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IMK–IAA MIPAS retrieval version 8: CH_4 and N_2O

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S1 Overview

This document serves as reference for the definition of the representative atmospheres used for the calculation of methane and nitrous oxide error budgets, as listed in Tab. S0, and as collection of the respective error budgets for methane and notrous oxide retrievals for different measurement modes and periods:

- Nominal measurement mode (NOM) CH_4 errors for the FR period (V8H_CH4_61, 2002-2004), which are listed in tables S1–S34 and and depicted in figures S1–S34,
- Nominal measurement mode (NOM) CH_4 errors for the RR period (V8R_CH4_261, 2005-2012), which are listed in tables S35–S68 and depicted in figures S35–S68.
- Middle Atmosphere measurement mode (MA) CH_4 errors for the RR period (V8R_CH4_561, 2005-2012), which are listed in tables S69–S102 and depicted in figures S69–S102.
- Upper Atmosphere measurement mode (UA) CH_4 errors at low solar activity for the RR period (V8R_CH4_662, 2005-2012), which are listed in tables S103–S136 and depicted in figures S103–S136.
- Nominal measurement mode (NOM) N_2O errors for the FR period (V8H_N2O_61, 2002-2004), which are listed in tables S137–S170 and and depicted in figures S137–S170,
- Nominal measurement mode (NOM) N_2O errors for the RR period (V8R_N2O_261, 2005-2012), which are listed in tables S171–S204 and depicted in figures S171–S204.
- Middle Atmosphere measurement mode (MA) N_2O errors for the RR period (V8R_N2O_561, 2005-2012), which are listed in tables S205–S238 and depicted in figures S205–S238.
- Upper Atmosphere measurement mode (UA) N_2O errors at low solar activity for the RR period (V8R_N2O_662, 2005-2012), which are listed in tables S239–S272 and depicted in figures S239–S272.

In the plots, the errors are presented as relative errors in percent, regardless of whether they are additive or multiplicative errors. They were calculated with respect to the average gas profiles that were calculated from the single geolocations which contribute to the respective representative atmospheres.

Table S0. Labels and definitions of the representative atmospheric conditions which were used to calculate the error budget. Daytime atmospheres are defined by solar zenith angles $< 90^{\circ}$. Nighttime atmospheres are defined by solar zenith angles $> 95^{\circ}$for NOM observations, $> 98^{\circ}$for MA observations, and $> 100^{\circ}$for UA observations.

representative atmosphere label	month(s) used	latitude range
Northern polar winter day	Jan, Feb	65°N – 90°N
Northern polar winter night	Jan, Feb	65°N – 90°N
Northern polar spring day	Apr	65°N – 90°N
Northern polar spring night	Apr	65°N – 90°N
Northern polar summer day	Jul, Aug	65°N – 90°N
Northern polar summer night	Jul, Aug	65°N – 90°N
Northern polar autumn day	Oct	65°N – 90°N
Northern polar autumn night	Oct	65°N – 90°N
Northern midlatitude winter day	Jan, Feb	40°N – 60°N
Northern midlatitude winter night	Jan, Feb	40°N – 60°N
Northern midlatitude spring day	Apr	40°N – 60°N
Northern midlatitude spring night	Apr	40°N – 60°N
Northern midlatitude summer day	Jul, Aug	40°N – 60°N
Northern midlatitude summer night	Jul, Aug	40°N – 60°N
Northern midlatitude autumn day	Oct	40°N – 60°N
Northern midlatitude autumn night	Oct	40°N – 60°N
Tropics day	Apr	20°S – 20°N
Tropics night	Apr	20°S – 20°N
Southern midlatitude winter day	Jul, Aug	40°S – 60°S
Southern midlatitude winter night	Jul, Aug	40°S – 60°S
Southern midlatitude spring day	Oct	40°S – 60°S
Southern midlatitude spring night	Oct	40°S – 60°S
Southern midlatitude summer day	Jan, Feb	40°S – 60°S
Southern midlatitude summer night	Jan, Feb	40°S – 60°S
Southern midlatitude autumn day	Apr	40°S – 60°S
Southern midlatitude autumn night	Apr	40°S – 60°S
Southern polar winter day	Jul, Aug	65°S – 90°S
Southern polar winter night	Jul, Aug	65°S – 90°S
Southern polar spring day	Oct	65°S – 90°S
Southern polar spring night	Oct	65°S – 90°S
Southern polar summer day	Jan, Feb	65°S – 90°S
Southern polar summer night	Jan, Feb	65°S – 90°S
Southern polar autumn day	Apr	65°S – 90°S
Southern polar autumn night	Apr	65°S – 90°S

Table S1. Methane error budget for Northern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1703.54	25.61	11.15	1.50	25.12	62.87	253.64	38.68	72.17	149.18	232.70	276.41
12	1689.48	7.85	19.93	1.77	12.68	54.18	346.12	32.57	38.02	77.32	346.25	354.78
15	1546.57	11.61	46.55	5.17	15.48	71.62	293.79	46.95	47.49	113.99	292.37	313.80
18	1261.38	3.30	55.36	5.70	12.23	85.18	269.25	36.65	37.93	122.53	266.04	292.90
21	972.43	1.89	44.42	10.23	13.93	83.25	253.48	28.11	35.38	133.27	240.29	274.77
24	891.76	1.21	23.75	6.40	13.12	69.03	243.85	19.11	30.95	129.84	222.43	257.55
27	919.91	1.61	12.70	3.24	10.31	37.08	221.82	17.10	30.17	104.92	202.61	228.17
30	891.22	0.88	10.08	2.49	8.34	23.07	232.18	17.82	25.09	84.31	220.13	235.73
33	644.05	0.67	12.34	1.91	7.12	14.08	168.43	13.48	22.21	73.51	155.07	171.61
36	520.89	0.50	6.53	1.57	6.57	23.14	123.16	8.80	20.51	45.57	119.22	127.63
39	505.17	0.51	15.12	2.46	7.73	35.39	113.54	8.36	19.40	41.30	114.80	122.01
42	496.82	0.38	10.56	2.08	7.51	39.17	112.85	7.57	16.45	44.68	113.02	121.53
45	419.88	0.80	9.01	2.27	6.88	33.19	93.62	7.59	17.54	46.72	90.46	101.81
48	371.87	0.26	5.74	2.98	5.28	23.35	85.32	7.18	12.56	36.00	82.51	90.02
52	305.45	0.25	9.25	2.78	5.77	25.25	74.87	6.44	9.88	34.78	72.79	80.67
56	192.88	0.31	6.78	2.93	4.53	15.51	53.37	5.14	11.70	31.20	48.51	57.68
60	125.45	0.11	1.79	0.97	2.04	3.91	32.98	2.92	9.51	18.29	29.60	34.79
64	47.20	0.21	1.56	2.12	2.83	7.74	24.50	2.71	9.82	20.03	19.44	27.91
68	17.62	0.09	0.87	1.01	4.36	2.68	13.73	1.25	19.34	22.52	9.21	24.33

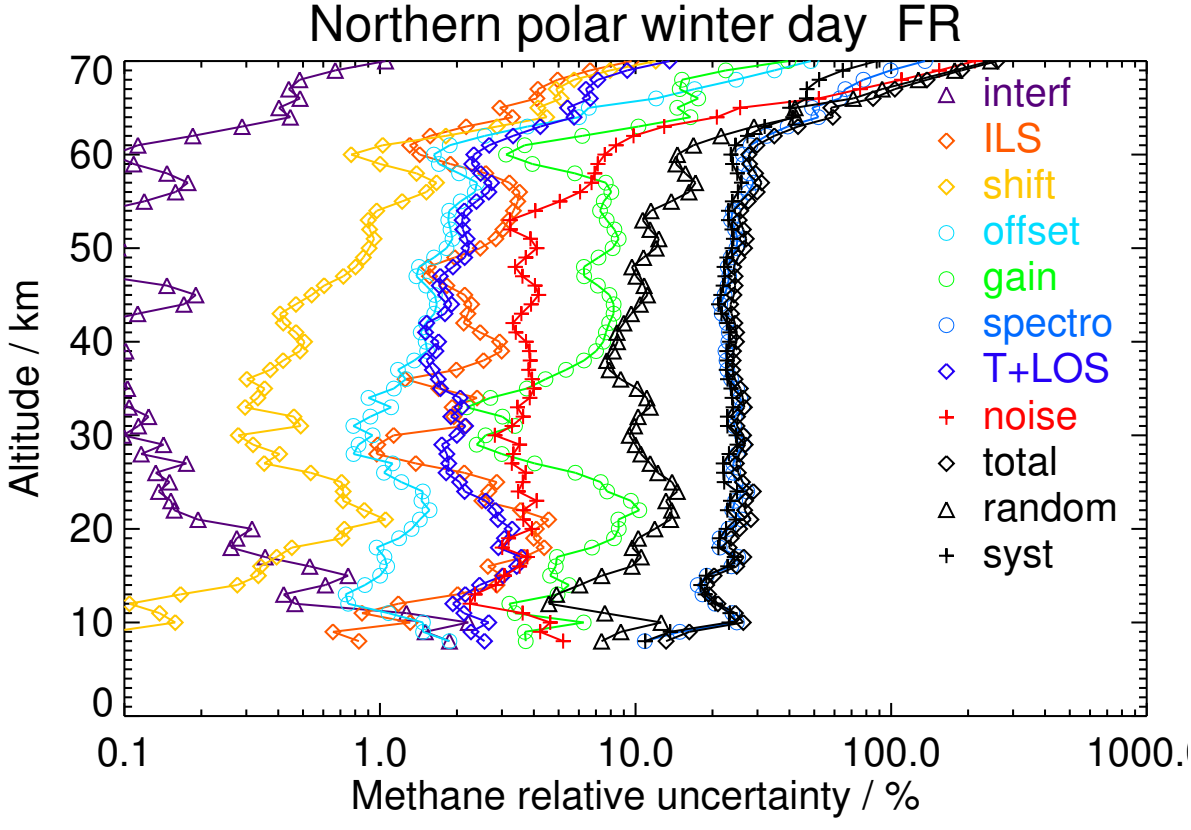

Figure S1. V8H_CH4_61 Northern polar winter day

Table S2. Methane error budget for Northern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1720.51	30.07	8.67	1.51	22.64	55.72	284.90	34.93	66.84	151.80	261.56	302.42
12	1716.84	13.54	39.45	2.95	15.56	71.48	352.73	39.15	44.31	90.96	356.00	367.44
15	1534.28	15.99	59.97	4.42	17.95	70.96	291.15	48.35	53.82	111.94	294.45	315.01
18	1227.13	4.04	55.19	5.60	13.02	68.73	277.16	42.56	41.82	122.84	270.69	297.26
21	886.53	3.78	39.15	6.84	12.26	55.70	229.38	25.41	38.79	124.22	210.20	244.16
24	827.44	1.29	29.98	5.47	9.71	34.67	228.38	17.22	34.40	111.46	208.42	236.35
27	775.47	2.09	9.28	2.75	8.73	24.98	222.31	14.84	31.73	133.43	183.41	226.82
30	735.55	0.91	10.87	1.43	7.62	11.59	218.71	13.84	26.77	110.23	192.11	221.49
33	563.72	0.92	8.87	1.55	6.54	16.75	147.81	10.74	21.68	63.74	137.03	151.12
36	457.74	0.59	8.86	1.28	5.45	21.36	110.52	6.99	17.49	37.29	108.37	114.61
39	377.61	0.47	12.02	1.48	4.84	21.04	86.37	5.57	14.81	31.99	85.44	91.23
42	376.38	0.41	7.93	1.56	3.77	16.91	88.00	4.78	13.27	32.08	85.32	91.15
45	367.66	0.86	12.36	1.60	5.07	23.77	79.39	5.87	15.87	42.36	74.44	85.65
48	331.72	0.32	5.29	2.06	2.75	12.20	75.87	4.65	9.92	33.95	70.08	77.88
52	257.99	0.21	5.17	1.58	3.11	10.81	61.78	4.32	9.56	25.22	58.71	63.89
56	200.97	0.38	4.56	3.66	5.24	19.04	52.84	5.19	12.27	33.90	47.38	58.25
60	173.53	0.17	1.53	1.38	2.78	5.28	41.53	4.47	12.17	18.49	39.89	43.96
64	117.17	0.33	1.78	2.15	3.79	10.19	40.23	4.65	14.04	22.73	38.03	44.31
68	77.60	0.28	2.09	1.70	6.50	10.91	33.59	4.44	28.07	35.02	29.63	45.88

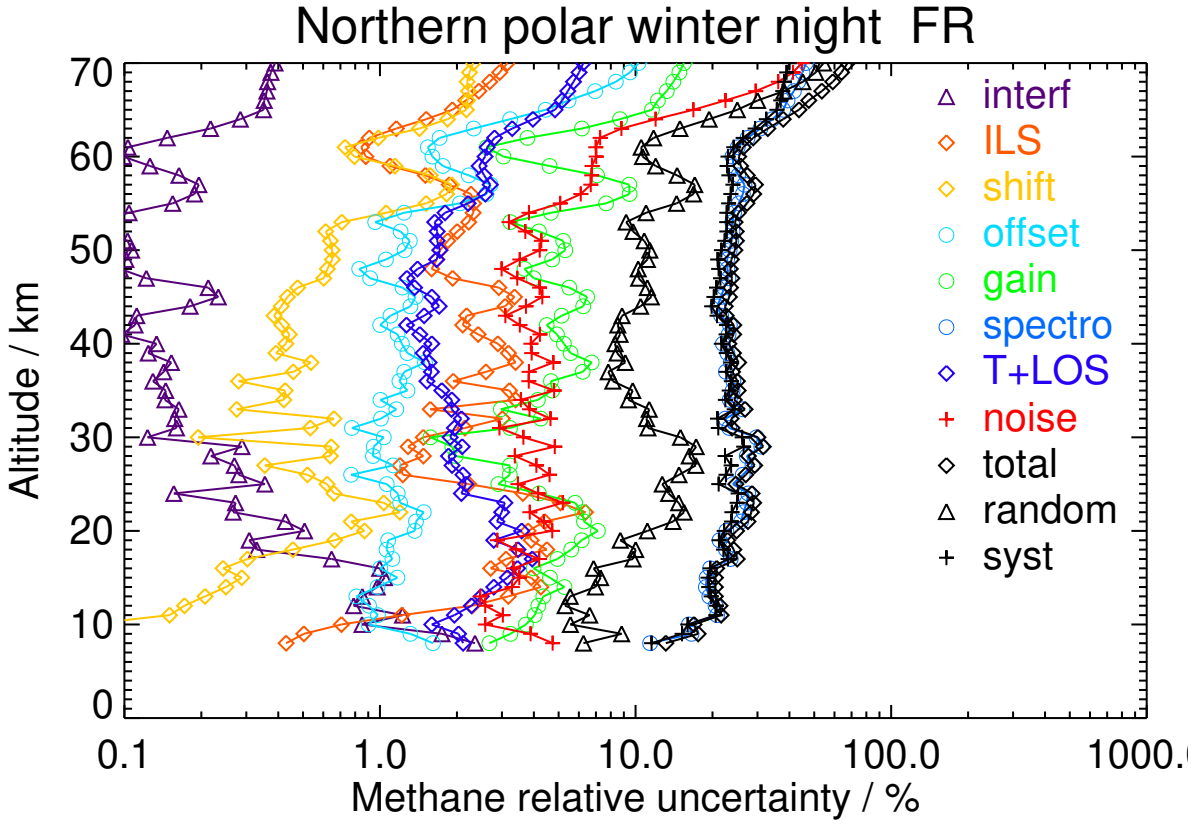

Figure S2. V8H_CH4_61 Northern polar winter night

Table S3. Methane error budget for Northern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1472.87	10.75	7.89	2.41	26.35	90.45	466.92	49.76	93.01	115.75	474.14	488.06
12	1711.14	4.43	24.96	1.38	12.90	112.77	296.52	35.92	39.84	72.58	314.74	323.00
15	1233.92	4.63	39.02	3.61	12.16	53.16	277.33	43.62	46.06	104.34	273.09	292.34
18	994.93	1.99	46.39	4.05	9.87	57.44	204.24	32.33	33.44	95.61	200.76	222.37
21	754.75	1.10	43.23	9.36	9.46	47.54	204.15	21.75	31.93	111.63	187.12	217.89
24	914.29	1.14	40.26	8.13	7.48	32.66	221.97	19.29	32.30	97.74	209.63	231.29
27	845.10	1.00	18.21	4.98	6.30	18.95	214.67	16.65	30.34	82.86	202.90	219.17
30	817.18	1.14	33.41	2.90	5.54	20.69	189.73	16.36	26.93	63.16	185.98	196.41
33	754.48	0.64	13.33	4.00	5.13	19.79	162.34	12.59	22.74	51.98	157.92	166.26
36	687.33	0.51	12.13	2.91	4.96	23.49	142.47	9.14	19.43	41.10	140.71	146.59
39	538.39	0.67	19.47	4.31	4.87	21.39	117.57	7.79	17.64	39.15	116.37	122.78
42	422.65	0.44	17.64	3.48	4.44	23.10	93.45	5.19	13.57	36.26	92.22	99.10
45	328.14	1.06	18.10	4.00	5.17	25.22	95.36	6.70	20.55	41.09	94.24	102.81
48	292.41	0.48	6.86	4.63	5.63	34.09	71.85	7.37	14.35	43.68	69.12	81.76
52	155.78	0.14	4.00	1.42	2.47	11.69	41.51	2.39	6.04	21.86	38.06	43.89
56	154.29	0.29	7.19	3.19	3.88	17.43	33.23	3.63	10.77	28.50	28.31	40.17
60	111.94	0.10	2.89	1.79	1.36	4.30	29.61	2.31	5.40	11.46	28.49	30.71
64	23.41	0.49	2.90	5.68	4.78	18.87	36.67	4.50	10.13	19.13	39.00	43.44
68	44.98	0.09	0.45	0.50	2.35	2.25	9.95	0.84	9.90	11.58	8.65	14.45

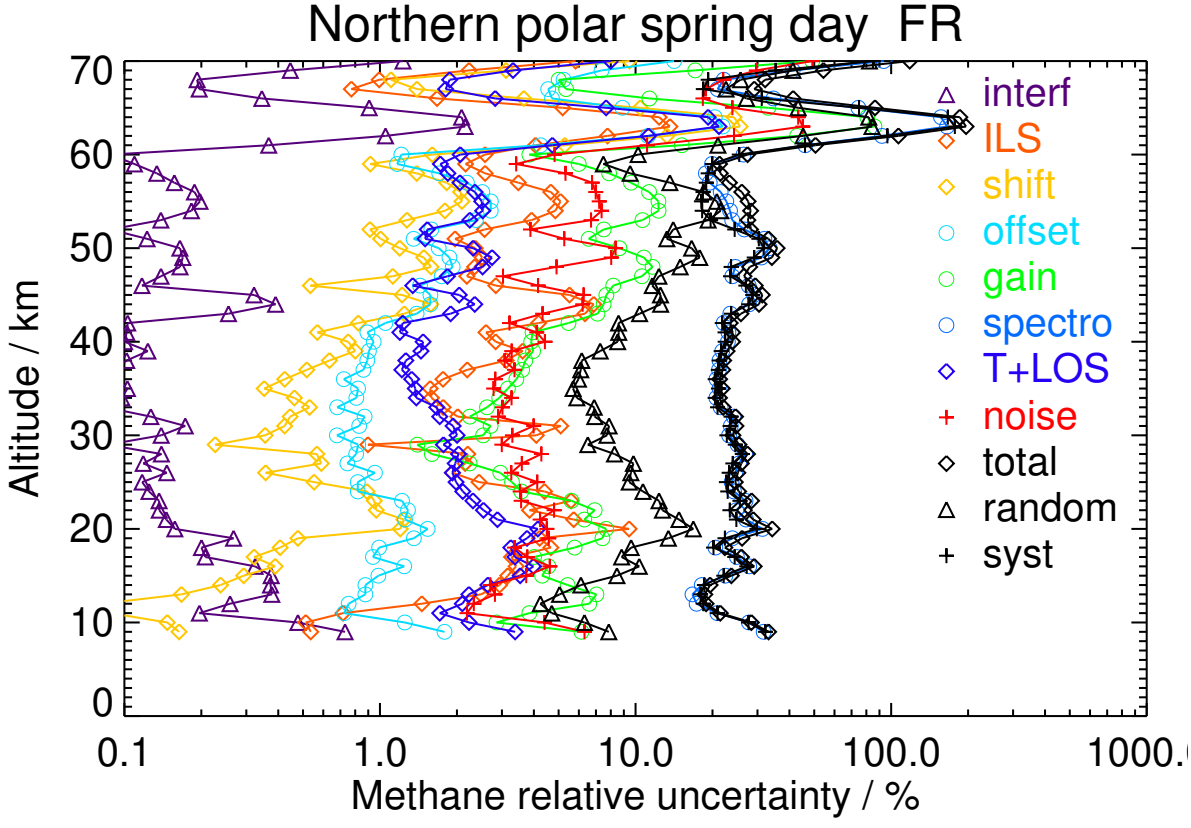

Figure S3. V8H_CH4_61 Northern polar spring day

Table S4. Methane error budget for Northern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1482.32	13.83	3.93	2.62	25.49	109.31	405.09	45.86	86.96	217.21	373.35	431.94
12	1670.88	3.78	18.98	1.57	11.57	97.14	310.12	34.08	37.75	72.96	321.53	329.70
15	1349.32	4.69	31.49	3.12	12.36	57.50	303.31	44.04	45.45	110.42	297.14	316.99
18	1126.54	1.80	41.09	4.64	11.18	72.67	223.81	32.25	34.18	104.87	220.04	243.76
21	872.62	1.38	47.63	12.70	9.69	50.19	236.42	23.47	30.94	133.08	211.52	249.90
24	1001.51	1.03	28.33	7.38	9.18	50.46	244.86	19.23	30.90	108.36	230.28	254.50
27	933.61	0.85	18.81	4.84	6.94	20.67	237.51	17.36	29.01	90.75	223.99	241.67
30	842.72	1.01	24.39	3.35	5.44	14.82	202.15	16.39	24.88	68.45	194.74	206.42
33	734.69	0.61	12.26	3.75	5.06	18.81	157.07	13.03	21.39	53.43	151.61	160.75
36	596.17	0.55	10.39	2.84	5.14	22.95	124.78	8.97	18.70	47.57	120.02	129.11
39	477.95	0.68	17.88	4.42	4.77	19.20	104.15	7.27	16.55	35.15	103.30	109.11
42	355.17	0.28	10.76	2.60	3.79	16.94	81.63	4.19	13.38	32.49	78.92	85.35
45	269.70	0.86	18.08	3.61	4.71	19.09	83.98	6.15	21.52	39.05	82.20	91.00
48	233.75	0.40	6.35	4.26	4.77	25.97	51.53	5.79	14.11	33.79	50.02	60.36
52	158.71	0.13	4.07	0.87	1.93	9.19	41.48	1.97	6.22	20.22	38.21	43.23
56	119.84	0.39	4.61	4.34	4.16	14.69	35.83	3.87	11.71	30.09	28.36	41.35
60	84.69	0.07	2.07	1.07	1.05	2.91	23.75	1.71	4.82	11.33	21.84	24.61
64	36.18	0.38	2.57	3.86	3.67	13.03	28.11	3.40	9.25	16.87	28.42	33.05
68	29.59	0.09	0.45	0.49	2.57	1.93	10.24	0.89	10.95	13.38	7.57	15.37

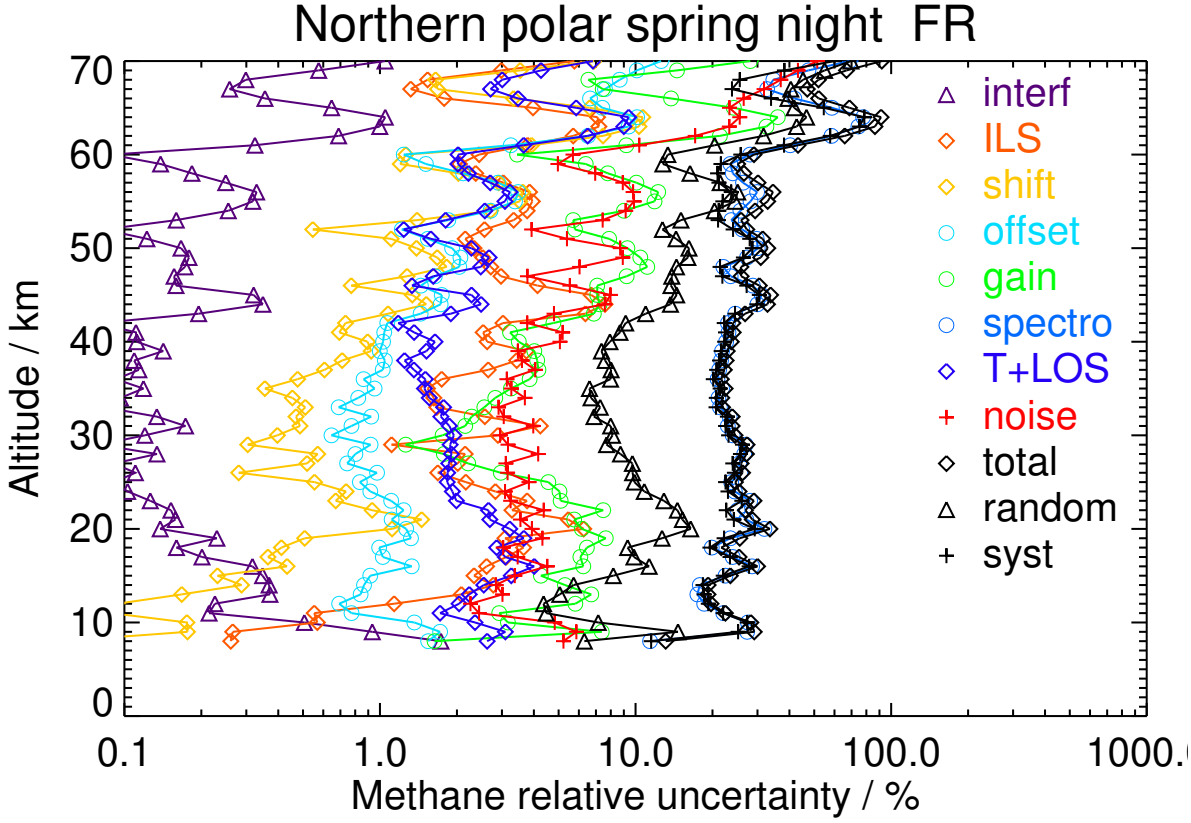

Figure S4. V8H_CH4_61 Northern polar spring night

Table S5. Methane error budget for Northern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1483.67	14.03	24.48	3.85	23.27	82.69	541.35	38.94	85.51	98.94	547.98	556.84
12	1719.42	4.08	15.62	1.83	12.30	60.81	405.31	28.16	42.95	104.62	400.10	413.55
15	1800.21	6.29	79.33	4.83	14.88	143.45	299.17	42.17	42.37	98.65	332.42	346.75
18	1519.17	1.63	47.69	3.17	11.31	96.85	341.60	39.13	37.30	103.99	347.26	362.50
21	1268.03	0.97	54.22	11.62	13.79	109.88	314.82	34.87	33.91	122.76	318.97	341.78
24	1173.55	0.94	25.87	4.97	10.94	69.84	288.62	23.75	32.26	83.14	289.29	301.00
27	996.46	1.24	10.80	6.11	7.81	16.10	234.35	18.94	29.92	45.24	233.68	238.02
30	867.78	0.78	12.12	2.27	6.54	10.08	219.46	15.92	26.52	43.26	218.05	222.30
33	742.96	1.00	16.83	4.35	6.05	20.82	167.96	12.47	22.49	35.42	168.50	172.18
36	595.57	0.68	5.97	1.44	5.03	15.91	128.73	8.80	20.31	28.65	128.67	131.83
39	454.96	0.62	15.99	2.94	4.23	14.17	95.70	5.70	17.84	27.63	96.07	99.96
42	335.19	0.43	8.27	2.30	3.14	6.98	79.05	4.87	19.26	27.23	77.68	82.31
45	267.96	1.14	18.81	3.90	3.97	18.50	91.40	6.55	21.27	39.86	89.38	97.87
48	171.99	0.39	3.94	1.50	2.75	16.40	32.56	2.47	8.71	18.20	33.25	37.90
52	124.33	0.28	1.91	1.28	1.92	9.10	37.10	2.08	10.46	15.09	36.80	39.77
56	72.38	0.30	6.82	1.78	2.27	7.31	17.47	2.25	11.27	15.67	17.32	23.36
60	97.60	0.10	1.53	0.97	1.33	5.78	20.20	1.23	4.29	7.07	20.40	21.59
64	91.41	0.36	2.19	3.99	2.95	11.39	39.16	2.73	8.41	12.74	40.11	42.09
68	134.90	0.18	0.95	1.79	2.55	2.76	33.89	2.09	11.31	13.87	33.27	36.05

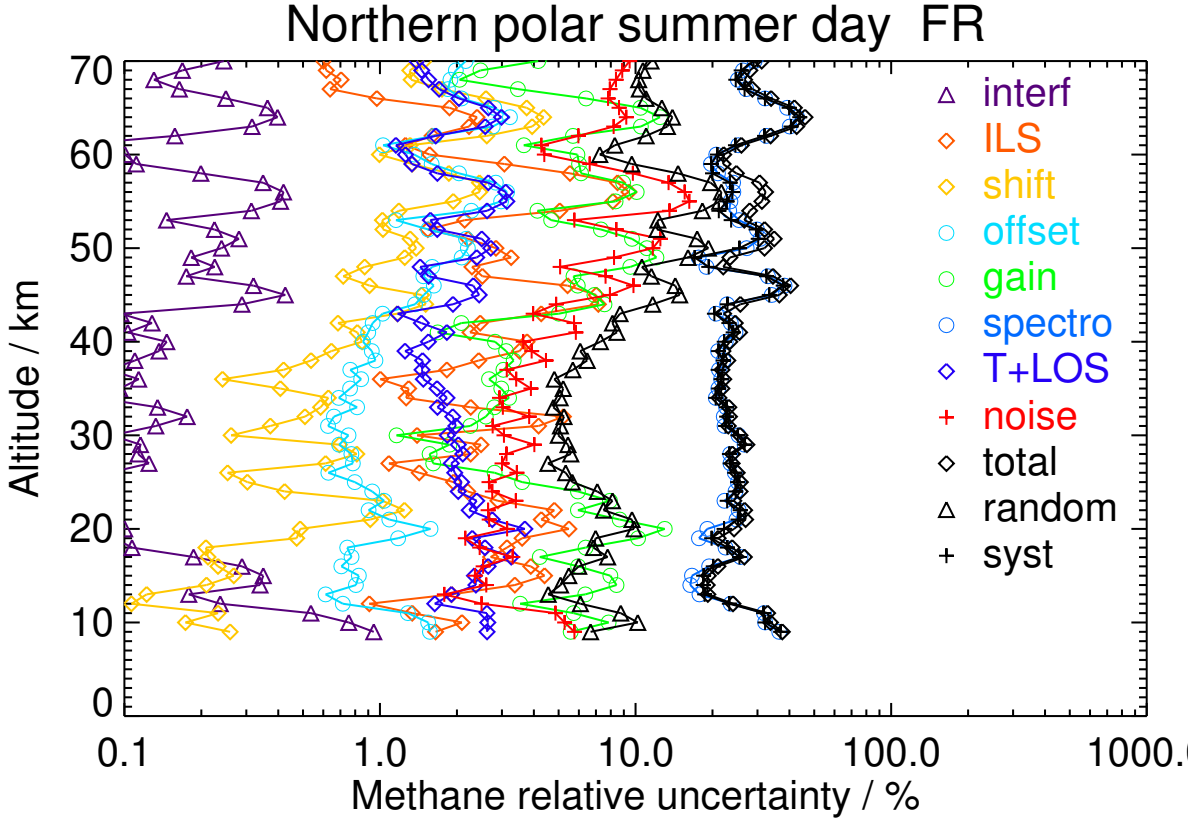

Figure S5. V8H_CH4_61 Northern polar summer day

Table S6. Methane error budget for Northern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1682.03	4.79	15.34	1.68	14.18	33.97	420.33	28.00	50.30	76.58	419.22	426.16
15	1836.17	6.49	73.07	3.77	14.56	127.10	295.33	37.58	42.16	91.81	322.09	334.92
18	1537.59	1.76	48.58	1.60	12.95	101.30	357.64	39.56	38.65	109.33	363.06	379.16
21	1285.60	1.26	33.64	7.47	13.73	100.49	306.53	33.73	36.40	104.41	311.44	328.48
24	1140.41	1.10	27.01	4.70	9.45	43.47	286.38	21.62	32.86	65.63	286.33	293.75
27	1008.67	1.37	7.79	3.88	8.18	13.14	238.18	19.13	31.12	42.56	237.85	241.62
30	831.14	0.78	8.60	2.02	6.95	7.22	220.97	16.15	27.51	37.76	220.45	223.66
33	665.71	1.16	16.50	3.48	6.32	17.86	156.70	12.13	22.78	30.95	157.83	160.83
36	553.16	0.73	5.85	1.47	5.20	13.15	124.53	8.46	20.94	28.75	124.21	127.49
39	422.66	0.45	15.73	3.04	4.52	18.04	92.54	5.95	19.16	27.30	93.94	97.82
42	257.04	0.47	10.57	1.86	3.68	6.48	74.26	5.73	21.07	26.73	73.80	78.50
45	202.18	0.61	19.02	2.34	4.13	22.08	62.11	6.26	21.88	31.18	65.39	72.44
48	117.83	0.16	1.08	1.10	1.20	4.31	25.04	1.31	6.45	11.69	23.58	26.32
52	99.75	0.19	1.18	1.16	1.86	7.81	25.92	1.55	8.26	11.72	25.93	28.45
56	89.87	0.26	3.61	1.69	2.20	7.31	26.48	2.10	10.24	15.54	25.36	29.74
60	124.08	0.08	1.69	1.11	1.42	5.23	27.17	1.76	5.10	10.74	26.18	28.29
64	128.66	0.43	0.99	3.09	2.76	9.39	49.69	2.75	8.59	12.89	49.91	51.54
68	170.40	0.28	2.57	2.18	3.62	4.17	47.89	3.85	16.33	19.22	47.41	51.16

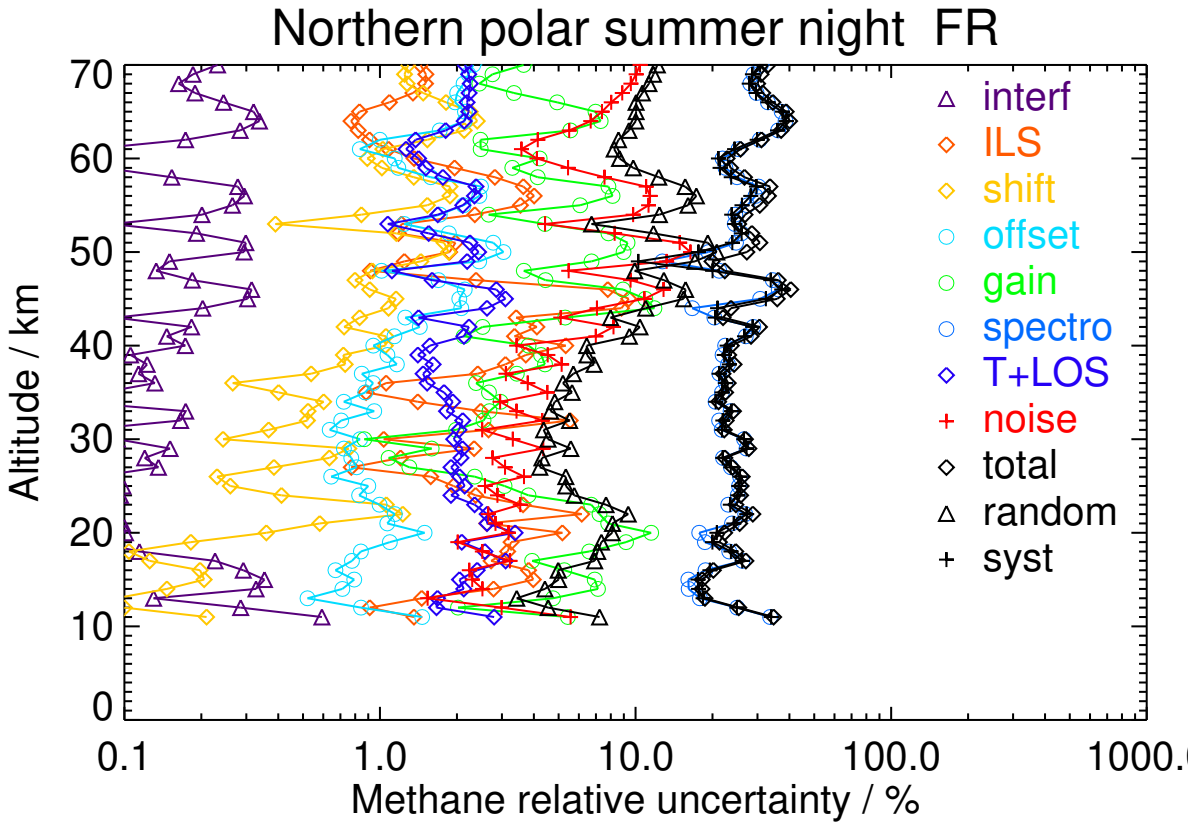

Figure S6. V8H_CH4_61 Northern polar summer night

Table S7. Methane error budget for Northern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1662.66	57.33	13.57	2.11	26.92	91.20	407.76	45.71	90.21	177.58	396.84	434.76
12	1734.22	24.13	24.30	2.55	14.52	75.42	388.86	31.23	49.62	112.89	385.98	402.15
15	1670.62	8.24	34.37	3.31	13.05	74.05	381.58	51.33	51.61	116.26	379.87	397.26
18	1621.53	3.91	120.58	8.34	14.44	136.32	305.21	69.79	49.92	154.22	331.89	365.97
21	1382.36	3.73	60.15	6.35	17.56	119.48	254.18	44.79	47.42	96.91	278.79	295.16
24	1195.56	1.40	24.72	10.61	13.93	86.43	244.35	26.13	41.31	74.63	254.79	265.50
27	936.03	1.00	14.42	6.29	8.92	44.05	214.47	19.16	37.25	60.17	215.41	223.66
30	735.64	1.00	8.57	2.61	7.34	20.85	179.22	16.89	33.12	53.58	176.64	184.59
33	527.63	0.42	7.86	1.79	6.15	12.36	131.33	12.95	27.34	44.07	128.36	135.72
36	331.29	0.27	6.68	1.92	4.86	8.47	83.63	7.42	22.71	38.07	79.12	87.80
39	191.49	0.29	6.37	1.27	3.51	9.59	50.70	4.37	18.05	34.42	43.32	55.33
42	101.26	0.26	4.43	1.22	2.72	8.17	39.07	3.06	14.77	33.68	26.73	43.00
45	140.12	0.24	4.61	0.76	3.11	12.14	35.29	3.65	10.56	25.86	29.67	39.36
48	189.41	0.15	4.29	1.59	3.37	13.86	49.92	3.38	9.20	25.71	46.38	53.03
52	212.71	0.19	5.89	1.15	3.18	11.21	50.44	2.94	10.45	19.50	49.53	53.23
56	161.28	0.18	5.65	1.76	2.50	7.00	41.43	2.78	7.93	19.50	38.70	43.33
60	120.74	0.10	1.55	0.81	2.00	3.61	30.06	2.01	8.02	15.42	27.46	31.49
64	67.49	0.17	1.34	1.20	2.03	4.87	25.21	2.05	7.07	16.13	21.46	26.84
68	41.55	0.11	0.82	0.75	4.13	4.11	17.43	1.39	17.54	21.53	13.59	25.46

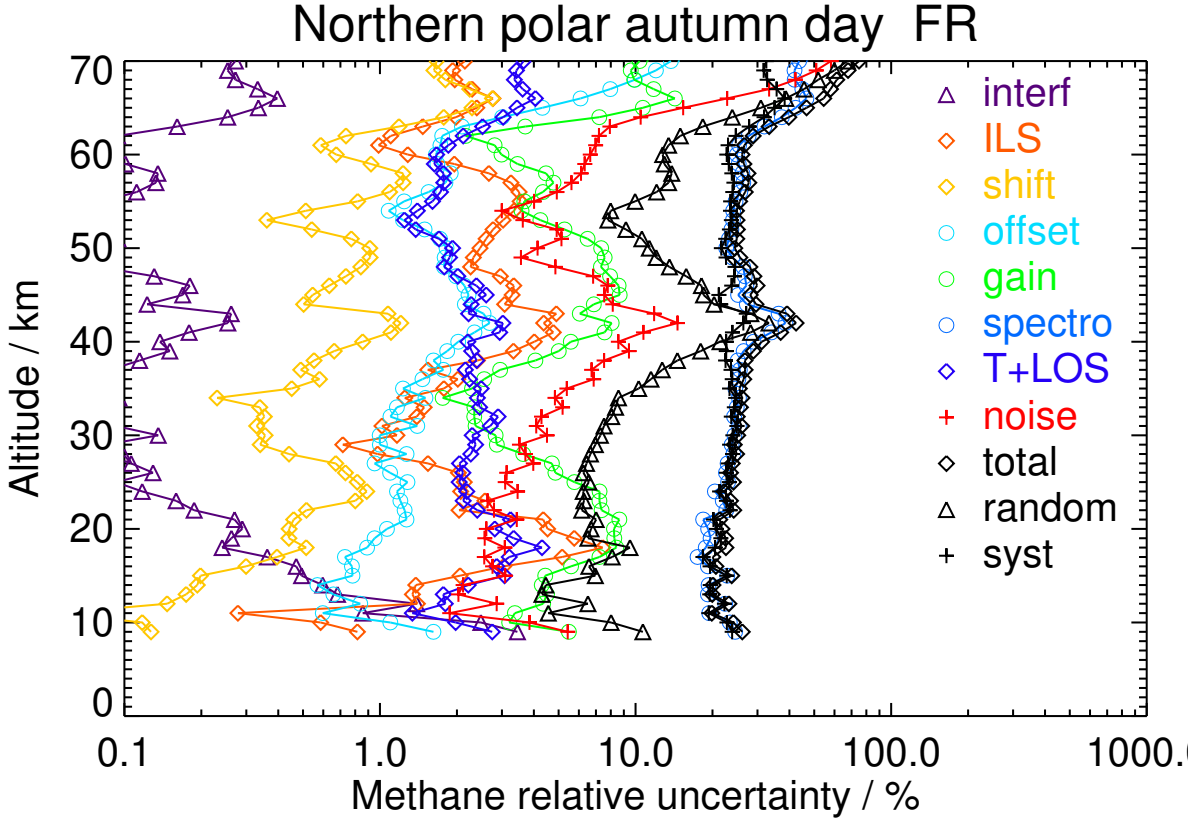

Figure S7. V8H_CH4_61 Northern polar autumn day

Table S8. Methane error budget for Northern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1683.45	69.37	11.31	2.48	27.41	91.81	443.51	47.57	94.92	170.78	439.25	471.28
12	1740.74	26.13	19.28	2.63	13.27	75.55	369.94	30.52	44.72	103.67	368.76	383.05
15	1530.95	8.12	34.01	3.42	12.67	56.55	352.27	50.91	50.82	109.71	349.04	365.87
18	1540.36	3.67	97.78	7.80	13.16	121.73	289.60	70.00	50.69	143.20	308.97	340.54
21	1412.56	4.49	62.52	6.36	18.15	121.92	275.07	44.06	45.31	97.01	299.02	314.36
24	1144.66	1.84	25.15	11.86	13.09	80.14	259.34	25.55	39.75	70.12	268.23	277.24
27	856.76	1.31	11.72	6.05	8.07	37.22	206.92	18.85	35.50	55.89	207.21	214.62
30	686.12	0.87	12.18	2.37	6.46	20.84	166.60	17.20	31.89	55.20	163.25	172.33
33	484.51	0.40	7.35	1.36	5.36	8.99	124.49	13.29	26.39	42.14	121.49	128.59
36	289.45	0.28	6.46	2.12	4.51	9.37	78.84	7.19	21.99	39.22	73.26	83.10
39	178.44	0.28	6.67	1.27	3.39	10.83	50.69	4.33	17.32	33.05	44.39	55.35
42	115.61	0.22	3.27	0.99	2.59	7.89	35.17	3.31	14.23	26.57	28.72	39.13
45	136.43	0.20	2.95	0.65	2.65	10.47	30.89	3.63	10.05	18.71	29.06	34.56
48	168.08	0.16	2.42	1.07	2.37	8.46	39.61	2.79	8.44	14.67	38.95	41.62
52	183.38	0.19	3.59	1.11	2.62	6.44	46.25	2.31	10.63	16.55	45.23	48.16
56	164.42	0.25	4.74	1.79	3.40	9.97	39.50	3.02	8.81	21.20	36.53	42.24
60	113.88	0.16	1.62	1.10	2.50	5.55	30.02	2.22	8.55	18.10	26.31	31.94
64	68.25	0.19	0.61	1.14	1.86	4.06	26.42	2.18	6.57	16.33	22.38	27.70
68	43.58	0.15	0.67	0.89	4.29	4.32	18.50	1.73	18.13	21.42	15.92	26.69

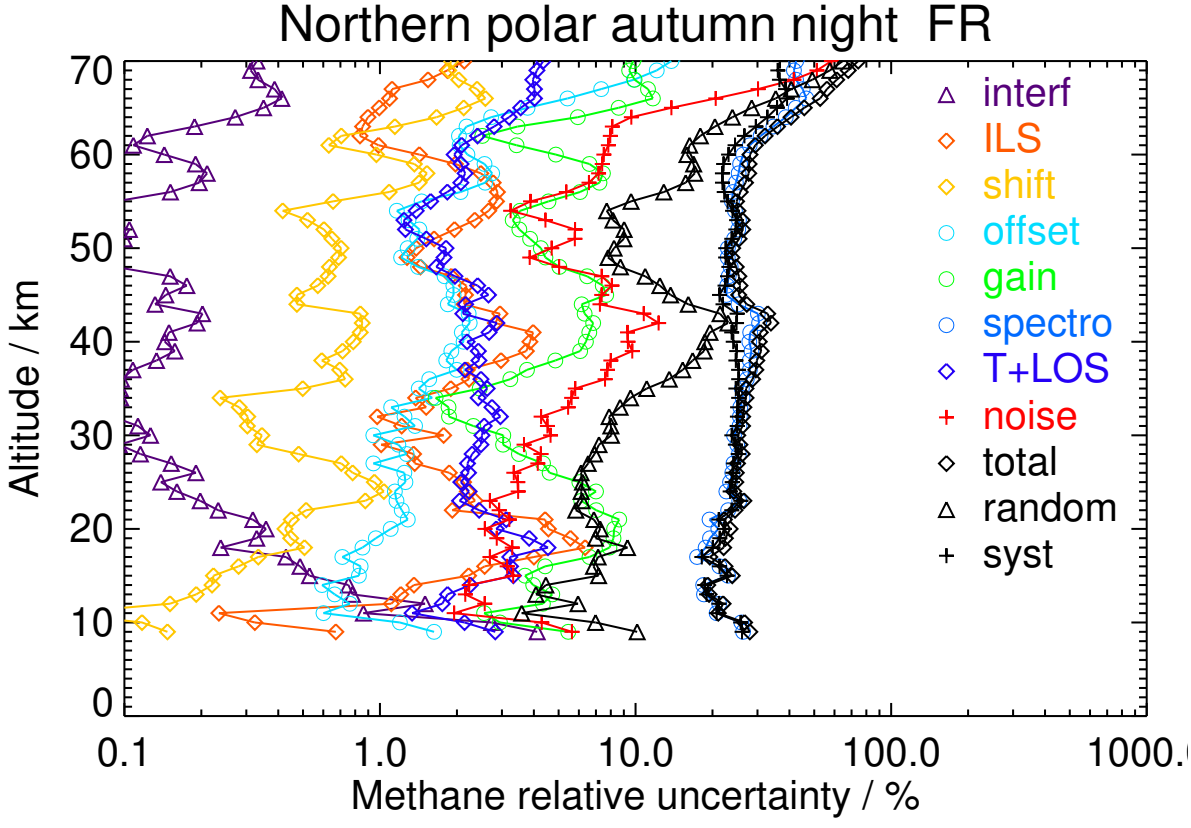

Figure S8. V8H_CH4_61 Northern polar autumn night

Table S9. Methane error budget for Northern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1791.17	22.02	2.59	0.52	23.52	45.04	228.08	38.90	71.66	116.24	219.62	248.48
12	1657.78	3.63	13.98	1.24	12.65	33.48	365.43	28.77	39.13	76.82	362.61	370.66
15	1574.00	5.39	51.96	6.12	14.33	62.94	310.26	40.88	44.52	100.53	311.03	326.88
18	1444.43	1.63	43.88	4.52	12.26	75.40	321.64	33.81	35.09	105.98	319.97	337.06
21	1271.88	1.44	51.55	11.36	15.19	89.99	323.02	28.86	32.75	121.19	320.43	342.58
24	1221.72	1.10	35.89	10.01	13.88	66.56	310.13	23.15	31.31	93.75	308.10	322.04
27	1096.50	1.13	13.24	2.54	11.15	29.83	255.63	20.76	30.86	76.12	249.27	260.63
30	1047.79	0.63	8.52	2.33	9.05	17.25	273.37	20.75	26.20	84.81	262.89	276.23
33	714.72	0.81	8.54	2.98	7.83	18.81	181.63	15.67	22.66	67.67	172.24	185.06
36	562.49	0.52	7.44	1.97	6.30	22.20	129.41	9.39	19.68	44.64	125.79	133.47
39	412.90	0.37	13.38	2.08	5.35	19.05	89.55	6.53	17.21	31.53	89.10	94.51
42	467.38	0.32	9.25	1.82	5.55	26.94	104.92	5.61	14.07	37.61	103.29	109.92
45	468.65	0.89	13.44	2.82	6.84	34.21	108.77	7.86	16.81	46.90	106.69	116.54
48	420.94	0.30	6.48	4.39	5.81	29.51	95.51	7.82	11.19	42.85	91.86	101.36
52	306.96	0.21	9.07	2.71	4.44	17.41	69.01	5.60	8.64	28.45	66.87	72.67
56	166.63	0.41	6.28	5.22	5.76	22.16	59.88	6.80	12.61	37.58	54.50	66.20
60	180.74	0.10	2.13	1.37	1.78	3.71	38.91	3.77	8.47	15.71	37.10	40.29
64	63.42	0.37	2.56	3.46	4.88	16.57	41.69	4.62	12.24	28.78	37.39	47.18
68	50.61	0.16	1.54	1.43	4.74	8.16	25.21	2.49	20.41	27.51	19.88	33.94

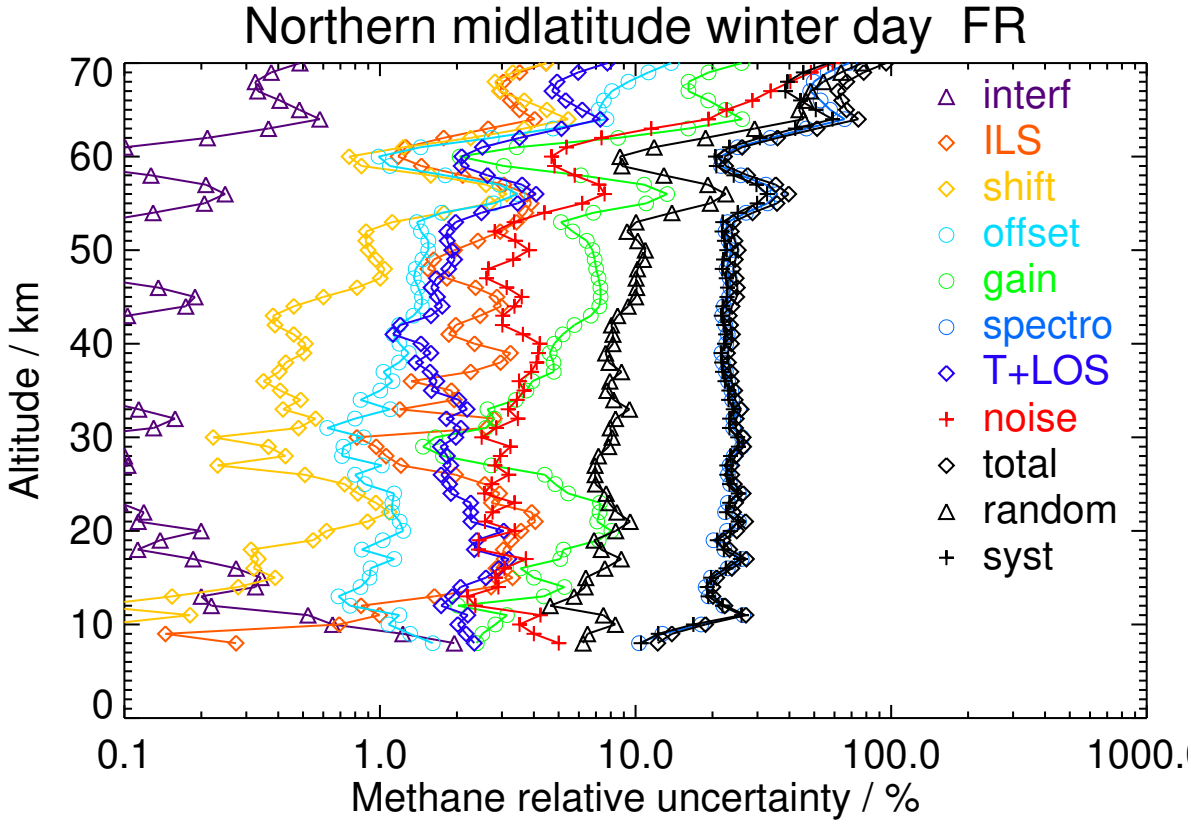

Figure S9. V8H_CH4_61 Northern midlatitude winter day

Table S10. Methane error budget for Northern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1730.58	24.88	5.98	1.20	24.28	43.56	280.60	38.29	78.84	148.32	259.93	299.27
12	1627.43	4.83	19.80	1.47	12.74	48.31	369.70	28.34	43.70	87.03	367.06	377.23
15	1526.07	5.38	48.81	6.06	13.94	68.84	304.39	36.47	45.04	117.99	299.12	321.55
18	1353.90	2.06	38.77	4.17	12.45	58.91	343.76	40.45	40.39	104.17	340.20	355.79
21	1240.75	2.28	35.62	6.28	11.21	60.71	318.76	30.05	36.47	96.45	315.69	330.10
24	1245.79	0.97	37.35	8.37	12.64	76.15	311.87	24.01	33.29	98.11	311.04	326.15
27	1217.75	0.98	23.04	2.09	10.18	48.34	279.00	18.61	31.20	68.34	278.33	286.60
30	1143.65	0.92	9.95	2.32	8.50	19.46	286.74	19.16	29.09	56.76	284.19	289.80
33	884.79	1.01	14.26	4.03	7.62	22.16	205.10	15.18	24.85	53.89	201.94	209.01
36	586.14	0.45	9.68	1.59	6.10	19.43	137.80	9.43	20.19	42.67	134.81	141.40
39	425.44	0.37	12.53	2.29	5.14	17.54	97.88	6.07	16.88	36.70	95.15	101.98
42	410.38	0.37	8.32	1.98	5.37	25.62	101.53	5.02	14.76	35.17	100.37	106.35
45	407.78	0.74	13.45	1.86	4.85	22.68	95.12	6.61	16.38	29.46	95.99	100.41
48	350.48	0.22	4.71	2.70	3.83	18.44	80.45	5.16	9.05	28.01	78.61	83.45
52	271.80	0.18	7.85	1.46	3.61	14.74	64.08	4.19	7.79	23.27	62.75	66.92
56	214.73	0.41	4.55	4.24	5.21	17.01	58.00	5.60	13.00	26.54	56.70	62.61
60	186.25	0.15	2.20	1.27	2.36	4.05	44.80	4.20	10.38	15.19	43.93	46.49
64	128.98	0.25	2.37	2.07	3.27	8.16	38.61	4.02	11.82	17.76	37.66	41.64
68	82.27	0.15	1.74	1.58	5.18	6.41	27.93	3.30	23.04	27.89	24.85	37.36

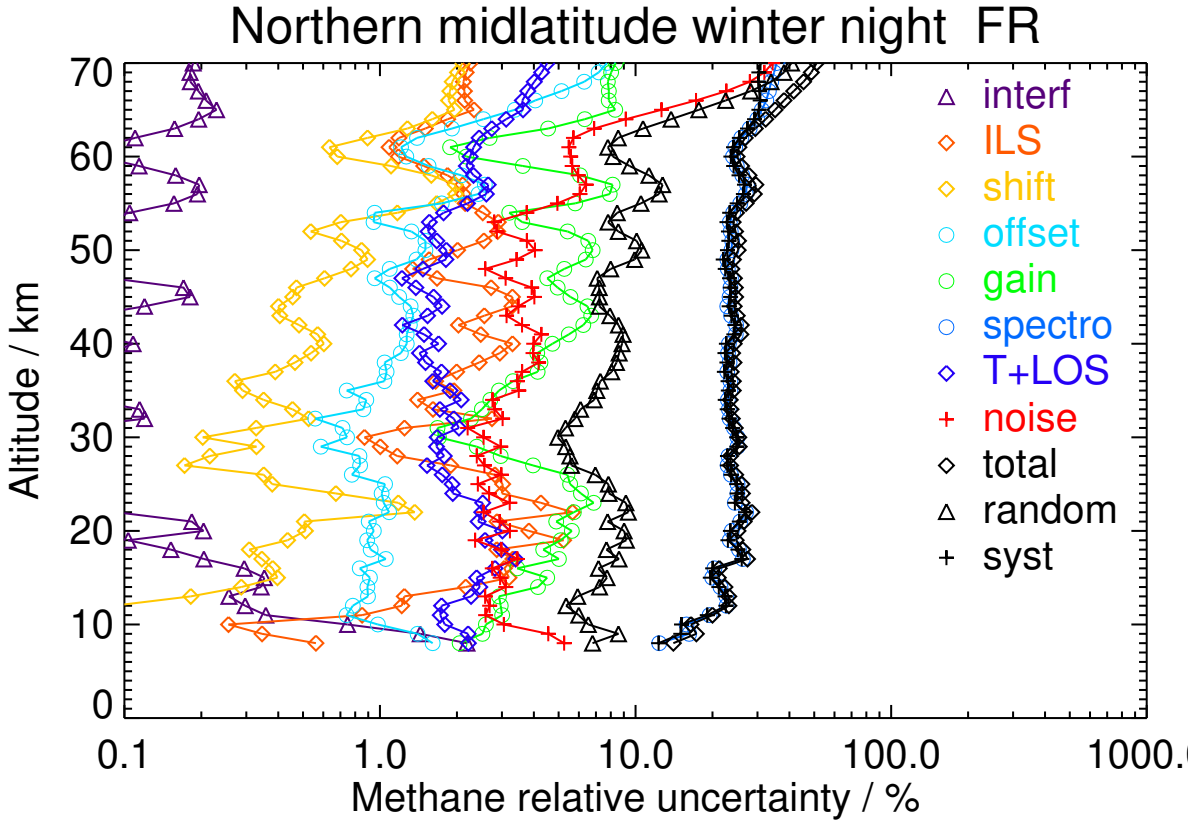

Figure S10. V8H_CH4_61 Northern midlatitude winter night

Table S11. Methane error budget for Northern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1441.39	12.80	17.28	2.31	29.00	122.43	412.24	50.10	96.57	137.53	423.28	445.06
12	1746.35	4.05	26.69	1.35	12.55	97.81	333.35	34.28	39.07	80.53	343.21	352.53
15	1572.31	4.23	42.12	3.24	13.12	55.65	351.20	47.24	46.80	105.71	348.80	364.47
18	1573.78	2.40	101.25	6.28	18.83	145.42	298.94	54.37	38.61	137.09	326.83	354.41
21	1209.87	2.10	46.76	12.82	16.18	97.86	267.54	31.54	35.83	125.70	265.05	293.35
24	1152.54	1.20	30.56	7.33	10.71	52.76	272.12	24.28	34.43	99.91	264.06	282.33
27	1030.76	1.12	15.55	5.45	8.04	17.37	248.32	20.27	32.69	70.61	242.48	252.55
30	907.29	1.44	31.81	3.47	6.51	21.01	226.52	19.57	29.55	60.98	224.41	232.55
33	814.31	0.89	19.28	4.88	6.10	22.90	174.33	14.80	25.06	46.35	173.34	179.43
36	695.15	0.67	6.98	3.27	5.35	21.42	143.72	10.05	21.61	44.84	140.57	147.55
39	568.41	0.63	10.30	4.72	5.08	15.72	122.49	8.02	19.77	42.39	118.59	125.94
42	476.90	0.36	16.72	2.65	5.09	25.19	107.59	6.07	13.51	40.28	105.44	112.88
45	432.53	0.77	19.14	2.07	6.42	36.80	120.94	6.77	16.65	46.09	120.80	129.29
48	391.98	0.43	13.73	5.21	6.82	43.08	100.28	9.37	15.91	54.48	97.71	111.87
52	229.98	0.19	6.60	2.45	3.18	13.68	53.10	4.13	8.67	28.28	48.57	56.21
56	176.19	0.30	7.44	3.39	3.36	14.41	39.15	4.13	10.90	27.74	34.42	44.21
60	105.45	0.17	2.86	3.43	2.76	9.49	34.85	3.54	7.49	16.61	33.54	37.43
64	37.72	0.31	1.94	4.54	4.48	18.26	30.65	3.95	8.12	18.20	32.68	37.41
68	46.81	0.13	0.90	0.94	2.45	4.83	14.33	1.33	10.04	13.28	12.75	18.41

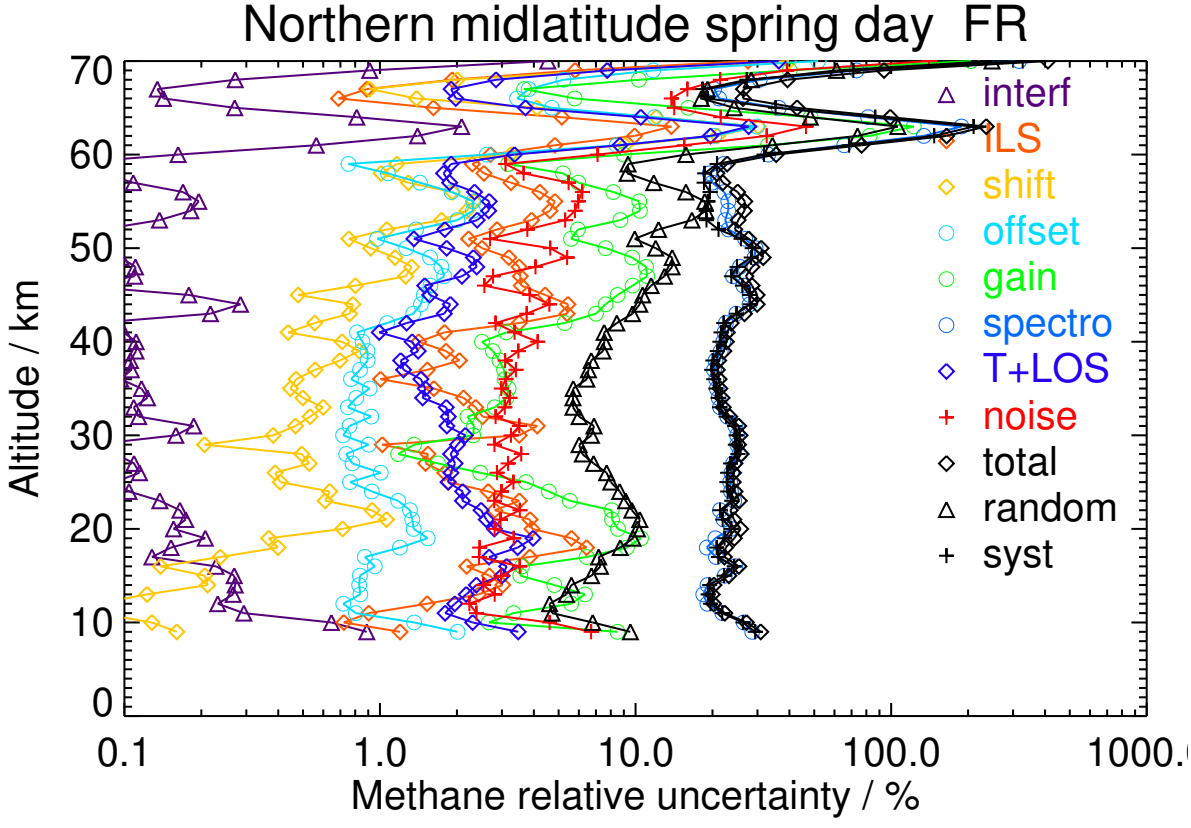

Figure S11. V8H_CH4_61 Northern midlatitude spring day

Table S12. Methane error budget for Northern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1570.98	13.29	12.27	3.39	27.30	67.74	513.48	50.86	94.51	112.08	517.96	529.95
12	1733.52	2.92	21.91	1.38	11.06	96.51	303.38	31.76	33.33	71.94	314.50	322.62
15	1593.12	4.71	51.58	3.21	13.13	76.47	321.17	45.69	44.59	108.96	322.59	340.50
18	1418.07	1.89	54.51	6.29	12.71	96.39	273.21	34.43	32.45	115.13	275.85	298.91
21	1143.28	2.08	60.34	13.77	14.70	87.02	280.97	28.21	32.73	137.15	271.34	304.03
24	1174.03	1.40	26.36	4.23	9.63	37.14	276.59	21.34	30.91	79.96	271.49	283.02
27	1119.91	1.30	14.44	7.45	8.08	16.44	271.92	20.71	29.96	51.65	270.55	275.44
30	1011.64	1.17	27.22	4.02	6.10	19.31	237.98	19.41	25.54	48.80	237.59	242.55
33	878.93	0.82	14.61	4.74	6.01	19.88	191.74	15.45	22.92	51.03	188.66	195.44
36	721.38	0.47	6.77	3.17	5.64	23.82	147.72	10.08	20.24	39.29	146.44	151.62
39	577.78	0.58	15.61	4.69	4.85	16.37	126.35	8.14	18.28	33.87	125.60	130.09
42	473.26	0.25	14.14	2.99	5.04	26.05	108.53	5.22	12.63	32.78	108.65	113.48
45	397.15	1.03	17.94	2.50	5.44	27.06	96.84	6.42	17.69	34.37	98.20	104.04
48	337.88	0.37	4.91	5.18	4.54	26.95	72.86	6.65	13.01	29.01	74.02	79.50
52	236.37	0.14	6.52	1.64	2.67	11.05	54.06	3.33	6.89	19.92	52.53	56.18
56	190.88	0.45	6.59	5.02	4.40	17.47	49.96	5.02	11.25	31.23	45.44	55.14
60	139.59	0.14	2.43	2.59	1.87	5.68	39.58	3.07	5.99	16.67	37.18	40.75
64	66.04	0.33	1.61	4.23	4.44	17.57	35.12	4.28	8.65	18.77	36.37	40.93
68	47.29	0.12	1.20	0.84	2.87	4.43	16.66	1.73	12.07	15.66	14.52	21.36

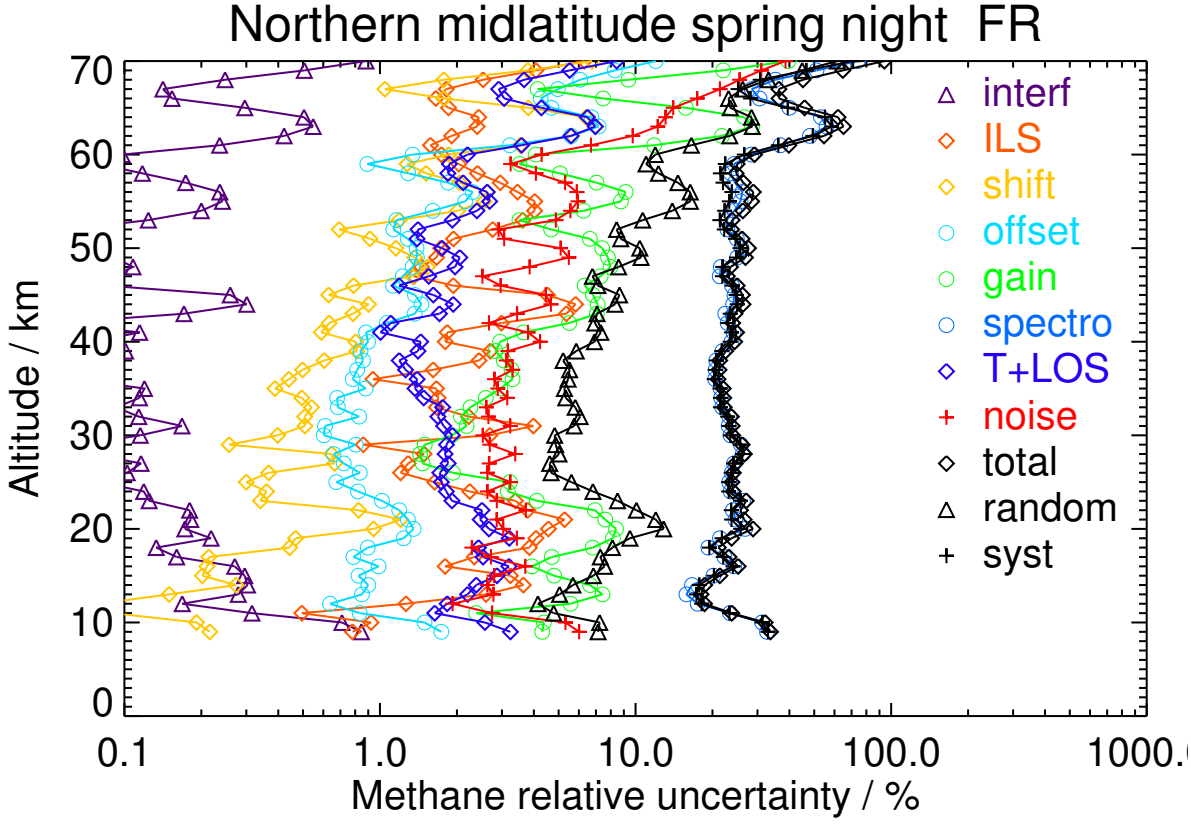

Figure S12. V8H_CH4_61 Northern midlatitude spring night

Table S13. Methane error budget for Northern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1776.59	5.40	32.29	1.32	14.33	72.36	404.96	34.81	43.00	86.04	407.63	416.61
15	1876.20	6.40	110.95	4.59	19.42	112.24	367.34	54.36	53.34	118.87	389.82	407.54
18	1674.14	2.65	30.33	3.88	13.68	75.04	368.81	38.43	41.45	93.92	370.35	382.07
21	1245.16	2.13	72.09	8.53	13.07	29.05	328.18	32.46	36.41	72.76	333.28	341.13
24	1140.89	1.55	39.35	4.07	11.12	20.42	285.05	23.43	32.00	51.93	286.77	291.44
27	1076.55	1.42	5.78	6.17	9.57	12.13	241.87	20.99	30.11	45.07	241.10	245.27
30	1022.50	0.65	11.89	2.83	7.56	16.96	251.93	19.28	25.03	42.90	251.24	254.87
33	794.28	0.94	10.02	4.34	6.61	15.17	183.47	14.61	21.28	38.18	182.39	186.34
36	688.28	0.70	7.76	2.39	5.43	14.23	149.48	10.05	19.17	32.32	148.55	152.03
39	554.88	0.72	17.22	3.08	4.50	12.89	112.35	6.97	16.15	27.41	112.58	115.87
42	435.59	0.31	14.51	2.79	4.36	23.38	111.15	4.35	14.27	37.70	109.27	115.59
45	358.98	1.05	23.50	3.01	6.29	36.44	109.94	7.80	21.22	46.74	111.10	120.53
48	268.83	0.36	5.02	3.21	4.36	27.67	63.35	4.90	11.30	41.07	57.43	70.60
52	211.88	0.18	3.60	1.34	2.77	13.36	56.36	2.64	5.79	28.20	51.21	58.46
56	171.72	0.39	5.08	3.47	3.09	12.18	49.80	4.07	11.45	26.14	46.27	53.14
60	192.79	0.12	3.46	2.67	1.29	3.80	46.84	2.97	5.64	18.44	43.93	47.64
64	162.22	0.26	1.08	2.81	3.57	12.62	51.77	2.99	9.74	18.60	51.18	54.45
68	169.18	0.16	1.81	1.73	3.66	4.96	44.49	2.99	16.49	21.54	42.90	48.01

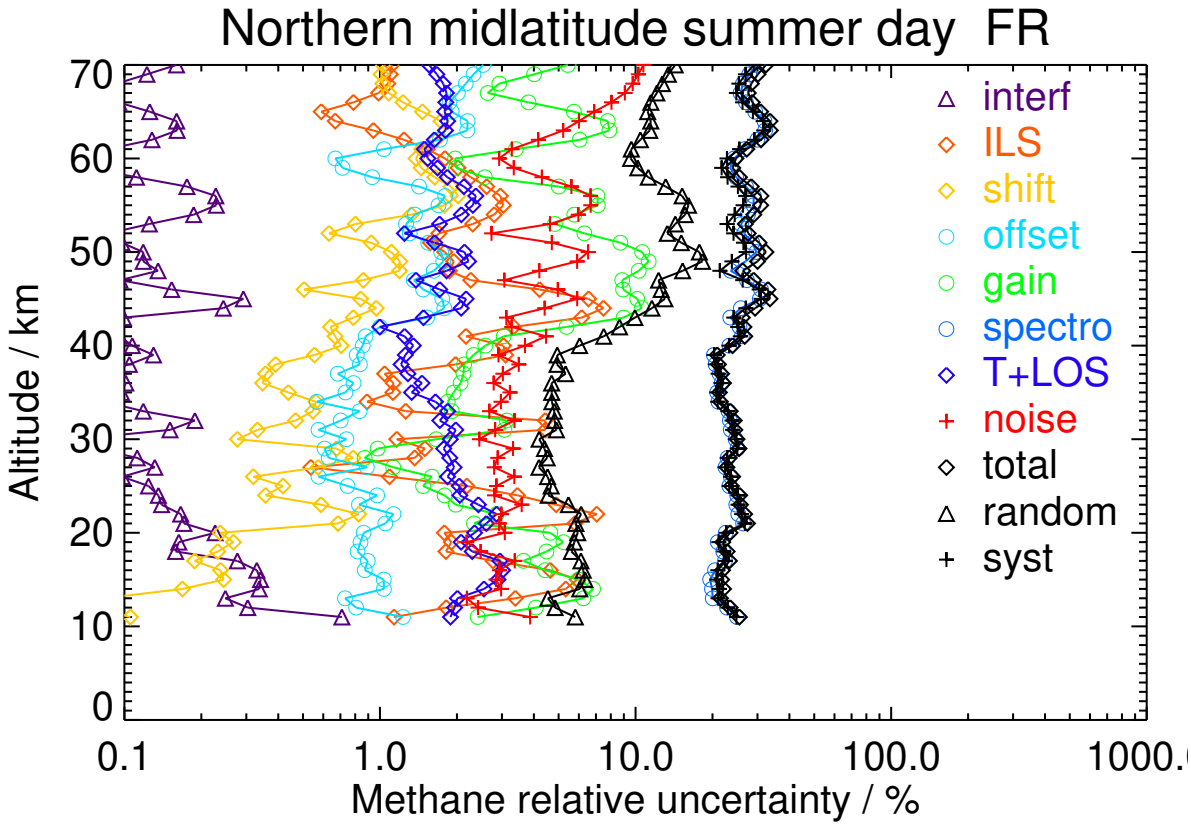

Figure S13. V8H_CH4_61 Northern midlatitude summer day

Table S14. Methane error budget for Northern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1791.40	7.53	20.34	1.09	16.51	46.52	421.02	34.65	51.11	86.10	420.20	428.93
15	1890.44	6.78	87.67	2.93	17.20	112.69	298.34	48.71	51.16	111.83	319.72	338.72
18	1599.47	3.32	32.69	3.08	12.63	55.32	348.62	40.40	43.53	92.44	347.60	359.68
21	1227.12	2.53	53.22	4.16	10.40	19.11	314.80	28.87	36.34	60.66	317.65	323.39
24	1096.50	1.62	36.78	1.78	9.47	17.55	273.06	21.92	32.49	47.03	275.03	279.02
27	1102.36	1.49	5.84	3.83	8.41	11.31	247.73	19.17	30.32	42.59	247.17	250.81
30	954.35	0.65	5.78	2.00	7.22	14.34	250.07	17.11	26.46	42.76	248.99	252.64
33	824.06	1.07	13.74	4.53	6.60	16.77	193.32	13.50	22.20	35.53	193.18	196.42
36	674.28	0.84	6.00	1.53	5.39	10.73	152.99	9.59	20.20	30.63	152.15	155.20
39	538.38	0.37	15.80	2.73	4.48	12.71	117.18	6.51	17.89	26.60	117.58	120.55
42	417.87	0.46	7.73	2.41	3.46	13.63	104.34	4.05	17.11	30.93	102.48	107.05
45	372.21	1.03	18.18	2.77	5.62	34.23	90.39	8.17	19.92	39.58	92.79	100.88
48	298.70	0.21	4.25	3.55	3.00	20.27	72.68	3.93	7.92	39.66	65.10	76.23
52	225.56	0.13	4.70	1.01	2.45	10.95	56.71	2.75	6.56	23.06	53.71	58.45
56	189.71	0.32	5.34	3.83	2.97	11.51	48.92	4.22	11.06	22.87	46.85	52.14
60	200.96	0.14	2.29	2.69	1.56	3.81	49.23	3.68	7.31	17.21	47.16	50.20
64	186.49	0.29	1.67	2.39	3.43	11.10	57.31	3.54	9.67	16.32	57.16	59.44
68	182.52	0.18	3.10	1.64	4.59	6.26	52.17	4.77	20.43	24.88	51.14	56.87

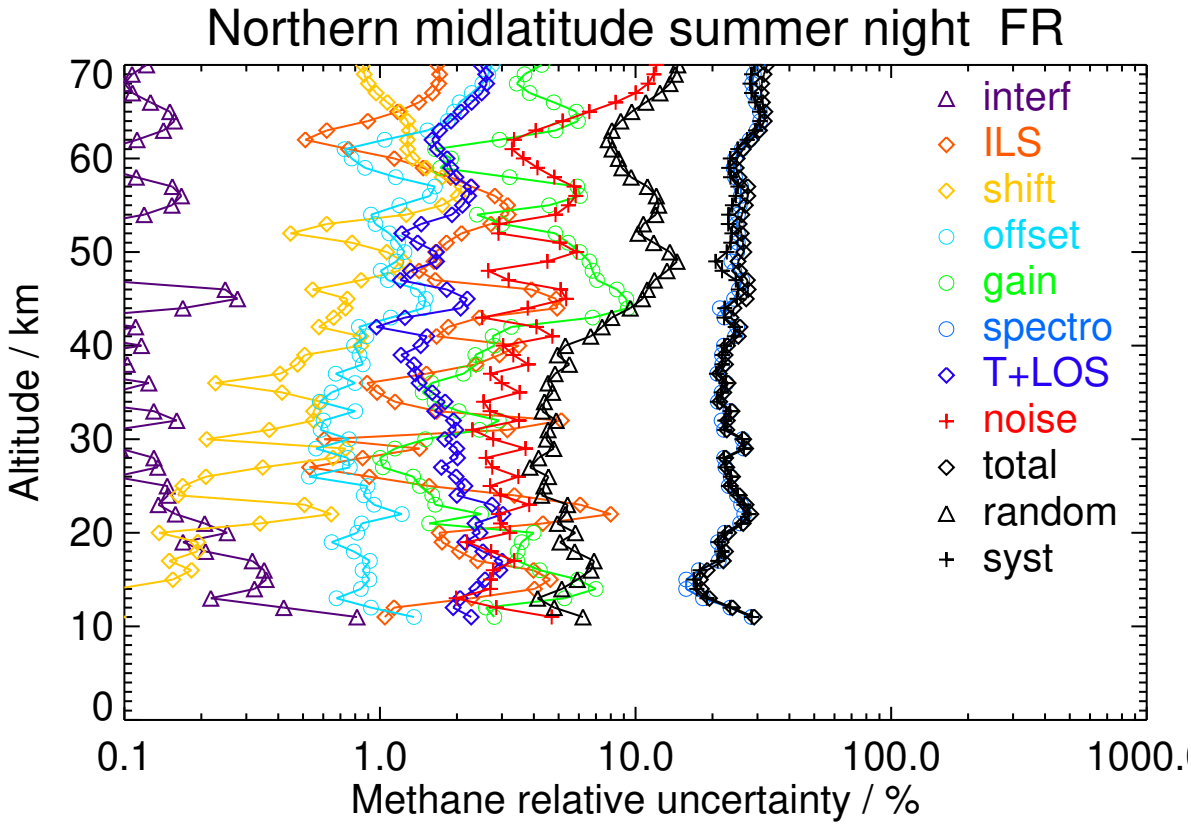

Figure S14. V8H_CH4_61 Northern midlatitude summer night

Table S15. Methane error budget for Northern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1821.12	8.29	38.44	1.50	21.32	50.56	428.91	37.92	62.07	103.30	427.96	440.25
15	1906.00	5.80	76.63	3.26	17.91	102.87	362.28	48.39	56.62	122.77	372.21	391.93
18	1599.35	3.43	106.27	3.69	16.23	101.20	332.26	59.30	47.06	172.04	329.17	371.41
21	1257.58	2.51	64.07	4.37	13.69	61.35	307.78	37.17	43.29	123.40	301.39	325.68
24	1099.64	1.20	54.78	4.52	9.25	26.76	274.79	23.73	37.87	67.25	277.15	285.19
27	1031.16	1.15	21.47	2.37	8.20	13.39	246.36	17.93	32.79	52.94	244.95	250.61
30	988.98	1.06	14.45	2.05	7.61	16.02	251.96	16.49	29.19	56.61	248.86	255.22
33	870.49	0.97	18.11	4.08	6.95	20.82	201.26	12.92	23.97	51.82	198.46	205.12
36	733.56	0.59	4.17	2.14	5.98	18.02	159.11	9.23	21.09	37.98	157.43	161.95
39	661.51	0.46	11.53	4.10	5.41	18.31	129.01	7.36	19.15	35.15	127.85	132.59
42	553.29	0.28	6.79	3.64	4.34	16.43	123.80	5.07	16.41	33.62	121.82	126.37
45	512.22	0.66	13.12	1.37	6.11	33.37	122.65	7.79	14.65	37.71	123.37	129.01
48	460.31	0.20	4.72	6.27	6.84	37.46	110.82	9.05	10.45	39.41	111.49	118.25
52	417.60	0.17	10.81	2.38	5.99	27.08	91.13	5.71	9.01	28.75	92.10	96.49
56	273.24	0.34	9.64	4.65	4.47	12.20	84.27	5.73	11.16	22.59	83.86	86.85
60	267.80	0.16	2.93	2.58	2.17	3.37	59.78	5.54	9.04	13.88	59.37	60.97
64	153.21	0.24	1.25	2.61	4.15	12.43	52.30	4.81	9.62	16.33	52.58	55.06
68	114.63	0.09	1.30	1.09	4.72	6.23	34.45	3.37	20.24	23.10	33.74	40.89

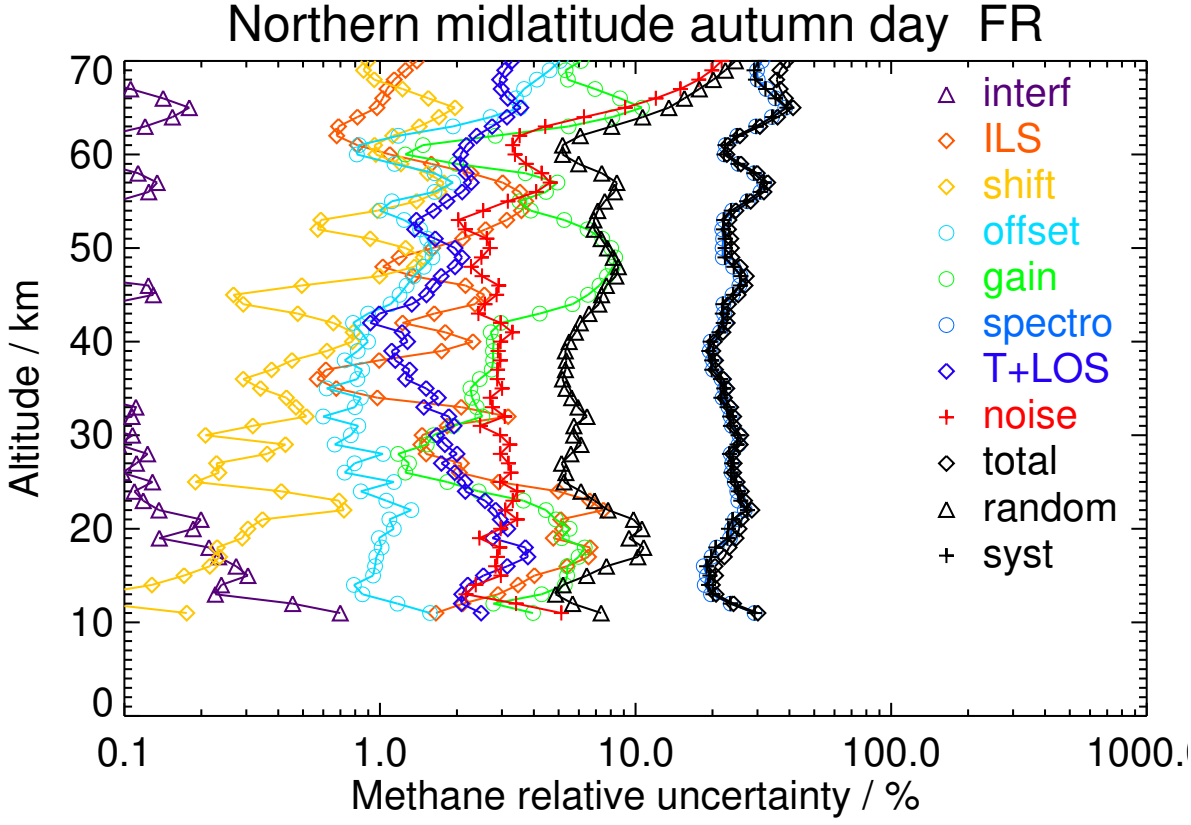

Figure S15. V8H_CH4_61 Northern midlatitude autumn day

Table S16. Methane error budget for Northern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1635.24	16.60	4.51	1.01	27.81	98.55	501.80	43.60	90.15	119.36	508.30	522.12
12	1810.93	5.72	27.32	2.26	16.53	94.26	395.73	34.50	48.44	126.57	392.51	412.41
15	1795.28	4.79	49.16	3.90	14.61	98.51	342.68	46.23	52.67	118.12	347.51	367.03
18	1680.03	2.66	117.99	5.80	16.95	130.45	329.15	61.03	46.50	174.43	339.22	381.44
21	1315.79	2.41	76.02	5.18	17.00	101.74	304.41	43.40	43.16	151.40	299.90	335.95
24	1176.88	1.09	61.32	8.38	11.89	60.41	282.31	27.11	38.44	93.44	284.26	299.22
27	1040.27	1.02	27.68	3.83	8.56	23.72	258.09	19.60	34.68	64.14	255.93	263.84
30	973.08	1.27	22.67	1.91	7.31	20.91	248.40	18.69	31.05	63.10	245.04	253.03
33	836.20	0.79	14.34	3.65	6.21	16.85	193.11	14.14	25.35	52.82	189.43	196.66
36	696.31	0.53	8.63	2.64	5.44	18.61	157.86	9.71	21.46	47.42	153.90	161.04
39	578.97	0.51	15.42	3.56	5.37	22.63	132.91	6.98	18.91	47.58	128.83	137.34
42	481.50	0.28	11.60	2.87	4.63	20.96	122.06	5.61	17.19	50.48	115.25	125.82
45	415.57	0.59	16.26	1.57	6.23	34.62	103.71	7.87	14.57	52.06	99.11	111.95
48	363.60	0.24	6.37	3.66	5.19	30.48	95.11	6.36	9.26	44.56	90.54	100.91
52	337.59	0.21	6.47	1.81	5.17	23.94	82.23	4.89	8.53	33.01	80.08	86.62
56	278.91	0.37	5.98	3.80	3.79	10.68	71.82	5.04	11.19	22.90	70.45	74.08
60	238.27	0.21	1.89	2.27	2.66	4.92	58.43	4.75	9.66	15.00	57.84	59.75
64	170.37	0.24	1.49	2.29	3.53	10.78	49.52	4.46	9.48	17.69	48.84	51.95
68	119.25	0.12	1.86	1.27	4.97	6.81	37.28	4.03	21.17	25.28	35.94	43.94

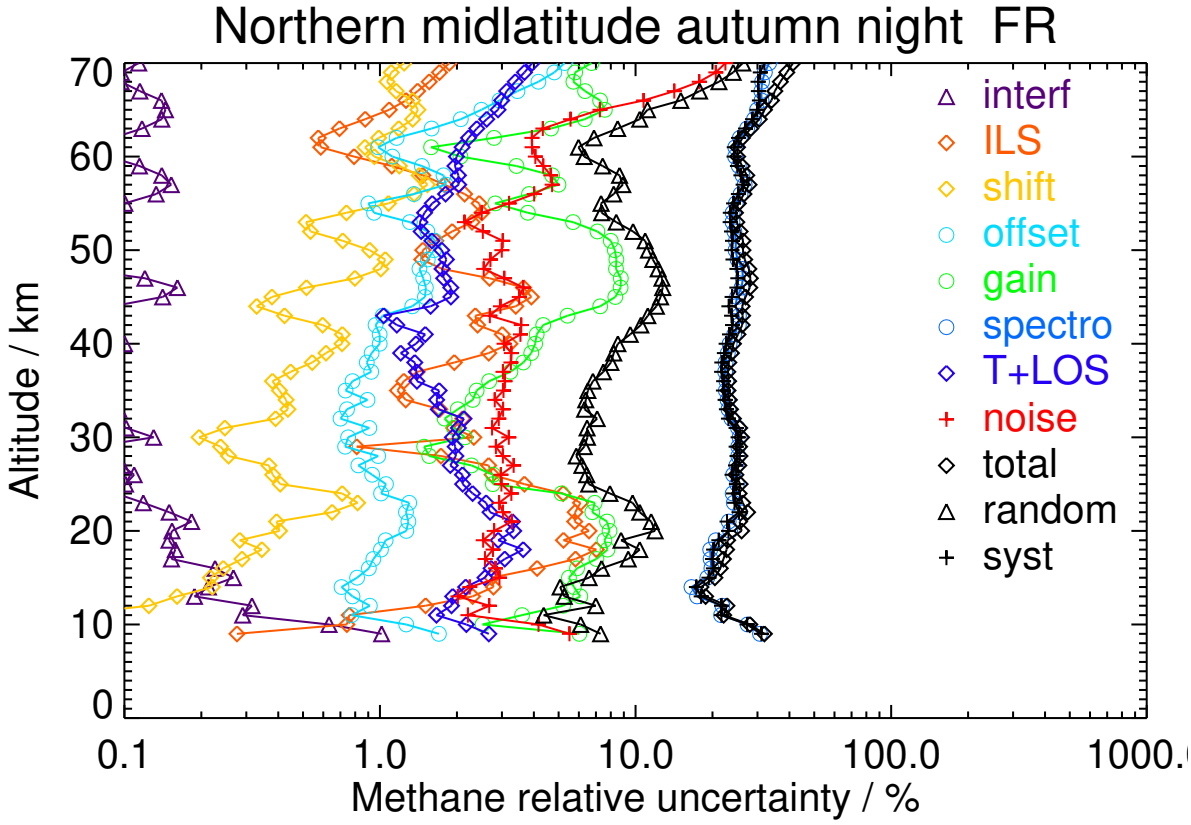

Figure S16. V8H_CH4_61 Northern midlatitude autumn night

Table S17. Methane error budget for Tropics day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1904.76	4.35	50.15	8.97	12.79	96.16	356.48	38.44	47.75	100.31	364.42	377.97
15	1890.71	10.30	115.31	13.27	21.87	66.73	358.81	60.05	60.95	109.09	377.72	393.16
18	1778.17	5.92	88.75	13.27	22.42	49.83	369.23	61.04	60.66	126.01	372.74	393.46
21	1620.31	2.81	31.56	5.81	19.57	24.18	379.91	42.07	48.36	81.59	379.20	387.87
24	1608.92	1.36	32.41	7.01	13.25	34.05	369.66	29.82	38.96	60.99	371.17	376.15
27	1467.06	1.10	18.31	7.59	9.97	20.19	352.29	26.25	35.44	59.06	351.38	356.31
30	1476.20	1.41	39.10	3.99	7.54	40.96	362.91	25.07	30.00	59.40	364.67	369.48
33	1324.19	1.54	28.02	7.17	6.95	32.28	284.82	19.92	26.88	51.64	285.49	290.12
36	1157.37	0.74	11.80	6.90	6.03	23.18	227.30	13.63	23.85	42.06	226.74	230.61
39	877.30	0.56	16.78	5.53	5.36	13.16	188.27	10.86	22.52	36.55	187.74	191.27
42	712.50	0.93	34.44	5.31	9.41	50.29	165.97	9.51	15.66	46.68	171.85	178.08
45	552.56	0.66	22.37	2.56	8.17	48.73	137.31	8.42	14.05	35.47	144.27	148.56
48	440.22	0.24	8.29	5.14	6.37	39.39	111.08	8.20	15.12	44.97	110.91	119.68
52	320.11	0.27	5.67	1.95	3.70	16.48	71.82	5.32	10.31	28.28	69.38	74.92
56	242.32	0.32	4.96	3.79	3.14	11.69	59.51	4.50	9.86	21.20	58.27	62.01
60	202.06	0.11	5.83	3.71	2.64	9.98	54.04	4.03	6.23	13.65	54.25	55.94
64	177.72	0.14	1.40	3.11	2.95	8.90	49.76	3.52	9.34	15.01	49.50	51.73
68	163.07	0.16	2.45	2.22	3.03	6.29	43.88	3.60	12.83	17.32	43.16	46.51

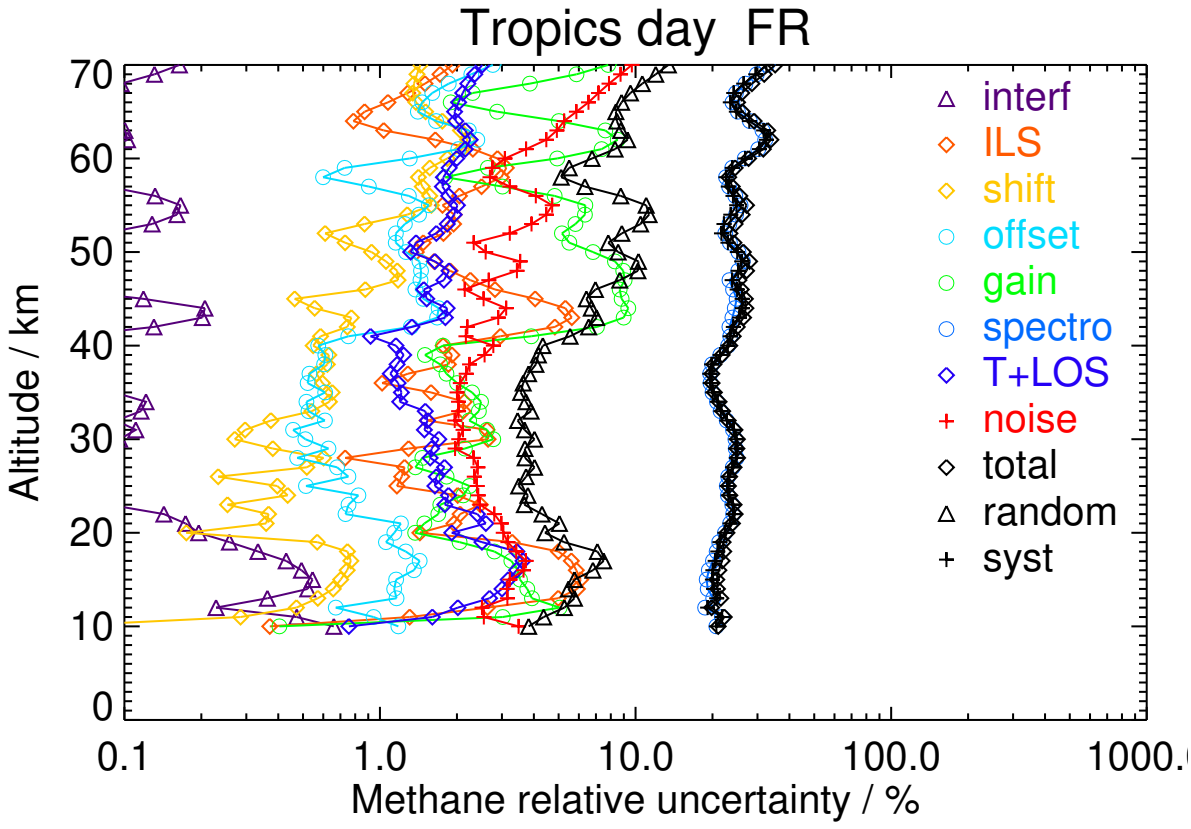

Figure S17. V8H_CH4_61 Tropics day

Table S18. Methane error budget for Tropics night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1907.14	5.67	13.47	5.14	10.87	112.17	332.93	32.20	50.18	102.53	341.79	356.84
15	1858.51	9.80	73.03	16.37	19.67	61.16	359.50	50.00	56.88	122.78	360.17	380.53
18	1840.00	6.38	65.59	16.94	23.51	51.36	386.78	56.51	61.45	116.79	388.26	405.45
21	1655.19	3.17	28.96	8.71	20.31	23.23	395.88	41.72	49.85	77.21	396.06	403.51
24	1638.57	1.43	16.56	6.74	13.68	33.32	375.42	30.27	39.03	58.82	376.22	380.79
27	1527.71	1.06	9.85	8.88	9.92	27.25	356.06	26.71	33.98	53.60	356.08	360.09
30	1536.44	1.39	40.69	4.37	7.38	41.76	374.65	25.98	28.49	53.98	377.37	381.21
33	1363.96	1.51	18.60	8.17	6.69	29.22	286.42	19.66	26.16	44.82	287.07	290.55
36	1215.49	0.70	14.13	6.45	6.54	27.60	234.74	14.02	23.26	40.37	235.07	238.51
39	906.40	0.57	22.31	5.04	5.67	14.42	191.11	11.47	21.64	35.25	191.42	194.64
42	688.11	0.40	23.97	4.56	6.65	39.52	159.37	7.35	14.21	36.82	162.79	166.90
45	534.21	0.87	18.31	2.79	8.19	48.53	129.16	9.19	16.61	32.09	137.04	140.75
48	404.92	0.31	9.31	5.08	5.46	34.23	95.31	7.31	13.94	41.44	94.49	103.18
52	283.91	0.15	8.60	1.99	2.04	6.91	64.80	4.99	8.60	16.51	64.46	66.54
56	230.91	0.25	9.10	3.55	2.50	9.80	53.34	5.03	9.86	19.96	52.61	56.27
60	201.14	0.10	3.06	3.63	2.06	6.37	50.85	3.76	6.15	10.96	50.84	52.01
64	179.12	0.20	2.50	3.60	4.12	13.81	50.89	4.05	9.54	14.52	52.09	54.07
68	165.73	0.16	2.05	1.78	3.34	6.23	42.90	4.04	14.15	16.46	42.94	45.98

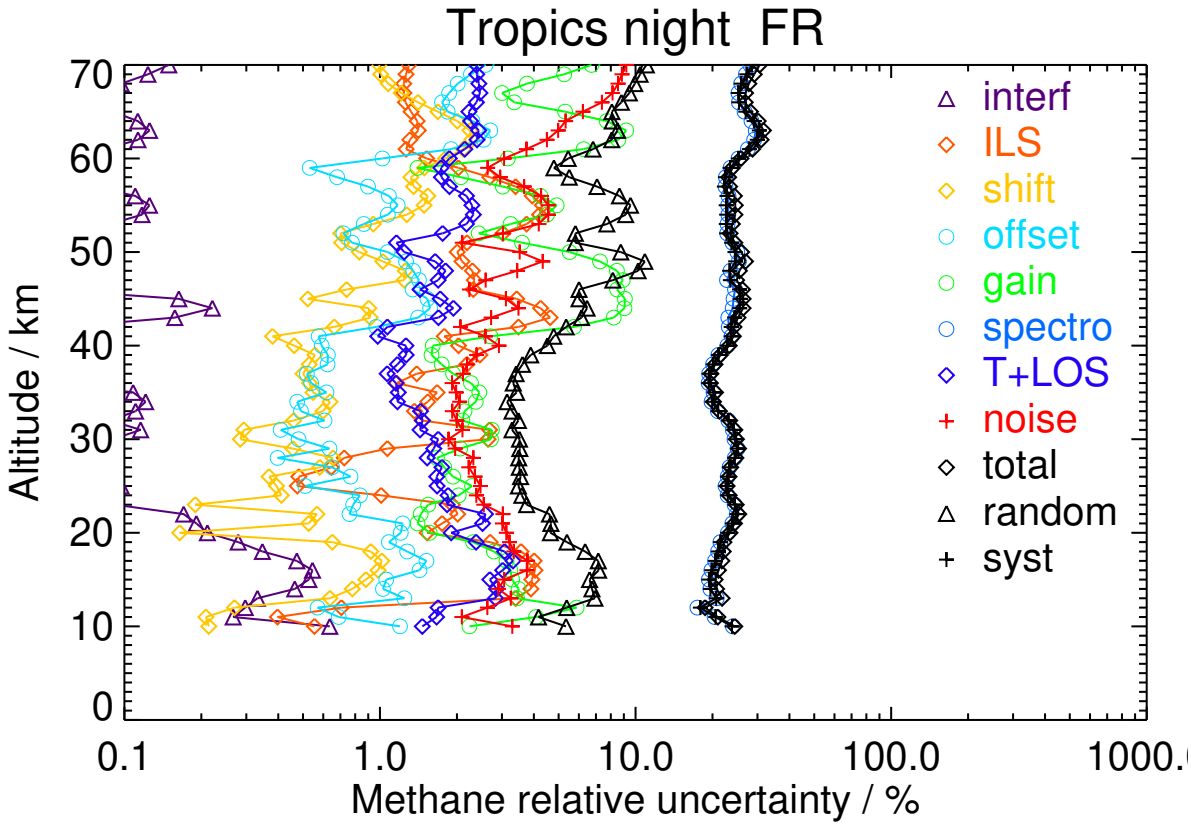

Figure S18. V8H_CH4_61 Tropics night

Table S19. Methane error budget for Southern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1724.83	10.04	13.65	1.81	24.80	60.22	430.23	46.28	75.45	116.96	428.70	444.37
12	1717.92	5.54	26.68	2.03	16.81	77.22	385.37	36.98	53.84	101.45	386.62	399.71
15	1621.34	3.56	38.33	3.77	13.88	64.48	361.68	45.18	52.46	109.43	359.83	376.10
18	1665.52	2.77	107.20	5.21	16.65	125.37	351.33	71.59	50.84	140.66	372.67	398.33
21	1501.19	3.20	38.91	6.42	16.94	104.22	339.72	41.16	46.07	102.05	348.61	363.24
24	1313.53	1.43	38.07	11.76	13.11	71.45	318.82	27.57	40.58	80.22	323.24	333.05
27	1197.31	1.10	18.56	6.23	10.75	39.56	297.62	25.23	38.08	72.83	295.68	304.52
30	1194.72	1.24	20.34	3.84	9.73	29.56	302.09	26.99	35.43	88.50	294.63	307.63
33	808.06	0.93	10.71	3.34	7.60	14.91	203.13	19.00	30.52	66.16	196.43	207.27
36	547.53	0.57	10.10	3.05	6.37	13.17	142.17	11.63	25.90	54.64	135.49	146.10
39	374.52	0.41	12.47	3.44	5.06	16.79	97.66	7.45	21.23	54.40	86.95	102.56
42	260.73	0.39	7.28	2.31	3.55	10.94	66.74	4.91	17.15	32.91	62.29	70.45
45	258.31	0.47	6.81	1.90	4.04	16.61	59.01	5.95	15.13	28.43	57.28	63.95
48	261.42	0.16	3.92	2.53	2.66	12.27	60.02	3.87	7.81	24.14	57.23	62.11
52	254.34	0.24	8.53	1.95	3.58	11.51	61.40	3.62	10.01	24.33	59.27	64.07
56	211.73	0.33	6.74	3.38	4.68	12.54	58.68	4.26	12.76	31.00	53.84	62.13
60	195.80	0.17	2.71	1.66	2.50	5.40	49.42	3.73	9.60	19.54	47.04	50.93
64	136.90	0.22	1.76	1.75	2.62	6.07	43.95	3.14	9.61	20.32	40.88	45.65
68	93.49	0.11	0.99	0.88	4.55	3.49	31.22	2.54	20.01	25.40	27.76	37.63

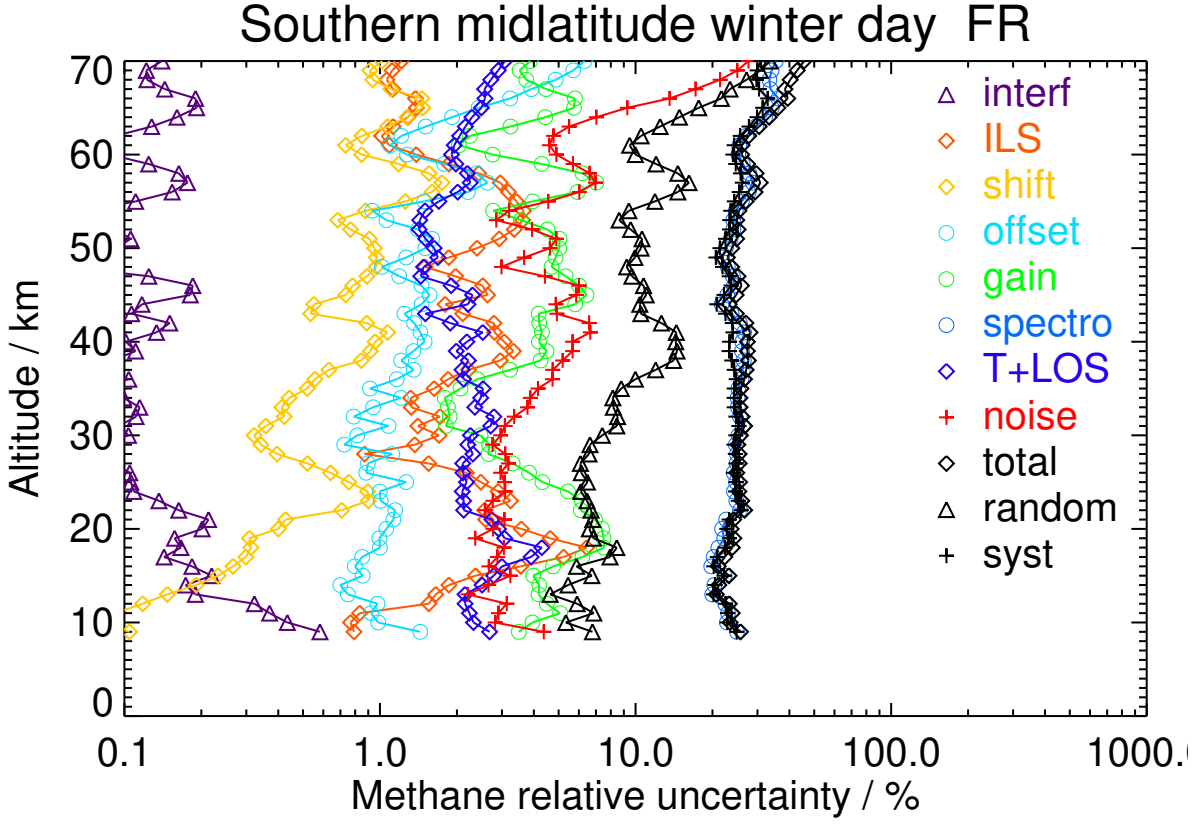

Figure S19. V8H_CH4_61 Southern midlatitude winter day

Table S20. Methane error budget for Southern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1719.35	17.73	8.21	1.58	24.15	61.42	292.31	36.68	67.81	159.59	265.82	310.05
12	1738.30	5.18	27.09	1.47	15.66	85.66	353.93	34.76	47.15	106.45	354.56	370.19
15	1679.77	4.90	63.28	5.15	15.58	81.86	341.87	42.60	47.82	129.19	339.53	363.28
18	1615.11	3.06	96.55	5.09	17.17	115.70	318.67	54.53	46.75	150.00	327.49	360.21
21	1344.13	2.26	39.47	4.35	13.71	69.52	305.42	33.23	41.97	106.60	302.30	320.54
24	1218.30	1.05	57.53	8.92	13.11	62.73	294.40	29.06	40.37	102.34	293.55	310.88
27	1142.35	1.07	22.70	3.65	10.75	31.37	276.43	22.88	38.35	81.82	270.82	282.91
30	1090.16	1.25	14.74	3.25	8.78	21.12	283.64	22.90	34.69	89.17	273.83	287.98
33	887.58	0.91	14.85	3.52	7.04	20.65	205.55	18.43	30.18	71.34	197.79	210.26
36	576.62	0.43	9.57	2.40	5.78	17.77	140.45	11.61	24.55	55.78	133.41	144.61
39	391.15	0.36	11.89	2.58	4.63	17.64	93.62	7.00	19.99	38.55	90.60	98.46
42	265.45	0.25	7.99	1.91	3.53	14.52	67.95	5.17	16.53	31.16	65.09	72.16
45	233.29	0.39	5.17	1.34	3.31	13.57	57.27	5.05	12.97	26.52	54.71	60.80
48	248.30	0.22	3.71	1.67	2.47	10.78	61.51	3.26	8.80	25.43	58.00	63.33
52	238.51	0.23	7.48	1.72	3.72	14.37	59.93	3.81	9.98	27.57	56.79	63.13
56	220.02	0.27	4.43	2.77	3.91	11.51	55.43	4.02	10.53	26.64	51.62	58.09
60	185.67	0.20	1.26	1.53	2.93	5.58	47.35	3.60	10.57	21.02	44.37	49.10
64	135.03	0.19	1.88	1.18	2.36	5.65	35.93	3.42	9.40	16.55	34.05	37.86
68	85.03	0.14	1.27	0.90	4.74	4.79	25.57	2.65	20.79	24.23	23.53	33.78

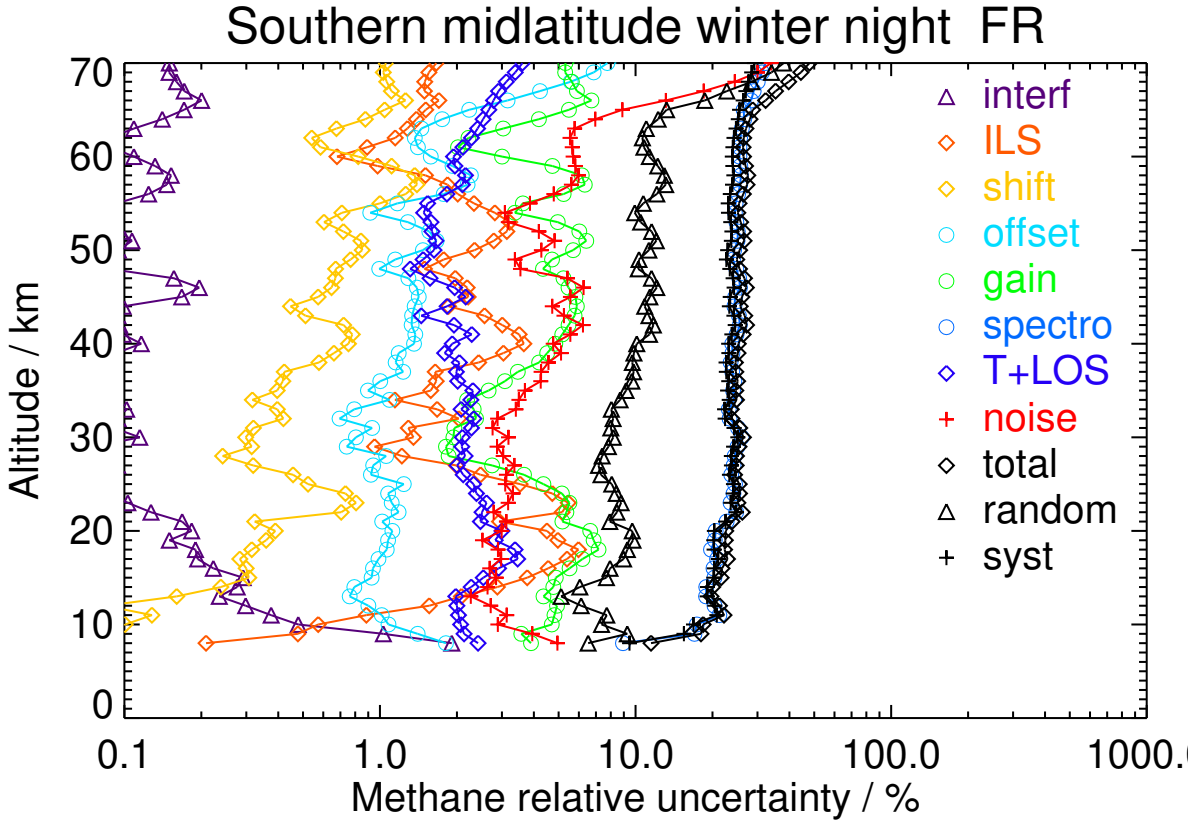

Figure S20. V8H_CH4_61 Southern midlatitude winter night

Table S21. Methane error budget for Southern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1571.14	14.98	13.82	2.82	24.62	93.60	421.03	49.81	79.98	172.72	407.56	442.64
12	1762.20	6.92	39.07	1.51	13.63	100.81	344.24	39.58	45.46	102.05	351.63	366.14
15	1528.02	6.05	52.14	3.86	16.62	92.64	399.99	55.65	54.50	179.78	381.27	421.53
18	1679.59	4.60	169.00	8.87	22.69	182.25	308.29	80.11	48.81	241.05	328.83	407.72
21	1278.86	3.02	78.57	7.73	15.21	97.82	301.16	42.59	43.58	160.70	290.91	332.35
24	1105.11	1.15	65.75	12.53	10.65	63.62	320.75	28.03	39.26	152.40	301.04	337.42
27	1036.04	1.46	42.44	4.28	9.04	41.50	302.87	21.22	36.54	134.86	280.99	311.68
30	1096.31	1.83	34.49	2.62	7.27	30.11	289.70	20.98	35.08	112.93	273.87	296.24
33	809.88	0.96	15.23	3.94	5.78	17.49	181.89	15.58	28.30	59.15	176.68	186.32
36	603.18	0.53	7.09	2.33	5.08	16.08	132.30	9.43	22.54	44.05	128.45	135.80
39	481.72	0.47	9.11	2.85	4.56	16.54	99.05	6.36	18.44	34.30	96.95	102.84
42	466.03	0.37	8.38	3.52	4.14	18.24	106.94	5.58	16.47	29.14	106.40	110.32
45	453.72	0.55	15.65	1.61	6.29	35.18	101.29	7.92	12.90	41.31	101.52	109.60
48	420.79	0.32	10.18	3.99	6.46	36.33	103.33	7.19	11.00	40.69	103.32	111.05
52	341.33	0.21	8.18	2.40	4.27	19.99	83.02	4.86	10.70	29.88	81.41	86.72
56	245.57	0.30	9.23	4.34	3.45	12.84	68.95	5.40	9.75	24.16	67.65	71.83
60	220.25	0.21	3.10	2.64	2.43	5.54	51.75	3.85	8.61	14.73	51.02	53.10
64	126.35	0.29	1.98	3.13	4.26	14.63	48.39	4.29	7.94	18.52	48.23	51.66
68	94.98	0.18	1.97	1.86	5.12	12.02	36.99	3.18	19.27	25.23	35.94	43.91

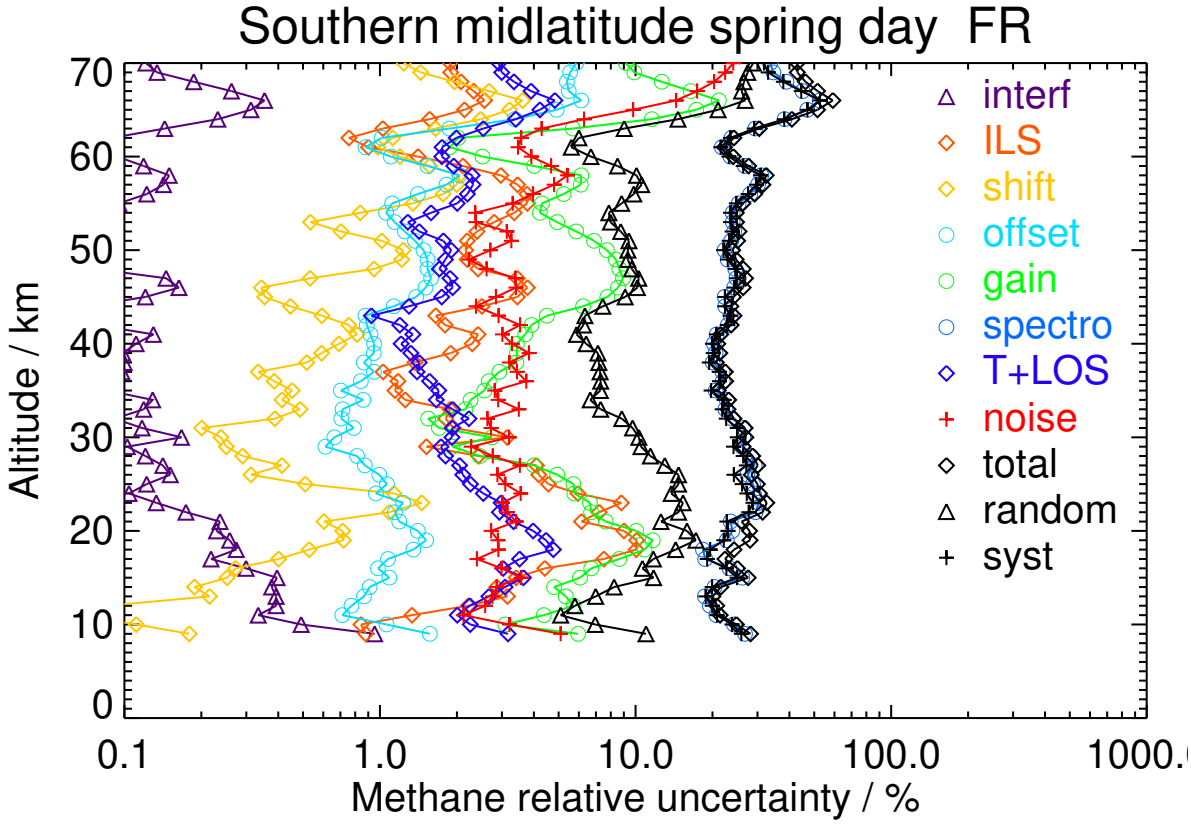

Figure S21. V8H_CH4_61 Southern midlatitude spring day

Table S22. Methane error budget for Southern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1551.85	15.99	22.75	3.41	27.27	113.96	420.20	55.05	88.60	177.56	412.84	449.40
12	1718.93	6.39	33.94	2.30	13.75	94.10	357.91	34.50	47.72	109.84	360.20	376.57
15	1632.59	4.70	62.21	4.04	16.59	114.44	452.22	63.70	55.87	173.51	445.94	478.50
18	1870.41	2.94	204.74	13.89	22.44	227.62	328.69	99.78	48.42	216.09	409.97	463.43
21	1616.04	3.18	98.96	7.15	23.84	184.93	321.83	58.48	44.81	164.35	355.82	391.94
24	1467.22	1.33	57.84	16.42	16.49	126.72	330.63	32.85	42.16	125.50	341.13	363.48
27	1353.35	1.19	38.25	6.73	9.02	48.55	329.21	24.97	39.01	80.20	328.70	338.34
30	1380.19	1.89	35.15	2.85	8.00	47.30	339.67	27.10	36.51	61.23	342.40	347.84
33	976.98	0.89	11.92	3.95	6.02	16.15	232.58	20.98	30.04	50.49	230.96	236.41
36	657.96	0.55	9.49	2.59	4.74	17.07	157.28	12.81	23.23	39.46	155.87	160.78
39	475.92	0.37	8.50	3.31	4.55	18.11	100.55	7.23	19.98	33.62	99.32	104.85
42	418.96	0.38	8.64	4.24	4.18	15.36	95.36	6.63	17.95	30.26	94.29	99.02
45	389.18	0.34	8.24	1.29	4.87	25.54	86.75	6.32	11.79	27.47	87.72	91.92
48	358.17	0.27	4.55	3.09	4.19	23.55	90.74	5.19	11.37	23.83	91.78	94.83
52	318.78	0.24	6.40	3.53	4.16	18.92	74.07	4.73	11.73	22.58	74.59	77.94
56	251.09	0.31	10.93	3.95	3.01	9.87	63.98	4.83	9.44	18.94	63.94	66.69
60	199.35	0.26	4.17	3.03	3.03	6.57	50.64	3.81	8.90	14.97	50.13	52.32
64	134.57	0.29	2.42	2.78	3.21	10.20	42.80	3.92	7.04	14.43	42.62	45.00
68	86.92	0.20	1.98	1.87	4.60	10.43	32.71	3.24	16.91	21.81	32.06	38.77

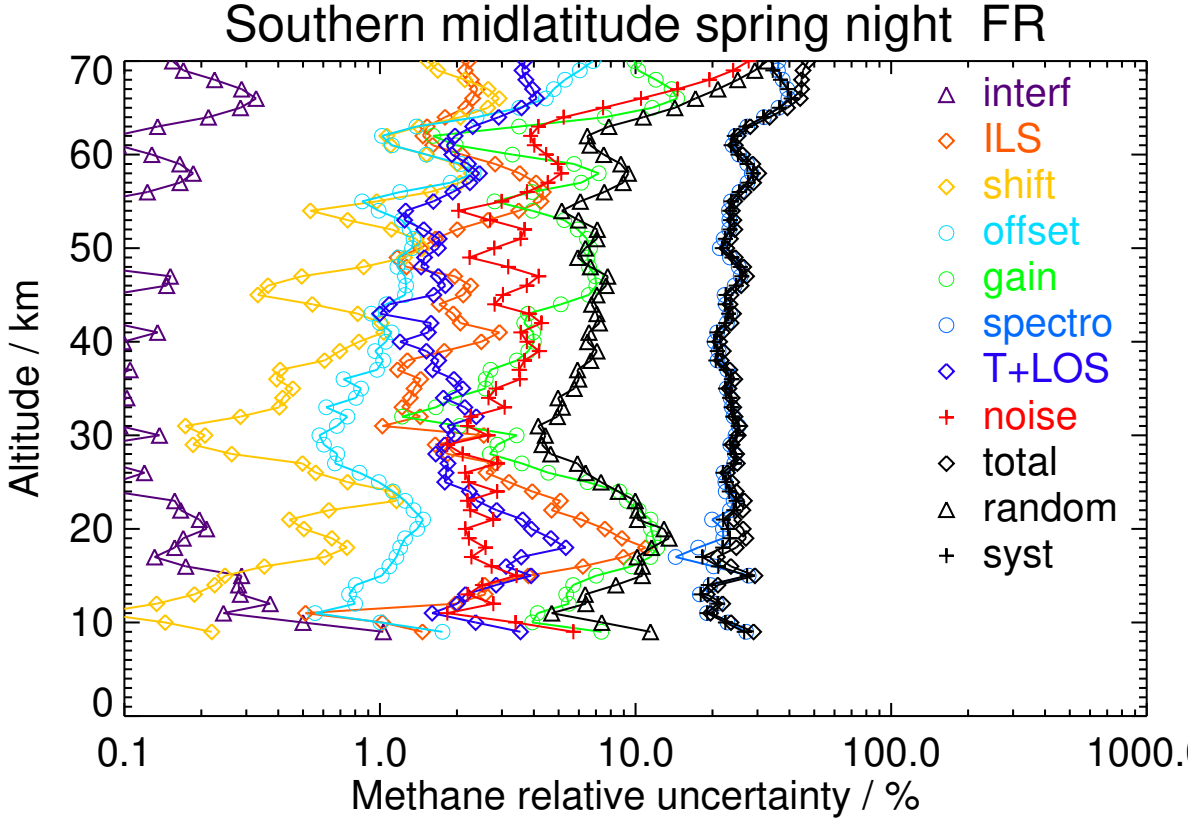

Figure S22. V8H_CH4_61 Southern midlatitude spring night

Table S23. Methane error budget for Southern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1715.91	28.26	11.99	1.56	22.89	61.04	343.57	35.42	76.26	185.43	309.71	360.98
12	1738.40	6.10	36.56	1.40	13.65	111.22	325.95	33.12	44.47	121.76	329.28	351.07
15	1668.76	6.89	62.00	3.25	14.55	91.46	332.05	44.14	50.23	137.31	329.17	356.66
18	1453.19	3.35	52.67	2.85	10.89	58.62	320.61	42.44	42.88	113.58	316.04	335.83
21	1141.32	2.12	71.65	3.66	10.50	39.38	292.55	33.32	40.81	72.72	299.81	308.50
24	1141.56	1.35	62.88	6.33	8.56	21.38	285.57	26.29	38.19	56.85	291.53	297.03
27	1044.41	1.26	34.80	4.47	7.33	13.82	255.75	19.93	35.38	55.52	255.84	261.79
30	1028.09	1.70	28.91	2.99	6.40	24.40	248.62	18.18	32.17	50.03	249.31	254.29
33	843.79	1.19	21.91	4.63	5.65	19.38	177.96	12.54	26.76	34.02	179.71	182.90
36	719.12	0.58	6.20	1.99	4.99	9.83	149.22	9.34	22.90	29.05	148.99	151.79
39	562.14	0.81	16.31	3.30	4.54	15.96	119.62	6.70	19.89	27.38	120.63	123.70
42	417.07	0.35	5.87	3.12	3.23	9.26	105.74	5.51	19.19	26.76	104.90	108.26
45	367.52	0.71	24.93	4.24	5.88	37.60	82.95	7.97	16.63	34.55	90.09	96.49
48	269.79	0.22	6.27	2.28	3.17	21.22	70.07	3.36	8.04	24.17	70.05	74.10
52	201.28	0.19	3.95	2.06	2.87	14.00	51.83	3.02	10.97	26.24	48.49	55.13
56	165.34	0.27	5.61	2.88	2.38	8.16	44.81	3.27	10.73	21.54	42.22	47.39
60	176.15	0.16	3.51	2.64	1.44	3.48	42.41	2.68	6.57	17.57	39.67	43.38
64	164.85	0.27	1.18	3.06	2.91	10.10	57.16	2.62	7.75	14.77	56.90	58.79
68	195.75	0.19	2.82	2.64	3.83	6.39	54.57	3.61	16.46	19.70	54.26	57.73

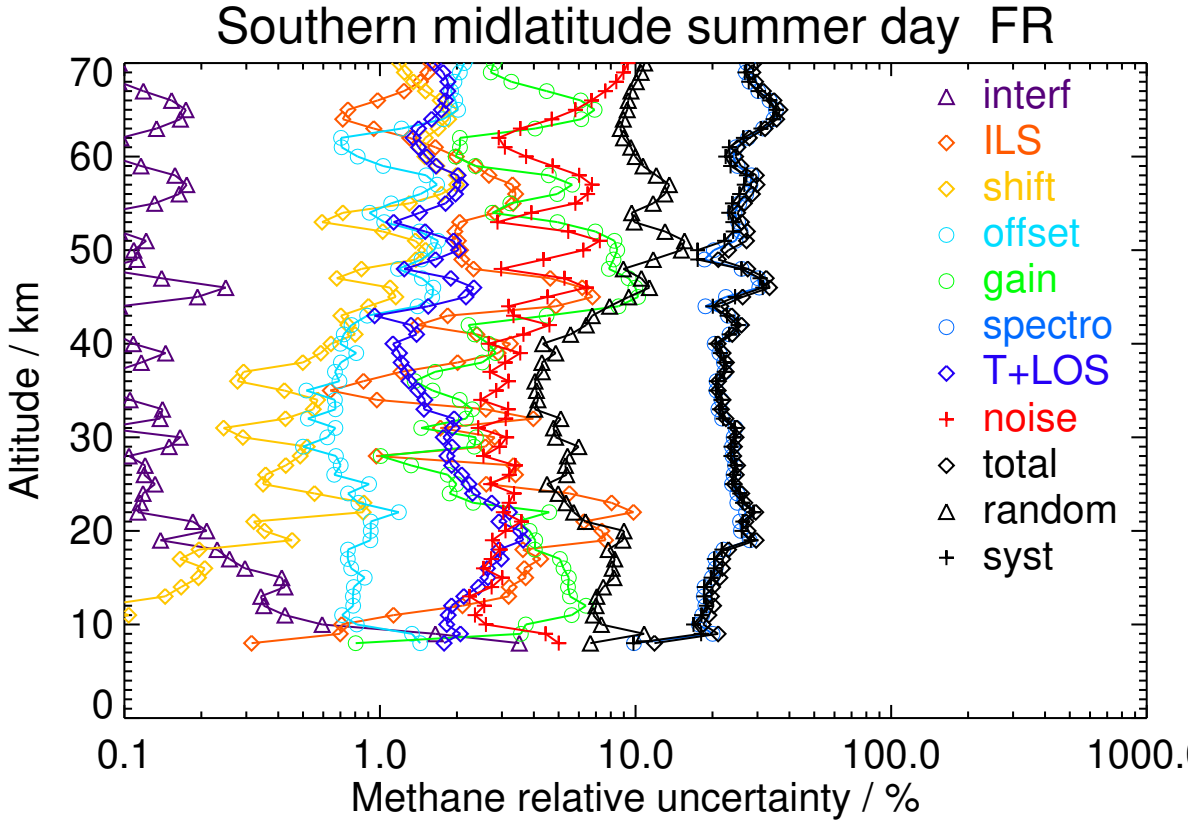

Figure S23. V8H_CH4_61 Southern midlatitude summer day

Table S24. Methane error budget for Southern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1717.87	29.72	14.89	1.82	22.51	64.43	331.56	34.49	69.65	186.26	295.04	348.91
12	1740.90	6.08	39.84	1.66	16.43	98.89	391.05	37.55	44.92	108.48	395.29	409.91
15	1801.29	6.19	103.78	4.85	18.50	137.07	369.56	54.46	52.91	133.65	392.99	415.09
18	1621.47	3.02	128.33	4.19	17.18	136.65	331.64	53.93	41.53	181.50	342.26	387.40
21	1241.11	2.31	70.11	6.92	11.08	45.60	291.16	30.29	37.78	101.58	289.78	307.07
24	1100.45	1.38	55.24	5.29	9.16	25.89	273.85	24.70	35.53	61.30	277.39	284.08
27	1087.19	1.38	32.45	5.40	7.99	17.70	254.17	20.65	34.04	60.11	253.05	260.09
30	992.91	1.51	26.15	3.09	6.60	22.21	253.09	18.74	30.94	50.44	253.09	258.06
33	854.29	1.16	24.52	4.50	5.80	20.45	187.02	13.53	26.06	37.26	188.48	192.13
36	709.58	0.73	5.96	1.60	4.99	9.64	152.54	9.42	22.69	28.91	152.29	155.01
39	586.63	0.71	15.18	2.60	4.45	13.04	124.22	7.06	20.39	27.79	124.71	127.77
42	433.33	0.41	7.73	3.58	3.52	15.69	115.77	5.81	19.06	29.24	115.22	118.87
45	354.91	0.74	22.82	3.82	5.66	37.22	91.92	7.84	17.66	36.67	97.12	103.81
48	253.37	0.25	7.24	2.22	2.87	18.73	67.19	3.08	9.35	22.99	67.08	70.91
52	187.83	0.19	3.72	2.09	2.71	13.09	47.83	2.76	11.54	22.07	46.24	51.24
56	146.76	0.29	5.52	3.41	2.98	13.86	38.56	3.87	11.69	19.59	38.69	43.37
60	164.84	0.15	2.90	2.66	1.35	3.18	39.22	2.65	6.28	16.89	36.43	40.15
64	167.26	0.28	1.42	2.60	2.75	10.74	48.69	2.53	7.16	15.00	48.32	50.60
68	177.02	0.17	1.63	2.12	3.32	5.86	46.58	3.74	14.47	17.22	46.36	49.45

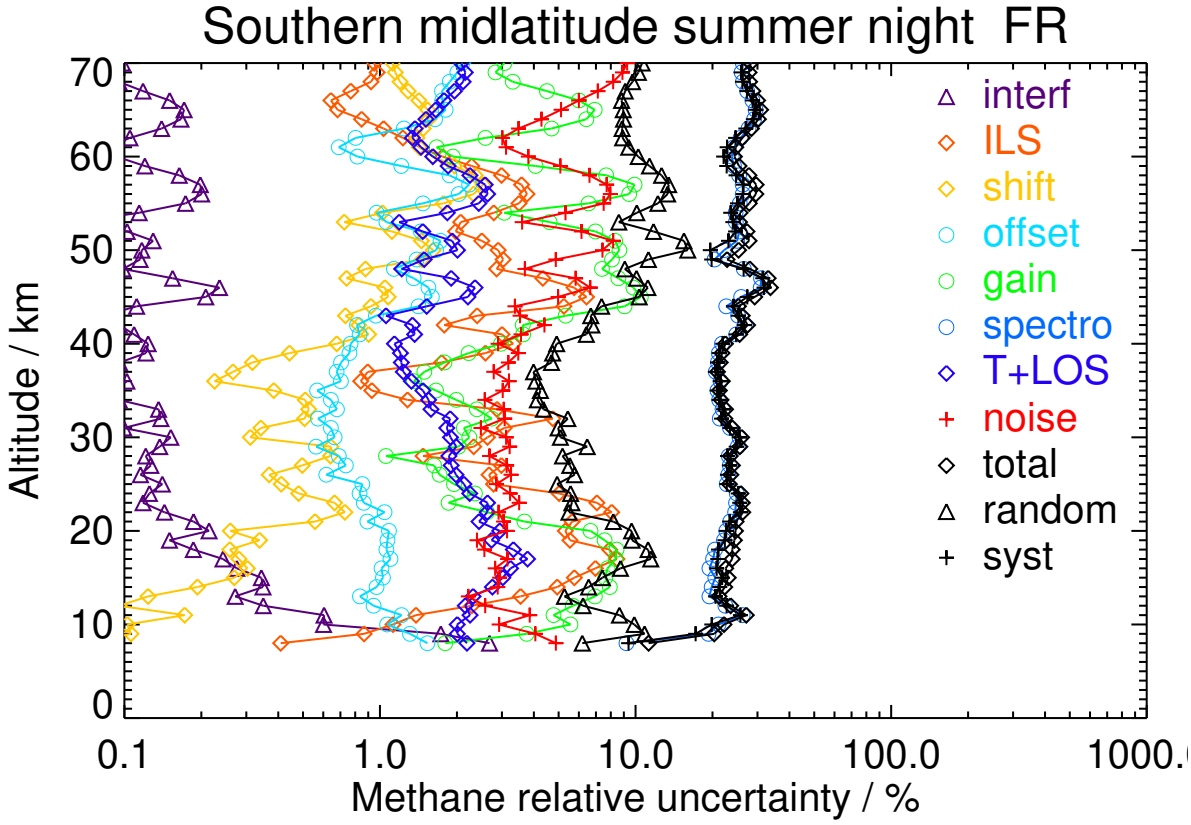

Figure S24. V8H_CH4_61 Southern midlatitude summer night

Table S25. Methane error budget for Southern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1782.34	4.07	30.41	1.47	12.74	92.12	340.86	32.88	36.38	81.38	348.65	358.03
15	1711.88	4.36	62.44	4.03	15.26	88.94	340.18	44.52	45.72	119.48	342.92	363.14
18	1606.85	1.83	54.48	4.46	19.67	136.79	319.51	35.66	35.91	125.72	333.06	356.00
21	1262.38	1.69	64.21	12.34	15.15	76.61	327.16	28.52	32.40	103.68	329.43	345.36
24	1170.47	1.28	29.90	2.97	13.03	53.92	282.75	23.34	31.07	79.41	281.31	292.30
27	1023.92	1.10	12.06	4.94	9.82	16.95	242.14	20.04	29.88	54.83	239.74	245.93
30	981.39	0.84	19.49	3.19	7.83	21.39	239.68	20.17	25.41	48.47	238.87	243.74
33	811.19	0.56	8.40	3.60	7.49	21.75	189.28	14.74	23.42	46.22	187.27	192.89
36	650.85	0.45	7.02	2.55	6.41	25.96	153.10	10.64	21.48	46.86	150.30	157.43
39	540.85	0.39	15.32	4.08	6.57	26.28	129.51	8.39	20.19	50.25	125.34	135.04
42	465.37	0.31	16.93	2.04	5.82	29.17	116.80	5.75	14.69	49.44	112.35	122.75
45	382.98	0.71	15.87	2.30	6.08	31.34	100.15	6.46	15.71	44.77	97.93	107.68
48	368.89	0.23	4.55	4.46	5.90	28.70	83.93	7.30	10.81	38.39	81.48	90.07
52	332.83	0.21	7.99	1.72	4.31	16.44	74.60	5.13	7.71	24.38	73.57	77.50
56	218.96	0.50	5.01	4.81	6.26	17.42	71.63	6.46	15.14	29.97	69.96	76.11
60	247.59	0.15	2.75	1.89	1.96	3.82	59.45	4.58	8.40	16.81	58.08	60.46
64	134.62	0.21	1.46	2.32	3.57	9.97	43.24	3.52	9.24	22.09	39.99	45.69
68	79.59	0.07	1.25	0.40	3.63	1.75	24.31	2.47	15.97	19.15	22.44	29.50

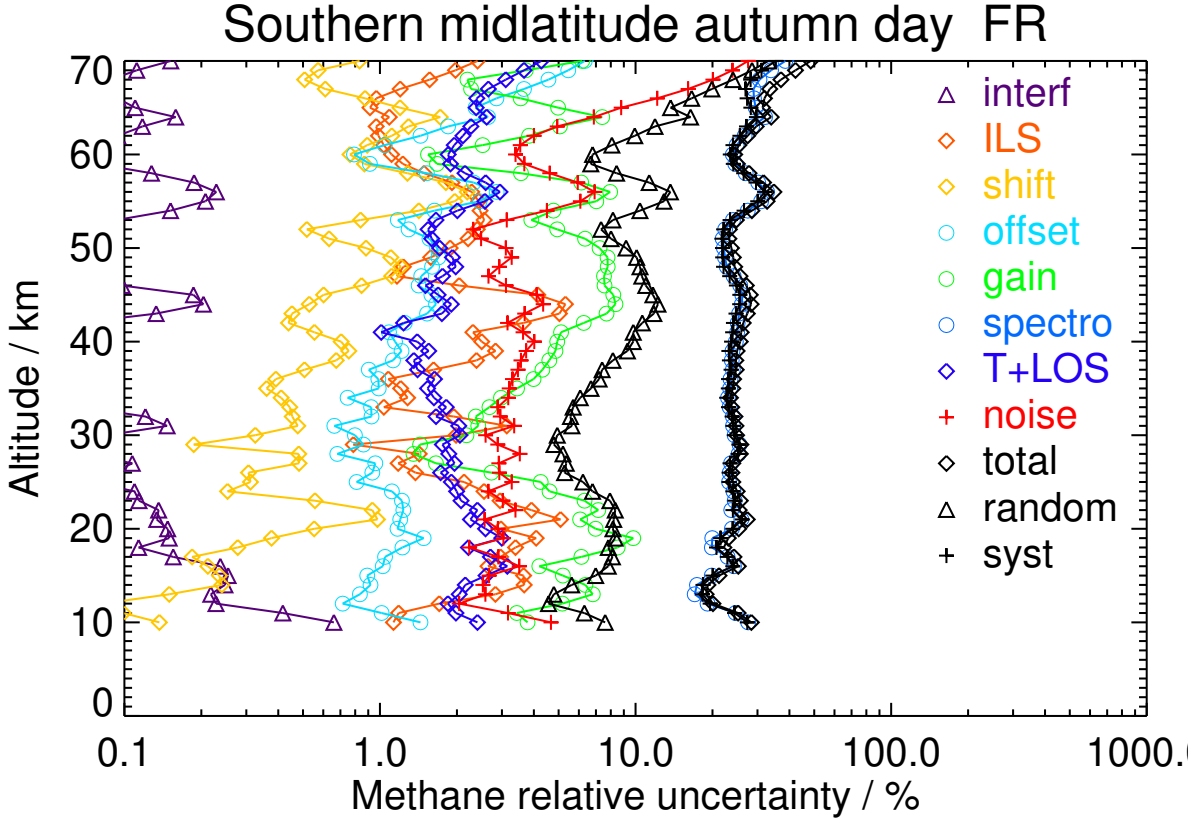

Figure S25. V8H_CH4_61 Southern midlatitude autumn day

Table S26. Methane error budget for Southern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1819.62	4.94	42.94	1.79	15.45	121.26	353.98	37.14	39.93	82.34	371.90	380.90
15	1769.79	4.90	57.28	3.53	14.20	74.16	358.43	45.64	46.60	96.81	363.83	376.49
18	1715.79	2.35	47.67	5.38	22.58	155.32	311.50	37.75	35.88	110.05	338.49	355.94
21	1259.34	1.88	75.59	13.31	16.37	78.67	314.08	31.97	34.00	107.36	318.83	336.42
24	1172.69	1.39	20.18	2.46	11.89	34.00	274.32	23.99	32.01	62.54	273.22	280.29
27	1031.80	1.23	11.98	5.78	9.37	15.01	236.01	20.30	29.76	48.91	234.73	239.77
30	987.22	0.82	20.90	3.44	7.54	22.59	231.90	19.68	24.91	48.72	231.14	236.22
33	804.90	0.55	8.50	3.98	7.12	18.33	173.61	14.73	22.64	44.74	171.30	177.05
36	703.98	0.51	6.13	2.15	6.25	21.21	143.78	10.22	21.41	46.78	139.93	147.54
39	580.40	0.60	16.05	4.42	5.66	16.65	115.49	7.96	19.01	44.98	111.02	119.79
42	471.14	0.29	10.06	2.29	5.06	22.76	111.09	4.92	13.97	45.46	105.57	114.94
45	437.34	0.72	13.03	1.63	5.79	30.73	111.12	7.59	17.45	43.74	109.30	117.73
48	357.56	0.27	4.96	5.05	5.23	27.63	86.55	6.36	10.84	42.45	81.78	92.14
52	311.18	0.13	10.26	1.34	3.74	14.48	70.75	4.49	7.15	23.06	69.82	73.53
56	271.89	0.46	6.03	5.27	6.02	19.01	73.99	6.48	12.82	28.73	72.92	78.37
60	244.38	0.16	2.56	2.46	2.06	4.36	59.59	4.74	8.04	17.56	58.01	60.61
64	166.43	0.20	2.49	2.27	3.70	10.55	46.24	4.39	9.51	20.09	44.50	48.83
68	91.19	0.09	1.96	0.63	3.69	3.58	29.34	3.10	16.26	22.05	26.06	34.14

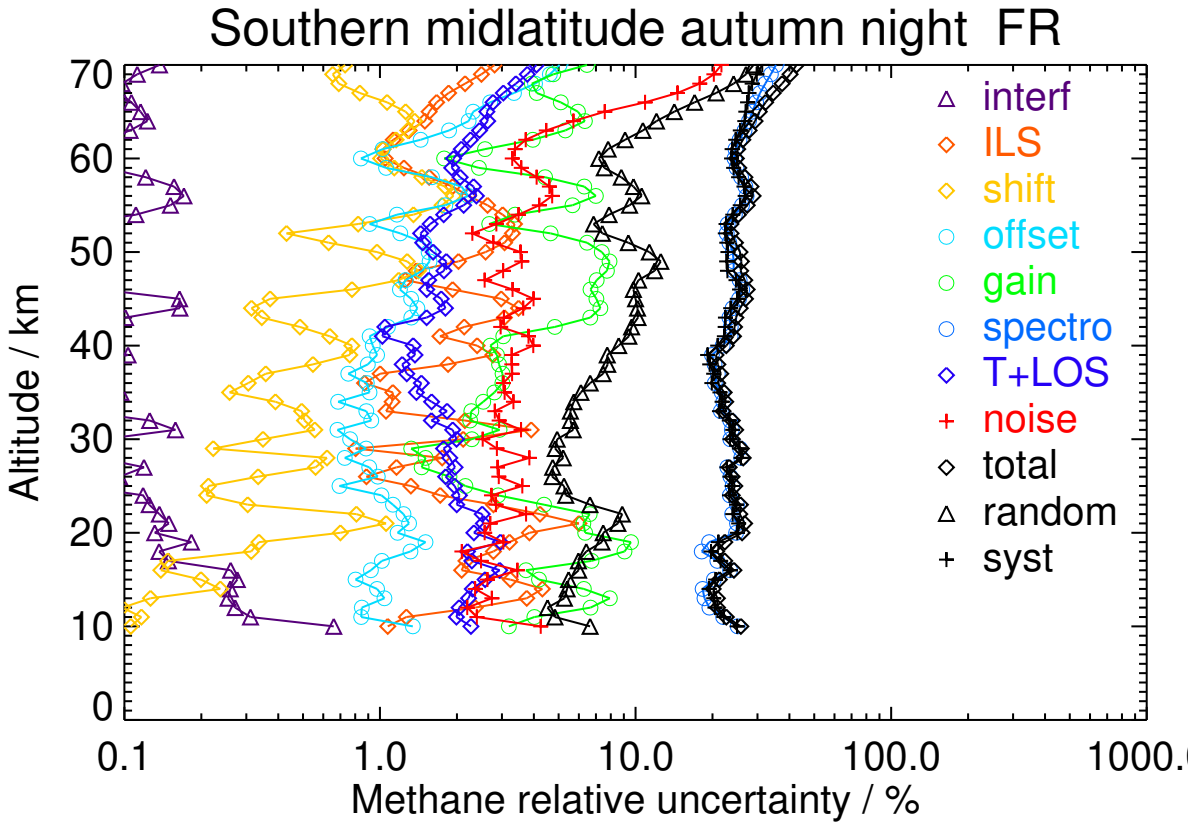

Figure S26. V8H_CH4_61 Southern midlatitude autumn night

Table S27. Methane error budget for Southern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1728.40	30.76	8.41	1.45	31.97	58.62	338.44	53.37	78.99	153.19	325.03	359.32
12	1731.06	11.51	12.54	3.17	26.65	71.85	375.50	63.50	68.37	114.32	377.90	394.82
15	1426.38	13.48	18.39	4.97	24.68	59.63	293.79	62.47	71.46	112.65	295.54	316.28
18	1134.57	5.24	21.74	6.04	18.53	49.24	277.63	46.72	51.81	92.24	277.03	291.98
21	1005.48	3.34	15.60	9.42	14.98	45.23	249.82	31.12	48.83	78.21	249.52	261.49
24	547.81	1.09	11.14	2.52	8.88	11.48	160.22	20.59	42.34	60.83	156.62	168.02
27	370.08	1.08	9.68	1.94	8.70	4.89	89.63	12.74	35.57	45.93	86.89	98.28
30	408.29	0.76	12.28	1.46	7.84	6.76	100.13	11.57	31.47	42.57	97.97	106.82
33	270.19	0.56	5.93	1.74	6.38	4.61	67.22	7.70	29.13	36.30	64.88	74.34
36	199.03	0.40	3.33	2.69	4.70	3.75	47.95	5.02	23.73	27.99	46.47	54.25
39	169.24	0.31	4.11	1.13	3.28	5.38	39.16	3.75	17.19	20.43	38.51	43.60
42	183.12	0.31	2.12	1.39	3.04	4.10	47.56	3.36	17.14	20.64	46.62	50.99
45	210.34	0.36	3.71	2.12	3.43	12.06	44.24	4.84	14.00	20.65	43.88	48.50
48	209.65	0.20	2.10	1.21	1.77	6.52	51.04	1.89	7.94	13.81	50.33	52.19
52	202.92	0.24	2.92	2.29	3.17	12.13	43.11	2.80	10.95	16.23	43.52	46.45
56	145.72	0.35	5.97	3.27	3.69	10.27	48.49	3.31	11.24	20.73	47.17	51.52
60	122.34	0.16	1.68	1.27	2.32	4.46	33.09	2.08	9.08	13.91	31.90	34.81
64	86.68	0.24	1.54	1.37	2.00	4.54	28.34	1.93	8.32	12.61	27.31	30.08
68	56.64	0.22	1.61	1.35	4.89	5.36	22.72	1.81	21.58	24.50	21.02	32.28

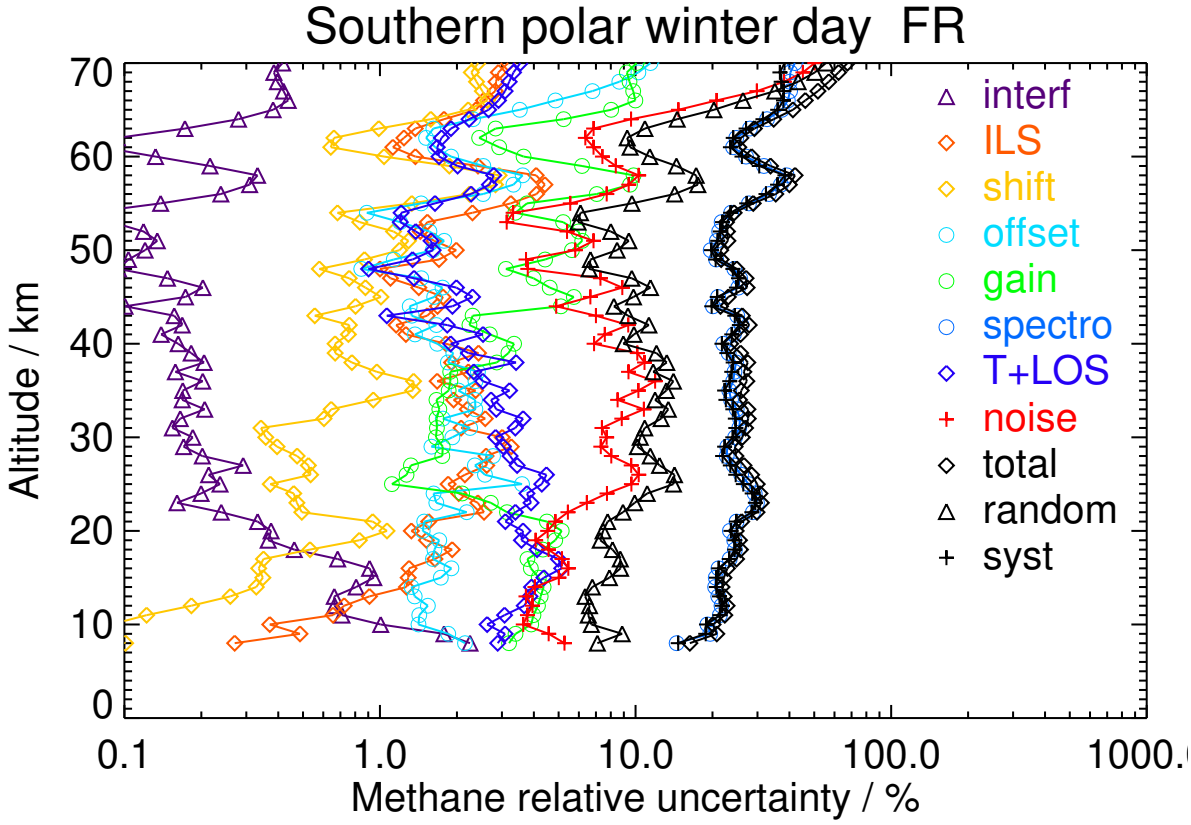

Figure S27. V8H_CH4_61 Southern polar winter day

Table S28. Methane error budget for Southern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1690.76	27.07	5.47	1.12	28.33	56.94	222.13	39.30	71.68	110.27	220.62	246.64
12	1722.99	9.80	20.73	2.26	20.49	57.42	310.91	47.30	53.24	94.20	311.62	325.55
15	1442.18	12.34	30.14	3.97	21.79	53.33	233.88	54.43	62.36	107.76	233.10	256.80
18	1163.56	4.53	23.28	4.36	16.62	41.48	237.68	37.40	46.79	84.88	235.49	250.32
21	1011.86	2.39	14.40	8.81	15.83	44.88	208.47	28.52	46.10	70.66	209.67	221.26
24	724.71	0.97	14.50	4.20	11.85	22.59	188.07	23.04	44.21	68.29	184.58	196.81
27	415.03	0.93	7.58	2.08	9.78	7.79	108.80	16.03	38.86	59.98	101.12	117.57
30	347.57	0.66	10.76	1.43	7.84	4.48	88.47	11.29	32.09	46.34	83.89	95.83
33	314.99	0.38	5.06	1.68	6.56	5.84	77.32	9.12	29.60	38.85	74.39	83.92
36	230.68	0.35	5.34	2.57	4.78	6.08	61.55	6.32	24.51	31.77	59.28	67.26
39	197.35	0.33	4.16	1.34	3.38	7.58	50.18	4.60	19.11	24.94	48.69	54.71
42	168.55	0.33	2.81	1.76	3.23	5.55	43.59	3.94	18.24	23.48	41.83	47.96
45	177.87	0.26	2.75	1.73	3.25	10.33	39.86	4.39	13.76	18.82	39.63	43.88
48	179.91	0.18	2.77	1.13	1.90	5.14	44.39	1.86	9.36	14.50	43.48	45.84
52	154.77	0.23	3.37	1.87	3.03	9.49	36.84	2.19	11.18	15.90	36.72	40.02
56	138.40	0.25	4.45	2.45	2.73	7.65	36.97	2.37	9.22	17.31	35.35	39.36
60	108.97	0.17	1.84	1.40	2.34	5.29	29.22	1.97	8.95	15.32	27.24	31.25
64	78.92	0.20	1.23	1.17	1.83	3.17	25.45	1.96	8.16	11.83	24.39	27.11
68	55.22	0.22	1.79	1.17	4.83	3.96	21.88	2.03	21.34	24.50	19.53	31.34

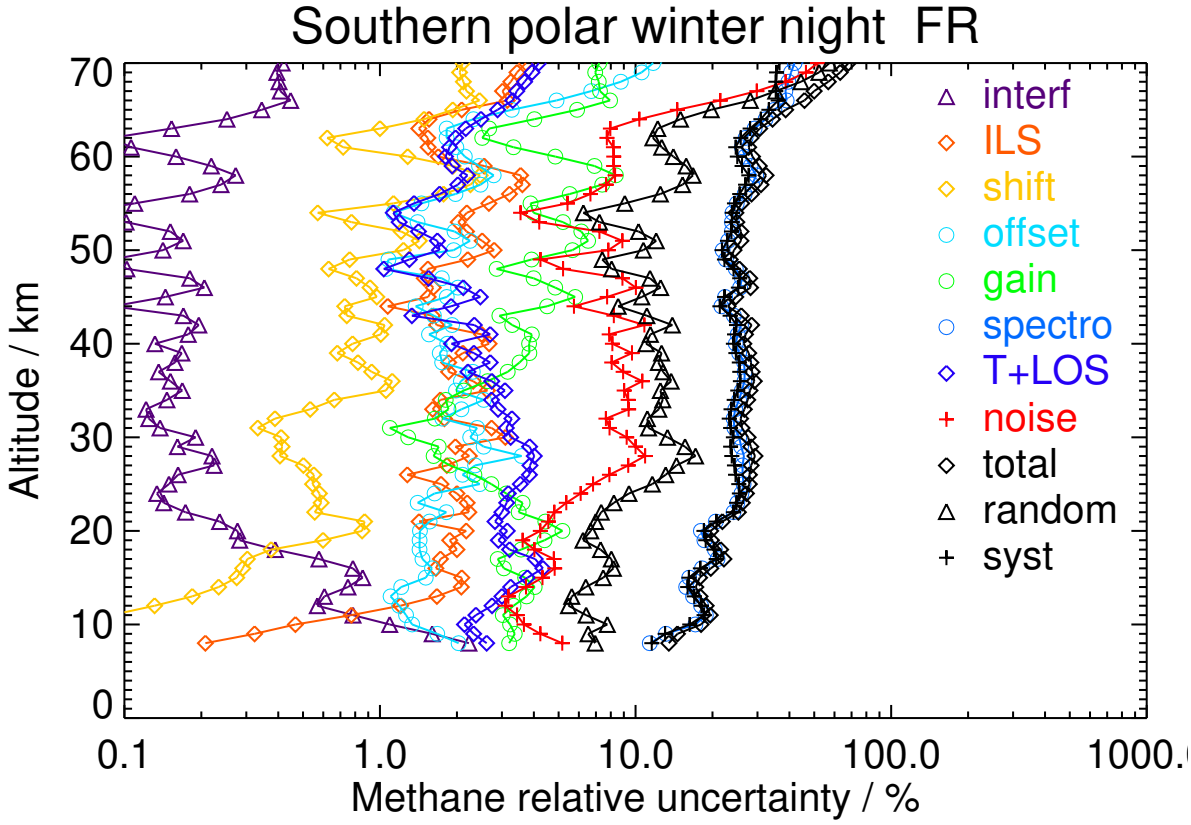

Figure S28. V8H_CH4_61 Southern polar winter night

Table S29. Methane error budget for Southern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1797.35	15.47	13.56	3.74	29.04	59.33	368.60	59.81	79.01	146.21	359.32	387.93
12	1816.55	14.84	83.35	6.86	22.11	75.34	305.56	69.67	65.62	111.98	321.51	340.46
15	1319.71	9.34	34.97	8.54	19.38	31.00	280.88	61.84	67.74	115.20	277.05	300.04
18	922.35	3.81	27.91	4.45	9.95	17.37	208.57	53.51	45.38	82.67	206.89	222.80
21	413.52	0.83	21.58	3.83	7.33	6.76	119.87	24.64	35.63	59.02	115.51	129.72
24	374.05	1.19	14.25	2.67	3.91	13.50	100.09	13.34	31.54	56.38	91.77	107.70
27	351.28	3.40	13.36	3.99	4.11	7.88	125.46	11.07	29.34	94.13	90.27	130.42
30	544.34	2.44	35.48	4.94	5.32	37.59	142.32	14.75	29.89	104.91	114.41	155.23
33	542.55	1.17	10.45	3.22	5.23	12.77	127.38	10.29	24.93	64.71	114.35	131.39
36	454.47	0.88	14.40	3.94	5.41	20.86	99.47	7.74	21.38	43.03	96.17	105.36
39	443.37	0.63	14.08	3.44	4.49	21.72	92.61	6.00	17.03	37.67	90.48	98.01
42	406.44	0.44	17.83	3.76	4.04	24.76	93.64	5.57	13.61	37.88	92.26	99.73
45	404.85	0.62	30.68	4.81	7.20	52.72	91.44	7.75	10.62	55.37	96.25	111.04
48	371.81	0.93	31.47	3.12	6.56	50.61	106.14	7.50	14.66	61.44	106.62	123.05
52	298.76	0.35	11.89	2.74	4.20	26.32	71.88	5.54	12.63	40.81	67.46	78.85
56	251.46	0.31	8.85	3.88	1.70	7.86	64.30	4.43	8.66	17.98	63.75	66.24
60	209.28	0.24	5.28	3.87	3.36	10.37	56.58	3.82	9.75	17.27	56.35	58.93
64	185.56	0.22	2.18	2.33	1.74	5.81	50.73	2.91	5.73	12.47	50.07	51.60
68	168.14	0.19	3.05	1.57	4.32	5.99	52.61	3.46	17.86	24.15	50.81	56.26

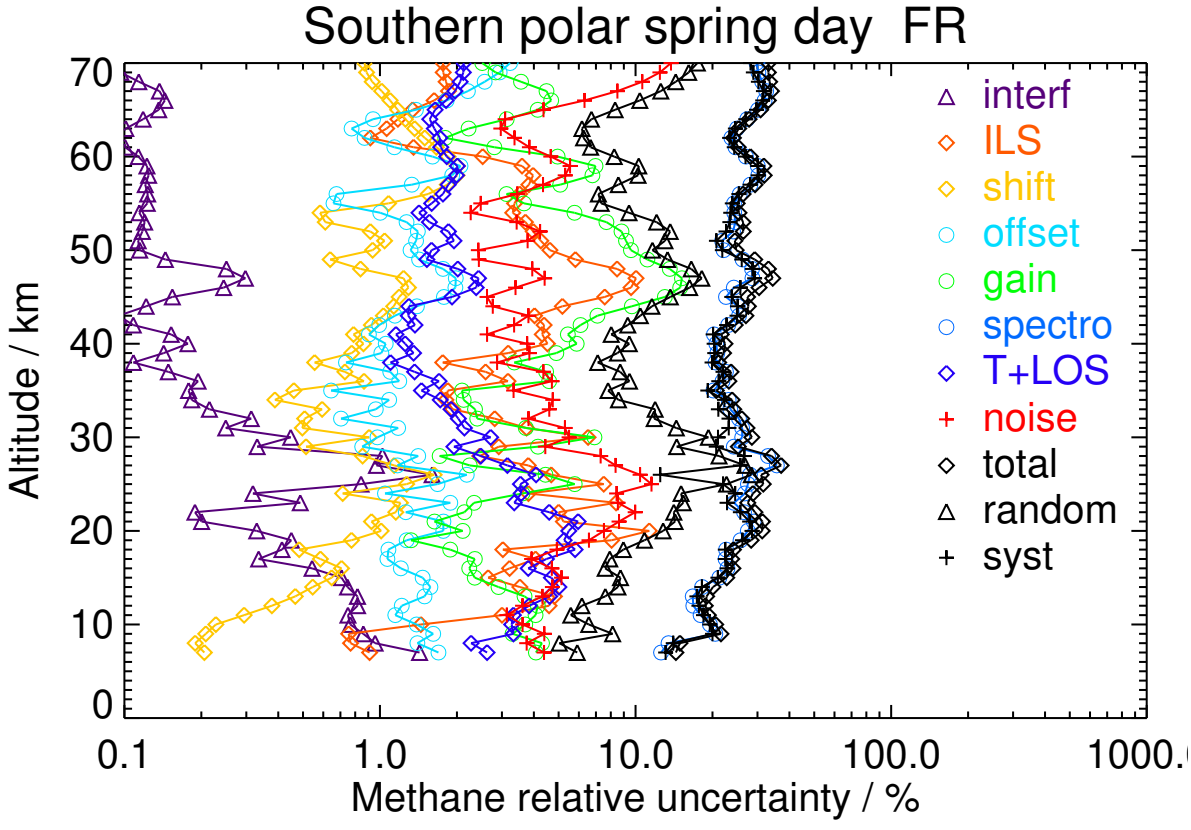

Figure S29. V8H_CH4_61 Southern polar spring day

Table S30. Methane error budget for Southern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1761.25	11.06	13.96	2.22	27.95	51.32	402.46	56.19	75.58	129.06	397.40	417.83
12	1787.98	8.98	83.24	7.60	18.55	79.85	300.54	55.37	57.31	126.16	307.48	332.35
15	1289.57	6.26	50.92	7.69	18.15	51.08	298.53	54.42	61.14	125.82	292.60	318.51
18	1032.05	3.85	40.18	7.26	12.23	43.20	217.62	57.44	49.19	108.15	212.32	238.28
21	771.05	1.49	55.78	8.18	9.68	24.22	193.04	32.52	43.02	94.69	187.27	209.85
24	677.11	1.05	50.21	9.23	7.26	50.51	210.74	20.70	38.36	151.45	169.07	226.98
27	624.46	3.86	29.99	6.78	6.81	29.32	203.82	17.22	36.36	133.46	164.97	212.19
30	602.15	1.62	30.18	4.50	6.67	25.33	179.51	17.09	31.81	113.74	149.04	187.48
33	551.20	1.54	19.06	3.69	6.63	14.50	144.56	13.57	28.45	76.01	129.41	150.08
36	446.51	0.81	10.08	2.76	5.54	18.11	110.81	8.46	23.15	49.30	104.52	115.57
39	414.26	0.66	16.62	2.95	5.05	25.69	102.32	6.68	18.87	44.74	99.19	108.82
42	392.04	0.59	14.75	3.12	5.09	26.49	99.22	6.60	16.50	40.94	97.15	105.43
45	362.45	0.40	11.08	2.00	4.47	27.30	78.08	5.50	11.74	34.27	77.34	84.59
48	328.12	0.55	10.76	2.10	4.59	25.85	82.37	4.30	12.28	39.23	78.90	88.11
52	301.50	0.31	6.19	2.41	3.55	15.27	69.14	4.43	12.78	26.38	67.51	72.48
56	239.49	0.32	7.51	4.37	2.85	11.73	59.15	4.50	9.61	18.92	58.94	61.90
60	186.56	0.27	3.58	3.71	3.75	10.93	47.85	3.74	9.96	16.85	47.74	50.63
64	143.46	0.25	2.48	2.29	2.20	7.14	40.86	3.09	6.84	14.82	39.67	42.35
68	98.53	0.23	2.71	1.96	4.77	9.88	35.77	3.41	18.53	24.11	34.42	42.02

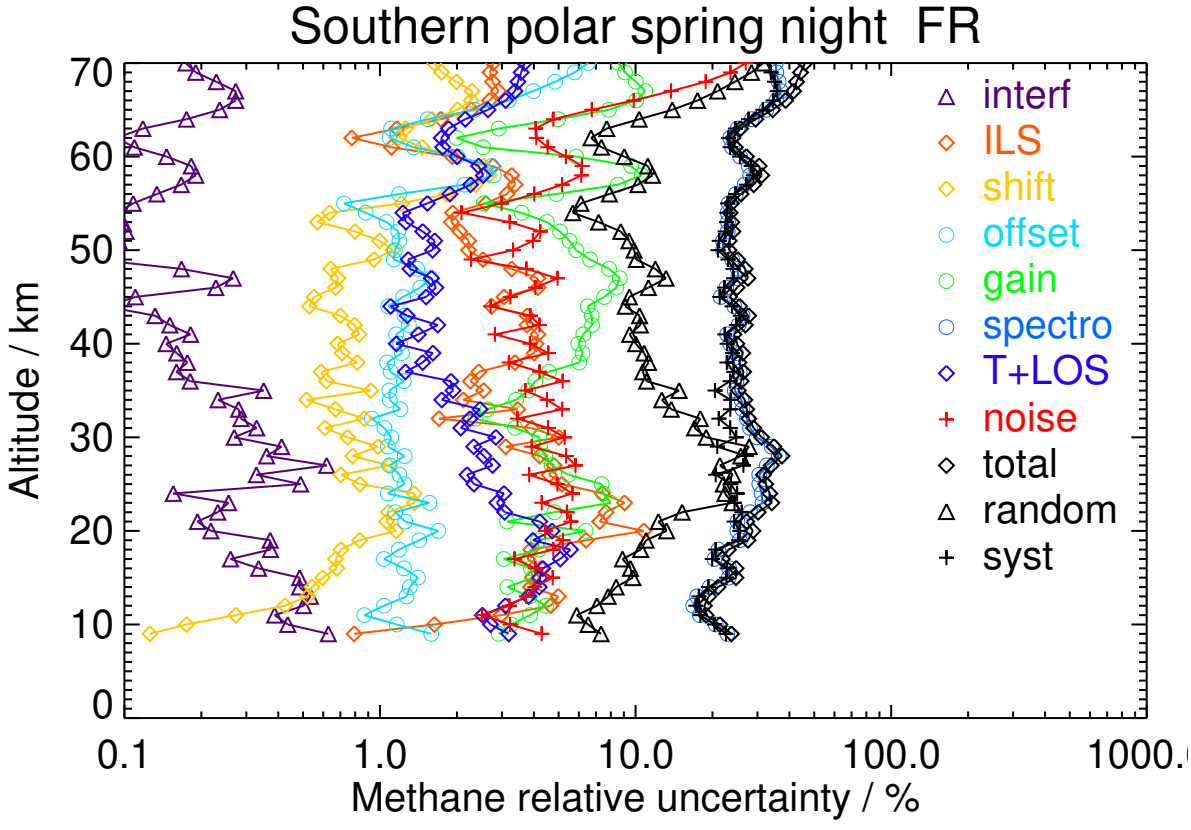

Figure S30. V8H_CH4_61 Southern polar spring night

Table S31. Methane error budget for Southern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1631.40	21.95	10.77	1.24	22.55	81.93	301.04	38.53	76.61	164.56	280.56	325.26
12	1684.67	3.49	23.43	1.59	10.36	65.71	342.44	24.17	37.39	69.39	345.58	352.47
15	1525.00	6.53	58.70	3.17	13.22	84.93	336.56	40.04	44.01	131.35	332.33	357.35
18	1296.62	2.26	56.00	3.03	11.58	60.30	304.41	43.27	41.36	105.93	303.22	321.20
21	1155.77	2.05	41.26	3.62	9.07	39.25	297.26	30.97	42.14	83.02	295.89	307.32
24	1133.25	1.08	60.37	11.73	7.84	32.91	296.29	27.15	41.92	76.59	298.90	308.56
27	960.46	0.90	54.76	5.73	8.32	35.02	258.00	22.77	40.62	60.56	263.43	270.30
30	919.20	2.33	32.54	3.84	6.17	14.62	228.00	20.78	37.61	54.05	228.56	234.86
33	792.61	1.18	35.46	3.62	5.36	22.11	165.59	14.35	30.99	39.75	169.70	174.29
36	671.23	0.84	10.39	1.99	5.01	14.24	145.69	9.85	25.27	37.05	144.66	149.33
39	508.13	0.79	15.76	2.91	4.70	18.59	117.04	7.74	22.73	29.73	118.39	122.06
42	350.56	0.41	7.13	3.13	3.20	7.54	94.69	6.67	21.20	27.10	94.09	97.92
45	289.65	0.42	22.76	4.72	4.70	29.79	49.51	5.74	14.73	24.42	59.62	64.43
48	180.80	0.31	5.53	0.94	2.46	11.65	66.58	2.86	12.93	23.09	65.18	69.15
52	152.56	0.40	4.00	1.97	3.40	14.20	39.99	3.21	18.30	24.65	39.63	46.67
56	72.81	0.30	5.19	1.63	2.33	8.21	22.29	2.76	12.54	16.19	22.41	27.64
60	95.41	0.23	3.25	1.33	1.46	3.31	21.18	1.43	6.73	10.97	20.03	22.83
64	111.57	0.31	1.03	2.78	1.80	7.01	38.66	1.65	5.89	10.27	38.57	39.92
68	150.32	0.25	1.48	2.76	2.76	6.17	42.93	2.38	11.01	13.90	42.81	45.01

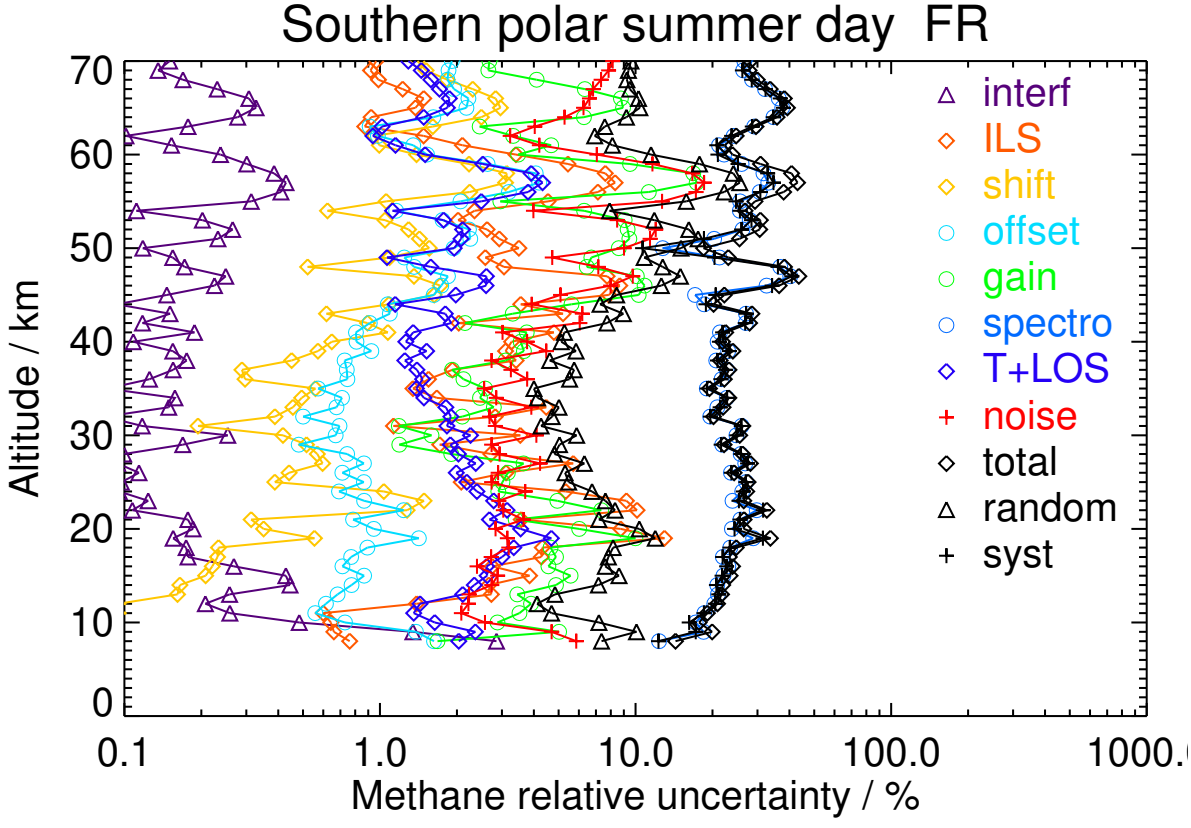

Figure S31. V8H_CH4_61 Southern polar summer day

Table S32. Methane error budget for Southern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1666.27	22.59	8.90	1.29	20.38	80.01	268.42	38.13	69.31	170.90	237.72	292.77
12	1708.85	2.45	14.84	1.14	9.99	56.37	355.86	25.30	30.13	65.97	356.84	362.89
15	1765.85	5.56	85.59	5.45	16.27	138.26	323.13	42.96	42.14	108.89	350.64	367.16
18	1499.96	1.57	44.84	3.94	11.66	95.67	336.29	34.44	33.18	93.24	343.51	355.94
21	1253.06	0.86	53.79	12.14	14.05	100.85	327.41	30.70	33.18	113.97	331.15	350.21
24	1122.03	0.86	34.95	4.09	10.35	49.79	293.86	22.31	31.71	74.97	293.36	302.79
27	957.08	1.47	21.96	3.56	8.77	21.64	227.60	18.49	30.59	48.03	227.63	232.64
30	865.14	0.87	9.04	1.91	7.06	7.42	225.51	15.57	27.91	39.83	224.68	228.18
33	741.63	1.17	19.14	3.33	6.54	22.23	163.67	12.26	24.91	35.06	165.06	168.75
36	566.23	0.64	8.38	1.36	5.33	13.30	126.15	8.78	22.54	28.18	126.42	129.53
39	388.96	0.53	12.20	2.69	4.58	15.46	84.09	5.85	20.92	25.28	85.56	89.22
42	221.33	0.42	9.07	1.71	3.65	6.67	69.66	5.02	21.37	25.68	69.41	74.01
45	189.45	0.51	16.70	1.92	4.38	23.20	46.36	5.35	18.93	25.20	52.36	58.10
48	109.42	0.22	2.13	1.00	1.16	4.44	31.60	1.15	6.13	11.59	30.49	32.62
52	82.32	0.19	1.16	1.30	2.12	7.56	21.03	1.50	9.21	13.70	20.16	24.37
56	106.99	0.24	4.45	1.75	2.11	6.20	28.92	1.72	9.39	14.30	28.09	31.52
60	171.33	0.14	2.91	1.82	1.47	4.16	41.29	2.24	6.15	14.68	39.55	42.18
64	172.82	0.44	1.68	2.73	2.54	7.75	49.88	2.49	7.53	12.84	49.63	51.26
68	159.29	0.27	1.43	1.74	3.44	4.71	43.60	3.54	15.11	17.07	43.47	46.70

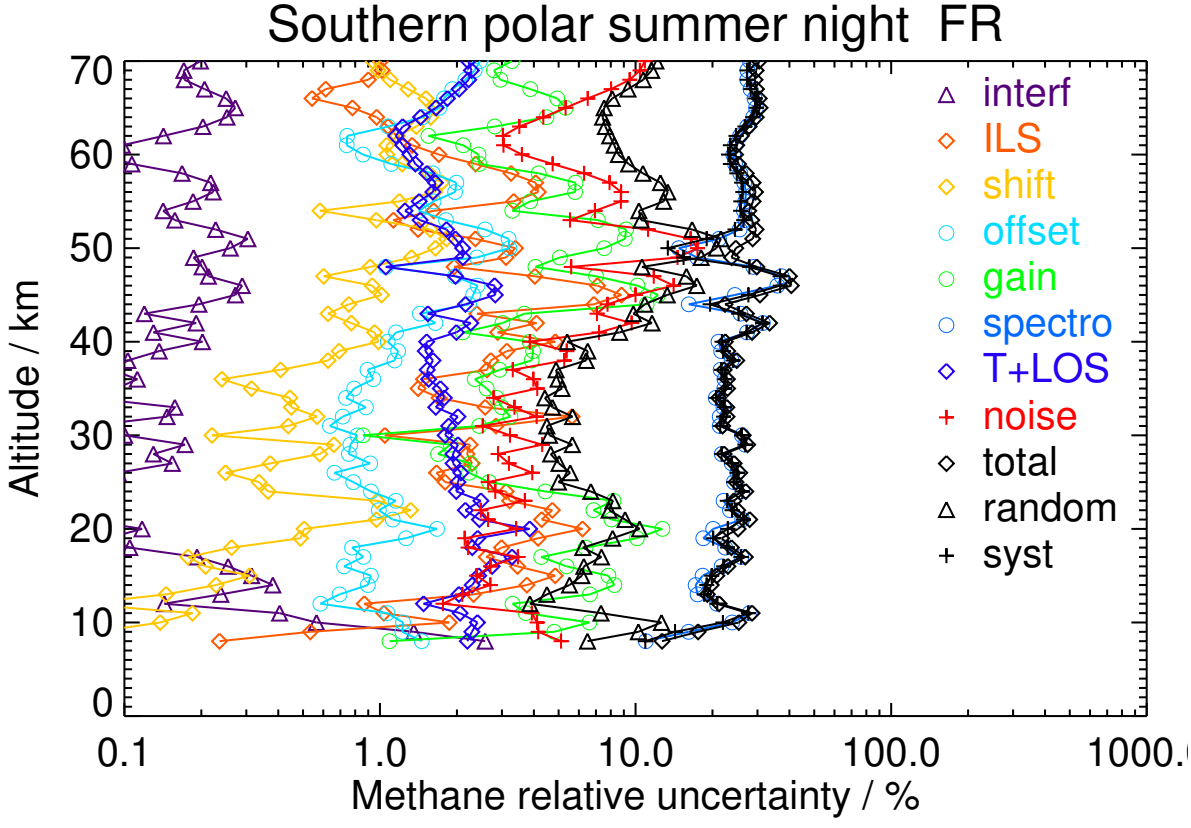

Figure S32. V8H_CH4_61 Southern polar summer night

Table S33. Methane error budget for Southern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1692.53	63.20	1.74	2.91	27.70	63.24	473.24	48.93	101.72	133.81	477.04	495.45
12	1754.13	4.44	17.17	1.92	10.38	88.19	323.61	30.75	35.37	60.37	333.89	339.30
15	1551.81	11.12	36.20	3.91	12.45	43.42	326.90	43.48	45.23	78.97	328.72	338.07
18	1375.14	3.14	25.26	5.47	13.21	100.18	272.31	32.26	37.02	64.31	288.65	295.73
21	1209.83	2.34	21.43	13.51	16.04	95.88	278.79	24.68	33.24	58.64	293.42	299.22
24	1038.03	1.66	21.52	5.09	13.71	58.61	245.34	21.51	32.33	53.42	250.92	256.54
27	807.87	1.27	8.18	1.88	10.38	18.62	190.45	18.58	31.10	46.21	189.67	195.22
30	666.81	0.51	5.27	2.54	7.89	12.14	166.35	17.65	25.18	39.71	165.18	169.88
33	428.21	0.46	9.71	1.88	6.24	11.79	111.89	11.35	21.64	34.80	110.37	115.73
36	224.36	0.30	4.99	1.77	4.23	9.39	61.01	5.74	17.40	29.57	57.60	64.75
39	123.40	0.26	5.49	1.52	2.96	6.30	31.72	3.21	13.23	19.65	29.77	35.67
42	88.25	0.23	3.09	0.73	2.28	3.58	22.77	1.64	11.06	14.14	21.71	25.91
45	109.63	0.39	4.59	1.08	2.93	5.96	27.58	2.58	15.41	18.83	26.77	32.73
48	163.88	0.14	1.31	1.57	2.24	7.20	36.12	3.09	7.99	12.58	35.79	37.94
52	221.36	0.15	5.06	0.75	2.38	7.71	51.49	2.42	6.12	10.43	51.73	52.78
56	209.78	0.25	5.24	2.17	4.18	11.56	46.64	3.11	10.19	17.75	46.44	49.72
60	167.32	0.07	1.65	0.81	1.45	4.56	42.42	2.67	6.47	12.32	41.51	43.30
64	91.92	0.24	1.36	1.65	2.63	4.17	32.70	2.49	9.58	15.73	30.81	34.59
68	44.72	0.10	0.52	0.50	3.80	1.18	16.79	1.53	16.84	19.26	14.60	24.17

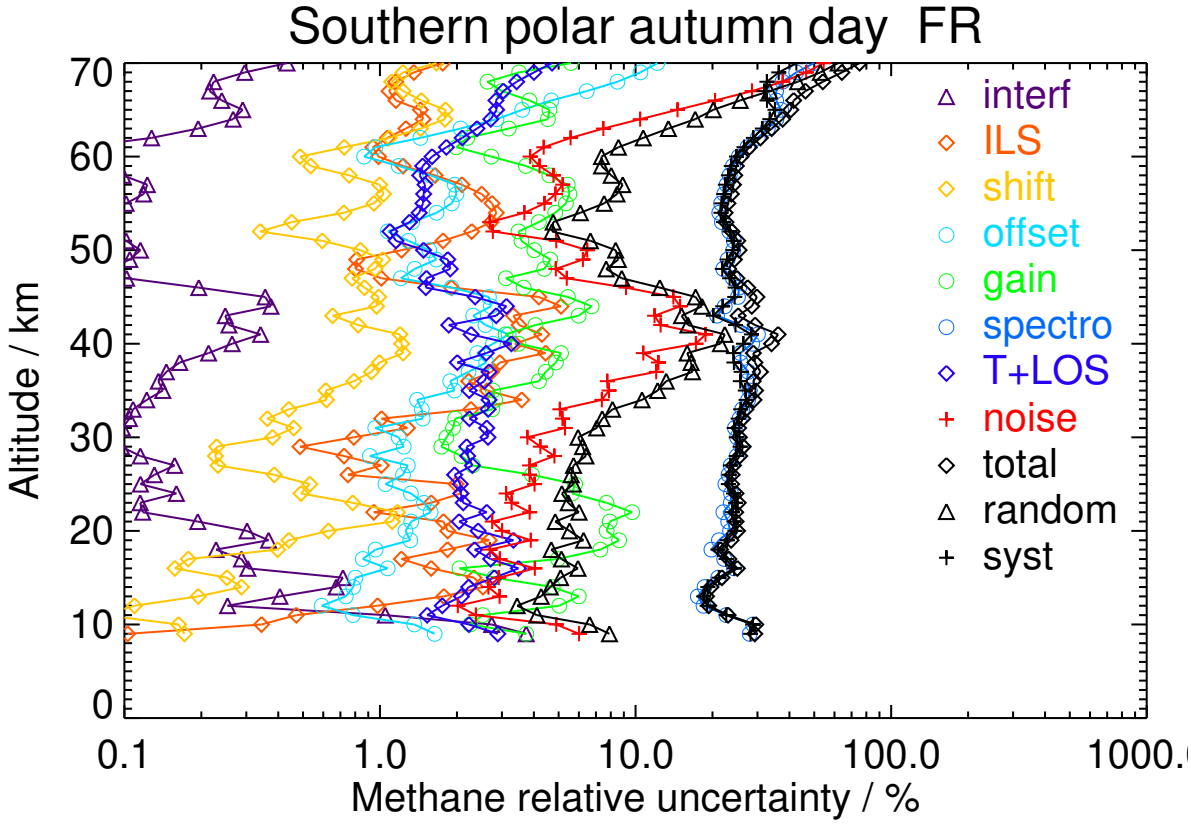

Figure S33. V8H_CH4_61 Southern polar autumn day

Table S34. Methane error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1706.65	31.30	1.76	1.79	23.34	52.79	292.35	35.58	71.94	164.17	263.20	310.20
12	1751.21	8.09	13.75	2.08	11.08	69.08	338.47	29.15	33.49	69.79	341.78	348.83
15	1623.13	11.35	47.95	6.21	13.74	66.63	308.03	43.91	46.14	88.52	313.36	325.62
18	1407.28	3.04	44.54	4.81	14.52	99.69	256.90	32.18	36.79	74.52	273.86	283.82
21	1205.42	2.13	23.44	10.36	16.68	93.70	260.21	25.86	34.38	70.68	272.55	281.56
24	1015.13	1.25	16.63	7.16	15.02	55.11	230.94	21.73	34.60	61.56	234.10	242.06
27	773.07	1.02	9.32	2.48	11.90	16.43	181.29	18.21	33.38	51.16	179.45	186.60
30	617.60	0.55	3.73	1.87	9.35	11.51	157.84	16.77	27.32	46.18	155.07	161.80
33	350.68	0.39	6.23	1.29	7.00	7.27	97.85	10.08	22.96	45.14	91.15	101.71
36	168.21	0.25	3.29	1.28	4.75	5.44	47.21	4.88	19.29	32.39	40.50	51.86
39	106.11	0.22	4.12	1.14	3.20	4.79	28.33	3.11	14.74	21.25	25.08	32.88
42	105.16	0.22	3.28	0.88	2.59	4.04	28.00	2.05	14.27	18.25	26.33	32.04
45	155.76	0.31	2.32	1.12	2.85	6.45	38.40	3.74	15.08	20.08	37.01	42.10
48	188.60	0.13	2.02	1.30	2.30	7.70	43.61	3.14	7.80	12.06	43.56	45.20
52	195.28	0.19	3.68	0.97	2.34	6.63	46.87	2.21	9.41	13.94	46.47	48.52
56	144.66	0.15	4.24	1.24	2.73	7.28	35.25	2.32	8.85	15.37	34.21	37.50
60	97.77	0.08	1.13	0.62	1.71	3.89	25.81	1.87	7.42	13.29	23.83	27.28
64	59.40	0.19	1.56	1.35	2.14	3.23	21.62	2.04	8.48	13.93	19.21	23.73
68	26.23	0.10	0.77	0.60	4.02	1.54	12.46	1.23	17.75	19.94	9.69	22.16

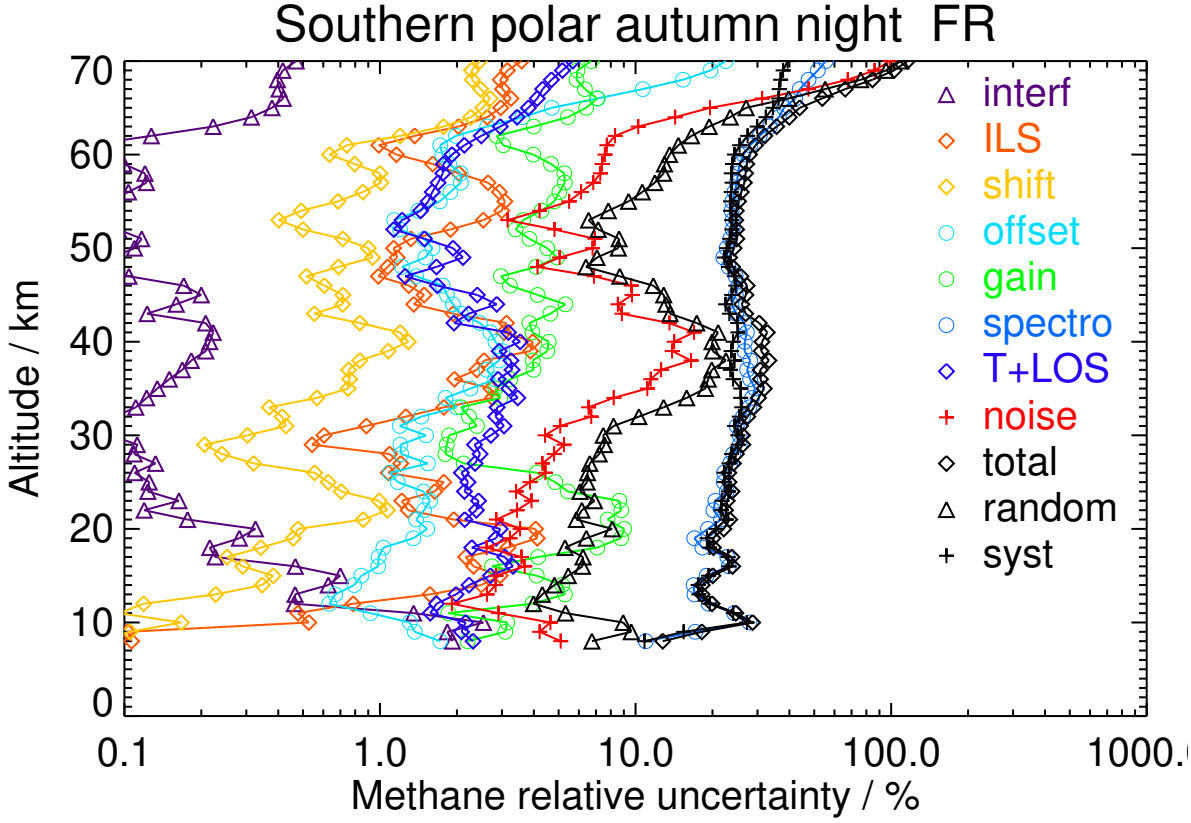

Figure S34. V8H_CH4_61 Southern polar autumn night

Table S35. Methane error budget for Northern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1746.26	21.62	22.64	2.77	18.81	47.11	430.83	51.32	79.44	114.98	430.00	445.11
15	1481.96	19.82	25.62	3.15	10.94	33.75	320.66	33.72	40.29	75.54	319.68	328.48
18	1305.88	4.77	43.53	2.61	5.50	66.42	328.15	27.91	28.89	94.43	326.72	340.09
21	1309.03	2.08	43.39	2.04	5.85	58.00	359.46	21.19	26.50	90.30	357.07	368.31
24	1214.42	1.88	32.58	1.49	5.21	33.95	281.37	17.85	26.12	63.41	279.99	287.08
27	1155.32	1.44	24.49	1.66	7.76	30.66	268.84	20.94	30.92	62.53	267.15	274.37
30	980.98	0.94	13.80	1.66	6.12	22.69	238.07	19.64	24.29	79.12	228.35	241.66
33	750.91	0.81	5.51	2.17	3.52	12.33	186.63	16.06	22.96	53.72	181.47	189.25
36	492.62	1.04	8.39	1.90	3.12	15.10	119.60	8.40	20.07	39.46	116.34	122.85
39	381.19	1.13	8.35	1.17	3.17	11.80	81.59	6.24	20.31	30.57	79.97	85.61
42	329.13	1.03	7.63	1.18	3.20	9.92	66.68	5.56	20.55	26.86	65.93	71.19
45	274.68	0.71	5.13	1.23	3.34	14.40	59.50	4.88	18.65	27.01	58.56	64.49
48	245.02	0.81	4.48	0.77	4.71	22.34	52.92	5.96	17.40	22.67	56.29	60.68
52	183.22	0.26	1.39	0.43	2.48	7.02	42.83	3.98	13.06	15.89	42.73	45.59
56	165.29	0.23	1.12	0.42	1.64	2.99	38.94	3.90	12.85	14.63	38.67	41.35
60	118.11	0.17	0.60	0.24	1.65	1.74	28.91	3.15	14.70	16.40	28.27	32.68
64	52.86	0.27	1.50	0.21	2.98	2.05	16.86	1.82	17.24	18.85	15.64	24.50
68	10.66	0.33	2.16	0.27	5.40	3.61	12.41	1.06	24.69	26.43	10.63	28.49

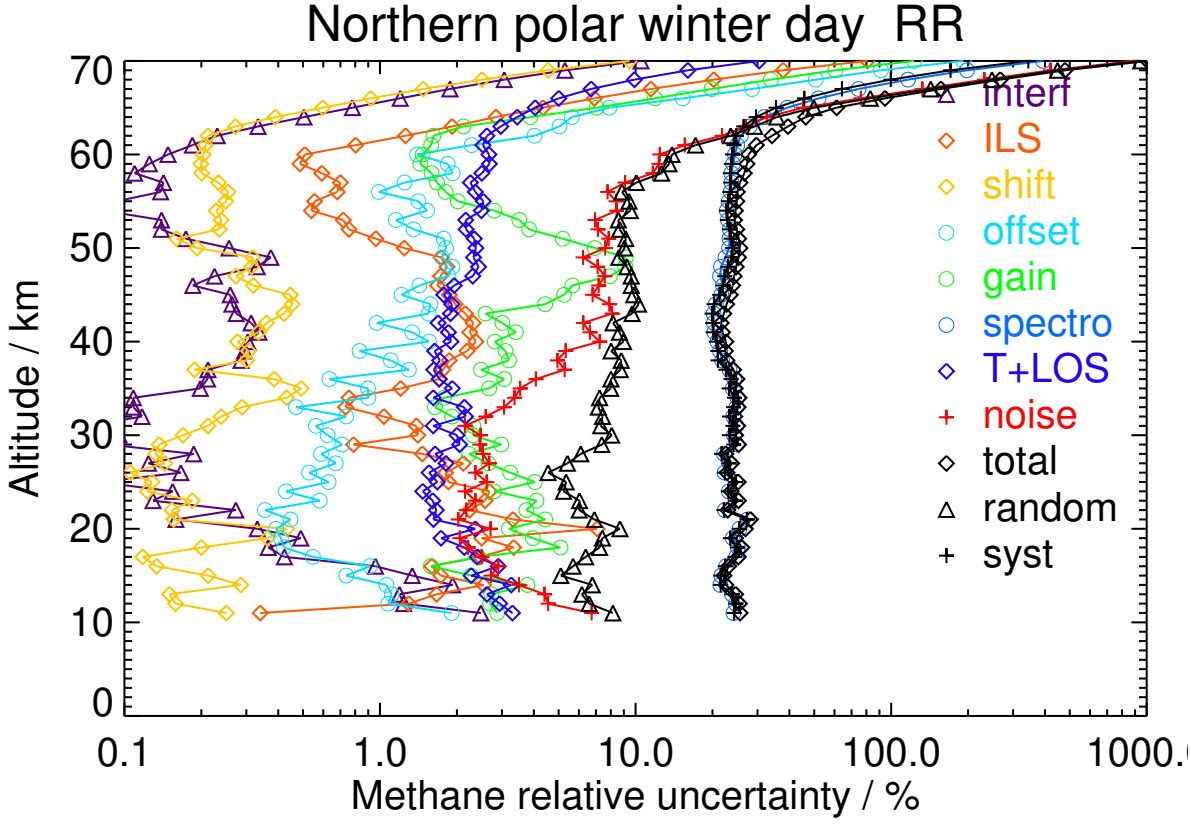

Figure S35. V8R_CH4_261 Northern polar winter day

Table S36. Methane error budget for Northern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1923.46	39.60	25.18	3.22	32.32	73.90	391.36	75.21	118.10	149.88	398.77	426.01
12	1792.23	22.84	34.25	2.99	18.80	51.22	403.16	50.66	81.95	109.44	405.62	420.12
15	1457.38	22.83	31.20	2.50	14.15	20.09	312.26	42.46	50.96	84.35	311.28	322.51
18	1303.36	5.87	18.95	4.24	6.57	34.66	327.82	31.47	35.28	78.82	324.26	333.71
21	1057.78	1.72	42.32	2.24	7.23	44.34	314.99	23.90	33.35	115.44	302.31	323.60
24	928.85	2.98	26.30	2.59	4.15	28.65	206.55	14.34	22.26	104.76	184.21	211.92
27	939.22	1.60	16.69	2.28	7.67	18.54	249.34	18.07	30.02	111.67	227.20	253.16
30	889.99	4.30	20.93	4.22	6.47	34.98	174.23	14.21	20.32	80.23	162.09	180.86
33	668.08	2.14	10.39	3.08	4.94	25.55	156.42	11.72	23.08	57.54	150.41	161.04
36	413.39	2.29	13.43	2.57	4.18	17.86	100.17	5.78	20.15	46.40	94.07	104.89
39	346.83	1.48	11.94	1.78	3.68	18.72	75.60	4.71	17.01	31.39	74.52	80.86
42	351.64	1.40	14.49	2.15	3.13	15.81	73.97	4.43	14.38	26.31	74.04	78.58
45	341.86	1.10	10.45	2.45	2.53	10.78	72.87	4.39	13.19	24.06	71.85	75.77
48	279.07	0.96	5.19	1.48	2.17	4.23	59.84	4.08	13.25	22.47	57.62	61.85
52	194.66	0.35	2.95	0.49	1.67	3.74	43.67	3.42	10.44	15.27	42.67	45.32
56	160.45	0.30	3.21	0.63	1.21	2.23	36.63	3.23	9.70	12.04	36.31	38.25
60	141.48	0.28	1.34	0.72	1.48	1.68	33.02	3.27	12.02	13.85	32.57	35.39
64	97.70	0.40	1.66	0.70	2.58	3.62	27.11	2.97	15.90	19.23	25.50	31.94
68	64.50	0.51	3.13	1.09	5.09	6.01	26.24	2.86	24.64	28.64	23.60	37.11

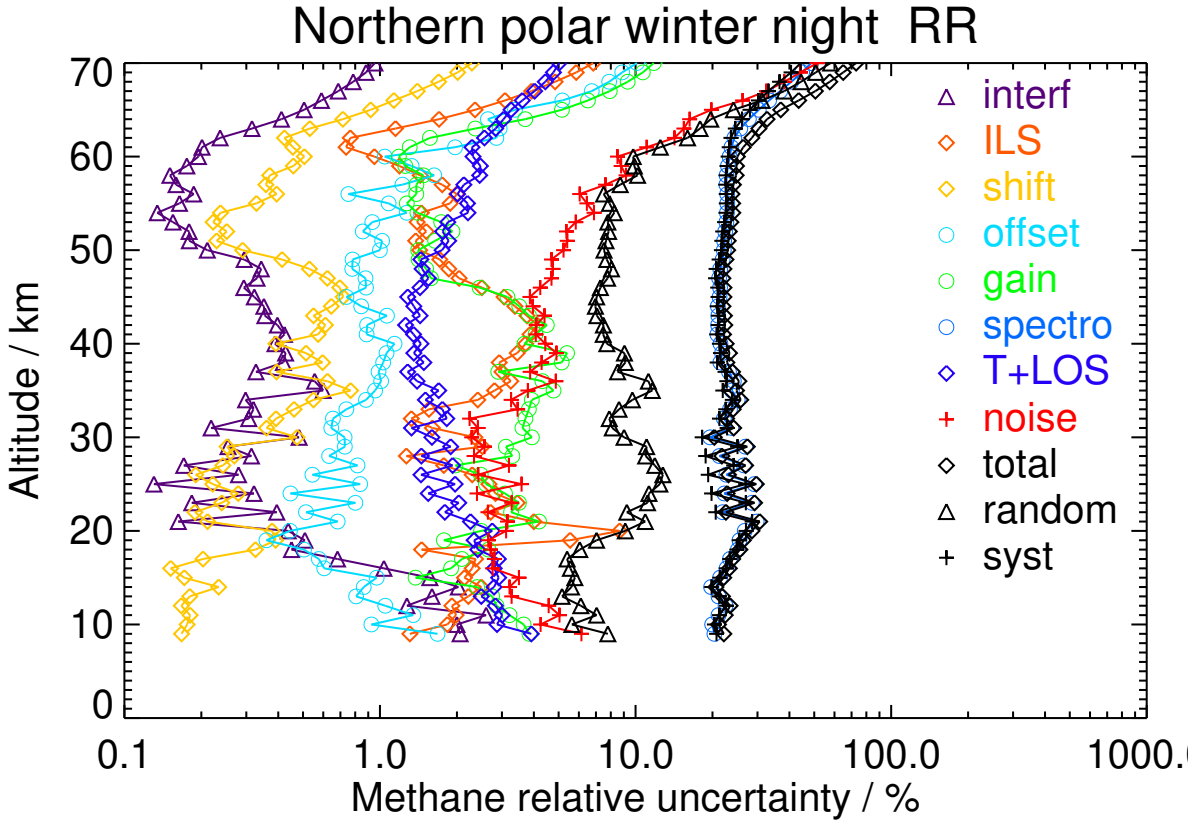

Figure S36. V8R_CH4_261 Northern polar winter night

Table S37. Methane error budget for Northern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1720.71	8.35	12.70	2.22	18.47	45.32	395.07	50.18	71.05	95.33	396.47	407.77
15	1507.60	5.81	24.82	2.26	12.48	47.66	292.80	44.84	47.43	77.19	295.16	305.09
18	1365.51	3.13	27.92	2.53	6.61	70.20	316.46	28.71	33.38	62.50	322.41	328.41
21	1174.56	1.19	23.33	2.15	6.04	50.80	279.57	23.90	33.50	51.48	283.50	288.13
24	1148.19	0.77	13.68	1.78	6.61	37.22	261.70	20.84	34.62	48.44	263.42	267.84
27	935.54	0.64	7.95	1.41	8.00	12.56	219.52	21.12	37.57	49.80	218.76	224.35
30	786.62	0.67	28.92	1.62	6.09	11.07	189.84	19.40	29.84	41.70	191.23	195.72
33	529.44	0.88	5.42	2.38	4.74	6.91	124.49	12.76	26.58	33.04	124.02	128.34
36	365.16	1.20	7.65	2.11	4.29	5.21	79.14	6.77	23.34	27.08	78.93	83.45
39	277.64	0.72	6.11	1.30	3.48	11.40	61.73	4.40	19.54	21.79	62.60	66.29
42	200.55	0.26	6.50	1.19	2.55	7.80	48.72	3.06	16.46	18.97	49.04	52.58
45	118.17	0.22	4.24	0.68	2.36	5.17	31.48	1.97	14.30	17.50	30.73	35.36
48	56.50	0.29	2.97	0.61	2.06	4.21	16.32	1.21	10.61	16.50	11.80	20.29
52	67.23	0.12	0.84	0.29	0.96	2.02	19.06	0.77	5.12	11.34	16.35	19.89
56	73.51	0.10	0.83	0.23	0.75	1.59	19.08	0.78	4.35	8.71	17.65	19.69
60	55.37	0.08	0.56	0.13	0.95	1.17	14.85	0.73	5.56	7.86	13.89	15.95
64	39.75	0.21	0.60	0.23	1.16	1.13	10.74	0.61	8.13	9.31	9.91	13.60
68	19.74	0.24	0.84	0.56	3.06	2.58	8.52	0.60	14.47	15.68	7.31	17.30

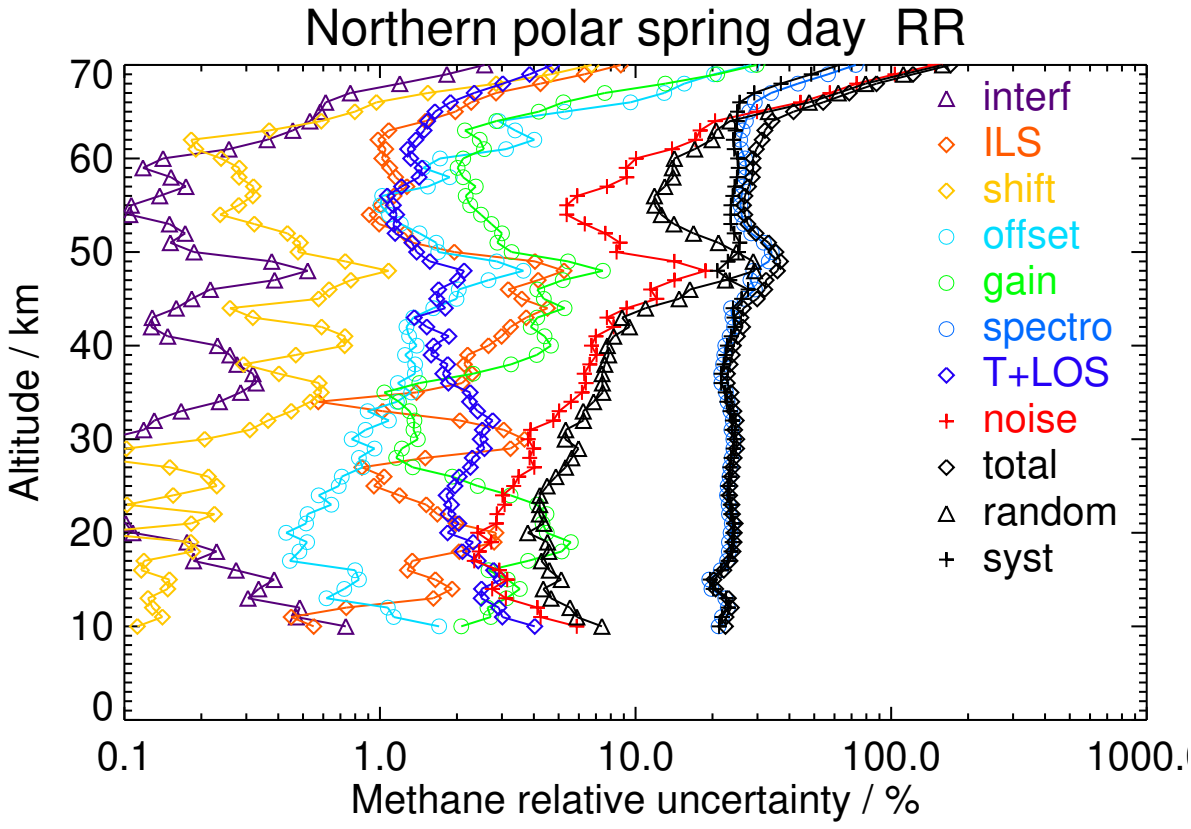

Figure S37. V8R_CH4_261 Northern polar spring day

Table S38. Methane error budget for Northern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1709.81	8.32	13.69	2.43	19.94	44.26	405.61	52.47	77.84	103.19	406.58	419.47
15	1626.37	5.35	18.34	2.23	13.31	38.62	337.09	42.76	46.36	74.98	337.67	345.90
18	1452.32	2.88	19.80	2.34	6.86	87.14	336.54	34.16	34.03	64.10	345.72	351.61
21	1246.59	1.19	12.40	2.43	7.42	70.71	304.74	25.15	35.73	54.15	311.55	316.22
24	1092.23	0.91	19.06	1.73	5.19	31.70	254.61	19.22	31.59	48.09	255.50	259.99
27	972.46	0.69	7.21	1.15	8.80	13.99	231.22	21.45	41.08	54.32	230.18	236.51
30	784.11	0.69	24.80	1.52	6.07	10.95	190.24	19.22	29.45	40.03	191.32	195.46
33	537.79	0.87	3.87	1.89	4.16	6.42	127.71	13.22	26.56	34.18	126.89	131.41
36	368.56	1.17	8.75	2.23	3.77	6.39	86.33	6.90	23.01	26.53	86.39	90.38
39	305.19	0.87	6.61	1.61	3.38	12.92	74.71	4.86	19.61	22.37	75.60	78.84
42	219.54	0.26	8.40	1.25	2.27	9.33	53.86	3.78	16.11	17.82	54.97	57.79
45	147.02	0.20	4.10	0.62	2.29	5.23	35.00	2.43	14.75	16.10	35.20	38.70
48	109.84	0.33	4.33	0.64	2.31	6.52	22.92	2.06	12.05	14.50	23.06	27.24
52	77.81	0.13	1.21	0.31	1.17	1.90	20.34	0.95	6.73	11.06	18.55	21.60
56	87.03	0.08	0.78	0.23	0.77	1.96	21.95	0.96	4.78	8.22	21.05	22.59
60	60.67	0.08	0.74	0.22	0.81	1.34	16.57	1.00	5.63	8.03	15.68	17.62
64	37.61	0.20	0.32	0.24	1.02	0.57	10.96	0.74	8.09	9.29	10.08	13.70
68	20.45	0.20	0.40	0.52	3.37	1.50	9.95	0.71	15.56	17.06	8.04	18.86

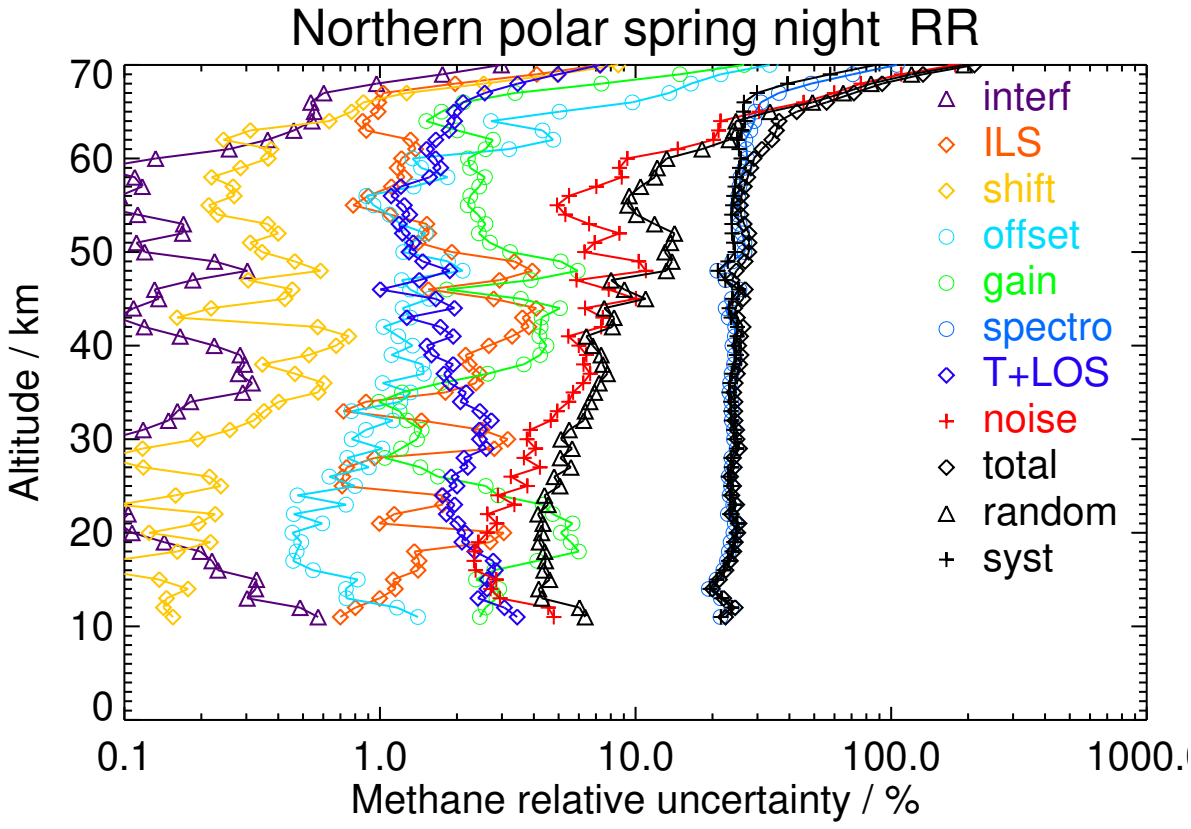

Figure S38. V8R_CH4_261 Northern polar spring night

Table S39. Methane error budget for Northern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1843.22	11.38	19.14	2.58	19.07	43.12	398.94	53.52	77.66	110.02	398.34	413.25
15	1769.22	9.07	50.49	4.24	12.23	59.32	346.03	46.57	46.92	87.66	350.34	361.14
18	1642.57	3.41	62.65	3.77	7.70	93.25	378.05	30.38	32.59	104.78	382.93	397.00
21	1286.26	2.09	53.06	5.24	7.70	31.79	342.99	29.63	34.90	74.09	343.75	351.64
24	1133.34	1.31	15.14	1.35	2.89	10.07	250.59	14.77	19.80	34.58	250.11	252.49
27	1073.63	0.76	11.63	4.05	8.13	9.79	256.00	21.70	34.10	44.32	255.97	259.78
30	916.31	0.69	45.73	1.85	3.83	24.81	171.90	12.46	19.03	28.22	178.88	181.09
33	706.98	1.00	6.83	2.52	3.72	18.81	141.71	9.61	22.30	27.40	142.63	145.23
36	502.13	1.89	18.49	3.26	3.66	10.51	109.96	5.70	22.60	26.03	111.52	114.52
39	317.43	1.31	8.29	1.66	3.05	11.66	70.06	3.20	20.37	22.72	70.96	74.51
42	244.09	0.59	7.42	1.27	2.37	9.36	56.11	2.28	17.20	19.66	56.69	60.00
45	174.75	0.39	4.11	0.74	2.42	6.43	50.26	1.99	16.94	20.36	49.67	53.68
48	119.15	0.31	9.05	0.95	2.54	10.56	27.74	2.22	14.87	20.33	27.99	34.59
52	76.46	0.24	3.65	0.28	1.77	4.06	18.74	1.02	10.87	16.37	15.34	22.44
56	71.85	0.12	1.37	0.32	0.97	1.81	18.02	0.67	5.94	8.10	17.35	19.15
60	69.17	0.17	0.66	0.27	0.86	0.63	17.50	0.69	4.53	5.86	17.16	18.13
64	72.01	0.25	1.14	0.25	0.80	0.90	19.55	0.79	6.16	7.08	19.33	20.58
68	96.49	0.53	2.23	1.06	1.91	3.24	27.39	1.22	10.30	11.66	27.25	29.64

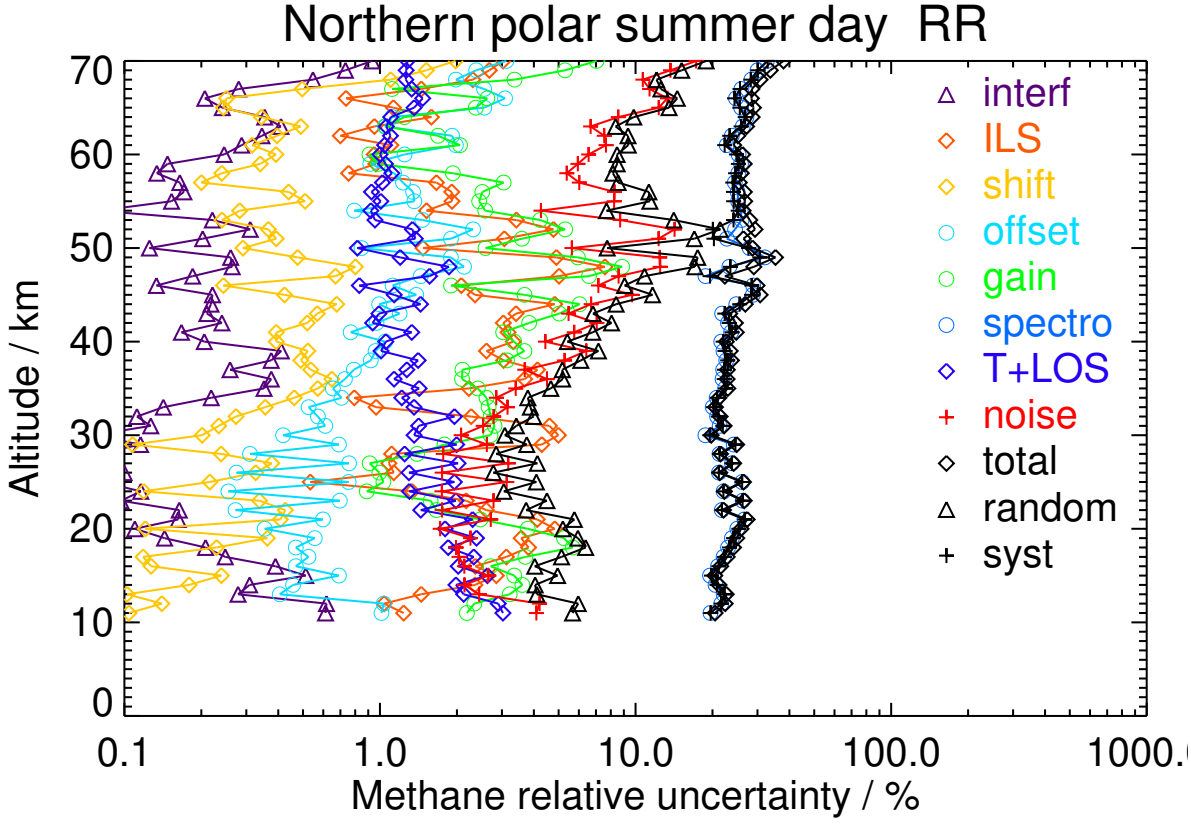

Figure S39. V8R_CH4_261 Northern polar summer day

Table S40. Methane error budget for Northern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
15	1841.87	6.03	33.34	1.72	26.62	20.83	428.98	89.31	78.34	127.97	429.02	447.70
18	1634.77	1.55	58.28	2.31	8.07	111.79	356.84	41.24	31.38	79.35	373.75	382.08
21	1347.15	1.28	31.34	3.32	7.87	75.16	344.22	28.89	31.63	72.11	349.04	356.41
24	1114.34	1.18	18.63	1.35	4.60	14.74	253.27	19.18	24.49	39.35	253.28	256.32
27	1028.79	0.64	13.90	2.68	7.20	12.11	249.39	21.09	31.36	42.17	249.49	253.02
30	839.76	0.93	32.92	2.13	4.86	20.38	169.09	16.22	21.09	34.06	172.25	175.58
33	590.09	0.98	5.83	1.82	3.68	15.37	131.73	12.62	23.77	29.62	132.24	135.52
36	370.82	1.69	13.70	2.42	3.73	11.63	84.28	5.87	24.04	27.01	85.62	89.78
39	231.98	0.64	7.39	0.89	2.80	10.73	55.44	3.49	21.89	24.46	56.08	61.19
42	156.86	0.45	8.40	0.76	2.51	6.48	41.44	2.58	18.84	21.28	41.78	46.89
45	86.61	0.24	3.47	0.28	2.59	4.79	20.63	1.58	16.69	18.98	19.71	27.36
48	79.30	0.23	2.87	0.41	1.97	4.32	19.72	1.31	11.40	14.38	18.57	23.48
52	77.51	0.08	0.95	0.22	1.09	1.63	19.16	0.82	6.79	9.63	18.06	20.46
56	92.53	0.12	0.58	0.36	0.79	2.15	23.52	1.10	5.05	10.26	21.91	24.20
60	119.11	0.20	0.88	0.42	0.92	2.46	32.38	1.61	5.76	14.46	29.72	33.05
64	170.73	0.48	1.35	0.73	1.47	2.18	44.71	2.40	8.60	14.60	43.30	45.69
68	178.15	0.79	1.15	1.65	3.86	2.84	51.63	3.62	18.83	23.75	49.98	55.33

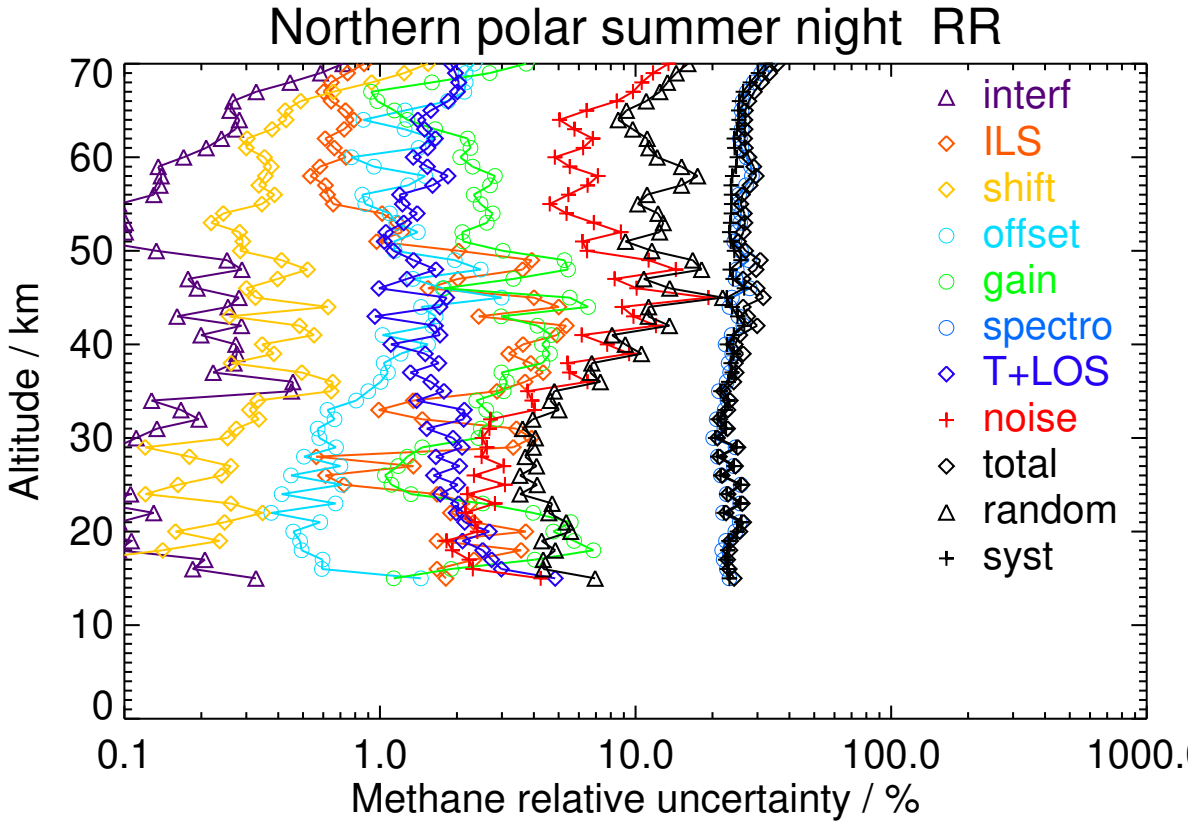

Figure S40. V8R_CH4_261 Northern polar summer night

Table S41. Methane error budget for Northern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
15	1625.29	13.39	17.25	3.10	15.79	33.74	335.37	44.70	57.19	83.25	335.68	345.85
18	1483.33	1.90	21.53	2.92	5.15	73.36	328.90	35.49	31.96	67.14	334.41	341.08
21	1202.93	1.31	26.56	1.40	7.05	70.23	289.32	24.12	33.02	65.44	294.60	301.78
24	1060.73	1.51	20.29	1.58	6.55	37.79	241.64	20.98	33.54	51.64	243.25	248.68
27	849.96	1.24	16.12	1.34	7.70	17.44	203.32	19.09	35.99	53.81	201.82	208.87
30	610.47	1.17	12.53	1.38	6.32	14.84	153.09	16.47	26.93	54.25	148.02	157.65
33	351.31	1.18	3.93	1.11	3.87	9.90	92.06	10.57	24.39	46.31	84.66	96.50
36	217.74	1.06	4.88	1.09	2.85	8.58	60.78	5.03	20.18	41.10	50.46	65.08
39	141.18	0.79	5.41	0.84	2.18	7.99	42.63	2.90	15.92	35.90	29.83	46.68
42	165.10	0.54	6.52	0.94	2.23	11.35	49.28	3.01	12.56	36.98	37.49	52.66
45	193.34	0.30	5.33	0.48	2.05	11.16	49.86	3.18	11.10	28.03	44.63	52.70
48	218.01	0.48	3.49	0.57	2.80	13.09	50.20	4.08	11.00	19.25	49.79	53.38
52	238.04	0.36	2.52	0.39	2.43	10.58	55.24	3.95	9.07	16.55	54.77	57.22
56	207.74	0.30	1.36	0.48	1.35	4.83	50.29	3.70	8.51	16.75	48.60	51.41
60	154.35	0.24	1.31	0.29	1.15	2.80	38.76	3.17	9.46	15.86	36.90	40.16
64	92.18	0.26	1.08	0.20	1.74	1.60	24.30	1.89	11.14	14.04	22.98	26.93
68	55.72	0.36	1.18	0.47	4.15	3.73	18.23	1.69	19.92	22.32	16.32	27.65

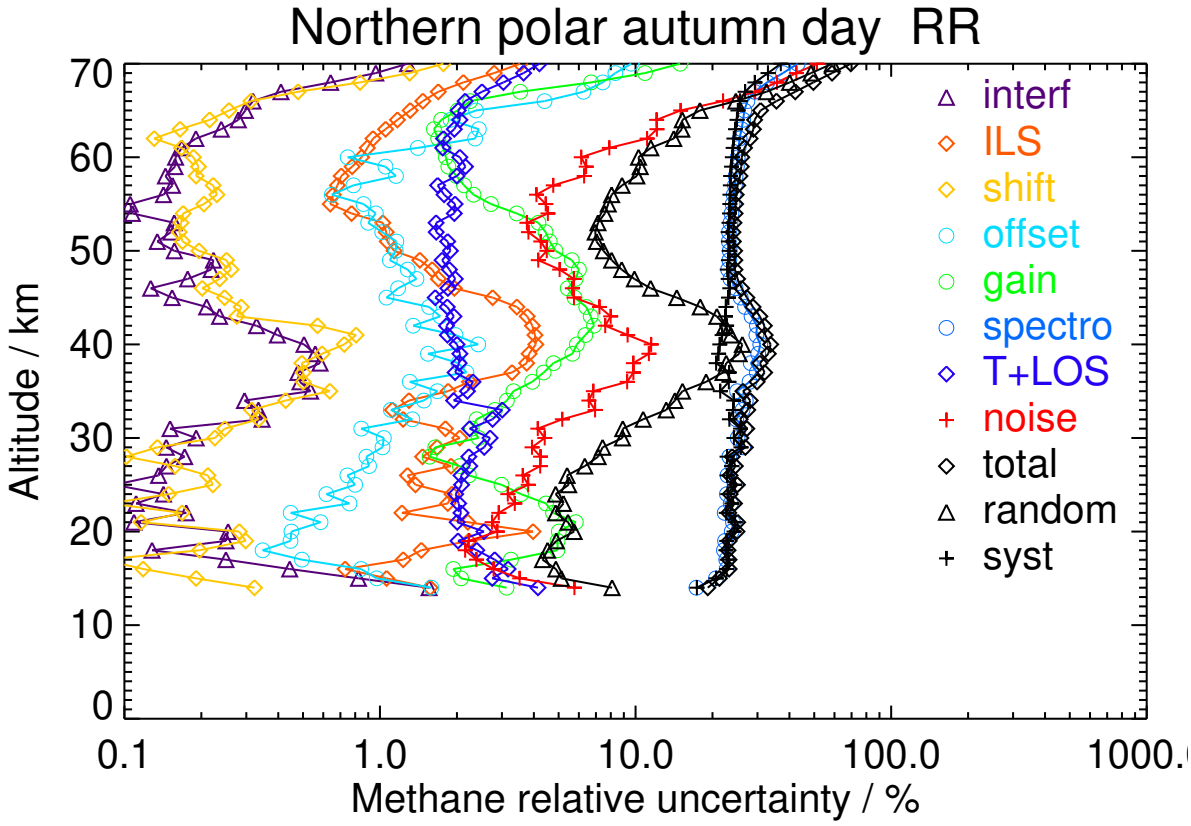

Figure S41. V8R_CH4_261 Northern polar autumn day

Table S42. Methane error budget for Northern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
15	1618.58	12.63	17.04	3.30	16.42	30.26	344.41	45.55	57.77	93.04	342.08	354.51
18	1455.36	2.10	19.98	3.35	5.96	79.02	346.23	34.82	32.94	66.51	352.77	358.98
21	1227.13	1.50	21.67	1.38	7.03	65.80	309.30	23.13	33.58	54.89	314.91	319.66
24	1035.15	1.79	20.41	1.39	6.37	35.77	247.52	20.22	32.83	50.00	248.99	253.96
27	813.68	1.50	13.94	1.07	7.69	16.98	203.96	18.72	36.77	57.91	201.23	209.40
30	545.84	1.66	11.03	1.61	6.03	12.83	141.78	15.28	26.33	49.60	137.46	146.14
33	343.07	1.19	4.07	2.09	3.74	13.64	96.01	9.74	23.89	58.43	81.81	100.53
36	236.50	1.19	5.74	1.24	2.91	8.30	73.45	5.06	21.43	55.79	53.66	77.41
39	174.51	1.22	7.13	1.23	2.27	8.68	60.18	3.41	17.36	51.57	37.54	63.78
42	162.19	0.77	7.82	1.12	2.27	11.14	52.90	3.13	13.12	42.61	36.84	56.33
45	171.05	0.25	3.89	0.39	1.83	7.89	45.07	2.88	11.04	25.18	40.11	47.36
48	194.56	0.26	4.30	0.48	2.45	10.89	48.04	3.80	9.97	20.38	46.37	50.65
52	216.54	0.28	3.21	0.36	2.02	8.72	50.57	3.42	7.95	13.77	50.33	52.18
56	200.55	0.22	1.93	0.51	1.32	5.93	49.27	3.46	7.82	15.57	47.95	50.41
60	146.66	0.08	1.45	0.22	1.15	3.75	38.11	3.04	8.91	15.85	36.15	39.47
64	94.97	0.21	0.98	0.29	1.84	1.69	27.72	2.04	11.05	16.40	25.15	30.03
68	73.80	0.27	1.31	0.87	4.24	2.19	25.96	2.21	20.36	25.21	21.98	33.45

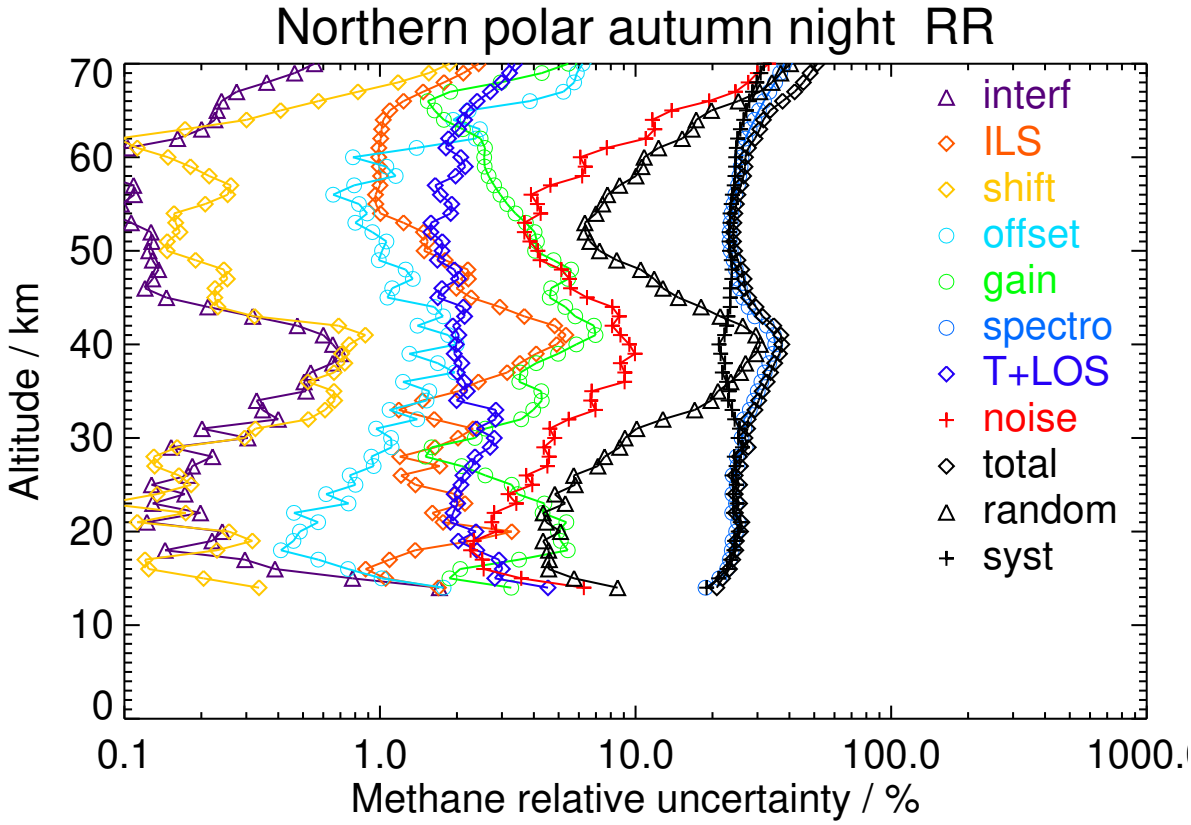

Figure S42. V8R_CH4_261 Northern polar autumn night

Table S43. Methane error budget for Northern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1771.39	11.84	17.03	2.37	22.35	40.10	398.81	52.43	90.91	115.01	399.22	415.46
15	1658.32	5.65	53.73	2.50	11.67	50.97	351.47	37.82	44.54	82.38	354.71	364.15
18	1608.30	3.36	53.99	3.04	11.29	103.58	385.27	39.97	37.02	96.98	394.70	406.44
21	1345.93	1.50	48.98	1.82	4.61	37.34	339.38	27.40	35.87	70.68	340.65	347.91
24	1289.13	1.26	36.02	1.91	6.04	27.02	311.54	21.44	30.36	67.96	309.66	317.03
27	1141.01	0.93	19.98	3.36	8.00	16.09	266.86	22.01	36.69	64.97	263.74	271.63
30	1155.91	1.07	47.51	2.65	6.12	28.86	262.06	19.31	24.58	59.59	263.13	269.79
33	1005.04	1.46	17.57	5.25	6.11	27.73	222.84	15.62	21.99	53.81	220.53	227.00
36	539.91	1.51	18.73	2.89	4.93	18.70	132.43	9.29	18.01	54.23	125.47	136.68
39	355.20	0.99	13.86	1.65	4.07	15.18	78.00	5.61	15.84	31.81	76.14	82.52
42	308.15	0.61	15.30	1.67	3.77	19.54	71.60	4.81	13.78	28.83	71.71	77.29
45	282.22	0.50	10.83	1.38	2.86	13.52	65.51	4.26	12.60	23.70	64.95	69.13
48	251.39	0.45	5.50	1.11	2.47	10.19	57.11	3.97	10.30	19.40	56.12	59.38
52	194.72	0.25	2.02	0.59	1.80	5.12	44.48	3.12	8.11	12.52	43.94	45.69
56	181.61	0.25	2.77	0.44	1.61	3.21	42.88	3.20	8.86	12.05	42.46	44.13
60	185.36	0.30	3.05	0.50	2.01	2.89	43.67	3.83	12.41	15.17	43.21	45.80
64	152.47	0.50	1.56	1.00	3.40	4.10	41.06	3.74	17.81	21.46	39.85	45.26
68	86.85	1.03	4.06	2.20	5.05	12.63	44.63	3.61	25.14	33.00	41.90	53.33

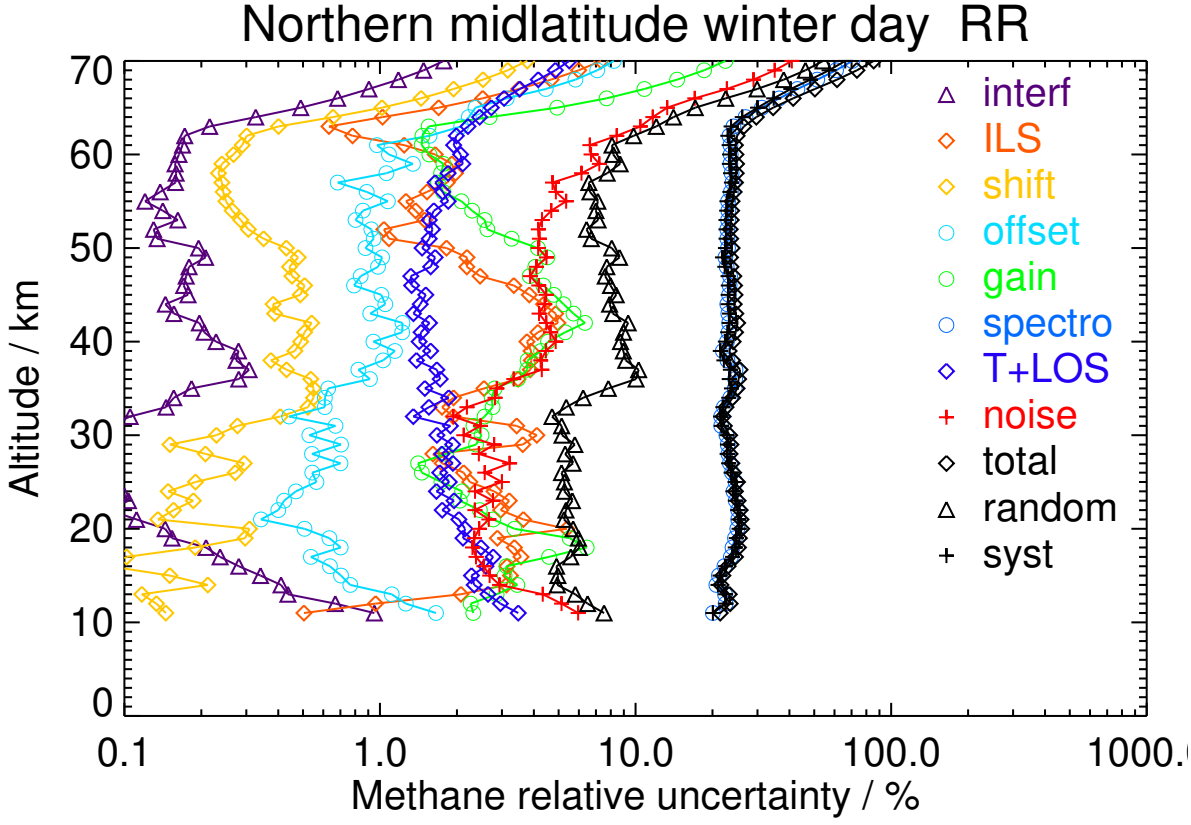

Figure S43. V8R_CH4_261 Northern midlatitude winter day

Table S44. Methane error budget for Northern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1855.06	10.10	27.38	2.04	23.62	53.02	424.54	55.25	89.48	117.88	426.18	442.18
15	1745.37	5.65	49.65	2.71	12.20	48.75	353.15	39.84	44.33	76.72	356.95	365.10
18	1614.13	2.85	47.85	3.22	9.50	84.45	366.32	36.66	34.91	95.39	370.39	382.47
21	1368.28	1.62	56.29	2.00	5.52	33.39	350.83	29.47	37.45	73.81	352.45	360.10
24	1296.39	1.20	33.40	1.27	6.10	18.34	317.93	21.56	31.37	60.38	316.82	322.52
27	1150.42	1.03	18.07	3.75	8.45	12.72	268.20	22.82	37.69	63.72	265.31	272.85
30	1114.08	1.12	49.05	1.69	5.72	22.20	255.05	18.54	23.45	56.06	256.39	262.45
33	938.76	1.58	10.63	5.93	5.62	22.73	210.52	14.01	21.06	54.01	206.73	213.67
36	547.02	1.66	16.35	2.53	4.92	13.64	127.02	8.81	17.61	51.82	119.67	130.41
39	357.96	0.86	14.16	1.73	3.86	15.34	80.87	5.23	14.37	29.54	79.72	85.02
42	303.18	0.57	12.27	1.68	3.45	16.56	71.52	4.40	12.21	26.17	70.98	75.65
45	301.96	0.43	12.27	1.56	2.74	15.26	71.63	4.21	10.80	26.26	70.49	75.22
48	249.62	0.34	4.45	1.15	1.90	7.56	56.78	3.31	8.48	16.86	55.72	58.21
52	180.09	0.28	2.57	0.53	1.46	3.32	40.93	2.75	6.90	10.83	40.41	41.84
56	171.03	0.28	2.83	0.29	1.47	1.95	39.32	3.00	8.24	10.31	39.12	40.46
60	168.61	0.32	2.92	0.58	2.01	2.42	39.53	3.72	12.37	14.34	39.28	41.81
64	151.36	0.47	1.83	1.20	3.55	3.44	40.37	3.83	18.16	22.28	38.82	44.76
68	120.10	0.81	5.24	2.41	4.58	9.61	41.95	3.67	24.66	31.10	39.51	50.28

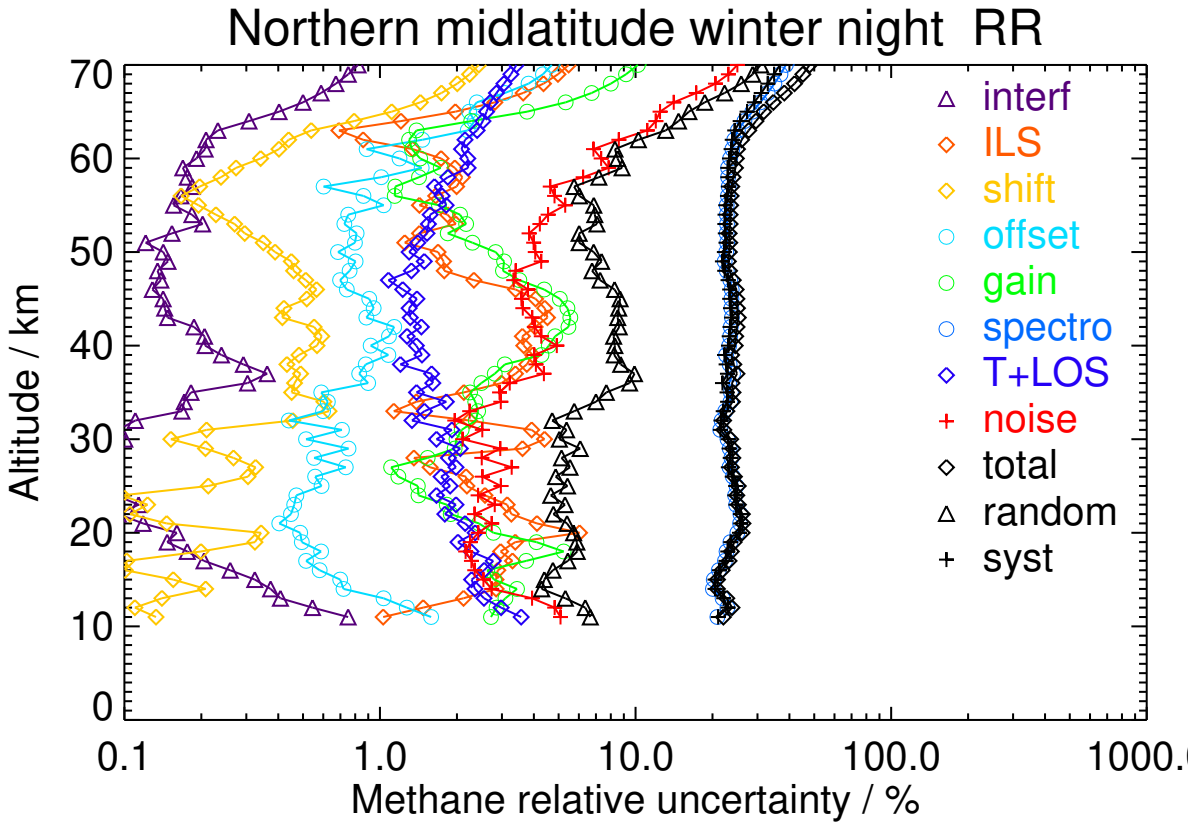

Figure S44. V8R_CH4_261 Northern midlatitude winter night

Table S45. Methane error budget for Northern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1796.90	8.00	18.14	2.01	12.70	55.69	416.30	46.35	61.43	92.13	417.61	427.66
15	1750.56	6.16	42.90	2.49	11.80	55.27	366.26	43.30	46.18	87.41	368.23	378.46
18	1628.81	3.32	57.36	3.80	12.23	123.82	362.25	42.31	38.41	97.16	379.27	391.52
21	1318.12	1.48	30.76	2.16	5.64	57.53	314.65	27.89	35.45	73.34	316.15	324.55
24	1163.23	1.01	18.96	2.15	7.09	19.70	282.98	22.88	36.35	55.10	282.29	287.62
27	1114.52	0.88	9.95	2.68	6.51	16.02	251.80	19.89	32.56	57.05	249.02	255.47
30	1021.05	1.02	39.99	2.58	7.19	22.66	243.12	21.12	29.11	65.96	241.30	250.15
33	750.46	1.12	9.17	2.36	5.40	18.11	165.83	14.10	23.17	48.24	162.35	169.36
36	476.08	1.60	9.08	2.43	4.38	10.97	105.70	7.56	19.29	40.42	100.99	108.78
39	386.99	1.24	7.62	1.93	3.75	12.93	85.03	5.09	16.54	31.94	82.18	88.17
42	358.98	0.69	14.40	1.85	3.31	17.94	86.25	4.67	13.59	30.73	85.12	90.50
45	285.97	0.38	9.59	1.12	2.72	15.96	72.99	4.13	11.30	31.80	69.40	76.34
48	282.17	0.52	7.23	1.43	2.72	15.77	69.99	4.28	9.52	27.95	67.36	72.93
52	211.29	0.34	2.74	0.57	1.44	5.01	49.66	3.21	7.39	15.94	48.08	50.65
56	168.01	0.27	1.26	0.60	1.18	1.88	39.94	2.99	7.00	11.61	39.05	40.74
60	126.48	0.23	0.99	0.37	1.22	1.30	30.40	2.45	8.31	11.11	29.66	31.68
64	84.79	0.30	0.81	0.34	2.07	1.70	21.69	1.82	11.33	12.83	21.11	24.70
68	35.99	0.46	1.66	0.85	4.01	6.73	18.29	1.62	19.27	21.12	18.09	27.81

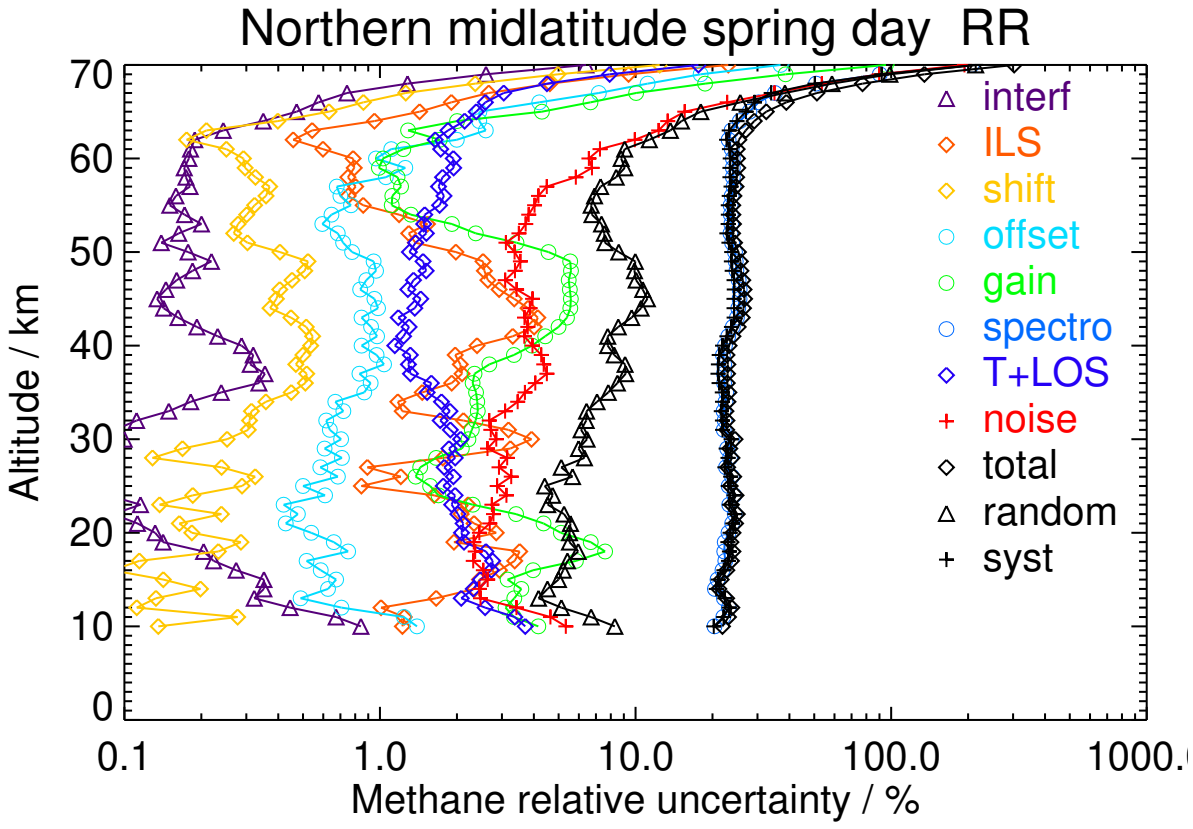

Figure S45. V8R_CH4_261 Northern midlatitude spring day

Table S46. Methane error budget for Northern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1831.94	8.71	15.87	2.08	16.42	52.67	406.14	49.46	68.65	93.40	408.36	418.91
15	1663.92	6.16	39.44	2.60	11.72	51.22	338.50	40.94	44.81	75.67	341.91	350.18
18	1579.18	3.39	46.13	3.19	10.51	107.01	359.58	35.55	35.90	91.41	370.41	381.52
21	1330.25	1.46	35.02	2.69	5.98	58.83	326.91	26.54	33.99	73.84	328.65	336.84
24	1176.24	1.09	16.97	2.10	6.36	28.61	279.96	21.87	34.62	55.96	279.42	284.96
27	1110.07	0.87	10.86	2.67	6.70	13.57	257.44	20.71	33.65	54.29	255.43	261.14
30	1005.99	0.77	39.82	2.08	6.61	17.70	235.50	20.68	27.93	49.40	237.01	242.11
33	740.02	1.47	9.04	3.13	5.29	16.88	165.80	12.94	22.54	42.54	163.59	169.03
36	492.56	1.64	12.39	2.56	4.69	12.52	113.83	7.82	19.32	42.22	109.32	117.19
39	382.28	1.19	10.60	1.86	3.86	12.93	85.73	5.28	16.35	33.23	82.70	89.13
42	342.26	0.59	12.59	1.69	3.33	17.96	82.76	4.76	13.15	33.41	80.15	86.83
45	262.88	0.35	8.01	1.06	2.38	13.73	65.34	3.85	10.58	31.06	60.76	68.24
48	243.51	0.30	4.98	0.86	2.04	10.20	57.37	3.43	8.09	20.59	55.48	59.18
52	203.90	0.21	1.58	0.56	1.46	5.46	47.18	2.96	6.73	13.18	46.27	48.11
56	172.24	0.25	1.41	0.57	1.30	2.46	41.46	2.93	7.08	11.25	40.75	42.28
60	138.98	0.27	1.00	0.49	1.60	1.95	34.72	2.83	9.29	11.81	34.18	36.16
64	86.17	0.28	0.52	0.38	2.61	1.06	23.24	2.01	12.99	14.32	22.73	26.86
68	48.06	0.45	1.22	0.96	4.02	5.64	20.97	1.90	19.80	22.21	19.81	29.76

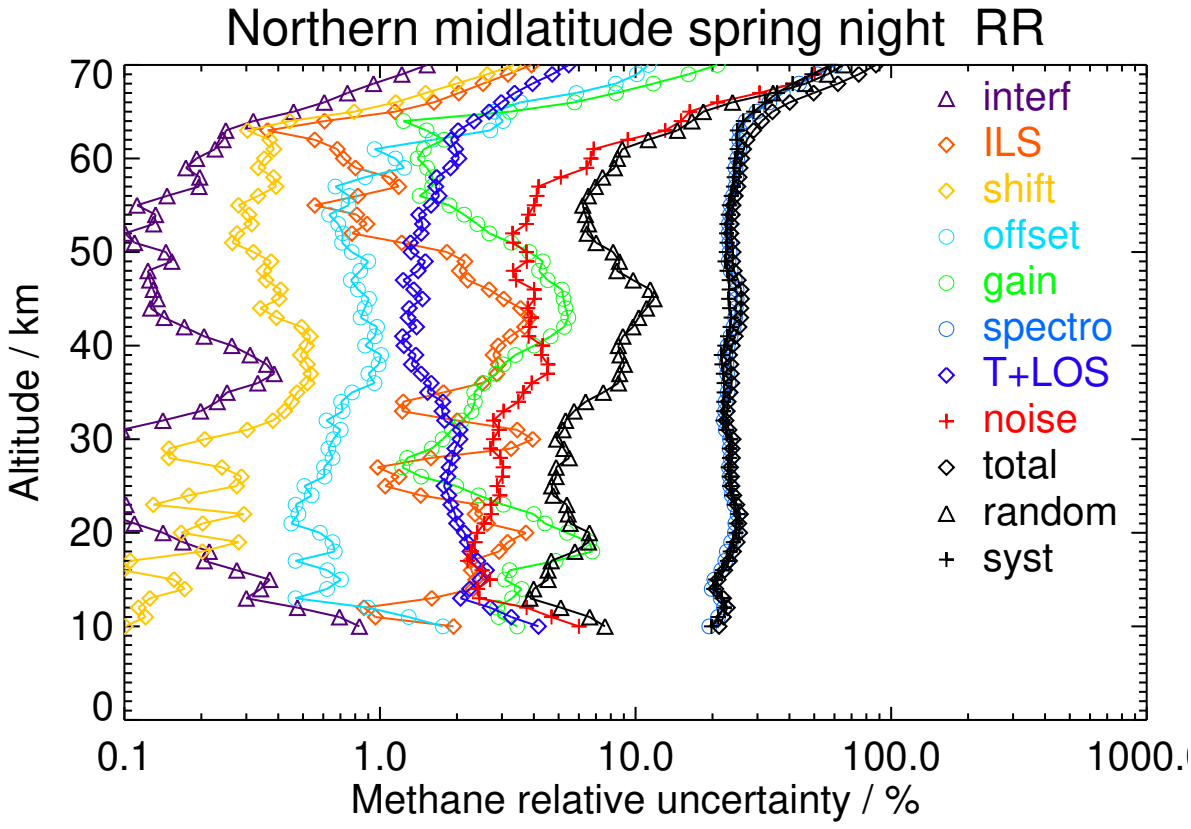

Figure S46. V8R_CH4_261 Northern midlatitude spring night

Table S47. Methane error budget for Northern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1979.46	7.43	26.08	1.73	11.51	73.08	432.96	47.32	53.54	74.11	439.63	445.84
15	1943.59	7.04	89.81	3.23	14.77	54.42	421.57	50.90	57.24	88.73	432.46	441.47
18	1862.12	4.25	35.11	2.62	13.59	61.33	439.47	53.12	48.06	88.00	442.40	451.07
21	1489.38	2.05	53.33	2.43	4.79	11.56	363.71	39.23	43.88	66.18	366.58	372.50
24	1255.82	1.10	17.57	0.84	4.83	20.51	303.57	20.30	30.02	42.95	303.93	306.96
27	1080.49	0.99	16.94	3.51	7.52	13.09	249.89	20.86	37.33	48.40	249.92	254.56
30	1132.70	1.15	46.85	1.45	5.42	23.63	263.35	17.98	23.79	35.89	267.84	270.24
33	918.77	0.84	8.97	4.13	5.72	22.90	191.57	13.37	22.02	36.44	191.55	194.98
36	742.26	2.19	9.51	3.76	5.20	16.92	153.07	9.22	18.82	31.73	152.59	155.86
39	511.21	1.91	15.26	2.50	4.21	15.77	110.90	6.29	15.81	27.67	111.05	114.45
42	413.41	0.88	17.70	3.02	4.01	22.58	98.50	5.37	13.17	28.79	99.62	103.70
45	362.97	0.53	18.50	1.63	3.31	22.98	92.92	5.03	11.51	34.35	92.17	98.37
48	279.19	0.41	8.50	1.49	2.42	13.66	71.65	4.04	9.30	35.33	65.24	74.19
52	275.75	0.46	3.43	1.19	1.87	6.76	67.59	3.91	7.75	29.63	61.87	68.60
56	240.66	0.48	3.44	0.73	1.43	2.55	59.65	4.16	8.08	26.40	54.45	60.51
60	216.66	0.38	4.43	0.68	1.52	2.41	51.64	4.38	10.35	19.53	49.39	53.11
64	221.89	0.46	1.72	0.70	2.93	2.38	54.24	4.24	15.19	21.52	52.40	56.65
68	212.21	0.68	5.47	1.59	4.68	8.29	57.38	3.84	25.07	30.01	56.21	63.71

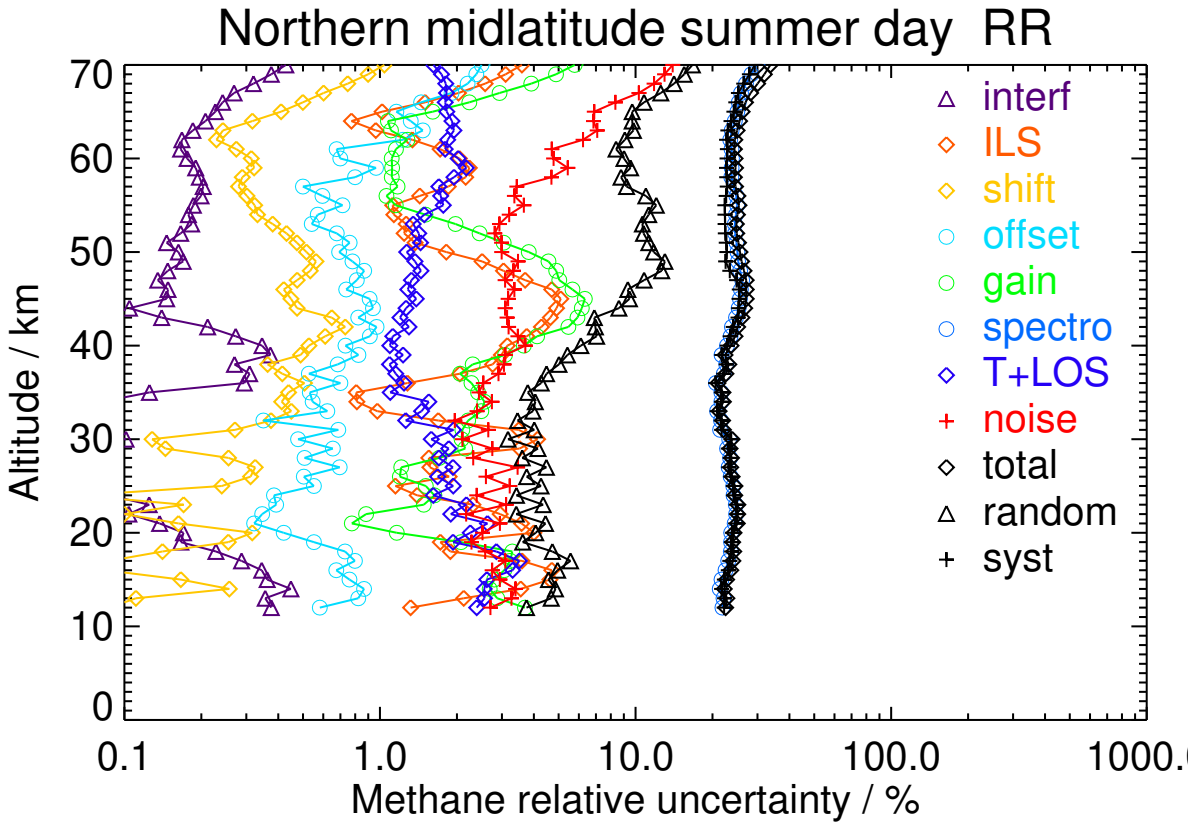

Figure S47. V8R_CH4_261 Northern midlatitude summer day

Table S48. Methane error budget for Northern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1991.42	9.34	24.59	2.01	19.21	77.23	415.79	61.87	78.47	115.25	420.26	435.77
15	1909.28	8.14	64.37	3.42	15.03	48.00	353.58	50.74	60.03	91.82	359.89	371.42
18	1767.91	4.15	26.54	2.57	7.00	34.81	384.57	37.93	41.28	74.00	384.12	391.18
21	1476.72	2.12	59.62	1.91	5.64	11.61	364.95	36.73	40.93	63.40	368.67	374.08
24	1258.15	1.10	21.34	1.05	5.40	20.10	306.50	22.38	31.72	46.34	306.91	310.39
27	1104.42	0.88	15.58	3.35	6.88	15.80	252.96	21.13	34.28	47.35	252.82	257.22
30	1097.42	1.14	44.80	1.53	5.46	20.61	250.31	19.08	24.11	38.33	254.16	257.04
33	907.92	1.14	14.33	4.12	5.43	19.59	190.29	14.31	21.79	39.94	189.56	193.72
36	732.22	2.20	14.43	3.61	4.98	12.78	154.97	10.04	19.25	34.71	153.94	157.80
39	479.72	1.80	13.75	2.69	4.01	11.45	104.49	6.73	16.60	30.34	103.27	107.64
42	396.20	0.81	13.21	2.09	3.49	17.50	89.45	5.19	13.25	31.65	87.74	93.28
45	347.28	0.47	10.28	1.34	2.89	18.47	81.26	4.89	11.00	28.99	79.78	84.88
48	330.99	0.40	7.34	1.73	2.49	14.92	77.37	4.46	8.90	29.63	74.12	79.82
52	266.54	0.39	3.96	1.42	1.74	7.15	66.82	4.04	7.92	33.12	59.32	67.94
56	216.16	0.30	2.35	0.67	1.44	2.76	53.24	4.08	8.02	21.63	49.63	54.14
60	216.84	0.35	3.53	0.56	1.68	2.90	52.91	4.37	10.50	19.16	50.86	54.35
64	189.53	0.40	1.17	0.67	2.89	2.17	50.66	4.09	14.64	21.79	48.35	53.03
68	187.40	0.65	4.02	1.78	4.44	7.76	54.31	4.55	23.81	28.94	52.91	60.31

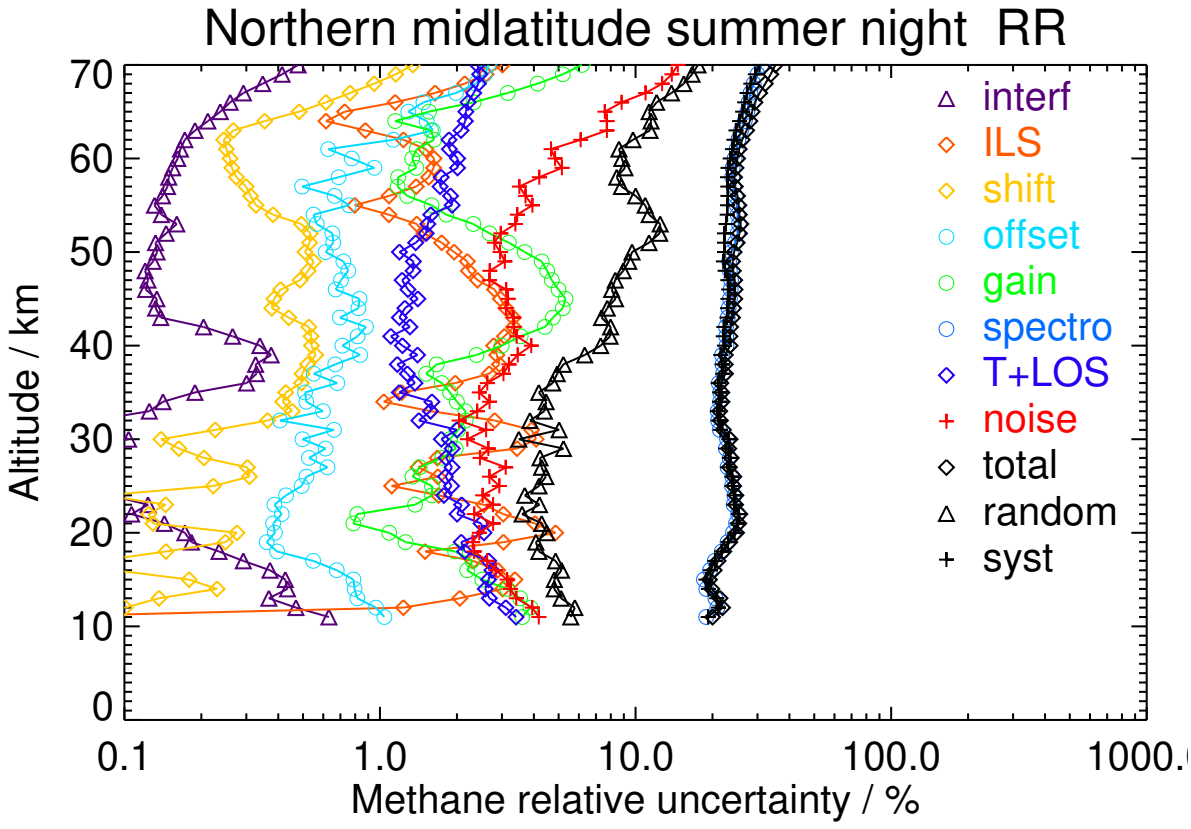

Figure S48. V8R_CH4_261 Northern midlatitude summer night

Table S49. Methane error budget for Northern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1915.65	6.24	25.02	1.43	11.14	67.91	408.48	42.94	50.29	68.62	414.64	420.28
15	1857.96	6.73	71.80	2.68	18.33	58.23	406.63	55.03	68.26	111.47	411.76	426.58
18	1789.51	2.84	29.60	2.73	9.44	62.68	415.69	41.77	39.96	76.33	418.60	425.50
21	1470.25	1.71	70.07	3.04	6.01	13.50	369.46	35.10	40.98	66.17	374.40	380.20
24	1238.53	1.12	29.55	1.72	5.66	14.79	301.38	21.44	30.94	48.80	301.65	305.57
27	1082.13	0.88	25.15	3.32	8.45	11.93	259.18	22.61	41.11	53.87	259.48	265.02
30	1080.83	0.95	42.10	1.01	5.89	20.36	250.83	19.25	27.15	42.20	253.90	257.38
33	948.92	0.79	14.18	4.49	7.19	20.98	204.63	14.70	27.61	44.52	203.92	208.72
36	878.11	1.93	7.62	3.41	6.71	18.71	183.45	11.10	25.00	40.07	182.39	186.74
39	673.92	2.33	14.48	3.79	5.83	15.55	139.40	8.38	22.96	41.33	137.21	143.30
42	627.97	1.55	18.53	2.82	5.44	23.40	130.31	7.30	20.35	36.78	130.48	135.57
45	492.58	0.49	19.15	1.49	4.57	27.87	113.89	7.29	16.69	34.39	115.27	120.29
48	412.56	0.56	13.75	2.34	4.03	21.60	93.58	7.06	13.61	25.36	95.01	98.34
52	346.00	0.40	4.18	1.57	2.66	9.31	76.18	6.03	11.02	18.72	75.67	77.95
56	296.41	0.42	3.20	0.78	1.90	2.52	66.73	6.24	11.07	14.77	66.46	68.08
60	257.11	0.42	3.45	0.55	1.96	2.11	59.53	6.00	13.11	16.34	59.20	61.42
64	213.35	0.41	1.09	0.60	3.12	2.42	51.52	4.91	16.13	20.50	50.35	54.37
68	136.62	0.44	2.95	0.86	4.46	5.64	42.74	3.95	23.29	27.36	41.20	49.46

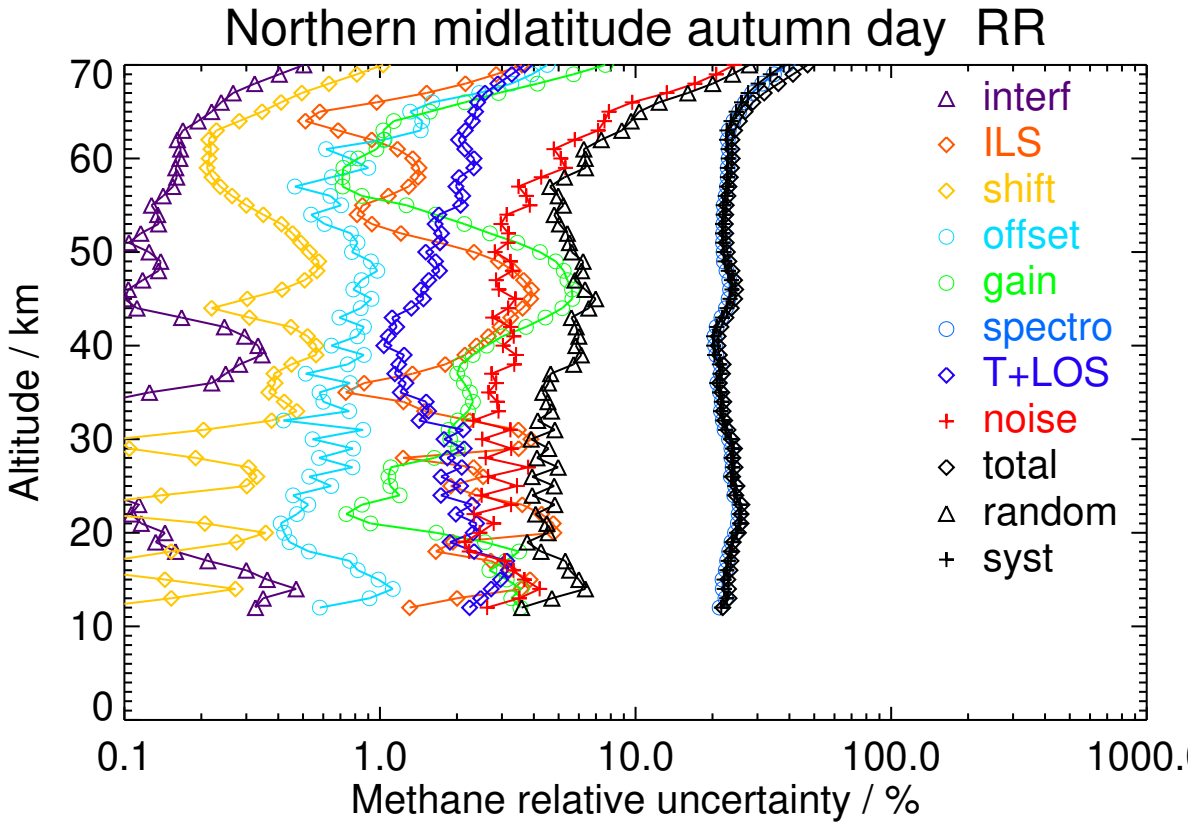

Figure S49. V8R_CH4_261 Northern midlatitude autumn day

Table S50. Methane error budget for Northern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1800.86	7.70	29.65	1.68	23.50	58.61	397.04	57.03	86.49	107.13	402.28	416.30
15	1877.60	6.13	59.23	2.09	18.93	54.32	380.71	56.57	66.92	105.56	385.15	399.35
18	1769.69	2.71	25.59	2.96	8.37	58.50	392.80	36.70	37.46	68.08	395.69	401.50
21	1446.90	1.66	51.13	2.37	6.04	35.92	359.78	32.24	40.32	75.18	361.12	368.86
24	1214.99	1.05	29.49	2.10	5.71	16.40	295.56	21.81	32.44	52.08	295.55	300.10
27	1083.36	0.86	23.31	2.89	7.95	13.05	258.18	21.89	38.55	56.05	257.42	263.45
30	1020.62	0.74	40.21	1.35	5.97	19.25	239.26	19.46	26.80	48.01	240.96	245.70
33	896.43	1.05	11.85	4.23	6.71	17.56	197.06	14.88	26.33	49.83	194.36	200.65
36	740.12	1.86	7.05	3.38	6.27	15.30	164.31	10.51	23.89	51.78	159.17	167.38
39	620.08	2.15	15.99	3.71	5.63	17.96	141.21	8.35	21.75	53.38	135.14	145.30
42	511.17	1.10	17.91	2.37	5.00	23.30	120.33	6.86	18.38	42.85	118.00	125.54
45	452.71	0.47	15.78	1.51	4.25	25.60	108.17	6.95	15.15	29.50	109.70	113.60
48	370.54	0.40	12.12	1.96	3.24	17.85	87.75	5.84	11.77	20.19	89.13	91.39
52	318.56	0.34	3.68	1.40	2.23	7.89	72.36	5.10	9.78	16.61	71.86	73.76
56	283.66	0.37	2.75	0.75	1.76	2.68	65.48	5.38	10.22	13.51	65.25	66.63
60	252.38	0.41	3.01	0.63	1.93	1.81	59.77	5.60	12.52	14.93	59.62	61.46
64	195.57	0.38	1.13	0.57	2.96	1.92	48.86	4.49	15.37	17.88	48.35	51.55
68	137.76	0.45	2.13	0.99	4.28	6.03	41.69	4.24	22.27	25.66	40.67	48.09

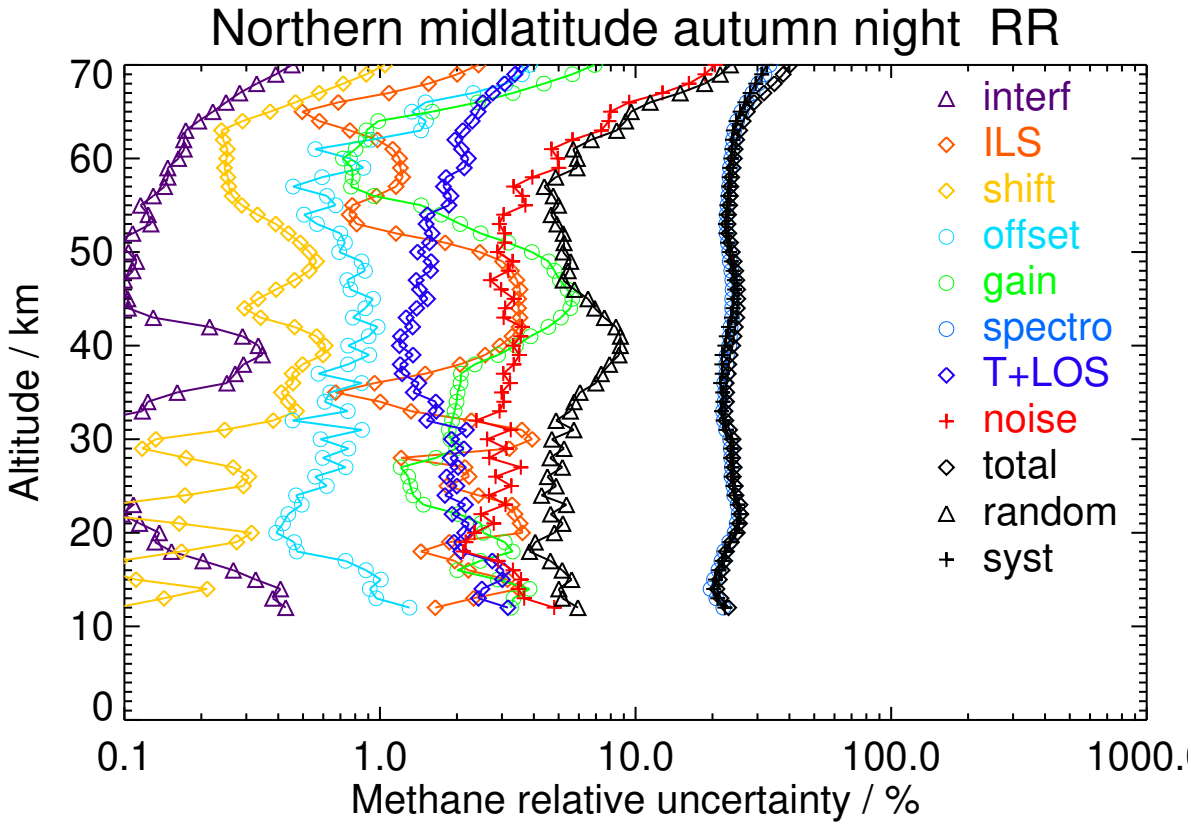

Figure S50. V8R_CH4_261 Northern midlatitude autumn night

Table S51. Methane error budget for Tropics day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1895.22	7.11	17.47	2.29	10.88	71.88	406.97	47.09	52.68	78.88	412.36	419.84
15	2062.95	9.46	103.32	2.77	16.50	79.99	412.04	72.11	63.41	112.24	428.77	443.22
18	1940.08	8.33	56.40	2.50	16.18	61.17	391.58	64.39	61.13	98.38	398.49	410.46
21	1668.41	4.47	34.62	1.52	5.33	19.04	395.51	46.60	48.24	76.08	395.92	403.16
24	1582.60	1.18	7.71	1.74	5.31	32.71	392.35	27.20	38.74	68.62	390.68	396.66
27	1503.16	1.40	10.71	2.49	5.95	21.36	349.78	26.80	38.95	55.35	349.48	353.83
30	1474.73	0.71	48.09	3.11	6.38	32.20	341.94	25.54	31.06	52.99	345.16	349.20
33	1367.62	0.78	12.11	2.46	6.94	32.09	286.44	19.76	29.21	49.61	286.47	290.73
36	1127.12	1.07	9.63	3.43	4.85	21.44	239.41	14.15	23.61	38.51	239.13	242.21
39	804.57	1.56	13.50	3.66	4.56	16.73	168.93	9.08	19.30	40.34	166.93	171.73
42	618.38	1.06	16.98	3.64	4.78	28.48	139.89	7.40	15.44	39.95	139.30	144.91
45	453.24	0.42	14.78	2.16	3.57	26.62	110.20	6.31	12.03	30.72	111.04	115.22
48	350.18	0.34	8.29	1.12	2.29	14.50	81.19	4.67	9.97	25.32	79.74	83.66
52	243.72	0.32	2.93	0.65	1.36	5.41	55.12	3.63	8.06	17.17	53.50	56.19
56	196.01	0.28	1.72	0.36	1.06	1.79	44.87	3.10	6.86	11.40	44.13	45.58
60	167.94	0.28	1.64	0.28	1.47	1.58	39.59	2.81	8.59	10.53	39.32	40.70
64	166.80	0.30	0.59	0.30	1.94	1.46	37.87	2.74	11.98	13.73	37.46	39.90
68	122.29	0.70	2.99	1.64	3.52	10.98	43.39	3.36	19.80	23.33	43.44	49.30

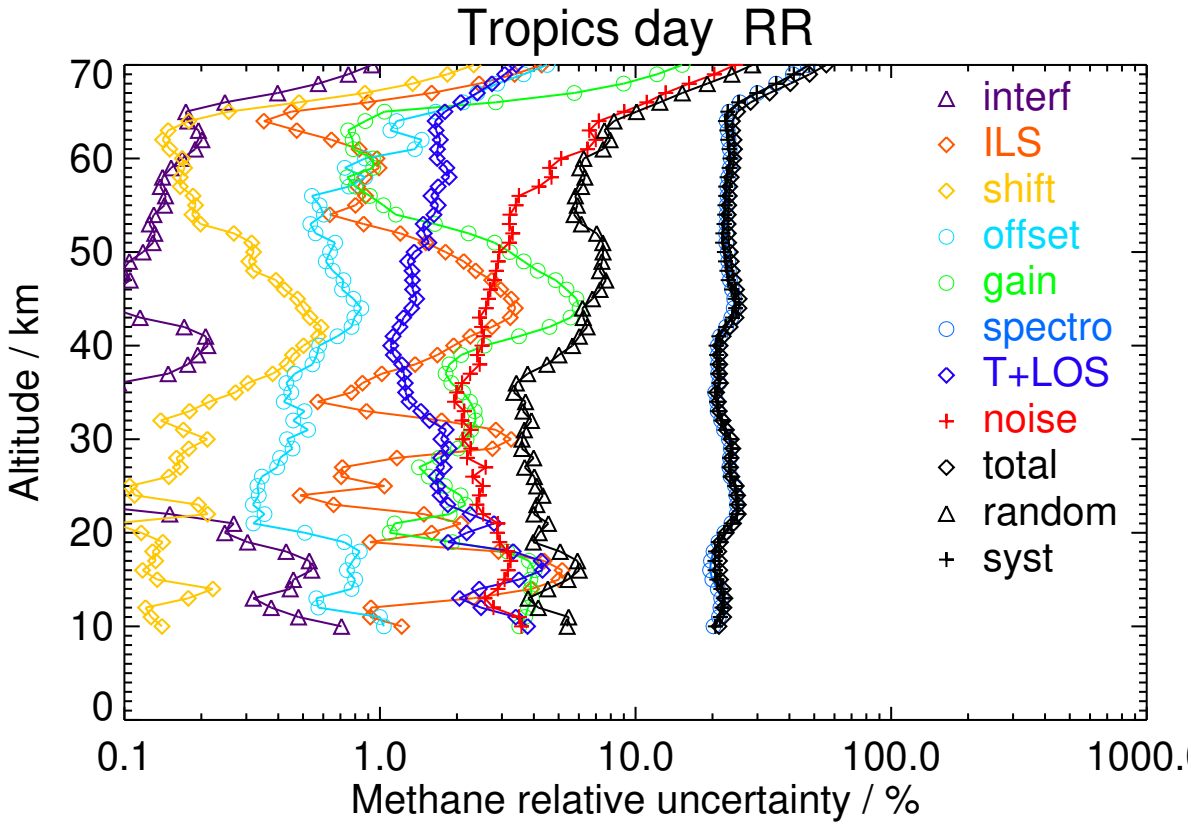

Figure S51. V8R_CH4_261 Tropics day

Table S52. Methane error budget for Tropics night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1898.05	8.00	16.11	2.08	12.48	71.82	406.88	51.94	57.92	85.39	412.25	421.00
15	2080.55	9.37	88.50	2.98	15.95	75.72	408.44	81.73	64.15	116.10	421.96	437.64
18	1922.82	8.56	54.92	2.48	15.77	54.58	397.15	68.36	62.66	102.54	402.66	415.51
21	1679.24	4.68	39.96	2.11	5.57	17.47	409.37	51.29	49.80	81.32	409.93	417.92
24	1604.56	1.11	8.88	1.08	4.30	36.35	382.44	29.06	38.83	64.80	381.88	387.34
27	1487.33	1.34	10.57	2.40	6.02	23.24	354.90	27.90	37.52	59.72	353.93	358.93
30	1486.02	0.69	51.62	2.38	6.43	30.20	342.93	28.24	32.16	53.11	346.75	350.79
33	1388.88	0.70	17.63	3.14	6.49	32.09	296.26	21.09	28.96	46.70	297.09	300.74
36	1109.31	1.08	16.18	4.16	5.01	20.75	234.17	14.91	24.19	40.02	234.05	237.44
39	808.31	1.54	15.81	3.74	4.81	15.58	166.48	9.92	20.23	36.35	165.63	169.57
42	592.12	0.85	17.06	2.88	4.52	28.07	134.96	7.46	15.29	34.59	135.71	140.05
45	422.35	0.38	12.38	1.72	3.24	23.46	101.20	6.03	12.11	26.25	102.23	105.55
48	313.20	0.29	7.45	1.36	2.34	14.22	72.85	4.64	9.91	20.89	72.50	75.45
52	224.30	0.27	1.60	0.59	1.30	4.24	50.41	3.48	7.93	13.08	49.67	51.37
56	181.35	0.25	1.57	0.40	0.99	1.63	41.44	2.94	6.63	9.47	41.07	42.15
60	163.41	0.27	1.66	0.29	1.26	1.48	38.45	2.87	8.18	10.45	38.09	39.50
64	154.10	0.33	0.79	0.34	1.81	1.81	37.00	2.99	11.49	13.26	36.63	38.96
68	120.94	0.80	2.60	1.88	3.62	12.19	42.77	3.98	19.98	23.71	43.07	49.16

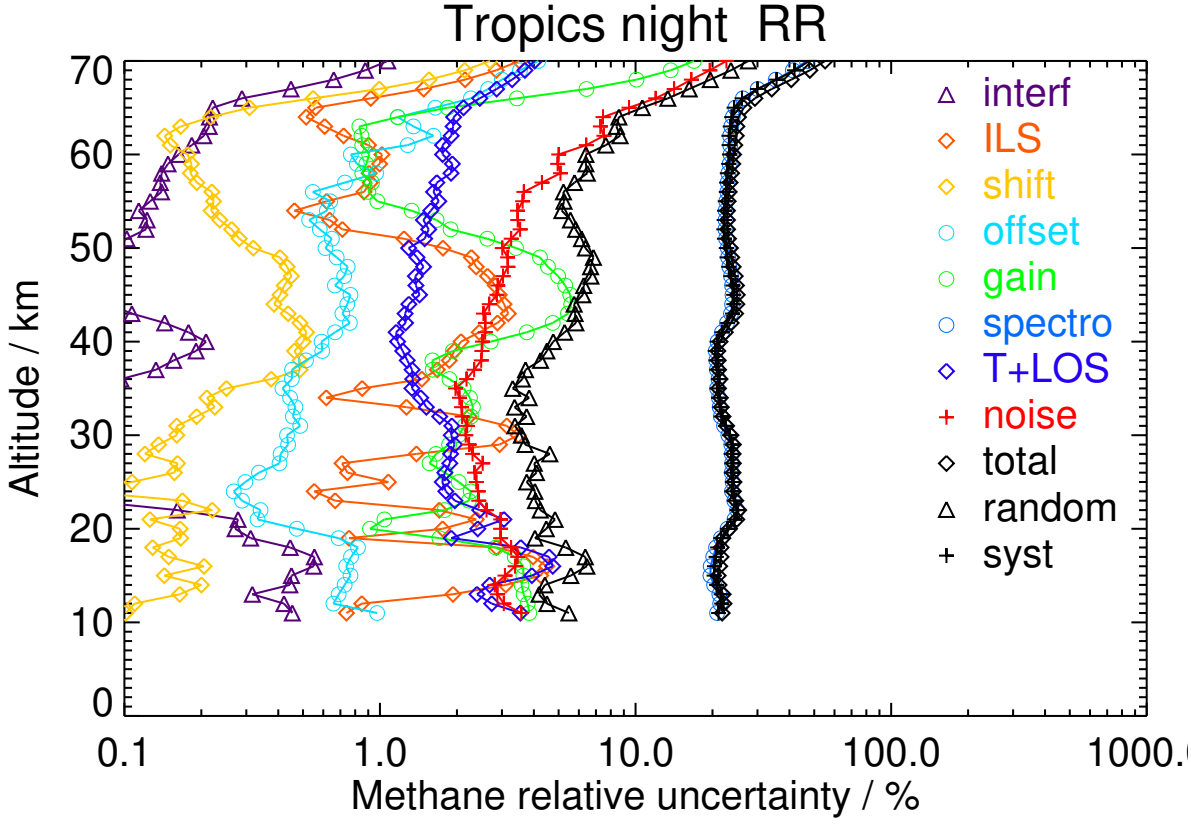

Figure S52. V8R_CH4_261 Tropics night

Table S53. Methane error budget for Southern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1898.98	21.83	12.35	3.60	28.28	81.31	370.63	64.08	111.95	232.83	328.41	402.57
12	1806.19	6.00	37.07	1.51	7.16	60.15	402.76	37.23	47.31	70.78	407.32	413.43
15	1697.31	5.06	21.31	2.85	12.11	40.98	359.82	44.68	48.19	79.43	360.26	368.92
18	1587.80	3.34	29.37	3.37	7.42	84.97	382.90	35.58	39.64	77.55	389.35	397.00
21	1365.31	1.43	22.73	1.72	6.09	70.09	351.88	27.75	39.10	65.41	356.81	362.76
24	1207.62	1.04	11.98	1.89	7.59	38.61	293.30	24.24	43.28	59.76	294.30	300.30
27	1048.58	0.86	8.93	0.75	7.80	18.60	257.47	23.78	43.29	73.19	252.71	263.10
30	937.00	0.91	35.24	2.96	9.07	15.03	237.30	24.36	42.36	95.04	226.33	245.47
33	798.03	1.30	9.79	3.10	7.77	12.91	199.67	18.16	38.65	84.13	186.95	205.01
36	679.71	1.80	18.72	2.78	8.12	13.36	161.91	13.34	35.82	66.46	154.48	168.17
39	443.52	1.22	18.39	2.19	6.55	16.79	115.43	9.59	28.03	52.17	110.22	121.94
42	236.71	0.46	7.76	0.90	3.92	10.53	60.80	5.43	18.61	29.85	58.04	65.26
45	160.35	0.17	2.80	0.49	2.42	7.06	38.72	3.38	12.07	17.92	37.41	41.48
48	152.22	0.15	2.39	0.39	1.74	5.55	35.68	2.40	7.59	13.75	34.46	37.10
52	155.43	0.12	1.31	0.28	1.44	4.77	36.78	2.32	6.26	11.89	35.82	37.74
56	150.44	0.10	1.39	0.35	1.37	3.84	37.49	2.50	7.46	12.78	36.37	38.55
60	135.51	0.12	1.52	0.28	1.79	2.88	34.87	2.43	10.44	14.36	33.74	36.67
64	106.92	0.19	0.80	0.19	2.78	1.92	28.26	1.79	13.44	16.05	27.15	31.54
68	83.63	0.22	1.81	0.69	4.26	1.68	26.14	1.75	21.07	24.12	23.95	33.99

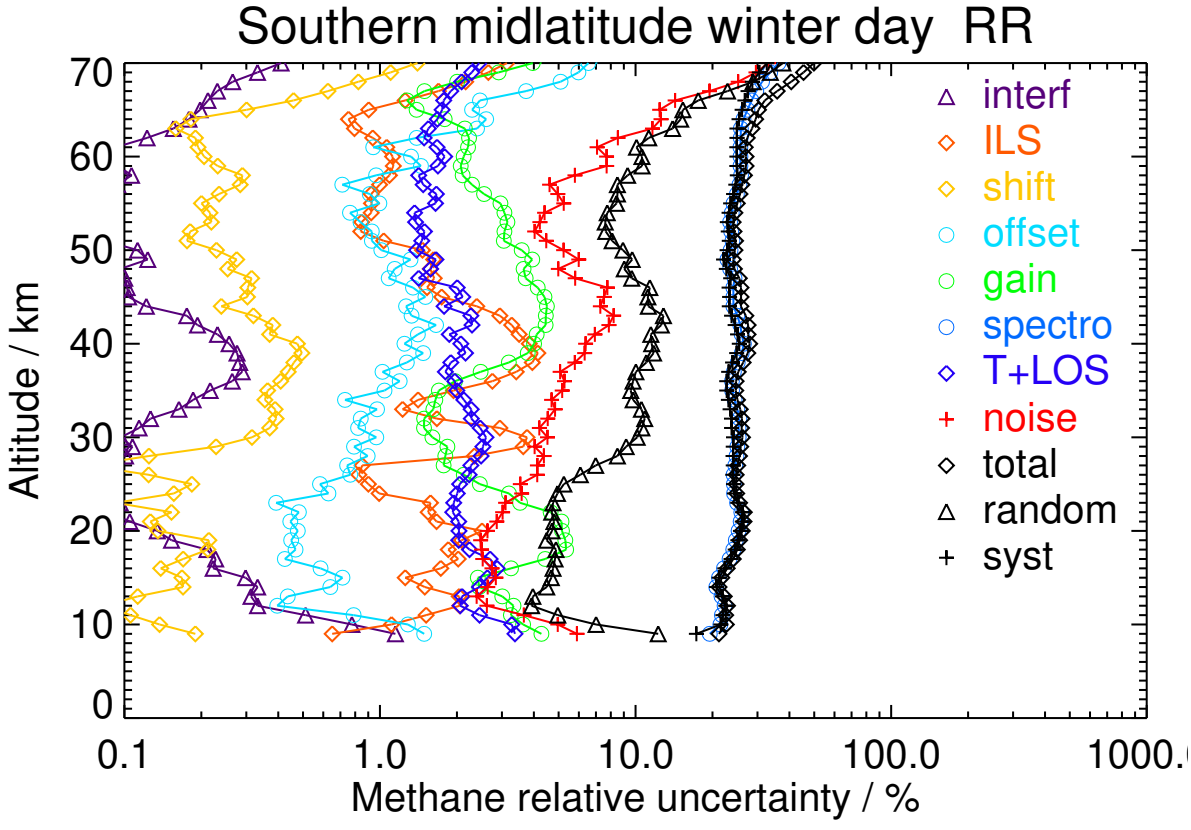

Figure S53. V8R_CH4_261 Southern midlatitude winter day

Table S54. Methane error budget for Southern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1710.21	18.92	6.42	1.77	27.51	57.44	312.98	63.28	101.44	164.32	299.51	341.63
12	1838.01	6.64	31.89	1.37	6.07	56.69	386.83	35.21	41.88	71.64	389.64	396.17
15	1693.73	5.62	26.39	2.36	11.71	50.80	348.11	41.47	46.88	84.25	348.50	358.54
18	1611.63	3.15	51.82	2.08	10.53	121.44	316.15	40.42	38.78	86.05	336.51	347.34
21	1346.50	1.36	16.48	2.01	7.57	79.55	287.78	28.80	39.13	70.43	294.75	303.05
24	1187.35	0.89	12.60	1.73	6.09	38.22	265.71	22.10	37.07	58.07	265.99	272.26
27	1065.99	0.80	10.65	1.27	9.14	19.23	252.26	24.91	47.00	68.35	249.72	258.91
30	881.67	0.76	29.59	1.94	6.23	14.07	229.53	22.58	34.67	80.03	221.60	235.61
33	758.81	0.88	9.84	2.85	7.21	9.87	184.84	15.67	35.87	76.60	173.45	189.61
36	631.95	1.78	13.44	2.47	7.54	16.21	142.46	10.70	32.25	56.94	136.80	148.18
39	455.90	1.32	13.84	2.21	6.02	15.21	95.95	8.04	25.93	38.29	94.56	102.02
42	266.64	0.39	6.85	0.62	3.86	14.20	62.50	4.84	17.21	26.62	61.49	67.00
45	161.44	0.18	3.53	0.45	2.27	6.89	39.59	2.99	11.84	18.06	38.15	42.21
48	142.92	0.14	2.12	0.37	1.64	4.68	34.69	2.28	8.16	13.32	33.57	36.12
52	141.77	0.12	1.33	0.32	1.57	4.37	34.95	2.46	7.59	13.21	33.68	36.18
56	140.70	0.13	1.19	0.36	1.73	3.27	34.74	2.62	9.19	13.69	33.56	36.25
60	120.42	0.14	1.00	0.29	2.20	2.12	29.74	2.28	11.50	13.72	29.06	32.13
64	99.07	0.19	0.60	0.25	2.93	1.50	24.58	1.82	14.44	16.17	23.79	28.77
68	76.34	0.23	1.47	0.54	4.15	2.27	21.06	1.89	21.22	23.03	19.80	30.37

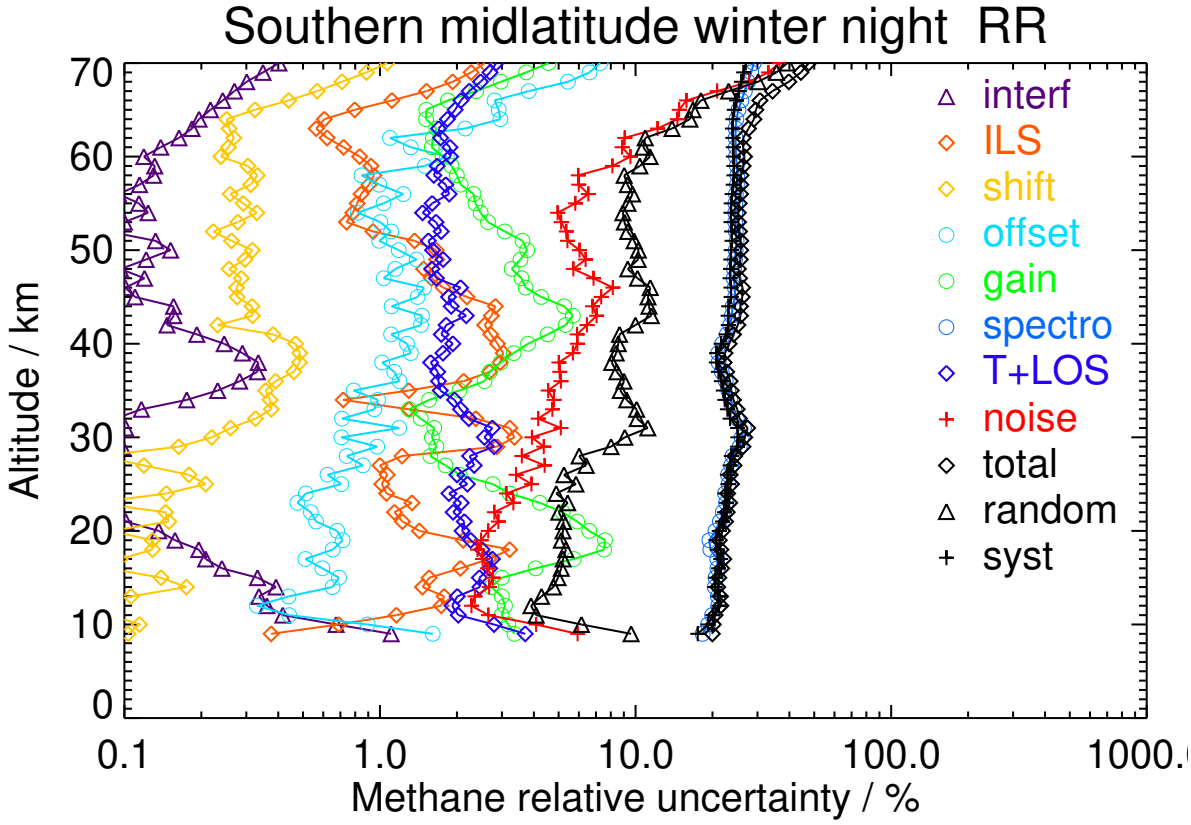

Figure S54. V8R_CH4_261 Southern midlatitude winter night

Table S55. Methane error budget for Southern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1894.55	23.04	23.26	2.44	24.50	63.49	366.89	61.62	96.35	143.31	364.50	391.66
12	1782.24	9.69	43.39	2.08	6.74	56.59	402.54	39.30	44.44	92.81	402.71	413.27
15	1652.68	8.52	38.36	3.44	12.72	44.00	364.80	45.04	49.74	103.87	361.17	375.81
18	1472.92	3.29	48.07	3.60	7.71	70.65	363.52	33.56	35.61	122.60	356.22	376.73
21	1240.05	1.52	37.46	2.79	5.23	51.55	335.81	27.53	37.11	111.85	326.33	344.97
24	1322.32	1.00	20.86	1.53	6.29	30.17	335.68	21.11	30.31	66.47	333.19	339.76
27	1300.44	1.02	17.45	3.71	6.83	18.82	303.13	21.92	33.59	54.28	302.11	306.95
30	1273.64	0.94	44.57	4.09	5.79	24.23	292.15	21.87	25.29	51.93	293.93	298.48
33	1062.82	1.35	12.12	3.19	6.03	24.04	226.75	16.48	23.86	50.33	224.72	230.28
36	669.54	1.85	18.89	3.29	5.36	15.00	145.94	10.46	20.15	43.75	143.26	149.79
39	454.64	1.50	15.21	2.20	4.61	15.77	96.63	6.43	17.18	29.41	96.53	100.91
42	360.73	0.80	13.07	1.40	3.83	17.38	81.74	4.68	14.51	24.11	82.60	86.05
45	278.45	0.36	6.45	0.81	2.84	14.95	63.58	4.05	12.06	16.24	64.92	66.92
48	271.36	0.34	5.40	1.06	2.79	14.58	62.89	4.29	9.26	15.07	63.90	65.65
52	272.73	0.27	2.34	0.87	2.21	10.05	62.30	4.14	8.28	13.33	62.46	63.87
56	241.33	0.24	0.84	0.72	1.71	5.38	56.20	4.29	8.93	11.99	56.09	57.36
60	220.29	0.34	0.89	0.57	2.03	2.81	52.81	4.36	11.64	13.98	52.54	54.37
64	190.48	0.36	0.83	0.50	3.09	1.67	45.73	3.62	15.28	17.72	45.14	48.49
68	118.38	0.50	2.98	1.01	4.12	6.65	38.48	2.87	21.42	24.38	37.75	44.93

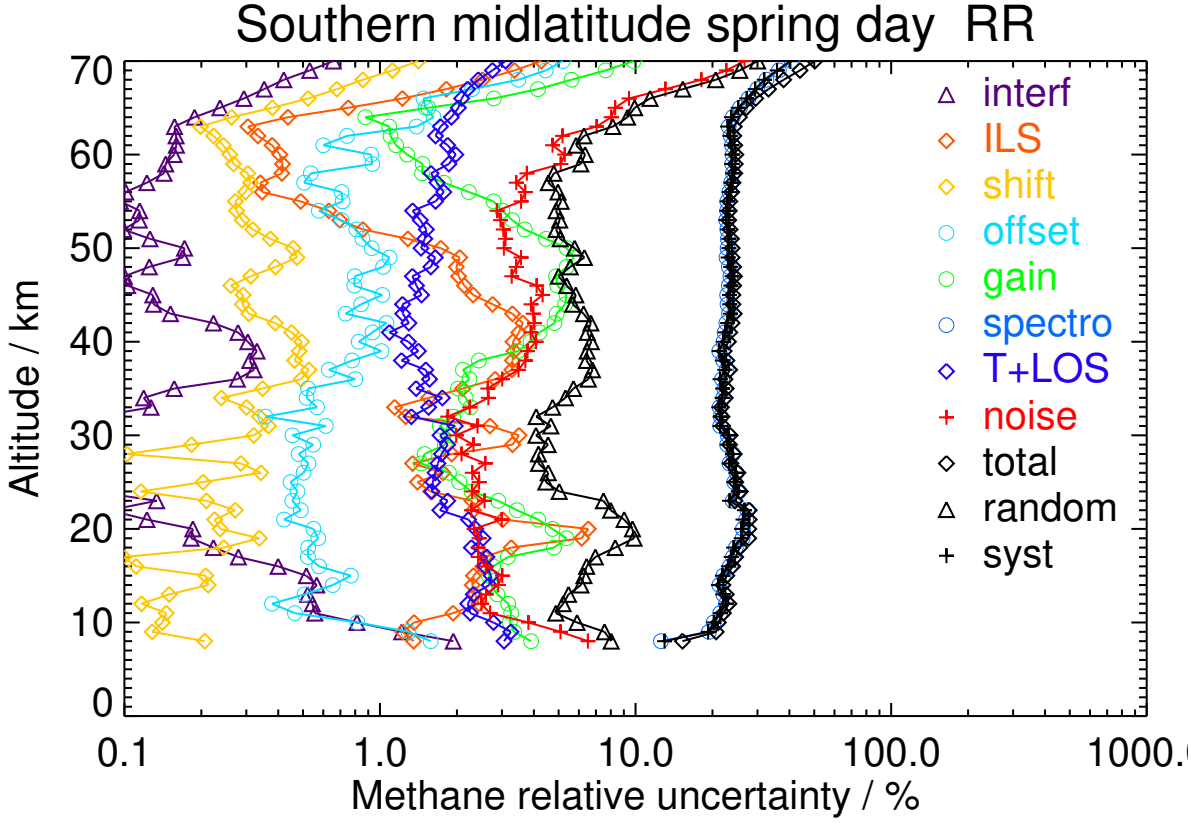

Figure S55. V8R_CH4_261 Southern midlatitude spring day

Table S56. Methane error budget for Southern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1838.74	17.11	24.63	2.40	24.19	58.75	333.72	63.80	92.82	147.25	327.59	359.17
12	1851.12	7.71	70.98	1.92	7.76	75.55	387.34	40.50	46.51	90.49	395.62	405.84
15	1683.67	7.14	67.17	2.39	13.36	61.39	351.18	45.92	50.09	107.45	353.44	369.41
18	1455.49	3.07	61.89	2.87	12.13	122.80	344.12	38.07	37.77	137.09	348.68	374.66
21	1123.30	1.55	37.58	1.90	6.07	64.46	285.17	26.33	37.07	112.49	276.31	298.33
24	1094.81	1.08	18.97	1.46	5.24	22.95	278.94	17.75	29.48	109.51	260.60	282.68
27	1064.51	1.14	17.09	2.67	6.62	15.25	258.36	18.76	33.28	104.02	240.77	262.28
30	1193.54	0.91	48.04	3.50	5.42	29.00	276.33	18.59	23.48	75.14	273.50	283.63
33	963.31	1.57	14.01	3.54	5.61	24.27	220.81	14.69	22.66	59.93	216.16	224.31
36	626.00	1.92	18.31	2.90	5.30	19.81	139.02	9.47	19.60	42.64	136.93	143.42
39	410.72	1.35	17.23	2.07	4.42	17.50	92.03	5.97	16.42	29.09	92.51	96.98
42	303.55	0.68	11.01	1.28	3.42	15.36	70.47	4.10	13.03	21.37	71.18	74.32
45	261.59	0.35	7.26	0.95	2.62	14.39	62.57	3.86	10.83	16.76	63.51	65.68
48	268.71	0.35	6.01	0.98	2.36	12.33	64.02	3.85	8.56	15.68	64.31	66.20
52	254.35	0.29	2.36	0.72	1.95	8.52	58.99	3.76	7.51	13.41	58.77	60.28
56	227.81	0.27	1.79	0.74	1.55	3.86	53.37	3.94	8.31	11.44	53.13	54.35
60	200.61	0.38	2.03	0.66	1.92	2.24	48.53	3.98	10.64	13.17	48.21	49.97
64	167.17	0.36	1.67	0.52	2.91	1.60	41.53	3.46	14.14	17.50	40.55	44.17
68	110.94	0.45	2.70	1.08	3.90	5.36	35.26	3.14	20.19	23.70	33.94	41.40

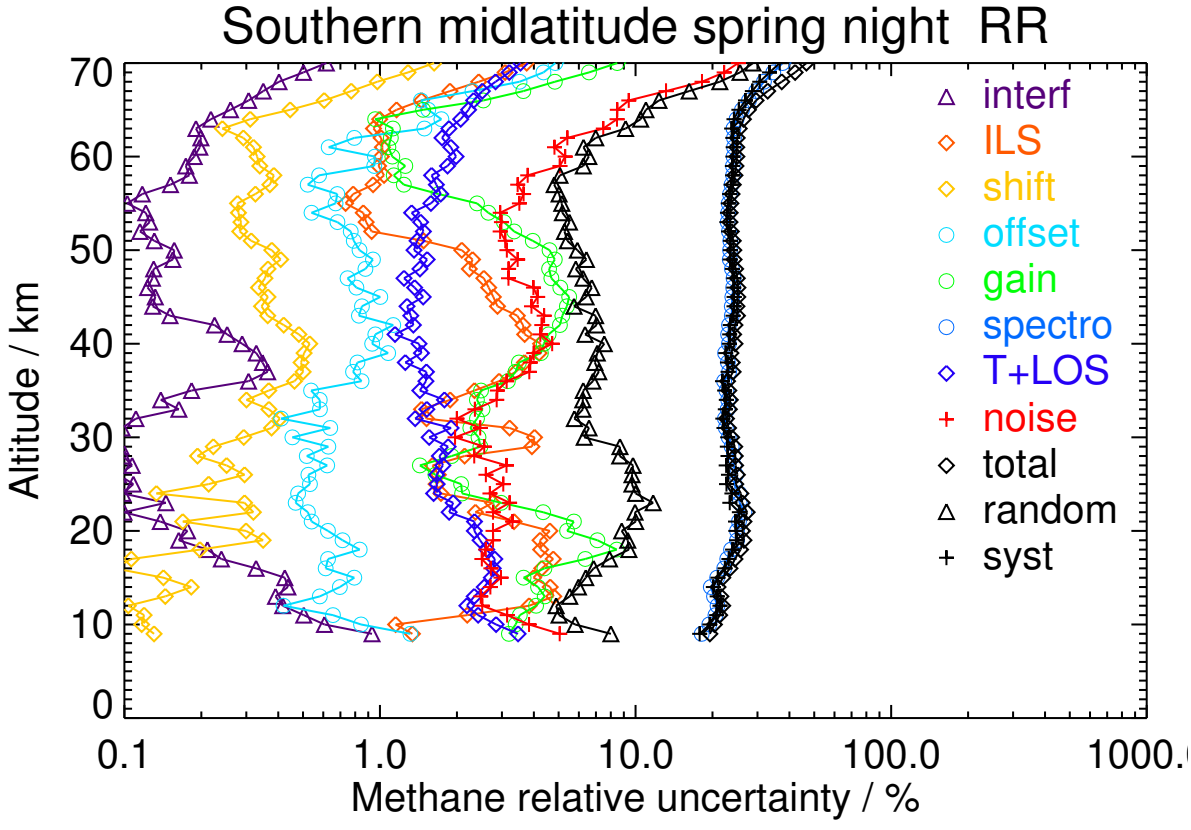

Figure S56. V8R_CH4_261 Southern midlatitude spring night

Table S57. Methane error budget for Southern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1659.84	24.75	31.40	2.91	23.05	56.78	272.03	54.56	91.24	165.37	251.63	301.10
12	1785.30	8.25	50.31	1.93	6.67	69.64	357.88	33.76	39.84	104.80	356.82	371.89
15	1765.84	7.91	89.84	3.12	11.99	80.02	352.23	40.90	46.05	133.58	353.14	377.56
18	1596.47	4.43	83.55	2.66	9.94	96.34	338.38	37.69	38.13	132.31	340.96	365.73
21	1276.42	1.83	55.66	2.00	5.10	16.02	337.67	30.33	36.32	83.54	335.66	345.90
24	1177.37	1.37	21.57	1.08	4.59	12.46	286.37	19.17	26.56	58.80	283.32	289.35
27	1063.20	0.91	12.26	3.02	7.32	12.71	251.85	21.13	34.05	51.54	250.51	255.76
30	979.07	1.32	44.89	1.55	4.06	19.12	209.99	14.15	19.49	41.27	213.02	216.98
33	872.66	1.23	7.66	3.19	5.12	20.15	178.90	11.01	19.99	32.00	178.90	181.74
36	688.34	2.31	14.76	2.96	4.64	13.27	141.85	8.08	17.89	25.50	142.43	144.70
39	530.47	1.75	13.77	2.69	3.87	12.83	109.97	5.98	15.15	27.98	109.34	112.86
42	361.59	0.68	10.94	1.80	3.25	15.56	81.14	4.09	12.12	22.39	81.38	84.40
45	282.03	0.46	6.46	1.44	2.46	14.79	66.84	3.24	9.91	23.70	65.45	69.61
48	188.87	0.29	5.43	1.00	1.51	8.90	50.45	1.91	7.50	20.54	47.91	52.12
52	140.16	0.13	1.81	0.35	0.97	3.64	33.36	1.48	4.78	9.91	32.52	33.99
56	114.58	0.07	0.57	0.28	1.04	2.04	26.96	1.48	4.94	6.24	26.83	27.55
60	124.98	0.22	1.15	0.40	1.56	1.39	30.06	1.90	7.47	9.24	29.73	31.13
64	143.21	0.34	1.95	0.34	2.64	1.71	35.44	2.27	11.80	13.06	35.27	37.61
68	168.43	0.67	2.79	1.34	3.95	5.80	48.58	2.88	19.55	21.76	48.34	53.01

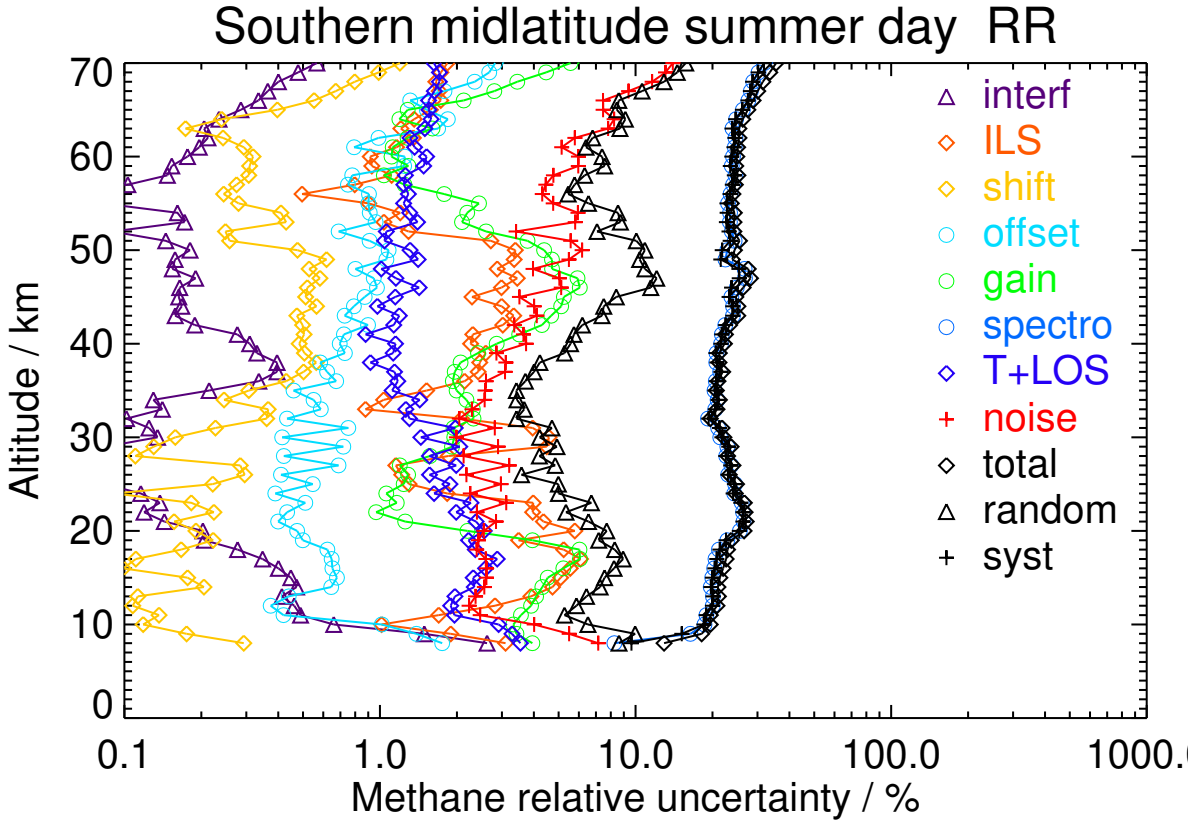

Figure S57. V8R_CH4_261 Southern midlatitude summer day

Table S58. Methane error budget for Southern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1707.92	23.71	36.14	2.31	22.99	41.38	284.82	59.32	91.14	182.51	252.50	311.55
12	1770.64	7.50	35.64	1.82	6.87	60.29	383.05	32.94	41.03	101.02	379.87	393.07
15	1709.73	7.59	67.51	3.35	12.27	69.45	374.03	40.40	45.76	98.37	378.88	391.44
18	1580.12	3.57	75.62	4.53	12.95	119.94	373.89	37.45	37.23	121.32	384.92	403.59
21	1216.13	1.77	32.10	2.92	4.46	35.30	310.86	26.00	35.24	86.36	305.62	317.59
24	1163.30	1.47	14.56	1.35	4.17	11.38	259.45	18.24	27.67	56.12	256.17	262.25
27	1038.41	0.85	11.29	3.27	7.21	11.09	249.41	20.23	33.59	50.24	248.06	253.09
30	974.76	1.17	48.01	2.10	4.34	20.40	205.23	14.16	20.36	42.74	208.94	213.26
33	859.73	1.30	9.24	3.39	4.92	21.70	181.79	10.54	19.92	30.71	182.23	184.80
36	706.79	2.24	16.73	2.94	4.57	14.72	149.11	8.06	18.20	29.87	149.23	152.19
39	510.59	1.55	16.21	2.46	3.85	14.53	111.83	5.40	14.63	27.30	111.80	115.09
42	373.64	0.58	13.61	1.94	3.52	19.55	90.88	3.99	11.99	25.82	91.30	94.88
45	240.01	0.49	5.87	1.47	2.08	12.57	63.28	2.65	9.37	23.88	61.06	65.56
48	170.97	0.26	3.66	0.80	1.34	6.36	45.45	1.56	7.41	18.25	42.97	46.69
52	117.67	0.12	1.35	0.31	0.90	2.60	28.42	1.32	4.73	8.67	27.68	29.01
56	110.51	0.12	0.93	0.31	0.97	1.47	26.37	1.39	4.76	8.25	25.62	26.91
60	109.88	0.23	1.35	0.40	1.41	1.12	26.01	1.69	6.76	8.20	25.75	27.03
64	128.47	0.35	1.68	0.35	2.34	1.39	30.85	2.09	10.50	11.56	30.71	32.81
68	147.82	0.67	1.86	1.25	3.58	6.26	40.36	3.05	17.36	20.08	39.93	44.69

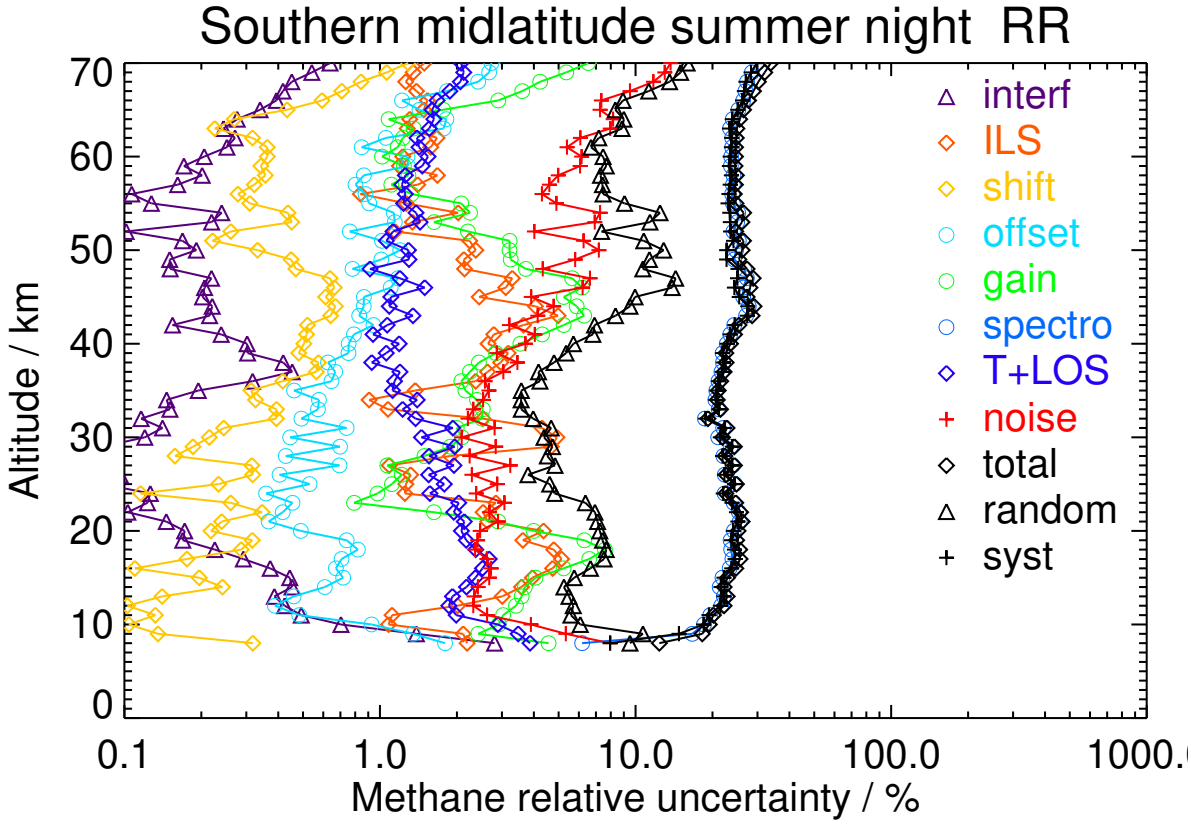

Figure S58. V8R_CH4_261 Southern midlatitude summer night

Table S59. Methane error budget for Southern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1751.93	16.59	12.65	2.46	25.77	61.65	348.78	66.02	90.45	128.32	350.18	372.96
12	1862.82	6.16	43.05	1.53	5.88	68.90	389.96	36.76	39.92	68.26	396.28	402.11
15	1775.10	5.78	51.37	2.42	13.08	69.17	370.54	45.58	47.53	88.91	375.99	386.36
18	1631.88	3.39	57.36	3.24	11.37	130.06	359.71	39.06	37.29	101.20	377.39	390.72
21	1319.51	1.36	32.44	2.74	7.14	80.39	319.11	30.40	36.83	86.72	322.75	334.20
24	1163.05	1.05	12.58	1.45	6.91	38.31	279.98	22.52	36.15	57.25	280.36	286.14
27	1014.39	0.99	8.68	1.48	6.58	17.06	236.45	20.14	33.37	51.14	235.00	240.50
30	874.21	0.63	27.84	2.43	6.96	15.62	211.64	19.81	28.59	48.19	211.54	216.96
33	763.02	1.09	8.55	2.52	6.67	17.11	174.60	13.91	26.22	50.39	171.01	178.28
36	548.79	1.50	15.62	1.94	5.87	18.06	134.99	9.02	22.77	58.02	126.76	139.40
39	462.15	1.44	16.78	2.01	5.27	19.95	113.79	7.24	20.80	58.27	103.69	118.94
42	370.98	0.81	14.79	1.06	4.62	21.55	96.25	5.79	17.96	51.95	87.34	101.62
45	345.66	0.37	9.45	1.00	3.95	22.04	89.33	5.92	15.50	46.87	81.54	94.05
48	317.20	0.41	6.48	1.08	3.72	19.12	81.49	5.88	12.58	39.02	75.72	85.19
52	305.85	0.35	2.13	0.70	2.97	12.32	70.82	6.11	11.23	22.52	69.55	73.10
56	294.77	0.33	1.74	0.67	2.26	6.99	68.35	6.39	12.18	18.00	67.79	70.14
60	230.02	0.31	1.02	0.45	2.25	3.43	55.58	5.24	13.40	19.14	54.29	57.57
64	137.30	0.26	1.22	0.31	3.14	1.38	35.63	3.16	15.77	19.41	34.13	39.27
68	60.35	0.23	1.82	0.46	4.22	2.94	22.37	2.04	21.16	23.62	20.60	31.34

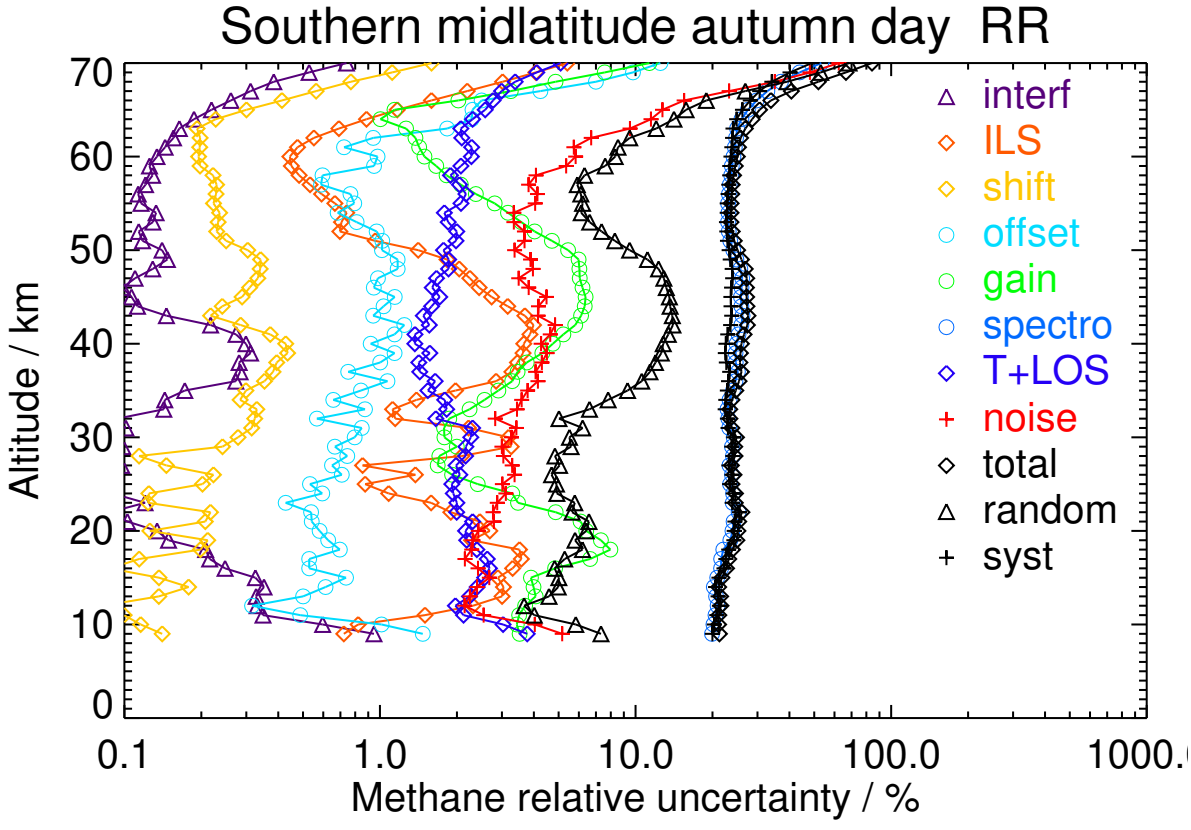

Figure S59. V8R_CH4_261 Southern midlatitude autumn day

Table S60. Methane error budget for Southern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1853.90	18.78	17.32	2.26	26.33	51.91	353.58	68.14	95.86	129.11	355.29	378.02
12	1860.35	6.43	50.19	1.36	5.93	75.72	409.73	36.53	40.37	77.31	416.17	423.29
15	1774.57	6.16	71.58	2.26	13.14	90.12	366.65	45.47	48.46	90.05	379.73	390.26
18	1622.12	3.16	71.65	3.49	11.84	135.66	344.37	40.63	36.76	91.67	369.98	381.17
21	1291.78	1.52	37.86	2.40	7.01	70.43	305.73	30.00	37.06	87.84	307.37	319.68
24	1125.80	1.16	16.49	1.76	5.26	20.84	260.72	20.01	30.25	52.26	259.42	264.63
27	999.83	0.84	15.70	2.51	8.51	12.66	243.23	21.78	39.05	58.84	241.21	248.28
30	882.03	0.68	34.52	2.33	4.67	16.70	200.66	16.39	23.27	47.93	200.69	206.34
33	751.09	1.02	6.21	2.52	6.00	15.72	166.86	11.77	24.11	45.95	163.64	169.97
36	572.37	1.38	10.33	1.87	6.01	14.83	127.86	8.08	22.49	51.56	120.95	131.48
39	491.76	1.65	14.65	2.26	5.36	16.21	111.39	6.63	20.46	55.82	101.33	115.69
42	420.69	1.02	13.78	1.52	4.63	20.18	101.45	5.53	17.46	50.49	93.28	106.06
45	346.08	0.39	8.20	1.03	3.69	19.73	89.88	5.43	14.58	47.38	80.91	93.76
48	324.94	0.45	5.81	1.29	3.19	15.91	81.40	5.16	11.40	36.14	75.99	84.15
52	294.19	0.36	1.94	0.78	2.55	9.30	67.54	5.52	11.06	21.74	65.87	69.37
56	283.11	0.47	2.10	0.73	2.34	4.74	63.75	6.07	12.41	17.79	63.02	65.49
60	225.61	0.40	1.32	0.48	2.61	2.42	52.97	5.22	14.03	17.64	52.28	55.18
64	136.10	0.29	0.97	0.36	3.25	1.45	34.93	3.39	16.34	19.84	33.45	38.89
68	67.60	0.28	1.94	0.48	4.01	3.84	23.48	2.44	20.92	24.10	21.18	32.09

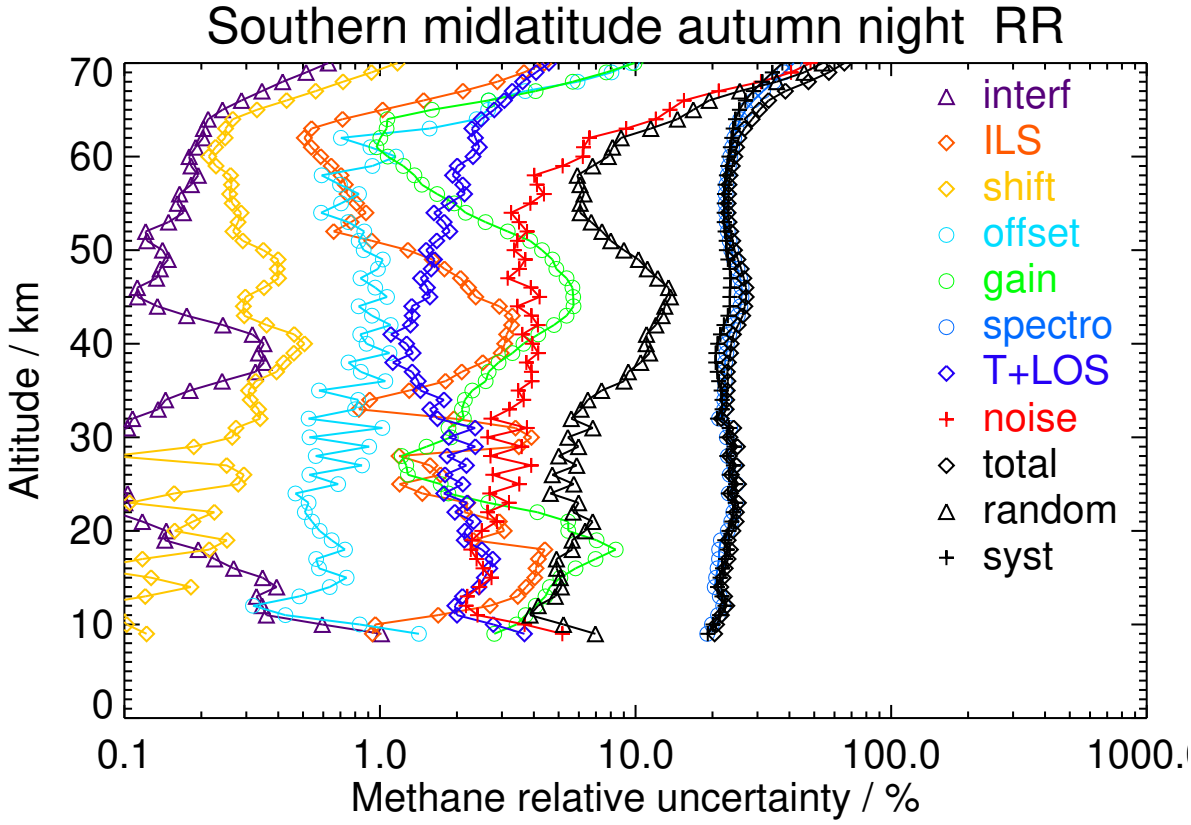

Figure S60. V8R_CH4_261 Southern midlatitude autumn night

Table S61. Methane error budget for Southern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1810.04	35.13	2.29	0.86	26.97	53.61	264.28	46.57	110.40	128.79	269.18	298.40
12	1789.07	12.00	34.82	2.31	11.43	58.32	406.36	44.92	58.32	83.04	410.54	418.85
15	1495.94	13.90	9.64	2.94	14.07	41.43	321.38	51.55	58.54	85.43	322.92	334.03
18	1273.25	3.97	22.83	3.47	8.78	56.12	334.97	33.19	40.92	66.62	338.11	344.61
21	966.45	1.70	19.20	1.18	6.18	29.92	261.86	22.93	39.09	63.33	260.62	268.20
24	659.44	1.09	12.09	2.23	8.56	10.69	178.43	22.20	50.06	80.11	169.58	187.55
27	487.20	1.14	8.16	0.80	6.08	5.33	115.12	13.94	36.13	62.02	105.08	122.01
30	531.93	1.41	17.82	2.21	8.80	6.54	127.35	15.34	39.27	50.22	126.17	135.80
33	328.93	2.04	6.31	2.49	6.31	4.67	85.64	10.70	30.95	50.35	77.35	92.29
36	216.24	1.44	4.88	1.53	4.56	4.96	55.93	6.25	24.12	40.71	46.53	61.83
39	198.65	0.79	4.00	0.78	3.41	5.68	48.23	4.67	17.93	25.10	45.83	52.25
42	189.61	0.32	3.18	1.11	2.56	6.54	44.83	4.12	12.81	17.61	44.06	47.45
45	205.12	0.21	4.05	0.75	2.08	7.27	47.40	3.50	9.66	14.77	46.99	49.26
48	192.32	0.19	3.67	0.53	1.67	6.45	43.65	2.84	7.32	12.56	43.21	45.00
52	166.01	0.14	2.23	0.48	1.35	4.49	38.54	2.31	5.70	9.38	38.24	39.37
56	144.92	0.10	2.04	0.31	1.10	3.25	35.66	2.06	6.21	8.83	35.39	36.48
60	129.49	0.08	1.15	0.33	1.46	2.74	33.00	2.16	9.29	11.89	32.40	34.51
64	101.88	0.22	0.73	0.48	2.87	1.82	28.15	1.86	14.26	16.60	27.12	31.80
68	90.71	0.41	1.03	1.53	4.71	3.97	29.07	2.10	23.62	25.80	27.99	38.07

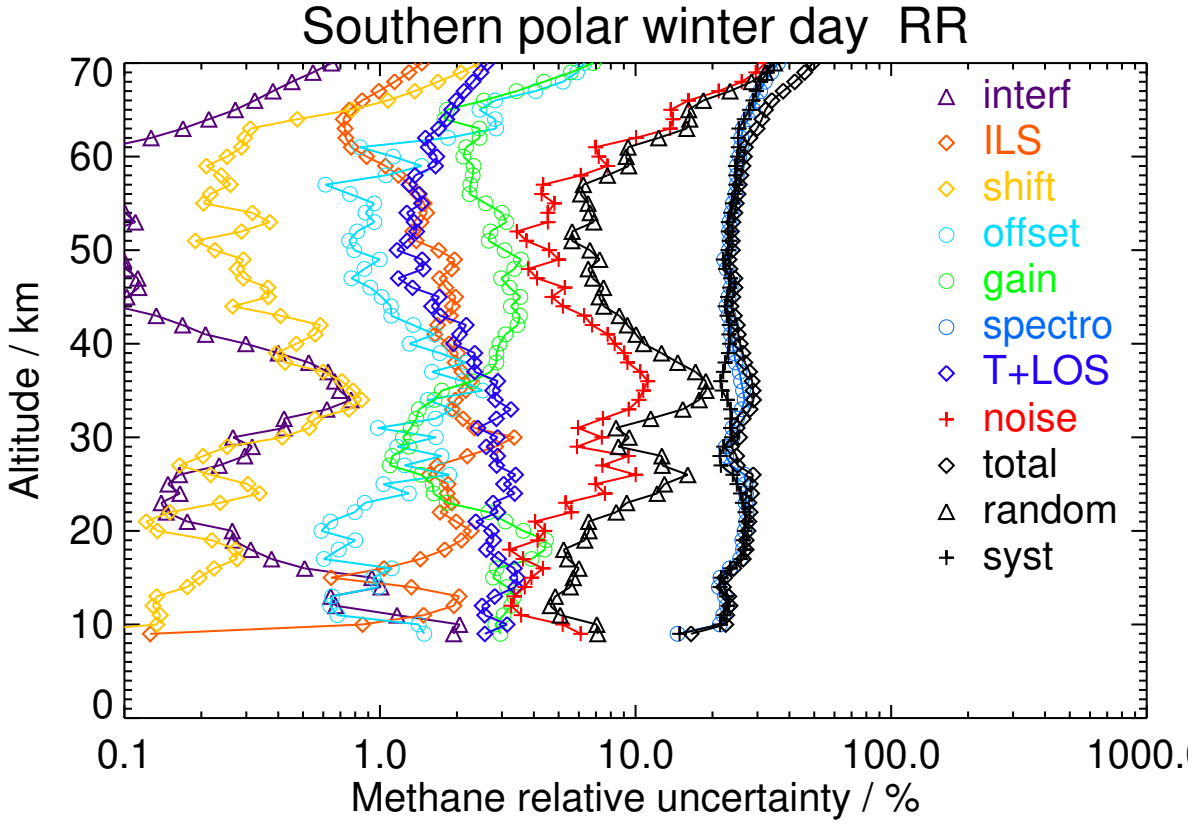

Figure S61. V8R_CH4_261 Southern polar winter day

Table S62. Methane error budget for Southern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1733.87	30.31	10.50	1.39	23.55	60.11	218.54	43.15	96.11	129.08	217.71	253.10
12	1824.70	8.83	39.54	1.37	8.43	62.45	348.32	42.01	47.88	72.36	354.63	361.94
15	1519.23	13.91	17.99	2.24	13.65	46.05	265.09	51.55	58.88	94.97	264.97	281.47
18	1244.95	3.82	14.11	2.27	8.92	49.02	260.11	35.76	42.69	71.67	261.39	271.03
21	988.52	2.39	18.59	1.09	5.86	28.03	232.12	25.44	42.12	60.10	232.08	239.74
24	724.20	1.04	12.74	2.28	9.08	16.54	187.54	23.03	50.57	73.09	182.87	196.93
27	459.93	1.16	9.17	1.08	6.36	6.72	119.42	14.74	36.69	64.06	109.06	126.48
30	447.10	0.95	12.78	1.92	8.55	10.24	114.87	13.57	37.12	54.52	110.14	122.89
33	331.56	1.88	6.51	2.17	6.60	8.82	87.30	10.39	28.85	45.15	81.83	93.45
36	216.10	1.16	4.31	1.31	5.03	6.36	59.39	6.18	22.44	38.69	51.57	64.47
39	182.95	0.68	3.11	0.85	3.76	7.61	48.18	4.68	17.03	26.83	44.67	52.11
42	180.93	0.33	4.62	1.20	2.79	7.90	45.92	4.05	12.55	21.34	43.82	48.74
45	181.79	0.21	4.32	0.69	2.05	7.29	43.78	3.17	9.19	16.30	42.68	45.69
48	176.67	0.17	2.60	0.30	1.53	5.66	41.68	2.33	6.74	12.62	40.87	42.77
52	151.94	0.13	1.96	0.37	1.23	4.18	36.95	2.08	5.50	8.23	36.81	37.72
56	138.31	0.10	1.55	0.36	1.20	3.22	34.05	2.11	6.71	8.83	33.84	34.98
60	115.17	0.09	0.89	0.29	1.67	2.26	29.21	2.11	10.10	12.06	28.69	31.12
64	101.01	0.21	0.97	0.31	2.89	1.43	25.55	1.86	14.02	15.99	24.67	29.40
68	76.58	0.41	1.65	1.32	4.55	4.81	23.39	2.19	22.22	24.90	21.77	33.08

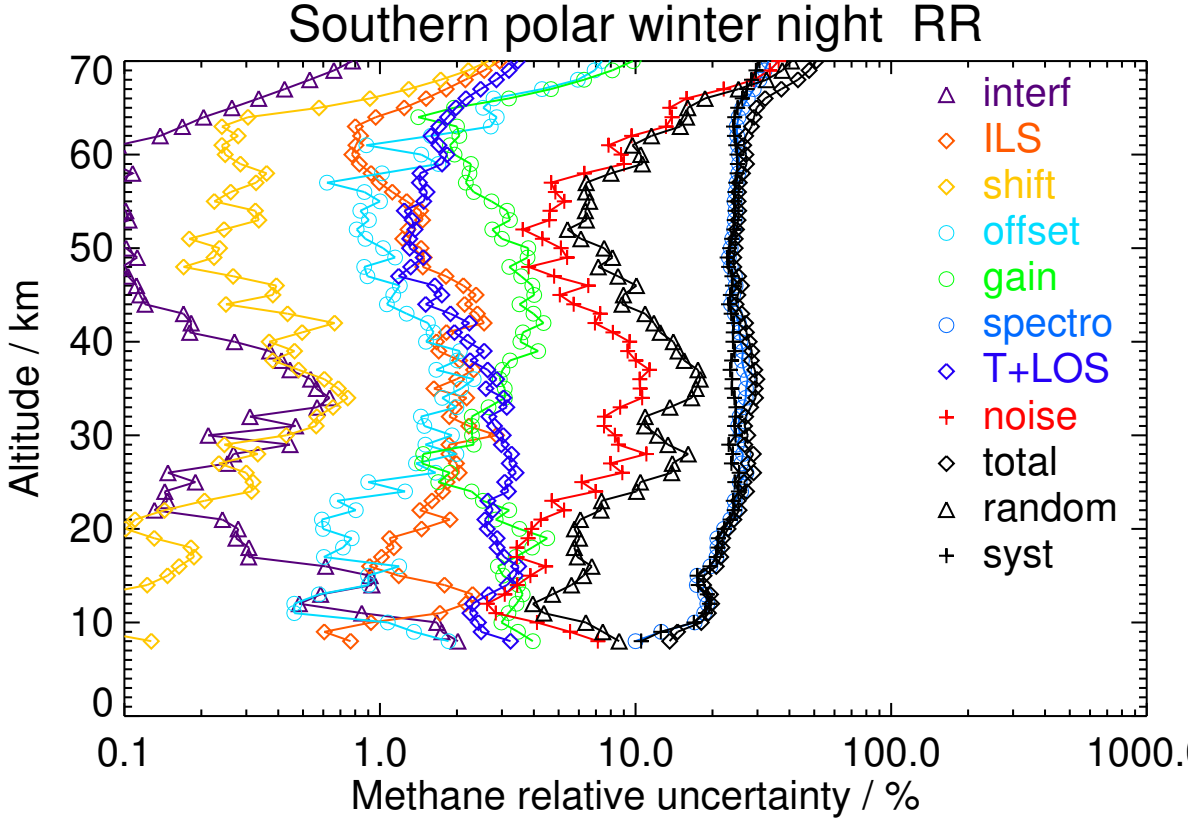

Figure S62. V8R_CH4_261 Southern polar winter night

Table S63. Methane error budget for Southern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1762.63	28.76	19.17	4.09	23.93	58.61	246.41	45.35	104.27	129.56	249.15	280.83
12	1728.51	11.79	52.81	4.16	8.42	52.20	419.53	49.74	51.10	114.10	416.91	432.24
15	1348.01	7.30	31.81	2.64	11.60	22.97	263.01	47.25	53.16	96.42	258.20	275.62
18	1238.69	2.07	26.07	3.43	7.40	37.82	291.04	32.93	32.43	87.63	285.20	298.36
21	1018.10	1.28	26.46	3.16	4.39	33.06	289.62	18.86	25.77	120.68	268.63	294.49
24	971.48	0.77	19.86	1.69	6.71	18.51	295.35	18.73	32.54	151.98	257.54	299.04
27	865.38	1.27	8.78	3.07	3.22	15.05	224.25	12.04	18.70	124.94	188.41	226.07
30	919.54	1.06	34.26	3.79	6.19	26.87	234.94	17.42	24.70	117.20	210.54	240.96
33	767.28	1.36	13.26	2.85	4.42	18.36	174.30	14.29	21.56	77.54	159.93	177.74
36	557.66	1.27	9.43	3.45	3.70	11.52	121.64	8.67	20.06	45.77	115.87	124.59
39	388.88	1.15	14.36	2.21	3.05	13.34	82.87	5.24	16.69	29.02	82.04	87.02
42	307.15	0.75	10.93	1.58	2.46	12.00	65.94	3.97	12.95	21.22	65.99	69.31
45	281.12	0.35	7.94	0.96	2.29	13.35	63.18	3.70	10.61	16.59	63.96	66.07
48	286.47	0.46	8.28	1.20	2.46	15.37	64.41	4.32	9.00	21.43	64.04	67.53
52	268.08	0.34	4.94	0.82	1.93	8.62	59.42	3.80	7.19	14.38	59.11	60.83
56	251.37	0.28	2.99	0.87	1.31	4.55	57.89	3.88	7.28	10.99	57.71	58.75
60	221.81	0.34	1.92	0.74	1.43	2.90	53.56	4.14	9.32	12.48	53.22	54.66
64	189.00	0.38	1.37	0.64	2.53	1.73	47.12	3.45	12.54	15.45	46.51	49.01
68	150.58	0.47	2.24	1.23	4.27	5.55	43.67	3.41	21.26	24.45	42.76	49.26

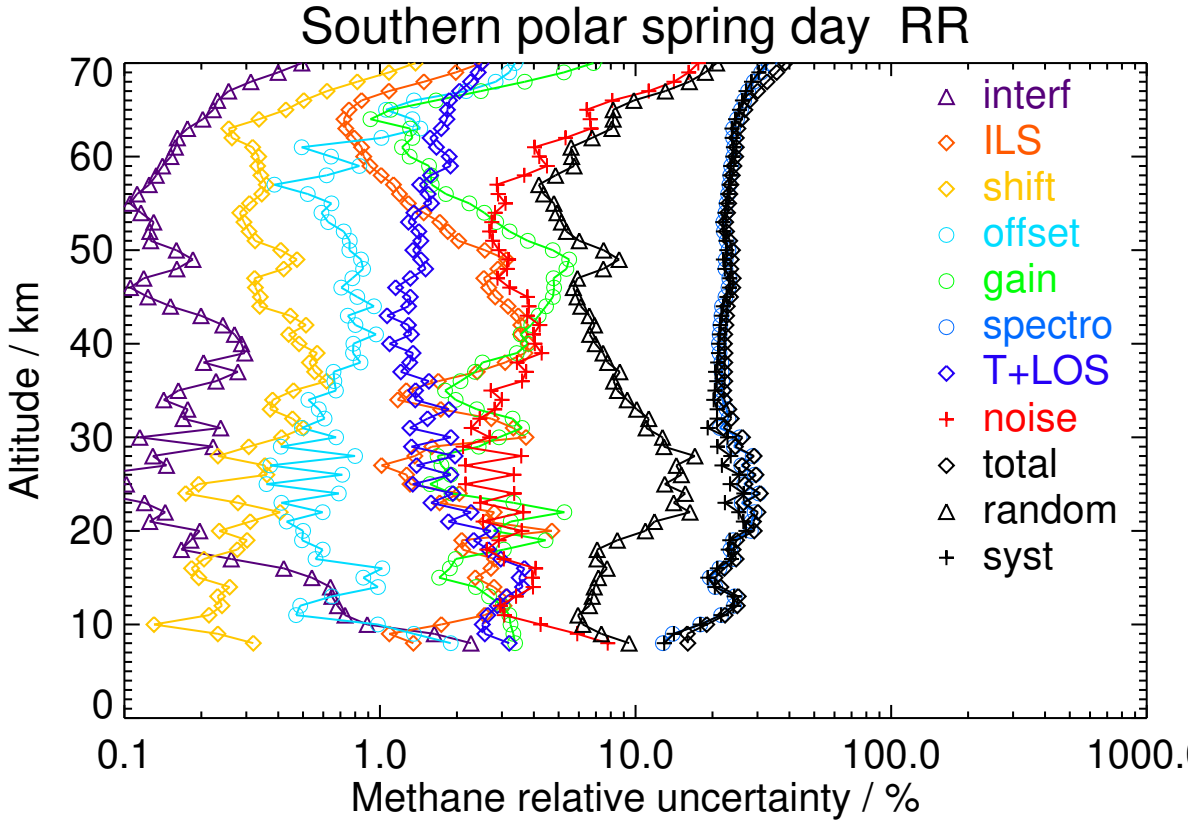

Figure S63. V8R_CH4_261 Southern polar spring day

Table S64. Methane error budget for Southern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1731.71	20.70	19.11	3.20	20.14	47.80	176.80	40.35	89.29	118.40	174.17	210.61
12	1685.64	7.08	33.19	2.51	7.96	36.83	355.19	38.42	45.45	87.40	353.05	363.70
15	1320.69	7.02	28.12	2.37	9.86	31.59	242.11	38.41	46.86	96.91	234.17	253.43
18	1242.33	1.89	33.74	3.66	6.71	46.38	294.54	29.73	29.84	81.94	291.83	303.12
21	1131.89	1.34	30.42	2.69	5.05	50.23	310.32	18.23	24.10	106.89	298.79	317.33
24	1027.94	0.89	20.00	1.74	6.92	35.13	282.36	19.24	33.95	124.13	259.86	287.99
27	1046.58	1.24	11.97	2.40	3.60	25.01	247.79	13.60	19.56	112.45	223.85	250.51
30	995.26	0.87	33.74	3.58	6.78	31.27	261.62	19.25	26.19	116.20	241.19	267.72
33	808.63	1.19	10.47	3.20	4.65	29.06	204.18	15.06	21.51	85.94	189.69	208.25
36	555.04	1.32	14.82	3.08	3.72	19.90	141.26	8.57	19.10	54.86	134.25	145.03
39	410.61	0.91	19.11	2.03	3.60	24.07	98.98	5.66	16.59	36.56	98.64	105.19
42	331.24	0.67	14.21	1.79	3.08	21.10	78.62	4.41	13.50	26.66	79.58	83.92
45	277.14	0.39	8.97	1.22	2.81	19.66	69.51	3.95	11.47	24.10	69.82	73.86
48	279.42	0.40	8.60	1.51	3.21	23.29	72.23	4.41	9.79	28.10	71.91	77.21
52	268.06	0.39	3.58	0.70	2.03	10.31	62.59	3.68	7.84	15.91	62.15	64.16
56	249.08	0.38	2.38	0.83	1.40	4.95	57.78	4.02	7.95	11.59	57.59	58.75
60	207.43	0.37	1.09	0.62	1.45	2.50	49.53	4.23	9.81	12.12	49.30	50.76
64	164.67	0.38	1.13	0.50	2.49	1.73	40.81	3.43	12.78	14.89	40.36	43.02
68	131.78	0.55	3.32	1.32	4.28	6.87	38.69	3.89	21.72	24.81	38.04	45.41

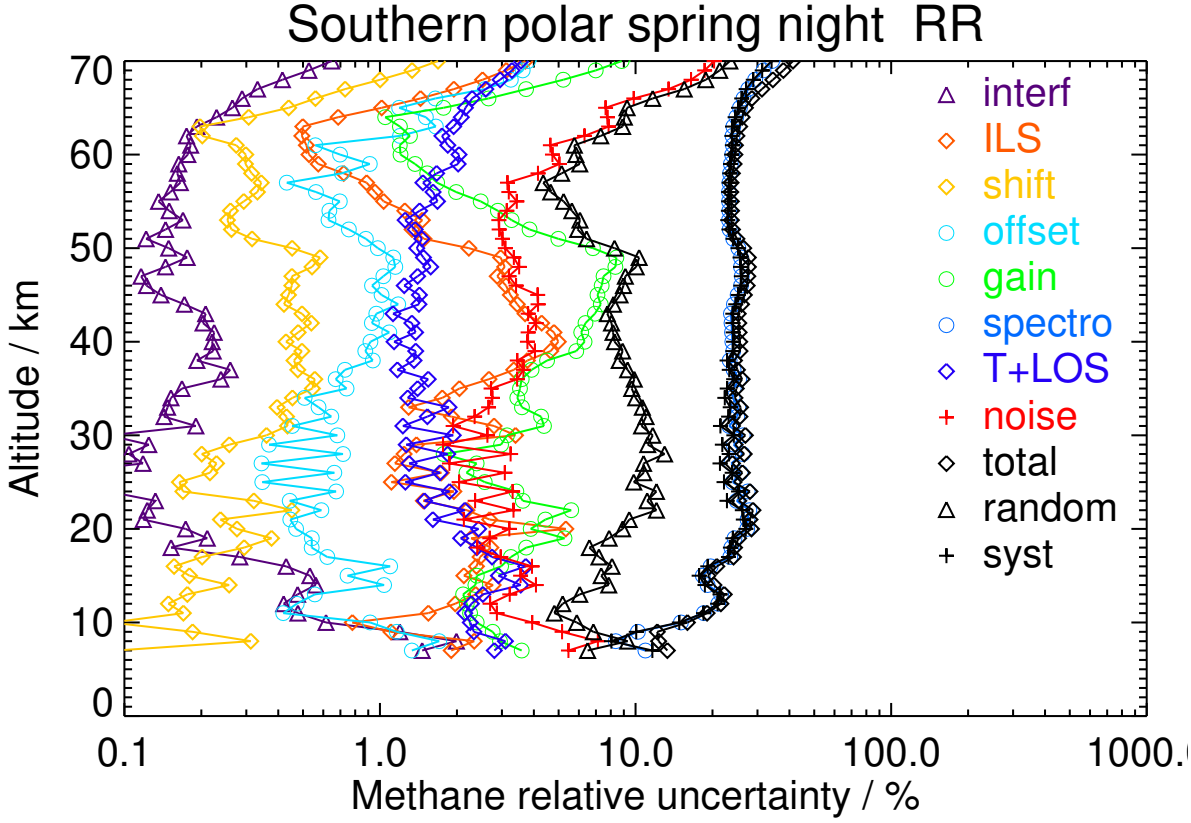

Figure S64. V8R_CH4_261 Southern polar spring night

Table S65. Methane error budget for Southern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1661.45	28.42	55.98	3.99	19.38	22.06	170.08	40.59	90.43	121.44	169.78	208.74
12	1748.10	5.30	36.53	1.71	6.31	45.78	388.77	31.71	36.12	70.93	389.77	396.17
15	1611.82	8.42	41.29	3.33	7.94	30.99	324.46	31.38	35.83	74.72	323.69	332.20
18	1448.98	2.41	56.20	5.39	5.54	34.29	369.79	25.98	26.95	61.52	372.51	377.56
21	1148.64	1.66	57.35	5.61	5.08	25.06	304.22	18.33	21.08	50.09	307.90	311.95
24	1154.60	0.88	27.84	1.55	7.94	14.86	314.01	21.28	32.27	49.14	314.24	318.06
27	1009.03	0.70	8.89	3.99	2.94	10.35	209.04	12.84	17.59	29.17	208.64	210.67
30	936.50	1.07	47.24	2.03	6.91	13.58	221.34	19.27	25.51	37.74	225.96	229.09
33	755.47	0.98	17.33	2.44	4.38	21.40	152.16	13.58	19.56	28.03	154.01	156.54
36	581.64	2.34	11.52	4.19	4.06	14.78	119.30	7.53	18.07	25.00	119.92	122.50
39	412.33	1.23	14.48	1.63	3.40	15.54	93.61	5.44	16.33	21.34	95.24	97.60
42	268.31	0.36	14.26	1.50	2.14	12.44	66.13	3.84	12.28	19.32	67.31	70.03
45	160.83	0.31	8.19	1.06	1.90	10.78	38.39	2.44	10.46	16.39	38.84	42.16
48	82.79	0.19	2.34	0.39	1.21	2.97	19.27	1.07	7.36	9.82	18.60	21.03
52	55.88	0.10	1.27	0.37	0.97	1.20	14.50	0.66	5.70	7.57	13.79	15.73
56	64.37	0.06	0.70	0.10	0.74	1.25	17.00	0.74	3.84	6.63	16.22	17.52
60	104.22	0.21	0.78	0.53	0.86	1.75	30.20	1.25	4.79	16.72	25.72	30.68
64	102.29	0.35	1.11	0.44	1.72	1.67	29.04	1.40	7.67	15.06	26.17	30.19
68	114.68	0.43	2.16	0.89	3.56	1.77	33.47	1.81	15.64	19.17	31.97	37.28

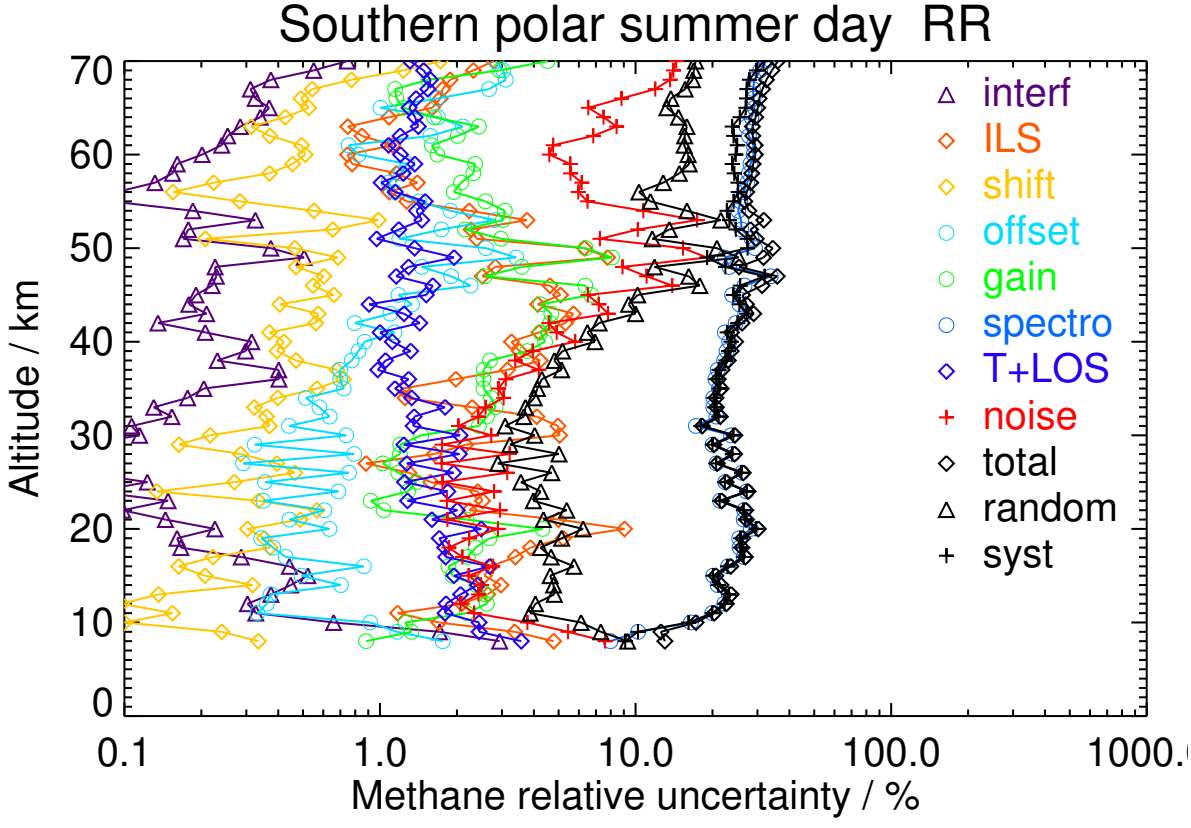

Figure S65. V8R_CH4_261 Southern polar summer day

Table S66. Methane error budget for Southern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1714.68	23.71	33.17	2.74	21.68	38.12	254.33	49.95	90.37	163.98	228.14	280.96
12	1759.22	6.39	35.99	1.68	6.30	50.44	382.16	34.18	40.26	74.51	383.68	390.85
15	1661.62	7.61	91.80	3.50	12.09	88.81	332.69	42.92	43.59	113.20	343.72	361.88
18	1526.14	3.17	53.58	5.73	10.98	112.21	352.73	30.40	32.87	91.31	365.66	376.89
21	1184.97	1.65	42.94	4.15	4.25	36.43	296.18	23.91	31.83	65.65	296.99	304.16
24	1136.63	0.72	15.73	1.16	7.82	18.87	301.52	21.68	32.69	47.04	301.50	305.15
27	976.40	0.84	9.50	3.36	3.96	9.19	198.43	14.13	21.52	30.66	198.24	200.60
30	894.71	1.36	46.36	1.79	6.54	14.09	216.43	17.08	23.50	34.64	221.09	223.79
33	718.12	1.75	7.18	3.40	4.86	22.46	139.14	10.77	17.48	25.22	140.50	142.75
36	515.08	2.51	16.91	2.88	4.49	17.23	105.27	6.85	15.31	21.86	107.25	109.46
39	359.08	0.92	15.09	1.25	3.15	14.71	81.04	4.91	12.65	19.88	82.54	84.90
42	194.95	0.42	10.83	1.68	2.20	12.32	49.27	2.88	9.25	17.39	49.96	52.90
45	117.49	0.32	2.89	0.72	1.33	6.29	31.62	1.60	7.47	12.82	30.73	33.29
48	73.05	0.11	1.49	0.26	0.93	1.60	19.26	0.80	5.99	7.41	18.93	20.33
52	54.96	0.06	0.71	0.24	0.76	1.27	13.49	0.59	3.84	4.95	13.25	14.14
56	66.06	0.06	0.58	0.17	0.78	1.00	17.07	0.90	3.90	6.56	16.32	17.59
60	116.40	0.27	0.90	0.56	1.16	1.97	30.77	1.60	6.20	15.19	27.63	31.53
64	122.98	0.38	0.83	0.51	2.26	1.87	31.75	1.94	9.76	13.54	30.55	33.42
68	146.34	0.66	0.85	1.38	4.03	2.89	39.77	2.99	18.38	20.54	39.16	44.22

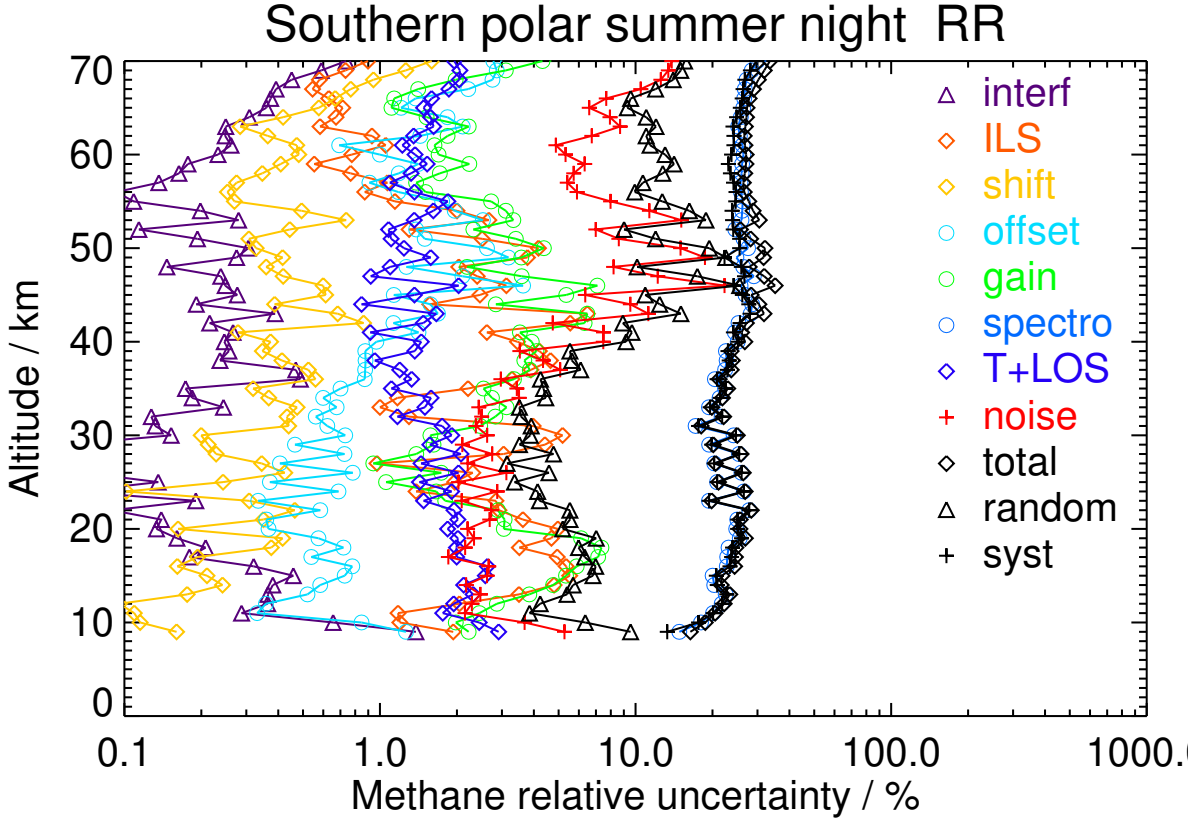

Figure S66. V8R_CH4_261 Southern polar summer night

Table S67. Methane error budget for Southern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	1802.40	9.82	41.08	1.61	5.72	55.81	390.19	33.68	36.21	56.97	395.45	399.54
15	1658.54	16.15	39.00	2.30	9.87	46.08	336.66	39.24	43.21	68.00	340.78	347.49
18	1464.13	7.07	27.17	4.60	6.27	75.76	346.54	27.77	31.46	56.33	353.93	358.39
21	1195.32	1.62	23.31	2.47	5.28	64.43	291.74	19.52	28.62	44.96	298.36	301.73
24	1065.32	1.48	9.45	2.14	8.73	43.88	252.43	24.09	43.01	55.10	255.37	261.24
27	866.97	1.40	8.26	0.91	5.02	17.43	202.70	17.45	30.52	40.65	202.66	206.70
30	667.87	0.98	14.71	2.04	8.82	9.11	170.40	19.98	35.95	49.34	169.34	176.38
33	428.95	1.67	4.96	1.56	6.00	8.17	109.38	13.71	28.54	40.61	107.00	114.45
36	191.99	0.89	6.55	0.85	3.99	7.71	51.57	6.76	22.14	30.46	48.86	57.57
39	80.41	0.59	3.72	0.81	2.63	4.31	22.32	3.22	16.47	22.16	18.15	28.64
42	69.54	0.29	1.67	0.49	2.22	3.27	19.51	2.10	13.00	17.69	16.11	23.93
45	92.77	0.13	1.27	0.28	2.01	3.87	23.60	2.10	10.75	15.63	21.28	26.41
48	158.39	0.18	1.68	0.17	2.27	7.14	36.86	3.15	9.25	14.35	36.15	38.90
52	210.70	0.22	1.70	0.16	2.03	7.90	47.52	3.59	7.59	11.76	47.54	48.97
56	182.69	0.11	2.02	0.22	1.46	5.45	44.49	3.25	8.01	12.73	43.91	45.71
60	122.59	0.04	1.51	0.13	1.61	3.17	32.02	2.52	10.40	13.79	31.06	33.99
64	64.87	0.17	0.77	0.11	2.79	1.37	18.45	1.39	13.73	15.64	17.23	23.27
68	31.88	0.17	0.82	0.46	4.47	0.87	13.68	1.06	21.16	22.84	11.65	25.64

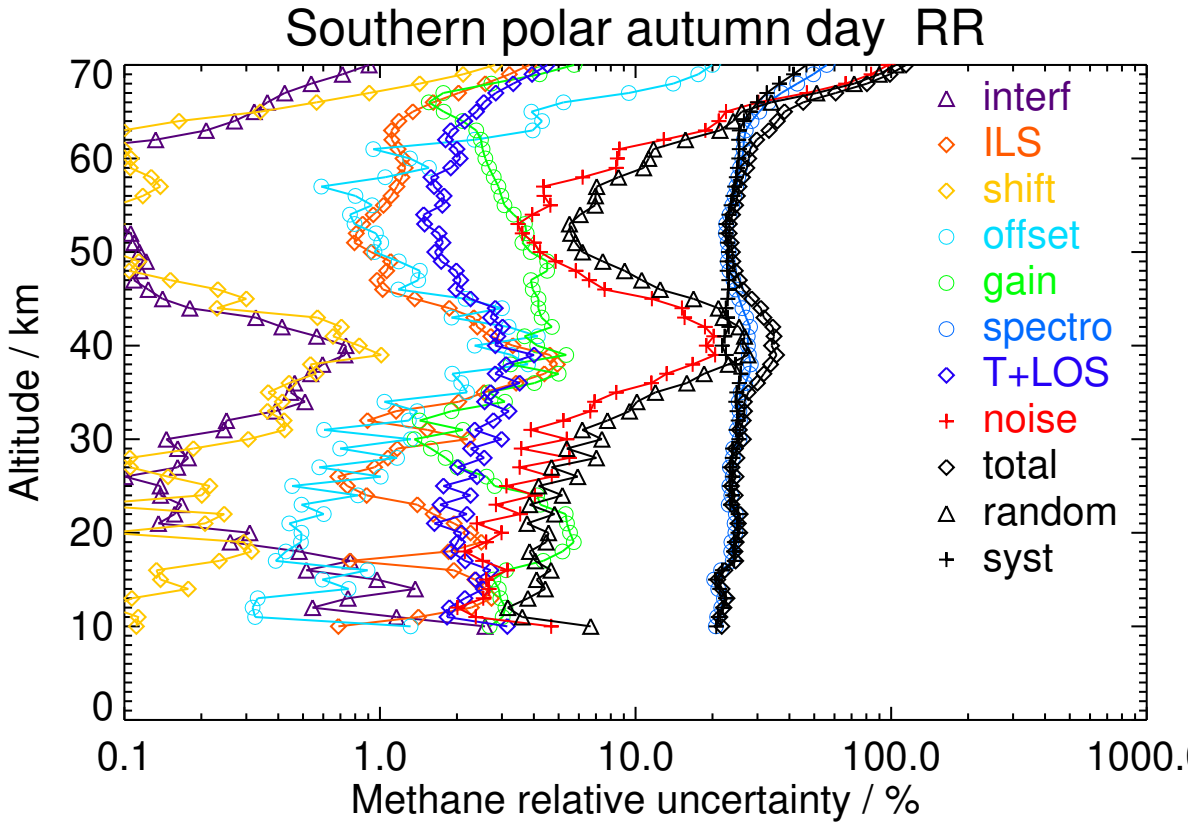

Figure S67. V8R_CH4_261 Southern polar autumn day

Table S68. Methane error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	1832.48	33.80	14.24	2.29	24.14	57.38	308.89	52.58	92.91	158.28	294.94	334.72
12	1766.14	9.57	39.15	1.56	5.91	62.32	387.13	36.03	39.65	66.99	392.17	397.85
15	1604.44	12.25	32.90	2.21	11.50	59.69	314.37	42.45	46.60	78.63	318.67	328.22
18	1383.84	6.07	22.16	2.91	8.23	93.24	292.98	30.98	33.55	65.38	304.87	311.80
21	1138.28	2.04	17.68	2.35	6.01	65.24	257.84	21.41	31.22	51.58	264.32	269.31
24	1016.33	1.33	13.95	2.11	8.83	38.77	237.93	24.40	43.89	60.59	239.26	246.81
27	795.27	1.21	9.58	0.90	5.08	13.68	186.09	17.44	30.62	42.02	185.51	190.21
30	595.02	0.89	8.85	1.16	8.58	9.27	159.52	18.75	34.43	48.60	157.67	164.99
33	324.63	1.58	6.16	1.39	5.83	12.21	84.65	11.30	26.06	40.70	80.88	90.54
36	132.26	0.74	5.32	0.91	3.70	6.37	37.71	5.15	19.59	27.81	33.80	43.77
39	59.49	0.37	2.34	0.75	2.59	6.16	17.28	2.46	14.66	19.84	13.29	23.88
42	64.35	0.20	1.62	0.43	2.06	2.71	16.71	1.95	11.82	14.87	14.70	20.91
45	115.55	0.14	0.98	0.30	2.14	5.39	28.52	2.47	10.53	15.06	27.17	31.07
48	175.25	0.18	1.69	0.13	2.30	8.02	40.31	3.53	9.14	12.49	40.46	42.34
52	194.81	0.21	1.80	0.22	1.87	7.75	45.40	3.42	7.34	11.79	45.33	46.84
56	145.90	0.11	1.88	0.24	1.31	4.16	36.80	2.72	7.36	12.65	35.75	37.92
60	96.87	0.05	1.23	0.13	1.51	2.62	26.45	2.07	9.41	14.77	24.19	28.34
64	47.38	0.17	0.63	0.08	2.67	1.02	14.15	1.17	12.96	14.91	12.49	19.45
68	26.13	0.16	0.73	0.40	4.39	0.81	10.37	1.02	20.73	21.99	8.68	23.64

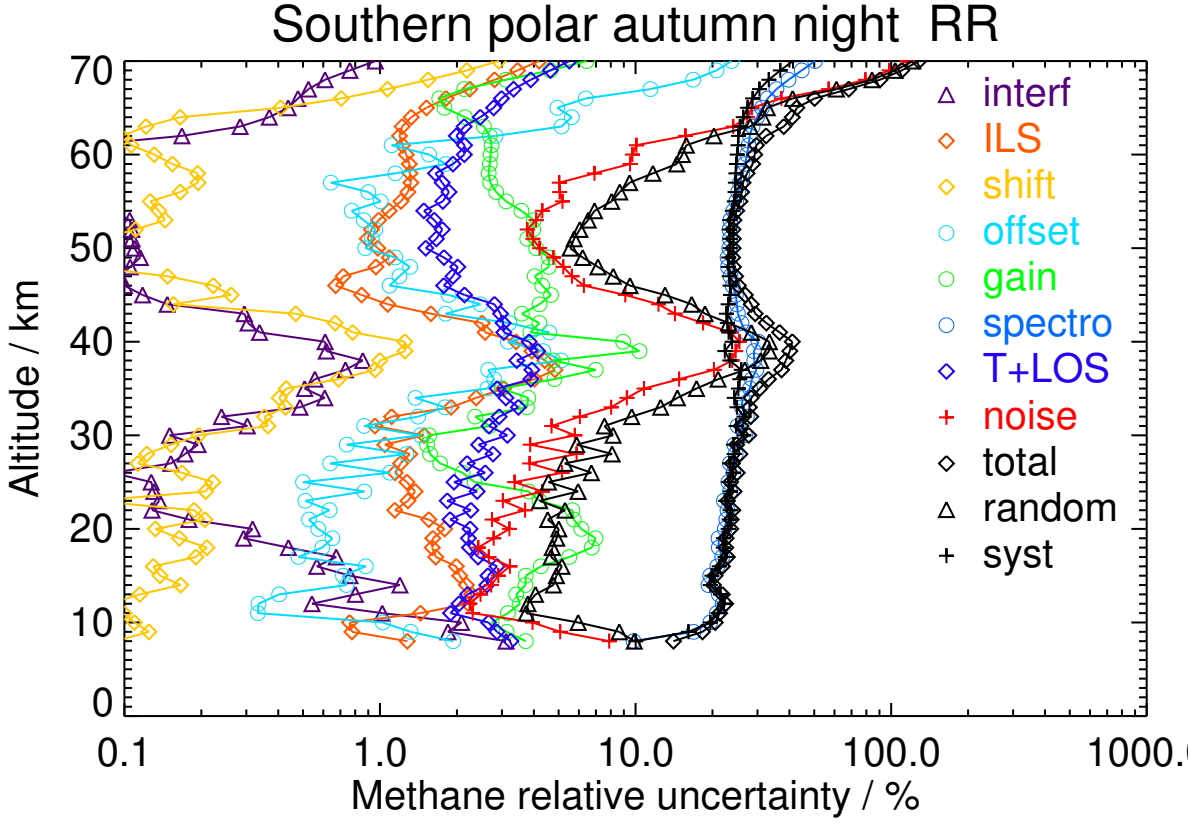

Figure S68. V8R_CH4_261 Southern polar autumn night

Table S69. Methane error budget for Northern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	1018.29	0.14	2.81	10.48	4.53	13.96	100.81	217.72	18.65	29.18	76.86	230.63	243.10
35	541.74	0.12	1.81	9.39	1.19	4.68	21.47	134.21	9.54	21.98	48.30	129.73	138.43
40	349.44	0.15	1.43	6.65	0.87	5.77	10.04	73.06	6.35	27.94	33.53	72.21	79.62
45	262.55	0.26	0.59	4.03	0.31	2.74	11.37	52.90	5.06	18.73	22.69	53.04	57.69
50	157.78	0.34	0.16	1.31	0.08	2.48	4.70	35.00	3.80	14.24	16.02	34.87	38.37
55	139.06	0.38	0.04	0.87	0.08	2.45	3.08	32.59	3.45	14.76	15.80	32.54	36.17
60	72.78	0.21	0.07	0.87	0.05	1.62	1.31	19.07	2.04	14.45	15.66	18.35	24.12
65	22.00	0.10	0.12	0.44	0.07	1.86	0.46	7.93	0.81	17.94	18.61	6.57	19.73
70	13.10	0.13	0.19	0.45	0.16	3.22	0.92	6.43	0.67	22.88	23.51	4.89	24.01
74	-3.82	0.18	0.29	0.73	0.22	6.96	1.35	6.34	0.60	32.82	33.84	4.82	34.19
80	-14.45	0.28	0.44	1.11	0.22	11.74	2.28	6.91	0.46	45.30	47.03	5.70	47.37
84	-9.89	0.19	0.25	0.81	0.13	8.42	1.41	3.80	0.17	30.81	32.01	3.54	32.21

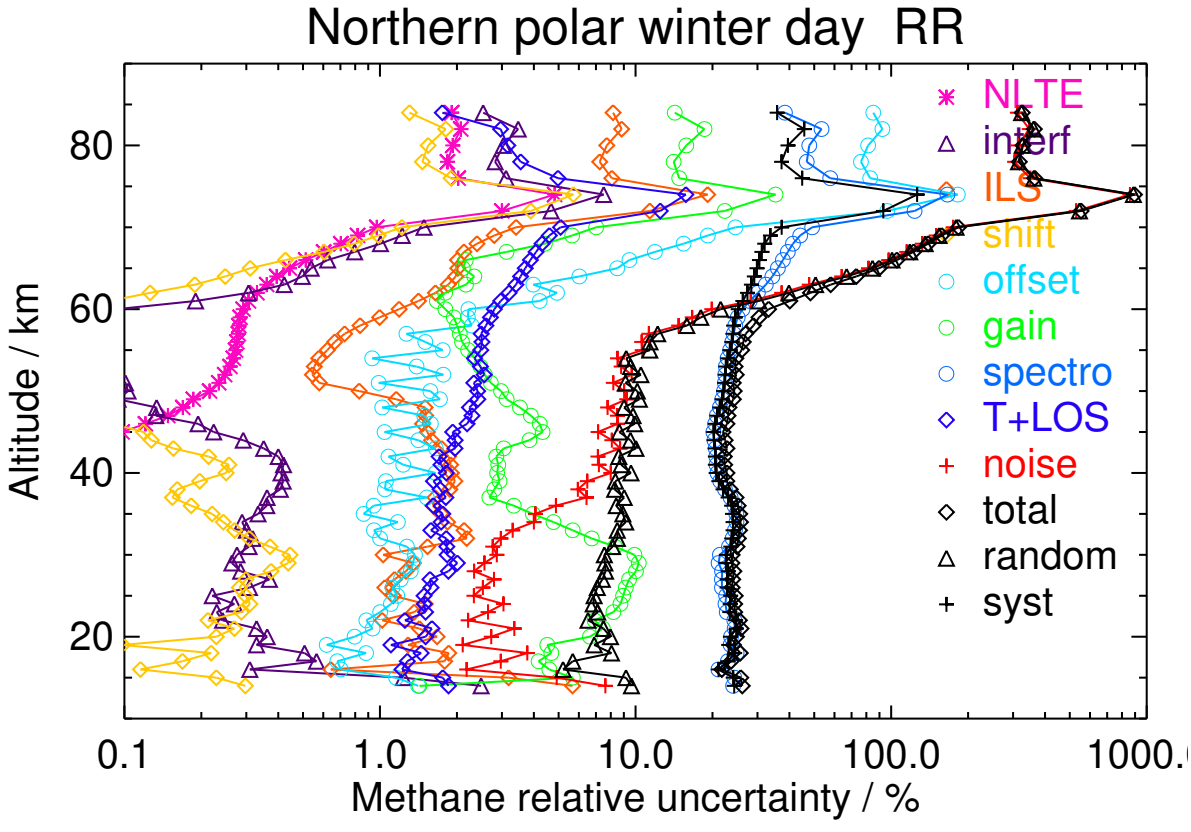

Figure S69. V8R_CH4_561 Northern polar winter day

Table S70. Methane error budget for Northern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	462.00	0.09	1.31	5.54	2.64	9.92	64.06	152.67	11.46	27.11	116.39	121.94	168.57
35	343.86	0.08	2.36	6.59	1.05	5.09	19.57	94.88	6.82	24.48	56.70	83.02	100.53
40	233.95	0.09	1.09	5.85	1.00	4.89	12.26	62.29	5.29	22.28	37.08	56.92	67.93
45	176.89	0.13	0.40	3.42	0.26	2.15	7.32	43.62	3.45	14.41	21.81	41.43	46.82
50	145.89	0.19	0.12	1.44	0.12	1.91	4.70	34.40	2.78	10.54	12.49	34.27	36.48
55	122.38	0.24	0.05	1.25	0.07	1.97	2.52	29.36	2.60	11.35	12.79	29.08	31.77
60	76.78	0.27	0.07	1.23	0.04	2.10	1.46	19.51	1.68	12.84	14.03	18.96	23.59
65	41.87	0.29	0.10	0.68	0.11	1.57	0.77	12.54	1.07	15.80	17.04	11.02	20.29
70	31.38	0.31	0.12	0.31	0.31	3.02	0.83	11.24	1.05	21.51	22.79	8.98	24.50
74	7.45	0.38	0.29	0.79	0.93	6.69	1.53	11.19	1.08	32.87	34.41	8.46	35.43
80	-7.34	0.64	0.56	1.71	1.85	10.51	3.39	11.78	1.02	43.04	45.20	8.88	46.06
84	1.86	0.59	0.18	0.81	0.31	8.16	1.02	4.03	0.25	30.76	31.99	2.82	32.11

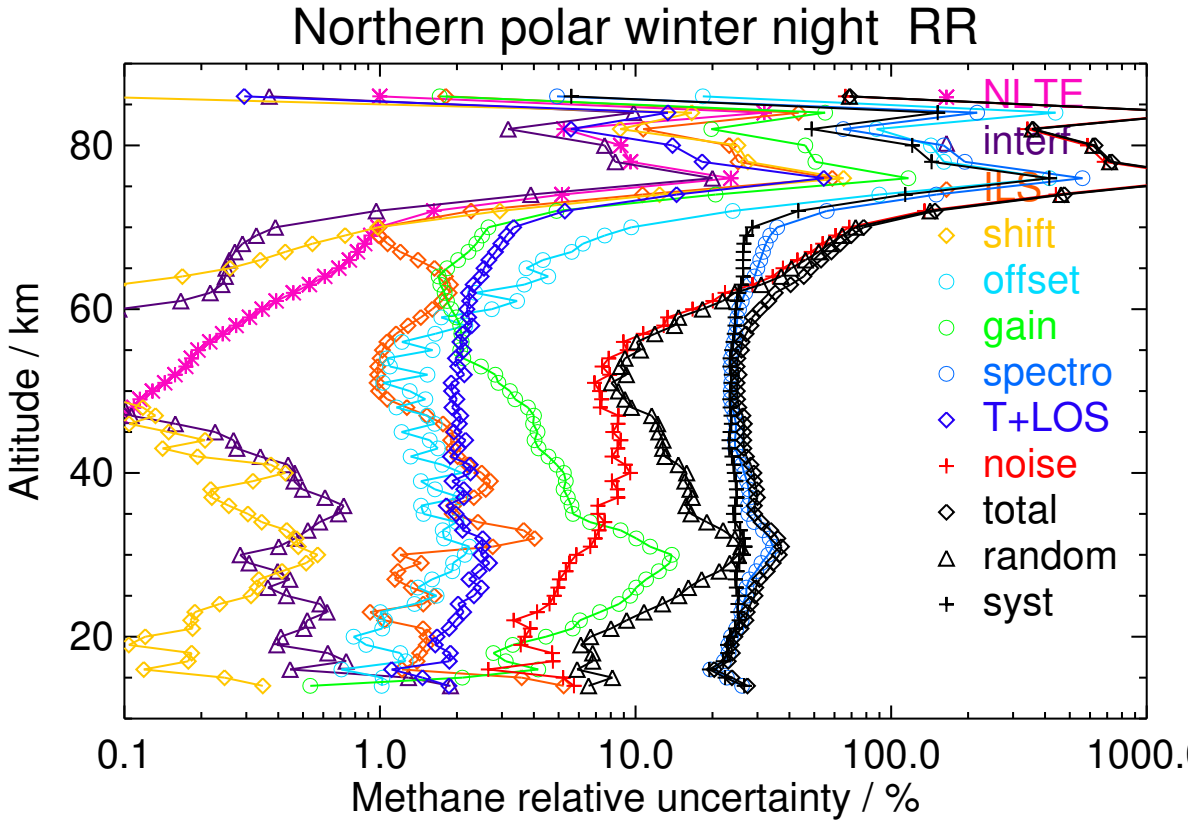

Figure S70. V8R_CH4_561 Northern polar winter night

Table S71. Methane error budget for Northern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	765.65	0.03	0.84	11.52	2.03	6.67	14.44	187.72	15.59	27.25	39.47	187.24	191.35
35	390.88	0.06	0.71	4.15	1.28	4.31	10.31	92.16	8.95	24.81	30.37	91.71	96.61
40	259.66	0.11	0.72	3.21	1.46	3.15	6.20	56.34	4.28	14.15	17.22	56.19	58.77
45	141.75	0.11	0.30	2.40	0.32	1.92	3.67	34.74	1.66	11.12	17.34	32.49	36.83
50	94.63	0.14	0.13	1.11	0.16	1.25	2.48	27.21	1.25	7.31	18.06	21.87	28.36
55	93.92	0.16	0.05	1.14	0.10	1.17	1.70	25.17	1.49	5.65	13.27	22.29	25.95
60	76.92	0.19	0.09	1.12	0.07	2.35	1.38	21.06	1.28	9.21	13.77	18.69	23.21
65	49.16	0.14	0.11	0.52	0.09	0.72	0.76	13.55	0.91	10.71	12.48	12.02	17.33
70	26.84	0.15	0.19	1.01	0.39	1.99	1.54	9.51	0.76	18.02	18.95	7.99	20.57
74	1.25	0.52	0.74	3.48	1.84	4.76	7.09	16.22	1.15	29.03	31.85	13.49	34.59
80	-19.95	1.00	1.55	6.32	4.27	9.20	13.42	29.82	1.38	43.72	49.05	26.89	55.94
84	-14.14	0.67	1.04	4.11	2.97	6.52	8.93	20.12	0.59	29.06	32.15	19.12	37.41

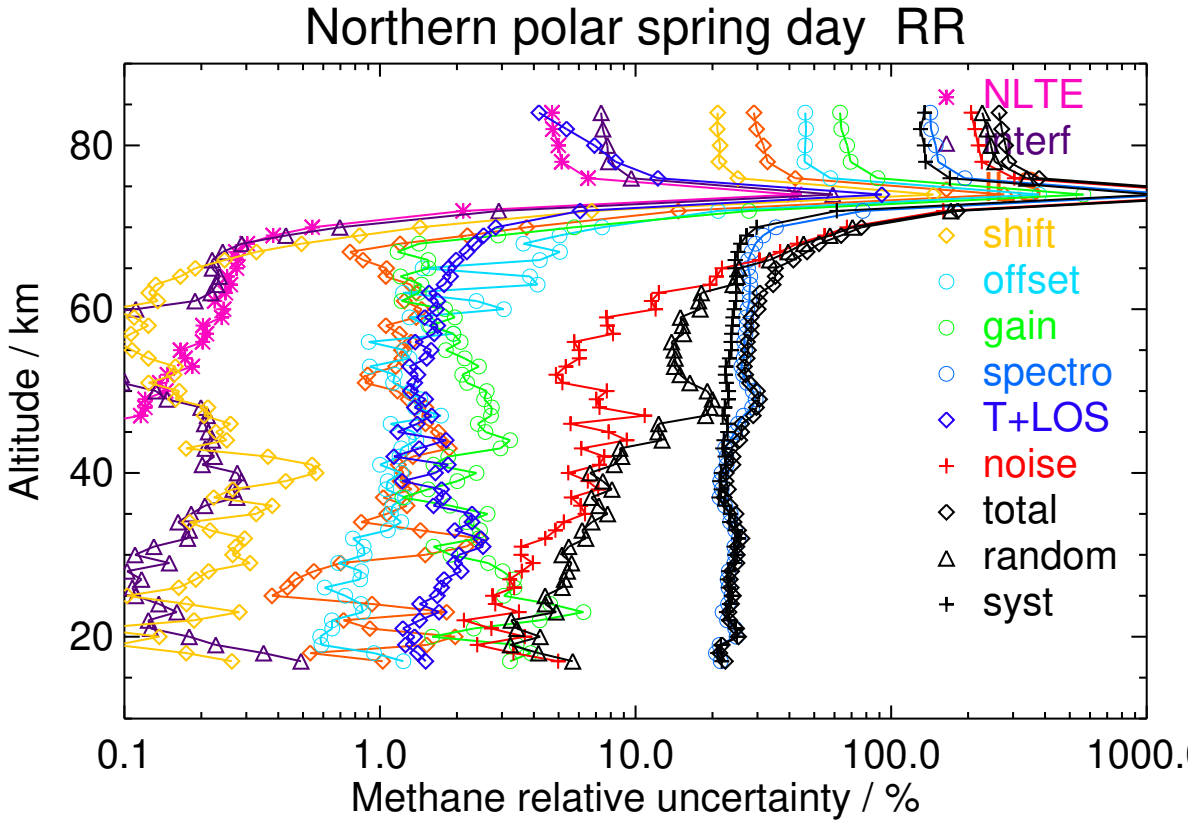

Figure S71. V8R_CH4_561 Northern polar spring day

Table S72. Methane error budget for Northern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	778.91	0.01	0.74	11.37	2.11	6.28	10.85	191.70	15.19	26.51	40.76	190.56	194.87
35	434.18	0.03	0.71	2.93	1.32	4.22	10.53	102.61	9.37	23.28	29.18	102.21	106.29
40	301.07	0.08	0.82	2.61	1.65	3.46	6.63	65.90	4.82	14.99	18.18	65.77	68.24
45	167.06	0.08	0.36	2.81	0.36	1.90	4.49	39.69	1.94	11.44	17.42	37.92	41.73
50	115.09	0.09	0.11	1.25	0.09	1.26	2.53	29.88	1.53	7.64	16.45	26.31	31.03
55	106.09	0.13	0.04	1.33	0.08	1.38	1.95	26.70	1.81	6.39	11.73	25.04	27.65
60	73.75	0.13	0.10	1.19	0.08	2.34	1.29	20.17	1.34	9.56	13.16	18.31	22.55
65	46.86	0.11	0.12	0.72	0.11	0.91	0.74	12.62	1.01	11.47	12.75	11.46	17.14
70	20.73	0.12	0.22	1.06	0.51	2.07	1.67	9.74	0.89	18.90	19.84	8.24	21.48
74	-0.70	0.29	0.67	2.83	1.81	5.22	5.48	15.23	1.40	30.50	32.18	14.06	35.12
80	-27.86	0.57	1.42	5.08	4.17	9.11	10.48	27.78	1.83	43.58	46.49	27.41	53.97
84	-20.53	0.37	0.94	3.25	2.84	6.40	7.54	19.33	0.83	28.46	30.71	18.94	36.08

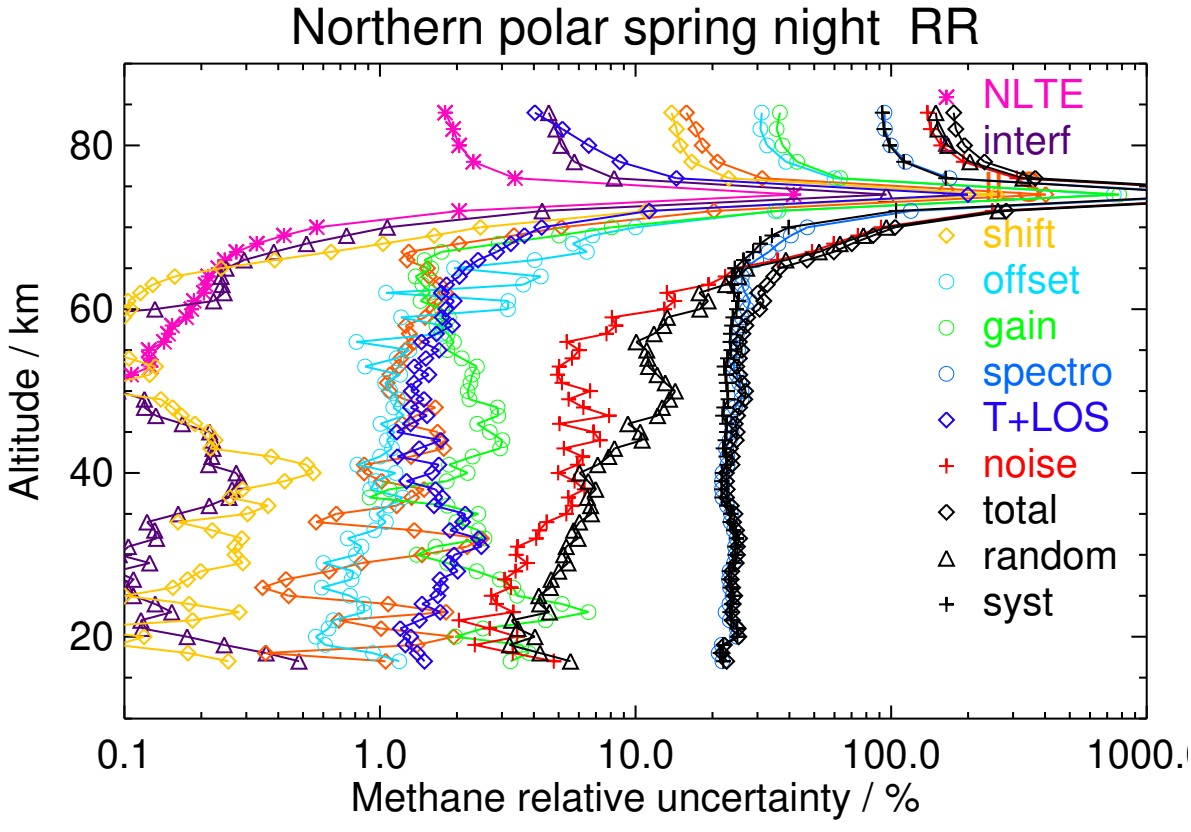

Figure S72. V8R_CH4_561 Northern polar spring night

Table S73. Methane error budget for Northern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	872.13	0.03	1.01	17.05	2.02	7.13	31.26	234.46	13.42	26.67	36.22	236.37	239.13
35	528.48	0.03	0.68	5.58	1.85	4.76	9.68	128.81	9.86	23.92	28.30	128.89	131.96
40	256.10	0.06	0.69	1.94	0.98	2.81	4.90	51.35	3.38	12.96	15.40	51.15	53.42
45	134.23	0.05	0.27	2.59	0.47	2.21	3.71	30.10	1.32	13.73	15.27	29.82	33.50
50	72.86	0.04	0.11	0.91	0.17	1.82	1.02	17.14	0.88	10.75	11.77	16.64	20.38
55	56.03	0.05	0.04	0.72	0.05	0.97	0.83	13.84	0.73	4.47	5.49	13.57	14.64
60	68.01	0.11	0.09	0.79	0.11	1.80	1.15	18.15	0.94	6.42	10.82	16.12	19.41
65	63.20	0.11	0.13	0.70	0.09	0.71	1.13	16.35	0.92	8.06	9.82	15.45	18.31
70	70.70	0.19	0.15	1.31	0.36	2.35	0.82	17.95	1.16	16.75	17.87	17.12	24.74
74	54.12	0.77	1.05	3.54	2.03	2.75	6.09	25.92	0.74	25.53	27.17	25.48	37.24
80	21.31	1.28	2.60	3.79	7.84	6.24	13.06	48.12	0.24	39.53	42.90	48.28	64.59
84	5.78	0.81	1.76	1.96	5.97	5.30	8.52	32.93	0.22	30.85	32.79	33.25	46.69

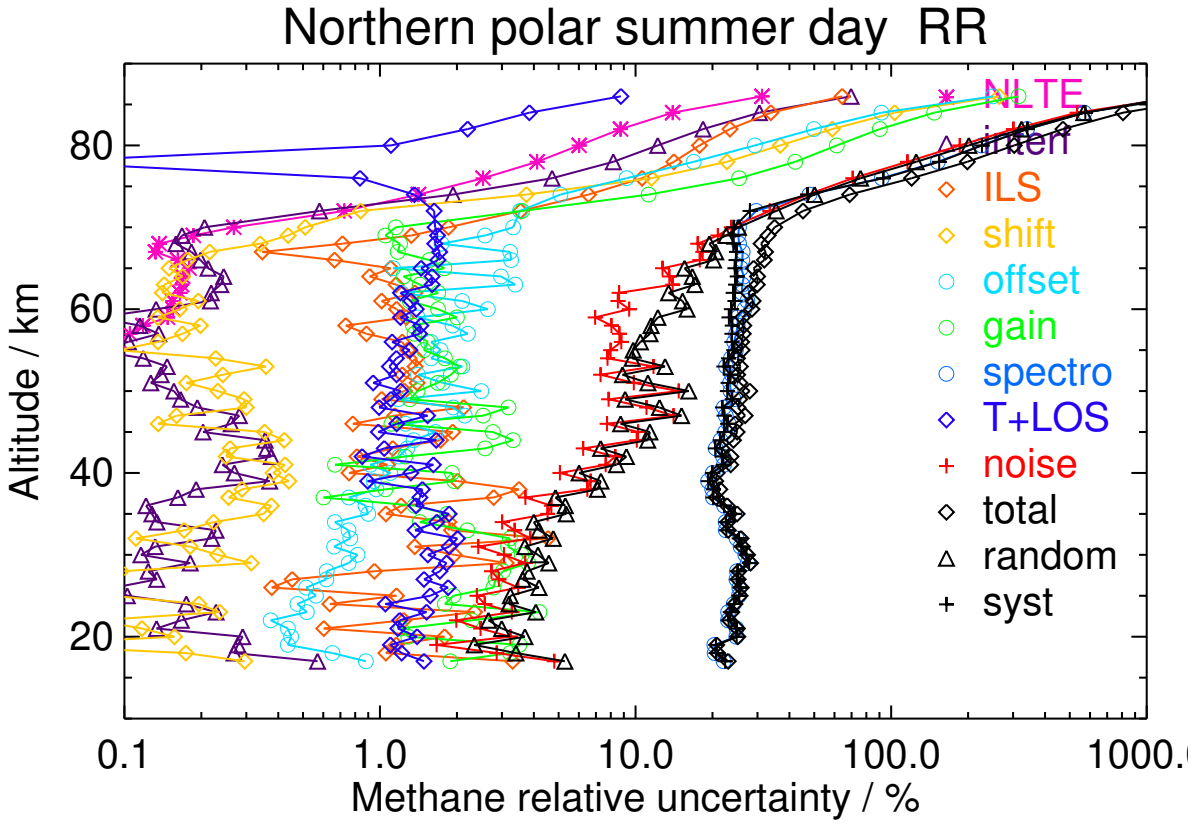

Figure S73. V8R_CH4_561 Northern polar summer day

Table S74. Methane error budget for Northern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	794.31	0.02	1.15	4.86	2.86	7.07	25.67	204.49	13.03	27.19	37.86	205.03	208.49
35	402.52	0.02	0.62	3.68	1.34	4.41	11.55	97.30	8.52	23.12	27.27	97.47	101.21
40	185.72	0.05	0.66	1.60	0.80	2.71	3.79	39.13	2.72	12.89	15.83	38.46	41.59
45	83.53	0.04	0.18	1.97	0.30	1.79	2.84	20.08	1.03	11.07	14.00	18.61	23.29
50	67.24	0.03	0.08	0.62	0.09	1.08	1.04	16.42	0.78	6.61	8.94	15.38	17.79
55	82.53	0.09	0.09	0.71	0.14	1.34	1.48	21.69	1.45	6.38	12.61	18.93	22.75
60	167.97	0.25	0.17	1.95	0.18	2.70	2.92	40.19	3.06	10.48	17.62	38.00	41.88
65	167.45	0.19	0.18	1.13	0.21	2.14	2.37	40.89	3.33	13.01	15.84	40.17	43.17
70	149.99	0.46	0.44	1.89	0.79	3.17	1.08	39.81	3.51	20.94	22.93	39.06	45.29
74	98.97	1.12	1.26	2.53	2.51	5.25	5.71	41.99	2.42	31.75	34.04	41.16	53.41
80	25.41	1.20	1.93	2.39	4.71	8.51	9.31	41.05	0.45	44.02	46.09	41.12	61.77
84	3.30	0.66	1.18	1.20	3.36	5.93	5.89	24.55	0.01	28.84	30.23	24.60	38.97

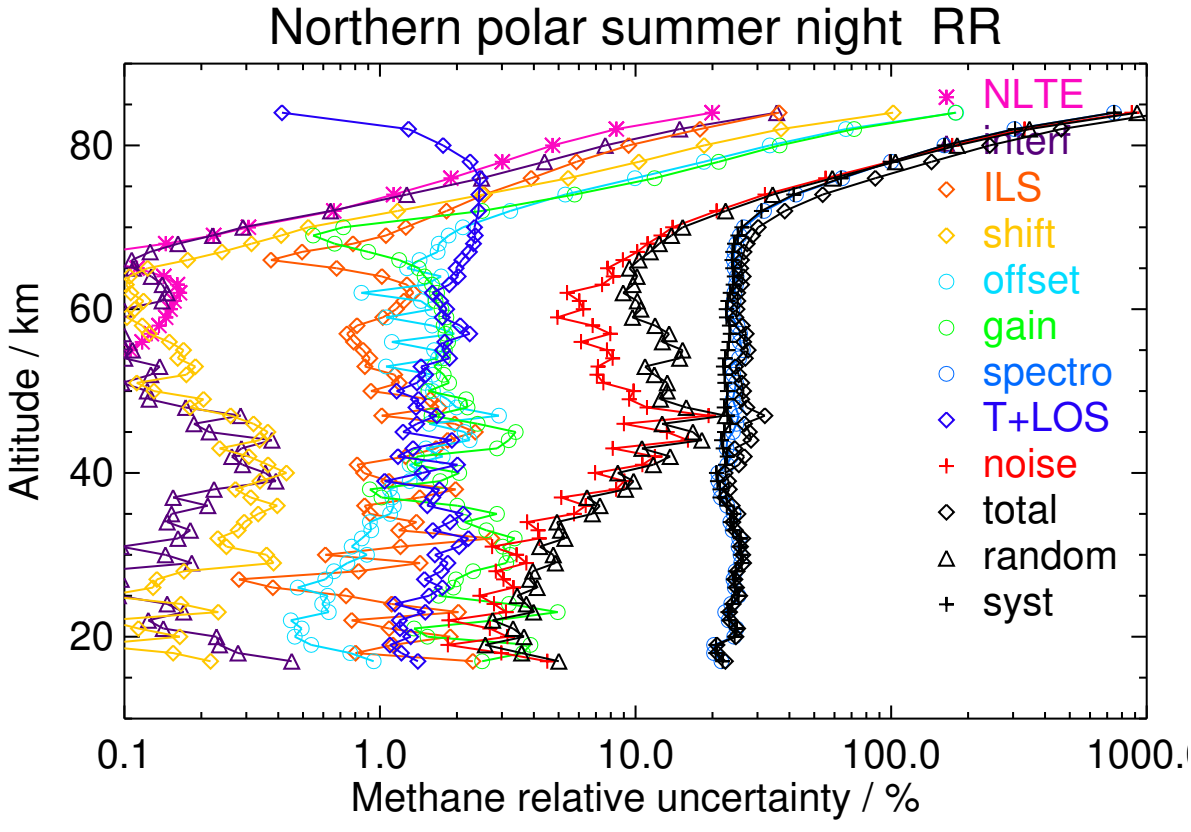

Figure S74. V8R_CH4_561 Northern polar summer night

Table S75. Methane error budget for Northern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	616.51	0.04	1.52	4.58	1.57	5.74	12.43	157.79	12.51	25.91	45.51	154.49	161.06
35	188.08	0.03	1.38	2.51	0.72	3.52	11.90	52.15	6.74	22.08	30.01	50.15	58.44
40	82.64	0.05	0.62	2.11	0.58	2.60	2.69	21.11	2.08	12.34	17.39	17.86	24.93
45	88.40	0.10	0.29	1.02	0.15	1.53	2.64	22.71	1.89	9.02	14.72	19.87	24.73
50	175.14	0.30	0.19	1.08	0.12	1.44	3.79	40.30	2.85	7.92	11.57	39.74	41.39
55	208.89	0.52	0.08	2.20	0.13	2.15	4.47	48.39	4.14	10.75	12.79	48.38	50.04
60	180.45	0.58	0.13	2.45	0.10	2.71	3.26	43.82	3.34	12.33	14.91	43.42	45.91
65	104.56	0.42	0.12	1.38	0.12	1.31	1.53	27.01	2.27	13.79	15.78	26.12	30.52
70	47.56	0.25	0.15	0.45	0.30	2.51	0.84	14.52	1.40	19.59	20.51	13.53	24.57
74	12.90	0.46	0.52	1.33	0.97	5.71	3.86	11.71	1.58	31.69	33.05	10.11	34.56
80	-4.33	1.02	1.19	3.24	2.33	9.36	8.51	15.06	2.20	43.59	45.89	14.29	48.06
84	-13.57	0.29	0.21	0.28	0.76	7.13	1.37	3.02	0.51	28.50	29.39	3.33	29.58

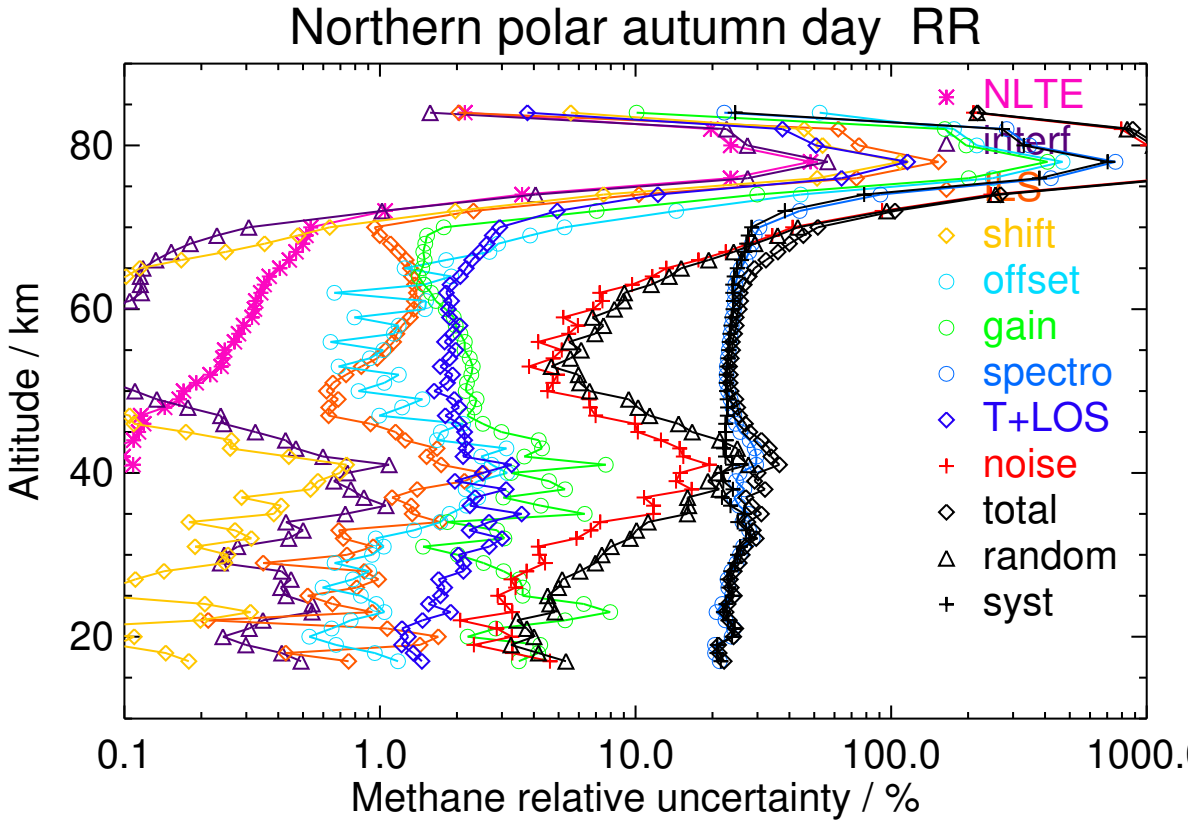

Figure S75. V8R_CH4_561 Northern polar autumn day

Table S76. Methane error budget for Northern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	540.35	0.06	1.28	1.86	1.18	5.01	10.44	140.68	11.47	25.57	35.19	139.56	143.93
35	165.22	0.04	1.31	2.45	0.50	2.99	6.43	43.85	5.89	20.47	25.08	42.49	49.34
40	58.93	0.05	0.55	1.09	0.42	2.89	1.49	14.99	1.88	14.32	16.18	13.56	21.11
45	102.06	0.06	0.32	0.73	0.21	1.36	2.06	23.72	2.26	9.81	13.43	22.14	25.89
50	176.03	0.23	0.18	1.42	0.10	1.60	3.76	39.19	2.98	8.34	10.25	39.09	40.41
55	192.85	0.39	0.07	2.06	0.10	2.22	3.99	44.32	4.02	10.88	13.14	44.17	46.09
60	169.21	0.50	0.10	2.74	0.07	2.30	3.05	40.70	3.17	11.24	13.99	40.25	42.61
65	89.54	0.39	0.12	1.47	0.09	1.62	1.35	23.40	2.24	14.19	15.71	22.67	27.58
70	39.44	0.27	0.14	0.44	0.33	2.58	0.57	13.85	1.50	20.00	21.00	12.67	24.53
74	9.58	0.26	0.31	0.60	0.85	6.15	1.37	12.82	1.62	32.71	34.12	10.64	35.74
80	-7.35	0.64	0.77	2.02	2.24	9.41	3.88	16.96	2.46	43.29	45.22	15.39	47.76
84	23.95	0.18	0.23	0.20	0.73	7.37	0.65	8.44	0.86	29.52	30.46	8.42	31.60

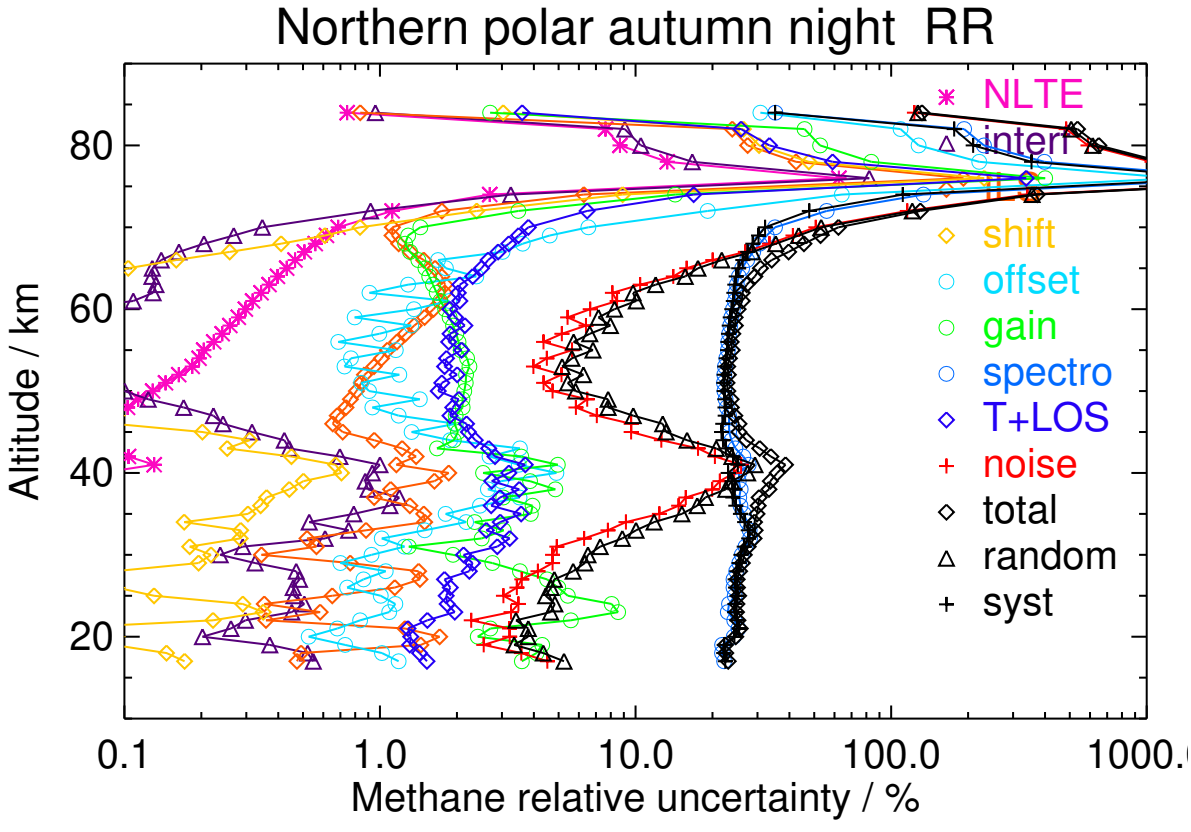

Figure S76. V8R_CH4_561 Northern polar autumn night

Table S77. Methane error budget for Northern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	923.07	0.05	4.92	20.35	1.26	7.22	30.56	233.01	16.63	30.15	70.77	227.81	238.55
35	568.11	0.11	2.09	9.33	1.48	4.45	11.74	139.48	9.53	20.16	41.02	136.09	142.13
40	355.33	0.14	1.83	2.71	1.15	4.68	5.31	71.88	5.11	20.34	25.86	70.71	75.29
45	296.43	0.29	1.17	3.26	0.37	1.80	7.20	63.22	3.63	12.28	18.88	62.22	65.02
50	173.37	0.32	0.33	1.27	0.16	1.58	4.00	38.11	2.99	8.67	11.82	37.64	39.45
55	153.19	0.35	0.07	1.44	0.10	2.16	3.15	35.67	3.06	10.25	11.71	35.59	37.46
60	122.74	0.31	0.11	1.49	0.11	1.94	1.96	30.02	2.27	10.64	12.32	29.63	32.09
65	64.47	0.17	0.19	0.71	0.15	1.99	0.81	16.88	1.56	14.59	15.67	16.12	22.48
70	28.38	0.19	0.56	0.62	0.43	2.14	2.36	10.34	1.24	19.99	20.78	9.35	22.78
74	-2.46	0.39	1.06	1.17	0.81	5.53	5.17	12.36	1.36	30.82	32.37	10.84	34.14
80	-32.68	0.59	1.65	1.46	1.43	10.30	7.72	18.16	1.53	44.61	46.50	18.24	49.95
84	-21.62	0.35	1.12	1.05	0.84	7.76	5.26	12.13	0.66	30.91	32.36	12.11	34.55

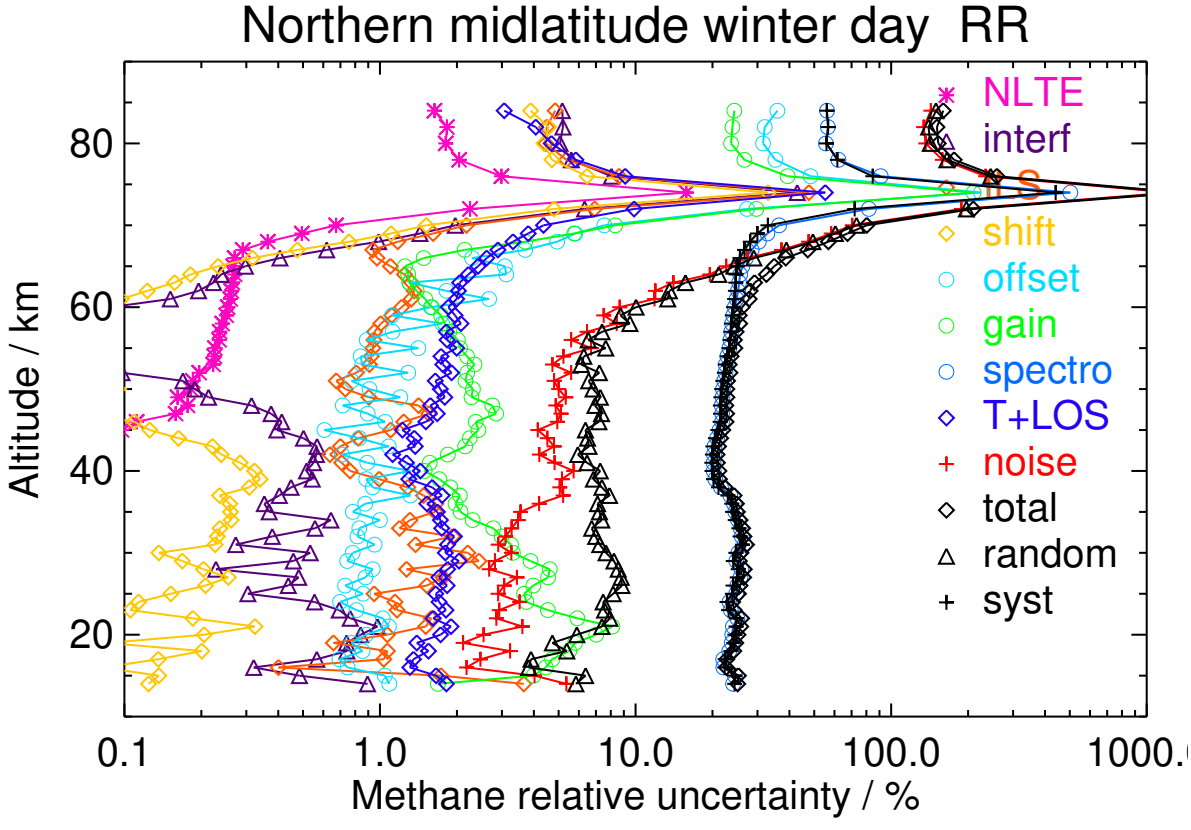

Figure S77. V8R_CH4_561 Northern midlatitude winter day

Table S78. Methane error budget for Northern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	983.44	0.04	3.32	22.59	3.04	8.94	54.37	244.11	20.49	28.43	76.36	241.98	253.74
35	566.49	0.04	2.33	5.52	1.64	5.35	12.33	136.87	9.78	21.79	43.41	132.81	139.72
40	384.38	0.11	2.21	3.16	1.22	3.79	9.93	86.83	5.55	19.13	26.36	85.86	89.81
45	332.55	0.19	1.28	4.22	0.49	2.44	11.33	79.19	4.78	12.84	24.57	77.52	81.32
50	200.17	0.18	0.33	2.21	0.20	2.06	5.07	46.42	3.56	9.63	15.32	45.39	47.91
55	160.35	0.21	0.11	1.64	0.11	1.59	3.55	37.46	3.14	9.42	11.59	37.23	38.99
60	128.69	0.19	0.10	1.52	0.13	1.80	2.15	31.83	2.91	11.72	13.72	31.32	34.19
65	71.41	0.14	0.21	0.93	0.24	1.85	0.91	19.22	1.95	15.82	17.06	18.38	25.08
70	31.03	0.11	0.29	0.55	0.45	2.47	2.00	12.55	1.48	20.47	21.69	10.90	24.27
74	8.77	0.18	0.63	1.06	0.81	5.94	4.35	13.11	1.56	31.46	33.14	11.06	34.94
80	-17.43	0.40	1.36	2.06	1.65	10.50	9.27	22.29	1.91	44.78	47.87	20.49	52.07
84	-17.28	0.26	0.90	1.30	1.11	7.51	5.84	14.50	0.78	29.83	31.94	13.22	34.57

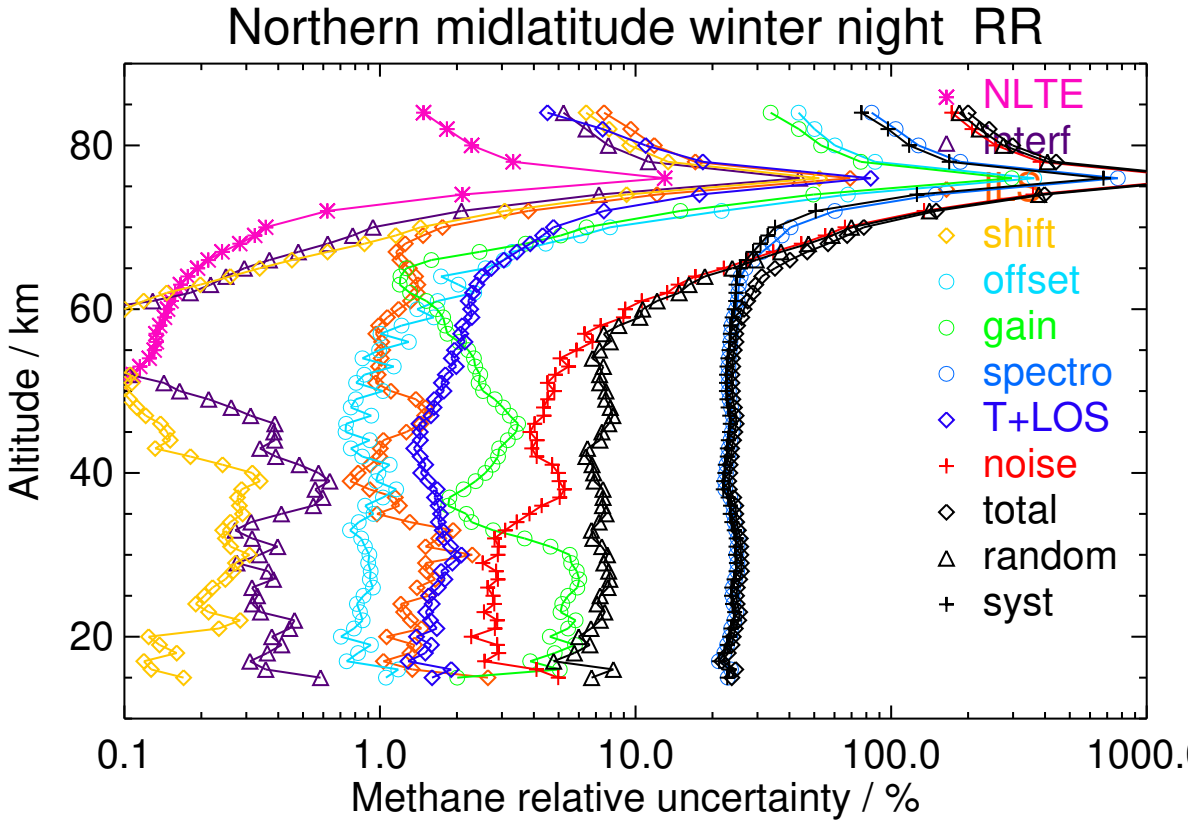

Figure S78. V8R_CH4_561 Northern midlatitude winter night

Table S79. Methane error budget for Northern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	966.44	0.05	2.04	9.25	2.73	7.41	21.26	251.21	17.22	25.77	52.63	248.80	254.31
35	570.87	0.12	2.33	3.16	1.92	4.52	11.13	139.14	10.21	22.40	46.05	134.20	141.88
40	404.74	0.17	1.80	4.86	1.43	3.07	7.66	85.97	5.24	14.13	32.17	81.73	87.83
45	302.81	0.27	1.29	1.87	0.55	2.49	7.55	69.11	3.64	11.27	26.51	65.44	70.61
50	246.95	0.39	0.56	2.63	0.24	1.52	6.50	55.82	3.42	8.55	17.37	54.32	57.03
55	190.46	0.36	0.10	2.20	0.17	1.43	4.04	43.96	3.39	7.38	12.26	43.26	44.96
60	139.11	0.29	0.11	1.59	0.12	2.73	2.16	33.76	2.76	11.36	13.40	33.34	35.93
65	79.31	0.14	0.16	0.62	0.12	1.00	0.90	20.40	1.65	12.28	13.47	19.76	23.91
70	34.63	0.18	0.33	1.07	0.29	2.01	2.06	11.68	1.21	18.47	19.37	10.65	22.11
74	-8.84	0.74	1.46	4.12	1.59	4.93	10.11	22.09	2.14	29.34	31.92	21.98	38.76
80	-40.79	1.61	3.25	7.94	4.58	9.31	22.58	47.51	3.47	42.82	47.52	50.38	69.26
84	-27.42	0.97	1.99	4.61	2.85	6.65	13.62	29.14	1.41	28.75	31.32	30.99	44.06

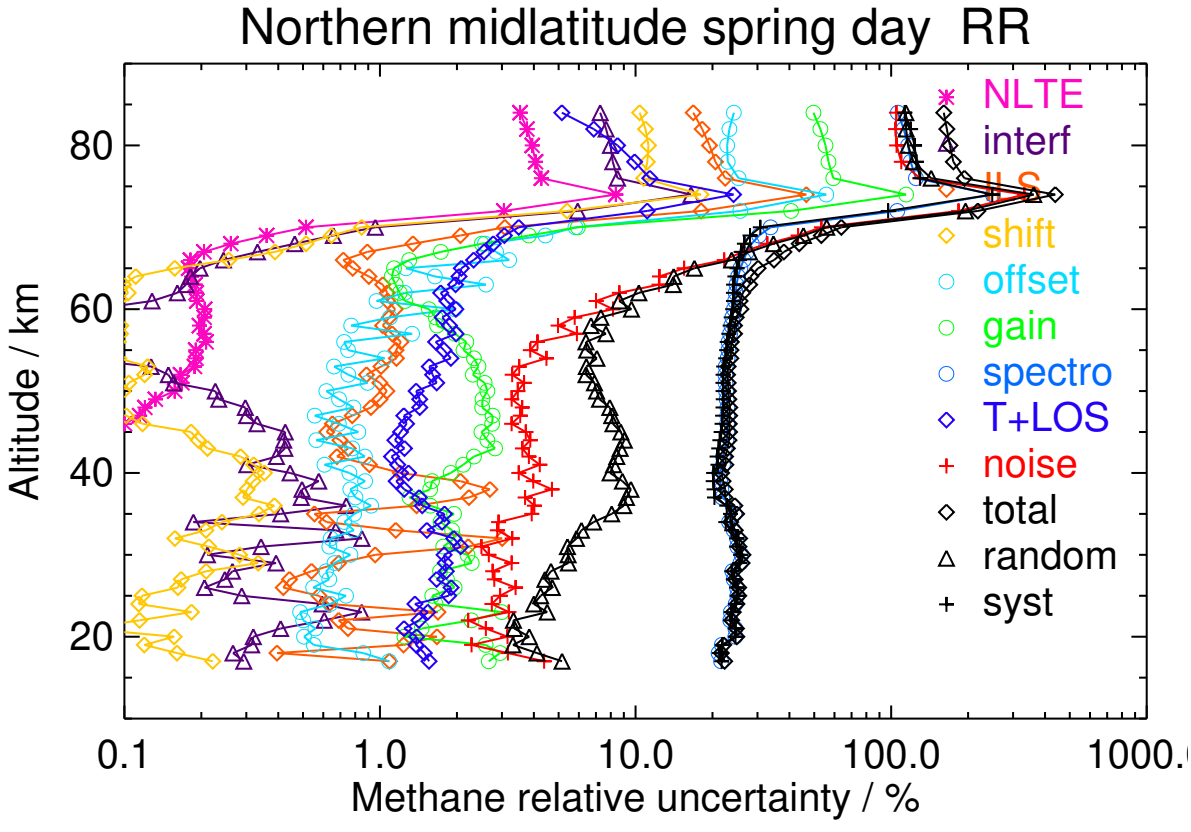

Figure S79. V8R_CH4_561 Northern midlatitude spring day

Table S80. Methane error budget for Northern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	965.86	0.01	2.16	8.07	2.59	6.42	14.33	243.37	16.72	26.42	47.17	241.46	246.03
35	537.85	0.04	1.64	3.34	1.60	4.27	8.64	131.71	10.38	22.31	42.55	127.48	134.40
40	378.14	0.07	2.30	3.55	1.60	3.39	7.92	82.27	5.35	14.73	30.45	78.62	84.31
45	226.41	0.09	1.31	2.25	0.50	1.94	5.99	54.19	2.69	10.06	25.75	49.27	55.60
50	201.99	0.16	0.48	2.41	0.16	1.45	5.21	47.06	2.78	8.33	19.70	44.04	48.24
55	161.73	0.18	0.08	1.93	0.14	1.56	3.38	38.53	2.99	7.62	14.51	36.87	39.62
60	121.02	0.17	0.12	1.69	0.09	2.65	1.99	29.83	2.33	11.02	14.16	28.81	32.11
65	64.13	0.11	0.14	0.84	0.12	0.91	1.04	16.62	1.48	12.12	13.28	15.86	20.68
70	29.83	0.13	0.36	1.10	0.40	2.14	2.07	11.57	1.20	18.92	19.76	10.62	22.44
74	3.66	0.41	1.31	3.46	1.86	5.06	7.92	20.95	2.20	30.35	32.30	20.66	38.35
80	-17.90	0.78	2.48	5.99	4.31	9.02	14.64	36.79	2.75	43.56	46.81	37.75	60.13
84	-20.34	0.48	1.59	3.54	2.84	6.42	9.32	23.74	1.16	28.66	30.72	24.37	39.21

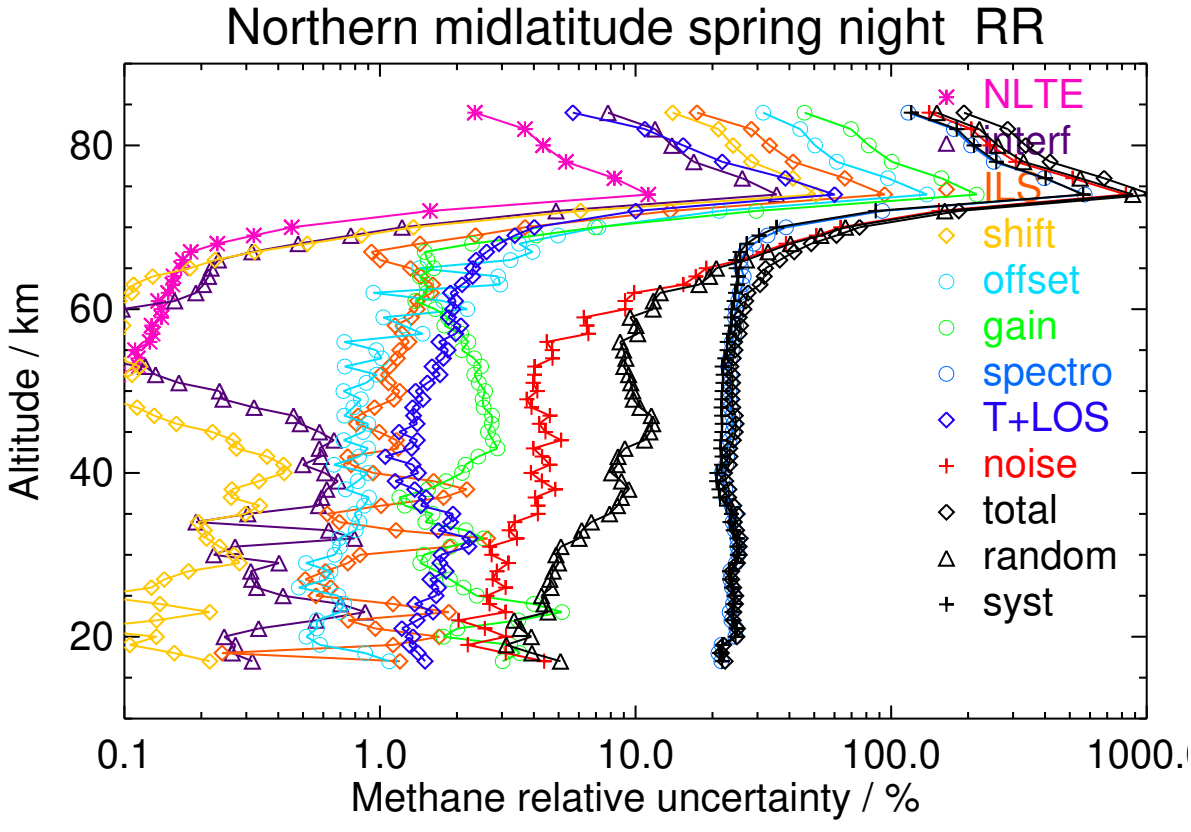

Figure S80. V8R_CH4_561 Northern midlatitude spring night

Table S81. Methane error budget for Northern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	900.31	0.02	2.63	6.24	2.24	7.32	29.27	230.45	14.40	25.42	37.49	231.33	234.35
35	544.93	0.06	3.28	4.39	2.01	5.00	11.58	131.90	10.42	23.94	32.12	131.31	135.18
40	269.12	0.09	1.33	1.86	0.79	2.50	4.86	54.64	3.72	11.28	16.47	53.77	56.24
45	166.33	0.09	0.94	1.42	0.35	1.75	3.31	38.26	1.63	9.30	16.57	35.99	39.62
50	109.64	0.12	0.60	1.50	0.16	1.20	2.40	27.59	1.64	8.30	15.70	24.42	29.03
55	169.99	0.27	0.37	1.17	0.28	1.37	3.25	42.95	2.68	6.44	21.10	38.24	43.67
60	201.14	0.39	0.25	1.78	0.30	2.84	3.53	50.13	3.60	11.09	22.86	46.38	51.70
65	145.60	0.24	0.26	0.65	0.24	1.62	1.61	36.87	2.55	12.08	16.45	35.31	38.96
70	128.24	0.59	0.59	1.96	0.53	2.60	1.67	32.54	2.34	19.11	21.78	31.13	38.00
74	90.20	1.59	1.42	2.20	1.77	4.17	6.59	31.34	1.73	28.74	31.20	30.19	43.41
80	60.71	2.47	2.34	2.92	4.41	8.20	11.75	36.13	0.30	42.60	45.94	35.42	58.01
84	25.68	1.44	1.52	1.81	3.16	6.09	7.51	22.82	0.09	28.95	31.07	22.46	38.34

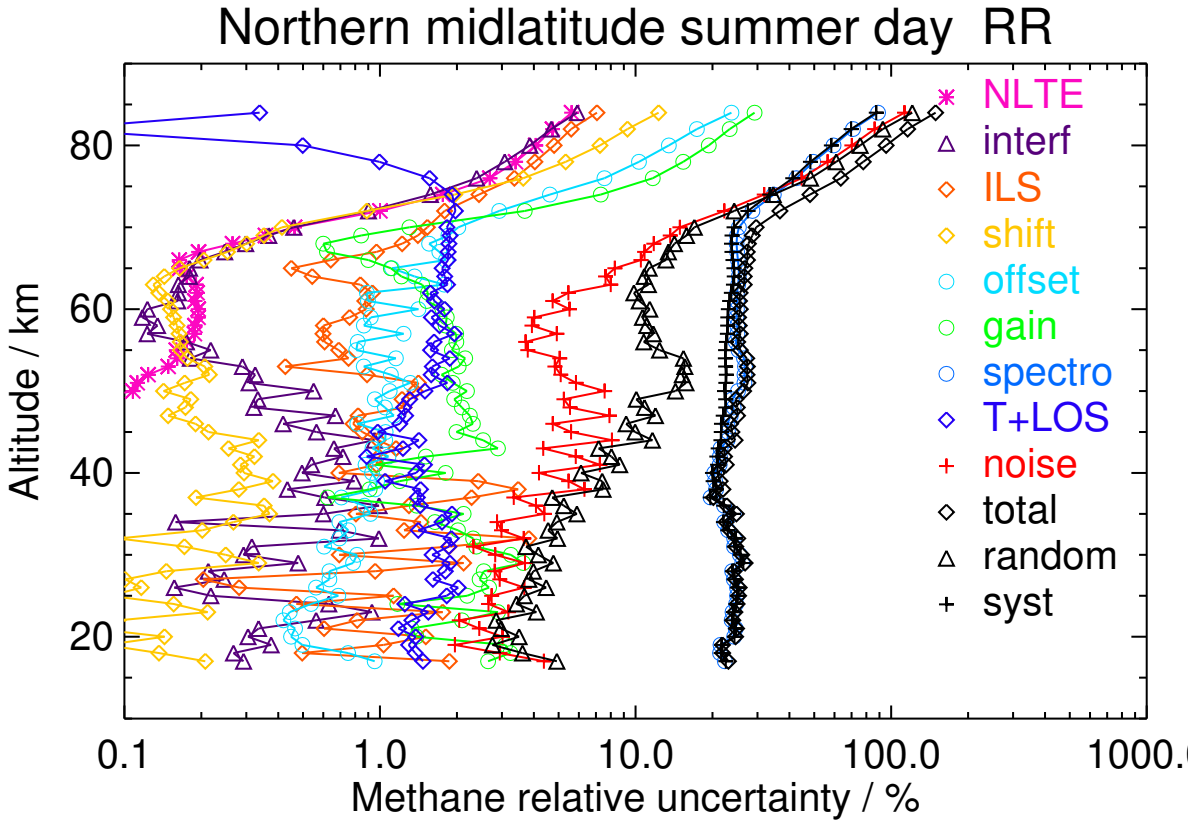

Figure S81. V8R_CH4_561 Northern midlatitude summer day

Table S82. Methane error budget for Northern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	936.52	0.03	4.35	8.89	2.15	6.50	19.79	247.89	14.21	26.06	36.98	247.99	250.74
35	563.29	0.02	2.65	4.29	2.06	4.49	5.60	134.44	10.24	23.28	30.30	133.73	137.12
40	269.32	0.04	1.76	1.80	0.92	2.60	4.96	55.27	3.77	11.57	15.98	54.65	56.94
45	164.60	0.05	0.95	1.82	0.45	1.74	3.95	37.62	1.60	9.94	15.34	36.12	39.24
50	111.29	0.06	0.55	1.18	0.19	1.12	1.93	27.17	1.59	7.53	14.91	24.11	28.35
55	184.87	0.17	0.40	1.24	0.31	1.66	3.62	45.49	3.30	7.14	22.21	40.69	46.36
60	194.23	0.18	0.22	2.19	0.31	2.65	3.45	48.39	3.59	10.33	20.82	45.30	49.85
65	135.45	0.10	0.18	0.72	0.20	1.54	1.78	34.39	2.81	12.18	15.67	33.16	36.67
70	100.52	0.72	0.68	2.35	0.53	2.30	2.79	30.22	2.61	20.05	21.82	29.43	36.63
74	63.92	1.33	2.32	3.18	3.62	4.28	10.69	40.40	2.32	28.54	31.65	40.17	51.14
80	26.67	1.50	2.81	3.11	6.17	8.11	11.03	40.00	0.51	43.08	46.01	39.81	60.84
84	6.63	0.76	1.67	2.32	4.00	5.92	6.06	22.88	0.02	28.86	30.45	22.92	38.11

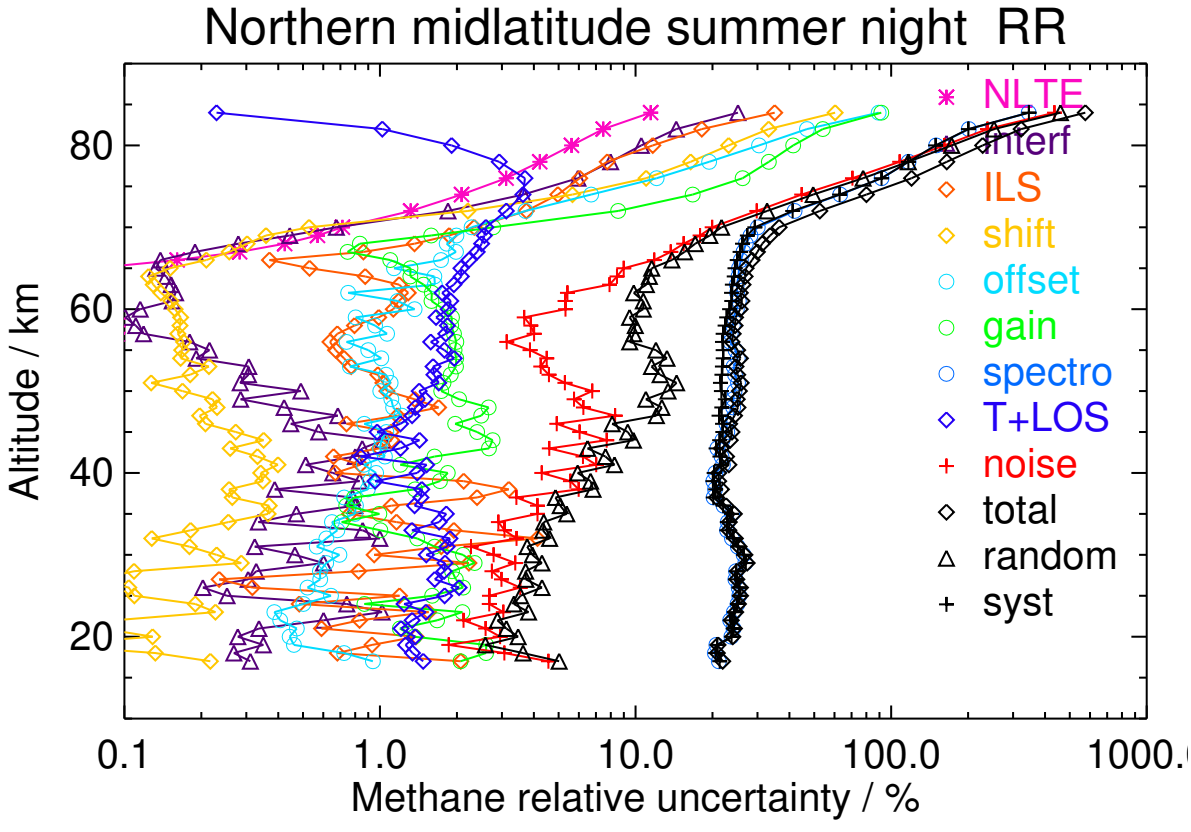

Figure S82. V8R_CH4_561 Northern midlatitude summer night

Table S83. Methane error budget for Northern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	885.32	0.03	1.96	7.71	2.49	6.94	22.26	229.20	16.10	26.84	63.79	223.73	232.65
35	666.90	0.12	2.98	4.99	1.31	4.23	11.27	168.26	10.38	21.68	65.15	157.56	170.50
40	523.27	0.23	2.13	8.09	1.68	4.33	8.22	117.61	7.04	19.82	58.16	105.13	120.14
45	358.82	0.31	1.39	1.81	0.75	2.66	8.74	79.78	4.60	13.72	33.76	74.33	81.63
50	304.86	0.47	0.70	1.79	0.17	1.86	6.93	66.97	4.64	10.16	20.51	65.15	68.30
55	281.93	0.62	0.21	2.25	0.25	2.38	6.13	62.87	5.78	11.75	16.12	62.55	64.60
60	246.90	0.60	0.19	2.69	0.20	3.26	4.29	57.83	5.20	14.09	16.66	57.69	60.05
65	163.07	0.34	0.23	1.18	0.19	1.52	1.71	40.03	3.62	14.36	16.26	39.55	42.76
70	89.62	0.42	0.35	0.85	0.38	2.69	2.14	25.40	2.63	19.72	21.56	24.27	32.47
74	51.23	1.23	1.15	2.33	1.53	5.55	8.68	24.76	3.58	31.90	34.32	24.13	41.96
80	13.86	1.95	2.12	4.77	2.98	9.92	16.11	32.73	4.06	43.75	47.47	33.86	58.31
84	1.79	1.04	1.11	2.24	1.58	7.17	8.77	19.00	1.66	29.11	31.06	19.62	36.74

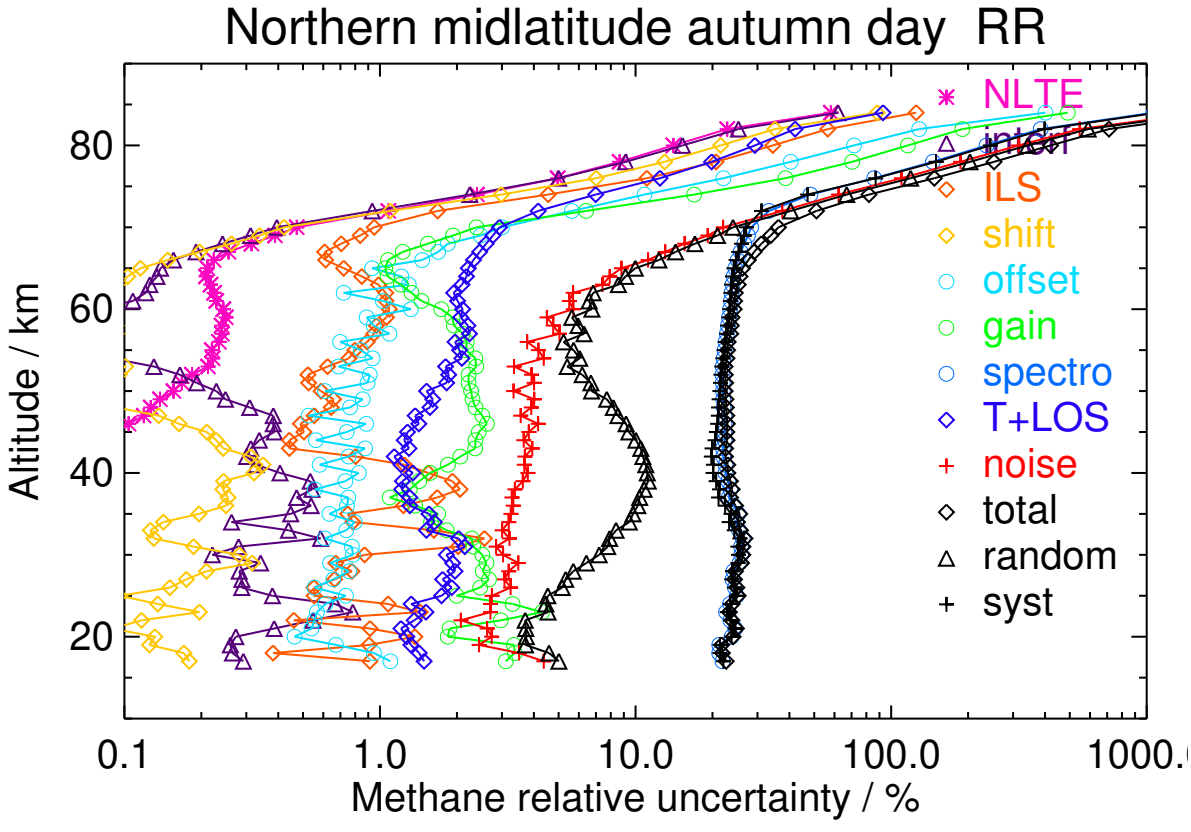

Figure S83. V8R_CH4_561 Northern midlatitude autumn day

Table S84. Methane error budget for Northern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	944.65	0.03	1.91	9.03	2.41	6.60	20.02	236.72	15.98	26.28	54.09	233.65	239.83
35	765.93	0.05	2.45	4.98	1.61	4.67	14.32	187.95	12.13	22.03	57.19	181.52	190.31
40	533.99	0.12	1.80	4.86	1.53	4.71	8.78	122.11	7.89	21.29	51.79	113.46	124.72
45	360.48	0.17	1.18	3.45	0.46	2.73	11.44	84.68	5.16	14.35	33.26	80.31	86.92
50	316.43	0.26	0.63	2.52	0.25	2.24	7.98	70.81	5.36	11.39	20.26	69.55	72.44
55	287.66	0.37	0.21	2.66	0.23	2.65	6.57	63.92	6.57	13.33	16.85	63.87	66.06
60	248.55	0.38	0.19	3.21	0.18	3.19	4.50	57.68	5.67	14.48	16.71	57.70	60.08
65	164.11	0.27	0.25	1.87	0.21	1.89	1.89	40.21	4.14	15.64	17.81	39.65	43.47
70	92.73	0.43	0.53	1.16	0.54	3.07	3.64	27.39	3.39	21.51	24.21	25.75	35.34
74	39.40	0.72	1.09	2.52	1.21	6.35	8.30	25.72	3.81	33.65	36.42	24.50	43.89
80	-6.42	1.00	1.82	4.94	2.48	10.28	14.61	32.18	3.91	43.99	48.79	30.98	57.80
84	-6.35	0.43	0.81	1.80	1.08	7.40	6.27	15.14	1.28	28.99	31.00	14.48	34.22

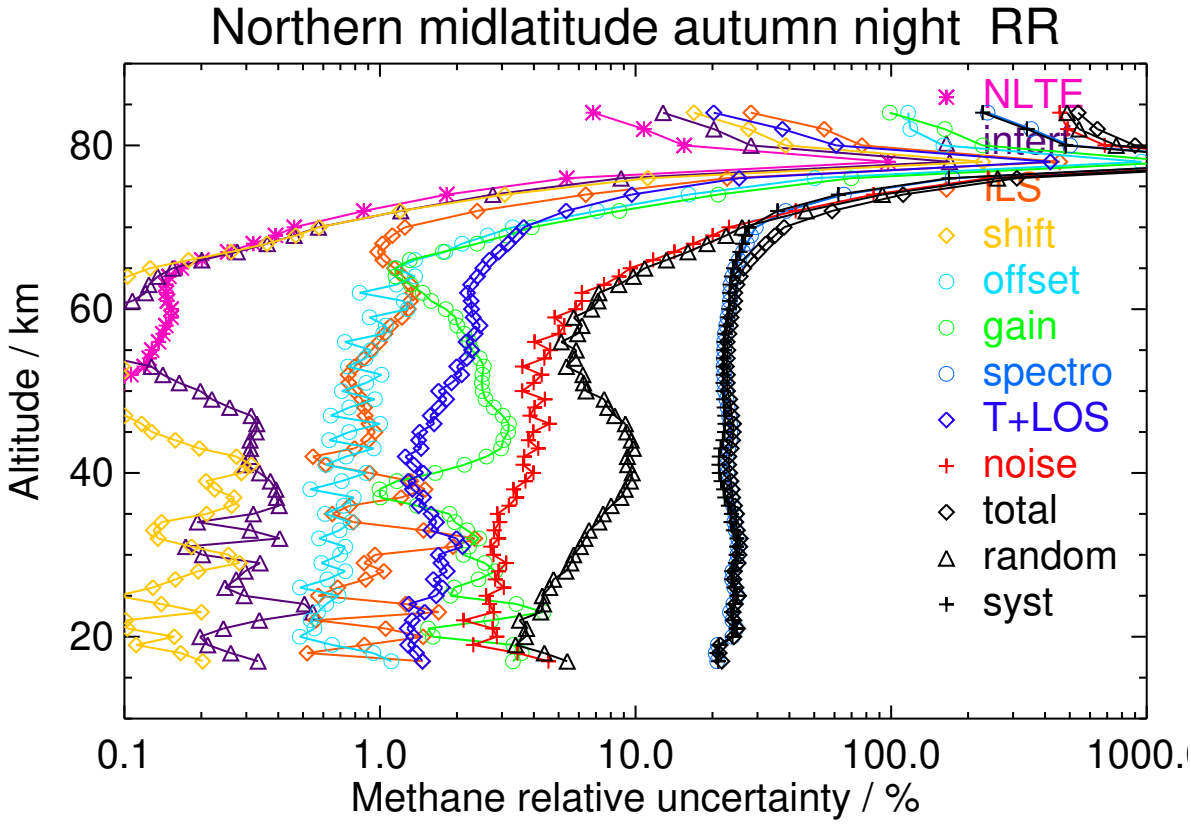

Figure S84. V8R_CH4_561 Northern midlatitude autumn night

Table S85. Methane error budget for Tropics day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	1466.92	0.04	3.83	14.97	2.30	6.58	7.43	365.78	21.57	28.84	43.91	365.38	368.01
35	1244.21	0.19	4.33	4.83	2.78	4.94	9.53	289.24	16.02	24.55	40.05	288.24	291.01
40	705.89	0.28	2.88	10.22	1.68	3.70	14.01	142.00	8.69	18.22	34.44	140.39	144.56
45	424.46	0.31	1.67	2.51	1.00	2.88	9.92	88.31	4.81	12.62	21.33	87.43	89.99
50	297.52	0.38	0.65	2.94	0.32	1.53	7.27	65.01	3.97	8.96	15.57	64.37	66.23
55	201.81	0.32	0.14	2.00	0.24	1.26	3.97	45.65	3.42	7.32	10.73	45.34	46.59
60	157.37	0.26	0.12	1.28	0.17	2.57	2.20	37.53	3.10	11.49	12.96	37.35	39.54
65	129.90	0.18	0.21	0.56	0.18	1.63	0.97	31.77	2.62	13.69	14.55	31.56	34.76
70	96.40	0.52	0.30	0.91	0.37	2.35	1.38	24.73	2.70	19.04	19.98	24.31	31.47
74	52.16	1.31	1.07	1.09	1.63	4.74	8.22	27.09	3.23	30.03	31.91	26.92	41.74
80	6.19	1.74	1.82	1.63	2.99	9.76	14.16	36.89	2.46	44.12	46.87	37.82	60.23
84	-4.15	0.98	1.08	1.02	1.69	7.46	7.97	21.62	0.84	30.50	32.08	22.24	39.03

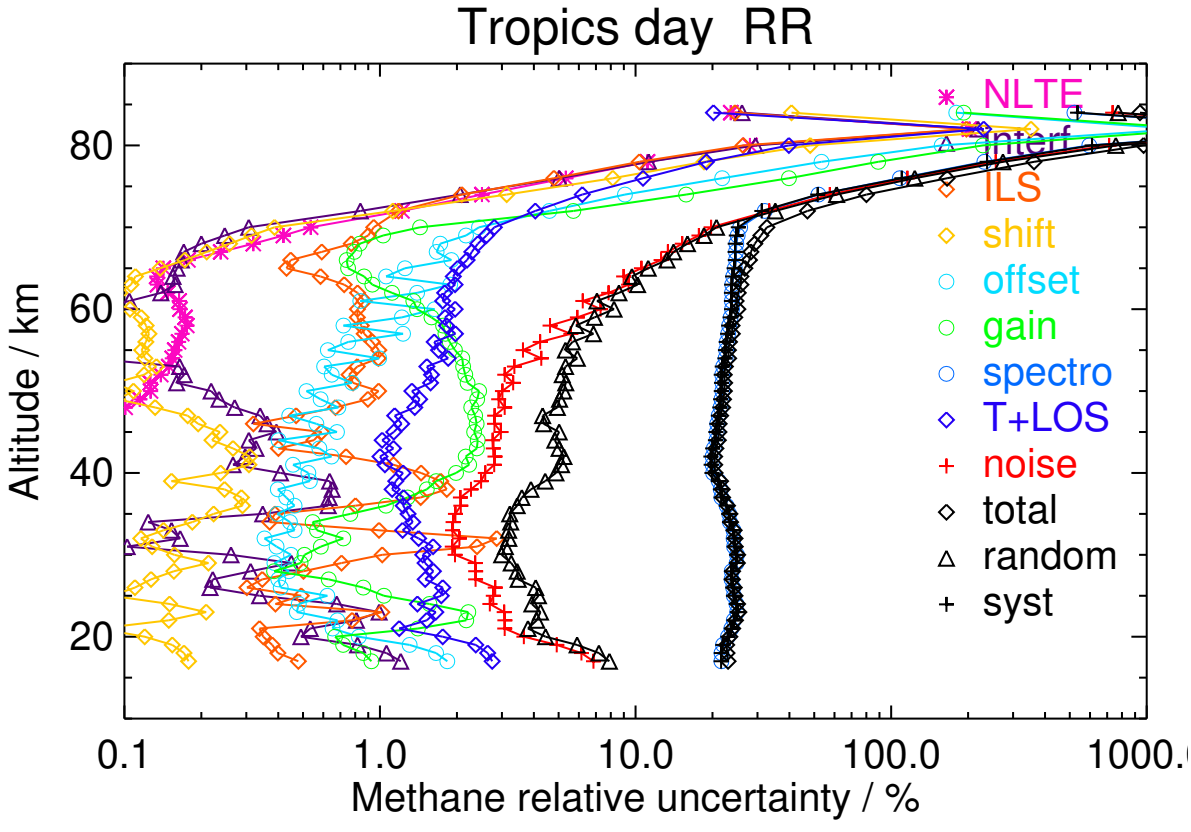

Figure S85. V8R_CH4_561 Tropics day

Table S86. Methane error budget for Tropics night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	1462.32	0.01	4.62	17.20	2.86	6.17	7.99	365.58	20.60	28.99	47.24	364.84	367.89
35	1239.02	0.06	4.33	7.69	2.76	5.07	9.60	290.46	16.48	24.56	41.53	289.35	292.31
40	730.65	0.09	3.48	10.90	1.68	4.16	12.59	147.25	9.15	19.22	37.88	144.95	149.81
45	429.40	0.13	1.59	2.28	1.06	2.48	9.85	90.29	4.38	11.91	20.51	89.47	91.79
50	288.71	0.18	0.69	2.84	0.33	1.58	6.78	62.88	4.09	9.19	17.07	61.81	64.13
55	206.91	0.15	0.16	2.17	0.26	1.62	3.95	46.75	3.85	8.24	12.15	46.30	47.87
60	171.44	0.11	0.17	1.70	0.18	2.91	2.55	40.26	3.44	12.18	14.15	39.98	42.42
65	142.06	0.25	0.19	0.64	0.16	1.65	1.30	34.52	3.15	13.96	15.49	34.08	37.44
70	106.29	0.93	0.75	1.88	1.02	2.44	5.18	31.28	3.55	21.22	22.95	30.89	38.48
74	55.84	1.37	1.66	2.58	2.84	5.46	12.10	36.85	3.95	31.68	34.45	37.23	50.73
80	-0.97	1.18	1.70	2.74	2.69	10.40	11.34	32.40	2.33	44.84	47.45	32.72	57.64
84	-7.63	0.63	0.90	1.55	1.21	8.13	5.49	16.68	0.80	31.15	32.79	16.59	36.74

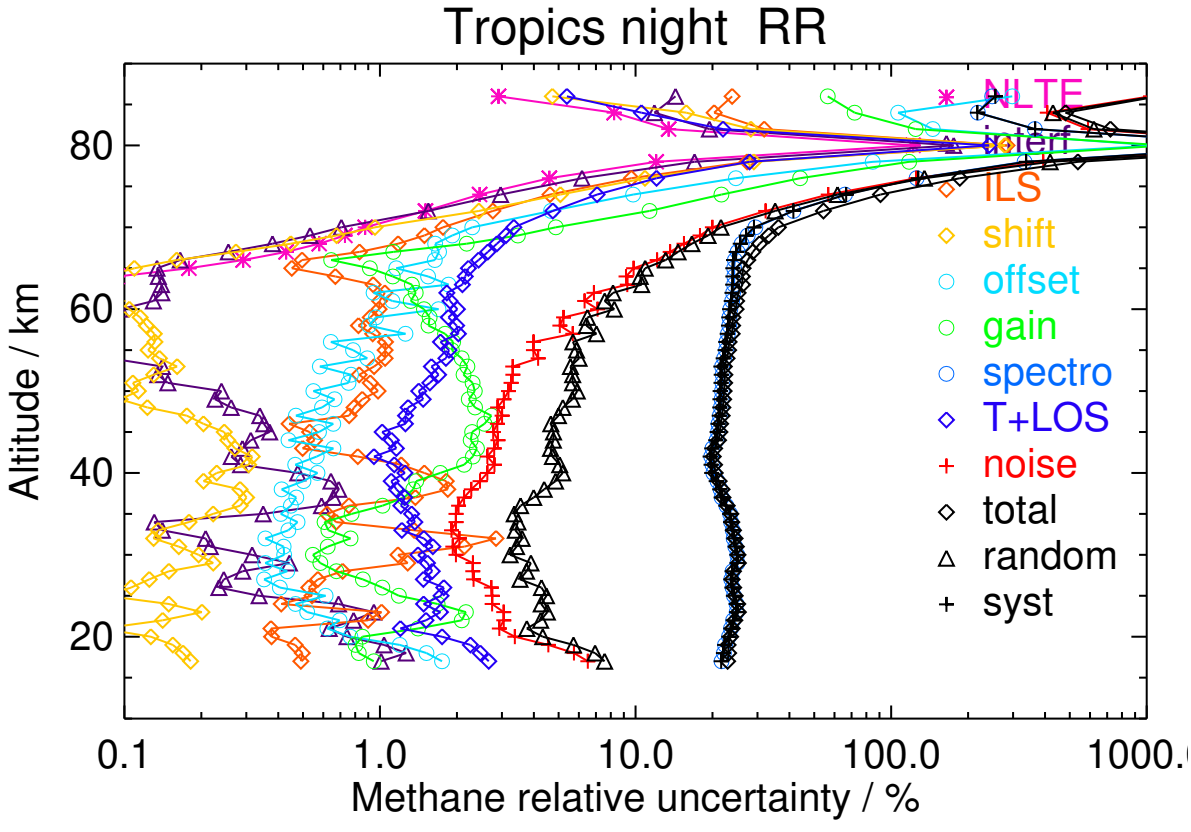

Figure S86. V8R_CH4_561 Tropics night

Table S87. Methane error budget for Southern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	1193.31	0.05	6.51	23.75	2.74	7.71	45.93	297.48	23.38	33.50	96.88	289.07	304.87
35	756.96	0.07	2.90	8.60	2.39	5.81	20.77	192.07	15.08	22.70	68.18	183.13	195.41
40	251.73	0.07	2.51	3.76	1.29	3.62	3.54	58.21	4.63	16.65	29.13	53.72	61.11
45	242.13	0.20	1.22	1.93	0.38	1.67	5.81	52.85	3.36	11.04	17.50	51.59	54.48
50	248.99	0.39	0.44	2.35	0.22	2.02	6.31	56.49	3.81	9.43	18.32	54.86	57.83
55	215.08	0.48	0.15	1.96	0.25	2.42	4.97	49.52	4.55	11.83	16.46	48.75	51.46
60	173.20	0.45	0.12	1.92	0.16	1.90	3.00	41.86	3.53	11.06	14.37	41.19	43.63
65	142.32	0.36	0.21	0.99	0.29	2.49	1.38	35.41	3.45	15.96	18.74	34.34	39.12
70	107.08	0.74	0.61	1.31	0.95	3.11	3.02	30.83	3.59	21.86	25.19	28.79	38.25
74	73.80	1.36	1.33	2.95	1.95	6.47	7.26	29.21	3.60	34.38	37.82	26.98	46.46
80	19.29	1.49	1.71	3.24	2.67	10.06	9.68	24.97	2.47	44.39	47.51	23.66	53.08
84	2.95	0.94	0.97	2.12	1.18	7.61	4.84	12.90	0.91	29.79	31.62	12.00	33.82

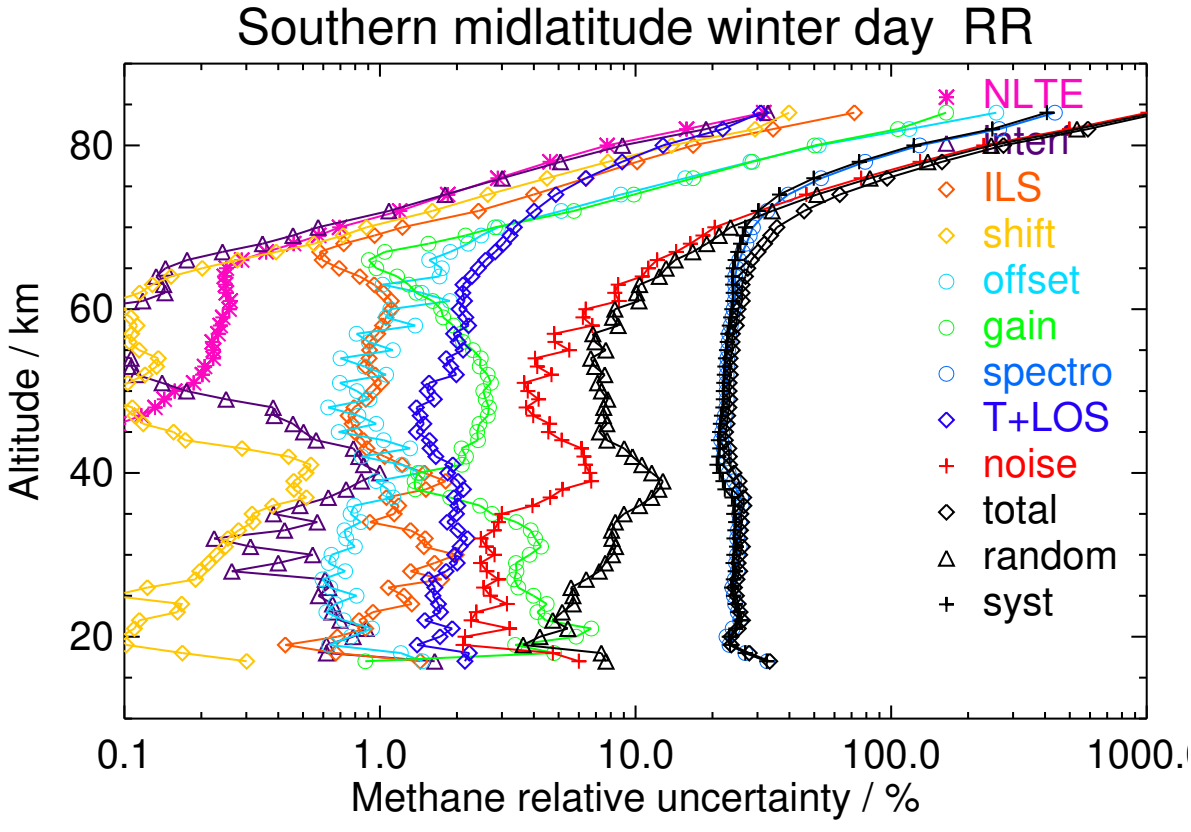

Figure S87. V8R_CH4_561 Southern midlatitude winter day

Table S88. Methane error budget for Southern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	960.62	0.04	4.30	16.59	2.30	7.45	32.29	242.93	20.46	33.28	93.29	230.73	248.87
35	639.92	0.06	2.72	7.02	2.18	5.81	14.98	164.48	13.94	26.88	70.37	152.77	168.20
40	212.95	0.07	2.17	2.88	1.32	3.90	3.89	52.27	4.63	19.02	26.78	49.43	56.22
45	195.44	0.12	0.83	1.73	0.39	1.82	5.55	46.90	3.30	11.97	20.18	44.55	48.91
50	204.22	0.21	0.28	2.28	0.24	1.74	4.93	47.97	3.05	8.33	15.57	46.58	49.12
55	182.05	0.30	0.10	1.88	0.18	2.15	3.91	43.23	3.69	10.76	14.75	42.48	44.97
60	157.06	0.36	0.12	1.98	0.16	1.92	2.64	38.57	3.04	11.03	14.03	37.90	40.41
65	126.84	0.41	0.23	1.16	0.38	2.29	1.57	32.29	3.04	16.02	18.75	31.09	36.30
70	94.25	0.51	0.49	0.88	0.94	3.24	2.87	27.27	3.08	22.26	25.31	25.08	35.63
74	61.89	0.68	1.07	1.99	1.92	6.69	6.86	24.60	3.21	34.70	37.82	22.15	43.83
80	13.75	0.76	1.61	3.08	2.89	9.87	10.22	21.64	2.29	43.87	47.42	19.32	51.20
84	-9.02	0.43	1.09	2.69	1.18	7.70	6.54	12.01	0.87	29.83	32.11	10.78	33.87

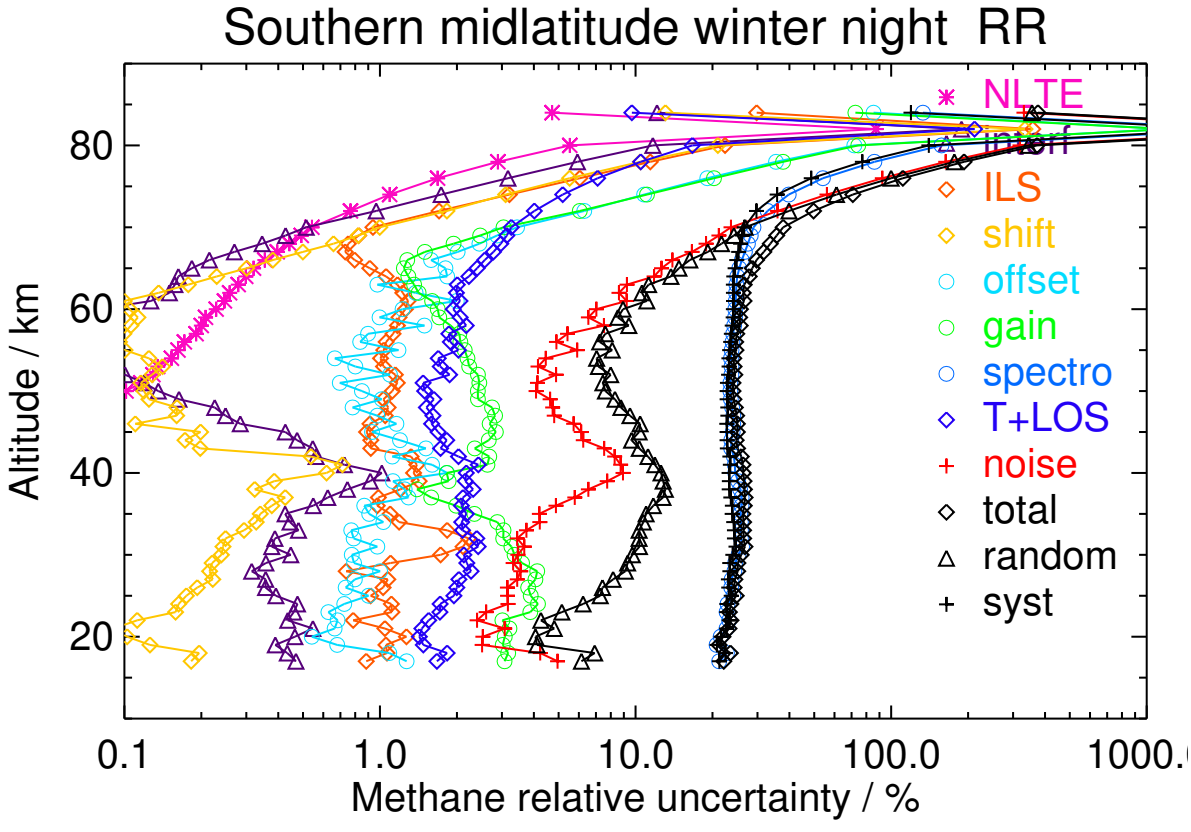

Figure S88. V8R_CH4_561 Southern midlatitude winter night

Table S89. Methane error budget for Southern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	1173.89	0.04	4.33	34.34	3.08	7.81	37.47	312.93	19.80	31.94	94.94	304.95	319.39
35	708.47	0.06	2.34	6.73	2.41	5.06	17.97	175.62	13.01	19.10	51.32	170.72	178.27
40	370.61	0.14	1.65	3.70	1.28	3.69	6.78	77.93	5.47	16.58	25.07	76.34	80.35
45	254.93	0.23	1.21	2.57	0.40	1.36	4.98	54.31	3.42	10.86	14.05	54.01	55.80
50	265.67	0.35	0.54	2.31	0.24	2.11	5.41	57.83	4.00	9.50	11.89	57.87	59.08
55	236.60	0.45	0.24	2.04	0.23	2.20	4.57	52.85	4.56	10.47	12.56	52.87	54.35
60	213.49	0.50	0.14	2.73	0.16	1.90	3.73	50.01	3.82	9.93	12.44	49.85	51.38
65	161.11	0.29	0.22	1.30	0.20	2.31	1.66	39.41	3.18	14.40	17.02	38.62	42.20
70	91.97	0.32	0.36	0.73	0.46	2.25	2.02	26.39	2.46	19.49	21.25	25.31	33.05
74	35.04	1.00	1.28	1.86	1.87	5.19	9.32	24.45	2.77	30.80	33.05	24.19	40.96
80	-12.76	1.56	2.32	3.24	3.80	9.45	17.01	33.51	3.18	43.50	46.41	35.82	58.62
84	-12.30	0.94	1.47	2.13	2.44	6.72	10.54	20.98	1.33	28.91	30.77	22.37	38.05

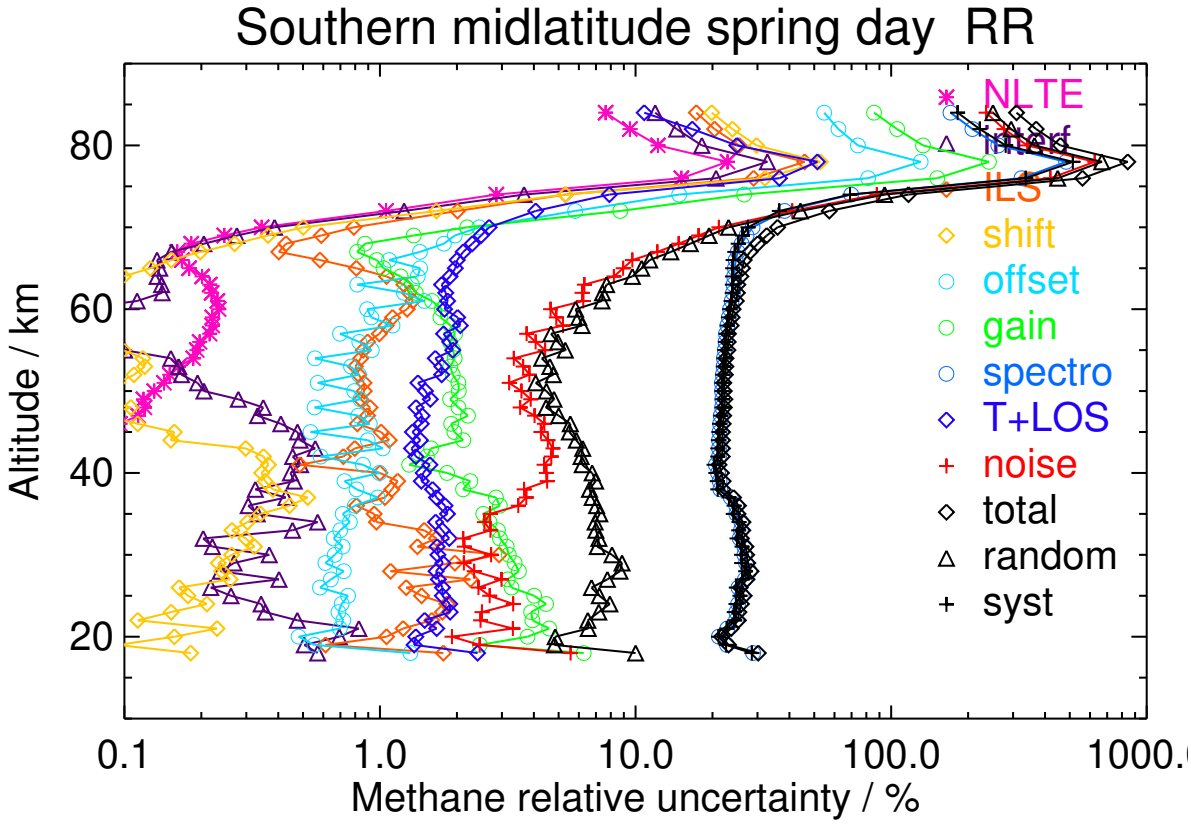

Figure S89. V8R_CH4_561 Southern midlatitude spring day

Table S90. Methane error budget for Southern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	1158.47	0.02	4.10	11.09	3.47	8.46	44.51	292.64	19.05	29.83	92.64	283.75	298.49
35	782.99	0.04	2.90	8.53	2.73	5.48	25.03	189.68	13.20	20.92	62.64	182.79	193.22
40	371.72	0.06	1.49	4.42	1.10	3.94	6.92	77.37	5.83	16.79	23.47	76.40	79.93
45	255.09	0.10	1.18	2.09	0.42	1.60	5.21	54.25	3.30	10.68	13.40	54.07	55.71
50	261.98	0.18	0.56	2.02	0.21	1.78	5.15	56.95	3.88	9.00	11.97	56.83	58.08
55	248.65	0.28	0.19	2.25	0.27	2.38	5.07	55.19	5.17	11.38	13.71	55.23	56.91
60	217.12	0.28	0.17	2.71	0.17	2.36	3.64	50.81	4.26	11.22	13.75	50.62	52.46
65	146.58	0.16	0.25	1.37	0.20	1.99	1.29	36.61	3.55	14.73	17.34	35.74	39.72
70	75.57	0.39	0.50	0.95	0.54	2.39	3.02	24.25	2.70	20.26	22.80	22.41	31.97
74	23.61	0.72	1.10	1.86	1.53	5.40	8.18	23.17	3.06	31.35	33.64	22.37	40.40
80	-12.89	0.93	1.90	3.38	3.15	9.35	14.56	31.23	3.21	43.49	46.08	32.86	56.59
84	-10.15	0.56	1.28	2.54	2.11	6.66	9.45	20.40	1.29	28.53	30.57	21.06	37.12

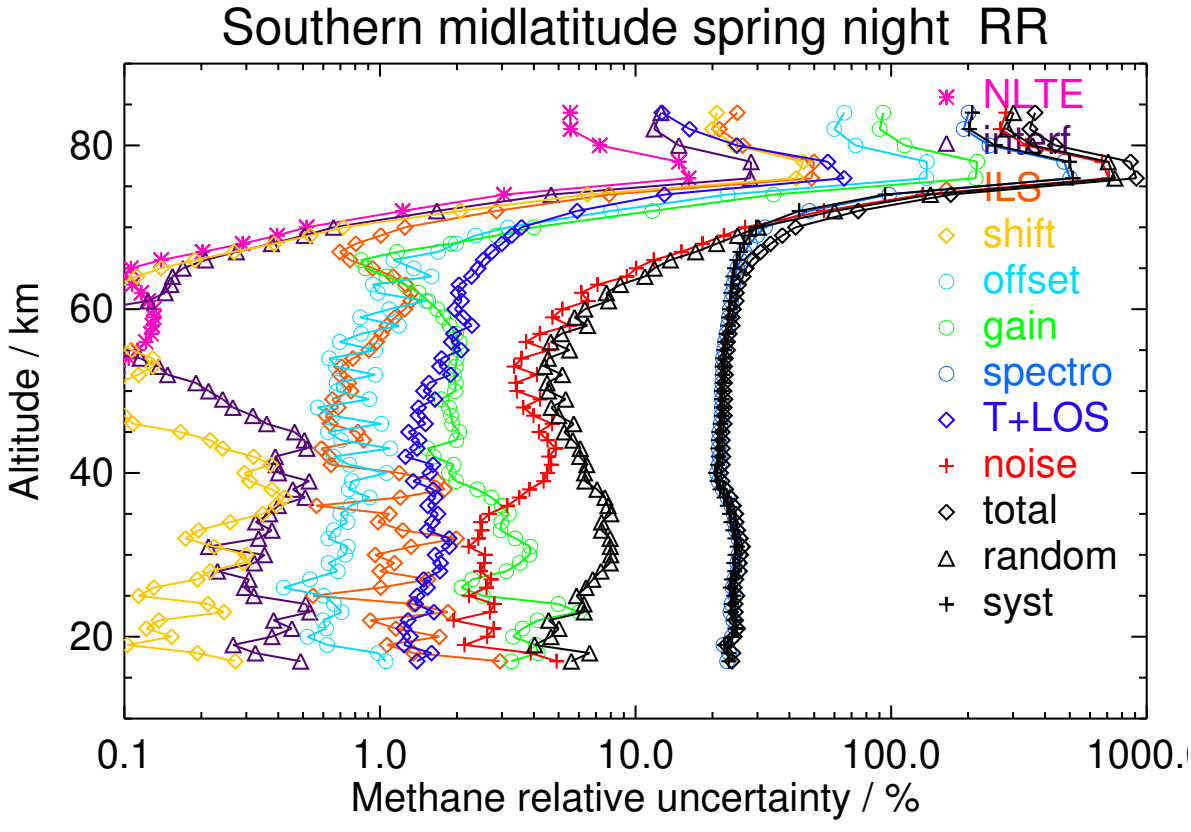

Figure S90. V8R_CH4_561 Southern midlatitude spring night

Table S91. Methane error budget for Southern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	954.71	0.04	6.37	19.59	2.20	6.92	19.10	254.45	16.38	24.10	41.59	254.37	257.75
35	722.71	0.07	4.15	4.90	1.56	4.43	5.85	164.83	9.43	21.37	29.08	164.21	166.76
40	427.84	0.12	2.01	4.42	1.53	2.79	7.96	90.12	5.26	14.34	28.90	87.27	91.93
45	253.73	0.17	2.00	1.65	0.77	2.49	5.98	61.22	2.93	11.71	30.20	55.06	62.80
50	182.05	0.21	0.76	1.71	0.20	1.43	4.25	46.99	2.39	8.25	26.80	39.84	48.01
55	201.66	0.39	0.39	1.30	0.34	1.73	4.67	52.60	3.38	7.01	29.21	44.74	53.43
60	218.88	0.43	0.22	2.42	0.31	3.02	4.08	53.54	4.38	11.40	21.41	50.88	55.20
65	179.32	0.28	0.22	1.08	0.25	2.09	2.17	43.35	3.39	12.64	15.39	42.71	45.39
70	136.66	0.61	0.38	1.10	0.47	3.08	0.98	36.11	2.75	19.19	21.30	35.20	41.14
74	91.10	1.54	1.49	3.07	1.83	4.60	4.89	33.54	1.70	29.32	31.98	32.06	45.28
80	35.91	2.12	3.36	7.38	4.91	8.77	11.49	42.19	0.07	42.90	46.95	41.47	62.64
84	14.07	1.23	2.21	4.90	3.23	6.65	7.31	26.68	0.10	29.29	31.99	26.17	41.33

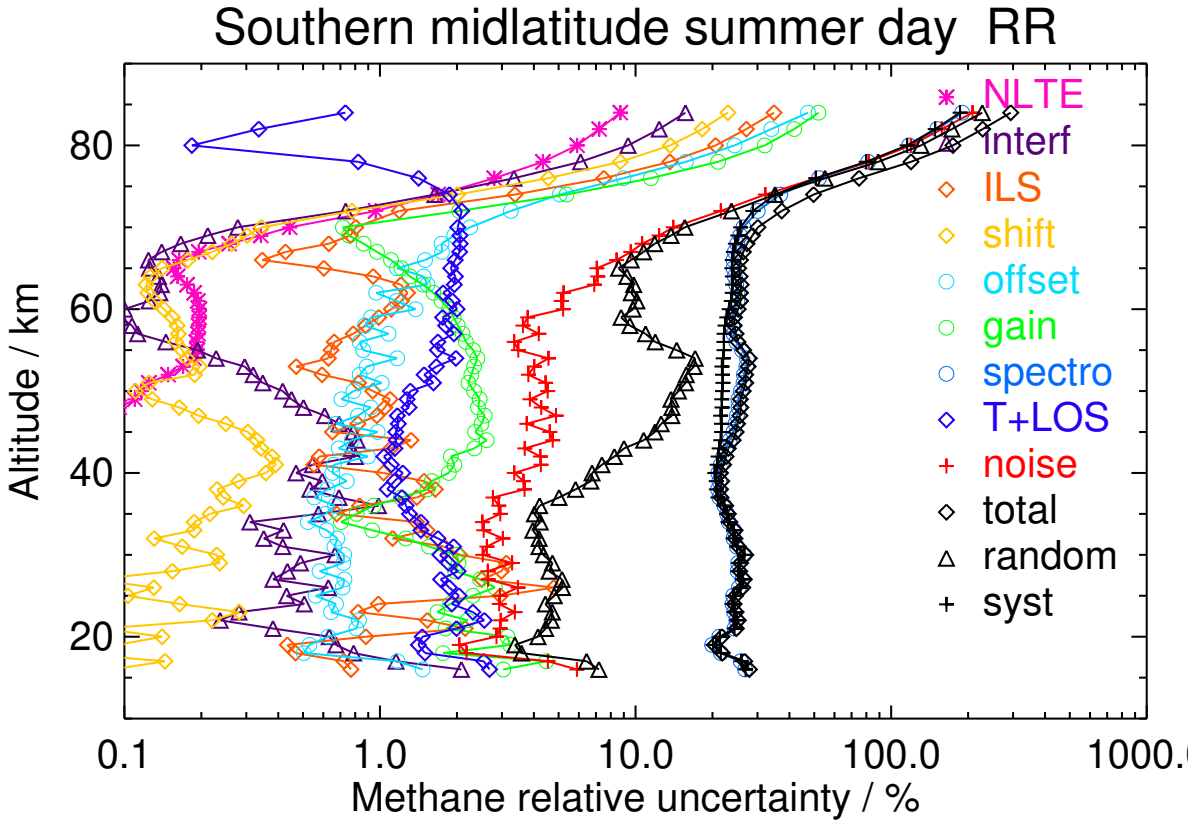

Figure S91. V8R_CH4_561 Southern midlatitude summer day

Table S92. Methane error budget for Southern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	929.13	0.01	5.33	22.50	2.46	7.53	28.10	241.10	16.15	26.23	45.70	241.61	245.90
35	699.91	0.04	4.86	5.09	1.70	4.58	6.47	161.57	10.07	21.60	30.26	160.84	163.67
40	392.42	0.06	1.95	5.74	1.32	2.89	7.65	78.53	4.58	13.51	23.67	76.91	80.47
45	219.49	0.07	1.47	3.08	0.72	2.28	5.32	50.81	2.30	12.10	25.29	46.26	52.72
50	155.81	0.10	0.68	1.26	0.18	1.32	2.92	41.61	1.90	7.83	25.50	34.03	42.53
55	159.56	0.14	0.27	1.72	0.32	1.62	3.83	42.18	2.74	6.93	23.34	36.20	43.07
60	167.37	0.14	0.24	1.85	0.26	2.58	2.94	43.00	3.15	10.07	19.93	39.77	44.49
65	166.56	0.11	0.29	1.19	0.25	2.03	1.79	39.94	3.31	12.50	15.96	38.94	42.09
70	145.22	0.79	0.70	1.34	0.67	2.72	1.66	36.16	3.57	19.83	22.02	35.24	41.55
74	99.23	1.66	1.91	2.27	2.11	4.59	6.92	35.47	2.60	29.78	32.85	34.02	47.30
80	40.06	1.88	2.58	5.58	3.72	9.37	9.23	35.20	0.34	44.32	47.71	33.98	58.57
84	11.95	1.03	1.61	3.89	2.39	7.10	5.62	21.21	0.03	30.28	32.27	20.78	38.38

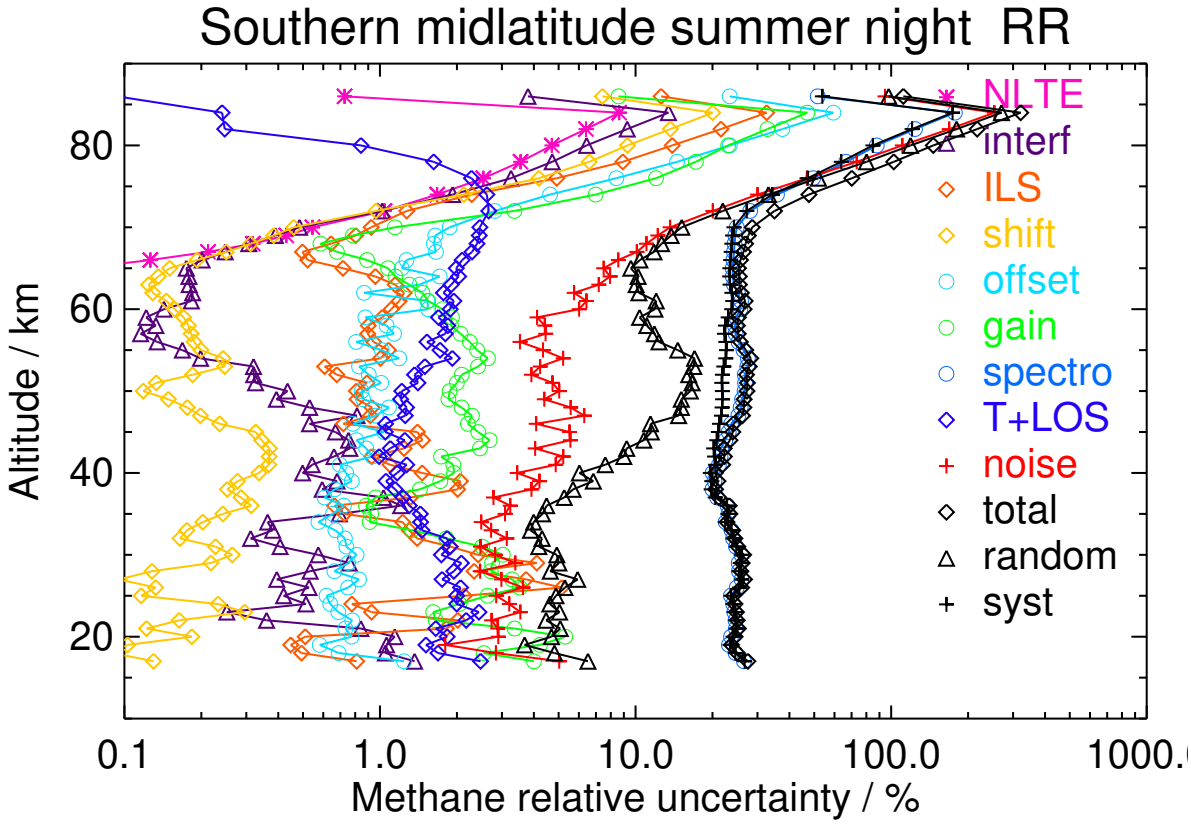

Figure S92. V8R_CH4_561 Southern midlatitude summer night

Table S93. Methane error budget for Southern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	961.59	0.03	3.89	23.68	2.35	6.78	22.42	236.57	20.23	31.52	53.74	235.81	241.86
35	700.44	0.06	1.88	5.17	1.17	4.72	13.57	166.04	11.60	20.10	48.28	161.29	168.37
40	561.95	0.26	1.71	4.73	1.56	4.85	9.75	123.69	8.05	22.27	43.71	118.73	126.52
45	442.62	0.42	1.64	3.41	0.52	2.40	12.31	99.00	5.76	14.05	28.57	96.89	101.01
50	356.38	0.57	0.87	2.65	0.35	2.81	8.74	80.11	5.87	12.98	20.04	79.45	81.93
55	323.39	0.79	0.28	2.32	0.29	3.08	7.85	72.07	7.37	14.53	17.79	72.26	74.41
60	263.56	0.63	0.17	2.93	0.21	2.50	4.61	61.40	5.93	13.11	15.28	61.48	63.35
65	158.20	0.27	0.24	1.74	0.23	2.18	1.55	39.11	4.10	15.87	18.02	38.52	42.53
70	69.45	0.27	0.27	0.70	0.30	2.70	1.46	21.82	2.39	20.18	21.51	20.90	29.99
74	41.21	0.85	0.83	1.09	0.85	6.07	6.03	18.73	2.57	32.44	34.21	17.77	38.55
80	20.47	1.53	1.73	2.22	2.17	10.03	13.04	27.57	3.34	43.75	46.80	27.95	54.51
84	2.77	0.99	1.28	1.73	1.49	7.15	9.33	19.47	1.67	28.66	30.69	20.19	36.73

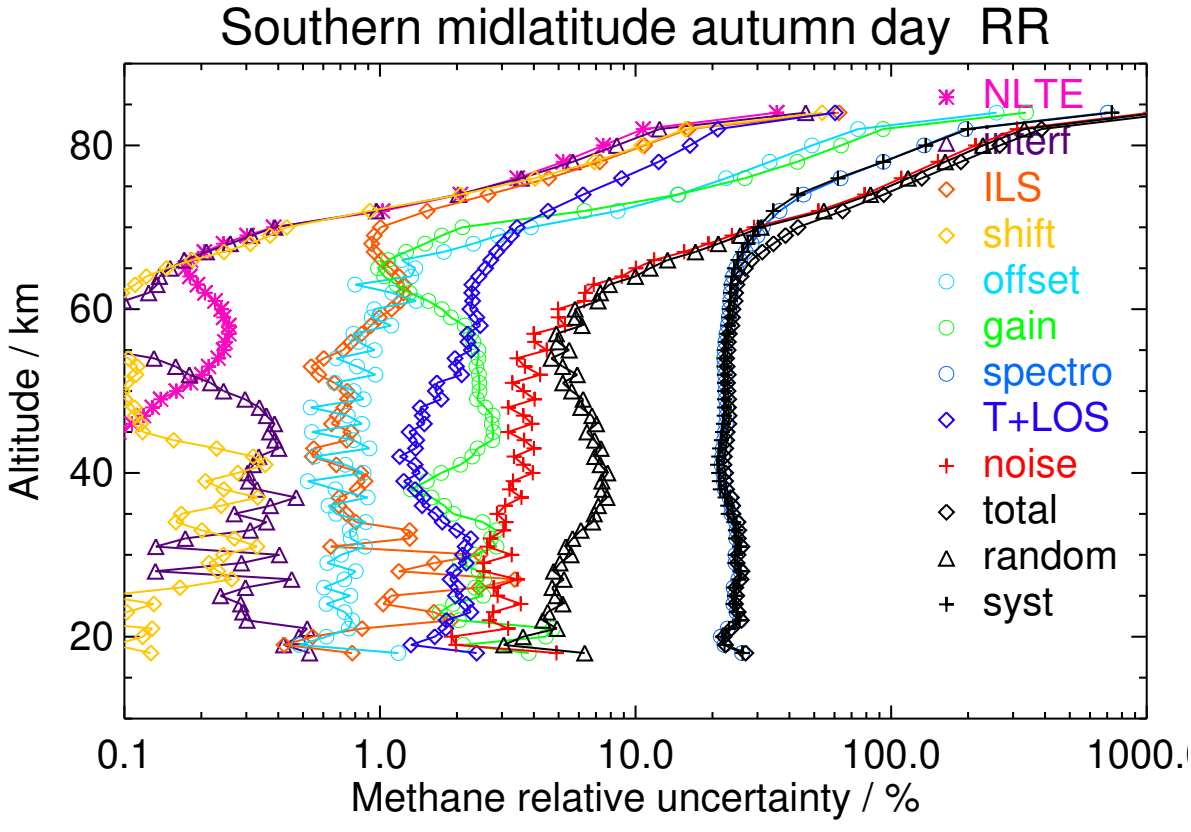

Figure S93. V8R_CH4_561 Southern midlatitude autumn day

Table S94. Methane error budget for Southern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	907.77	0.01	4.72	22.84	2.22	7.19	27.32	235.26	20.02	31.44	50.32	235.70	241.01
35	643.74	0.04	2.43	3.92	1.06	4.52	13.40	152.70	11.07	19.67	40.89	149.59	155.08
40	457.52	0.09	1.54	4.80	1.26	4.54	6.55	98.45	6.75	20.35	37.17	94.13	101.20
45	391.46	0.14	1.60	1.93	0.70	1.93	7.81	84.07	4.80	13.03	29.70	80.31	85.63
50	339.78	0.26	0.83	2.30	0.22	2.55	7.38	73.18	5.59	12.12	19.40	72.29	74.84
55	317.08	0.42	0.18	2.58	0.26	3.09	7.88	69.50	7.64	14.98	18.78	69.56	72.05
60	258.16	0.34	0.18	3.16	0.19	2.48	4.48	60.19	6.23	13.75	17.31	59.89	62.35
65	141.09	0.18	0.25	1.66	0.18	2.17	1.55	35.81	3.88	16.04	18.70	34.86	39.56
70	66.22	0.24	0.37	0.55	0.34	2.71	1.78	20.41	2.49	20.56	22.31	18.94	29.27
74	25.16	0.51	0.96	1.08	1.02	6.16	6.26	17.08	2.74	32.68	34.51	16.01	38.05
80	-12.40	0.83	2.02	2.37	2.38	9.79	13.65	26.31	3.55	43.10	46.00	27.29	53.48
84	-0.45	0.16	0.85	0.91	1.01	7.08	5.15	12.11	1.01	28.18	29.19	13.00	31.95

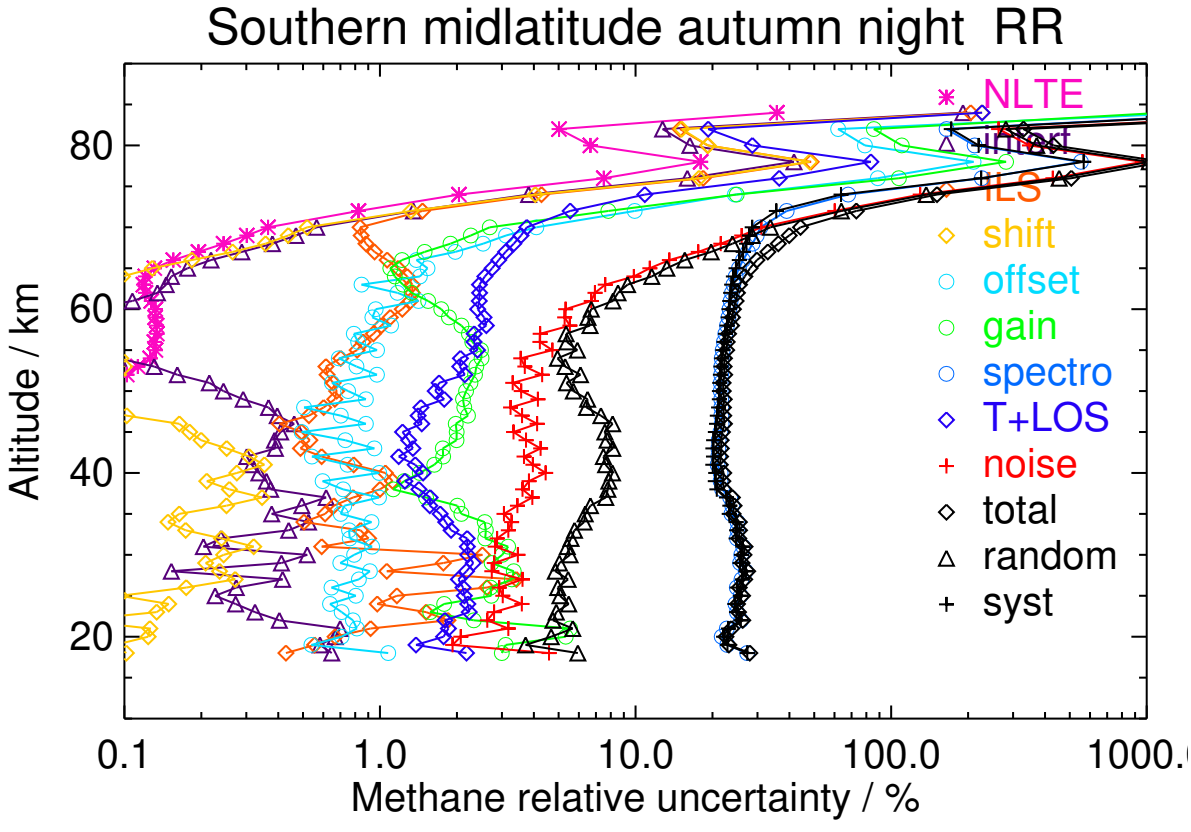

Figure S94. V8R_CH4_561 Southern midlatitude autumn night

Table S95. Methane error budget for Southern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	444.73	0.06	5.38	10.38	2.84	4.80	5.60	106.39	13.86	31.18	44.04	103.65	112.62
35	200.25	0.10	2.43	7.11	1.91	4.33	3.24	50.14	5.58	19.95	29.96	46.20	55.07
40	211.54	0.09	1.42	2.93	1.14	2.86	5.89	50.07	3.38	13.80	19.49	48.83	52.57
45	244.46	0.20	0.80	2.14	0.54	1.86	6.44	57.25	3.33	10.98	20.43	55.16	58.82
50	232.99	0.29	0.22	2.51	0.30	1.80	5.13	53.33	3.28	7.89	14.33	52.42	54.34
55	199.11	0.41	0.09	2.22	0.27	1.77	4.18	46.29	3.27	8.98	14.05	45.42	47.54
60	180.11	0.51	0.07	2.82	0.14	1.55	3.18	43.81	3.20	9.99	15.61	42.51	45.28
65	129.83	0.40	0.17	1.10	0.37	2.57	1.15	35.00	3.06	16.94	20.23	33.49	39.13
70	93.46	0.91	0.55	1.62	2.03	3.15	4.08	33.99	3.06	22.86	27.06	31.46	41.49
74	49.63	1.53	1.05	3.77	3.95	6.60	8.71	34.17	3.08	34.88	38.95	32.08	50.46
80	11.20	1.44	1.04	4.21	3.81	10.35	9.20	24.74	1.84	44.45	47.93	22.83	53.09
84	3.78	0.49	0.40	1.14	1.10	8.00	3.20	7.55	0.51	30.15	31.57	6.83	32.30

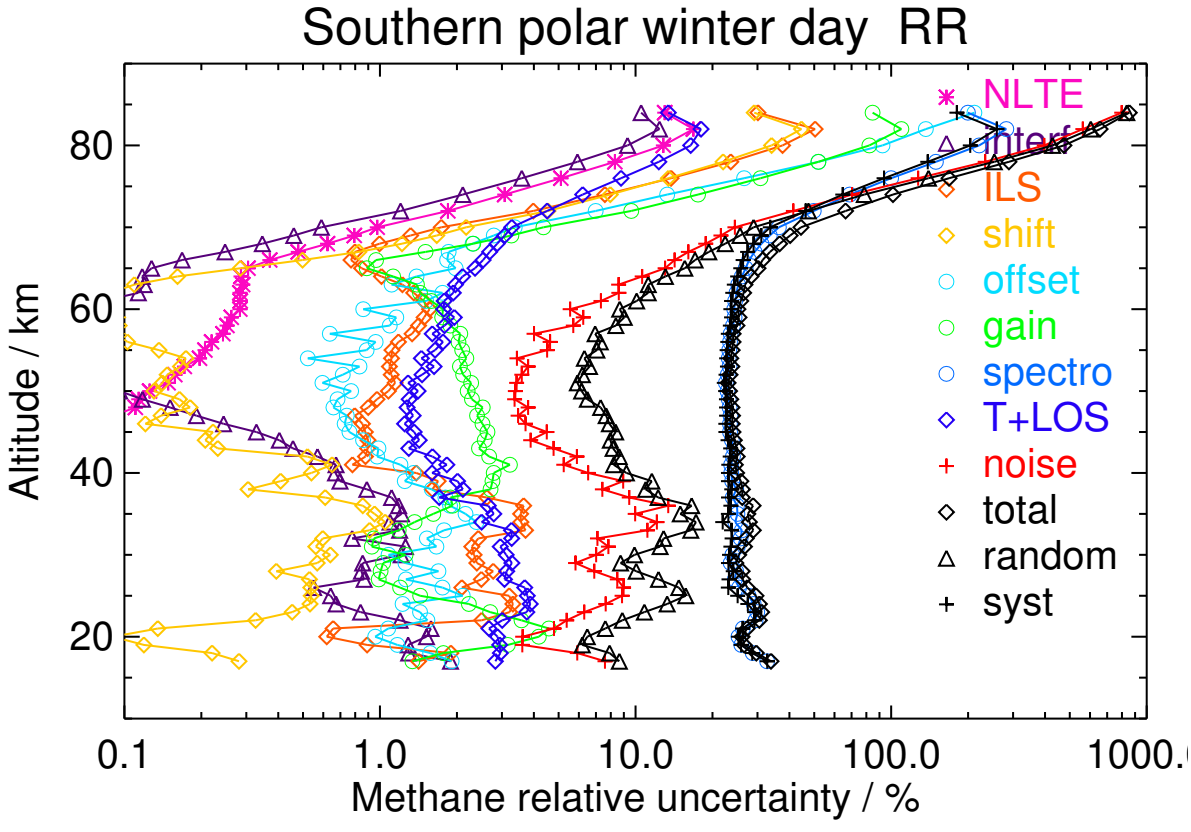

Figure S95. V8R_CH4_561 Southern polar winter day

Table S96. Methane error budget for Southern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	454.85	0.05	5.03	12.67	2.87	5.11	5.07	114.22	13.73	31.02	44.78	111.52	120.18
35	197.92	0.09	2.45	5.43	1.66	4.65	2.94	53.25	5.82	20.56	36.78	44.80	57.97
40	193.95	0.09	1.07	2.13	0.93	2.60	5.19	45.88	3.04	13.82	17.99	44.97	48.43
45	223.25	0.16	0.71	2.66	0.63	1.83	6.46	54.16	3.02	10.82	21.56	51.45	55.79
50	209.23	0.22	0.23	2.19	0.32	1.68	4.39	50.04	2.95	7.59	16.00	48.39	50.97
55	179.41	0.32	0.12	1.94	0.32	1.58	3.60	43.76	2.87	8.40	14.55	42.45	44.87
60	161.30	0.40	0.09	2.14	0.21	1.31	2.59	40.82	2.86	9.53	15.75	39.12	42.17
65	123.79	0.43	0.19	0.97	0.42	2.52	1.37	31.80	2.85	16.08	19.51	30.11	35.88
70	86.12	0.67	0.51	1.61	1.64	2.93	3.77	26.28	3.26	21.78	24.57	24.51	34.71
74	44.70	1.01	0.97	3.39	3.37	6.40	8.02	23.69	3.76	34.78	37.61	22.37	43.76
80	3.83	1.18	1.33	5.31	4.60	9.36	11.81	21.05	3.30	42.70	46.12	20.72	50.56
84	-12.96	0.51	0.56	1.30	1.18	8.06	3.24	8.12	1.13	30.41	31.96	7.06	32.73

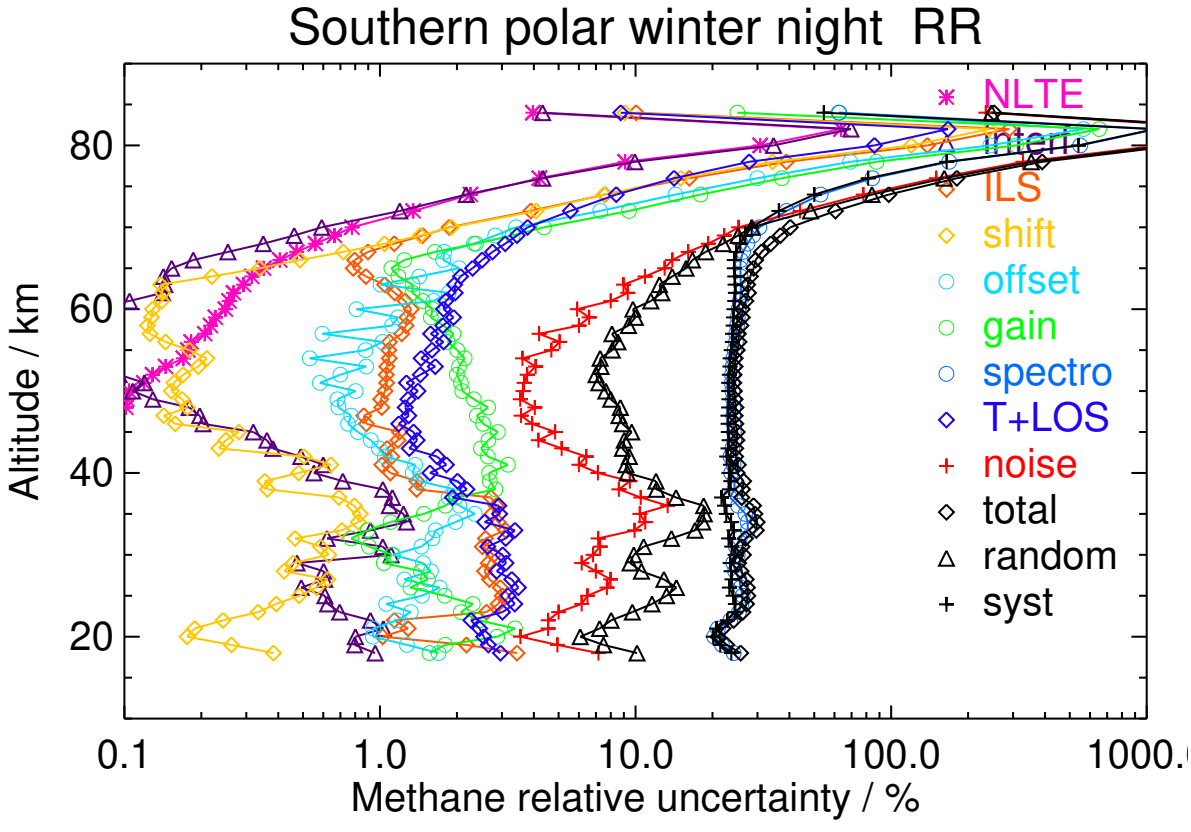

Figure S96. V8R_CH4_561 Southern polar winter night

Table S97. Methane error budget for Southern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	690.52	0.08	2.99	37.42	3.62	7.73	50.87	196.45	11.66	35.10	135.02	160.62	209.83
35	537.91	0.04	1.68	7.49	2.15	3.39	13.18	114.79	6.77	15.48	45.82	107.75	117.09
40	315.43	0.07	0.78	6.82	1.24	2.66	7.81	66.64	3.62	11.79	21.91	65.04	68.63
45	264.72	0.15	0.51	4.49	0.83	1.53	7.24	58.26	3.15	10.03	17.93	57.09	59.84
50	270.41	0.26	0.29	4.30	0.55	1.98	6.97	60.23	3.85	8.57	15.82	59.48	61.55
55	237.47	0.31	0.16	2.46	0.40	1.81	4.76	53.11	4.00	8.74	11.05	53.13	54.27
60	210.18	0.32	0.10	2.62	0.22	1.54	3.54	49.30	3.65	8.86	10.90	49.24	50.44
65	168.28	0.22	0.17	1.10	0.22	2.73	1.85	41.37	3.36	14.60	16.65	40.88	44.14
70	121.18	0.82	0.18	1.37	0.53	2.24	1.08	31.76	2.76	19.21	20.48	31.22	37.34
74	63.06	1.68	0.68	2.43	2.61	4.44	5.71	27.68	2.41	30.09	32.39	26.39	41.78
80	3.42	1.92	1.22	4.53	5.31	8.95	10.10	31.11	1.74	43.74	47.67	29.12	55.86
84	-3.83	1.09	0.68	2.79	3.04	7.06	5.76	18.16	0.57	30.76	32.92	17.16	37.12

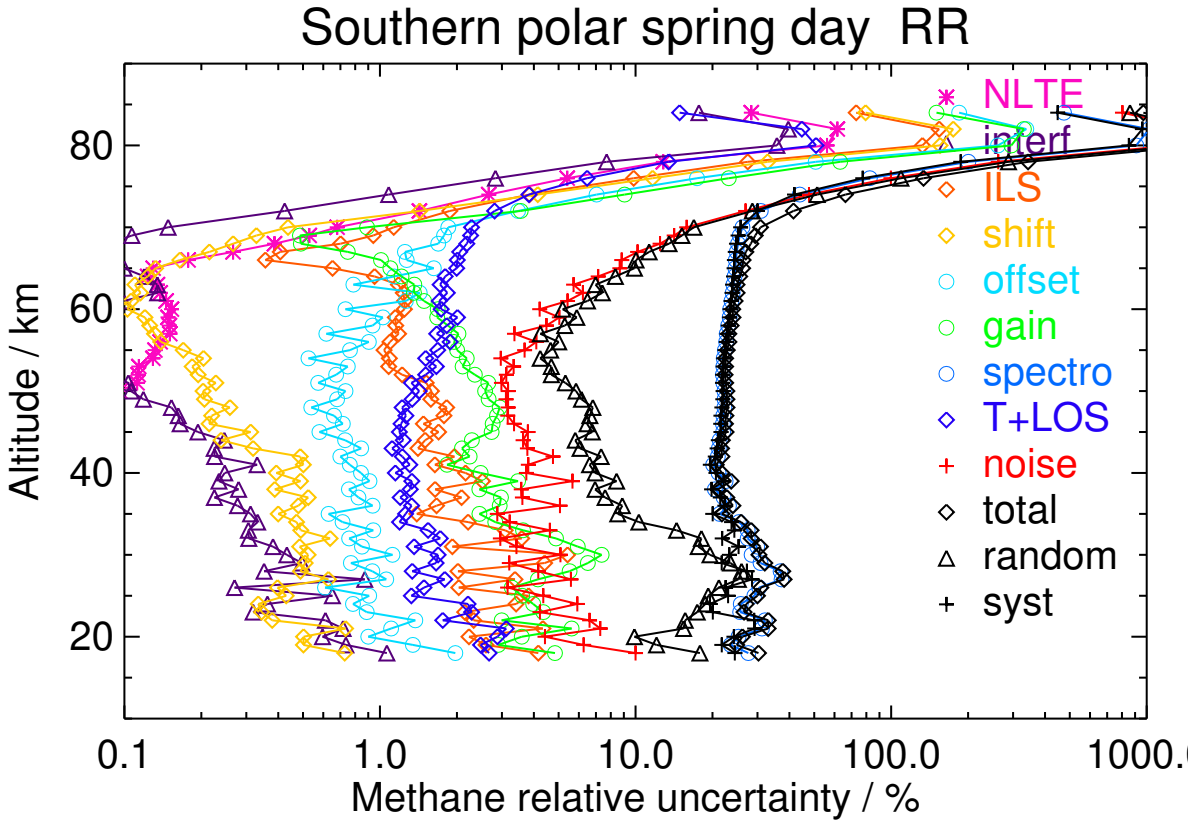

Figure S97. V8R_CH4_561 Southern polar spring day

Table S98. Methane error budget for Southern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	781.45	0.05	2.87	34.89	3.56	8.38	60.97	200.35	11.30	33.28	135.11	167.77	215.41
35	473.34	0.03	2.37	9.03	2.49	3.66	15.38	109.25	7.08	16.45	54.33	98.22	112.25
40	315.05	0.07	0.86	6.58	1.23	2.99	10.69	67.66	3.94	12.23	24.06	65.82	70.08
45	256.30	0.10	0.64	3.16	0.57	1.51	6.57	56.86	3.05	10.12	14.77	56.42	58.32
50	263.75	0.16	0.31	2.41	0.39	1.81	5.41	58.42	3.65	8.45	12.07	58.23	59.47
55	245.92	0.21	0.16	2.13	0.36	2.08	4.83	55.25	4.53	10.08	12.42	55.26	56.64
60	213.76	0.18	0.12	2.54	0.20	1.76	3.47	50.45	4.09	10.02	12.22	50.34	51.80
65	170.96	0.25	0.20	1.14	0.24	2.56	1.62	41.16	3.82	15.26	16.78	40.87	44.18
70	103.17	0.73	0.30	1.19	0.64	2.24	2.27	28.87	3.38	20.39	21.69	28.33	35.68
74	44.65	1.19	0.77	2.64	2.06	5.17	7.55	26.36	3.38	31.35	33.64	25.58	42.26
80	-1.63	1.28	1.23	5.09	3.68	9.65	10.92	30.36	2.53	44.53	48.04	29.29	56.27
84	-6.92	0.72	0.73	3.06	2.25	7.25	6.24	17.97	0.92	30.33	32.42	17.31	36.75

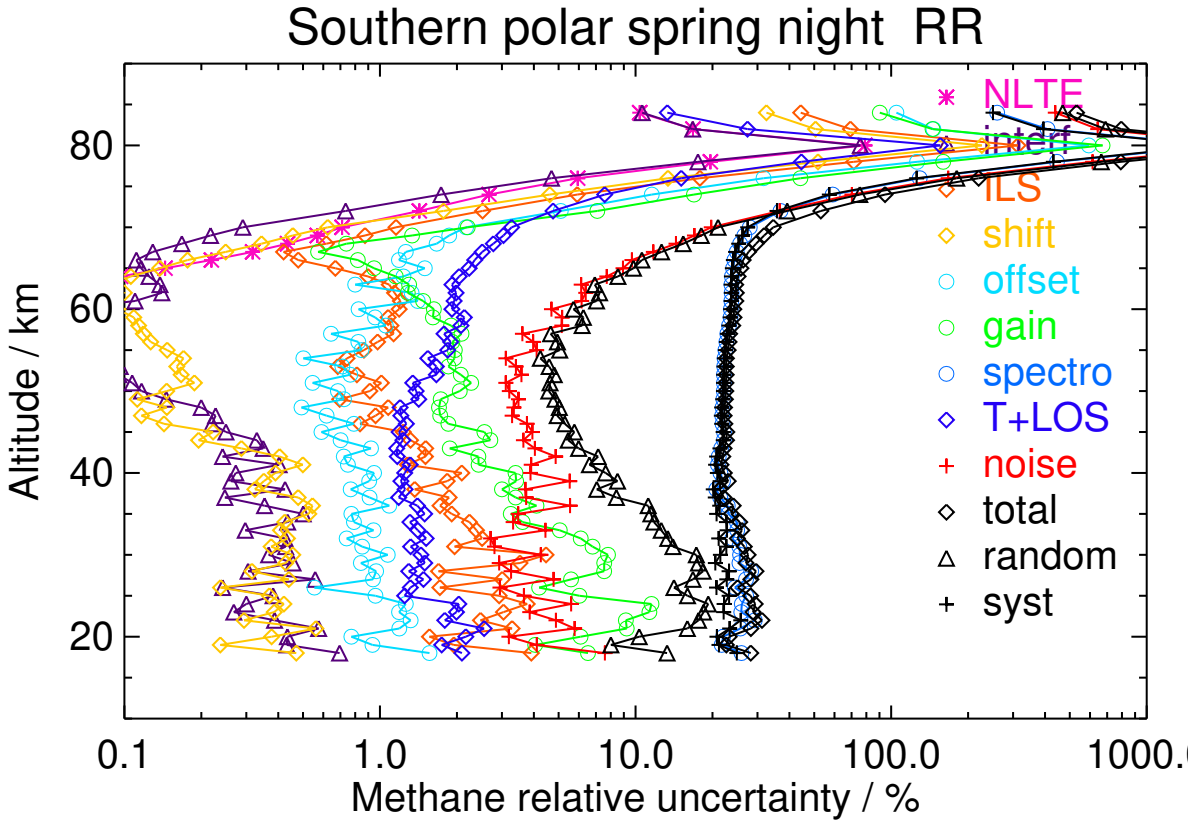

Figure S98. V8R_CH4_561 Southern polar spring night

Table S99. Methane error budget for Southern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	930.86	0.03	1.84	43.32	1.16	8.75	49.44	252.44	19.74	33.07	54.52	258.14	263.83
35	648.39	0.06	1.15	5.59	0.96	3.88	10.33	139.62	9.24	18.02	26.49	139.13	141.63
40	405.07	0.11	0.98	4.83	1.34	3.00	9.46	79.31	3.65	17.14	23.18	78.64	81.98
45	179.60	0.12	0.55	4.69	0.79	2.32	6.08	38.95	2.77	15.74	19.59	38.13	42.87
50	82.79	0.03	0.10	0.71	0.17	1.12	0.88	20.31	0.90	6.74	8.83	19.58	21.48
55	74.53	0.06	0.09	0.65	0.20	1.01	1.05	17.51	0.93	4.50	6.65	16.91	18.17
60	97.80	0.13	0.06	1.16	0.17	1.08	1.53	23.66	1.19	4.94	8.48	22.77	24.30
65	108.63	0.15	0.16	1.12	0.17	2.25	1.34	27.07	1.68	9.92	12.39	26.25	29.02
70	110.32	0.31	0.12	1.30	0.43	2.05	1.15	27.77	1.51	14.87	16.82	26.82	31.66
74	102.10	1.44	0.68	2.51	1.34	3.39	3.83	32.09	1.01	25.69	27.98	30.73	41.56
80	79.70	3.11	1.88	3.91	6.71	6.69	9.19	48.31	0.42	38.79	42.17	47.57	63.57
84	52.74	2.29	1.28	4.98	5.53	6.21	5.66	32.67	0.39	31.92	34.07	32.53	47.11

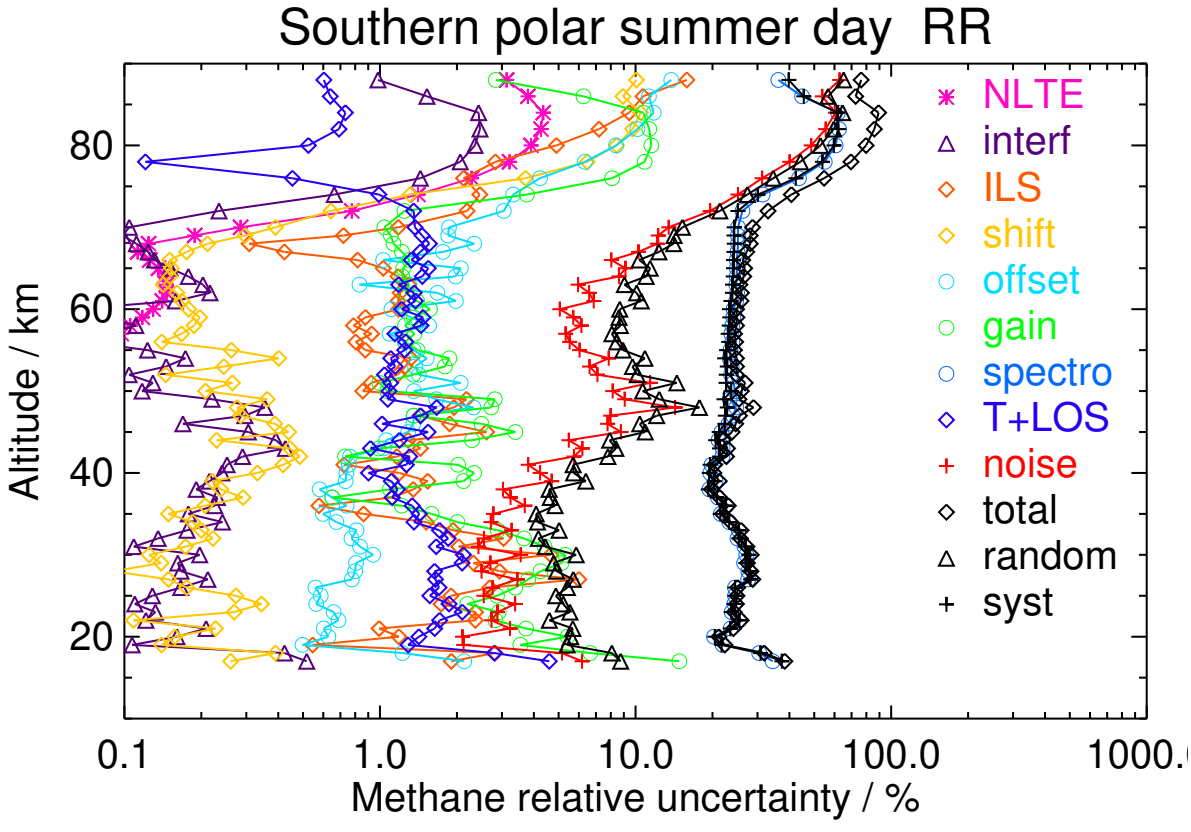

Figure S99. V8R_CH4_561 Southern polar summer day

Table S100. Methane error budget for Southern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	855.21	<0.01	4.15	26.23	1.66	9.32	51.51	227.79	21.11	32.63	49.53	233.22	238.42
35	548.37	0.02	2.02	3.15	1.03	4.52	13.25	123.07	9.22	18.45	27.93	122.48	125.63
40	240.44	0.04	2.23	2.52	1.19	3.17	3.41	51.79	2.84	17.49	22.40	50.30	55.06
45	83.82	0.05	1.13	2.22	0.39	2.55	2.77	22.50	1.66	16.14	19.69	20.05	28.11
50	55.44	0.03	0.20	1.05	0.11	1.28	1.12	13.40	0.69	6.46	7.43	13.07	15.03
55	73.82	0.06	0.11	0.55	0.11	1.34	1.03	17.79	1.22	5.94	7.95	17.12	18.88
60	92.28	0.12	0.09	1.06	0.10	1.44	1.49	23.19	1.58	7.41	10.13	22.32	24.51
65	137.04	0.13	0.23	0.78	0.18	2.51	1.60	32.82	2.69	13.38	15.26	32.25	35.68
70	128.41	0.39	0.56	1.07	0.64	2.65	1.17	32.63	2.95	19.43	20.69	32.14	38.23
74	91.87	1.16	2.13	1.65	2.81	4.67	8.12	39.62	2.24	30.12	32.43	39.18	50.86
80	32.95	1.46	2.68	2.19	4.64	8.86	11.67	45.65	0.31	44.37	46.75	46.01	65.59
84	4.07	0.77	1.58	1.85	3.06	6.34	7.37	28.40	0.03	28.98	30.64	28.61	41.92

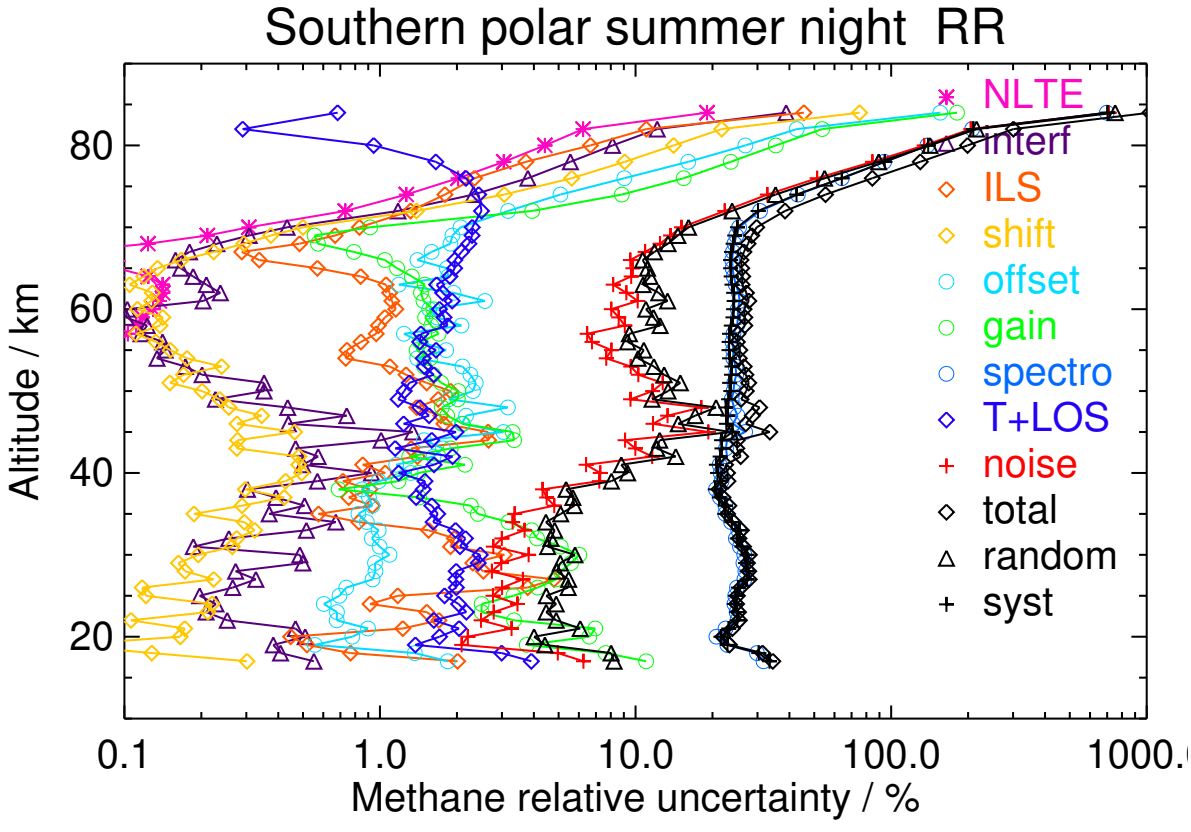

Figure S100. V8R_CH4_561 Southern polar summer night

Table S101. Methane error budget for Southern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	707.93	0.08	1.51	9.72	1.19	5.44	26.58	178.83	18.00	30.43	50.07	177.65	184.57
35	289.81	0.06	1.49	4.66	0.81	4.59	5.37	77.26	8.06	19.86	36.09	72.11	80.64
40	82.49	0.05	0.52	1.86	0.36	2.29	2.96	21.14	2.07	13.24	16.70	19.11	25.38
45	76.27	0.10	0.28	0.81	0.38	1.29	2.40	19.59	1.93	9.80	13.49	17.61	22.18
50	178.13	0.32	0.18	1.54	0.12	2.40	3.74	40.88	3.36	10.40	15.70	39.58	42.58
55	210.81	0.55	0.09	2.34	0.13	1.80	4.34	48.06	3.71	9.60	13.77	47.47	49.43
60	153.02	0.52	0.05	2.55	0.07	1.27	2.80	37.54	3.13	10.68	14.29	36.68	39.37
65	84.87	0.36	0.12	1.30	0.14	2.37	1.26	23.42	1.98	16.11	18.48	21.90	28.66
70	53.41	0.16	0.18	0.43	0.51	2.83	0.59	17.34	1.71	21.28	22.47	16.14	27.67
74	23.50	0.21	0.30	0.50	0.92	6.59	0.99	14.70	1.63	33.82	34.95	13.65	37.52
80	-8.41	0.41	0.43	0.68	1.37	10.37	1.76	12.45	1.29	44.30	45.85	11.41	47.24
84	-0.15	0.31	0.28	0.34	0.91	7.34	1.39	7.91	0.63	29.00	30.12	7.33	31.00

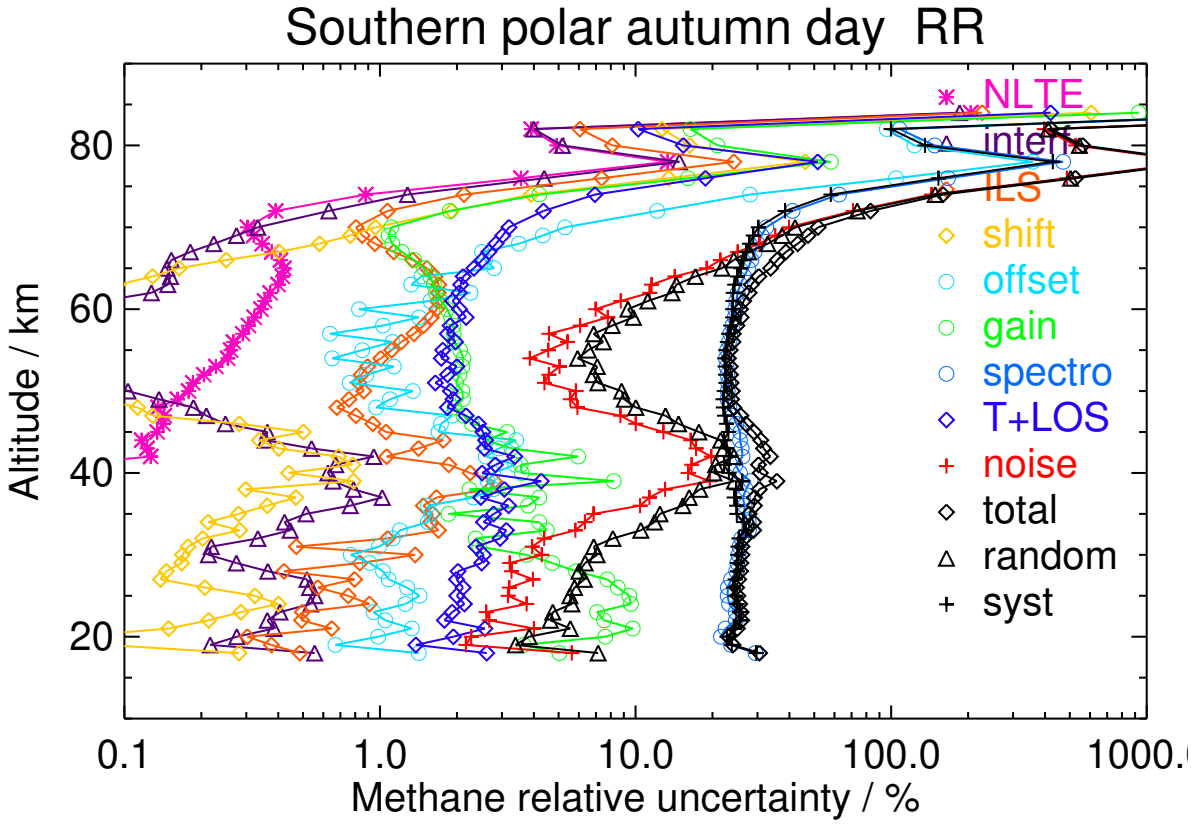

Figure S101. V8R_CH4_561 Southern polar autumn day

Table S102. Methane error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	645.79	0.06	2.48	7.61	1.13	5.29	17.55	173.23	18.61	30.79	48.14	171.43	178.06
35	222.66	0.06	1.40	4.33	0.87	4.25	5.45	58.62	6.74	18.55	32.28	53.41	62.41
40	66.43	0.04	0.47	1.29	0.31	2.27	2.50	16.89	1.88	12.79	15.87	14.63	21.58
45	103.21	0.08	0.29	0.79	0.38	1.24	1.73	24.75	2.19	9.59	12.97	23.38	26.74
50	182.78	0.24	0.21	1.30	0.15	2.36	3.56	42.45	3.43	10.43	14.49	41.63	44.08
55	198.54	0.43	0.09	2.21	0.13	1.71	4.17	47.19	3.69	9.90	14.96	46.27	48.63
60	131.47	0.41	0.06	2.13	0.07	1.22	2.47	33.90	2.88	10.56	15.89	32.08	35.80
65	60.97	0.26	0.14	1.02	0.13	2.29	0.82	18.13	1.69	16.05	18.38	16.08	24.42
70	33.33	0.20	0.17	0.33	0.34	2.91	0.77	11.14	1.37	20.86	21.78	9.80	23.88
74	17.04	0.26	0.45	0.51	0.99	6.80	2.55	10.56	1.86	34.61	35.82	9.16	36.97
80	-1.16	0.46	0.82	1.09	1.88	9.83	4.74	11.34	2.22	43.34	45.11	10.07	46.22
84	38.62	0.16	0.79	0.20	0.80	7.20	4.36	7.38	1.45	28.87	29.82	8.53	31.02

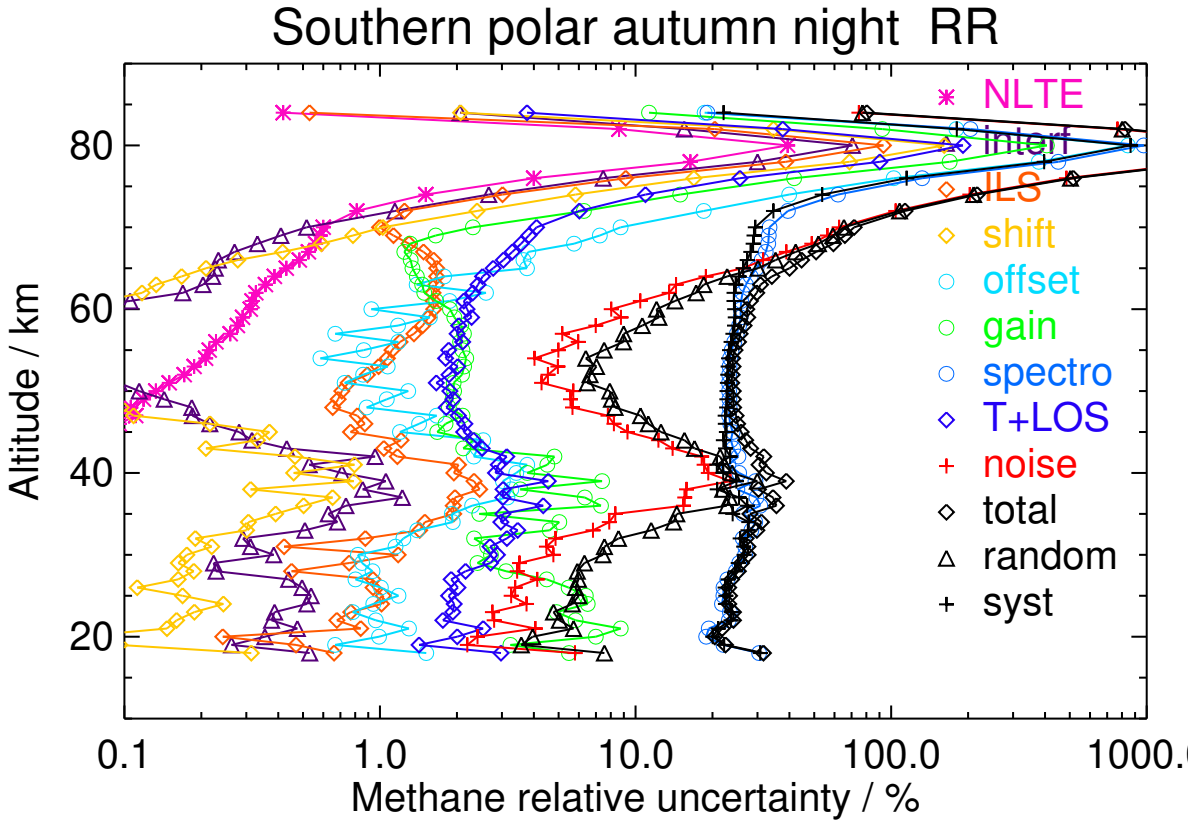

Figure S102. V8R_CH4_561 Southern polar autumn night

Table S103. Methane error budget for Northern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	355.73	0.22	0.38	6.34	0.21	5.76	14.09	71.90	7.53	29.91	32.84	72.90	79.95
45	221.50	0.27	0.06	2.56	0.22	2.11	7.54	43.79	4.16	13.20	14.98	44.19	46.66
50	148.44	0.31	0.03	0.86	0.10	1.61	3.75	32.37	2.86	10.76	11.63	32.47	34.49
55	106.72	0.29	0.03	1.01	0.05	1.43	2.28	26.38	2.40	10.80	13.05	25.62	28.75
60	40.13	0.14	<0.01	0.73	0.01	1.13	0.77	11.65	0.94	7.37	9.32	10.32	13.91
65	20.49	0.09	0.02	0.44	0.02	1.36	0.30	5.98	0.47	7.14	7.80	5.32	9.44
70	14.65	0.09	0.01	0.29	0.02	1.79	0.18	3.94	0.31	8.24	8.54	3.73	9.32
74	16.76	0.26	0.02	0.31	0.03	3.62	0.20	4.49	0.33	16.64	17.18	3.94	17.62
80	24.12	0.74	0.02	0.44	0.04	6.22	0.29	6.08	0.37	28.24	29.17	4.82	29.56

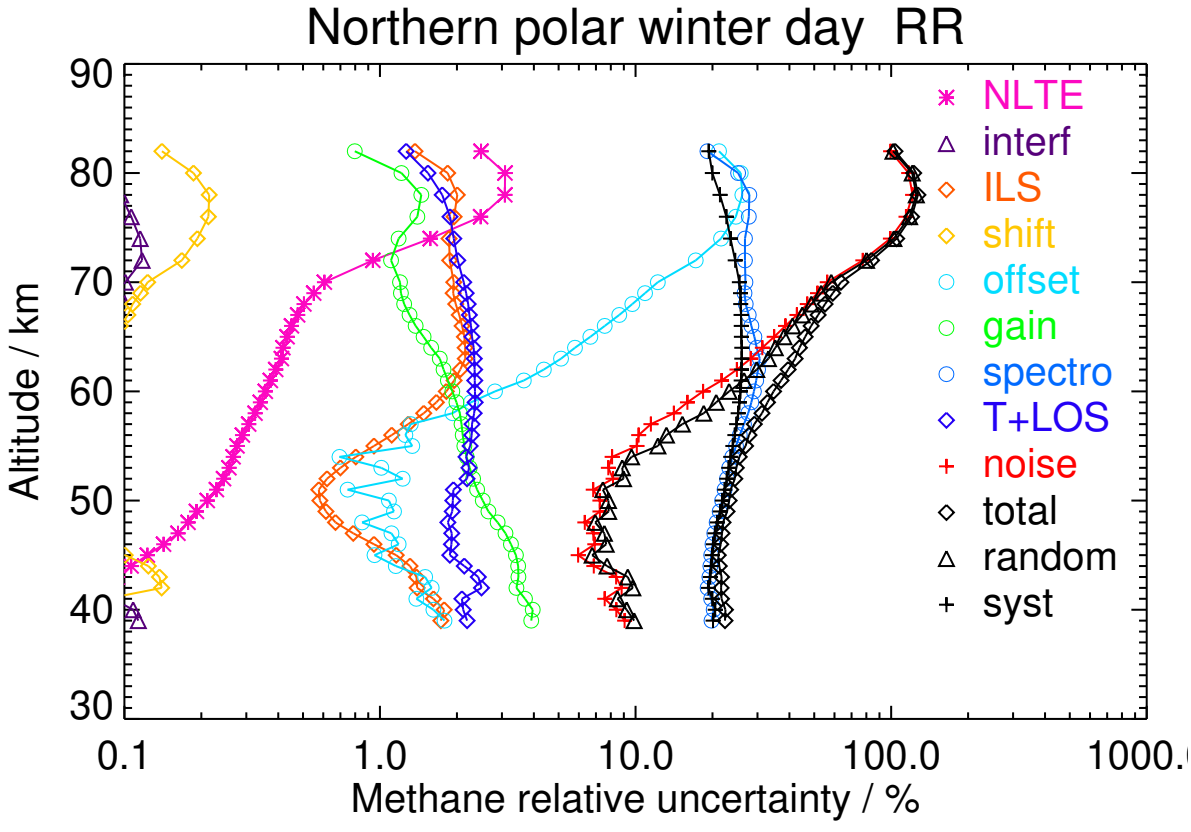

Figure S103. V8R_CH4_662 Northern polar winter day

Table S104. Methane error budget for Northern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	137.94	0.13	0.03	1.95	0.23	0.89	4.22	32.06	1.82	4.76	6.15	32.22	32.80
50	137.89	0.17	0.04	1.22	0.16	1.02	2.54	32.84	1.91	6.35	7.88	32.70	33.64
55	118.39	0.28	0.02	1.45	0.11	1.37	2.01	28.54	2.01	8.28	9.44	28.39	29.92
60	81.02	0.32	0.01	1.60	0.08	1.13	1.28	20.09	1.45	8.18	9.21	19.83	21.87
65	56.17	0.36	0.04	1.26	0.08	1.63	0.75	14.72	1.14	11.24	12.33	14.05	18.69
70	34.23	0.28	0.06	0.50	0.15	2.73	0.23	9.85	0.92	15.63	16.38	9.05	18.71
74	23.34	0.28	0.08	0.39	0.30	3.74	0.70	7.59	0.74	20.94	21.69	6.40	22.62

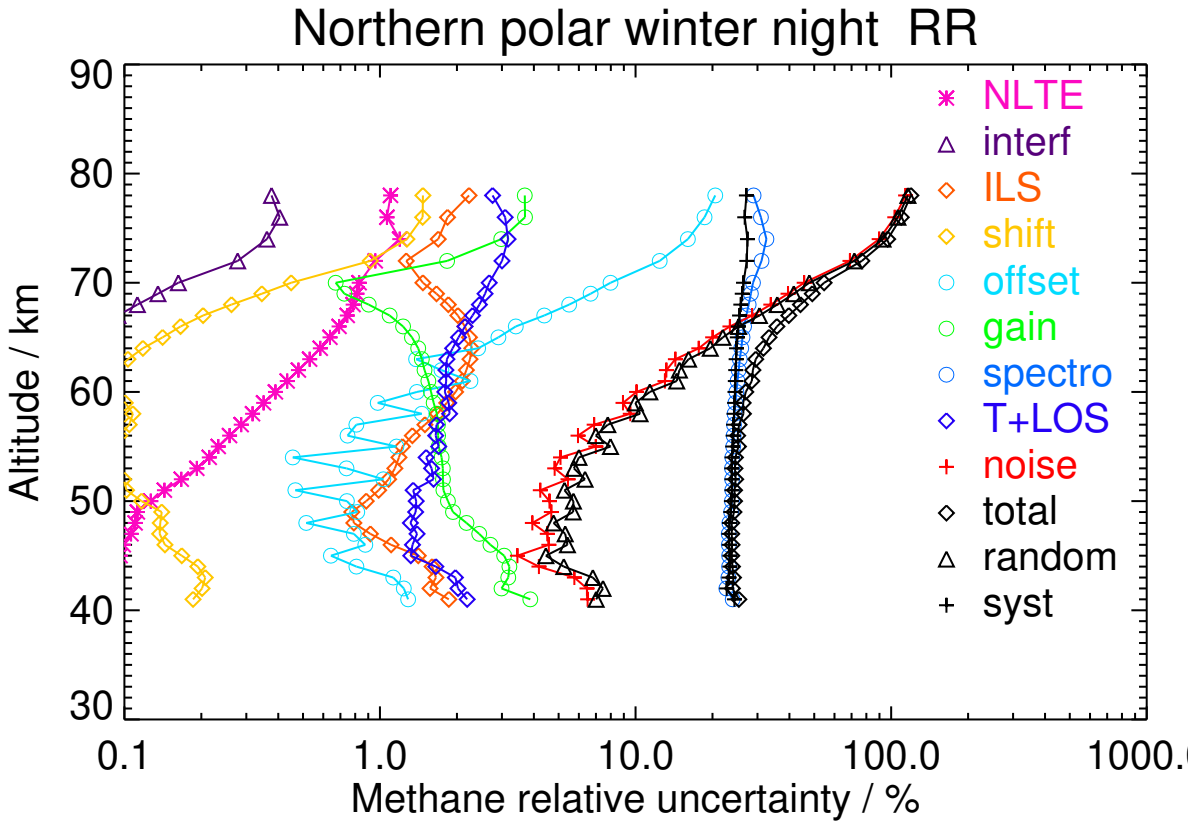

Figure S104. V8R_CH4_662 Northern polar winter night

Table S105. Methane error budget for Northern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	153.18	0.12	0.08	3.26	0.24	0.77	5.18	38.02	1.28	3.82	13.79	36.19	38.73
50	114.01	0.13	0.06	1.37	0.16	0.65	2.34	29.43	1.29	3.74	13.17	26.77	29.83
55	117.96	0.23	0.04	2.01	0.14	1.27	2.62	28.62	1.93	5.84	10.32	27.62	29.49
60	91.40	0.27	0.05	2.64	0.14	1.50	2.34	23.22	1.58	6.79	11.18	21.85	24.55
65	64.54	0.17	0.03	2.04	0.08	1.22	0.97	17.02	1.25	9.80	11.72	16.02	19.85
70	36.24	0.12	0.11	0.52	0.26	1.79	1.06	10.40	0.85	13.72	14.40	9.72	17.37
74	35.43	0.90	0.42	2.87	1.21	3.42	5.40	16.68	1.46	24.80	28.10	12.54	30.77
80	46.79	1.56	0.79	5.33	2.36	7.49	9.31	22.53	1.62	50.23	53.14	19.73	56.69
84	43.76	1.03	0.56	3.29	1.68	6.30	5.59	15.85	0.69	35.83	36.45	17.12	40.27

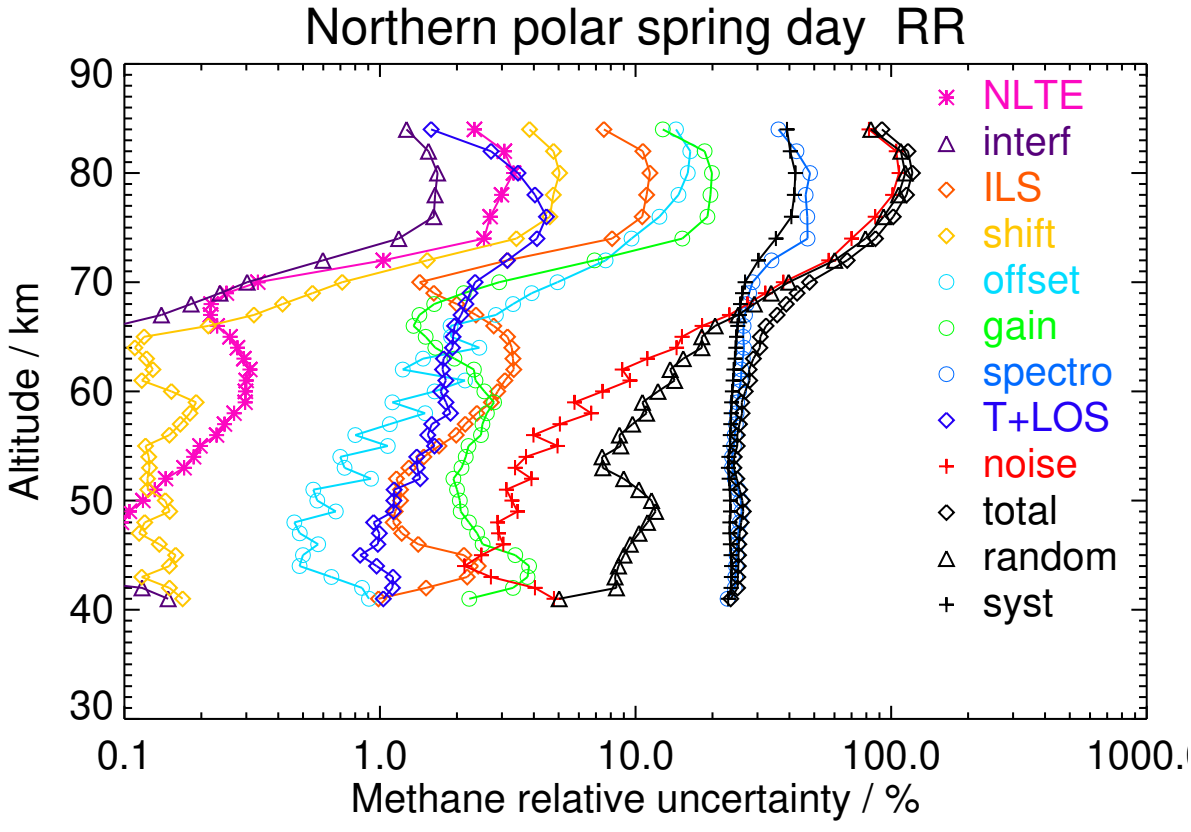

Figure S105. V8R_CH4_662 Northern polar spring day

Table S106. Methane error budget for Northern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	280.72	0.09	0.31	5.13	0.40	2.30	9.70	65.58	3.18	9.40	10.36	66.47	67.27
45	176.60	0.09	0.08	3.44	0.27	0.93	5.59	42.68	1.62	4.98	11.86	41.86	43.51
50	138.39	0.10	0.08	1.48	0.18	0.72	2.30	34.94	1.70	4.90	14.67	32.26	35.44
55	107.74	0.19	0.07	2.18	0.18	1.22	2.95	26.42	1.89	5.92	11.93	24.69	27.42
60	67.12	0.16	0.04	1.97	0.10	1.04	1.62	17.12	1.20	6.20	9.38	15.89	18.45
65	39.16	0.08	0.05	1.04	0.09	1.08	0.36	10.88	0.75	7.99	9.40	9.84	13.61
70	25.12	0.07	0.11	0.27	0.27	1.64	1.04	8.47	0.68	10.73	11.76	7.29	13.83
74	21.74	0.20	0.21	1.19	0.60	3.10	2.58	9.03	0.94	19.56	20.53	7.86	21.98
80	21.70	0.21	0.26	1.26	0.65	4.20	2.45	6.64	0.64	25.08	25.58	6.71	26.44

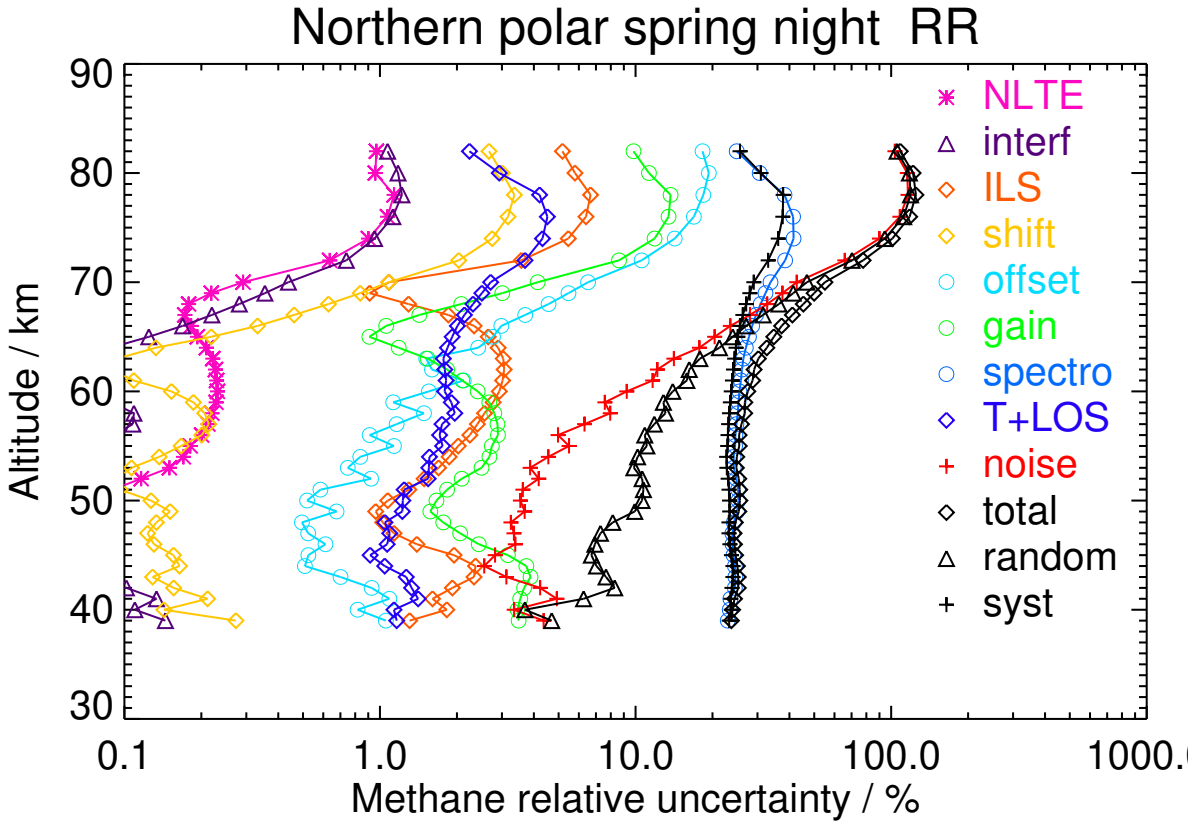

Figure S106. V8R_CH4_662 Northern polar spring night

Table S107. Methane error budget for Northern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	131.41	0.05	0.10	2.14	0.35	0.59	3.16	30.99	0.88	3.47	4.78	31.07	31.44
50	73.84	0.04	0.05	0.64	0.12	0.26	0.78	17.69	0.59	2.36	3.60	17.52	17.89
55	57.47	0.05	<0.01	0.82	0.07	0.54	0.84	13.85	0.66	2.90	4.12	13.62	14.23
60	62.94	0.09	0.03	1.21	0.13	1.02	1.11	15.28	0.89	4.31	6.21	14.76	16.02
65	80.90	0.16	0.05	2.99	0.10	1.28	1.73	21.13	1.40	8.52	12.65	19.35	23.12
70	79.15	0.21	0.12	1.33	0.22	2.97	0.98	21.90	1.72	21.87	24.28	19.57	31.18
74	63.17	0.87	0.61	4.02	1.15	2.55	4.28	21.70	0.94	32.93	34.44	20.32	39.99
80	71.77	2.60	0.93	5.08	2.73	7.71	6.40	25.07	0.59	55.52	57.28	23.91	62.07
84	65.99	3.98	1.01	4.67	3.53	8.70	7.10	24.54	0.76	61.19	63.93	20.89	67.26

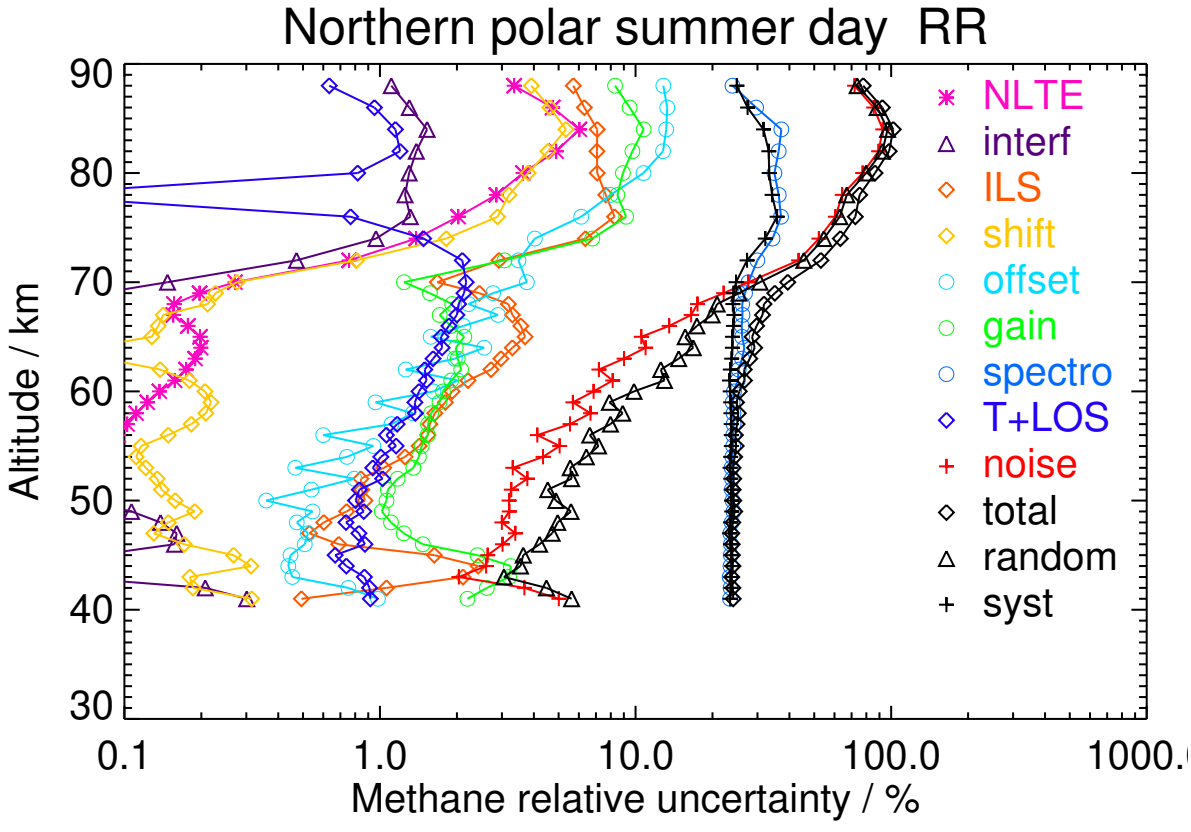

Figure S107. V8R_CH4_662 Northern polar summer day

Table S108. Methane error budget for Northern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	113.53	0.04	0.04	2.51	0.26	0.58	3.45	26.93	0.86	3.18	7.11	26.53	27.47
50	65.20	0.03	0.02	0.70	0.08	0.34	0.94	15.41	0.63	2.58	4.18	15.12	15.69
55	113.35	0.11	0.02	1.41	0.18	1.32	2.13	28.99	1.94	5.82	16.29	24.92	29.77
60	148.25	0.20	0.07	3.61	0.18	2.27	2.99	34.75	3.16	8.80	15.91	32.70	36.36
65	151.21	0.18	0.08	5.55	0.19	2.76	2.95	35.72	3.97	15.97	19.33	34.93	39.92
70	123.16	0.53	0.21	1.19	0.40	4.55	1.22	33.86	4.44	35.67	37.82	32.13	49.63
74	85.46	1.43	0.79	4.85	1.75	5.37	6.40	35.08	3.05	50.11	52.21	33.53	62.05
80	57.87	1.91	0.89	5.38	2.47	8.15	7.73	28.00	0.56	60.83	62.76	26.66	68.19
84	58.10	1.78	0.73	4.50	2.14	8.29	6.44	20.94	0.03	54.74	55.81	21.42	59.78

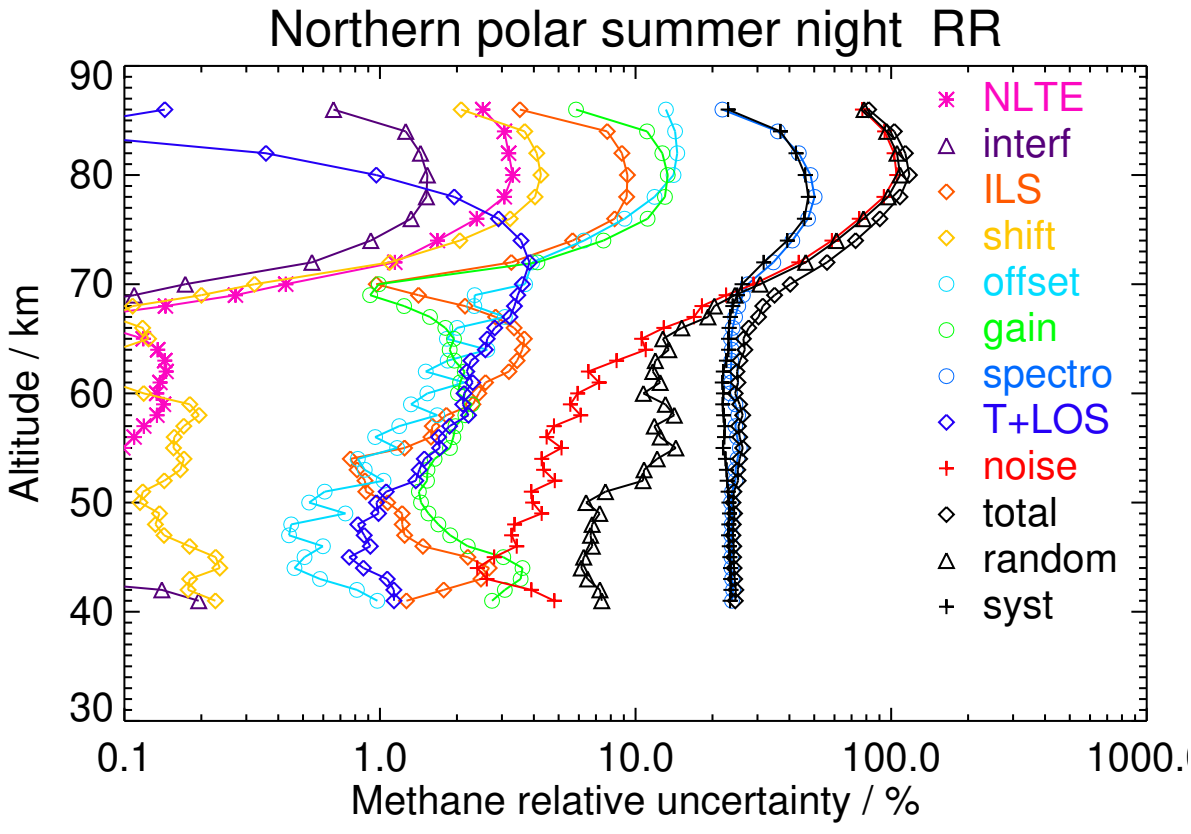

Figure S108. V8R_CH4_662 Northern polar summer night

Table S109. Methane error budget for Northern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	79.49	0.07	0.03	0.66	0.12	0.63	2.24	18.85	1.17	3.97	7.16	18.08	19.45
50	147.46	0.23	0.03	0.92	0.15	1.46	3.21	34.85	2.40	7.90	12.33	33.82	36.00
55	184.61	0.48	0.03	2.03	0.15	2.22	3.85	43.11	3.85	11.17	13.41	42.93	44.97
60	171.05	0.64	0.03	3.70	0.10	2.59	3.35	41.73	3.60	12.51	16.55	40.85	44.08
65	114.47	0.52	0.04	3.21	0.07	2.19	1.84	30.47	2.86	16.32	20.16	28.56	34.96
70	54.94	0.20	0.09	0.88	0.22	2.91	0.44	16.88	1.71	20.49	22.26	14.90	26.78
74	32.33	0.27	0.15	0.58	0.41	4.31	1.54	10.96	1.27	28.07	28.96	9.64	30.52
80	31.07	0.25	0.15	0.71	0.48	6.53	1.93	10.78	1.02	38.34	39.50	8.61	40.43

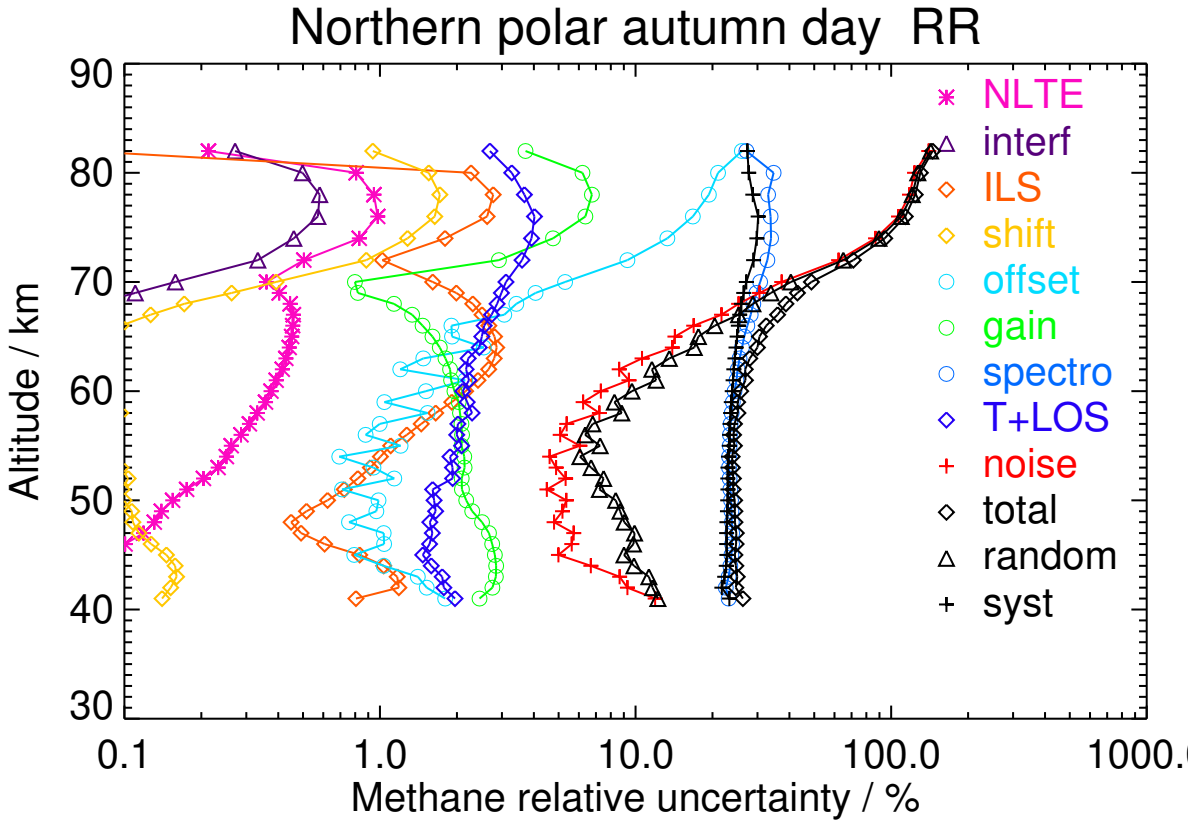

Figure S109. V8R_CH4_662 Northern polar autumn day

Table S110. Methane error budget for Northern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	156.82	0.11	0.04	1.60	0.28	1.32	4.93	36.71	2.85	7.17	10.30	36.46	37.89
50	195.53	0.23	0.05	1.79	0.22	1.75	4.39	45.34	3.52	10.22	12.70	45.13	46.88
55	133.84	0.26	0.02	1.71	0.14	1.46	2.42	33.20	2.58	8.99	13.15	32.06	34.65
60	87.90	0.29	<0.01	1.64	0.09	1.07	1.45	22.33	1.61	8.16	10.47	21.55	23.96
65	58.09	0.32	0.04	1.25	0.05	1.49	0.85	15.35	1.14	10.92	12.23	14.54	19.00
70	39.59	0.33	0.04	0.75	0.10	2.23	0.53	11.31	1.02	15.02	16.07	10.12	18.99
74	44.61	0.59	0.13	0.48	0.43	5.30	1.56	16.94	2.11	34.18	36.58	12.37	38.61
80	47.95	0.66	0.33	0.23	1.16	8.66	4.91	20.07	2.64	52.52	55.40	14.16	57.18

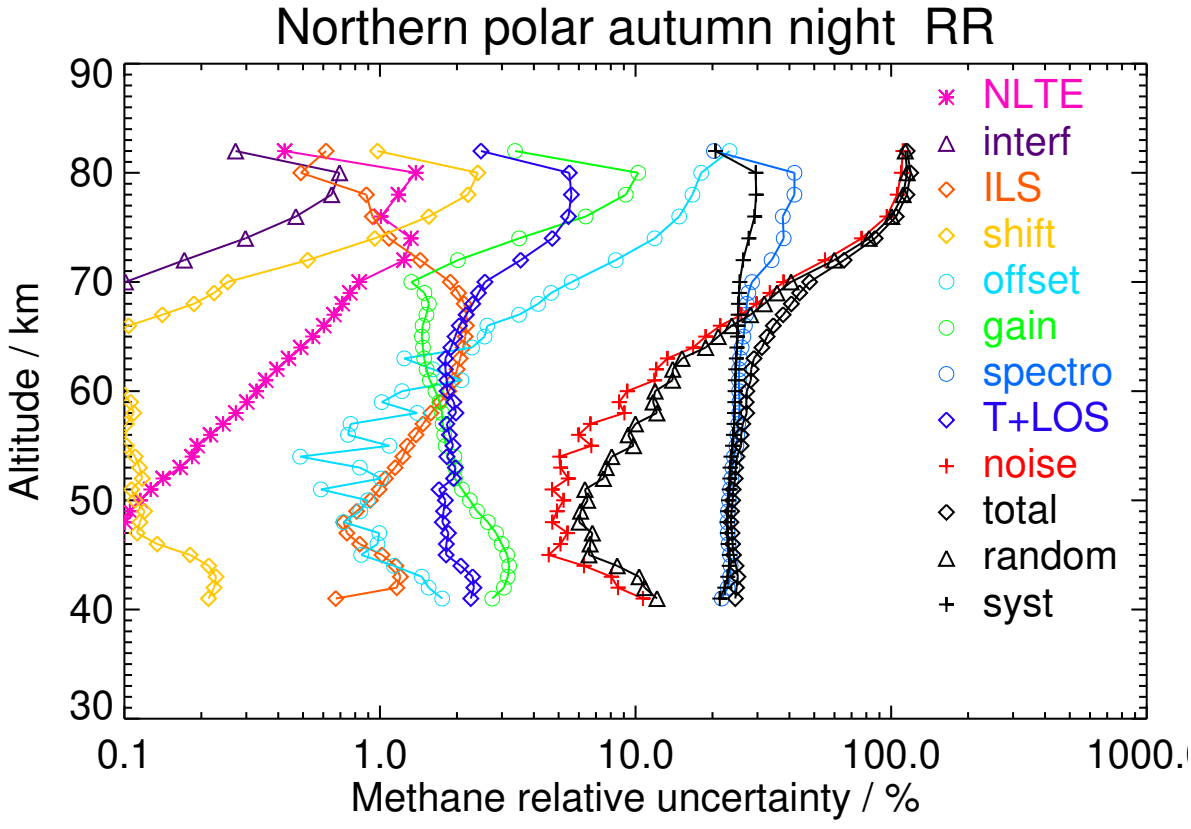

Figure S110. V8R_CH4_662 Northern polar autumn night

Table S111. Methane error budget for Northern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	419.76	0.29	0.94	5.73	0.48	4.51	14.22	90.72	5.62	18.52	25.99	90.48	94.14
45	272.34	0.27	0.31	4.17	0.34	1.56	8.35	62.88	2.83	8.51	18.32	61.55	64.22
50	171.34	0.26	0.10	1.83	0.16	1.21	3.56	39.27	2.52	6.79	9.87	38.92	40.15
55	148.16	0.39	0.09	2.30	0.17	1.95	3.89	34.45	2.97	9.03	11.24	34.28	36.08
60	118.86	0.38	0.07	2.95	0.13	1.99	3.07	29.12	2.56	9.95	13.24	28.29	31.24
65	62.82	0.14	0.05	1.84	0.13	1.75	0.79	18.07	1.56	11.69	14.92	15.82	21.75
70	30.23	0.12	0.08	0.62	0.20	2.05	0.88	9.29	0.91	12.69	13.73	8.08	15.93
74	22.17	0.28	0.15	0.76	0.37	3.47	2.23	7.31	0.96	20.81	21.51	6.51	22.48
80	24.90	0.65	0.28	1.95	0.61	5.00	5.15	11.16	1.41	29.26	30.93	9.07	32.24

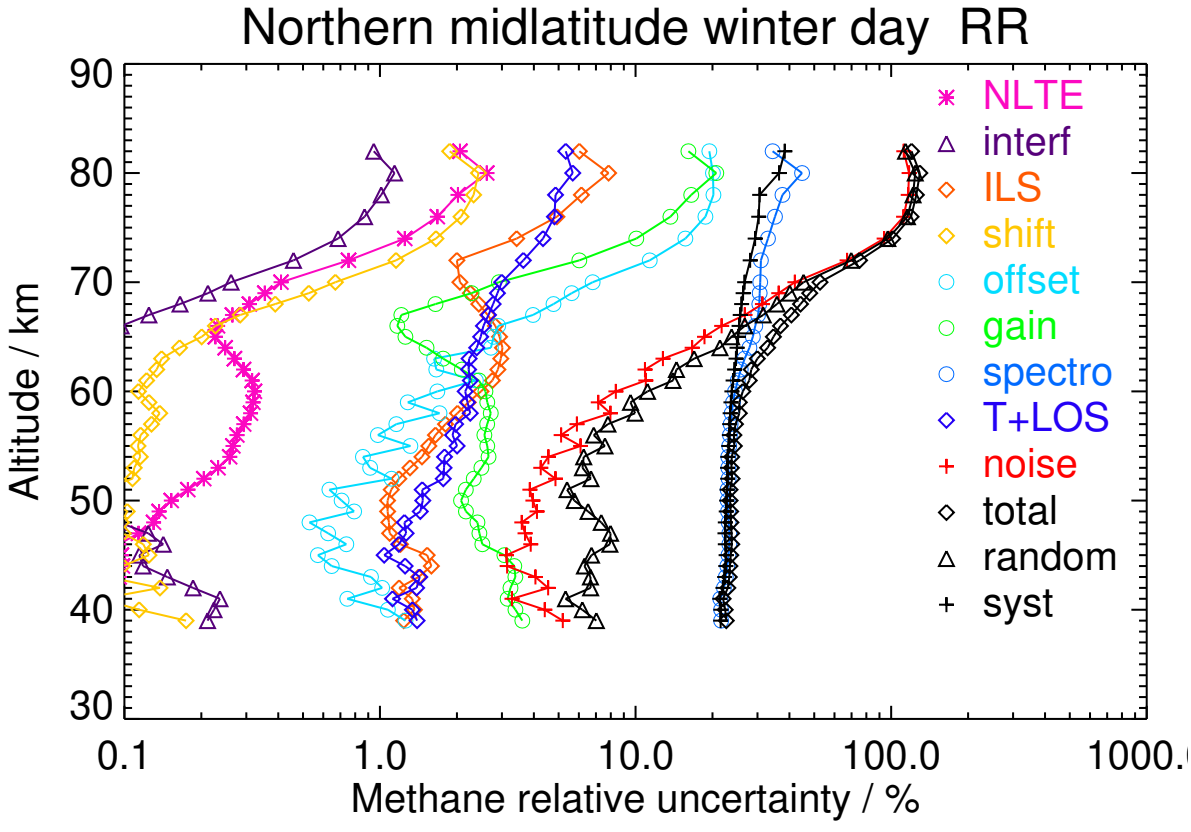

Figure S111. V8R_CH4_662 Northern midlatitude winter day

Table S112. Methane error budget for Northern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	373.77	0.25	0.70	6.94	0.53	5.57	19.56	94.52	6.77	21.65	28.26	95.46	99.56
45	270.81	0.17	0.18	4.64	0.26	2.36	12.49	69.71	4.00	10.86	26.70	66.81	71.95
50	176.91	0.18	0.09	2.36	0.18	1.74	5.77	42.77	3.16	8.76	15.23	41.54	44.24
55	162.83	0.27	0.07	2.17	0.13	2.14	4.34	37.63	3.80	11.30	13.21	37.57	39.82
60	135.06	0.28	0.05	2.66	0.13	2.11	2.66	32.69	3.35	12.87	14.73	32.36	35.56
65	86.57	0.28	0.05	2.24	0.11	2.15	1.22	22.58	2.41	16.00	17.71	21.66	27.98
70	47.16	0.25	0.08	0.92	0.17	2.96	0.95	13.35	1.61	18.92	20.02	12.20	23.44
74	34.04	0.30	0.12	0.52	0.34	4.78	1.72	11.64	1.56	28.71	30.07	9.20	31.44
80	28.80	0.70	0.04	0.71	0.16	6.20	0.87	7.81	0.77	33.81	34.71	6.30	35.28

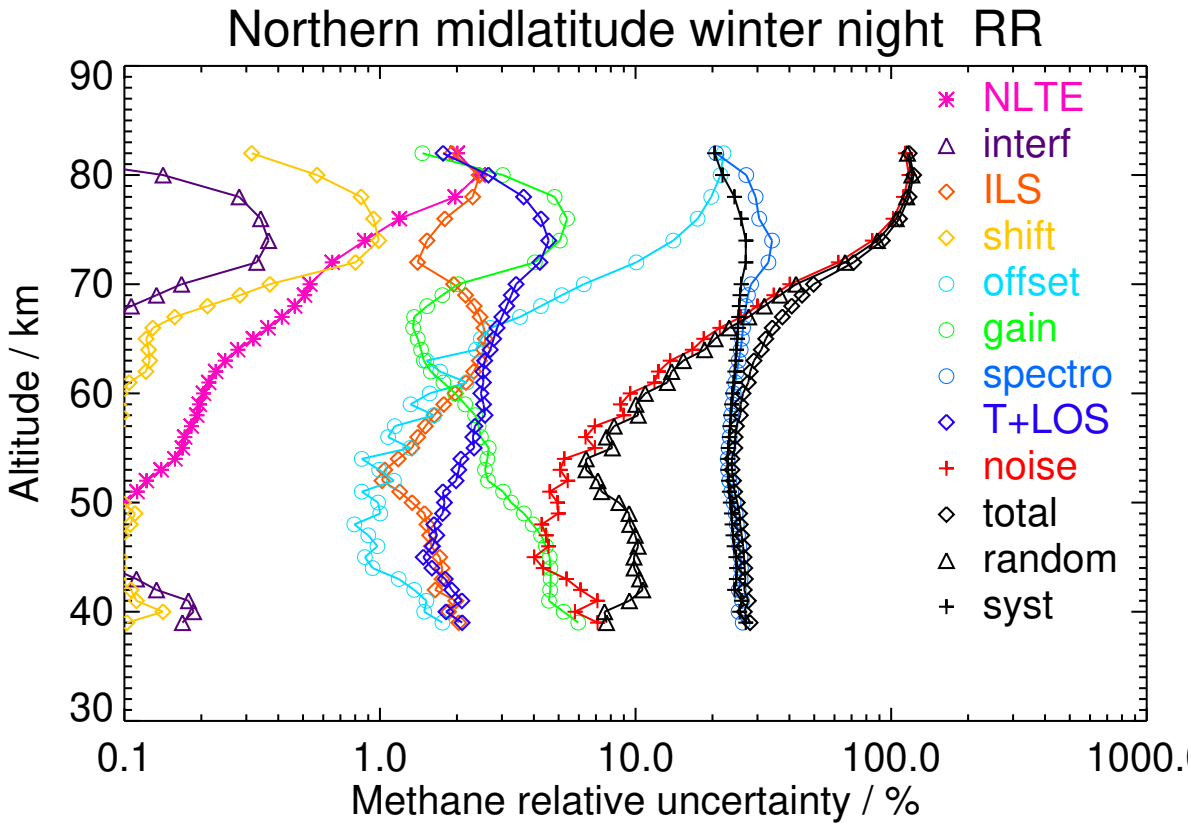

Figure S112. V8R_CH4_662 Northern midlatitude winter night

Table S113. Methane error budget for Northern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	243.88	0.30	0.23	4.75	0.32	1.58	9.93	63.36	2.48	6.60	29.41	57.65	64.72
50	192.97	0.37	0.16	3.03	0.26	1.61	6.35	47.99	2.98	6.68	21.19	44.27	49.08
55	161.77	0.45	0.12	3.50	0.29	2.11	5.46	38.10	3.43	8.05	14.88	36.79	39.69
60	113.58	0.35	0.07	3.31	0.18	2.07	3.28	27.75	2.36	8.87	12.68	26.83	29.68
65	66.72	0.14	0.03	2.03	0.07	1.25	1.00	17.53	1.40	10.47	12.23	16.61	20.63
70	39.13	0.24	0.11	0.55	0.27	1.85	1.47	11.74	1.10	14.58	15.61	10.68	18.91
74	39.67	1.12	0.33	2.42	0.89	3.93	5.56	16.96	2.10	28.06	30.82	13.57	33.67
80	58.34	4.21	1.22	9.01	3.91	9.37	19.31	36.79	3.47	59.36	69.03	26.45	73.93

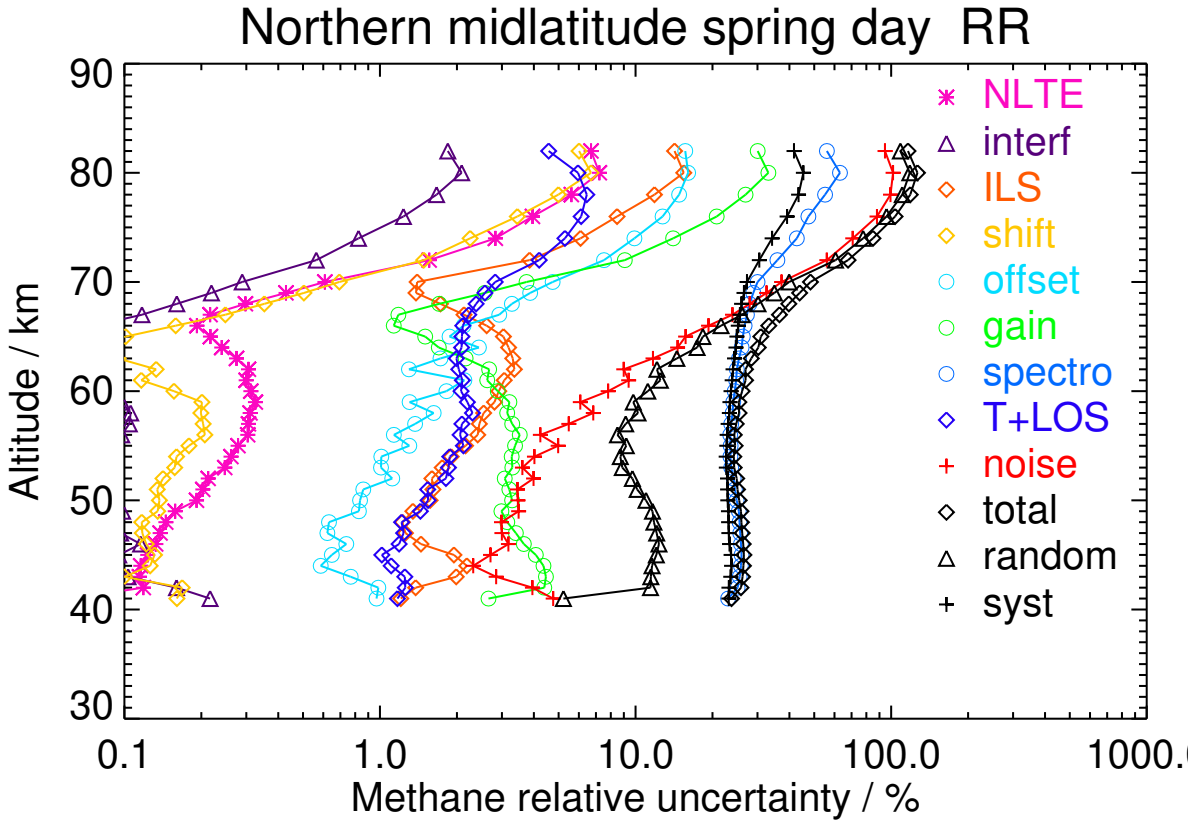

Figure S113. V8R_CH4_662 Northern midlatitude spring day

Table S114. Methane error budget for Northern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	273.44	0.11	0.28	4.18	0.30	1.45	8.84	65.15	2.52	6.91	24.48	61.62	66.30
50	238.15	0.18	0.16	2.54	0.20	1.56	5.77	55.34	3.50	7.25	19.55	52.79	56.30
55	199.23	0.34	0.20	4.78	0.45	2.80	8.12	44.46	4.92	9.58	17.03	43.59	46.80
60	141.27	0.23	0.10	4.02	0.24	2.40	4.21	32.71	3.28	9.85	13.50	32.18	34.90
65	85.77	0.09	0.06	2.36	0.16	1.81	0.98	22.41	2.18	13.04	14.98	21.50	26.21
70	38.42	0.29	0.19	0.75	0.53	2.20	2.78	13.18	1.78	15.91	16.85	12.63	21.06
74	22.22	0.41	0.26	1.75	0.77	3.01	4.21	10.22	1.77	19.86	20.80	10.01	23.08
80	22.84	0.49	0.28	2.03	0.85	4.23	4.79	9.35	1.47	25.79	26.43	10.10	28.29

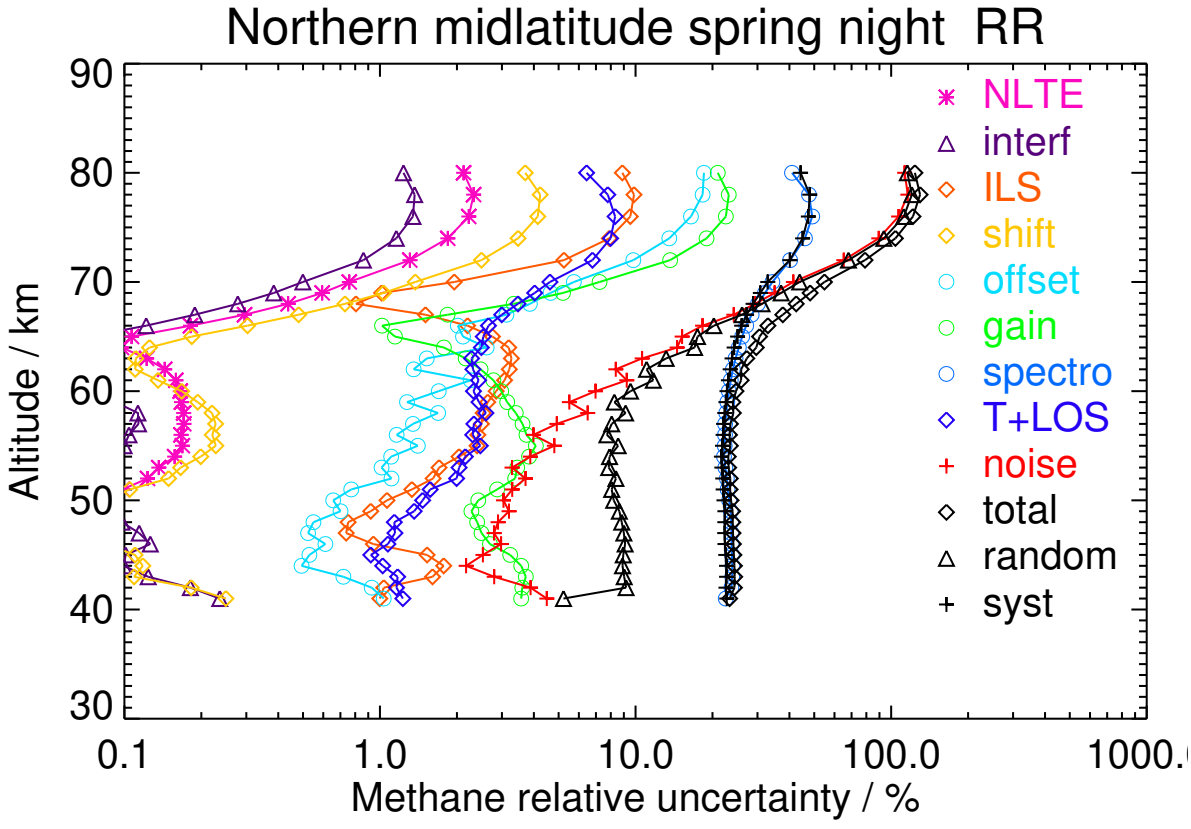

Figure S114. V8R_CH4_662 Northern midlatitude spring night

Table S115. Methane error budget for Northern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	225.10	0.19	0.20	3.79	0.37	1.24	7.94	56.65	1.99	5.77	20.15	54.03	57.67
50	152.91	0.17	0.14	1.50	0.22	0.88	3.12	39.14	1.87	5.25	17.58	35.59	39.69
55	204.97	0.44	0.07	3.50	0.42	2.71	6.21	53.56	4.47	9.43	30.14	46.13	55.10
60	171.52	0.51	0.10	4.62	0.23	3.47	4.99	42.15	4.23	11.35	19.60	39.97	44.52
65	182.12	0.49	0.08	5.40	0.19	3.89	3.98	44.55	5.16	19.68	24.90	42.89	49.59
70	122.46	0.64	0.18	1.54	0.50	4.51	2.01	32.20	3.78	34.86	36.78	30.68	47.90
74	89.54	1.88	0.38	2.33	1.13	5.54	4.91	27.68	2.35	52.07	53.56	26.06	59.57
80	80.69	9.01	0.97	5.47	3.69	9.85	12.90	41.35	0.51	71.39	79.49	29.59	84.82
84	267.44	53.86	1.65	7.40	7.69	31.95	20.89	128.25	1.19	205.00	236.93	82.54	250.89

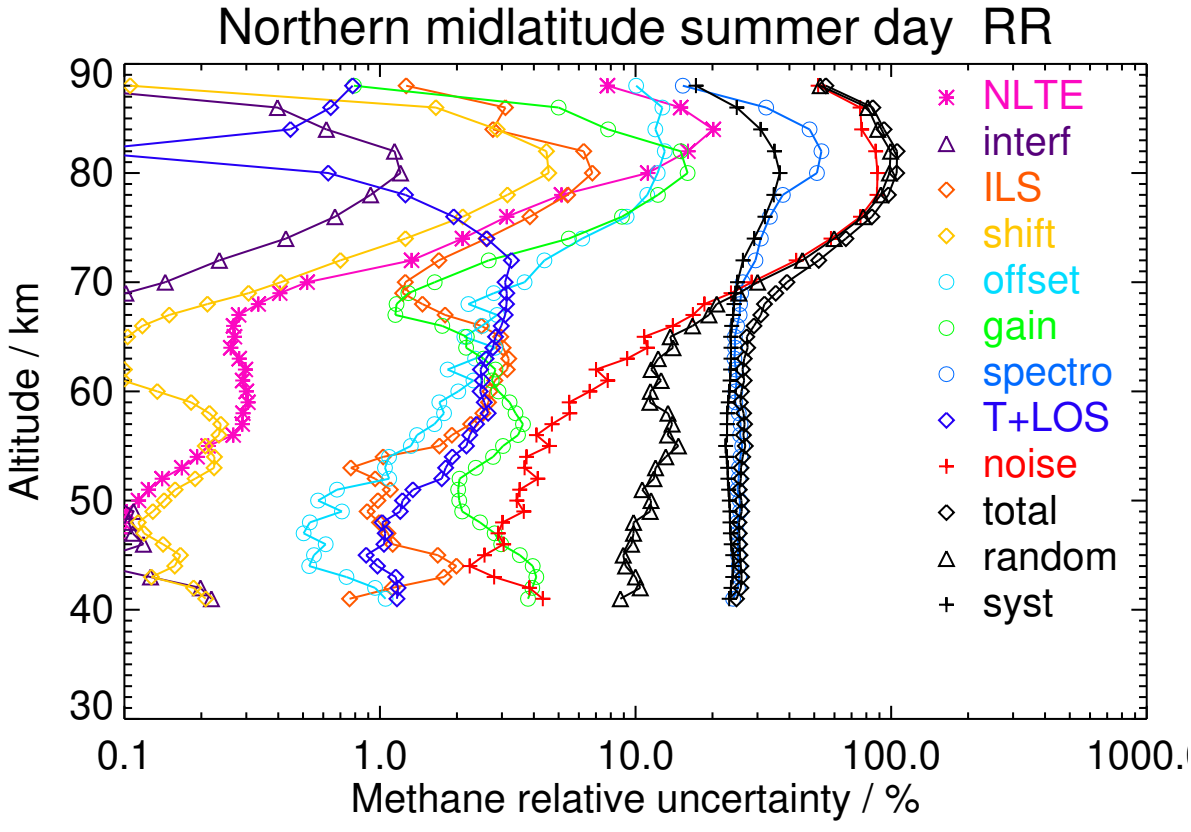

Figure S115. V8R_CH4_662 Northern midlatitude summer day

Table S116. Methane error budget for Northern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	210.43	0.08	0.23	2.86	0.24	1.20	6.50	50.81	1.84	5.45	20.28	47.49	51.64
50	187.37	0.13	0.15	1.88	0.25	1.23	4.74	48.56	2.56	6.36	26.23	41.76	49.32
55	229.78	0.22	0.14	4.27	0.52	3.15	7.72	56.86	5.39	10.89	32.76	48.95	58.90
60	267.65	0.22	0.15	7.58	0.33	5.26	7.85	59.97	7.69	16.66	27.58	57.61	63.87
65	177.66	0.34	0.07	5.78	0.19	3.70	3.80	43.37	6.04	20.95	26.86	41.19	49.18
70	166.03	1.39	0.36	2.42	1.00	5.56	4.35	48.12	7.48	47.20	50.73	45.65	68.25
74	101.77	2.32	0.61	4.15	1.91	6.56	7.33	38.45	4.43	61.30	63.71	36.33	73.34
80	69.70	2.61	0.42	2.43	1.83	10.91	5.29	25.74	0.70	76.75	78.61	23.18	81.95
84	52.67	1.74	0.33	2.20	1.53	8.48	4.01	17.92	0.02	51.89	53.85	14.57	55.79

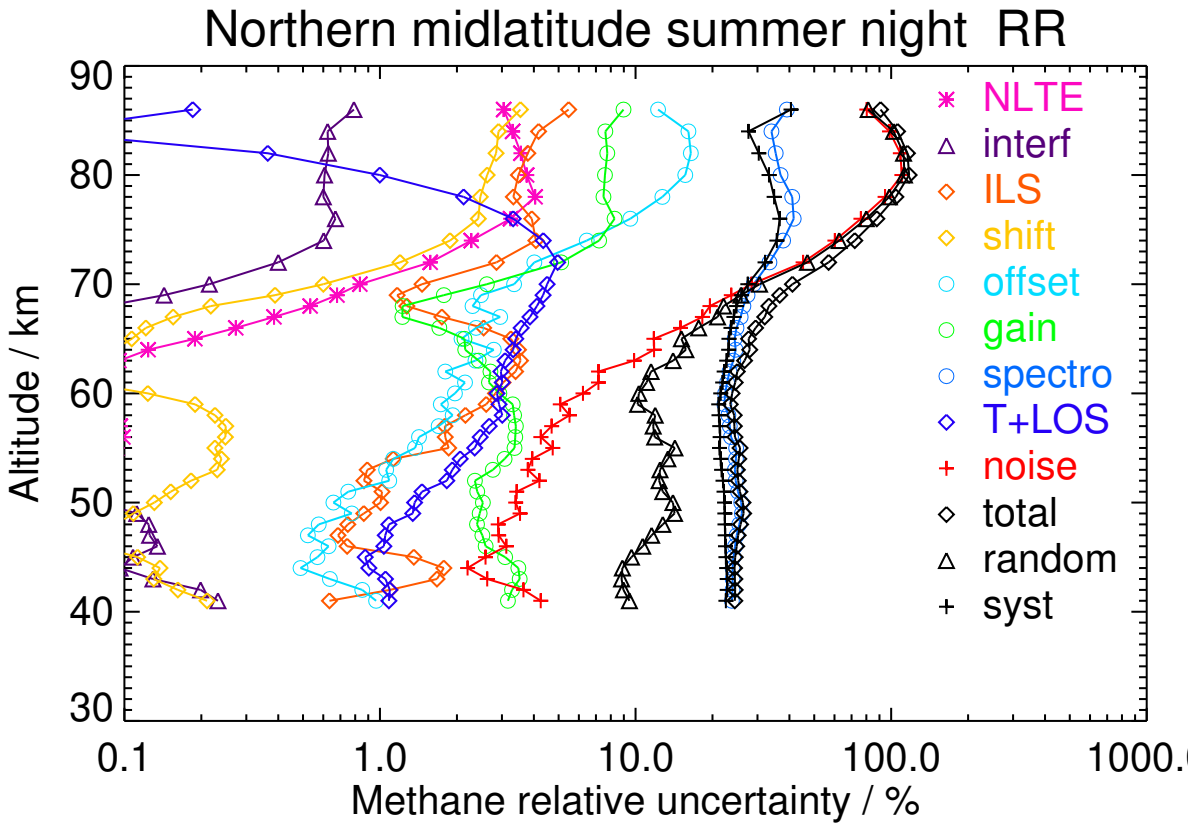

Figure S116. V8R_CH4_662 Northern midlatitude summer night

Table S117. Methane error budget for Northern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	336.01	0.33	0.41	4.00	0.24	2.20	11.77	82.28	3.80	10.07	35.88	75.88	83.94
50	307.42	0.44	0.28	1.96	0.33	2.09	6.36	70.97	4.98	12.29	23.93	68.48	72.54
55	281.79	0.88	0.13	4.11	0.35	3.98	8.82	62.45	7.57	15.19	20.07	62.42	65.57
60	224.75	0.81	0.10	5.99	0.21	4.61	6.57	51.58	6.28	16.43	20.20	51.60	55.41
65	174.78	0.46	0.03	4.72	0.11	3.25	3.26	44.31	5.82	21.78	27.23	42.11	50.15
70	92.54	0.60	0.16	1.10	0.44	3.80	2.57	26.90	4.24	29.93	32.35	24.78	40.75
74	60.61	1.57	0.37	2.77	1.08	6.00	7.33	25.07	4.39	45.03	48.63	20.29	52.70
80	39.69	1.45	0.32	2.47	0.98	6.94	6.91	15.86	2.88	44.16	45.90	14.45	48.12

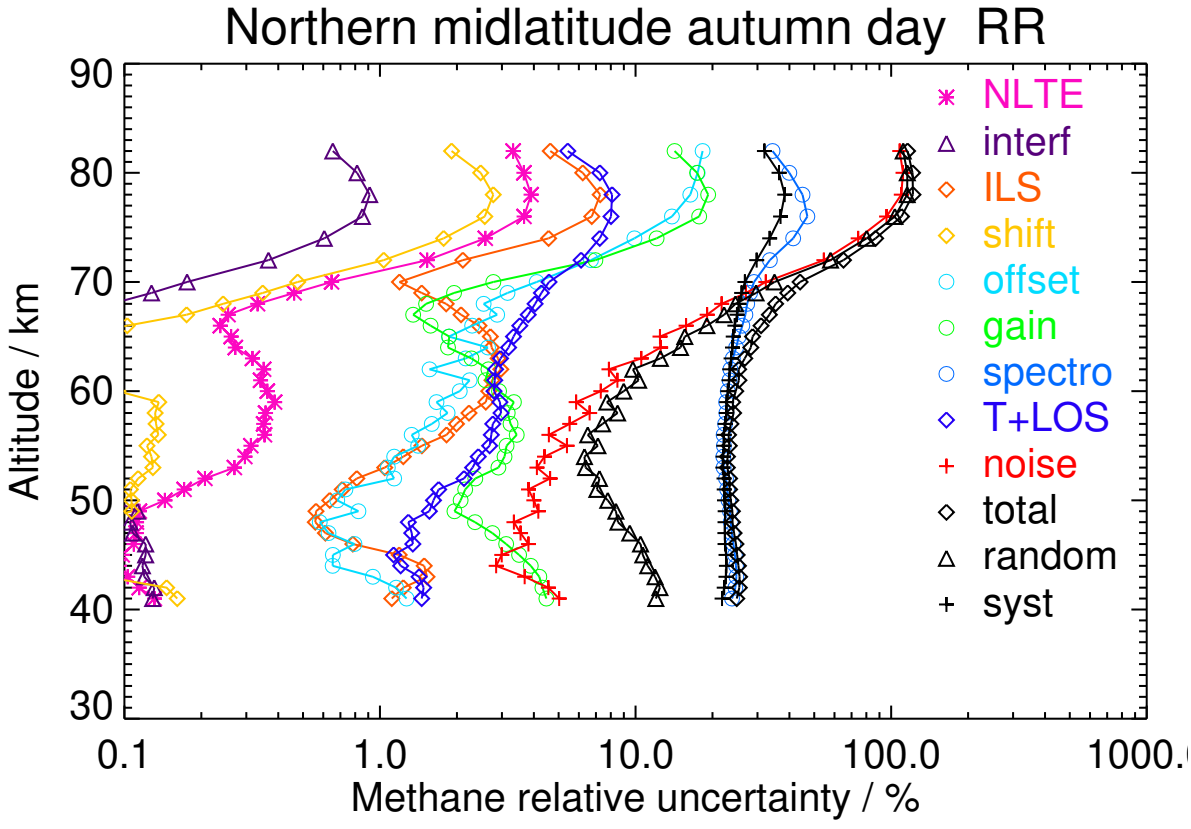

Figure S117. V8R_CH4_662 Northern midlatitude autumn day

Table S118. Methane error budget for Northern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	292.10	0.14	0.36	4.54	0.29	1.91	11.64	79.59	3.38	9.10	42.19	69.35	81.17
50	238.08	0.22	0.16	2.52	0.21	2.02	6.60	57.32	4.15	10.11	23.00	54.13	58.81
55	248.39	0.40	0.09	3.86	0.28	3.35	7.55	56.23	6.41	13.97	21.65	54.88	59.00
60	224.82	0.46	0.10	5.88	0.20	4.09	6.28	51.80	6.60	16.17	22.81	50.58	55.49
65	166.73	0.28	0.06	5.16	0.20	3.53	3.26	42.54	5.65	21.92	27.81	39.98	48.70
70	87.17	0.60	0.21	1.63	0.57	3.55	3.39	27.21	4.10	29.20	32.35	24.31	40.46
74	56.11	1.32	0.39	2.84	1.24	5.95	7.59	26.64	4.28	43.14	48.04	19.65	51.90
80	47.98	1.12	0.26	1.46	0.82	8.39	4.93	17.15	2.83	54.55	56.09	15.18	58.11

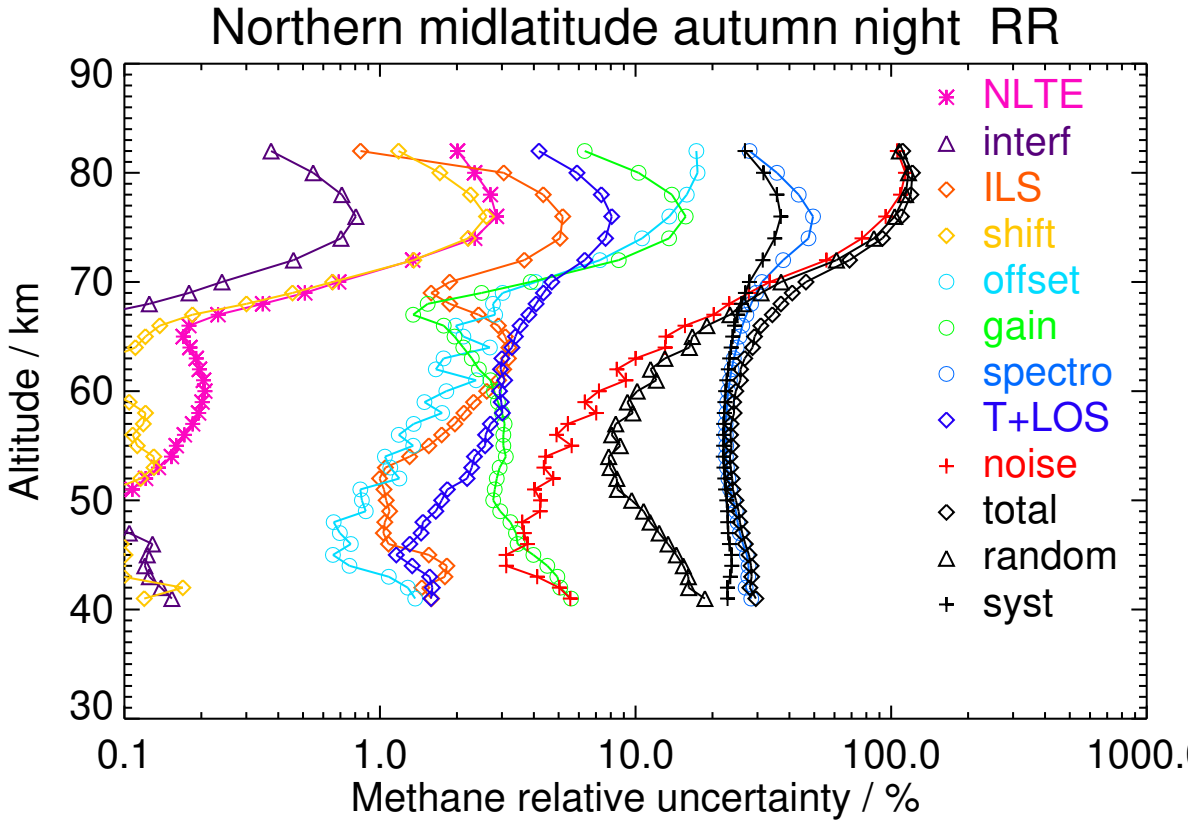

Figure S118. V8R_CH4_662 Northern midlatitude autumn night

Table S119. Methane error budget for Tropics day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	627.43	0.59	0.81	3.34	2.05	6.44	24.02	144.60	6.44	31.18	42.56	144.04	150.19
45	436.54	0.30	0.70	6.01	0.65	2.33	12.80	101.75	3.98	12.63	23.45	100.92	103.60
50	291.63	0.47	0.24	3.87	0.35	2.17	8.32	66.49	4.60	9.24	17.05	65.78	67.95
55	205.94	0.56	0.17	4.66	0.46	2.84	7.70	46.09	4.84	9.36	13.90	46.17	48.21
60	167.68	0.49	0.13	4.82	0.30	3.26	5.32	38.23	4.15	11.29	13.48	38.56	40.85
65	138.44	0.30	0.05	4.23	0.15	2.86	2.86	33.10	3.71	17.20	18.44	33.16	37.94
70	97.84	0.67	0.17	0.91	0.46	3.54	2.10	26.49	4.07	28.27	29.79	25.47	39.19
74	71.28	2.01	0.46	3.15	1.42	5.93	7.88	27.26	5.30	47.66	50.65	24.31	56.18
80	32.59	1.11	0.28	1.83	0.90	4.57	5.13	11.35	1.82	31.07	32.08	11.01	33.91

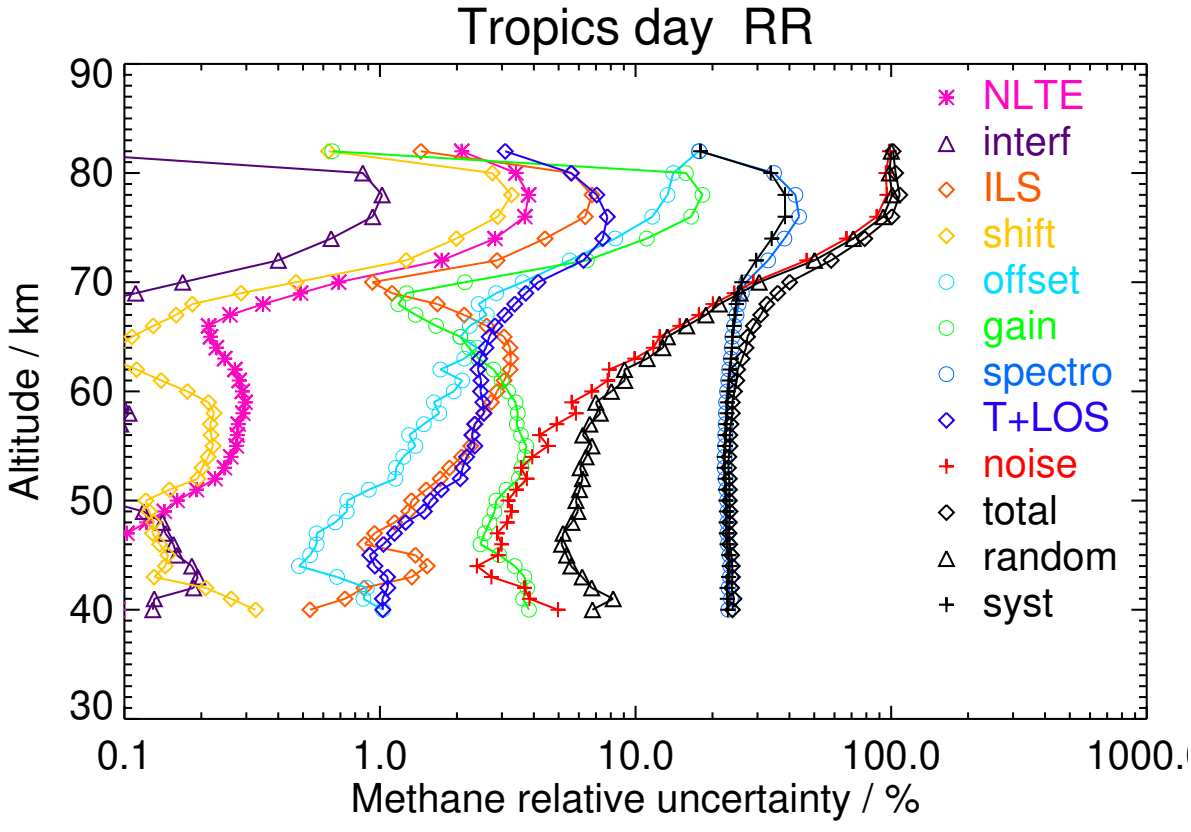

Figure S119. V8R_CH4_662 Tropics day

Table S120. Methane error budget for Tropics night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	448.73	0.16	0.49	7.13	0.60	2.31	14.66	104.99	4.29	12.36	21.46	104.90	107.07
50	299.31	0.21	0.19	4.30	0.31	2.30	8.50	68.57	4.93	9.23	16.91	67.98	70.05
55	217.17	0.23	0.15	5.24	0.41	2.97	7.84	48.96	5.22	10.21	14.35	49.19	51.25
60	172.74	0.15	0.10	5.26	0.23	2.85	4.97	39.57	4.20	10.59	12.96	39.85	41.91
65	143.97	0.24	0.04	4.68	0.17	3.40	2.79	34.72	4.38	18.71	20.88	34.35	40.20
70	100.77	1.18	0.45	2.98	1.27	3.61	7.50	31.09	5.33	31.58	33.72	30.61	45.54
74	67.07	2.22	0.81	5.89	2.81	6.19	13.79	32.10	6.96	48.20	52.49	30.38	60.65
80	73.01	3.79	0.40	1.32	1.80	10.54	6.70	26.08	7.08	71.80	73.87	24.60	77.85

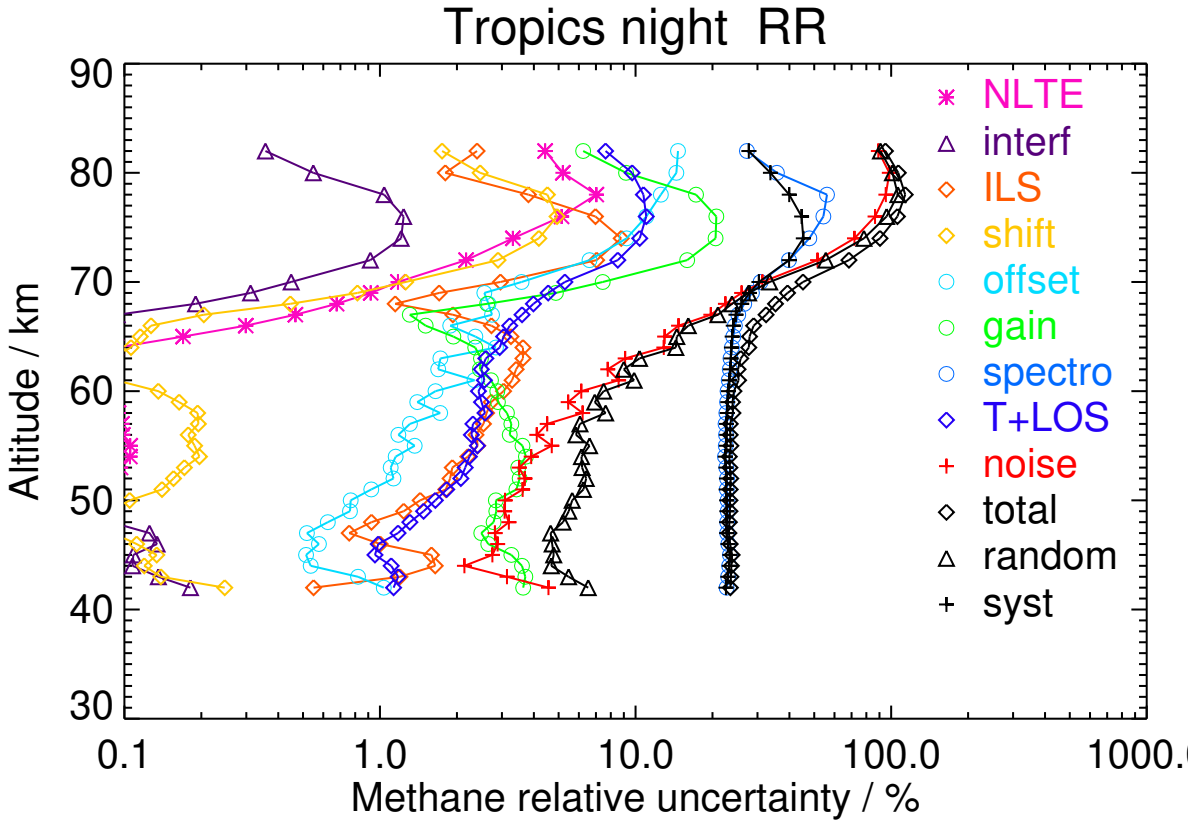

Figure S120. V8R_CH4_662 Tropics night

Table S121. Methane error budget for Southern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	182.34	0.20	0.07	2.49	0.22	1.06	6.14	41.93	2.15	5.29	13.63	40.62	42.85
50	196.97	0.33	0.08	1.69	0.22	1.70	4.62	45.34	3.03	8.38	14.30	44.25	46.50
55	178.21	0.57	0.09	2.70	0.24	2.16	5.16	39.92	4.02	10.85	14.00	39.63	42.03
60	160.29	0.56	0.06	3.34	0.14	2.04	3.50	37.35	3.95	12.53	15.21	36.94	39.95
65	116.28	0.43	0.06	2.98	0.17	2.90	1.89	28.95	3.17	18.99	20.68	28.32	35.07
70	68.55	0.34	0.13	0.99	0.39	3.30	1.57	20.32	2.45	25.17	26.69	18.84	32.67
74	45.67	0.61	0.28	1.71	1.08	5.50	3.77	19.37	2.07	38.05	40.36	15.73	43.32
80	39.15	0.68	0.29	2.34	1.17	7.02	4.27	15.01	1.42	43.43	44.90	13.13	46.78

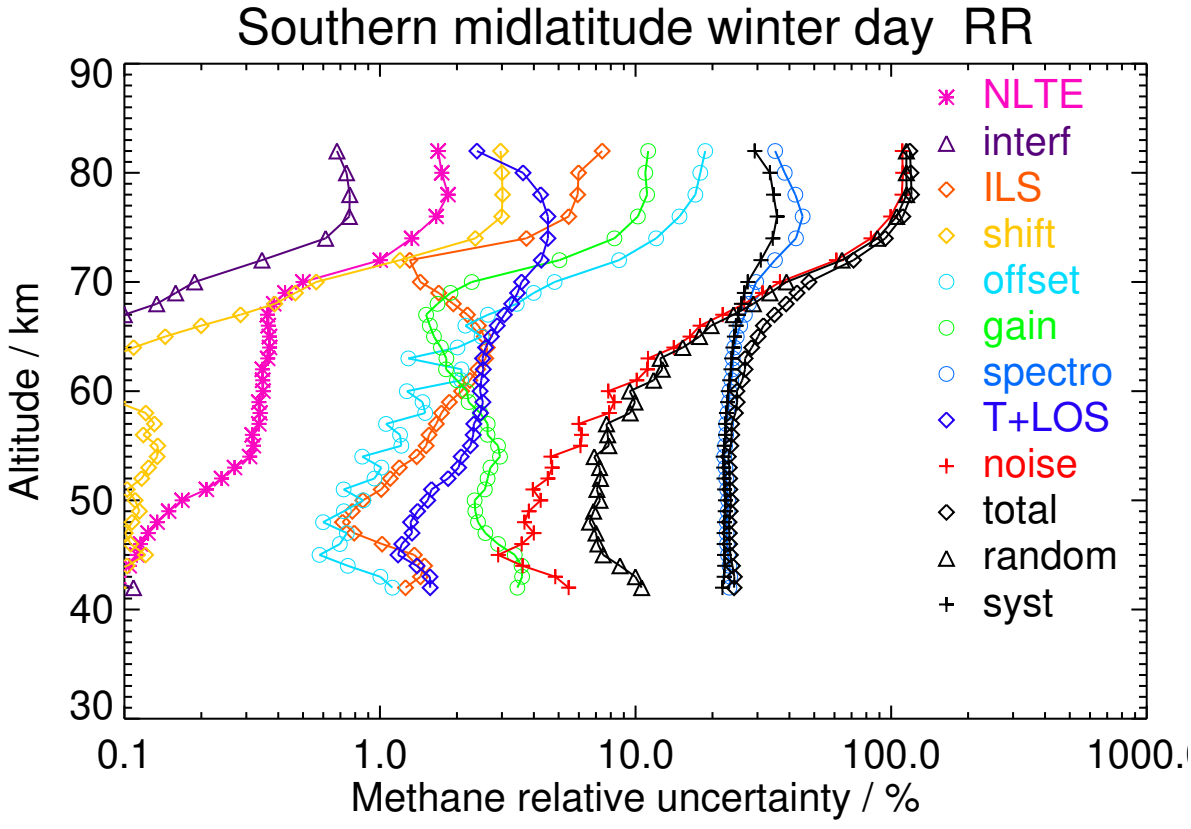

Figure S121. V8R_CH4_662 Southern midlatitude winter day

Table S122. Methane error budget for Southern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	196.32	0.15	0.09	2.56	0.26	1.37	7.42	47.53	2.56	6.53	13.16	46.89	48.70
50	213.24	0.26	0.08	2.21	0.22	1.90	6.46	51.43	3.73	9.19	16.82	50.11	52.86
55	180.54	0.36	0.09	2.65	0.19	2.40	5.37	43.61	4.28	11.69	16.04	42.92	45.81
60	153.37	0.41	0.05	3.45	0.13	2.15	3.30	38.02	3.55	12.18	14.92	37.56	40.42
65	122.64	0.40	0.09	2.85	0.26	2.65	1.62	32.84	3.57	19.75	23.13	31.05	38.72
70	79.87	0.44	0.18	1.13	0.56	3.79	2.77	22.20	3.27	28.62	30.23	20.81	36.70
74	49.61	0.40	0.28	1.21	0.89	6.11	4.59	16.06	2.76	43.17	44.70	13.86	46.80
80	39.48	0.42	0.27	1.53	0.83	6.25	4.67	11.59	1.85	41.86	42.86	10.83	44.21

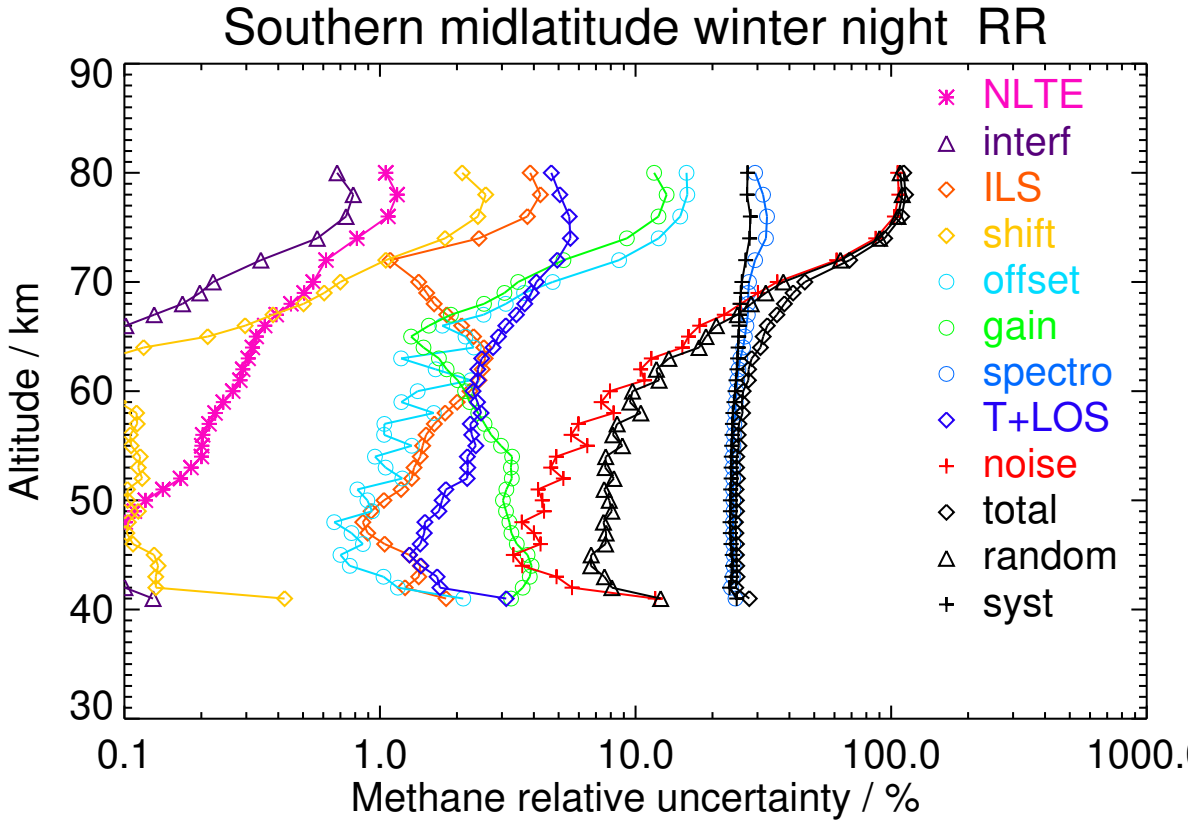

Figure S122. V8R_CH4_662 Southern midlatitude winter night

Table S123. Methane error budget for Southern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	259.98	0.24	0.20	3.45	0.29	1.41	8.25	60.03	2.64	6.68	10.49	60.23	61.13
50	268.95	0.36	0.20	2.37	0.30	2.05	5.96	61.74	4.09	9.70	13.44	61.54	63.00
55	240.91	0.66	0.09	4.04	0.34	2.95	6.93	53.10	5.47	10.86	14.26	53.27	55.15
60	212.68	0.76	0.14	5.99	0.33	3.28	6.30	47.15	5.42	11.86	15.03	47.48	49.80
65	161.49	0.43	0.03	5.19	0.17	3.71	2.87	38.74	4.28	19.97	21.91	38.56	44.35
70	86.61	0.50	0.17	0.99	0.50	2.92	2.33	25.54	3.09	26.94	28.58	24.21	37.46
74	47.01	1.08	0.35	3.16	1.13	4.94	6.47	19.04	3.04	37.19	38.68	18.36	42.82
80	30.08	0.94	0.31	3.04	1.17	4.96	5.77	13.29	1.88	33.23	34.33	13.24	36.80

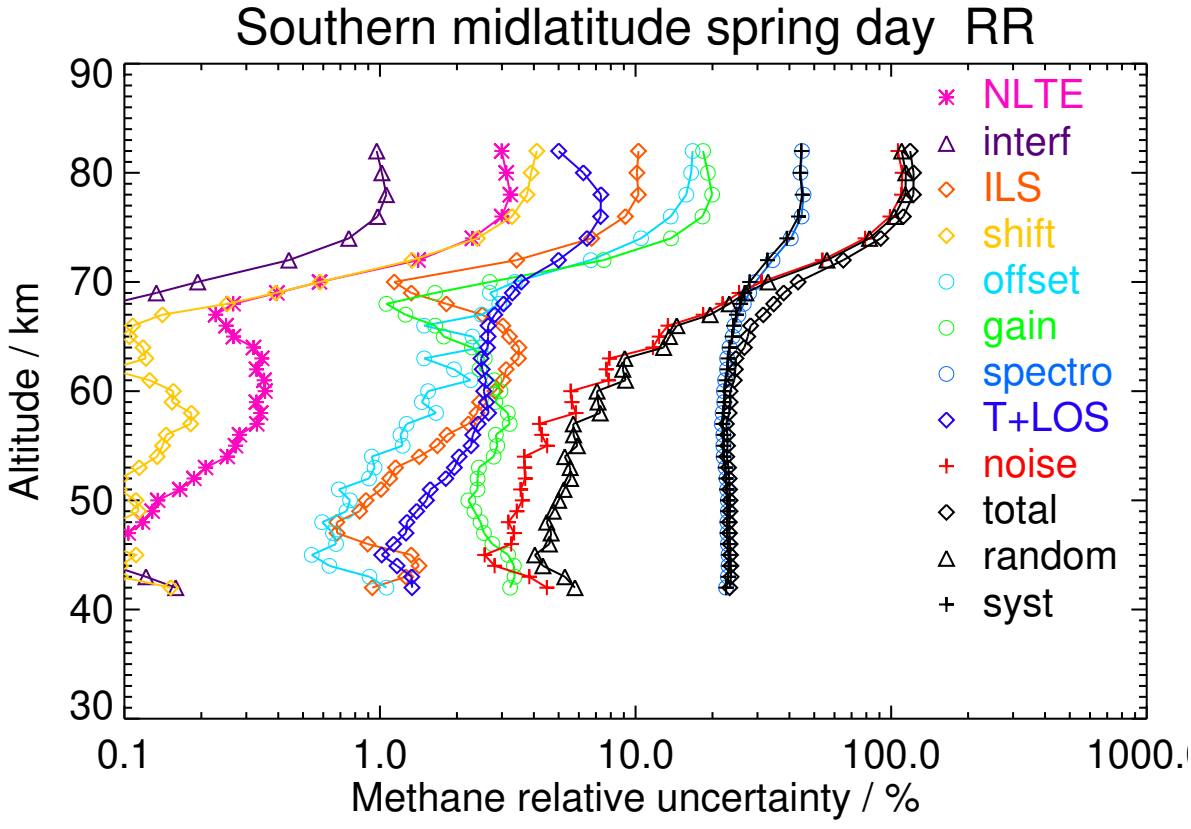

Figure S123. V8R_CH4_662 Southern midlatitude spring day

Table S124. Methane error budget for Southern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	259.80	0.12	0.16	3.75	0.30	1.38	8.61	60.65	2.57	6.45	9.21	61.09	61.78
50	255.33	0.19	0.19	2.43	0.28	1.75	5.74	58.31	3.76	8.57	11.89	58.21	59.41
55	242.55	0.39	0.12	4.69	0.37	3.13	7.63	53.82	5.87	11.36	14.39	54.25	56.13
60	214.41	0.42	0.15	6.63	0.31	3.59	6.51	48.13	5.80	12.50	15.29	48.71	51.05
65	164.63	0.25	0.05	5.85	0.21	3.56	3.25	40.29	5.07	19.49	22.87	39.54	45.68
70	87.21	0.55	0.20	0.96	0.57	3.07	2.70	26.24	3.82	27.89	30.23	24.20	38.72
74	52.86	0.97	0.39	3.41	1.17	4.98	6.71	21.54	3.96	38.79	41.07	19.53	45.48
80	43.07	1.89	0.50	4.78	1.94	6.53	8.94	22.24	3.08	44.79	48.36	18.02	51.61
84	32.51	0.76	0.27	2.79	1.10	5.81	4.96	13.03	1.21	33.28	33.84	14.20	36.70

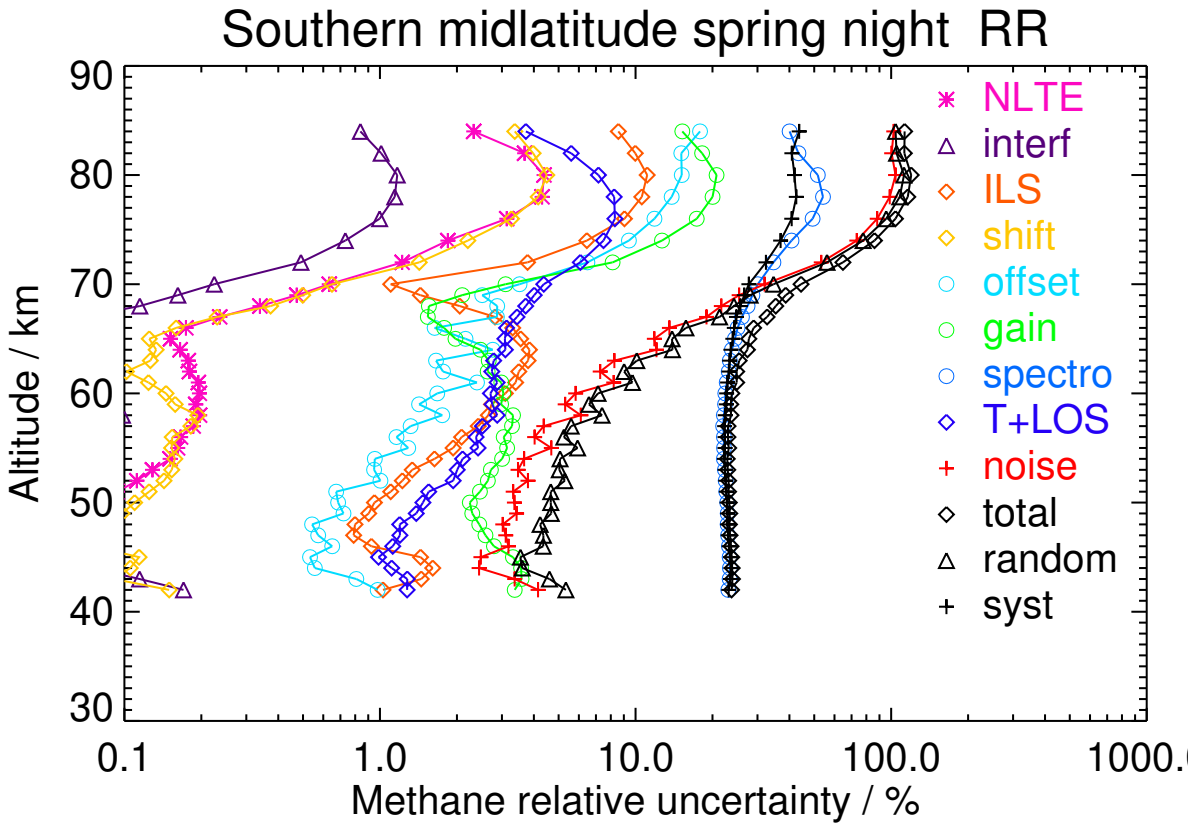

Figure S124. V8R_CH4_662 Southern midlatitude spring night

Table S125. Methane error budget for Southern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	198.69	0.17	0.14	4.56	0.41	1.13	7.06	47.16	1.69	5.41	16.69	45.27	48.25
50	123.92	0.13	0.07	1.75	0.13	0.77	2.57	30.44	1.41	3.92	12.28	28.35	30.89
55	135.50	0.27	0.04	1.78	0.29	1.75	3.44	35.27	2.50	5.74	19.73	30.20	36.07
60	169.67	0.50	0.16	5.74	0.34	2.89	5.49	40.10	3.85	8.83	19.70	37.22	42.11
65	127.84	0.25	0.03	4.31	0.12	3.25	2.16	31.42	3.21	15.84	18.81	30.47	35.81
70	107.57	0.52	0.10	1.34	0.33	3.37	1.42	28.28	3.15	29.16	30.86	26.90	40.94
74	99.09	1.98	0.48	3.21	1.35	6.42	4.94	34.12	2.62	51.47	54.27	30.93	62.46
80	70.50	3.95	1.01	6.74	3.28	9.25	10.68	35.51	0.10	68.03	71.57	32.24	78.50
84	67.55	4.31	0.93	5.89	3.24	10.34	9.31	29.23	0.22	67.93	70.85	26.58	75.68

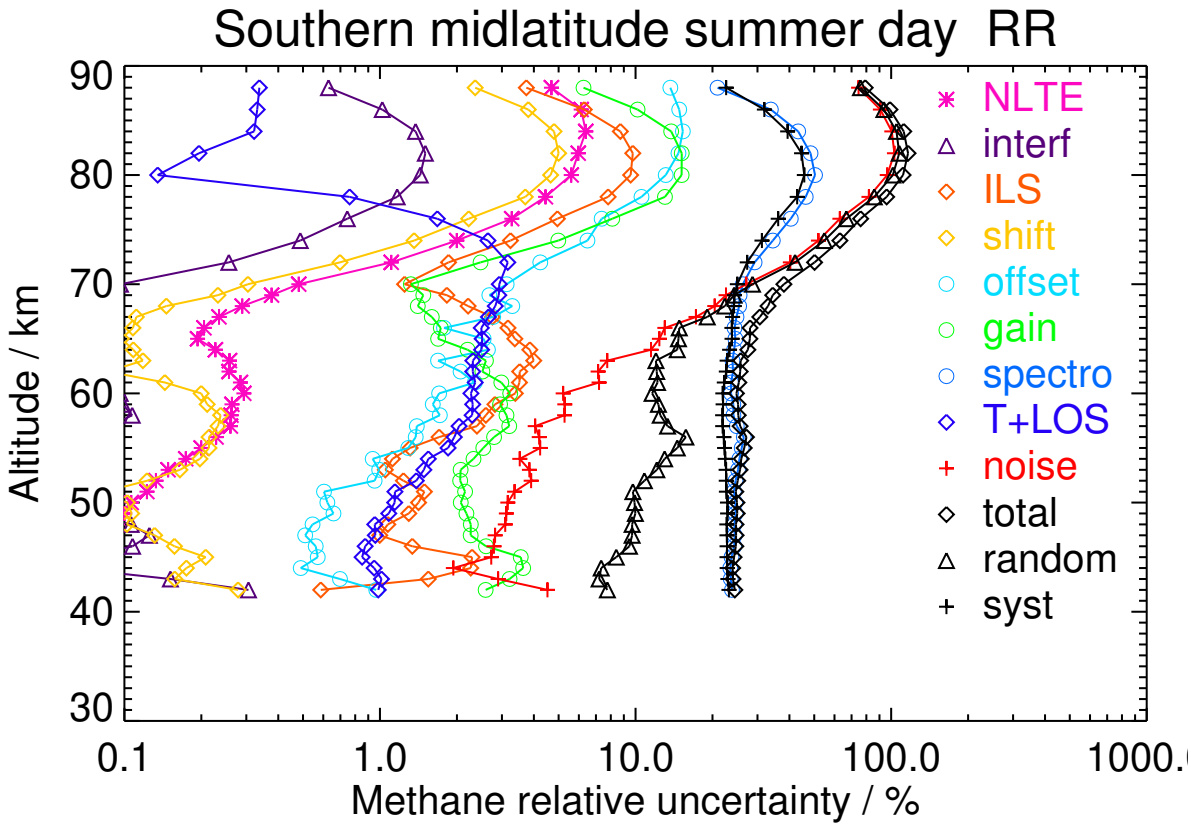

Figure S125. V8R_CH4_662 Southern midlatitude summer day

Table S126. Methane error budget for Southern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	270.33	0.12	0.23	5.11	0.49	1.59	10.54	70.26	2.51	7.08	32.11	64.04	71.64
50	203.45	0.19	0.10	3.54	0.61	2.12	8.56	57.30	3.28	6.54	34.61	47.23	58.55
55	172.78	0.19	0.15	4.33	0.54	2.84	7.92	44.71	4.20	8.02	25.41	39.05	46.59
60	173.15	0.14	0.13	5.35	0.29	3.10	5.49	41.06	4.51	10.18	16.99	39.87	43.34
65	171.62	0.23	0.06	5.76	0.21	4.30	3.19	42.86	5.48	21.06	25.80	41.31	48.70
70	126.19	0.93	0.27	1.66	0.65	3.77	2.96	35.02	5.36	35.64	38.61	32.59	50.52
74	101.08	2.35	0.63	3.67	1.73	6.89	7.17	35.16	4.24	57.88	61.37	30.97	68.74
80	60.11	2.65	0.48	2.43	1.56	10.00	6.05	20.75	0.39	66.53	68.24	18.78	70.77
84	56.49	2.41	0.35	1.82	1.23	10.04	4.19	14.80	0.05	58.88	60.08	14.32	61.77

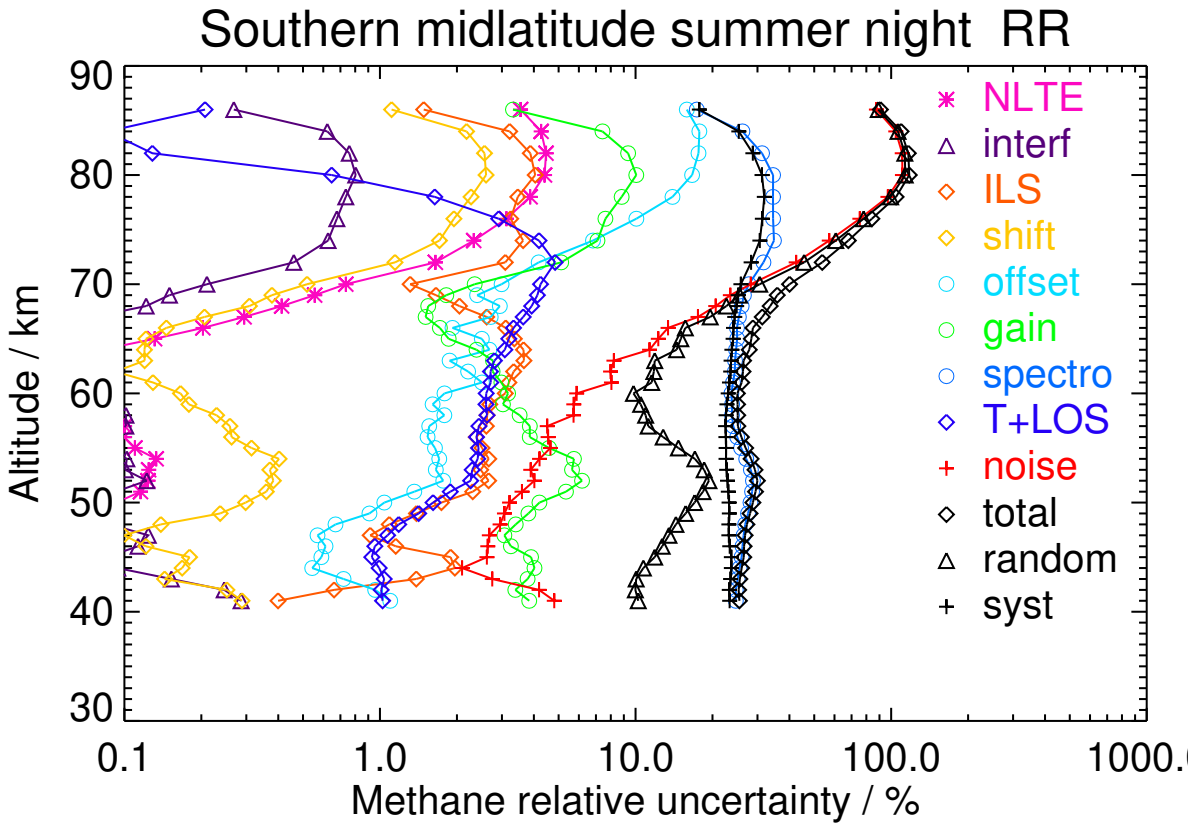

Figure S126. V8R_CH4_662 Southern midlatitude summer night

Table S127. Methane error budget for Southern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	278.41	0.40	0.21	4.31	0.30	2.10	13.10	75.98	3.85	9.18	40.45	66.56	77.89
50	283.39	0.60	0.14	2.50	0.30	3.03	8.77	67.98	5.54	13.70	26.66	64.98	70.24
55	279.14	1.02	0.12	3.43	0.26	3.79	9.69	62.59	7.91	15.36	21.65	62.20	65.86
60	226.95	0.89	0.10	4.90	0.21	3.21	6.68	52.78	7.19	16.29	21.07	52.33	56.41
65	116.73	0.36	0.05	3.46	0.14	3.10	2.10	31.33	3.67	18.90	22.93	29.19	37.12
70	45.43	0.23	0.08	1.09	0.19	2.57	1.52	13.05	1.53	17.55	18.71	11.86	22.15
74	32.08	0.67	0.16	1.27	0.45	4.22	3.57	12.55	1.60	27.61	29.46	9.35	30.90
80	36.76	1.10	0.30	3.09	1.06	6.22	6.92	14.58	2.75	39.81	41.21	14.31	43.63

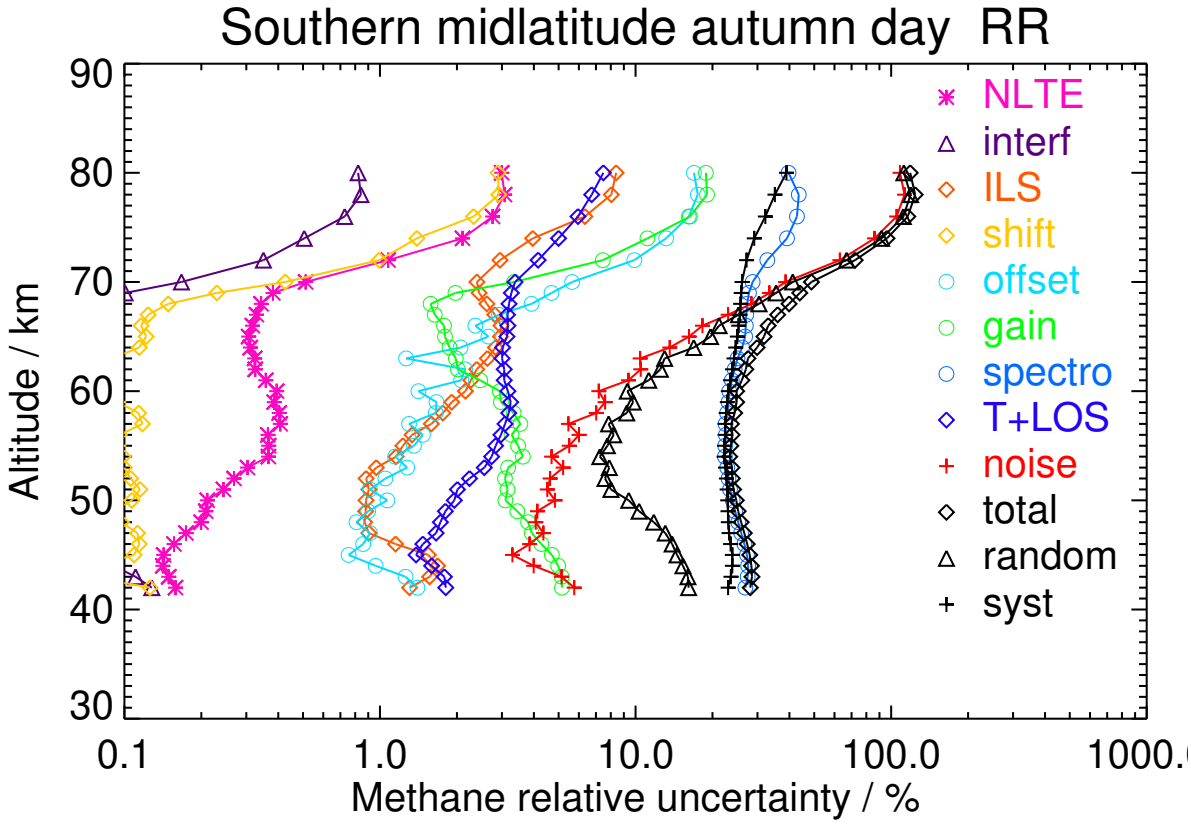

Figure S127. V8R_CH4_662 Southern midlatitude autumn day

Table S128. Methane error budget for Southern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	402.04	0.18	0.36	5.55	0.31	2.35	15.07	96.15	4.70	11.10	38.02	90.60	98.25
50	349.56	0.28	0.20	2.71	0.27	3.16	9.21	79.22	6.48	14.37	25.32	77.36	81.40
55	309.98	0.53	0.17	4.97	0.32	4.61	11.72	67.57	9.64	17.51	22.66	68.08	71.76
60	256.62	0.41	0.15	6.54	0.24	4.20	8.17	58.18	9.20	18.84	23.51	58.30	62.86
65	142.44	0.35	0.11	3.81	0.30	3.60	2.08	37.51	5.20	23.27	26.92	35.81	44.80
70	55.90	0.24	0.09	1.04	0.22	3.09	1.51	16.02	2.41	21.81	22.87	15.11	27.41
74	35.53	0.48	0.21	1.54	0.59	4.69	4.37	13.08	2.39	30.97	32.61	10.79	34.35
80	34.40	0.75	0.32	2.57	0.94	5.86	7.39	11.85	2.91	35.86	37.41	11.50	39.14

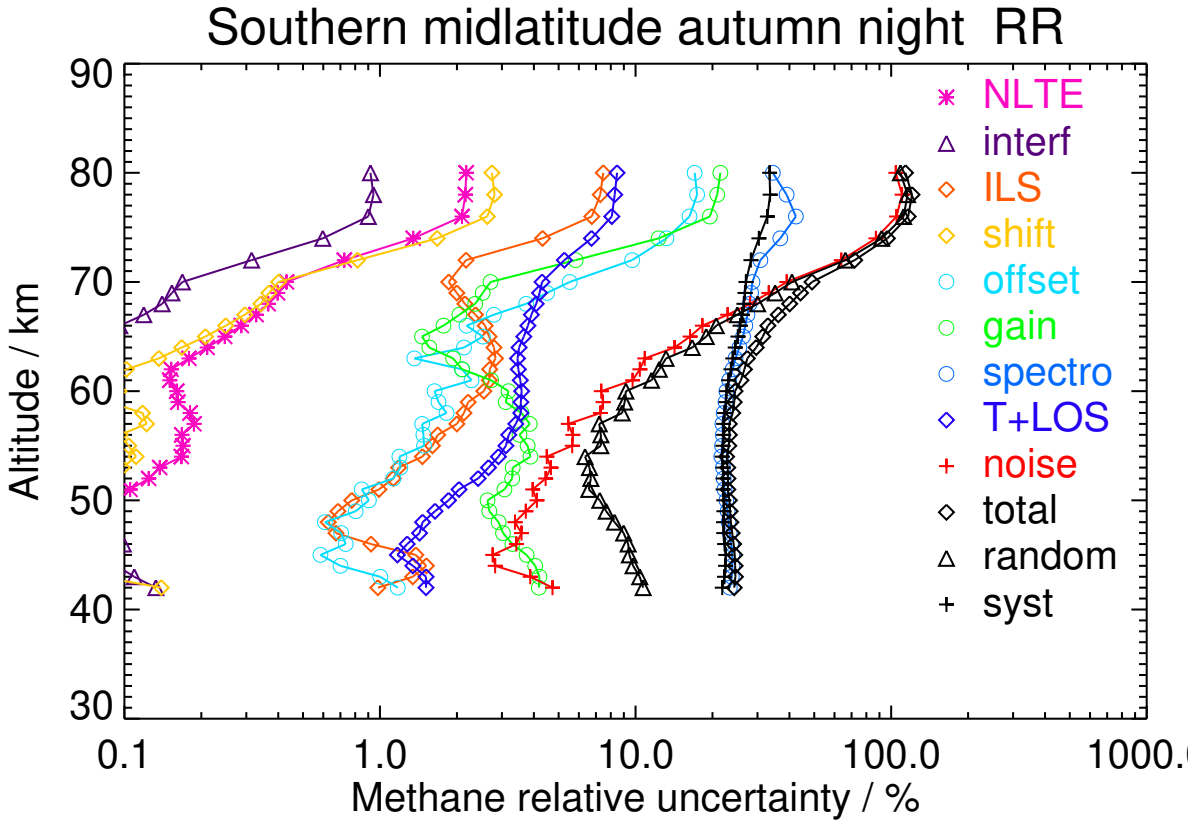

Figure S128. V8R_CH4_662 Southern midlatitude autumn night

Table S129. Methane error budget for Southern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	193.76	0.22	0.06	2.83	0.35	1.06	5.59	44.49	2.32	4.93	9.30	44.31	45.27
50	169.96	0.25	0.07	2.16	0.26	1.17	3.49	40.01	2.28	6.09	8.86	39.79	40.77
55	141.22	0.40	0.06	2.40	0.24	1.17	3.13	32.43	2.19	6.96	9.17	32.22	33.50
60	115.10	0.44	0.04	2.78	0.14	1.05	2.13	27.25	2.05	8.59	10.44	26.92	28.88
65	81.13	0.42	0.03	2.19	0.10	2.05	1.20	20.32	1.58	14.16	15.36	19.77	25.03
70	50.40	0.22	0.11	0.68	0.45	2.69	1.26	15.84	1.33	19.59	20.80	14.61	25.42
74	48.05	0.50	0.32	2.42	1.36	5.19	4.16	24.27	2.04	36.90	40.97	18.13	44.80
80	246.35	15.84	2.27	10.07	10.04	21.90	22.02	186.94	12.69	165.95	232.11	100.97	253.12
84	258.41	7.28	0.40	1.82	1.94	29.27	3.08	65.18	9.23	210.90	213.13	65.68	223.02

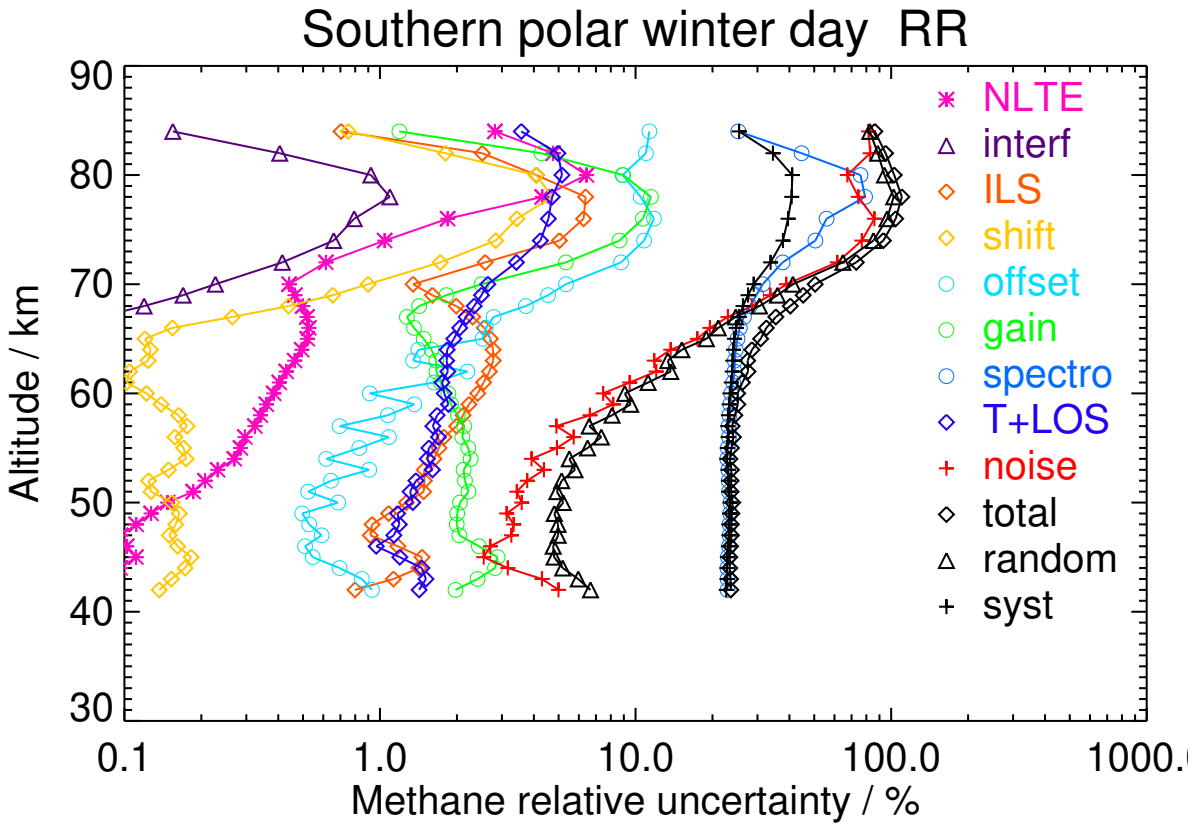

Figure S129. V8R_CH4_662 Southern polar winter day

Table S130. Methane error budget for Southern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	127.15	0.15	0.03	1.68	0.21	0.71	3.43	29.31	1.64	3.92	5.75	29.32	29.87
50	121.24	0.18	0.04	1.07	0.13	1.00	2.42	29.32	1.70	6.13	8.42	28.94	30.14
55	98.79	0.27	0.02	1.34	0.10	0.96	1.77	24.72	1.50	7.04	9.75	23.95	25.86
60	80.83	0.38	0.02	1.75	0.09	0.87	1.37	20.59	1.35	8.01	9.85	19.96	22.26
65	52.59	0.40	0.04	1.19	0.05	1.51	0.75	14.42	1.03	10.96	12.40	13.42	18.27
70	39.28	0.41	0.08	0.44	0.29	2.73	0.45	12.40	1.08	16.94	18.25	10.82	21.21
74	34.07	0.47	0.15	0.72	0.60	5.03	1.18	12.48	1.30	31.36	32.66	10.11	34.19
80	25.49	0.27	0.06	0.07	0.23	4.86	0.46	5.59	0.82	27.62	28.06	5.62	28.61

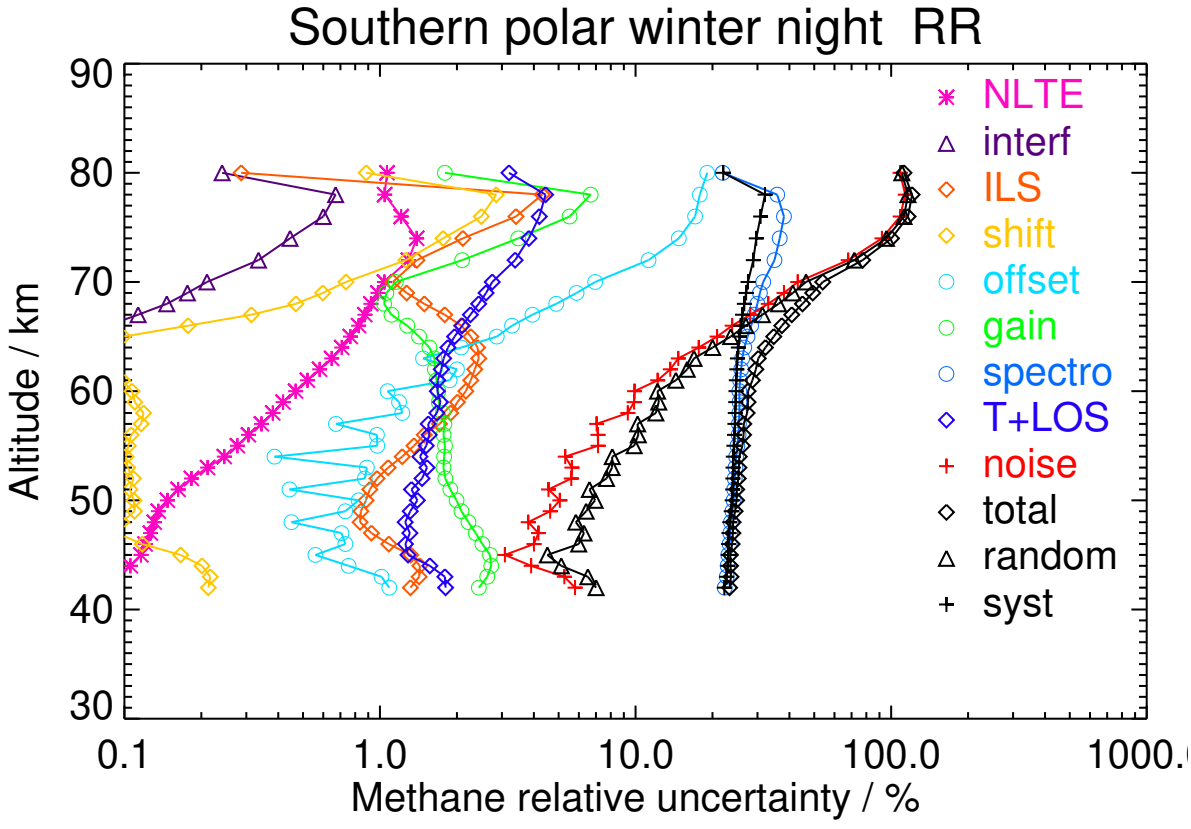

Figure S130. V8R_CH4_662 Southern polar winter night

Table S131. Methane error budget for Southern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	235.07	0.15	0.09	3.73	0.31	1.14	7.18	53.29	2.12	5.30	7.54	53.69	54.21
50	239.52	0.21	0.16	2.53	0.25	1.43	4.66	54.20	3.05	6.61	8.99	54.23	54.96
55	223.54	0.36	0.08	4.22	0.44	2.27	5.81	49.19	4.09	8.16	10.05	49.58	50.59
60	209.85	0.44	0.15	6.66	0.47	2.93	6.32	45.98	4.68	9.28	11.38	46.75	48.12
65	194.97	0.30	0.06	7.46	0.23	4.90	4.26	45.59	4.99	20.04	22.12	45.97	51.02
70	143.48	0.75	0.09	2.69	0.41	4.04	2.28	36.79	4.65	33.61	35.64	35.55	50.34
74	97.17	2.44	0.42	4.57	1.83	6.16	7.11	34.54	4.28	53.72	55.71	33.35	64.93
80	52.52	2.98	0.57	6.33	2.66	7.62	9.73	27.40	2.11	52.92	56.73	23.38	61.36
84	49.62	2.32	0.39	4.33	2.06	7.44	6.94	18.72	0.99	47.63	49.16	18.33	52.47

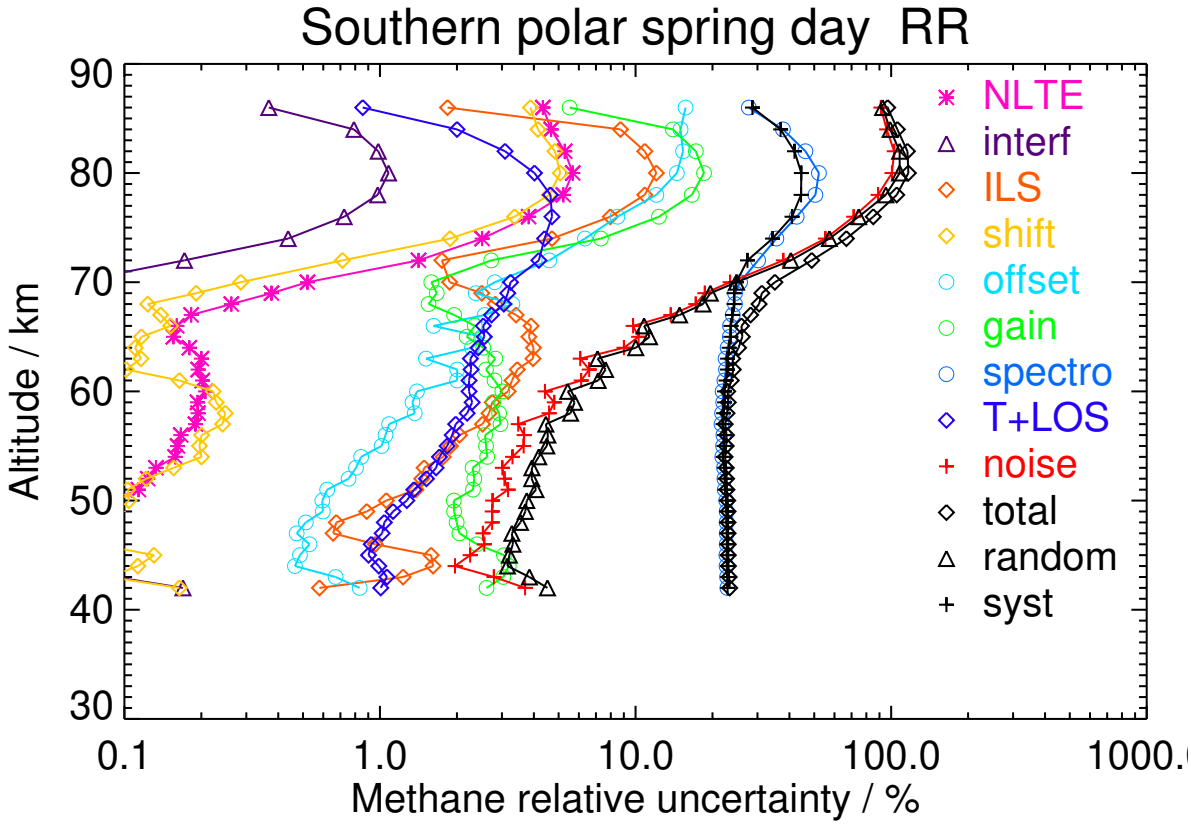

Figure S131. V8R_CH4_662 Southern polar spring day

Table S132. Methane error budget for Southern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	265.67	0.15	0.13	3.94	0.37	1.52	10.06	64.19	2.85	6.57	10.28	64.70	65.51
50	269.04	0.20	0.21	3.00	0.45	1.81	6.57	63.08	3.95	8.52	13.64	62.75	64.21
55	251.24	0.33	0.13	4.56	0.47	3.21	8.53	56.77	5.89	11.73	15.89	56.98	59.15
60	218.99	0.32	0.14	6.52	0.34	3.54	7.04	50.60	6.18	13.21	17.48	50.72	53.64
65	162.29	0.44	0.08	4.97	0.28	4.04	2.41	40.79	5.27	22.84	25.85	39.90	47.54
70	88.17	0.85	0.21	1.05	0.68	3.26	3.51	25.38	4.11	29.38	30.92	24.36	39.36
74	48.18	1.19	0.30	2.31	1.10	5.21	5.83	17.73	3.32	38.26	39.99	16.11	43.11
80	36.17	1.22	0.30	2.54	1.33	6.40	5.83	12.91	2.07	41.81	43.09	12.11	44.76

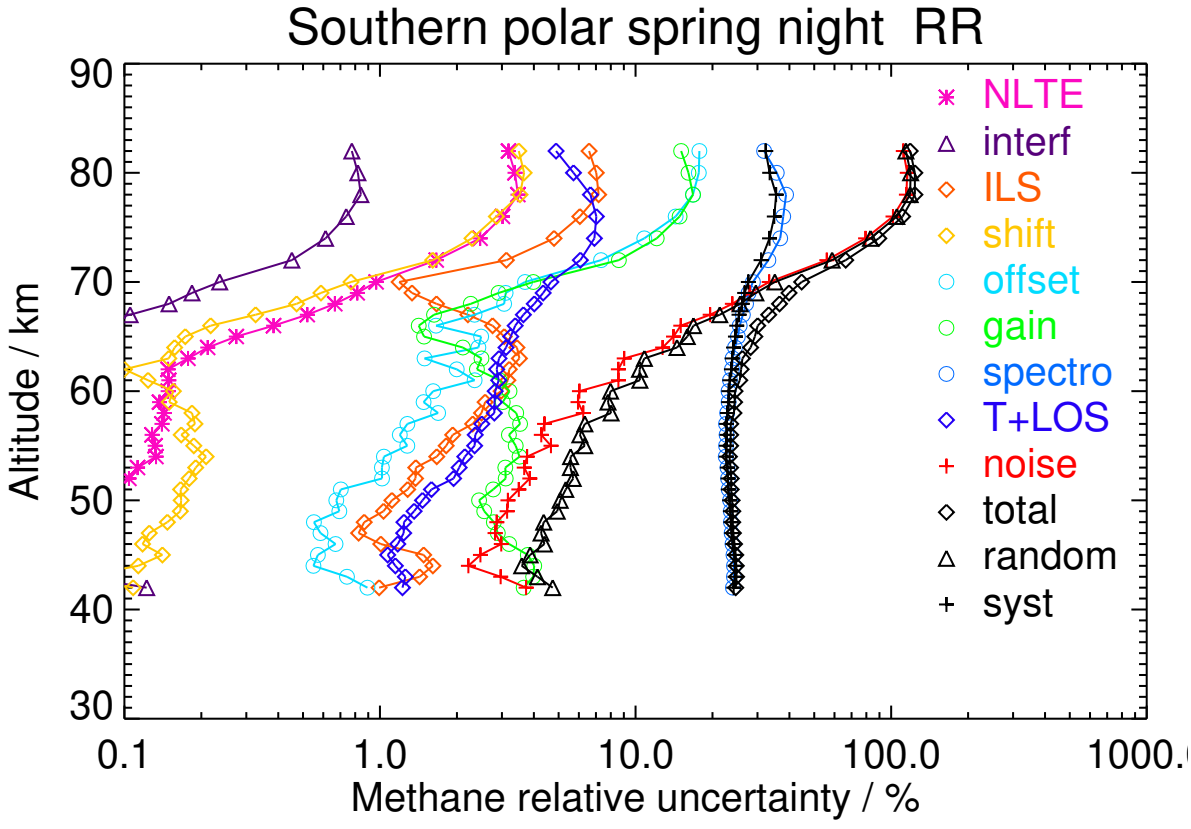

Figure S132. V8R_CH4_662 Southern polar spring night

Table S133. Methane error budget for Southern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	209.04	0.16	0.16	6.06	0.73	1.20	7.27	48.87	1.67	7.05	8.77	49.55	50.32
50	95.91	0.05	0.06	0.82	0.14	0.43	0.97	22.57	0.82	2.64	3.28	22.54	22.78
55	91.70	0.06	0.03	1.17	0.13	0.73	1.39	21.22	1.05	3.14	4.10	21.17	21.57
60	108.34	0.09	0.06	2.54	0.33	1.17	2.20	24.76	1.67	4.27	5.79	24.76	25.43
65	133.00	0.16	0.06	4.61	0.09	3.36	2.68	31.43	2.56	11.94	13.48	31.55	34.31
70	147.73	0.58	0.14	5.17	0.41	4.92	3.30	35.65	3.29	27.97	30.02	35.00	46.11
74	121.18	1.59	0.45	4.62	1.12	7.29	3.99	36.60	2.03	53.40	55.88	34.16	65.50
80	129.69	6.50	0.96	7.23	3.82	8.26	8.12	44.78	1.01	78.02	80.57	42.97	91.31
84	133.01	12.31	0.77	4.65	4.73	14.84	6.82	43.90	1.73	101.82	105.89	39.34	112.96

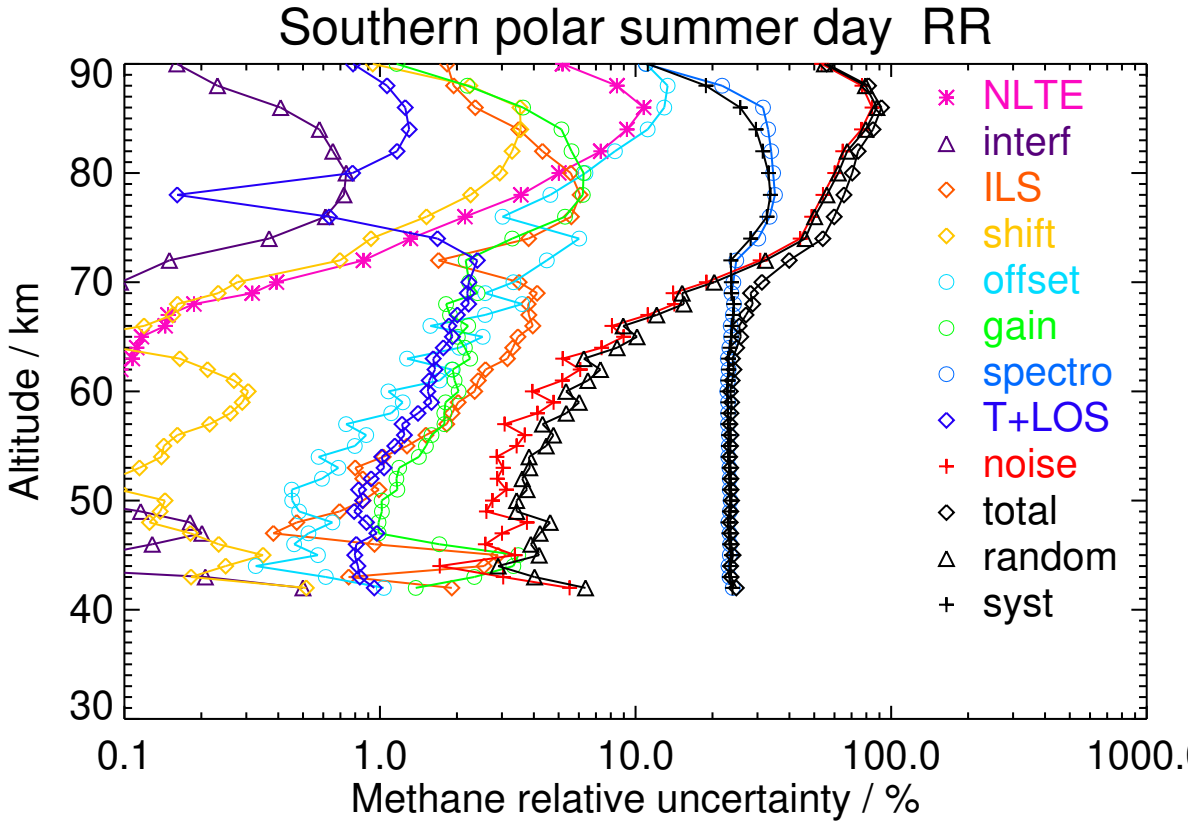

Figure S133. V8R_CH4_662 Southern polar summer day

Table S134. Methane error budget for Southern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	91.11	0.03	0.02	2.34	0.17	0.50	3.15	21.22	0.68	2.41	3.53	21.45	21.74
50	56.00	0.03	<0.01	0.73	0.05	0.47	0.96	13.43	0.53	2.52	2.99	13.41	13.74
55	68.54	0.05	0.02	0.78	0.08	0.74	1.13	16.69	0.96	4.02	6.02	16.19	17.27
60	89.42	0.12	0.06	2.06	0.09	1.23	1.76	23.01	1.68	6.58	11.46	21.28	24.17
65	144.01	0.15	0.04	4.59	0.15	3.95	2.41	35.76	3.82	18.67	22.34	34.43	41.04
70	124.91	0.43	0.19	1.55	0.36	3.23	0.98	31.91	4.53	33.71	34.74	31.34	46.79
74	104.81	1.75	0.80	3.40	1.68	6.67	4.97	33.92	3.72	60.23	62.43	31.32	69.85
80	94.29	6.09	1.02	3.74	2.38	11.82	6.35	38.27	0.64	83.50	88.77	28.20	93.14
84	108.54	7.77	1.01	3.85	2.40	15.93	6.59	36.38	0.11	103.19	107.43	28.44	111.13

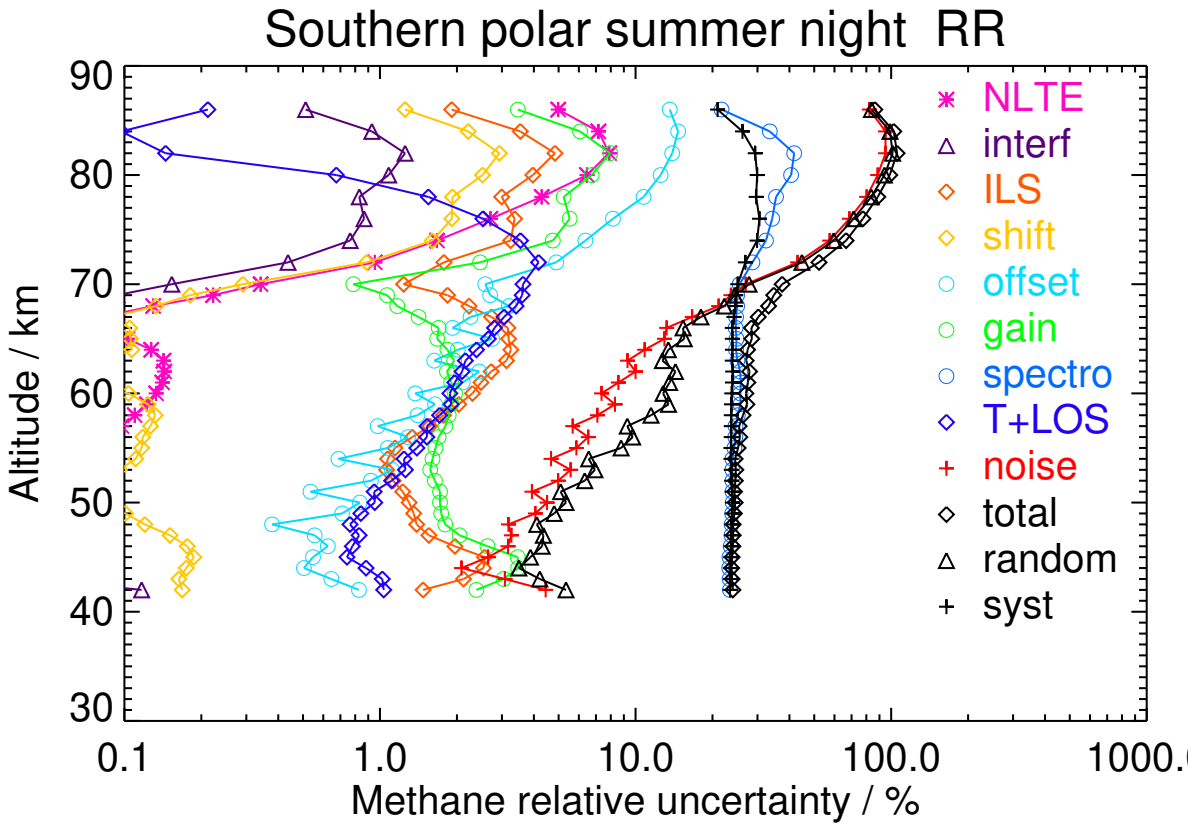

Figure S134. V8R_CH4_662 Southern polar summer night

Table S135. Methane error budget for Southern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	86.86	0.08	0.03	0.92	0.15	0.81	2.61	21.30	1.46	5.12	9.81	19.85	22.14
50	153.56	0.22	0.04	1.10	0.18	1.49	3.03	35.68	2.57	8.14	11.86	34.90	36.86
55	197.39	0.48	0.04	2.26	0.23	1.54	3.64	45.28	3.62	9.55	12.45	44.95	46.64
60	146.68	0.55	0.03	3.32	0.11	1.61	2.70	35.50	3.11	10.78	15.39	34.21	37.52
65	85.45	0.37	0.04	2.28	0.08	2.20	1.13	22.74	2.08	15.37	17.57	21.45	27.73
70	43.69	0.19	0.06	0.72	0.18	2.71	0.37	13.14	1.29	18.20	19.13	12.17	22.67
74	37.90	0.34	0.11	0.46	0.43	4.64	0.80	18.88	1.56	29.04	33.03	11.57	35.00
80	50.94	0.18	0.15	0.30	0.62	8.22	1.53	19.88	1.94	51.06	53.14	15.91	55.47

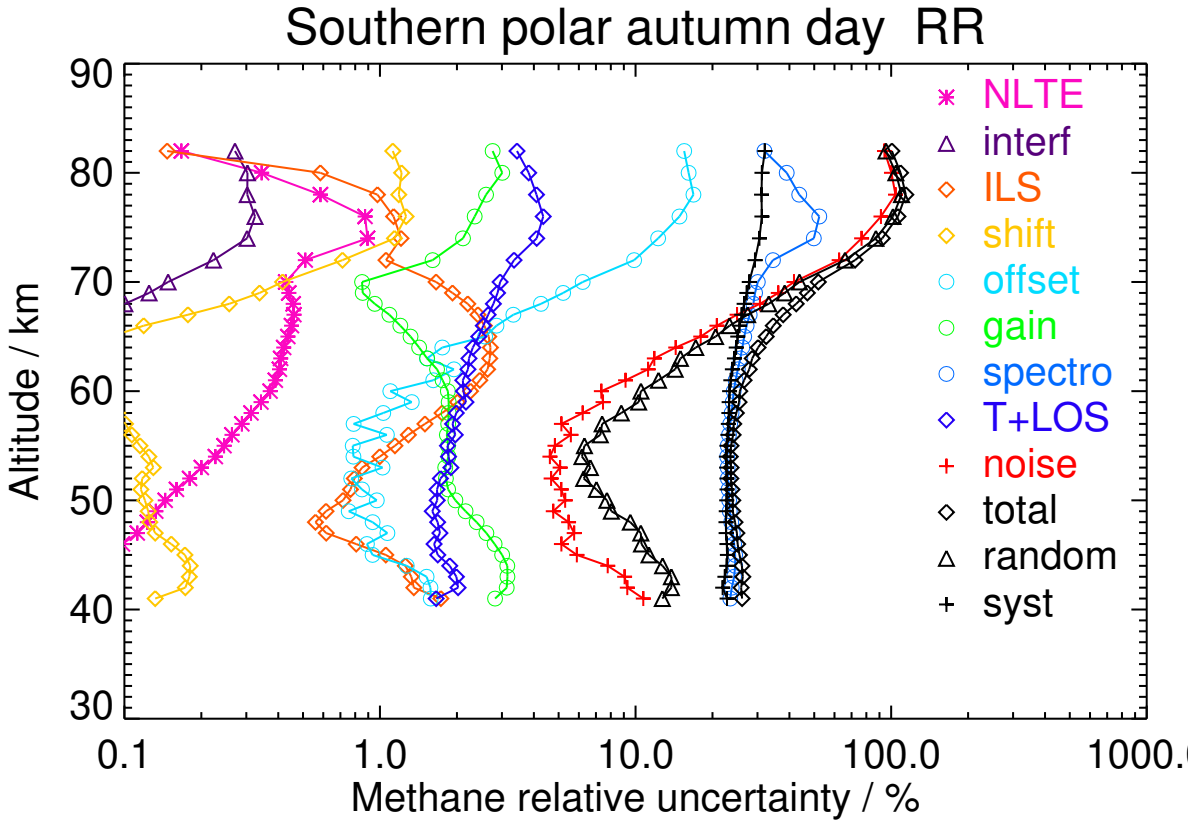

Figure S135. V8R_CH4_662 Southern polar autumn day

Table S136. Methane error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	110.90	0.09	0.03	0.90	0.20	1.03	3.16	26.05	2.14	5.57	8.27	25.65	26.95
50	192.20	0.24	0.03	1.80	0.20	1.88	4.25	44.68	3.38	9.73	11.50	44.66	46.12
55	148.04	0.31	0.02	1.96	0.12	1.11	2.81	35.89	2.71	8.46	10.79	35.55	37.15
60	76.19	0.27	0.01	1.69	0.05	0.78	1.40	20.16	1.60	7.38	10.40	19.00	21.66
65	39.52	0.20	0.04	1.05	0.06	1.45	0.48	11.70	0.91	9.46	11.34	10.11	15.19
70	20.58	0.10	0.05	0.34	0.10	1.80	0.21	6.13	0.59	10.16	10.70	5.49	12.03
74	22.26	0.15	0.08	0.12	0.22	3.81	0.69	7.02	0.81	21.46	22.13	5.98	22.93
80	23.09	0.17	0.07	0.08	0.21	4.96	0.74	5.19	0.73	26.20	26.73	4.99	27.19

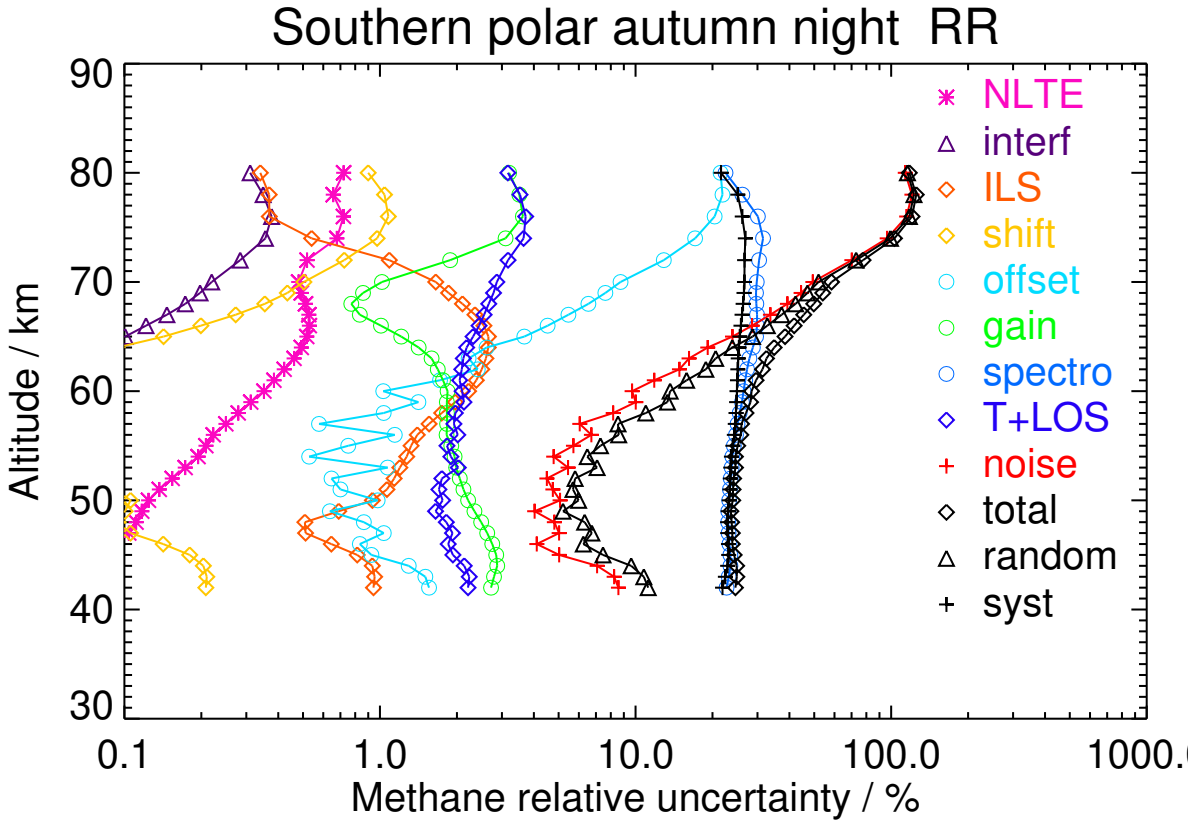

Figure S136. V8R_CH4_662 Southern polar autumn night

Table S137. Nitrous oxide error budget for Northern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	312.880	3.296	1.612	0.195	3.012	10.988	12.356	4.422	7.543	11.920	15.177	19.298
12	290.010	1.314	2.959	0.290	1.917	9.329	12.332	3.650	5.437	9.454	14.382	17.211
15	258.678	1.211	6.022	0.540	1.850	11.626	14.844	5.190	5.150	12.099	17.436	21.223
18	192.909	0.420	8.923	0.909	1.656	14.035	16.804	4.581	3.928	16.238	18.316	24.478
21	126.654	0.240	5.085	1.205	1.915	14.174	14.739	3.617	3.489	15.171	15.630	21.781
24	104.551	0.144	2.868	0.870	1.469	9.740	11.034	2.117	2.937	11.077	10.871	15.520
27	88.617	0.134	1.204	0.390	0.875	4.590	9.613	1.628	2.568	7.239	8.527	11.185
30	66.754	0.064	1.119	0.214	0.500	2.360	9.188	1.441	1.879	5.639	8.084	9.857
33	30.870	0.035	1.307	0.129	0.292	1.318	5.645	0.766	1.350	4.174	4.517	6.150
36	14.531	0.021	0.585	0.044	0.204	0.900	1.988	0.300	1.008	1.919	1.604	2.501
39	12.705	0.017	0.440	0.063	0.175	0.922	0.896	0.190	0.814	1.156	1.114	1.606
42	11.624	0.013	0.244	0.057	0.147	0.849	0.738	0.140	0.616	0.934	0.935	1.322
45	8.745	0.014	0.163	0.043	0.108	0.674	0.619	0.127	0.584	0.866	0.696	1.111
48	5.476	0.007	0.126	0.023	0.101	0.293	0.535	0.081	0.681	0.788	0.497	0.932
52	2.121	0.004	0.085	0.014	0.099	0.120	0.279	0.046	0.775	0.808	0.244	0.844
56	0.955	0.007	0.077	0.015	0.090	0.098	0.151	0.043	0.777	0.800	0.110	0.807
60	0.760	0.008	0.043	0.012	0.228	0.124	0.082	0.030	1.578	1.601	0.065	1.602
64	0.467	0.018	0.104	0.028	0.255	0.264	0.152	0.040	1.646	1.690	0.153	1.697
68	0.427	0.019	0.104	0.034	0.287	0.323	0.163	0.043	1.724	1.778	0.199	1.789

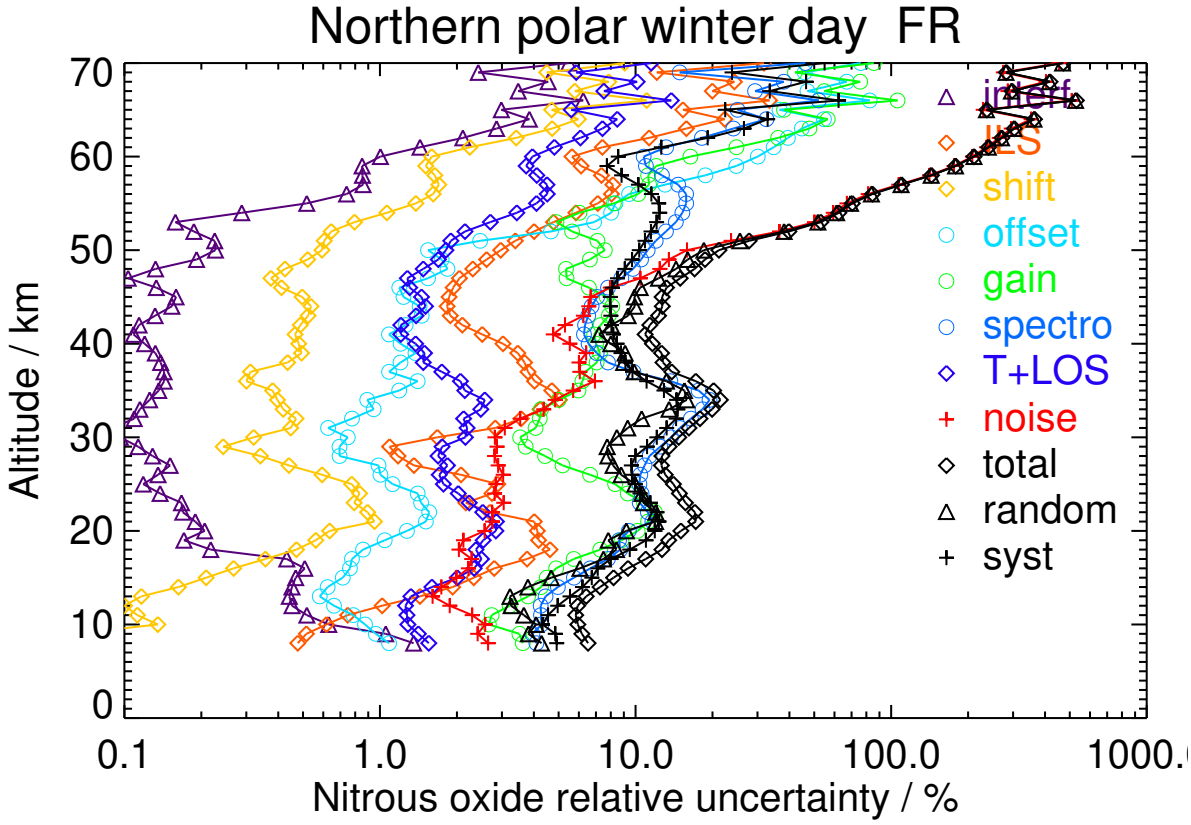

Figure S137. V8H_N2O_61 Northern polar winter day

Table S138. Nitrous oxide error budget for Northern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	309.645	2.551	2.662	0.283	2.742	10.322	11.952	4.063	7.118	10.560	15.042	18.378
12	293.314	2.007	6.192	0.402	2.218	12.485	12.044	4.641	5.915	11.618	16.430	20.123
15	251.690	2.275	7.387	0.431	2.111	11.106	12.543	5.796	6.109	11.992	16.497	20.395
18	173.913	0.923	7.713	0.783	1.489	9.980	15.847	5.535	4.364	14.855	15.586	21.531
21	96.821	0.350	5.623	0.858	1.298	8.206	14.090	2.968	3.790	12.738	12.686	17.978
24	78.012	0.127	4.489	0.777	0.946	4.202	11.035	1.826	3.094	11.276	6.845	13.191
27	72.577	0.140	1.678	0.354	0.651	2.444	10.193	1.326	2.385	8.431	7.044	10.986
30	46.883	0.081	0.780	0.122	0.375	1.520	7.473	1.026	1.490	5.727	5.421	7.886
33	23.018	0.034	1.089	0.102	0.236	1.279	3.728	0.488	0.930	3.124	2.852	4.230
36	10.334	0.022	0.466	0.024	0.118	0.617	1.465	0.192	0.628	1.333	1.190	1.786
39	6.590	0.012	0.195	0.023	0.086	0.350	0.433	0.087	0.481	0.606	0.476	0.771
42	6.925	0.011	0.136	0.019	0.066	0.338	0.424	0.066	0.359	0.540	0.399	0.671
45	6.429	0.018	0.146	0.027	0.069	0.405	0.391	0.083	0.400	0.625	0.348	0.715
48	5.162	0.009	0.128	0.021	0.083	0.325	0.417	0.057	0.516	0.675	0.342	0.757
52	2.654	0.014	0.200	0.025	0.092	0.249	0.381	0.058	0.663	0.761	0.346	0.836
56	0.588	0.039	0.232	0.054	0.126	0.457	0.301	0.087	0.760	0.927	0.318	0.980
60	-0.010	0.055	0.387	0.075	0.276	0.724	0.449	0.119	1.732	1.912	0.568	1.994
64	-0.426	0.063	0.491	0.066	0.282	0.918	0.567	0.102	1.699	1.981	0.680	2.095
68	0.343	0.033	0.116	0.047	0.250	0.239	0.167	0.053	1.578	1.620	0.185	1.630

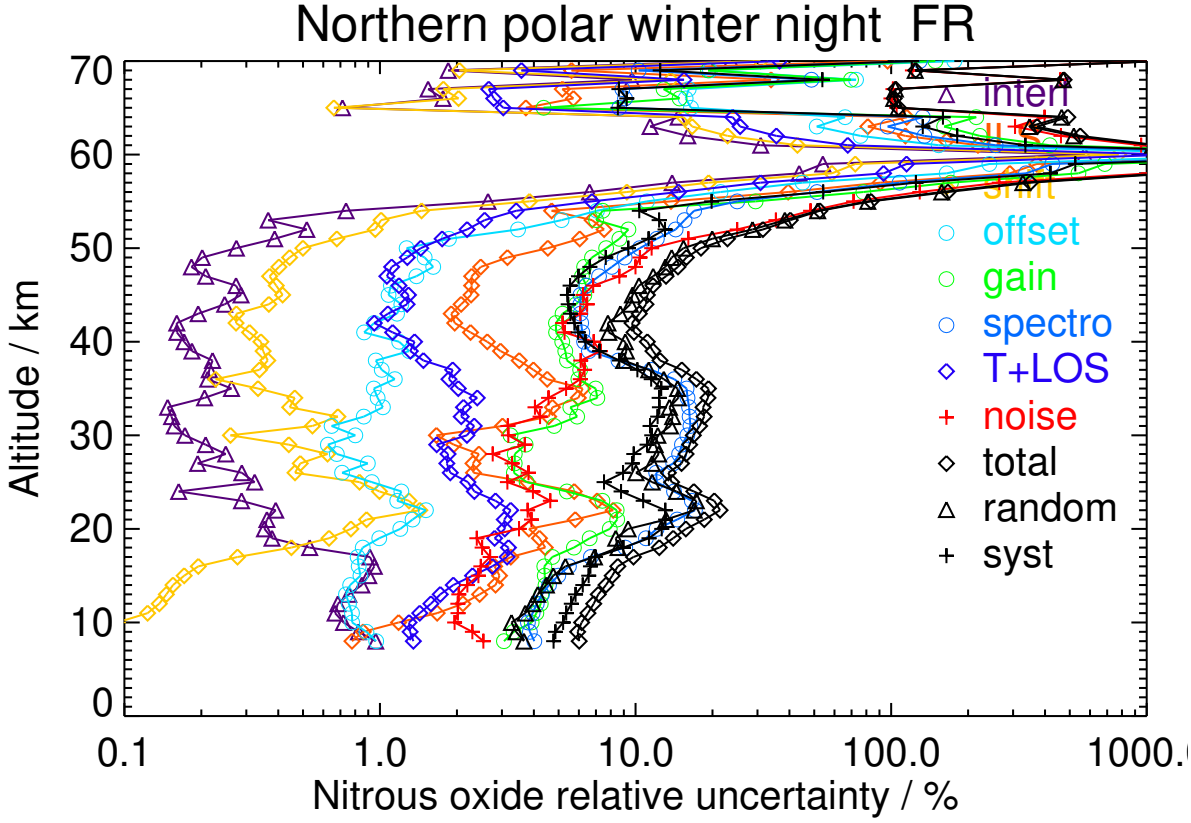

Figure S138. V8H_N2O_61 Northern polar winter night

Table S139. Nitrous oxide error budget for Northern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	275.448	1.830	0.433	0.465	2.401	4.531	11.871	3.240	7.547	9.116	12.462	15.441
12	275.867	0.754	3.050	0.197	1.572	11.159	12.531	3.560	4.262	7.754	16.268	18.022
15	197.194	0.616	4.131	0.273	1.402	7.173	16.111	5.060	4.643	10.600	16.288	19.434
18	119.686	0.120	4.159	0.341	1.014	7.021	11.628	3.246	3.072	9.872	11.202	14.931
21	93.213	0.155	5.405	1.068	1.181	8.182	11.381	2.361	3.018	11.583	10.429	15.586
24	98.567	0.123	4.423	0.823	0.800	5.160	10.242	1.861	2.872	9.539	8.553	12.812
27	83.709	0.081	1.261	0.422	0.455	2.275	9.535	1.383	2.433	6.209	8.207	10.291
30	57.504	0.051	0.949	0.201	0.266	1.093	6.260	1.053	1.708	3.921	5.482	6.740
33	45.182	0.038	0.880	0.303	0.280	1.829	3.766	0.665	1.171	2.696	3.608	4.504
36	31.170	0.035	1.229	0.204	0.238	1.935	3.071	0.428	0.810	1.944	3.442	3.953
39	15.752	0.019	0.904	0.130	0.135	1.159	1.757	0.257	0.543	1.475	1.861	2.375
42	8.018	0.009	0.535	0.065	0.074	0.588	0.909	0.117	0.333	0.913	0.871	1.262
45	4.345	0.014	0.334	0.039	0.047	0.346	0.506	0.072	0.279	0.517	0.554	0.758
48	1.892	0.005	0.052	0.022	0.034	0.077	0.199	0.043	0.252	0.296	0.167	0.340
52	0.725	0.003	0.026	0.006	0.054	0.026	0.063	0.015	0.331	0.342	0.036	0.344
56	0.810	0.011	0.165	0.038	0.063	0.168	0.137	0.033	0.479	0.510	0.226	0.558
60	0.384	0.003	0.036	0.012	0.115	0.029	0.066	0.014	0.779	0.789	0.053	0.791
64	-0.572	0.025	0.184	0.043	0.210	0.268	0.287	0.044	1.238	1.280	0.362	1.330
68	-0.540	0.029	0.220	0.053	0.307	0.289	0.330	0.046	1.735	1.784	0.410	1.831

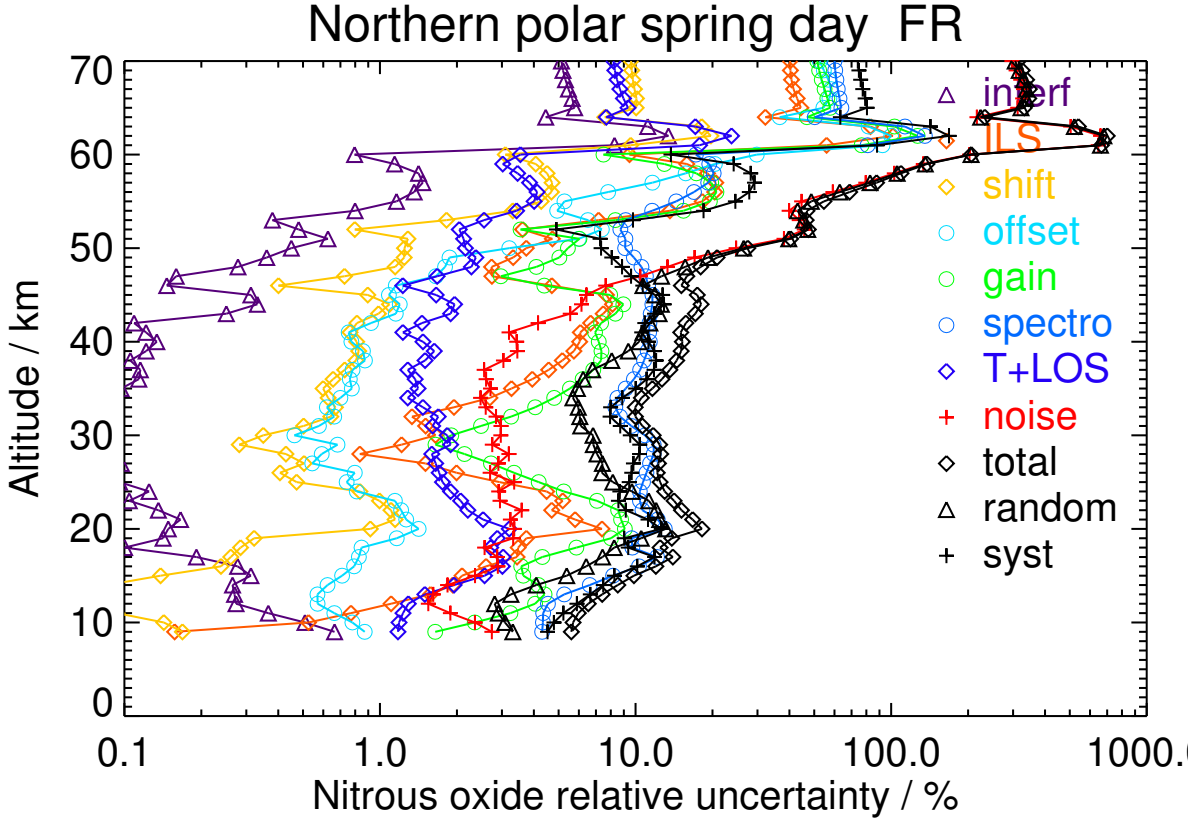

Figure S139. V8H_N2O_61 Northern polar spring day

Table S140. Nitrous oxide error budget for Northern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	277.346	2.109	1.342	0.410	2.448	5.831	13.001	3.524	7.763	10.729	13.154	16.974
12	274.631	0.835	2.858	0.206	1.619	10.583	12.341	3.623	4.665	8.433	15.478	17.627
15	219.047	0.676	4.712	0.331	1.642	9.604	15.930	5.424	5.271	12.842	16.241	20.705
18	149.624	0.170	5.366	0.431	1.437	10.113	14.794	3.851	3.573	12.976	14.541	19.489
21	109.399	0.155	6.101	1.439	1.162	7.879	14.137	2.544	2.919	13.496	11.639	17.821
24	112.750	0.102	3.553	0.764	0.923	6.285	10.823	1.887	2.739	9.589	9.478	13.482
27	92.163	0.076	1.443	0.385	0.547	2.318	11.137	1.515	2.369	6.978	9.548	11.826
30	64.177	0.052	0.755	0.220	0.289	1.034	7.008	1.229	1.701	4.023	6.254	7.436
33	44.138	0.041	0.848	0.309	0.264	1.720	4.330	0.775	1.197	2.760	4.124	4.962
36	24.991	0.033	1.090	0.204	0.238	1.822	2.787	0.423	0.794	2.182	2.902	3.631
39	13.128	0.017	0.762	0.128	0.138	1.080	1.515	0.226	0.518	1.421	1.541	2.096
42	6.029	0.007	0.325	0.050	0.056	0.369	0.714	0.098	0.296	0.679	0.627	0.924
45	3.012	0.012	0.214	0.028	0.035	0.196	0.355	0.060	0.266	0.397	0.359	0.535
48	1.590	0.005	0.057	0.018	0.035	0.077	0.153	0.035	0.249	0.288	0.119	0.312
52	0.763	0.004	0.032	0.008	0.055	0.031	0.069	0.015	0.343	0.355	0.038	0.357
56	0.834	0.011	0.157	0.042	0.068	0.170	0.132	0.041	0.496	0.535	0.197	0.570
60	0.420	0.003	0.031	0.010	0.125	0.033	0.076	0.016	0.859	0.871	0.055	0.873
64	-0.481	0.025	0.155	0.047	0.208	0.271	0.244	0.049	1.226	1.266	0.325	1.307
68	-0.465	0.026	0.170	0.053	0.306	0.277	0.261	0.046	1.712	1.761	0.319	1.790

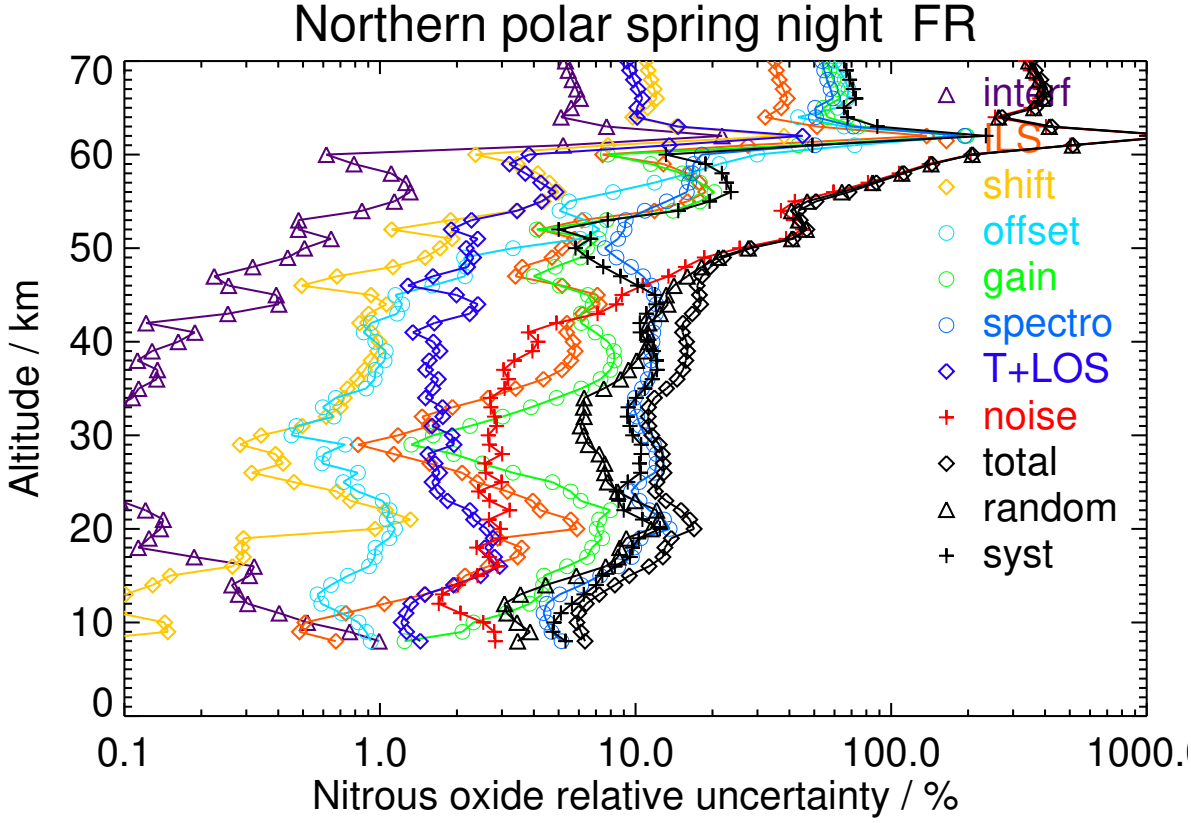

Figure S140. V8H_N2O_61 Northern polar spring night

Table S141. Nitrous oxide error budget for Northern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	307.827	0.877	3.728	0.409	1.774	10.696	14.073	3.492	5.302	9.159	16.937	19.255
15	308.220	0.632	10.425	0.512	1.961	19.028	14.478	5.262	4.851	10.870	24.857	27.130
18	254.200	0.209	8.220	0.555	1.964	18.725	17.873	4.849	4.180	14.554	23.896	27.980
21	193.102	0.143	7.204	1.412	2.115	18.645	18.911	4.491	3.474	16.546	22.850	28.212
24	152.172	0.109	3.385	0.638	1.219	9.017	15.095	2.854	3.075	9.776	15.639	18.443
27	106.639	0.073	1.942	0.775	0.705	2.022	11.853	2.014	2.506	4.063	11.970	12.641
30	72.072	0.062	0.591	0.123	0.388	0.931	7.441	1.429	1.739	2.642	7.406	7.863
33	40.957	0.032	0.884	0.313	0.235	1.569	4.233	0.784	1.123	1.768	4.480	4.816
36	20.162	0.038	0.832	0.142	0.130	0.932	2.115	0.343	0.682	1.090	2.338	2.580
39	9.327	0.012	0.571	0.070	0.059	0.420	0.983	0.164	0.367	0.686	1.080	1.280
42	4.119	0.010	0.238	0.023	0.032	0.136	0.453	0.062	0.221	0.453	0.360	0.578
45	2.155	0.018	0.236	0.028	0.035	0.126	0.249	0.067	0.284	0.362	0.300	0.470
48	0.440	0.007	0.030	0.018	0.030	0.021	0.082	0.023	0.201	0.214	0.066	0.224
52	0.226	0.004	0.034	0.009	0.043	0.018	0.029	0.013	0.268	0.275	0.032	0.276
56	0.256	0.007	0.101	0.027	0.034	0.045	0.060	0.026	0.303	0.313	0.109	0.332
60	0.083	0.007	0.087	0.026	0.113	0.030	0.078	0.018	0.733	0.743	0.114	0.752
64	-0.634	0.022	0.131	0.041	0.144	0.112	0.151	0.031	0.901	0.918	0.213	0.943
68	-1.057	0.032	0.182	0.063	0.271	0.169	0.243	0.043	1.558	1.587	0.333	1.621

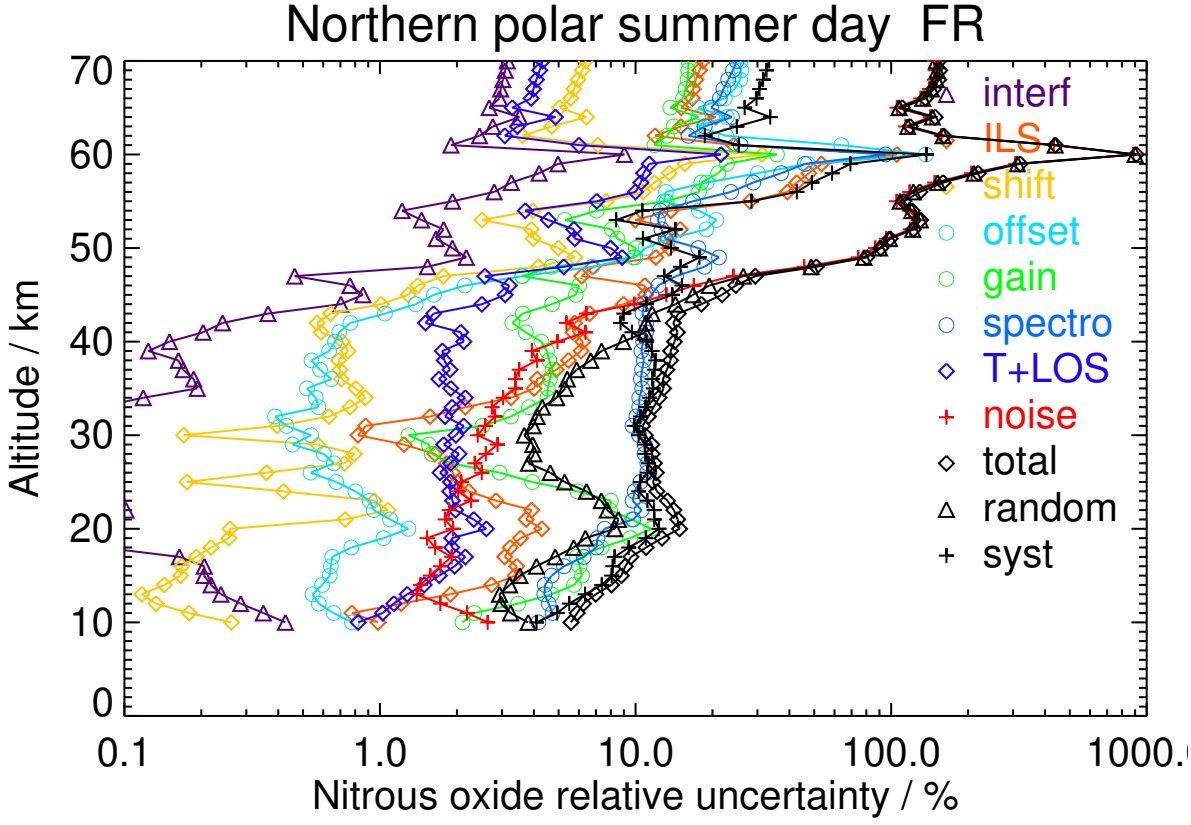

Figure S141. V8H_N2O_61 Northern polar summer day

Table S142. Nitrous oxide error budget for Northern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	306.908	0.920	3.990	0.390	1.919	10.257	13.163	3.567	5.760	9.428	16.003	18.574
15	309.333	0.624	9.275	0.334	1.812	16.824	13.406	4.593	4.552	10.656	21.928	24.380
18	260.401	0.233	9.458	0.314	2.128	19.131	17.408	5.075	4.241	15.439	23.844	28.406
21	194.733	0.160	5.457	1.138	2.075	16.733	17.625	4.399	3.776	14.392	21.273	25.684
24	148.826	0.109	3.929	0.622	1.023	5.882	15.932	2.752	3.136	7.786	16.190	17.964
27	105.659	0.069	1.827	0.633	0.734	1.968	12.235	2.054	2.558	3.960	12.367	12.985
30	62.701	0.057	0.626	0.143	0.393	0.732	7.650	1.393	1.673	2.375	7.663	8.023
33	30.040	0.019	0.757	0.220	0.200	1.051	3.335	0.637	0.996	1.442	3.494	3.780
36	15.085	0.029	0.699	0.117	0.117	0.756	1.642	0.257	0.605	1.025	1.779	2.053
39	6.530	0.005	0.382	0.038	0.047	0.258	0.826	0.130	0.318	0.519	0.864	1.008
42	1.866	0.011	0.076	0.021	0.035	0.054	0.243	0.053	0.213	0.285	0.192	0.343
45	1.028	0.013	0.147	0.027	0.035	0.096	0.101	0.059	0.265	0.291	0.181	0.342
48	0.333	0.005	0.020	0.010	0.031	0.017	0.049	0.015	0.203	0.210	0.043	0.214
52	0.036	0.004	0.035	0.009	0.048	0.020	0.033	0.015	0.313	0.320	0.031	0.321
56	0.327	0.006	0.087	0.024	0.034	0.049	0.052	0.029	0.312	0.322	0.094	0.335
60	0.595	0.006	0.099	0.023	0.130	0.029	0.090	0.023	0.868	0.880	0.124	0.889
64	-0.515	0.025	0.151	0.040	0.154	0.117	0.158	0.041	0.985	1.003	0.232	1.030
68	-1.019	0.035	0.231	0.063	0.247	0.164	0.247	0.057	1.441	1.470	0.357	1.512

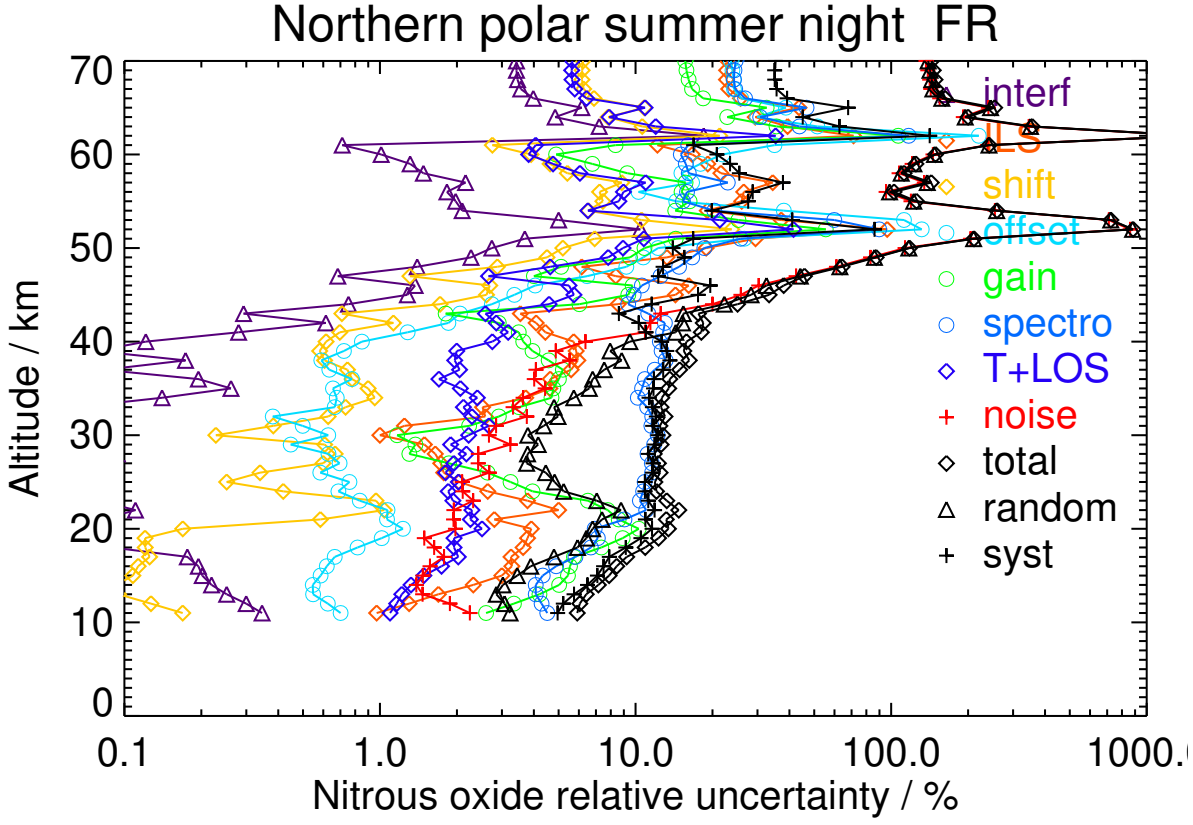

Figure S142. V8H_N2O_61 Northern polar summer night

Table S143. Nitrous oxide error budget for Northern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	300.482	2.869	1.439	0.494	2.630	6.276	12.545	2.998	8.062	11.203	12.756	16.977
12	309.265	1.630	4.195	0.455	1.883	11.677	13.736	3.532	5.258	9.664	17.198	19.727
15	297.051	1.496	7.062	0.641	1.842	15.543	14.996	5.551	5.339	10.877	21.527	24.119
18	264.148	0.637	17.617	1.330	1.942	21.809	13.718	8.527	5.232	16.660	28.331	32.866
21	201.011	0.484	8.048	0.738	2.236	17.709	13.394	5.682	4.570	11.242	22.144	24.834
24	143.144	0.189	2.606	1.285	1.406	10.039	14.997	2.918	3.809	6.998	17.613	18.952
27	89.306	0.114	1.443	0.780	0.732	5.231	11.155	1.823	3.127	5.242	11.860	12.967
30	42.632	0.034	1.510	0.214	0.317	1.868	7.426	1.220	2.080	3.832	7.224	8.178
33	12.590	0.036	0.693	0.113	0.177	0.732	2.674	0.554	1.177	2.177	2.272	3.147
36	3.092	0.012	0.163	0.036	0.084	0.232	0.656	0.164	0.589	0.757	0.567	0.945
39	0.775	0.004	0.055	0.017	0.041	0.103	0.186	0.056	0.359	0.401	0.145	0.427
42	-0.023	0.003	0.027	0.013	0.031	0.096	0.083	0.037	0.313	0.333	0.082	0.343
45	0.315	0.002	0.036	0.017	0.059	0.130	0.070	0.040	0.402	0.422	0.111	0.436
48	0.117	0.002	0.018	0.009	0.069	0.057	0.038	0.015	0.510	0.519	0.023	0.520
52	0.424	0.002	0.022	0.010	0.058	0.041	0.029	0.013	0.548	0.554	0.025	0.554
56	0.818	0.002	0.037	0.016	0.088	0.098	0.044	0.029	0.660	0.670	0.093	0.676
60	0.886	0.005	0.052	0.016	0.202	0.077	0.049	0.034	1.230	1.249	0.078	1.252
64	0.529	0.009	0.048	0.011	0.247	0.088	0.068	0.031	1.467	1.490	0.092	1.493
68	0.447	0.009	0.049	0.013	0.261	0.116	0.065	0.032	1.526	1.551	0.117	1.555

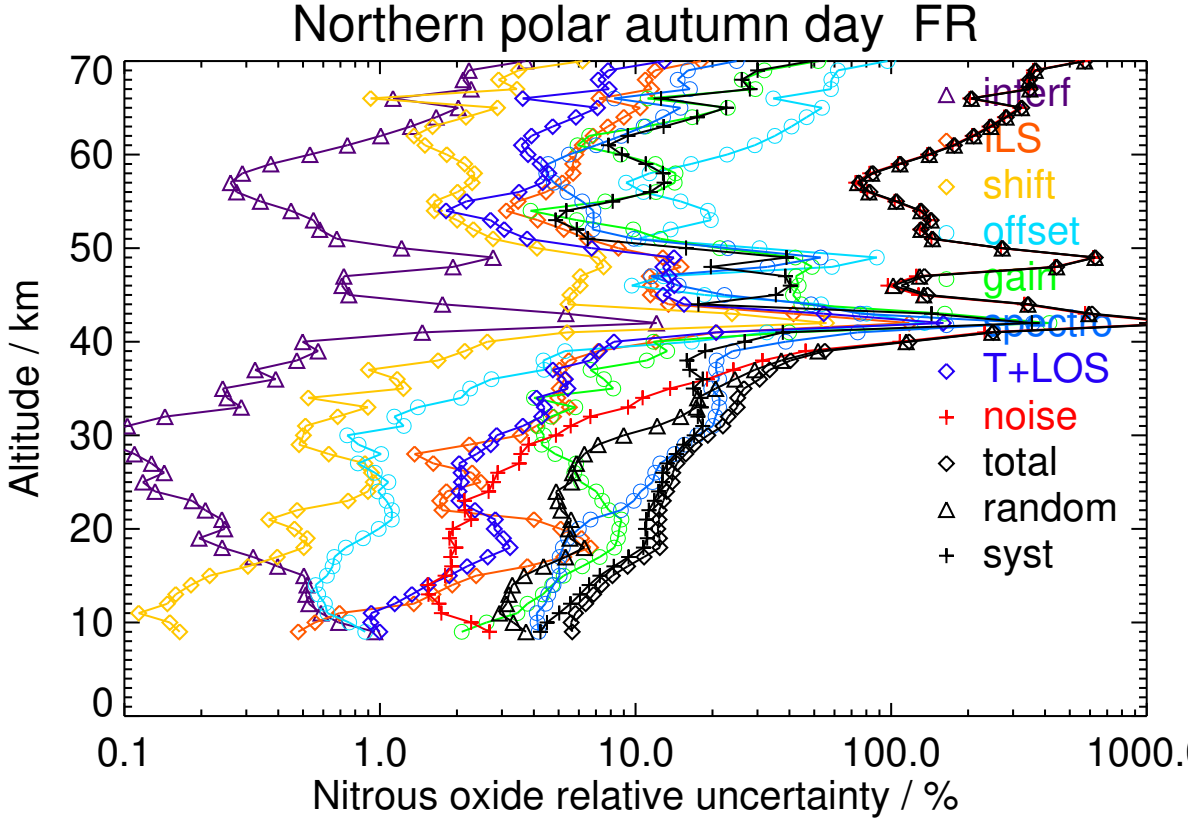

Figure S143. V8H_N2O_61 Northern polar autumn day

Table S144. Nitrous oxide error budget for Northern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	304.732	2.106	0.869	0.512	2.559	4.053	12.532	2.827	8.073	9.625	12.885	16.083
12	303.260	1.703	3.219	0.439	1.770	11.112	12.833	3.574	4.762	7.769	16.728	18.445
15	277.000	1.484	5.926	0.589	1.777	13.986	13.869	6.021	5.644	10.123	19.860	22.291
18	245.754	0.651	16.824	1.155	1.890	21.163	11.758	9.205	5.381	15.282	27.471	31.435
21	188.351	0.582	7.613	0.721	2.013	14.754	13.417	5.379	4.319	10.079	20.164	22.543
24	120.254	0.214	3.850	1.369	1.109	7.500	16.078	2.627	3.713	6.790	17.530	18.799
27	64.997	0.112	1.478	0.630	0.540	3.662	9.486	1.563	2.936	4.366	9.914	10.832
30	26.213	0.030	1.291	0.172	0.241	1.207	4.757	0.879	1.836	2.948	4.615	5.476
33	9.430	0.036	0.433	0.117	0.169	0.773	1.786	0.430	1.073	1.627	1.645	2.314
36	2.255	0.015	0.156	0.055	0.095	0.368	0.518	0.141	0.568	0.803	0.372	0.885
39	1.159	0.006	0.071	0.022	0.043	0.148	0.208	0.050	0.343	0.419	0.133	0.439
42	0.512	0.003	0.048	0.018	0.035	0.125	0.113	0.037	0.310	0.351	0.079	0.360
45	0.809	0.003	0.037	0.020	0.059	0.130	0.101	0.036	0.392	0.418	0.109	0.432
48	0.902	0.003	0.038	0.014	0.067	0.089	0.073	0.023	0.499	0.513	0.075	0.518
52	0.846	0.004	0.030	0.015	0.056	0.084	0.056	0.024	0.528	0.541	0.041	0.542
56	1.117	0.003	0.053	0.022	0.094	0.134	0.069	0.038	0.674	0.688	0.134	0.701
60	1.073	0.007	0.082	0.028	0.202	0.146	0.089	0.051	1.196	1.220	0.143	1.229
64	0.854	0.012	0.068	0.014	0.255	0.101	0.095	0.037	1.481	1.508	0.099	1.511
68	1.001	0.009	0.066	0.013	0.257	0.109	0.091	0.036	1.486	1.513	0.109	1.517

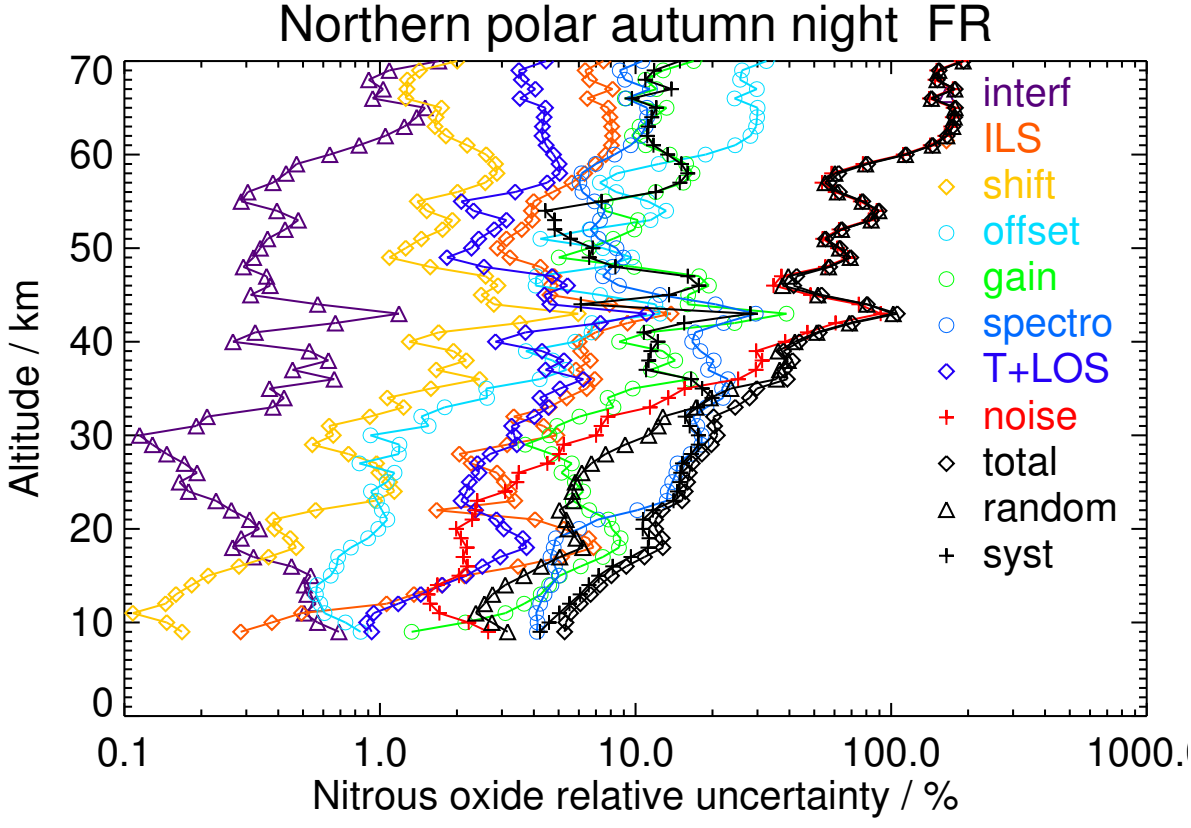

Figure S144. V8H_N2O_61 Northern polar autumn night

Table S145. Nitrous oxide error budget for Northern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	301.070	4.926	1.024	0.243	2.811	3.441	13.268	4.321	8.529	11.451	13.470	17.680
12	289.977	0.960	2.951	0.351	1.856	6.486	13.358	3.382	5.763	9.434	13.760	16.684
15	268.918	0.594	6.967	0.661	1.764	9.603	16.068	4.664	5.270	12.688	17.070	21.269
18	230.036	0.266	7.586	0.732	1.687	12.001	18.973	4.261	4.039	15.299	19.116	24.484
21	185.713	0.239	6.946	1.412	2.088	14.334	18.485	3.882	3.578	15.255	19.925	25.094
24	156.584	0.134	4.700	1.415	1.565	9.694	16.440	2.858	3.305	10.905	17.058	20.246
27	120.235	0.104	1.409	0.327	0.934	3.592	12.350	2.213	2.927	6.589	11.767	13.486
30	91.132	0.077	0.899	0.190	0.580	1.928	11.641	1.952	2.152	6.205	10.505	12.200
33	41.620	0.041	1.266	0.232	0.358	1.714	6.192	1.044	1.440	3.686	5.713	6.799
36	18.842	0.031	0.786	0.074	0.195	0.966	2.583	0.391	0.920	1.819	2.440	3.044
39	8.744	0.015	0.397	0.047	0.121	0.531	0.880	0.160	0.647	1.022	0.794	1.294
42	9.910	0.008	0.273	0.036	0.112	0.612	0.504	0.109	0.450	0.716	0.646	0.965
45	10.063	0.012	0.258	0.051	0.098	0.643	0.561	0.136	0.434	0.661	0.760	1.007
48	6.787	0.007	0.155	0.034	0.075	0.301	0.646	0.081	0.485	0.655	0.593	0.884
52	2.288	0.006	0.143	0.022	0.088	0.094	0.348	0.051	0.628	0.684	0.294	0.745
56	0.645	0.018	0.082	0.032	0.083	0.101	0.158	0.050	0.693	0.724	0.092	0.730
60	0.470	0.020	0.132	0.023	0.216	0.115	0.137	0.037	1.527	1.554	0.119	1.559
64	-0.177	0.024	0.113	0.031	0.229	0.205	0.156	0.038	1.500	1.531	0.199	1.544
68	-0.646	0.018	0.061	0.025	0.275	0.208	0.115	0.035	1.659	1.689	0.194	1.700

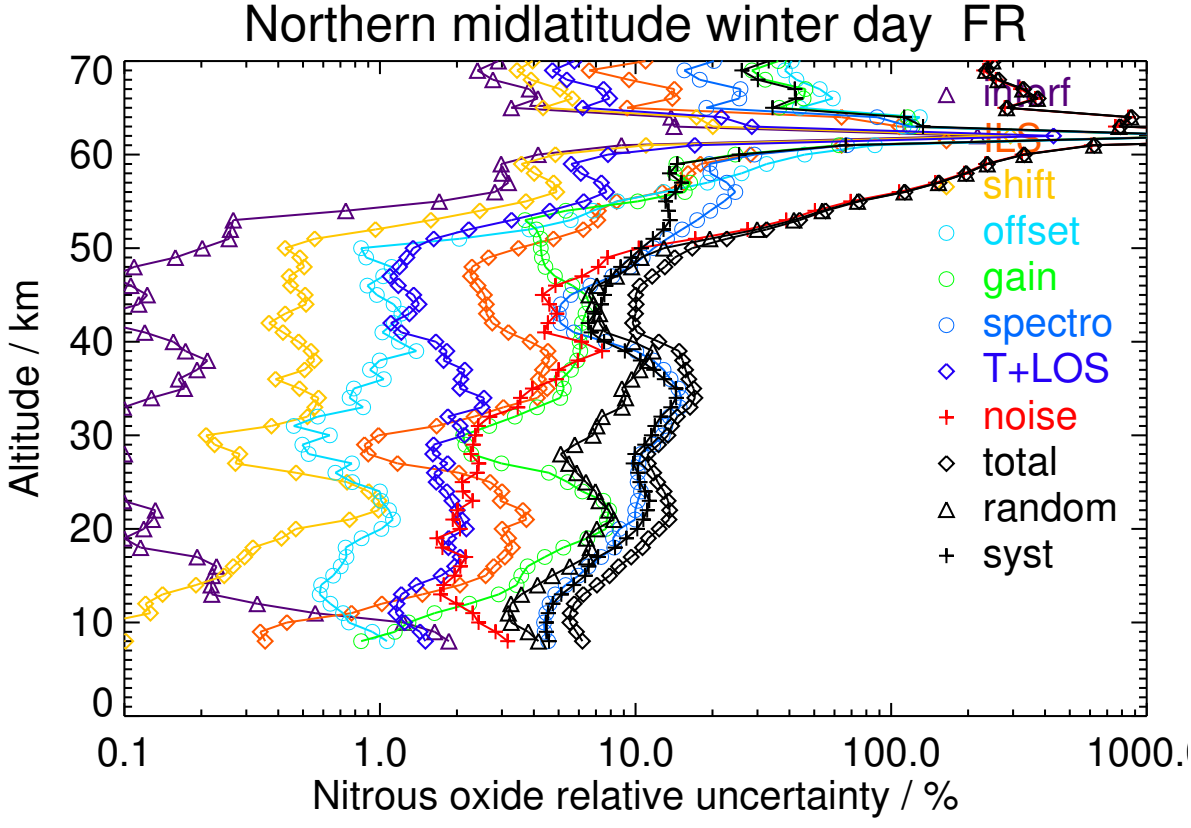

Figure S145. V8H_N2O_61 Northern midlatitude winter day

Table S146. Nitrous oxide error budget for Northern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	296.306	4.032	0.936	0.349	2.691	3.095	13.809	3.899	8.469	11.200	13.648	17.655
12	286.744	1.300	2.593	0.327	1.578	6.271	15.343	3.100	5.225	9.391	15.312	17.963
15	261.305	0.518	5.995	0.628	1.763	8.650	17.098	4.459	5.164	13.017	16.852	21.294
18	221.707	0.252	5.620	0.548	1.435	8.226	18.785	4.388	4.103	12.711	18.141	22.151
21	186.799	0.174	7.072	0.997	1.483	10.244	17.960	3.874	3.554	12.913	18.484	22.547
24	162.989	0.118	4.744	1.198	1.491	10.722	15.255	2.972	3.274	10.559	16.790	19.834
27	138.106	0.104	2.102	0.278	0.954	6.014	13.087	2.171	2.838	6.569	13.508	15.020
30	102.038	0.083	0.842	0.207	0.535	2.255	11.269	1.830	2.163	4.057	11.167	11.881
33	55.751	0.037	1.549	0.283	0.344	2.149	7.438	1.068	1.425	3.549	7.288	8.107
36	17.934	0.031	0.957	0.090	0.150	0.900	3.299	0.426	0.856	1.859	3.177	3.682
39	6.994	0.009	0.268	0.033	0.091	0.315	0.706	0.120	0.546	0.813	0.575	0.996
42	7.593	0.008	0.174	0.030	0.069	0.369	0.416	0.078	0.351	0.529	0.442	0.689
45	7.316	0.012	0.225	0.058	0.095	0.579	0.473	0.120	0.407	0.631	0.635	0.895
48	4.611	0.006	0.125	0.017	0.071	0.203	0.420	0.059	0.429	0.521	0.393	0.653
52	1.933	0.008	0.125	0.019	0.080	0.119	0.251	0.040	0.582	0.621	0.234	0.663
56	0.521	0.017	0.091	0.025	0.081	0.142	0.154	0.047	0.617	0.662	0.071	0.666
60	0.369	0.021	0.135	0.024	0.226	0.099	0.147	0.041	1.561	1.589	0.112	1.593
64	-0.461	0.029	0.189	0.046	0.240	0.280	0.236	0.078	1.589	1.632	0.310	1.661
68	-0.875	0.023	0.088	0.039	0.261	0.326	0.148	0.065	1.612	1.649	0.299	1.676

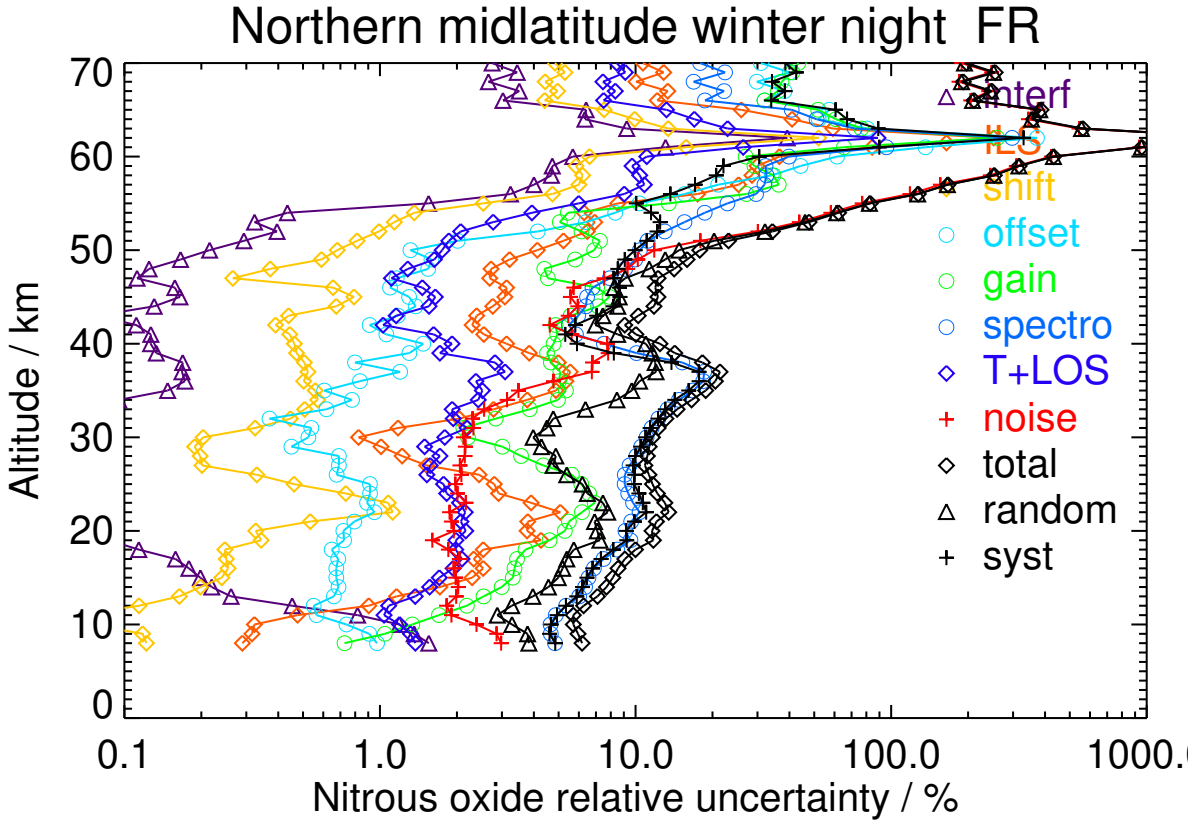

Figure S146. V8H_N2O_61 Northern midlatitude winter night

Table S147. Nitrous oxide error budget for Northern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	273.252	2.206	1.303	0.527	2.527	4.242	10.211	3.088	8.052	10.106	10.379	14.487
12	296.180	0.829	4.053	0.248	1.943	12.134	12.107	3.930	5.174	9.289	16.453	18.894
15	279.127	0.803	6.934	0.447	1.895	12.480	14.179	5.555	5.548	12.186	17.957	21.701
18	250.142	0.399	13.719	0.773	2.721	22.039	17.392	6.852	4.318	18.223	26.797	32.406
21	179.690	0.332	6.237	1.651	2.435	16.730	17.409	4.158	3.706	15.943	20.186	25.723
24	148.184	0.154	4.172	0.876	1.130	6.830	15.289	2.636	3.308	9.827	14.872	17.826
27	114.183	0.115	1.492	0.508	0.683	2.470	13.282	2.013	2.868	6.307	12.569	14.062
30	74.906	0.076	0.911	0.246	0.362	1.218	8.251	1.544	2.110	4.074	7.799	8.799
33	51.546	0.068	0.657	0.325	0.297	1.631	4.702	0.958	1.486	2.647	4.639	5.341
36	32.240	0.055	1.143	0.214	0.233	1.576	2.820	0.466	0.955	1.757	3.145	3.602
39	19.033	0.025	1.086	0.143	0.138	1.069	1.826	0.264	0.633	1.280	2.128	2.483
42	9.235	0.016	0.544	0.040	0.071	0.452	0.914	0.133	0.385	0.727	0.989	1.228
45	5.698	0.013	0.265	0.021	0.034	0.211	0.507	0.057	0.276	0.409	0.535	0.673
48	3.398	0.008	0.090	0.018	0.029	0.090	0.257	0.043	0.263	0.318	0.231	0.393
52	1.539	0.003	0.063	0.010	0.052	0.039	0.120	0.024	0.330	0.345	0.114	0.363
56	1.033	0.009	0.115	0.030	0.075	0.078	0.123	0.025	0.565	0.580	0.156	0.601
60	0.251	0.006	0.036	0.007	0.111	0.042	0.071	0.016	0.770	0.782	0.044	0.783
64	-0.641	0.034	0.321	0.060	0.232	0.308	0.423	0.044	1.363	1.464	0.388	1.515
68	-0.987	0.038	0.369	0.072	0.308	0.349	0.487	0.049	1.757	1.866	0.452	1.920

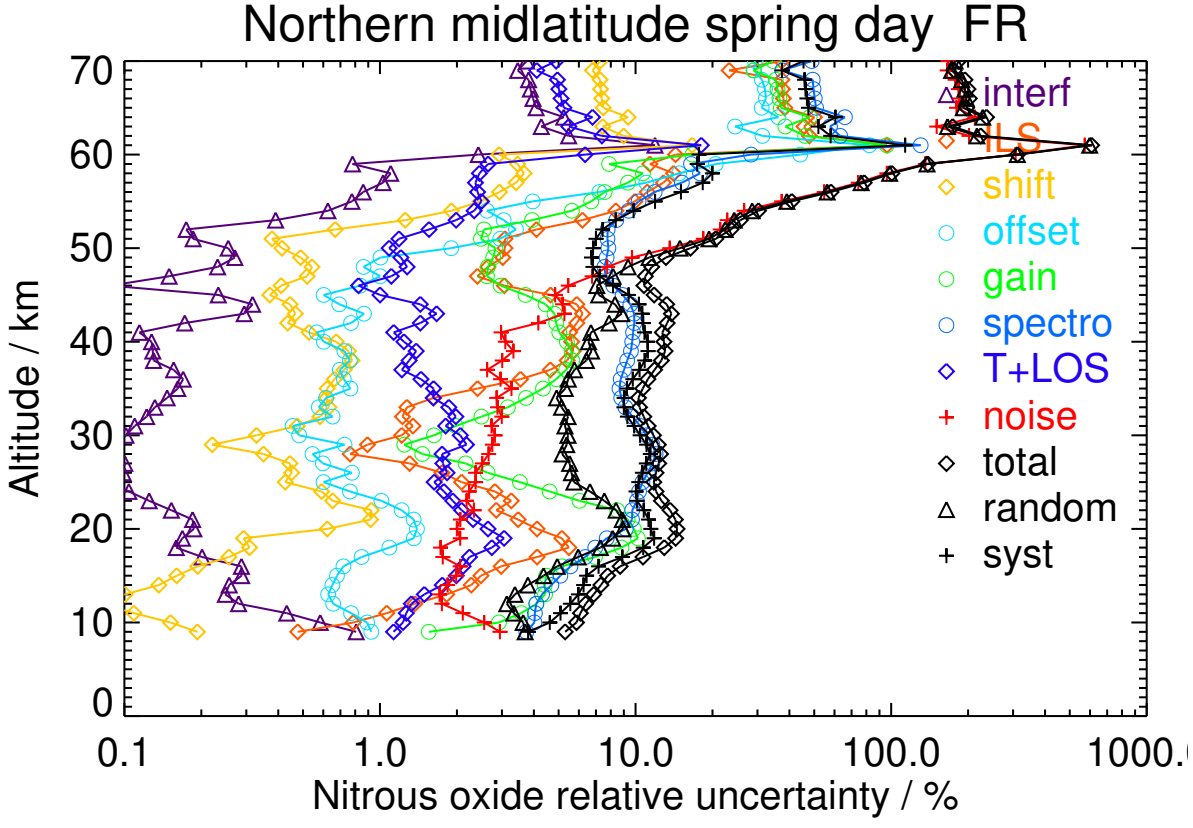

Figure S147. V8H_N2O_61 Northern midlatitude spring day

Table S148. Nitrous oxide error budget for Northern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	287.091	1.978	0.180	0.445	2.370	6.426	11.659	3.063	7.045	8.389	13.252	15.685
12	293.629	0.789	4.111	0.262	1.837	12.948	11.683	3.777	4.874	8.798	16.903	19.055
15	270.668	0.796	6.835	0.363	1.858	13.129	13.948	5.310	5.366	11.850	18.287	21.790
18	216.620	0.271	8.126	0.594	1.811	14.875	16.635	4.451	3.518	15.271	19.149	24.493
21	164.124	0.297	7.853	1.718	2.044	13.704	17.349	3.646	3.492	17.162	16.989	24.149
24	147.846	0.155	3.915	0.473	0.999	5.088	13.808	2.433	3.090	8.991	12.951	15.767
27	126.428	0.128	1.302	0.705	0.701	2.028	13.413	2.079	2.727	4.686	13.286	14.088
30	87.384	0.083	0.659	0.309	0.386	1.563	8.914	1.611	2.048	3.857	8.632	9.454
33	63.108	0.077	1.099	0.361	0.331	1.741	6.308	1.085	1.571	3.606	5.909	6.923
36	35.218	0.059	1.149	0.226	0.263	1.806	3.454	0.534	1.004	2.008	3.728	4.234
39	19.953	0.031	0.932	0.169	0.160	1.152	1.907	0.289	0.647	1.303	2.166	2.527
42	9.336	0.015	0.538	0.064	0.075	0.516	0.966	0.126	0.353	0.766	1.026	1.280
45	5.565	0.017	0.307	0.027	0.041	0.282	0.516	0.068	0.286	0.460	0.563	0.727
48	3.324	0.006	0.050	0.028	0.031	0.071	0.217	0.043	0.257	0.289	0.202	0.353
52	1.718	0.003	0.065	0.010	0.055	0.044	0.125	0.021	0.344	0.358	0.125	0.379
56	1.113	0.009	0.099	0.028	0.065	0.076	0.108	0.025	0.524	0.537	0.135	0.554
60	0.471	0.005	0.024	0.009	0.122	0.023	0.065	0.016	0.852	0.862	0.049	0.864
64	-0.375	0.031	0.163	0.054	0.221	0.217	0.282	0.039	1.322	1.362	0.319	1.398
68	-0.802	0.034	0.181	0.064	0.298	0.248	0.313	0.043	1.714	1.758	0.366	1.796

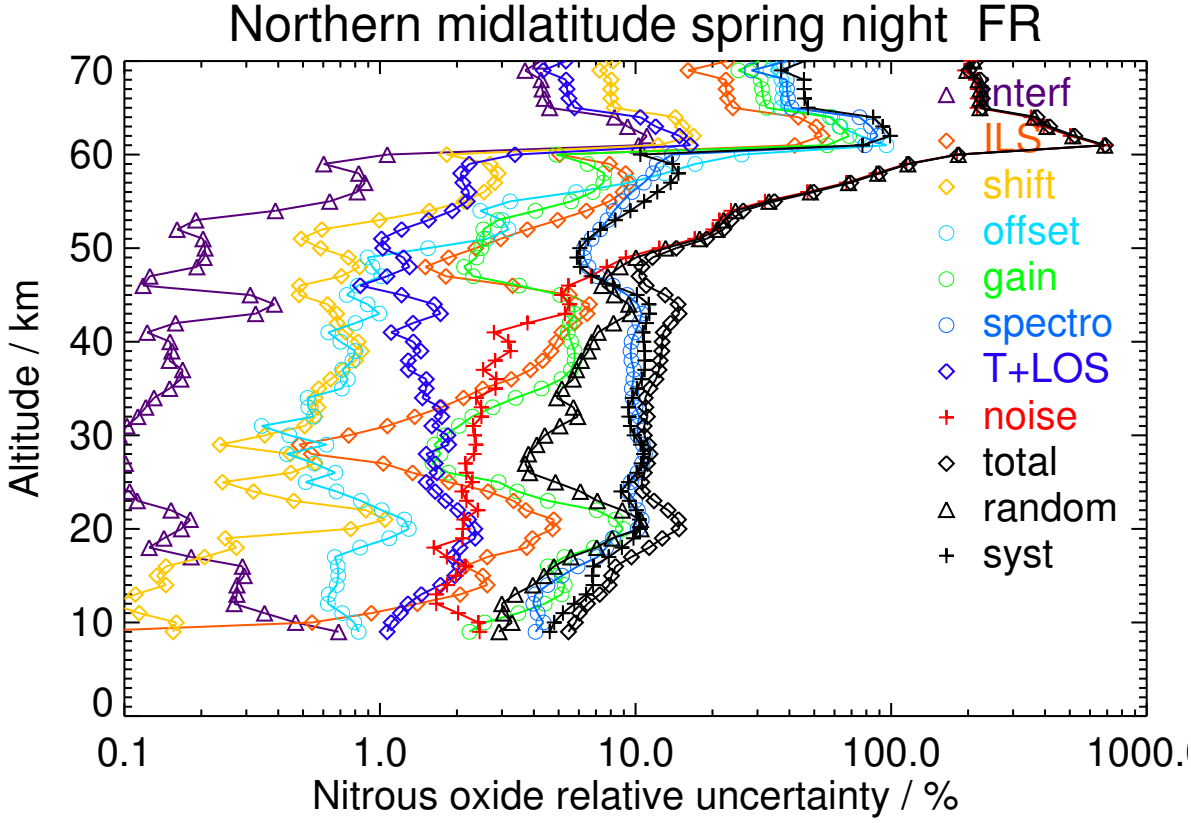

Figure S148. V8H_N2O_61 Northern midlatitude spring night

Table S149. Nitrous oxide error budget for Northern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	325.507	1.162	8.928	0.301	2.436	14.775	13.937	4.643	6.539	12.124	20.419	23.748
15	328.325	1.033	14.610	0.457	2.711	16.347	15.467	6.831	7.357	15.298	24.399	28.798
18	289.498	0.716	6.337	0.557	1.917	13.121	19.540	5.003	5.097	13.488	21.627	25.488
21	200.527	0.320	11.230	1.106	1.662	5.513	25.003	4.334	4.127	9.788	26.940	28.663
24	159.233	0.169	6.388	0.640	1.248	3.216	17.312	3.268	3.403	6.410	18.276	19.367
27	127.974	0.124	1.890	0.840	0.857	1.720	12.744	2.447	2.856	4.570	12.793	13.585
30	92.066	0.087	0.412	0.281	0.492	1.615	10.289	1.937	2.030	3.393	10.263	10.810
33	49.380	0.055	1.001	0.339	0.290	1.284	4.898	1.054	1.379	2.118	5.037	5.464
36	30.614	0.039	1.234	0.205	0.217	1.427	2.873	0.471	0.870	1.372	3.316	3.589
39	15.299	0.019	0.886	0.104	0.117	0.933	1.641	0.251	0.509	0.956	1.944	2.167
42	6.556	0.009	0.321	0.037	0.052	0.379	0.696	0.085	0.247	0.528	0.724	0.896
45	3.317	0.012	0.197	0.014	0.037	0.234	0.361	0.070	0.274	0.441	0.334	0.553
48	1.707	0.006	0.061	0.023	0.034	0.086	0.186	0.035	0.235	0.299	0.119	0.322
52	1.370	0.004	0.052	0.009	0.052	0.056	0.116	0.014	0.327	0.351	0.076	0.359
56	1.000	0.009	0.067	0.020	0.050	0.067	0.109	0.022	0.424	0.443	0.087	0.451
60	0.699	0.005	0.049	0.015	0.127	0.037	0.094	0.021	0.885	0.898	0.081	0.901
64	-1.529	0.045	0.246	0.075	0.195	0.361	0.450	0.063	1.180	1.223	0.584	1.355
68	-2.459	0.054	0.296	0.097	0.277	0.446	0.569	0.074	1.594	1.641	0.744	1.802

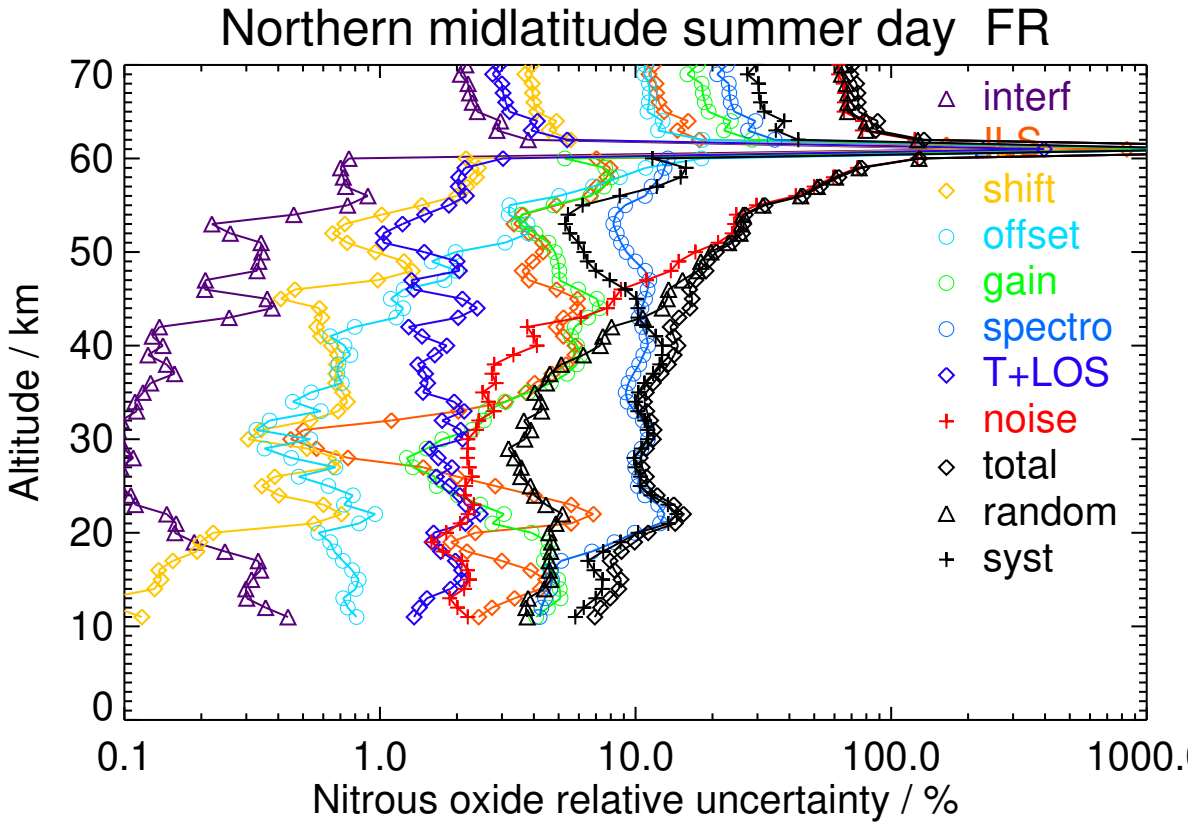

Figure S149. V8H_N2O_61 Northern midlatitude summer day

Table S150. Nitrous oxide error budget for Northern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	321.032	1.237	6.139	0.303	2.472	12.113	12.284	4.666	6.900	11.432	16.784	20.308
15	321.694	0.978	9.842	0.155	2.101	14.145	13.423	5.640	6.107	13.198	19.427	23.487
18	273.812	0.628	5.145	0.330	1.472	8.748	19.129	4.966	5.004	12.354	19.200	22.832
21	194.118	0.286	9.944	0.625	1.296	2.834	24.039	4.036	3.906	7.290	25.794	26.804
24	151.936	0.163	6.211	0.329	1.094	2.751	16.942	3.195	3.312	5.631	17.999	18.859
27	126.456	0.117	1.769	0.668	0.744	1.437	13.436	2.300	2.745	4.206	13.486	14.127
30	83.408	0.083	0.308	0.127	0.440	1.538	9.226	1.694	1.915	3.179	9.178	9.713
33	49.115	0.055	0.924	0.340	0.268	1.152	4.843	0.902	1.328	2.002	4.939	5.329
36	26.689	0.043	0.959	0.129	0.159	0.989	2.704	0.409	0.845	1.213	2.943	3.183
39	13.688	0.024	0.591	0.087	0.088	0.649	1.276	0.194	0.489	0.769	1.449	1.640
42	7.167	0.011	0.251	0.040	0.046	0.332	0.566	0.070	0.252	0.465	0.592	0.752
45	5.022	0.017	0.249	0.020	0.047	0.316	0.386	0.075	0.304	0.453	0.455	0.642
48	3.774	0.008	0.145	0.039	0.045	0.231	0.372	0.038	0.263	0.467	0.261	0.536
52	1.885	0.005	0.093	0.014	0.056	0.077	0.210	0.025	0.378	0.428	0.150	0.454
56	1.048	0.011	0.062	0.024	0.045	0.055	0.119	0.028	0.399	0.419	0.090	0.429
60	1.257	0.005	0.049	0.015	0.156	0.030	0.088	0.019	1.081	1.094	0.082	1.097
64	0.072	0.038	0.171	0.061	0.180	0.219	0.280	0.043	1.169	1.193	0.372	1.250
68	-0.434	0.048	0.228	0.084	0.240	0.290	0.374	0.053	1.428	1.460	0.504	1.544

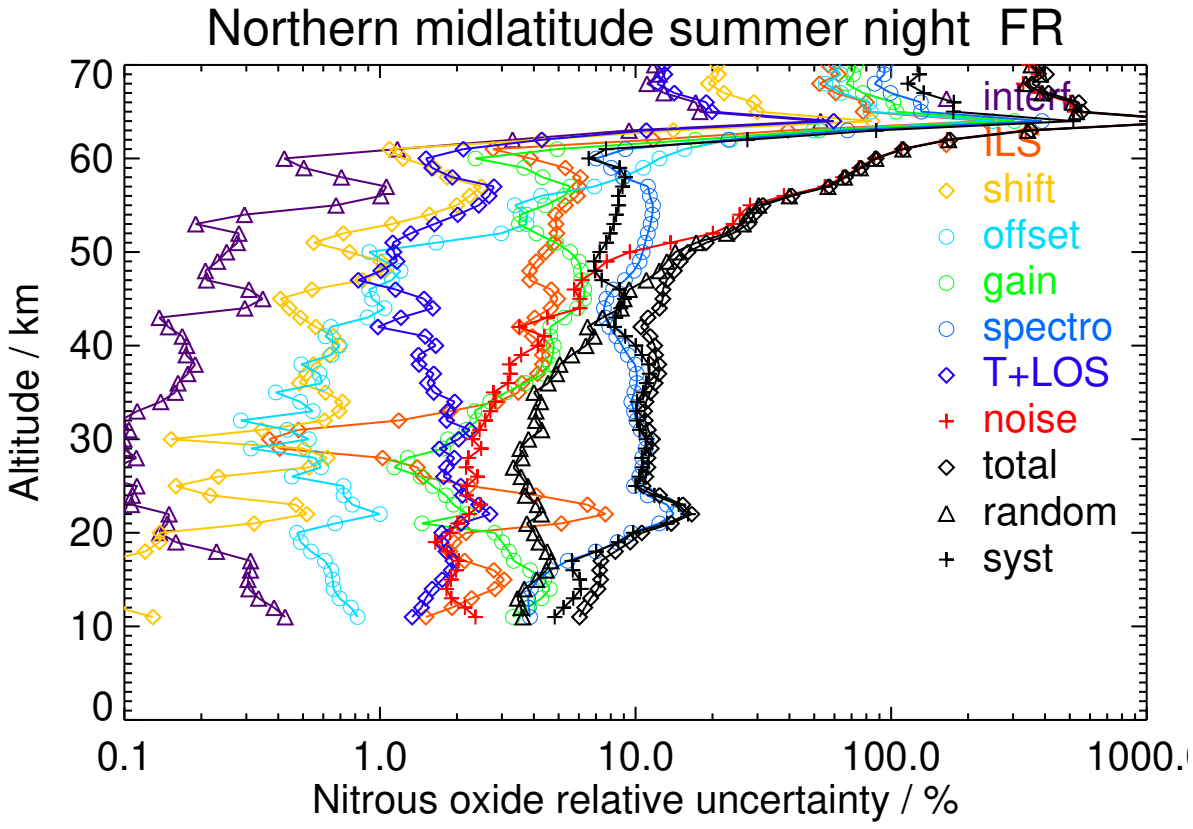

Figure S150. V8H_N2O_61 Northern midlatitude summer night

Table S151. Nitrous oxide error budget for Northern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	329.761	1.181	9.979	0.245	2.901	13.423	14.562	5.434	7.468	14.832	19.157	24.227
15	327.229	1.062	13.716	0.303	2.595	15.984	16.023	6.652	6.572	16.997	22.514	28.209
18	271.923	0.652	15.359	0.492	2.262	16.042	17.839	7.184	5.092	22.878	19.272	29.914
21	191.734	0.301	11.240	0.776	1.809	10.117	27.204	5.024	4.293	17.826	26.431	31.881
24	138.949	0.118	8.068	0.562	1.139	4.011	18.018	3.025	3.551	8.044	19.092	20.718
27	112.199	0.094	2.031	0.304	0.740	1.505	12.399	1.965	2.829	5.003	12.150	13.140
30	83.644	0.077	0.723	0.133	0.453	1.306	9.454	1.527	2.090	4.324	8.935	9.926
33	51.952	0.055	0.868	0.241	0.287	1.372	5.677	0.904	1.505	3.306	5.212	6.172
36	33.025	0.047	0.933	0.150	0.241	1.430	3.095	0.444	1.088	2.047	3.125	3.736
39	23.614	0.034	0.965	0.192	0.212	1.418	1.855	0.279	0.710	1.394	2.259	2.654
42	15.459	0.014	0.735	0.122	0.126	0.974	1.294	0.169	0.428	0.980	1.564	1.845
45	9.040	0.020	0.474	0.041	0.092	0.625	0.895	0.135	0.462	0.837	0.979	1.288
48	4.833	0.005	0.138	0.037	0.062	0.168	0.469	0.055	0.377	0.513	0.394	0.646
52	3.477	0.008	0.126	0.019	0.066	0.109	0.254	0.034	0.482	0.501	0.283	0.575
56	1.527	0.013	0.047	0.022	0.061	0.049	0.148	0.037	0.502	0.518	0.130	0.534
60	0.282	0.014	0.054	0.011	0.203	0.048	0.088	0.025	1.348	1.366	0.076	1.368
64	-0.940	0.029	0.144	0.040	0.215	0.213	0.240	0.054	1.413	1.437	0.324	1.473
68	-1.239	0.033	0.163	0.054	0.244	0.278	0.300	0.064	1.506	1.536	0.410	1.590

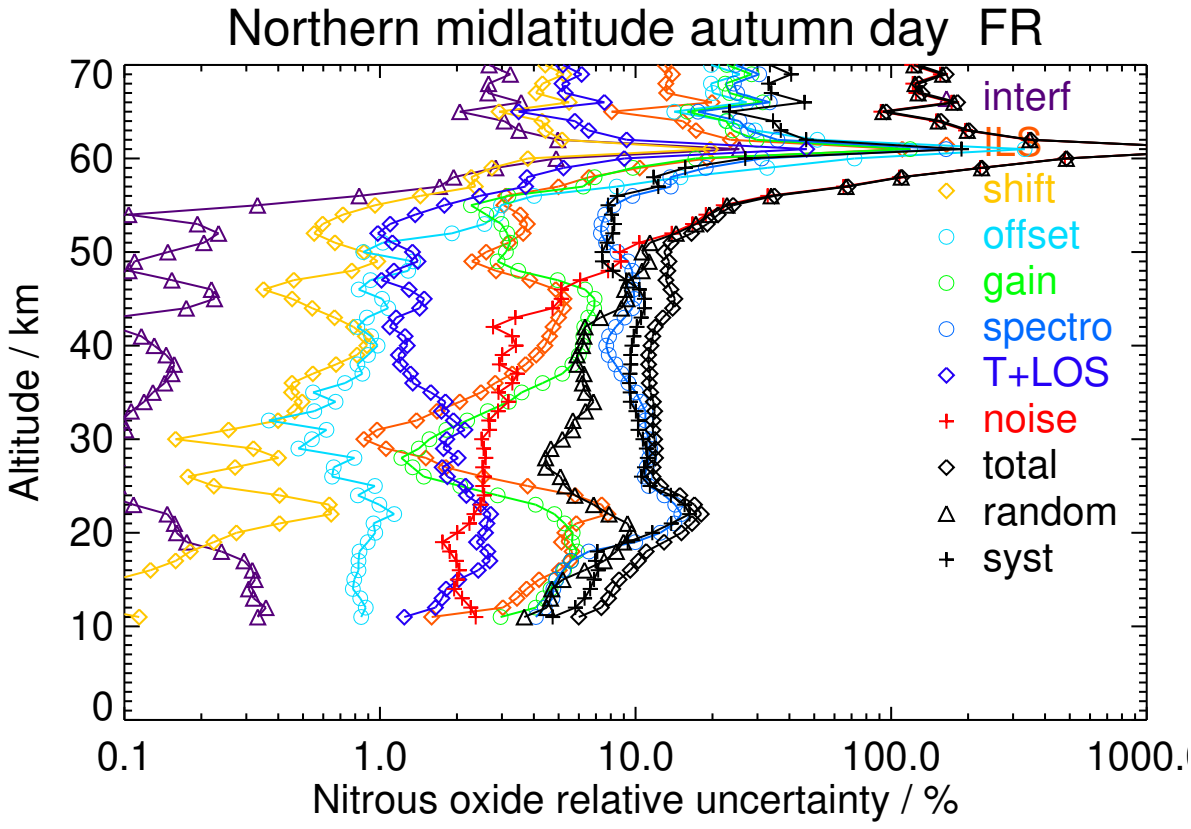

Figure S151. V8H_N2O_61 Northern midlatitude autumn day

Table S152. Nitrous oxide error budget for Northern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	305.986	1.784	3.312	0.507	2.684	11.972	11.897	3.304	7.279	11.435	15.480	19.246
12	323.099	0.843	5.993	0.422	2.354	14.695	12.709	4.260	5.684	10.935	18.727	21.686
15	317.796	0.784	10.103	0.560	2.264	17.443	13.366	5.787	5.872	13.311	21.950	25.671
18	278.058	0.462	16.349	0.783	2.359	19.570	15.949	7.529	5.221	20.819	23.697	31.543
21	202.219	0.325	12.053	0.826	2.257	15.135	21.675	5.770	4.359	21.077	21.403	30.039
24	150.996	0.157	9.126	0.995	1.409	7.513	18.341	3.347	3.570	11.571	19.214	22.429
27	118.141	0.101	2.159	0.352	0.741	2.712	14.348	2.058	2.883	6.186	13.887	15.203
30	76.288	0.064	1.042	0.159	0.373	1.478	9.308	1.493	2.009	4.448	8.750	9.815
33	49.085	0.048	0.979	0.230	0.251	1.611	5.526	0.882	1.367	3.359	5.057	6.071
36	28.568	0.042	1.127	0.159	0.193	1.422	3.304	0.444	0.897	2.445	3.049	3.909
39	18.159	0.027	0.894	0.127	0.145	1.138	1.944	0.238	0.591	1.631	1.912	2.513
42	11.585	0.013	0.611	0.081	0.101	0.778	1.146	0.156	0.431	1.107	1.138	1.587
45	7.123	0.015	0.385	0.040	0.076	0.463	0.729	0.120	0.428	0.749	0.734	1.049
48	3.753	0.004	0.126	0.025	0.057	0.136	0.365	0.045	0.373	0.474	0.297	0.559
52	2.819	0.008	0.137	0.017	0.063	0.131	0.222	0.033	0.479	0.518	0.228	0.566
56	1.585	0.010	0.061	0.021	0.066	0.097	0.130	0.038	0.511	0.534	0.109	0.545
60	0.544	0.016	0.096	0.016	0.209	0.113	0.116	0.030	1.317	1.345	0.086	1.347
64	-0.318	0.027	0.145	0.036	0.233	0.222	0.210	0.047	1.450	1.486	0.261	1.509
68	-0.643	0.025	0.140	0.040	0.251	0.237	0.219	0.047	1.517	1.555	0.272	1.578

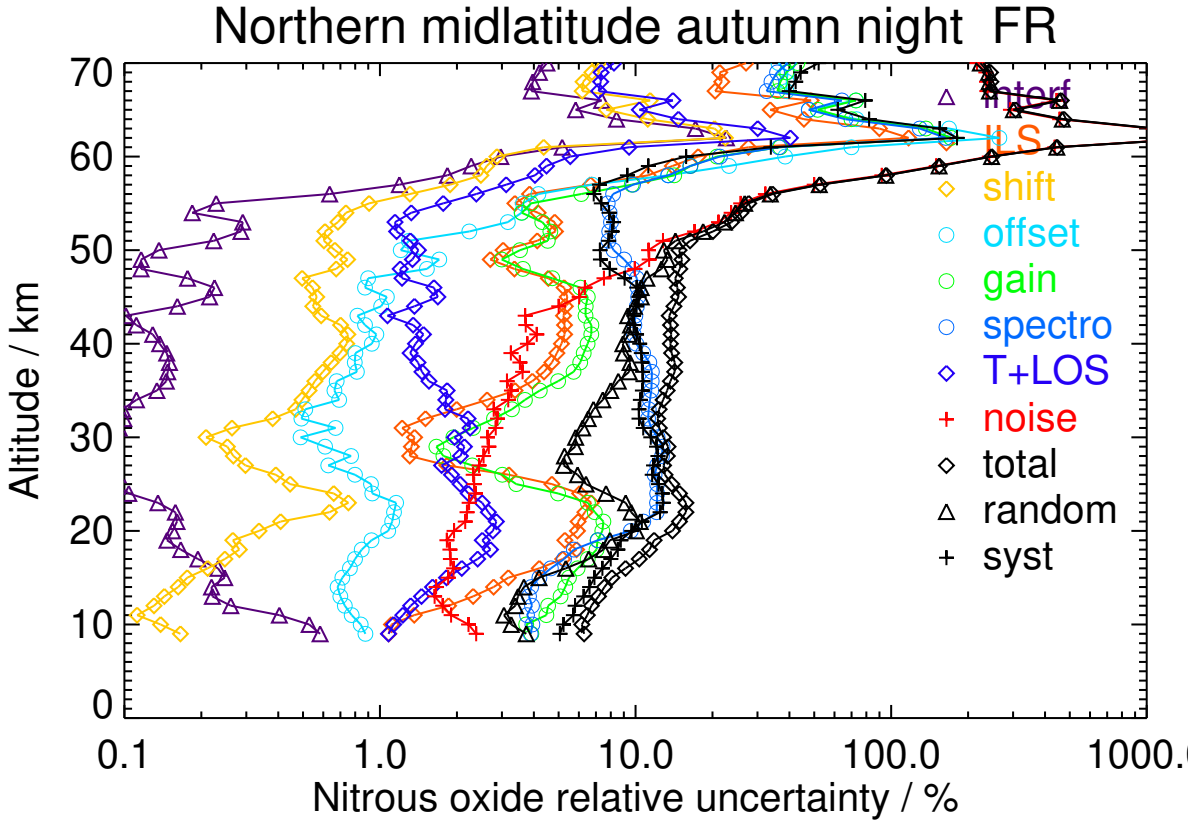

Figure S152. V8H_N2O_61 Northern midlatitude autumn night

Table S153. Nitrous oxide error budget for Tropics day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	339.045	1.133	11.457	1.384	2.415	13.349	17.333	5.042	7.605	14.154	22.402	26.499
15	342.644	1.590	17.717	2.232	3.521	10.696	23.521	8.735	9.470	16.961	29.661	34.167
18	320.546	1.160	12.006	1.824	3.118	7.629	16.328	7.478	8.009	15.747	18.854	24.564
21	284.343	0.519	4.141	0.527	2.369	3.881	21.962	5.072	6.481	9.823	22.180	24.258
24	270.109	0.192	6.618	0.832	1.233	5.271	24.586	3.695	4.500	6.970	25.761	26.687
27	236.494	0.111	2.021	0.884	0.902	4.368	22.989	3.148	3.697	5.996	23.257	24.018
30	196.282	0.088	2.024	0.507	0.565	4.212	19.044	2.548	2.775	5.326	19.259	19.982
33	142.918	0.073	1.232	0.710	0.449	3.178	12.808	1.739	2.148	3.869	13.001	13.565
36	90.103	0.068	2.490	0.570	0.409	2.850	7.447	0.917	1.336	2.450	8.179	8.538
39	49.489	0.057	2.347	0.350	0.324	2.614	4.446	0.501	0.800	1.415	5.588	5.765
42	24.588	0.019	1.667	0.202	0.246	1.997	2.718	0.308	0.610	1.291	3.613	3.837
45	10.332	0.010	0.595	0.023	0.075	0.695	1.262	0.119	0.340	0.704	1.439	1.602
48	3.989	0.008	0.094	0.068	0.047	0.163	0.425	0.079	0.298	0.443	0.349	0.564
52	2.479	0.003	0.084	0.015	0.051	0.093	0.160	0.034	0.318	0.343	0.169	0.382
56	1.360	0.009	0.118	0.029	0.092	0.164	0.197	0.037	0.642	0.673	0.224	0.709
60	0.209	0.011	0.048	0.013	0.114	0.126	0.149	0.032	0.801	0.823	0.141	0.835
64	-1.210	0.038	0.201	0.071	0.248	0.490	0.544	0.093	1.468	1.516	0.715	1.676
68	-1.455	0.043	0.229	0.084	0.306	0.560	0.629	0.104	1.770	1.824	0.826	2.002

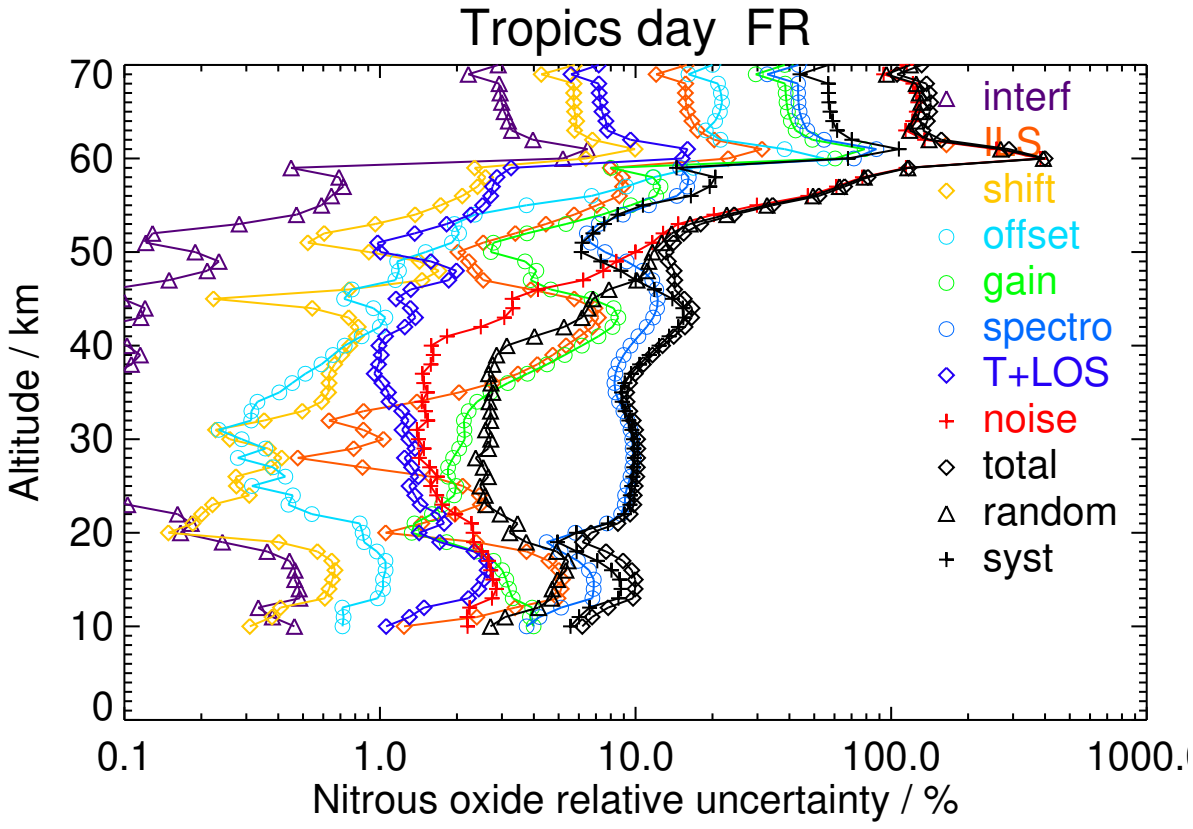

Figure S153. V8H_N2O_61 Tropics day

Table S154. Nitrous oxide error budget for Tropics night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	338.906	1.175	3.068	0.928	2.022	15.548	14.909	4.132	7.181	11.083	20.629	23.418
15	339.080	1.625	12.064	2.845	3.370	10.229	18.782	7.564	9.005	19.311	19.759	27.628
18	327.831	1.294	8.719	2.363	3.322	8.160	16.584	6.937	8.320	16.126	17.123	23.521
21	298.023	0.587	4.520	0.711	2.417	4.182	24.741	5.079	6.816	10.032	25.066	26.999
24	275.612	0.223	4.471	0.628	1.247	5.098	24.461	3.812	4.628	6.841	25.209	26.121
27	248.078	0.116	0.796	1.025	0.905	4.999	21.788	3.175	3.719	5.751	22.205	22.937
30	213.112	0.092	1.613	0.620	0.599	4.441	20.258	2.760	2.836	4.993	20.596	21.192
33	155.545	0.081	1.662	0.793	0.451	3.201	13.213	1.818	2.259	3.675	13.541	14.030
36	99.971	0.076	2.552	0.554	0.444	3.046	7.674	0.960	1.431	2.408	8.506	8.840
39	54.845	0.066	2.253	0.368	0.319	2.591	4.597	0.550	0.877	1.437	5.672	5.851
42	26.277	0.016	1.544	0.215	0.222	1.929	2.734	0.289	0.583	1.076	3.597	3.755
45	11.233	0.016	0.691	0.045	0.094	0.831	1.364	0.135	0.394	0.681	1.658	1.793
48	3.931	0.009	0.113	0.078	0.049	0.167	0.419	0.086	0.304	0.434	0.369	0.570
52	2.450	0.003	0.068	0.013	0.055	0.075	0.136	0.029	0.336	0.354	0.142	0.381
56	1.411	0.008	0.130	0.034	0.075	0.187	0.197	0.036	0.530	0.555	0.267	0.616
60	0.275	0.006	0.019	0.008	0.110	0.054	0.082	0.023	0.781	0.792	0.079	0.796
64	-1.056	0.042	0.238	0.088	0.233	0.591	0.653	0.108	1.360	1.427	0.849	1.660
68	-1.251	0.048	0.271	0.106	0.301	0.687	0.769	0.125	1.724	1.799	0.996	2.056

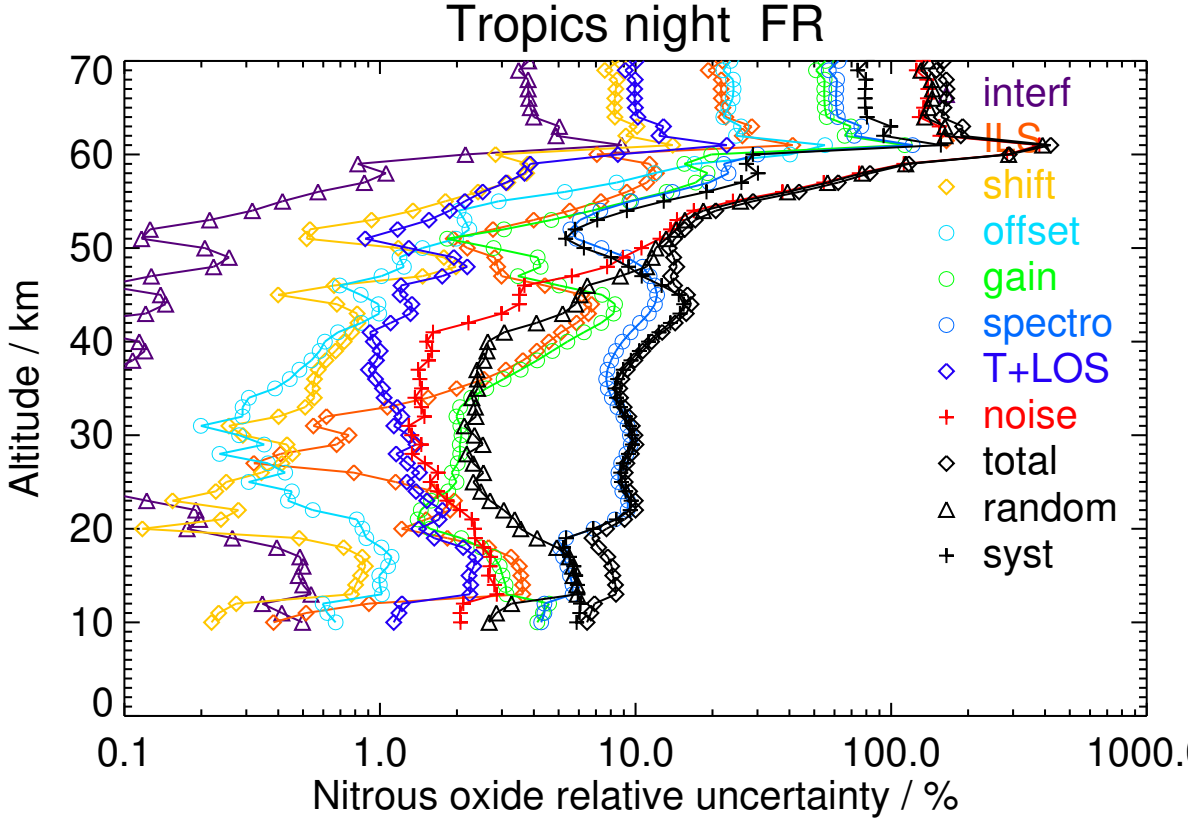

Figure S154. V8H_N2O_61 Tropics night

Table S155. Nitrous oxide error budget for Southern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	317.458	2.966	2.464	0.341	3.085	11.436	12.508	4.663	8.069	11.606	16.245	19.965
12	302.769	0.692	4.838	0.365	2.291	11.664	12.666	4.600	6.119	10.081	16.814	19.605
15	293.801	0.667	8.686	0.558	1.963	13.524	13.690	5.982	5.687	11.310	19.763	22.771
18	277.230	0.480	16.436	0.893	2.368	20.529	14.634	9.558	5.582	17.798	26.798	32.170
21	232.914	0.431	5.328	0.987	2.196	16.013	20.403	5.574	4.703	11.979	24.834	27.573
24	171.451	0.220	6.214	1.504	1.350	8.797	21.298	3.301	4.101	9.482	22.617	24.525
27	142.070	0.144	2.111	0.697	0.862	4.730	15.355	2.590	3.536	6.751	15.411	16.825
30	110.185	0.096	1.261	0.363	0.522	2.715	14.781	2.291	2.739	6.682	13.999	15.512
33	45.146	0.045	1.892	0.219	0.292	1.196	8.031	1.270	1.685	4.420	7.386	8.608
36	17.891	0.032	0.885	0.115	0.161	0.828	2.994	0.457	0.945	2.293	2.513	3.402
39	7.097	0.011	0.412	0.072	0.066	0.381	1.347	0.182	0.535	1.137	1.080	1.568
42	2.650	0.008	0.146	0.037	0.048	0.225	0.384	0.085	0.331	0.535	0.232	0.583
45	2.329	0.009	0.131	0.054	0.079	0.399	0.156	0.093	0.370	0.543	0.246	0.596
48	1.899	0.003	0.046	0.012	0.064	0.076	0.153	0.023	0.428	0.453	0.118	0.468
52	1.671	0.007	0.100	0.017	0.073	0.076	0.135	0.027	0.544	0.568	0.113	0.580
56	1.078	0.013	0.100	0.026	0.082	0.119	0.102	0.042	0.575	0.606	0.089	0.612
60	0.452	0.019	0.110	0.027	0.212	0.089	0.105	0.036	1.368	1.395	0.061	1.396
64	-0.232	0.022	0.107	0.033	0.237	0.120	0.115	0.038	1.488	1.516	0.109	1.520
68	-0.257	0.015	0.059	0.024	0.257	0.158	0.089	0.037	1.536	1.564	0.135	1.570

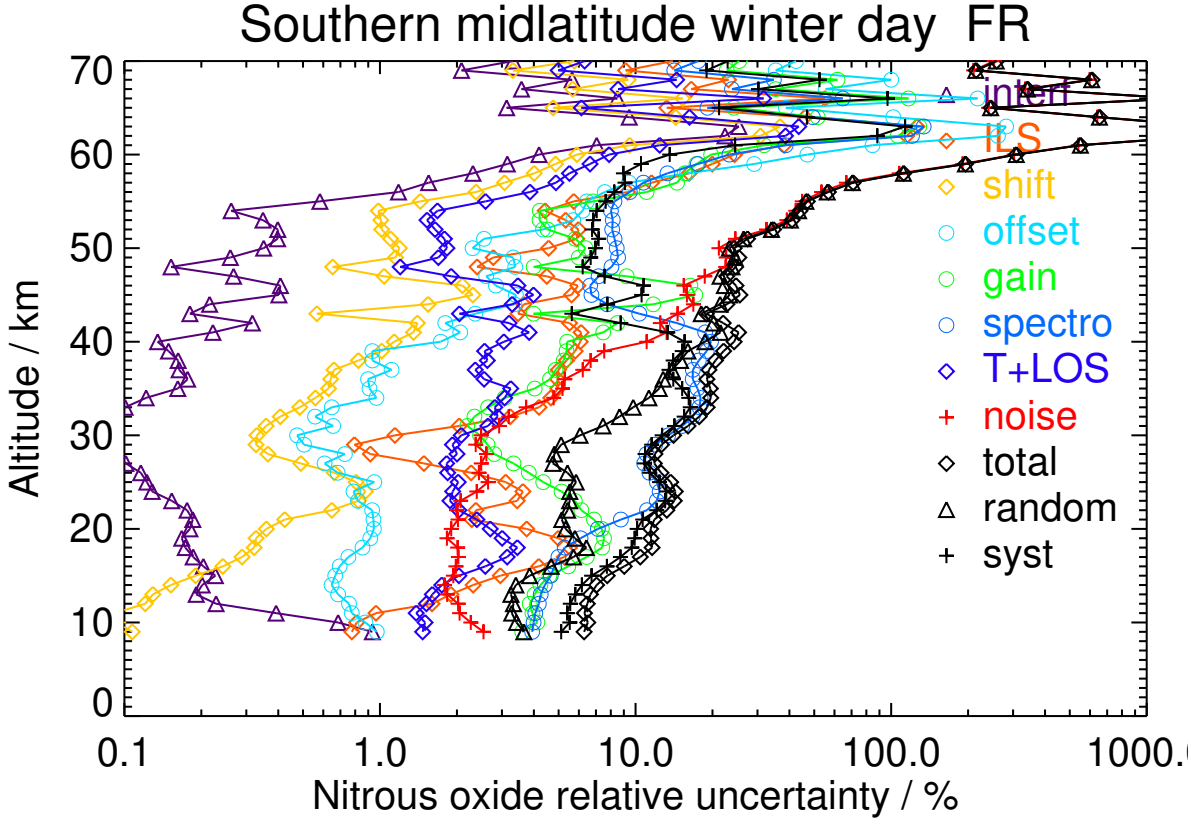

Figure S155. V8H_N2O_61 Southern midlatitude winter day

Table S156. Nitrous oxide error budget for Southern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	315.983	3.334	2.130	0.274	3.022	12.635	12.355	4.785	7.648	12.423	16.254	20.458
12	309.977	0.880	5.113	0.315	2.131	12.508	12.162	4.009	5.628	10.574	16.487	19.587
15	295.714	0.769	9.649	0.634	1.982	12.988	14.059	5.168	5.426	14.269	17.802	22.815
18	261.545	0.536	11.170	0.710	2.089	15.317	15.323	6.226	5.167	16.213	20.049	25.784
21	202.054	0.313	6.941	0.760	1.703	10.691	20.017	4.424	4.345	14.413	19.936	24.601
24	152.534	0.133	7.717	1.146	1.464	8.301	18.110	3.561	4.034	12.214	18.430	22.110
27	126.487	0.103	2.238	0.351	0.924	3.903	13.530	2.445	3.351	7.401	12.913	14.883
30	97.602	0.084	1.166	0.308	0.498	2.145	12.291	1.996	2.468	6.476	11.204	12.941
33	45.950	0.044	1.544	0.190	0.268	1.649	7.143	1.148	1.555	4.211	6.499	7.744
36	17.836	0.029	0.838	0.093	0.171	1.088	2.882	0.452	0.876	2.269	2.461	3.347
39	7.550	0.009	0.426	0.066	0.067	0.483	1.177	0.184	0.481	0.961	1.072	1.440
42	2.593	0.006	0.140	0.021	0.036	0.127	0.384	0.079	0.319	0.456	0.293	0.542
45	2.259	0.004	0.048	0.015	0.053	0.112	0.163	0.061	0.362	0.406	0.119	0.423
48	2.039	0.004	0.041	0.009	0.062	0.048	0.121	0.019	0.419	0.436	0.093	0.446
52	1.999	0.010	0.112	0.019	0.066	0.111	0.162	0.029	0.521	0.549	0.163	0.573
56	1.253	0.021	0.082	0.024	0.085	0.121	0.133	0.039	0.599	0.634	0.075	0.639
60	0.683	0.029	0.135	0.029	0.235	0.145	0.152	0.043	1.442	1.479	0.121	1.484
64	0.214	0.028	0.124	0.029	0.267	0.164	0.162	0.045	1.636	1.671	0.167	1.679
68	0.051	0.025	0.118	0.027	0.261	0.170	0.164	0.040	1.607	1.642	0.173	1.651

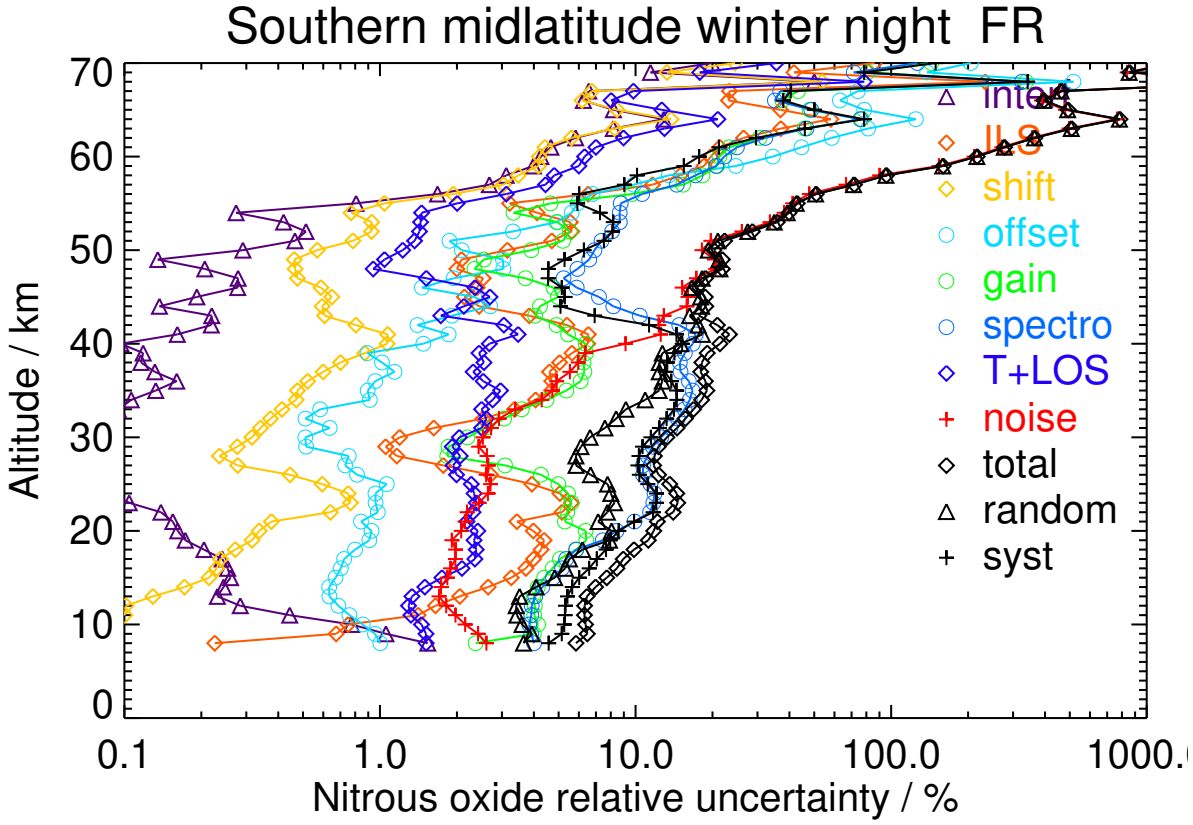

Figure S156. V8H_N2O_61 Southern midlatitude winter night

Table S157. Nitrous oxide error budget for Southern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	288.307	3.389	1.985	0.467	2.533	6.812	13.327	3.812	7.782	11.573	13.682	17.921
12	302.168	1.210	5.694	0.268	2.033	13.451	13.678	4.512	5.580	13.168	16.858	21.392
15	280.625	1.133	10.322	0.463	2.415	16.732	16.998	6.345	6.151	21.389	17.417	27.584
18	259.269	0.668	22.177	1.266	3.190	25.874	18.698	9.353	5.132	32.027	24.722	40.459
21	182.433	0.352	12.609	1.140	2.043	15.501	21.077	5.395	4.105	22.506	19.712	29.918
24	140.118	0.147	10.070	1.548	1.403	9.776	17.459	3.263	3.432	15.915	16.592	22.991
27	133.851	0.130	4.138	0.360	0.971	5.366	15.314	2.220	2.799	11.008	13.157	17.155
30	100.567	0.097	1.636	0.226	0.451	2.135	12.974	1.662	2.149	6.943	11.619	13.536
33	42.536	0.047	1.438	0.154	0.220	0.970	6.155	1.062	1.288	3.656	5.512	6.614
36	20.695	0.042	0.708	0.117	0.141	0.962	2.081	0.385	0.753	1.682	1.918	2.551
39	13.863	0.022	0.525	0.089	0.105	0.759	1.169	0.178	0.475	1.011	1.214	1.580
42	10.759	0.013	0.399	0.094	0.097	0.687	0.729	0.143	0.386	0.752	0.886	1.162
45	7.537	0.017	0.253	0.082	0.117	0.736	0.576	0.141	0.393	0.803	0.698	1.064
48	5.020	0.006	0.138	0.019	0.061	0.331	0.410	0.055	0.319	0.498	0.397	0.637
52	2.733	0.008	0.110	0.019	0.045	0.130	0.240	0.033	0.366	0.411	0.234	0.473
56	1.144	0.008	0.049	0.018	0.055	0.063	0.126	0.033	0.411	0.430	0.104	0.442
60	0.705	0.017	0.071	0.018	0.188	0.122	0.094	0.027	1.099	1.124	0.098	1.129
64	-0.229	0.031	0.135	0.046	0.220	0.329	0.217	0.053	1.297	1.345	0.320	1.382
68	-0.239	0.038	0.131	0.064	0.230	0.285	0.216	0.052	1.372	1.406	0.337	1.445

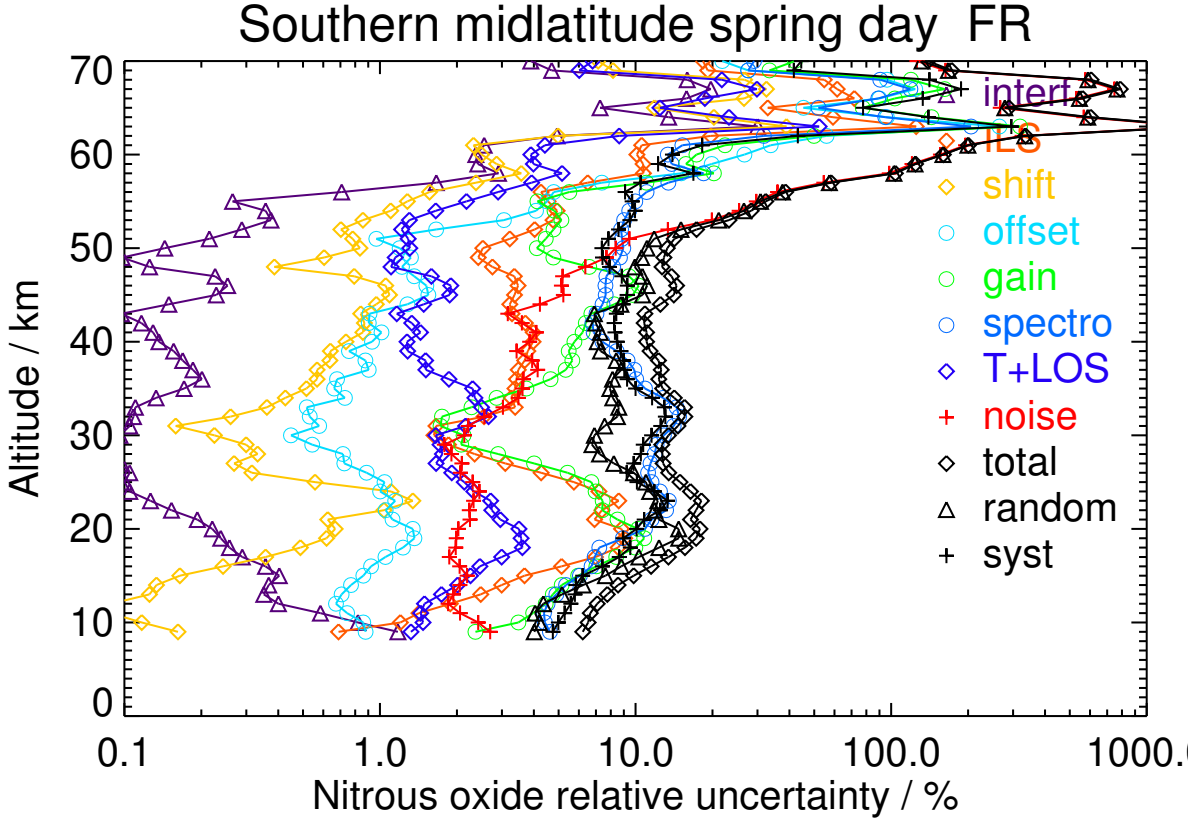

Figure S157. V8H_N2O_61 Southern midlatitude spring day

Table S158. Nitrous oxide error budget for Southern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	287.350	2.678	2.682	0.553	2.658	9.125	12.787	3.852	8.167	13.808	12.625	18.709
12	304.079	0.768	7.740	0.434	1.993	15.801	12.644	4.118	5.223	14.532	17.529	22.769
15	293.887	0.726	14.337	0.778	2.647	22.852	15.701	6.892	6.144	22.734	23.470	32.675
18	287.332	0.389	27.748	1.952	3.231	33.079	14.099	11.621	5.143	28.752	37.579	47.316
21	237.493	0.392	14.035	0.859	3.184	26.878	18.306	7.481	4.238	23.422	28.122	36.599
24	195.372	0.216	7.758	2.028	1.867	15.414	18.724	3.538	3.667	15.333	21.140	26.115
27	183.470	0.123	3.276	0.673	0.902	7.002	15.988	2.446	2.984	8.500	16.103	18.209
30	143.229	0.102	1.815	0.348	0.474	3.801	16.234	2.088	2.363	5.383	16.205	17.076
33	63.517	0.045	2.320	0.196	0.286	1.172	9.612	1.582	1.519	3.988	9.389	10.201
36	22.389	0.046	0.913	0.101	0.135	0.675	3.007	0.620	0.878	1.939	2.786	3.394
39	12.973	0.021	0.457	0.110	0.104	0.691	1.052	0.227	0.539	0.875	1.180	1.469
42	9.566	0.010	0.346	0.107	0.115	0.743	0.683	0.168	0.458	0.741	0.923	1.184
45	6.496	0.015	0.234	0.075	0.110	0.679	0.523	0.133	0.401	0.742	0.660	0.993
48	4.299	0.008	0.137	0.042	0.066	0.413	0.333	0.068	0.315	0.497	0.405	0.641
52	2.516	0.005	0.071	0.017	0.039	0.099	0.185	0.030	0.347	0.370	0.189	0.415
56	1.422	0.005	0.054	0.015	0.058	0.056	0.116	0.028	0.425	0.439	0.111	0.453
60	0.360	0.013	0.062	0.015	0.181	0.154	0.082	0.029	1.012	1.040	0.106	1.045
64	-0.416	0.022	0.056	0.029	0.219	0.275	0.124	0.044	1.241	1.278	0.228	1.298
68	-0.549	0.025	0.082	0.040	0.230	0.261	0.135	0.050	1.340	1.372	0.253	1.395

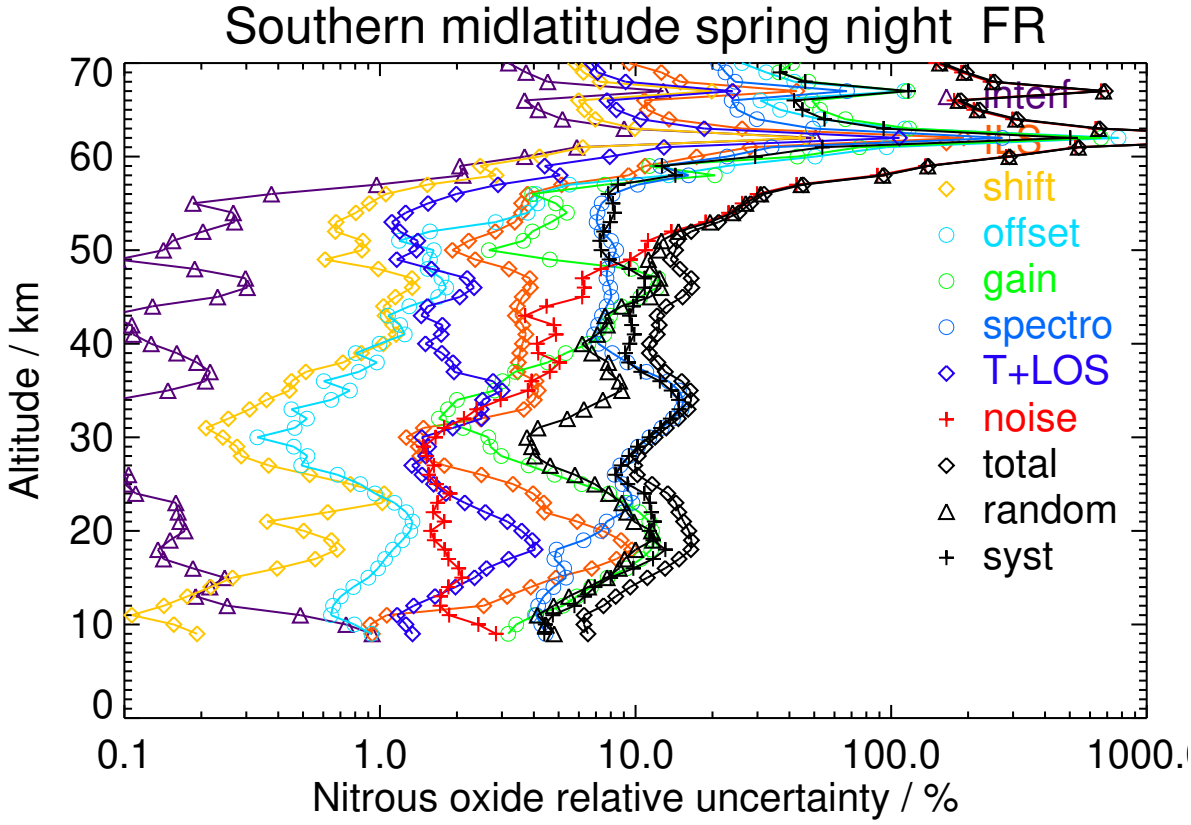

Figure S158. V8H_N2O_61 Southern midlatitude spring night

Table S159. Nitrous oxide error budget for Southern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	301.920	3.020	2.439	0.409	2.566	10.339	12.232	3.770	7.759	13.223	13.338	18.781
12	306.812	1.181	5.179	0.239	1.840	14.753	12.356	3.835	5.062	12.981	16.547	21.031
15	290.313	0.964	8.162	0.324	1.825	13.326	15.828	4.946	5.368	16.498	16.739	23.503
18	237.148	0.438	6.400	0.319	1.215	7.780	19.311	4.794	4.296	12.886	18.750	22.751
21	171.735	0.205	14.637	0.685	1.377	6.789	22.883	5.089	3.933	9.073	27.303	28.771
24	144.412	0.131	10.614	0.767	1.041	3.653	17.392	3.306	3.420	6.017	20.411	21.279
27	115.739	0.088	1.899	0.491	0.565	1.449	11.783	1.921	2.705	3.860	11.884	12.495
30	81.415	0.090	0.654	0.250	0.299	1.576	7.732	1.274	1.873	2.647	7.810	8.246
33	51.694	0.058	0.692	0.274	0.188	0.988	4.407	0.764	1.212	1.622	4.518	4.800
36	29.312	0.050	1.137	0.201	0.150	1.099	2.355	0.355	0.730	0.950	2.805	2.962
39	16.936	0.015	0.890	0.117	0.087	0.873	1.476	0.188	0.440	0.631	1.893	1.996
42	8.042	0.010	0.371	0.039	0.039	0.347	0.742	0.102	0.309	0.475	0.832	0.958
45	3.415	0.015	0.160	0.021	0.036	0.114	0.326	0.085	0.293	0.356	0.336	0.489
48	1.736	0.004	0.039	0.016	0.033	0.049	0.137	0.020	0.208	0.226	0.129	0.260
52	0.912	0.007	0.058	0.012	0.044	0.047	0.084	0.015	0.298	0.319	0.046	0.322
56	0.639	0.009	0.075	0.018	0.035	0.042	0.079	0.017	0.295	0.311	0.076	0.320
60	0.782	0.009	0.119	0.030	0.139	0.042	0.118	0.021	0.867	0.882	0.159	0.896
64	-0.456	0.033	0.142	0.055	0.145	0.235	0.282	0.038	0.953	0.976	0.373	1.044
68	-1.007	0.050	0.243	0.094	0.231	0.355	0.458	0.055	1.371	1.405	0.607	1.531

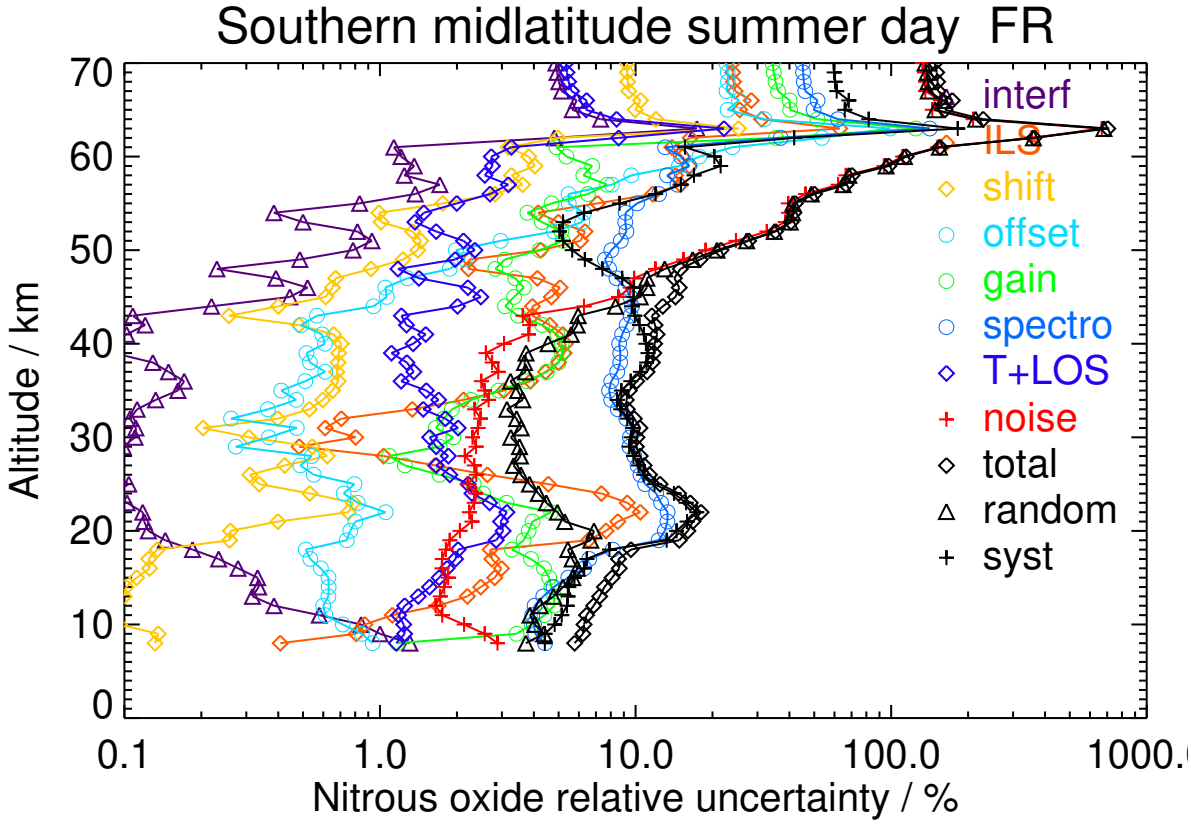

Figure S159. V8H_N2O_61 Southern midlatitude summer day

Table S160. Nitrous oxide error budget for Southern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	304.454	3.253	4.184	0.281	3.091	18.564	14.450	4.662	7.390	16.870	19.568	25.836
12	316.132	1.176	9.615	0.335	2.659	17.850	14.033	5.351	6.365	13.721	22.304	26.186
15	317.283	1.070	17.026	0.534	2.811	22.468	15.687	6.986	6.486	17.274	29.027	33.778
18	270.438	0.580	18.480	0.597	2.560	21.578	19.197	6.869	4.799	24.086	25.942	35.399
21	193.117	0.296	11.635	0.913	1.391	7.996	23.170	4.025	3.827	13.519	24.230	27.747
24	138.044	0.126	8.993	0.693	1.072	3.860	15.902	3.084	3.382	6.776	18.037	19.267
27	119.041	0.100	2.212	0.627	0.636	1.630	11.812	1.973	2.762	4.249	11.889	12.625
30	82.206	0.091	0.611	0.245	0.330	1.736	8.161	1.373	1.953	2.730	8.271	8.710
33	53.235	0.059	0.729	0.305	0.216	1.277	4.544	0.813	1.278	1.712	4.724	5.025
36	30.299	0.054	1.111	0.194	0.155	1.110	2.492	0.397	0.791	1.042	2.904	3.086
39	17.631	0.020	0.932	0.117	0.088	0.835	1.519	0.204	0.467	0.660	1.929	2.039
42	8.023	0.013	0.414	0.039	0.045	0.354	0.798	0.111	0.331	0.481	0.910	1.029
45	3.106	0.013	0.155	0.023	0.037	0.107	0.318	0.085	0.290	0.365	0.312	0.480
48	1.542	0.004	0.034	0.015	0.030	0.032	0.108	0.020	0.198	0.210	0.102	0.234
52	0.926	0.006	0.050	0.011	0.041	0.044	0.066	0.013	0.279	0.289	0.071	0.298
56	0.269	0.010	0.040	0.012	0.033	0.036	0.056	0.014	0.295	0.305	0.038	0.307
60	0.528	0.008	0.075	0.028	0.130	0.053	0.102	0.014	0.804	0.818	0.118	0.827
64	-0.714	0.031	0.150	0.054	0.140	0.189	0.274	0.032	0.909	0.933	0.338	0.992
68	-1.327	0.046	0.230	0.092	0.237	0.301	0.436	0.049	1.416	1.450	0.553	1.552

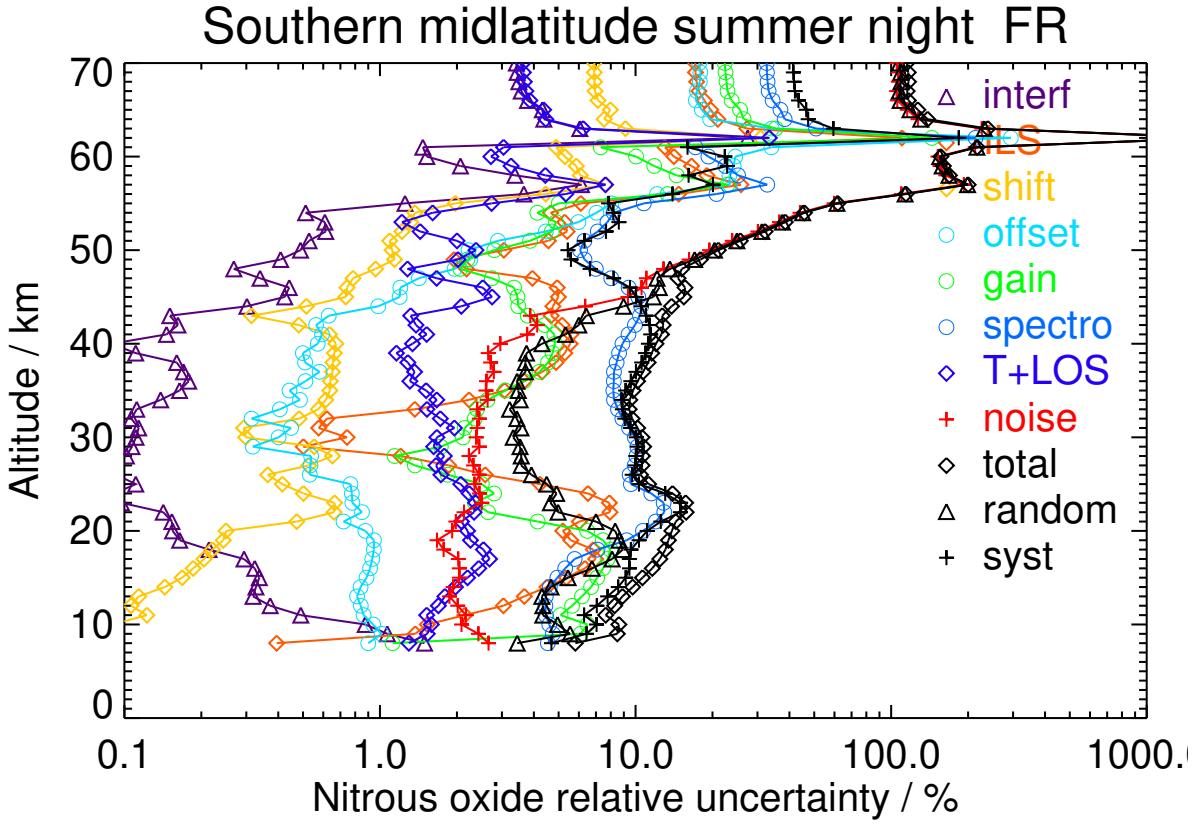

Figure S160. V8H_N2O_61 Southern midlatitude summer night

Table S161. Nitrous oxide error budget for Southern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	314.527	0.863	5.447	0.324	2.188	13.274	12.590	3.960	5.604	10.323	17.622	20.423
15	303.224	0.685	9.620	0.506	2.256	15.580	14.508	5.458	5.767	14.359	20.210	24.792
18	263.133	0.265	9.092	0.604	2.830	20.515	19.083	4.988	4.467	18.207	24.279	30.348
21	192.936	0.282	8.422	1.510	2.204	13.414	22.398	3.892	3.601	15.169	23.617	28.069
24	144.939	0.149	4.107	0.445	1.465	7.249	15.858	2.862	3.247	9.842	15.656	18.493
27	108.978	0.109	1.255	0.489	0.810	2.076	12.214	1.993	2.730	5.193	11.850	12.938
30	72.283	0.056	1.138	0.204	0.453	1.603	8.743	1.579	2.009	3.648	8.589	9.332
33	44.399	0.041	1.221	0.234	0.367	1.877	5.171	0.849	1.442	2.931	5.115	5.895
36	24.109	0.032	0.939	0.129	0.235	1.495	3.431	0.432	0.994	2.548	3.105	4.017
39	15.114	0.023	0.620	0.134	0.189	1.158	1.556	0.230	0.699	1.557	1.522	2.177
42	10.473	0.008	0.551	0.069	0.123	0.837	1.127	0.130	0.463	1.176	1.069	1.589
45	6.323	0.010	0.369	0.031	0.066	0.507	0.710	0.095	0.372	0.753	0.695	1.025
48	3.481	0.005	0.105	0.034	0.055	0.158	0.358	0.054	0.380	0.484	0.285	0.562
52	2.545	0.003	0.086	0.013	0.080	0.092	0.178	0.028	0.550	0.571	0.177	0.598
56	1.599	0.012	0.072	0.026	0.081	0.181	0.113	0.042	0.652	0.690	0.094	0.696
60	1.184	0.008	0.035	0.010	0.190	0.043	0.076	0.023	1.335	1.350	0.061	1.352
64	0.702	0.015	0.070	0.021	0.224	0.137	0.121	0.030	1.438	1.464	0.124	1.469
68	0.466	0.018	0.080	0.027	0.283	0.209	0.141	0.036	1.670	1.703	0.202	1.715

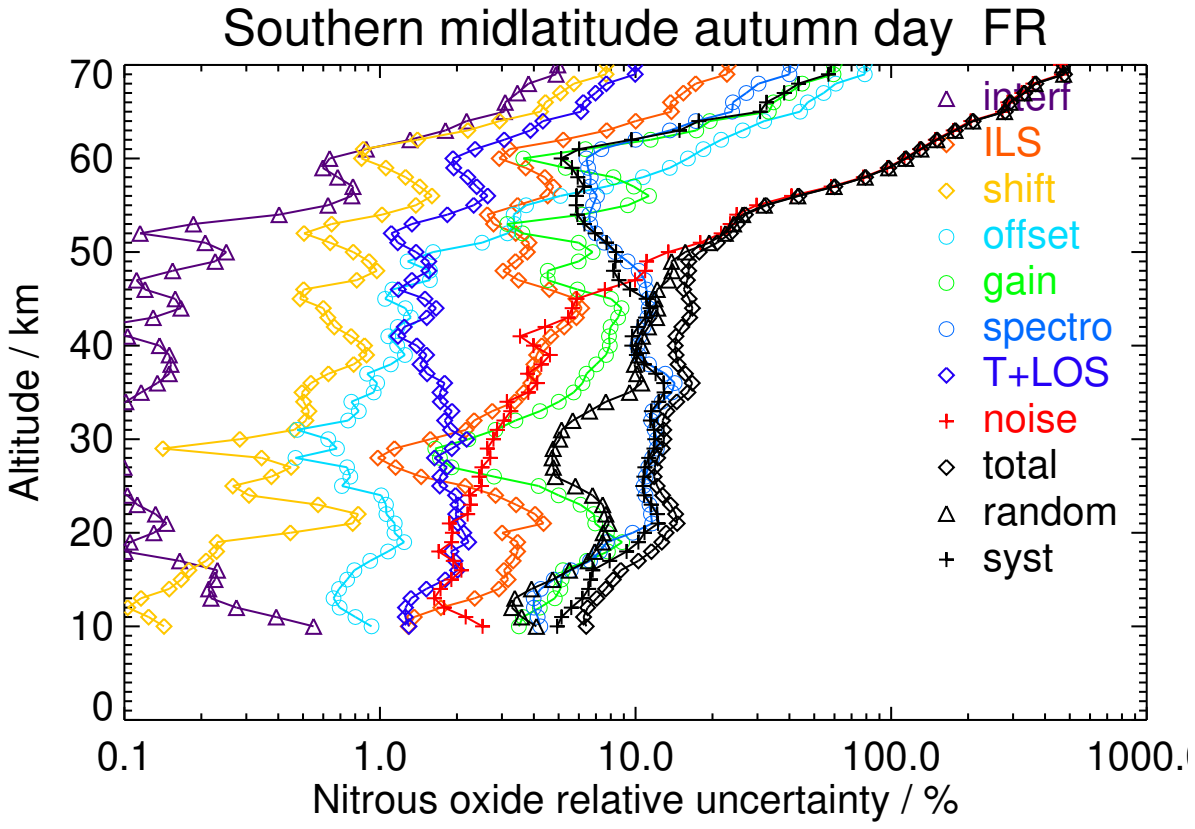

Figure S161. V8H_N2O_61 Southern midlatitude autumn day

Table S162. Nitrous oxide error budget for Southern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	323.693	0.999	7.442	0.285	2.500	16.506	13.111	4.264	5.747	10.771	21.029	23.627
15	319.088	0.935	10.023	0.417	2.522	16.897	14.259	5.617	5.826	11.536	23.003	25.734
18	281.480	0.489	7.421	0.527	3.091	22.159	18.810	4.857	4.383	13.708	27.657	30.868
21	197.515	0.289	9.648	1.654	2.256	13.059	24.844	4.184	3.787	15.198	26.261	30.341
24	151.670	0.142	3.341	0.279	1.373	4.938	16.357	2.988	3.338	8.006	16.157	18.032
27	113.607	0.116	1.250	0.599	0.797	1.863	12.260	2.145	2.776	4.585	12.151	12.987
30	74.630	0.065	0.891	0.215	0.454	1.666	8.547	1.671	2.049	3.939	8.267	9.158
33	44.985	0.053	0.903	0.259	0.348	1.552	4.327	0.865	1.491	2.597	4.286	5.011
36	30.474	0.043	0.938	0.158	0.269	1.577	2.996	0.432	1.049	2.225	2.962	3.705
39	19.985	0.031	0.908	0.165	0.187	1.201	1.792	0.252	0.717	1.657	1.836	2.473
42	12.517	0.014	0.718	0.089	0.125	0.881	1.248	0.136	0.451	1.278	1.209	1.759
45	8.013	0.016	0.444	0.028	0.071	0.547	0.818	0.107	0.389	0.846	0.787	1.155
48	4.243	0.008	0.132	0.054	0.059	0.164	0.452	0.055	0.383	0.524	0.361	0.636
52	2.737	0.004	0.107	0.015	0.078	0.079	0.214	0.030	0.527	0.551	0.210	0.590
56	1.558	0.014	0.084	0.024	0.068	0.100	0.143	0.040	0.586	0.615	0.095	0.622
60	1.233	0.009	0.053	0.011	0.180	0.039	0.096	0.026	1.257	1.274	0.073	1.276
64	0.207	0.018	0.069	0.024	0.204	0.155	0.175	0.038	1.328	1.356	0.171	1.367
68	-0.297	0.025	0.096	0.041	0.272	0.268	0.252	0.052	1.622	1.666	0.284	1.690

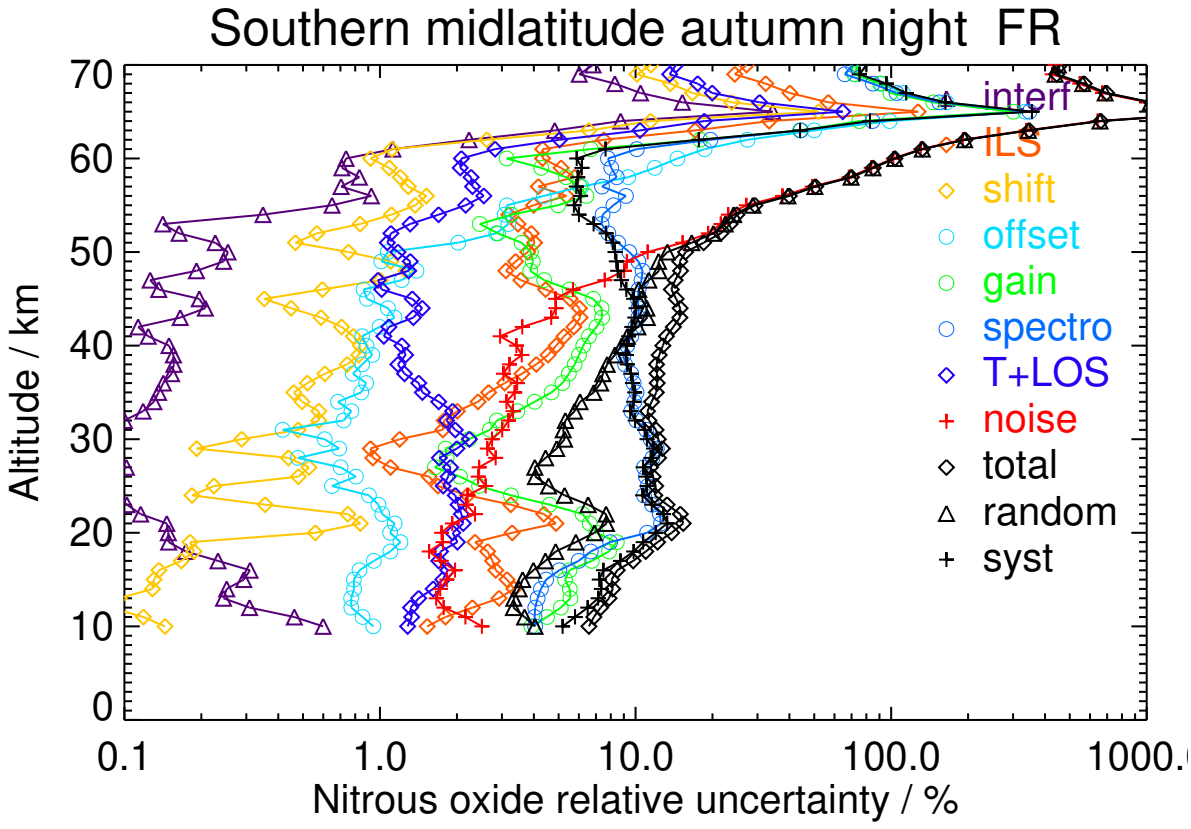

Figure S162. V8H_N2O_61 Southern midlatitude autumn night

Table S163. Nitrous oxide error budget for Southern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	319.250	2.198	1.371	0.324	4.161	12.202	13.473	6.961	9.816	13.959	17.450	22.346
12	286.672	1.864	1.969	0.471	3.713	11.012	12.486	7.473	9.808	14.623	15.387	21.227
15	225.720	2.120	2.019	0.550	2.996	8.689	12.263	7.480	8.526	13.300	13.982	19.297
18	140.562	1.262	2.715	0.718	1.978	6.351	15.429	5.993	5.622	10.334	15.891	18.956
21	80.609	0.320	1.491	0.782	1.189	4.011	14.956	3.069	4.696	7.464	14.828	16.601
24	25.934	0.086	1.235	0.189	0.523	0.762	7.275	1.378	3.519	5.317	6.431	8.344
27	11.053	0.057	0.477	0.148	0.390	0.464	1.498	0.597	2.128	2.559	1.096	2.784
30	9.720	0.056	0.344	0.106	0.264	0.409	1.260	0.355	1.455	1.720	1.114	2.049
33	4.260	0.027	0.272	0.045	0.133	0.153	0.702	0.158	0.812	0.922	0.666	1.137
36	1.420	0.007	0.099	0.017	0.066	0.044	0.239	0.051	0.414	0.464	0.178	0.497
39	0.836	0.002	0.032	0.009	0.039	0.026	0.059	0.019	0.287	0.295	0.050	0.299
42	0.827	0.003	0.018	0.006	0.027	0.017	0.053	0.013	0.229	0.236	0.037	0.239
45	1.221	0.004	0.030	0.011	0.039	0.038	0.064	0.017	0.292	0.301	0.056	0.306
48	1.093	0.003	0.023	0.005	0.058	0.017	0.060	0.009	0.397	0.403	0.053	0.407
52	1.145	0.004	0.044	0.015	0.065	0.022	0.055	0.012	0.505	0.511	0.063	0.515
56	0.958	0.005	0.025	0.015	0.074	0.035	0.063	0.017	0.556	0.564	0.054	0.567
60	0.943	0.008	0.039	0.013	0.218	0.034	0.062	0.023	1.375	1.394	0.052	1.395
64	0.808	0.010	0.045	0.017	0.254	0.026	0.067	0.026	1.569	1.591	0.050	1.592
68	0.323	0.009	0.031	0.013	0.254	0.020	0.046	0.022	1.539	1.561	0.034	1.561

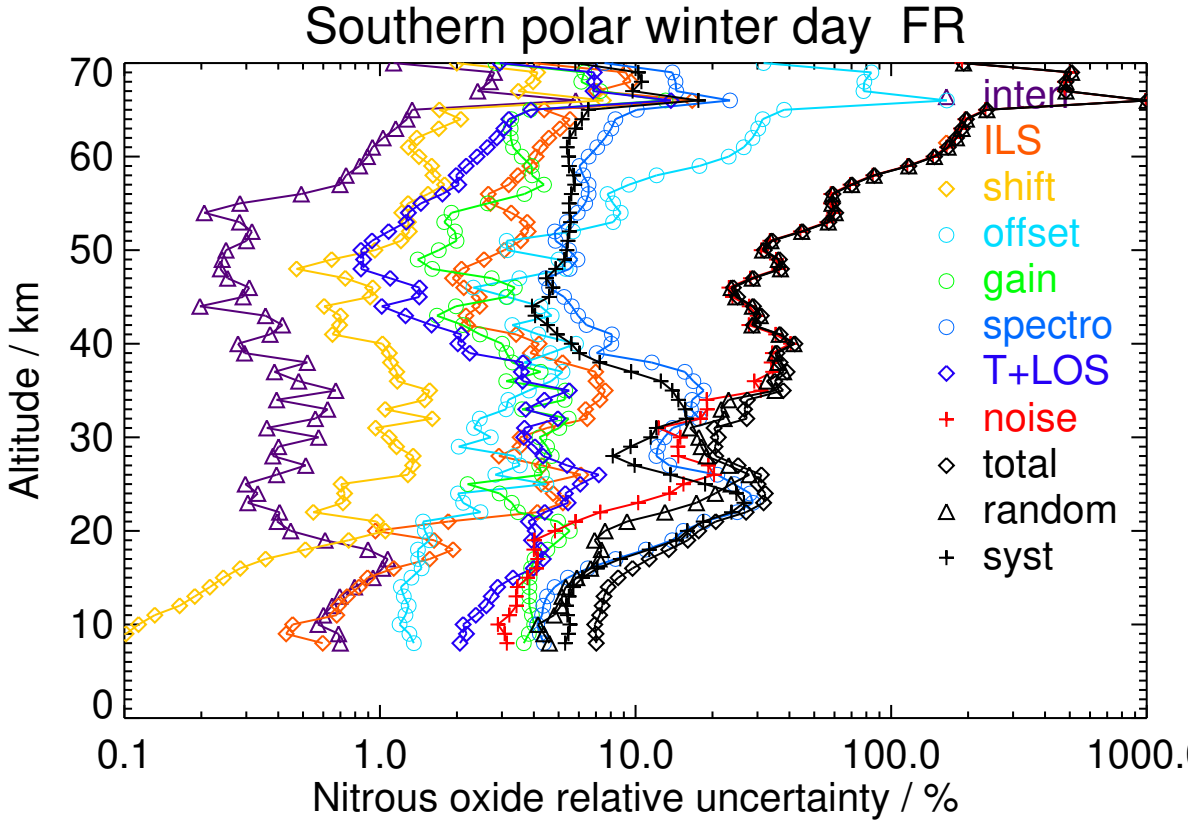

Figure S163. V8H_N2O_61 Southern polar winter day

Table S164. Nitrous oxide error budget for Southern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	311.947	2.013	1.489	0.195	3.585	10.433	11.275	5.615	8.331	12.315	14.298	18.870
12	288.192	1.521	3.021	0.211	2.897	9.632	10.997	5.674	7.599	11.980	13.417	17.987
15	227.883	1.662	3.376	0.317	2.618	7.461	9.629	6.342	7.363	12.123	10.815	16.246
18	152.739	0.980	2.508	0.495	1.799	5.378	11.899	4.855	5.057	9.565	11.785	15.178
21	94.533	0.276	1.347	0.798	1.398	4.273	11.022	2.996	4.598	6.887	11.266	13.204
24	42.610	0.096	1.791	0.364	0.758	1.843	8.478	1.752	3.828	5.273	8.314	9.845
27	13.651	0.053	0.936	0.197	0.422	0.836	3.694	0.892	2.354	3.444	3.150	4.667
30	6.670	0.044	0.358	0.120	0.249	0.569	1.163	0.386	1.396	1.917	0.553	1.995
33	5.804	0.030	0.273	0.091	0.171	0.437	0.824	0.224	0.948	1.163	0.761	1.390
36	2.571	0.009	0.158	0.039	0.084	0.221	0.385	0.096	0.537	0.642	0.342	0.727
39	1.149	0.003	0.072	0.018	0.041	0.071	0.162	0.039	0.347	0.383	0.115	0.400
42	0.628	0.003	0.033	0.015	0.035	0.072	0.093	0.035	0.274	0.291	0.088	0.304
45	0.860	0.003	0.035	0.019	0.053	0.107	0.096	0.039	0.345	0.370	0.092	0.382
48	0.597	0.002	0.025	0.007	0.063	0.025	0.054	0.013	0.443	0.451	0.041	0.453
52	0.923	0.003	0.031	0.015	0.061	0.047	0.047	0.018	0.504	0.510	0.053	0.513
56	1.136	0.003	0.022	0.013	0.077	0.057	0.059	0.020	0.572	0.580	0.065	0.584
60	1.346	0.006	0.026	0.010	0.213	0.054	0.070	0.027	1.335	1.353	0.073	1.355
64	1.016	0.008	0.031	0.008	0.257	0.031	0.080	0.030	1.567	1.589	0.069	1.591
68	0.886	0.006	0.016	0.007	0.262	0.025	0.074	0.024	1.580	1.603	0.065	1.604

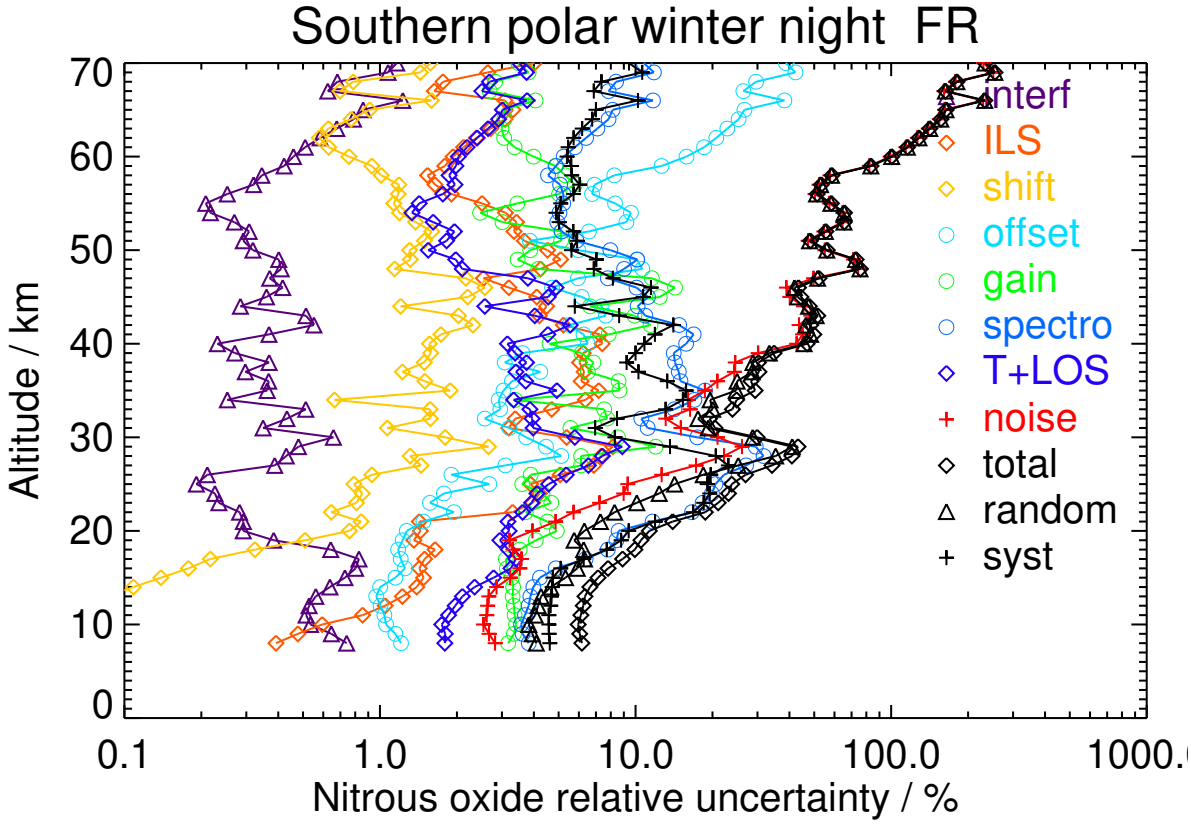

Figure S164. V8H_N2O_61 Southern polar winter night

Table S165. Nitrous oxide error budget for Southern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	308.334	3.715	5.085	0.557	3.864	10.286	11.137	7.414	10.775	15.219	14.972	21.349
12	286.364	2.323	6.376	0.811	2.871	9.035	10.895	7.605	8.783	13.435	14.483	19.755
15	200.571	1.511	5.266	0.874	1.917	4.797	16.223	7.008	7.111	12.284	16.415	20.502
18	91.991	0.324	4.064	0.773	0.953	2.549	15.841	6.186	4.123	8.785	15.926	18.189
21	10.972	0.084	1.829	0.255	0.387	0.703	3.333	1.282	2.884	4.368	2.461	5.013
24	7.367	0.111	2.086	0.167	0.302	1.111	2.917	0.635	2.424	3.482	2.894	4.528
27	14.935	0.131	1.669	0.189	0.351	0.528	1.994	0.450	2.176	3.306	1.106	3.486
30	20.628	0.086	1.379	0.130	0.256	1.997	3.438	0.347	1.679	4.148	1.881	4.554
33	15.281	0.034	0.505	0.092	0.135	0.538	1.253	0.201	0.929	1.382	1.065	1.745
36	11.299	0.020	0.413	0.072	0.072	0.446	0.675	0.116	0.518	0.748	0.748	1.057
39	9.571	0.013	0.326	0.042	0.041	0.349	0.515	0.074	0.324	0.489	0.607	0.779
42	6.885	0.008	0.300	0.034	0.037	0.292	0.424	0.065	0.273	0.485	0.448	0.661
45	4.979	0.007	0.230	0.023	0.034	0.224	0.342	0.044	0.238	0.392	0.355	0.529
48	3.407	0.010	0.181	0.020	0.032	0.170	0.230	0.029	0.230	0.344	0.227	0.412
52	2.211	0.010	0.135	0.024	0.031	0.114	0.148	0.021	0.261	0.303	0.178	0.351
56	1.117	0.007	0.063	0.014	0.053	0.055	0.108	0.022	0.364	0.381	0.097	0.393
60	0.324	0.027	0.184	0.039	0.148	0.165	0.148	0.024	0.819	0.870	0.147	0.882
64	-0.488	0.037	0.417	0.066	0.203	0.331	0.322	0.040	1.133	1.194	0.541	1.311
68	-2.202	0.065	0.946	0.138	0.211	0.752	0.742	0.081	1.205	1.444	1.206	1.881

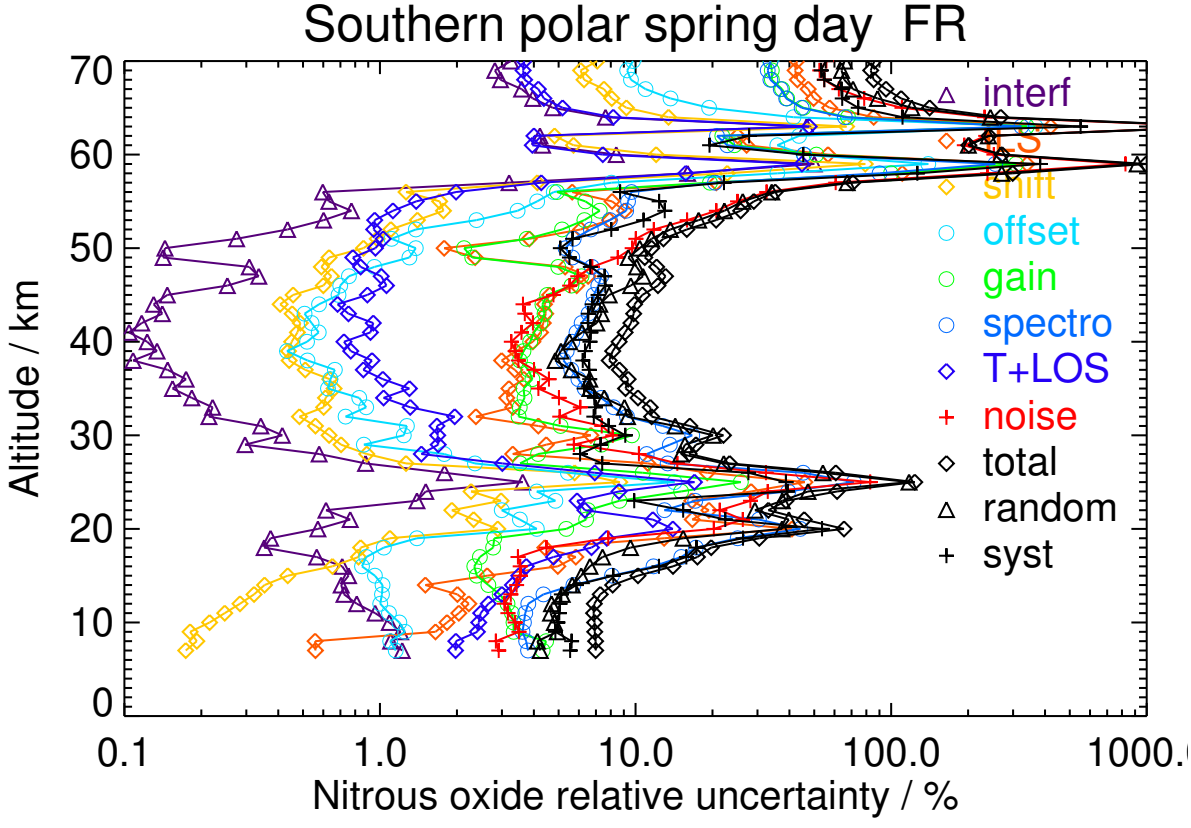

Figure S165. V8H_N2O_61 Southern polar spring day

Table S166. Nitrous oxide error budget for Southern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	310.302	2.695	5.595	0.601	3.691	9.404	12.151	6.284	9.671	14.979	14.045	20.534
12	289.061	1.438	7.598	0.883	2.415	8.722	12.142	6.014	7.127	13.870	13.583	19.413
15	209.435	1.279	5.772	1.033	1.951	6.345	14.618	6.675	6.352	13.674	13.846	19.460
18	121.684	0.371	3.360	0.959	1.309	4.839	13.046	6.785	4.597	10.646	12.709	16.578
21	67.831	0.124	7.233	0.774	0.884	4.117	10.272	2.552	3.675	10.303	9.489	14.007
24	64.608	0.119	7.057	0.957	0.921	7.044	9.156	1.651	3.032	12.179	6.974	14.034
27	60.062	0.113	2.987	0.478	0.647	3.449	9.668	1.188	2.662	8.974	6.550	11.111
30	41.332	0.143	1.327	0.315	0.362	2.258	7.357	0.802	1.908	6.910	4.215	8.095
33	20.906	0.080	1.092	0.152	0.200	1.079	3.774	0.469	1.142	3.412	2.560	4.266
36	11.618	0.038	0.519	0.093	0.125	0.821	1.361	0.193	0.586	1.460	1.035	1.790
39	8.504	0.015	0.386	0.040	0.072	0.523	0.757	0.092	0.358	0.783	0.726	1.068
42	6.650	0.010	0.193	0.035	0.061	0.409	0.443	0.069	0.305	0.550	0.448	0.709
45	4.964	0.009	0.096	0.020	0.040	0.165	0.325	0.046	0.271	0.362	0.297	0.468
48	3.559	0.012	0.083	0.018	0.045	0.170	0.217	0.035	0.272	0.356	0.185	0.401
52	2.597	0.009	0.115	0.023	0.041	0.124	0.176	0.025	0.318	0.356	0.192	0.405
56	1.350	0.010	0.055	0.017	0.061	0.067	0.142	0.028	0.424	0.447	0.110	0.461
60	0.229	0.023	0.096	0.026	0.179	0.223	0.142	0.029	0.972	1.017	0.152	1.028
64	-0.537	0.032	0.259	0.056	0.232	0.332	0.250	0.044	1.286	1.351	0.358	1.398
68	-1.245	0.054	0.637	0.123	0.213	0.463	0.501	0.057	1.256	1.437	0.673	1.586

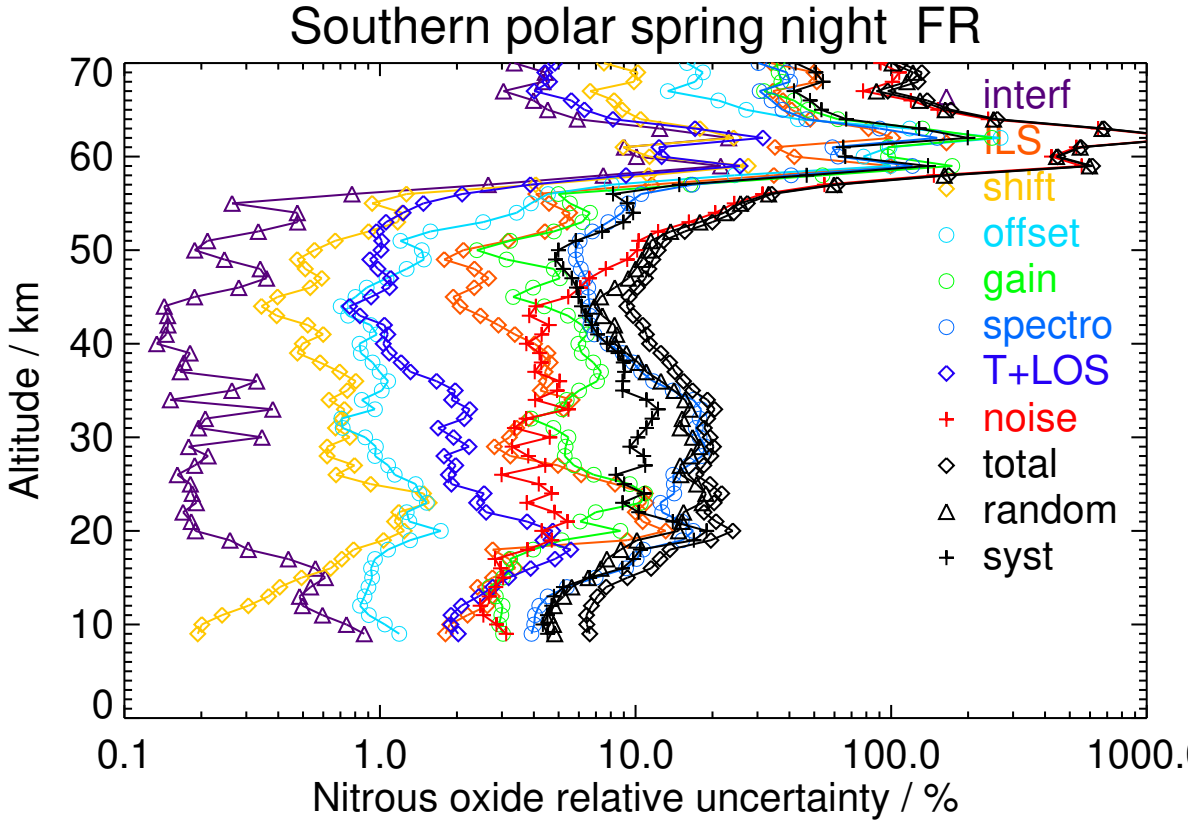

Figure S166. V8H_N2O_61 Southern polar spring night

Table S167. Nitrous oxide error budget for Southern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	290.308	2.235	1.323	0.579	2.372	5.546	12.144	3.151	7.838	11.027	11.863	16.196
12	292.512	0.847	3.494	0.247	1.332	10.092	14.058	2.559	4.067	10.051	15.373	18.367
15	265.685	0.529	6.453	0.312	1.505	11.128	18.128	4.193	4.323	14.620	17.868	23.087
18	212.158	0.277	6.787	0.310	1.379	8.589	18.770	4.744	4.026	10.970	19.814	22.648
21	162.832	0.125	12.037	0.630	1.097	7.256	19.305	4.037	3.909	10.637	22.142	24.565
24	133.087	0.073	9.225	1.274	0.826	4.452	15.939	2.865	3.567	7.737	17.955	19.551
27	100.313	0.049	2.632	0.444	0.658	3.115	11.268	1.852	3.020	4.155	11.811	12.521
30	71.956	0.068	0.441	0.318	0.246	1.251	6.370	1.064	2.067	2.529	6.443	6.922
33	46.359	0.029	0.456	0.249	0.167	1.444	3.752	0.692	1.202	1.543	4.000	4.287
36	26.873	0.056	1.206	0.210	0.118	1.034	2.204	0.345	0.717	0.957	2.676	2.842
39	13.066	0.012	0.832	0.071	0.044	0.527	1.390	0.192	0.457	0.620	1.664	1.776
42	4.679	0.009	0.194	0.021	0.038	0.135	0.440	0.117	0.343	0.412	0.462	0.619
45	2.183	0.008	0.128	0.019	0.030	0.051	0.160	0.067	0.248	0.273	0.193	0.335
48	0.844	0.004	0.052	0.008	0.027	0.031	0.079	0.015	0.183	0.194	0.083	0.211
52	0.283	0.006	0.042	0.011	0.038	0.022	0.037	0.014	0.240	0.250	0.030	0.252
56	0.152	0.005	0.052	0.013	0.031	0.018	0.034	0.012	0.237	0.243	0.050	0.248
60	0.372	0.012	0.158	0.037	0.119	0.040	0.126	0.027	0.661	0.677	0.194	0.704
64	-0.591	0.021	0.104	0.032	0.110	0.113	0.157	0.024	0.688	0.701	0.210	0.732
68	-1.167	0.040	0.257	0.080	0.225	0.204	0.356	0.042	1.327	1.354	0.473	1.434

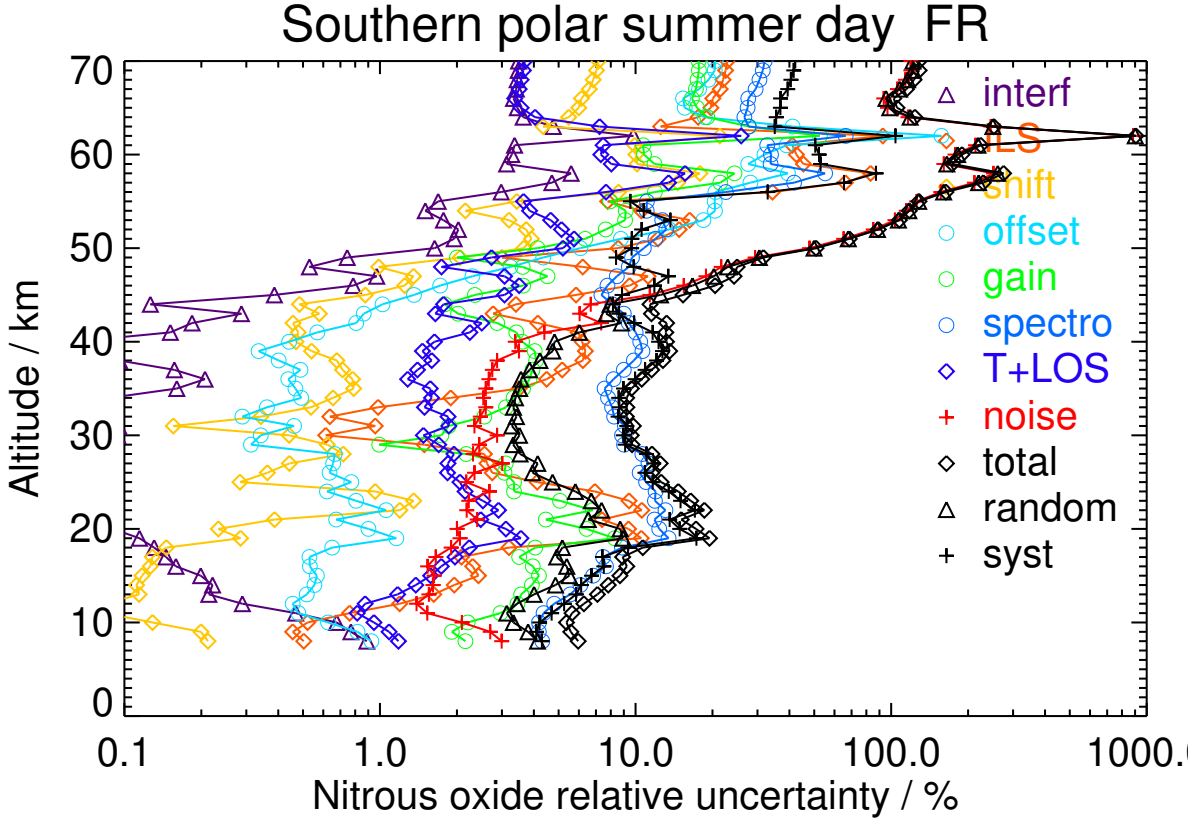

Figure S167. V8H_N2O_61 Southern polar summer day

Table S168. Nitrous oxide error budget for Southern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	299.406	2.476	1.809	0.501	2.374	2.890	14.730	4.140	8.064	10.063	14.884	17.967
12	302.111	0.809	3.833	0.382	1.668	10.432	13.378	3.246	4.710	8.326	16.415	18.406
15	298.761	0.598	10.820	0.544	2.089	18.980	14.908	5.249	4.901	12.195	24.646	27.498
18	242.678	0.187	7.387	0.540	1.927	17.603	18.678	4.213	3.604	13.409	23.839	27.351
21	186.248	0.134	7.515	1.518	2.157	17.454	19.326	4.205	3.426	16.370	22.429	27.767
24	133.037	0.072	3.949	0.433	1.051	6.208	14.723	2.616	3.021	8.060	14.940	16.976
27	92.105	0.059	2.215	0.535	0.769	2.505	10.567	1.792	2.453	3.646	10.939	11.530
30	62.560	0.056	0.601	0.101	0.366	0.832	6.394	1.164	1.663	2.255	6.412	6.797
33	36.897	0.019	0.873	0.243	0.227	1.435	3.773	0.631	1.088	1.483	4.068	4.330
36	15.859	0.039	0.851	0.099	0.104	0.661	1.926	0.281	0.641	0.866	2.153	2.320
39	5.418	0.009	0.308	0.020	0.044	0.161	0.665	0.114	0.317	0.383	0.729	0.824
42	1.443	0.009	0.053	0.016	0.032	0.026	0.157	0.048	0.229	0.251	0.145	0.290
45	0.800	0.010	0.123	0.019	0.032	0.045	0.076	0.046	0.257	0.270	0.140	0.304
48	0.223	0.004	0.019	0.005	0.031	0.007	0.033	0.010	0.202	0.206	0.028	0.208
52	0.099	0.003	0.029	0.007	0.045	0.011	0.029	0.009	0.300	0.306	0.013	0.306
56	0.325	0.004	0.049	0.013	0.029	0.021	0.028	0.014	0.289	0.294	0.043	0.297
60	0.965	0.005	0.089	0.024	0.131	0.027	0.095	0.020	0.846	0.859	0.117	0.867
64	-0.064	0.020	0.120	0.029	0.146	0.076	0.140	0.031	0.941	0.955	0.187	0.973
68	-0.752	0.030	0.204	0.054	0.237	0.124	0.241	0.047	1.398	1.423	0.326	1.460

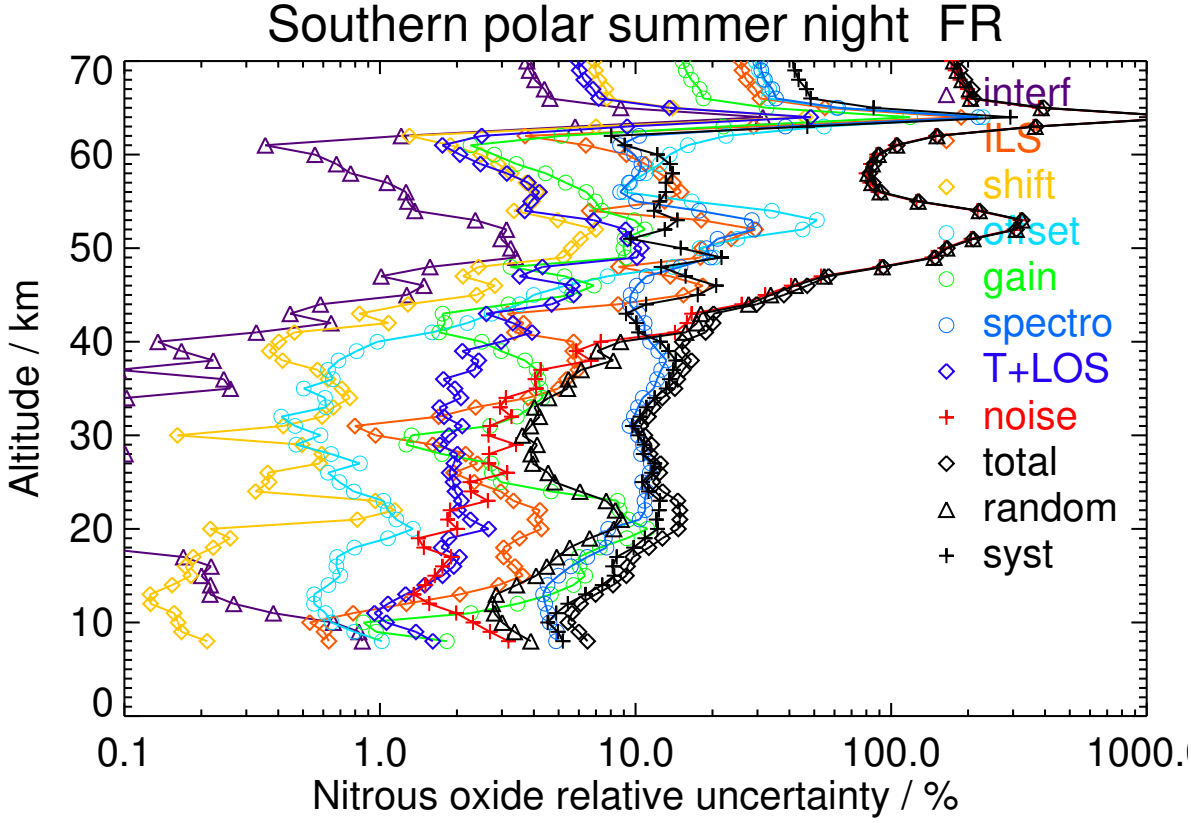

Figure S168. V8H_N2O_61 Southern polar summer night

Table S169. Nitrous oxide error budget for Southern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	291.221	1.730	0.624	0.481	2.679	4.933	12.802	3.025	8.096	9.390	13.621	16.544
12	300.992	1.553	3.605	0.335	1.732	11.275	12.430	3.590	4.659	7.342	16.759	18.296
15	269.927	1.658	6.638	0.602	1.811	11.272	13.969	5.775	5.805	9.626	18.629	20.969
18	215.349	0.478	5.253	0.752	1.814	15.584	16.405	4.640	4.374	8.579	22.599	24.172
21	153.012	0.452	2.419	1.549	1.954	12.944	17.122	3.238	3.572	6.874	21.189	22.276
24	103.378	0.190	2.020	0.625	1.243	6.315	12.119	2.143	3.175	5.410	13.349	14.404
27	58.292	0.106	1.159	0.185	0.665	1.886	8.634	1.530	2.495	3.773	8.617	9.407
30	25.935	0.037	0.792	0.166	0.322	1.073	4.469	0.937	1.542	2.495	4.350	5.014
33	8.101	0.030	0.389	0.117	0.178	0.834	1.611	0.373	0.862	1.392	1.560	2.091
36	1.853	0.015	0.091	0.040	0.083	0.270	0.395	0.110	0.489	0.659	0.253	0.706
39	0.417	0.005	0.045	0.015	0.051	0.099	0.151	0.036	0.350	0.386	0.111	0.402
42	0.011	0.004	0.022	0.020	0.051	0.128	0.048	0.031	0.299	0.326	0.081	0.336
45	0.661	0.005	0.029	0.040	0.058	0.284	0.061	0.075	0.308	0.342	0.271	0.437
48	0.276	0.003	0.018	0.013	0.053	0.081	0.052	0.023	0.390	0.398	0.083	0.407
52	0.496	0.003	0.021	0.017	0.082	0.102	0.049	0.029	0.567	0.578	0.093	0.585
56	1.111	0.006	0.043	0.053	0.087	0.346	0.066	0.088	0.548	0.582	0.324	0.666
60	0.577	0.002	0.036	0.021	0.176	0.097	0.061	0.031	1.235	1.250	0.097	1.253
64	0.358	0.006	0.023	0.013	0.201	0.092	0.050	0.024	1.305	1.324	0.051	1.325
68	0.317	0.008	0.020	0.018	0.264	0.146	0.049	0.031	1.546	1.572	0.116	1.576

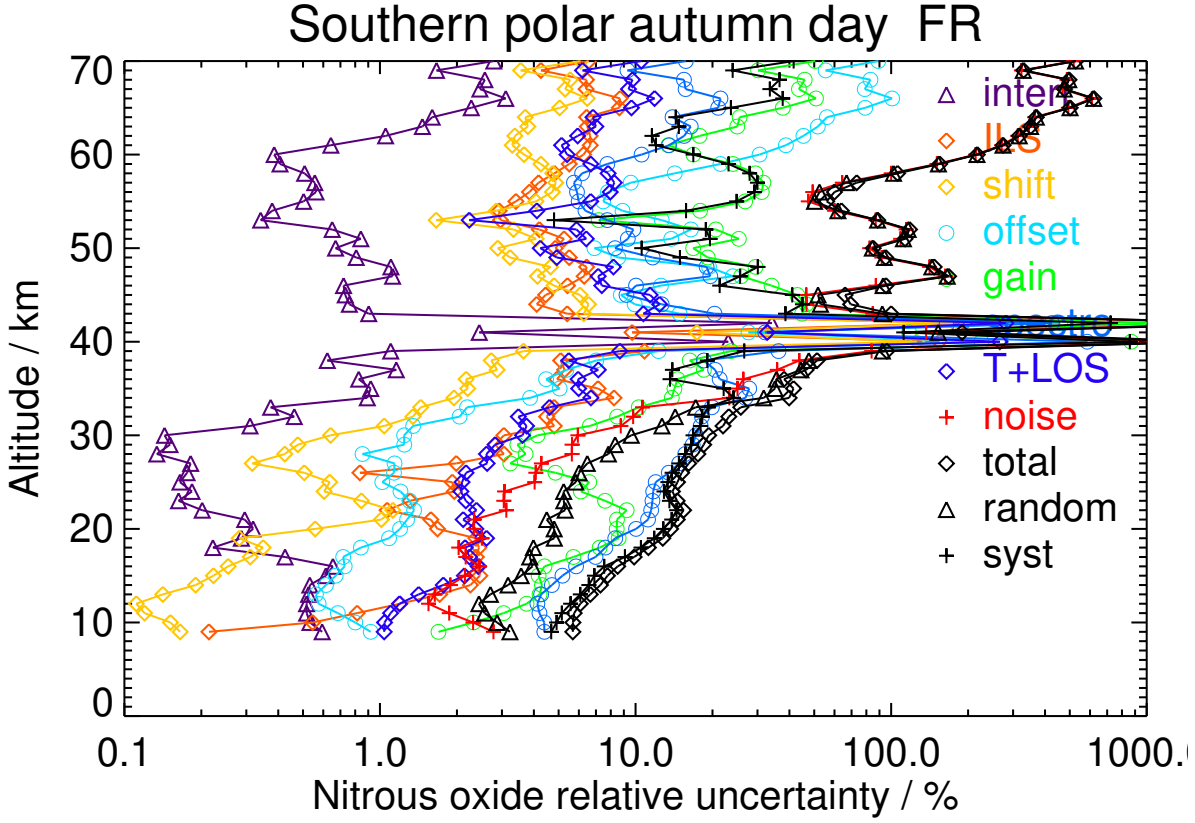

Figure S169. V8H_N2O_61 Southern polar autumn day

Table S170. Nitrous oxide error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	315.645	2.076	0.602	0.283	2.783	5.662	13.289	3.897	8.028	10.382	13.893	17.343
12	301.943	1.508	3.566	0.423	1.809	10.056	12.898	3.535	4.859	7.838	16.143	17.945
15	277.993	1.497	7.965	0.866	1.945	12.248	12.895	5.865	6.071	10.308	18.749	21.396
18	217.175	0.585	8.126	0.823	1.980	15.056	12.944	4.774	4.667	9.448	20.506	22.578
21	152.189	0.416	2.552	1.203	2.060	12.680	14.444	3.398	3.843	7.901	18.592	20.202
24	96.614	0.145	2.182	0.875	1.305	5.558	11.661	2.214	3.414	5.862	12.503	13.809
27	50.238	0.086	1.030	0.245	0.720	1.679	7.815	1.417	2.536	3.704	7.762	8.601
30	20.175	0.047	0.604	0.144	0.376	1.116	3.702	0.787	1.621	2.585	3.471	4.328
33	5.335	0.030	0.256	0.094	0.179	0.670	1.116	0.278	0.827	1.291	0.947	1.601
36	0.773	0.009	0.062	0.023	0.088	0.172	0.248	0.067	0.484	0.568	0.137	0.584
39	0.336	0.003	0.027	0.013	0.061	0.087	0.088	0.027	0.396	0.417	0.062	0.421
42	0.116	0.003	0.019	0.018	0.046	0.125	0.055	0.036	0.314	0.329	0.112	0.348
45	0.612	0.003	0.024	0.024	0.045	0.187	0.081	0.054	0.346	0.366	0.183	0.409
48	0.368	0.002	0.018	0.008	0.070	0.045	0.049	0.014	0.485	0.493	0.051	0.495
52	0.693	0.002	0.022	0.012	0.073	0.063	0.045	0.020	0.579	0.588	0.037	0.589
56	0.978	0.003	0.029	0.030	0.077	0.198	0.069	0.057	0.573	0.590	0.190	0.620
60	0.497	0.002	0.028	0.017	0.193	0.090	0.048	0.032	1.297	1.313	0.087	1.316
64	0.243	0.006	0.027	0.015	0.220	0.120	0.075	0.034	1.417	1.438	0.089	1.441
68	0.312	0.007	0.028	0.020	0.259	0.163	0.076	0.040	1.550	1.577	0.134	1.583

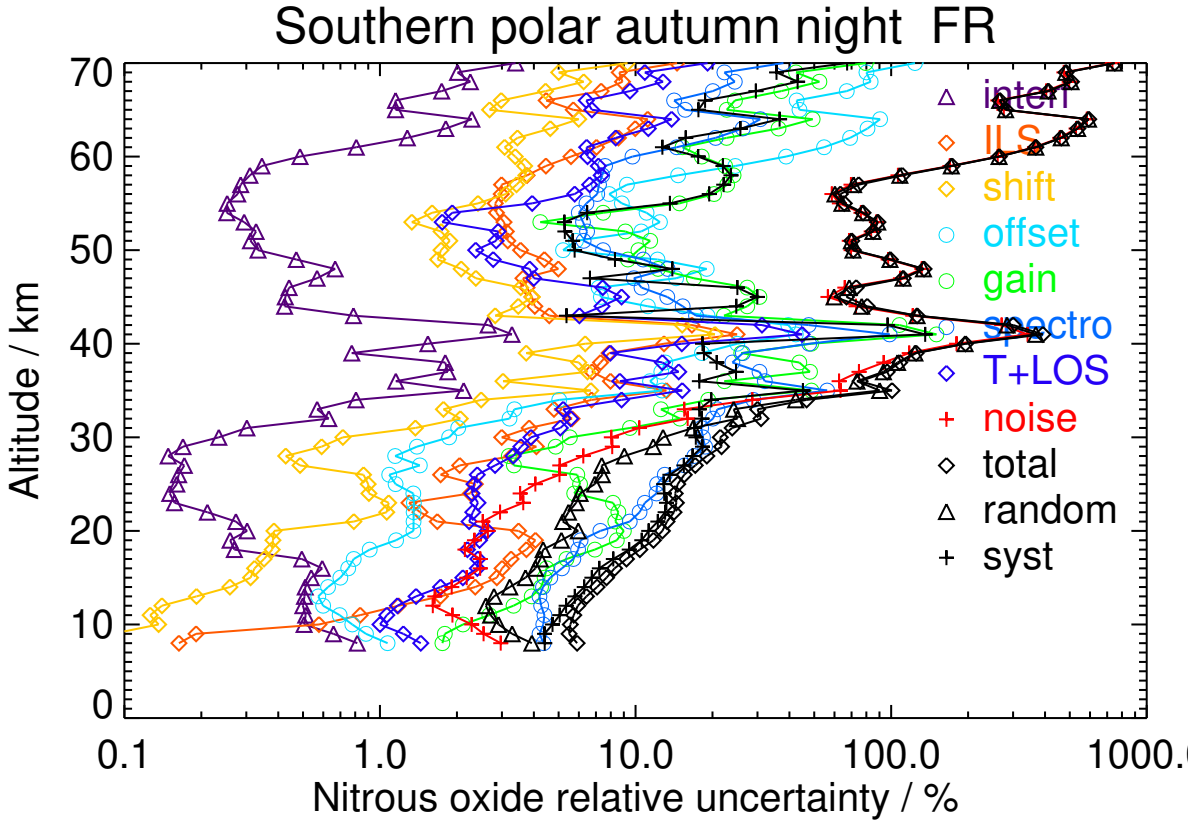

Figure S170. V8H_N2O_61 Southern polar autumn night

Table S171. Nitrous oxide error budget for Northern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	277.970	4.890	5.064	0.291	2.126	8.187	15.971	5.355	9.911	14.849	16.813	22.431
15	249.137	4.292	4.621	0.302	1.096	6.098	17.419	3.810	4.613	9.964	17.837	20.432
18	196.645	0.809	5.797	0.456	0.772	10.233	18.928	3.557	3.041	12.322	19.187	22.803
21	186.107	0.479	6.573	0.276	0.694	8.175	20.017	2.589	3.062	11.267	20.016	22.969
24	156.460	0.371	4.588	0.257	0.576	5.763	16.152	2.077	2.879	7.707	16.398	18.119
27	125.933	0.191	3.103	0.268	0.575	4.024	13.341	1.906	2.894	7.093	12.881	14.705
30	88.711	0.140	1.107	0.226	0.349	2.096	10.277	1.417	1.995	5.625	9.261	10.835
33	51.224	0.105	0.654	0.231	0.181	1.131	6.987	0.963	1.597	3.684	6.366	7.355
36	19.387	0.063	0.615	0.107	0.117	0.755	2.919	0.369	1.121	2.177	2.480	3.300
39	10.444	0.036	0.302	0.046	0.084	0.321	1.145	0.158	0.877	1.249	0.866	1.520
42	6.363	0.020	0.171	0.022	0.059	0.137	0.556	0.087	0.789	0.842	0.532	0.996
45	3.676	0.014	0.102	0.020	0.049	0.089	0.355	0.051	0.775	0.796	0.342	0.867
48	1.537	0.015	0.110	0.023	0.084	0.139	0.228	0.040	0.884	0.899	0.256	0.935
52	0.261	0.017	0.056	0.020	0.100	0.088	0.091	0.020	1.047	1.056	0.107	1.061
56	0.400	0.018	0.058	0.013	0.177	0.086	0.050	0.019	1.405	1.420	0.067	1.421
60	-0.125	0.021	0.090	0.037	0.321	0.299	0.108	0.041	1.828	1.867	0.268	1.886
64	-0.518	0.027	0.108	0.052	0.410	0.445	0.172	0.050	1.990	2.054	0.393	2.091
68	-2.039	0.022	0.082	0.021	0.407	0.231	0.126	0.033	1.880	1.927	0.256	1.944

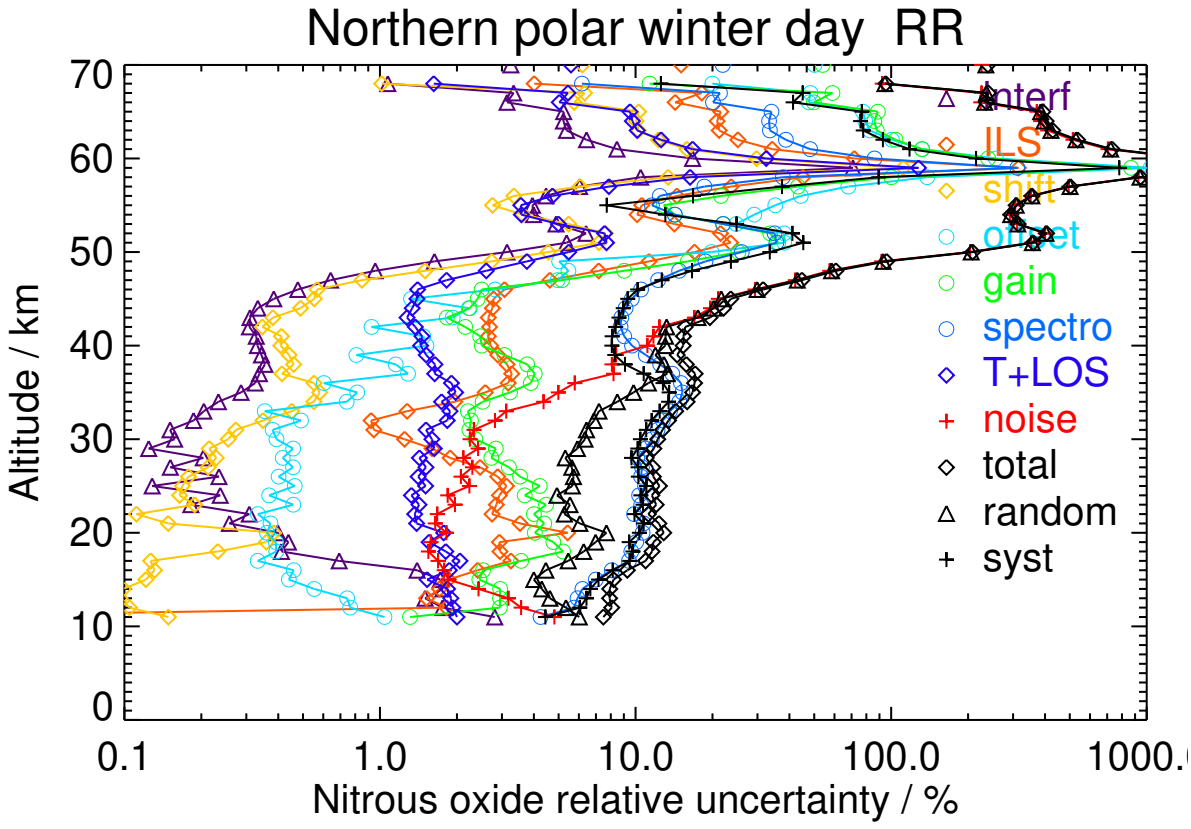

Figure S171. V8R_N2O_261 Northern polar winter day

Table S172. Nitrous oxide error budget for Northern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	356.970	4.995	7.817	0.295	2.862	13.260	11.835	6.115	12.350	15.162	19.242	24.498
12	298.965	4.813	5.987	0.285	2.226	7.890	13.945	5.597	9.943	14.259	15.736	21.235
15	252.076	4.447	5.845	0.372	1.350	4.417	16.376	4.859	5.495	11.015	16.616	19.935
18	189.424	0.930	4.301	0.607	0.791	4.476	21.174	4.155	3.717	8.036	21.336	22.799
21	132.093	0.413	7.932	0.327	0.865	6.429	16.887	2.768	3.409	13.125	15.411	20.242
24	108.787	0.639	4.036	0.369	0.428	3.151	11.403	1.488	2.237	7.903	10.087	12.814
27	97.916	0.220	1.969	0.269	0.621	2.582	10.812	1.657	2.764	7.914	8.701	11.762
30	80.114	0.290	1.437	0.574	0.406	3.347	7.865	1.030	1.524	5.858	6.691	8.893
33	39.225	0.135	1.372	0.434	0.233	2.218	5.749	0.735	1.194	3.495	5.465	6.487
36	12.152	0.068	0.628	0.121	0.094	0.690	1.976	0.219	0.686	1.847	1.382	2.307
39	8.461	0.037	0.322	0.057	0.069	0.358	0.738	0.090	0.527	0.856	0.582	1.035
42	7.164	0.025	0.297	0.054	0.054	0.230	0.399	0.059	0.491	0.589	0.452	0.743
45	6.541	0.024	0.165	0.058	0.047	0.158	0.373	0.050	0.529	0.591	0.361	0.692
48	3.992	0.026	0.071	0.057	0.061	0.183	0.350	0.050	0.645	0.709	0.292	0.766
52	1.051	0.017	0.050	0.018	0.059	0.091	0.177	0.029	0.781	0.798	0.138	0.810
56	0.015	0.021	0.081	0.022	0.123	0.086	0.075	0.017	1.114	1.127	0.079	1.130
60	-0.281	0.067	0.383	0.133	0.254	0.588	0.351	0.064	1.591	1.706	0.573	1.800
64	-0.727	0.114	0.665	0.238	0.355	0.952	0.611	0.104	1.832	2.077	0.984	2.299
68	0.698	0.159	1.057	0.323	0.341	0.365	0.829	0.074	1.699	1.881	1.240	2.253

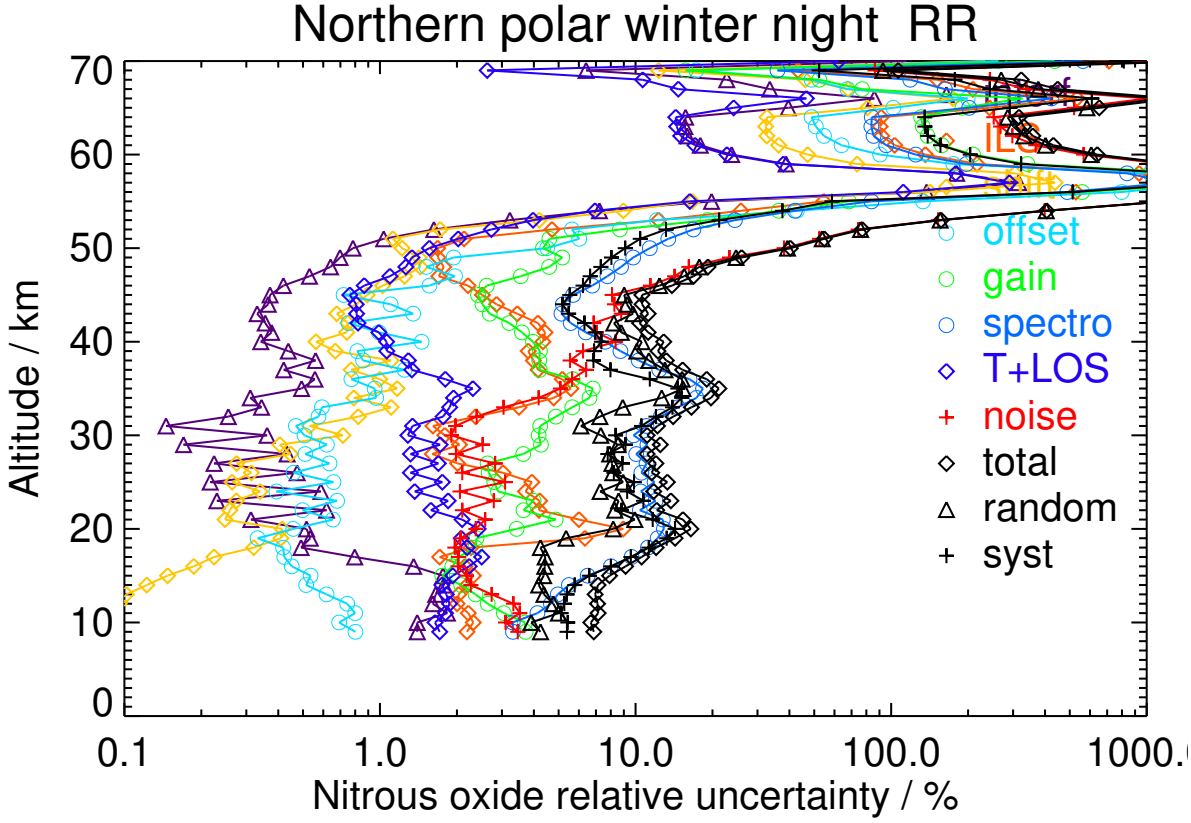

Figure S172. V8R_N2O_261 Northern polar winter night

Table S173. Nitrous oxide error budget for Northern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	291.274	1.328	2.859	0.248	1.975	8.878	15.264	5.124	8.732	11.017	17.517	20.693
15	252.441	0.712	4.192	0.194	1.245	7.849	15.220	4.819	4.918	7.837	17.289	18.982
18	209.418	0.126	3.275	0.391	0.765	10.762	19.673	3.873	3.569	7.430	22.065	23.282
21	155.635	0.167	3.181	0.275	0.694	7.339	15.838	2.597	3.631	5.508	17.464	18.312
24	141.661	0.095	2.819	0.319	0.639	5.651	13.619	2.300	3.646	5.182	14.751	15.635
27	97.741	0.084	1.562	0.301	0.531	1.912	12.614	1.993	3.314	4.327	12.720	13.436
30	57.524	0.045	0.317	0.257	0.297	0.815	7.750	1.330	2.393	3.148	7.653	8.275
33	26.251	0.064	0.510	0.195	0.203	0.868	3.837	0.637	1.660	1.942	3.900	4.356
36	9.991	0.038	0.389	0.063	0.124	0.524	1.334	0.209	0.902	1.010	1.437	1.756
39	3.957	0.009	0.180	0.018	0.056	0.104	0.468	0.068	0.493	0.517	0.495	0.716
42	1.069	0.009	0.065	0.009	0.040	0.030	0.189	0.029	0.377	0.389	0.187	0.431
45	0.122	0.010	0.014	0.004	0.036	0.030	0.047	0.011	0.363	0.368	0.027	0.369
48	0.772	0.012	0.020	0.006	0.041	0.041	0.047	0.010	0.418	0.423	0.049	0.426
52	0.315	0.013	0.018	0.004	0.040	0.013	0.051	0.007	0.533	0.536	0.037	0.537
56	0.014	0.015	0.014	0.007	0.064	0.032	0.032	0.009	0.771	0.774	0.035	0.775
60	0.110	0.011	0.015	0.006	0.131	0.020	0.035	0.008	1.046	1.055	0.022	1.055
64	0.020	0.022	0.044	0.007	0.275	0.069	0.040	0.014	1.480	1.507	0.069	1.508
68	-0.201	0.022	0.048	0.008	0.316	0.103	0.043	0.019	1.595	1.627	0.102	1.630

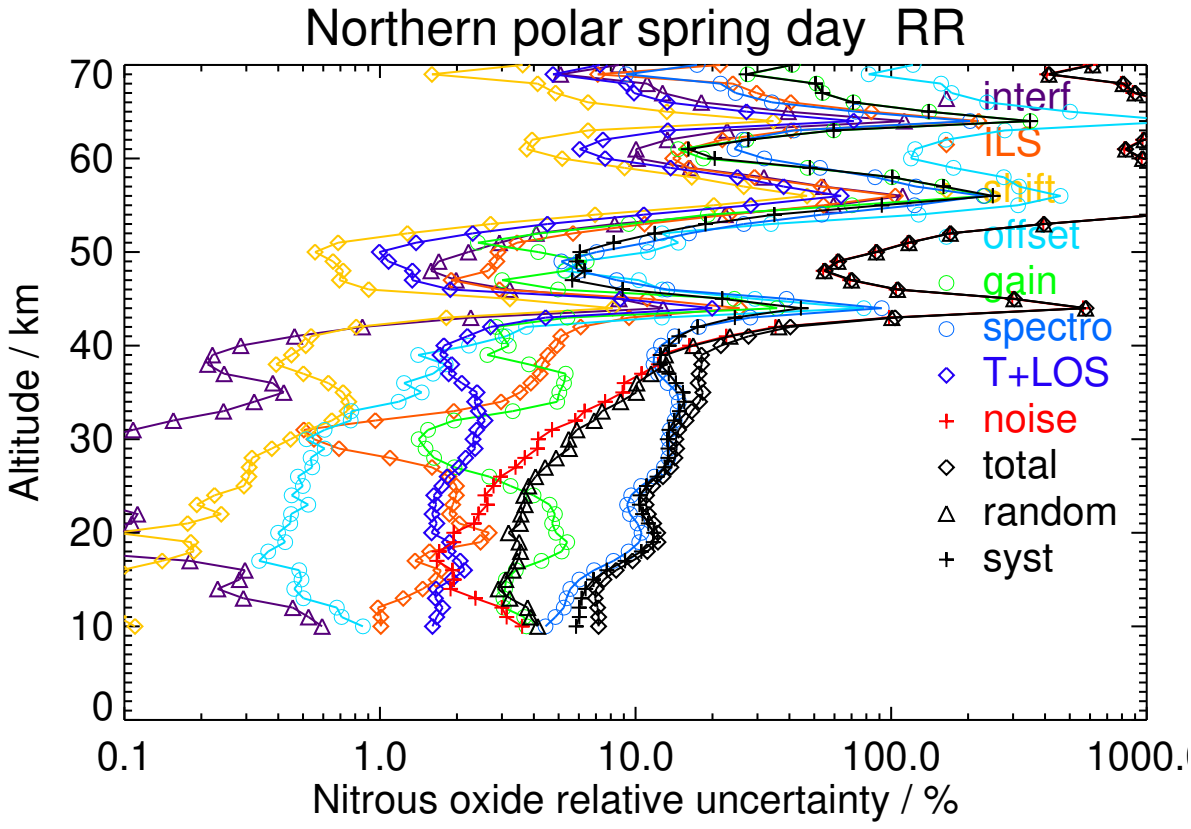

Figure S173. V8R_N2O_261 Northern polar spring day

Table S174. Nitrous oxide error budget for Northern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	295.214	1.162	2.036	0.285	2.086	8.163	15.732	5.178	8.835	11.081	17.497	20.711
15	273.033	0.766	4.103	0.203	1.268	7.632	16.340	4.838	4.816	7.605	18.251	19.772
18	227.960	0.099	2.698	0.414	0.933	13.110	20.912	4.781	3.672	8.079	24.261	25.571
21	167.906	0.152	2.087	0.305	0.906	9.696	17.334	2.837	3.897	6.098	19.642	20.567
24	134.561	0.110	2.929	0.315	0.567	5.131	14.241	2.152	3.412	4.868	15.189	15.950
27	100.966	0.084	1.395	0.295	0.563	2.035	12.765	1.975	3.534	4.759	12.774	13.632
30	56.364	0.042	0.551	0.232	0.294	0.947	8.166	1.291	2.300	3.175	8.056	8.659
33	27.639	0.060	0.710	0.182	0.182	0.938	3.968	0.628	1.640	1.934	4.067	4.504
36	10.525	0.043	0.478	0.066	0.109	0.602	1.593	0.224	0.880	0.988	1.731	1.993
39	4.254	0.010	0.182	0.017	0.039	0.116	0.414	0.067	0.475	0.494	0.454	0.671
42	1.986	0.010	0.084	0.009	0.025	0.069	0.243	0.035	0.361	0.370	0.258	0.451
45	0.122	0.010	0.016	0.007	0.025	0.042	0.069	0.017	0.351	0.356	0.064	0.362
48	0.328	0.013	0.016	0.009	0.045	0.065	0.039	0.015	0.423	0.429	0.064	0.433
52	0.305	0.014	0.017	0.005	0.039	0.018	0.042	0.007	0.534	0.537	0.030	0.538
56	0.179	0.016	0.015	0.008	0.065	0.049	0.037	0.011	0.796	0.800	0.050	0.801
60	0.187	0.011	0.021	0.008	0.143	0.034	0.041	0.011	1.099	1.109	0.035	1.110
64	-0.375	0.020	0.033	0.007	0.288	0.075	0.038	0.017	1.535	1.563	0.072	1.565
68	-0.502	0.020	0.036	0.007	0.324	0.113	0.044	0.022	1.620	1.654	0.112	1.658

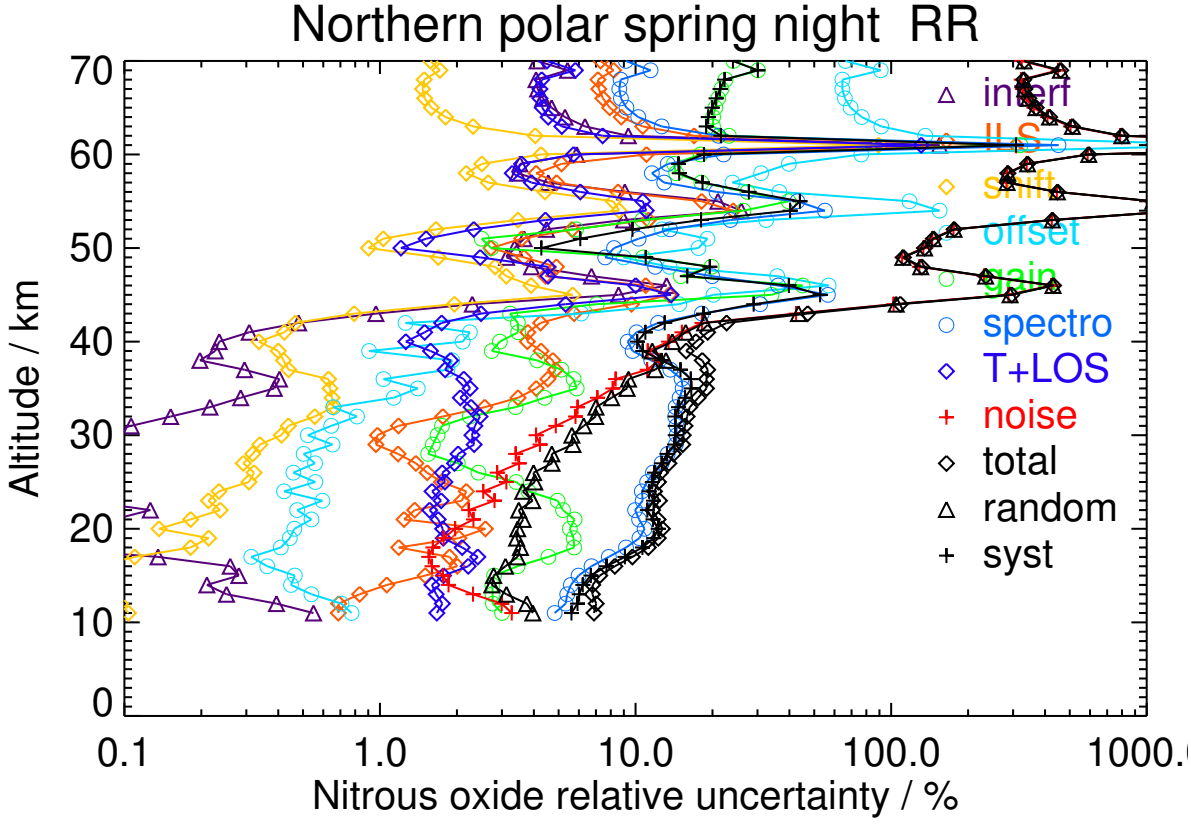

Figure S174. V8R_N2O_261 Northern polar spring night

Table S175. Nitrous oxide error budget for Northern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	313.377	1.991	4.040	0.427	1.826	9.786	13.408	4.554	8.936	11.420	16.417	19.998
15	307.974	0.777	7.392	0.297	1.053	10.187	16.189	4.265	4.533	8.686	19.636	21.471
18	275.414	0.337	9.046	0.653	1.213	15.722	21.499	4.196	3.465	15.146	24.360	28.685
21	200.376	0.293	8.964	0.667	0.824	5.506	23.254	3.515	3.831	9.521	24.269	26.070
24	149.910	0.158	2.433	0.200	0.411	1.154	13.680	1.877	2.429	3.801	13.770	14.285
27	128.819	0.117	0.562	0.582	0.628	1.496	11.728	2.170	3.351	4.293	11.762	12.521
30	84.976	0.078	0.836	0.598	0.271	2.739	8.201	1.082	1.483	2.301	8.600	8.903
33	45.767	0.044	1.551	0.383	0.145	1.892	4.574	0.629	1.070	1.520	5.129	5.350
36	18.725	0.119	1.168	0.070	0.075	0.784	2.351	0.263	0.646	0.848	2.702	2.832
39	5.679	0.026	0.333	0.080	0.037	0.150	0.690	0.090	0.347	0.419	0.756	0.864
42	2.073	0.009	0.063	0.014	0.021	0.028	0.188	0.032	0.224	0.249	0.173	0.303
45	0.871	0.008	0.018	0.008	0.020	0.011	0.076	0.016	0.205	0.211	0.068	0.222
48	0.294	0.009	0.029	0.012	0.018	0.009	0.041	0.013	0.236	0.240	0.038	0.243
52	0.105	0.010	0.014	0.004	0.015	0.008	0.022	0.005	0.293	0.294	0.011	0.295
56	0.084	0.015	0.026	0.012	0.034	0.010	0.026	0.005	0.455	0.457	0.031	0.458
60	-0.168	0.011	0.030	0.016	0.068	0.017	0.035	0.007	0.658	0.662	0.041	0.663
64	-0.294	0.037	0.099	0.031	0.182	0.076	0.110	0.011	1.081	1.098	0.161	1.109
68	-0.136	0.053	0.224	0.079	0.251	0.107	0.233	0.018	1.432	1.459	0.335	1.497

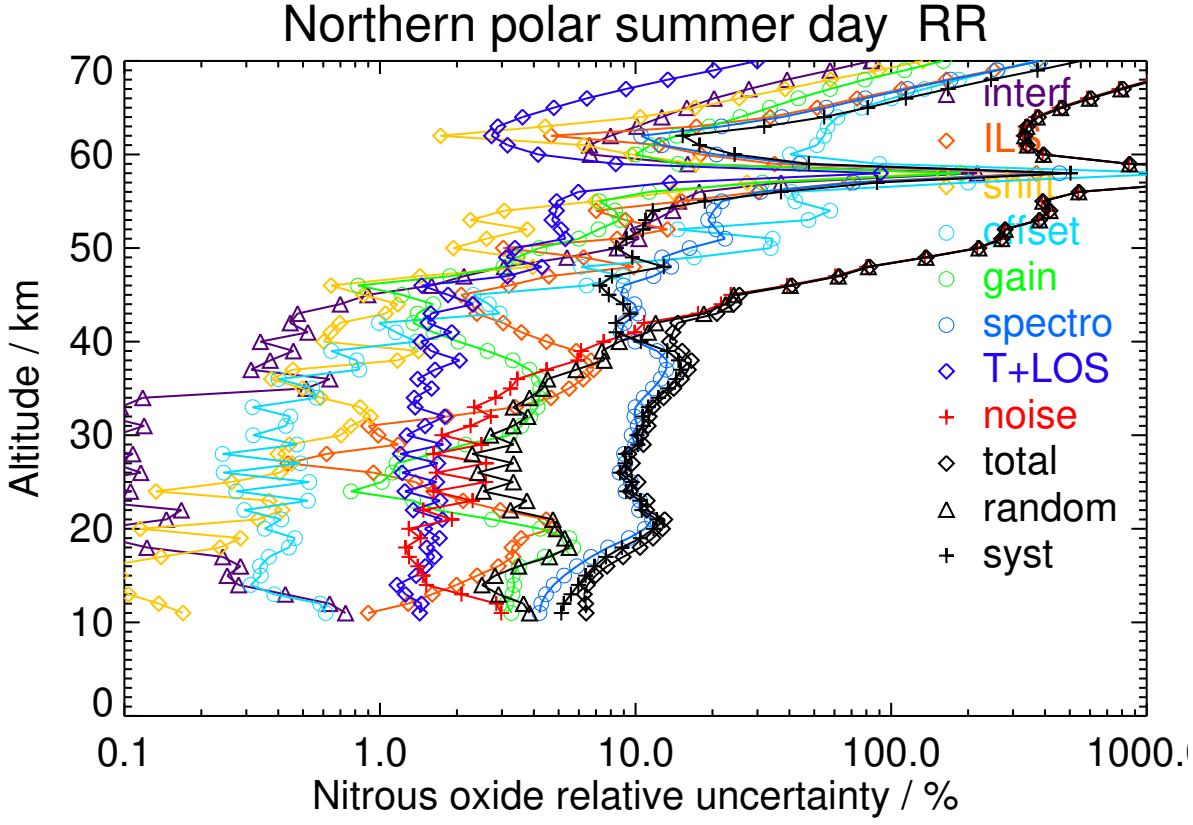

Figure S175. V8R_N2O_261 Northern polar summer day

Table S176. Nitrous oxide error budget for Northern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
15	309.561	1.110	8.728	0.179	2.416	7.575	19.564	10.202	7.745	13.808	22.289	26.219
18	278.569	0.229	8.114	0.426	1.320	18.639	20.303	5.779	3.151	11.526	27.164	29.508
21	203.980	0.187	5.019	0.434	1.004	11.861	22.206	3.655	3.609	10.287	24.099	26.203
24	144.815	0.139	2.482	0.214	0.522	2.337	13.819	2.268	2.797	4.663	13.934	14.693
27	118.134	0.094	1.264	0.369	0.544	1.656	12.483	2.095	3.123	4.171	12.544	13.220
30	66.892	0.044	0.530	0.341	0.293	2.385	8.030	1.258	1.730	2.540	8.293	8.674
33	27.539	0.054	1.040	0.195	0.149	1.427	3.620	0.688	1.194	1.531	3.980	4.265
36	7.810	0.043	0.466	0.125	0.069	0.277	1.251	0.203	0.653	0.767	1.327	1.533
39	2.240	0.018	0.138	0.025	0.028	0.055	0.258	0.056	0.332	0.365	0.265	0.451
42	0.683	0.010	0.025	0.011	0.020	0.023	0.094	0.021	0.236	0.244	0.085	0.258
45	0.217	0.008	0.011	0.006	0.016	0.022	0.028	0.010	0.235	0.238	0.021	0.239
48	0.285	0.011	0.020	0.013	0.026	0.034	0.033	0.010	0.293	0.297	0.036	0.300
52	0.038	0.014	0.009	0.003	0.022	0.008	0.026	0.005	0.386	0.388	0.012	0.388
56	0.409	0.019	0.016	0.012	0.045	0.037	0.036	0.008	0.617	0.620	0.041	0.622
60	0.188	0.014	0.013	0.008	0.115	0.022	0.039	0.009	0.929	0.937	0.030	0.937
64	-0.360	0.031	0.041	0.027	0.257	0.198	0.096	0.029	1.458	1.484	0.206	1.498
68	-0.267	0.039	0.085	0.056	0.282	0.266	0.163	0.038	1.536	1.569	0.298	1.597

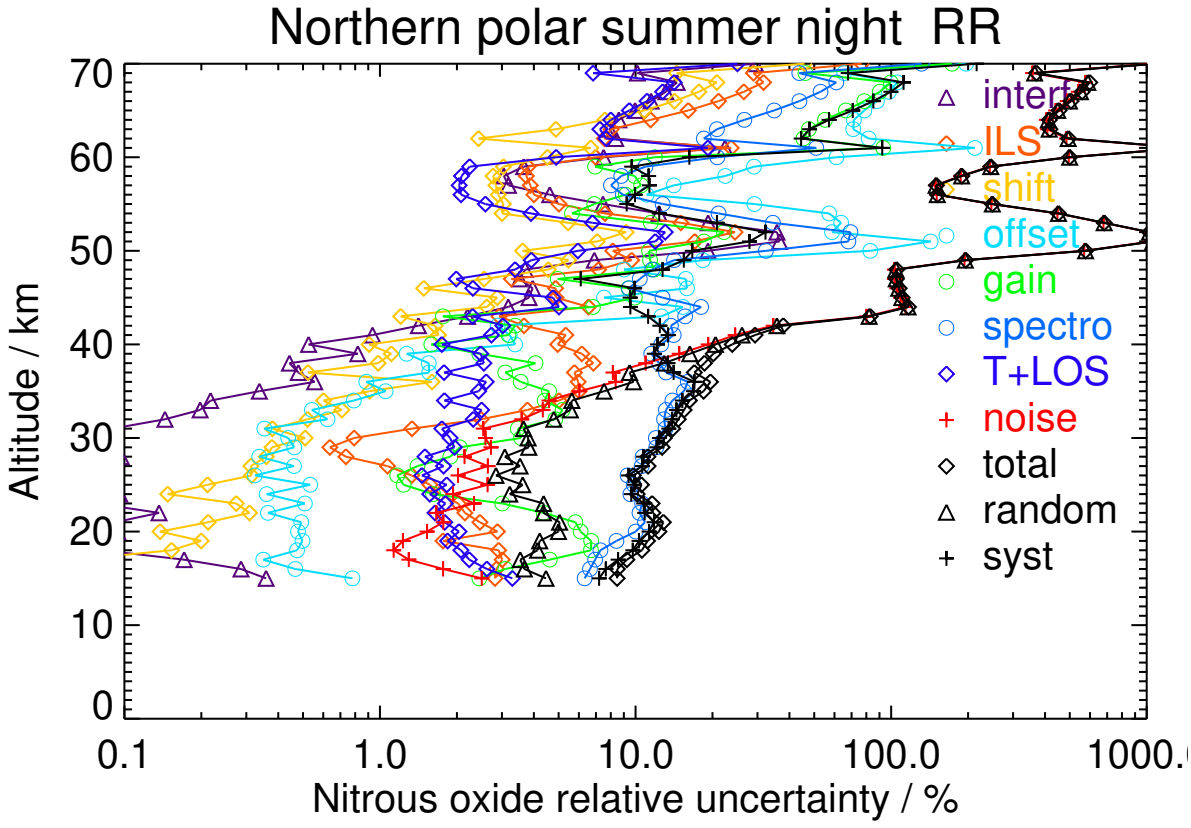

Figure S176. V8R_N2O_261 Northern polar summer night

Table S177. Nitrous oxide error budget for Northern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
15	280.757	2.866	2.806	0.199	1.838	6.452	17.130	5.639	7.503	10.457	18.258	21.040
18	237.518	0.564	2.951	0.484	0.758	11.689	21.160	5.027	3.369	8.800	23.524	25.116
21	168.289	0.319	4.015	0.210	0.915	10.710	18.682	2.975	3.740	8.747	20.668	22.443
24	123.662	0.229	3.319	0.249	0.646	5.484	13.534	2.281	3.443	5.867	14.402	15.551
27	76.738	0.115	2.498	0.167	0.526	2.273	11.438	1.712	3.054	5.339	11.239	12.442
30	30.126	0.063	0.681	0.134	0.356	1.791	5.590	0.977	1.857	4.048	4.805	6.282
33	8.602	0.048	0.373	0.068	0.177	0.685	1.900	0.389	1.247	2.069	1.298	2.442
36	3.115	0.026	0.246	0.032	0.070	0.468	0.714	0.114	0.628	1.034	0.364	1.097
39	2.141	0.014	0.161	0.018	0.046	0.275	0.366	0.044	0.490	0.671	0.173	0.693
42	2.076	0.010	0.114	0.014	0.028	0.165	0.268	0.025	0.471	0.560	0.150	0.580
45	1.506	0.012	0.059	0.009	0.026	0.066	0.232	0.017	0.526	0.570	0.119	0.583
48	0.717	0.015	0.025	0.007	0.063	0.054	0.108	0.019	0.655	0.665	0.077	0.670
52	0.809	0.018	0.021	0.009	0.064	0.050	0.065	0.014	0.801	0.807	0.056	0.809
56	0.724	0.020	0.020	0.010	0.099	0.064	0.069	0.017	1.077	1.084	0.069	1.086
60	-0.101	0.015	0.027	0.008	0.197	0.049	0.049	0.015	1.380	1.396	0.033	1.396
64	-0.599	0.022	0.058	0.013	0.322	0.163	0.056	0.029	1.728	1.763	0.137	1.768
68	-0.668	0.024	0.067	0.017	0.336	0.207	0.064	0.035	1.698	1.737	0.178	1.746

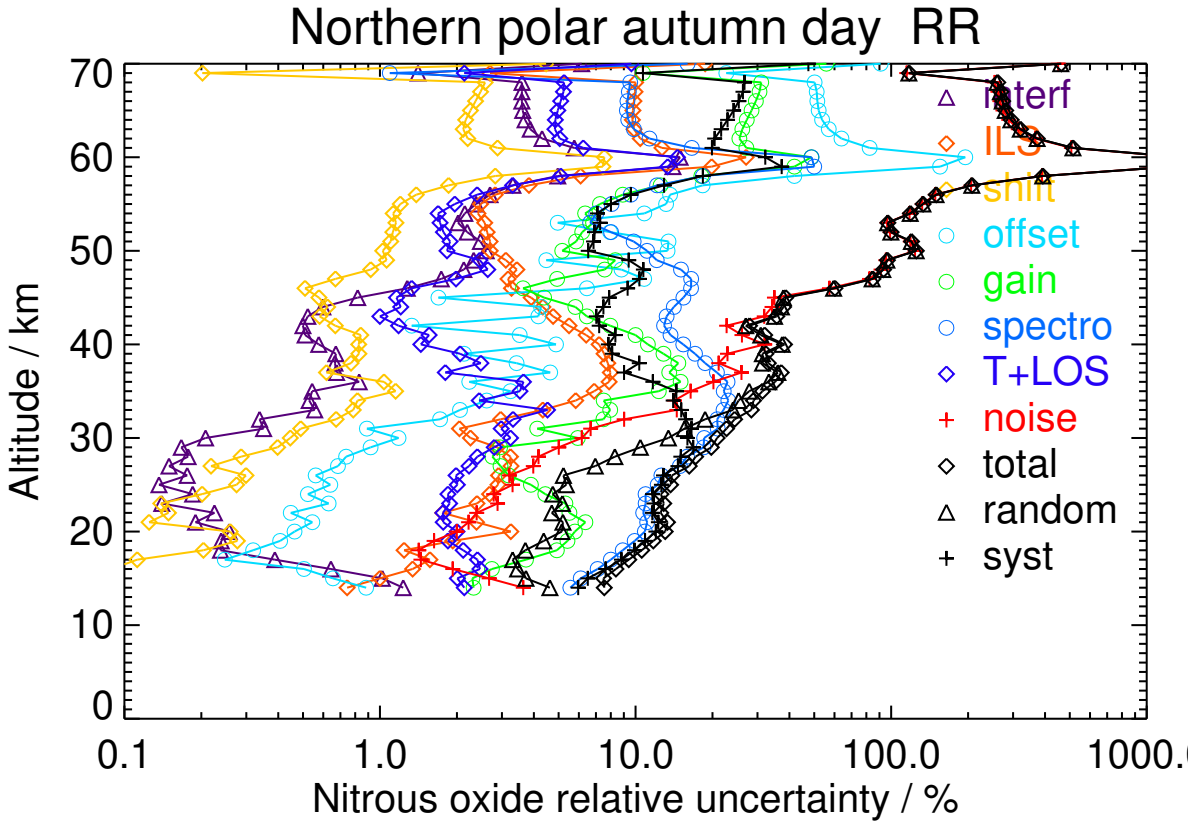

Figure S177. V8R_N2O_261 Northern polar autumn day

Table S178. Nitrous oxide error budget for Northern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
15	275.688	3.118	2.609	0.263	1.874	6.134	17.998	5.848	7.315	10.771	18.798	21.665
18	231.823	0.612	2.327	0.545	0.831	12.031	22.358	4.962	3.567	8.051	24.979	26.244
21	169.711	0.331	3.707	0.203	0.836	9.101	19.640	2.798	3.767	7.526	21.179	22.476
24	121.672	0.313	3.438	0.233	0.619	5.277	14.808	2.221	3.349	5.821	15.548	16.602
27	69.227	0.128	2.140	0.181	0.523	2.130	11.463	1.610	3.028	5.313	11.153	12.353
30	27.878	0.066	0.600	0.187	0.338	2.010	4.405	0.813	1.718	3.353	4.041	5.251
33	20.534	0.065	0.608	0.286	0.227	2.055	3.136	0.387	1.253	3.580	1.861	4.035
36	13.088	0.052	1.012	0.195	0.113	1.241	2.626	0.180	0.731	2.876	1.345	3.175
39	7.512	0.037	0.765	0.072	0.081	0.680	1.594	0.099	0.580	1.805	0.831	1.987
42	4.060	0.019	0.402	0.034	0.044	0.330	0.925	0.056	0.512	1.081	0.478	1.181
45	1.620	0.013	0.093	0.021	0.027	0.067	0.350	0.027	0.506	0.605	0.165	0.628
48	1.197	0.015	0.032	0.010	0.062	0.078	0.104	0.024	0.613	0.625	0.091	0.632
52	0.990	0.018	0.034	0.010	0.059	0.044	0.085	0.014	0.723	0.729	0.077	0.733
56	0.423	0.020	0.037	0.015	0.094	0.078	0.067	0.018	1.018	1.026	0.082	1.029
60	0.549	0.014	0.035	0.013	0.192	0.077	0.057	0.022	1.339	1.355	0.070	1.357
64	0.433	0.021	0.102	0.029	0.317	0.081	0.109	0.023	1.711	1.748	0.059	1.749
68	-0.285	0.018	0.078	0.018	0.335	0.087	0.076	0.022	1.688	1.725	0.075	1.727

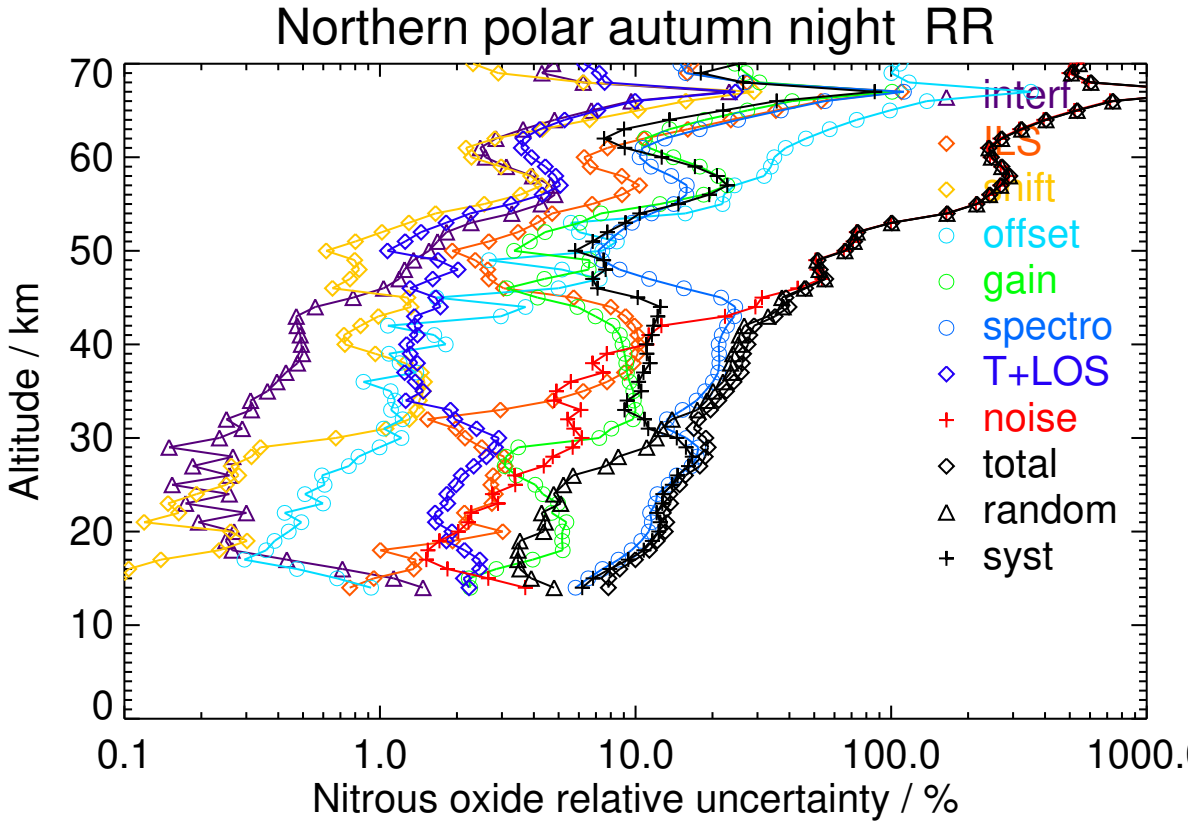

Figure S178. V8R_N2O_261 Northern polar autumn night

Table S179. Nitrous oxide error budget for Northern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	298.156	1.653	3.711	0.201	2.210	7.875	13.159	4.825	9.962	12.106	15.250	19.471
15	290.074	0.977	9.642	0.162	1.380	10.329	15.343	4.439	5.252	9.749	19.753	22.028
18	263.462	0.381	9.144	0.490	1.726	17.119	23.324	5.574	4.164	13.865	27.933	31.184
21	207.522	0.259	8.192	0.337	0.699	6.614	21.918	3.335	3.796	9.403	23.001	24.849
24	183.492	0.242	6.520	0.282	0.758	4.045	20.234	2.738	3.361	8.316	20.460	22.086
27	130.396	0.158	2.646	0.474	0.633	2.264	13.781	2.170	3.265	6.874	13.069	14.767
30	112.650	0.092	1.699	0.597	0.451	3.396	10.350	1.596	2.237	5.076	10.193	11.386
33	73.858	0.069	2.355	0.522	0.301	2.710	9.591	1.108	1.636	4.215	9.559	10.448
36	20.317	0.056	1.325	0.167	0.167	1.040	3.922	0.438	0.949	2.725	3.456	4.401
39	6.961	0.026	0.426	0.049	0.098	0.287	1.113	0.141	0.579	1.122	0.781	1.368
42	3.921	0.012	0.198	0.037	0.073	0.118	0.387	0.056	0.472	0.579	0.317	0.660
45	3.366	0.012	0.156	0.027	0.076	0.083	0.301	0.034	0.531	0.593	0.245	0.642
48	1.683	0.015	0.054	0.017	0.086	0.034	0.223	0.025	0.591	0.620	0.168	0.642
52	0.385	0.017	0.037	0.014	0.092	0.020	0.088	0.012	0.750	0.760	0.061	0.762
56	0.150	0.018	0.035	0.019	0.124	0.030	0.054	0.009	1.064	1.073	0.044	1.074
60	-0.408	0.038	0.246	0.080	0.228	0.095	0.235	0.026	1.520	1.555	0.282	1.580
64	-0.665	0.068	0.437	0.170	0.330	0.229	0.497	0.053	1.789	1.859	0.616	1.959
68	-0.890	0.018	0.028	0.025	0.357	0.259	0.131	0.031	1.712	1.752	0.272	1.773

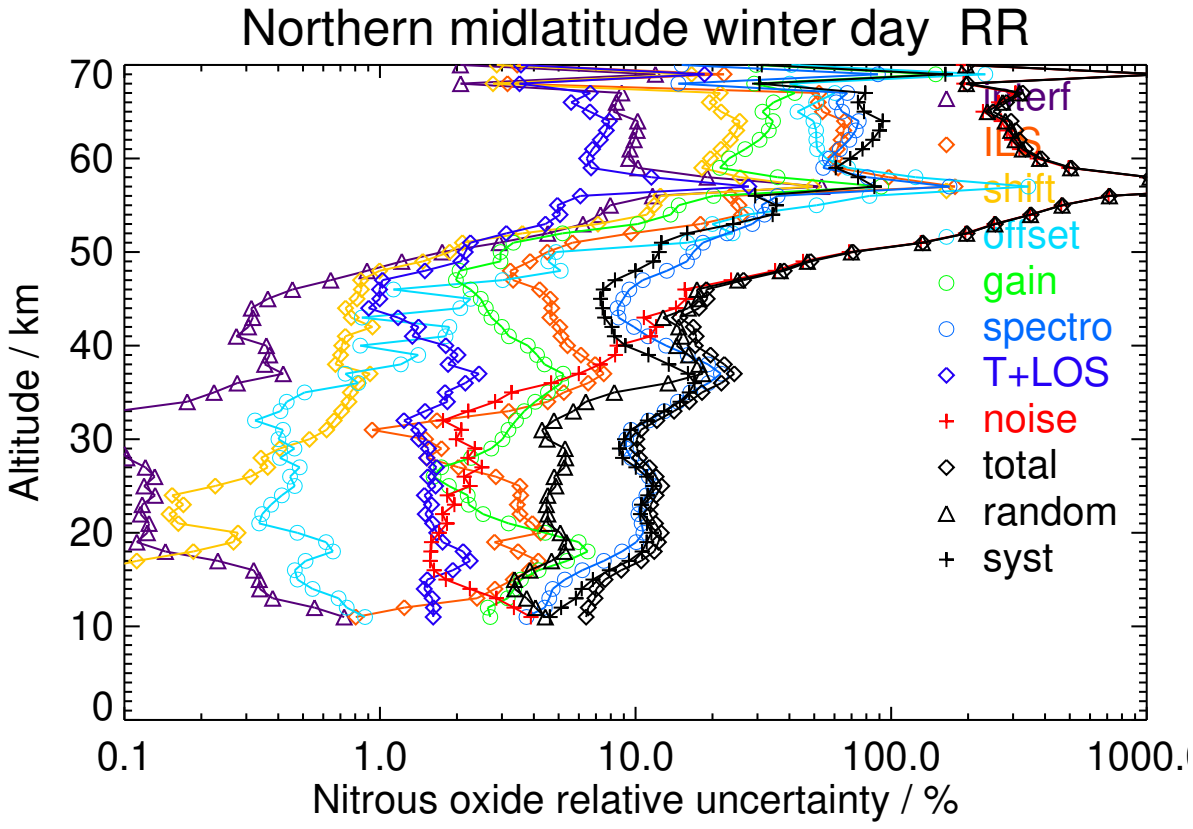

Figure S179. V8R_N2O_261 Northern midlatitude winter day

Table S180. Nitrous oxide error budget for Northern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	306.925	1.454	5.904	0.208	2.342	9.991	14.578	5.151	9.453	11.796	18.209	21.696
15	304.321	0.989	8.782	0.232	1.370	9.377	16.462	4.749	5.117	10.045	19.667	22.084
18	262.996	0.382	7.545	0.536	1.423	13.296	21.487	4.845	3.865	13.608	23.475	27.134
21	211.667	0.339	10.344	0.350	0.857	5.522	21.867	3.745	4.008	9.800	23.466	25.430
24	185.878	0.252	6.531	0.286	0.785	3.055	19.991	2.751	3.480	7.831	20.267	21.727
27	135.299	0.169	2.545	0.535	0.684	2.066	15.471	2.319	3.336	6.622	14.951	16.352
30	101.907	0.091	1.518	0.448	0.380	2.348	9.956	1.533	2.180	5.234	9.327	10.695
33	65.586	0.082	1.778	0.546	0.287	2.217	8.256	0.985	1.564	3.204	8.353	8.947
36	19.000	0.060	1.308	0.135	0.170	0.921	3.372	0.395	0.898	2.319	3.092	3.865
39	6.805	0.020	0.453	0.048	0.097	0.337	0.884	0.115	0.517	0.915	0.745	1.180
42	4.387	0.012	0.239	0.035	0.075	0.164	0.445	0.056	0.433	0.614	0.322	0.693
45	3.925	0.013	0.164	0.034	0.075	0.111	0.331	0.035	0.475	0.554	0.274	0.618
48	2.308	0.016	0.054	0.017	0.082	0.037	0.272	0.027	0.524	0.564	0.207	0.601
52	0.418	0.018	0.028	0.013	0.093	0.011	0.081	0.012	0.708	0.717	0.067	0.720
56	0.270	0.017	0.036	0.018	0.125	0.022	0.053	0.010	1.038	1.048	0.036	1.048
60	0.164	0.048	0.280	0.097	0.226	0.095	0.267	0.032	1.513	1.546	0.347	1.584
64	-0.141	0.087	0.517	0.212	0.331	0.237	0.591	0.064	1.782	1.867	0.725	2.003
68	0.399	0.027	0.096	0.039	0.343	0.133	0.142	0.020	1.673	1.713	0.180	1.722

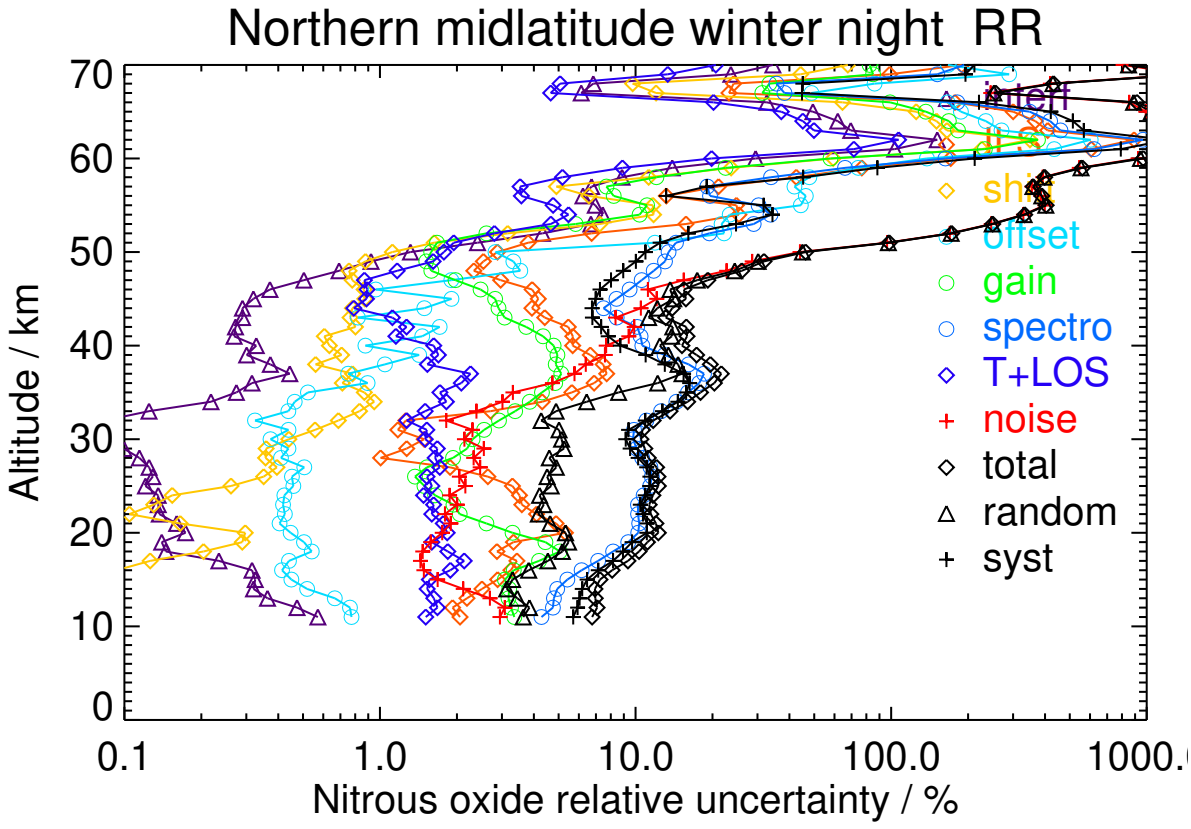

Figure S180. V8R_N2O_261 Northern midlatitude winter night

Table S181. Nitrous oxide error budget for Northern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	311.038	1.578	4.299	0.328	1.799	10.536	14.729	4.555	8.226	10.766	18.021	20.992
15	301.139	1.041	8.135	0.221	1.327	11.526	16.661	4.908	5.002	9.109	21.110	22.992
18	266.946	0.383	9.113	0.556	1.927	20.844	22.224	6.112	4.311	13.679	29.739	32.734
21	199.487	0.267	5.298	0.252	0.901	10.413	21.341	3.437	3.807	10.784	22.425	24.883
24	155.993	0.180	3.321	0.335	0.763	3.335	15.703	2.655	3.842	6.375	15.831	17.066
27	136.277	0.171	1.334	0.443	0.540	2.577	13.062	2.065	3.115	5.884	12.605	13.911
30	100.867	0.088	0.822	0.592	0.402	2.956	11.668	1.726	2.515	5.769	11.050	12.465
33	52.120	0.081	1.746	0.355	0.244	1.816	7.125	0.935	1.631	4.103	6.633	7.800
36	17.366	0.057	1.103	0.132	0.148	0.840	2.679	0.332	0.915	1.847	2.584	3.176
39	8.258	0.032	0.516	0.052	0.088	0.453	1.047	0.109	0.546	1.155	0.746	1.375
42	5.430	0.013	0.281	0.051	0.065	0.238	0.581	0.057	0.439	0.652	0.501	0.822
45	3.153	0.012	0.086	0.022	0.059	0.082	0.287	0.032	0.442	0.497	0.224	0.545
48	2.536	0.016	0.045	0.016	0.071	0.058	0.195	0.021	0.489	0.517	0.148	0.537
52	1.150	0.018	0.036	0.009	0.075	0.022	0.125	0.016	0.627	0.639	0.094	0.645
56	0.570	0.018	0.022	0.012	0.097	0.024	0.068	0.010	0.933	0.940	0.051	0.941
60	0.093	0.020	0.078	0.020	0.168	0.039	0.074	0.012	1.258	1.272	0.080	1.275
64	-0.152	0.041	0.178	0.064	0.301	0.155	0.205	0.024	1.649	1.688	0.251	1.707
68	-0.367	0.046	0.196	0.068	0.322	0.173	0.217	0.027	1.653	1.697	0.284	1.720

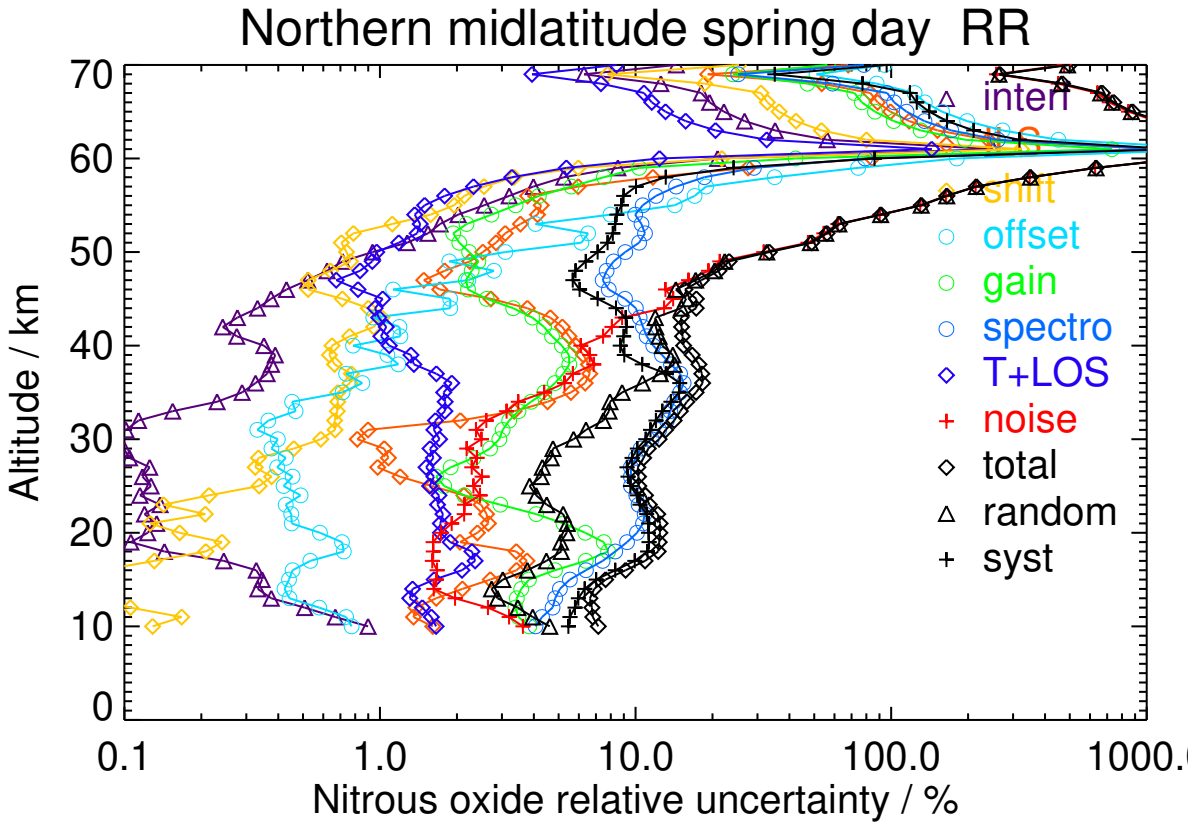

Figure S181. V8R_N2O_261 Northern midlatitude spring day

Table S182. Nitrous oxide error budget for Northern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	311.288	1.528	4.385	0.274	1.931	10.319	14.243	4.743	8.513	10.755	17.720	20.728
15	289.071	0.957	6.851	0.212	1.242	10.167	15.660	4.489	4.659	8.123	19.337	20.973
18	257.225	0.277	7.547	0.475	1.651	17.887	20.693	4.923	4.007	13.747	25.680	29.128
21	199.948	0.281	6.372	0.337	0.960	10.047	21.309	3.318	3.692	10.614	22.555	24.927
24	156.668	0.195	2.854	0.348	0.705	4.581	15.007	2.487	3.663	6.816	15.104	16.571
27	134.607	0.161	1.195	0.472	0.505	2.094	14.016	2.081	3.171	5.201	13.788	14.736
30	90.682	0.082	0.775	0.514	0.356	1.959	10.696	1.609	2.412	4.130	10.516	11.299
33	48.542	0.078	1.570	0.359	0.252	1.847	5.925	0.807	1.598	2.508	6.172	6.662
36	18.832	0.058	1.093	0.159	0.166	0.931	2.739	0.325	0.964	1.895	2.658	3.264
39	8.498	0.033	0.511	0.065	0.098	0.478	1.034	0.112	0.570	1.087	0.854	1.383
42	5.575	0.014	0.282	0.057	0.071	0.266	0.587	0.054	0.446	0.691	0.476	0.840
45	3.244	0.012	0.097	0.023	0.066	0.092	0.332	0.033	0.453	0.528	0.247	0.583
48	2.328	0.016	0.039	0.012	0.072	0.047	0.188	0.020	0.491	0.519	0.128	0.535
52	1.440	0.019	0.032	0.009	0.086	0.023	0.116	0.014	0.662	0.672	0.098	0.679
56	0.531	0.017	0.030	0.014	0.109	0.031	0.067	0.011	0.963	0.971	0.061	0.973
60	0.553	0.020	0.084	0.019	0.171	0.030	0.074	0.013	1.274	1.289	0.077	1.291
64	-0.059	0.039	0.184	0.059	0.300	0.146	0.190	0.024	1.654	1.693	0.238	1.710
68	-0.334	0.045	0.214	0.071	0.326	0.170	0.225	0.024	1.664	1.711	0.283	1.735

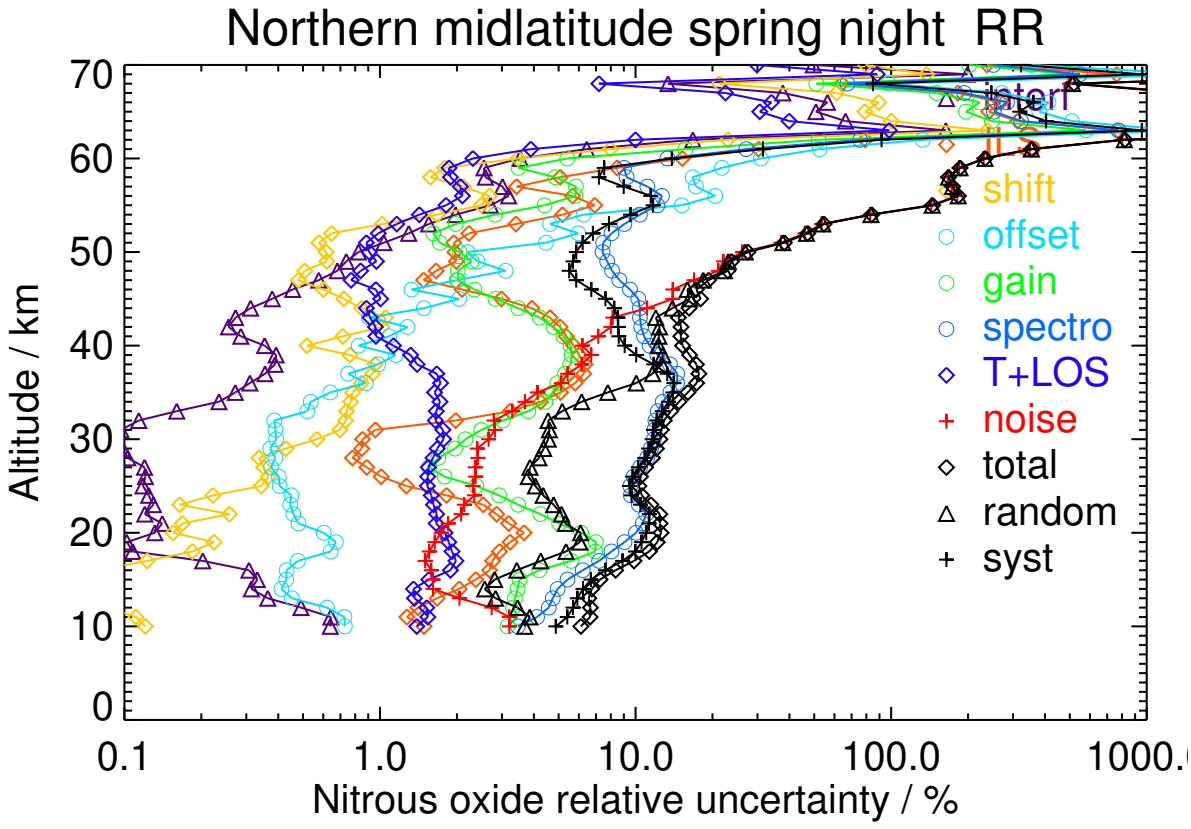

Figure S182. V8R_N2O_261 Northern midlatitude spring night

Table S183. Nitrous oxide error budget for Northern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	360.365	2.013	12.340	0.186	2.196	15.622	15.123	5.350	8.781	11.107	24.825	27.197
15	347.376	1.450	14.319	0.173	2.125	11.152	16.259	7.574	7.518	11.908	23.927	26.726
18	321.453	1.286	6.535	0.459	2.238	10.168	23.259	7.385	6.014	12.038	25.292	28.011
21	244.405	0.516	10.045	0.406	0.696	2.147	24.463	5.161	4.964	8.418	26.178	27.498
24	180.784	0.245	4.213	0.121	0.566	2.839	18.499	2.647	3.476	5.130	19.005	19.685
27	139.331	0.177	1.578	0.510	0.539	2.274	12.087	2.107	3.391	4.463	12.262	13.049
30	120.974	0.104	1.415	0.608	0.353	2.687	11.859	1.638	2.345	3.325	12.144	12.591
33	69.882	0.070	1.971	0.623	0.269	2.060	7.830	0.960	1.751	2.782	8.134	8.596
36	36.690	0.099	1.512	0.248	0.210	1.452	4.104	0.467	1.154	1.569	4.521	4.785
39	15.283	0.045	0.806	0.106	0.123	0.705	1.966	0.215	0.728	1.011	2.143	2.370
42	6.788	0.014	0.332	0.065	0.081	0.270	0.668	0.085	0.500	0.686	0.653	0.948
45	4.996	0.013	0.194	0.048	0.071	0.160	0.420	0.048	0.468	0.572	0.376	0.685
48	3.257	0.016	0.109	0.036	0.075	0.100	0.269	0.034	0.489	0.542	0.218	0.584
52	2.940	0.018	0.053	0.019	0.078	0.056	0.226	0.027	0.601	0.638	0.141	0.653
56	1.979	0.020	0.039	0.022	0.097	0.051	0.184	0.024	0.886	0.900	0.151	0.913
60	0.516	0.030	0.129	0.039	0.169	0.062	0.127	0.020	1.276	1.292	0.159	1.302
64	-0.432	0.076	0.359	0.150	0.291	0.277	0.421	0.034	1.677	1.718	0.598	1.819
68	-0.514	0.080	0.390	0.192	0.292	0.351	0.558	0.039	1.617	1.663	0.753	1.825

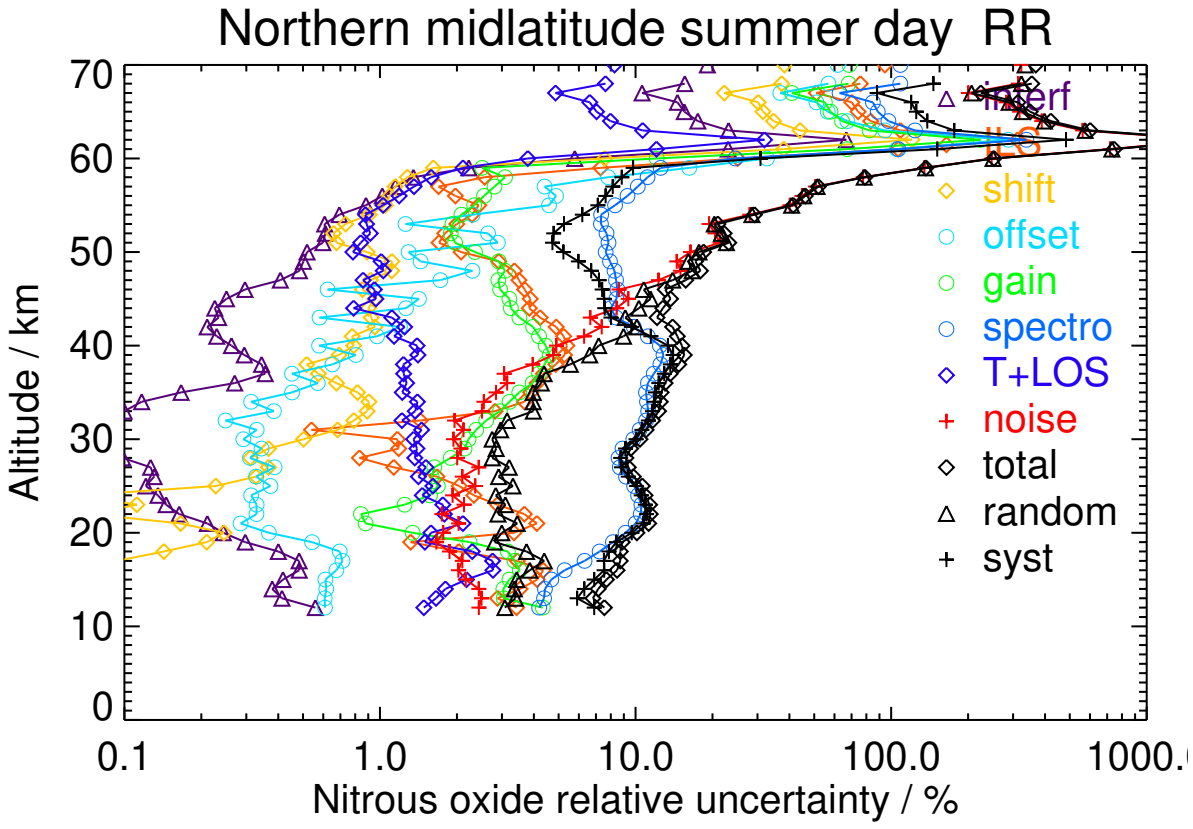

Figure S183. V8R_N2O_261 Northern midlatitude summer day

Table S184. Nitrous oxide error budget for Northern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	338.947	2.051	6.172	0.239	2.343	12.147	14.486	6.551	10.112	13.593	19.122	23.461
15	334.506	1.384	9.010	0.151	1.842	8.372	13.965	6.371	7.535	12.538	17.082	21.189
18	302.349	1.003	4.984	0.506	1.006	4.845	20.468	4.564	5.029	9.744	20.511	22.708
21	242.216	0.534	11.419	0.392	0.881	2.024	24.831	5.009	4.638	7.921	27.133	28.265
24	181.169	0.232	4.471	0.146	0.599	2.793	18.960	2.900	3.594	5.360	19.502	20.225
27	139.638	0.178	1.560	0.524	0.517	2.254	12.872	2.190	3.208	4.446	13.004	13.743
30	110.027	0.117	1.269	0.670	0.363	2.170	10.803	1.667	2.342	3.407	10.967	11.484
33	65.923	0.085	1.640	0.642	0.273	1.863	6.737	0.937	1.704	2.859	6.903	7.471
36	35.912	0.101	1.491	0.321	0.198	1.243	3.928	0.483	1.147	1.795	4.205	4.572
39	14.289	0.051	0.687	0.095	0.120	0.638	1.649	0.204	0.727	0.959	1.810	2.048
42	8.017	0.016	0.389	0.059	0.084	0.338	0.748	0.082	0.515	0.810	0.673	1.053
45	5.668	0.013	0.195	0.047	0.073	0.178	0.431	0.047	0.478	0.585	0.389	0.703
48	4.865	0.017	0.104	0.038	0.077	0.124	0.328	0.039	0.483	0.558	0.256	0.614
52	3.606	0.019	0.092	0.027	0.083	0.084	0.299	0.034	0.622	0.671	0.223	0.708
56	1.605	0.019	0.044	0.020	0.103	0.046	0.189	0.026	0.912	0.929	0.138	0.940
60	1.041	0.026	0.109	0.023	0.168	0.033	0.115	0.020	1.259	1.275	0.121	1.281
64	0.632	0.069	0.334	0.108	0.288	0.177	0.306	0.030	1.659	1.697	0.459	1.758
68	0.031	0.080	0.372	0.138	0.298	0.217	0.384	0.028	1.616	1.658	0.558	1.749

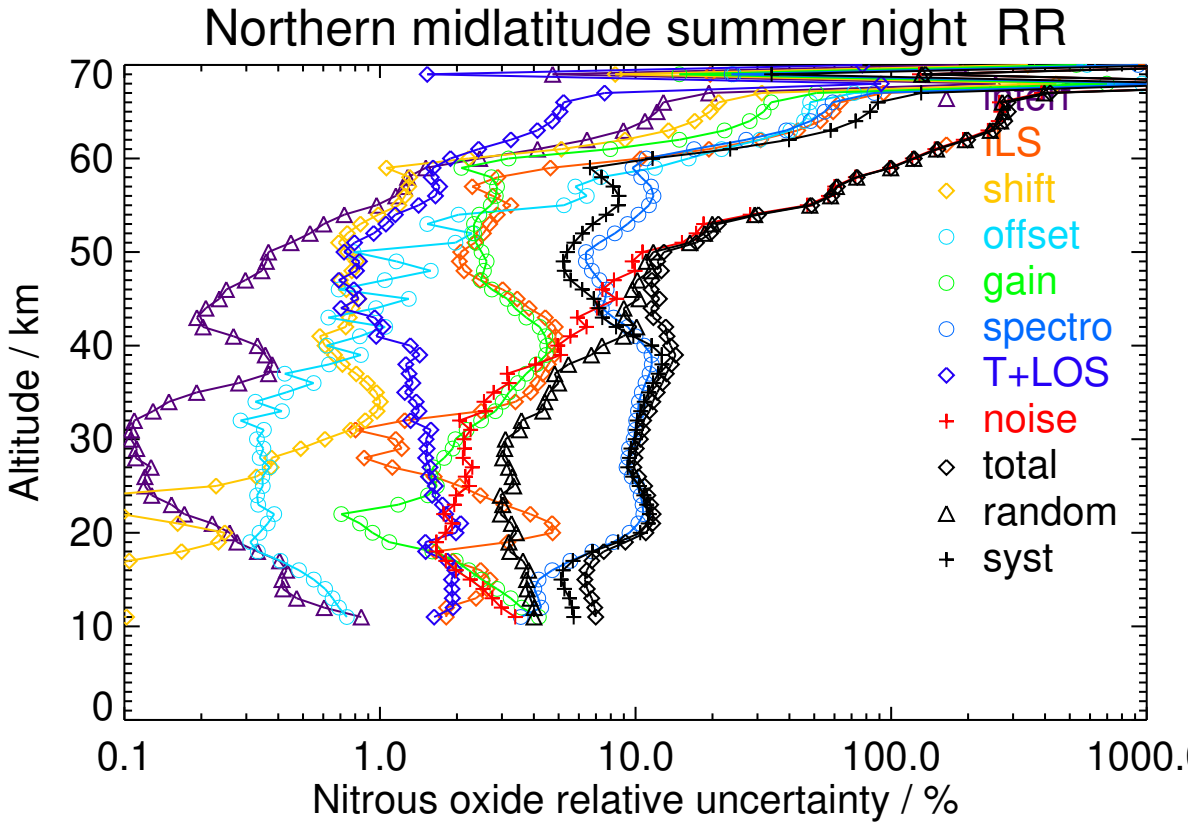

Figure S184. V8R_N2O_261 Northern midlatitude summer night

Table S185. Nitrous oxide error budget for Northern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	344.158	1.574	8.281	0.154	2.119	14.636	13.921	4.762	7.906	9.996	21.653	23.849
15	327.134	1.237	11.649	0.147	2.262	11.293	16.102	7.628	8.388	13.232	21.969	25.647
18	310.971	0.778	4.328	0.455	1.520	10.296	23.201	5.717	4.908	10.278	24.846	26.888
21	238.969	0.407	12.142	0.521	0.918	2.618	26.319	4.673	4.565	7.984	28.761	29.848
24	180.451	0.239	6.245	0.306	0.811	1.951	19.489	2.888	3.563	6.077	20.188	21.083
27	137.469	0.158	2.947	0.515	0.627	1.991	14.675	2.316	3.665	5.186	14.852	15.732
30	104.144	0.095	0.924	0.521	0.352	1.957	10.650	1.588	2.500	3.717	10.652	11.282
33	73.126	0.079	0.977	0.641	0.317	1.788	7.327	0.896	2.066	3.353	7.224	7.964
36	48.746	0.097	1.399	0.411	0.264	1.654	4.752	0.517	1.511	2.323	4.967	5.484
39	28.920	0.086	1.198	0.171	0.203	1.358	2.781	0.297	1.104	1.728	3.068	3.521
42	19.480	0.037	0.934	0.105	0.143	0.903	1.852	0.190	0.861	1.374	2.010	2.435
45	8.943	0.017	0.494	0.083	0.098	0.304	1.016	0.105	0.696	0.861	1.068	1.371
48	4.770	0.017	0.178	0.034	0.094	0.085	0.408	0.052	0.650	0.707	0.375	0.800
52	3.057	0.020	0.070	0.019	0.098	0.042	0.227	0.030	0.793	0.809	0.210	0.836
56	1.246	0.020	0.030	0.017	0.115	0.029	0.138	0.020	1.079	1.089	0.117	1.096
60	0.534	0.025	0.105	0.027	0.196	0.050	0.098	0.018	1.424	1.440	0.129	1.446
64	-0.075	0.048	0.217	0.079	0.314	0.165	0.232	0.028	1.760	1.796	0.328	1.826
68	-0.509	0.045	0.194	0.075	0.325	0.173	0.222	0.025	1.706	1.744	0.313	1.772

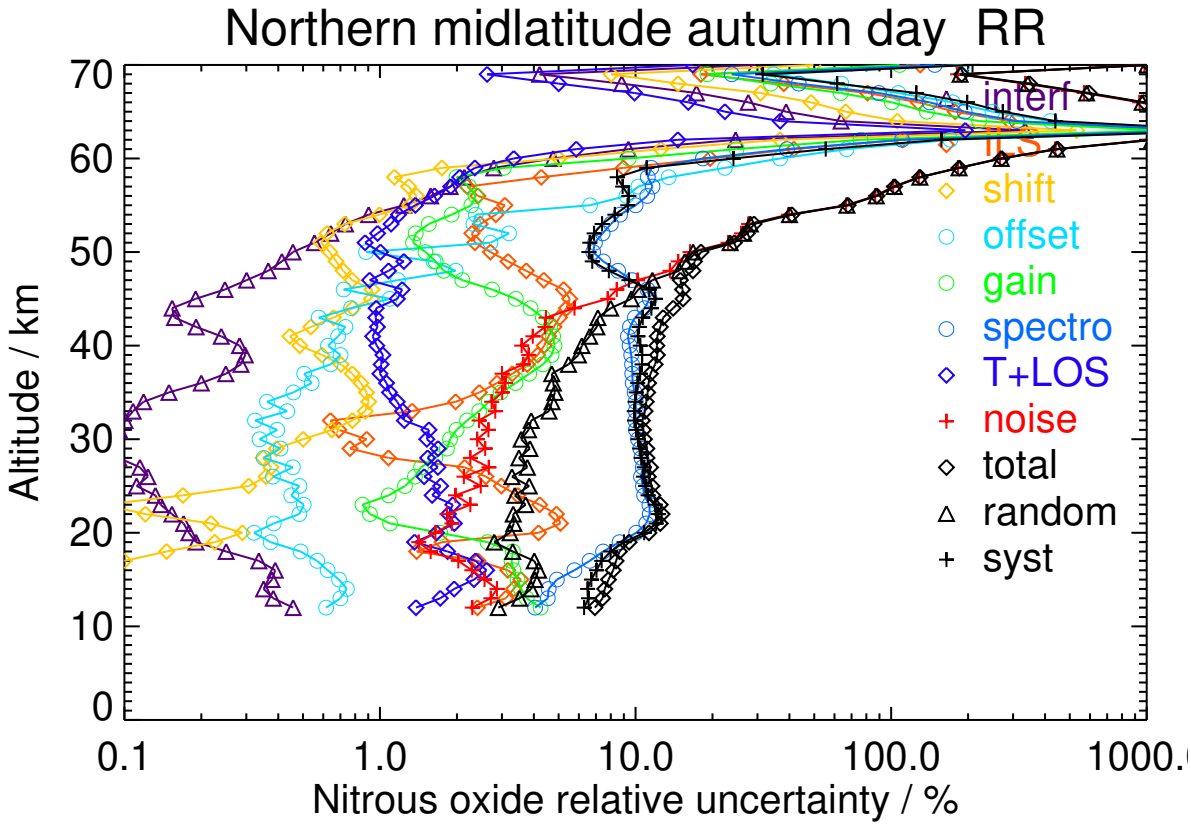

Figure S185. V8R_N2O_261 Northern midlatitude autumn day

Table S186. Nitrous oxide error budget for Northern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	324.141	1.252	12.150	0.086	2.559	14.851	14.028	5.902	9.476	11.862	23.601	26.414
15	328.441	1.083	10.240	0.136	2.056	10.552	15.242	7.332	7.489	12.447	20.220	23.744
18	305.189	0.691	3.935	0.489	1.383	10.192	21.057	4.944	4.467	9.762	22.682	24.693
21	232.770	0.391	8.725	0.439	0.922	7.039	24.555	4.134	4.355	10.120	25.758	27.675
24	171.535	0.216	5.832	0.338	0.714	2.397	18.822	2.783	3.628	6.914	19.178	20.386
27	132.679	0.149	3.078	0.494	0.572	2.266	14.269	2.193	3.466	5.401	14.369	15.350
30	95.384	0.090	1.082	0.512	0.359	2.040	10.767	1.557	2.436	4.281	10.568	11.402
33	63.857	0.086	0.962	0.610	0.313	1.647	7.117	0.895	1.958	3.786	6.713	7.708
36	38.945	0.087	1.161	0.410	0.245	1.452	4.386	0.466	1.380	2.778	4.163	5.005
39	23.661	0.071	1.114	0.158	0.180	1.215	2.767	0.257	0.975	2.220	2.553	3.384
42	14.068	0.030	0.816	0.081	0.121	0.727	1.596	0.142	0.743	1.409	1.534	2.082
45	8.363	0.015	0.397	0.065	0.092	0.263	0.782	0.078	0.638	0.811	0.778	1.124
48	4.694	0.018	0.183	0.031	0.089	0.088	0.402	0.045	0.602	0.639	0.410	0.759
52	2.650	0.020	0.064	0.015	0.096	0.037	0.175	0.024	0.751	0.763	0.172	0.782
56	1.664	0.018	0.035	0.016	0.114	0.034	0.130	0.019	1.044	1.053	0.120	1.060
60	0.450	0.021	0.070	0.012	0.181	0.029	0.075	0.016	1.359	1.373	0.082	1.375
64	-0.088	0.038	0.156	0.045	0.305	0.131	0.147	0.022	1.713	1.745	0.226	1.759
68	-0.225	0.043	0.184	0.057	0.321	0.152	0.176	0.024	1.686	1.723	0.269	1.744

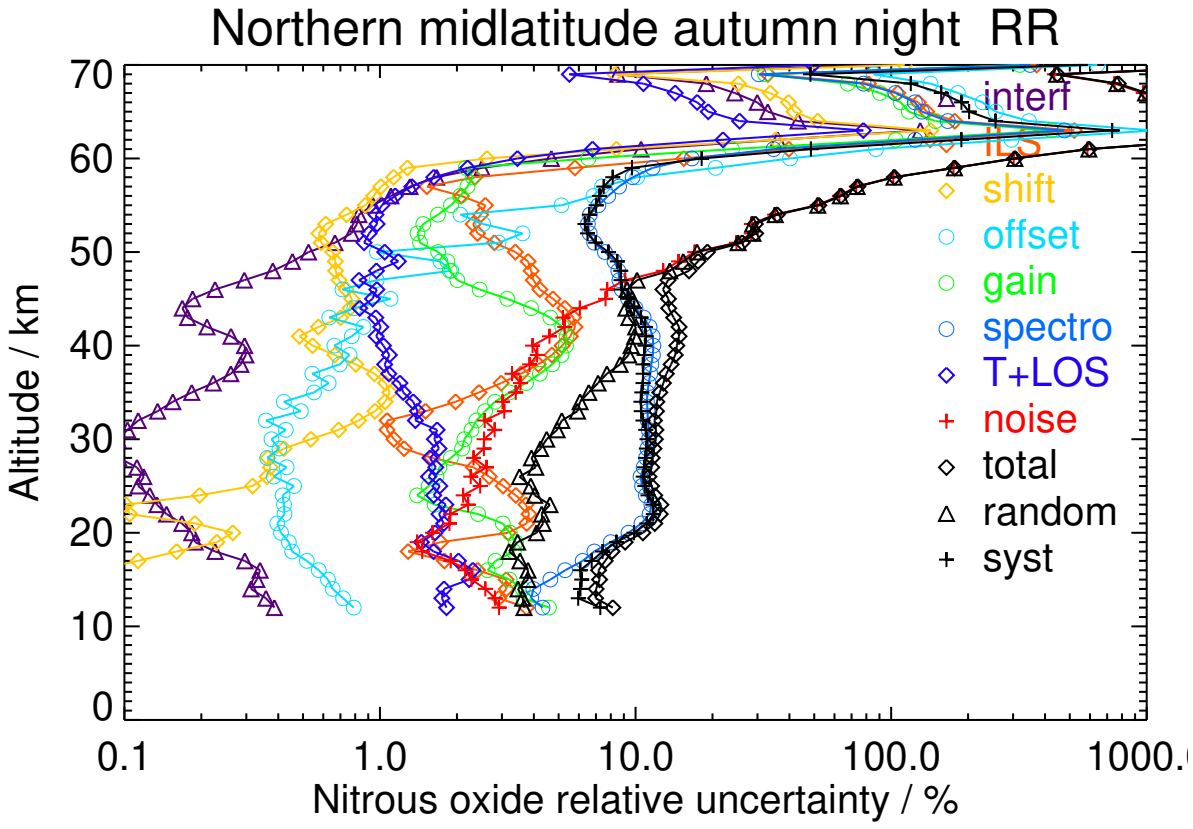

Figure S186. V8R_N2O_261 Northern midlatitude autumn night

Table S187. Nitrous oxide error budget for Tropics day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	353.458	1.315	6.576	0.096	2.105	13.988	16.897	5.919	8.292	11.428	22.445	25.187
15	362.230	1.681	13.356	0.334	2.449	13.530	15.428	10.277	8.500	14.844	23.789	28.040
18	335.895	1.389	7.650	0.263	2.417	9.007	17.257	8.407	7.741	12.630	20.405	23.998
21	293.336	0.812	5.961	0.260	0.856	3.875	23.099	5.919	6.087	9.401	23.860	25.645
24	265.355	0.214	1.429	0.262	0.669	5.486	24.488	3.347	4.229	7.153	24.704	25.719
27	251.759	0.170	0.894	0.292	0.652	4.401	21.022	3.179	3.922	5.929	21.283	22.094
30	213.112	0.112	1.523	0.651	0.536	4.470	18.214	2.713	3.017	4.809	18.657	19.267
33	160.327	0.135	3.240	1.254	0.416	3.712	13.850	1.699	2.256	4.541	14.326	15.028
36	87.582	0.131	2.747	0.928	0.252	2.515	8.630	0.974	1.480	3.101	9.100	9.614
39	39.352	0.110	1.377	0.339	0.185	1.623	4.082	0.425	0.963	1.893	4.345	4.740
42	19.120	0.045	0.709	0.139	0.120	0.930	2.163	0.210	0.662	1.504	2.075	2.562
45	6.858	0.018	0.182	0.081	0.069	0.226	0.762	0.093	0.496	0.629	0.732	0.965
48	4.154	0.016	0.082	0.016	0.061	0.097	0.294	0.045	0.492	0.524	0.277	0.593
52	1.190	0.016	0.045	0.014	0.047	0.028	0.171	0.026	0.561	0.572	0.152	0.592
56	0.355	0.018	0.061	0.028	0.071	0.038	0.081	0.010	0.774	0.780	0.090	0.786
60	-0.043	0.024	0.110	0.034	0.154	0.071	0.112	0.013	1.119	1.132	0.157	1.143
64	-0.579	0.070	0.450	0.184	0.287	0.323	0.524	0.044	1.609	1.662	0.729	1.814
68	-0.801	0.082	0.558	0.225	0.309	0.396	0.643	0.056	1.622	1.699	0.885	1.915

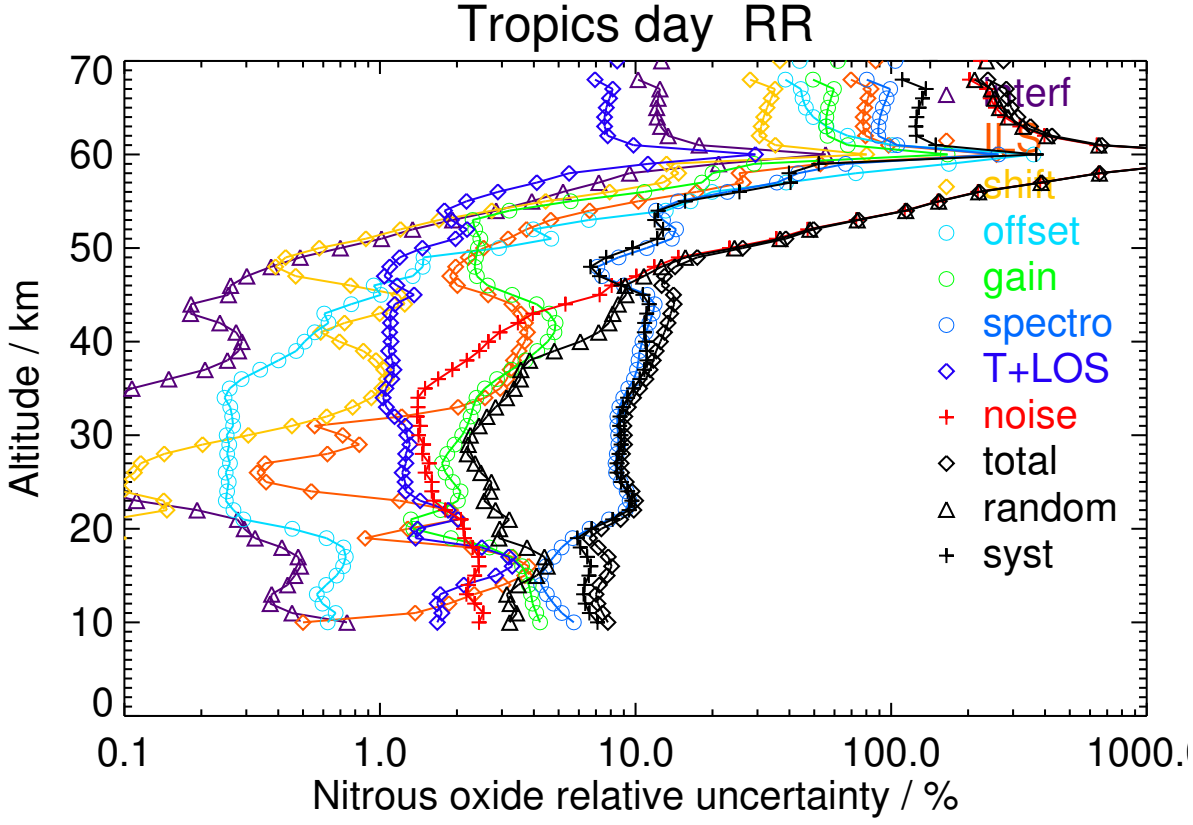

Figure S187. V8R_N2O_261 Tropics day

Table S188. Nitrous oxide error budget for Tropics night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	355.453	1.373	6.087	0.081	2.084	14.191	17.464	6.265	8.523	11.652	22.930	25.721
15	364.118	1.791	12.155	0.295	2.452	12.804	15.626	11.566	8.891	15.755	23.017	27.893
18	338.866	1.273	6.921	0.303	2.307	8.029	17.166	8.814	7.848	12.662	19.825	23.523
21	292.229	0.832	6.413	0.378	0.875	3.618	24.939	6.357	6.281	9.711	25.755	27.525
24	267.044	0.182	1.236	0.160	0.577	6.090	22.659	3.587	4.241	6.855	23.158	24.152
27	246.541	0.150	0.973	0.253	0.664	4.539	21.551	3.370	3.844	5.985	21.836	22.642
30	213.258	0.096	2.018	0.576	0.515	4.193	17.883	2.948	3.027	4.945	18.315	18.971
33	162.501	0.113	3.225	1.091	0.403	3.760	14.245	1.835	2.270	4.243	14.810	15.406
36	87.420	0.123	3.354	0.925	0.252	2.511	8.661	1.022	1.511	3.127	9.330	9.840
39	41.114	0.111	1.654	0.287	0.190	1.667	4.172	0.466	1.001	1.785	4.592	4.927
42	18.357	0.038	0.716	0.159	0.116	0.911	2.179	0.219	0.673	1.379	2.175	2.575
45	6.435	0.015	0.123	0.055	0.074	0.156	0.712	0.090	0.507	0.618	0.662	0.905
48	3.451	0.015	0.068	0.017	0.069	0.080	0.251	0.043	0.509	0.525	0.255	0.584
52	1.116	0.016	0.033	0.011	0.053	0.022	0.136	0.023	0.561	0.571	0.113	0.582
56	0.382	0.019	0.053	0.026	0.072	0.035	0.082	0.011	0.772	0.778	0.090	0.783
60	-0.325	0.023	0.110	0.034	0.152	0.070	0.111	0.012	1.127	1.140	0.157	1.151
64	-0.776	0.067	0.446	0.184	0.284	0.325	0.526	0.044	1.615	1.662	0.741	1.820
68	-0.997	0.085	0.610	0.258	0.304	0.435	0.723	0.061	1.624	1.694	1.012	1.973

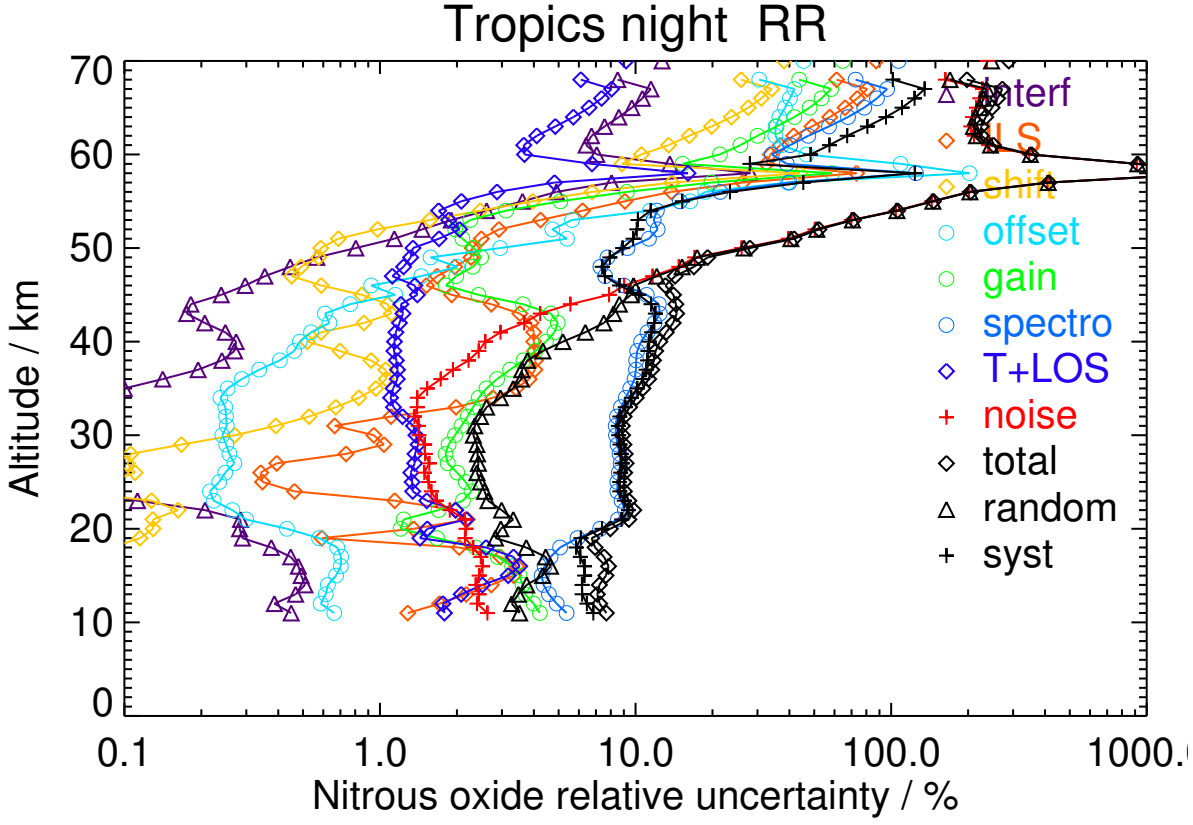

Figure S188. V8R_N2O_261 Tropics night

Table S189. Nitrous oxide error budget for Southern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	342.298	4.523	3.460	0.381	2.959	12.739	15.390	6.545	12.340	15.332	20.013	25.211
12	314.411	1.162	5.076	0.248	1.484	10.409	13.236	4.091	7.058	9.356	17.086	19.480
15	298.225	0.843	5.271	0.303	1.395	8.953	16.663	5.198	5.347	9.166	18.972	21.071
18	265.215	0.320	4.914	0.543	1.081	14.052	23.286	5.105	4.513	10.503	26.487	28.493
21	209.178	0.250	3.819	0.175	0.917	10.320	23.087	3.325	4.251	7.792	24.969	26.156
24	159.128	0.176	2.754	0.332	0.826	5.899	19.135	2.811	4.476	6.540	19.862	20.911
27	108.601	0.115	1.358	0.299	0.568	2.858	14.064	2.182	3.744	6.132	13.763	15.067
30	77.165	0.064	0.632	0.395	0.419	1.911	10.676	1.536	3.137	6.855	9.142	11.427
33	56.813	0.071	1.808	0.295	0.331	1.674	8.444	0.947	2.456	5.847	7.094	9.193
36	30.438	0.071	1.639	0.097	0.266	1.378	5.114	0.543	1.748	3.564	4.634	5.846
39	10.750	0.031	0.692	0.049	0.138	0.584	2.218	0.228	1.012	1.717	1.972	2.615
42	2.084	0.012	0.154	0.017	0.083	0.102	0.601	0.064	0.674	0.831	0.413	0.928
45	0.912	0.011	0.035	0.008	0.080	0.037	0.147	0.018	0.658	0.678	0.065	0.681
48	0.450	0.016	0.021	0.005	0.088	0.013	0.075	0.010	0.679	0.687	0.050	0.689
52	-0.002	0.019	0.022	0.007	0.098	0.013	0.046	0.008	0.848	0.855	0.021	0.856
56	0.424	0.016	0.039	0.013	0.115	0.037	0.061	0.012	1.130	1.138	0.044	1.139
60	0.185	0.013	0.043	0.011	0.183	0.027	0.050	0.012	1.369	1.383	0.030	1.383
64	-0.258	0.016	0.064	0.013	0.306	0.068	0.069	0.016	1.697	1.728	0.056	1.729
68	-0.269	0.017	0.071	0.013	0.326	0.070	0.072	0.017	1.672	1.706	0.068	1.708

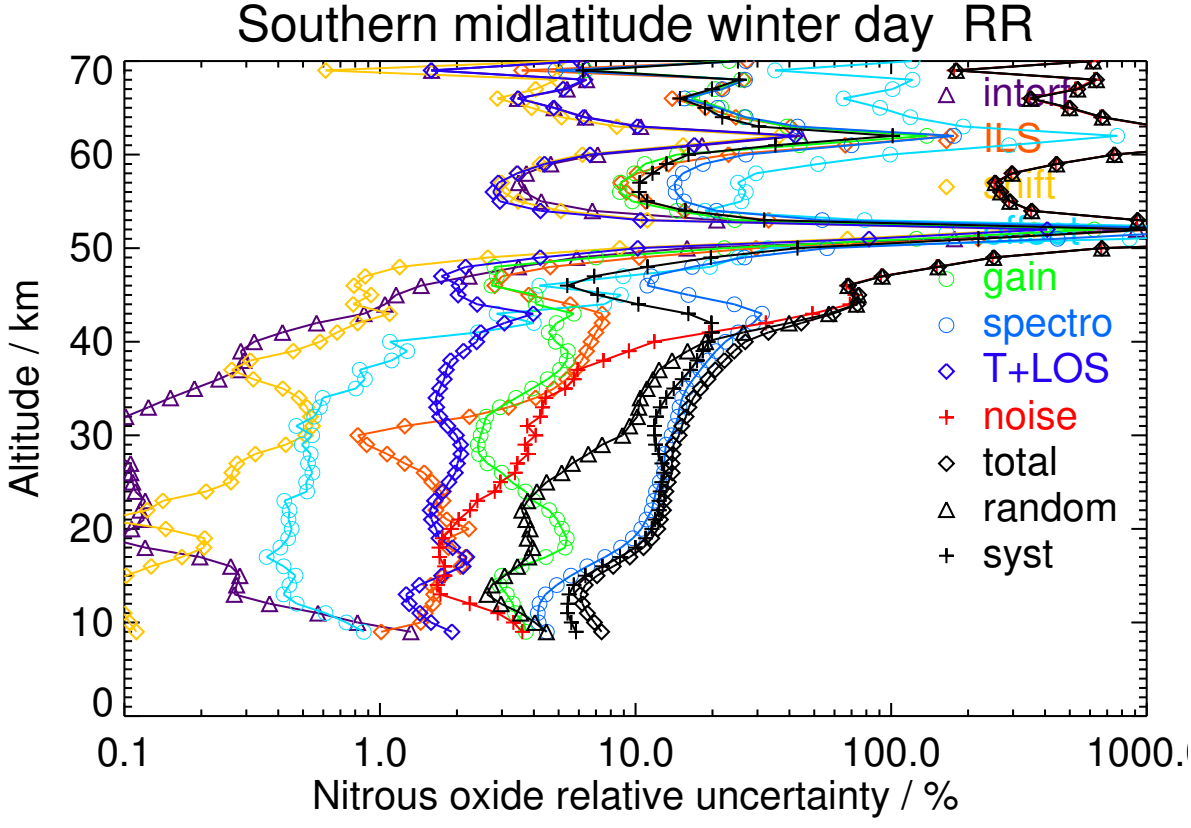

Figure S189. V8R_N2O_261 Southern midlatitude winter day

Table S190. Nitrous oxide error budget for Southern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	310.415	3.303	2.015	0.374	2.439	9.117	12.569	4.865	10.667	12.917	15.257	19.990
12	311.921	1.048	4.699	0.309	1.200	10.238	12.365	3.201	5.407	8.327	15.892	17.942
15	296.479	0.907	5.923	0.233	1.384	10.464	15.318	4.712	5.074	9.535	18.412	20.735
18	264.377	0.318	8.839	0.288	1.666	19.618	17.085	5.854	4.457	11.785	25.944	28.495
21	206.019	0.241	2.488	0.255	1.250	13.494	18.581	3.558	4.230	8.916	22.052	23.786
24	151.061	0.161	2.441	0.308	0.746	5.817	16.129	2.586	3.911	6.659	16.681	17.961
27	105.232	0.101	1.852	0.272	0.637	2.580	13.412	2.281	3.920	6.235	13.120	14.526
30	63.929	0.065	0.664	0.308	0.359	1.589	8.899	1.514	2.751	5.068	8.158	9.605
33	45.397	0.071	0.963	0.331	0.291	0.873	6.003	0.795	2.328	4.659	4.719	6.632
36	26.620	0.073	1.029	0.139	0.267	1.345	3.253	0.434	1.570	2.591	3.080	4.025
39	11.314	0.028	0.540	0.043	0.143	0.655	1.634	0.202	0.948	1.391	1.554	2.086
42	2.903	0.010	0.150	0.017	0.090	0.135	0.570	0.068	0.684	0.769	0.505	0.920
45	0.580	0.012	0.028	0.005	0.086	0.021	0.147	0.018	0.698	0.716	0.069	0.720
48	0.342	0.016	0.012	0.005	0.082	0.013	0.052	0.008	0.723	0.729	0.024	0.730
52	0.381	0.019	0.019	0.007	0.100	0.019	0.046	0.009	0.953	0.960	0.027	0.960
56	0.433	0.016	0.019	0.008	0.112	0.035	0.040	0.012	1.167	1.174	0.034	1.174
60	-0.163	0.016	0.041	0.008	0.189	0.030	0.040	0.012	1.367	1.381	0.023	1.381
64	-0.774	0.021	0.060	0.017	0.309	0.074	0.060	0.017	1.705	1.735	0.069	1.737
68	-0.835	0.018	0.042	0.010	0.331	0.091	0.041	0.019	1.688	1.722	0.085	1.724

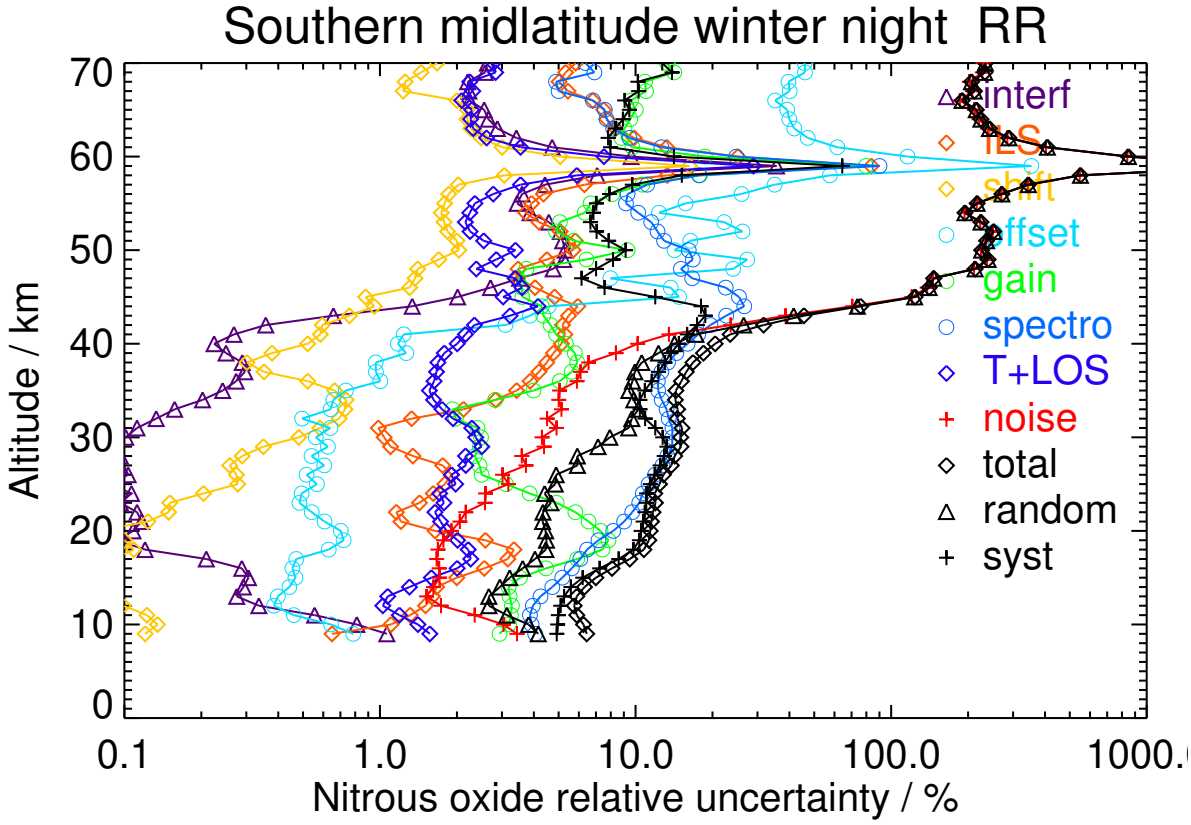

Figure S190. V8R_N2O_261 Southern midlatitude winter night

Table S191. Nitrous oxide error budget for Southern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	309.480	5.107	4.745	0.479	2.357	9.179	15.008	5.237	11.161	15.473	16.627	22.713
12	304.384	1.787	6.668	0.476	1.321	8.879	14.555	3.909	5.999	11.972	15.756	19.788
15	284.134	1.426	7.188	0.448	1.371	7.585	18.861	5.092	5.730	13.628	18.495	22.974
18	230.137	0.449	9.830	0.577	1.157	11.155	22.468	4.731	4.037	16.578	22.172	27.685
21	170.194	0.273	7.135	0.363	0.817	7.865	19.077	3.201	3.746	14.082	17.422	22.402
24	171.304	0.194	3.405	0.241	0.766	4.938	14.920	2.407	3.361	8.516	14.277	16.624
27	167.006	0.183	1.525	0.444	0.540	2.920	14.456	2.163	3.180	5.831	14.182	15.334
30	140.147	0.122	1.323	0.678	0.413	3.404	13.589	1.961	2.438	5.710	13.260	14.437
33	88.137	0.090	2.855	0.454	0.316	3.121	10.342	1.229	1.845	3.886	10.723	11.405
36	29.364	0.073	1.772	0.188	0.201	1.420	4.598	0.544	1.179	2.577	4.628	5.297
39	11.298	0.031	0.529	0.061	0.137	0.740	1.235	0.168	0.720	1.067	1.336	1.710
42	6.742	0.014	0.214	0.046	0.092	0.376	0.671	0.077	0.540	0.694	0.681	0.973
45	2.639	0.012	0.032	0.014	0.079	0.100	0.282	0.038	0.511	0.541	0.259	0.600
48	2.161	0.016	0.029	0.009	0.079	0.057	0.111	0.015	0.521	0.533	0.104	0.543
52	1.501	0.019	0.031	0.010	0.093	0.039	0.119	0.015	0.708	0.718	0.107	0.726
56	0.547	0.015	0.045	0.019	0.115	0.074	0.081	0.015	1.002	1.011	0.095	1.016
60	-0.032	0.019	0.088	0.020	0.170	0.071	0.068	0.013	1.293	1.307	0.098	1.311
64	-0.267	0.045	0.268	0.086	0.292	0.413	0.239	0.047	1.660	1.722	0.430	1.775
68	-0.496	0.051	0.308	0.104	0.319	0.532	0.273	0.056	1.660	1.754	0.499	1.824

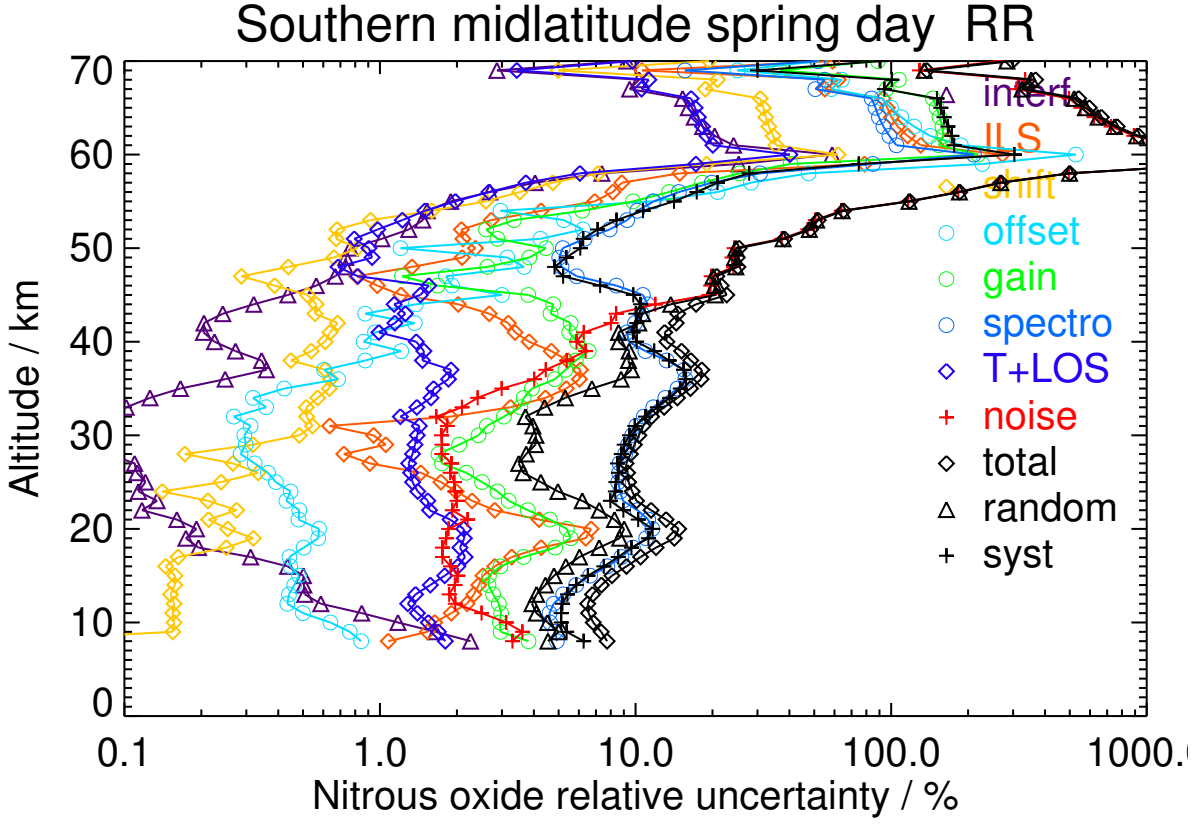

Figure S191. V8R_N2O_261 Southern midlatitude spring day

Table S192. Nitrous oxide error budget for Southern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	314.018	3.682	6.231	0.320	2.466	11.182	11.780	5.209	10.731	14.508	15.944	21.557
12	316.116	1.520	9.825	0.278	1.494	12.617	12.410	4.258	6.296	10.756	18.880	21.729
15	289.011	1.263	11.964	0.229	1.541	11.747	14.926	5.482	5.312	12.791	20.065	23.795
18	228.069	0.401	10.179	0.493	1.721	19.266	21.750	5.443	4.010	19.425	24.891	31.574
21	145.821	0.225	6.185	0.268	0.911	9.809	17.208	2.930	3.664	13.767	16.249	21.297
24	137.896	0.211	3.020	0.247	0.601	3.779	14.200	1.946	3.091	10.303	11.519	15.455
27	134.160	0.185	2.143	0.463	0.575	2.857	12.475	1.878	3.062	8.511	10.461	13.486
30	132.066	0.100	1.631	0.679	0.413	4.155	13.317	1.689	2.190	5.954	13.043	14.337
33	74.414	0.080	2.840	0.443	0.282	2.794	10.198	1.135	1.715	4.916	10.011	11.153
36	23.415	0.067	1.502	0.127	0.196	1.353	3.716	0.442	1.077	2.204	3.802	4.394
39	9.785	0.026	0.503	0.070	0.116	0.522	1.089	0.140	0.639	0.907	1.156	1.469
42	4.513	0.012	0.196	0.035	0.080	0.193	0.469	0.057	0.474	0.542	0.488	0.729
45	2.667	0.012	0.042	0.015	0.075	0.076	0.181	0.026	0.483	0.501	0.172	0.530
48	2.118	0.016	0.027	0.010	0.076	0.040	0.121	0.014	0.507	0.517	0.115	0.529
52	1.539	0.020	0.030	0.010	0.092	0.033	0.098	0.012	0.695	0.703	0.093	0.709
56	0.911	0.015	0.053	0.020	0.112	0.046	0.090	0.013	0.988	0.997	0.093	1.001
60	0.202	0.019	0.092	0.022	0.160	0.035	0.070	0.012	1.240	1.254	0.082	1.256
64	-0.186	0.044	0.367	0.102	0.281	0.249	0.291	0.033	1.608	1.674	0.396	1.720
68	-0.092	0.054	0.493	0.142	0.309	0.312	0.397	0.042	1.636	1.739	0.520	1.815

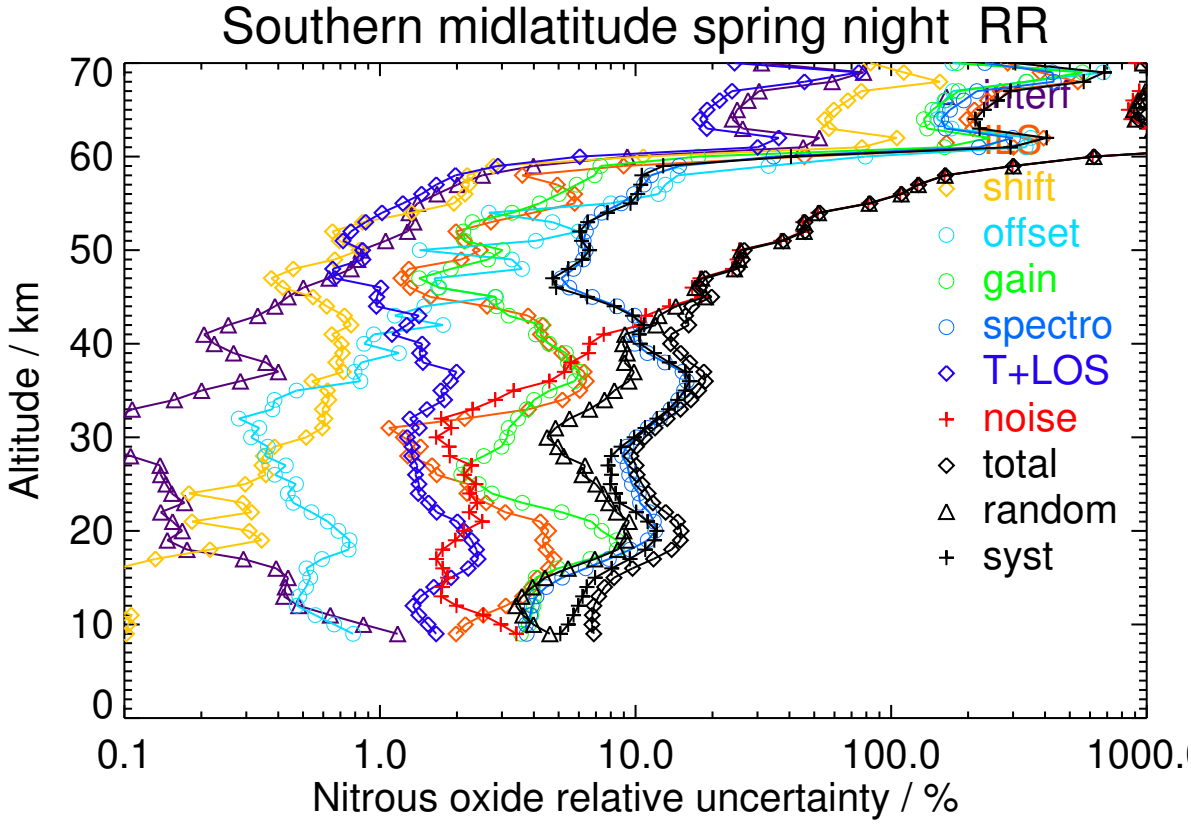

Figure S192. V8R_N2O_261 Southern midlatitude spring night

Table S193. Nitrous oxide error budget for Southern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	307.380	4.855	3.030	0.410	2.225	8.632	15.174	5.019	9.879	13.675	16.685	21.573
12	309.311	1.626	7.831	0.310	1.116	11.957	13.514	3.255	4.963	11.245	17.311	20.643
15	303.005	1.330	14.121	0.518	1.544	12.991	16.565	4.932	5.383	18.847	18.576	26.463
18	254.250	0.814	11.526	0.504	1.412	13.470	18.180	4.864	4.623	17.139	19.975	26.320
21	199.458	0.397	10.525	0.315	0.813	2.829	22.585	3.993	3.962	10.391	23.526	25.718
24	168.401	0.255	4.601	0.150	0.606	1.888	16.482	2.525	3.048	6.785	16.324	17.678
27	124.585	0.174	1.410	0.495	0.557	2.030	13.722	2.231	3.156	5.063	13.575	14.488
30	78.401	0.107	1.242	0.631	0.258	1.576	7.041	1.150	1.800	2.870	7.099	7.657
33	53.662	0.085	1.617	0.557	0.261	1.478	4.360	0.670	1.513	1.942	4.812	5.189
36	29.192	0.083	1.398	0.174	0.184	1.137	2.818	0.360	0.989	1.264	3.282	3.517
39	14.444	0.033	0.724	0.094	0.109	0.603	1.488	0.176	0.585	0.810	1.686	1.871
42	5.726	0.012	0.183	0.044	0.068	0.183	0.630	0.073	0.385	0.539	0.577	0.790
45	2.758	0.010	0.030	0.020	0.059	0.055	0.241	0.032	0.354	0.389	0.202	0.439
48	0.946	0.014	0.016	0.007	0.056	0.020	0.144	0.017	0.351	0.370	0.106	0.385
52	0.180	0.017	0.011	0.005	0.074	0.009	0.041	0.007	0.513	0.520	0.017	0.520
56	0.057	0.014	0.045	0.017	0.101	0.012	0.039	0.007	0.792	0.799	0.051	0.801
60	0.201	0.015	0.041	0.014	0.140	0.015	0.045	0.008	1.063	1.074	0.025	1.074
64	-0.378	0.058	0.283	0.095	0.253	0.133	0.262	0.018	1.443	1.478	0.373	1.525
68	-0.352	0.075	0.384	0.131	0.286	0.169	0.363	0.025	1.532	1.571	0.541	1.661

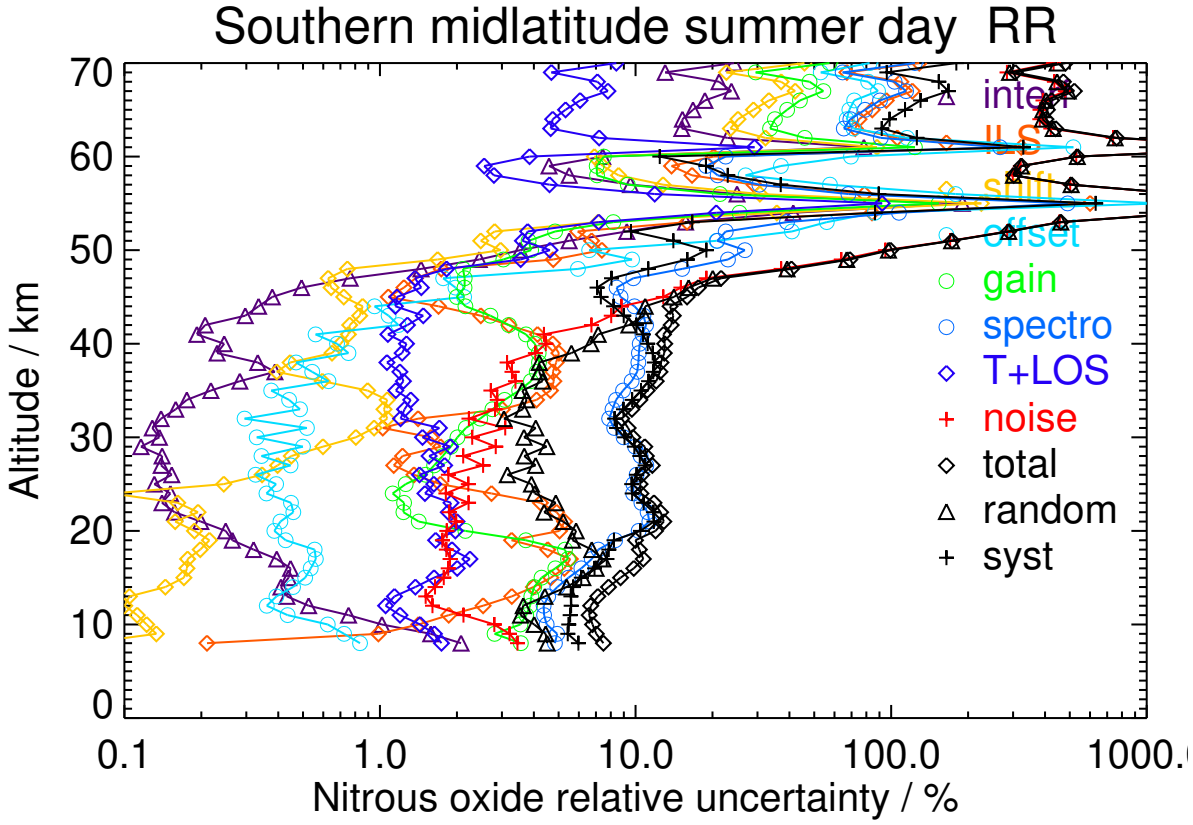

Figure S193. V8R_N2O_261 Southern midlatitude summer day

Table S194. Nitrous oxide error budget for Southern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	309.842	4.115	2.119	0.427	2.089	7.747	13.058	4.264	9.596	12.514	14.497	19.151
12	311.707	1.254	6.197	0.286	1.099	11.111	13.428	3.018	4.878	7.672	17.863	19.441
15	293.503	1.271	11.337	0.372	1.514	13.058	16.667	4.645	5.142	11.993	22.024	25.078
18	264.198	0.674	11.125	0.777	2.164	20.590	22.282	5.306	4.320	16.168	28.903	33.117
21	200.606	0.312	6.233	0.455	0.626	6.523	23.645	3.208	3.853	9.634	23.948	25.813
24	168.166	0.288	3.429	0.231	0.544	1.469	15.225	2.298	3.060	5.890	15.037	16.149
27	117.414	0.164	0.995	0.518	0.537	1.640	12.956	2.077	3.131	4.452	12.901	13.647
30	79.352	0.109	1.285	0.689	0.265	1.731	7.056	1.128	1.778	2.579	7.264	7.708
33	53.815	0.084	1.637	0.549	0.254	1.679	4.486	0.635	1.459	1.884	4.997	5.341
36	29.743	0.080	1.625	0.176	0.179	1.195	3.011	0.362	0.948	1.207	3.574	3.773
39	12.878	0.031	0.719	0.091	0.100	0.534	1.401	0.154	0.528	0.752	1.588	1.757
42	5.677	0.010	0.227	0.054	0.065	0.160	0.580	0.064	0.350	0.503	0.542	0.739
45	2.138	0.010	0.025	0.017	0.058	0.040	0.232	0.031	0.333	0.367	0.193	0.414
48	0.992	0.014	0.016	0.007	0.057	0.020	0.106	0.013	0.340	0.356	0.068	0.362
52	0.153	0.017	0.014	0.006	0.077	0.008	0.045	0.008	0.501	0.509	0.026	0.510
56	0.075	0.014	0.035	0.014	0.103	0.013	0.033	0.006	0.769	0.776	0.040	0.777
60	-0.254	0.015	0.033	0.012	0.134	0.016	0.034	0.006	1.029	1.039	0.019	1.039
64	-0.639	0.049	0.241	0.079	0.240	0.123	0.233	0.015	1.362	1.393	0.330	1.432
68	-0.855	0.073	0.392	0.136	0.279	0.179	0.385	0.026	1.499	1.542	0.555	1.638

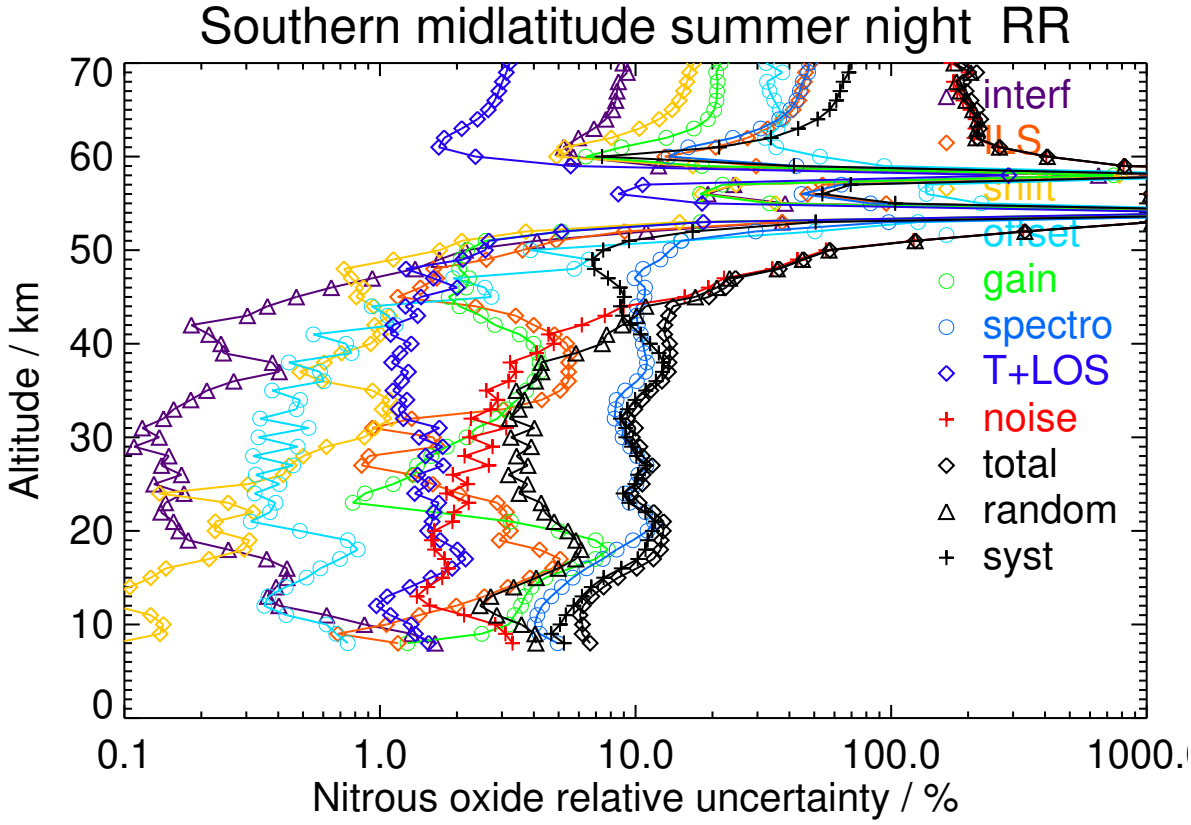

Figure S194. V8R_N2O_261 Southern midlatitude summer night

Table S195. Nitrous oxide error budget for Southern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	313.316	3.401	3.298	0.430	2.283	11.001	12.879	4.670	10.164	12.714	16.679	20.973
12	318.161	0.988	6.977	0.250	1.179	12.556	13.119	3.670	5.184	8.344	18.750	20.523
15	309.010	0.928	10.462	0.230	1.532	13.499	15.317	5.435	5.172	10.946	21.587	24.204
18	273.866	0.305	9.964	0.475	1.832	21.388	20.019	5.697	4.231	14.771	28.167	31.805
21	205.309	0.271	5.240	0.330	1.093	12.527	21.708	3.718	3.896	11.985	23.289	26.192
24	152.843	0.172	2.210	0.283	0.748	6.082	17.246	2.686	3.797	7.146	17.622	19.016
27	104.994	0.111	1.389	0.303	0.458	2.596	12.313	1.896	2.925	4.629	12.301	13.143
30	61.560	0.054	0.627	0.325	0.345	1.680	8.103	1.237	2.313	3.965	7.762	8.716
33	34.829	0.063	1.160	0.224	0.281	1.439	4.565	0.615	1.712	2.910	4.385	5.263
36	17.696	0.049	0.999	0.123	0.191	1.099	2.611	0.268	1.067	2.358	2.173	3.207
39	11.299	0.041	0.707	0.038	0.136	0.796	1.570	0.144	0.762	1.649	1.225	2.054
42	7.239	0.020	0.389	0.042	0.100	0.468	0.932	0.076	0.651	1.080	0.717	1.296
45	4.721	0.014	0.118	0.030	0.091	0.187	0.488	0.045	0.653	0.764	0.377	0.852
48	3.303	0.017	0.056	0.014	0.096	0.089	0.278	0.032	0.689	0.722	0.231	0.758
52	1.942	0.020	0.038	0.012	0.106	0.062	0.161	0.023	0.896	0.909	0.141	0.920
56	1.399	0.016	0.023	0.013	0.126	0.075	0.107	0.020	1.184	1.193	0.106	1.198
60	0.576	0.020	0.073	0.019	0.207	0.056	0.083	0.019	1.443	1.462	0.060	1.463
64	-0.657	0.029	0.109	0.034	0.329	0.167	0.105	0.028	1.765	1.804	0.154	1.810
68	-1.131	0.025	0.074	0.024	0.351	0.221	0.090	0.032	1.740	1.781	0.203	1.793

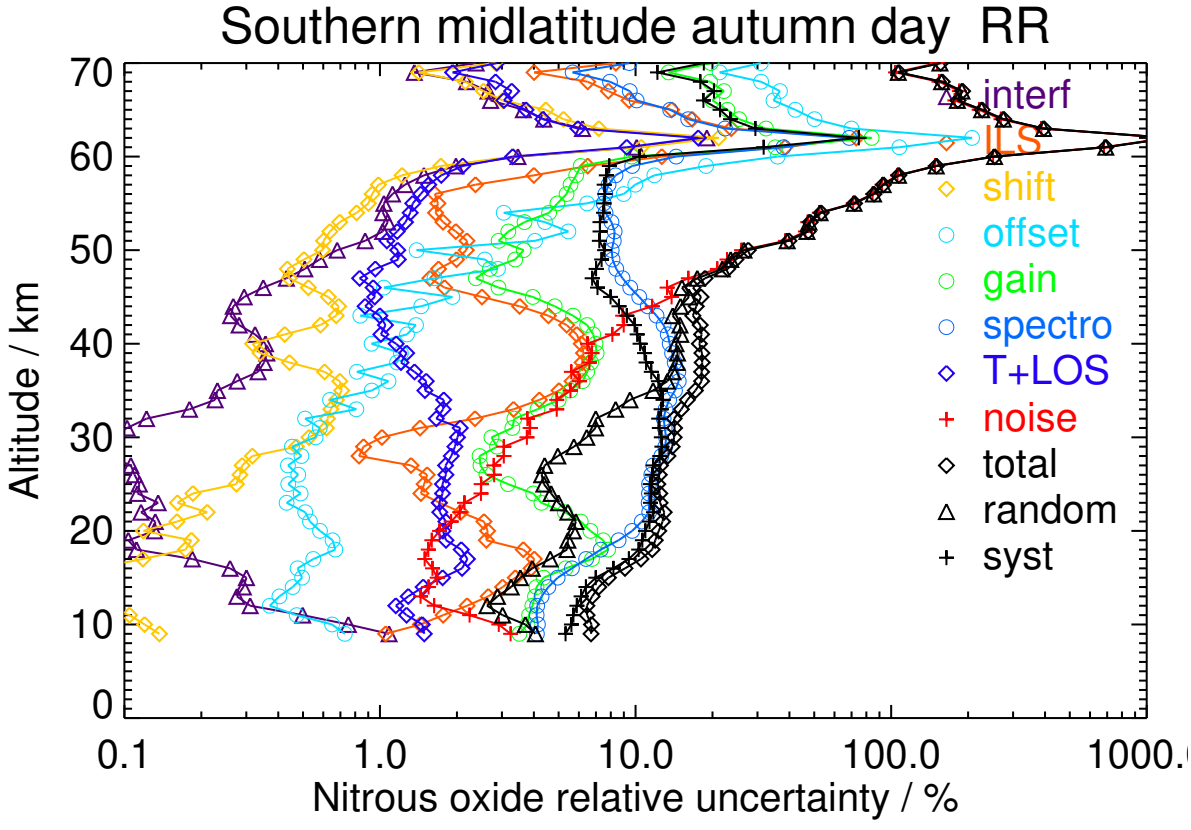

Figure S195. V8R_N2O_261 Southern midlatitude autumn day

Table S196. Nitrous oxide error budget for Southern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	311.848	3.391	2.343	0.510	2.243	8.820	11.877	4.169	10.315	12.294	14.620	19.102
12	320.248	1.079	8.021	0.234	1.177	13.525	13.211	3.400	4.909	8.588	19.655	21.449
15	309.600	1.093	12.888	0.237	1.646	16.134	15.455	5.631	5.465	10.743	24.807	27.034
18	272.216	0.369	11.951	0.486	1.910	22.179	20.106	5.899	4.263	13.449	30.251	33.106
21	200.913	0.277	6.334	0.305	1.127	11.605	21.452	3.754	3.984	12.535	22.567	25.815
24	149.954	0.195	3.263	0.298	0.693	3.576	15.766	2.474	3.249	6.328	15.787	17.008
27	104.465	0.115	1.958	0.309	0.602	1.706	12.962	2.083	3.339	5.698	12.579	13.810
30	61.180	0.060	0.542	0.394	0.229	1.512	7.463	1.109	1.878	3.797	6.987	7.952
33	35.868	0.059	0.954	0.283	0.261	1.138	4.533	0.562	1.647	3.162	3.991	5.092
36	19.327	0.054	0.914	0.192	0.212	1.040	2.336	0.264	1.140	2.175	2.024	2.971
39	14.523	0.054	0.792	0.103	0.159	0.921	1.618	0.153	0.807	1.756	1.313	2.193
42	9.510	0.026	0.511	0.058	0.116	0.604	1.160	0.092	0.673	1.272	0.912	1.565
45	5.432	0.014	0.142	0.046	0.096	0.220	0.619	0.050	0.661	0.838	0.448	0.950
48	3.672	0.018	0.061	0.018	0.088	0.087	0.306	0.029	0.655	0.701	0.229	0.737
52	2.379	0.021	0.049	0.014	0.106	0.052	0.182	0.023	0.905	0.919	0.155	0.932
56	1.517	0.017	0.034	0.013	0.123	0.058	0.118	0.020	1.169	1.179	0.108	1.184
60	0.425	0.025	0.093	0.027	0.207	0.061	0.092	0.018	1.434	1.453	0.099	1.457
64	-0.438	0.040	0.160	0.061	0.324	0.180	0.171	0.031	1.761	1.802	0.224	1.816
68	-0.548	0.040	0.176	0.070	0.344	0.214	0.202	0.034	1.735	1.785	0.257	1.804

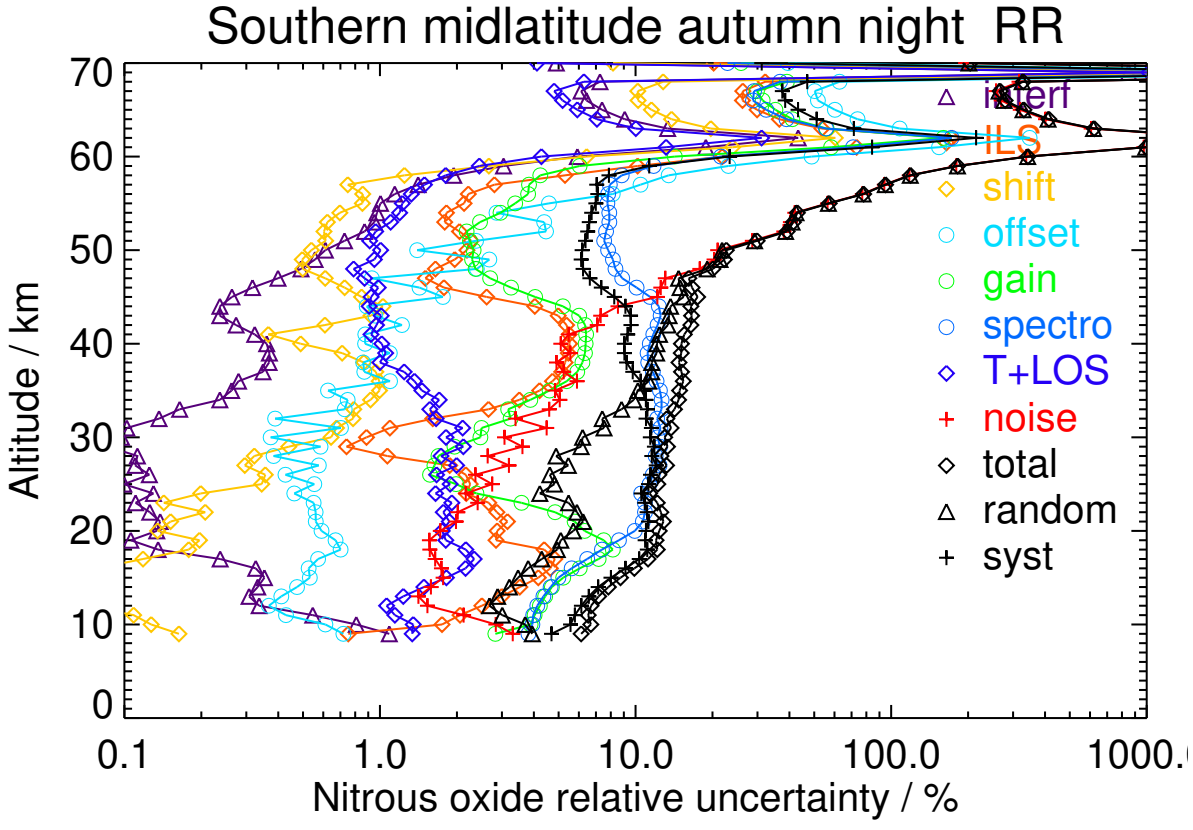

Figure S196. V8R_N2O_261 Southern midlatitude autumn night

Table S197. Nitrous oxide error budget for Southern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	332.445	2.870	2.538	0.210	2.983	10.470	13.910	5.832	11.240	13.524	17.441	22.070
12	305.084	3.341	4.244	0.193	2.149	9.409	12.667	5.492	8.777	11.632	15.960	19.749
15	252.556	3.004	1.769	0.402	2.004	7.728	16.282	6.189	7.026	10.618	17.779	20.708
18	179.792	0.890	4.865	0.595	1.140	7.948	24.367	4.545	4.638	7.915	25.740	26.930
21	89.808	0.302	3.978	0.253	0.757	3.883	16.480	2.339	3.795	6.801	16.638	17.974
24	42.116	0.097	2.268	0.207	0.666	1.332	8.969	1.564	3.976	6.953	7.600	10.301
27	18.669	0.070	0.912	0.078	0.281	0.576	4.426	0.608	2.342	4.677	2.196	5.167
30	15.992	0.061	0.283	0.083	0.382	0.506	2.062	0.470	2.346	2.694	1.792	3.236
33	6.974	0.036	0.273	0.060	0.231	0.373	1.253	0.242	1.436	1.649	1.115	1.991
36	2.486	0.022	0.174	0.023	0.106	0.323	0.644	0.088	0.728	1.009	0.284	1.048
39	1.836	0.010	0.112	0.011	0.055	0.122	0.387	0.033	0.478	0.623	0.150	0.640
42	1.140	0.010	0.041	0.005	0.053	0.018	0.123	0.014	0.464	0.478	0.081	0.485
45	1.141	0.013	0.027	0.005	0.065	0.018	0.079	0.009	0.542	0.550	0.053	0.553
48	0.847	0.019	0.025	0.005	0.086	0.015	0.078	0.011	0.637	0.647	0.053	0.649
52	0.602	0.019	0.024	0.006	0.094	0.013	0.066	0.010	0.795	0.803	0.036	0.804
56	0.316	0.016	0.020	0.007	0.114	0.018	0.045	0.010	1.063	1.070	0.031	1.071
60	0.455	0.013	0.021	0.012	0.197	0.024	0.044	0.011	1.401	1.415	0.031	1.416
64	0.716	0.015	0.052	0.015	0.319	0.025	0.044	0.012	1.743	1.773	0.048	1.774
68	0.472	0.014	0.058	0.013	0.334	0.025	0.039	0.013	1.699	1.732	0.048	1.733

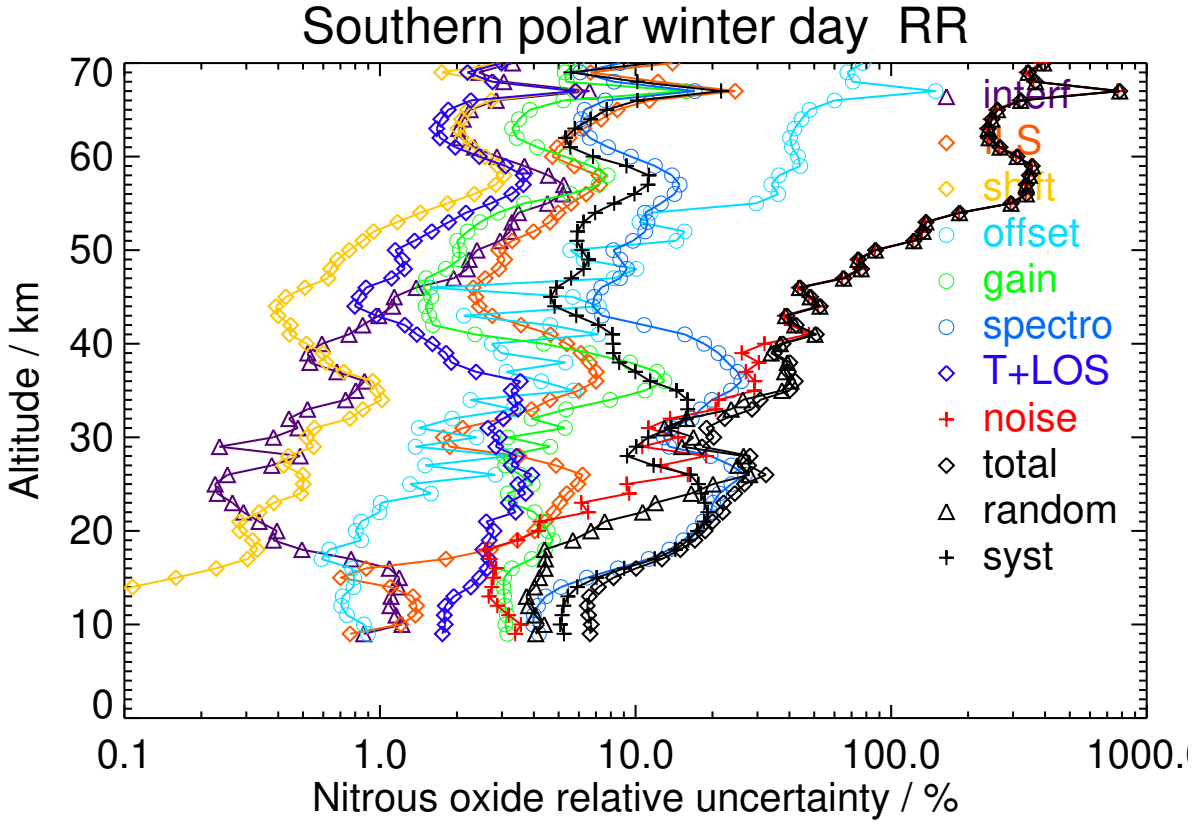

Figure S197. V8R_N2O_261 Southern polar winter day

Table S198. Nitrous oxide error budget for Southern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	330.581	3.097	2.679	0.205	2.769	10.348	12.206	5.604	10.406	13.219	15.668	20.499
12	304.385	2.586	5.190	0.116	1.711	10.652	10.711	4.616	6.592	9.829	15.261	18.153
15	250.987	2.317	3.316	0.218	1.933	7.866	11.513	6.074	6.810	10.958	13.332	17.258
18	175.892	0.719	2.161	0.367	1.114	6.936	14.476	4.820	4.555	8.354	15.440	17.556
21	93.701	0.343	3.422	0.240	0.776	3.747	13.192	2.797	4.224	6.281	13.667	15.041
24	45.904	0.097	2.455	0.232	0.707	1.497	8.696	1.794	4.076	5.580	8.552	10.212
27	14.428	0.056	0.896	0.090	0.327	1.106	3.254	0.681	2.285	3.614	2.314	4.292
30	12.749	0.067	0.391	0.105	0.333	0.378	1.714	0.428	2.154	2.501	1.388	2.860
33	6.966	0.038	0.247	0.062	0.206	0.436	1.182	0.224	1.247	1.475	1.060	1.817
36	2.231	0.012	0.132	0.020	0.119	0.194	0.402	0.079	0.705	0.811	0.279	0.857
39	1.433	0.008	0.064	0.008	0.073	0.113	0.205	0.034	0.498	0.547	0.119	0.560
42	0.905	0.010	0.035	0.005	0.067	0.029	0.109	0.015	0.501	0.517	0.056	0.520
45	0.939	0.013	0.020	0.005	0.074	0.023	0.073	0.011	0.573	0.581	0.046	0.583
48	0.626	0.019	0.016	0.005	0.086	0.026	0.052	0.010	0.636	0.644	0.035	0.645
52	0.800	0.020	0.016	0.007	0.099	0.031	0.052	0.012	0.840	0.848	0.036	0.849
56	0.221	0.018	0.022	0.008	0.116	0.036	0.042	0.013	1.107	1.115	0.029	1.115
60	0.064	0.015	0.036	0.010	0.194	0.029	0.040	0.011	1.396	1.411	0.028	1.411
64	-0.225	0.017	0.068	0.012	0.320	0.032	0.039	0.013	1.742	1.772	0.050	1.773
68	-0.431	0.017	0.056	0.011	0.335	0.037	0.038	0.015	1.700	1.734	0.049	1.735

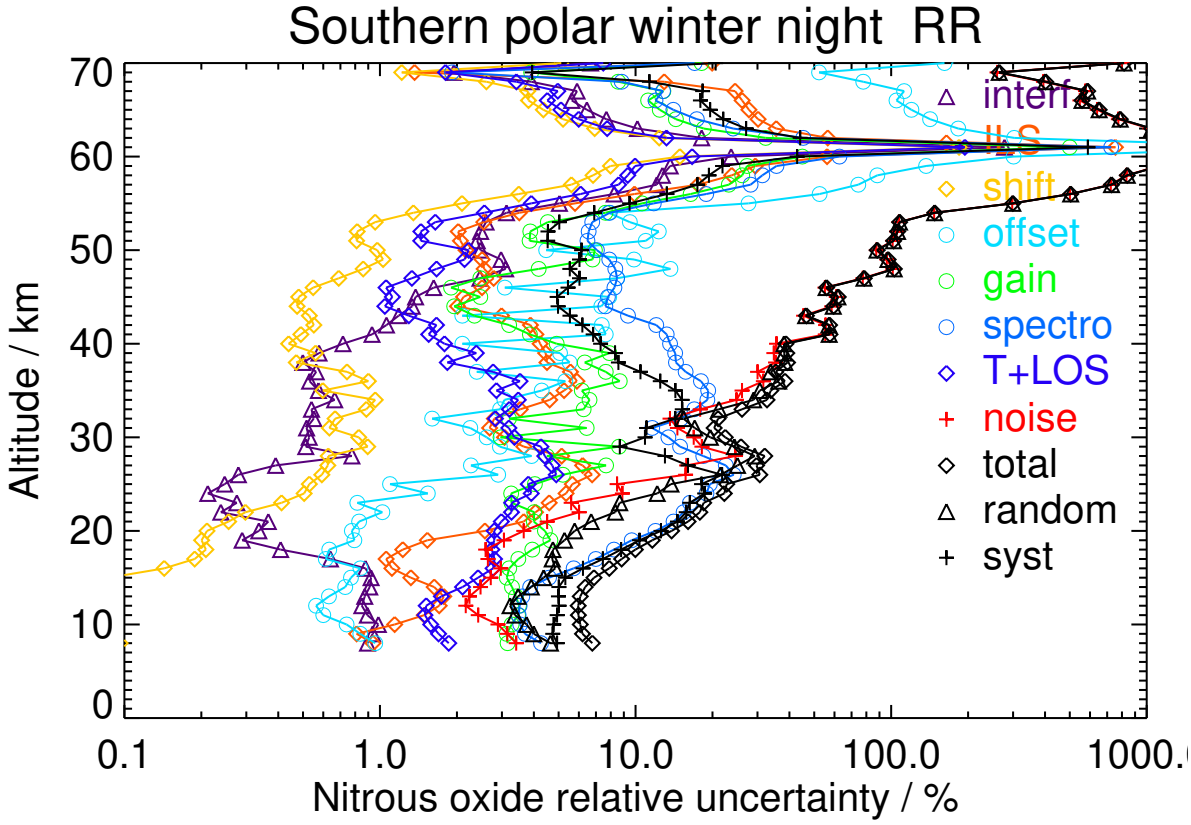

Figure S198. V8R_N2O_261 Southern polar winter night

Table S199. Nitrous oxide error budget for Southern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	327.291	5.449	3.579	0.335	2.679	9.283	16.846	6.227	11.140	15.298	18.671	24.138
12	288.172	2.805	6.294	0.572	1.576	8.313	16.721	5.359	6.948	13.286	17.305	21.817
15	228.751	1.176	4.331	0.569	1.577	4.526	15.520	5.851	6.349	11.668	14.923	18.943
18	168.405	0.364	4.351	0.468	0.779	5.427	18.475	4.174	3.422	10.175	17.784	20.489
21	121.676	0.199	3.933	0.425	0.531	5.126	13.921	2.013	2.555	9.346	12.621	15.705
24	110.794	0.102	2.044	0.262	0.551	2.397	12.031	1.714	2.985	9.085	9.185	12.919
27	101.908	0.125	1.170	0.347	0.304	2.170	10.084	1.198	1.787	7.182	7.813	10.612
30	88.874	0.059	0.567	0.564	0.395	3.968	9.042	1.320	1.895	6.545	7.797	10.180
33	53.529	0.079	0.898	0.401	0.188	2.372	6.908	0.891	1.264	4.955	5.674	7.533
36	20.730	0.066	1.095	0.156	0.112	0.835	3.142	0.368	0.792	2.403	2.607	3.546
39	8.560	0.022	0.481	0.064	0.078	0.558	1.027	0.136	0.493	0.964	0.970	1.368
42	4.298	0.013	0.194	0.026	0.048	0.168	0.420	0.058	0.374	0.483	0.395	0.624
45	2.826	0.011	0.061	0.015	0.049	0.084	0.173	0.028	0.384	0.403	0.171	0.438
48	2.312	0.016	0.034	0.011	0.067	0.058	0.126	0.018	0.453	0.463	0.126	0.480
52	1.599	0.018	0.029	0.009	0.074	0.033	0.094	0.012	0.577	0.584	0.090	0.591
56	1.086	0.020	0.045	0.020	0.096	0.072	0.097	0.014	0.859	0.870	0.094	0.875
60	0.559	0.019	0.069	0.010	0.151	0.055	0.065	0.014	1.193	1.205	0.078	1.208
64	-0.255	0.050	0.297	0.083	0.279	0.441	0.233	0.046	1.591	1.660	0.450	1.720
68	-0.318	0.064	0.403	0.120	0.298	0.516	0.333	0.056	1.608	1.699	0.590	1.799

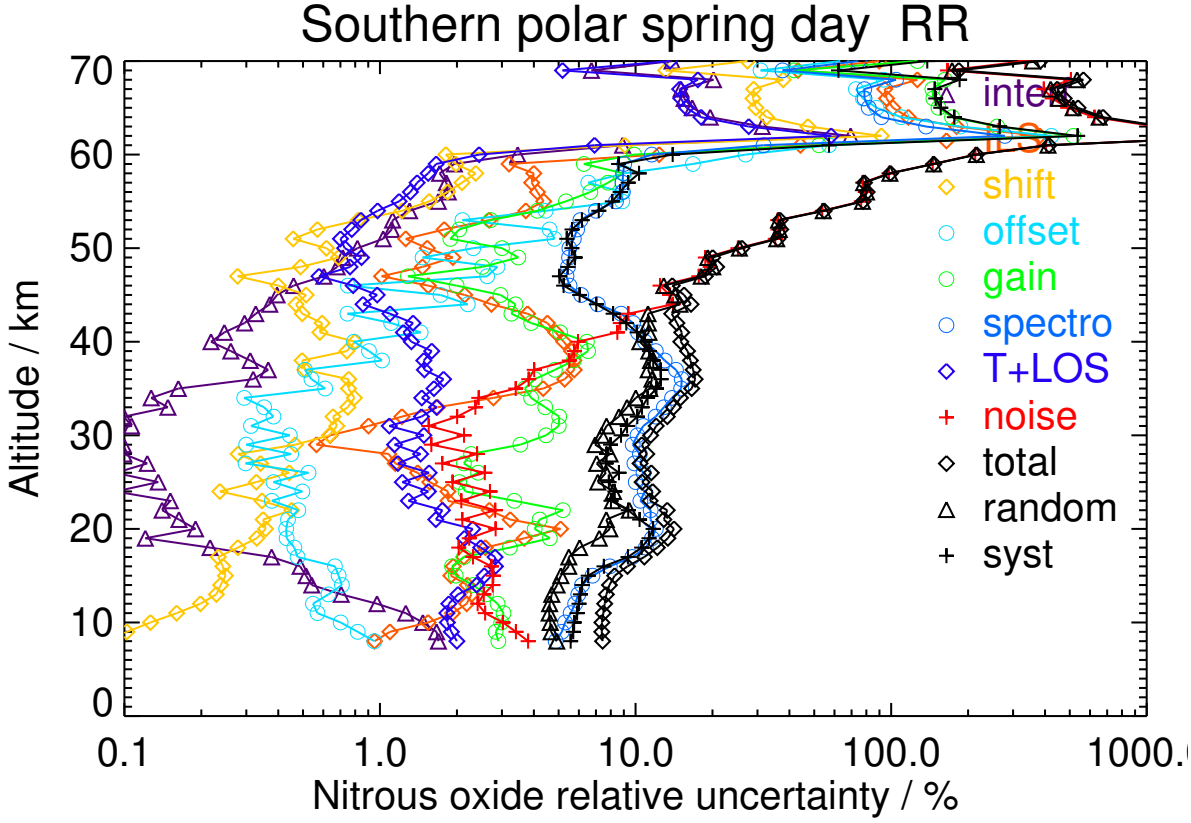

Figure S199. V8R_N2O_261 Southern polar spring day

Table S200. Nitrous oxide error budget for Southern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	314.236	4.178	2.076	0.382	2.234	7.405	12.870	4.970	9.647	12.691	14.286	19.109
12	275.130	1.587	4.686	0.574	1.297	6.077	13.116	3.741	6.016	10.778	13.018	16.901
15	217.900	1.062	4.923	0.660	1.392	5.542	14.034	4.853	5.858	11.964	13.043	17.699
18	171.002	0.358	4.672	0.558	0.855	6.869	16.827	3.710	3.238	11.029	15.998	19.432
21	139.957	0.202	4.682	0.385	0.690	7.640	16.390	2.175	2.637	10.851	15.606	19.008
24	119.894	0.100	2.588	0.292	0.610	5.126	11.395	1.865	3.153	9.080	9.709	13.293
27	127.378	0.132	1.302	0.339	0.339	3.556	12.039	1.392	1.992	7.249	10.624	12.862
30	95.465	0.065	1.082	0.476	0.433	4.107	10.894	1.542	2.078	7.268	9.540	11.993
33	54.656	0.053	1.470	0.358	0.259	3.091	7.692	0.982	1.306	5.157	6.866	8.588
36	18.746	0.064	1.078	0.156	0.127	1.326	3.077	0.366	0.763	2.411	2.708	3.626
39	9.491	0.028	0.439	0.064	0.077	0.539	0.919	0.134	0.501	0.893	0.900	1.268
42	5.822	0.016	0.272	0.033	0.054	0.298	0.576	0.073	0.408	0.579	0.578	0.819
45	2.808	0.012	0.077	0.015	0.051	0.067	0.256	0.038	0.409	0.447	0.219	0.497
48	2.358	0.015	0.038	0.015	0.069	0.093	0.140	0.020	0.467	0.484	0.136	0.503
52	1.674	0.018	0.027	0.009	0.073	0.038	0.108	0.014	0.588	0.596	0.100	0.604
56	1.239	0.021	0.035	0.020	0.097	0.083	0.103	0.015	0.892	0.901	0.109	0.908
60	0.749	0.021	0.115	0.040	0.159	0.124	0.119	0.017	1.233	1.254	0.133	1.261
64	0.162	0.047	0.343	0.132	0.284	0.529	0.397	0.054	1.625	1.712	0.606	1.816
68	-0.039	0.056	0.395	0.140	0.300	0.710	0.444	0.069	1.611	1.729	0.762	1.890

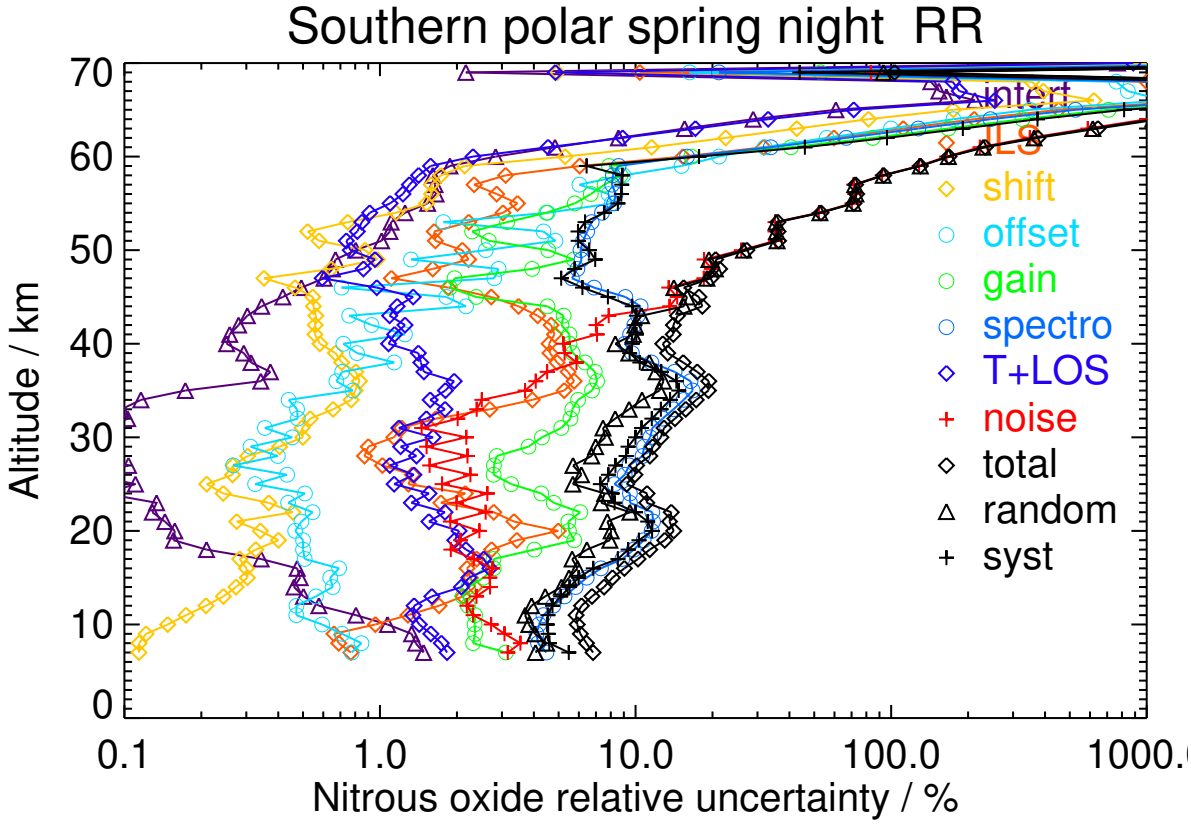

Figure S200. V8R_N2O_261 Southern polar spring night

Table S201. Nitrous oxide error budget for Southern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	312.502	3.313	7.233	0.433	1.914	3.065	14.716	4.035	9.482	11.582	16.283	19.982
12	298.323	0.929	5.191	0.493	0.878	7.181	14.399	2.610	4.497	8.933	15.329	17.741
15	277.746	0.772	5.974	0.431	1.006	5.234	16.927	3.398	4.061	9.621	16.937	19.479
18	237.657	0.189	10.630	0.770	0.645	5.424	23.819	3.150	2.922	7.682	25.889	27.005
21	172.247	0.242	9.912	0.819	0.828	4.431	19.583	2.633	2.601	6.066	21.902	22.727
24	150.591	0.095	3.832	0.275	0.785	1.944	15.652	2.430	3.453	5.156	15.981	16.792
27	103.033	0.118	1.168	0.486	0.279	1.430	10.083	1.357	1.862	2.849	10.129	10.522
30	71.425	0.045	0.708	0.416	0.418	1.045	7.033	1.378	2.238	2.880	7.072	7.636
33	40.663	0.051	0.897	0.399	0.232	1.742	4.043	0.733	1.319	1.763	4.424	4.762
36	19.011	0.084	0.897	0.153	0.135	0.880	2.097	0.292	0.744	0.959	2.397	2.582
39	7.817	0.023	0.525	0.065	0.065	0.338	0.940	0.123	0.425	0.654	1.025	1.216
42	2.151	0.012	0.161	0.028	0.040	0.037	0.305	0.050	0.280	0.345	0.291	0.452
45	0.767	0.008	0.018	0.009	0.039	0.017	0.074	0.020	0.272	0.281	0.057	0.286
48	0.139	0.011	0.016	0.008	0.049	0.007	0.046	0.009	0.299	0.305	0.033	0.307
52	0.028	0.014	0.006	0.003	0.056	0.007	0.020	0.005	0.381	0.386	0.011	0.386
56	-0.042	0.014	0.021	0.010	0.078	0.008	0.032	0.007	0.611	0.617	0.026	0.617
60	-0.032	0.014	0.019	0.014	0.116	0.014	0.039	0.008	0.911	0.919	0.029	0.920
64	-0.124	0.032	0.088	0.034	0.233	0.095	0.118	0.013	1.286	1.309	0.166	1.319
68	-0.207	0.048	0.195	0.083	0.270	0.139	0.237	0.022	1.458	1.488	0.328	1.523

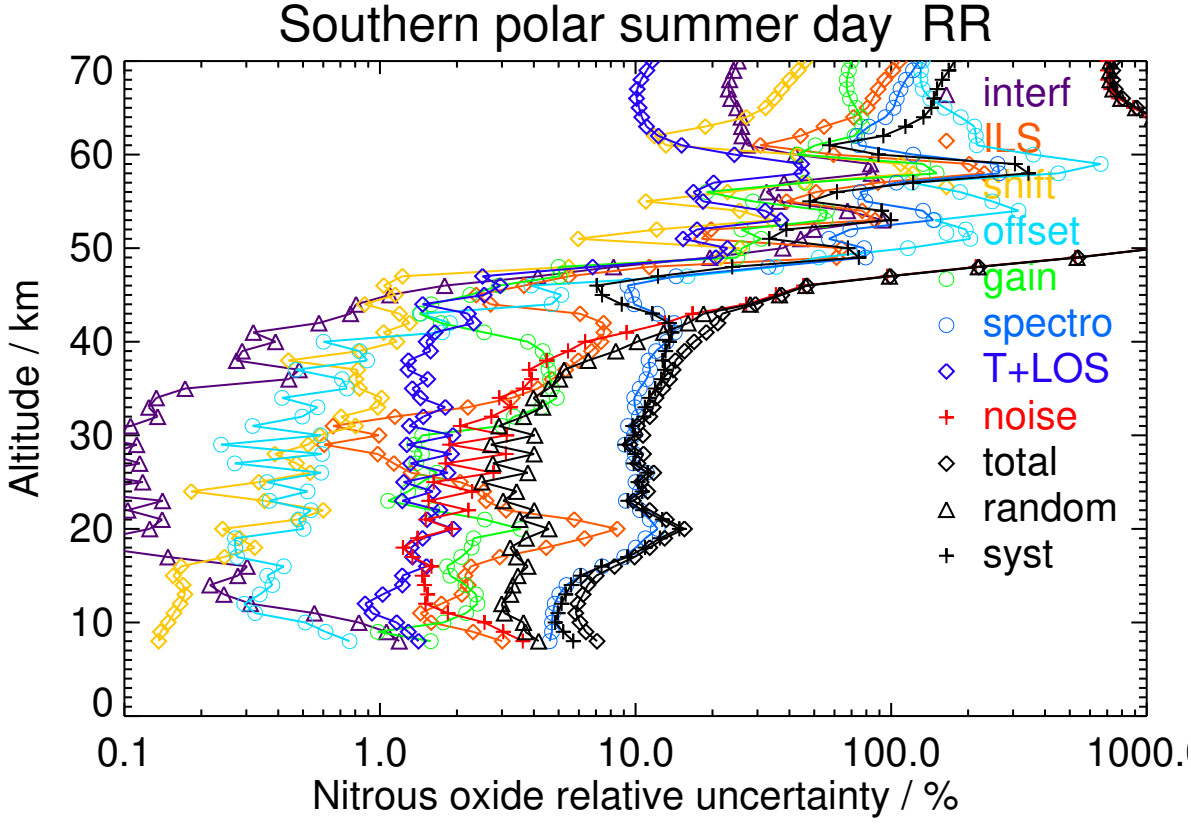

Figure S201. V8R_N2O_261 Southern polar summer day

Table S202. Nitrous oxide error budget for Southern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	307.762	3.471	4.124	0.474	2.036	4.800	12.494	3.851	9.755	12.773	12.626	17.960
12	300.155	0.989	6.688	0.356	0.923	10.524	13.482	2.736	4.391	8.459	17.159	19.131
15	285.883	0.825	14.744	0.394	1.389	15.318	15.178	4.622	4.556	13.982	23.060	26.968
18	253.771	0.258	8.896	0.852	1.621	19.256	21.381	3.963	3.426	13.677	27.402	30.626
21	182.280	0.182	7.451	0.545	0.622	5.961	20.334	2.876	3.228	8.437	21.278	22.890
24	150.501	0.108	4.090	0.236	0.860	2.993	16.937	2.606	3.531	5.626	17.348	18.238
27	96.075	0.129	1.040	0.472	0.310	1.266	9.478	1.418	2.022	2.854	9.529	9.948
30	63.677	0.047	0.930	0.396	0.372	1.255	6.569	1.182	2.055	2.756	6.627	7.177
33	35.290	0.080	1.581	0.268	0.246	1.696	3.841	0.587	1.239	1.633	4.414	4.706
36	13.326	0.038	0.817	0.105	0.127	0.565	1.711	0.231	0.655	0.873	1.914	2.104
39	5.394	0.012	0.328	0.041	0.060	0.161	0.649	0.087	0.359	0.442	0.708	0.835
42	1.009	0.008	0.052	0.020	0.043	0.021	0.189	0.035	0.269	0.289	0.176	0.338
45	0.443	0.008	0.016	0.006	0.044	0.010	0.042	0.012	0.287	0.293	0.024	0.294
48	0.058	0.013	0.007	0.006	0.055	0.006	0.032	0.006	0.335	0.341	0.024	0.342
52	-0.018	0.016	0.007	0.004	0.069	0.008	0.022	0.005	0.469	0.474	0.013	0.475
56	0.072	0.013	0.022	0.010	0.094	0.010	0.031	0.006	0.736	0.743	0.027	0.743
60	-0.036	0.014	0.015	0.008	0.132	0.011	0.030	0.007	1.031	1.040	0.018	1.040
64	0.001	0.034	0.095	0.042	0.254	0.107	0.140	0.014	1.402	1.427	0.190	1.440
68	0.007	0.049	0.182	0.082	0.284	0.140	0.241	0.022	1.513	1.545	0.318	1.578

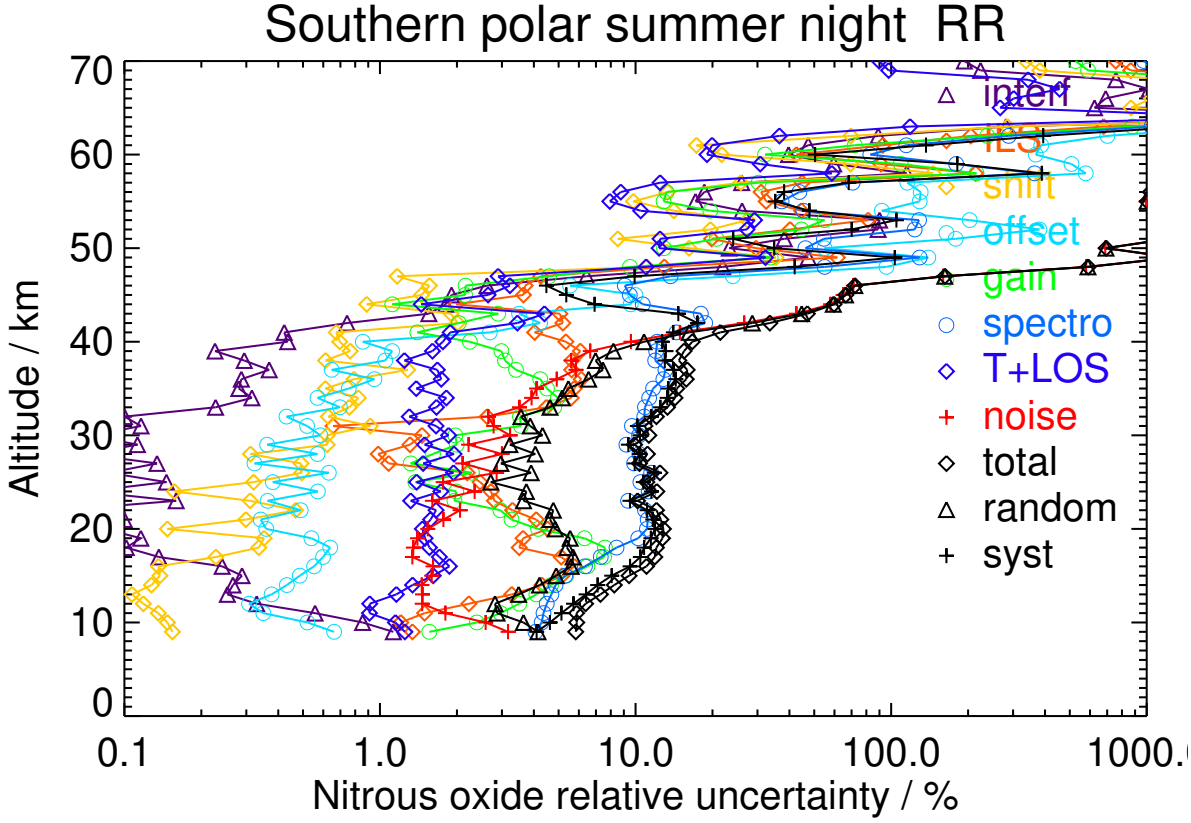

Figure S202. V8R_N2O_261 Southern polar summer night

Table S203. Nitrous oxide error budget for Southern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
12	309.987	4.628	6.199	0.192	1.028	9.890	13.770	3.264	4.816	8.215	17.740	19.550
15	285.655	3.768	6.804	0.297	1.352	8.277	15.778	4.808	5.233	8.803	18.785	20.745
18	239.379	0.325	2.849	0.709	0.870	11.586	22.128	3.868	3.729	7.125	24.728	25.734
21	171.486	0.343	3.724	0.285	0.790	9.778	20.683	2.555	3.368	5.764	22.864	23.579
24	116.691	0.130	2.764	0.296	0.754	6.016	14.485	2.539	4.179	5.778	15.647	16.680
27	64.207	0.111	1.480	0.136	0.302	1.747	9.731	1.382	2.558	3.505	9.809	10.417
30	26.898	0.039	0.353	0.113	0.398	0.777	4.585	0.885	2.381	2.836	4.509	5.327
33	8.813	0.046	0.246	0.068	0.242	0.675	1.779	0.374	1.455	1.788	1.675	2.450
36	1.139	0.016	0.109	0.030	0.084	0.289	0.363	0.098	0.653	0.756	0.314	0.819
39	0.210	0.010	0.031	0.011	0.038	0.103	0.102	0.029	0.446	0.471	0.037	0.473
42	0.167	0.008	0.018	0.004	0.046	0.024	0.061	0.010	0.496	0.502	0.019	0.503
45	0.206	0.011	0.010	0.003	0.067	0.019	0.043	0.007	0.617	0.622	0.016	0.623
48	0.408	0.015	0.017	0.006	0.095	0.045	0.052	0.011	0.739	0.747	0.044	0.749
52	0.512	0.019	0.021	0.008	0.099	0.043	0.070	0.012	0.886	0.894	0.053	0.895
56	0.123	0.015	0.021	0.011	0.121	0.070	0.053	0.017	1.161	1.169	0.070	1.171
60	0.642	0.012	0.027	0.011	0.210	0.065	0.058	0.018	1.447	1.463	0.067	1.465
64	0.142	0.013	0.030	0.008	0.336	0.062	0.054	0.017	1.771	1.804	0.045	1.805
68	-0.523	0.013	0.031	0.006	0.356	0.098	0.050	0.019	1.738	1.776	0.075	1.778

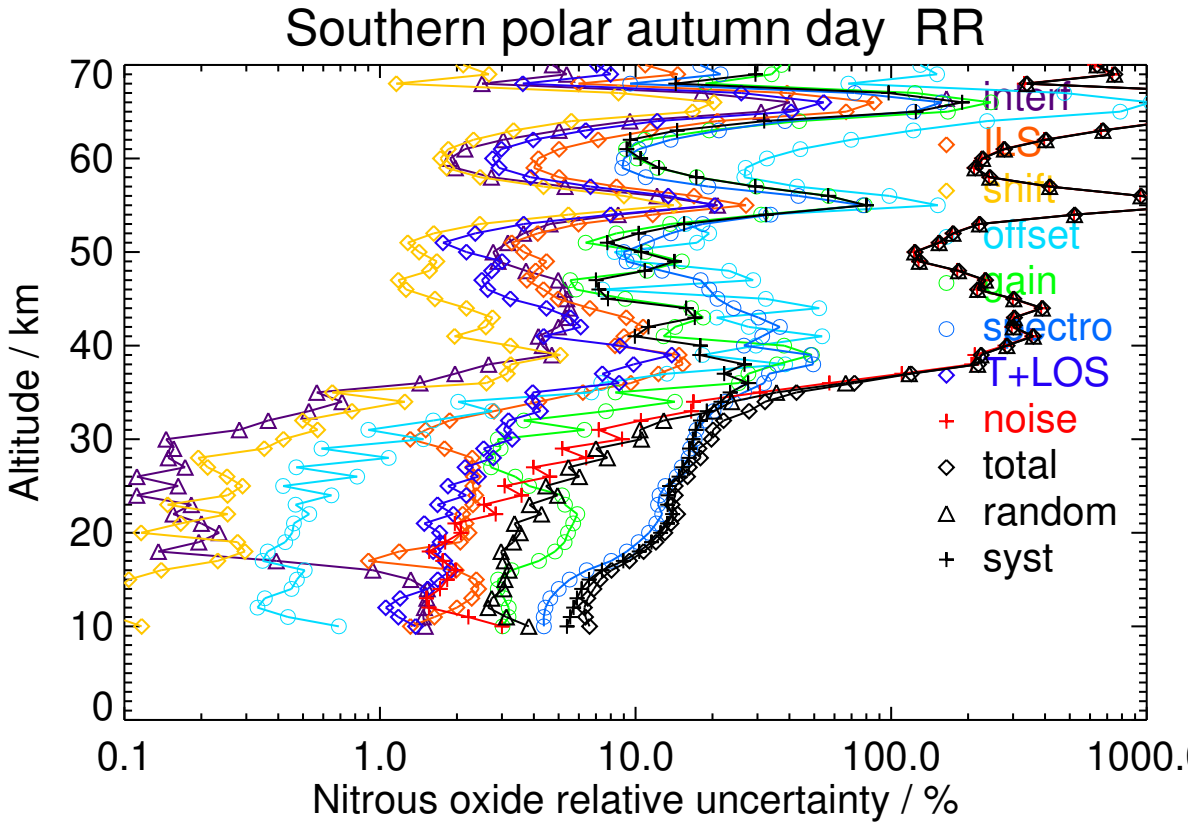

Figure S203. V8R_N2O_261 Southern polar autumn day

Table S204. Nitrous oxide error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
9	316.825	3.678	3.261	0.362	2.276	9.970	13.591	4.499	10.039	13.141	16.184	20.847
12	309.142	3.930	5.851	0.164	1.103	10.770	13.361	3.409	4.732	8.290	17.627	19.479
15	278.013	2.974	6.770	0.276	1.493	10.414	15.285	5.290	5.457	9.554	19.119	21.373
18	220.204	0.393	3.373	0.439	1.175	14.166	18.248	4.314	3.847	8.585	22.505	24.087
21	151.590	0.346	2.762	0.305	0.876	10.022	16.416	2.629	3.487	6.587	18.821	19.940
24	101.342	0.096	2.943	0.266	0.762	5.019	12.511	2.441	4.144	5.753	13.456	14.634
27	52.323	0.100	1.467	0.124	0.309	1.461	8.085	1.294	2.413	3.273	8.159	8.791
30	19.293	0.057	0.440	0.072	0.373	0.705	3.680	0.705	2.113	2.607	3.543	4.399
33	5.190	0.027	0.222	0.045	0.207	0.719	1.175	0.241	1.159	1.552	0.993	1.842
36	0.599	0.010	0.074	0.015	0.081	0.175	0.261	0.074	0.585	0.662	0.145	0.677
39	0.234	0.007	0.021	0.007	0.047	0.088	0.074	0.023	0.451	0.465	0.054	0.469
42	0.103	0.009	0.015	0.004	0.055	0.029	0.051	0.010	0.517	0.523	0.025	0.523
45	0.159	0.012	0.007	0.004	0.072	0.028	0.040	0.008	0.638	0.644	0.028	0.644
48	0.715	0.017	0.016	0.006	0.096	0.051	0.061	0.013	0.751	0.760	0.051	0.762
52	0.464	0.020	0.019	0.008	0.103	0.063	0.062	0.015	0.908	0.917	0.062	0.919
56	0.341	0.016	0.016	0.010	0.119	0.095	0.050	0.021	1.152	1.161	0.087	1.164
60	0.203	0.012	0.019	0.008	0.195	0.060	0.042	0.015	1.388	1.403	0.047	1.403
64	-0.435	0.014	0.036	0.006	0.322	0.135	0.046	0.024	1.725	1.758	0.098	1.761
68	-0.454	0.014	0.040	0.005	0.343	0.140	0.038	0.025	1.704	1.741	0.114	1.745

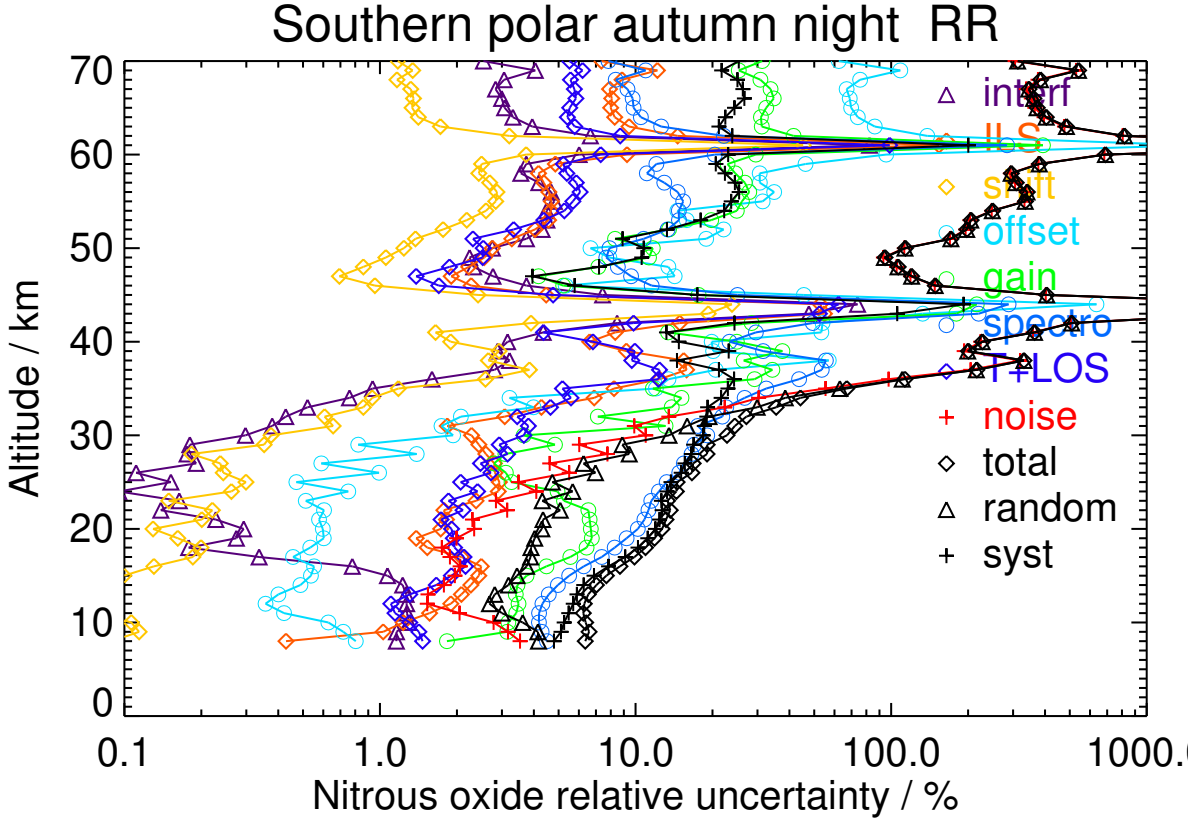

Figure S204. V8R_N2O_261 Southern polar autumn night

Table S205. Nitrous oxide error budget for Northern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	90.006	<0.001	0.195	1.839	0.336	0.984	8.112	11.479	1.416	2.162	5.788	13.238	14.448
35	26.464	<0.001	0.077	0.646	0.062	0.185	0.962	4.091	0.477	1.412	2.479	3.768	4.511
40	7.617	<0.001	0.023	0.131	0.016	0.136	0.206	0.756	0.103	1.023	1.124	0.665	1.306
45	3.501	<0.001	0.014	0.077	0.012	0.051	0.124	0.382	0.046	0.858	0.874	0.381	0.953
50	0.249	<0.001	0.017	0.039	0.012	0.078	0.069	0.094	0.017	1.025	1.031	0.098	1.035
55	0.585	<0.001	0.017	0.012	0.005	0.165	0.029	0.052	0.012	1.339	1.351	0.029	1.351
60	0.460	<0.001	0.017	0.041	0.013	0.337	0.108	0.053	0.019	1.717	1.752	0.092	1.755
65	0.258	<0.001	0.016	0.048	0.016	0.333	0.107	0.044	0.017	1.480	1.520	0.096	1.523

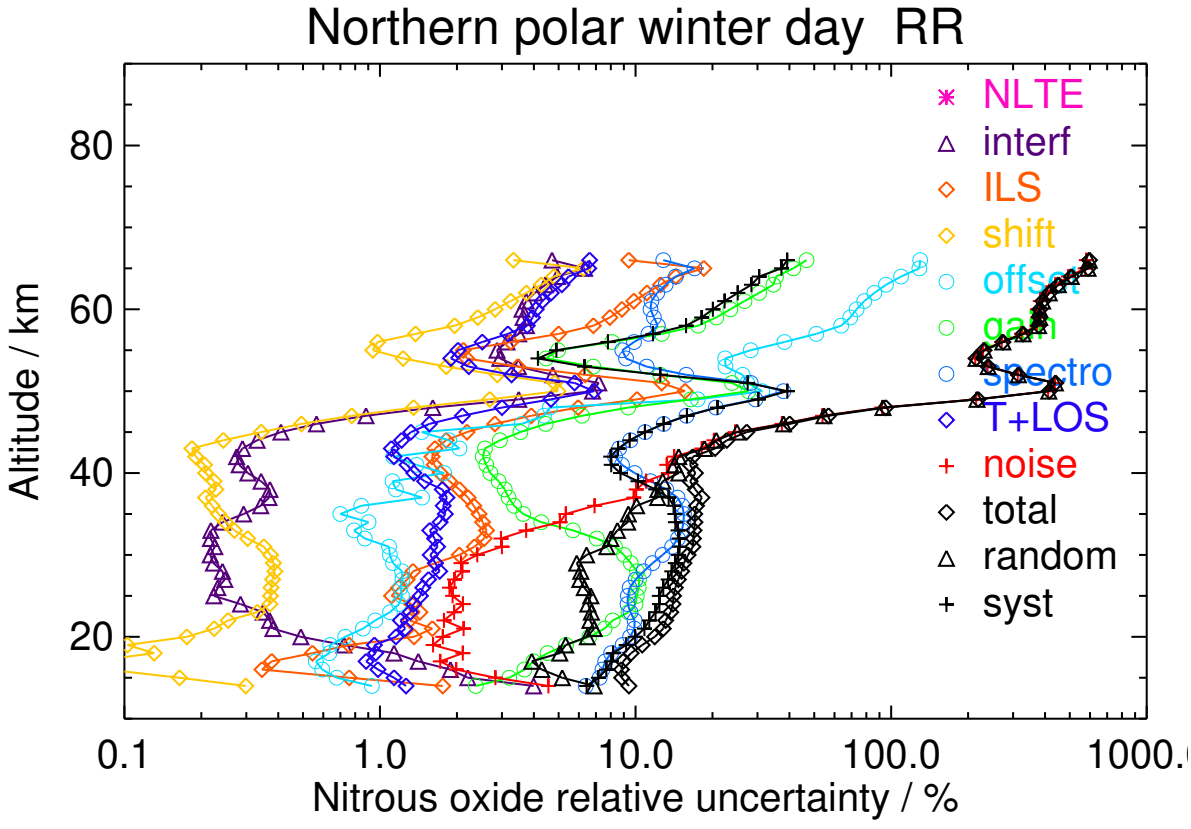

Figure S205. V8R_N2O_561 Northern polar winter day

Table S206. Nitrous oxide error budget for Northern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	28.127	<0.001	0.097	1.060	0.132	0.450	3.628	6.954	0.534	1.399	6.521	4.754	8.070
35	10.466	<0.001	0.047	0.343	0.033	0.140	0.694	2.074	0.175	0.957	2.099	1.211	2.423
40	3.002	<0.001	0.018	0.095	0.012	0.112	0.108	0.717	0.050	0.809	1.020	0.407	1.098
45	1.073	<0.001	0.013	0.021	0.004	0.050	0.033	0.149	0.016	0.704	0.717	0.090	0.723
50	0.388	<0.001	0.018	0.017	0.006	0.069	0.028	0.073	0.011	0.876	0.882	0.039	0.883
55	0.478	<0.001	0.016	0.019	0.009	0.125	0.062	0.048	0.012	1.180	1.189	0.041	1.189
60	0.516	<0.001	0.011	0.021	0.009	0.259	0.059	0.045	0.014	1.464	1.488	0.044	1.489
65	-0.028	<0.001	0.011	0.021	0.006	0.298	0.022	0.030	0.008	1.423	1.454	0.021	1.454
70	0.805	<0.001	0.007	0.002	0.002	0.233	0.009	0.021	0.004	1.019	1.045	0.023	1.046

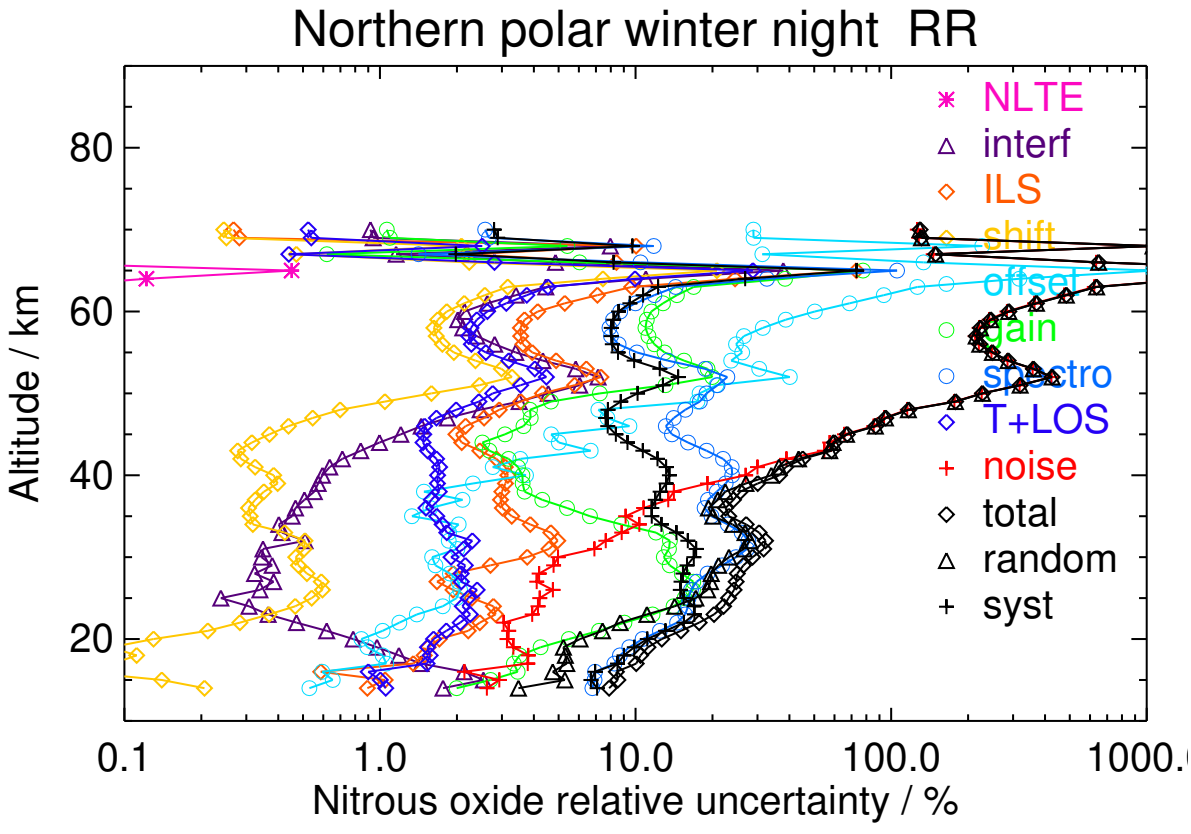

Figure S206. V8R_N2O_561 Northern polar winter night

Table S207. Nitrous oxide error budget for Northern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	56.373	<0.001	0.079	0.967	0.264	0.433	1.561	7.191	1.233	2.132	3.325	7.097	7.837
35	12.630	<0.001	0.069	0.350	0.053	0.123	0.220	1.703	0.316	1.013	1.151	1.702	2.055
40	3.008	<0.001	0.011	0.058	0.009	0.079	0.067	0.301	0.046	0.470	0.495	0.287	0.573
45	0.577	<0.001	0.011	0.015	0.004	0.055	0.018	0.075	0.010	0.433	0.443	0.027	0.444
50	0.568	<0.001	0.016	0.021	0.004	0.026	0.015	0.065	0.009	0.498	0.502	0.044	0.504
55	0.323	<0.001	0.017	0.017	0.006	0.090	0.010	0.038	0.007	0.881	0.887	0.024	0.887
60	0.845	<0.001	0.012	0.029	0.005	0.138	0.021	0.052	0.010	1.071	1.081	0.041	1.082
65	1.266	<0.001	0.023	0.098	0.011	0.249	0.028	0.054	0.012	1.332	1.358	0.083	1.361
70	0.829	<0.001	0.010	0.005	0.002	0.218	0.006	0.020	0.005	1.011	1.034	0.021	1.035

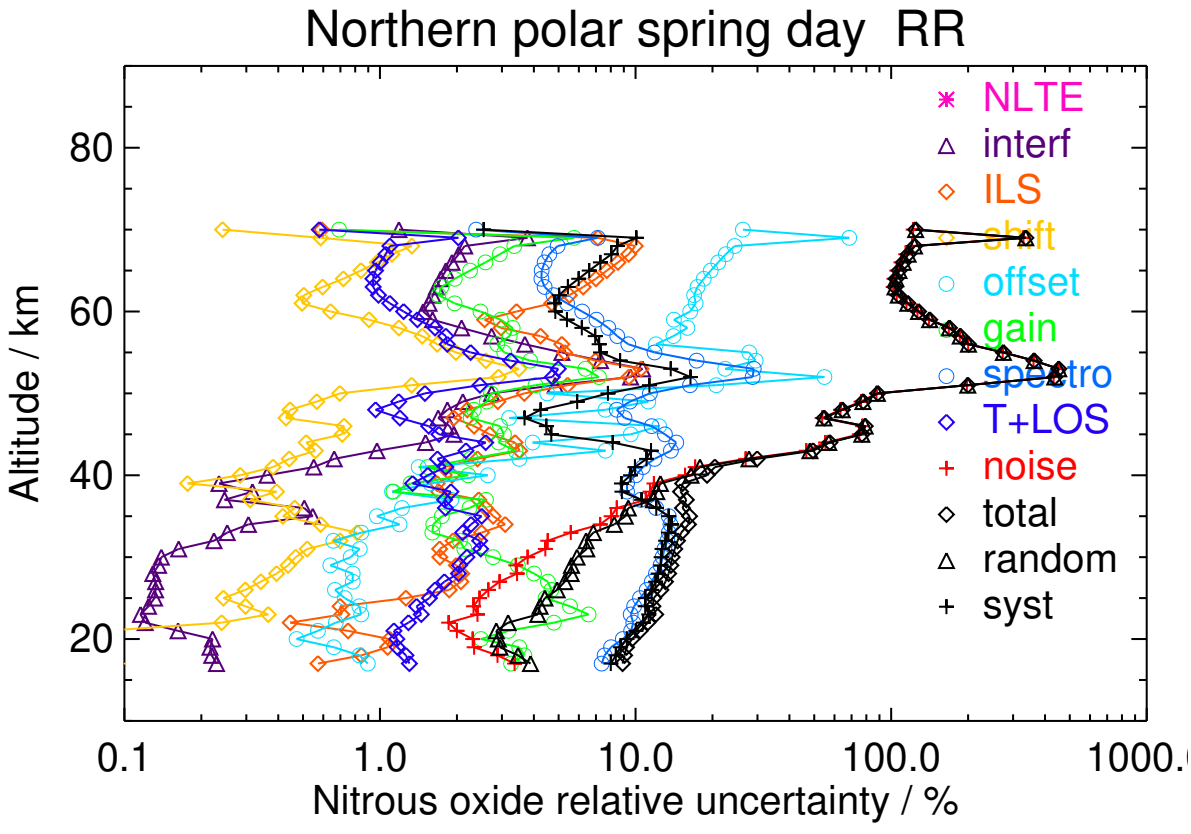

Figure S207. V8R_N2O_561 Northern polar spring day

Table S208. Nitrous oxide error budget for Northern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	57.705	<0.001	0.076	0.963	0.266	0.410	1.201	7.246	1.204	2.073	3.192	7.119	7.802
35	15.230	<0.001	0.077	0.434	0.057	0.124	0.202	2.081	0.346	1.010	1.167	2.088	2.392
40	3.827	<0.001	0.012	0.055	0.010	0.081	0.077	0.314	0.049	0.472	0.502	0.295	0.583
45	0.715	<0.001	0.011	0.023	0.005	0.052	0.027	0.105	0.014	0.427	0.439	0.070	0.445
50	0.610	<0.001	0.016	0.018	0.004	0.032	0.013	0.068	0.008	0.511	0.516	0.033	0.517
55	0.314	<0.001	0.017	0.021	0.007	0.092	0.013	0.046	0.008	0.904	0.910	0.030	0.910
60	0.383	<0.001	0.013	0.029	0.006	0.146	0.020	0.041	0.009	1.097	1.108	0.028	1.108
65	0.294	<0.001	0.022	0.091	0.011	0.255	0.021	0.041	0.008	1.346	1.372	0.070	1.374

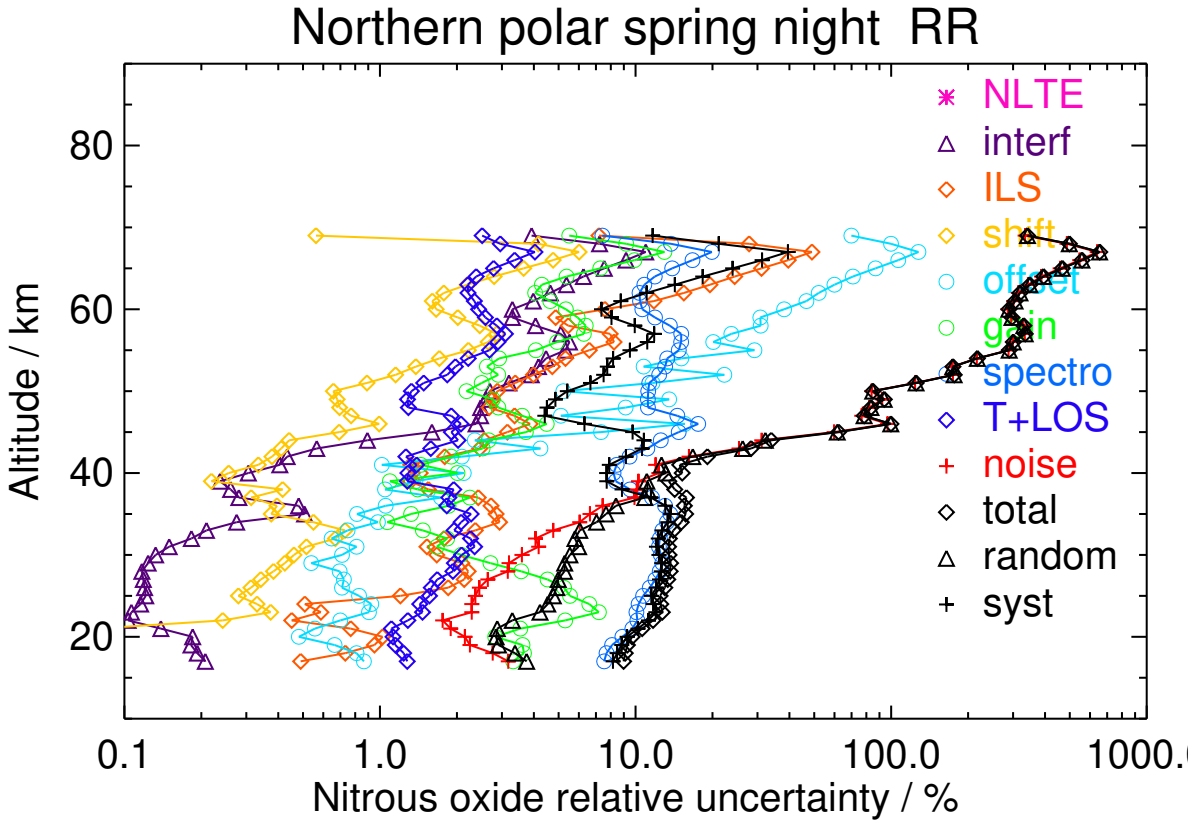

Figure S208. V8R_N2O_561 Northern polar spring night

Table S209. Nitrous oxide error budget for Northern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	77.297	<0.001	0.141	1.024	0.233	0.630	3.383	7.850	1.419	1.639	2.477	8.553	8.904
35	21.594	<0.001	0.136	0.452	0.194	0.148	0.428	2.330	0.412	0.827	1.042	2.380	2.598
40	3.083	<0.001	0.020	0.012	0.014	0.056	0.065	0.311	0.056	0.308	0.337	0.298	0.450
45	0.548	<0.001	0.009	0.015	0.006	0.038	0.013	0.055	0.011	0.271	0.275	0.051	0.280
50	0.168	<0.001	0.013	0.007	0.003	0.018	0.009	0.027	0.006	0.319	0.321	0.013	0.321
55	-0.045	<0.001	0.020	0.010	0.004	0.091	0.007	0.033	0.008	0.687	0.694	0.012	0.694
60	0.413	<0.001	0.011	0.022	0.012	0.095	0.018	0.047	0.010	0.839	0.845	0.040	0.846
65	1.222	<0.001	0.032	0.118	0.025	0.192	0.051	0.077	0.015	1.151	1.169	0.144	1.178
70	0.871	<0.001	0.030	0.144	0.035	0.175	0.065	0.084	0.014	0.932	0.950	0.176	0.966

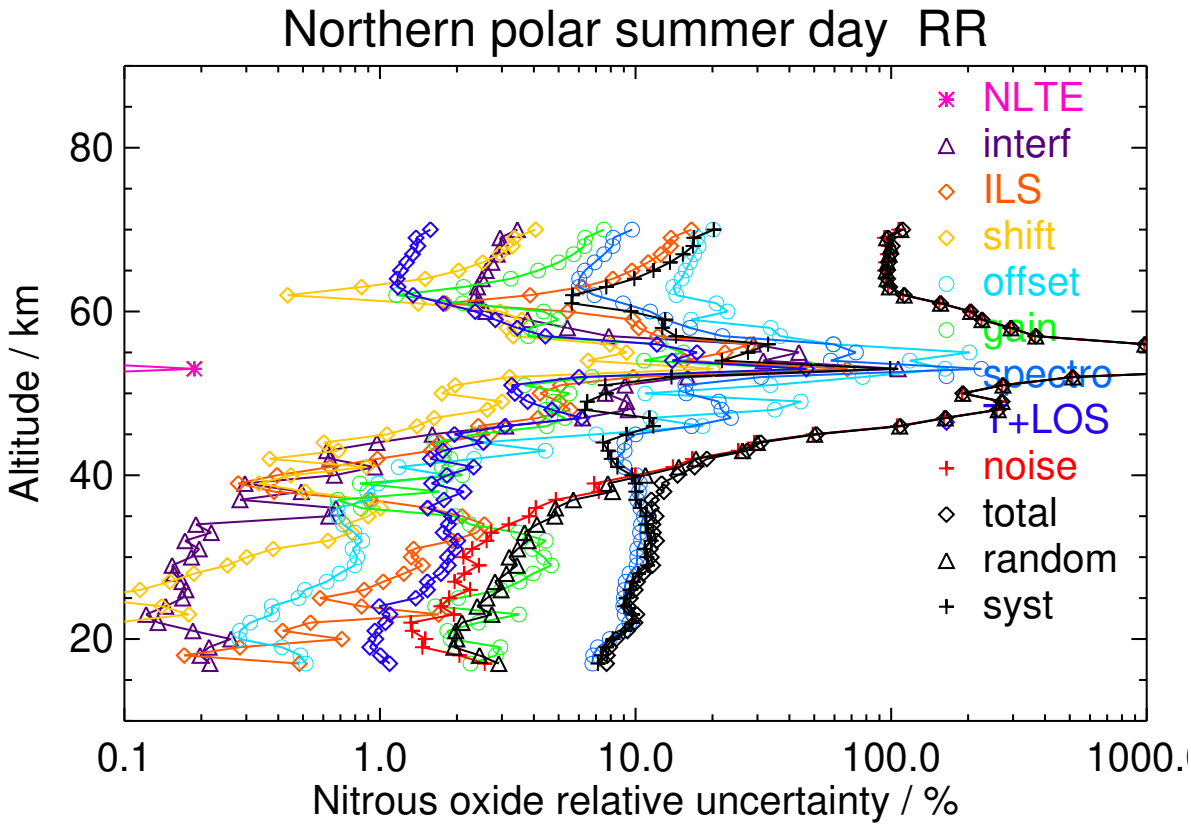

Figure S209. V8R_N2O_561 Northern polar summer day

Table S210. Nitrous oxide error budget for Northern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	61.095	<0.001	0.101	1.082	0.292	0.545	2.415	7.349	1.223	1.620	2.377	7.737	8.094
35	10.143	<0.001	0.055	0.284	0.070	0.128	0.396	1.533	0.285	0.794	0.946	1.558	1.823
40	1.062	<0.001	0.011	0.010	0.011	0.056	0.045	0.137	0.026	0.323	0.337	0.127	0.360
45	0.175	<0.001	0.009	0.010	0.003	0.048	0.011	0.033	0.007	0.349	0.354	0.021	0.354
50	0.155	<0.001	0.015	0.007	0.002	0.025	0.008	0.027	0.005	0.435	0.436	0.010	0.437
55	0.137	<0.001	0.019	0.014	0.006	0.094	0.014	0.040	0.008	0.851	0.857	0.027	0.857
60	0.287	<0.001	0.014	0.014	0.009	0.132	0.012	0.045	0.009	1.022	1.031	0.028	1.031
65	0.055	<0.001	0.025	0.097	0.013	0.241	0.100	0.051	0.020	1.319	1.342	0.142	1.349

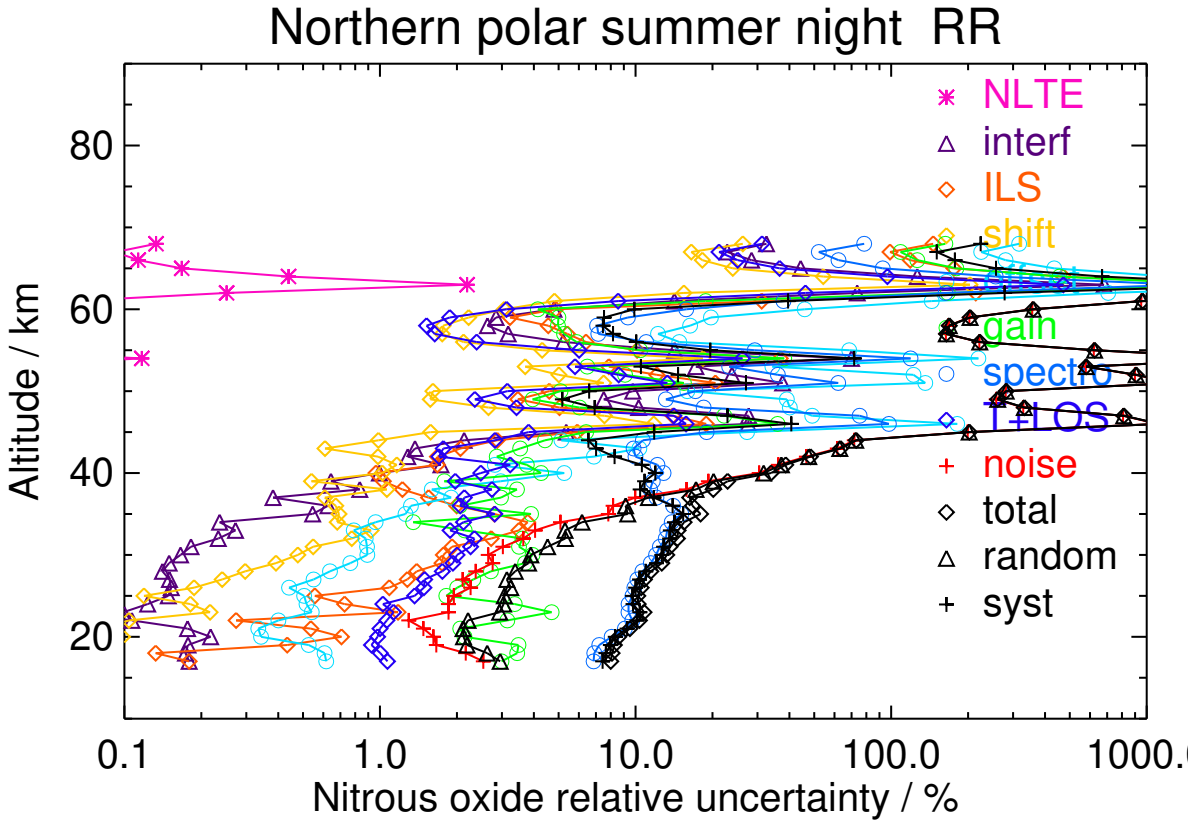

Figure S210. V8R_N2O_561 Northern polar summer night

Table S211. Nitrous oxide error budget for Northern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	31.905	<0.001	0.141	1.076	0.193	0.303	0.940	5.789	0.826	1.613	3.045	5.451	6.244
35	2.286	<0.001	0.059	0.118	0.054	0.093	0.406	0.604	0.145	0.688	0.938	0.416	1.026
40	0.841	<0.001	0.012	0.042	0.012	0.083	0.088	0.247	0.021	0.525	0.589	0.078	0.594
45	0.542	<0.001	0.012	0.035	0.005	0.057	0.042	0.152	0.011	0.566	0.589	0.046	0.591
50	0.582	<0.001	0.018	0.018	0.006	0.044	0.017	0.064	0.010	0.695	0.700	0.029	0.700
55	0.729	<0.001	0.020	0.021	0.009	0.085	0.031	0.062	0.012	1.029	1.034	0.046	1.035
60	0.941	<0.001	0.015	0.024	0.010	0.196	0.023	0.061	0.014	1.294	1.310	0.045	1.311
65	0.508	<0.001	0.014	0.040	0.007	0.279	0.049	0.045	0.015	1.417	1.445	0.061	1.446
70	-0.100	<0.001	0.009	0.019	0.003	0.218	0.027	0.020	0.008	1.015	1.038	0.035	1.038

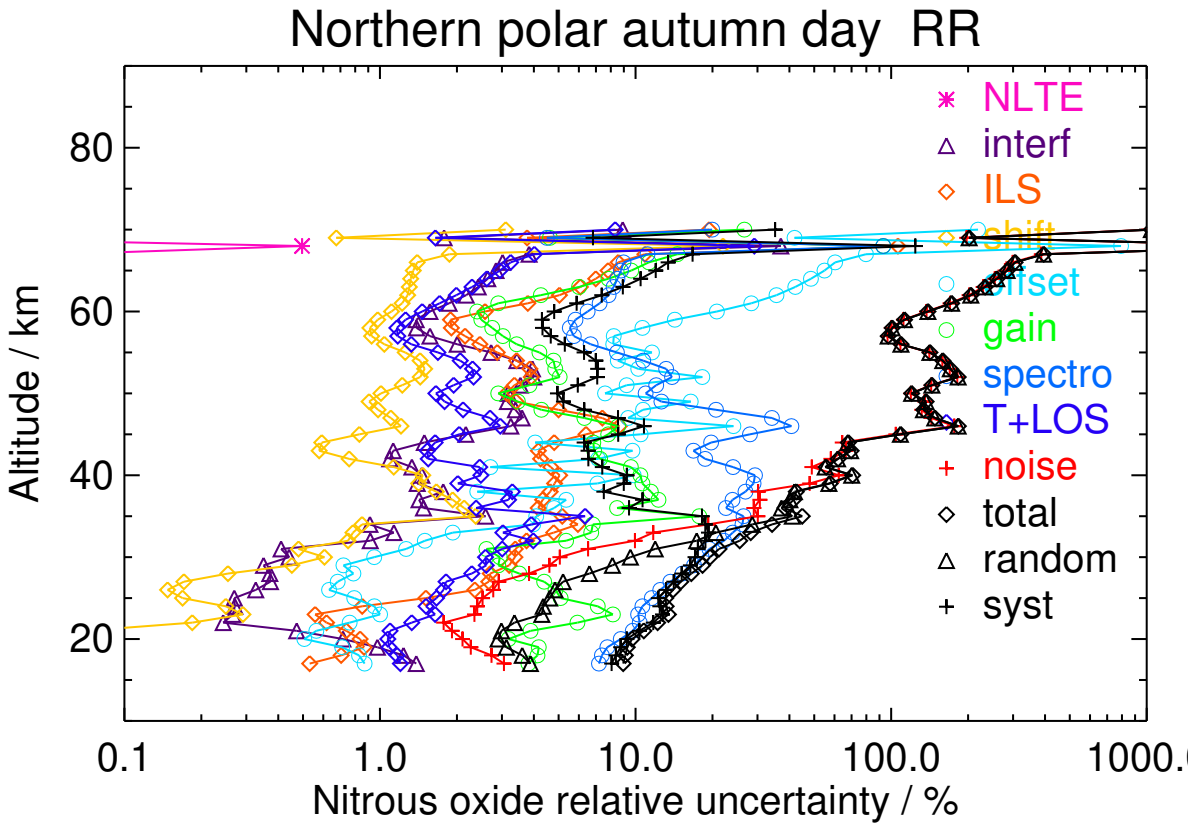

Figure S211. V8R_N2O_561 Northern polar autumn day

Table S212. Nitrous oxide error budget for Northern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	22.468	<0.001	0.093	1.076	0.150	0.246	0.836	4.720	0.683	1.548	2.089	4.767	5.204
35	0.960	<0.001	0.037	0.066	0.027	0.072	0.236	0.184	0.093	0.606	0.672	0.160	0.691
40	-0.023	<0.001	0.008	0.010	0.002	0.089	0.021	0.051	0.009	0.573	0.583	0.010	0.583
45	0.081	<0.001	0.011	0.008	0.004	0.040	0.020	0.033	0.006	0.555	0.558	0.019	0.558
50	0.706	<0.001	0.018	0.013	0.006	0.058	0.022	0.054	0.008	0.729	0.733	0.033	0.734
55	0.684	<0.001	0.019	0.024	0.009	0.081	0.031	0.055	0.011	1.034	1.038	0.050	1.040
60	0.322	<0.001	0.013	0.010	0.010	0.189	0.034	0.045	0.012	1.258	1.273	0.041	1.273
65	0.101	<0.001	0.013	0.025	0.006	0.277	0.026	0.028	0.008	1.406	1.433	0.028	1.434
70	-0.485	<0.001	0.008	0.021	0.003	0.214	0.017	0.008	0.004	0.971	0.994	0.025	0.994

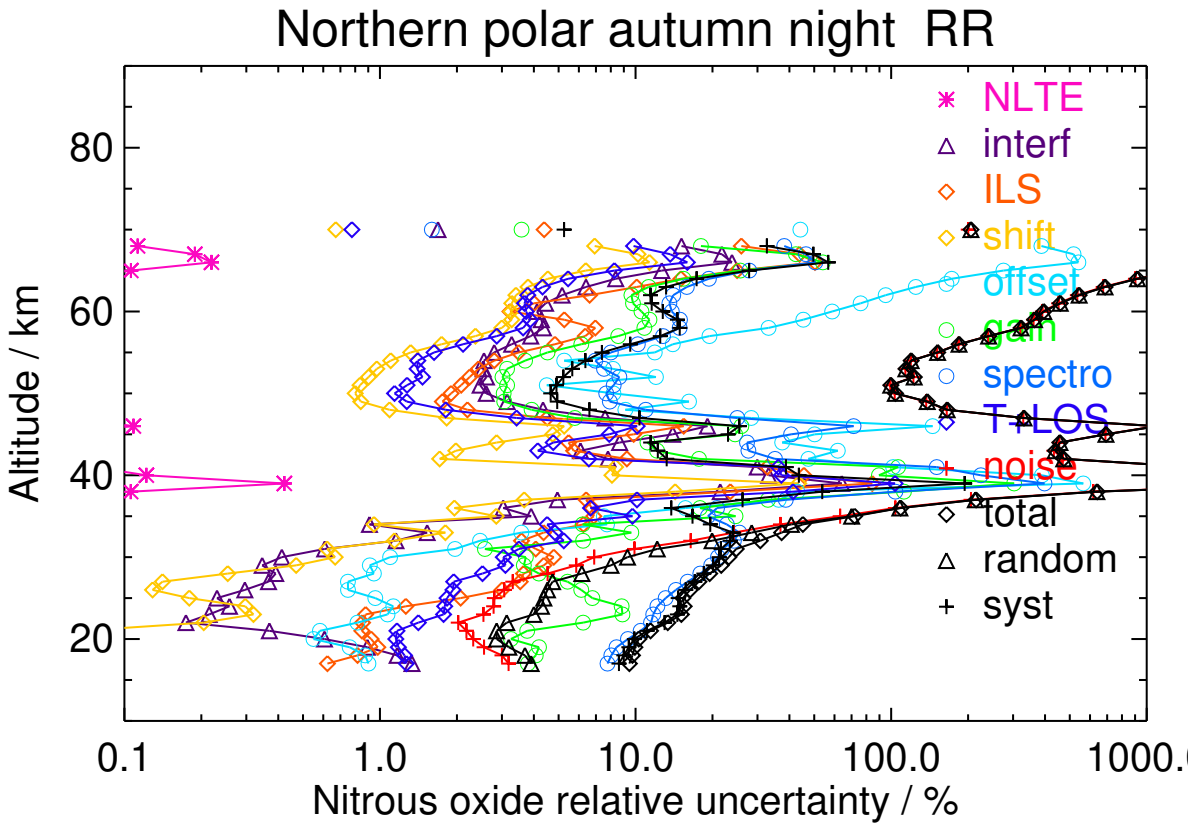

Figure S212. V8R_N2O_561 Northern polar autumn night

Table S213. Nitrous oxide error budget for Northern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	80.838	<0.001	0.194	1.671	0.259	0.622	3.248	9.720	1.399	2.047	5.084	9.413	10.698
35	30.470	<0.001	0.137	0.466	0.167	0.182	0.385	3.872	0.491	1.217	2.191	3.515	4.142
40	7.838	<0.001	0.030	0.120	0.029	0.125	0.160	0.631	0.091	0.775	0.889	0.522	1.031
45	4.459	<0.001	0.014	0.081	0.013	0.040	0.099	0.455	0.043	0.555	0.594	0.427	0.732
50	0.505	<0.001	0.016	0.025	0.007	0.060	0.020	0.088	0.014	0.692	0.700	0.041	0.701
55	0.323	<0.001	0.015	0.022	0.011	0.087	0.022	0.055	0.009	1.033	1.038	0.036	1.039
60	-0.057	<0.001	0.021	0.046	0.008	0.211	0.046	0.051	0.012	1.331	1.349	0.056	1.350
65	-0.100	<0.001	0.038	0.088	0.022	0.286	0.089	0.067	0.017	1.421	1.452	0.118	1.457
70	1.172	<0.001	0.030	0.061	0.016	0.235	0.016	0.062	0.010	1.040	1.068	0.067	1.071

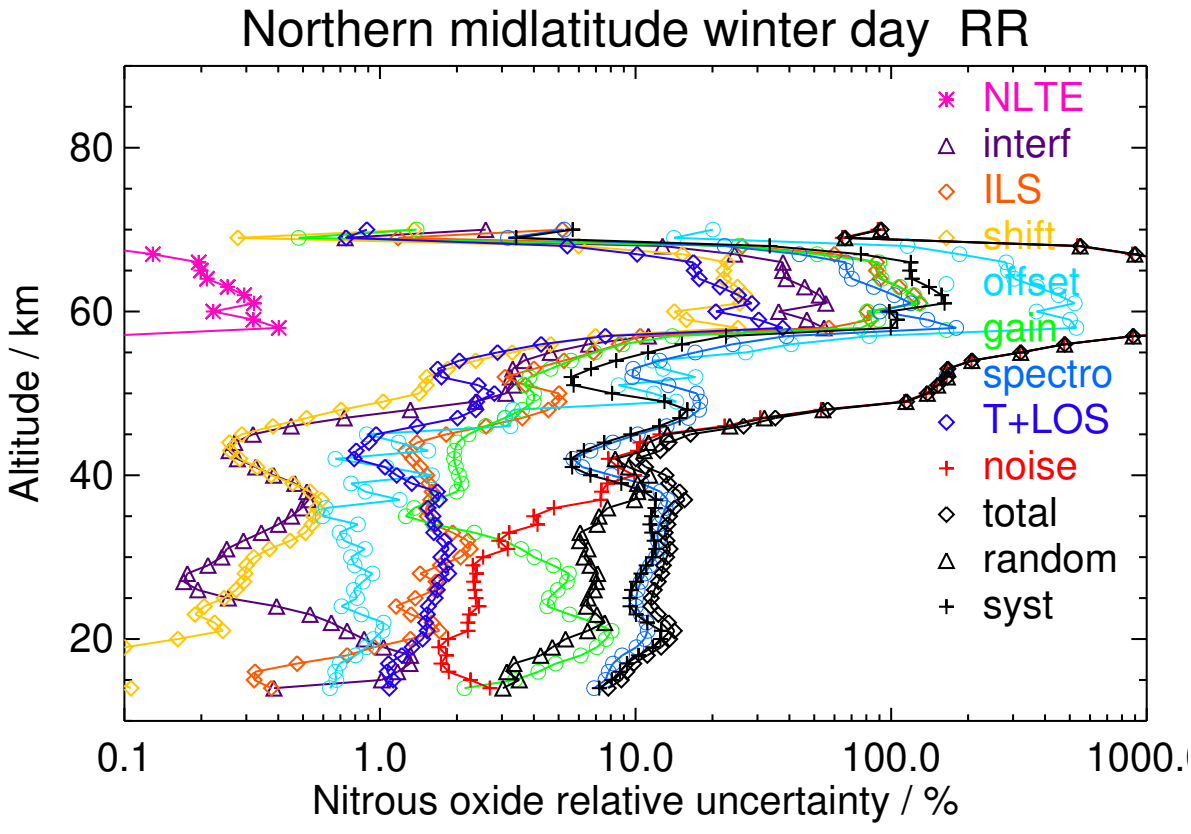

Figure S213. V8R_N2O_561 Northern midlatitude winter day

Table S214. Nitrous oxide error budget for Northern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	88.715	<0.001	0.188	2.052	0.313	0.714	5.110	10.676	1.508	2.055	6.267	10.591	12.306
35	29.272	<0.001	0.139	0.777	0.184	0.247	0.887	4.463	0.527	1.398	2.593	4.115	4.864
40	8.273	<0.001	0.031	0.134	0.035	0.081	0.187	0.652	0.092	0.676	0.824	0.523	0.976
45	5.098	<0.001	0.015	0.091	0.014	0.061	0.098	0.476	0.052	0.560	0.602	0.449	0.751
50	1.057	<0.001	0.017	0.038	0.006	0.086	0.034	0.155	0.018	0.757	0.774	0.089	0.779
55	0.451	<0.001	0.016	0.027	0.011	0.066	0.042	0.066	0.011	0.959	0.963	0.061	0.965
60	0.015	<0.001	0.020	0.066	0.009	0.213	0.046	0.048	0.012	1.348	1.368	0.050	1.369
65	0.033	<0.001	0.030	0.107	0.018	0.291	0.095	0.059	0.015	1.421	1.454	0.120	1.459
70	0.110	<0.001	0.030	0.092	0.015	0.233	0.031	0.043	0.007	1.016	1.043	0.104	1.048

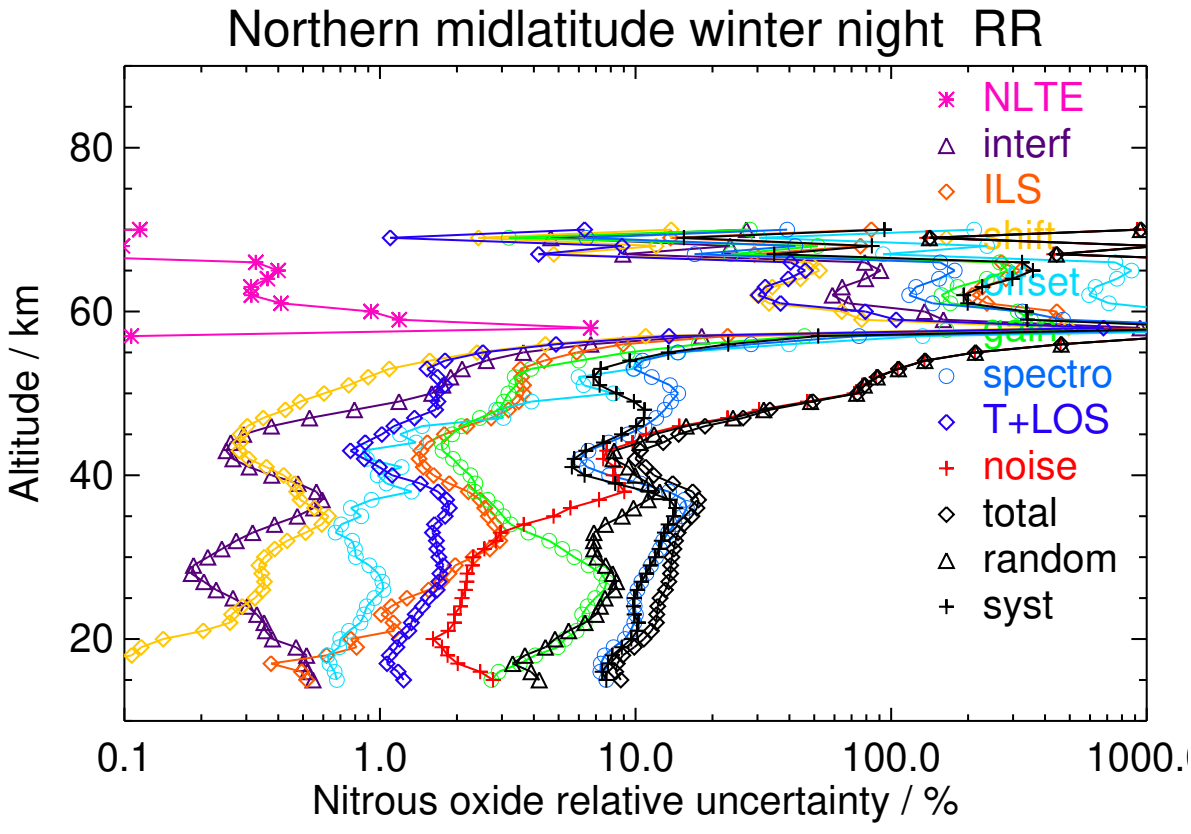

Figure S214. V8R_N2O_561 Northern midlatitude winter night

Table S215. Nitrous oxide error budget for Northern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	89.815	<0.001	0.205	0.924	0.355	0.654	2.162	9.356	1.704	2.136	3.605	9.387	10.056
35	27.357	<0.001	0.161	0.497	0.227	0.170	0.563	3.183	0.480	0.989	1.611	3.068	3.465
40	9.894	<0.001	0.049	0.065	0.100	0.089	0.226	0.851	0.106	0.559	0.847	0.636	1.059
45	4.261	<0.001	0.014	0.060	0.013	0.078	0.081	0.330	0.033	0.516	0.571	0.259	0.627
50	2.267	<0.001	0.017	0.045	0.006	0.019	0.039	0.172	0.021	0.522	0.535	0.146	0.554
55	1.070	<0.001	0.019	0.039	0.012	0.076	0.022	0.099	0.015	0.859	0.865	0.087	0.870
60	0.285	<0.001	0.018	0.054	0.009	0.156	0.017	0.050	0.010	1.162	1.174	0.055	1.175
65	0.723	<0.001	0.046	0.180	0.036	0.259	0.078	0.095	0.016	1.365	1.394	0.197	1.408
70	-1.031	<0.001	0.024	0.085	0.014	0.213	0.040	0.040	0.006	0.988	1.011	0.102	1.016

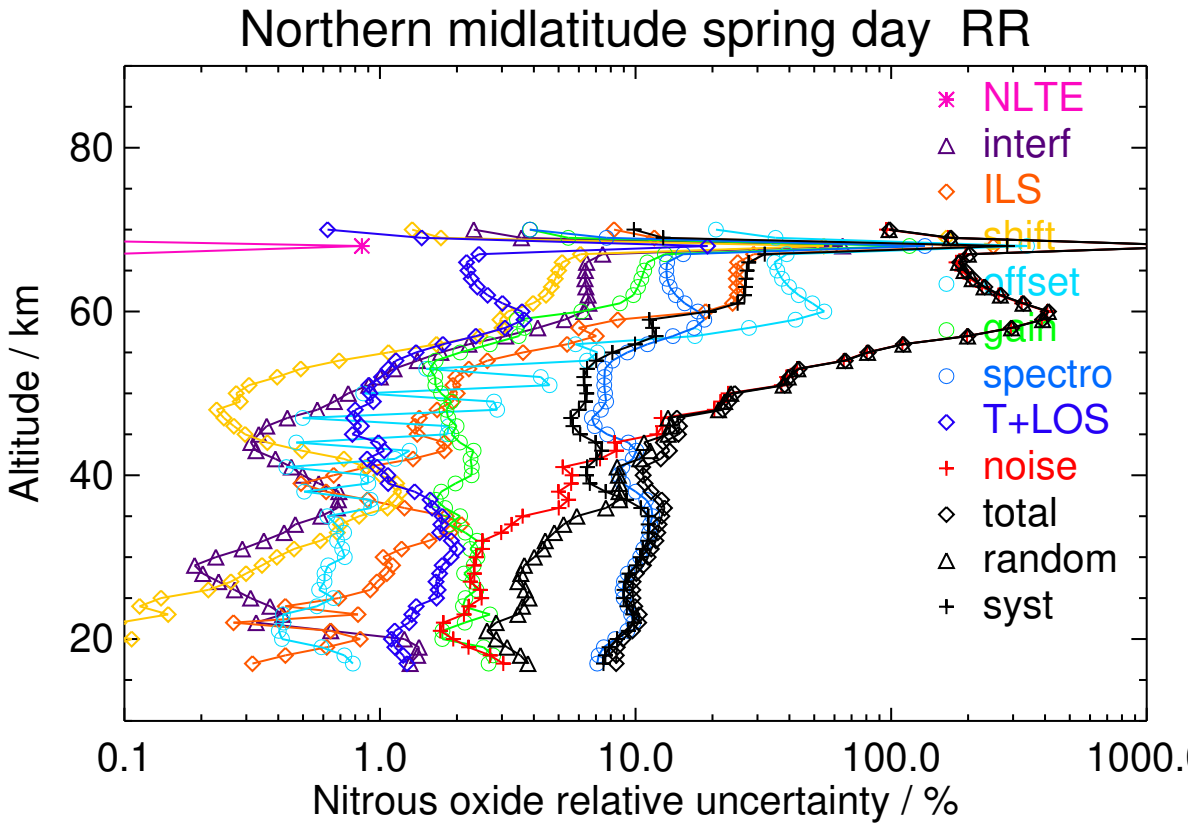

Figure S215. V8R_N2O_561 Northern midlatitude spring day

Table S216. Nitrous oxide error budget for Northern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	86.958	<0.001	0.190	1.216	0.354	0.535	1.587	9.428	1.592	2.140	3.286	9.469	10.023
35	23.578	<0.001	0.155	0.502	0.207	0.154	0.278	2.919	0.461	1.022	1.562	2.785	3.193
40	7.832	<0.001	0.044	0.052	0.097	0.091	0.226	0.747	0.089	0.536	0.794	0.544	0.962
45	2.372	<0.001	0.013	0.055	0.010	0.060	0.074	0.266	0.023	0.450	0.508	0.168	0.535
50	1.466	<0.001	0.017	0.036	0.005	0.026	0.030	0.130	0.014	0.512	0.523	0.098	0.532
55	0.817	<0.001	0.018	0.025	0.009	0.088	0.017	0.077	0.012	0.899	0.906	0.045	0.907
60	0.489	<0.001	0.016	0.041	0.008	0.154	0.015	0.055	0.011	1.138	1.150	0.044	1.151
65	0.271	<0.001	0.037	0.126	0.027	0.259	0.046	0.073	0.012	1.360	1.389	0.116	1.394

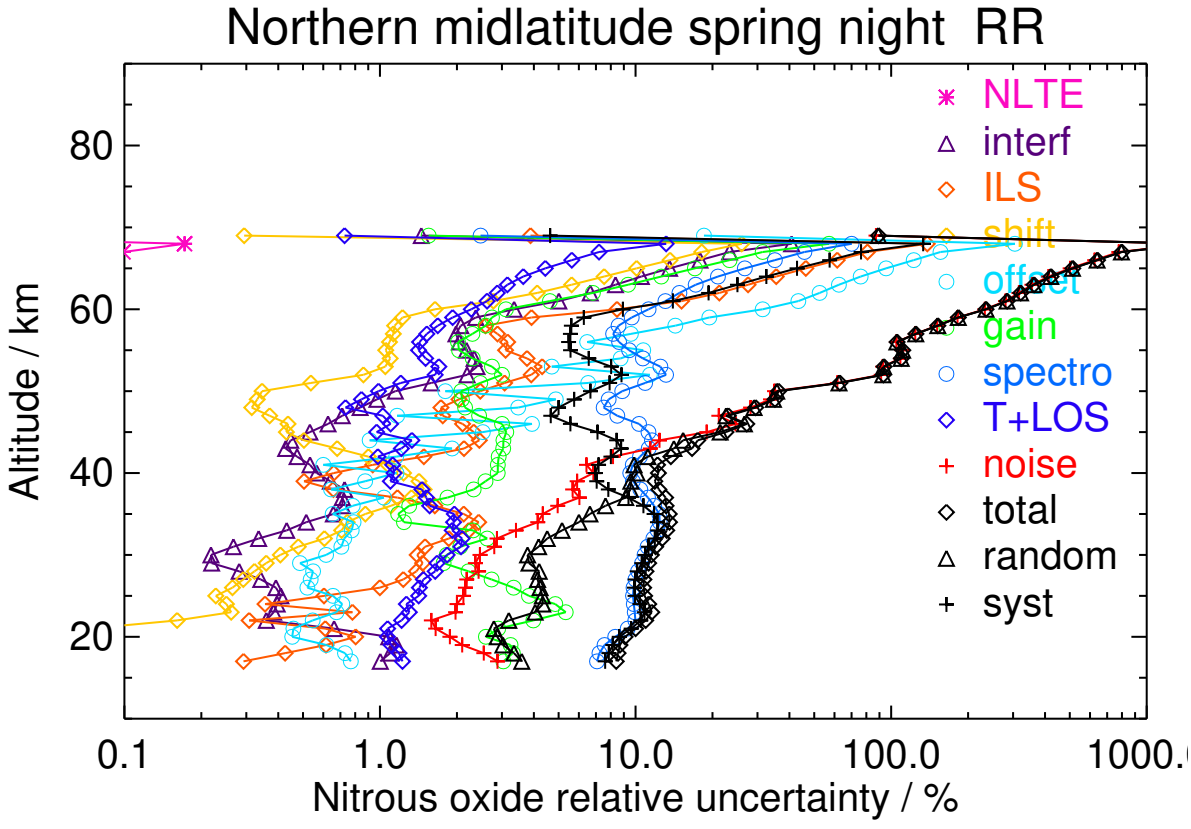

Figure S216. V8R_N2O_561 Northern midlatitude spring night

Table S217. Nitrous oxide error budget for Northern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	80.160	<0.001	0.175	1.008	0.271	0.627	2.930	7.729	1.494	1.753	2.771	8.214	8.669
35	22.005	<0.001	0.148	0.474	0.195	0.140	0.328	2.517	0.418	0.841	1.191	2.492	2.762
40	3.336	<0.001	0.019	0.021	0.013	0.061	0.069	0.360	0.061	0.357	0.399	0.333	0.520
45	1.288	<0.001	0.010	0.022	0.005	0.059	0.028	0.131	0.012	0.375	0.394	0.087	0.403
50	0.441	<0.001	0.015	0.013	0.004	0.014	0.010	0.063	0.008	0.413	0.419	0.021	0.419
55	1.001	<0.001	0.019	0.029	0.009	0.080	0.026	0.108	0.012	0.766	0.777	0.049	0.779
60	1.251	<0.001	0.016	0.036	0.008	0.131	0.012	0.079	0.014	1.045	1.055	0.060	1.057
65	0.896	<0.001	0.056	0.196	0.038	0.235	0.101	0.106	0.021	1.311	1.336	0.234	1.356

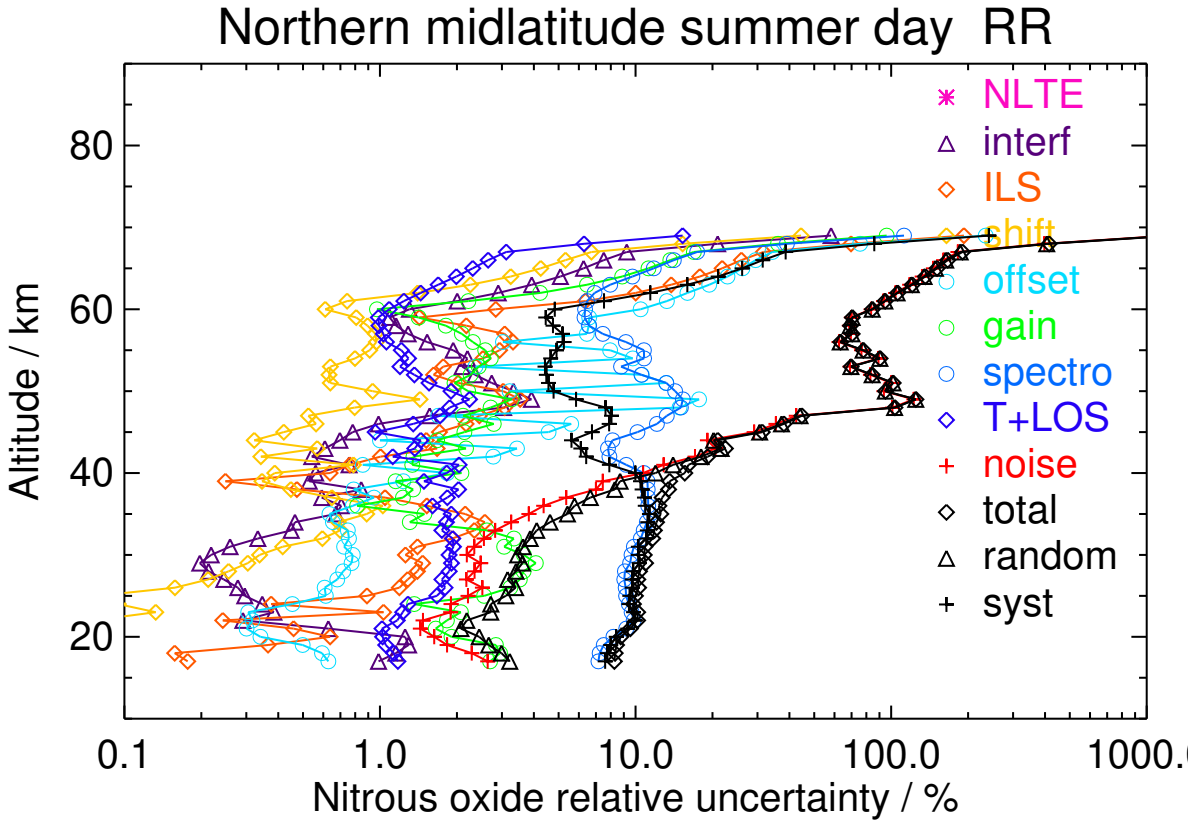

Figure S217. V8R_N2O_561 Northern midlatitude summer day

Table S218. Nitrous oxide error budget for Northern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	83.327	<0.001	0.178	1.003	0.266	0.599	2.380	8.558	1.518	1.743	2.660	8.867	9.258
35	22.055	<0.001	0.159	0.465	0.207	0.123	0.159	2.470	0.404	0.831	1.107	2.461	2.698
40	3.122	<0.001	0.018	0.016	0.012	0.061	0.062	0.340	0.058	0.342	0.379	0.316	0.494
45	0.888	<0.001	0.010	0.016	0.005	0.048	0.019	0.080	0.011	0.329	0.338	0.059	0.343
50	0.364	<0.001	0.014	0.012	0.003	0.017	0.008	0.052	0.007	0.385	0.390	0.019	0.390
55	1.518	<0.001	0.019	0.024	0.008	0.090	0.021	0.086	0.012	0.789	0.798	0.057	0.800
60	1.343	<0.001	0.014	0.019	0.010	0.123	0.018	0.091	0.013	0.989	0.999	0.070	1.001
65	0.666	<0.001	0.058	0.189	0.035	0.230	0.054	0.094	0.016	1.297	1.320	0.213	1.337

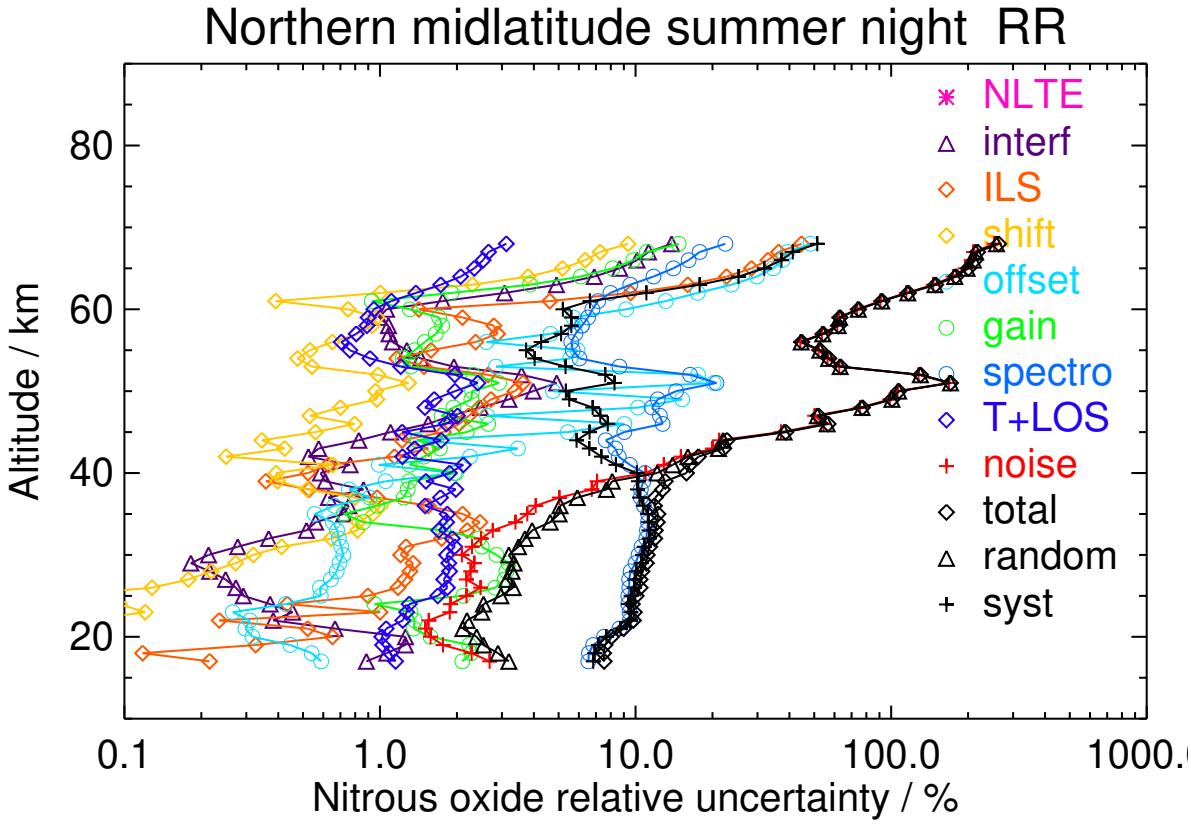

Figure S218. V8R_N2O_561 Northern midlatitude summer night

Table S219. Nitrous oxide error budget for Northern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	73.677	<0.001	0.165	1.015	0.293	0.576	2.215	8.290	1.465	2.093	3.967	8.117	9.035
35	35.818	<0.001	0.160	0.494	0.256	0.190	0.496	3.687	0.481	1.176	2.530	3.069	3.978
40	18.688	<0.001	0.083	0.208	0.221	0.128	0.393	1.778	0.203	0.873	1.489	1.421	2.058
45	6.778	<0.001	0.018	0.141	0.028	0.069	0.169	0.711	0.066	0.610	0.787	0.564	0.968
50	3.200	<0.001	0.018	0.058	0.007	0.033	0.054	0.206	0.029	0.641	0.653	0.185	0.679
55	1.702	<0.001	0.020	0.040	0.012	0.082	0.033	0.119	0.018	0.980	0.987	0.105	0.993
60	0.747	<0.001	0.023	0.074	0.014	0.188	0.030	0.074	0.017	1.287	1.303	0.084	1.305
65	0.028	<0.001	0.042	0.169	0.040	0.270	0.084	0.103	0.019	1.403	1.435	0.181	1.446
70	-0.157	<0.001	0.016	0.064	0.009	0.215	0.052	0.037	0.011	1.005	1.029	0.076	1.032

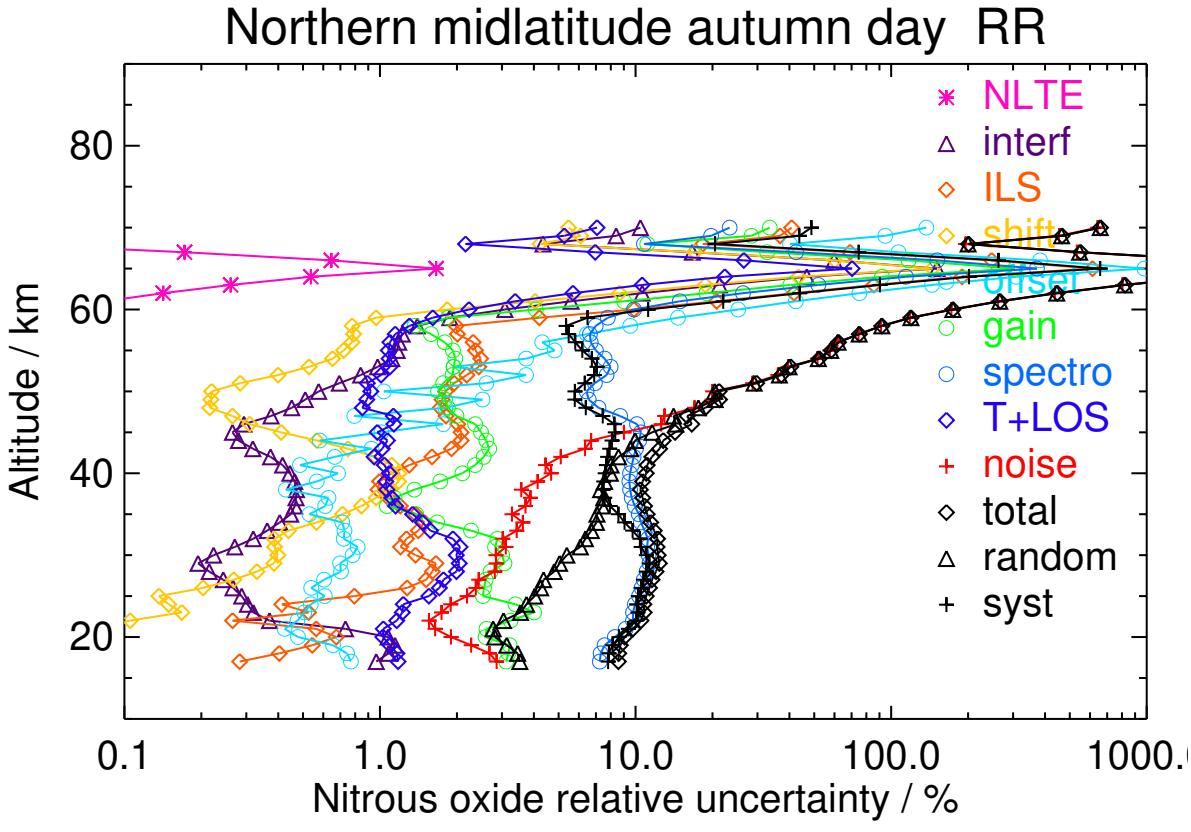

Figure S219. V8R_N2O_561 Northern midlatitude autumn day

Table S220. Nitrous oxide error budget for Northern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	83.306	<0.001	0.205	1.057	0.300	0.537	2.063	9.145	1.467	2.135	4.272	8.825	9.805
35	40.049	<0.001	0.173	0.680	0.246	0.212	0.657	4.406	0.579	1.290	2.471	4.042	4.737
40	16.893	<0.001	0.073	0.241	0.155	0.131	0.405	1.736	0.198	0.900	1.495	1.378	2.033
45	6.631	<0.001	0.017	0.144	0.018	0.060	0.156	0.708	0.066	0.613	0.780	0.567	0.964
50	3.360	<0.001	0.019	0.057	0.007	0.044	0.056	0.215	0.030	0.673	0.689	0.184	0.713
55	1.662	<0.001	0.020	0.040	0.011	0.086	0.036	0.137	0.020	1.015	1.022	0.125	1.029
60	1.068	<0.001	0.020	0.052	0.008	0.201	0.029	0.067	0.016	1.317	1.334	0.068	1.336
65	0.443	<0.001	0.031	0.120	0.025	0.275	0.086	0.072	0.017	1.412	1.442	0.135	1.449
70	-0.356	<0.001	0.009	0.019	0.006	0.212	0.009	0.003	0.004	0.989	1.011	0.021	1.012

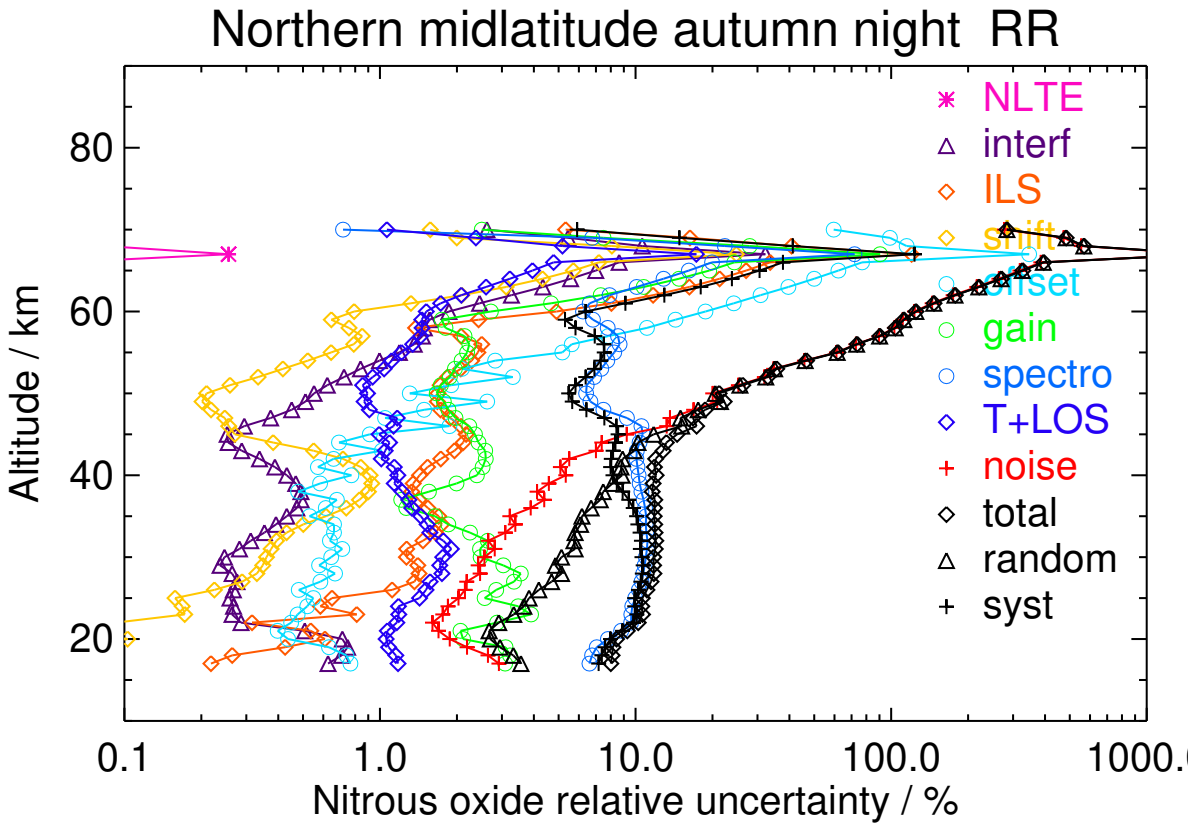

Figure S220. V8R_N2O_561 Northern midlatitude autumn night

Table S221. Nitrous oxide error budget for Tropics day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	209.781	<0.001	0.717	1.594	0.495	0.845	1.074	17.820	2.654	3.106	4.816	17.782	18.423
35	112.282	<0.001	0.460	0.703	0.552	0.459	0.535	9.887	1.258	1.770	2.829	9.796	10.196
40	29.104	<0.001	0.151	0.079	0.387	0.138	0.549	2.700	0.355	0.915	1.332	2.642	2.959
45	7.469	<0.001	0.017	0.107	0.029	0.084	0.155	0.579	0.066	0.536	0.624	0.530	0.819
50	2.730	<0.001	0.017	0.064	0.008	0.025	0.051	0.231	0.033	0.511	0.524	0.222	0.569
55	0.743	<0.001	0.019	0.043	0.014	0.065	0.016	0.086	0.013	0.797	0.804	0.070	0.807
60	0.301	<0.001	0.025	0.100	0.019	0.152	0.034	0.074	0.012	1.147	1.160	0.109	1.165
65	-0.175	<0.001	0.079	0.320	0.083	0.253	0.124	0.212	0.023	1.363	1.393	0.396	1.449

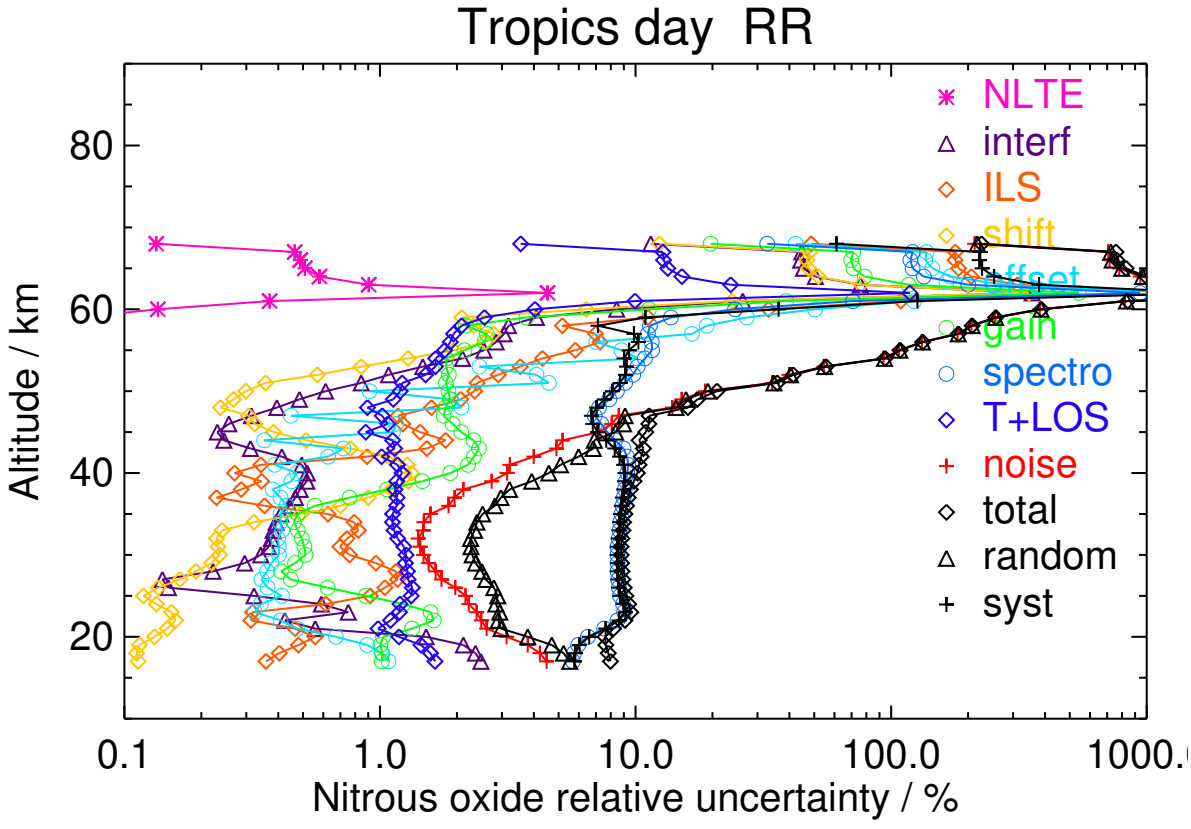

Figure S221. V8R_N2O_561 Tropics day

Table S222. Nitrous oxide error budget for Tropics night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	207.480	<0.001	0.793	1.562	0.511	0.778	1.055	17.769	2.562	3.014	4.795	17.704	18.342
35	110.066	<0.001	0.446	0.737	0.516	0.432	0.578	9.633	1.220	1.742	2.779	9.546	9.942
40	32.483	<0.001	0.161	0.113	0.451	0.155	0.596	2.824	0.368	0.979	1.415	2.772	3.112
45	7.568	<0.001	0.019	0.127	0.036	0.062	0.170	0.633	0.075	0.483	0.565	0.609	0.831
50	2.503	<0.001	0.017	0.061	0.007	0.024	0.046	0.213	0.034	0.494	0.506	0.202	0.545
55	0.605	<0.001	0.019	0.037	0.014	0.084	0.015	0.067	0.010	0.842	0.848	0.059	0.851
60	0.653	<0.001	0.023	0.086	0.017	0.156	0.027	0.071	0.012	1.132	1.145	0.098	1.149
65	0.279	<0.001	0.078	0.312	0.083	0.248	0.121	0.212	0.024	1.355	1.385	0.389	1.438

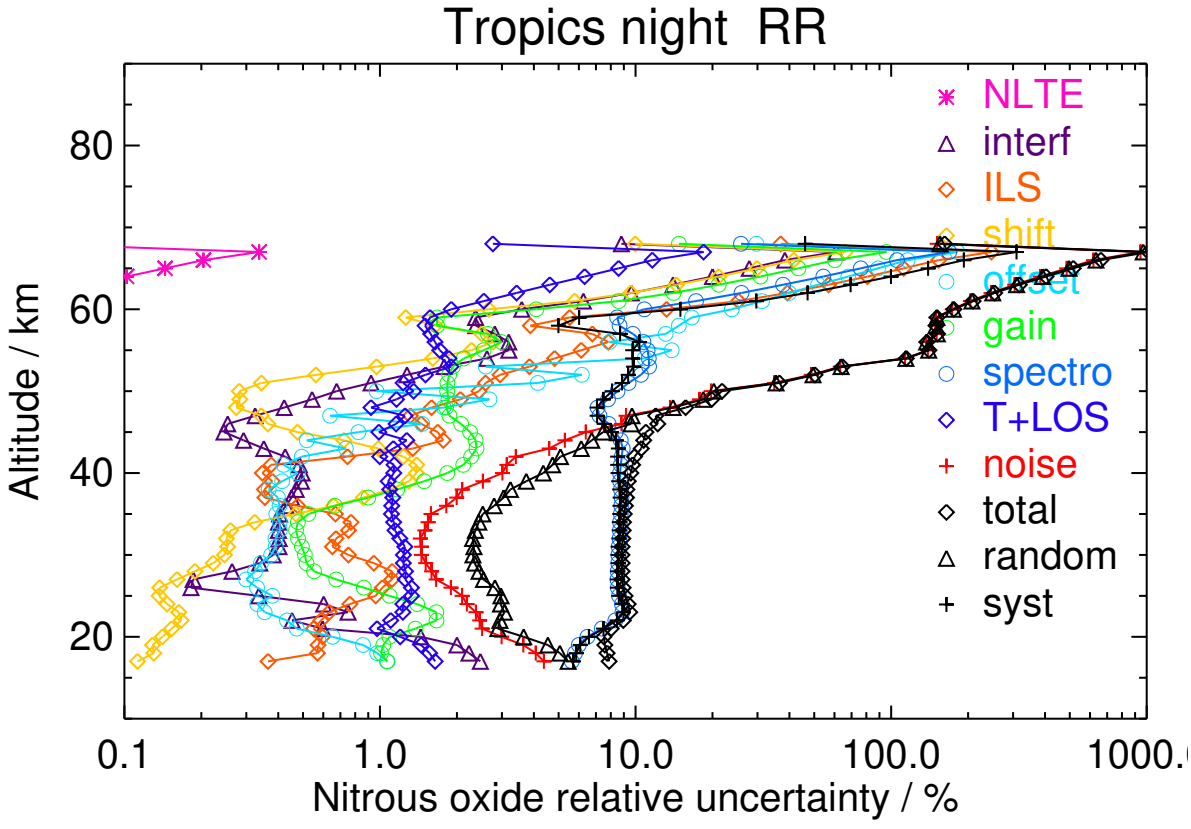

Figure S222. V8R_N2O_561 Tropics night

Table S223. Nitrous oxide error budget for Southern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	122.327	<0.001	0.290	2.117	0.487	0.937	6.441	13.265	2.119	2.435	8.691	12.570	15.282
35	38.824	<0.001	0.142	1.375	0.226	0.332	1.871	6.407	0.823	1.332	3.872	5.838	7.006
40	3.294	<0.001	0.017	0.144	0.013	0.090	0.132	0.776	0.063	0.568	0.906	0.393	0.988
45	2.334	<0.001	0.012	0.028	0.006	0.019	0.043	0.144	0.022	0.440	0.457	0.097	0.467
50	2.055	<0.001	0.017	0.039	0.007	0.077	0.041	0.162	0.017	0.692	0.707	0.123	0.718
55	0.876	<0.001	0.017	0.030	0.010	0.076	0.027	0.087	0.014	1.011	1.016	0.071	1.019
60	1.035	<0.001	0.023	0.082	0.012	0.204	0.061	0.062	0.016	1.328	1.347	0.070	1.349
65	0.862	<0.001	0.043	0.152	0.027	0.273	0.166	0.083	0.024	1.398	1.436	0.170	1.446

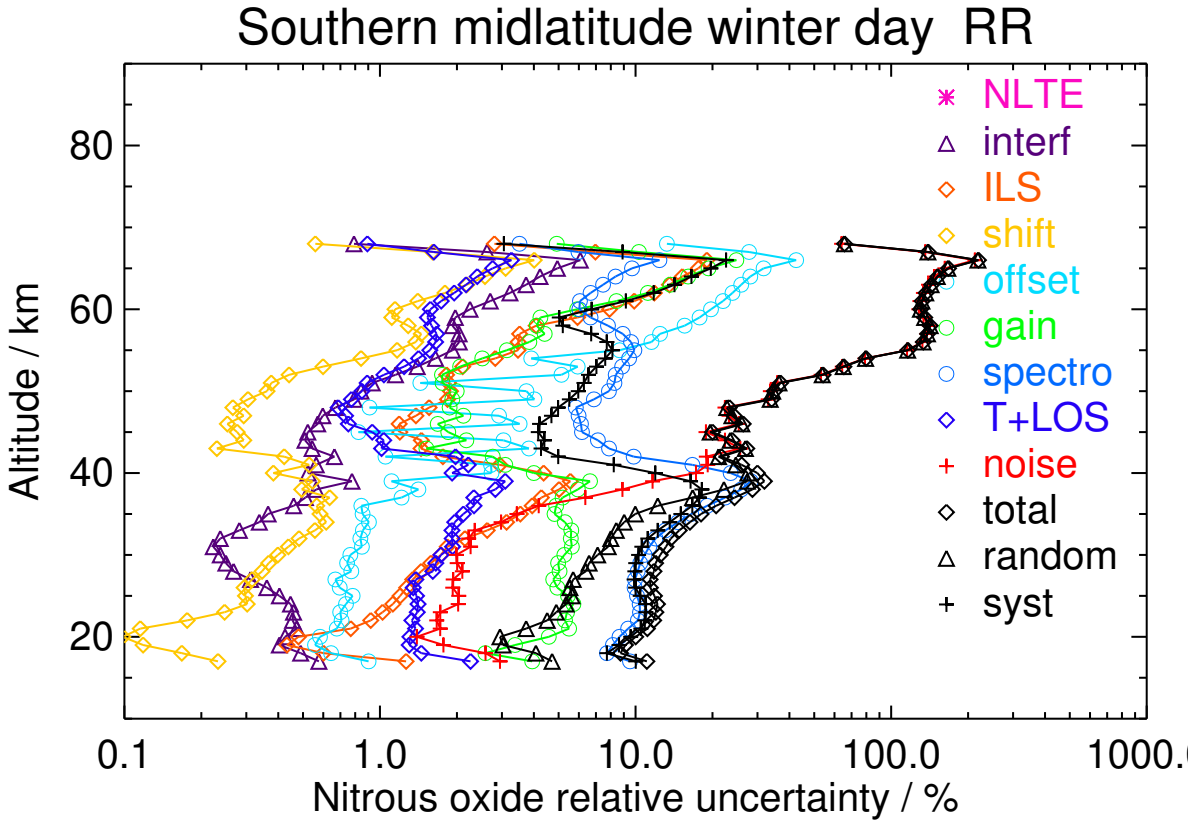

Figure S223. V8R_N2O_561 Southern midlatitude winter day

Table S224. Nitrous oxide error budget for Southern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	84.126	<0.001	0.240	1.190	0.299	0.604	3.277	9.835	1.594	2.453	6.387	8.784	10.861
35	29.462	<0.001	0.126	0.917	0.174	0.253	0.914	4.591	0.640	1.395	3.019	4.013	5.022
40	2.383	<0.001	0.014	0.122	0.012	0.095	0.084	0.575	0.061	0.610	0.782	0.355	0.859
45	1.624	<0.001	0.012	0.025	0.005	0.023	0.029	0.115	0.017	0.467	0.479	0.069	0.484
50	1.391	<0.001	0.018	0.029	0.006	0.070	0.030	0.112	0.013	0.668	0.678	0.073	0.682
55	0.696	<0.001	0.018	0.027	0.009	0.080	0.024	0.077	0.012	0.999	1.004	0.053	1.006
60	0.359	<0.001	0.019	0.065	0.010	0.198	0.036	0.052	0.013	1.296	1.314	0.051	1.315
65	0.128	<0.001	0.030	0.128	0.017	0.268	0.088	0.053	0.015	1.387	1.418	0.110	1.422

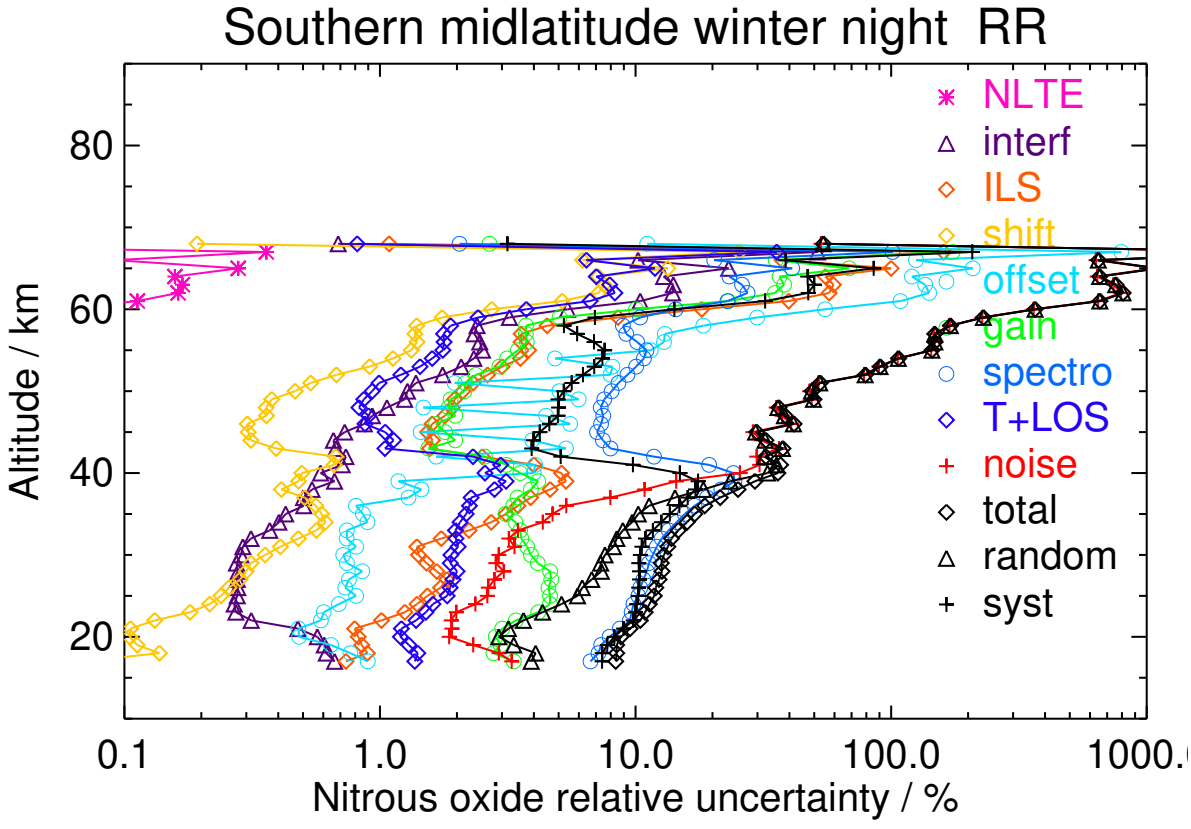

Figure S224. V8R_N2O_561 Southern midlatitude winter night

Table S225. Nitrous oxide error budget for Southern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	128.987	<0.001	0.320	1.497	0.428	0.841	4.629	13.244	1.997	2.135	6.128	13.079	14.443
35	35.698	<0.001	0.164	1.060	0.222	0.235	0.626	5.140	0.696	1.154	2.620	4.798	5.466
40	7.661	<0.001	0.030	0.076	0.027	0.092	0.091	0.702	0.096	0.586	0.685	0.633	0.932
45	2.612	<0.001	0.012	0.044	0.004	0.017	0.039	0.205	0.032	0.410	0.425	0.185	0.464
50	2.128	<0.001	0.017	0.035	0.007	0.078	0.038	0.128	0.015	0.631	0.641	0.115	0.651
55	0.753	<0.001	0.016	0.031	0.011	0.073	0.032	0.067	0.011	0.908	0.912	0.061	0.915
60	1.129	<0.001	0.019	0.047	0.010	0.156	0.051	0.065	0.015	1.152	1.165	0.057	1.167
65	0.403	<0.001	0.045	0.158	0.030	0.255	0.208	0.090	0.029	1.365	1.399	0.226	1.417

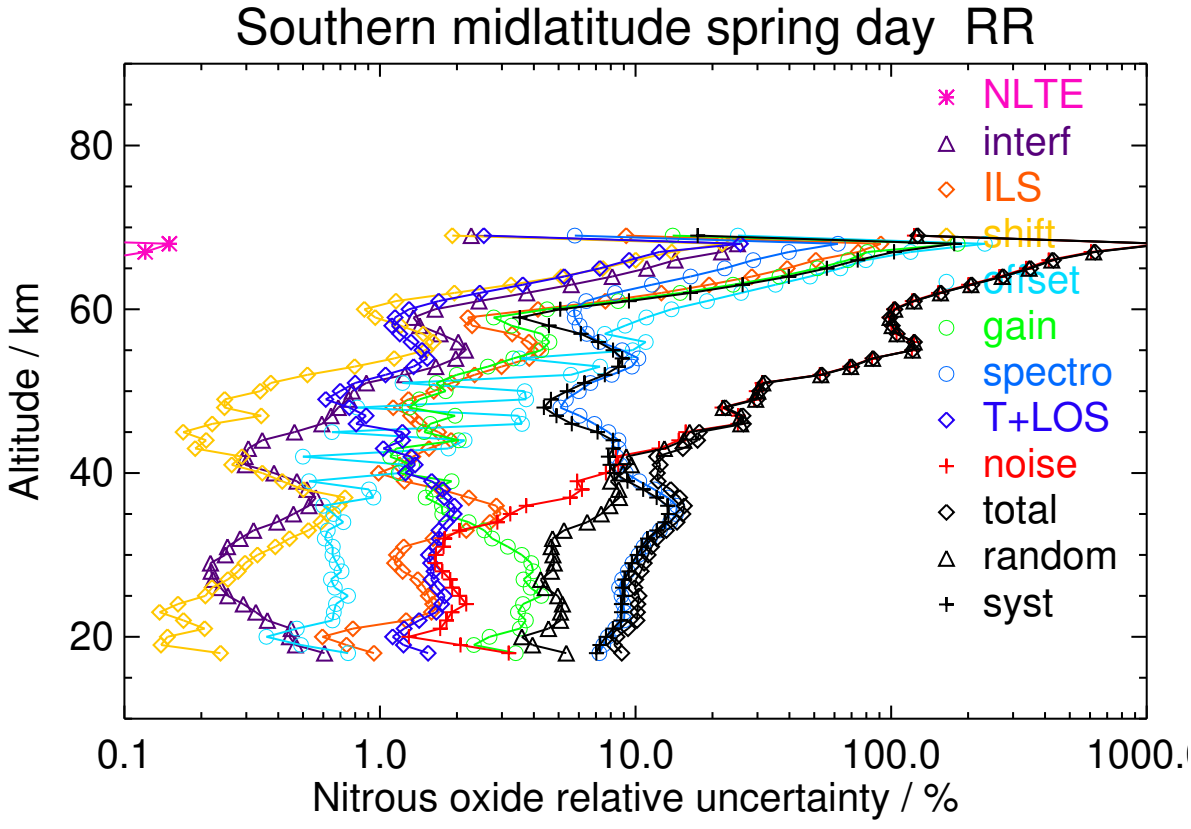

Figure S225. V8R_N2O_561 Southern midlatitude spring day

Table S226. Nitrous oxide error budget for Southern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	127.074	<0.001	0.273	1.876	0.450	0.876	5.139	11.562	1.929	2.264	6.164	11.641	13.172
35	43.191	<0.001	0.164	1.141	0.271	0.289	1.366	5.644	0.762	1.158	2.950	5.331	6.093
40	8.228	<0.001	0.030	0.069	0.029	0.103	0.098	0.764	0.111	0.626	0.736	0.688	1.007
45	2.827	<0.001	0.012	0.047	0.006	0.029	0.053	0.211	0.029	0.419	0.433	0.200	0.477
50	1.857	<0.001	0.017	0.034	0.007	0.057	0.036	0.117	0.014	0.573	0.581	0.105	0.591
55	1.033	<0.001	0.018	0.039	0.011	0.087	0.040	0.092	0.014	0.935	0.942	0.083	0.945
60	0.232	<0.001	0.019	0.058	0.007	0.161	0.053	0.053	0.013	1.165	1.178	0.067	1.180
65	-0.227	<0.001	0.040	0.172	0.031	0.258	0.221	0.108	0.026	1.368	1.404	0.245	1.425
70	0.479	<0.001	0.018	0.069	0.014	0.208	0.077	0.042	0.012	0.998	1.021	0.106	1.026

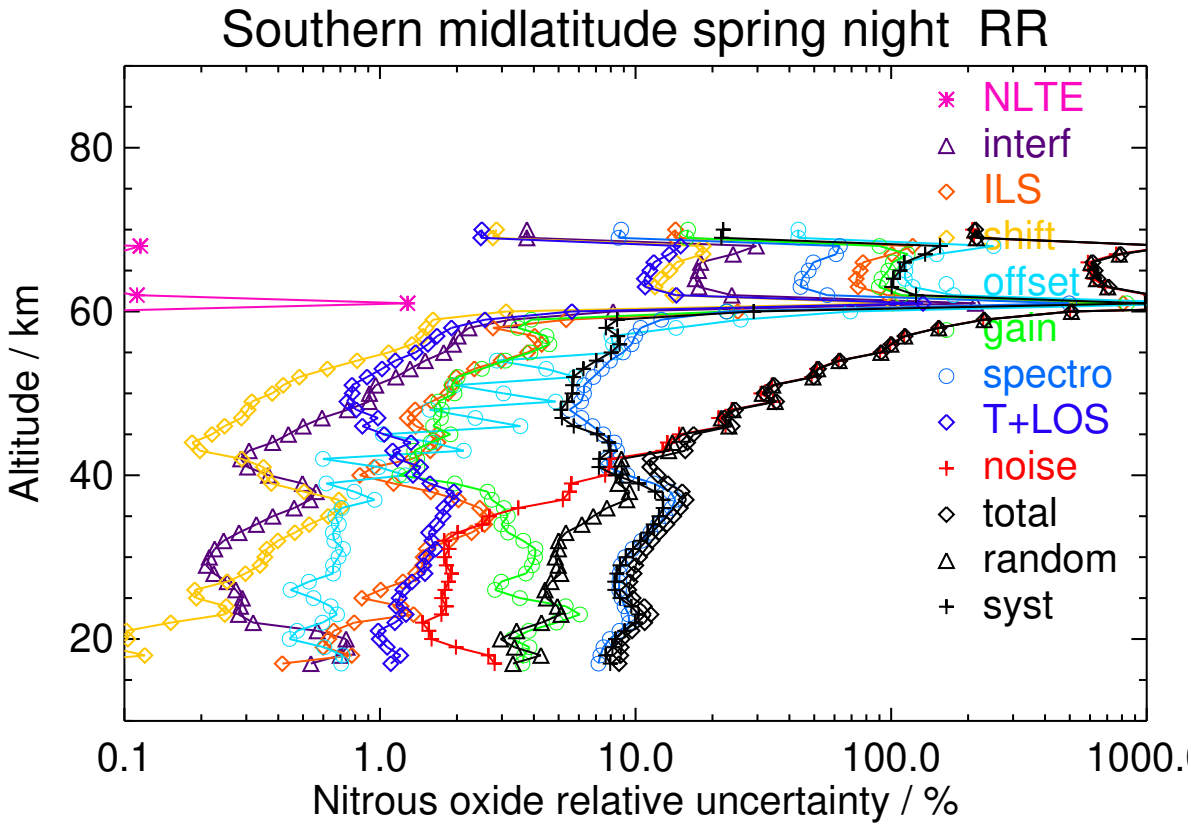

Figure S226. V8R_N2O_561 Southern midlatitude spring night

Table S227. Nitrous oxide error budget for Southern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	75.999	<0.001	0.223	1.004	0.274	0.565	2.054	7.810	1.421	1.745	2.858	7.973	8.469
35	30.024	<0.001	0.194	0.485	0.401	0.151	0.247	2.741	0.387	0.922	1.210	2.751	3.005
40	7.968	<0.001	0.045	0.032	0.087	0.068	0.181	0.690	0.101	0.446	0.553	0.653	0.856
45	2.930	<0.001	0.014	0.039	0.018	0.071	0.080	0.228	0.026	0.421	0.462	0.172	0.493
50	1.342	<0.001	0.013	0.032	0.005	0.033	0.037	0.126	0.014	0.452	0.468	0.075	0.473
55	1.506	<0.001	0.014	0.043	0.012	0.080	0.034	0.132	0.016	0.782	0.796	0.076	0.800
60	1.387	<0.001	0.023	0.070	0.012	0.141	0.012	0.104	0.018	1.072	1.086	0.087	1.089
65	0.731	<0.001	0.077	0.240	0.053	0.248	0.077	0.135	0.018	1.333	1.362	0.270	1.389
70	0.691	<0.001	0.061	0.187	0.046	0.190	0.052	0.116	0.009	0.953	0.975	0.226	1.000

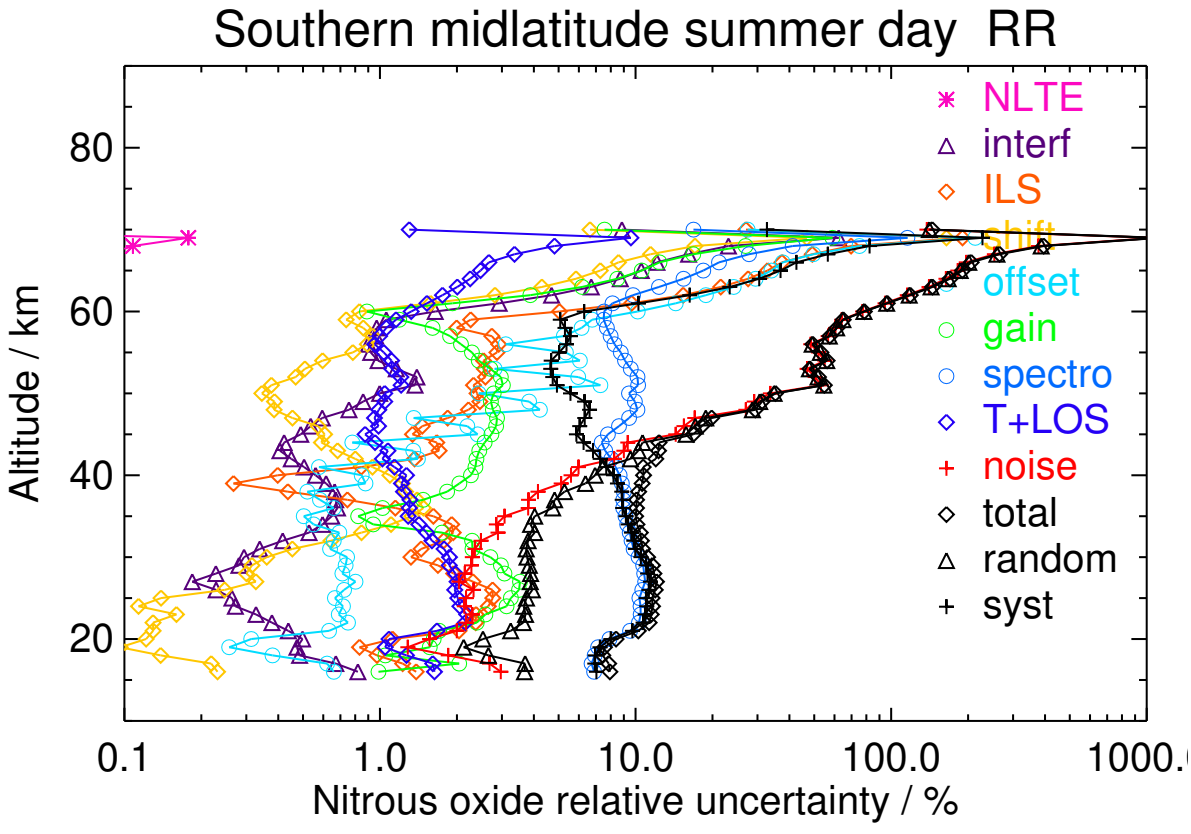

Figure S227. V8R_N2O_561 Southern midlatitude summer day

Table S228. Nitrous oxide error budget for Southern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	72.755	<0.001	0.195	1.272	0.277	0.616	2.722	6.994	1.393	1.715	2.903	7.409	7.957
35	30.803	<0.001	0.182	0.530	0.401	0.161	0.292	2.653	0.414	0.899	1.211	2.672	2.933
40	7.065	<0.001	0.038	0.025	0.076	0.071	0.138	0.648	0.098	0.408	0.507	0.608	0.792
45	2.056	<0.001	0.012	0.039	0.013	0.053	0.060	0.193	0.022	0.349	0.384	0.142	0.410
50	1.011	<0.001	0.013	0.029	0.005	0.027	0.037	0.107	0.012	0.404	0.419	0.048	0.422
55	1.049	<0.001	0.014	0.030	0.009	0.094	0.027	0.117	0.013	0.791	0.805	0.052	0.806
60	0.862	<0.001	0.019	0.049	0.009	0.123	0.014	0.085	0.014	0.985	0.996	0.057	0.998
65	0.069	<0.001	0.075	0.236	0.055	0.236	0.089	0.138	0.016	1.292	1.320	0.274	1.348
70	0.313	<0.001	0.072	0.228	0.056	0.191	0.067	0.140	0.011	0.954	0.978	0.273	1.016

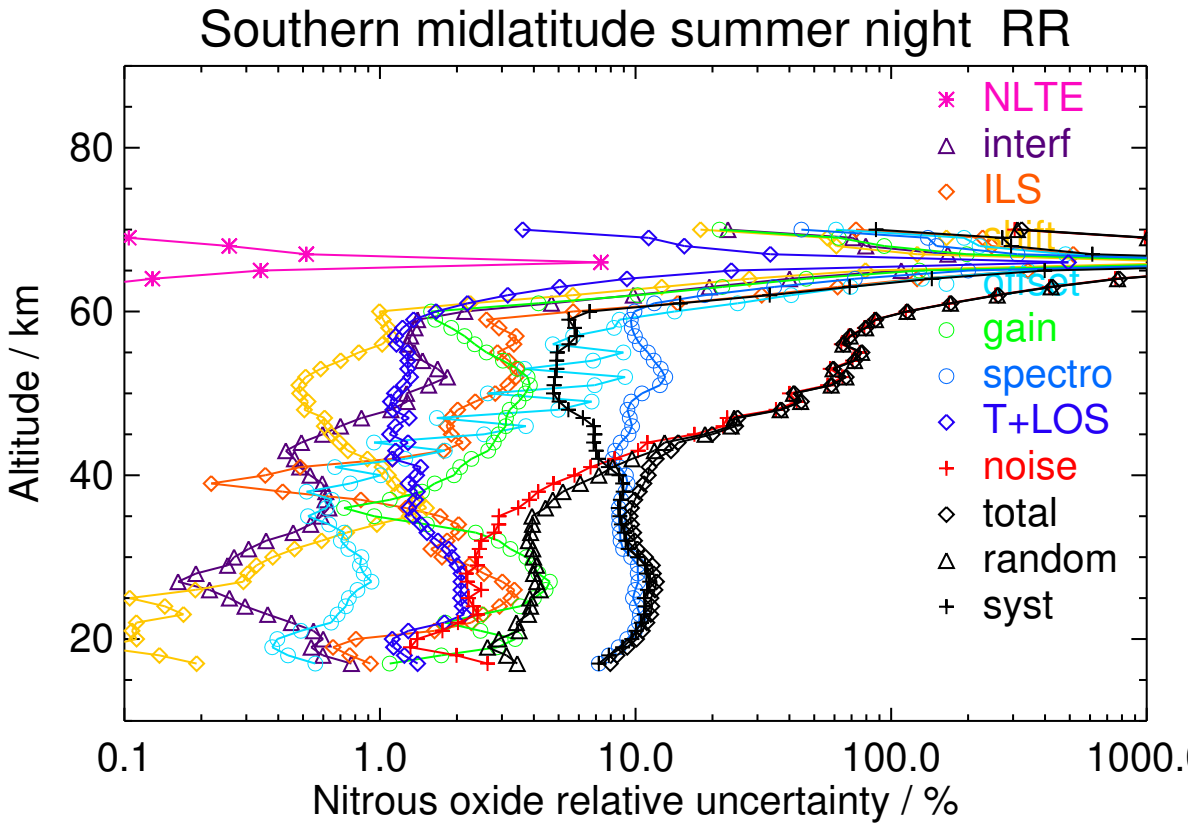

Figure S228. V8R_N2O_561 Southern midlatitude summer night

Table S229. Nitrous oxide error budget for Southern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	73.471	<0.001	0.205	1.855	0.355	0.544	2.233	9.100	1.495	1.845	3.819	9.097	9.867
35	26.978	<0.001	0.160	0.624	0.231	0.207	0.580	3.089	0.436	1.167	2.192	2.671	3.455
40	14.884	<0.001	0.068	0.214	0.134	0.129	0.251	1.341	0.169	0.868	1.277	1.047	1.651
45	7.896	<0.001	0.019	0.145	0.018	0.036	0.170	0.638	0.070	0.572	0.692	0.558	0.890
50	3.693	<0.001	0.018	0.072	0.009	0.079	0.072	0.271	0.037	0.727	0.749	0.243	0.788
55	2.134	<0.001	0.017	0.041	0.012	0.083	0.044	0.153	0.023	1.031	1.038	0.146	1.048
60	1.255	<0.001	0.028	0.086	0.013	0.216	0.050	0.083	0.020	1.367	1.387	0.107	1.391
65	0.659	<0.001	0.041	0.145	0.029	0.285	0.098	0.081	0.021	1.428	1.460	0.171	1.470
70	0.437	<0.001	0.015	0.027	0.005	0.245	0.065	0.026	0.013	1.067	1.095	0.074	1.097

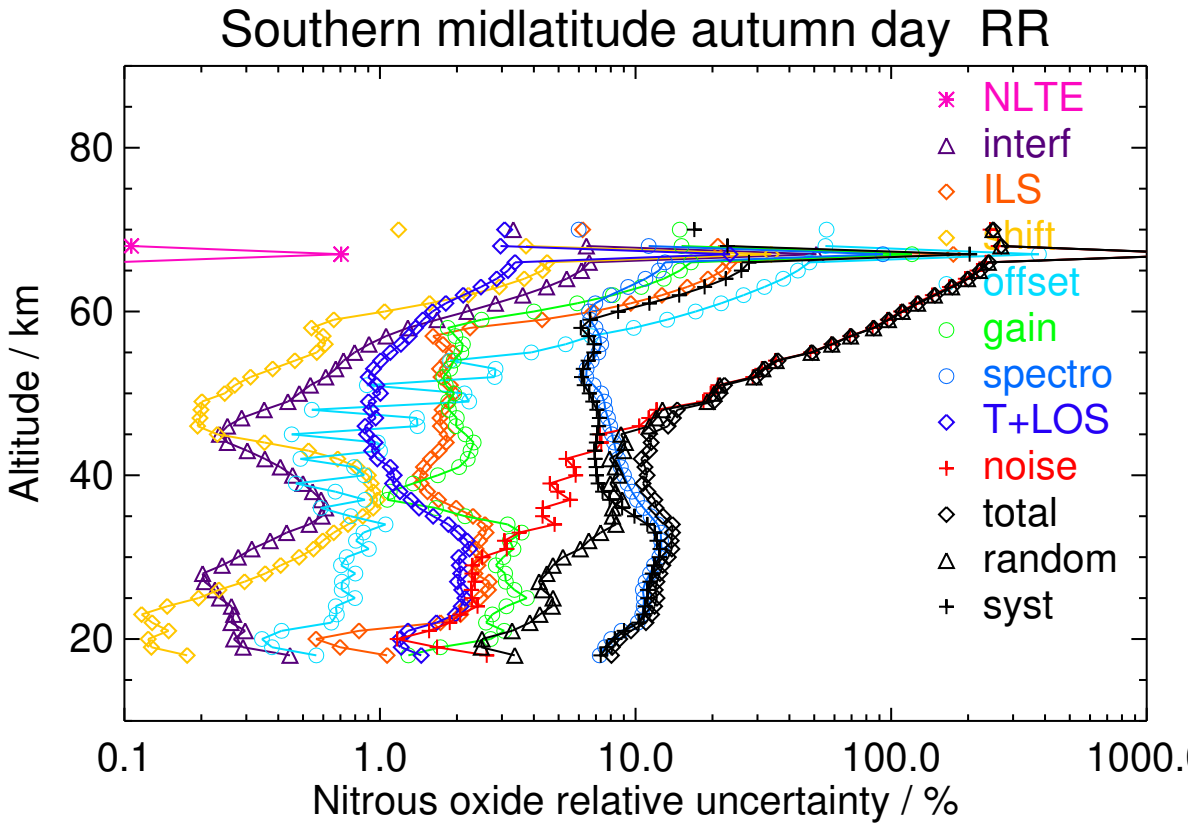

Figure S229. V8R_N2O_561 Southern midlatitude autumn day

Table S230. Nitrous oxide error budget for Southern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	64.901	<0.001	0.166	1.549	0.305	0.561	2.522	8.002	1.479	1.834	3.561	8.130	8.876
35	22.302	<0.001	0.125	0.517	0.197	0.164	0.388	2.520	0.380	1.061	1.737	2.259	2.850
40	9.227	<0.001	0.043	0.115	0.080	0.117	0.148	0.737	0.110	0.741	0.885	0.616	1.078
45	6.193	<0.001	0.017	0.098	0.018	0.028	0.108	0.419	0.049	0.514	0.585	0.351	0.682
50	3.563	<0.001	0.017	0.067	0.008	0.078	0.066	0.256	0.034	0.710	0.735	0.217	0.766
55	2.147	<0.001	0.017	0.039	0.011	0.082	0.038	0.141	0.022	1.037	1.043	0.132	1.052
60	0.858	<0.001	0.029	0.083	0.014	0.210	0.068	0.079	0.020	1.355	1.374	0.109	1.378
65	0.246	<0.001	0.041	0.129	0.025	0.285	0.118	0.070	0.023	1.438	1.469	0.166	1.479
70	0.671	<0.001	0.018	0.036	0.010	0.226	0.097	0.033	0.016	1.036	1.062	0.095	1.066

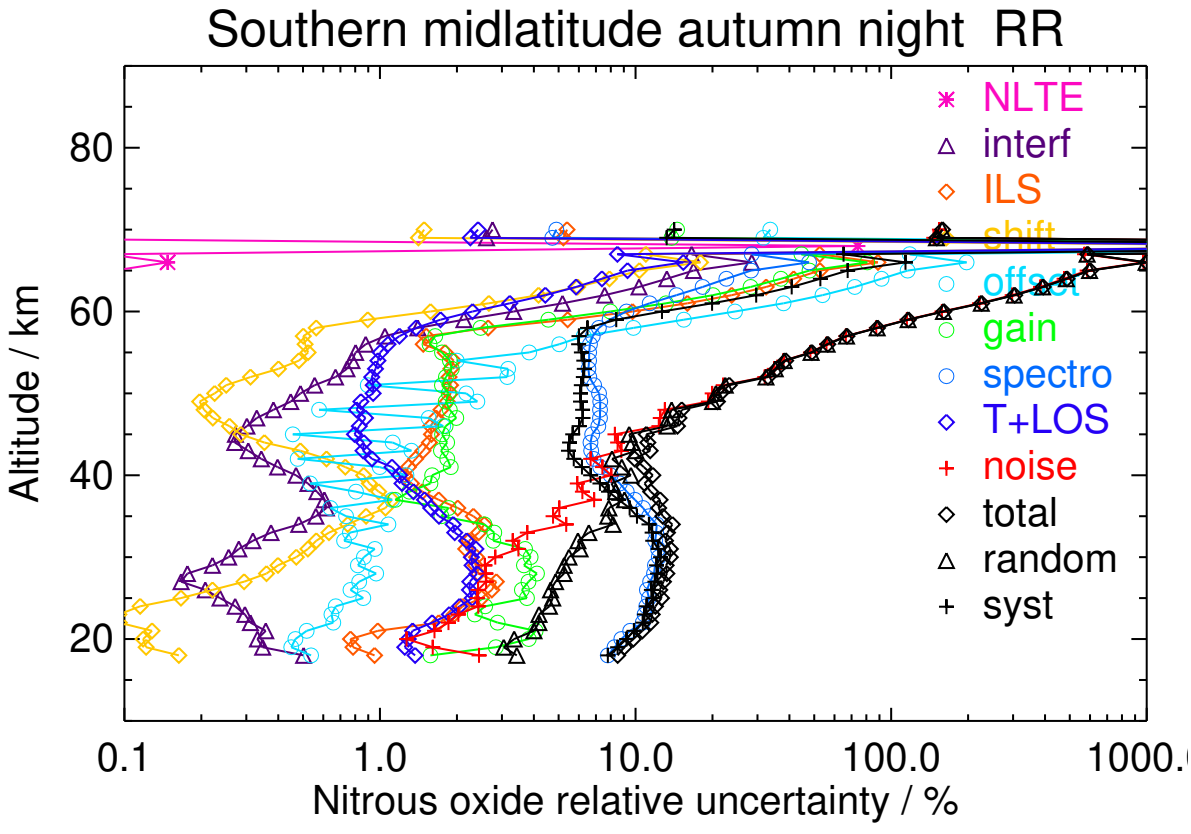

Figure S230. V8R_N2O_561 Southern midlatitude autumn night

Table S231. Nitrous oxide error budget for Southern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	14.387	<0.001	0.267	0.402	0.231	0.276	0.830	1.598	0.458	1.553	1.966	1.537	2.495
35	2.883	<0.001	0.060	0.189	0.048	0.109	0.242	0.550	0.125	0.646	0.862	0.323	0.921
40	1.329	<0.001	0.011	0.021	0.006	0.070	0.022	0.102	0.014	0.439	0.455	0.048	0.457
45	1.835	<0.001	0.014	0.028	0.005	0.020	0.021	0.095	0.011	0.396	0.402	0.076	0.409
50	1.320	<0.001	0.018	0.032	0.006	0.091	0.020	0.102	0.013	0.719	0.730	0.070	0.733
55	1.042	<0.001	0.015	0.030	0.009	0.059	0.013	0.064	0.011	0.898	0.902	0.050	0.903
60	0.292	<0.001	0.019	0.093	0.016	0.203	0.013	0.054	0.011	1.336	1.354	0.071	1.356
65	-0.017	<0.001	0.030	0.187	0.016	0.263	0.019	0.038	0.009	1.374	1.405	0.153	1.413

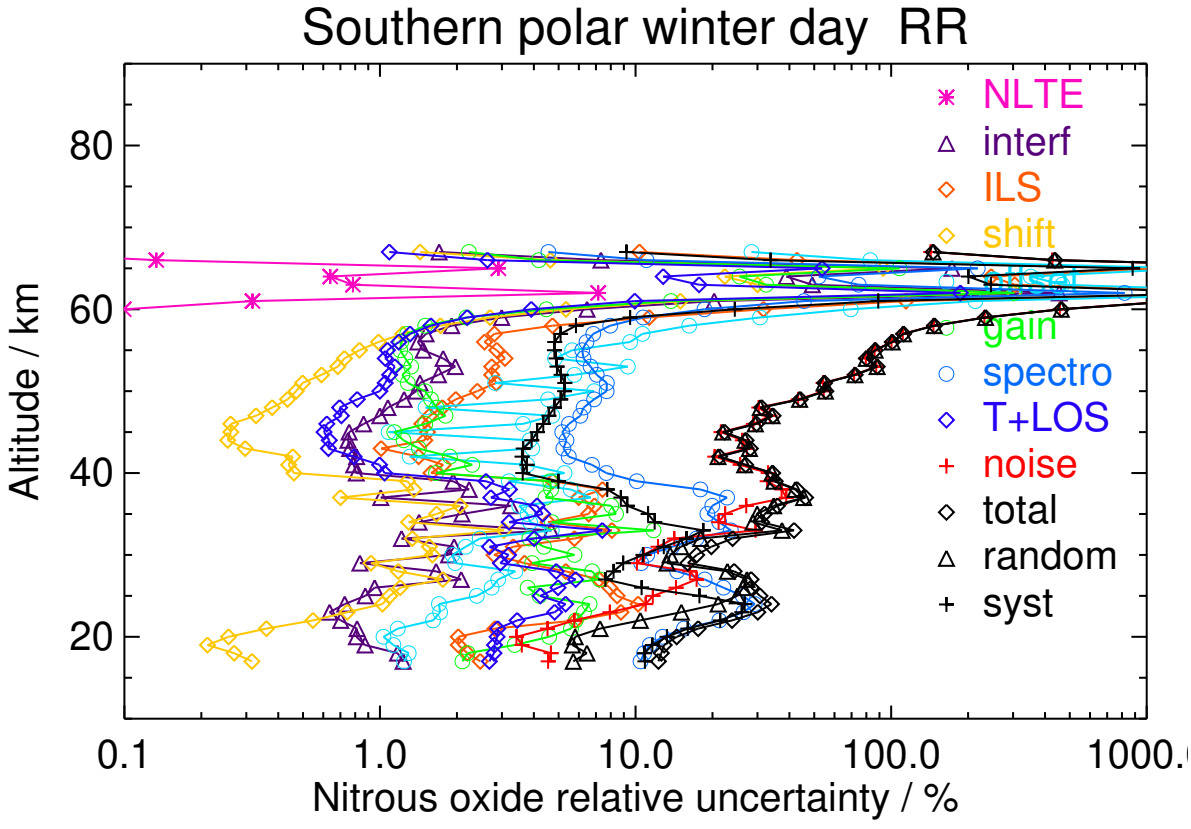

Figure S231. V8R_N2O_561 Southern polar winter day

Table S232. Nitrous oxide error budget for Southern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	14.679	<0.001	0.172	0.375	0.213	0.222	0.355	1.701	0.456	1.603	1.845	1.630	2.462
35	2.471	<0.001	0.036	0.158	0.033	0.116	0.183	0.599	0.096	0.693	0.911	0.306	0.961
40	1.332	<0.001	0.010	0.033	0.005	0.064	0.028	0.130	0.015	0.437	0.457	0.073	0.463
45	1.840	<0.001	0.013	0.024	0.004	0.023	0.029	0.096	0.009	0.402	0.410	0.071	0.416
50	1.077	<0.001	0.019	0.031	0.006	0.093	0.019	0.098	0.014	0.719	0.730	0.068	0.733
55	0.799	<0.001	0.015	0.028	0.008	0.051	0.011	0.052	0.010	0.873	0.876	0.042	0.877
60	0.357	<0.001	0.020	0.091	0.012	0.181	0.017	0.041	0.010	1.261	1.277	0.063	1.278
65	-0.117	<0.001	0.035	0.203	0.015	0.261	0.036	0.034	0.010	1.381	1.413	0.154	1.421

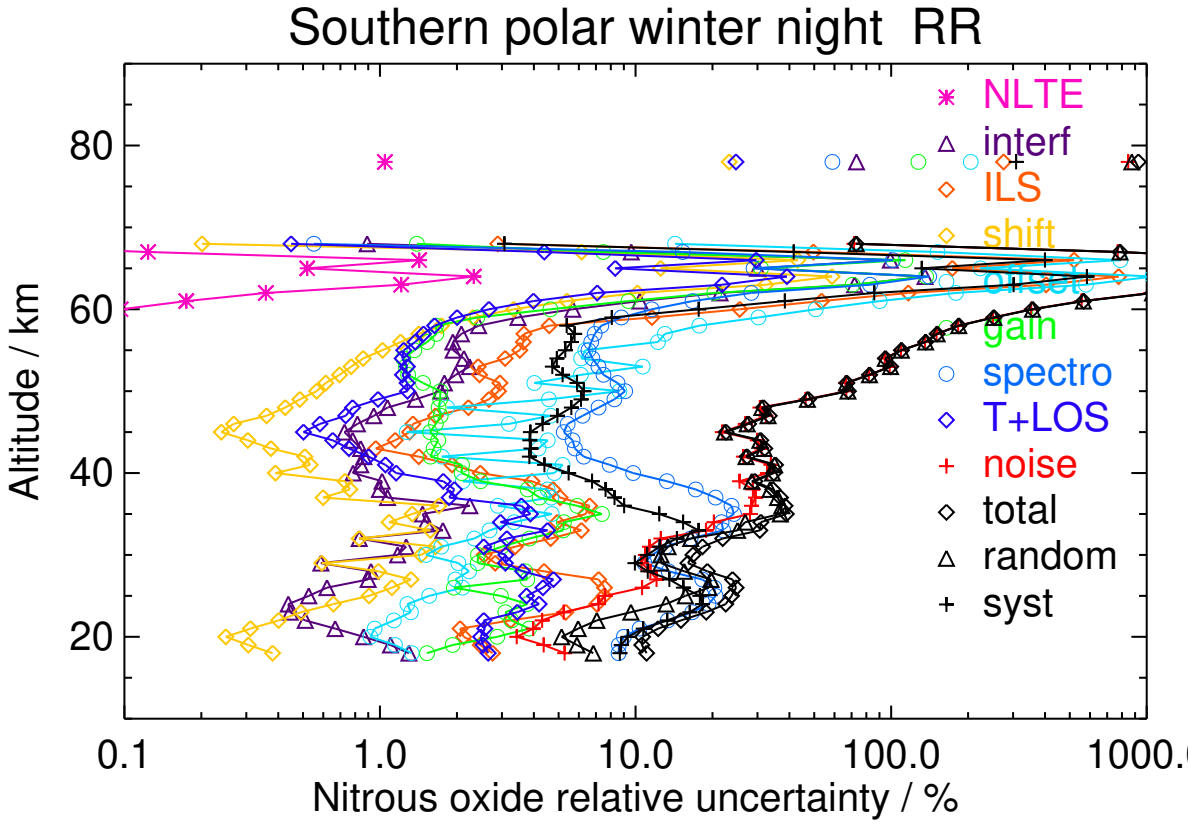

Figure S232. V8R_N2O_561 Southern polar winter night

Table S233. Nitrous oxide error budget for Southern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	51.123	<0.001	0.264	2.000	0.524	0.464	3.828	7.649	0.659	1.858	7.408	5.169	9.033
35	17.631	<0.001	0.077	0.455	0.128	0.112	0.456	1.884	0.239	0.666	1.481	1.520	2.122
40	5.837	<0.001	0.017	0.040	0.030	0.066	0.065	0.434	0.056	0.391	0.460	0.379	0.596
45	2.611	<0.001	0.013	0.042	0.011	0.017	0.037	0.148	0.023	0.325	0.339	0.132	0.363
50	1.953	<0.001	0.017	0.039	0.007	0.086	0.031	0.131	0.016	0.604	0.616	0.117	0.627
55	1.105	<0.001	0.015	0.044	0.013	0.056	0.026	0.087	0.013	0.795	0.800	0.074	0.803
60	0.429	<0.001	0.021	0.082	0.014	0.133	0.032	0.068	0.013	1.081	1.092	0.079	1.095
65	0.892	<0.001	0.061	0.374	0.076	0.239	0.188	0.182	0.026	1.341	1.376	0.425	1.440

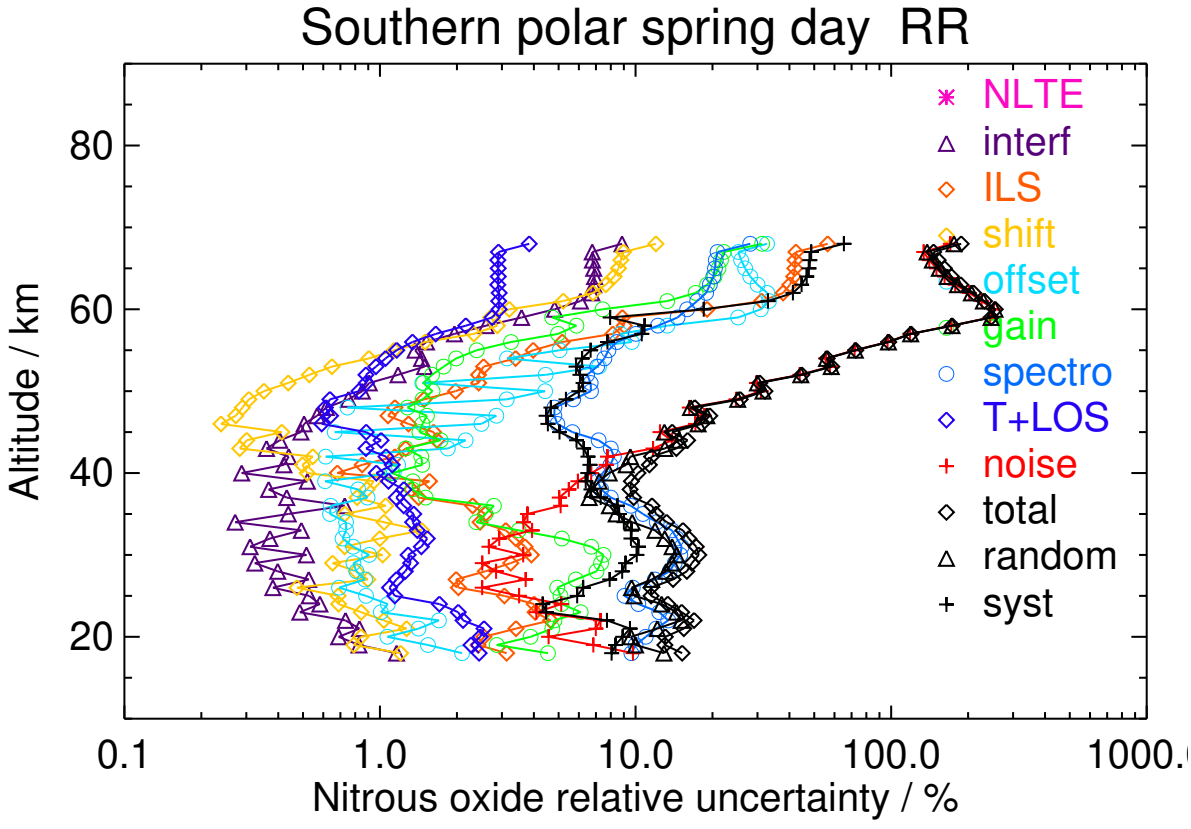

Figure S233. V8R_N2O_561 Southern polar spring day

Table S234. Nitrous oxide error budget for Southern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	68.768	<0.001	0.249	2.157	0.467	0.647	6.287	8.222	0.787	1.719	8.245	6.934	10.773
35	16.666	<0.001	0.080	0.632	0.142	0.129	0.550	2.532	0.292	0.683	2.085	1.834	2.776
40	5.775	<0.001	0.016	0.031	0.019	0.075	0.094	0.464	0.061	0.428	0.503	0.406	0.646
45	2.663	<0.001	0.012	0.044	0.009	0.017	0.050	0.155	0.022	0.338	0.352	0.140	0.379
50	1.799	<0.001	0.016	0.040	0.009	0.078	0.046	0.116	0.014	0.590	0.601	0.107	0.610
55	1.226	<0.001	0.015	0.048	0.013	0.067	0.041	0.097	0.014	0.856	0.862	0.090	0.866
60	0.802	<0.001	0.020	0.104	0.017	0.148	0.075	0.084	0.015	1.132	1.147	0.111	1.152
65	0.177	<0.001	0.045	0.351	0.070	0.249	0.257	0.212	0.028	1.362	1.408	0.419	1.469

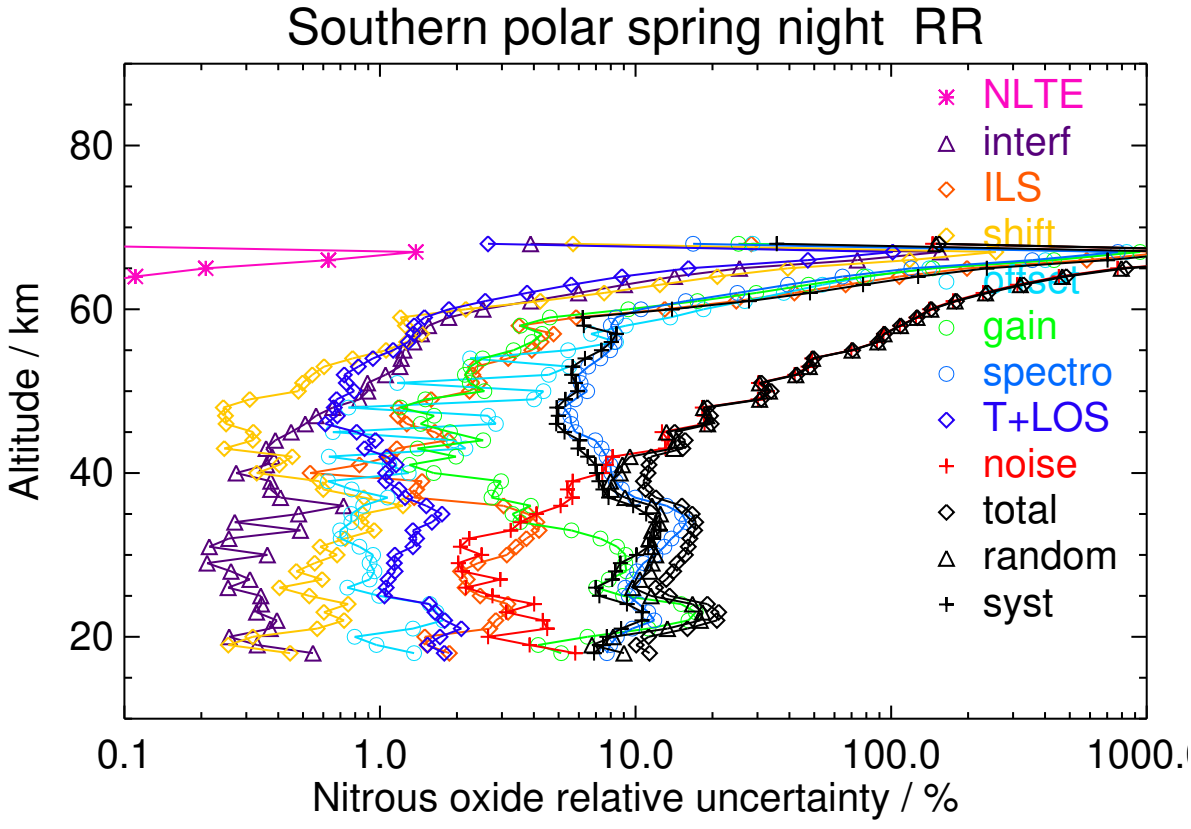

Figure S234. V8R_N2O_561 Southern polar spring night

Table S235. Nitrous oxide error budget for Southern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	73.175	<0.001	0.111	1.211	0.247	0.729	4.531	6.894	1.429	1.672	2.907	8.156	8.658
35	29.042	<0.001	0.087	0.636	0.316	0.217	0.885	2.480	0.469	0.865	1.191	2.654	2.909
40	7.541	<0.001	0.026	0.046	0.079	0.057	0.049	0.612	0.089	0.336	0.416	0.580	0.714
45	1.231	<0.001	0.009	0.037	0.007	0.027	0.026	0.111	0.028	0.263	0.273	0.105	0.292
50	0.111	<0.001	0.013	0.009	0.005	0.060	0.008	0.029	0.006	0.388	0.394	0.009	0.395
55	0.033	<0.001	0.013	0.009	0.004	0.071	0.007	0.026	0.007	0.609	0.614	0.012	0.614
60	0.303	<0.001	0.012	0.033	0.016	0.073	0.015	0.040	0.008	0.788	0.792	0.042	0.793
65	0.814	<0.001	0.036	0.153	0.032	0.183	0.079	0.085	0.013	1.091	1.109	0.182	1.124
70	0.430	<0.001	0.039	0.213	0.053	0.182	0.084	0.123	0.012	0.949	0.971	0.252	1.003

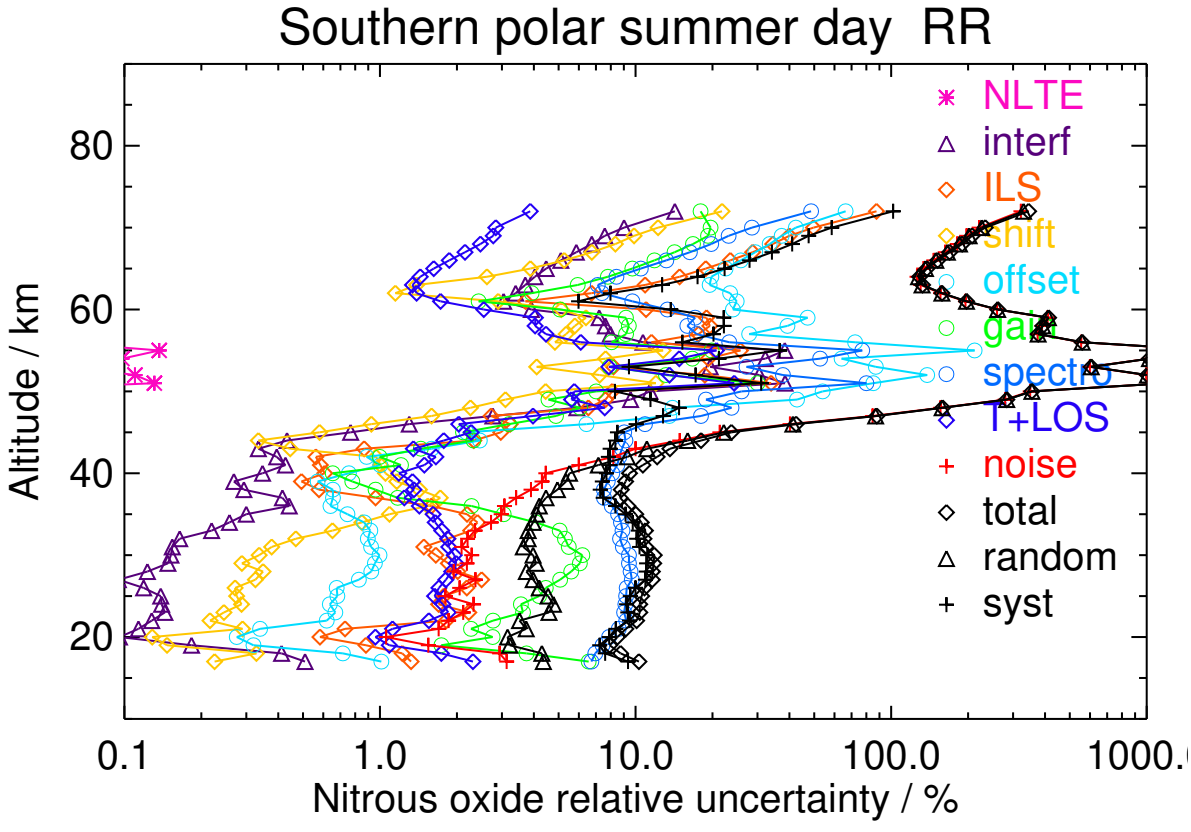

Figure S235. V8R_N2O_561 Southern polar summer day

Table S236. Nitrous oxide error budget for Southern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	56.490	<0.001	0.104	1.285	0.251	0.710	4.336	6.012	1.408	1.649	2.766	7.364	7.866
35	16.535	<0.001	0.093	0.506	0.123	0.146	0.342	1.826	0.308	0.753	0.913	1.893	2.101
40	2.297	<0.001	0.013	0.017	0.008	0.058	0.059	0.270	0.043	0.313	0.331	0.266	0.424
45	0.264	<0.001	0.009	0.013	0.004	0.026	0.021	0.036	0.010	0.287	0.291	0.020	0.292
50	0.027	<0.001	0.014	0.010	0.003	0.069	0.008	0.030	0.006	0.500	0.506	0.011	0.506
55	-0.009	<0.001	0.014	0.015	0.006	0.072	0.013	0.035	0.007	0.763	0.768	0.020	0.768
60	-0.155	<0.001	0.014	0.017	0.005	0.118	0.015	0.030	0.007	0.989	0.997	0.021	0.997
65	-0.472	<0.001	0.037	0.111	0.030	0.242	0.152	0.080	0.024	1.299	1.324	0.196	1.338
70	-0.124	<0.001	0.041	0.122	0.035	0.194	0.142	0.094	0.021	0.949	0.971	0.207	0.993

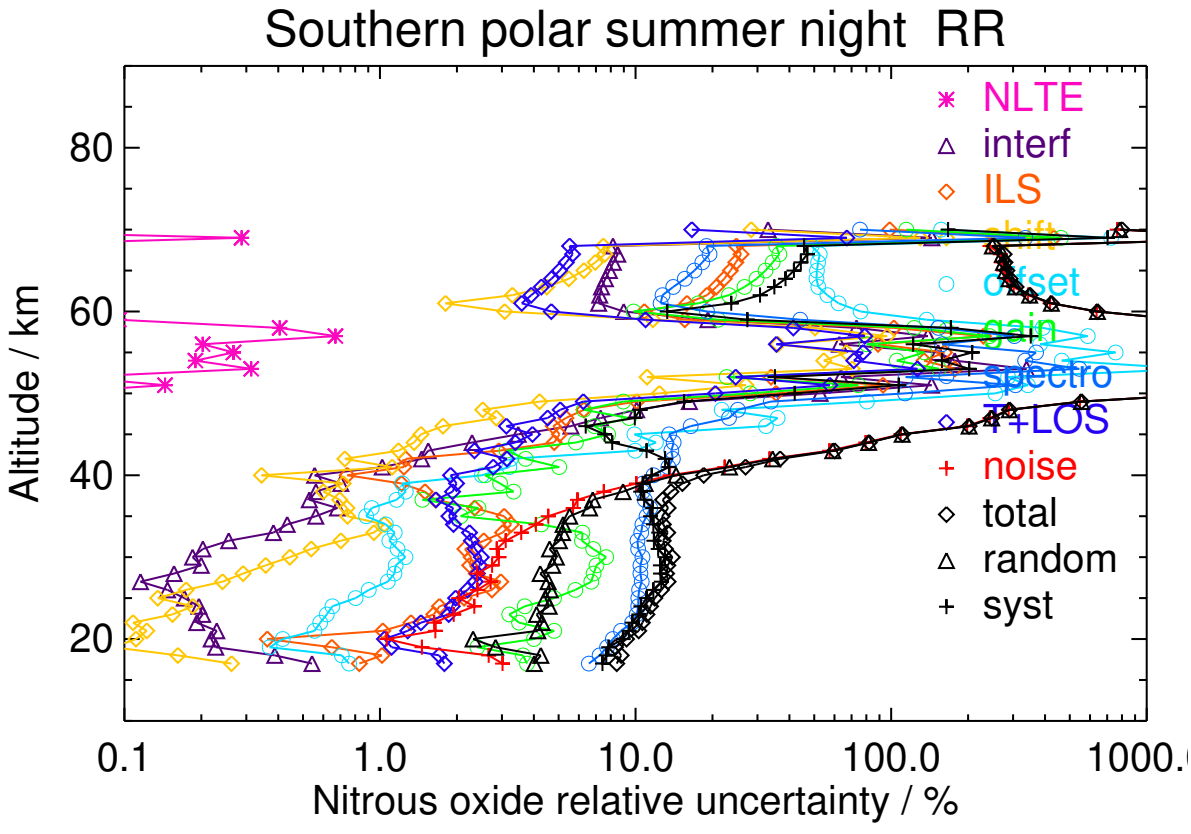

Figure S236. V8R_N2O_561 Southern polar summer night

Table S237. Nitrous oxide error budget for Southern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	32.446	<0.001	0.094	1.167	0.108	0.266	1.898	5.817	0.895	1.661	3.094	5.734	6.516
35	3.729	<0.001	0.022	0.196	0.018	0.134	0.266	0.871	0.142	0.761	0.995	0.704	1.219
40	0.042	<0.001	0.008	0.010	0.004	0.084	0.037	0.044	0.011	0.571	0.579	0.023	0.580
45	0.035	<0.001	0.012	0.010	0.003	0.029	0.011	0.047	0.007	0.540	0.543	0.011	0.543
50	1.046	<0.001	0.018	0.014	0.007	0.099	0.038	0.071	0.013	0.865	0.873	0.047	0.875
55	0.709	<0.001	0.016	0.025	0.011	0.059	0.052	0.068	0.015	0.970	0.974	0.066	0.976
60	0.333	<0.001	0.013	0.012	0.011	0.216	0.045	0.048	0.014	1.377	1.395	0.047	1.396
65	0.046	<0.001	0.012	0.022	0.006	0.283	0.062	0.033	0.014	1.424	1.454	0.040	1.454

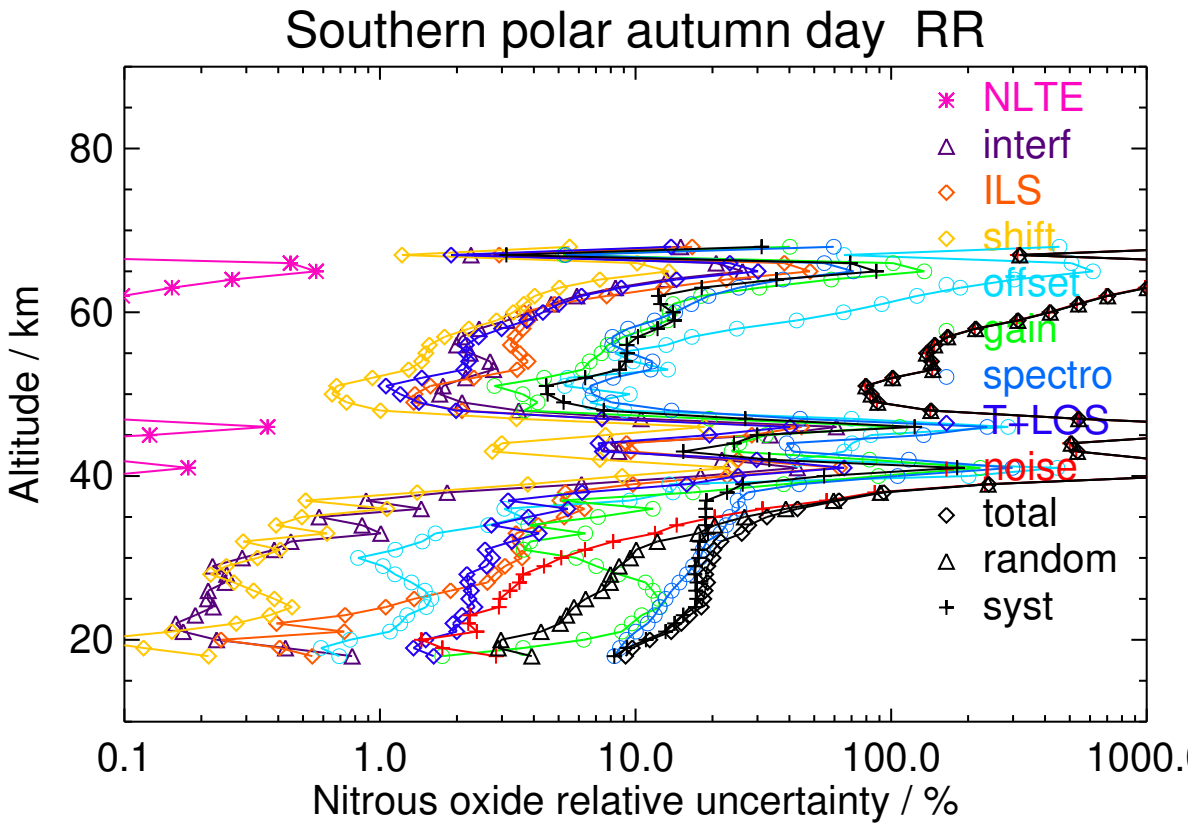

Figure S237. V8R_N2O_561 Southern polar autumn day

Table S238. Nitrous oxide error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
30	24.587	<0.001	0.117	0.914	0.122	0.280	1.265	4.600	0.840	1.647	2.773	4.408	5.208
35	1.919	<0.001	0.023	0.159	0.018	0.118	0.256	0.624	0.118	0.686	0.876	0.462	0.990
40	0.180	<0.001	0.008	0.010	0.003	0.085	0.027	0.058	0.011	0.595	0.604	0.027	0.604
45	0.184	<0.001	0.012	0.010	0.003	0.029	0.016	0.049	0.008	0.555	0.558	0.018	0.558
50	0.686	<0.001	0.018	0.014	0.006	0.096	0.030	0.057	0.011	0.866	0.873	0.036	0.874
55	0.940	<0.001	0.016	0.017	0.010	0.061	0.045	0.062	0.016	0.994	0.998	0.056	0.999
60	0.600	<0.001	0.013	0.012	0.008	0.212	0.033	0.058	0.014	1.361	1.378	0.040	1.379
65	0.058	<0.001	0.013	0.019	0.005	0.283	0.088	0.041	0.021	1.427	1.457	0.074	1.459

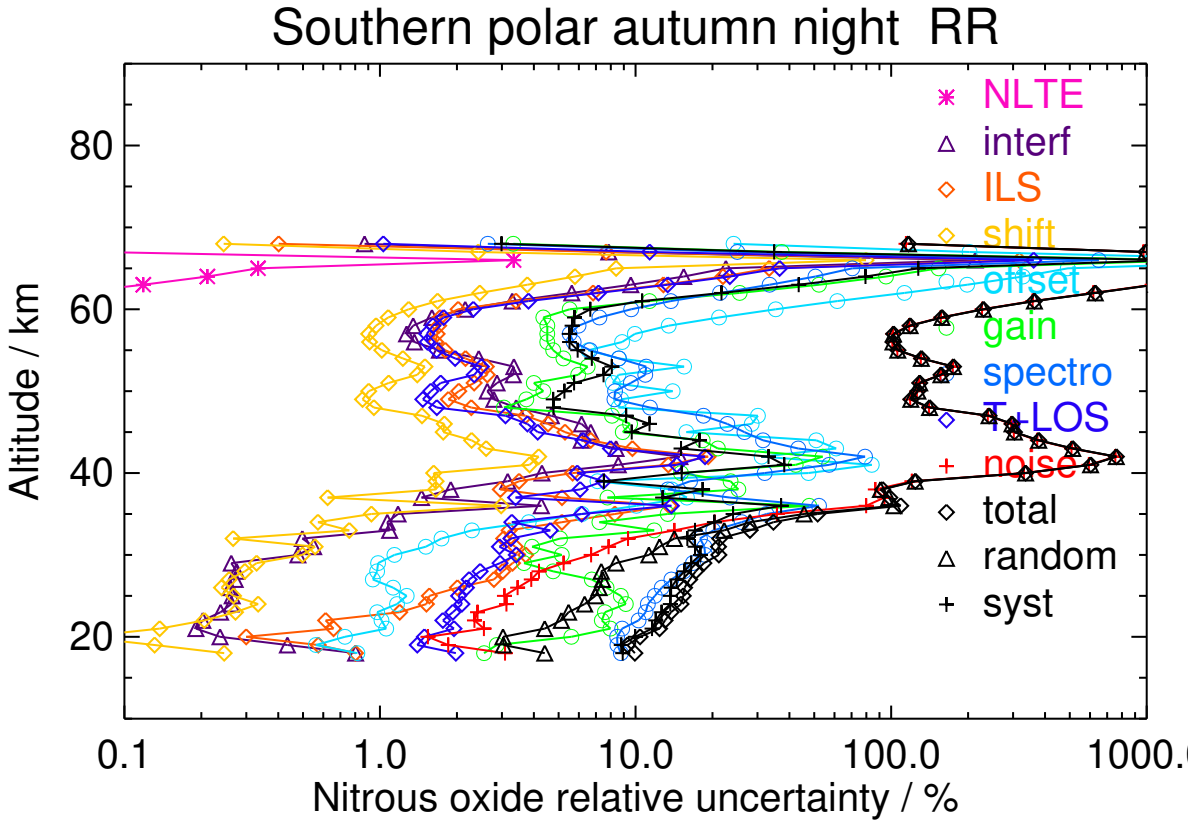

Figure S238. V8R_N2O_561 Southern polar autumn night

Table S239. Nitrous oxide error budget for Northern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	6.874	<0.001	0.024	0.152	0.011	0.145	0.154	0.686	0.109	1.180	1.202	0.706	1.394
45	1.744	<0.001	0.015	0.049	0.005	0.063	0.033	0.213	0.037	0.529	0.541	0.204	0.578
50	0.522	<0.001	0.007	0.012	0.003	0.054	0.008	0.047	0.008	0.353	0.358	0.046	0.361
55	0.761	<0.001	0.010	0.011	0.005	0.120	0.012	0.043	0.007	0.708	0.719	0.040	0.720
60	2.526	<0.001	0.020	0.032	0.009	0.451	0.046	0.132	0.037	2.477	2.519	0.123	2.522
65	5.001	<0.001	0.026	0.083	0.012	1.169	0.104	0.292	0.111	6.005	6.121	0.286	6.128
70	5.085	<0.001	0.023	0.090	0.011	1.459	0.107	0.294	0.116	7.207	7.356	0.280	7.361
74	4.619	<0.001	0.015	0.058	0.009	1.361	0.067	0.188	0.107	6.308	6.454	0.208	6.458

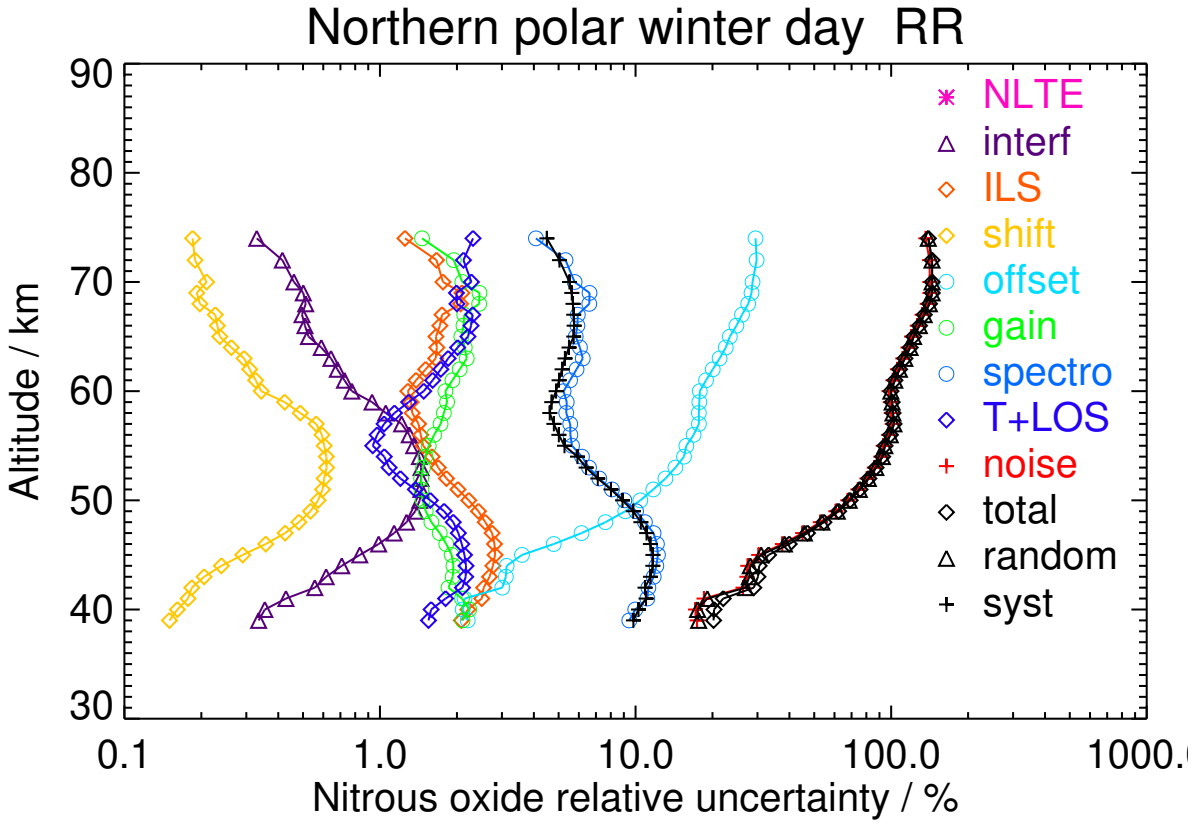

Figure S239. V8R_N2O_662 Northern polar winter day

Table S240. Nitrous oxide error budget for Northern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.313	<0.001	0.007	0.004	0.003	0.020	0.002	0.013	0.003	0.179	0.180	0.011	0.181
50	0.266	<0.001	0.008	0.004	0.004	0.030	0.003	0.012	0.002	0.198	0.201	0.011	0.201
55	0.374	<0.001	0.009	0.005	0.006	0.058	0.004	0.017	0.002	0.331	0.337	0.015	0.337
60	0.909	<0.001	0.013	0.010	0.009	0.141	0.007	0.049	0.007	0.816	0.829	0.036	0.830
65	6.779	<0.001	0.020	0.112	0.012	0.547	0.099	0.313	0.087	3.448	3.503	0.215	3.510
70	7.663	<0.001	0.017	0.076	0.010	0.687	0.075	0.216	0.116	5.079	5.129	0.195	5.132
74	25.061	0.001	0.035	0.243	0.048	2.873	0.237	0.728	0.654	21.410	21.612	0.802	21.627

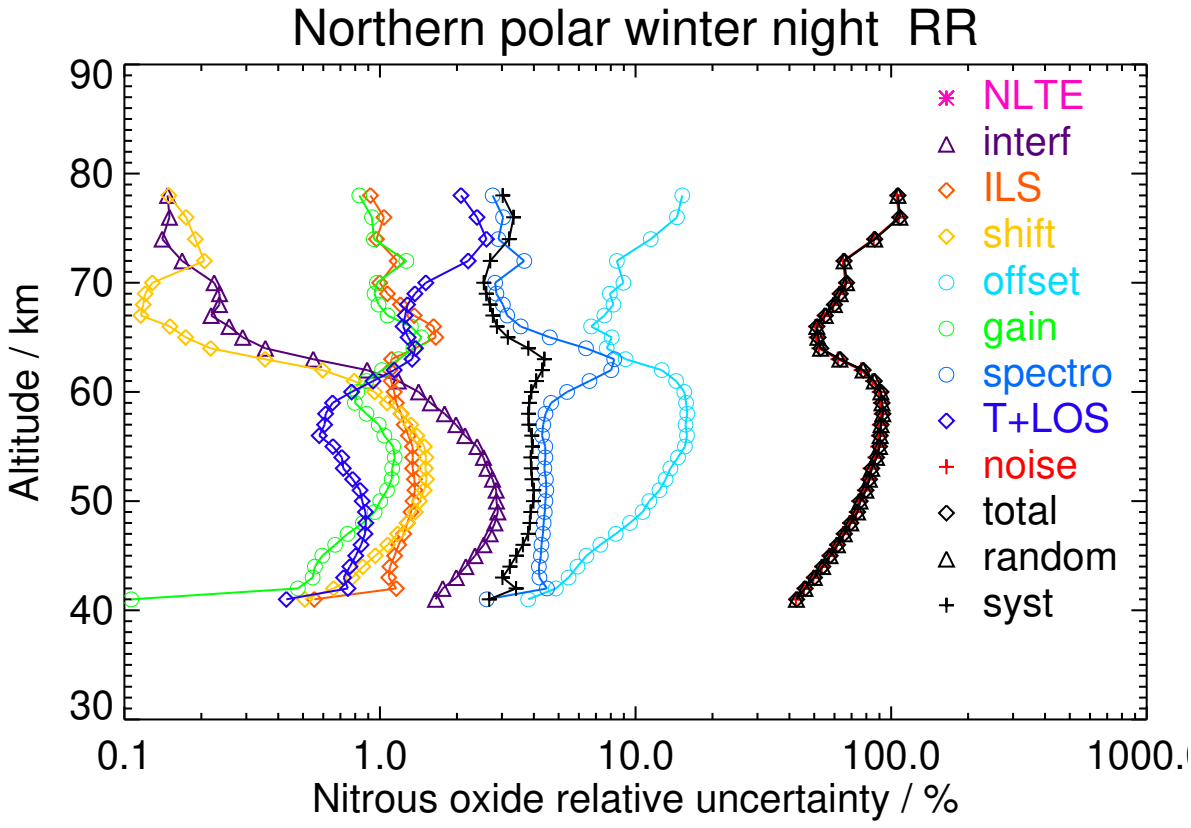

Figure S240. V8R_N2O_662 Northern polar winter night

Table S241. Nitrous oxide error budget for Northern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.446	<0.001	0.006	0.007	0.003	0.009	0.003	0.027	0.005	0.118	0.119	0.026	0.121
50	0.359	<0.001	0.007	0.005	0.003	0.017	0.004	0.020	0.003	0.150	0.152	0.015	0.152
55	0.272	<0.001	0.007	0.004	0.004	0.031	0.003	0.015	0.003	0.205	0.208	0.011	0.208
60	0.500	<0.001	0.009	0.004	0.006	0.073	0.004	0.026	0.003	0.437	0.444	0.018	0.444
65	1.075	<0.001	0.014	0.013	0.011	0.226	0.009	0.041	0.008	1.283	1.303	0.040	1.304
70	2.094	<0.001	0.023	0.044	0.019	0.527	0.022	0.072	0.022	2.837	2.886	0.087	2.887

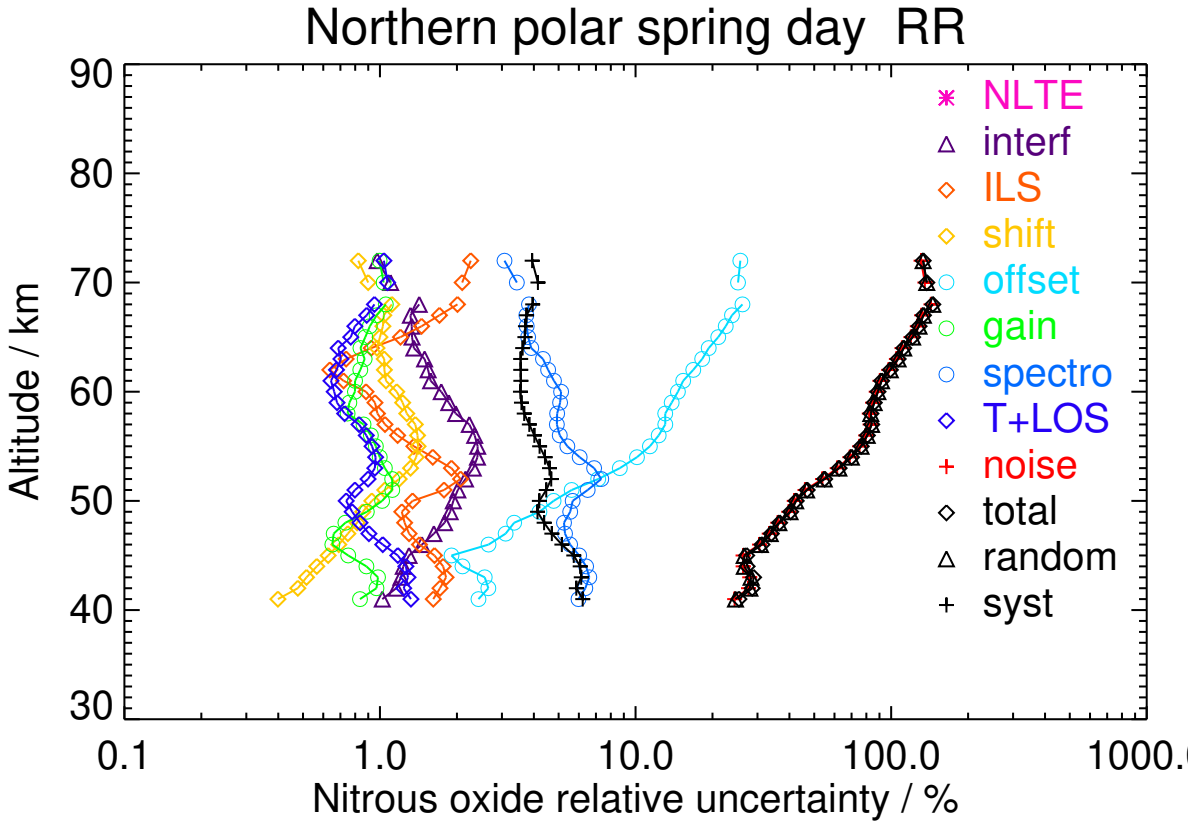

Figure S241. V8R_N2O_662 Northern polar spring day

Table S242. Nitrous oxide error budget for Northern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	3.346	<0.001	0.010	0.065	0.006	0.040	0.064	0.300	0.045	0.317	0.323	0.313	0.450
45	1.194	<0.001	0.009	0.037	0.006	0.021	0.023	0.129	0.016	0.226	0.242	0.109	0.265
50	0.793	<0.001	0.008	0.016	0.004	0.021	0.017	0.069	0.006	0.211	0.221	0.037	0.224
55	0.537	<0.001	0.008	0.013	0.005	0.041	0.007	0.047	0.005	0.311	0.316	0.031	0.318
60	0.499	<0.001	0.007	0.003	0.005	0.075	0.005	0.027	0.004	0.477	0.484	0.022	0.484
65	0.750	<0.001	0.014	0.009	0.008	0.199	0.006	0.031	0.005	1.137	1.155	0.026	1.155

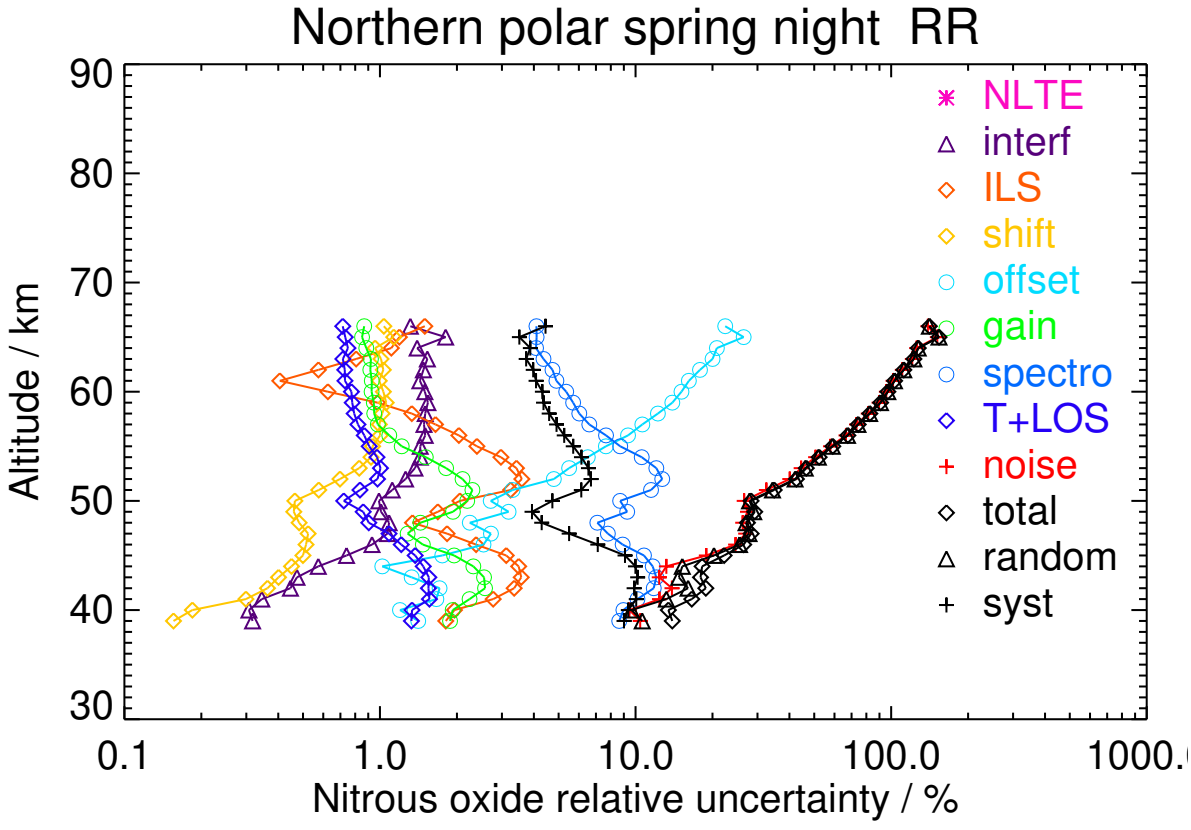

Figure S242. V8R_N2O_662 Northern polar spring night

Table S243. Nitrous oxide error budget for Northern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.564	<0.001	0.005	0.010	0.003	0.010	0.007	0.044	0.008	0.111	0.112	0.044	0.120
50	0.127	<0.001	0.004	0.002	0.002	0.009	0.002	0.007	0.002	0.072	0.073	0.007	0.073
55	0.112	<0.001	0.004	0.001	0.002	0.015	0.003	0.005	0.002	0.095	0.097	0.005	0.097
60	0.190	<0.001	0.006	0.002	0.003	0.037	0.004	0.007	0.003	0.217	0.220	0.008	0.221
65	0.505	<0.001	0.013	0.015	0.008	0.125	0.006	0.017	0.006	0.701	0.712	0.023	0.712
70	1.168	<0.001	0.027	0.044	0.016	0.339	0.009	0.038	0.013	1.809	1.841	0.059	1.842

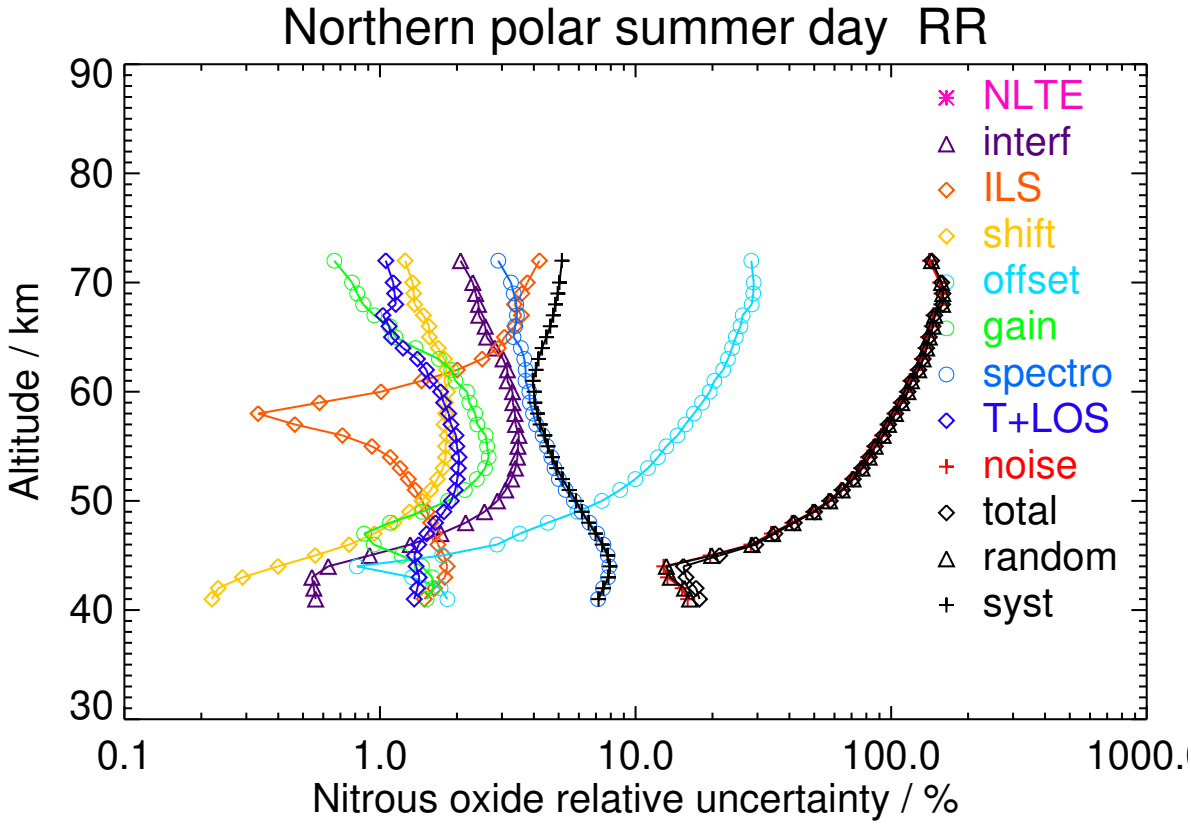

Figure S243. V8R_N2O_662 Northern polar summer day

Table S244. Nitrous oxide error budget for Northern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.401	<0.001	0.005	0.008	0.002	0.008	0.004	0.033	0.005	0.103	0.106	0.029	0.110
50	0.195	<0.001	0.005	0.003	0.002	0.011	0.002	0.010	0.002	0.102	0.103	0.009	0.103
55	0.306	<0.001	0.007	0.004	0.004	0.028	0.003	0.014	0.003	0.200	0.202	0.011	0.202
60	0.579	<0.001	0.011	0.003	0.007	0.073	0.004	0.025	0.004	0.456	0.462	0.020	0.463
65	1.652	<0.001	0.022	0.024	0.015	0.281	0.023	0.098	0.024	1.638	1.664	0.074	1.666
70	6.160	<0.001	0.058	0.132	0.046	1.364	0.096	0.328	0.173	7.716	7.839	0.340	7.846
74	6.269	<0.001	0.037	0.149	0.034	1.451	0.097	0.269	0.190	7.800	7.936	0.322	7.943

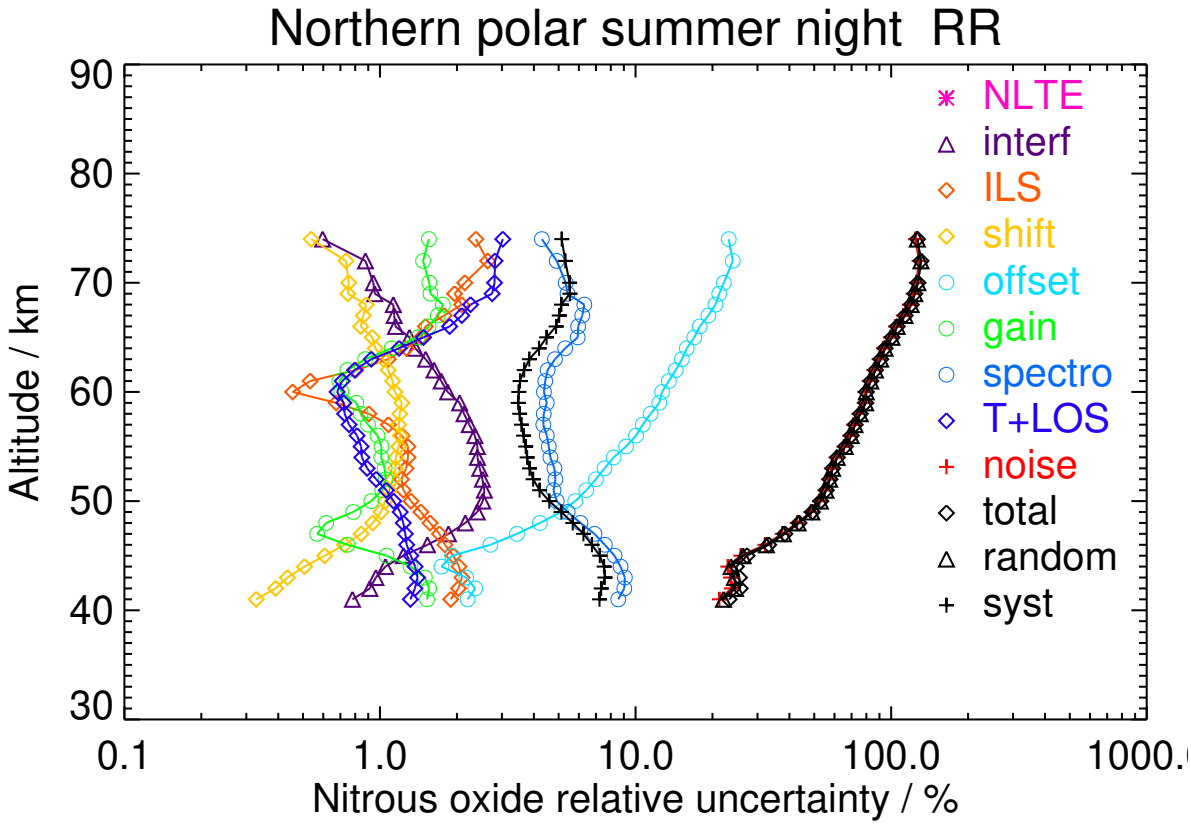

Figure S244. V8R_N2O_662 Northern polar summer night

Table S245. Nitrous oxide error budget for Northern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.274	<0.001	0.006	0.002	0.002	0.015	0.002	0.010	0.002	0.147	0.148	0.008	0.149
50	0.299	<0.001	0.008	0.004	0.004	0.029	0.003	0.015	0.002	0.196	0.198	0.012	0.199
55	0.339	<0.001	0.009	0.004	0.006	0.055	0.003	0.016	0.002	0.317	0.322	0.014	0.322
60	0.480	<0.001	0.011	0.004	0.007	0.103	0.003	0.020	0.003	0.559	0.569	0.018	0.569
65	1.148	<0.001	0.019	0.005	0.014	0.309	0.008	0.047	0.008	1.640	1.669	0.043	1.670
70	1.520	<0.001	0.018	0.002	0.014	0.426	0.011	0.052	0.011	2.179	2.220	0.053	2.221

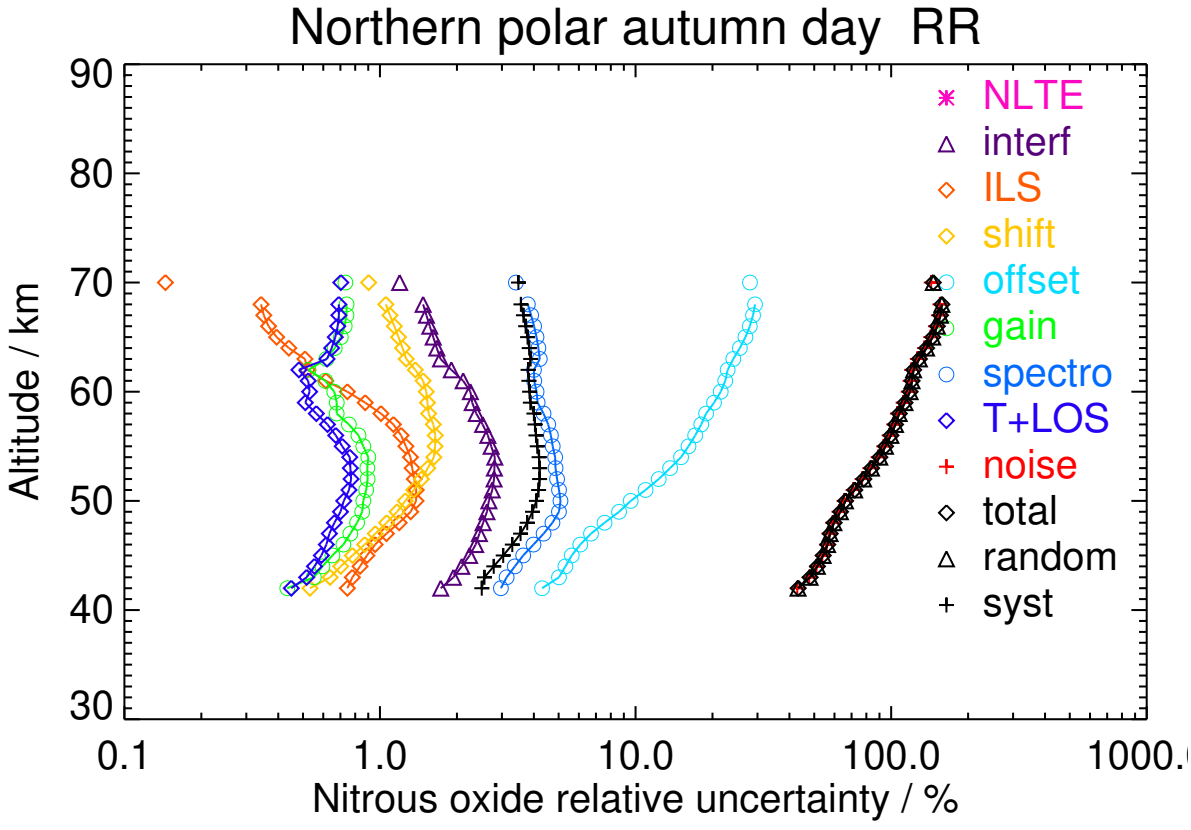

Figure S245. V8R_N2O_662 Northern polar autumn day

Table S246. Nitrous oxide error budget for Northern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.631	<0.001	0.009	0.023	0.004	0.020	0.019	0.075	0.004	0.249	0.261	0.029	0.263
50	0.588	<0.001	0.011	0.009	0.005	0.037	0.005	0.034	0.003	0.308	0.312	0.026	0.313
55	0.558	<0.001	0.010	0.008	0.006	0.066	0.004	0.026	0.003	0.421	0.426	0.024	0.427
60	0.834	<0.001	0.010	0.009	0.007	0.125	0.008	0.038	0.004	0.750	0.760	0.033	0.761
65	1.404	<0.001	0.013	0.012	0.008	0.274	0.017	0.061	0.011	1.591	1.615	0.055	1.616
70	3.669	<0.001	0.025	0.041	0.009	0.810	0.060	0.184	0.046	4.796	4.866	0.155	4.868
74	4.125	<0.001	0.022	0.028	0.007	0.955	0.051	0.146	0.054	4.925	5.017	0.157	5.020

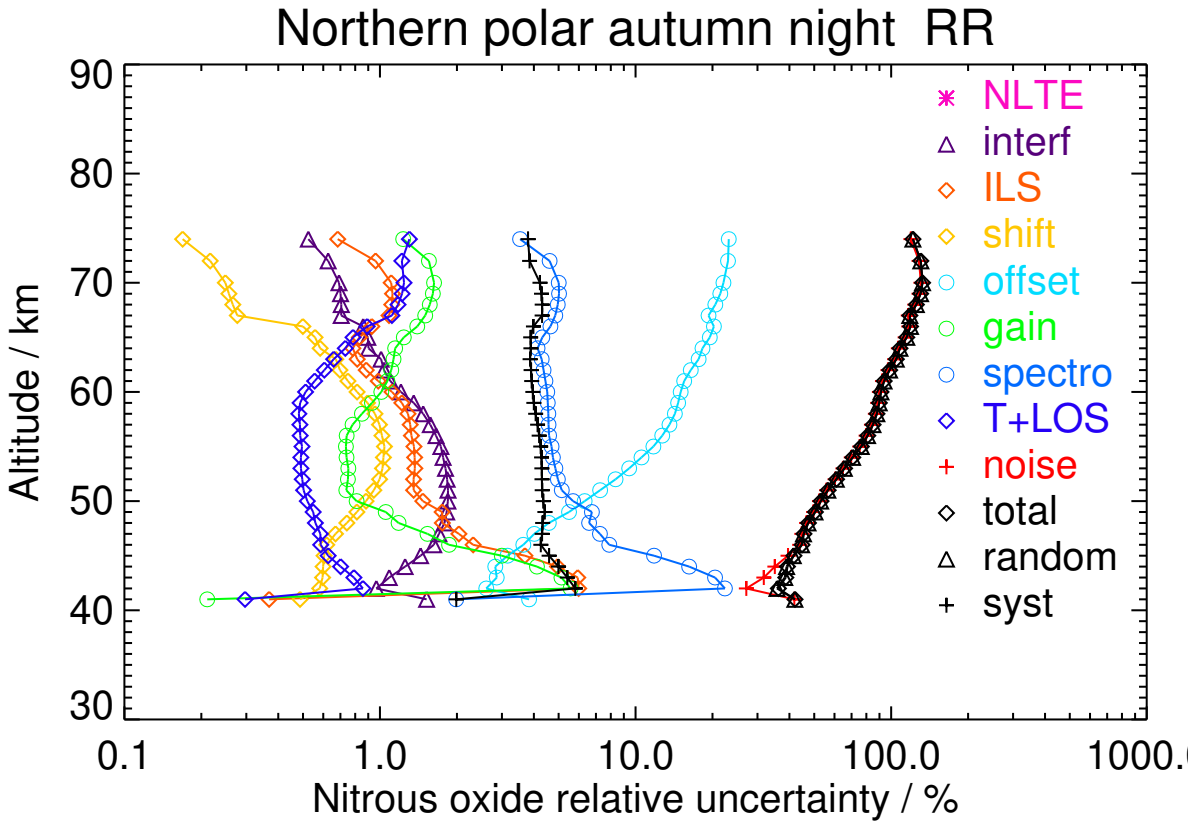

Figure S246. V8R_N2O_662 Northern polar autumn night

Table S247. Nitrous oxide error budget for Northern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	9.471	<0.001	0.031	0.163	0.015	0.131	0.244	0.568	0.102	0.823	0.881	0.582	1.056
45	3.261	<0.001	0.014	0.094	0.012	0.038	0.079	0.352	0.043	0.423	0.465	0.325	0.567
50	0.666	<0.001	0.009	0.019	0.004	0.033	0.010	0.078	0.009	0.269	0.276	0.059	0.283
55	0.351	<0.001	0.007	0.005	0.004	0.045	0.002	0.023	0.003	0.286	0.289	0.021	0.290
60	0.522	<0.001	0.010	0.012	0.006	0.101	0.002	0.028	0.004	0.584	0.593	0.024	0.593
65	1.536	<0.001	0.029	0.077	0.009	0.410	0.017	0.067	0.021	2.254	2.291	0.103	2.294
70	2.684	0.001	0.054	0.189	0.009	0.828	0.044	0.107	0.043	4.234	4.315	0.222	4.320

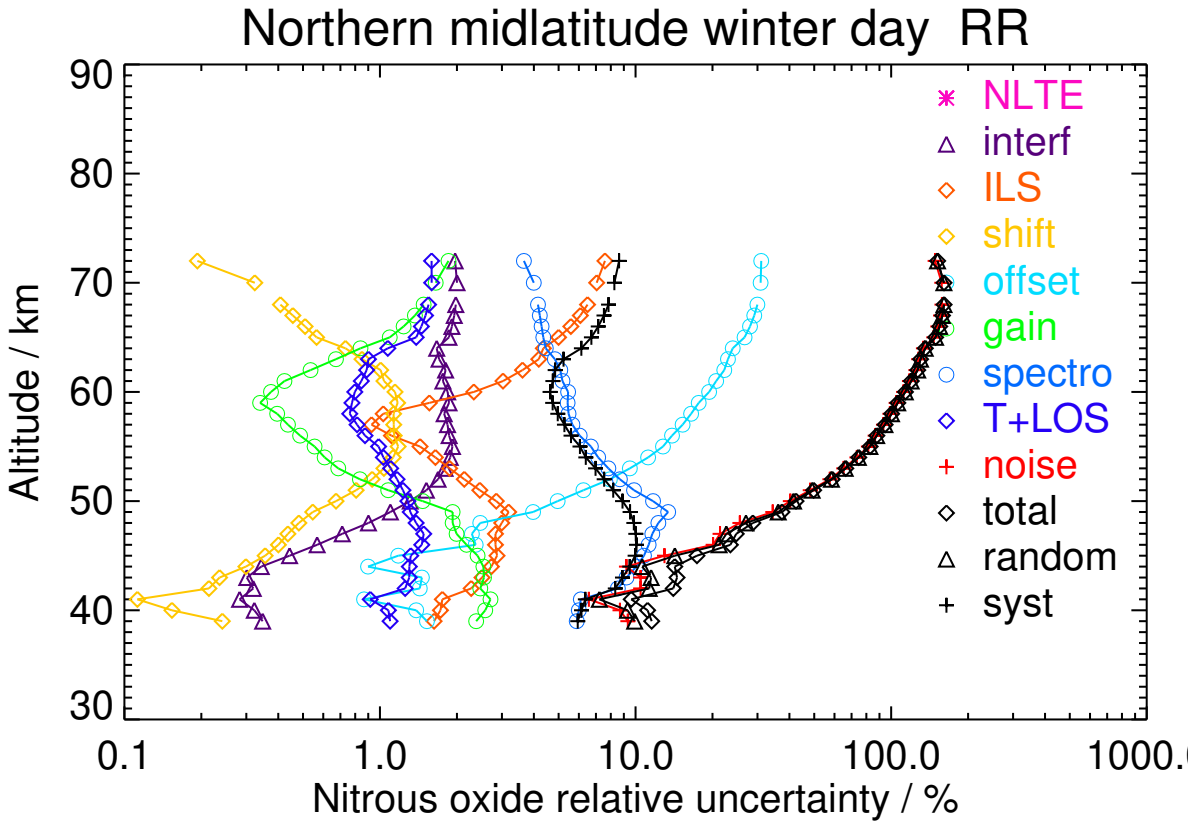

Figure S247. V8R_N2O_662 Northern midlatitude winter day

Table S248. Nitrous oxide error budget for Northern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	8.913	<0.001	0.032	0.195	0.017	0.155	0.241	0.799	0.107	1.020	1.110	0.761	1.346
45	3.392	<0.001	0.014	0.102	0.011	0.048	0.109	0.395	0.038	0.462	0.543	0.317	0.629
50	0.777	<0.001	0.010	0.028	0.005	0.039	0.013	0.119	0.012	0.313	0.328	0.083	0.338
55	0.462	<0.001	0.009	0.008	0.005	0.060	0.003	0.034	0.004	0.379	0.384	0.028	0.386
60	0.750	<0.001	0.012	0.008	0.008	0.138	0.006	0.034	0.005	0.771	0.784	0.028	0.784
65	1.807	<0.001	0.019	0.018	0.012	0.418	0.025	0.092	0.023	2.256	2.295	0.074	2.296
70	2.620	<0.001	0.028	0.030	0.016	0.813	0.033	0.125	0.037	4.102	4.183	0.099	4.184
74	3.498	<0.001	0.028	0.024	0.015	1.084	0.034	0.127	0.047	4.961	5.079	0.113	5.080

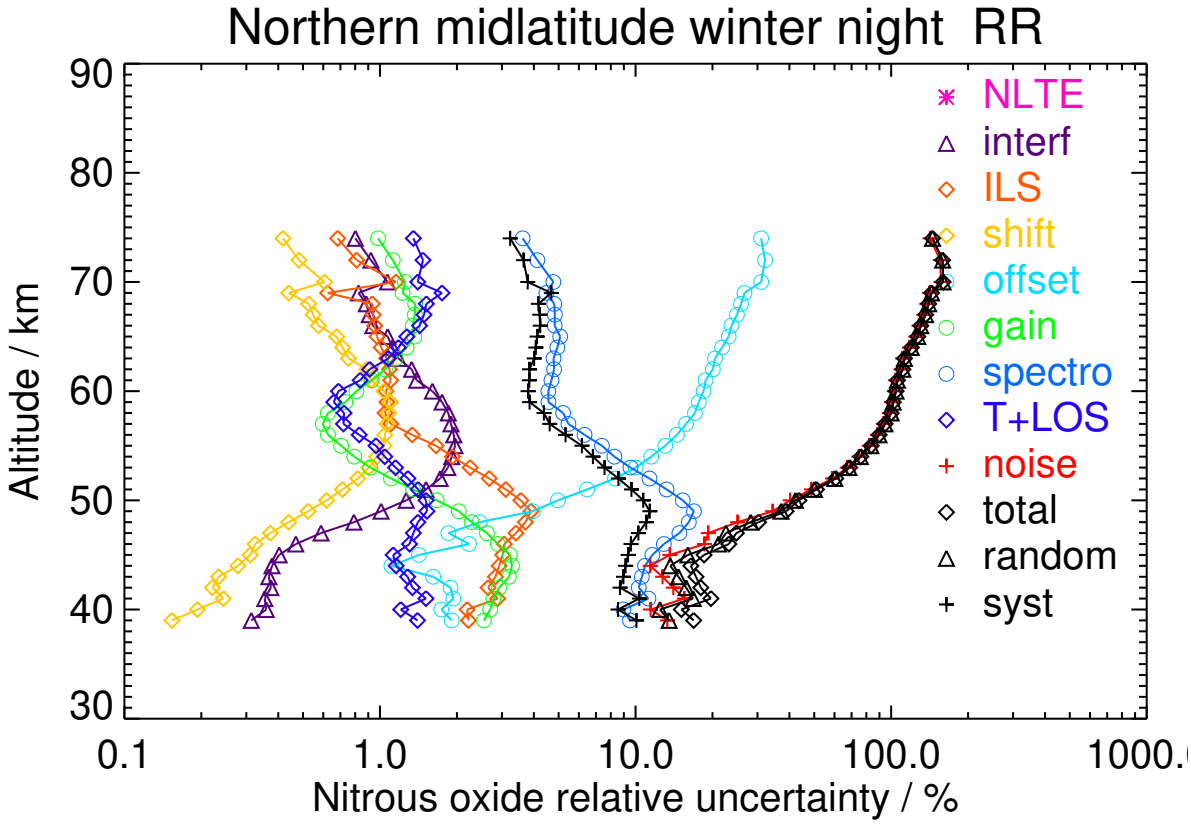

Figure S248. V8R_N2O_662 Northern midlatitude winter night

Table S249. Nitrous oxide error budget for Northern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	2.994	<0.001	0.011	0.098	0.014	0.034	0.105	0.324	0.025	0.297	0.408	0.224	0.465
50	1.380	<0.001	0.011	0.033	0.005	0.024	0.027	0.123	0.011	0.300	0.317	0.087	0.329
55	0.596	<0.001	0.009	0.011	0.005	0.044	0.006	0.048	0.006	0.336	0.341	0.036	0.343
60	0.525	<0.001	0.008	0.004	0.006	0.078	0.003	0.028	0.004	0.495	0.502	0.023	0.502
65	0.907	<0.001	0.013	0.025	0.010	0.203	0.006	0.035	0.007	1.153	1.171	0.037	1.172
70	1.425	<0.001	0.026	0.043	0.022	0.451	0.008	0.046	0.014	2.319	2.363	0.063	2.364

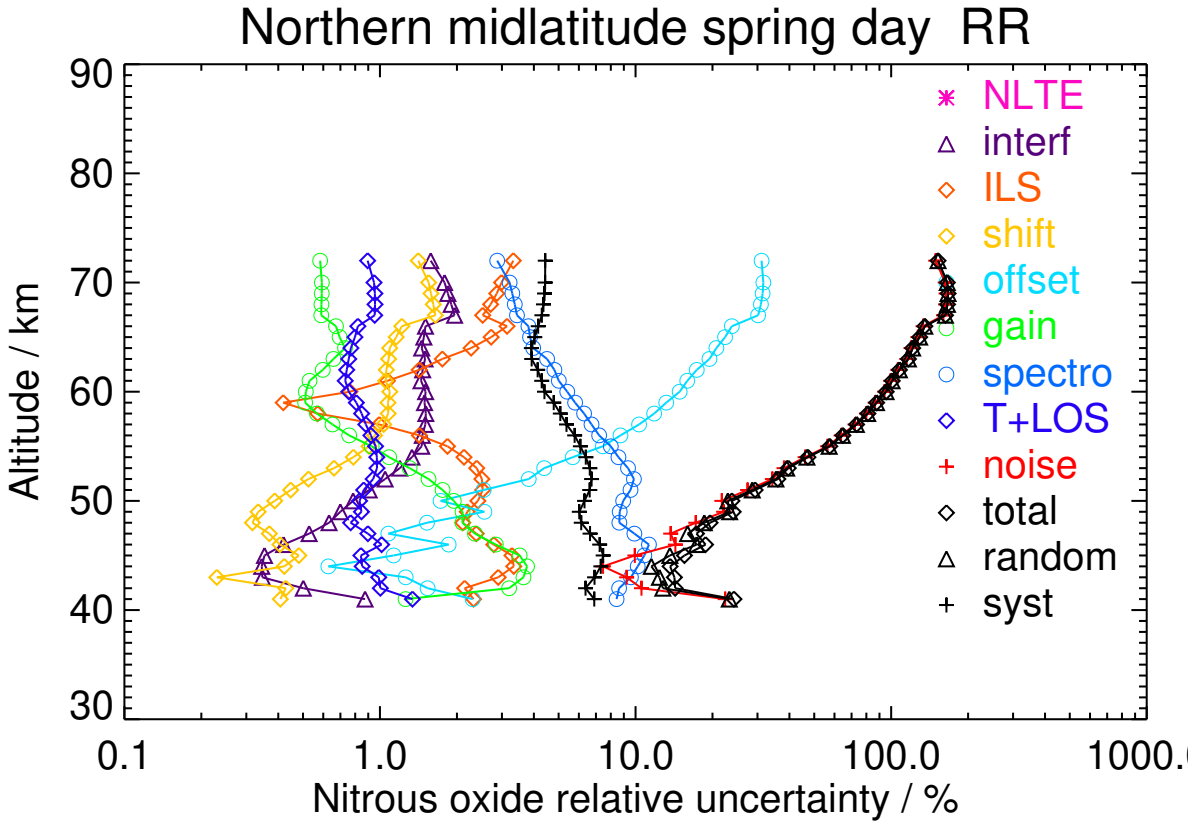

Figure S249. V8R_N2O_662 Northern midlatitude spring day

Table S250. Nitrous oxide error budget for Northern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	12.832	<0.001	0.039	0.264	0.014	0.145	0.372	0.970	0.141	0.883	0.909	1.070	1.404
45	3.535	<0.001	0.011	0.093	0.014	0.034	0.096	0.298	0.027	0.312	0.386	0.239	0.454
50	2.021	<0.001	0.013	0.039	0.006	0.029	0.034	0.150	0.014	0.368	0.385	0.116	0.402
55	1.027	<0.001	0.011	0.016	0.006	0.051	0.010	0.070	0.009	0.457	0.462	0.060	0.465
60	0.677	<0.001	0.008	0.004	0.006	0.079	0.005	0.039	0.006	0.535	0.541	0.033	0.542
65	1.701	<0.001	0.019	0.068	0.014	0.306	0.015	0.076	0.022	1.914	1.940	0.085	1.942
70	3.226	<0.001	0.043	0.325	0.039	0.790	0.026	0.132	0.062	4.411	4.489	0.254	4.496
74	7.133	0.002	0.100	0.806	0.096	2.003	0.050	0.243	0.166	9.785	9.990	0.843	10.026

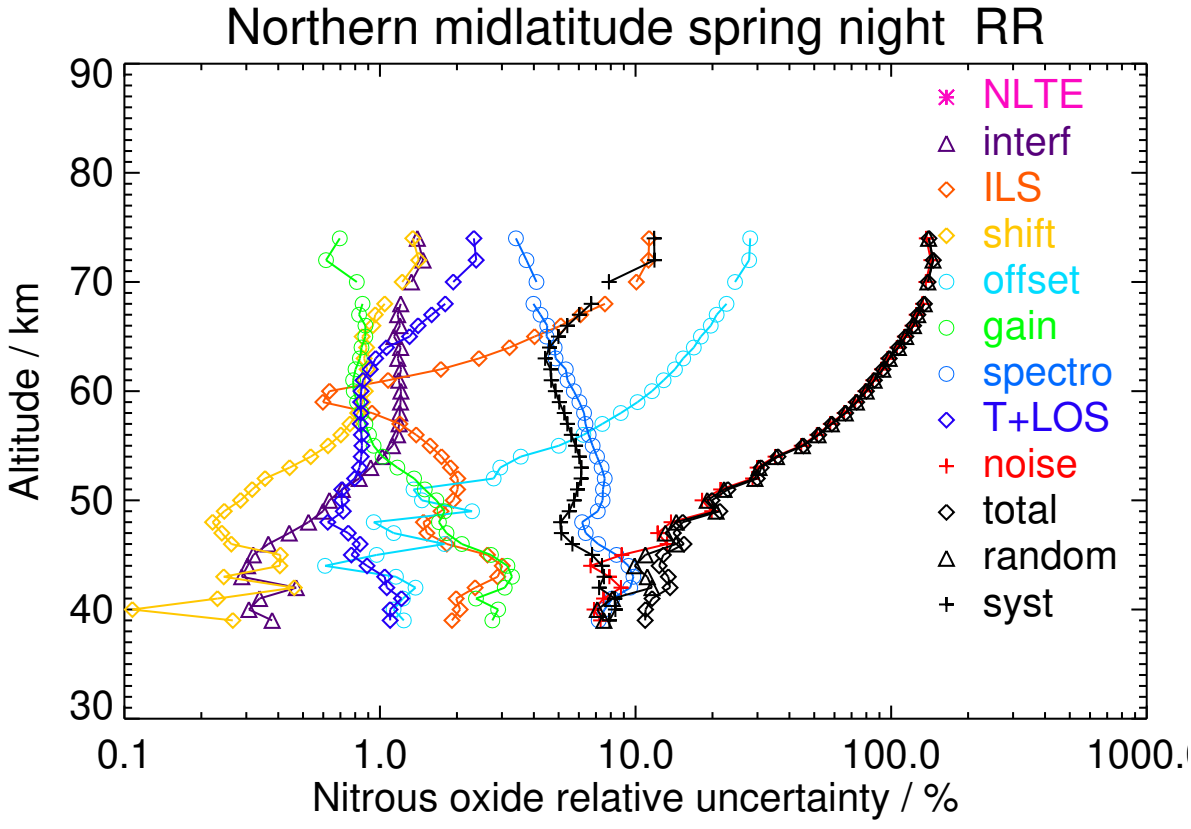

Figure S250. V8R_N2O_662 Northern midlatitude spring night

Table S251. Nitrous oxide error budget for Northern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	2.181	<0.001	0.009	0.057	0.009	0.024	0.056	0.211	0.019	0.253	0.303	0.157	0.341
50	1.024	<0.001	0.010	0.020	0.004	0.019	0.015	0.074	0.007	0.268	0.275	0.053	0.280
55	1.185	<0.001	0.013	0.016	0.006	0.046	0.013	0.064	0.007	0.449	0.454	0.048	0.456
60	1.031	<0.001	0.011	0.009	0.009	0.103	0.008	0.059	0.008	0.715	0.724	0.046	0.725
65	1.553	<0.001	0.018	0.075	0.015	0.266	0.010	0.072	0.018	1.684	1.706	0.088	1.709

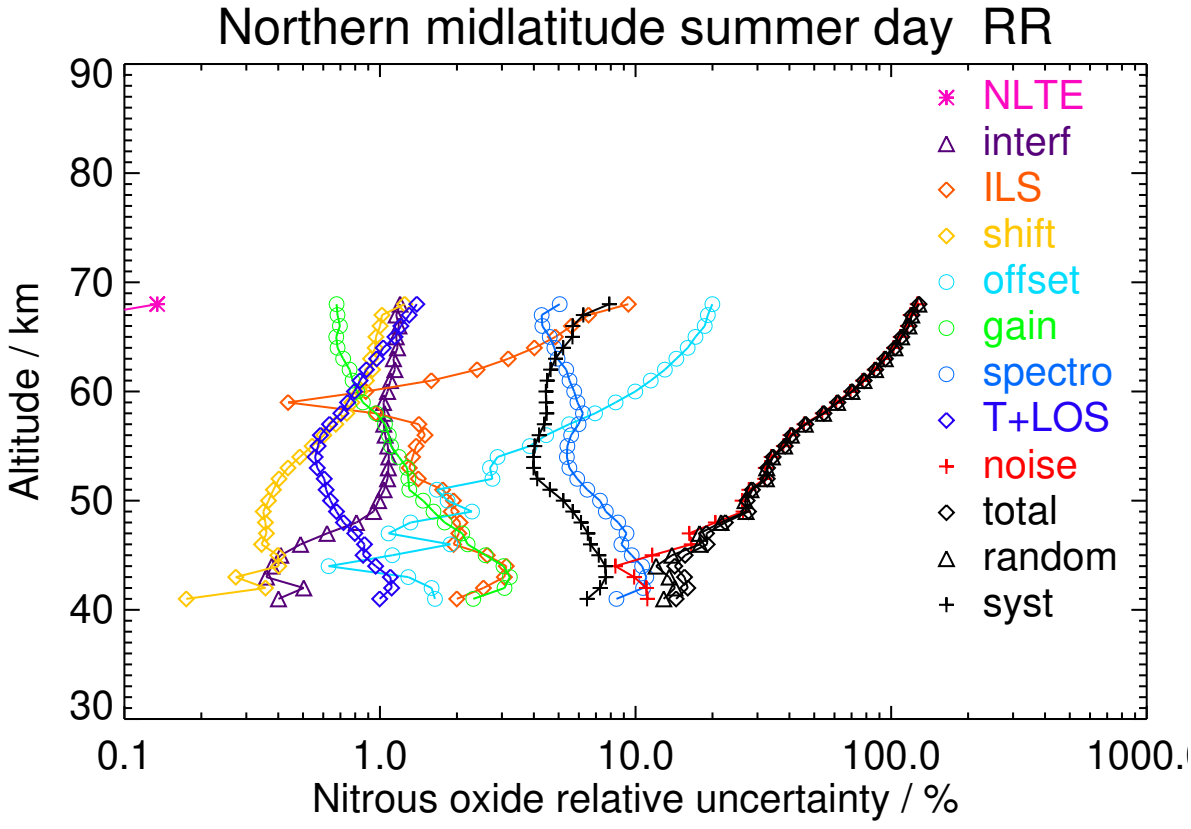

Figure S251. V8R_N2O_662 Northern midlatitude summer day

Table S252. Nitrous oxide error budget for Northern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	2.045	<0.001	0.008	0.040	0.005	0.025	0.057	0.143	0.014	0.228	0.256	0.113	0.280
50	1.694	<0.001	0.012	0.035	0.005	0.021	0.035	0.154	0.012	0.330	0.360	0.078	0.369
55	1.826	<0.001	0.015	0.027	0.006	0.052	0.024	0.110	0.013	0.583	0.593	0.070	0.597
60	1.779	<0.001	0.013	0.011	0.010	0.128	0.018	0.099	0.016	0.958	0.969	0.076	0.972
65	1.968	<0.001	0.018	0.077	0.015	0.286	0.019	0.092	0.026	1.887	1.910	0.104	1.913
70	3.698	<0.001	0.036	0.227	0.038	0.757	0.052	0.196	0.082	4.675	4.741	0.233	4.746

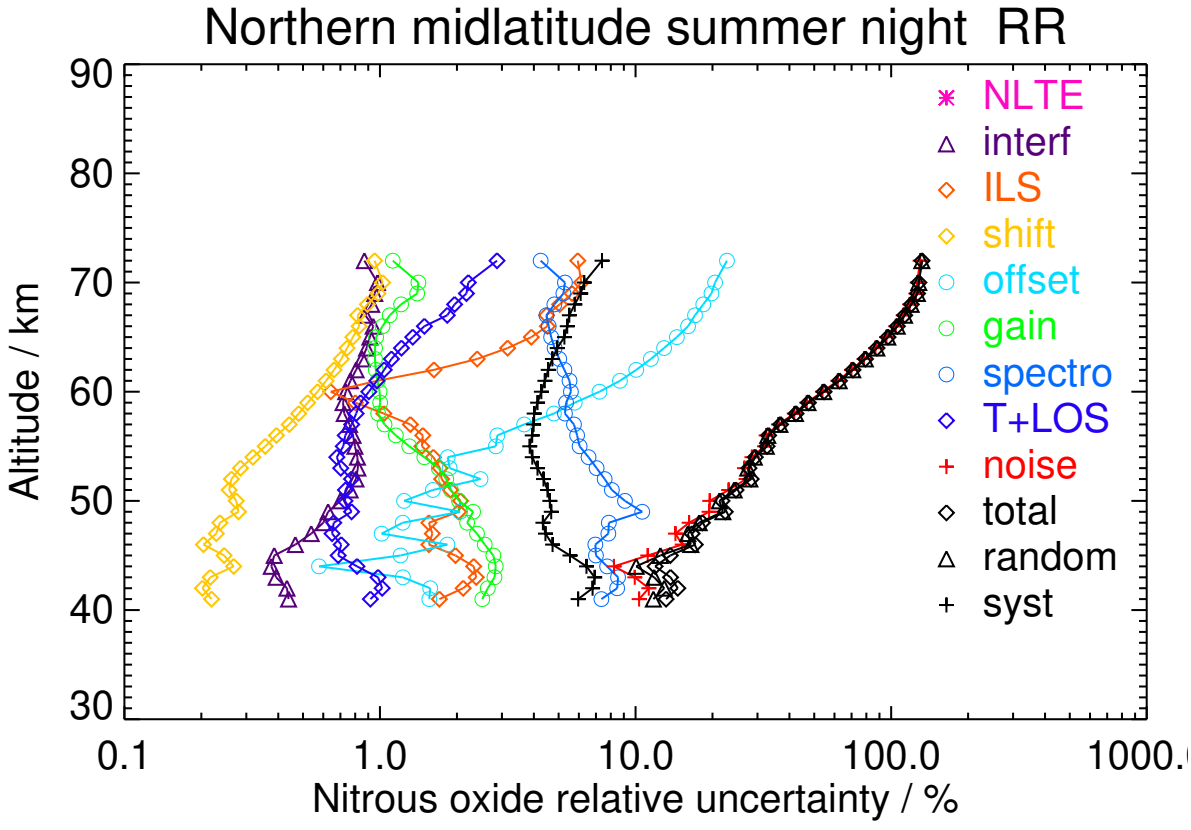

Figure S252. V8R_N2O_662 Northern midlatitude summer night

Table S253. Nitrous oxide error budget for Northern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	5.654	<0.001	0.016	0.126	0.017	0.061	0.155	0.432	0.042	0.524	0.601	0.381	0.712
50	2.978	<0.001	0.016	0.056	0.007	0.038	0.050	0.218	0.027	0.559	0.574	0.194	0.606
55	1.477	<0.001	0.014	0.025	0.008	0.075	0.016	0.104	0.014	0.668	0.675	0.091	0.681
60	1.222	<0.001	0.012	0.009	0.009	0.135	0.011	0.065	0.011	0.914	0.925	0.055	0.927
65	2.797	<0.001	0.028	0.110	0.021	0.498	0.024	0.139	0.049	3.030	3.073	0.147	3.076
70	3.672	<0.001	0.038	0.189	0.029	0.886	0.028	0.166	0.077	5.009	5.089	0.215	5.094

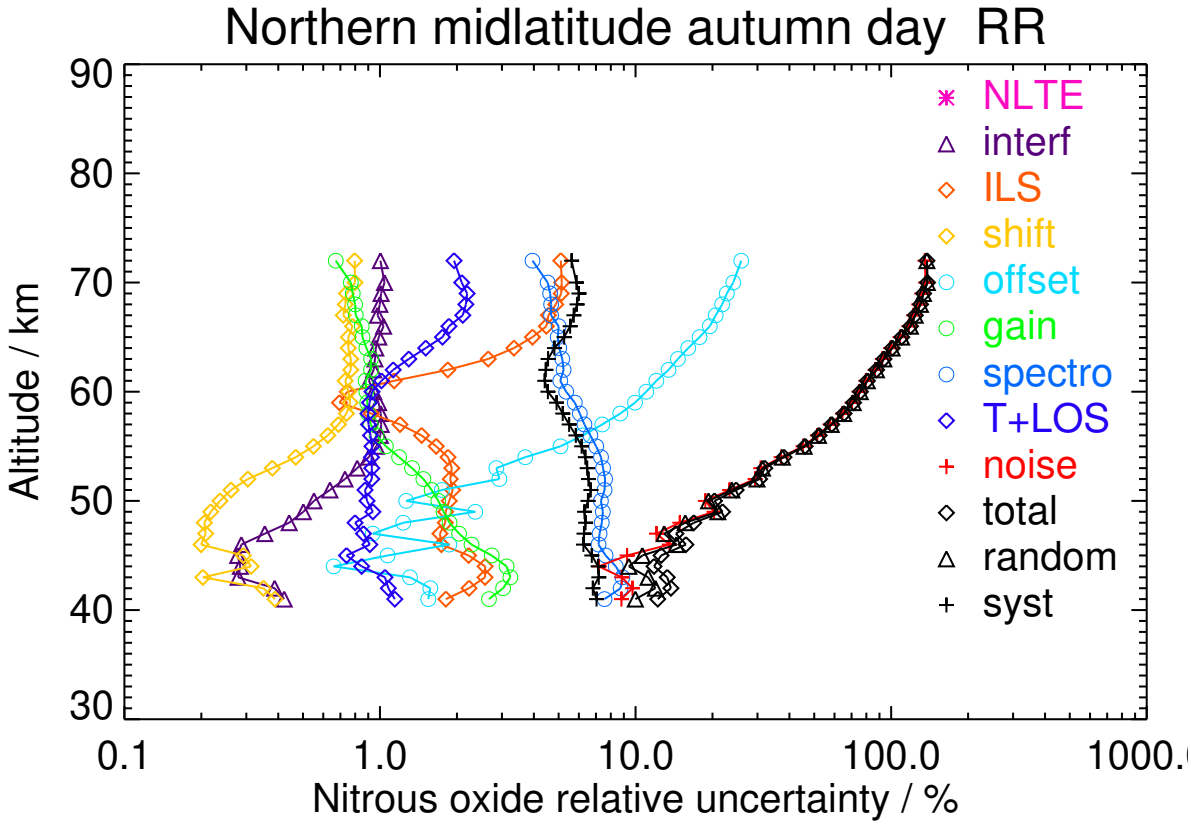

Figure S253. V8R_N2O_662 Northern midlatitude autumn day

Table S254. Nitrous oxide error budget for Northern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	4.921	<0.001	0.018	0.184	0.036	0.054	0.208	0.586	0.047	0.486	0.689	0.434	0.815
50	1.730	<0.001	0.013	0.042	0.006	0.037	0.032	0.159	0.016	0.426	0.442	0.126	0.460
55	1.092	<0.001	0.013	0.017	0.007	0.067	0.011	0.070	0.008	0.549	0.555	0.060	0.558
60	1.037	<0.001	0.012	0.006	0.008	0.124	0.009	0.053	0.008	0.833	0.843	0.044	0.844
65	2.514	<0.001	0.017	0.038	0.012	0.340	0.049	0.163	0.039	2.183	2.215	0.095	2.217
70	4.474	<0.001	0.023	0.024	0.014	0.807	0.051	0.176	0.084	5.033	5.099	0.167	5.101
74	3.949	<0.001	0.016	0.017	0.003	0.788	0.026	0.110	0.074	4.294	4.366	0.114	4.368

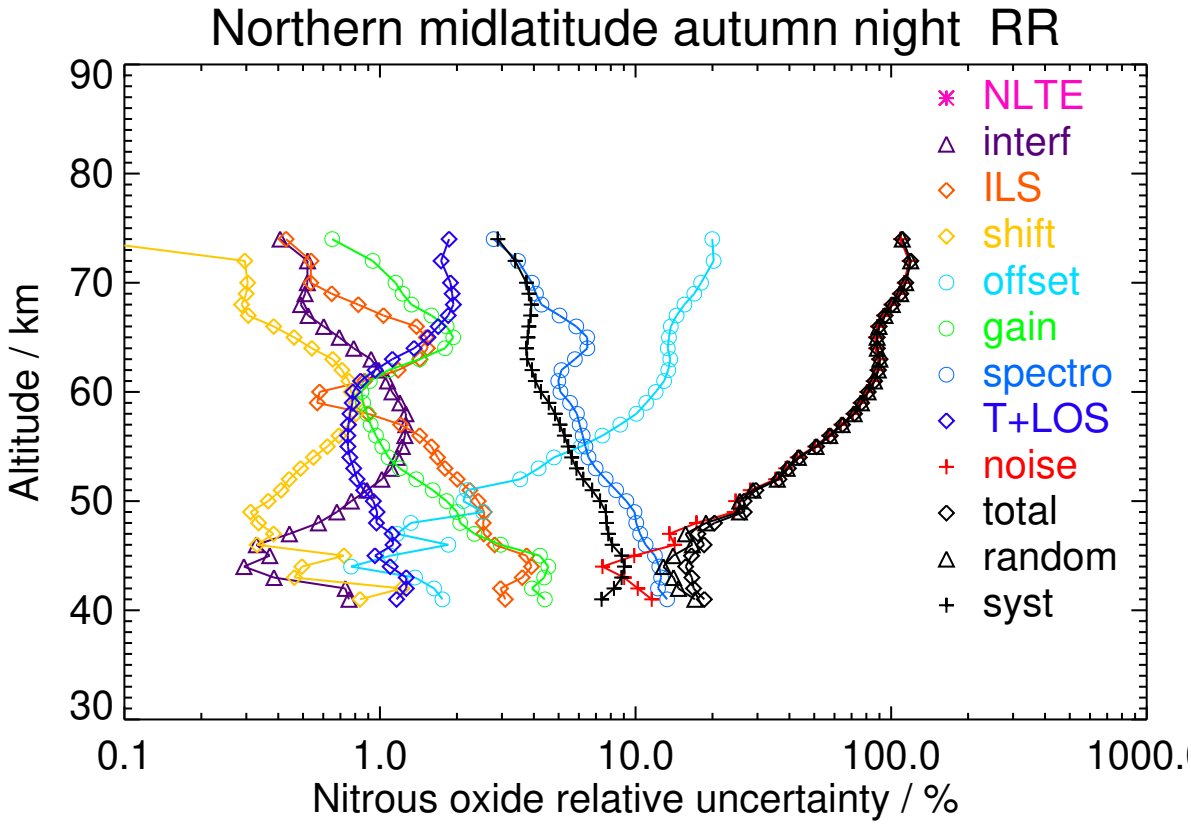

Figure S254. V8R_N2O_662 Northern midlatitude autumn night

Table S255. Nitrous oxide error budget for Tropics day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
40	24.915	0.001	0.189	0.634	0.545	0.306	0.824	2.705	0.324	1.831	2.721	2.210	3.505
45	7.569	<0.001	0.027	0.209	0.056	0.088	0.212	0.627	0.075	0.613	0.702	0.618	0.935
50	2.155	<0.001	0.014	0.049	0.009	0.038	0.035	0.199	0.024	0.426	0.438	0.188	0.477
55	0.554	<0.001	0.008	0.008	0.005	0.041	0.003	0.043	0.007	0.322	0.326	0.040	0.328
60	0.535	<0.001	0.008	0.011	0.006	0.076	0.003	0.029	0.005	0.496	0.502	0.029	0.503
65	1.153	<0.001	0.019	0.071	0.013	0.244	0.007	0.073	0.020	1.433	1.456	0.079	1.458
70	6.742	0.002	0.113	0.558	0.063	1.994	0.028	0.410	0.273	10.720	10.908	0.692	10.930
74	10.259	0.004	0.163	0.952	0.070	3.433	0.047	0.565	0.446	16.550	16.909	1.108	16.945

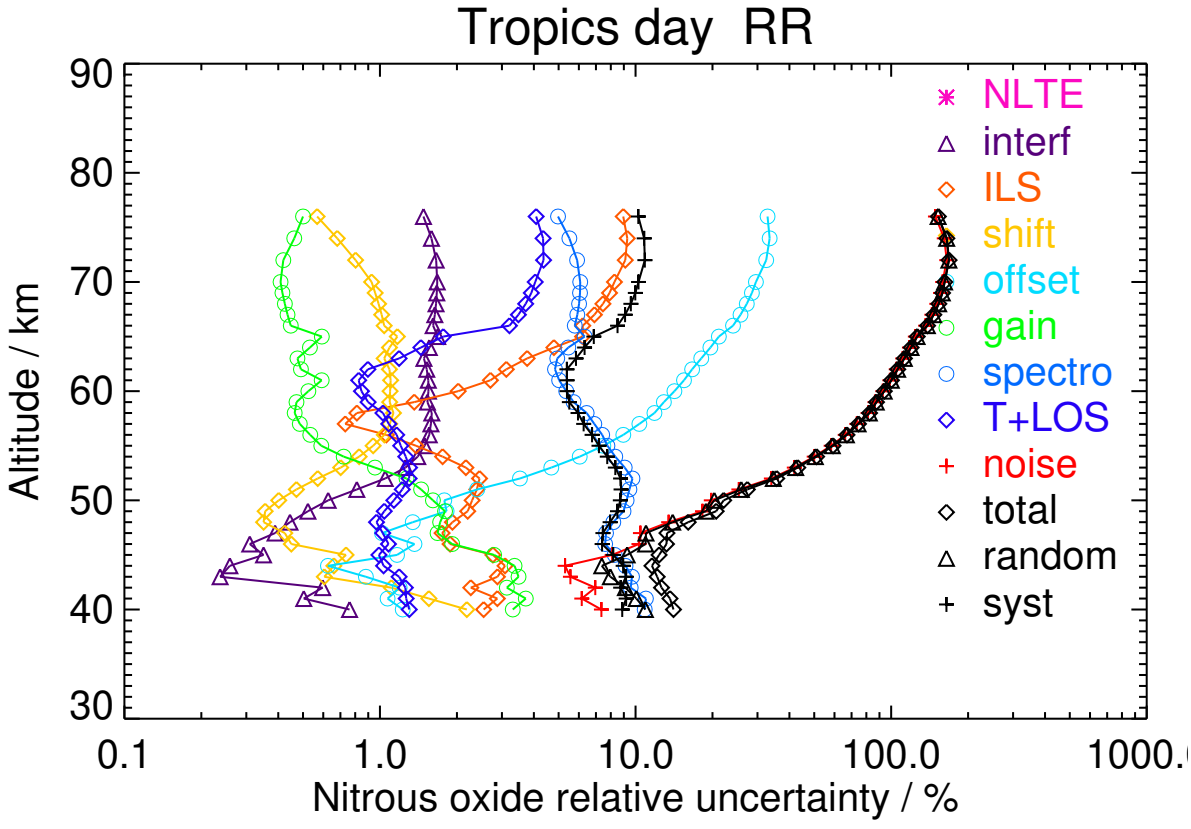

Figure S255. V8R_N2O_662 Tropics day

Table S256. Nitrous oxide error budget for Tropics night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	8.181	<0.001	0.033	0.264	0.066	0.078	0.255	0.690	0.082	0.615	0.707	0.713	1.004
50	2.491	<0.001	0.013	0.065	0.010	0.043	0.046	0.238	0.026	0.432	0.454	0.216	0.502
55	0.687	<0.001	0.009	0.014	0.005	0.043	0.006	0.058	0.008	0.359	0.363	0.051	0.366
60	0.692	<0.001	0.008	0.008	0.007	0.077	0.005	0.040	0.006	0.534	0.540	0.030	0.541
65	2.761	<0.001	0.031	0.137	0.015	0.403	0.015	0.141	0.045	2.582	2.616	0.156	2.621
70	3.612	0.001	0.048	0.322	0.018	0.717	0.051	0.147	0.079	4.286	4.349	0.329	4.362

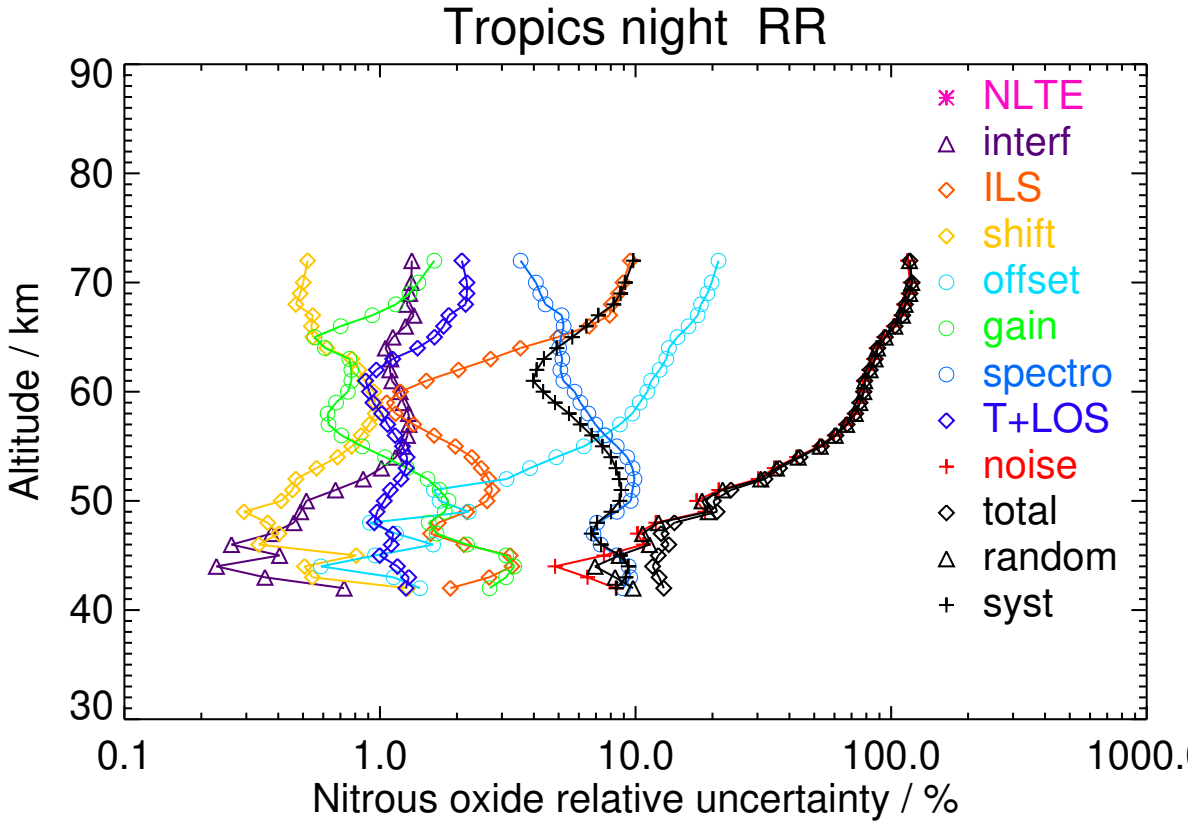

Figure S256. V8R_N2O_662 Tropics night

Table S257. Nitrous oxide error budget for Southern midlatitude winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.894	<0.001	0.010	0.016	0.003	0.014	0.013	0.056	0.007	0.229	0.233	0.046	0.237
50	0.921	<0.001	0.012	0.014	0.006	0.034	0.009	0.051	0.005	0.341	0.344	0.042	0.347
55	0.660	<0.001	0.010	0.008	0.006	0.067	0.005	0.034	0.004	0.463	0.468	0.031	0.469
60	0.774	<0.001	0.010	0.006	0.008	0.129	0.006	0.036	0.005	0.806	0.817	0.032	0.817
65	1.361	<0.001	0.017	0.013	0.014	0.346	0.016	0.070	0.012	1.952	1.983	0.059	1.984
70	4.435	<0.001	0.059	0.039	0.042	1.584	0.060	0.235	0.062	8.513	8.660	0.246	8.663

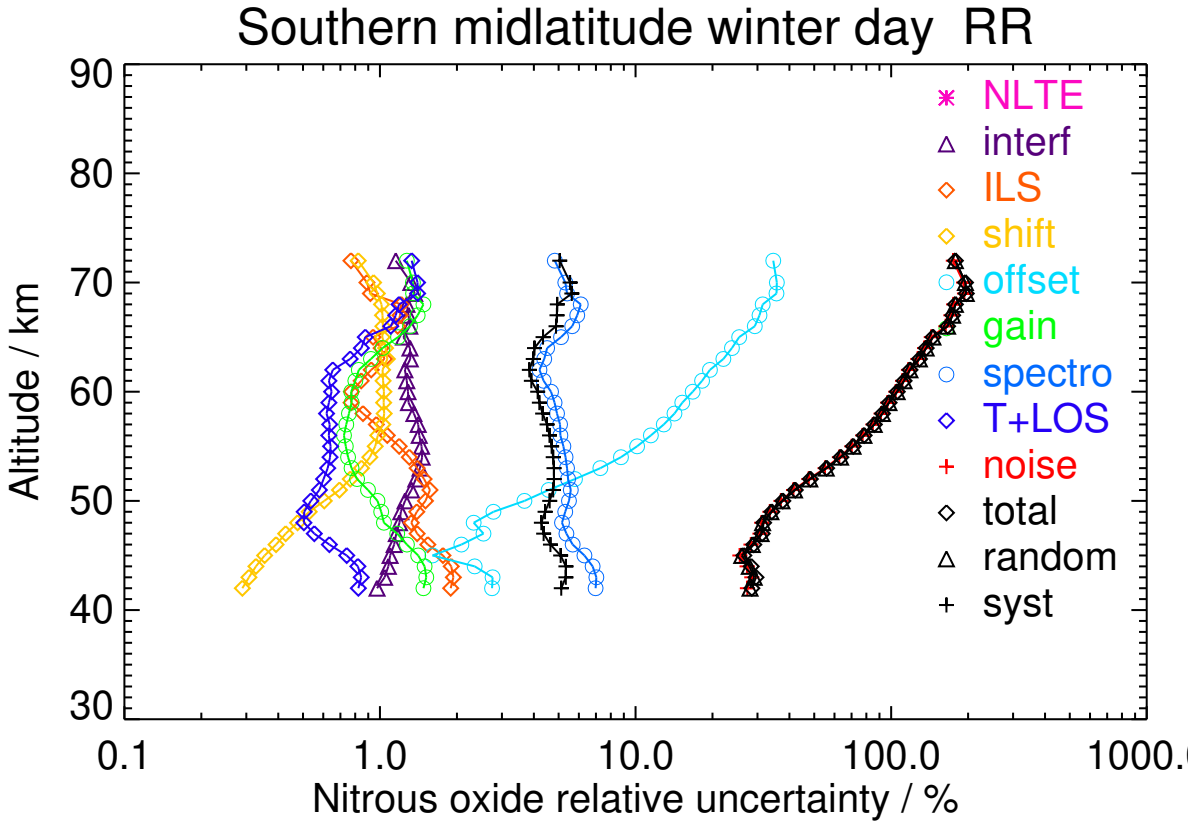

Figure S257. V8R_N2O_662 Southern midlatitude winter day

Table S258. Nitrous oxide error budget for Southern midlatitude winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	1.328	<0.001	0.011	0.024	0.004	0.017	0.023	0.087	0.009	0.263	0.271	0.072	0.280
50	1.136	<0.001	0.012	0.017	0.005	0.034	0.014	0.067	0.007	0.393	0.397	0.057	0.401
55	0.906	<0.001	0.010	0.013	0.006	0.066	0.011	0.056	0.007	0.512	0.518	0.043	0.520
60	1.206	<0.001	0.011	0.011	0.009	0.154	0.013	0.062	0.010	0.997	1.010	0.050	1.011
65	2.218	<0.001	0.017	0.057	0.016	0.415	0.029	0.102	0.030	2.522	2.557	0.088	2.559
70	5.672	<0.001	0.030	0.034	0.026	1.339	0.073	0.210	0.121	7.893	8.007	0.225	8.010
74	3.443	<0.001	0.015	0.023	0.013	0.829	0.035	0.101	0.061	4.287	4.367	0.109	4.368

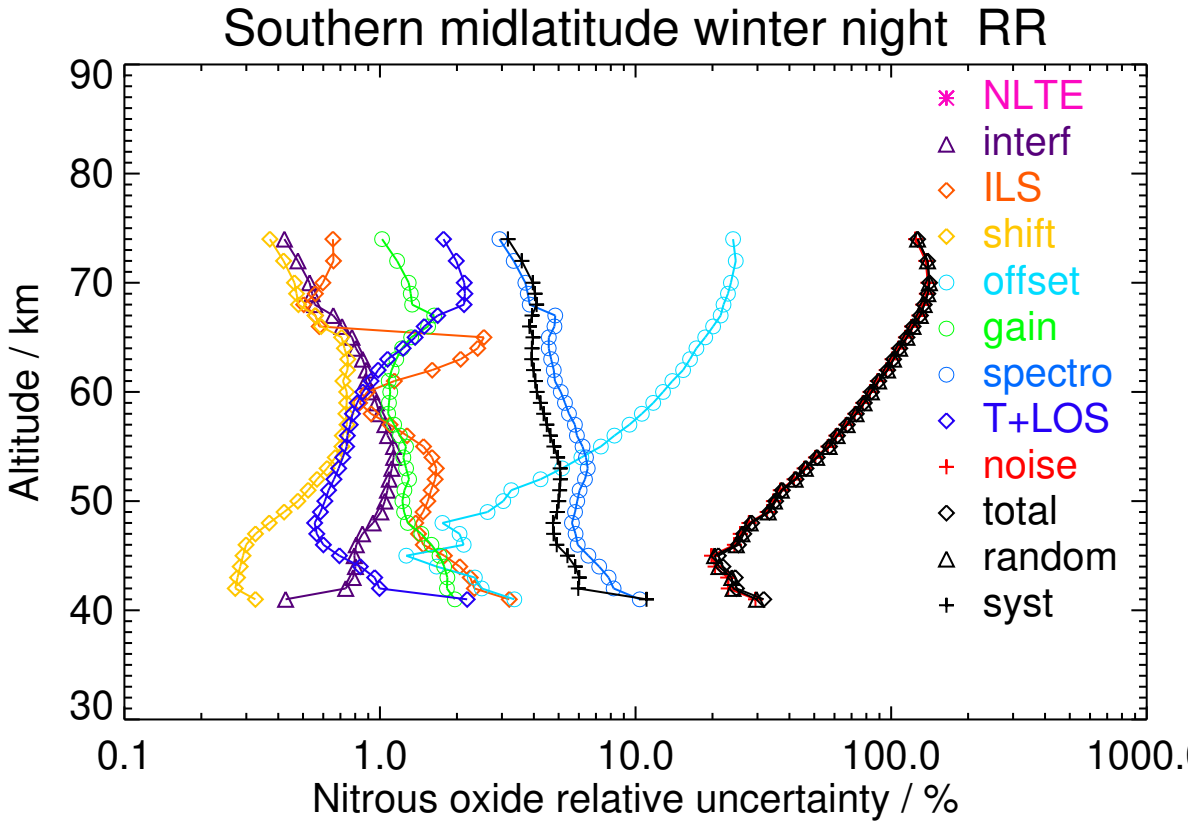

Figure S258. V8R_N2O_662 Southern midlatitude winter night

Table S259. Nitrous oxide error budget for Southern midlatitude spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	2.688	<0.001	0.011	0.049	0.006	0.019	0.051	0.168	0.019	0.281	0.293	0.166	0.336
50	1.876	<0.001	0.014	0.030	0.006	0.041	0.024	0.120	0.012	0.467	0.473	0.110	0.486
55	1.073	<0.001	0.010	0.016	0.007	0.053	0.010	0.067	0.008	0.483	0.488	0.059	0.491
60	0.846	<0.001	0.009	0.004	0.008	0.098	0.006	0.044	0.006	0.686	0.694	0.039	0.695
65	1.725	<0.001	0.016	0.035	0.016	0.286	0.021	0.082	0.021	1.789	1.813	0.074	1.815
70	4.005	<0.001	0.031	0.114	0.030	0.876	0.045	0.173	0.077	5.159	5.234	0.197	5.238
74	5.976	<0.001	0.034	0.195	0.031	1.427	0.051	0.206	0.134	7.761	7.892	0.288	7.898

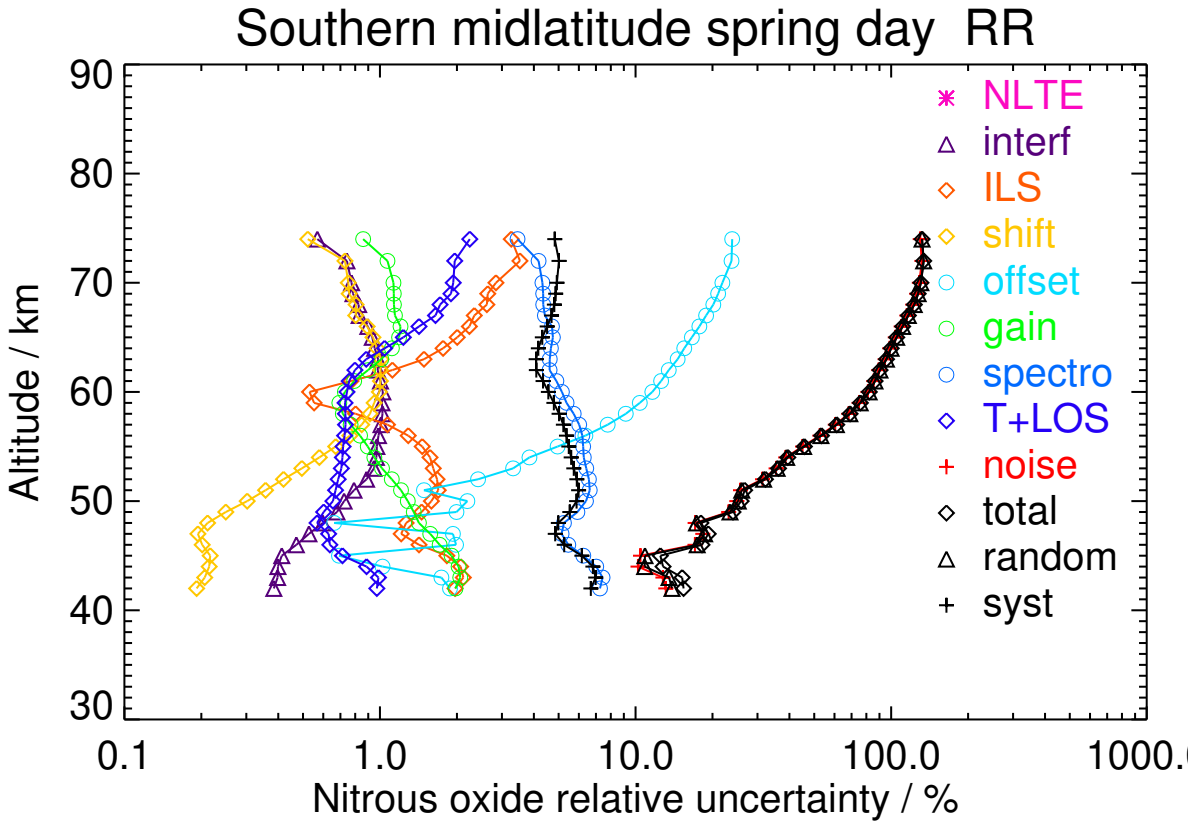

Figure S259. V8R_N2O_662 Southern midlatitude spring day

Table S260. Nitrous oxide error budget for Southern midlatitude spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	2.630	<0.001	0.011	0.050	0.006	0.024	0.048	0.170	0.019	0.288	0.299	0.169	0.343
50	1.617	<0.001	0.013	0.025	0.005	0.032	0.018	0.092	0.009	0.404	0.407	0.089	0.417
55	1.032	<0.001	0.011	0.015	0.007	0.055	0.008	0.057	0.007	0.482	0.486	0.053	0.489
60	0.738	<0.001	0.008	0.007	0.008	0.089	0.007	0.042	0.006	0.600	0.607	0.035	0.608
65	1.108	<0.001	0.010	0.030	0.010	0.193	0.009	0.046	0.010	1.236	1.251	0.051	1.252

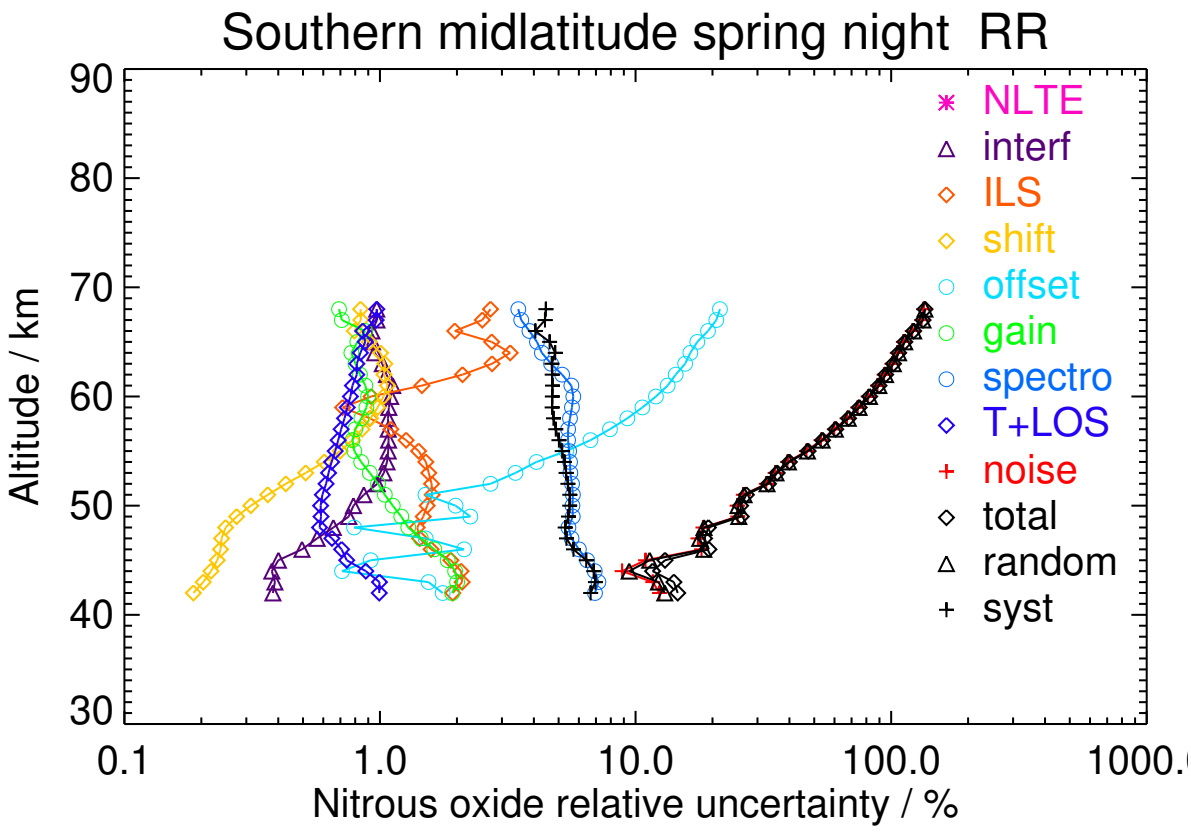

Figure S260. V8R_N2O_662 Southern midlatitude spring night

Table S261. Nitrous oxide error budget for Southern midlatitude summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	1.650	<0.001	0.008	0.050	0.007	0.017	0.043	0.161	0.019	0.193	0.224	0.136	0.261
50	0.512	<0.001	0.006	0.010	0.003	0.017	0.007	0.036	0.004	0.172	0.176	0.027	0.178
55	0.810	<0.001	0.008	0.012	0.005	0.034	0.011	0.053	0.006	0.310	0.316	0.028	0.317
60	0.904	<0.001	0.009	0.008	0.008	0.088	0.009	0.050	0.007	0.594	0.602	0.036	0.603
65	1.919	<0.001	0.023	0.126	0.023	0.313	0.024	0.127	0.035	1.930	1.961	0.111	1.964
70	7.336	0.004	0.104	0.991	0.102	1.657	0.075	0.619	0.307	9.345	9.538	0.755	9.568
74	10.434	0.005	0.128	1.113	0.121	2.701	0.045	0.547	0.471	13.440	13.718	1.241	13.774

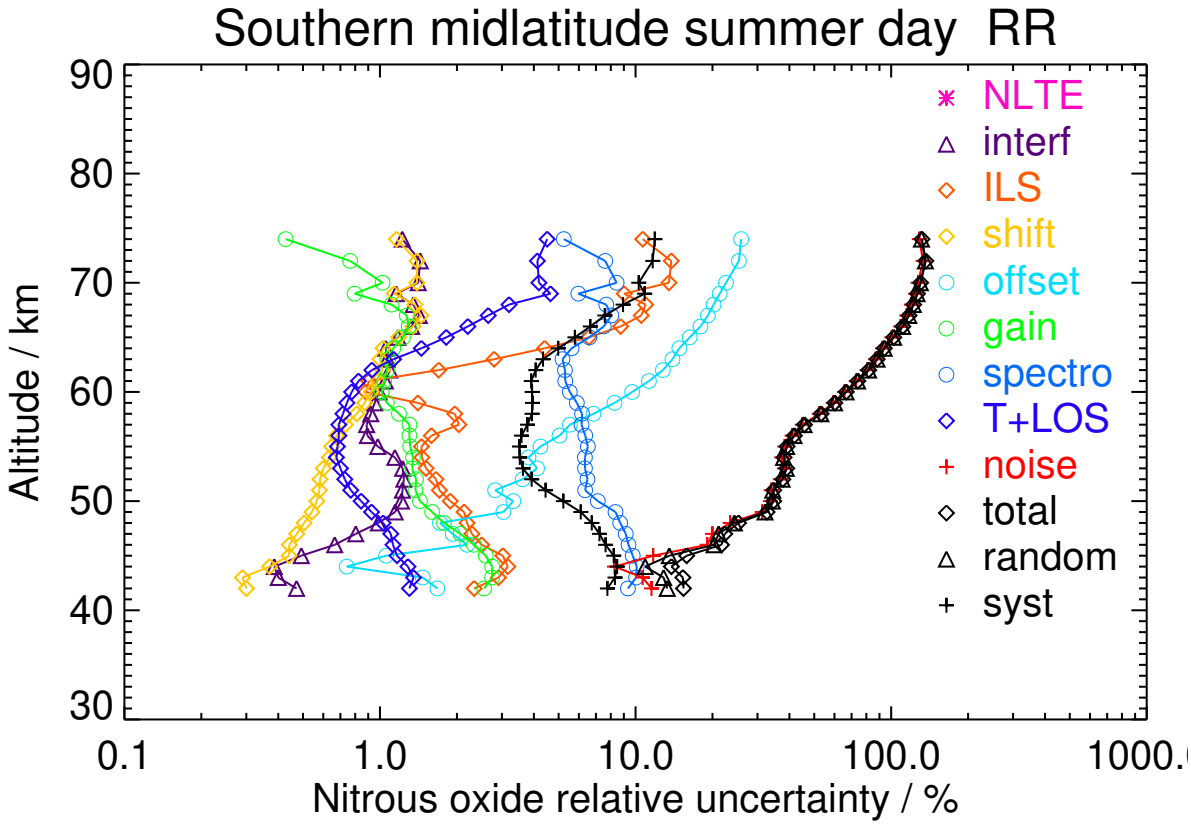

Figure S261. V8R_N2O_662 Southern midlatitude summer day

Table S262. Nitrous oxide error budget for Southern midlatitude summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	2.747	<0.001	0.010	0.082	0.013	0.027	0.090	0.248	0.024	0.242	0.314	0.194	0.369
50	1.276	<0.001	0.009	0.027	0.005	0.029	0.032	0.128	0.012	0.261	0.288	0.067	0.296
55	1.076	<0.001	0.009	0.024	0.006	0.042	0.018	0.088	0.009	0.385	0.395	0.053	0.398
60	0.897	<0.001	0.010	0.009	0.008	0.095	0.008	0.057	0.008	0.631	0.639	0.042	0.641
65	1.099	<0.001	0.014	0.046	0.011	0.200	0.007	0.057	0.012	1.203	1.220	0.063	1.222
70	1.566	<0.001	0.027	0.052	0.021	0.417	0.009	0.056	0.017	2.075	2.117	0.077	2.118

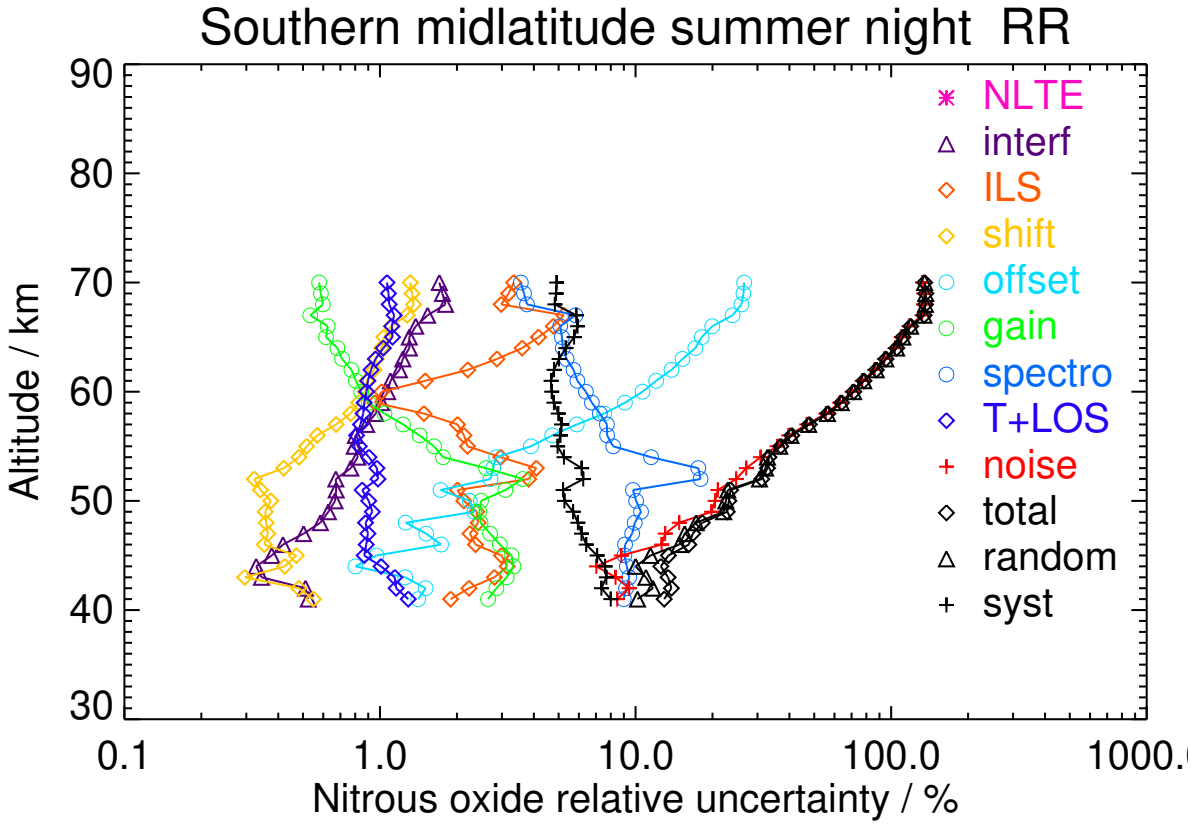

Figure S262. V8R_N2O_662 Southern midlatitude summer night

Table S263. Nitrous oxide error budget for Southern midlatitude autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	4.560	<0.001	0.017	0.126	0.016	0.036	0.165	0.423	0.038	0.449	0.563	0.330	0.653
50	2.344	<0.001	0.014	0.056	0.007	0.057	0.042	0.215	0.022	0.587	0.608	0.174	0.633
55	1.407	<0.001	0.012	0.019	0.008	0.084	0.014	0.091	0.012	0.701	0.708	0.082	0.713
60	1.219	<0.001	0.011	0.009	0.010	0.159	0.010	0.064	0.012	1.035	1.048	0.056	1.050
65	2.380	<0.001	0.024	0.092	0.016	0.446	0.022	0.141	0.043	2.661	2.702	0.108	2.704
70	5.259	0.002	0.057	0.310	0.024	1.238	0.035	0.340	0.156	7.161	7.278	0.302	7.284
74	6.424	0.002	0.061	0.303	0.016	1.638	0.018	0.288	0.219	8.320	8.483	0.418	8.493

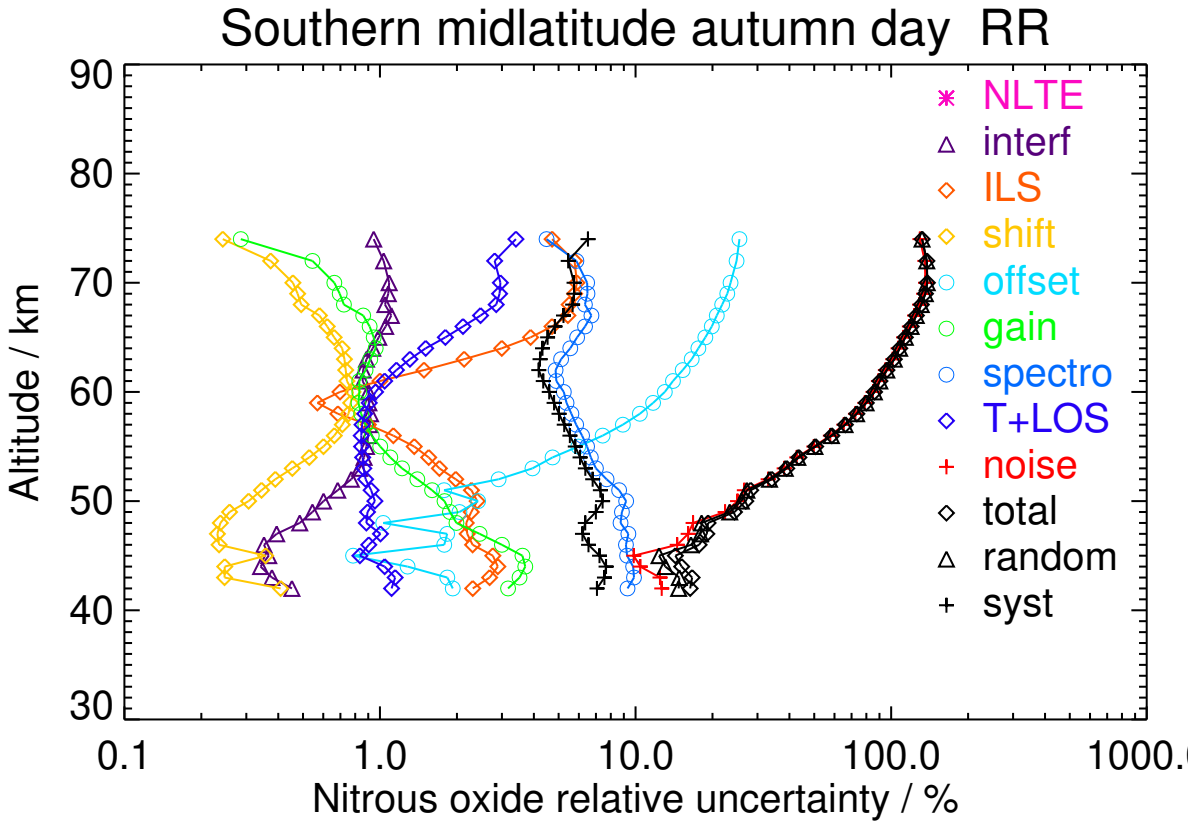

Figure S263. V8R_N2O_662 Southern midlatitude autumn day

Table S264. Nitrous oxide error budget for Southern midlatitude autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	7.016	<0.001	0.022	0.190	0.031	0.057	0.230	0.579	0.059	0.552	0.684	0.519	0.859
50	3.264	<0.001	0.016	0.069	0.008	0.068	0.055	0.261	0.030	0.667	0.688	0.230	0.726
55	1.755	<0.001	0.013	0.024	0.008	0.086	0.018	0.117	0.017	0.752	0.759	0.106	0.767
60	1.149	<0.001	0.010	0.011	0.008	0.142	0.008	0.067	0.012	0.961	0.972	0.062	0.974
65	1.457	<0.001	0.013	0.035	0.011	0.289	0.011	0.071	0.018	1.775	1.799	0.069	1.800
70	3.268	<0.001	0.032	0.114	0.023	0.925	0.029	0.133	0.056	5.164	5.247	0.167	5.249

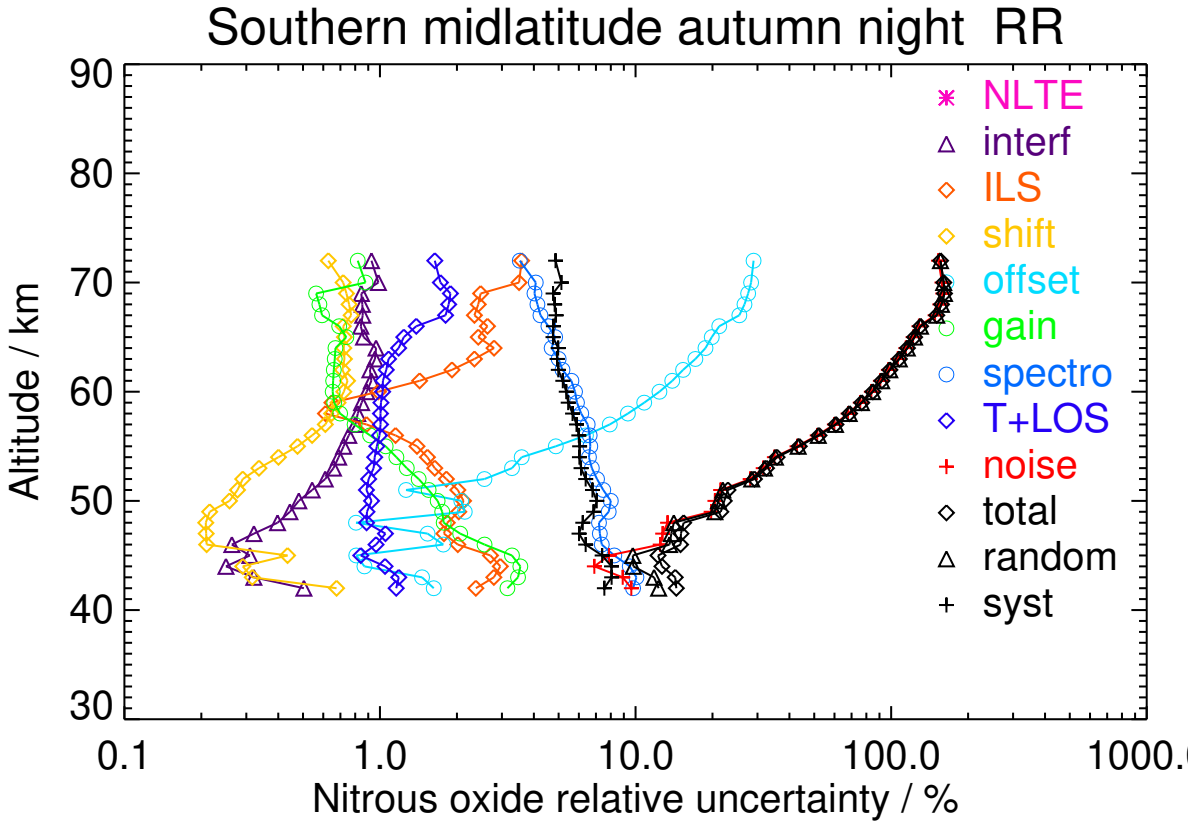

Figure S264. V8R_N2O_662 Southern midlatitude autumn night

Table S265. Nitrous oxide error budget for Southern polar winter day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	1.100	<0.001	0.014	0.013	0.004	0.017	0.011	0.051	0.006	0.292	0.294	0.047	0.298
50	0.744	<0.001	0.010	0.010	0.006	0.027	0.005	0.034	0.005	0.301	0.303	0.033	0.305
55	0.649	<0.001	0.008	0.008	0.006	0.056	0.004	0.028	0.004	0.410	0.414	0.026	0.415
60	0.872	<0.001	0.009	0.009	0.007	0.122	0.008	0.036	0.005	0.772	0.782	0.032	0.783
65	1.629	<0.001	0.015	0.007	0.014	0.333	0.018	0.066	0.014	2.020	2.048	0.059	2.049
70	3.167	0.001	0.023	0.022	0.019	0.797	0.045	0.127	0.039	4.677	4.745	0.118	4.747

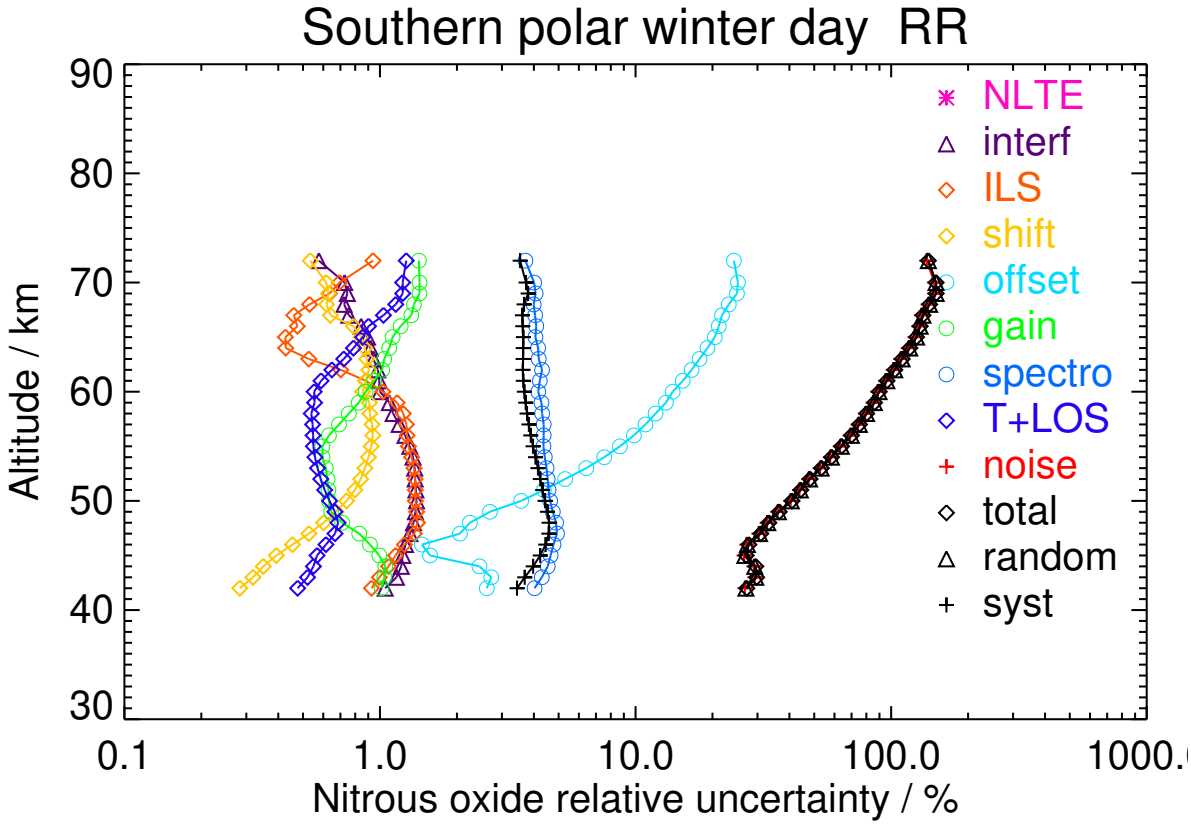

Figure S265. V8R_N2O_662 Southern polar winter day

Table S266. Nitrous oxide error budget for Southern polar winter night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.383	<0.001	0.009	0.004	0.003	0.020	0.002	0.015	0.002	0.203	0.204	0.012	0.205
50	0.366	<0.001	0.009	0.004	0.004	0.034	0.003	0.017	0.003	0.242	0.244	0.014	0.245
55	0.422	<0.001	0.008	0.005	0.005	0.061	0.004	0.020	0.003	0.374	0.379	0.017	0.379
60	0.698	<0.001	0.010	0.009	0.007	0.122	0.006	0.034	0.004	0.698	0.709	0.027	0.709
65	3.214	<0.001	0.028	0.040	0.018	0.654	0.034	0.150	0.032	3.641	3.700	0.149	3.703

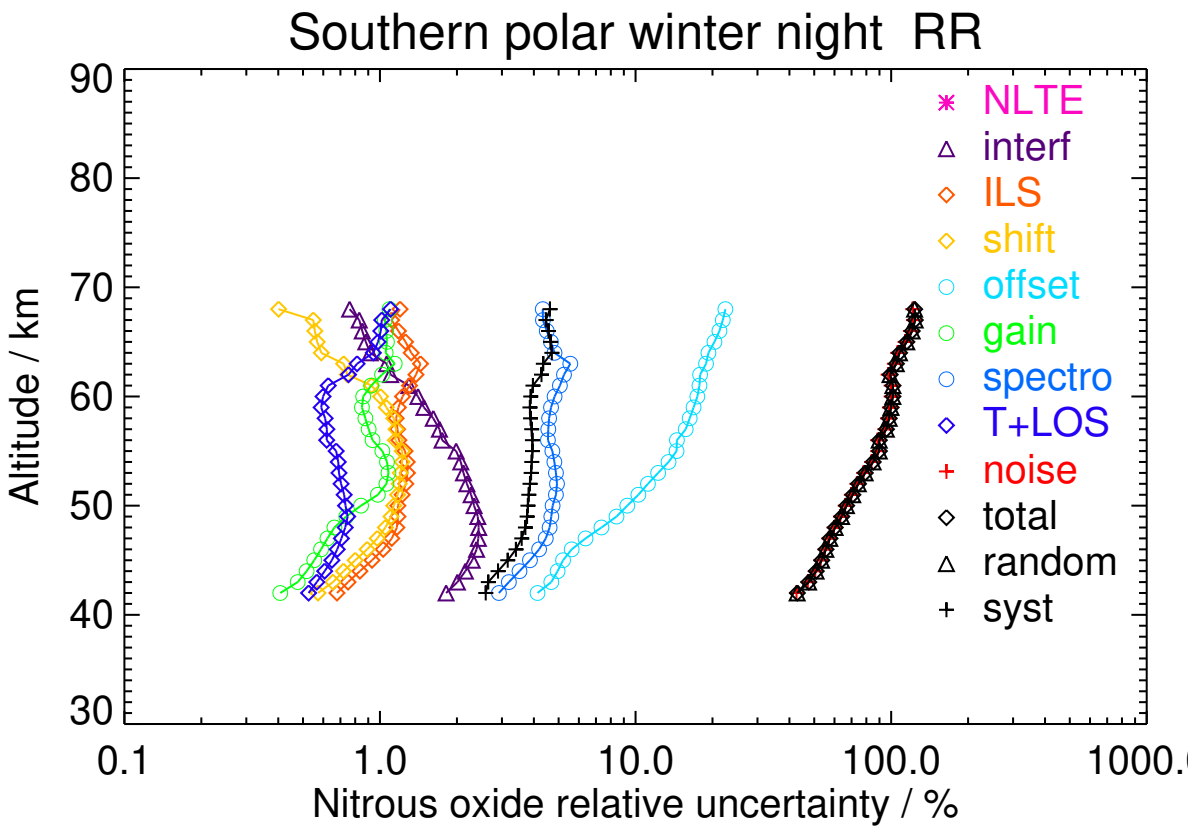

Figure S266. V8R_N2O_662 Southern polar winter night

Table S267. Nitrous oxide error budget for Southern polar spring day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	1.883	<0.001	0.009	0.032	0.005	0.013	0.029	0.102	0.013	0.199	0.205	0.103	0.229
50	1.229	<0.001	0.011	0.019	0.005	0.027	0.011	0.066	0.007	0.327	0.330	0.064	0.336
55	0.693	<0.001	0.009	0.010	0.007	0.039	0.003	0.037	0.006	0.337	0.340	0.035	0.342
60	0.465	<0.001	0.007	0.006	0.007	0.060	0.002	0.022	0.004	0.410	0.415	0.021	0.415
65	1.327	<0.001	0.017	0.062	0.021	0.229	0.008	0.061	0.015	1.448	1.467	0.074	1.469
70	3.583	0.002	0.040	0.310	0.062	0.774	0.028	0.189	0.073	4.519	4.590	0.316	4.600
74	6.671	0.008	0.066	0.854	0.122	1.681	0.047	0.293	0.165	8.885	9.059	0.758	9.090

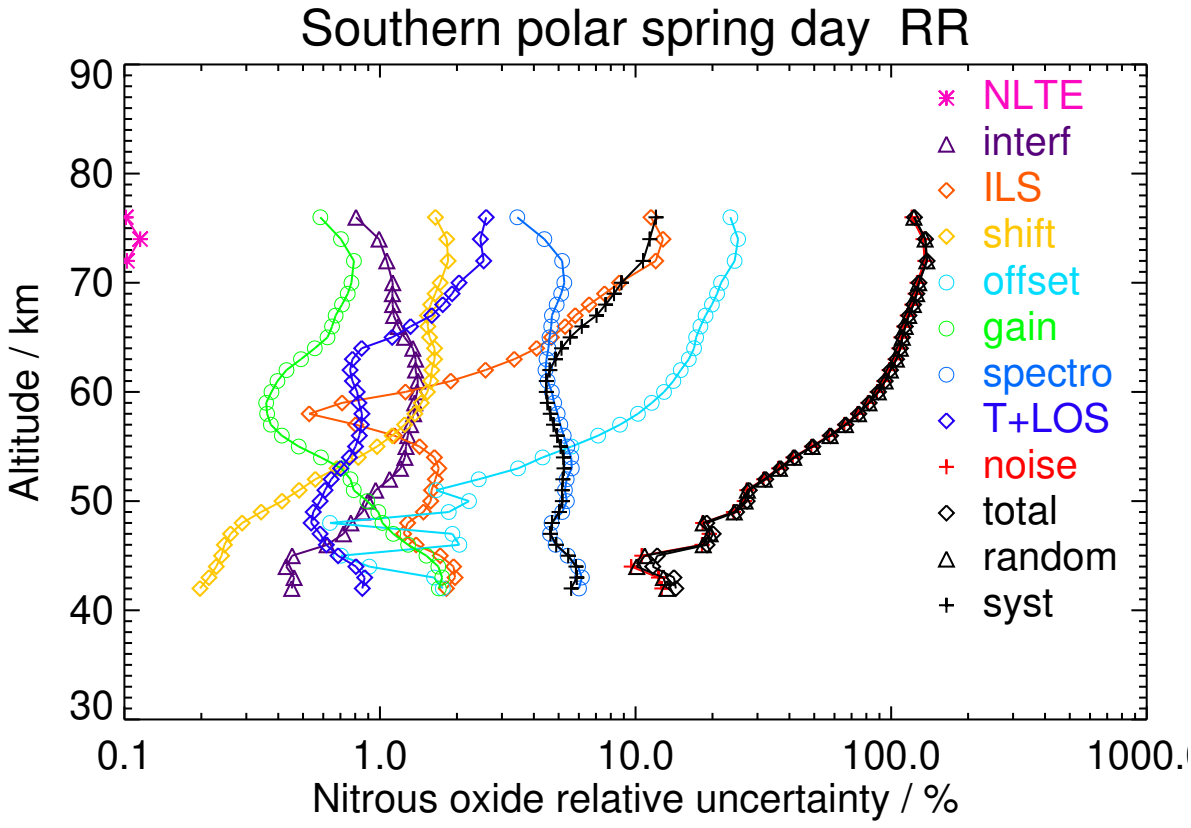

Figure S267. V8R_N2O_662 Southern polar spring day

Table S268. Nitrous oxide error budget for Southern polar spring night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	2.658	<0.001	0.011	0.046	0.006	0.020	0.048	0.156	0.015	0.269	0.282	0.149	0.319
50	1.847	<0.001	0.013	0.030	0.005	0.038	0.024	0.106	0.011	0.439	0.444	0.099	0.455
55	1.178	<0.001	0.011	0.017	0.008	0.056	0.010	0.068	0.008	0.521	0.526	0.061	0.529
60	0.915	<0.001	0.009	0.010	0.009	0.106	0.007	0.048	0.008	0.725	0.734	0.040	0.735
65	1.784	<0.001	0.018	0.074	0.020	0.322	0.016	0.085	0.026	1.990	2.018	0.090	2.020
70	6.426	<0.001	0.049	0.290	0.053	1.487	0.049	0.268	0.176	8.637	8.766	0.398	8.775

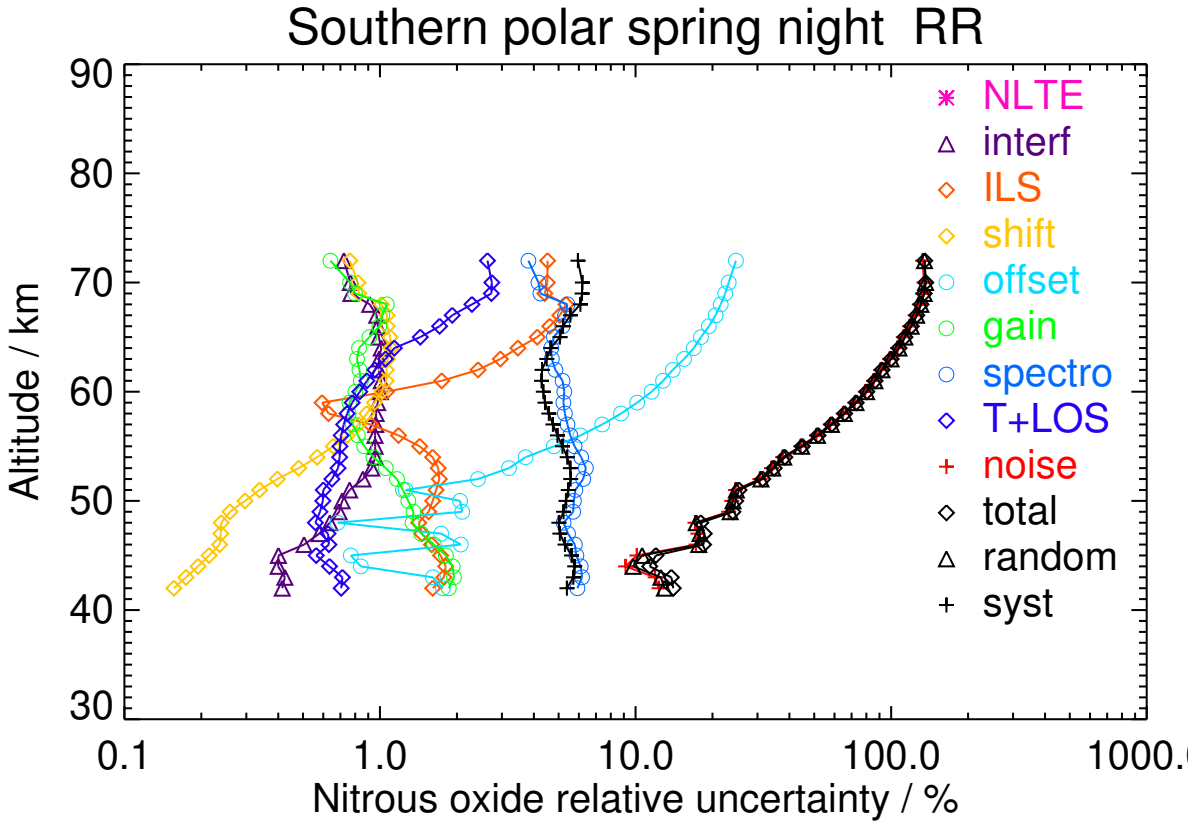

Figure S268. V8R_N2O_662 Southern polar spring night

Table S269. Nitrous oxide error budget for Southern polar summer day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	1.464	<0.001	0.008	0.041	0.008	0.020	0.033	0.126	0.023	0.196	0.200	0.134	0.241
50	0.176	<0.001	0.004	0.003	0.002	0.010	0.003	0.011	0.003	0.082	0.083	0.011	0.083
55	0.093	<0.001	0.003	<0.001	0.002	0.012	0.003	0.005	0.002	0.080	0.081	0.005	0.081
60	0.143	<0.001	0.004	0.004	0.003	0.025	0.004	0.006	0.003	0.156	0.159	0.006	0.159
65	0.675	<0.001	0.013	0.019	0.010	0.091	0.008	0.040	0.009	0.597	0.605	0.031	0.606
70	2.275	<0.001	0.028	0.129	0.028	0.343	0.027	0.141	0.040	1.984	2.019	0.138	2.024
74	6.448	0.002	0.059	0.655	0.085	1.427	0.032	0.226	0.178	8.119	8.246	0.694	8.275

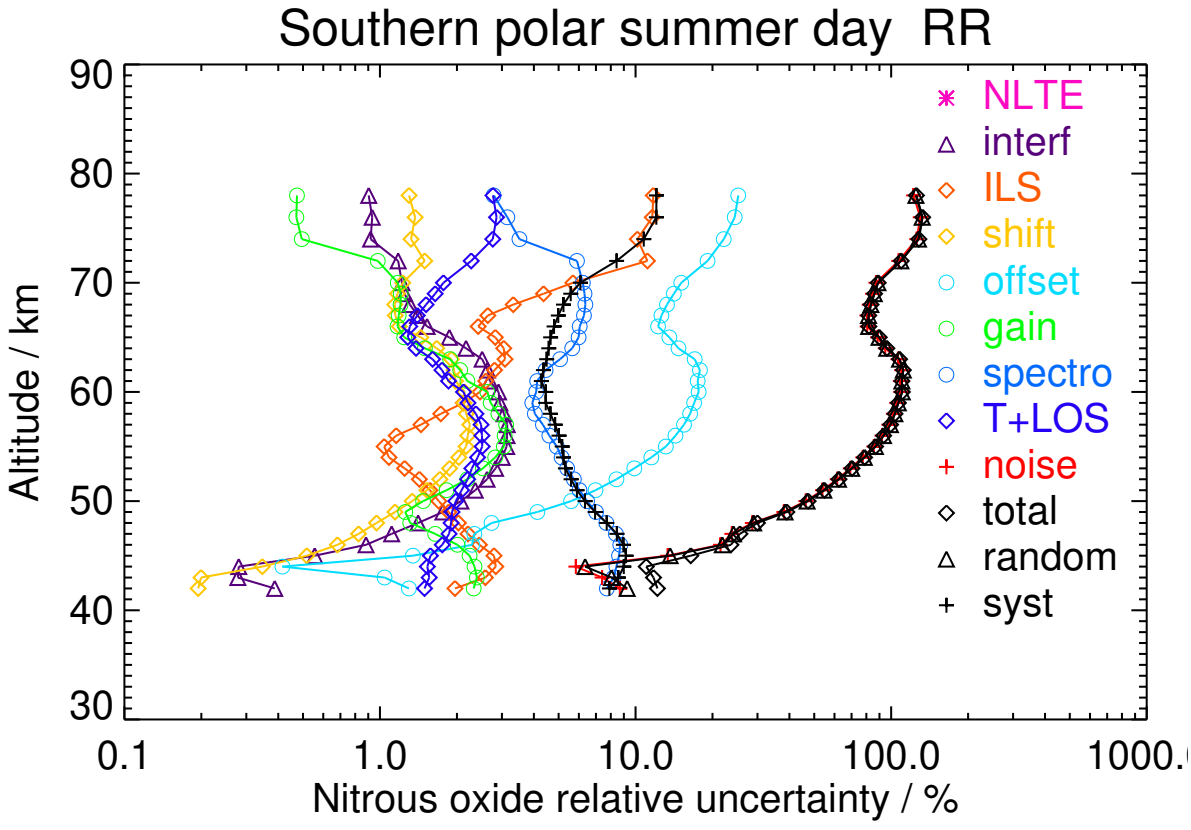

Figure S269. V8R_N2O_662 Southern polar summer day

Table S270. Nitrous oxide error budget for Southern polar summer night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.279	<0.001	0.005	0.007	0.002	0.010	0.002	0.024	0.005	0.091	0.093	0.021	0.095
50	0.123	<0.001	0.004	0.002	0.002	0.012	0.002	0.007	0.002	0.078	0.080	0.007	0.080
55	0.178	<0.001	0.005	0.002	0.003	0.027	0.003	0.008	0.002	0.157	0.160	0.008	0.160
60	0.290	<0.001	0.008	<0.001	0.005	0.060	0.004	0.012	0.003	0.329	0.334	0.011	0.334
65	1.713	<0.001	0.026	0.020	0.019	0.367	0.009	0.068	0.019	1.948	1.983	0.072	1.984
70	2.178	<0.001	0.027	0.035	0.021	0.553	0.013	0.077	0.027	2.827	2.881	0.086	2.882

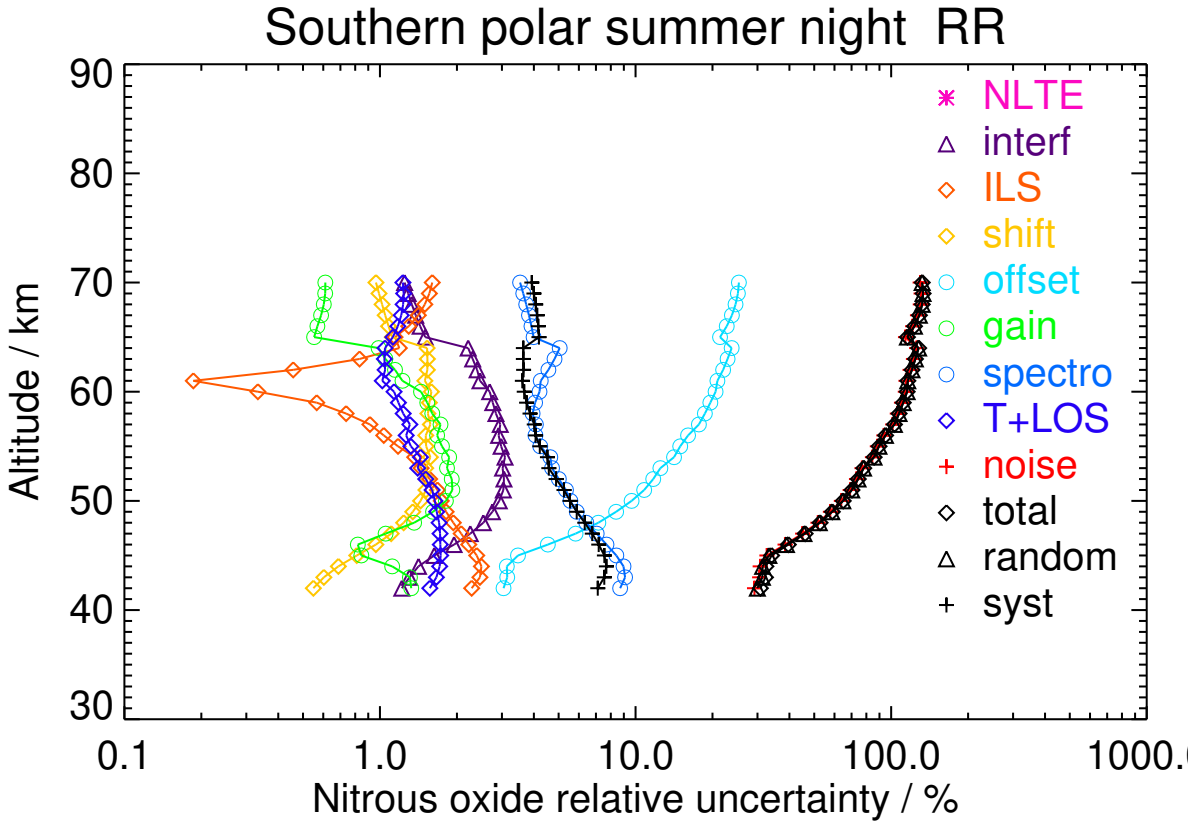

Figure S270. V8R_N2O_662 Southern polar summer night

Table S271. Nitrous oxide error budget for Southern polar autumn day. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.275	<0.001	0.006	0.002	0.002	0.015	0.001	0.009	0.002	0.153	0.154	0.008	0.154
50	0.313	<0.001	0.008	0.004	0.004	0.029	0.002	0.014	0.002	0.211	0.214	0.011	0.214
55	0.416	<0.001	0.009	0.006	0.006	0.060	0.003	0.019	0.003	0.356	0.361	0.016	0.362
60	0.644	<0.001	0.011	0.007	0.009	0.130	0.005	0.028	0.004	0.716	0.728	0.025	0.728
65	1.721	<0.001	0.018	0.010	0.016	0.408	0.015	0.067	0.015	2.208	2.245	0.067	2.246
70	2.003	<0.001	0.021	0.011	0.017	0.575	0.020	0.082	0.019	2.918	2.974	0.072	2.975

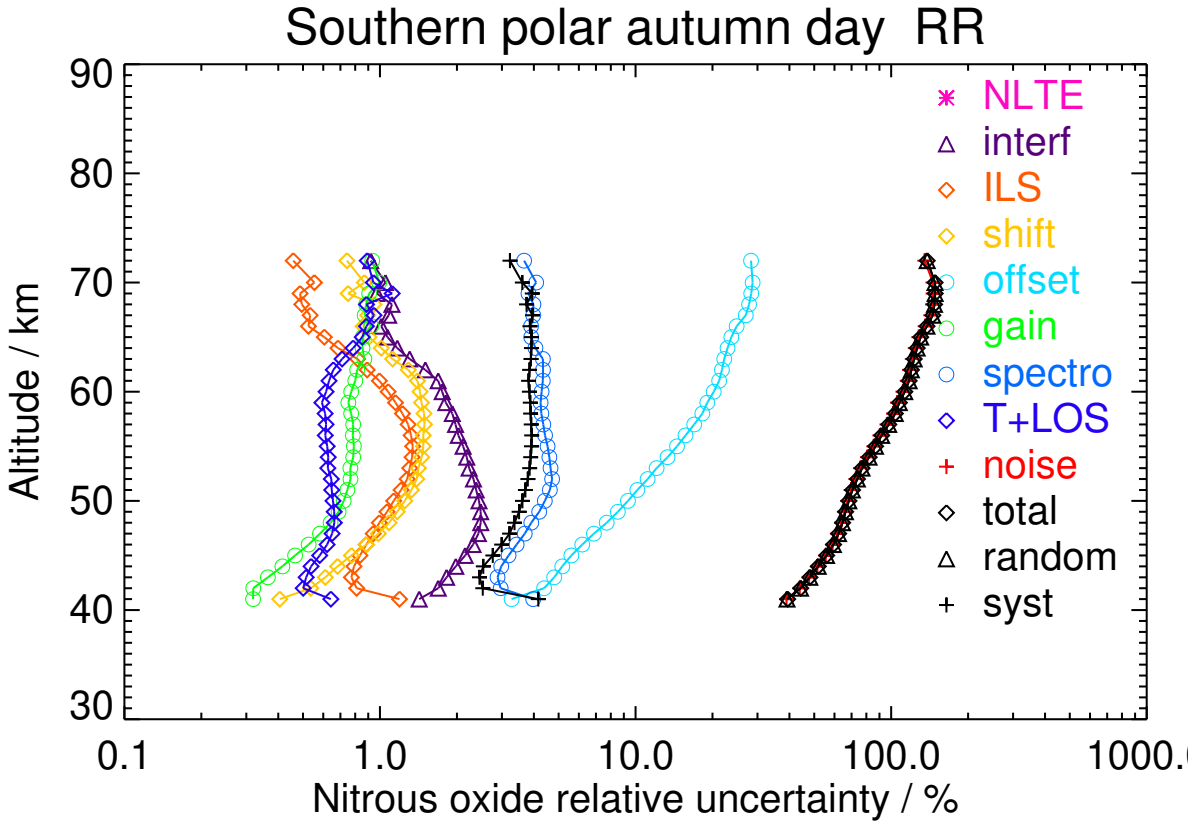

Figure S271. V8R_N2O_662 Southern polar autumn day

Table S272. Nitrous oxide error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (ppbv)	NLTE (ppbv)	interf (ppbv)	ILS (ppbv)	shift (ppbv)	offset (ppbv)	gain (ppbv)	spectro (ppbv)	T+LOS (ppbv)	noise (ppbv)	random (ppbv)	syst (ppbv)	total (ppbv)
45	0.396	<0.001	0.008	0.003	0.003	0.019	0.002	0.014	0.002	0.205	0.206	0.012	0.206
50	0.444	<0.001	0.009	0.005	0.005	0.035	0.004	0.021	0.003	0.269	0.272	0.017	0.273
55	0.507	<0.001	0.009	0.007	0.006	0.067	0.004	0.025	0.003	0.410	0.416	0.021	0.417
60	0.727	<0.001	0.010	0.010	0.007	0.128	0.006	0.035	0.004	0.723	0.734	0.029	0.735
65	1.913	<0.001	0.015	0.025	0.009	0.371	0.023	0.081	0.017	2.095	2.128	0.076	2.129
70	2.487	<0.001	0.016	0.019	0.008	0.598	0.026	0.081	0.025	3.257	3.312	0.087	3.313

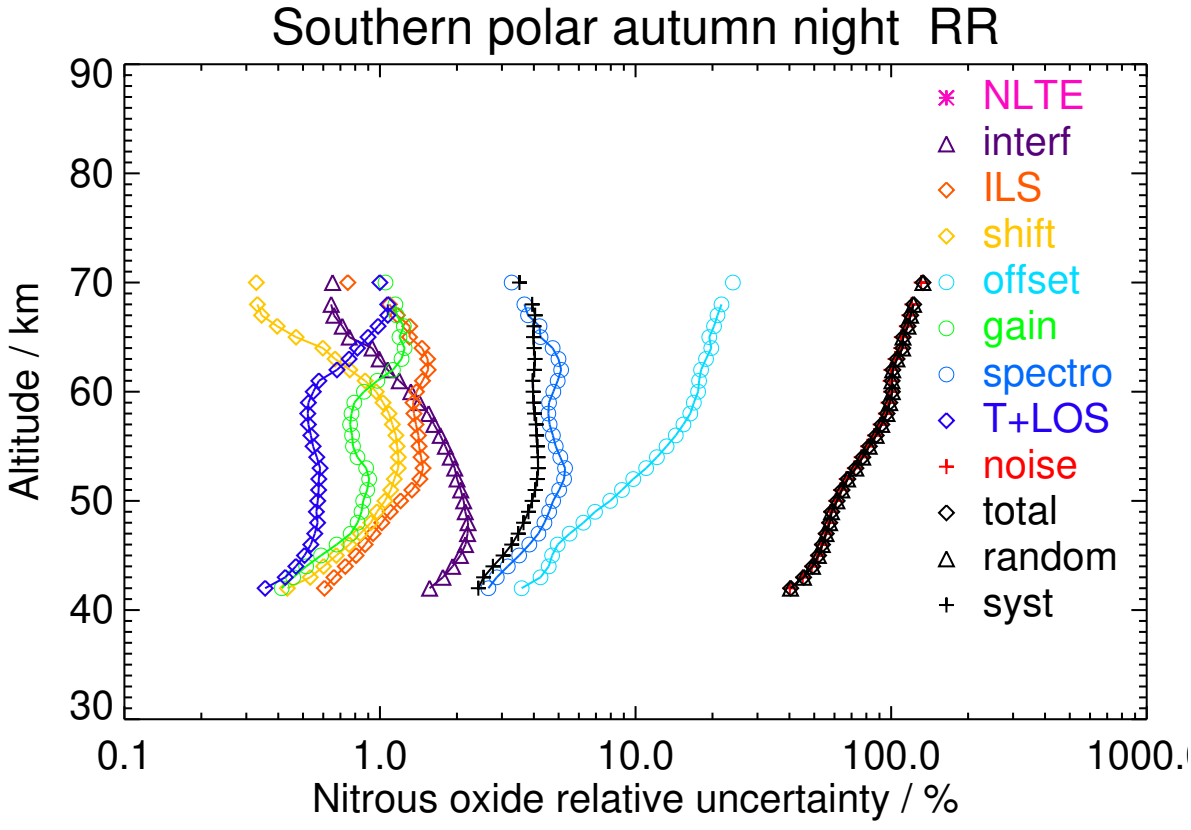

Figure S272. V8R_N2O_662 Southern polar autumn night