

Supplement to
**MIPAS IMK/IAA version 8 retrieval of nitric oxide and lower
thermospheric temperature**

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This document serves as reference for the definitions of the representative atmospheres used for the calculation of nitric oxide error budgets, as listed in Tab. S1, and as collection of the respective error budgets for V8R_NO_561 (MA) data, which are listed in tables S2–S35 and depicted in figures S1–S34.

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 nitric oxide profile that was calculated from the single geolocations which contribute to the respective representative atmospheres.

Table S1. Labels and definitions of the representative atmospheric conditions which were used to calculate the error budget for FR and RR data.

representative atmosphere label	month(s) used	latitude range	solar zenith angle range
Northern polar winter day	Jan, Feb	65°N – 90°N	< 90°
Northern polar winter night	Jan, Feb	65°N – 90°N	> 98°
Northern polar spring day	Apr	65°N – 90°N	< 90°
Northern polar spring night	Apr	65°N – 90°N	> 98°
Northern polar summer day	Jul, Aug	65°N – 90°N	< 90°
Northern polar summer night	Jul, Aug	65°N – 90°N	> 98°
Northern polar autumn day	Oct	65°N – 90°N	< 90°
Northern polar autumn night	Oct	65°N – 90°N	> 98°
Northern midlatitude winter day	Jan, Feb	40°N – 60°N	< 90°
Northern midlatitude winter night	Jan, Feb	40°N – 60°N	> 98°
Northern midlatitude spring day	Apr	40°N – 60°N	< 90°
Northern midlatitude spring night	Apr	40°N – 60°N	> 98°
Northern midlatitude summer day	Jul, Aug	40°N – 60°N	< 90°
Northern midlatitude summer night	Jul, Aug	40°N – 60°N	> 98°
Northern midlatitude autumn day	Oct	40°N – 60°N	< 90°
Northern midlatitude autumn night	Oct	40°N – 60°N	> 98°
Tropics day	Apr	20°S – 20°N	< 90°
Tropics night	Apr	20°S – 20°N	> 98°
Southern midlatitude winter day	Jul, Aug	40°S – 60°S	< 90°
Southern midlatitude winter night	Jul, Aug	40°S – 60°S	> 98°
Southern midlatitude spring day	Oct	40°S – 60°S	< 90°
Southern midlatitude spring night	Oct	40°S – 60°S	> 98°
Southern midlatitude summer day	Jan, Feb	40°S – 60°S	< 90°
Southern midlatitude summer night	Jan, Feb	40°S – 60°S	> 98°
Southern midlatitude autumn day	Apr	40°S – 60°S	< 90°
Southern midlatitude autumn night	Apr	40°S – 60°S	> 98°
Southern polar winter day	Jul, Aug	65°S – 90°S	< 90°
Southern polar winter night	Jul, Aug	65°S – 90°S	> 98°
Southern polar spring day	Oct	65°S – 90°S	< 90°
Southern polar spring night	Oct	65°S – 90°S	> 98°
Southern polar summer day	Jan, Feb	65°S – 90°S	< 90°
Southern polar summer night	Jan, Feb	65°S – 90°S	> 98°
Southern polar autumn day	Apr	65°S – 90°S	< 90°
Southern polar autumn night	Apr	65°S – 90°S	> 98°

Table S2. Nitric oxide error budget for Northern polar winter day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
30	0.00	9.85	0.52	0.65	0.37	1.37	2.16	12.39	2.15	40.62	41.14	14.83	43.73
40	0.01	13.46	0.18	2.16	0.31	1.43	2.68	12.96	2.83	44.07	44.84	17.40	48.10
50	0.01	14.72	0.22	2.09	0.19	0.99	1.77	12.56	4.72	56.08	57.24	16.58	59.59
60	0.02	16.88	0.30	2.14	0.24	1.52	1.24	12.67	9.44	54.86	56.90	17.74	59.60
70	0.11	15.42	0.20	2.19	0.17	1.31	1.04	11.19	11.58	36.75	39.91	16.20	43.08
80	0.55	15.01	0.20	1.77	0.12	1.06	0.91	9.69	12.40	30.84	34.85	14.65	37.81
90	3.31	16.85	0.20	1.36	0.21	1.85	0.69	7.91	13.14	32.28	35.96	16.55	39.58
100	21.54	20.06	0.16	1.00	0.20	2.50	0.55	6.69	19.17	24.75	32.48	19.49	37.88
110	120.59	15.12	0.27	1.19	0.05	1.66	0.62	6.49	39.83	16.55	43.77	14.85	46.22
120	186.00	16.79	0.19	1.67	0.05	1.28	0.58	7.86	32.04	10.18	34.07	17.84	38.46
130	203.89	21.15	0.07	1.81	0.07	1.16	0.63	8.85	21.22	8.06	23.25	22.47	32.34
140	236.83	23.02	0.20	1.80	0.09	1.07	0.71	9.06	15.86	9.13	18.97	24.33	30.85
150	264.19	24.40	0.28	1.72	0.10	1.19	0.77	8.85	11.98	11.15	17.37	25.40	30.77

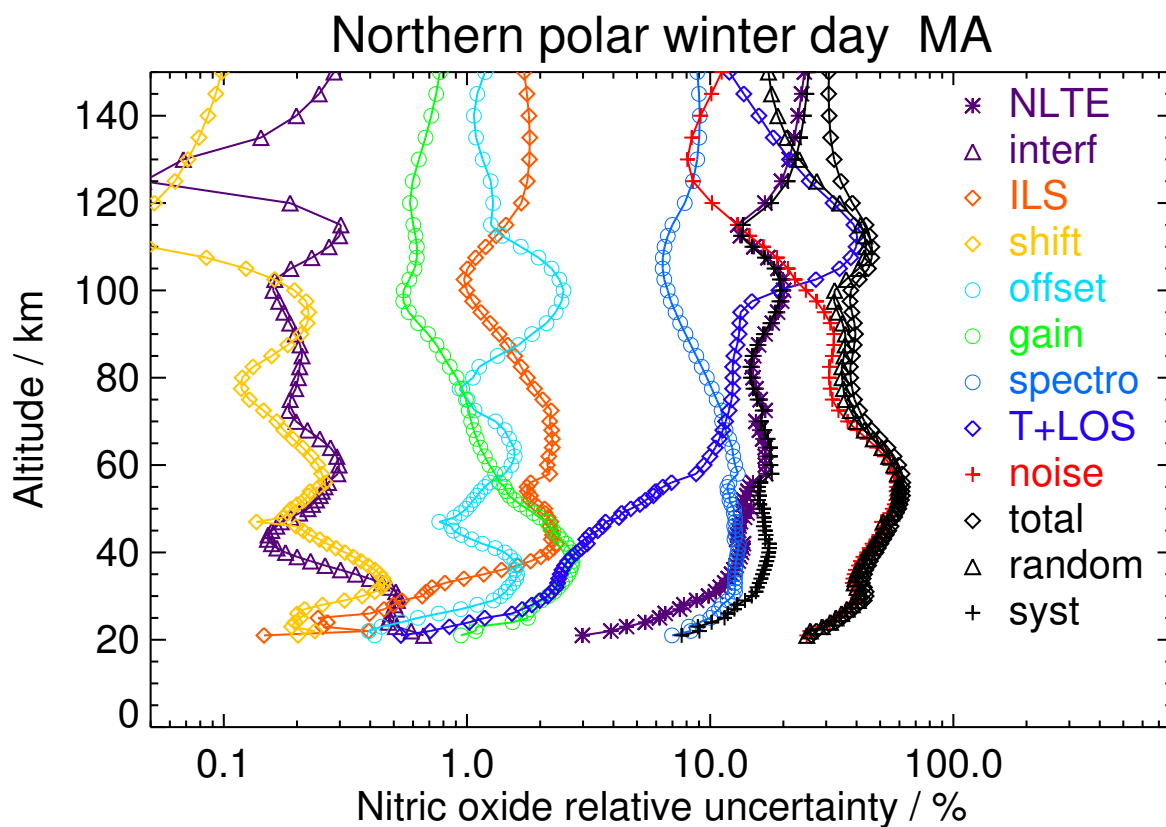


Figure S1. V8R_NO_561 Northern polar winter day

Table S3. Nitric oxide error budget for Northern polar winter night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	3.57	1.63	0.86	0.83	3.14	7.44	4.84	2.12	80.82	81.28	5.92	81.50
50	0.00	7.21	0.20	1.10	0.22	0.93	1.88	7.01	3.91	54.40	55.00	7.49	55.51
60	0.04	14.09	0.30	1.44	0.34	1.52	1.28	9.96	8.56	48.63	50.92	12.25	52.37
70	0.27	15.31	0.23	1.48	0.30	1.84	1.03	10.07	10.45	37.56	41.08	13.22	43.16
80	0.73	16.73	0.21	1.34	0.14	1.71	0.89	9.21	9.84	37.39	40.86	14.00	43.19
90	4.52	16.52	0.22	1.23	0.21	2.15	0.73	8.35	11.14	37.77	40.81	15.33	43.60
100	22.49	19.71	0.23	1.10	0.22	2.92	0.65	7.93	20.52	33.72	40.87	18.68	44.94
110	111.02	17.29	0.24	1.26	0.09	2.16	0.62	7.69	33.70	23.79	42.15	17.03	45.45
120	202.51	17.20	0.14	1.48	0.02	0.97	0.56	7.85	30.09	10.41	32.79	17.30	37.07
130	202.15	20.03	0.07	1.60	0.05	1.20	0.53	8.28	21.49	9.67	25.24	19.80	32.08
140	216.22	20.85	0.15	1.61	0.05	1.26	0.54	8.29	17.17	11.83	22.87	20.48	30.70
150	228.36	20.73	0.20	1.55	0.06	1.32	0.53	7.97	13.99	13.38	21.45	20.32	29.55

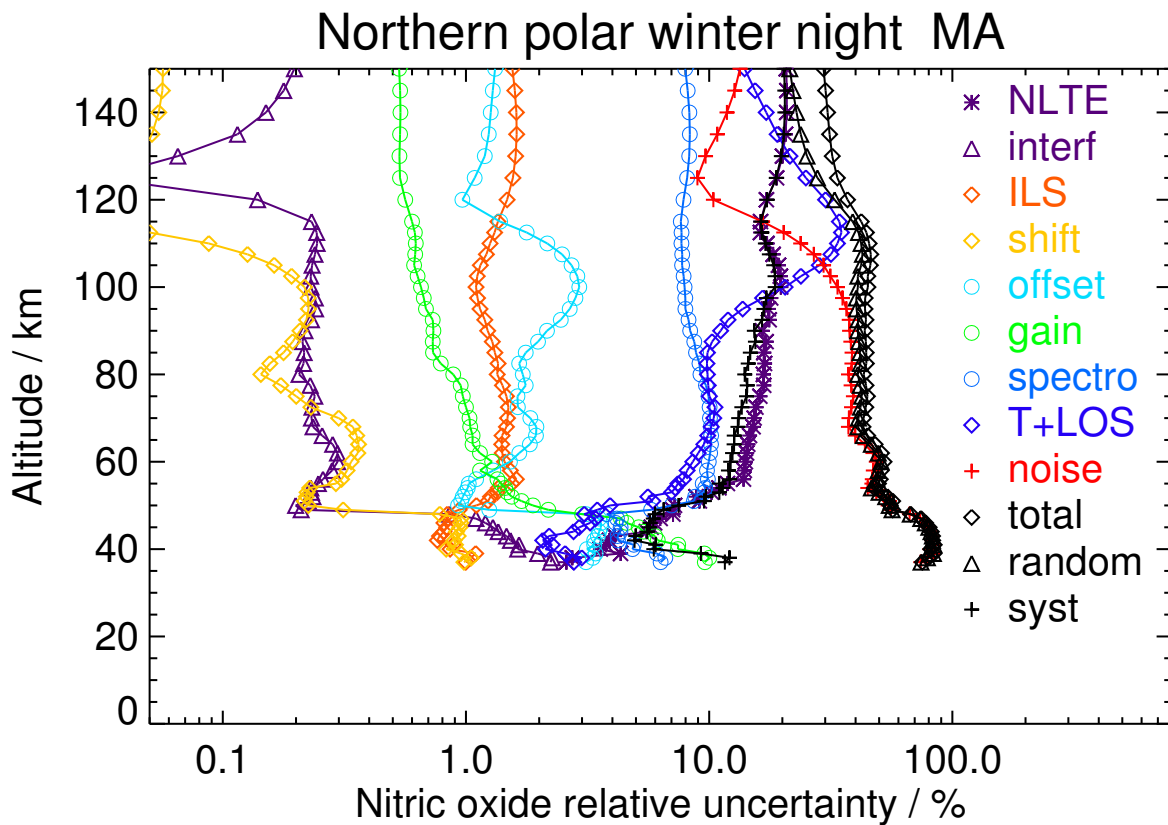
**Figure S2.** V8R_NO_561 Northern polar winter night

Table S4. Nitric oxide error budget for Northern polar spring day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	5.13	0.37	0.49	0.08	0.52	2.02	5.77	1.50	21.95	22.48	6.58	23.42
30	0.01	9.68	0.23	1.58	0.49	1.31	2.79	9.96	1.83	34.48	35.16	12.71	37.38
40	0.01	5.79	0.16	1.44	0.32	0.70	1.81	11.09	1.31	23.98	25.19	10.22	27.19
50	0.01	3.76	0.06	2.16	0.20	0.21	2.04	10.83	1.58	18.63	19.76	9.97	22.13
60	0.01	15.60	0.18	1.59	0.21	1.41	0.97	9.16	4.05	49.61	51.02	14.38	53.01
70	0.02	18.63	0.15	1.79	0.22	1.91	0.69	9.03	7.55	48.10	50.18	16.98	52.98
80	0.06	23.62	0.18	1.59	0.25	2.73	0.60	8.76	10.72	53.96	56.89	20.85	60.59
90	0.53	31.19	0.21	1.46	0.36	3.88	0.73	8.06	16.09	51.53	56.71	27.45	63.00
100	5.40	41.71	0.19	1.25	0.35	3.85	0.62	7.08	22.58	38.11	48.84	37.20	61.39
110	41.01	33.21	0.18	1.37	0.10	2.46	0.57	7.33	24.99	24.10	39.99	27.76	48.68
120	106.33	23.49	0.14	1.50	0.13	1.30	0.53	7.96	23.85	12.29	29.64	21.46	36.60
130	183.81	22.66	0.03	1.55	0.11	1.09	0.56	8.43	19.34	7.47	23.07	22.05	31.91
140	286.41	21.89	0.04	1.56	0.07	0.87	0.60	8.50	15.99	6.81	19.14	22.14	29.27
150	377.69	23.07	0.09	1.51	0.04	0.92	0.64	8.30	12.92	8.36	17.32	23.27	29.01

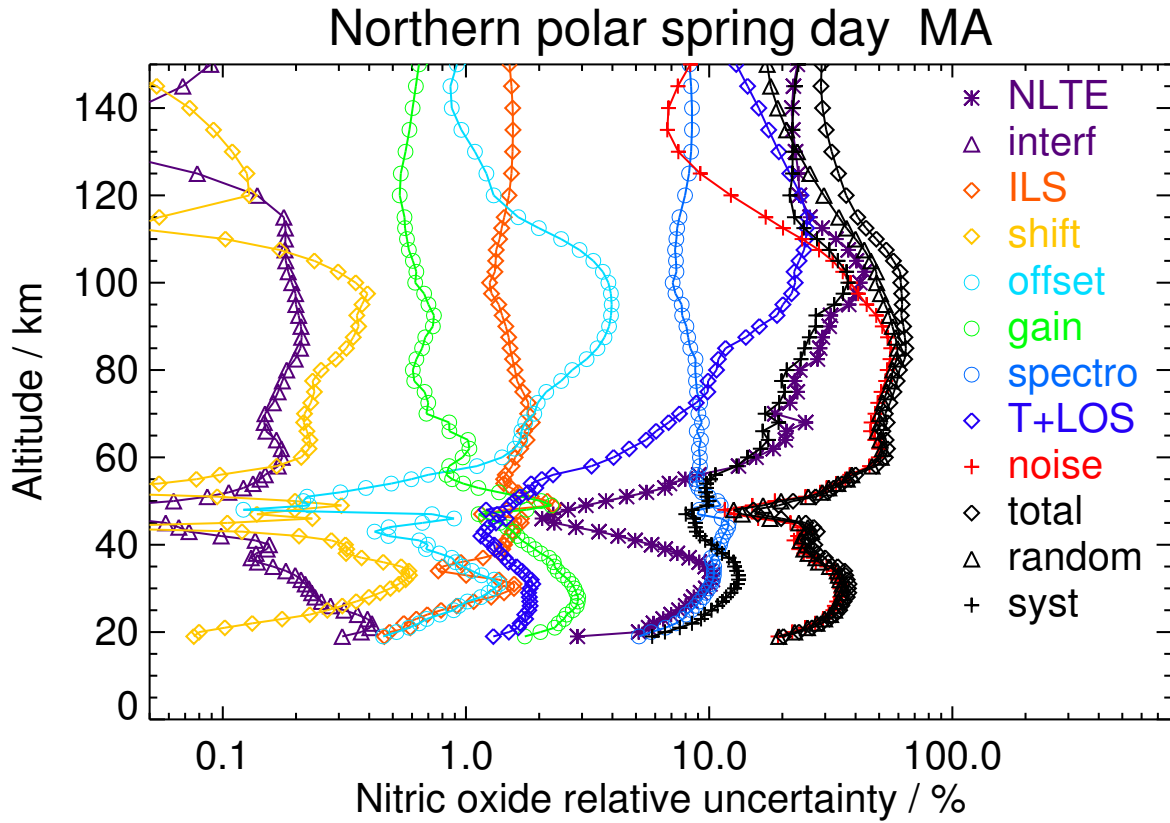


Figure S3. V8R_NO_561 Northern polar spring day

Table S5. Nitric oxide error budget for Northern polar spring night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	6.22	0.53	0.19	0.02	0.80	0.97	1.17	1.21	41.89	42.32	2.75	42.41
50	0.00	6.97	0.22	0.65	0.14	0.82	1.61	6.91	2.40	36.55	37.20	7.59	37.97
60	0.01	15.76	0.27	1.19	0.14	1.81	2.02	8.17	4.54	54.03	55.56	13.30	57.13
70	0.13	2.06	0.14	0.50	0.23	1.67	0.70	6.40	4.22	41.02	41.29	6.68	41.82
80	0.13	4.53	0.28	0.69	0.34	2.37	0.45	5.95	6.51	51.62	52.17	6.96	52.63
90	0.74	28.24	0.30	1.11	0.40	3.28	0.91	7.59	18.24	43.91	50.59	23.88	55.94
100	4.78	28.25	0.28	1.24	0.33	3.81	0.68	8.09	22.58	38.69	47.01	26.02	53.73
110	37.28	21.25	0.25	1.24	0.15	2.62	0.59	7.87	25.12	27.79	38.75	20.58	43.88
120	79.08	17.68	0.13	1.37	0.05	1.15	0.49	8.01	22.13	12.02	25.94	18.48	31.85
130	111.49	18.15	0.02	1.43	0.07	1.04	0.49	7.89	19.02	7.72	21.21	19.16	28.58
140	144.80	18.24	0.09	1.43	0.05	1.04	0.50	7.59	16.58	9.17	19.70	19.09	27.43
150	167.97	18.16	0.13	1.38	0.03	1.16	0.51	7.07	14.24	11.34	19.30	18.49	26.73

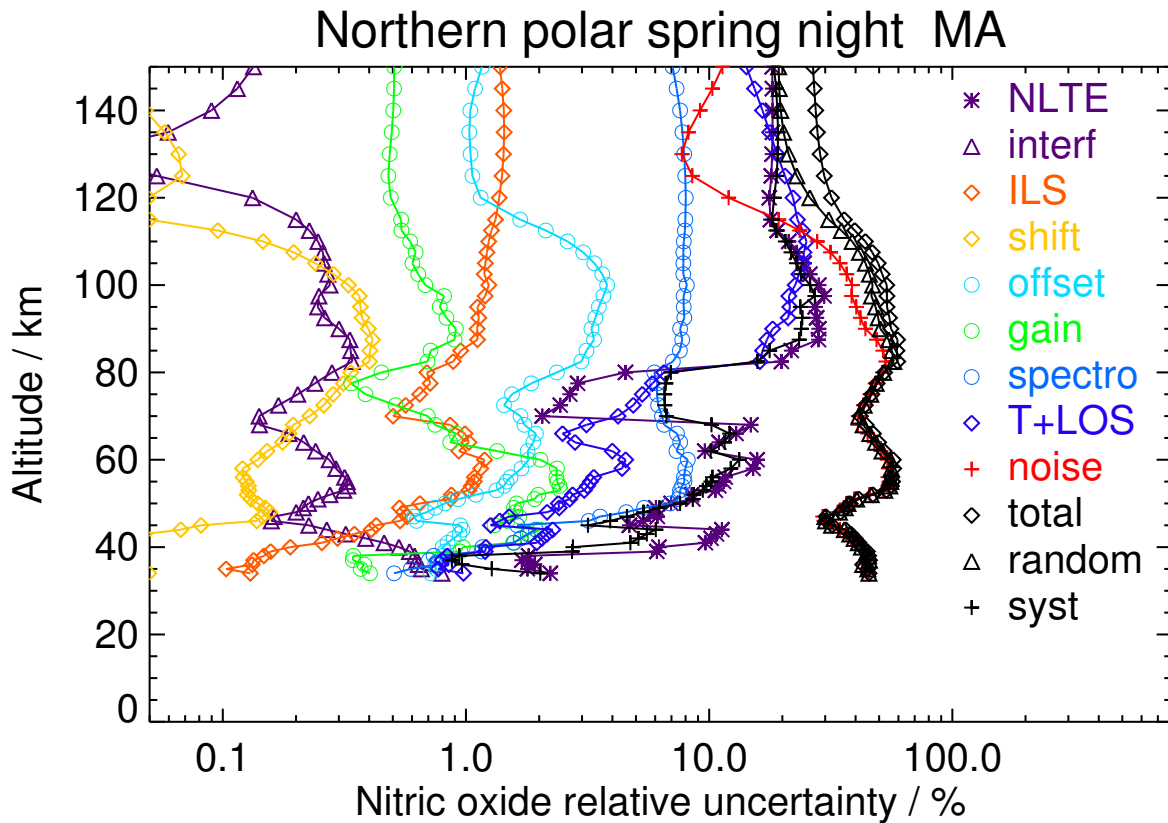
**Figure S4.** V8R_NO_561 Northern polar spring night

Table S6. Nitric oxide error budget for Northern polar summer day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.35	0.45	0.29	0.09	0.44	2.08	7.35	1.36	19.64	19.77	7.57	21.17
30	0.01	4.16	0.15	2.46	0.23	0.66	2.52	9.00	1.80	17.89	18.13	10.29	20.85
40	0.01	2.27	0.13	0.62	0.25	0.42	1.41	8.58	1.03	15.79	15.89	8.91	18.22
50	0.01	1.28	0.08	1.03	0.08	0.17	1.22	8.01	0.73	18.15	18.22	8.15	19.96
60	0.01	8.26	0.22	1.38	0.40	1.12	1.09	8.86	5.44	41.42	42.22	10.66	43.55
70	0.02	15.20	0.17	1.89	0.63	1.40	1.14	10.25	18.06	38.43	43.68	15.44	46.33
80	0.03	15.51	0.28	1.81	0.80	2.32	0.96	10.83	35.84	41.30	55.33	17.23	57.95
90	0.81	24.60	0.21	1.44	0.71	2.76	0.99	8.24	48.97	35.17	61.63	22.83	65.72
100	20.44	19.45	0.14	1.35	0.32	2.54	0.61	7.29	22.84	25.12	35.65	17.94	39.91
110	53.54	15.20	0.22	1.44	0.10	1.15	0.65	7.50	27.07	13.17	31.09	15.19	34.61
120	81.14	19.07	0.10	1.59	0.12	1.26	0.66	8.61	28.17	9.84	30.49	20.09	36.51
130	141.15	20.07	0.11	1.58	0.09	1.19	0.69	8.86	27.40	9.83	29.66	21.29	36.51
140	234.70	20.58	0.22	1.52	0.08	1.20	0.71	8.66	26.13	11.09	28.90	21.76	36.18
150	311.01	21.10	0.29	1.44	0.06	1.32	0.76	8.19	23.89	12.91	27.79	21.95	35.41

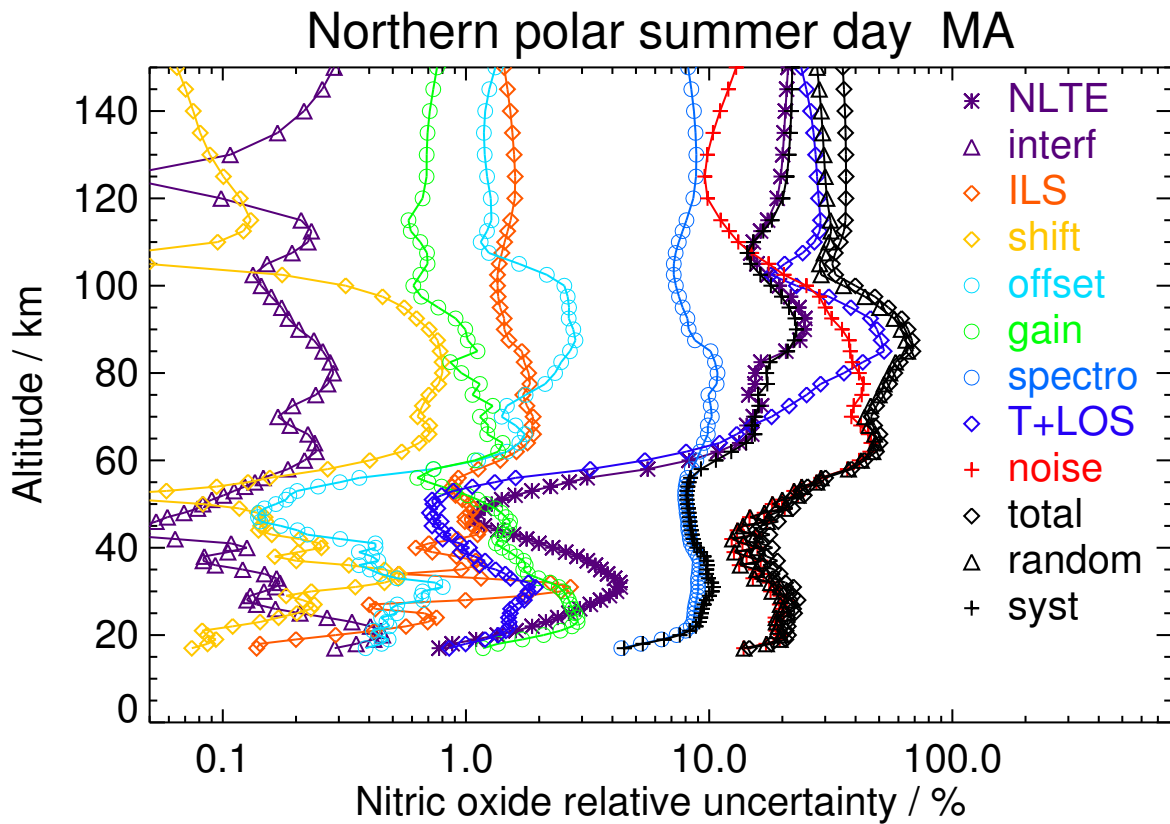


Figure S5. V8R_NO_561 Northern polar summer day

Table S7. Nitric oxide error budget for Northern polar summer night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	6.98	0.73	0.25	0.05	0.70	1.63	1.83	1.56	44.18	44.74	2.85	44.84
50	0.00	10.23	0.39	0.80	0.23	1.20	3.33	3.78	3.30	38.75	40.05	6.43	40.56
60	0.00	10.91	0.42	0.89	0.33	2.09	1.94	6.71	8.85	59.72	60.99	9.96	61.79
90	0.63	18.05	0.44	1.00	0.62	3.93	0.68	7.29	27.69	46.90	55.49	16.85	57.99
100	11.10	17.42	0.32	1.20	0.39	3.30	0.75	7.58	22.25	32.56	41.07	15.54	43.92
110	50.20	14.39	0.27	1.24	0.11	1.81	0.64	7.63	26.65	19.94	34.23	14.37	37.13
120	86.37	15.10	0.09	1.21	0.10	1.22	0.48	7.35	24.44	9.46	26.88	15.79	31.18
130	101.26	15.97	0.09	1.26	0.10	1.36	0.57	7.07	20.60	10.01	23.48	16.80	28.87
140	131.59	15.88	0.16	1.27	0.07	1.29	0.62	6.71	18.01	11.21	21.69	16.75	27.41
150	160.67	15.63	0.19	1.23	0.04	1.33	0.63	6.21	15.57	12.58	20.61	16.21	26.22

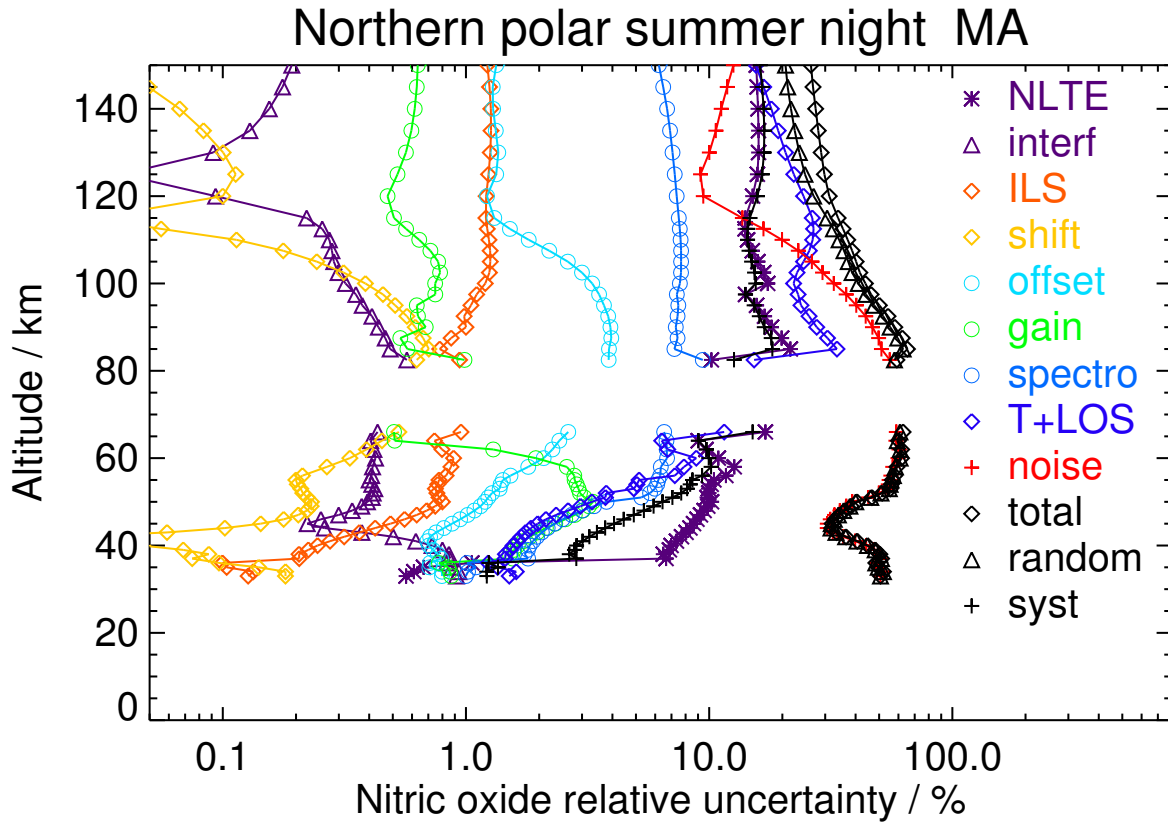
**Figure S6.** V8R_NO_561 Northern polar summer night

Table S8. Nitric oxide error budget for Northern polar autumn day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.99	0.42	0.12	0.10	0.47	1.28	5.10	0.76	23.11	23.16	5.51	23.81
30	0.01	8.57	0.15	0.76	0.29	1.01	3.66	10.56	1.81	25.59	25.96	13.56	29.29
40	0.01	6.22	0.14	1.73	0.24	0.85	1.94	10.62	1.03	29.04	29.25	12.17	31.68
50	0.00	4.80	0.14	1.55	0.07	0.72	1.12	9.32	1.54	41.13	41.34	9.93	42.52
60	0.00	9.46	0.23	1.57	0.06	2.20	0.67	9.42	2.98	65.92	66.30	12.03	67.39
70	0.01	11.83	0.29	1.69	0.12	2.45	0.62	9.91	5.57	65.99	66.57	14.17	68.06
80	0.05	14.93	0.38	1.68	0.18	3.19	0.59	9.55	7.68	66.49	67.43	16.17	69.34
90	0.58	15.74	0.41	1.51	0.21	3.85	0.57	8.76	13.13	53.28	55.53	16.43	57.91
100	4.43	15.56	0.41	1.33	0.18	3.88	0.52	8.19	22.82	41.21	47.63	16.65	50.45
110	28.69	14.24	0.32	1.42	0.09	2.48	0.52	8.37	26.75	27.84	38.97	15.91	42.09
120	46.92	15.69	0.09	1.53	0.03	1.04	0.52	8.62	21.74	11.37	24.80	17.64	30.43
130	75.55	17.46	0.09	1.52	0.07	1.33	0.54	8.45	18.83	10.75	22.06	19.09	29.17
140	109.21	17.76	0.17	1.47	0.08	1.47	0.54	8.12	16.80	12.77	21.56	19.15	28.84
150	141.70	17.26	0.21	1.38	0.09	1.52	0.53	7.58	14.76	14.16	20.95	18.42	27.90

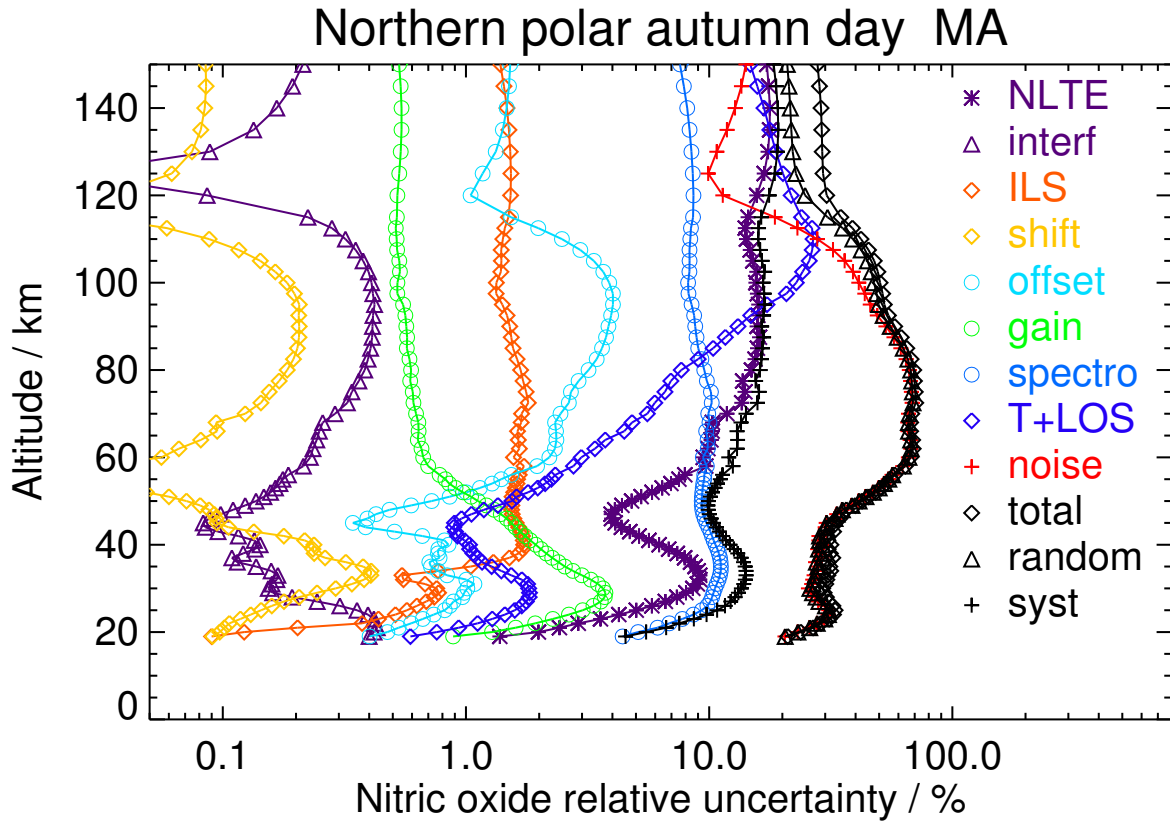


Figure S7. V8R_NO_561 Northern polar autumn day

Table S9. Nitric oxide error budget for Northern polar autumn night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	5.33	0.35	0.80	0.13	2.40	0.86	6.27	2.88	69.03	69.42	5.36	69.63
50	0.00	12.32	0.27	1.53	0.10	1.84	0.90	9.59	4.07	64.83	66.17	9.56	66.85
60	0.01	14.75	0.26	1.67	0.05	2.31	0.87	10.99	5.22	60.29	61.99	12.91	63.32
70	0.04	11.70	0.29	1.46	0.12	2.46	0.84	10.47	6.64	58.69	59.66	13.58	61.19
80	0.14	16.36	0.40	1.34	0.17	2.74	0.78	10.58	8.93	58.89	60.69	15.94	62.75
90	1.27	14.83	0.44	1.21	0.22	3.35	0.73	9.68	12.54	47.82	50.27	15.63	52.64
100	7.00	15.86	0.40	1.25	0.18	3.47	0.64	9.20	24.75	38.00	46.00	17.05	49.06
110	39.70	14.96	0.30	1.27	0.09	2.21	0.55	8.38	28.86	26.18	39.57	15.91	42.65
120	69.50	15.99	0.05	1.44	0.04	0.99	0.54	8.50	25.30	10.74	28.01	17.40	32.97
130	83.35	17.33	0.14	1.53	0.08	1.36	0.54	8.45	21.06	11.75	24.82	18.49	30.95
140	101.47	17.33	0.21	1.52	0.08	1.48	0.54	8.17	18.36	13.83	23.78	18.29	30.00
150	118.75	16.55	0.24	1.44	0.08	1.48	0.51	7.64	15.89	14.68	22.46	17.33	28.37

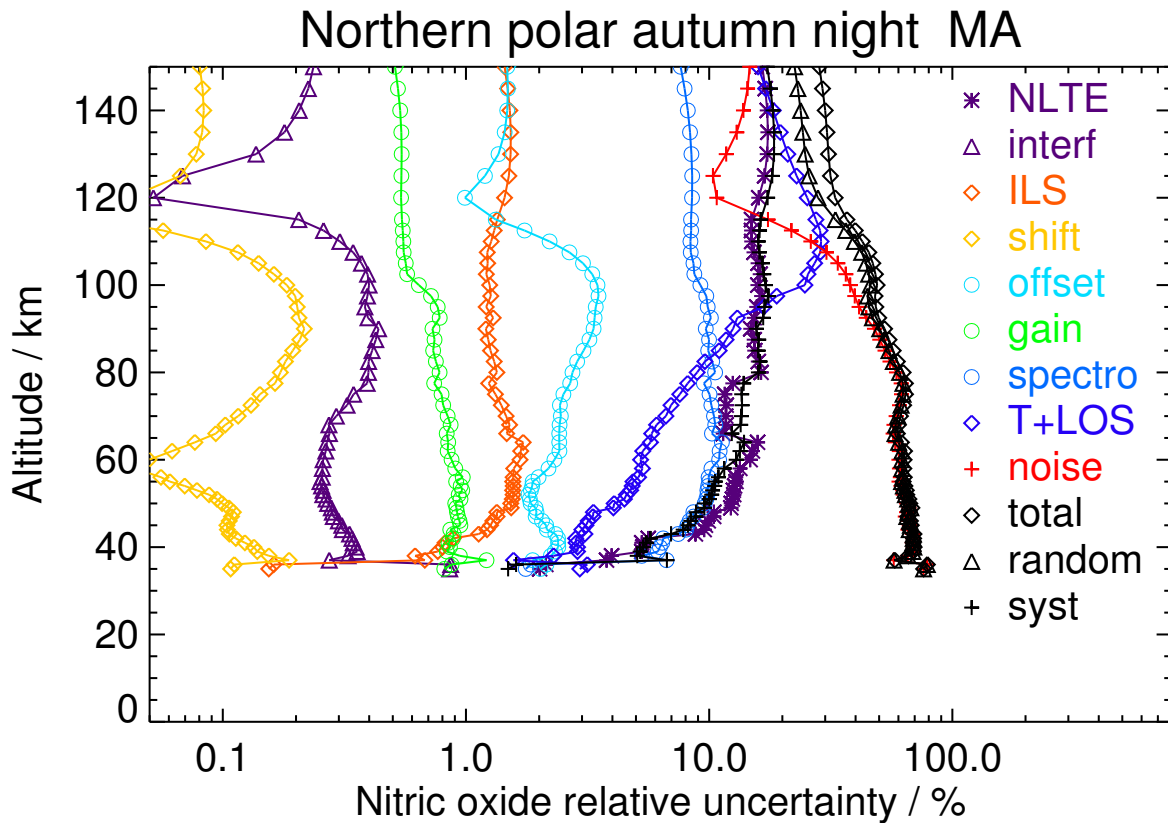
**Figure S8.** V8R_NO_561 Northern polar autumn night

Table S10. Nitric oxide error budget for Northern midlatitude winter day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.98	0.79	0.19	0.06	0.47	1.44	5.65	0.66	24.72	24.80	5.95	25.50
30	0.00	9.58	0.20	0.67	0.36	1.00	3.06	11.90	1.63	26.46	26.84	15.05	30.78
40	0.01	7.44	0.06	1.66	0.19	0.65	2.27	10.55	1.21	24.17	24.54	12.58	27.57
50	0.01	3.58	0.10	1.20	0.06	0.61	1.58	8.90	1.34	35.81	35.98	9.27	37.16
60	0.01	9.38	0.24	1.26	0.07	2.35	0.98	7.60	3.99	62.81	63.29	10.40	64.14
70	0.02	13.46	0.29	1.46	0.15	2.78	0.82	7.56	6.31	64.84	65.66	13.50	67.03
80	0.07	16.32	0.32	1.22	0.18	2.98	0.66	6.98	8.48	58.56	59.68	16.29	61.87
90	0.72	16.88	0.29	1.15	0.24	3.42	0.60	6.86	11.66	45.57	47.62	17.03	50.58
100	5.72	16.26	0.24	1.19	0.23	3.30	0.61	6.93	19.80	33.25	39.41	16.42	42.69
110	29.72	13.11	0.24	1.26	0.11	2.20	0.54	7.04	26.60	23.57	35.99	14.00	38.62
120	52.23	12.62	0.14	1.36	0.04	1.15	0.48	7.30	23.76	11.68	26.78	14.13	30.28
130	72.61	14.62	0.03	1.38	0.10	1.13	0.54	7.38	19.77	8.49	21.94	15.91	27.10
140	96.13	15.52	0.07	1.36	0.12	1.11	0.63	7.26	16.98	9.02	19.80	16.57	25.82
150	120.35	15.96	0.12	1.30	0.13	1.16	0.70	6.91	14.31	10.68	18.65	16.65	25.00

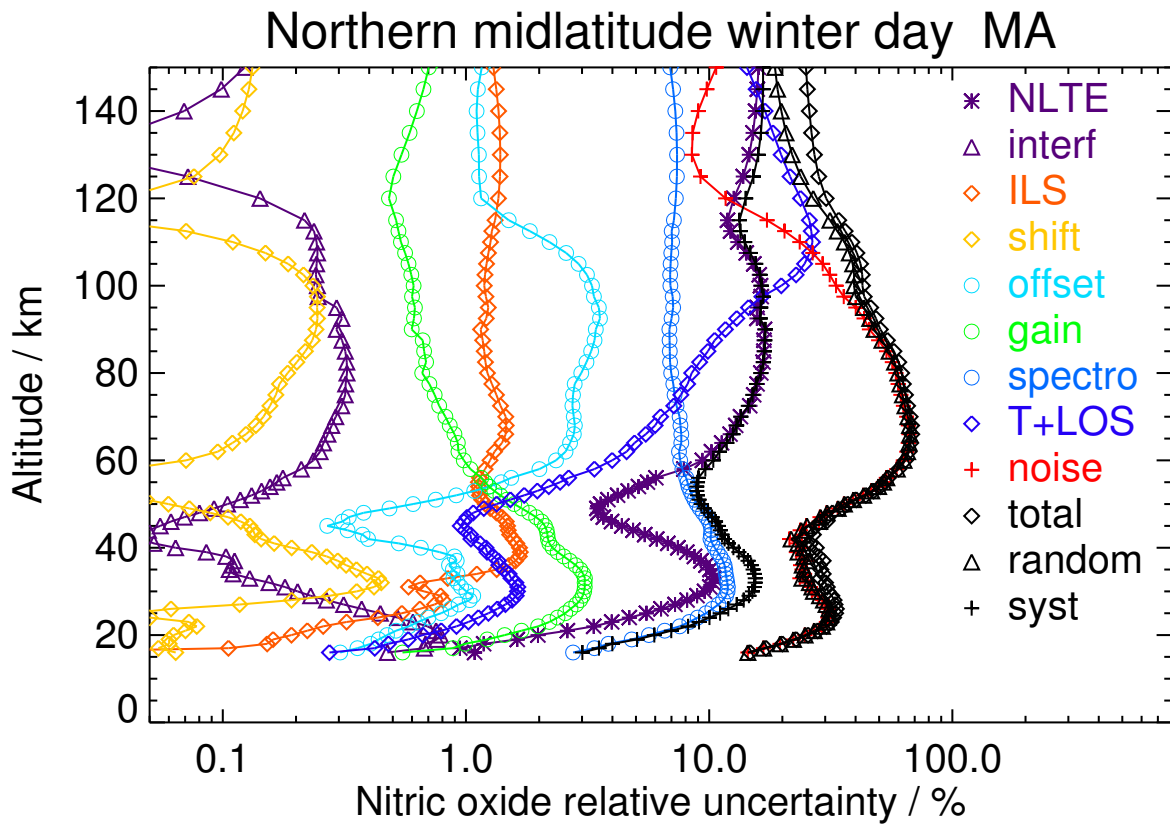


Figure S9. V8R_NO_561 Northern midlatitude winter day

Table S11. Nitric oxide error budget for Northern midlatitude winter night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
60	0.00	5.87	0.39	0.91	0.15	3.40	1.72	6.64	5.75	87.07	87.57	6.24	87.80
70	0.02	4.77	0.33	0.79	0.17	2.83	1.04	7.35	5.04	69.67	70.04	7.71	70.47
80	0.16	12.05	0.34	0.83	0.48	2.91	0.52	5.92	9.44	64.87	66.53	7.82	66.99
90	1.30	11.65	0.25	0.92	0.41	3.20	0.52	6.99	12.84	46.62	49.50	9.17	50.34
100	8.93	11.83	0.23	0.92	0.32	3.12	0.55	7.33	18.89	33.37	39.27	11.53	40.92
110	23.75	9.98	0.20	0.97	0.11	1.93	0.75	6.24	23.60	21.25	32.19	10.77	33.94
120	38.76	10.40	0.08	1.05	0.05	1.19	0.50	5.86	20.72	11.52	24.03	11.40	26.59
130	31.41	10.57	0.11	1.06	0.06	1.39	0.49	5.59	18.26	13.12	22.85	11.39	25.53
140	31.51	10.44	0.20	1.04	0.06	1.59	0.51	5.33	16.57	15.48	23.10	11.03	25.60
150	33.27	9.99	0.24	0.98	0.06	1.67	0.50	4.94	14.82	16.43	22.60	10.34	24.86

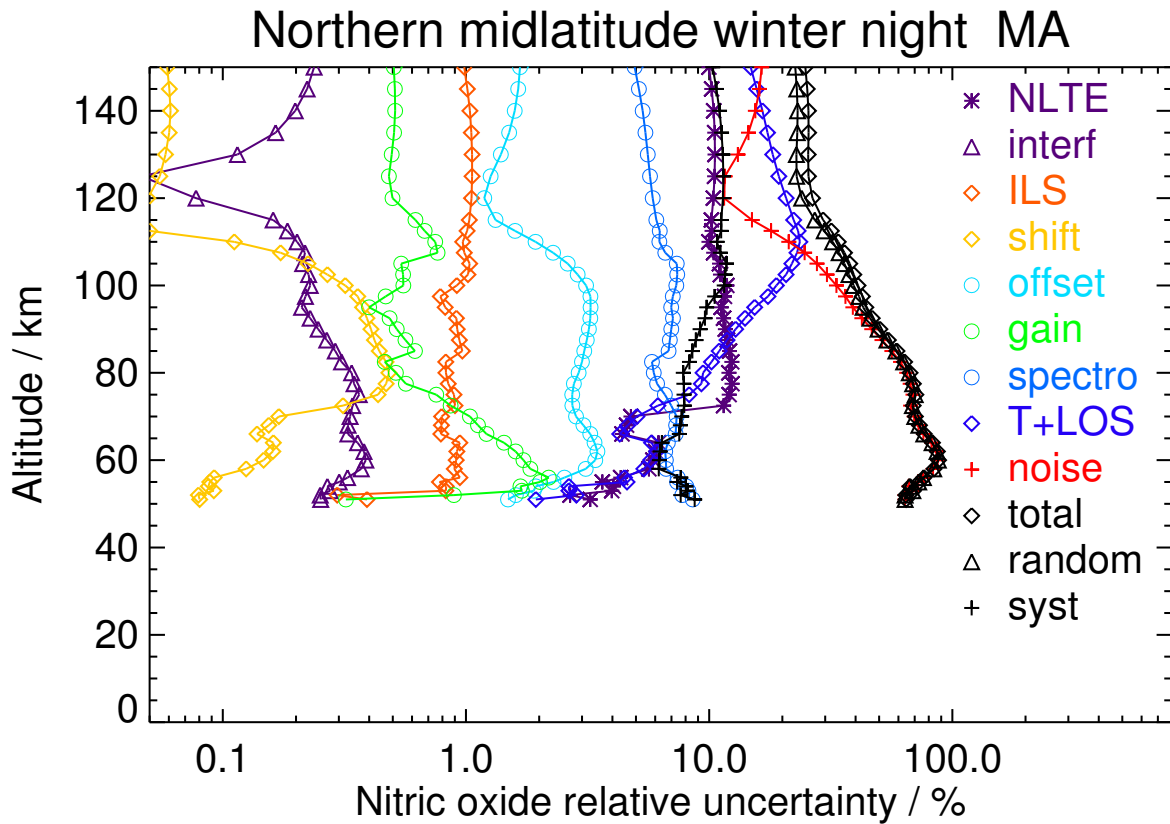


Figure S10. V8R_NO_561 Northern midlatitude winter night

Table S12. Nitric oxide error budget for Northern midlatitude spring day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	2.13	0.37	0.25	0.09	0.50	1.47	5.62	0.97	24.50	24.58	6.00	25.30
30	0.00	12.04	0.17	1.56	0.32	1.06	3.52	13.05	1.92	25.00	25.42	17.71	30.98
40	0.01	4.60	0.11	0.92	0.30	0.57	1.92	9.73	1.11	17.33	17.63	10.56	20.55
50	0.01	1.82	0.08	1.14	0.06	0.27	1.43	8.68	0.94	23.05	23.21	8.70	24.79
60	0.01	10.62	0.24	1.38	0.16	2.00	0.63	7.71	4.39	57.23	57.79	11.53	58.93
70	0.02	11.54	0.21	1.36	0.15	1.74	0.78	7.51	5.64	49.01	49.82	12.15	51.28
80	0.04	19.43	0.37	1.42	0.37	3.27	0.88	7.28	10.59	59.96	62.04	17.41	64.44
90	0.38	26.56	0.46	1.51	0.49	4.39	1.02	7.11	14.51	55.72	59.29	24.06	63.99
100	3.13	25.54	0.38	1.52	0.43	4.05	0.93	7.43	17.90	41.83	47.48	23.31	52.90
110	20.18	19.16	0.35	1.57	0.25	2.66	0.84	7.62	20.98	28.47	36.41	18.99	41.06
120	46.71	15.65	0.21	1.49	0.04	1.26	0.51	7.80	21.47	13.42	25.90	16.74	30.84
130	85.67	16.07	0.06	1.40	0.12	1.04	0.54	7.74	19.82	7.88	21.91	17.22	27.86
140	141.22	16.01	0.05	1.32	0.15	0.93	0.69	7.55	17.89	7.44	19.70	17.43	26.31
150	190.28	16.19	0.11	1.23	0.17	0.99	0.83	7.15	15.59	9.17	18.43	17.44	25.37

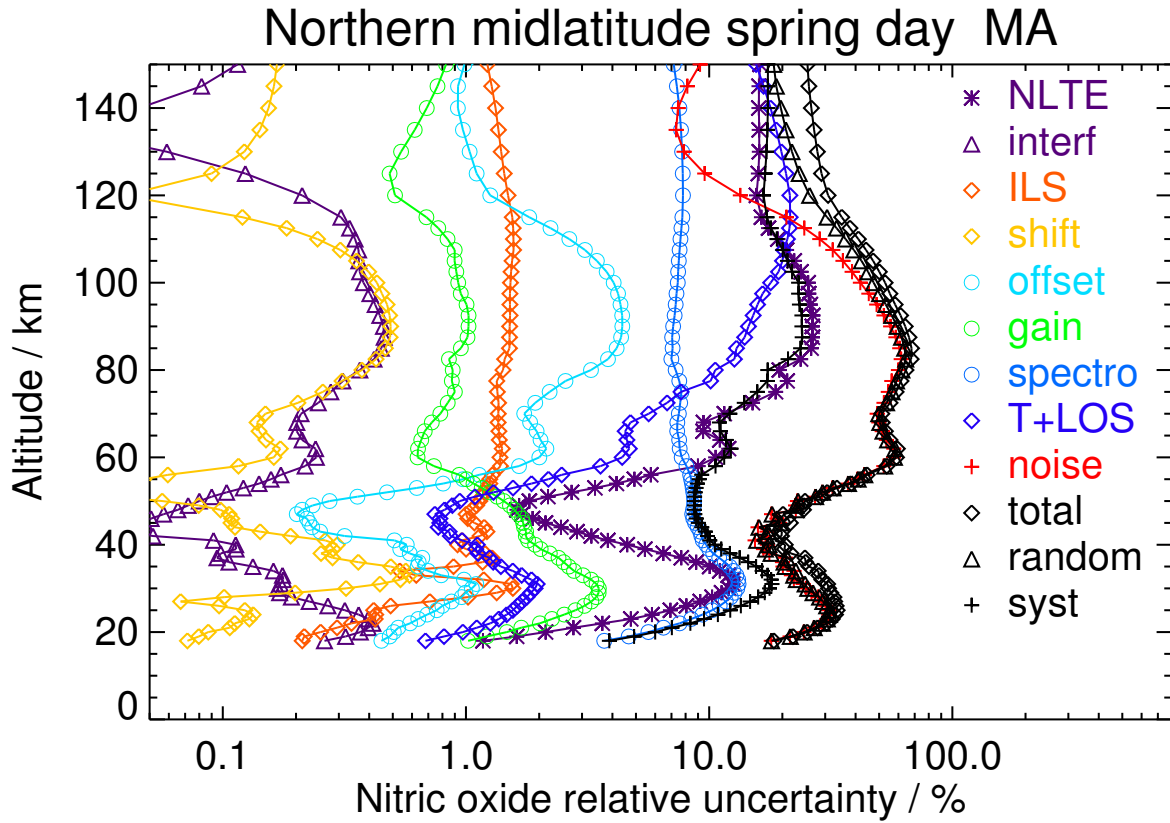


Figure S11. V8R_NO_561 Northern midlatitude spring day

Table S13. Nitric oxide error budget for Northern midlatitude spring night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
60	0.00	10.30	0.43	0.93	0.20	2.55	2.17	6.57	5.21	67.94	68.80	8.37	69.31
70	0.04	4.51	0.19	0.69	0.14	2.23	0.62	8.07	3.93	48.70	49.07	8.41	49.78
80	0.08	12.62	0.34	0.84	0.28	1.96	0.72	7.44	9.66	45.52	47.51	11.32	48.84
90	0.47	14.27	0.62	1.04	0.48	3.84	0.62	7.98	13.85	55.89	58.48	13.41	60.00
100	3.52	17.35	0.46	1.13	0.37	3.75	0.47	8.62	17.48	40.32	45.36	16.28	48.20
110	23.93	15.74	0.34	1.27	0.16	2.33	0.54	8.33	21.39	26.47	34.91	16.26	38.51
120	56.89	13.89	0.11	1.26	0.06	1.19	0.46	7.52	20.50	12.94	24.64	15.28	28.99
130	75.24	13.76	0.08	1.25	0.09	1.22	0.50	7.03	18.91	10.35	21.94	15.02	26.59
140	93.09	13.54	0.18	1.23	0.09	1.32	0.53	6.63	17.35	12.43	21.81	14.52	26.20
150	103.91	13.02	0.24	1.17	0.08	1.44	0.53	6.11	15.56	14.09	21.57	13.64	25.52

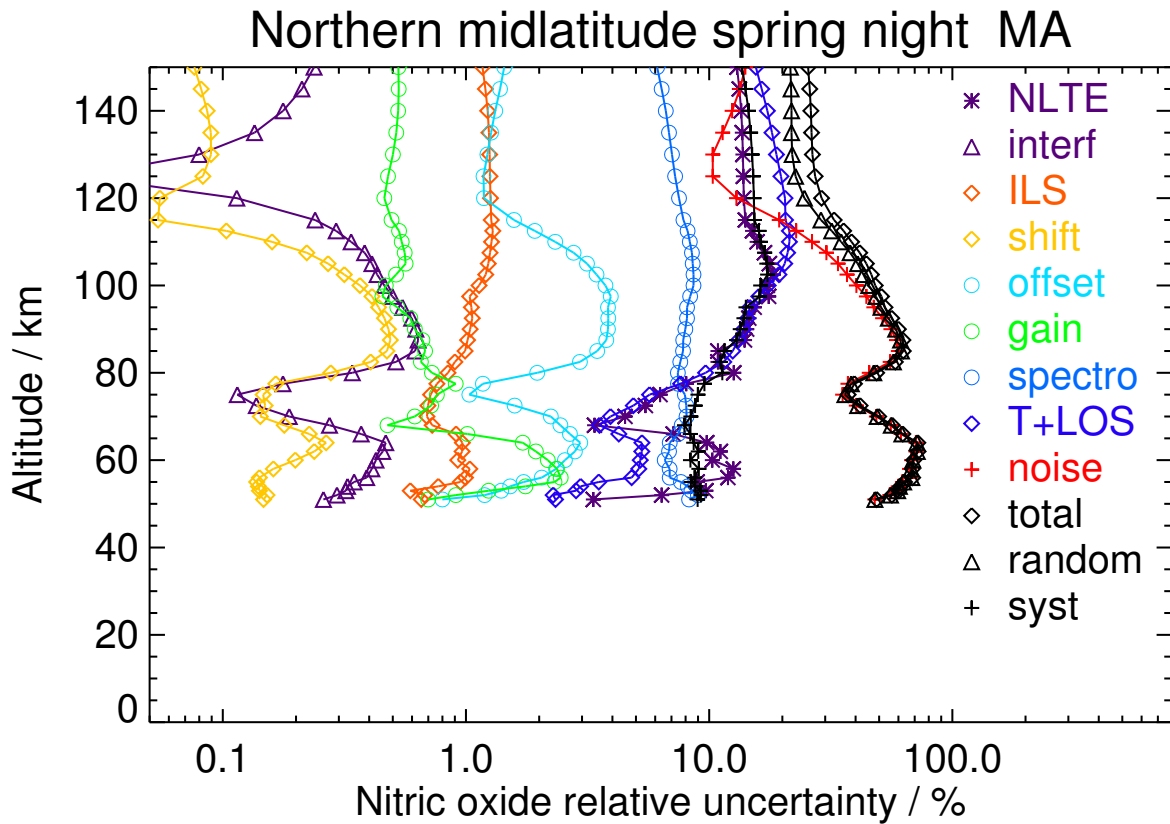


Figure S12. V8R_NO_561 Northern midlatitude spring night

Table S14. Nitric oxide error budget for Northern midlatitude summer day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.49	0.43	0.35	0.10	0.46	1.79	6.53	1.06	23.70	23.78	6.78	24.73
30	0.01	8.28	0.16	2.06	0.26	0.85	3.56	11.76	1.87	20.49	20.76	14.72	25.45
40	0.01	3.59	0.12	0.69	0.25	0.50	1.76	9.27	1.07	16.94	17.05	10.01	19.77
50	0.01	1.40	0.07	0.86	0.05	0.25	1.40	8.22	0.74	20.11	20.20	8.31	21.85
60	0.01	8.33	0.28	1.22	0.22	1.89	0.65	7.89	5.28	55.09	55.62	10.35	56.57
70	0.01	16.69	0.41	2.17	0.48	2.80	1.14	10.69	24.09	62.53	67.57	18.24	69.99
80	0.02	16.57	0.37	1.43	0.40	3.09	0.57	7.96	24.76	53.24	59.45	16.21	61.63
90	0.84	18.97	0.36	1.41	0.52	3.65	0.82	6.87	21.01	45.77	51.16	18.50	54.40
100	9.52	16.41	0.34	1.40	0.45	3.24	0.87	6.74	19.87	32.80	39.11	16.44	42.42
110	34.32	13.85	0.39	1.50	0.20	1.97	0.70	7.13	26.24	22.51	35.00	14.82	38.01
120	60.42	17.68	0.19	1.43	0.13	1.12	0.53	7.61	24.22	9.35	26.36	18.80	32.38
130	108.14	20.77	0.05	1.35	0.23	1.14	0.85	7.72	20.93	8.26	23.15	21.56	31.64
140	177.11	21.82	0.16	1.28	0.25	1.21	1.03	7.58	18.54	10.34	22.09	22.38	31.44
150	236.45	21.96	0.24	1.20	0.25	1.30	1.14	7.20	16.04	12.40	21.29	22.28	30.82

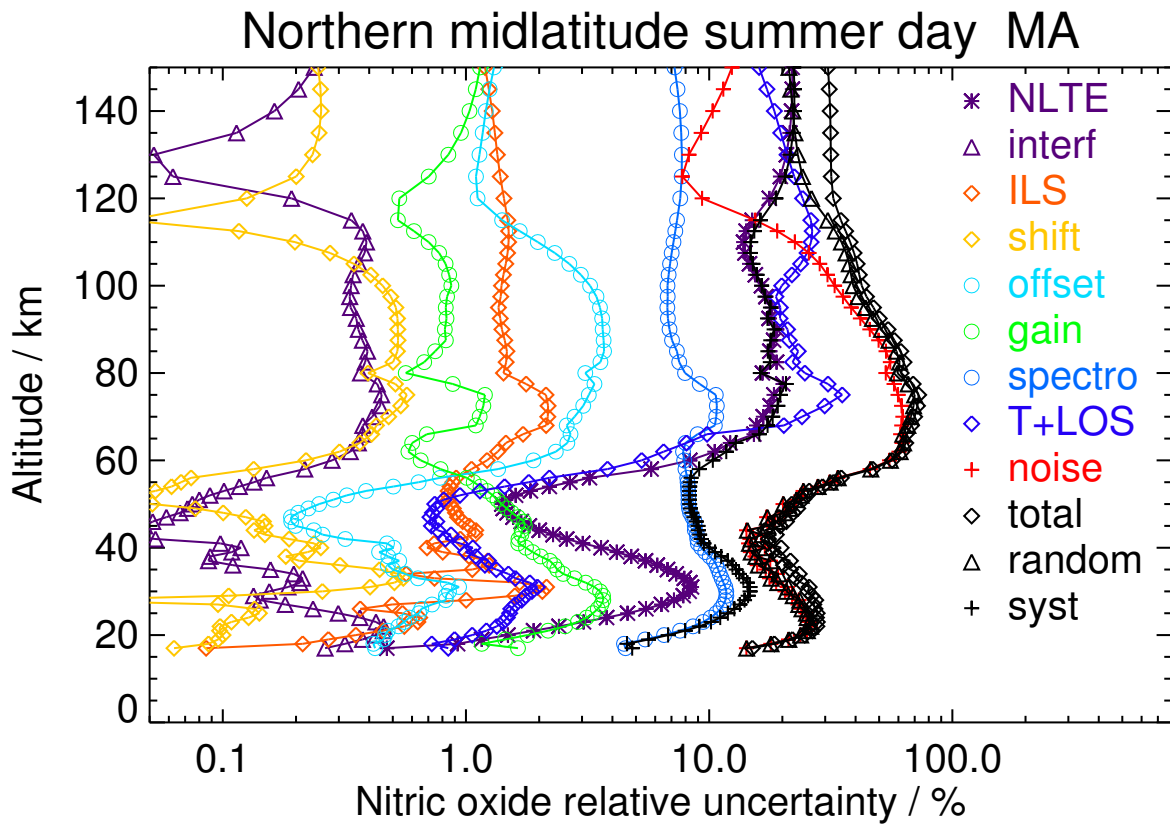


Figure S13. V8R_NO_561 Northern midlatitude summer day

Table S15. Nitric oxide error budget for Northern midlatitude summer night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	1.16	0.63	0.12	0.09	0.52	0.47	0.81	1.33	38.10	38.15	1.11	38.16
50	0.00	3.47	0.38	0.42	0.27	1.02	2.66	2.92	2.23	34.34	34.57	4.28	34.83
60	0.00	5.39	0.49	0.94	0.32	2.20	2.04	6.44	3.75	61.57	61.96	6.84	62.34
70	0.01	7.09	0.64	0.98	0.65	2.63	0.45	6.22	6.70	60.30	60.94	8.14	61.48
80	0.04	10.81	0.72	1.04	0.85	3.07	0.44	6.23	16.83	54.71	57.71	10.71	58.69
90	1.11	10.28	0.65	1.30	0.74	3.54	0.72	7.62	17.83	46.31	50.20	11.06	51.40
100	9.27	12.84	0.57	1.49	0.51	3.12	1.11	7.91	19.85	31.64	37.85	14.30	40.46
110	27.36	15.27	0.41	1.41	0.14	1.63	0.70	7.99	24.58	18.26	30.85	16.98	35.21
120	44.30	17.69	0.07	1.27	0.14	1.30	0.57	7.48	24.53	10.35	26.90	18.91	32.88
130	55.02	17.94	0.35	1.22	0.18	1.82	0.79	6.90	22.22	15.27	27.39	18.75	33.19
140	71.41	17.24	0.43	1.18	0.17	1.89	0.84	6.41	20.22	16.87	26.81	17.86	32.21
150	84.75	16.07	0.45	1.11	0.15	1.83	0.84	5.84	18.06	17.03	25.31	16.53	30.23

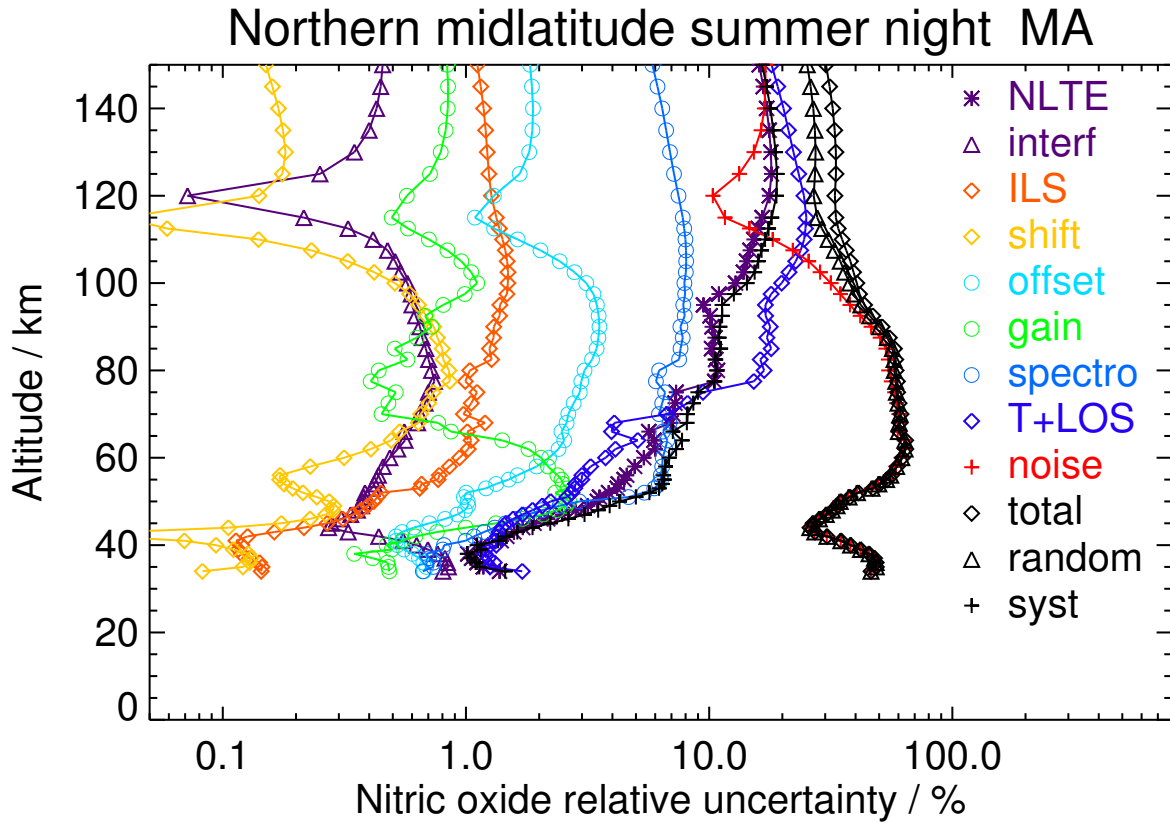


Figure S14. V8R_NO_561 Northern midlatitude summer night

Table S16. Nitric oxide error budget for Northern midlatitude autumn day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.67	0.35	0.10	0.12	0.46	1.01	4.75	0.79	24.33	24.39	4.96	24.89
30	0.01	9.79	0.16	1.68	0.32	1.01	3.56	11.60	1.96	24.93	25.23	15.36	29.54
40	0.01	5.86	0.10	1.26	0.33	0.67	2.21	10.05	1.31	19.54	19.77	11.62	22.93
50	0.01	1.98	0.07	1.22	0.07	0.33	1.52	8.95	0.93	25.29	25.43	9.03	26.99
60	0.00	7.16	0.17	1.43	0.11	2.06	0.67	8.67	2.90	60.35	60.72	9.79	61.51
70	0.01	11.61	0.22	1.69	0.18	2.55	0.61	9.45	5.29	64.09	64.99	12.08	66.10
80	0.04	12.68	0.33	1.55	0.29	3.44	0.67	8.22	7.74	67.94	68.91	13.05	70.14
90	0.50	14.52	0.33	1.59	0.29	3.82	0.76	8.27	11.56	55.59	57.49	14.70	59.34
100	3.92	15.64	0.27	1.52	0.24	3.48	0.67	8.15	21.15	37.79	44.18	15.80	46.92
110	21.47	15.26	0.27	1.54	0.15	2.70	0.60	8.14	22.62	30.11	38.24	16.29	41.57
120	27.38	13.08	0.12	1.41	0.01	1.18	0.47	7.71	19.62	14.33	24.68	14.67	28.71
130	50.35	13.92	0.02	1.32	0.09	1.09	0.53	7.47	18.50	9.72	21.38	15.25	26.26
140	81.36	14.18	0.08	1.25	0.12	1.24	0.60	7.20	17.21	10.79	20.87	15.28	25.87
150	112.02	13.92	0.13	1.16	0.14	1.36	0.65	6.75	15.58	12.62	20.64	14.80	25.39

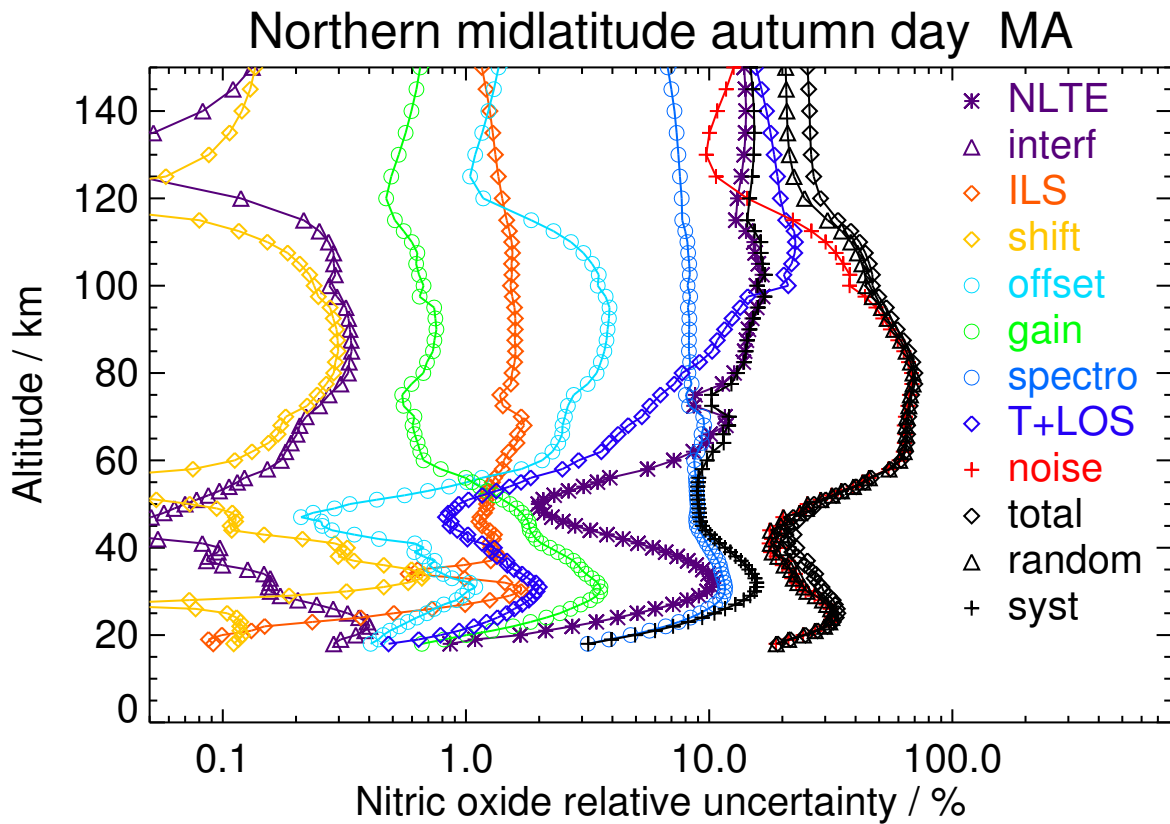


Figure S15. V8R_NO_561 Northern midlatitude autumn day

Table S17. Nitric oxide error budget for Northern midlatitude autumn night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
50	0.00	6.63	0.37	0.62	0.25	1.36	0.80	10.23	1.34	66.20	66.23	12.23	67.35
60	0.00	5.54	0.33	1.17	0.13	2.28	1.72	8.63	7.91	77.26	77.78	9.82	78.40
70	0.06	4.80	0.06	0.75	0.10	1.19	0.92	8.41	5.57	33.51	34.17	9.10	35.36
80	0.06	7.68	0.23	1.02	0.19	2.28	0.70	8.17	12.35	55.71	57.30	10.28	58.21
90	0.38	9.79	0.30	1.31	0.20	2.93	0.73	8.41	17.44	49.10	52.41	12.04	53.78
100	2.32	7.39	0.19	1.48	0.09	2.56	0.42	9.36	33.14	35.76	48.83	12.02	50.28
110	9.21	10.46	0.14	1.30	0.07	1.86	0.66	7.65	23.55	25.49	34.92	12.57	37.11
120	13.98	11.76	0.12	1.33	0.10	1.98	0.57	6.93	16.00	25.81	30.68	13.16	33.39
130	19.18	11.19	0.17	1.24	0.13	2.06	0.51	6.40	14.75	24.03	28.51	12.44	31.10
140	25.30	10.62	0.20	1.18	0.13	2.06	0.48	6.00	13.72	23.28	27.32	11.77	29.75
150	30.46	9.82	0.20	1.09	0.12	1.98	0.44	5.50	12.46	22.00	25.56	10.86	27.77

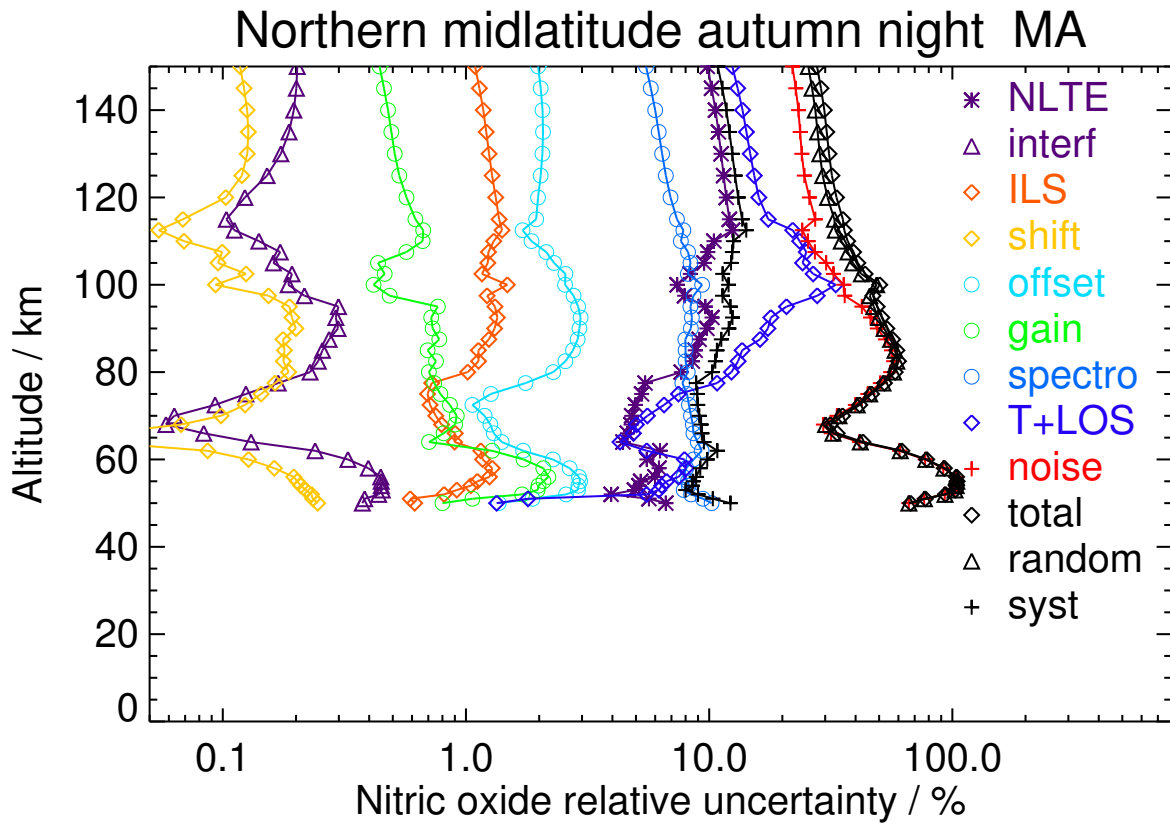


Figure S16. V8R_NO_561 Northern midlatitude autumn night

Table S18. Nitric oxide error budget for Tropics day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	2.61	0.10	1.18	0.04	0.80	0.25	3.26	0.56	23.41	23.49	3.99	23.83
30	0.00	10.04	0.17	2.80	0.20	0.93	1.53	12.22	1.83	29.96	30.21	15.79	34.09
40	0.01	4.27	0.09	0.74	0.34	0.52	2.00	9.28	1.30	13.80	14.03	10.22	17.36
50	0.01	1.28	0.07	1.27	0.06	0.20	1.50	8.89	0.77	19.87	19.96	9.02	21.90
60	0.00	8.82	0.17	1.92	0.29	2.31	0.40	8.91	2.55	62.86	63.10	11.94	64.22
70	0.01	11.10	0.19	2.31	0.40	3.05	0.63	9.71	4.61	65.30	65.70	14.20	67.22
80	0.02	13.41	0.23	2.35	0.49	3.84	1.01	8.95	7.53	61.37	62.11	15.72	64.07
90	0.38	18.32	0.25	2.30	0.54	4.48	1.24	8.53	18.38	54.59	58.14	19.30	61.26
100	3.87	18.53	0.25	2.20	0.49	4.24	1.20	8.37	26.33	44.93	52.72	19.25	56.12
110	16.35	14.96	0.21	2.10	0.30	2.79	0.91	8.58	27.67	30.61	41.71	16.53	44.87
120	26.08	14.25	0.09	1.84	0.03	1.07	0.54	8.83	21.18	11.63	24.40	16.57	29.50
130	51.20	16.17	0.03	1.62	0.14	1.15	0.60	8.70	17.37	8.21	19.41	18.28	26.66
140	87.67	16.74	0.07	1.49	0.17	1.24	0.69	8.38	15.06	9.60	18.05	18.65	25.96
150	117.41	16.55	0.10	1.35	0.18	1.27	0.74	7.82	12.91	11.24	17.32	18.21	25.14

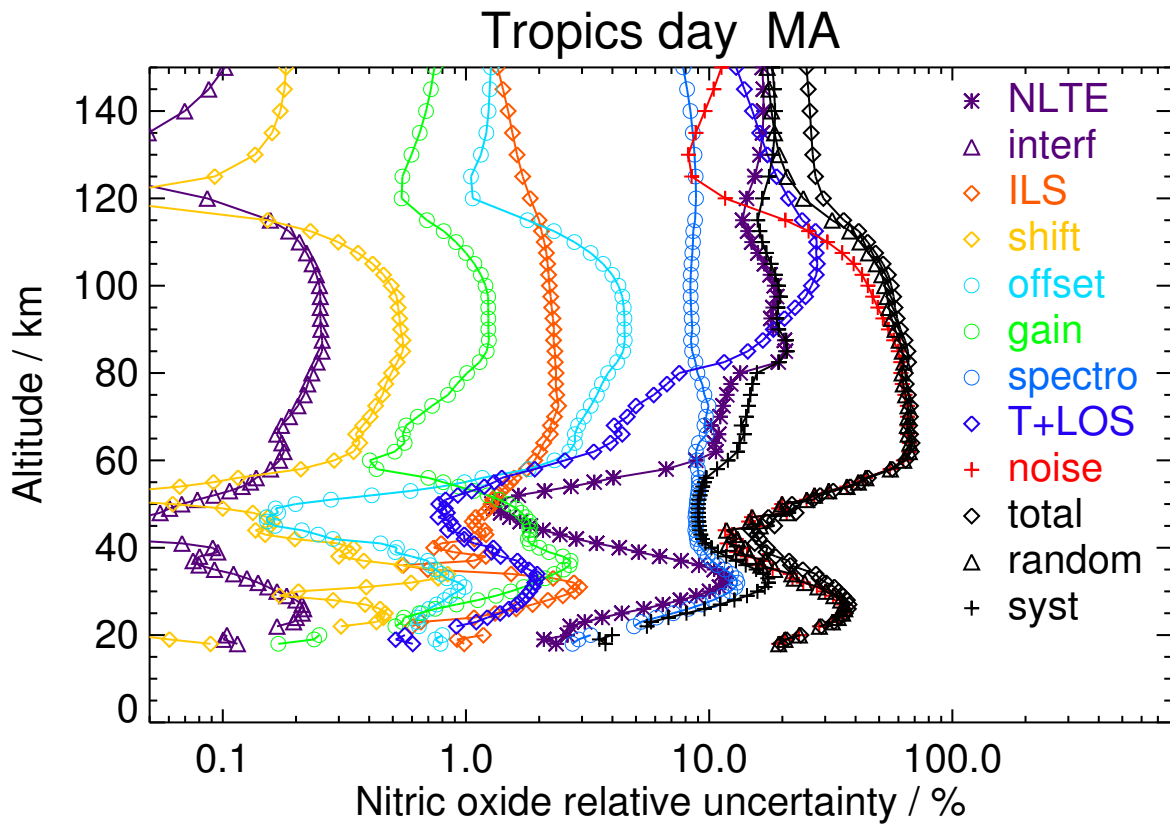


Figure S17. V8R_NO_561 Tropics day

Table S19. Nitric oxide error budget for Tropics night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
60	0.00	8.48	0.49	2.47	0.24	2.73	3.06	9.83	6.23	81.96	82.41	12.54	83.36
90	0.19	10.04	0.27	2.20	0.34	3.25	1.04	9.41	16.83	47.17	50.31	13.54	52.10
100	1.66	11.94	0.21	2.20	0.26	2.86	0.82	9.76	20.06	35.89	41.37	15.19	44.07
110	7.13	12.86	0.12	2.01	0.09	1.99	0.75	9.13	20.44	26.48	33.66	15.60	37.10
120	12.72	12.41	0.10	1.75	0.14	2.05	0.60	8.10	18.36	23.43	29.97	14.65	33.36
130	17.12	11.70	0.13	1.59	0.19	2.23	0.53	7.39	16.61	23.25	28.79	13.66	31.87
140	22.60	10.99	0.14	1.49	0.19	2.20	0.49	6.86	15.27	22.49	27.40	12.78	30.23
150	25.25	10.07	0.14	1.36	0.18	2.06	0.45	6.24	13.75	20.89	25.22	11.68	27.79

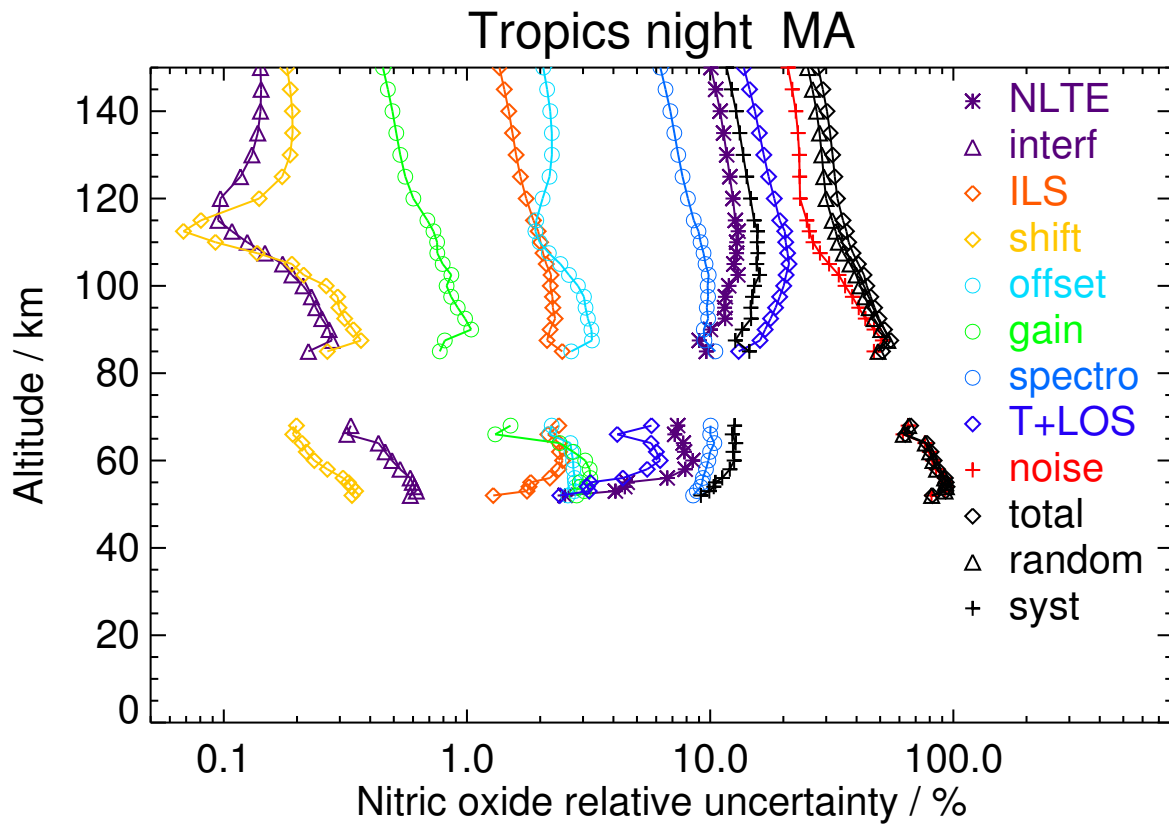
**Figure S18.** V8R_NO_561 Tropics night

Table S20. Nitric oxide error budget for Southern midlatitude winter day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	2.20	0.37	0.22	0.04	0.46	1.27	5.02	1.05	24.15	24.23	5.38	24.82
30	0.00	12.53	0.25	1.43	0.37	1.22	3.49	12.40	2.34	30.76	31.39	17.13	35.76
40	0.01	6.28	0.09	1.55	0.24	0.59	1.90	10.24	1.28	25.11	25.48	11.58	27.98
50	0.01	2.08	0.09	1.05	0.04	0.37	1.21	8.24	1.13	30.77	30.87	8.35	31.98
60	0.01	7.36	0.17	1.12	0.25	1.87	0.72	7.34	5.47	56.58	57.06	9.41	57.83
70	0.02	11.79	0.21	1.33	0.32	2.32	0.81	7.38	9.02	58.21	59.26	12.60	60.59
80	0.07	15.89	0.24	1.21	0.36	2.66	0.96	7.30	13.97	53.45	55.83	15.83	58.03
90	0.87	18.47	0.24	1.28	0.34	3.21	0.75	7.64	20.51	44.34	49.68	18.20	52.91
100	8.57	17.15	0.21	1.38	0.26	3.22	0.61	7.98	31.36	33.65	46.72	17.42	49.87
110	45.65	13.30	0.22	1.51	0.08	1.89	0.58	8.33	41.40	21.04	46.81	14.76	49.08
120	75.08	14.57	0.10	1.51	0.07	1.20	0.54	8.32	33.46	10.82	35.41	16.37	39.01
130	100.98	16.53	0.06	1.43	0.10	1.30	0.54	7.99	25.71	9.42	27.57	18.18	33.03
140	135.85	17.08	0.13	1.36	0.09	1.36	0.54	7.60	21.46	11.09	24.35	18.55	30.61
150	173.61	17.00	0.17	1.25	0.08	1.41	0.53	7.04	17.85	12.80	22.23	18.19	28.72

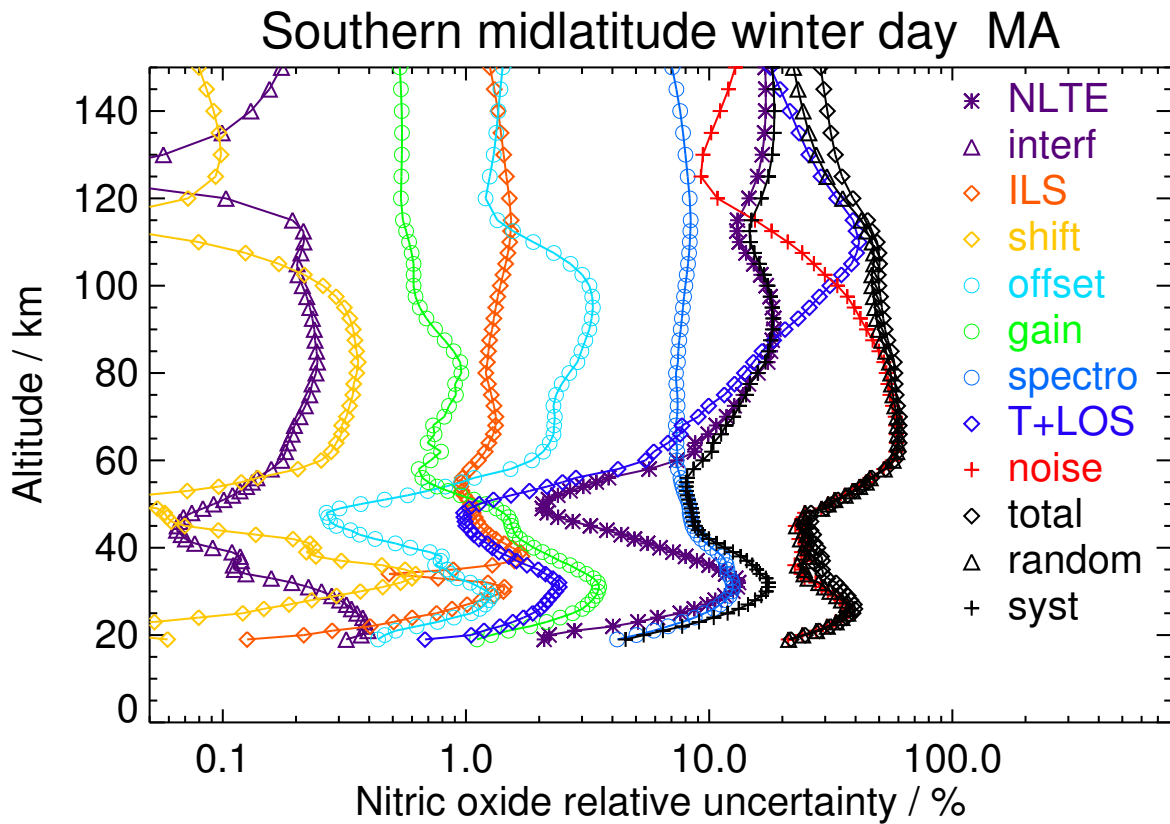


Figure S19. V8R_NO_561 Southern midlatitude winter day

Table S21. Nitric oxide error budget for Southern midlatitude winter night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
50	0.00	6.75	0.26	0.95	0.24	1.00	0.44	10.84	1.67	51.28	51.76	10.89	52.90
60	0.01	10.79	0.23	1.35	0.11	2.12	1.59	8.87	7.33	57.06	58.33	10.56	59.28
70	0.04	8.78	0.17	1.11	0.16	1.96	0.89	8.80	7.92	53.71	54.75	10.50	55.75
80	0.19	13.71	0.20	1.17	0.22	2.15	0.83	9.55	13.94	50.19	53.08	13.49	54.77
90	1.57	13.28	0.23	1.08	0.28	2.94	0.70	8.92	18.57	43.98	48.63	13.45	50.46
100	11.39	13.85	0.25	1.05	0.31	3.06	0.59	8.33	25.16	33.66	42.86	14.16	45.14
110	43.33	12.57	0.19	1.10	0.13	1.91	0.49	7.66	33.53	22.53	40.91	13.42	43.05
120	73.97	14.44	0.06	1.25	0.06	1.12	0.50	7.59	29.57	11.46	32.08	15.69	35.71
130	89.41	15.91	0.08	1.33	0.10	1.38	0.55	7.45	23.98	12.03	27.36	16.84	32.13
140	101.30	16.09	0.13	1.33	0.10	1.44	0.56	7.19	20.64	13.38	25.30	16.73	30.33
150	109.92	15.58	0.16	1.28	0.09	1.45	0.55	6.72	17.71	14.23	23.54	15.93	28.42

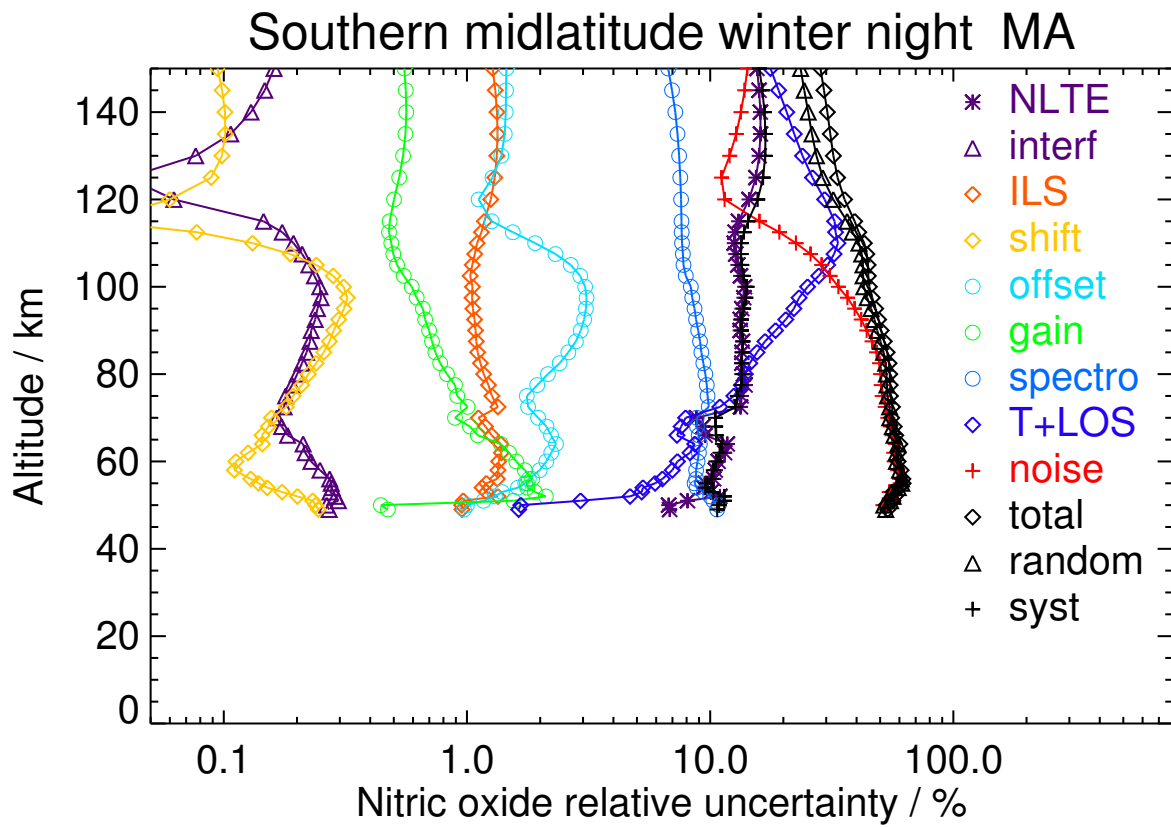


Figure S20. V8R_NO_561 Southern midlatitude winter night

Table S22. Nitric oxide error budget for Southern midlatitude spring day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.46	0.37	0.28	0.07	0.46	1.17	5.08	0.82	23.12	23.21	5.15	23.77
30	0.00	8.46	0.13	1.53	0.34	0.76	2.82	10.36	1.67	21.11	21.47	13.32	25.27
40	0.01	4.85	0.07	1.14	0.25	0.45	1.80	9.62	1.11	19.83	20.03	10.68	22.70
50	0.01	1.79	0.09	1.10	0.06	0.29	1.25	8.28	0.86	27.34	27.42	8.41	28.68
60	0.01	9.91	0.25	1.41	0.37	1.96	0.68	7.94	4.24	57.42	57.87	11.57	59.01
70	0.01	16.77	0.31	1.52	0.61	2.55	1.14	7.27	7.23	61.33	62.39	16.32	64.49
80	0.03	27.34	0.42	1.68	0.67	3.83	1.55	8.51	11.38	64.85	67.21	25.66	71.94
90	0.40	25.13	0.46	1.60	0.57	4.51	1.32	8.08	15.14	58.55	61.48	24.48	66.18
100	3.41	24.05	0.42	1.64	0.42	4.09	1.04	8.37	19.68	43.90	49.25	23.63	54.63
110	20.40	19.21	0.38	1.69	0.20	2.75	0.76	8.63	24.96	29.91	39.70	19.91	44.41
120	46.16	16.88	0.19	1.62	0.03	1.15	0.53	8.65	24.73	12.52	28.15	18.44	33.65
130	83.89	17.73	0.01	1.53	0.08	1.03	0.54	8.44	21.82	7.44	23.33	19.40	30.34
140	143.16	18.14	0.11	1.45	0.08	1.06	0.57	8.11	19.40	8.25	21.32	19.71	29.03
150	200.40	18.18	0.18	1.35	0.08	1.16	0.59	7.58	16.81	10.53	20.16	19.45	28.01

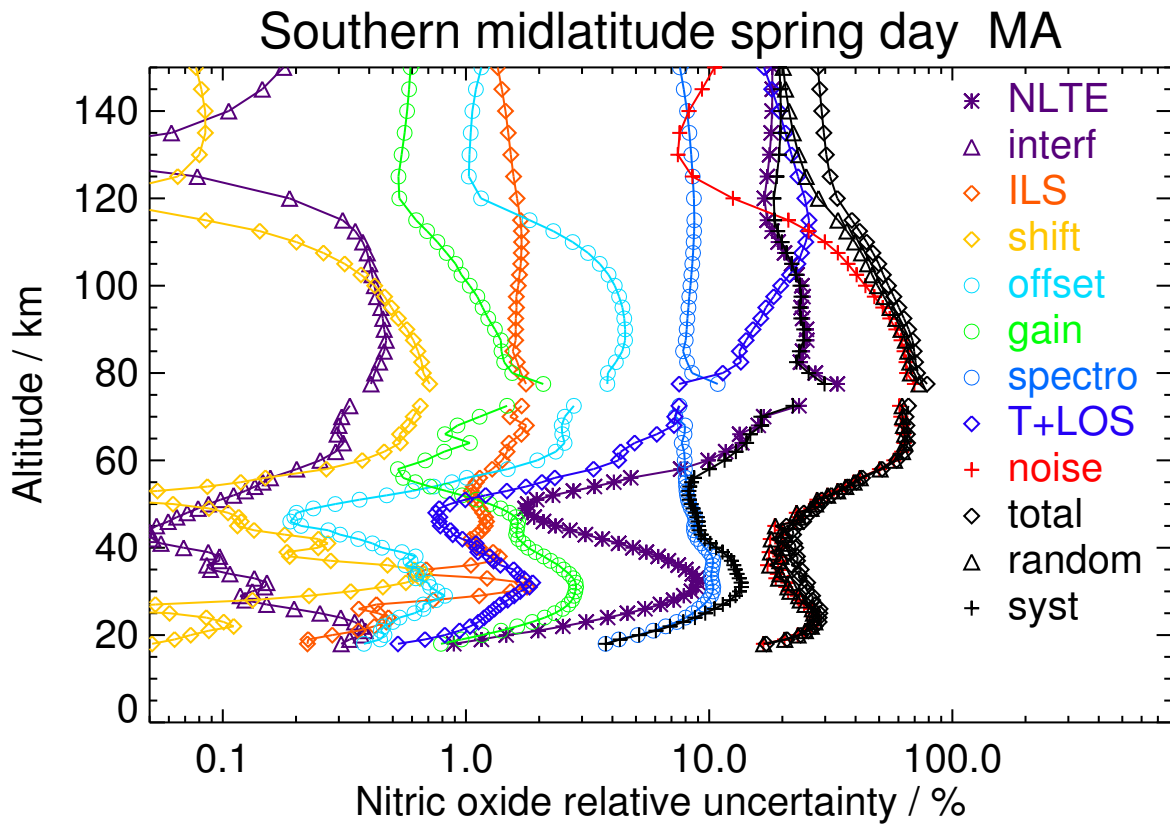


Figure S21. V8R_NO_561 Southern midlatitude spring day

Table S23. Nitric oxide error budget for Southern midlatitude spring night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
60	0.01	7.59	0.39	1.60	0.14	2.64	2.74	8.29	5.18	73.91	74.33	10.40	75.06
70	0.03	6.42	0.22	1.22	0.18	1.48	0.91	9.17	5.25	46.55	47.05	10.52	48.21
80	0.05	8.08	0.40	1.27	0.32	2.57	0.72	8.79	10.15	53.53	54.68	11.44	55.86
90	0.45	12.19	0.49	1.44	0.39	3.39	0.65	8.94	14.83	50.49	53.18	13.55	54.88
100	4.74	12.56	0.51	1.26	0.44	3.45	0.42	7.57	23.83	36.36	44.23	12.76	46.03
110	17.14	12.20	0.38	1.21	0.20	1.90	0.53	7.22	26.99	23.24	36.03	13.31	38.40
120	24.89	13.28	0.05	1.28	0.05	1.28	0.46	7.24	21.67	13.95	26.02	14.81	29.94
130	34.27	13.40	0.15	1.27	0.12	1.50	0.53	6.93	19.36	13.80	24.15	14.62	28.23
140	45.05	13.03	0.23	1.24	0.13	1.57	0.56	6.58	17.59	14.64	23.34	14.01	27.23
150	53.15	12.25	0.27	1.17	0.13	1.55	0.56	6.08	15.69	14.74	22.02	13.03	25.59

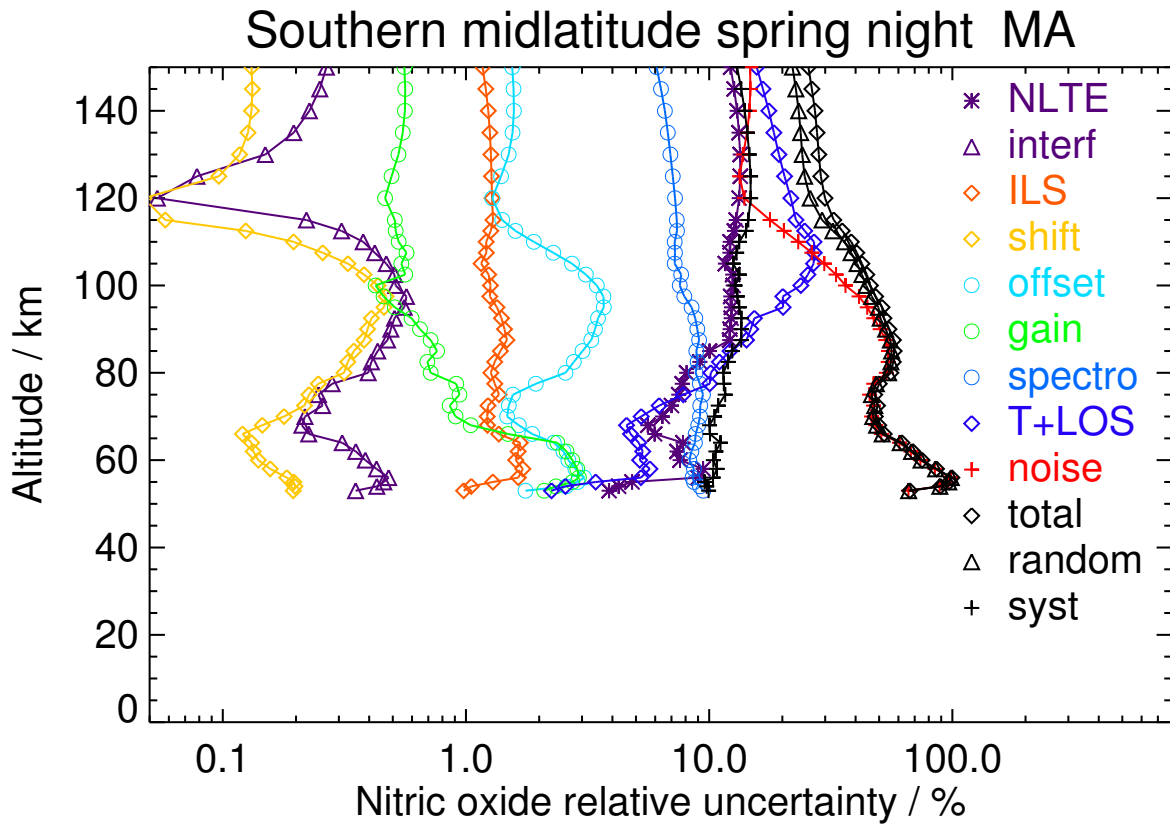


Figure S22. V8R_NO_561 Southern midlatitude spring night

Table S24. Nitric oxide error budget for Southern midlatitude summer day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.38	0.49	0.31	0.29	0.45	0.63	4.75	1.15	23.98	24.06	4.80	24.53
30	0.01	8.27	0.30	2.70	0.39	0.73	2.12	10.63	2.07	21.05	21.43	13.50	25.33
40	0.01	3.24	0.03	0.70	0.33	0.36	1.70	8.69	1.26	13.38	13.53	9.34	16.44
50	0.01	1.57	0.07	0.95	0.05	0.20	1.21	7.97	0.95	18.92	19.01	8.13	20.67
60	0.01	11.58	0.26	1.12	0.72	1.66	1.60	7.07	4.36	52.01	52.74	11.53	53.99
70	0.01	17.29	0.34	1.52	0.93	2.27	1.93	7.01	10.31	53.92	55.51	17.10	58.09
80	0.03	27.36	0.26	1.63	0.82	2.72	1.66	9.55	22.13	49.24	55.29	26.65	61.38
90	0.79	28.19	0.21	1.28	0.81	3.62	1.53	7.23	19.14	46.71	51.77	27.06	58.42
100	8.42	29.51	0.12	1.38	0.45	3.37	0.76	7.61	19.21	33.92	41.08	27.83	49.62
110	38.82	22.97	0.27	1.66	0.06	2.29	0.60	7.99	28.03	21.62	36.75	22.41	43.04
120	73.09	22.30	0.26	1.64	0.13	1.36	0.55	8.12	28.02	11.40	30.83	23.08	38.51
130	117.05	24.57	0.04	1.51	0.09	1.23	0.50	8.08	22.91	7.44	24.76	25.30	35.40
140	191.05	24.78	0.10	1.42	0.03	1.02	0.48	7.86	19.19	7.21	21.08	25.60	33.16
150	260.92	25.34	0.20	1.31	0.03	1.01	0.47	7.44	15.63	9.00	18.77	25.95	32.03

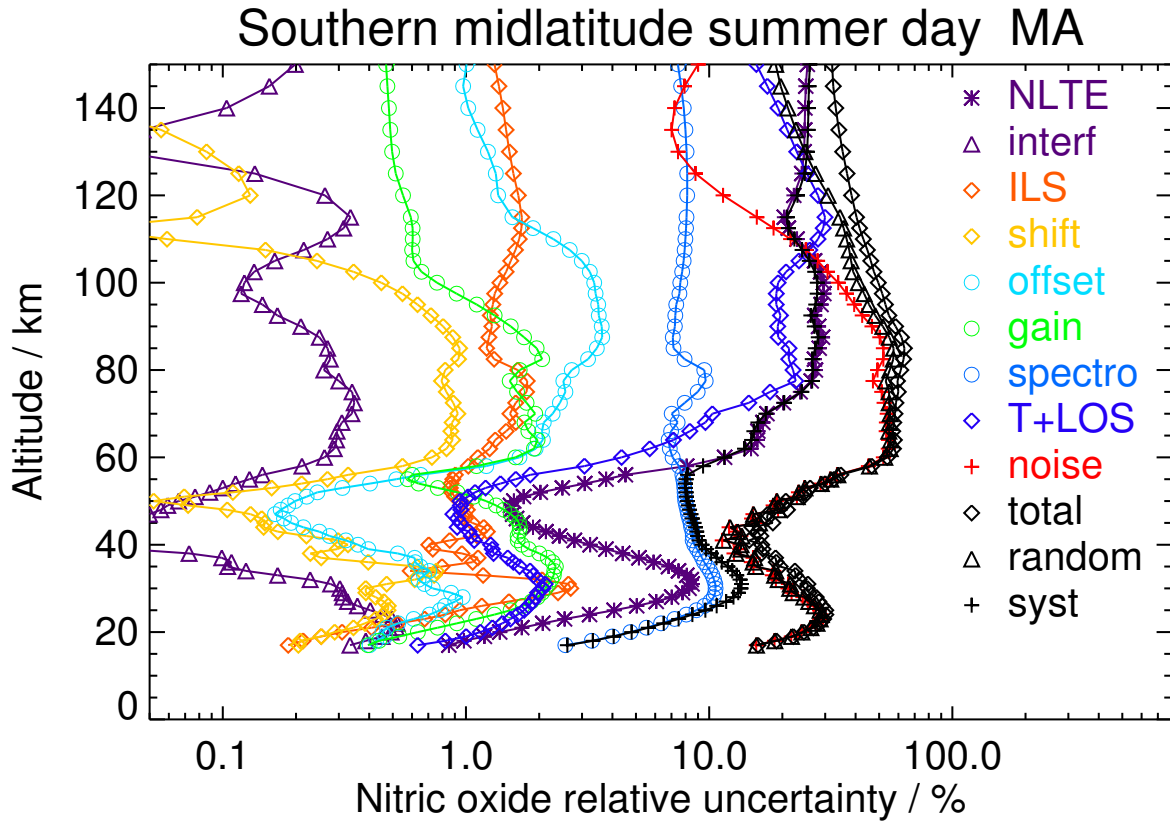


Figure S23. V8R_NO_561 Southern midlatitude summer day

Table S25. Nitric oxide error budget for Southern midlatitude summer night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	0.55	0.72	0.49	0.16	0.47	0.39	0.23	0.75	40.37	40.39	0.85	40.40
50	0.00	4.83	0.39	1.12	0.41	1.11	3.33	4.26	2.85	31.60	32.04	5.98	32.59
60	0.00	18.82	0.53	2.12	0.30	2.47	2.55	11.29	6.88	65.57	68.00	14.90	69.61
70	0.05	18.34	0.26	1.83	0.32	1.54	1.19	11.84	10.36	42.03	45.12	17.93	48.56
80	0.07	19.25	0.42	1.19	0.53	2.38	1.10	10.88	19.59	46.62	51.54	19.97	55.27
90	1.21	27.40	0.32	1.92	0.76	3.38	0.85	11.28	18.11	41.71	49.17	23.35	54.43
100	9.97	20.55	0.31	1.55	0.58	3.25	0.83	8.38	24.79	33.63	43.63	18.68	47.46
110	45.44	16.59	0.32	1.32	0.27	1.93	0.72	7.14	32.14	21.41	39.56	16.08	42.70
120	104.74	18.73	0.23	1.26	0.01	1.03	0.51	7.31	28.40	10.15	30.84	19.11	36.28
130	115.48	22.60	0.09	1.45	0.13	1.05	0.66	8.00	21.53	8.42	24.50	22.64	33.36
140	143.19	23.99	0.25	1.56	0.14	1.07	0.76	8.17	17.81	10.23	22.69	23.52	32.68
150	161.77	24.15	0.35	1.58	0.13	1.16	0.79	7.91	14.79	12.11	21.86	23.19	31.87

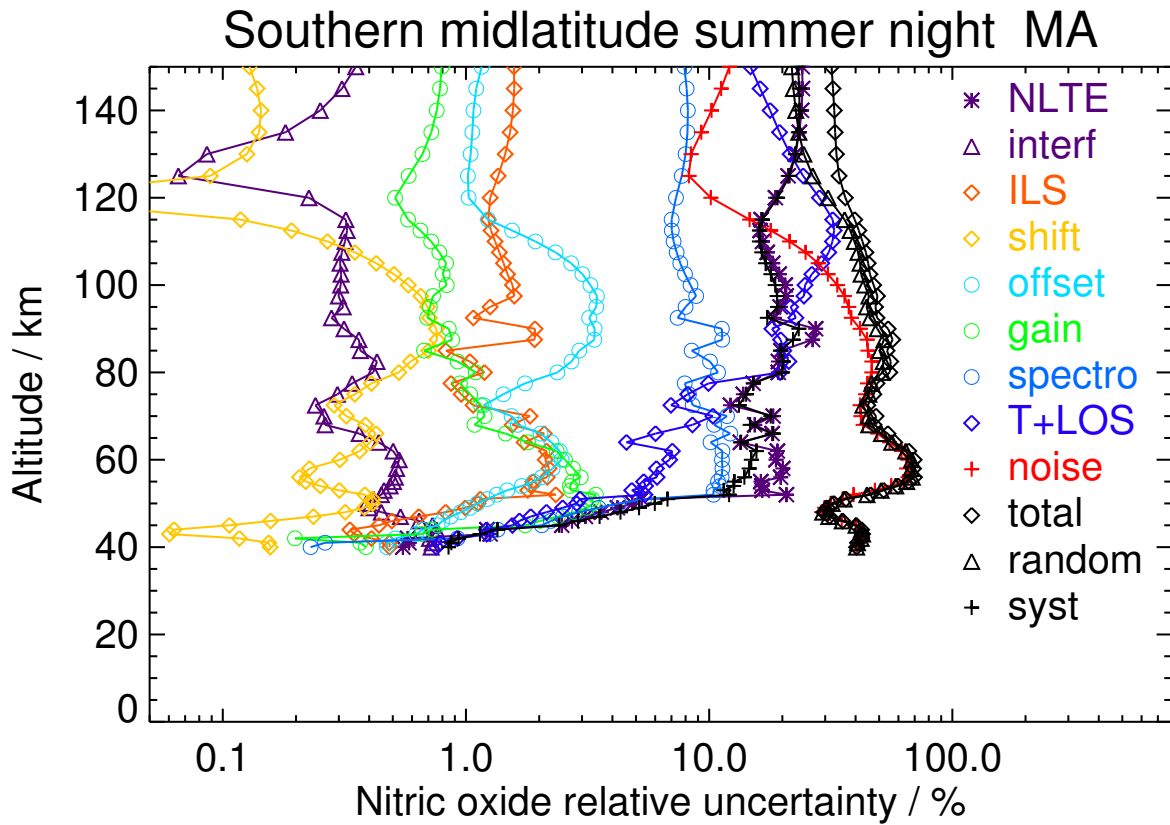


Figure S24. V8R_NO_561 Southern midlatitude summer night

Table S26. Nitric oxide error budget for Southern midlatitude autumn day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.97	0.33	0.19	0.09	0.49	1.23	4.79	0.91	23.72	23.78	5.18	24.34
30	0.01	11.43	0.22	1.92	0.36	1.06	3.87	12.70	2.23	25.59	26.02	17.18	31.18
40	0.01	5.74	0.05	1.09	0.31	0.53	2.34	9.74	1.50	18.88	19.09	11.38	22.22
50	0.01	2.14	0.06	1.09	0.06	0.31	1.41	8.62	1.15	25.61	25.74	8.76	27.19
60	0.01	7.50	0.14	1.40	0.33	1.70	0.98	7.95	3.24	53.13	53.62	9.13	54.39
70	0.02	12.84	0.22	1.54	0.47	2.19	1.15	7.25	7.05	56.02	57.35	11.18	58.43
80	0.06	12.49	0.21	1.52	0.43	2.36	1.27	7.76	10.59	52.45	54.22	12.24	55.58
90	0.88	15.55	0.18	1.54	0.35	2.80	1.06	7.72	15.46	41.75	45.65	14.53	47.90
100	4.96	16.01	0.19	1.60	0.23	3.12	0.79	8.05	19.19	33.24	39.52	15.67	42.51
110	25.37	14.25	0.21	1.66	0.08	2.23	0.60	8.46	25.15	24.25	35.61	15.33	38.77
120	44.17	14.66	0.11	1.56	0.02	1.10	0.53	8.44	24.00	11.63	27.06	16.41	31.65
130	62.62	15.80	0.03	1.43	0.04	1.24	0.56	8.07	21.30	9.69	23.85	17.24	29.43
140	83.58	16.06	0.10	1.34	0.04	1.34	0.57	7.69	19.10	11.38	22.77	17.22	28.55
150	109.44	15.85	0.14	1.23	0.04	1.42	0.56	7.15	16.78	13.02	21.91	16.65	27.52

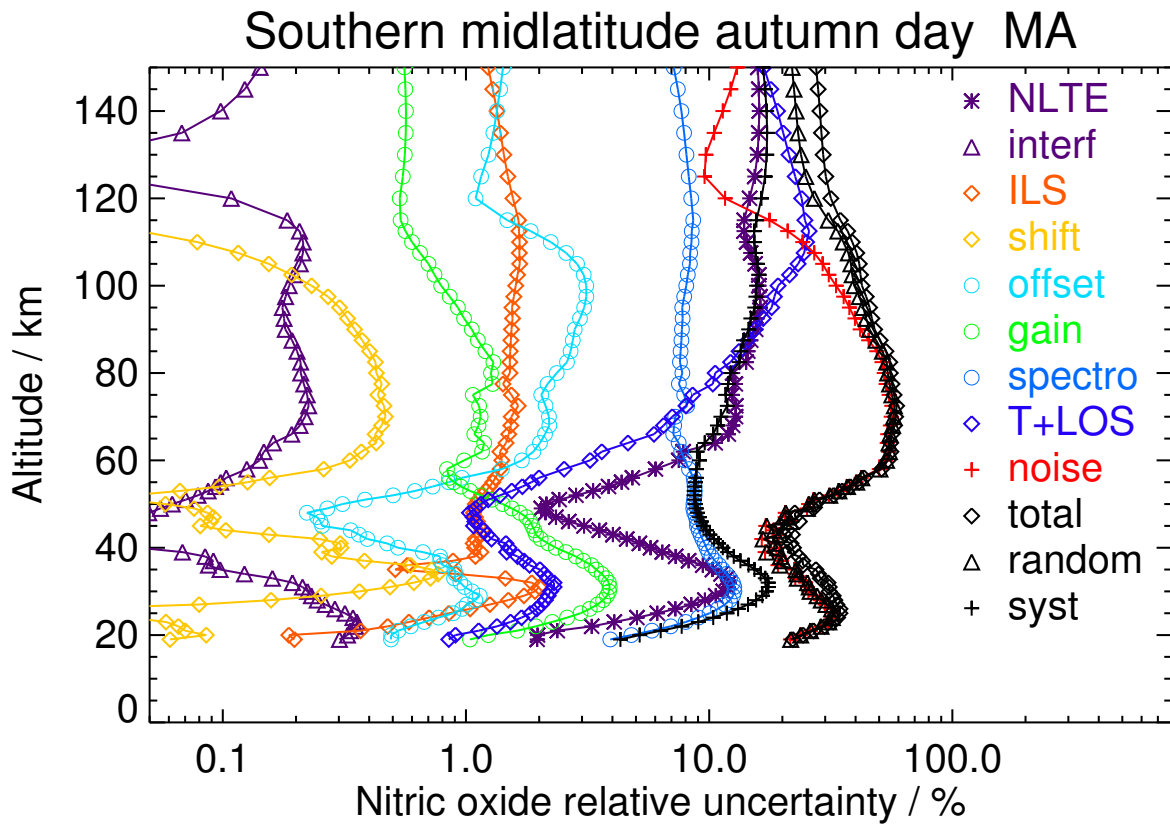


Figure S25. V8R_NO_561 Southern midlatitude autumn day

Table S27. Nitric oxide error budget for Southern midlatitude autumn night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
50	0.00	5.90	0.18	1.00	0.15	1.08	0.33	10.74	2.09	49.46	49.81	11.02	51.02
60	0.01	15.86	0.25	1.84	0.13	2.14	1.63	11.38	6.25	65.08	66.86	13.98	68.31
70	0.07	30.27	0.16	2.59	0.14	1.55	1.14	12.57	8.24	41.07	50.33	17.49	53.28
80	0.10	21.66	0.34	1.81	0.32	2.54	0.83	11.86	13.08	56.51	60.49	18.05	63.13
90	0.90	17.97	0.32	1.40	0.35	3.23	0.65	9.47	14.91	49.08	53.08	15.50	55.29
100	10.00	20.01	0.27	1.15	0.30	3.15	0.57	8.36	23.00	35.56	44.21	17.93	47.71
110	48.61	15.38	0.21	1.05	0.14	2.10	0.45	6.90	28.91	24.13	39.00	13.69	41.33
120	40.55	13.24	0.08	1.29	0.03	1.23	0.48	7.02	19.77	13.92	25.18	13.36	28.50
130	56.35	14.34	0.04	1.35	0.05	1.13	0.50	7.13	16.72	11.12	21.60	14.03	25.75
140	66.77	15.03	0.10	1.36	0.05	1.25	0.51	7.08	14.62	12.64	21.35	14.05	25.56
150	68.64	15.11	0.15	1.32	0.06	1.38	0.50	6.79	12.66	14.34	21.49	13.51	25.38

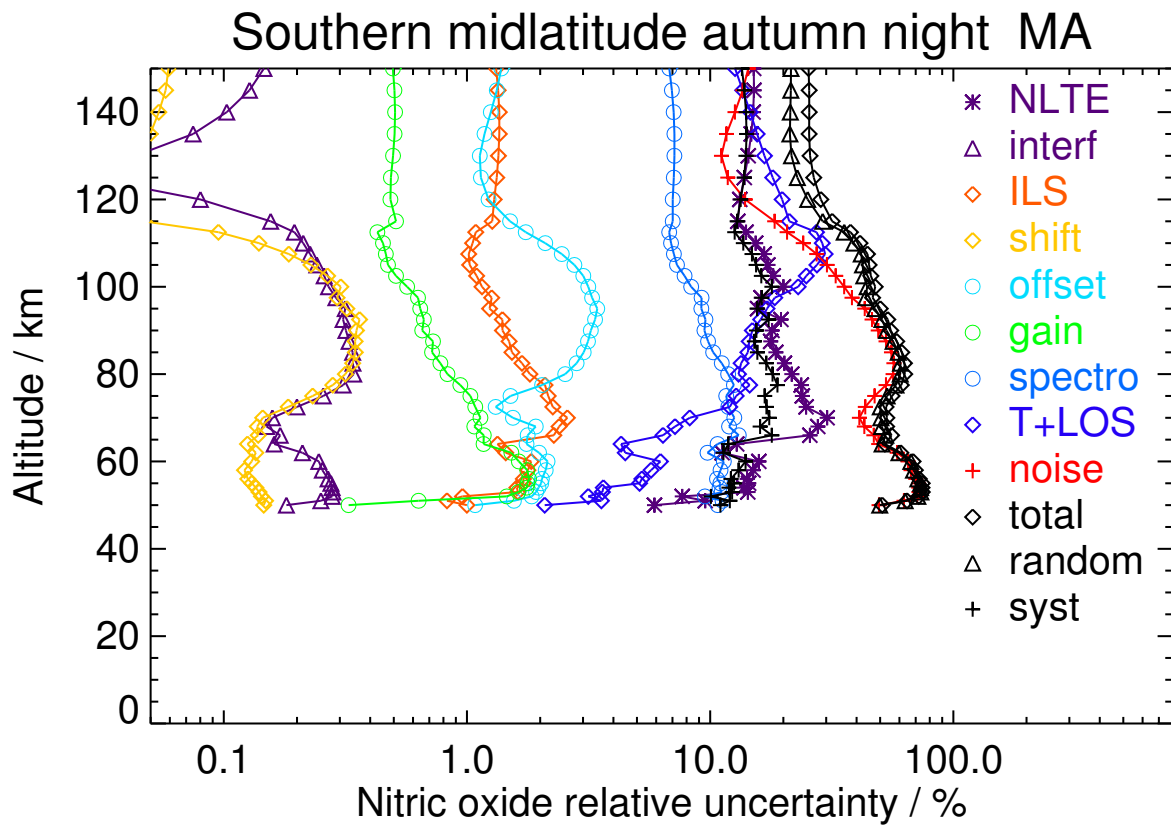


Figure S26. V8R_NO_561 Southern midlatitude autumn night

Table S28. Nitric oxide error budget for Southern polar winter day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
30	0.01	8.02	0.41	1.67	0.44	1.42	1.91	9.79	2.05	38.58	38.90	12.19	40.76
40	0.00	2.64	0.11	0.96	0.22	0.50	1.53	8.58	1.12	22.27	22.47	8.73	24.11
50	0.00	2.88	0.14	1.33	0.07	0.39	1.01	8.07	1.15	31.17	31.27	8.48	32.40
60	0.01	9.99	0.23	1.71	0.12	1.80	0.55	9.05	9.62	55.54	56.81	11.78	58.01
70	0.03	13.24	0.24	1.81	0.22	1.99	0.59	9.63	16.46	56.05	58.93	14.69	60.73
80	0.17	16.32	0.30	1.65	0.27	2.18	0.69	9.15	20.42	50.78	55.45	16.70	57.91
90	1.94	17.61	0.27	1.53	0.29	2.61	0.65	8.27	20.62	39.15	44.95	18.05	48.44
100	19.25	16.54	0.24	1.45	0.27	2.76	0.58	7.60	31.81	30.15	44.50	16.80	47.56
110	83.47	12.72	0.25	1.47	0.11	1.82	0.53	7.56	53.94	20.40	58.02	13.55	59.58
120	135.27	15.50	0.10	1.46	0.09	1.11	0.53	8.10	39.66	9.79	41.05	17.11	44.48
130	170.99	18.54	0.10	1.42	0.13	1.33	0.61	8.25	25.84	10.16	27.99	20.10	34.46
140	199.87	19.33	0.20	1.38	0.13	1.35	0.69	8.06	19.69	11.90	23.30	20.72	31.18
150	226.53	19.24	0.26	1.29	0.12	1.37	0.72	7.60	15.40	13.41	20.83	20.37	29.14

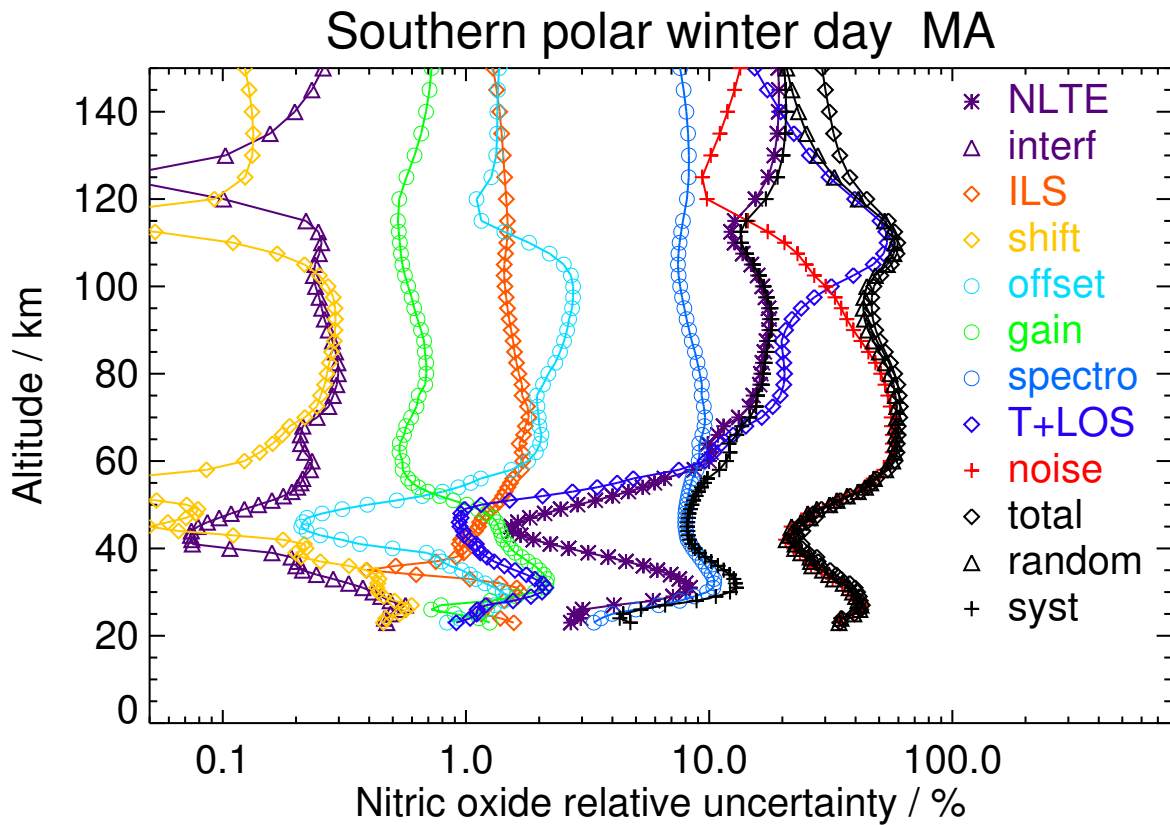


Figure S27. V8R_NO_561 Southern polar winter day

Table S29. Nitric oxide error budget for Southern polar winter night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	13.98	0.63	1.90	0.15	1.59	3.26	9.46	4.75	63.21	64.92	10.29	65.73
50	0.00	20.14	0.41	2.14	0.24	1.20	2.52	12.17	5.27	59.59	62.66	14.81	64.39
60	0.01	25.60	0.34	2.51	0.11	2.07	1.40	14.09	7.26	59.16	63.86	18.47	66.48
70	0.09	24.85	0.22	2.24	0.38	2.03	0.82	13.63	12.33	53.65	59.10	18.73	62.00
80	0.90	24.16	0.20	1.81	0.48	2.61	0.79	11.84	14.90	52.51	57.74	19.49	60.94
90	6.00	21.58	0.24	1.38	0.42	2.70	0.78	9.29	19.63	40.99	47.76	18.61	51.26
100	26.27	27.56	0.31	1.25	0.45	3.00	0.74	8.27	24.33	35.73	45.87	24.57	52.04
110	88.34	21.36	0.32	1.21	0.16	2.11	0.56	7.05	36.30	23.86	44.94	19.48	48.98
120	144.64	17.57	0.18	1.28	0.08	1.03	0.45	7.14	31.70	10.14	34.04	17.64	38.34
130	191.17	19.46	0.05	1.46	0.09	1.01	0.52	7.93	23.55	8.22	25.58	20.31	32.66
140	237.07	21.55	0.17	1.57	0.07	1.10	0.57	8.35	19.09	10.26	22.81	22.09	31.75
150	262.90	23.13	0.26	1.61	0.05	1.24	0.59	8.38	15.57	12.29	21.85	22.92	31.67

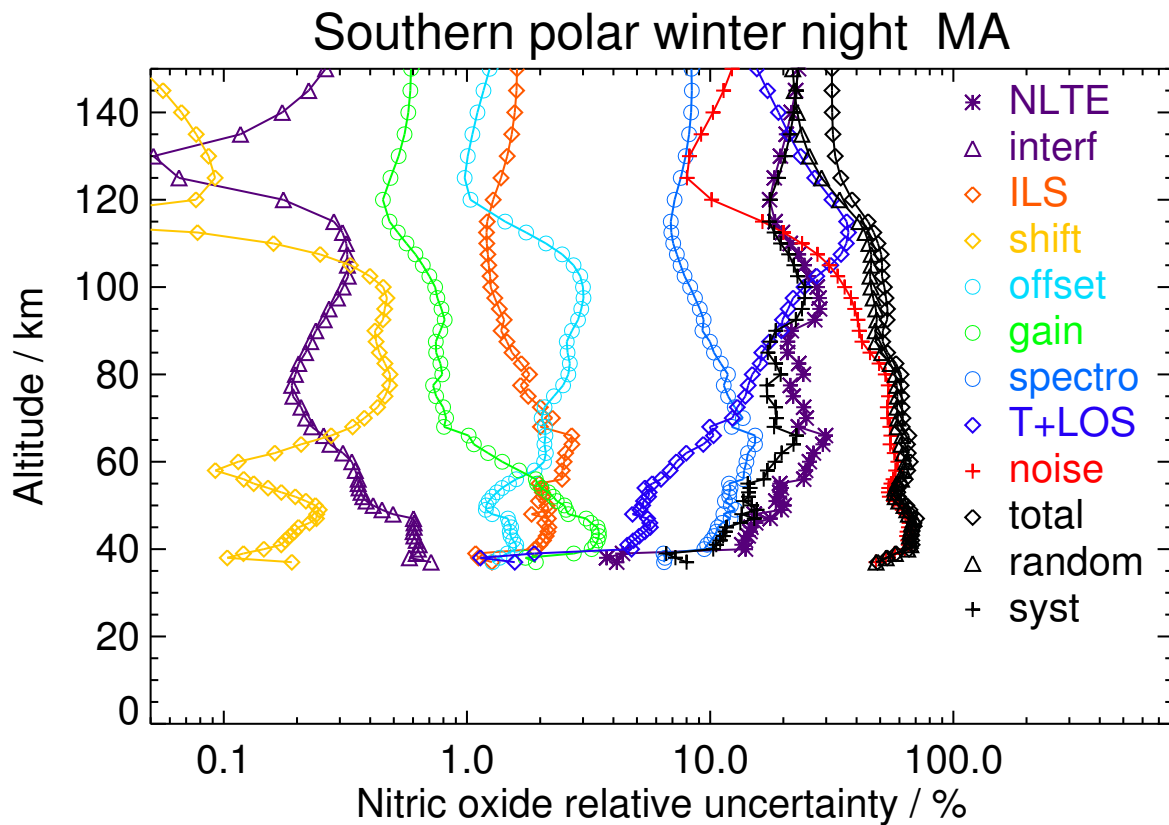
**Figure S28.** V8R_NO_561 Southern polar winter night

Table S30. Nitric oxide error budget for Southern polar spring day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.54	0.28	1.15	0.14	0.47	0.88	5.16	0.79	20.76	21.04	4.51	21.52
30	0.00	3.40	0.12	2.25	0.29	0.55	2.00	9.21	1.26	14.40	14.80	9.78	17.74
40	0.01	2.00	0.05	0.68	0.22	0.25	1.57	8.46	0.80	14.02	14.18	8.65	16.60
50	0.01	1.66	0.09	1.28	0.09	0.20	1.28	8.50	0.77	24.55	24.65	8.61	26.11
60	0.01	11.05	0.23	2.15	0.43	1.81	0.98	9.29	3.91	57.35	58.04	12.40	59.35
70	0.02	15.61	0.17	2.71	0.56	1.80	1.46	9.86	7.16	50.60	51.99	16.23	54.46
80	0.06	20.26	0.29	2.87	0.72	2.65	2.13	8.97	10.31	53.53	55.66	19.62	59.01
90	0.59	22.62	0.34	2.74	0.81	3.90	2.25	8.93	13.58	52.80	55.52	22.58	59.93
100	4.63	19.86	0.35	2.46	0.72	3.94	1.98	8.27	21.59	42.56	48.41	20.56	52.60
110	28.33	17.65	0.36	2.33	0.48	2.66	1.60	8.11	29.52	30.13	42.61	18.88	46.60
120	50.99	19.19	0.18	1.88	0.05	0.96	0.69	8.50	26.58	10.96	29.04	20.71	35.67
130	78.75	22.00	0.05	1.56	0.18	1.08	0.66	8.64	21.31	7.71	23.11	23.28	32.81
140	122.06	22.77	0.16	1.40	0.24	1.21	0.91	8.45	18.09	10.33	21.42	23.87	32.07
150	164.81	22.53	0.23	1.26	0.26	1.29	1.08	8.01	15.25	12.57	20.45	23.42	31.09

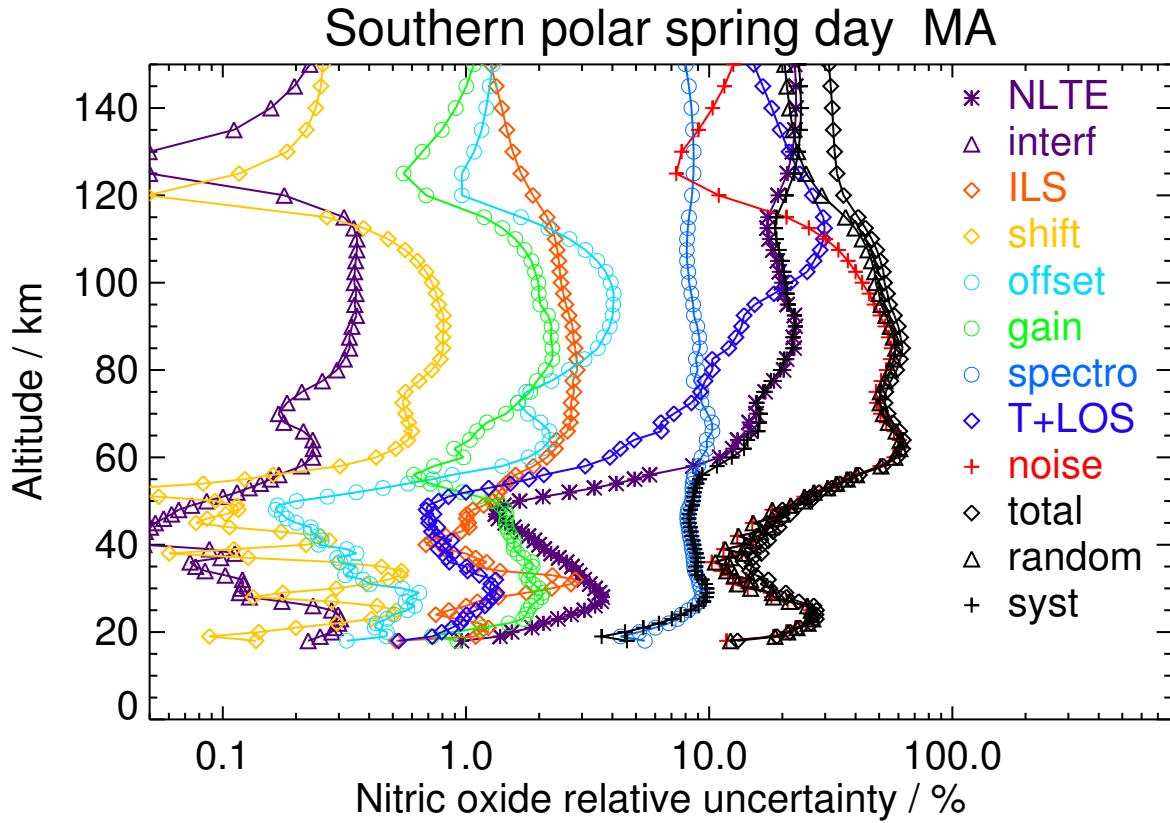


Figure S29. V8R_NO_561 Southern polar spring day

Table S31. Nitric oxide error budget for Southern polar spring night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	1.02	0.61	1.33	0.03	0.96	2.03	1.11	1.72	52.16	52.26	1.49	52.28
50	0.00	9.07	0.50	3.93	0.44	1.38	7.65	5.53	2.51	38.96	40.32	9.35	41.39
60	0.01	12.84	0.36	2.42	0.29	1.95	4.09	9.06	4.58	56.72	57.96	12.38	59.26
70	0.20	8.36	0.08	1.11	0.22	1.58	0.95	8.44	6.50	33.35	34.86	9.22	36.06
80	0.23	12.89	0.25	1.77	0.44	1.69	0.84	7.69	14.35	41.22	44.55	12.36	46.23
90	0.95	21.27	0.60	2.23	0.85	3.65	2.57	7.83	18.56	50.27	54.56	20.84	58.41
100	5.84	17.55	0.63	2.01	0.74	3.78	1.87	7.38	23.16	40.87	47.91	17.23	50.92
110	25.35	17.95	0.55	1.73	0.42	2.57	1.35	7.51	24.50	28.98	38.68	18.27	42.78
120	45.81	18.28	0.17	1.46	0.02	0.97	0.55	7.72	22.39	10.88	25.47	19.19	31.89
130	66.91	19.58	0.12	1.43	0.16	1.08	0.65	7.83	19.33	8.63	22.01	20.29	29.94
140	93.13	19.61	0.24	1.42	0.17	1.21	0.74	7.61	17.10	11.02	21.35	20.11	29.33
150	112.01	18.83	0.29	1.36	0.16	1.26	0.77	7.13	14.94	12.52	20.59	19.12	28.10

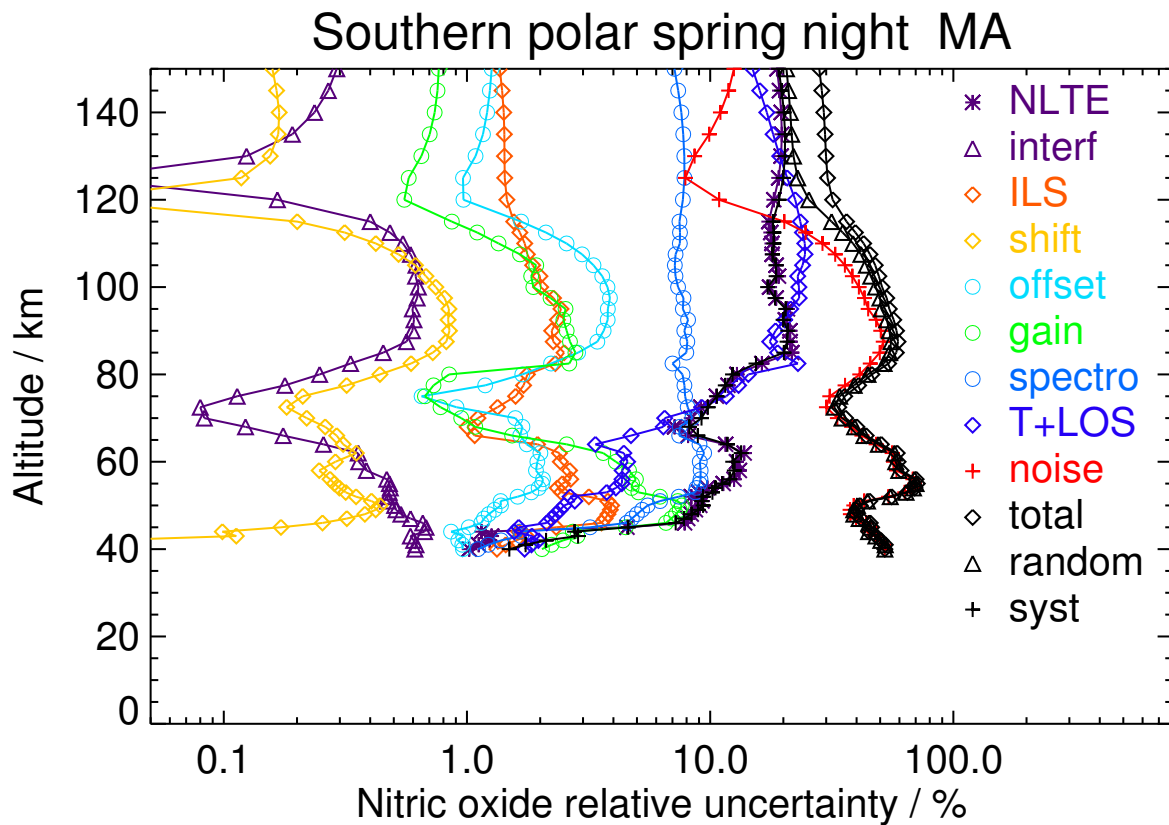
**Figure S30.** V8R_NO_561 Southern polar spring night

Table S32. Nitric oxide error budget for Southern polar summer day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.87	0.55	0.38	0.24	0.42	1.61	7.00	1.27	20.96	21.13	7.10	22.29
30	0.01	3.75	0.28	2.78	0.38	0.65	2.03	8.84	1.70	16.51	16.78	9.92	19.49
40	0.01	1.84	0.06	0.63	0.29	0.29	1.52	8.34	1.04	10.10	10.28	8.56	13.37
50	0.01	1.70	0.07	1.04	0.11	0.16	1.19	7.86	0.89	18.16	18.26	8.01	19.94
60	0.01	8.98	0.19	1.24	0.40	0.90	1.57	8.17	5.07	38.75	39.87	9.51	40.98
70	0.01	20.24	0.20	1.84	0.82	1.66	1.49	9.08	13.62	47.45	51.25	17.65	54.21
80	0.04	32.63	0.17	1.62	0.77	1.69	1.36	10.05	39.54	40.26	60.75	25.82	66.01
90	1.73	32.55	0.08	1.22	0.74	2.16	1.27	8.29	57.10	31.36	67.53	28.63	73.35
100	17.39	32.76	0.08	1.26	0.48	2.63	0.95	6.89	24.08	27.22	41.30	27.30	49.51
110	35.22	21.69	0.24	1.51	0.03	1.57	0.81	7.16	23.05	16.15	31.25	18.52	36.32
120	64.28	24.03	0.18	1.57	0.19	1.31	0.64	7.95	27.68	10.25	31.76	22.53	38.94
130	119.09	24.74	0.03	1.52	0.17	1.27	0.68	8.42	26.37	9.01	29.80	23.99	38.26
140	218.90	24.02	0.13	1.47	0.14	1.14	0.80	8.47	24.16	9.32	27.28	24.06	36.38
150	318.79	24.44	0.20	1.42	0.10	1.11	0.89	8.28	21.22	10.60	25.01	24.65	35.11

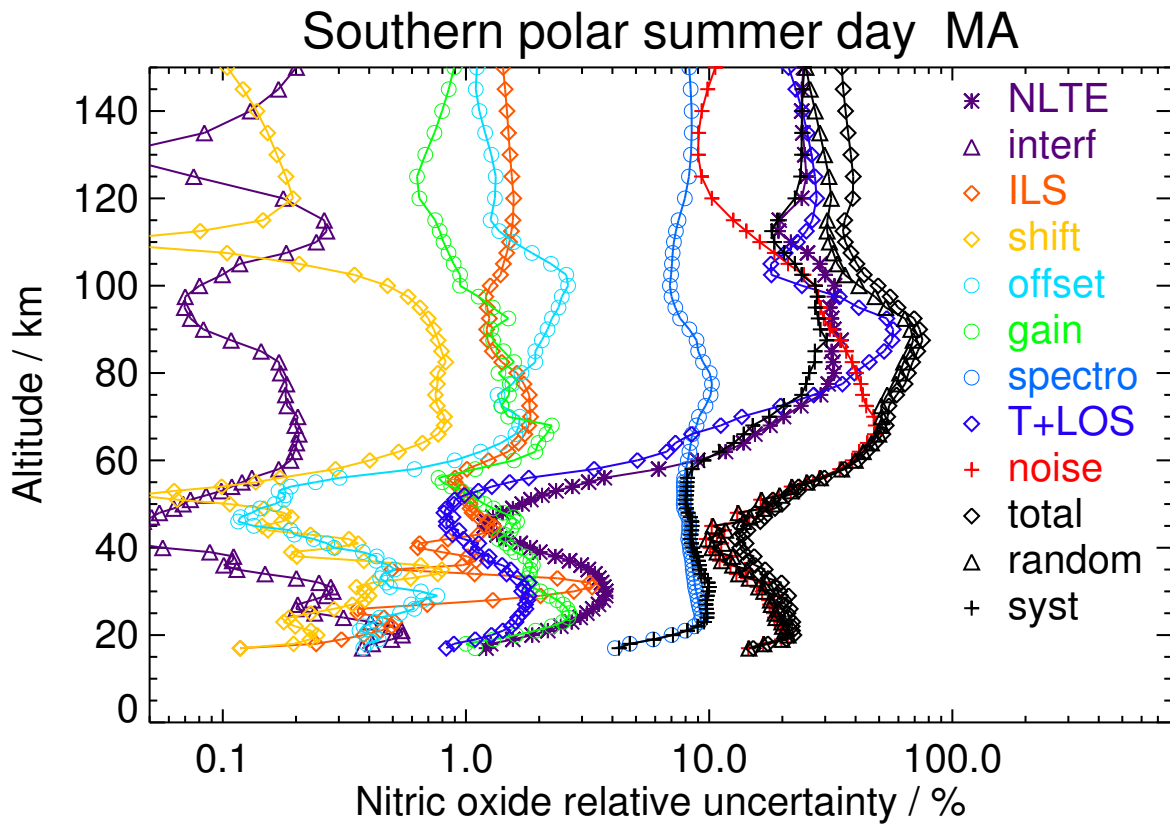


Figure S31. V8R_NO_561 Southern polar summer day

Table S33. Nitric oxide error budget for Southern polar summer night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
40	0.00	1.68	0.81	0.40	0.07	0.89	0.11	0.74	0.74	41.50	41.52	1.88	41.57
50	0.00	8.49	0.55	0.92	0.30	1.68	4.33	4.23	7.18	44.67	46.12	5.71	46.47
60	0.00	17.43	0.36	1.80	0.21	1.93	2.76	8.84	7.63	56.32	59.19	11.09	60.22
70	0.04	12.61	0.28	1.60	0.37	1.61	1.15	8.27	6.21	44.54	45.44	13.85	47.50
80	0.05	14.93	0.45	0.75	0.55	2.84	0.56	7.67	17.44	48.82	51.92	16.81	54.58
90	0.71	27.53	0.53	1.30	0.64	3.88	1.13	7.38	16.62	49.04	52.70	27.12	59.27
100	7.07	22.21	0.48	1.20	0.57	3.56	1.10	6.08	17.72	35.74	41.63	20.11	46.24
110	24.61	16.37	0.43	1.12	0.26	2.44	0.89	5.70	22.39	25.16	34.94	14.90	37.99
120	51.27	16.06	0.14	1.18	0.08	1.00	0.47	6.64	23.43	8.96	25.89	16.24	30.57
130	73.42	18.60	0.13	1.34	0.15	1.24	0.60	7.30	21.02	8.98	24.20	18.43	30.42
140	108.96	19.55	0.23	1.42	0.12	1.29	0.68	7.39	18.83	11.32	23.71	19.01	30.39
150	138.32	19.98	0.29	1.42	0.08	1.35	0.71	7.15	16.53	13.01	23.27	18.85	29.95

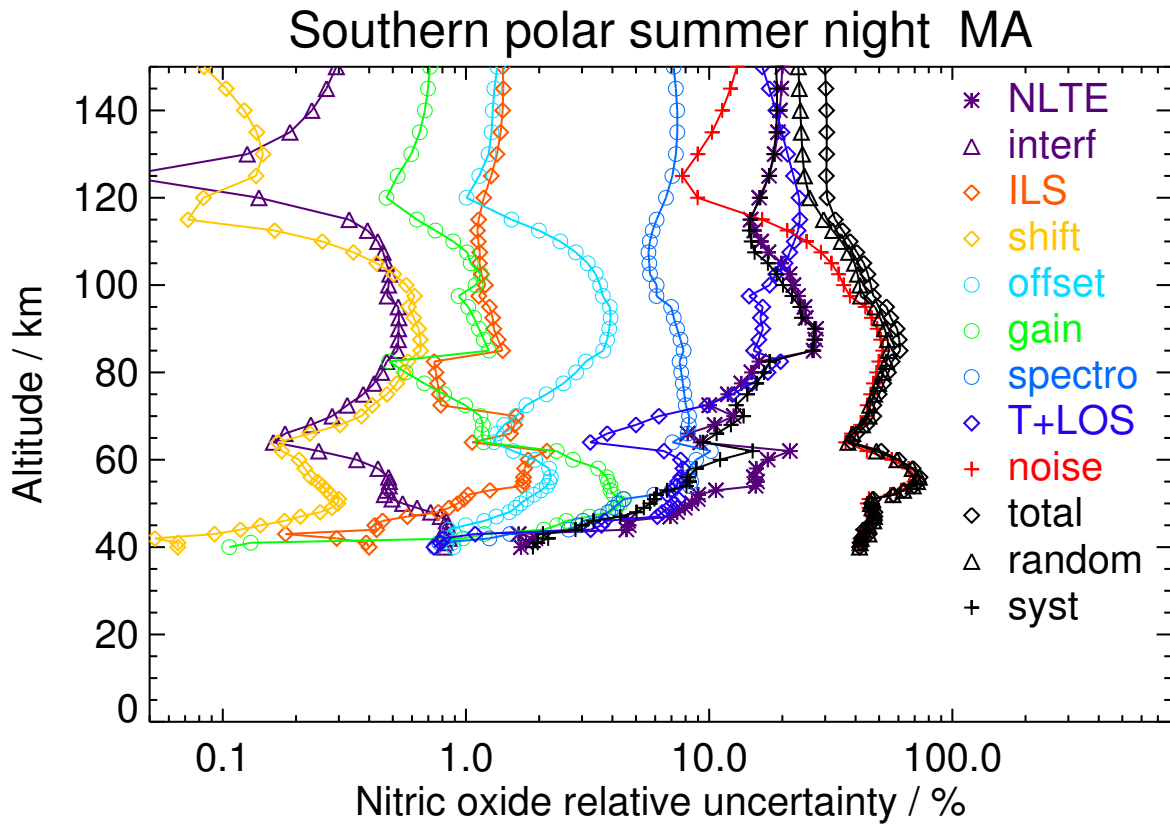


Figure S32. V8R_NO_561 Southern polar summer night

Table S34. Nitric oxide error budget for Southern polar autumn day. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
20	0.00	1.46	0.41	0.22	0.17	0.60	3.00	7.44	1.22	22.35	22.40	8.12	23.83
30	0.01	10.15	0.28	1.53	0.48	1.49	4.53	11.07	3.19	31.94	32.63	14.72	35.80
40	0.01	6.83	0.12	2.03	0.28	0.81	2.08	11.34	1.77	33.23	33.48	13.08	35.94
50	0.00	7.29	0.14	1.65	0.02	0.76	1.02	9.33	2.90	42.59	43.21	9.97	44.35
60	0.01	15.47	0.21	1.97	0.24	1.95	0.93	10.38	6.52	59.09	60.77	14.04	62.37
70	0.03	15.98	0.25	1.66	0.33	2.07	0.83	9.13	10.35	56.77	58.85	14.59	60.63
80	0.13	24.19	0.24	1.58	0.26	2.16	0.82	9.14	13.95	49.18	53.61	20.39	57.36
90	1.25	24.97	0.23	1.30	0.24	2.97	0.61	8.10	16.82	42.36	47.98	21.80	52.70
100	10.66	24.24	0.20	1.19	0.15	3.22	0.52	7.52	20.39	33.40	41.23	22.09	46.77
110	72.02	17.29	0.18	1.28	0.01	2.06	0.56	7.30	34.33	21.04	41.37	16.38	44.49
120	127.31	15.74	0.09	1.48	0.06	1.13	0.52	7.81	29.18	9.62	31.32	16.60	35.44
130	153.83	17.89	0.07	1.54	0.05	1.10	0.55	8.19	21.08	8.11	23.27	18.97	30.02
140	174.87	19.09	0.13	1.51	0.05	1.10	0.57	8.11	16.86	10.44	20.94	19.73	28.77
150	197.14	20.03	0.16	1.42	0.05	1.27	0.56	7.70	13.74	12.57	20.40	19.88	28.48

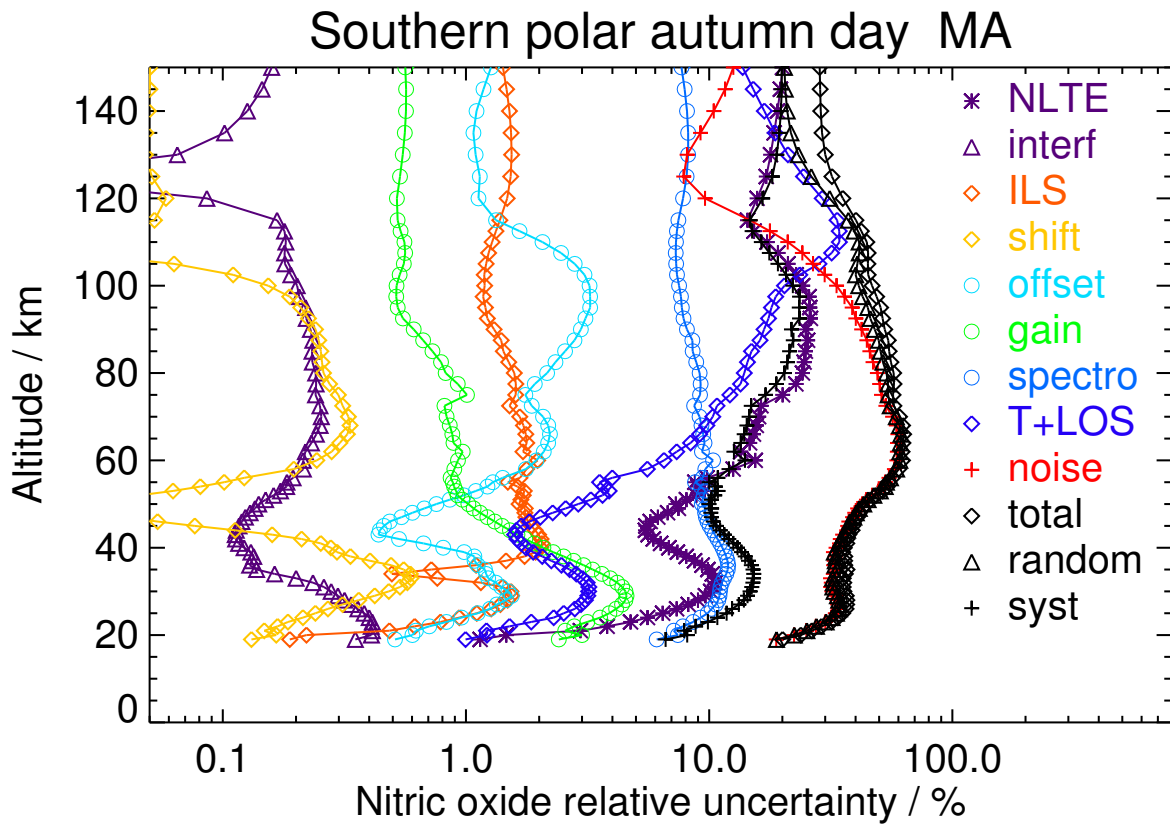


Figure S33. V8R_NO_561 Southern polar autumn day

Table S35. Nitric oxide error budget for Southern polar autumn night. All uncertainties are 1σ .

altitude (km)	mean target (ppmv)	NLTE (%)	interf (%)	ILS (%)	shift (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)	total (%)
50	0.00	12.50	0.17	1.09	0.10	0.90	0.52	10.93	5.02	51.04	52.72	11.39	53.93
60	0.02	14.20	0.18	1.29	0.12	1.39	0.89	9.91	5.74	46.88	48.81	12.35	50.35
70	0.08	15.11	0.19	1.22	0.26	1.86	0.81	9.44	7.32	54.03	55.74	13.75	57.41
80	0.40	24.27	0.23	1.15	0.33	2.03	0.86	9.78	9.36	51.90	54.94	21.29	58.93
90	3.69	22.46	0.19	0.96	0.38	2.81	0.77	9.11	11.91	44.58	48.17	20.15	52.22
100	23.66	19.85	0.17	0.79	0.26	2.82	0.69	7.81	21.06	34.16	41.30	19.22	45.55
110	117.69	23.13	0.17	1.09	0.07	1.90	0.53	7.24	34.86	21.78	42.74	21.32	47.77
120	142.48	19.78	0.10	1.56	0.05	1.04	0.53	8.26	28.29	11.34	31.60	19.82	37.31
130	184.74	20.21	0.05	1.70	0.05	0.88	0.54	8.71	19.72	7.14	21.87	21.21	30.47
140	218.33	21.26	0.11	1.70	0.03	0.99	0.54	8.74	15.31	9.43	19.15	22.12	29.26
150	232.97	22.05	0.14	1.62	0.02	1.18	0.51	8.40	12.17	11.82	18.72	22.32	29.13

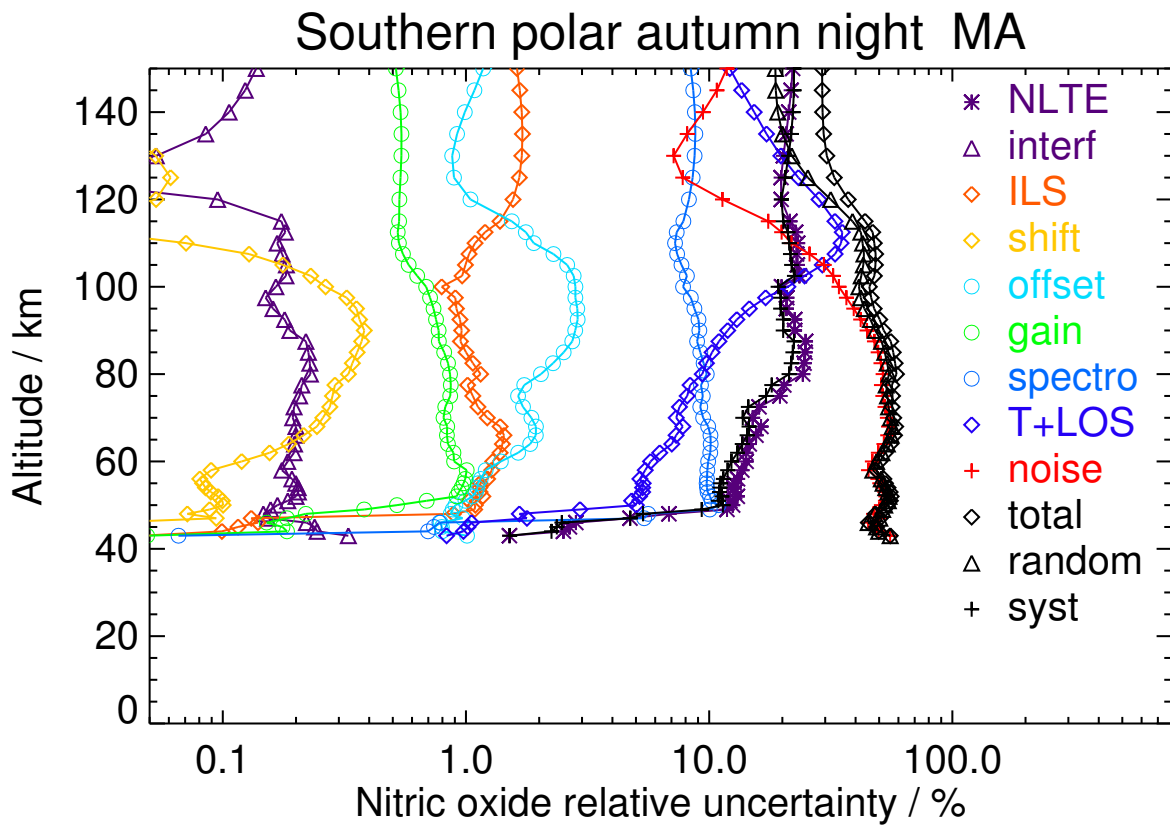


Figure S34. V8R_NO_561 Southern polar autumn night