

## *Supplement 3 to* **Version 8 IMK/IAA MIPAS measurements of CFC-11, CFC-12, and HCFC-22**

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This document serves as reference for the definitions of the representative atmospheres used for the calculation of HCFC-22 error budgets, as listed in Tab. S1, and as collection of the respective error budgets for FR data (2002-2004), which are listed in tables S2–S35 and depicted in figures S1–S34, and the respective error budgets for RR data (2005-2012), which are listed in tables S36–S69 and depicted in figures S35–S68.

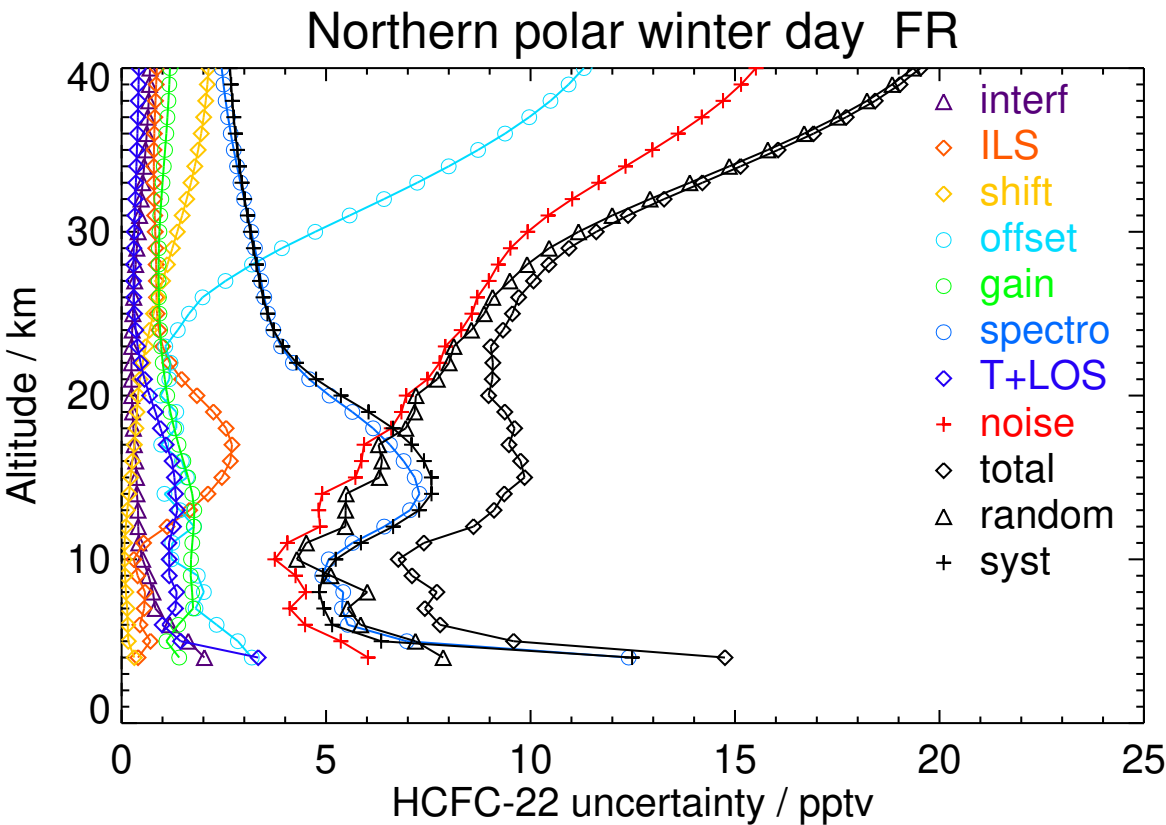
The errors are presented as relative errors in percent, even if they are of additive nature, i.e., do not scale with the retrieved volume mixing ratio. They were calculated with respect to the average ozone profile that was calculated from the single geolocations which contribute to the respective representative 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	> 95°
Northern polar spring day	Apr	65°N – 90°N	< 90°
Northern polar spring night	Apr	65°N – 90°N	> 95°
Northern polar summer day	Jul, Aug	65°N – 90°N	< 90°
Northern polar summer night	Jul, Aug	65°N – 90°N	> 95°
Northern polar autumn day	Oct	65°N – 90°N	< 90°
Northern polar autumn night	Oct	65°N – 90°N	> 95°
Northern midlatitude winter day	Jan, Feb	40°N – 60°N	< 90°
Northern midlatitude winter night	Jan, Feb	40°N – 60°N	> 95°
Northern midlatitude spring day	Apr	40°N – 60°N	< 90°
Northern midlatitude spring night	Apr	40°N – 60°N	> 95°
Northern midlatitude summer day	Jul, Aug	40°N – 60°N	< 90°
Northern midlatitude summer night	Jul, Aug	40°N – 60°N	> 95°
Northern midlatitude autumn day	Oct	40°N – 60°N	< 90°
Northern midlatitude autumn night	Oct	40°N – 60°N	> 95°
Tropics day	Apr	20°S – 20°N	< 90°
Tropics night	Apr	20°S – 20°N	> 95°
Southern midlatitude winter day	Jul, Aug	40°S – 60°S	< 90°
Southern midlatitude winter night	Jul, Aug	40°S – 60°S	> 95°
Southern midlatitude spring day	Oct	40°S – 60°S	< 90°
Southern midlatitude spring night	Oct	40°S – 60°S	> 95°
Southern midlatitude summer day	Jan, Feb	40°S – 60°S	< 90°
Southern midlatitude summer night	Jan, Feb	40°S – 60°S	> 95°
Southern midlatitude autumn day	Apr	40°S – 60°S	< 90°
Southern midlatitude autumn night	Apr	40°S – 60°S	> 95°
Southern polar winter day	Jul, Aug	65°S – 90°S	< 90°
Southern polar winter night	Jul, Aug	65°S – 90°S	> 95°
Southern polar spring day	Oct	65°S – 90°S	< 90°
Southern polar spring night	Oct	65°S – 90°S	> 95°
Southern polar summer day	Jan, Feb	65°S – 90°S	< 90°
Southern polar summer night	Jan, Feb	65°S – 90°S	> 95°
Southern polar autumn day	Apr	65°S – 90°S	< 90°
Southern polar autumn night	Apr	65°S – 90°S	> 95°

**Table S2.** HCFC-22 error budget for Northern polar winter day. All uncertainties are  $1\sigma$ .

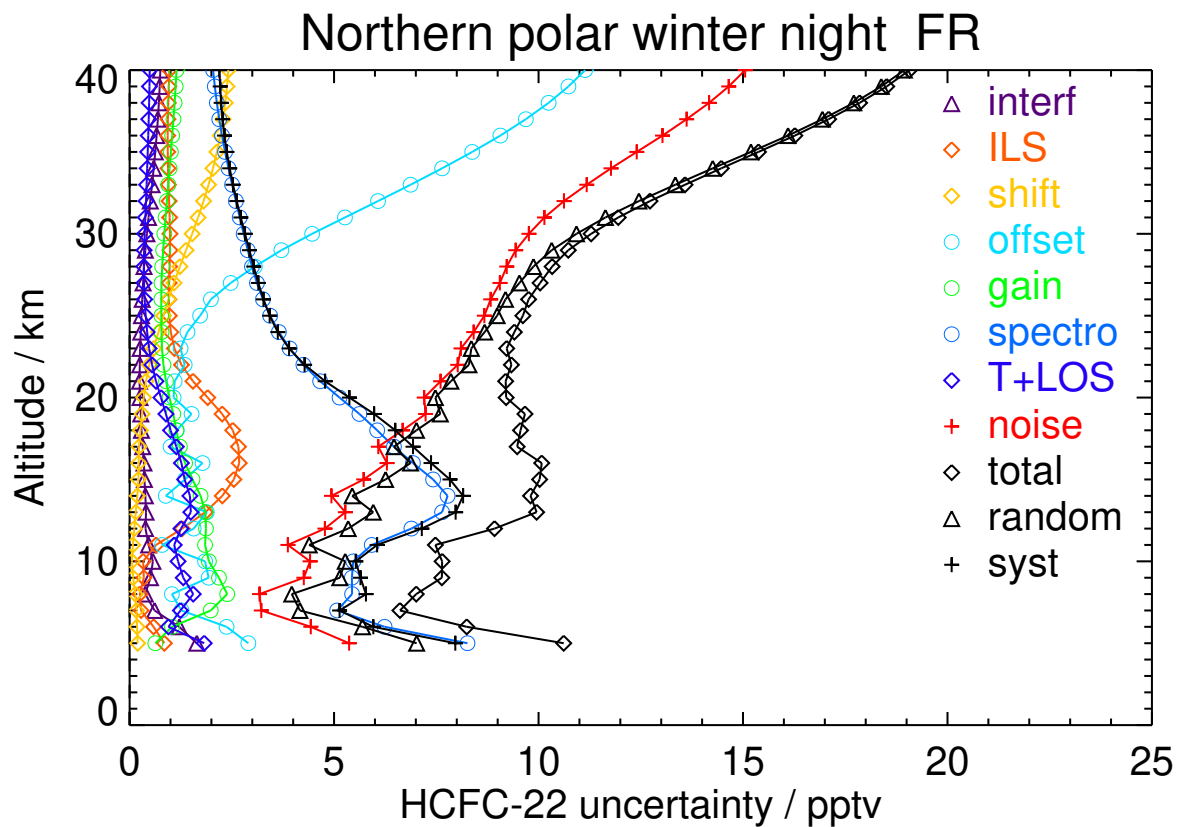
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	168.03	1.63	0.71	0.16	2.84	1.09	6.97	1.44	5.36	7.19	6.35	9.59
8	153.62	0.77	0.57	0.10	2.01	1.72	5.42	1.35	4.51	6.01	4.83	7.71
11	143.15	0.42	0.54	0.07	1.24	1.73	5.65	1.16	4.05	4.52	5.85	7.39
14	127.27	0.38	2.11	0.18	1.05	1.73	7.28	1.32	4.90	5.49	7.58	9.36
17	105.54	0.31	2.70	0.31	0.97	1.39	6.56	1.09	5.93	6.28	7.09	9.47
20	86.27	0.25	1.84	0.40	0.95	1.12	5.09	0.69	6.96	7.20	5.36	8.97
23	76.31	0.25	1.00	0.59	1.07	0.97	3.90	0.39	7.92	8.12	3.94	9.03
26	73.19	0.30	0.85	0.89	1.98	0.91	3.49	0.30	8.70	9.07	3.46	9.71
29	71.21	0.37	0.84	1.24	3.92	0.91	3.26	0.30	9.51	10.45	3.22	10.94
32	69.28	0.48	0.80	1.59	6.42	0.97	2.99	0.34	11.02	12.92	3.01	13.27
35	66.69	0.59	0.79	1.87	8.72	1.06	2.74	0.37	12.98	15.80	2.83	16.05
38	64.13	0.66	0.83	2.06	10.49	1.15	2.54	0.41	14.71	18.23	2.71	18.43
41	61.53	0.71	0.90	2.23	11.52	1.20	2.39	0.43	15.70	19.64	2.61	19.81



**Figure S1.** V8H\_F-22\_61 Northern polar winter day

**Table S3.** HCFC-22 error budget for Northern polar winter night. All uncertainties are  $1\sigma$ .

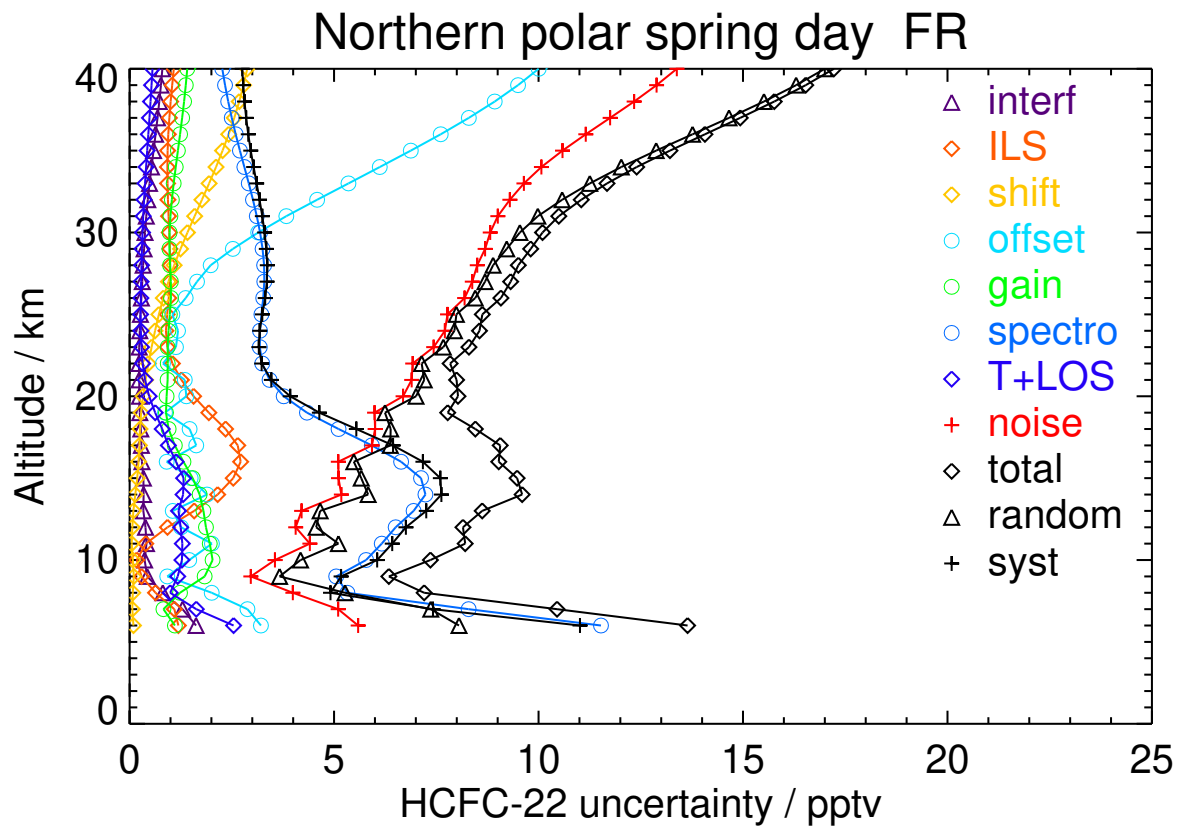
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	162.61	1.64	0.85	0.20	2.90	0.63	8.26	1.82	5.37	7.02	7.96	10.62
8	156.16	0.38	0.25	0.14	1.03	2.39	5.44	1.56	3.18	3.96	5.78	7.01
11	143.25	0.46	0.65	0.08	0.79	1.85	5.92	1.09	3.87	4.39	6.05	7.48
14	123.65	0.38	2.27	0.19	0.89	1.74	7.78	1.48	4.94	5.44	8.15	9.80
17	100.79	0.32	2.66	0.23	1.00	1.23	6.46	1.14	6.08	6.47	6.93	9.48
20	82.54	0.25	1.91	0.34	1.08	0.98	5.13	0.77	7.20	7.48	5.37	9.21
23	71.27	0.26	1.10	0.59	1.25	0.79	3.92	0.48	8.10	8.36	3.90	9.22
26	68.49	0.31	0.96	0.95	1.99	0.78	3.26	0.37	8.83	9.19	3.27	9.76
29	64.15	0.38	0.99	1.38	3.71	0.82	2.89	0.35	9.44	10.32	2.93	10.73
32	58.07	0.51	0.97	1.81	6.07	0.91	2.60	0.40	10.62	12.45	2.62	12.73
35	52.91	0.63	0.93	2.13	8.38	1.01	2.34	0.44	12.40	15.19	2.38	15.38
38	48.96	0.72	0.95	2.34	10.25	1.10	2.13	0.48	14.17	17.71	2.24	17.85
41	47.00	0.77	0.99	2.46	11.43	1.17	2.02	0.50	15.34	19.35	2.19	19.48



**Figure S2.** V8H\_F-22\_61 Northern polar winter night

**Table S4.** HCFC-22 error budget for Northern polar spring day. All uncertainties are  $1\sigma$ .

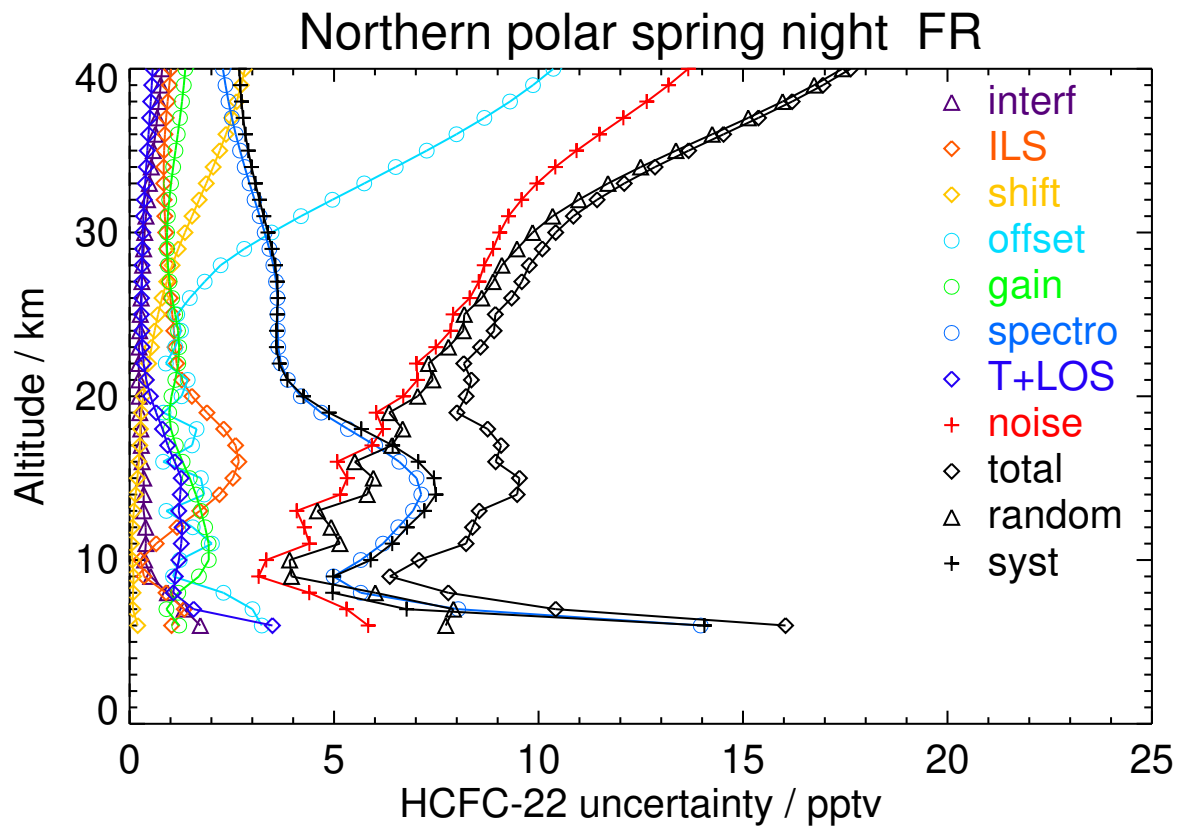
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.36	0.81	0.63	0.08	2.01	1.23	5.33	0.99	3.99	5.27	4.91	7.20
11	139.39	0.41	0.39	0.05	2.01	1.96	6.17	1.29	4.41	5.11	6.42	8.21
14	115.09	0.34	2.15	0.14	1.89	1.71	7.23	1.31	5.18	5.83	7.62	9.60
17	88.26	0.29	2.65	0.24	1.63	1.11	5.92	0.95	5.93	6.37	6.44	9.06
20	73.73	0.24	1.57	0.33	1.39	0.91	3.77	0.48	6.69	7.00	3.93	8.03
23	75.05	0.23	0.92	0.54	1.13	0.93	3.18	0.29	7.44	7.67	3.16	8.30
26	76.54	0.29	0.96	0.83	1.37	1.01	3.27	0.28	8.19	8.45	3.32	9.08
29	75.83	0.35	0.99	1.25	2.53	0.97	3.25	0.30	8.69	9.22	3.34	9.81
32	70.95	0.44	0.94	1.77	4.59	1.03	3.02	0.35	9.30	10.58	3.18	11.04
35	64.68	0.59	0.93	2.27	6.88	1.18	2.70	0.43	10.59	12.88	2.96	13.21
38	58.51	0.73	1.00	2.68	8.93	1.33	2.41	0.51	12.34	15.51	2.81	15.76
41	53.95	0.83	1.12	2.95	10.44	1.44	2.21	0.58	13.81	17.61	2.74	17.82



**Figure S3.** V8H\_F-22\_61 Northern polar spring day

**Table S5.** HCFC-22 error budget for Northern polar spring night. All uncertainties are  $1\sigma$ .

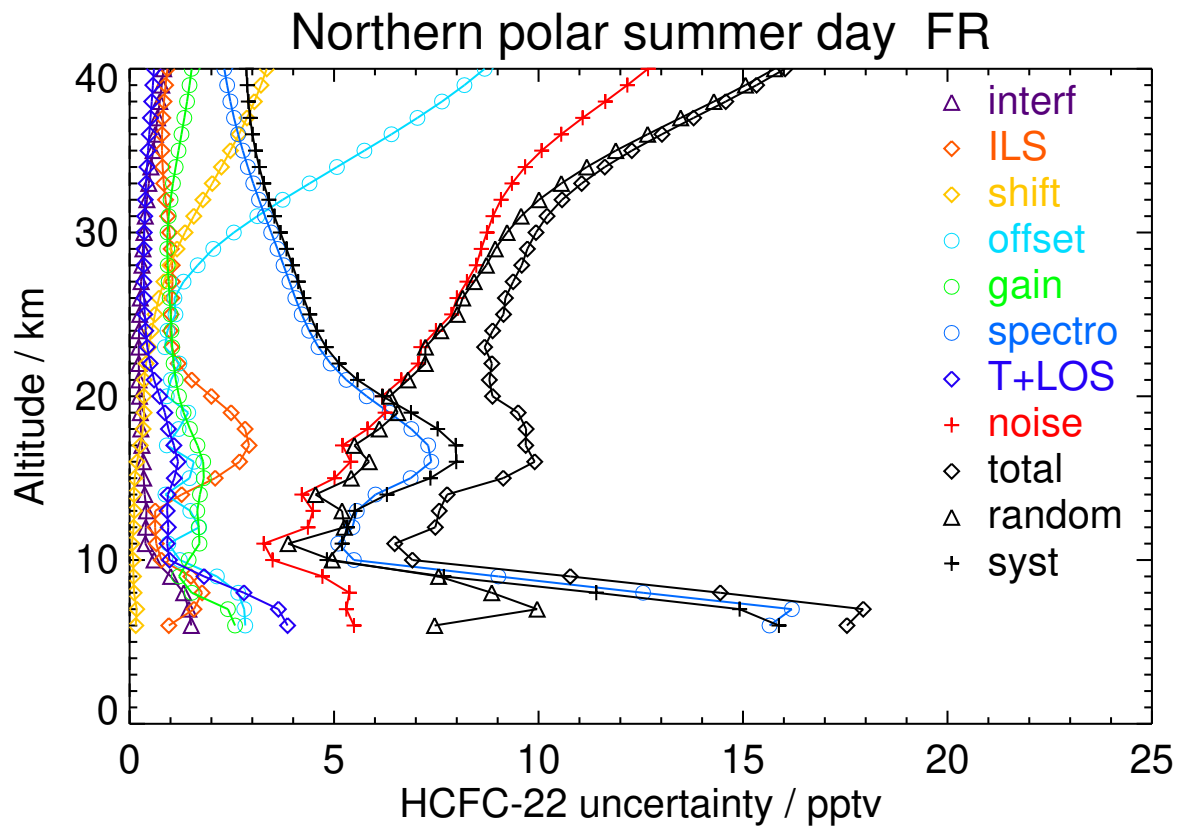
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.29	0.93	0.89	0.08	2.29	1.19	5.65	1.07	4.39	6.01	4.97	7.79
11	137.20	0.40	0.65	0.04	2.01	1.93	6.20	1.26	4.40	5.14	6.42	8.23
14	116.68	0.34	2.20	0.15	1.82	1.62	7.13	1.24	5.15	5.81	7.49	9.48
17	93.57	0.29	2.59	0.25	1.53	1.13	6.01	0.93	5.93	6.41	6.43	9.08
20	80.71	0.23	1.52	0.33	1.27	1.02	4.19	0.51	6.69	7.04	4.25	8.23
23	80.37	0.23	1.11	0.54	1.12	1.21	3.63	0.31	7.49	7.80	3.59	8.58
26	78.69	0.28	0.99	0.79	1.47	1.04	3.61	0.29	8.32	8.61	3.63	9.34
29	72.49	0.34	0.91	1.19	2.80	0.91	3.42	0.31	8.89	9.47	3.48	10.09
32	66.64	0.44	0.84	1.70	4.96	0.97	3.06	0.36	9.59	10.98	3.17	11.43
35	62.10	0.58	0.84	2.20	7.27	1.12	2.70	0.43	10.93	13.36	2.90	13.67
38	58.77	0.72	0.93	2.62	9.30	1.28	2.42	0.52	12.65	15.97	2.73	16.20
41	56.30	0.83	1.05	2.90	10.79	1.39	2.23	0.58	14.07	18.02	2.67	18.22



**Figure S4.** V8H\_F-22\_61 Northern polar spring night

**Table S6.** HCFC-22 error budget for Northern polar summer day. All uncertainties are  $1\sigma$ .

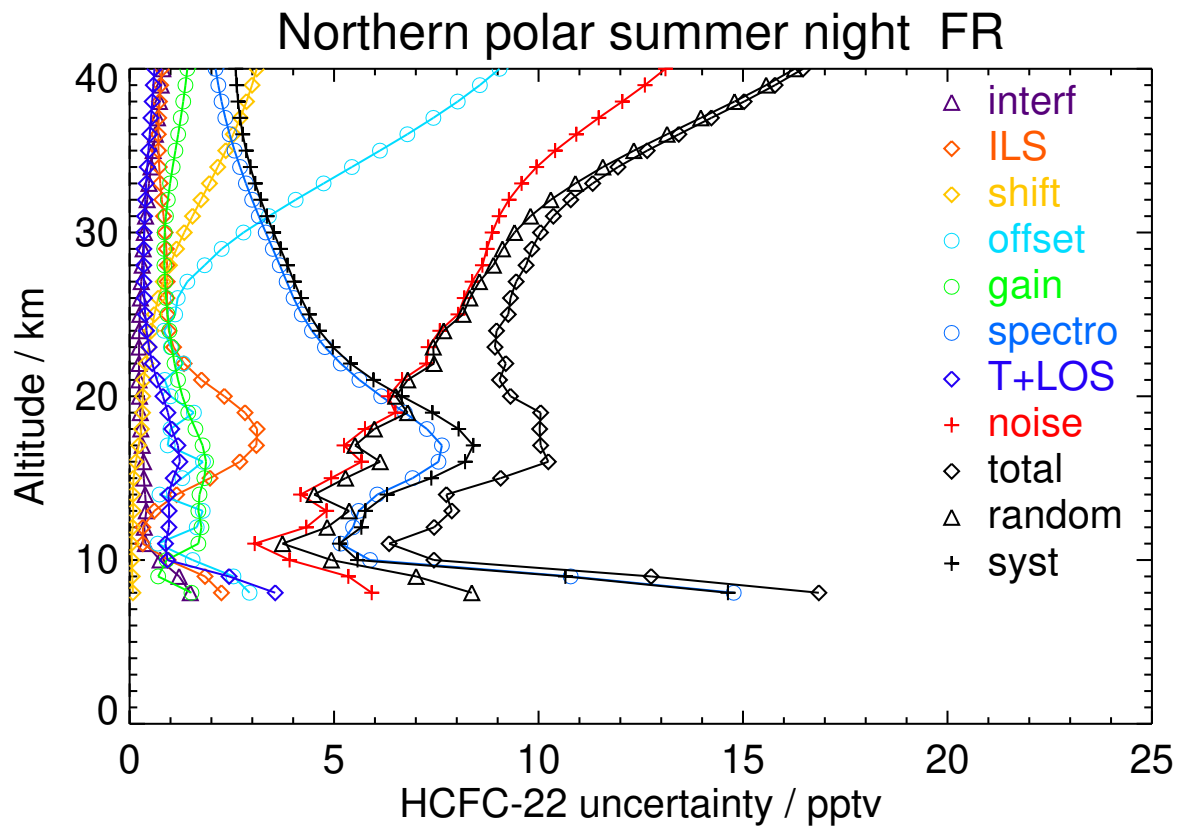
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	152.13	1.32	1.77	0.11	2.66	1.52	12.56	2.80	5.37	8.86	11.41	14.44
11	151.56	0.38	0.65	0.06	0.95	1.71	5.10	0.92	3.28	3.88	5.19	6.48
14	140.82	0.37	1.27	0.10	0.88	1.72	6.01	0.94	4.21	4.55	6.29	7.76
17	125.87	0.30	2.92	0.26	0.91	1.66	7.30	1.08	5.20	5.50	7.98	9.69
20	104.83	0.24	2.00	0.35	0.91	1.21	5.80	0.74	6.18	6.36	6.18	8.87
23	92.17	0.22	1.03	0.47	0.86	1.04	4.62	0.43	7.12	7.23	4.80	8.68
26	84.76	0.26	1.04	0.72	1.10	0.98	4.05	0.36	8.00	8.14	4.26	9.19
29	78.24	0.33	1.02	1.16	2.05	0.92	3.62	0.35	8.60	8.94	3.84	9.73
32	72.29	0.42	0.88	1.79	3.74	1.00	3.16	0.38	9.08	10.01	3.40	10.57
35	66.20	0.57	0.79	2.47	5.74	1.20	2.77	0.45	10.08	11.89	3.08	12.28
38	61.52	0.74	0.84	3.05	7.64	1.41	2.46	0.54	11.63	14.29	2.90	14.58
41	58.47	0.87	0.97	3.47	9.12	1.56	2.26	0.62	13.14	16.41	2.84	16.66



**Figure S5.** V8H\_F-22\_61 Northern polar summer day

**Table S7.** HCFC-22 error budget for Northern polar summer night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	154.99	1.48	2.25	0.08	2.93	1.51	14.77	3.56	5.92	8.37	14.63	16.85
11	153.21	0.39	0.32	0.04	0.69	1.68	5.16	0.88	3.06	3.74	5.13	6.35
14	142.97	0.38	1.15	0.08	0.73	1.71	6.06	0.95	4.18	4.51	6.30	7.75
17	127.80	0.31	3.10	0.22	0.93	1.79	7.64	1.18	5.24	5.51	8.40	10.05
20	104.85	0.24	2.32	0.32	1.00	1.29	6.15	0.82	6.33	6.51	6.66	9.31
23	90.37	0.23	1.08	0.47	1.01	1.03	4.78	0.47	7.30	7.43	4.97	8.94
26	81.68	0.26	0.91	0.70	1.18	0.89	4.01	0.36	8.18	8.32	4.19	9.31
29	75.19	0.33	0.90	1.15	2.25	0.85	3.50	0.35	8.74	9.12	3.69	9.84
32	67.49	0.43	0.79	1.75	4.06	0.93	3.00	0.38	9.28	10.30	3.21	10.79
35	60.63	0.58	0.71	2.35	6.12	1.12	2.57	0.46	10.41	12.33	2.85	12.66
38	55.41	0.73	0.73	2.86	8.02	1.31	2.25	0.55	12.05	14.79	2.65	15.03
41	51.88	0.84	0.83	3.21	9.47	1.45	2.04	0.63	13.56	16.89	2.58	17.08

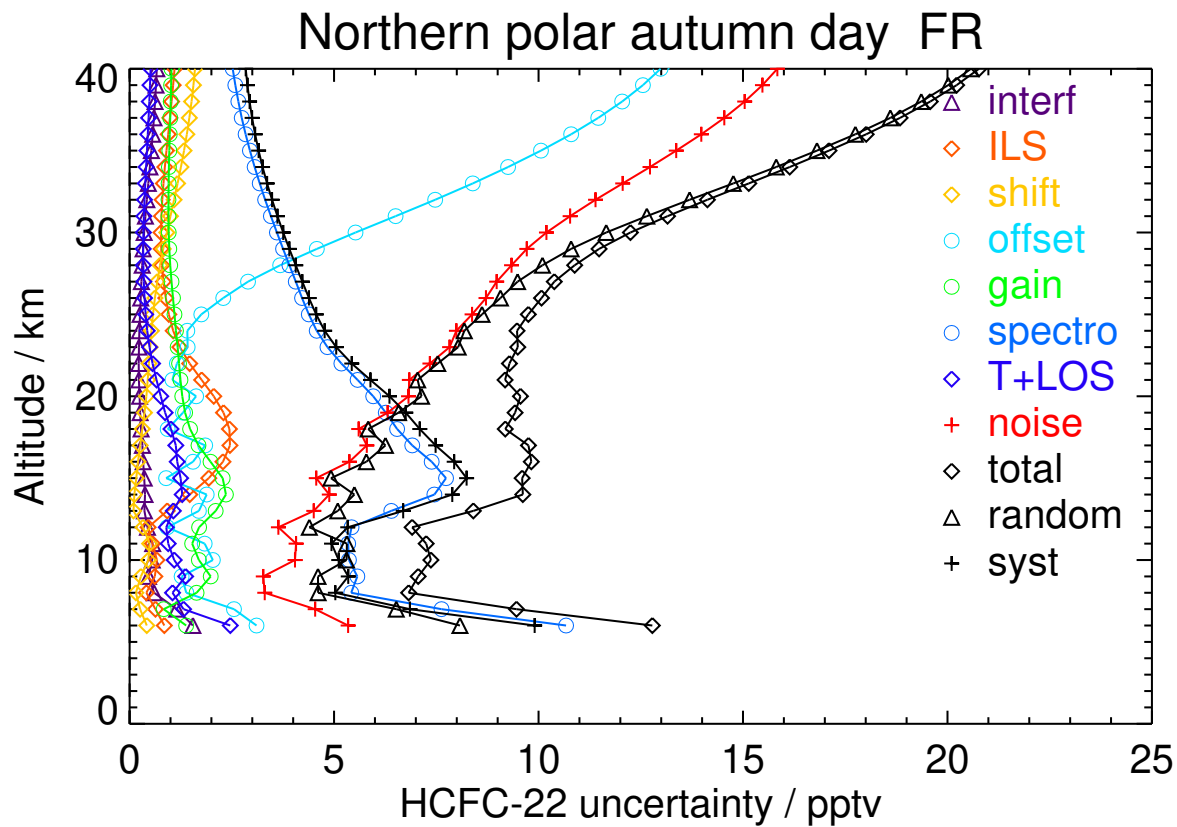


**Figure S6.** V8H\_F-22\_61 Northern polar summer night



**Table S8.** HCFC-22 error budget for Northern polar autumn day. All uncertainties are  $1\sigma$ .

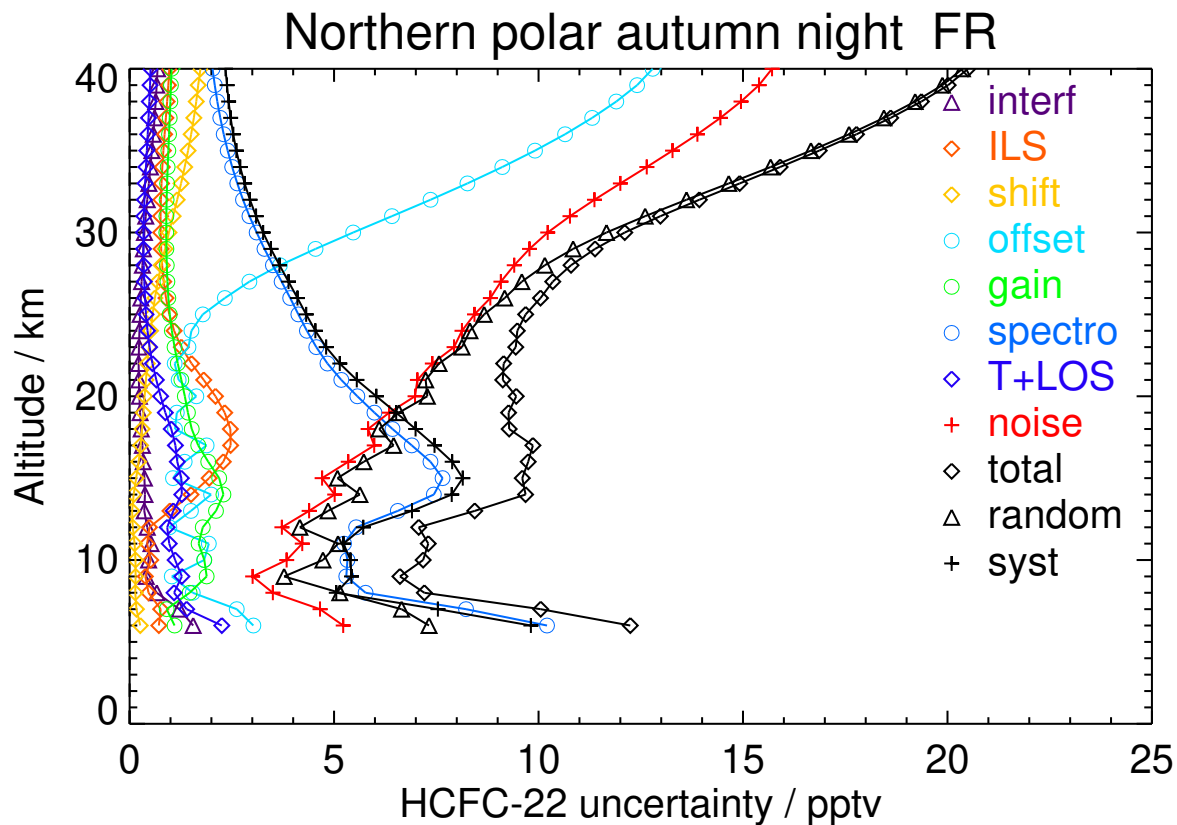
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	162.26	0.60	0.41	0.15	1.39	1.64	5.42	1.05	3.30	4.61	5.03	6.82
11	155.72	0.56	0.56	0.49	1.84	1.53	5.35	0.94	4.07	5.31	4.94	7.25
14	140.55	0.38	1.47	0.12	1.88	2.36	7.45	1.29	4.88	5.50	7.89	9.62
17	117.62	0.31	2.45	0.26	1.85	1.68	6.91	1.13	5.80	6.26	7.48	9.75
20	101.51	0.24	2.06	0.41	1.63	1.29	5.96	0.76	6.82	7.14	6.35	9.56
23	90.10	0.23	1.23	0.50	1.42	1.18	4.84	0.49	7.83	8.03	5.05	9.49
26	82.18	0.27	0.88	0.62	2.29	1.06	4.22	0.37	8.71	9.07	4.39	10.07
29	74.71	0.33	0.77	0.82	4.58	0.97	3.75	0.33	9.71	10.80	3.91	11.48
32	66.16	0.42	0.80	1.09	7.47	0.95	3.31	0.36	11.39	13.69	3.48	14.13
35	59.41	0.53	0.90	1.33	10.06	0.97	2.94	0.42	13.37	16.81	3.15	17.10
38	54.59	0.62	1.03	1.51	12.04	1.01	2.66	0.48	15.04	19.36	2.93	19.58
41	49.56	0.70	1.13	1.75	13.02	1.03	2.37	0.53	15.88	20.64	2.72	20.82



**Figure S7.** V8H\_F-22\_61 Northern polar autumn day

**Table S9.** HCFC-22 error budget for Northern polar autumn night. All uncertainties are  $1\sigma$ .

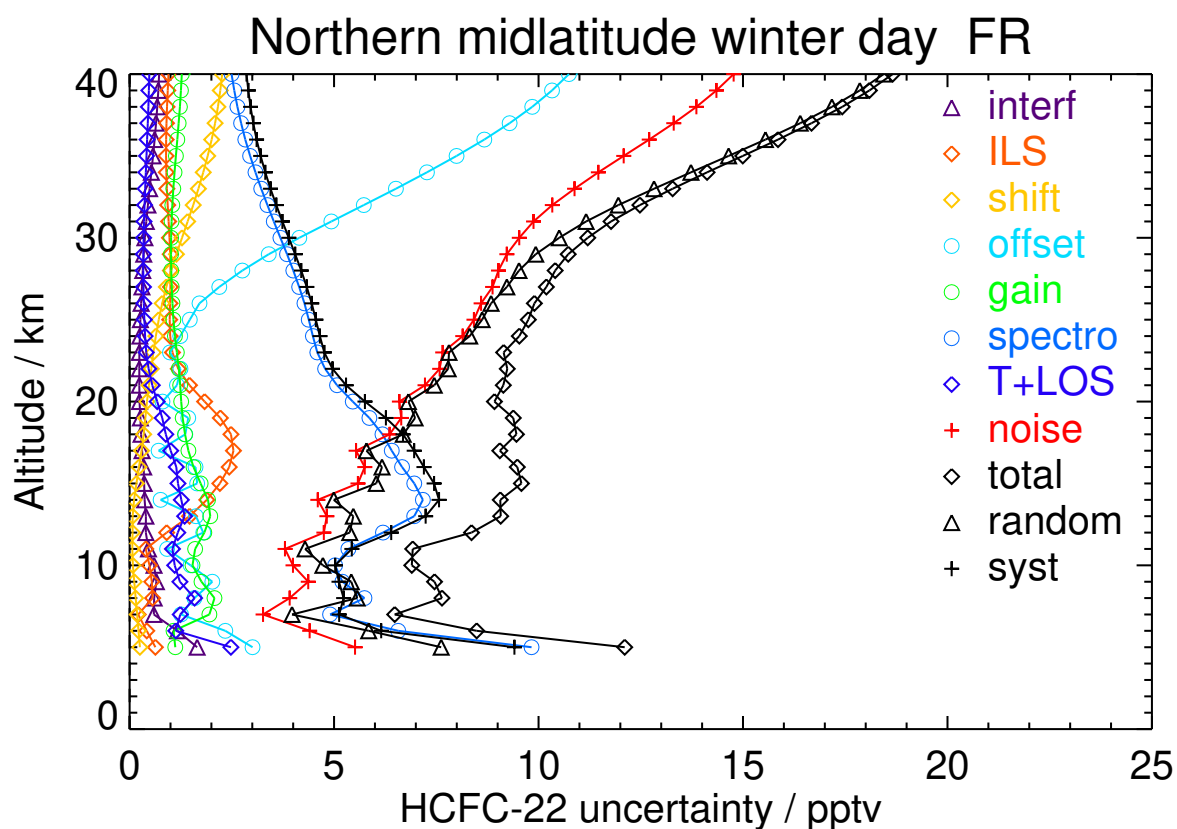
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	160.23	0.67	0.46	0.14	1.54	1.47	5.77	1.09	3.50	5.14	5.05	7.21
11	152.81	0.52	0.43	0.12	1.94	1.69	5.24	0.97	4.22	5.10	5.23	7.30
14	137.88	0.38	1.50	0.10	1.99	2.29	7.44	1.28	5.02	5.63	7.88	9.68
17	112.85	0.31	2.47	0.27	1.88	1.68	6.90	1.12	5.98	6.46	7.46	9.86
20	95.99	0.24	2.10	0.37	1.63	1.35	5.57	0.76	6.98	7.28	6.03	9.45
23	85.40	0.23	1.26	0.47	1.44	1.10	4.57	0.49	7.93	8.13	4.81	9.44
26	76.28	0.28	0.89	0.62	2.33	0.95	3.93	0.38	8.82	9.17	4.10	10.05
29	66.64	0.34	0.77	0.86	4.55	0.90	3.30	0.34	9.78	10.85	3.46	11.38
32	58.90	0.43	0.76	1.16	7.36	0.91	2.77	0.36	11.37	13.62	2.94	13.93
35	53.75	0.54	0.83	1.43	9.91	0.95	2.40	0.42	13.28	16.66	2.61	16.86
38	50.22	0.64	0.92	1.63	11.90	1.00	2.15	0.48	14.95	19.21	2.42	19.36
41	47.55	0.71	0.99	1.87	12.89	1.05	1.92	0.53	15.78	20.50	2.27	20.62



**Figure S8.** V8H\_F-22\_61 Northern polar autumn night

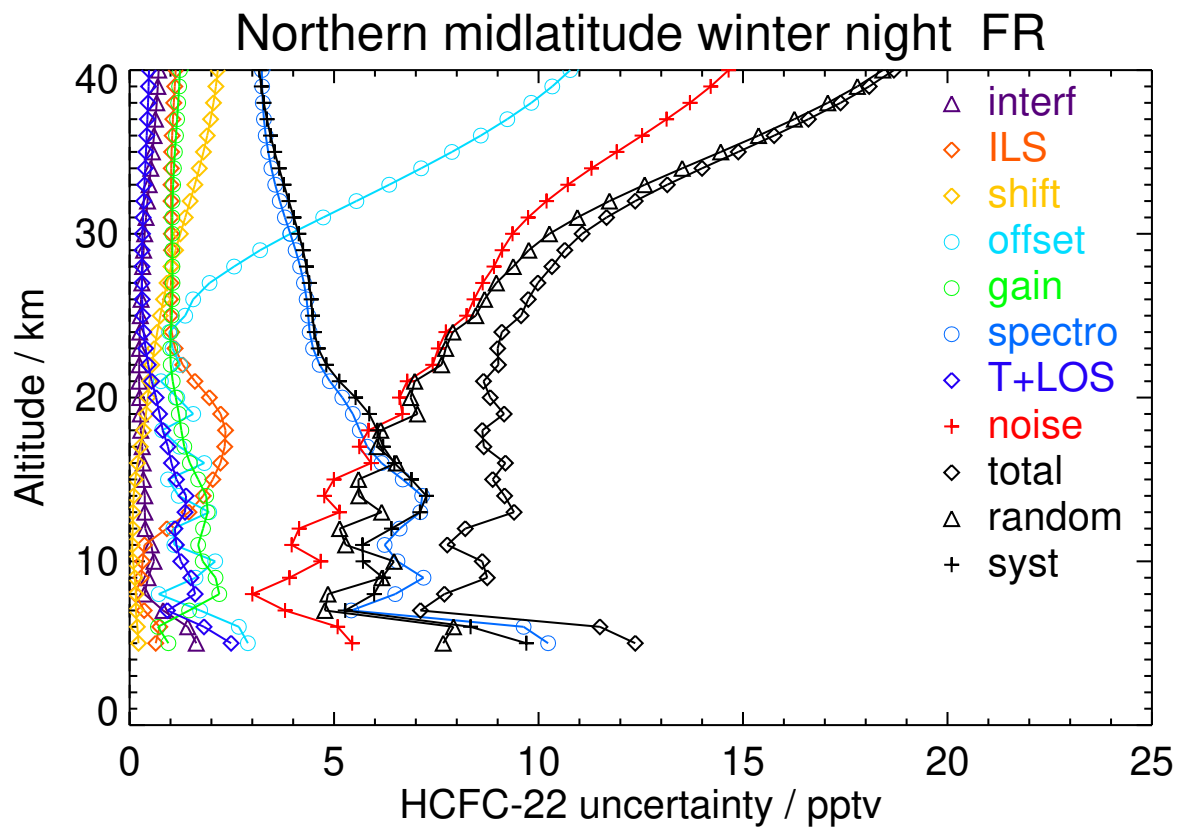
**Table S10.** HCFC-22 error budget for Northern midlatitude winter day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	161.54	1.65	0.63	0.25	3.01	1.12	9.83	2.48	5.51	7.62	9.41	12.11
8	158.43	0.60	0.56	0.15	1.59	2.08	5.74	1.59	3.92	5.57	5.23	7.64
11	144.98	0.46	0.40	0.07	0.92	1.60	5.35	1.05	3.80	4.29	5.43	6.92
14	130.33	0.37	1.89	0.11	0.76	1.92	7.17	1.27	4.60	4.99	7.57	9.06
17	115.04	0.30	2.54	0.29	0.71	1.44	6.41	1.00	5.54	5.79	6.96	9.05
20	101.51	0.24	1.83	0.43	0.80	1.26	5.46	0.67	6.60	6.82	5.75	8.92
23	95.80	0.24	1.05	0.58	0.99	1.16	4.59	0.41	7.66	7.81	4.76	9.15
26	88.53	0.28	0.99	0.80	1.71	1.05	4.28	0.35	8.59	8.84	4.45	9.90
29	80.62	0.35	0.99	1.15	3.40	1.01	3.85	0.34	9.22	9.93	4.05	10.73
32	71.48	0.45	0.93	1.56	5.73	1.04	3.37	0.37	10.34	11.95	3.59	12.48
35	64.79	0.57	0.89	1.91	8.00	1.13	2.95	0.41	12.08	14.65	3.20	14.99
38	60.69	0.68	0.92	2.16	9.85	1.23	2.64	0.46	13.86	17.17	2.96	17.43
41	58.23	0.74	0.97	2.32	11.04	1.30	2.42	0.49	15.07	18.86	2.81	19.07

**Figure S9.** V8H\_F-22\_61 Northern midlatitude winter day

**Table S11.** HCFC-22 error budget for Northern midlatitude winter night. All uncertainties are  $1\sigma$ .

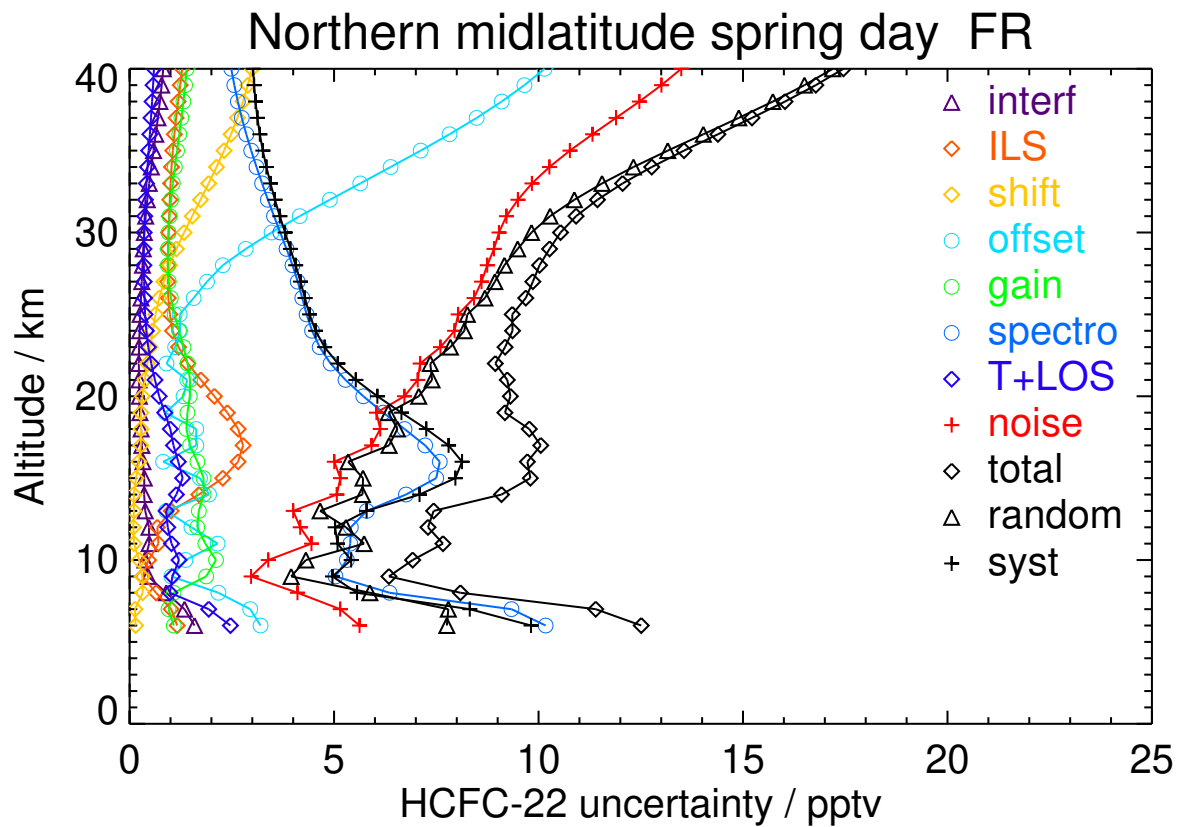
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	161.11	1.63	0.64	0.22	2.89	0.95	10.23	2.48	5.44	7.67	9.70	12.37
8	159.95	0.36	0.14	0.15	0.71	2.19	6.50	1.60	3.00	4.85	5.98	7.70
11	145.33	0.53	0.36	0.06	1.09	1.68	6.24	1.14	3.96	5.28	5.69	7.77
14	125.44	0.37	1.80	0.10	1.20	1.87	7.15	1.38	4.76	5.60	7.26	9.17
17	112.90	0.31	2.33	0.26	1.22	1.34	5.81	0.94	5.62	6.05	6.20	8.66
20	102.30	0.25	1.95	0.45	1.17	1.13	5.20	0.65	6.60	6.87	5.53	8.82
23	95.20	0.24	1.11	0.61	1.05	0.99	4.49	0.39	7.55	7.73	4.61	9.00
26	92.47	0.28	1.00	0.83	1.55	1.05	4.33	0.31	8.42	8.68	4.44	9.75
29	86.24	0.34	1.02	1.12	3.19	1.05	4.06	0.31	9.11	9.76	4.24	10.64
32	78.49	0.44	1.01	1.48	5.55	1.05	3.67	0.35	10.20	11.73	3.89	12.36
35	72.58	0.56	1.03	1.81	7.88	1.11	3.39	0.40	11.91	14.46	3.55	14.88
38	68.29	0.66	1.08	2.05	9.82	1.19	3.26	0.45	13.70	17.07	3.28	17.39
41	64.93	0.73	1.15	2.19	11.15	1.25	3.23	0.48	15.02	18.95	3.12	19.20



**Figure S10.** V8H\_F-22\_61 Northern midlatitude winter night

**Table S12.** HCFC-22 error budget for Northern midlatitude spring day. All uncertainties are  $1\sigma$ .

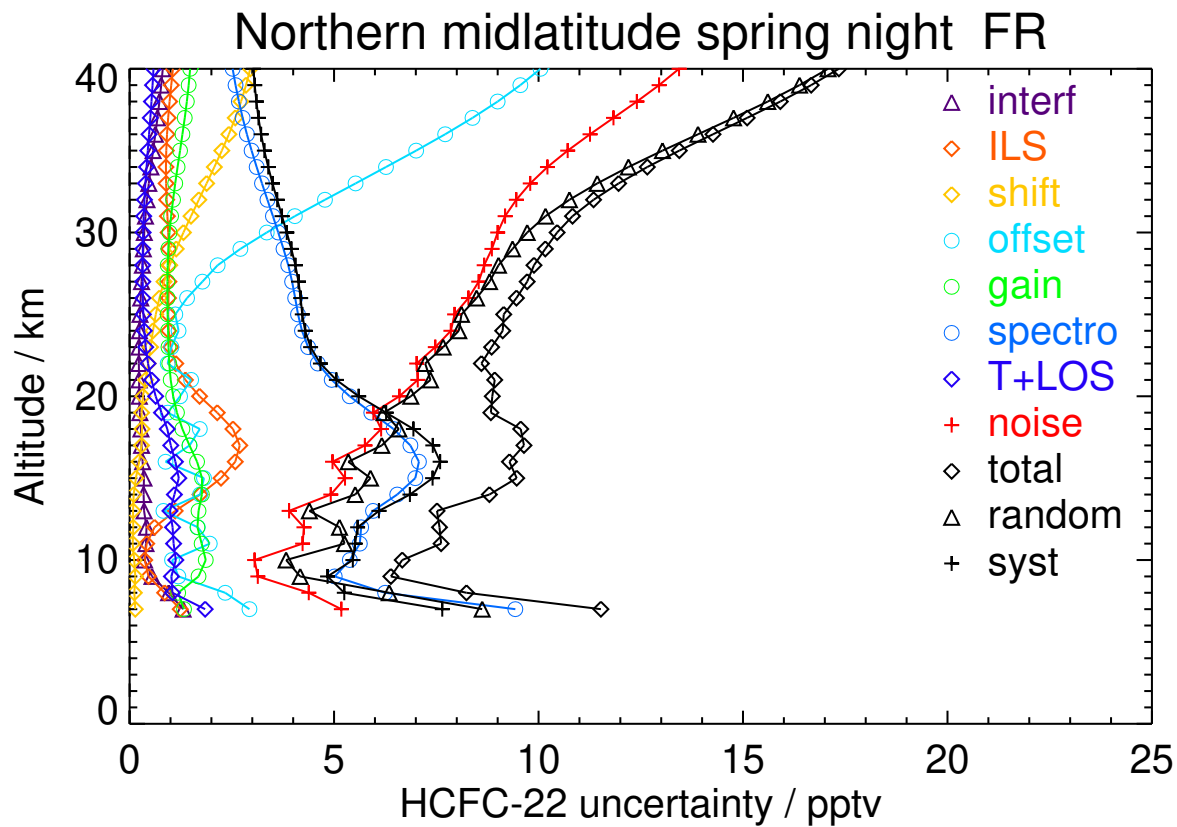
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	153.74	0.90	0.65	0.32	2.17	1.08	6.36	0.99	4.10	5.87	5.56	8.09
11	146.84	0.48	0.70	0.11	2.15	1.85	5.40	1.02	4.45	5.73	5.09	7.66
14	133.42	0.36	1.69	0.10	1.94	1.81	6.76	1.14	5.07	5.69	7.09	9.09
17	117.21	0.30	2.78	0.27	1.63	1.48	7.23	1.07	5.92	6.35	7.80	10.05
20	100.15	0.24	2.07	0.31	1.32	1.47	5.71	0.72	6.72	7.07	6.06	9.31
23	92.70	0.23	1.20	0.50	1.11	1.32	4.65	0.46	7.60	7.84	4.77	9.18
26	86.40	0.28	0.95	0.72	1.57	1.01	4.22	0.36	8.42	8.69	4.29	9.69
29	80.55	0.34	0.94	1.14	2.84	0.94	3.84	0.35	8.91	9.49	3.93	10.27
32	73.35	0.43	0.98	1.73	4.90	1.01	3.38	0.39	9.50	10.88	3.55	11.44
35	68.45	0.59	1.06	2.31	7.12	1.16	2.97	0.47	10.77	13.16	3.26	13.56
38	64.48	0.74	1.19	2.77	9.10	1.32	2.65	0.55	12.47	15.73	3.08	16.03
41	61.05	0.85	1.33	3.08	10.57	1.43	2.42	0.61	13.91	17.79	3.00	18.04



**Figure S11.** V8H\_F-22\_61 Northern midlatitude spring day

**Table S13.** HCFC-22 error budget for Northern midlatitude spring night. All uncertainties are  $1\sigma$ .

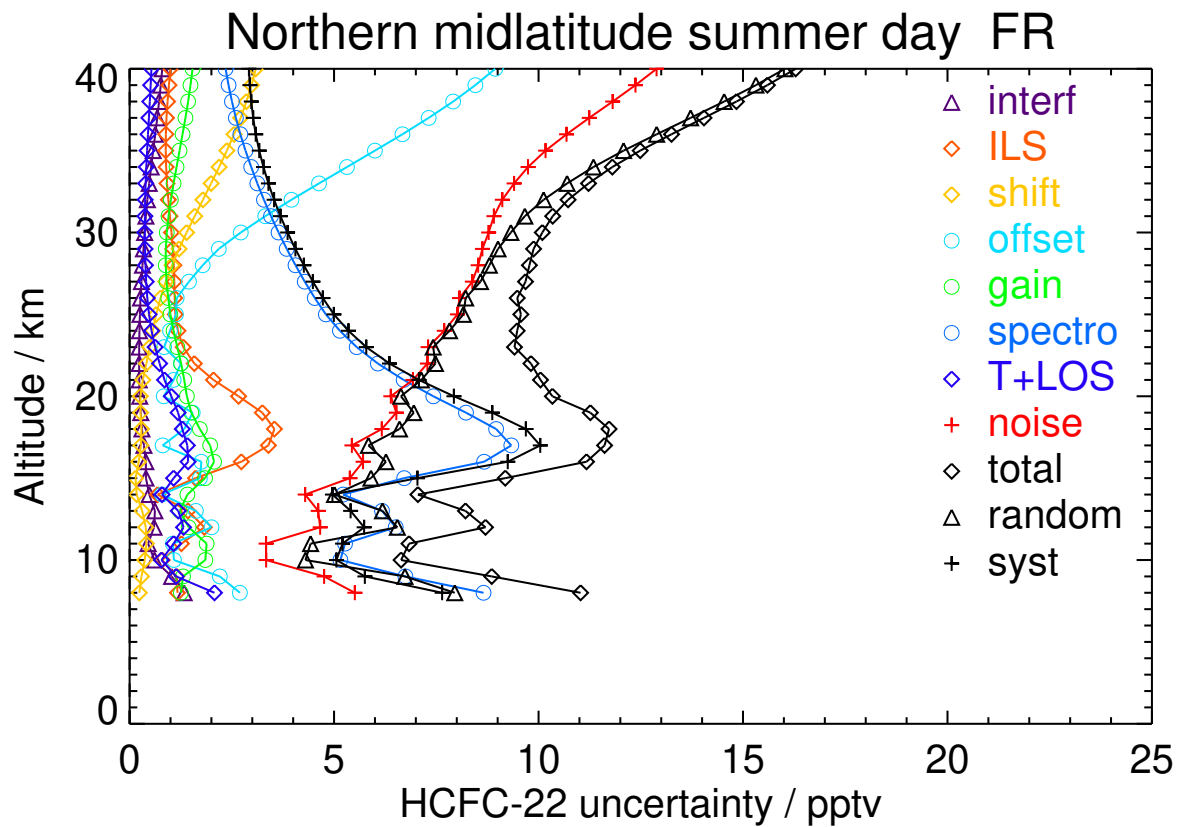
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.36	0.95	0.86	0.12	2.34	1.19	6.25	1.05	4.38	6.35	5.25	8.24
11	141.35	0.40	0.42	0.08	1.96	1.76	5.63	1.08	4.23	5.26	5.51	7.62
14	130.39	0.34	1.72	0.10	1.72	1.77	6.54	1.10	4.92	5.52	6.85	8.80
17	112.87	0.29	2.69	0.29	1.47	1.46	6.87	1.01	5.75	6.17	7.41	9.64
20	97.09	0.24	1.71	0.33	1.23	1.07	5.38	0.64	6.60	6.88	5.60	8.87
23	90.68	0.23	1.01	0.51	1.02	0.95	4.37	0.39	7.48	7.67	4.43	8.85
26	88.57	0.27	0.95	0.73	1.41	0.93	4.05	0.33	8.28	8.48	4.18	9.46
29	84.03	0.34	0.96	1.14	2.71	0.95	3.76	0.32	8.86	9.36	3.96	10.16
32	78.15	0.43	0.91	1.69	4.78	1.06	3.37	0.36	9.46	10.76	3.61	11.34
35	71.94	0.57	0.90	2.26	7.01	1.23	2.98	0.44	10.71	13.03	3.30	13.44
38	66.87	0.73	0.98	2.72	9.00	1.40	2.67	0.54	12.40	15.61	3.10	15.91
41	63.75	0.84	1.10	3.04	10.47	1.51	2.46	0.60	13.86	17.68	3.01	17.93



**Figure S12.** V8H\_F-22\_61 Northern midlatitude spring night

**Table S14.** HCFC-22 error budget for Northern midlatitude summer day. All uncertainties are  $1\sigma$ .

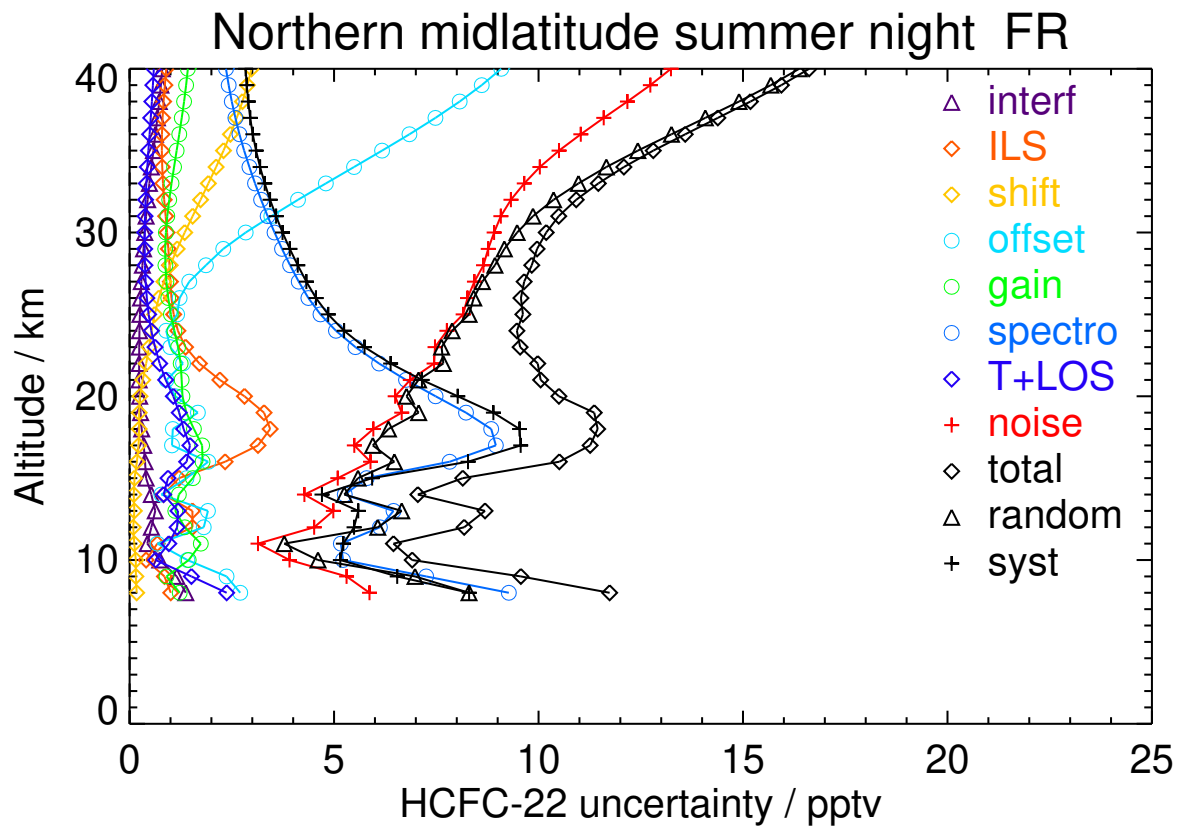
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	157.62	1.33	1.17	0.24	2.70	1.25	8.66	2.08	5.51	7.95	7.64	11.03
11	162.83	0.45	1.27	0.41	1.06	1.88	5.27	1.08	3.34	4.43	5.21	6.83
14	153.83	0.48	0.68	0.17	0.79	1.41	5.22	0.79	4.29	5.01	4.96	7.05
17	138.06	0.35	3.40	0.28	0.81	1.97	9.33	1.41	5.44	5.84	10.04	11.62
20	117.11	0.25	2.66	0.26	0.84	1.40	7.43	1.02	6.39	6.63	7.93	10.34
23	99.80	0.23	1.31	0.49	0.84	1.17	5.55	0.62	7.30	7.42	5.79	9.41
26	89.19	0.27	1.10	0.76	1.15	0.94	4.53	0.43	8.07	8.22	4.72	9.48
29	82.65	0.34	1.06	1.21	2.18	0.89	3.84	0.38	8.63	9.01	4.05	9.88
32	75.87	0.44	0.95	1.79	3.96	1.01	3.28	0.38	9.11	10.12	3.53	10.72
35	70.25	0.58	0.88	2.38	6.00	1.22	2.83	0.43	10.17	12.08	3.17	12.49
38	65.86	0.72	0.93	2.86	7.91	1.43	2.50	0.49	11.81	14.54	2.97	14.84
41	62.62	0.83	1.04	3.17	9.37	1.58	2.28	0.55	13.34	16.65	2.90	16.90



**Figure S13.** V8H\_F-22\_61 Northern midlatitude summer day

**Table S15.** HCFC-22 error budget for Northern midlatitude summer night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	166.11	1.37	1.01	0.17	2.71	1.23	9.27	2.37	5.87	8.30	8.30	11.74
11	164.75	0.43	0.68	0.11	0.68	1.74	5.17	0.96	3.14	3.78	5.23	6.45
14	153.18	0.53	0.83	0.10	0.78	1.20	5.26	0.83	4.27	5.25	4.70	7.05
17	135.83	0.35	3.14	0.22	1.04	1.77	8.96	1.48	5.49	5.95	9.56	11.26
20	113.13	0.25	2.81	0.25	1.12	1.29	7.48	1.07	6.49	6.77	8.02	10.50
23	95.42	0.24	1.37	0.48	0.99	1.19	5.52	0.62	7.47	7.63	5.74	9.55
26	87.12	0.27	1.02	0.71	1.22	0.94	4.37	0.42	8.26	8.41	4.56	9.57
29	82.64	0.34	0.95	1.16	2.29	0.87	3.73	0.37	8.77	9.16	3.92	9.96
32	76.97	0.44	0.85	1.73	4.12	0.97	3.22	0.39	9.33	10.37	3.43	10.92
35	71.96	0.58	0.79	2.30	6.17	1.15	2.80	0.46	10.50	12.43	3.09	12.81
38	67.97	0.73	0.83	2.76	8.07	1.33	2.50	0.54	12.17	14.90	2.90	15.18
41	64.56	0.83	0.93	3.07	9.51	1.46	2.30	0.61	13.69	16.99	2.82	17.22

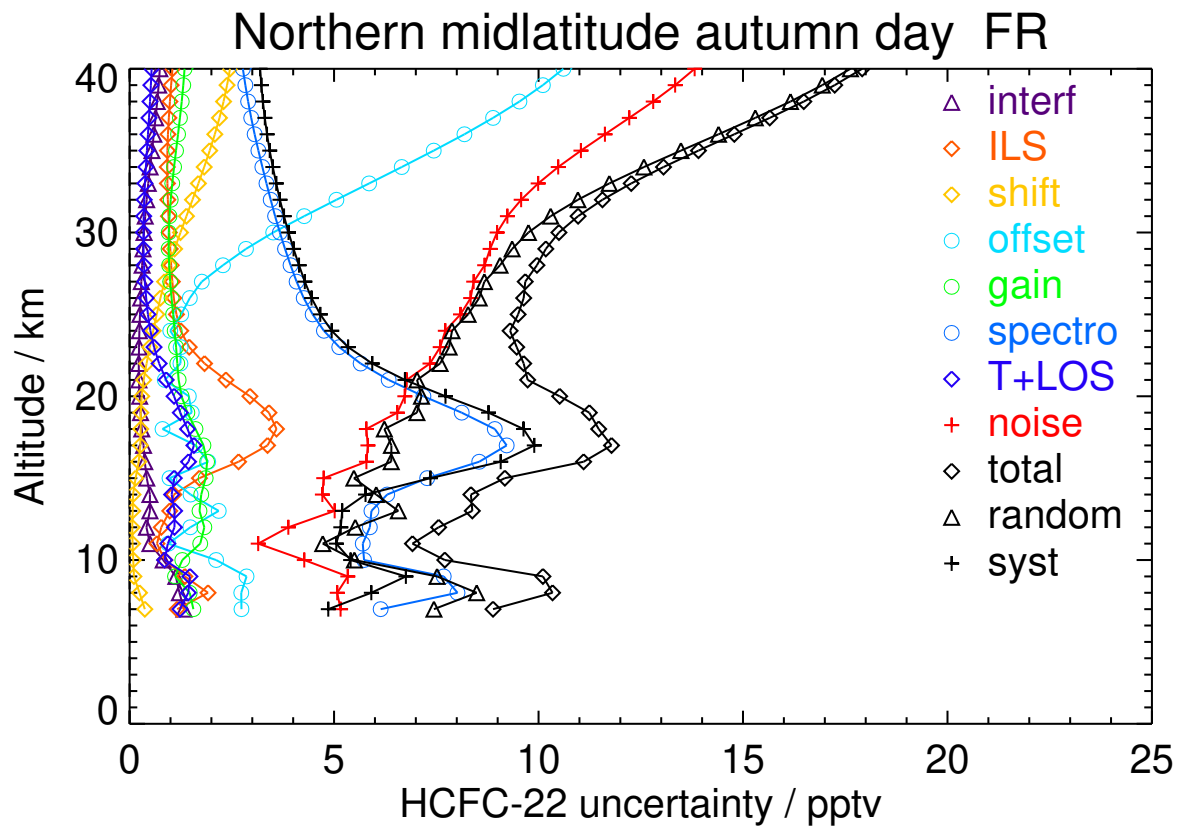


**Figure S14.** V8H\_F-22\_61 Northern midlatitude summer night



**Table S16.** HCFC-22 error budget for Northern midlatitude autumn day. All uncertainties are  $1\sigma$ .

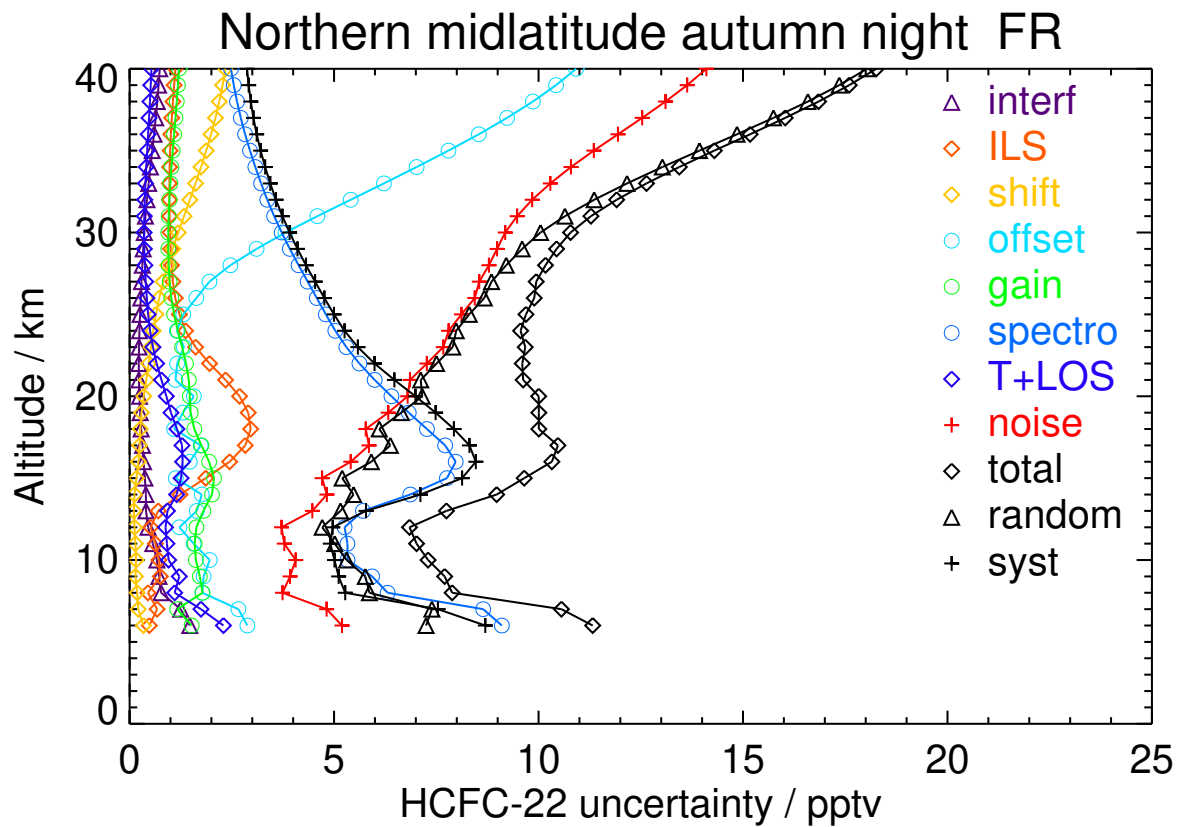
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	163.58	1.22	1.92	0.24	2.73	1.47	8.02	1.43	5.08	8.49	5.91	10.34
11	161.88	0.50	0.67	0.07	0.95	1.73	5.70	0.93	3.15	4.72	5.05	6.92
14	155.64	0.50	1.08	0.08	1.49	1.75	6.30	1.03	4.71	6.03	5.77	8.35
17	133.04	0.34	3.37	0.26	1.62	1.81	9.22	1.57	5.83	6.40	9.89	11.79
20	108.29	0.25	2.94	0.30	1.45	1.27	7.19	1.09	6.73	7.14	7.72	10.52
23	93.39	0.23	1.46	0.49	1.25	1.14	5.13	0.60	7.59	7.81	5.34	9.47
26	87.41	0.27	1.08	0.75	1.47	1.03	4.26	0.41	8.34	8.55	4.45	9.64
29	82.54	0.33	0.99	1.10	2.85	0.95	3.80	0.34	8.81	9.35	4.01	10.18
32	78.37	0.42	0.93	1.54	5.06	1.01	3.45	0.36	9.57	10.96	3.68	11.56
35	75.26	0.55	0.92	1.96	7.44	1.14	3.15	0.42	11.04	13.48	3.43	13.91
38	72.99	0.68	0.98	2.30	9.53	1.27	2.90	0.50	12.80	16.16	3.26	16.49
41	70.89	0.76	1.08	2.51	11.04	1.37	2.71	0.55	14.23	18.23	3.16	18.50



**Figure S15.** V8H\_F-22\_61 Northern midlatitude autumn day

**Table S17.** HCFC-22 error budget for Northern midlatitude autumn night. All uncertainties are  $1\sigma$ .

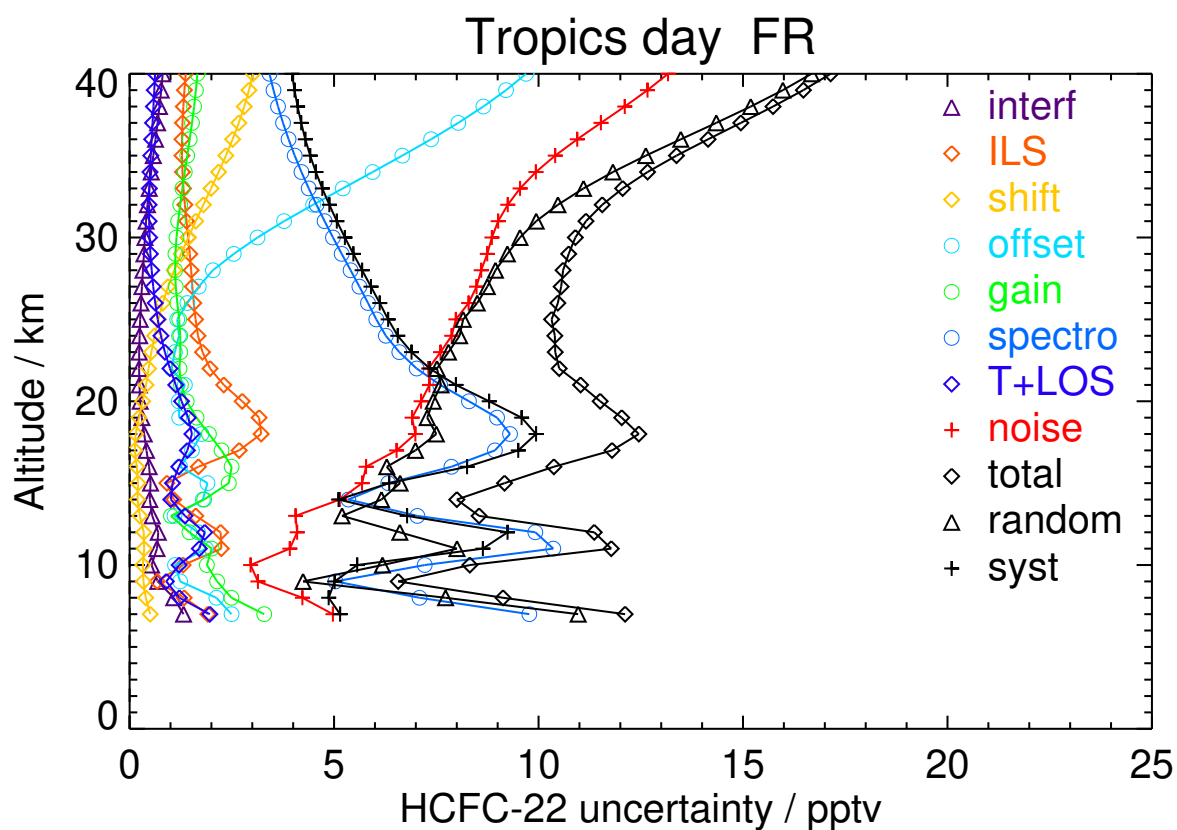
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	162.14	0.77	0.45	0.19	1.78	1.78	6.31	1.10	3.74	5.87	5.27	7.89
11	157.40	0.57	0.63	0.14	1.57	1.59	5.33	0.91	3.78	5.02	4.91	7.02
14	147.99	0.40	1.23	0.12	1.77	2.01	6.86	1.15	4.82	5.48	7.11	8.98
17	126.63	0.32	2.83	0.24	1.74	1.76	7.72	1.28	5.85	6.38	8.31	10.47
20	108.69	0.24	2.69	0.35	1.57	1.47	6.40	0.90	6.80	7.16	6.99	10.00
23	98.67	0.23	1.61	0.52	1.33	1.28	5.30	0.57	7.67	7.90	5.58	9.67
26	87.92	0.27	1.12	0.72	1.63	1.02	4.58	0.42	8.44	8.67	4.76	9.90
29	80.66	0.33	1.00	1.05	3.11	0.95	3.92	0.36	8.99	9.60	4.11	10.44
32	74.64	0.43	0.97	1.47	5.41	0.97	3.37	0.37	9.84	11.36	3.58	11.91
35	68.73	0.55	0.99	1.87	7.80	1.05	2.94	0.43	11.35	13.93	3.20	14.30
38	64.52	0.68	1.06	2.19	9.86	1.15	2.63	0.50	13.10	16.59	2.96	16.85
41	61.83	0.76	1.15	2.40	11.35	1.23	2.42	0.55	14.51	18.62	2.84	18.83



**Figure S16.** V8H\_F-22\_61 Northern midlatitude autumn night

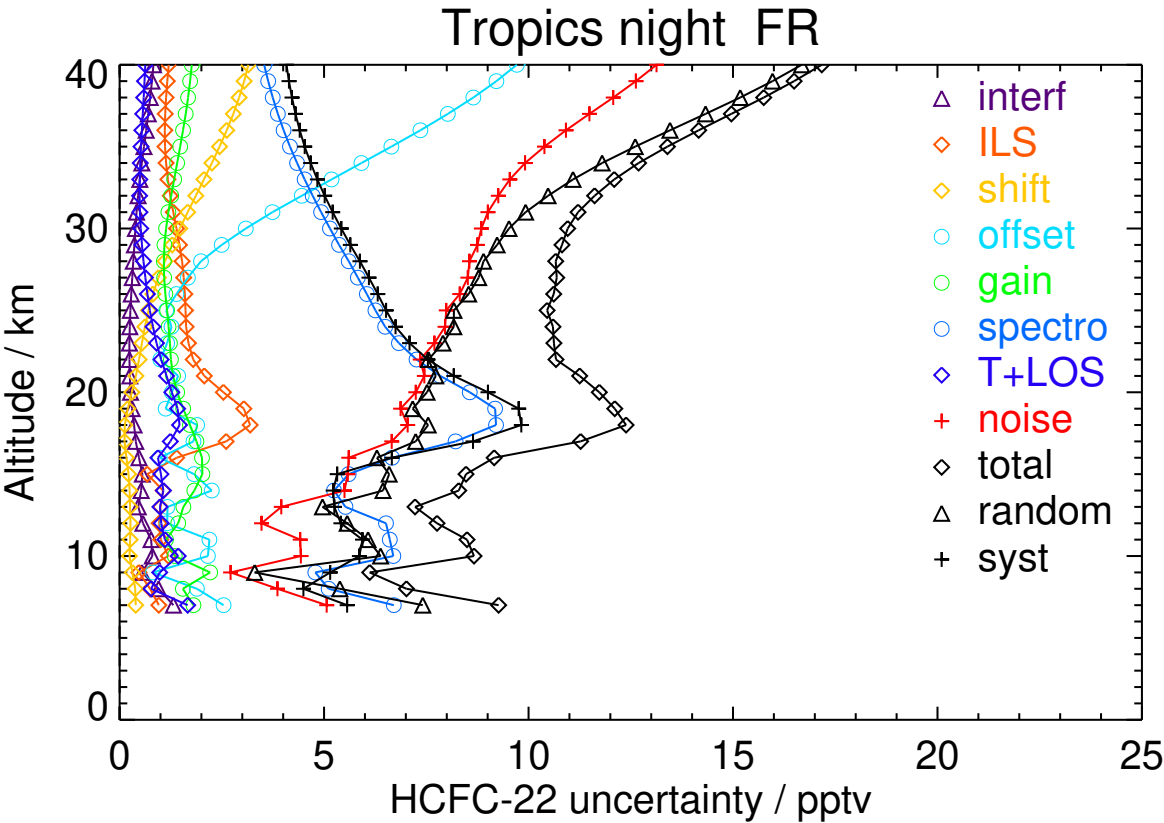
**Table S18.** HCFC-22 error budget for Tropics day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	154.78	1.08	1.33	0.40	2.12	2.49	7.09	1.22	4.22	7.73	4.87	9.13
11	159.54	0.67	2.24	0.36	1.87	2.01	10.36	1.71	3.92	8.01	8.64	11.78
14	158.97	0.49	1.08	0.19	1.79	1.82	5.35	1.01	5.14	6.16	5.11	8.00
17	150.96	0.41	2.68	0.13	1.52	2.25	8.93	1.41	6.53	6.99	9.50	11.80
20	135.16	0.26	2.75	0.32	1.20	1.40	8.30	1.27	7.13	7.43	8.79	11.51
23	123.80	0.23	1.78	0.53	1.11	1.24	6.59	0.86	7.60	7.80	6.89	10.41
26	116.30	0.28	1.57	0.81	1.41	1.17	5.83	0.63	8.29	8.50	6.12	10.47
29	109.73	0.35	1.47	1.26	2.55	1.12	5.19	0.51	8.75	9.24	5.47	10.74
32	102.14	0.44	1.35	1.80	4.49	1.24	4.57	0.48	9.25	10.47	4.88	11.56
35	95.86	0.58	1.28	2.35	6.67	1.41	4.04	0.52	10.41	12.62	4.42	13.37
38	89.76	0.73	1.31	2.81	8.65	1.58	3.63	0.58	12.11	15.19	4.11	15.73
41	85.20	0.84	1.41	3.09	10.11	1.69	3.34	0.64	13.59	17.27	3.92	17.71

**Figure S17.** V8H\_F-22\_61 Tropics day

**Table S19.** HCFC-22 error budget for Tropics night. All uncertainties are  $1\sigma$ .

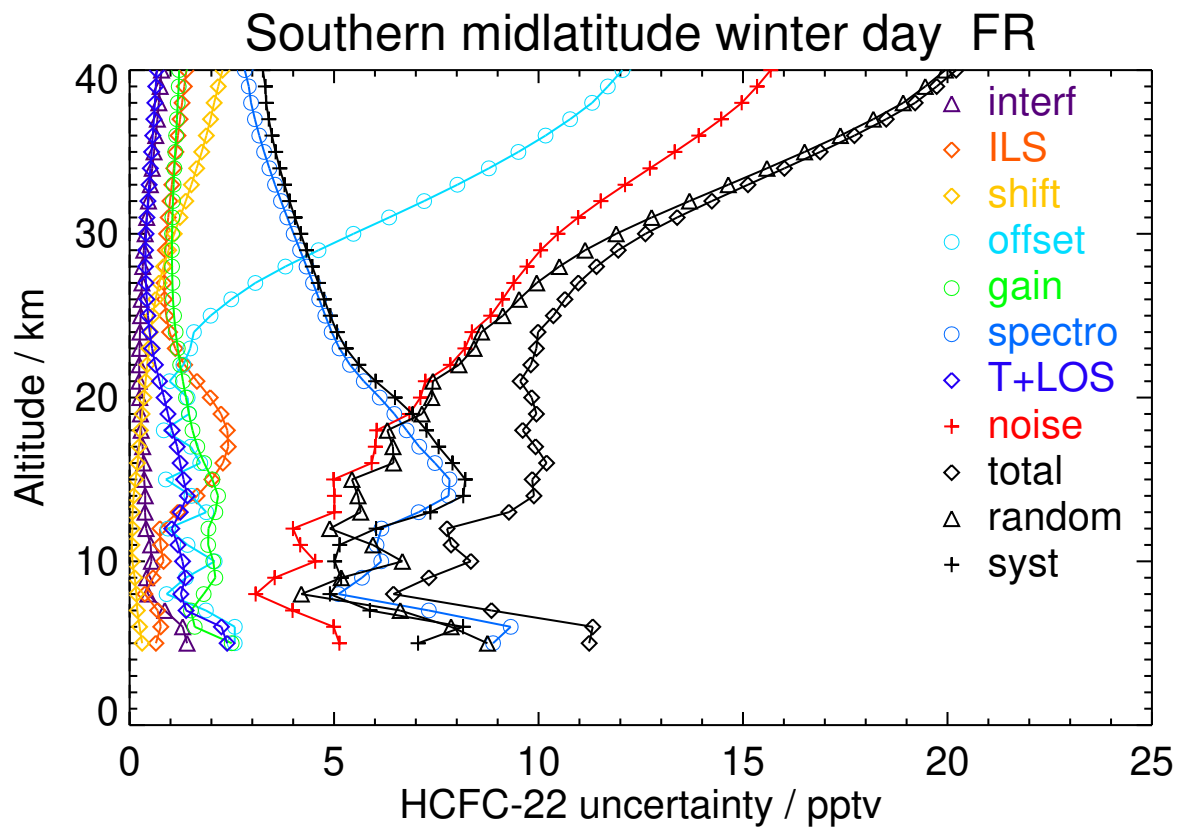
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	148.58	0.95	0.74	0.38	1.89	1.55	5.11	0.77	3.86	5.39	4.49	7.01
11	151.41	0.77	1.01	0.26	2.20	1.14	6.61	1.11	4.42	6.08	5.94	8.50
14	161.96	0.53	1.06	0.25	2.25	1.83	5.24	1.07	5.50	6.44	5.22	8.29
17	151.79	0.40	2.60	0.12	1.81	1.88	8.22	1.24	6.65	7.24	8.64	11.27
20	137.41	0.27	2.54	0.30	1.28	1.41	8.56	1.28	7.24	7.52	9.01	11.73
23	127.41	0.24	1.68	0.55	1.16	1.23	6.83	0.90	7.70	7.91	7.09	10.62
26	121.20	0.29	1.60	0.82	1.39	1.12	6.05	0.68	8.32	8.53	6.31	10.62
29	112.85	0.36	1.46	1.28	2.50	1.10	5.37	0.55	8.75	9.23	5.64	10.82
32	104.81	0.45	1.24	1.86	4.46	1.26	4.72	0.49	9.26	10.48	5.01	11.62
35	97.83	0.60	1.11	2.44	6.65	1.48	4.17	0.52	10.39	12.61	4.53	13.40
38	92.10	0.75	1.14	2.92	8.65	1.67	3.75	0.59	12.07	15.18	4.21	15.75
41	88.03	0.86	1.24	3.23	10.15	1.80	3.45	0.64	13.56	17.29	4.03	17.76



**Figure S18.** V8H\_F-22\_61 Tropics night

**Table S20.** HCFC-22 error budget for Southern midlatitude winter day. All uncertainties are  $1\sigma$ .

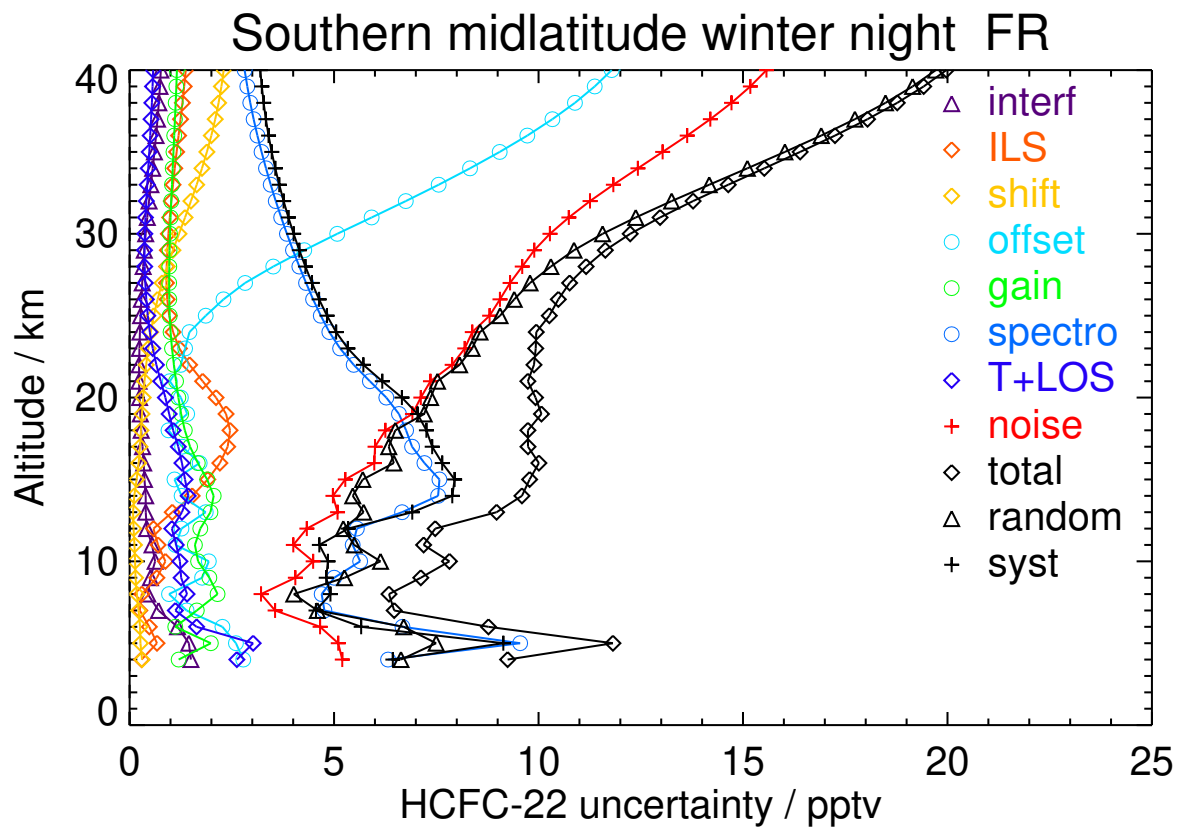
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	144.62	1.40	0.64	0.31	2.57	2.50	8.89	2.38	5.13	8.75	7.05	11.24
8	148.52	0.45	0.37	0.17	0.90	1.81	5.11	1.25	3.08	4.20	4.90	6.45
11	148.44	0.52	0.75	0.06	1.42	1.92	6.04	1.18	4.17	5.95	5.14	7.86
14	136.03	0.38	1.65	0.10	1.51	2.16	7.80	1.41	5.01	5.59	8.16	9.89
17	121.48	0.32	2.41	0.23	1.50	1.66	7.08	1.16	6.01	6.44	7.56	9.93
20	105.75	0.25	1.97	0.35	1.42	1.38	6.12	0.84	7.11	7.39	6.49	9.83
23	97.37	0.24	1.12	0.47	1.48	1.18	5.13	0.55	8.20	8.42	5.29	9.95
26	91.09	0.28	0.86	0.63	2.49	1.06	4.64	0.42	9.12	9.52	4.76	10.65
29	85.25	0.35	0.87	0.95	4.62	1.04	4.17	0.39	10.05	11.14	4.32	11.95
32	77.40	0.46	0.99	1.37	7.20	1.06	3.70	0.45	11.52	13.69	3.91	14.24
35	69.50	0.60	1.13	1.76	9.51	1.12	3.29	0.54	13.33	16.51	3.57	16.89
38	63.65	0.71	1.28	2.07	11.31	1.18	2.97	0.62	14.97	18.92	3.34	19.21
41	60.99	0.81	1.46	2.41	12.24	1.22	2.73	0.69	15.91	20.26	3.23	20.52



**Figure S19.** V8H\_F-22\_61 Southern midlatitude winter day

**Table S21.** HCFC-22 error budget for Southern midlatitude winter night. All uncertainties are  $1\sigma$ .

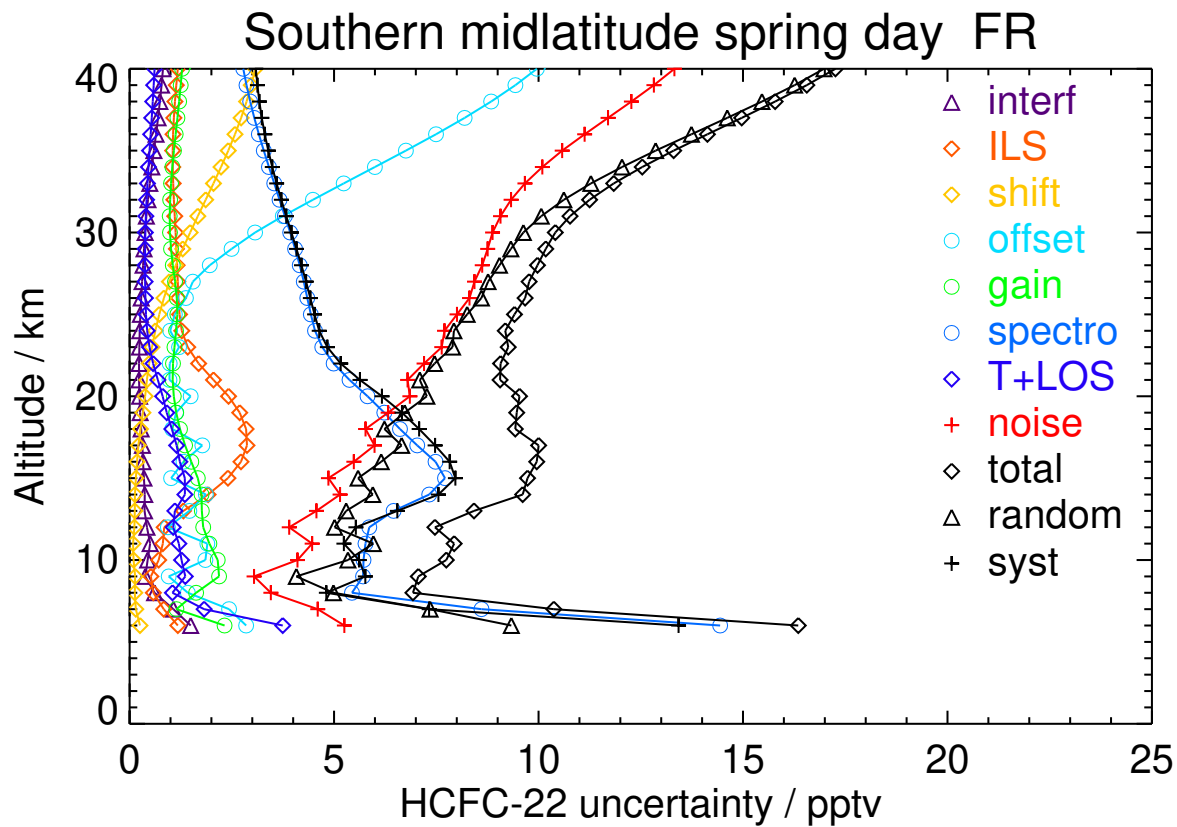
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	147.75	1.45	0.67	0.27	2.60	1.99	9.55	3.02	5.10	7.50	9.14	11.82
8	149.73	0.44	0.30	0.18	0.96	2.15	4.70	1.40	3.21	4.01	4.91	6.34
11	151.88	0.55	0.70	0.12	1.12	1.60	5.46	1.14	4.00	5.49	4.64	7.19
14	137.48	0.39	1.53	0.11	1.27	2.06	7.54	1.43	4.97	5.46	7.89	9.59
17	123.66	0.32	2.40	0.25	1.28	1.48	6.91	1.19	6.00	6.34	7.40	9.74
20	107.51	0.24	2.11	0.33	1.25	1.19	6.28	0.88	7.12	7.36	6.66	9.93
23	95.39	0.24	1.22	0.46	1.36	1.04	5.15	0.57	8.19	8.38	5.34	9.93
26	88.22	0.29	0.92	0.69	2.30	0.97	4.49	0.41	9.06	9.41	4.63	10.48
29	83.66	0.36	0.92	1.06	4.27	0.98	3.99	0.36	9.90	10.87	4.15	11.63
32	78.33	0.48	1.02	1.50	6.75	1.02	3.57	0.41	11.26	13.25	3.77	13.78
35	73.41	0.61	1.15	1.89	9.05	1.07	3.23	0.48	13.03	16.02	3.48	16.40
38	69.21	0.71	1.29	2.18	10.89	1.13	2.95	0.54	14.72	18.48	3.28	18.77
41	65.85	0.79	1.42	2.37	12.13	1.16	2.72	0.59	15.90	20.18	3.14	20.43



**Figure S20.** V8H\_F-22\_61 Southern midlatitude winter night

**Table S22.** HCFC-22 error budget for Southern midlatitude spring day. All uncertainties are  $1\sigma$ .

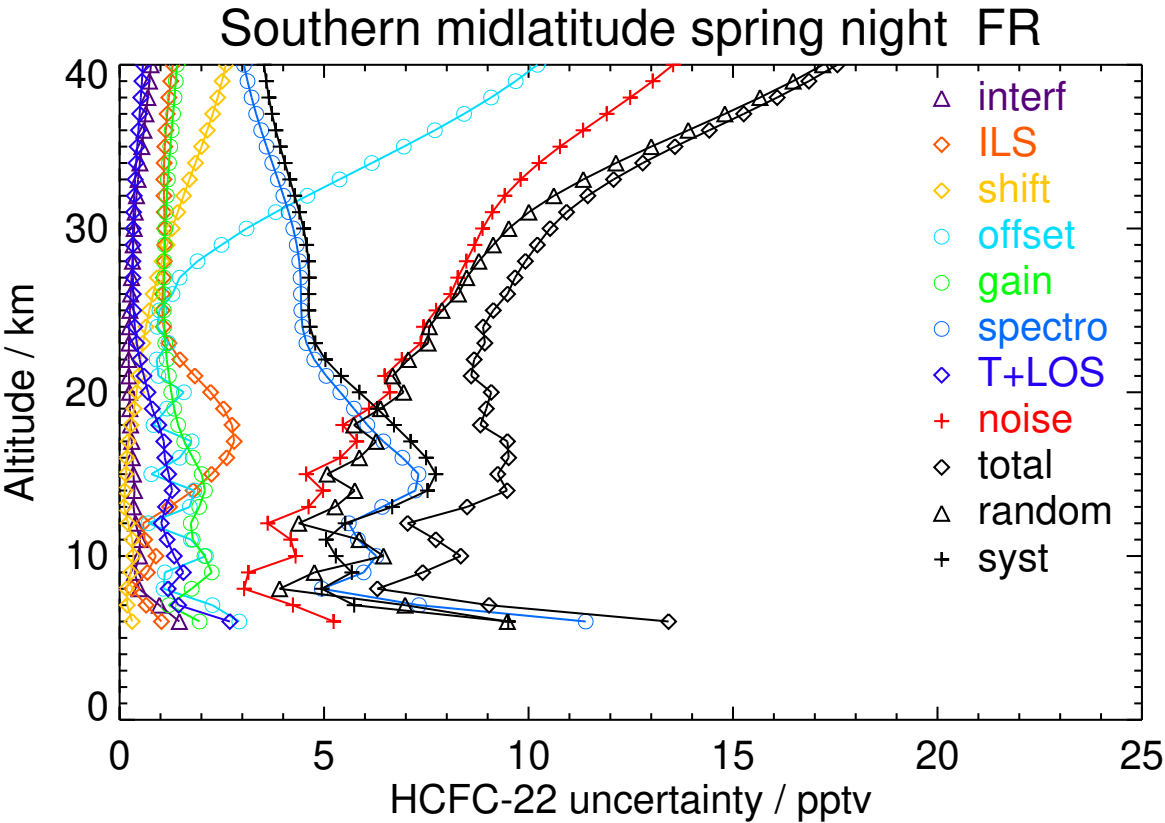
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.73	0.61	0.58	0.13	1.42	1.63	5.44	1.05	3.45	4.99	4.81	6.93
11	145.40	0.50	0.81	0.08	1.90	1.95	5.77	1.20	4.46	5.96	5.24	7.94
14	133.95	0.37	1.92	0.13	1.87	1.76	7.33	1.35	5.15	5.95	7.55	9.61
17	117.24	0.31	2.87	0.21	1.78	1.36	7.03	1.15	5.99	6.65	7.47	10.00
20	101.33	0.24	2.42	0.38	1.49	1.08	5.82	0.81	6.85	7.27	6.17	9.53
23	95.03	0.24	1.42	0.55	1.21	1.10	4.71	0.49	7.63	7.90	4.84	9.26
26	88.67	0.28	1.19	0.84	1.38	1.15	4.34	0.39	8.31	8.60	4.42	9.67
29	82.13	0.35	1.15	1.30	2.49	1.01	4.05	0.38	8.76	9.32	4.08	10.18
32	74.33	0.45	1.08	1.86	4.48	0.99	3.67	0.41	9.33	10.62	3.71	11.25
35	68.77	0.59	1.06	2.41	6.76	1.08	3.28	0.49	10.58	12.86	3.39	13.30
38	65.09	0.74	1.11	2.86	8.84	1.21	2.95	0.57	12.27	15.46	3.17	15.78
41	62.70	0.85	1.22	3.15	10.41	1.31	2.71	0.63	13.76	17.61	3.06	17.87



**Figure S21.** V8H\_F-22\_61 Southern midlatitude spring day

**Table S23.** HCFC-22 error budget for Southern midlatitude spring night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	153.27	0.48	0.30	0.17	1.07	1.76	4.95	1.19	3.04	3.91	4.94	6.30
11	145.65	0.50	0.61	0.31	1.74	1.79	5.83	1.16	4.18	5.86	5.05	7.73
14	135.71	0.36	1.80	0.13	1.83	2.09	7.23	1.28	4.98	5.75	7.53	9.48
17	118.39	0.30	2.80	0.21	1.76	1.58	6.45	1.08	5.80	6.27	7.12	9.48
20	107.90	0.24	2.23	0.42	1.57	1.26	5.40	0.70	6.61	6.94	5.86	9.09
23	103.44	0.23	1.21	0.57	1.20	1.12	4.57	0.42	7.36	7.54	4.78	8.93
26	102.61	0.27	1.05	0.82	1.29	1.08	4.43	0.33	8.10	8.28	4.62	9.49
29	99.86	0.34	1.10	1.16	2.49	1.10	4.33	0.32	8.68	9.14	4.57	10.22
32	89.24	0.41	1.09	1.56	4.59	1.16	4.00	0.36	9.42	10.62	4.28	11.45
35	79.94	0.54	1.11	2.00	6.95	1.24	3.60	0.43	10.77	13.00	3.93	13.58
38	72.70	0.69	1.20	2.40	9.08	1.34	3.23	0.52	12.48	15.66	3.65	16.08
41	67.58	0.80	1.34	2.68	10.68	1.42	2.96	0.59	13.97	17.83	3.49	18.17

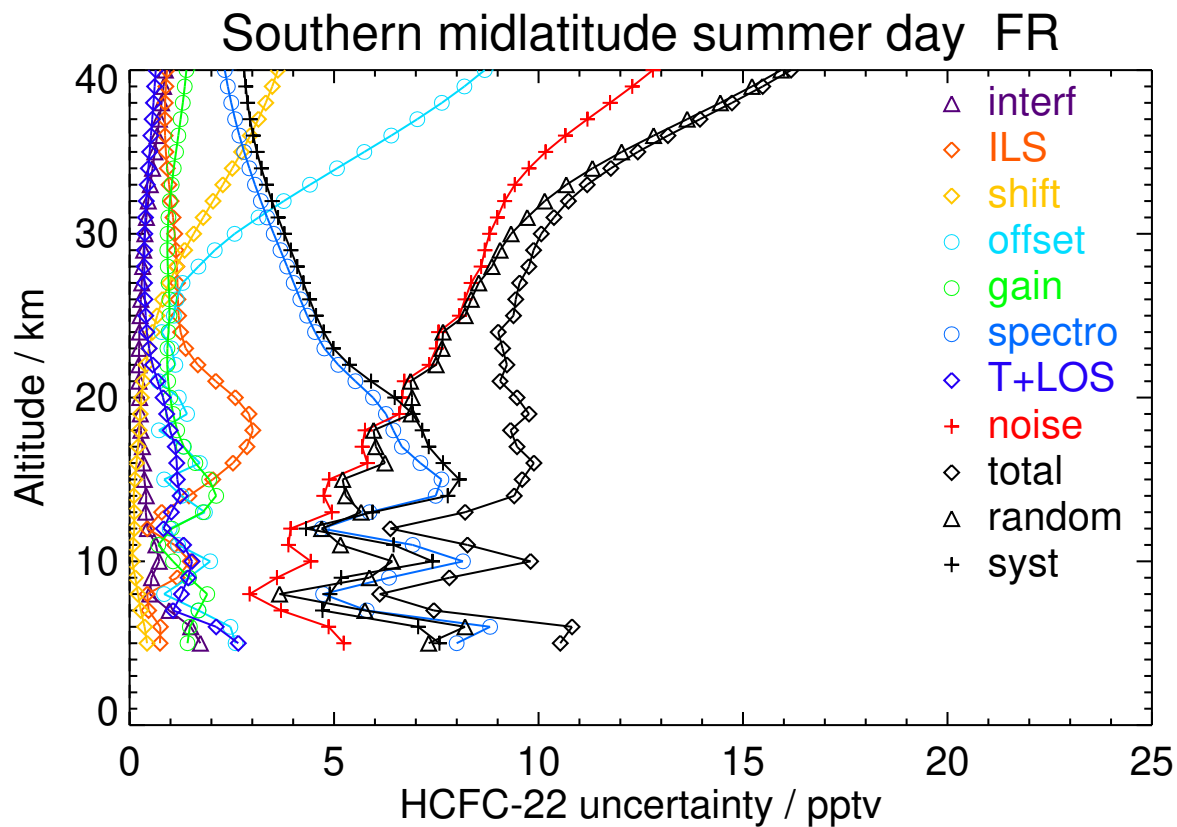


**Figure S22.** V8H\_F-22\_61 Southern midlatitude spring night



**Table S24.** HCFC-22 error budget for Southern midlatitude summer day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	142.33	1.73	0.74	0.43	2.59	1.42	8.00	2.66	5.24	7.31	7.58	10.53
8	149.17	0.49	0.43	0.20	0.84	1.90	4.73	1.27	2.94	3.67	4.89	6.12
11	145.90	0.64	1.10	0.08	1.19	0.70	6.92	1.32	3.88	5.16	6.45	8.26
14	135.07	0.41	1.45	0.10	1.27	2.12	7.48	1.24	4.75	5.28	7.78	9.41
17	121.62	0.31	2.87	0.20	1.31	1.33	6.66	1.12	5.69	6.02	7.32	9.47
20	104.09	0.24	2.59	0.29	1.20	0.99	5.95	0.82	6.66	6.91	6.48	9.47
23	94.06	0.23	1.37	0.47	1.02	0.93	4.76	0.48	7.50	7.64	4.98	9.12
26	88.08	0.28	1.18	0.81	1.15	0.97	4.17	0.37	8.20	8.36	4.40	9.44
29	80.92	0.34	1.13	1.35	2.08	0.92	3.69	0.36	8.69	9.06	3.94	9.88
32	74.41	0.46	1.01	2.04	3.77	0.98	3.21	0.41	9.17	10.15	3.48	10.73
35	68.79	0.62	0.89	2.74	5.74	1.14	2.80	0.49	10.17	12.03	3.11	12.43
38	64.31	0.78	0.87	3.33	7.64	1.30	2.49	0.58	11.75	14.45	2.89	14.73
41	60.91	0.91	0.95	3.74	9.13	1.42	2.26	0.66	13.25	16.57	2.77	16.80



**Figure S23.** V8H\_F-22\_61 Southern midlatitude summer day

Table S25. HCFC-22 error budget for Southern midlatitude summer night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	146.23	1.68	0.65	0.40	2.74	1.78	7.05	2.26	5.32	8.32	5.28	9.85
8	145.18	0.93	1.30	0.15	2.03	1.32	7.25	1.67	4.51	7.13	5.76	9.17
11	147.55	0.49	1.32	0.07	1.07	1.38	5.87	1.12	3.54	5.46	4.84	7.30
14	140.85	0.43	1.49	0.12	1.00	1.88	6.73	1.01	4.52	5.85	6.29	8.59
17	123.83	0.32	3.56	0.23	1.08	1.59	8.21	1.27	5.60	6.07	8.94	10.81
20	103.06	0.25	2.56	0.29	1.10	1.14	6.29	0.86	6.58	6.85	6.78	9.64
23	92.69	0.23	1.23	0.48	0.97	0.98	4.66	0.48	7.47	7.60	4.87	9.03
26	89.26	0.27	1.09	0.79	1.14	0.89	4.08	0.37	8.20	8.35	4.27	9.38
29	81.79	0.34	1.11	1.32	2.06	0.87	3.61	0.37	8.70	9.07	3.85	9.85
32	74.22	0.45	1.02	2.05	3.70	0.97	3.09	0.40	9.13	10.09	3.36	10.64
35	69.56	0.62	0.93	2.80	5.65	1.15	2.67	0.47	10.07	11.92	3.01	12.29
38	66.26	0.79	0.96	3.43	7.54	1.35	2.38	0.55	11.59	14.29	2.85	14.57
41	63.69	0.92	1.09	3.88	9.03	1.50	2.20	0.61	13.09	16.41	2.80	16.65

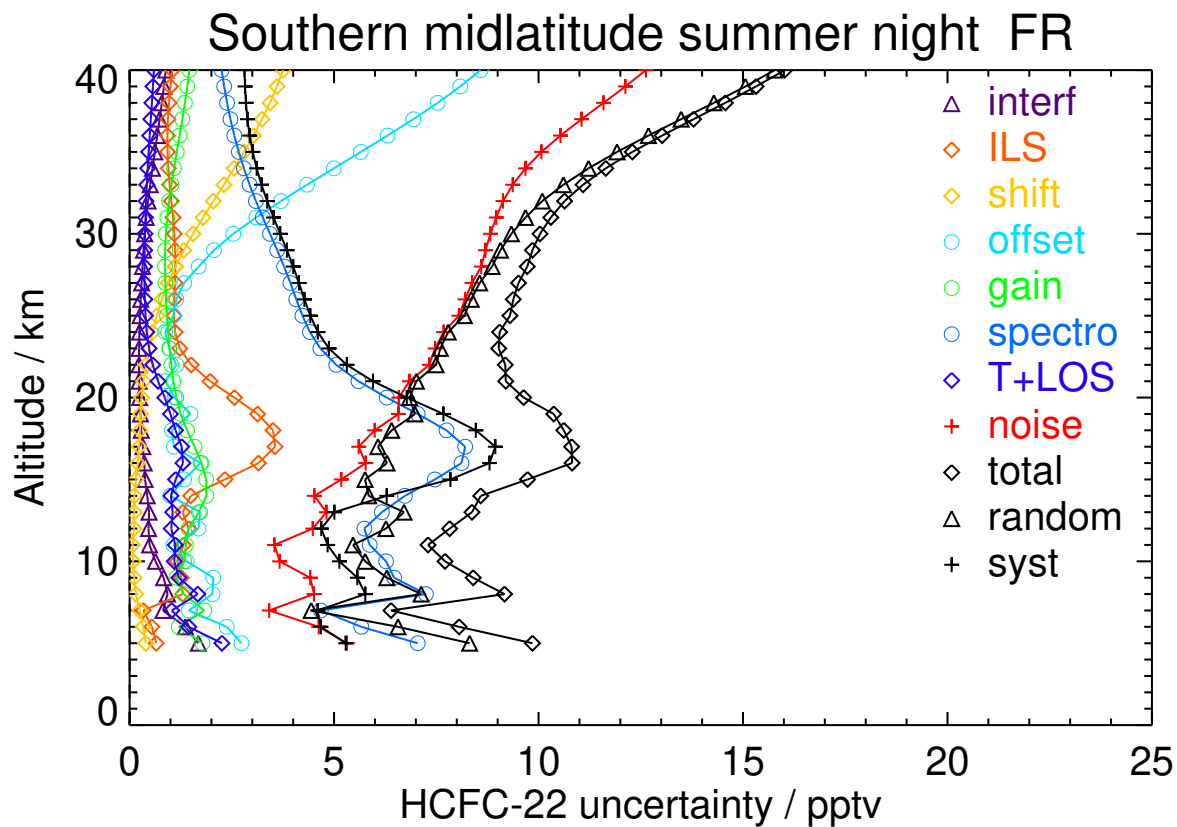
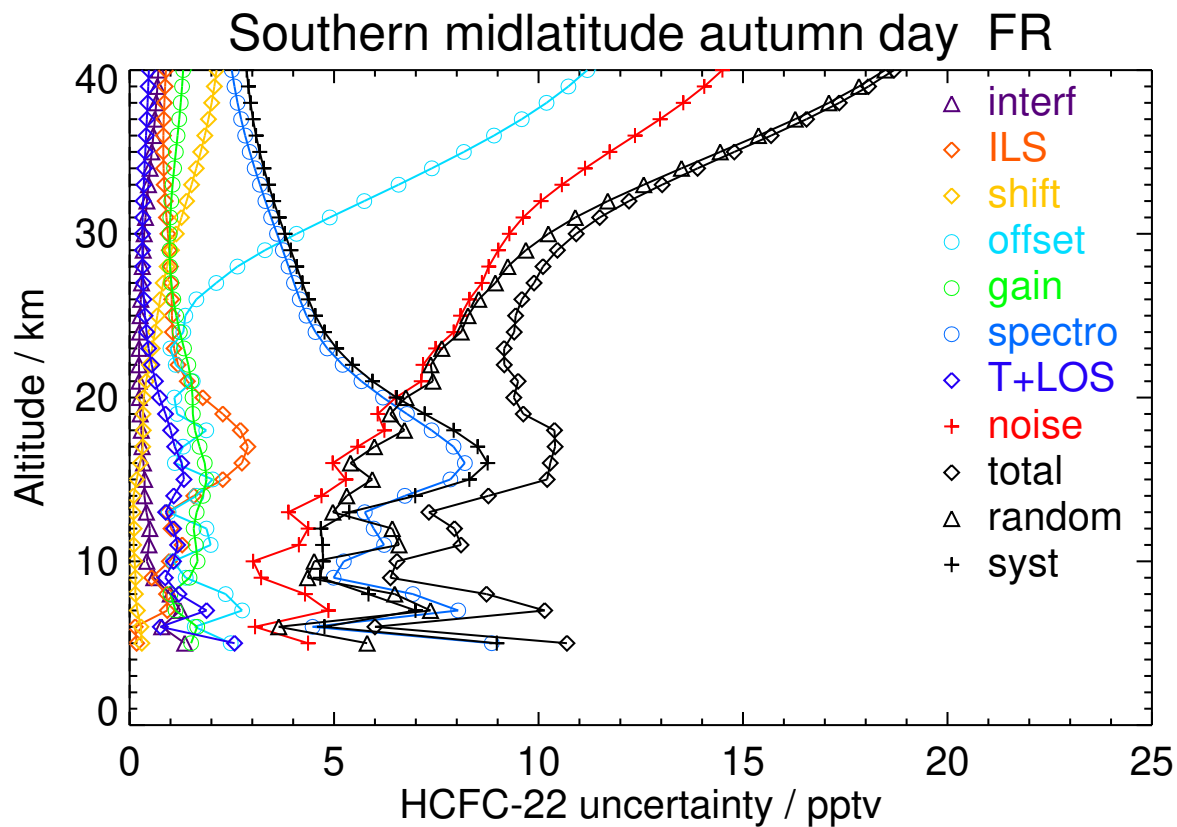


Figure S24. V8H\_F-22\_61 Southern midlatitude summer night

**Table S26.** HCFC-22 error budget for Southern midlatitude autumn day. All uncertainties are  $1\sigma$ .

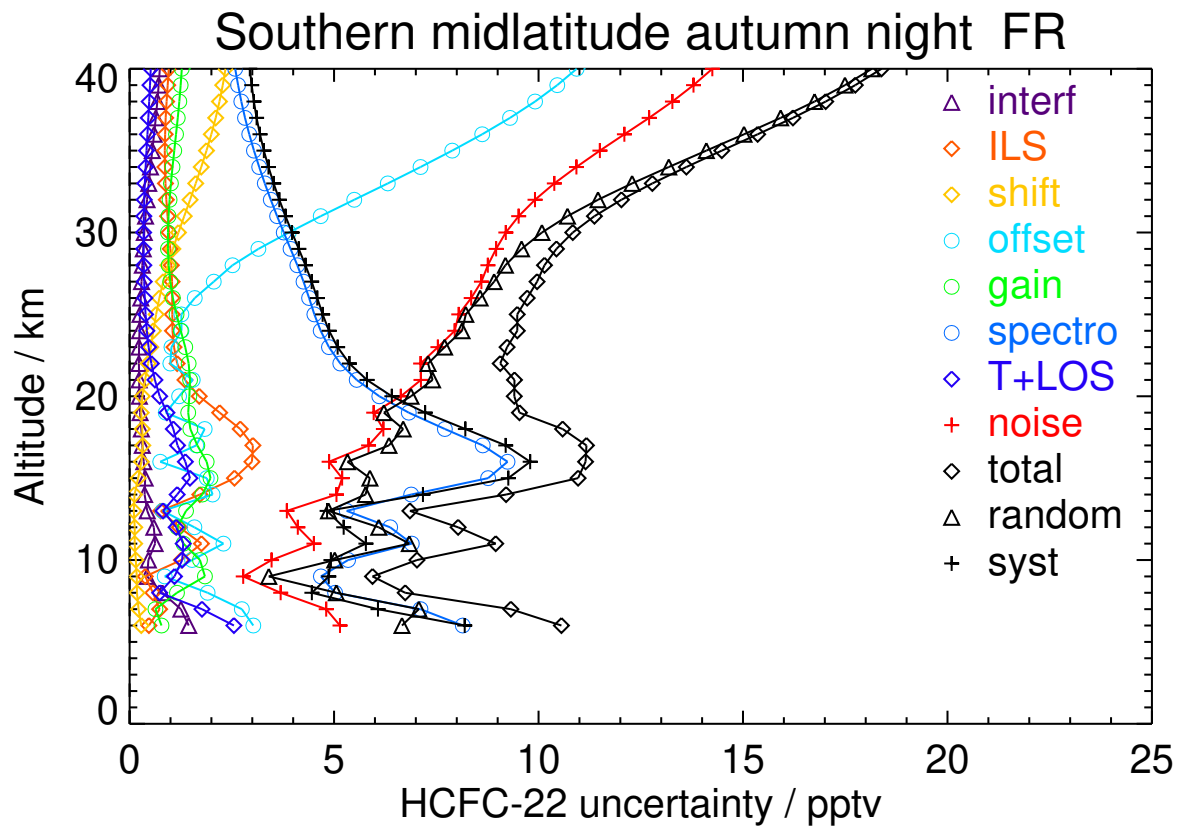
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	152.70	1.35	0.17	0.30	2.47	1.50	8.86	2.57	4.36	5.81	8.98	10.69
8	143.39	0.99	0.90	0.14	2.35	1.00	6.93	1.21	4.29	6.48	5.84	8.73
11	150.09	0.47	1.29	0.10	1.98	1.62	6.22	1.17	4.14	6.59	4.72	8.10
14	140.09	0.36	1.57	0.10	1.63	1.79	6.73	1.08	4.69	5.31	6.98	8.77
17	123.97	0.30	2.89	0.32	1.31	1.71	7.92	1.10	5.58	5.99	8.51	10.40
20	104.60	0.24	1.79	0.35	1.09	1.54	6.20	0.73	6.51	6.76	6.53	9.39
23	91.80	0.23	1.09	0.55	1.00	1.33	4.84	0.46	7.48	7.63	5.06	9.16
26	84.77	0.27	1.03	0.75	1.63	1.07	4.16	0.35	8.31	8.54	4.37	9.59
29	80.70	0.33	0.97	1.02	3.31	0.98	3.75	0.31	9.01	9.69	3.94	10.46
32	74.41	0.42	0.87	1.39	5.74	1.02	3.32	0.33	10.06	11.69	3.52	12.21
35	68.43	0.54	0.82	1.74	8.17	1.13	2.94	0.38	11.74	14.44	3.18	14.79
38	63.95	0.65	0.85	2.01	10.20	1.25	2.64	0.44	13.54	17.10	2.95	17.35
41	61.38	0.72	0.91	2.17	11.58	1.33	2.44	0.48	14.86	19.00	2.83	19.21



**Figure S25.** V8H\_F-22\_61 Southern midlatitude autumn day

**Table S27.** HCFC-22 error budget for Southern midlatitude autumn night. All uncertainties are  $1\sigma$ .

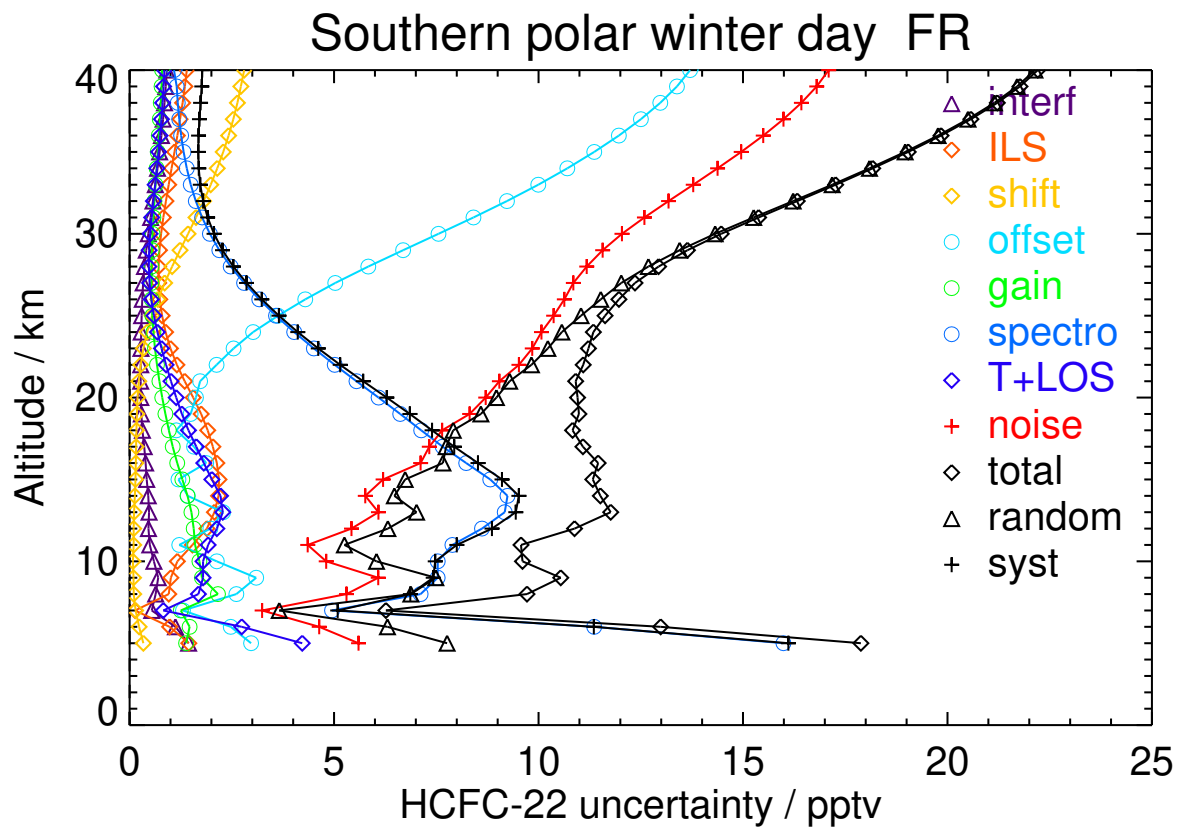
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	144.67	0.80	0.57	0.18	1.91	1.16	5.03	0.74	3.69	5.05	4.46	6.74
11	151.59	0.62	1.76	0.12	2.29	1.32	6.90	1.31	4.51	6.84	5.78	8.95
14	144.88	0.37	1.72	0.12	2.03	1.78	6.89	1.16	5.06	5.77	7.17	9.21
17	123.81	0.31	3.02	0.32	1.63	1.66	8.64	1.17	5.84	6.34	9.20	11.17
20	105.28	0.24	1.70	0.31	1.21	1.46	6.11	0.74	6.63	6.88	6.41	9.41
23	95.81	0.23	1.09	0.52	1.02	1.36	4.87	0.46	7.54	7.70	5.09	9.23
26	89.54	0.27	1.04	0.73	1.59	1.06	4.39	0.37	8.35	8.57	4.59	9.72
29	81.96	0.33	0.99	1.06	3.15	0.94	3.94	0.34	8.96	9.58	4.14	10.44
32	73.11	0.43	0.90	1.48	5.49	0.98	3.45	0.36	9.91	11.45	3.66	12.03
35	66.20	0.56	0.86	1.88	7.89	1.09	3.04	0.41	11.50	14.10	3.28	14.48
38	61.75	0.68	0.90	2.20	9.92	1.22	2.73	0.48	13.27	16.75	3.04	17.02
41	58.96	0.76	0.99	2.40	11.33	1.30	2.52	0.53	14.63	18.70	2.90	18.93



**Figure S26.** V8H\_F-22\_61 Southern midlatitude autumn night

**Table S28.** HCFC-22 error budget for Southern polar winter day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	143.10	1.44	1.45	0.34	2.97	1.38	15.99	4.22	5.60	7.76	16.11	17.88
8	151.49	0.64	0.96	0.10	2.61	2.16	7.12	1.68	5.30	6.88	6.86	9.72
11	141.32	0.49	1.54	0.10	1.21	1.60	7.89	1.92	4.35	5.25	8.00	9.57
14	120.58	0.46	2.17	0.13	1.42	1.42	9.24	2.22	5.76	6.47	9.52	11.51
17	95.62	0.36	2.04	0.16	1.58	1.06	7.66	1.63	7.33	7.74	7.94	11.09
20	78.81	0.27	1.56	0.19	1.62	0.80	6.09	1.14	8.71	8.97	6.29	10.95
23	62.77	0.28	1.00	0.34	2.54	0.62	4.51	0.78	9.85	10.23	4.61	11.22
26	48.65	0.31	0.74	0.69	4.30	0.54	3.17	0.53	10.63	11.52	3.23	11.97
29	39.48	0.41	0.73	1.23	6.69	0.55	2.19	0.48	11.57	13.45	2.27	13.64
32	34.17	0.57	0.89	1.81	9.23	0.61	1.62	0.58	13.18	16.23	1.80	16.33
35	30.57	0.73	1.10	2.29	11.36	0.69	1.32	0.71	14.96	18.96	1.68	19.04
38	27.98	0.85	1.30	2.64	12.98	0.76	1.18	0.81	16.43	21.15	1.73	21.22
41	26.86	0.93	1.45	2.87	13.99	0.82	1.11	0.87	17.35	22.52	1.84	22.60



**Figure S27.** V8H\_F-22\_61 Southern polar winter day

Table S29. HCFC-22 error budget for Southern polar winter night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	149.12	1.42	0.67	0.20	2.79	1.04	8.37	2.36	5.03	7.26	7.72	10.60
8	149.06	0.54	0.25	0.08	1.88	1.91	4.89	1.31	4.19	5.03	5.04	7.12
11	146.60	0.44	0.71	0.05	1.23	1.77	5.94	1.26	4.25	4.95	5.98	7.76
14	123.78	0.42	1.69	0.14	1.23	1.73	8.10	1.80	5.53	6.02	8.41	10.34
17	99.85	0.34	1.90	0.18	1.36	1.21	6.76	1.34	6.96	7.28	7.07	10.15
20	83.25	0.27	1.65	0.22	1.64	0.94	5.82	0.98	8.45	8.72	6.06	10.61
23	66.39	0.28	1.18	0.32	2.66	0.79	4.62	0.73	9.77	10.18	4.79	11.25
26	51.82	0.31	0.93	0.60	4.72	0.69	3.40	0.54	10.79	11.83	3.55	12.35
29	42.36	0.41	0.93	1.06	7.43	0.68	2.40	0.47	12.08	14.25	2.58	14.48
32	36.45	0.56	1.09	1.55	10.11	0.71	1.75	0.53	13.89	17.28	2.05	17.40
35	32.53	0.71	1.29	1.96	12.29	0.77	1.41	0.63	15.66	20.04	1.90	20.13
38	29.65	0.82	1.48	2.27	13.89	0.82	1.26	0.72	17.04	22.15	1.94	22.23
41	24.89	0.91	1.64	2.67	14.58	0.85	1.13	0.79	17.67	23.11	2.02	23.20

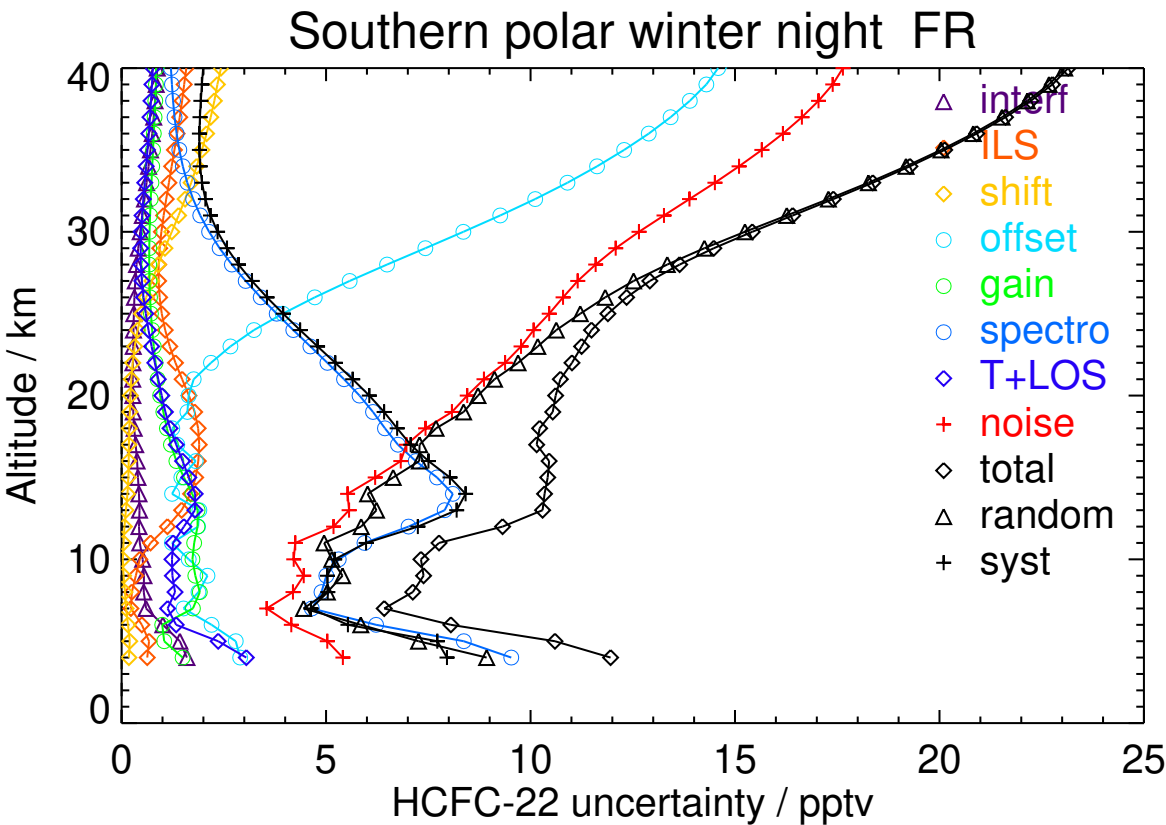
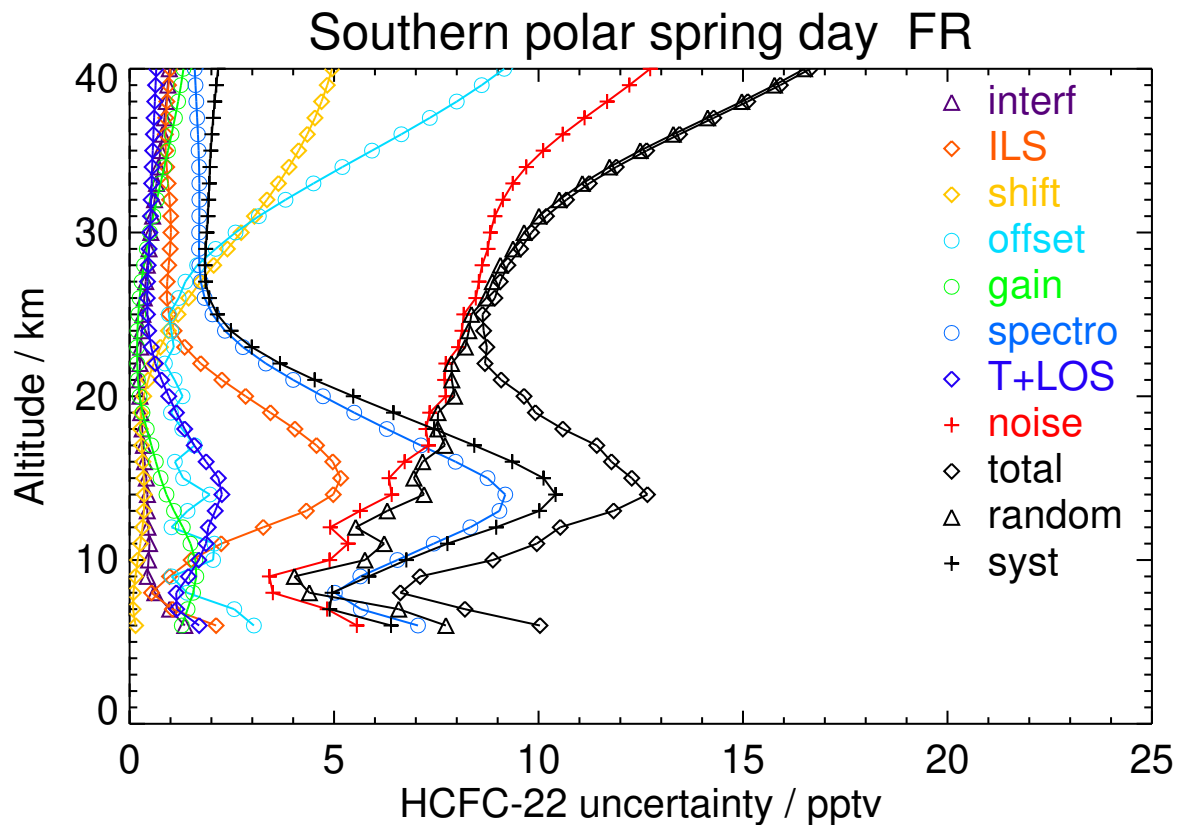


Figure S28. V8H\_F-22\_61 Southern polar winter night

**Table S30.** HCFC-22 error budget for Southern polar spring day. All uncertainties are  $1\sigma$ .

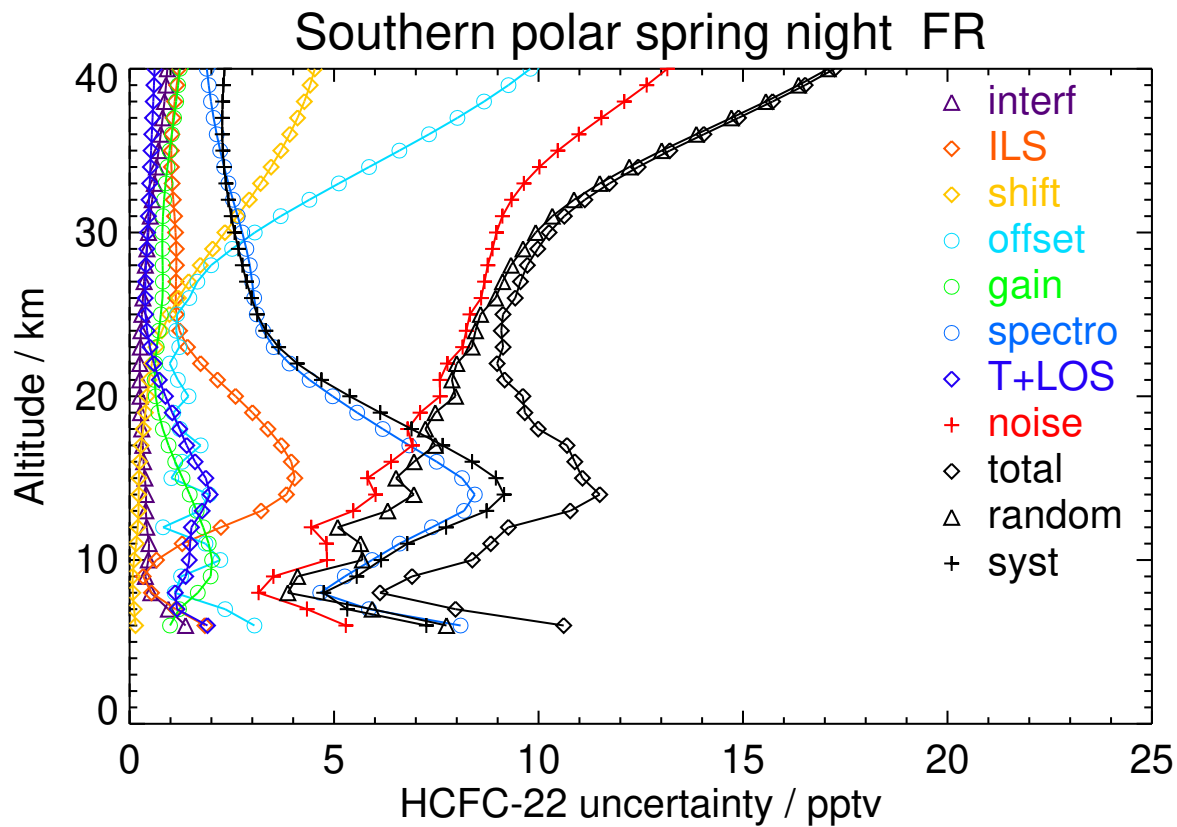
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.46	0.62	0.54	0.09	1.41	1.55	5.02	1.14	3.50	4.40	4.95	6.62
11	145.50	0.49	2.24	0.26	2.07	1.49	7.44	1.87	5.34	6.23	7.77	9.96
14	118.14	0.44	4.98	0.36	1.96	0.90	9.19	2.26	6.41	7.20	10.42	12.66
17	85.96	0.34	4.57	0.29	1.59	0.53	7.12	1.58	7.31	7.71	8.43	11.42
20	58.99	0.25	2.84	0.34	1.30	0.24	4.73	0.96	7.73	7.95	5.47	9.65
23	43.59	0.27	1.35	0.75	1.08	0.18	2.77	0.53	8.04	8.21	2.99	8.74
26	42.08	0.36	0.91	1.44	1.20	0.24	1.84	0.43	8.47	8.72	1.95	8.93
29	47.91	0.47	0.99	2.39	2.10	0.42	1.70	0.48	8.76	9.38	1.86	9.56
32	52.27	0.61	0.98	3.36	3.81	0.67	1.71	0.53	9.13	10.51	1.93	10.68
35	52.14	0.76	0.88	4.13	5.93	0.94	1.69	0.57	10.11	12.49	1.98	12.64
38	49.70	0.90	0.91	4.69	8.00	1.19	1.63	0.62	11.68	14.97	2.08	15.12
41	46.99	1.00	1.05	5.04	9.65	1.37	1.57	0.67	13.19	17.17	2.20	17.31



**Figure S29.** V8H\_F-22\_61 Southern polar spring day

**Table S31.** HCFC-22 error budget for Southern polar spring night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	152.02	0.52	0.53	0.08	1.10	1.67	4.66	1.12	3.15	3.87	4.75	6.12
11	146.76	0.48	1.29	0.16	1.85	1.93	6.60	1.48	4.81	5.65	6.79	8.83
14	121.12	0.40	3.83	0.22	1.95	1.47	8.44	1.97	6.01	6.95	9.16	11.50
17	93.68	0.32	3.71	0.28	1.74	0.95	6.84	1.40	6.91	7.47	7.66	10.70
20	73.85	0.26	2.59	0.43	1.44	0.64	4.96	0.88	7.59	7.97	5.38	9.62
23	65.78	0.26	1.42	0.64	1.21	0.66	3.52	0.50	8.14	8.37	3.64	9.13
26	64.01	0.33	1.13	1.19	1.46	0.80	3.05	0.38	8.60	8.95	2.98	9.43
29	59.50	0.42	1.14	2.03	2.51	0.80	2.86	0.42	8.87	9.62	2.66	9.98
32	56.51	0.55	1.07	2.93	4.40	0.84	2.53	0.48	9.34	10.87	2.41	11.13
35	54.47	0.71	1.02	3.70	6.60	0.98	2.22	0.53	10.47	13.01	2.28	13.21
38	52.74	0.85	1.10	4.27	8.67	1.14	1.99	0.58	12.10	15.56	2.28	15.72
41	51.96	0.95	1.26	4.62	10.27	1.27	1.85	0.62	13.60	17.73	2.35	17.88



**Figure S30.** V8H\_F-22\_61 Southern polar spring night



**Table S32.** HCFC-22 error budget for Southern polar summer day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	141.94	1.77	0.71	0.39	2.67	1.96	10.77	3.09	5.31	9.49	8.86	12.98
8	147.60	0.39	0.48	0.15	0.75	2.05	5.18	1.63	2.96	4.19	5.09	6.59
11	143.00	0.58	0.75	0.11	1.01	0.81	5.23	1.00	3.69	4.62	4.82	6.67
14	130.72	0.39	1.72	0.10	1.22	1.92	7.52	1.28	4.64	5.09	7.88	9.38
17	114.88	0.31	2.96	0.21	1.33	1.26	6.14	1.02	5.54	5.87	6.87	9.04
20	99.39	0.25	2.43	0.38	1.30	1.30	5.34	0.69	6.50	6.76	5.93	8.99
23	90.49	0.24	1.48	0.52	1.07	1.47	4.36	0.40	7.40	7.57	4.72	8.93
26	84.20	0.27	1.20	0.81	1.09	1.24	3.86	0.33	8.10	8.25	4.16	9.24
29	79.11	0.33	1.15	1.35	1.84	1.00	3.47	0.35	8.59	8.91	3.75	9.67
32	72.05	0.45	1.03	2.16	3.31	1.01	3.03	0.41	8.95	9.81	3.33	10.36
35	66.39	0.62	0.85	3.00	5.17	1.17	2.65	0.50	9.77	11.49	2.97	11.87
38	61.01	0.81	0.82	3.76	7.04	1.38	2.33	0.59	11.16	13.77	2.77	14.05
41	56.48	0.97	0.91	4.31	8.59	1.53	2.11	0.68	12.65	15.94	2.68	16.16

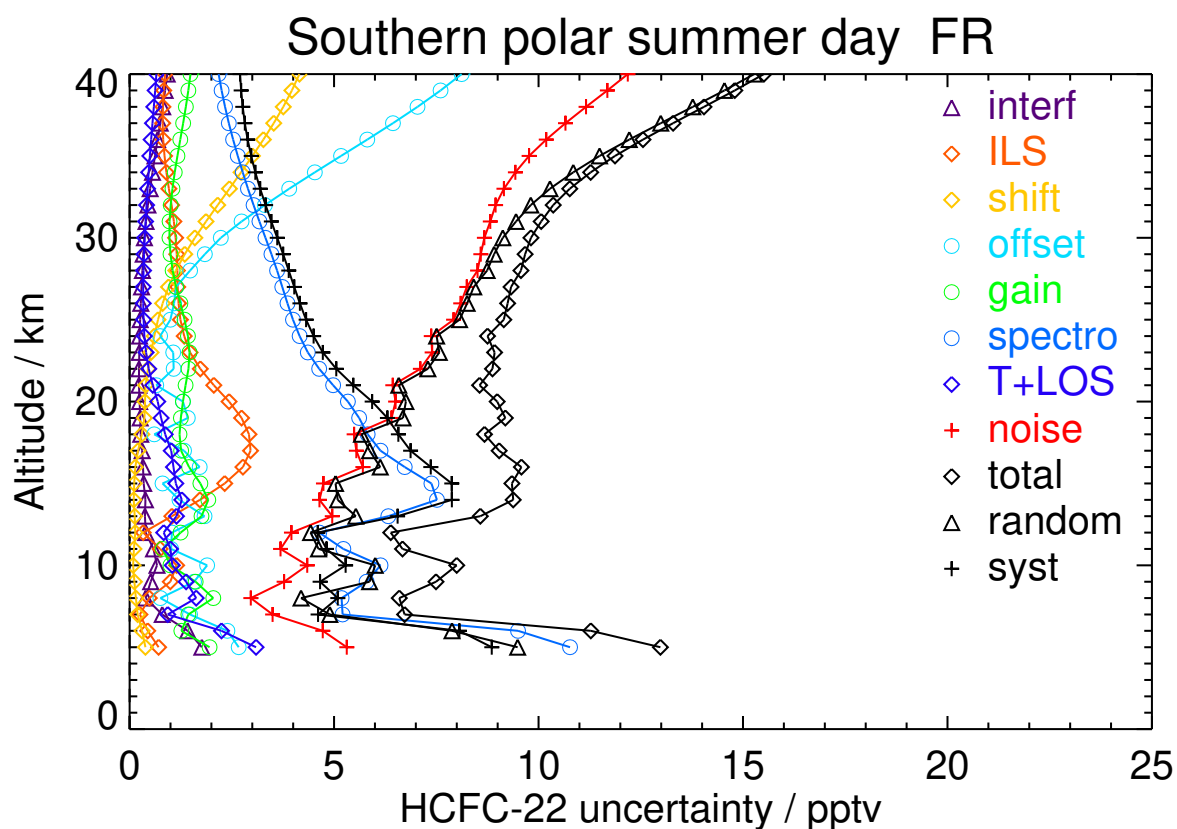
**Figure S31.** V8H\_F-22\_61 Southern polar summer day

Table S33. HCFC-22 error budget for Southern polar summer night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	150.44	1.58	0.33	0.36	2.61	0.32	5.81	2.11	5.13	6.34	5.83	8.61
8	141.68	1.25	1.85	0.09	2.56	1.08	10.79	2.35	5.14	7.88	9.95	12.70
11	143.28	0.35	0.33	0.07	1.28	1.62	5.16	0.95	3.68	4.42	5.10	6.75
14	137.07	0.36	1.67	0.10	0.84	1.76	6.66	0.98	4.33	4.62	7.03	8.41
17	117.99	0.30	3.04	0.28	0.65	1.60	6.94	1.02	5.28	5.49	7.70	9.46
20	101.67	0.24	1.94	0.36	0.77	1.16	5.43	0.66	6.31	6.45	5.84	8.70
23	90.69	0.23	1.01	0.50	0.87	0.99	4.48	0.39	7.36	7.46	4.67	8.80
26	81.84	0.27	0.97	0.77	1.23	0.91	3.98	0.34	8.26	8.41	4.17	9.39
29	73.68	0.34	0.98	1.25	2.36	0.88	3.48	0.34	8.84	9.27	3.69	9.97
32	65.04	0.45	0.90	1.89	4.22	0.97	2.98	0.38	9.47	10.57	3.21	11.05
35	59.76	0.61	0.86	2.53	6.29	1.14	2.59	0.45	10.67	12.69	2.89	13.01
38	56.57	0.77	0.92	3.07	8.19	1.31	2.31	0.54	12.33	15.16	2.74	15.41
41	54.18	0.89	1.04	3.44	9.62	1.45	2.13	0.61	13.80	17.22	2.69	17.43

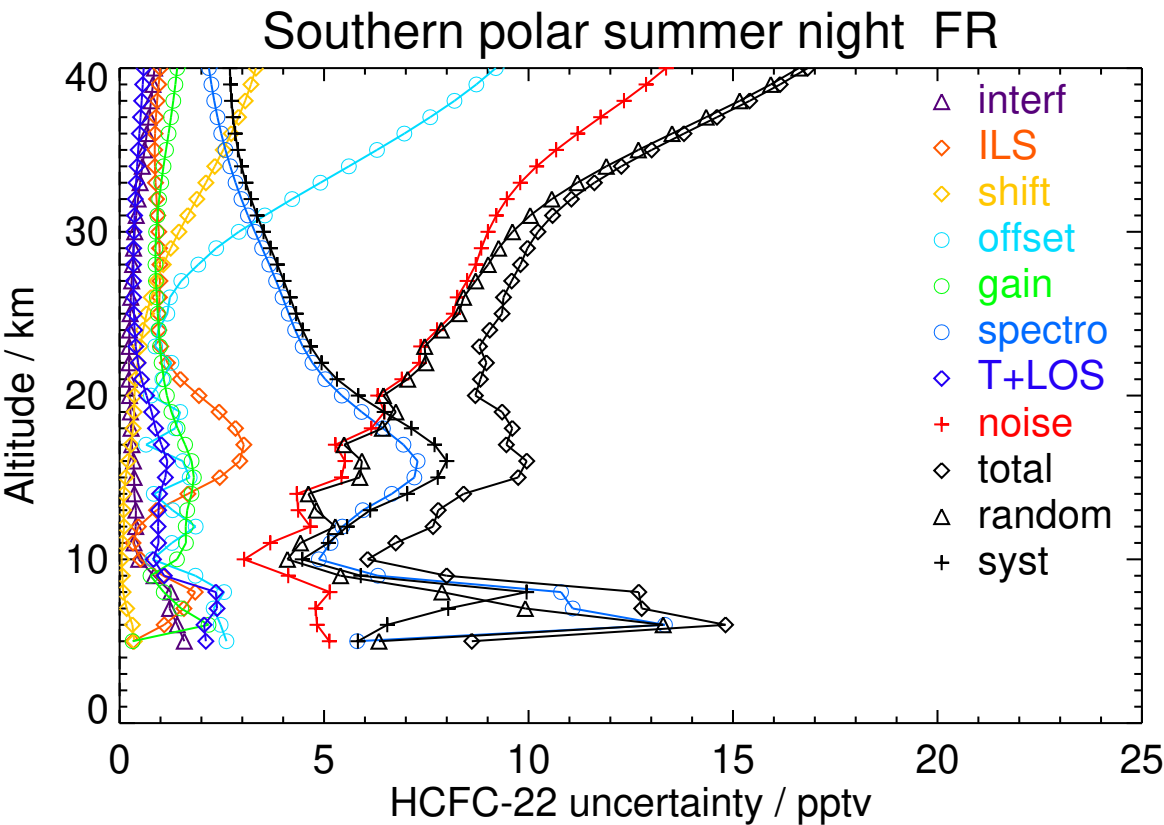


Figure S32. V8H\_F-22\_61 Southern polar summer night

Table S34. HCFC-22 error budget for Southern polar autumn day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	146.03	1.29	0.40	0.32	2.40	1.16	5.28	1.02	4.12	5.55	4.90	7.41
8	145.18	0.90	0.80	0.08	2.18	0.85	5.91	0.93	3.96	5.29	5.52	7.65
11	142.44	0.39	0.35	0.07	2.09	1.71	5.53	1.01	4.23	5.00	5.66	7.55
14	131.47	0.35	1.99	0.15	1.94	2.04	7.75	1.21	5.02	5.60	8.21	9.94
17	107.14	0.31	2.43	0.31	1.56	1.57	6.90	0.96	5.88	6.21	7.45	9.70
20	93.98	0.24	1.42	0.36	1.20	1.30	5.31	0.60	6.85	7.06	5.57	8.99
23	82.33	0.24	0.94	0.45	1.28	1.18	4.44	0.41	7.91	8.07	4.63	9.31
26	73.75	0.28	0.79	0.62	2.46	0.99	3.88	0.36	8.86	9.25	4.03	10.09
29	63.18	0.34	0.71	0.89	4.83	0.91	3.24	0.35	9.84	11.02	3.39	11.53
32	52.73	0.45	0.69	1.22	7.71	0.95	2.61	0.39	11.42	13.87	2.80	14.14
35	45.25	0.57	0.73	1.53	10.27	1.03	2.14	0.46	13.34	16.93	2.40	17.10
38	40.54	0.68	0.80	1.75	12.22	1.11	1.85	0.52	15.04	19.49	2.19	19.61
41	37.81	0.74	0.88	1.90	13.49	1.16	1.68	0.57	16.16	21.17	2.10	21.28

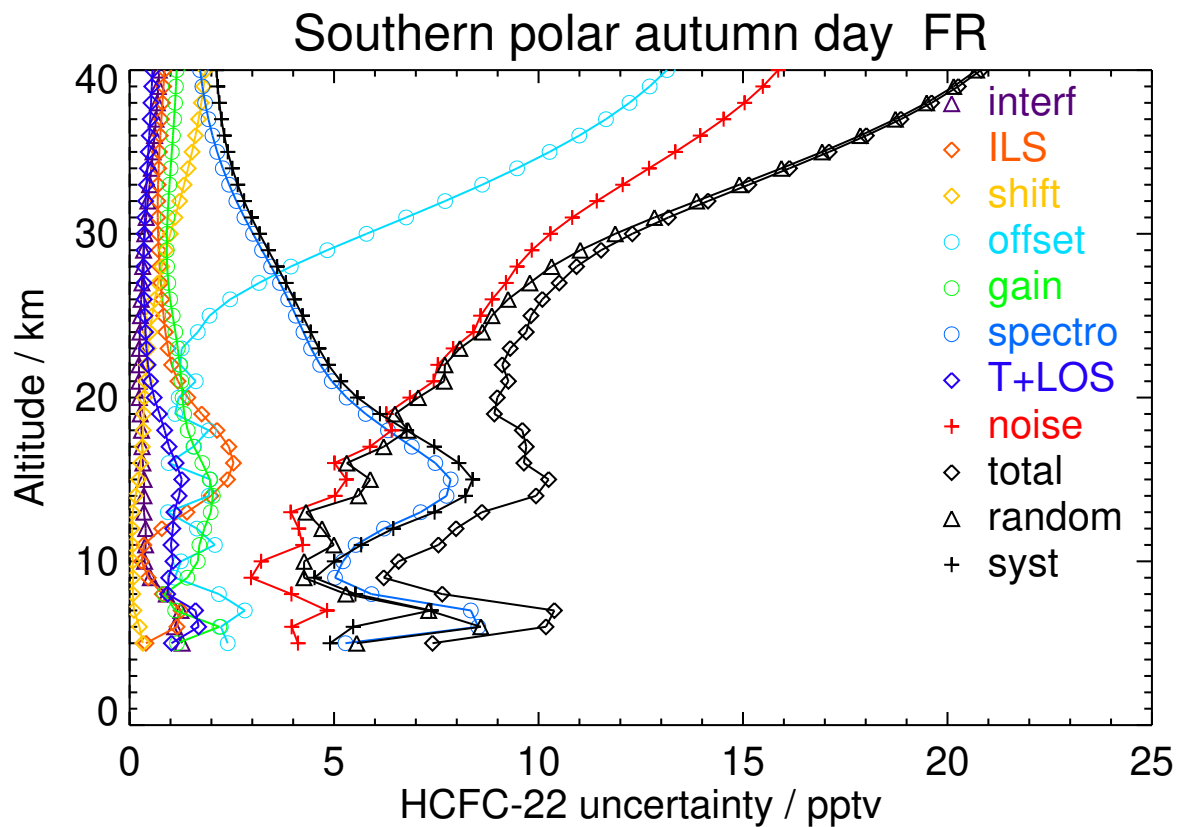


Figure S33. V8H\_F-22\_61 Southern polar autumn day

Table S35. HCFC-22 error budget for Southern polar autumn night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	145.94	1.25	0.30	0.29	2.44	0.93	6.21	1.31	4.15	5.92	5.57	8.13
8	146.48	0.73	0.60	0.10	2.13	1.26	5.06	1.06	3.95	5.24	4.69	7.03
11	143.10	0.39	0.29	0.06	1.63	1.57	5.11	0.91	3.92	4.52	5.22	6.90
14	130.95	0.36	1.66	0.14	1.37	2.02	7.46	1.17	4.77	5.20	7.85	9.42
17	110.41	0.30	2.38	0.29	1.12	1.53	6.87	1.01	5.75	6.04	7.36	9.52
20	95.35	0.24	1.64	0.35	1.08	1.23	5.73	0.69	6.94	7.15	6.00	9.33
23	84.79	0.24	0.90	0.42	1.46	1.02	4.74	0.45	8.13	8.32	4.88	9.65
26	73.31	0.29	0.70	0.57	2.99	0.93	4.05	0.39	9.21	9.73	4.18	10.59
29	61.77	0.36	0.68	0.82	5.65	0.89	3.34	0.37	10.45	11.94	3.48	12.43
32	50.48	0.47	0.76	1.11	8.64	0.90	2.70	0.42	12.32	15.12	2.87	15.39
35	41.96	0.58	0.87	1.36	11.16	0.92	2.21	0.49	14.29	18.21	2.46	18.38
38	36.34	0.68	0.99	1.55	13.02	0.95	1.89	0.55	15.88	20.62	2.23	20.74
41	31.13	0.74	1.11	1.73	13.93	1.01	1.66	0.58	16.63	21.79	2.14	21.90

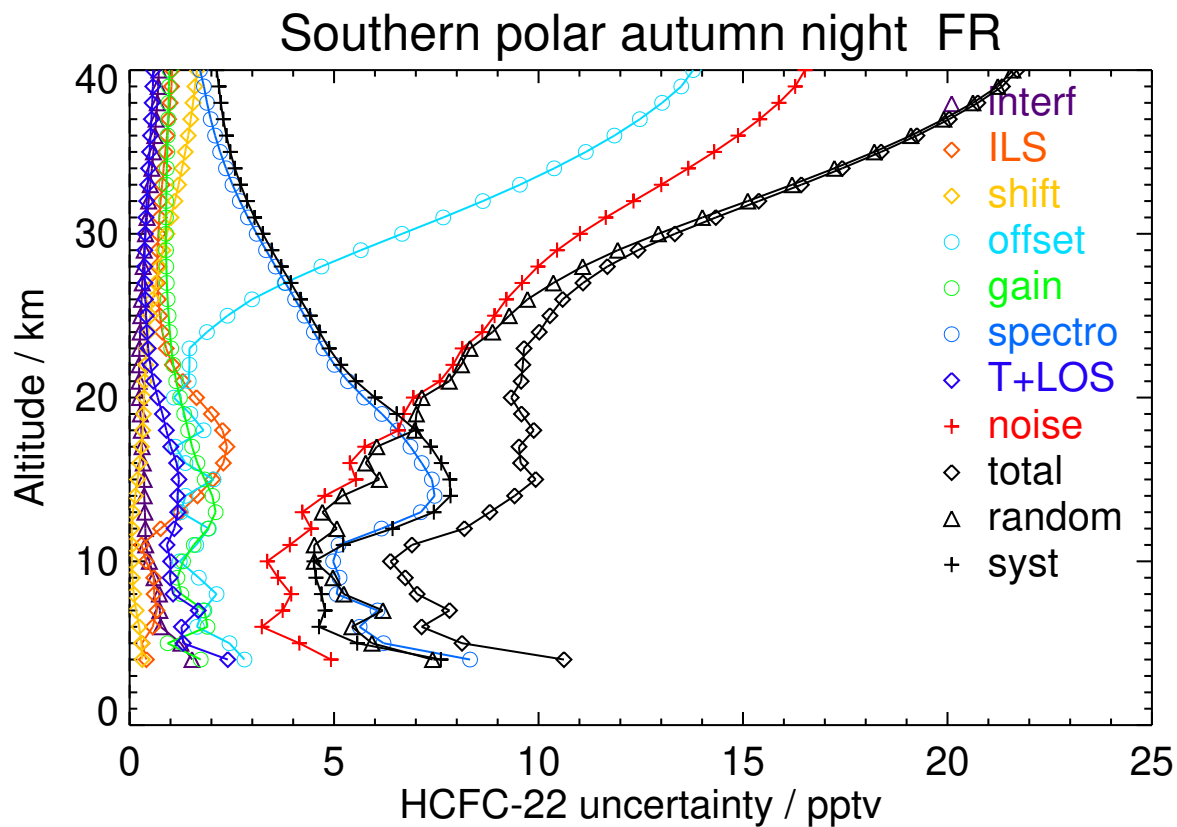
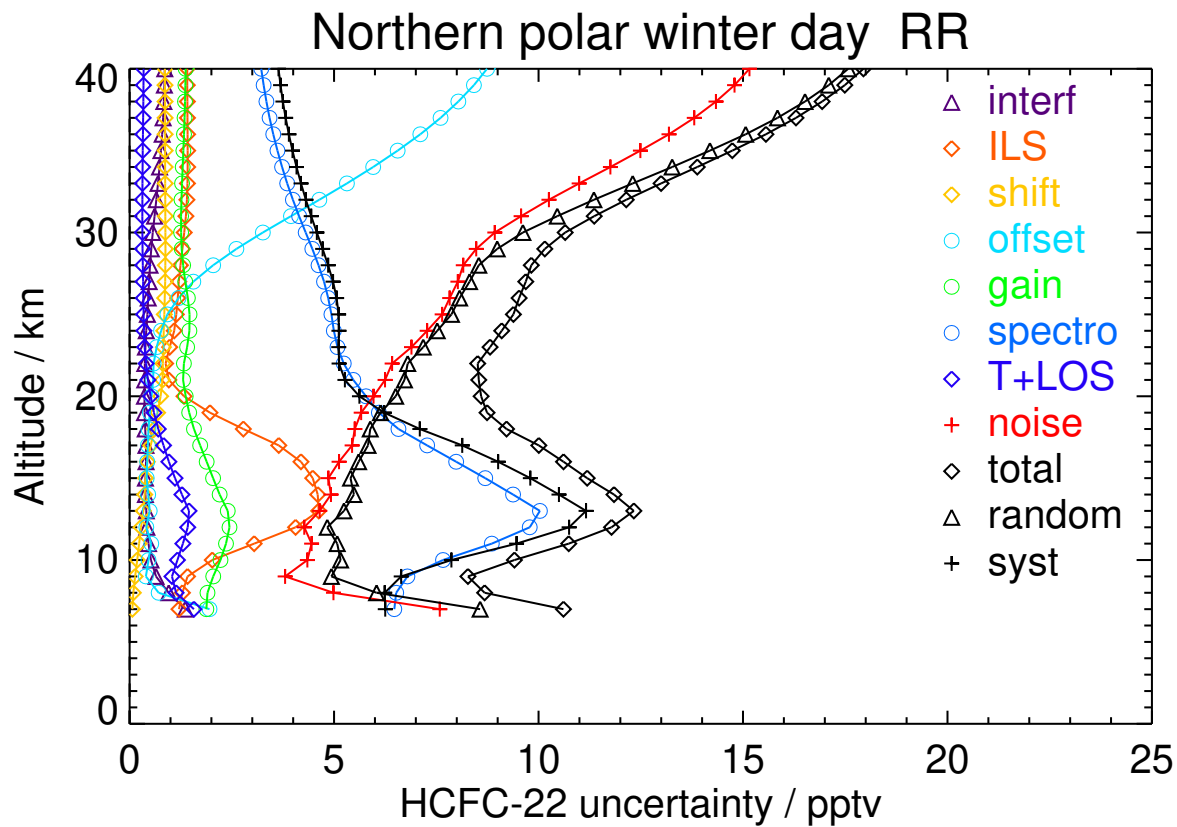


Figure S34. V8H\_F-22\_61 Southern polar autumn night

**Table S36.** HCFC-22 error budget for Northern polar winter day. All uncertainties are  $1\sigma$ .

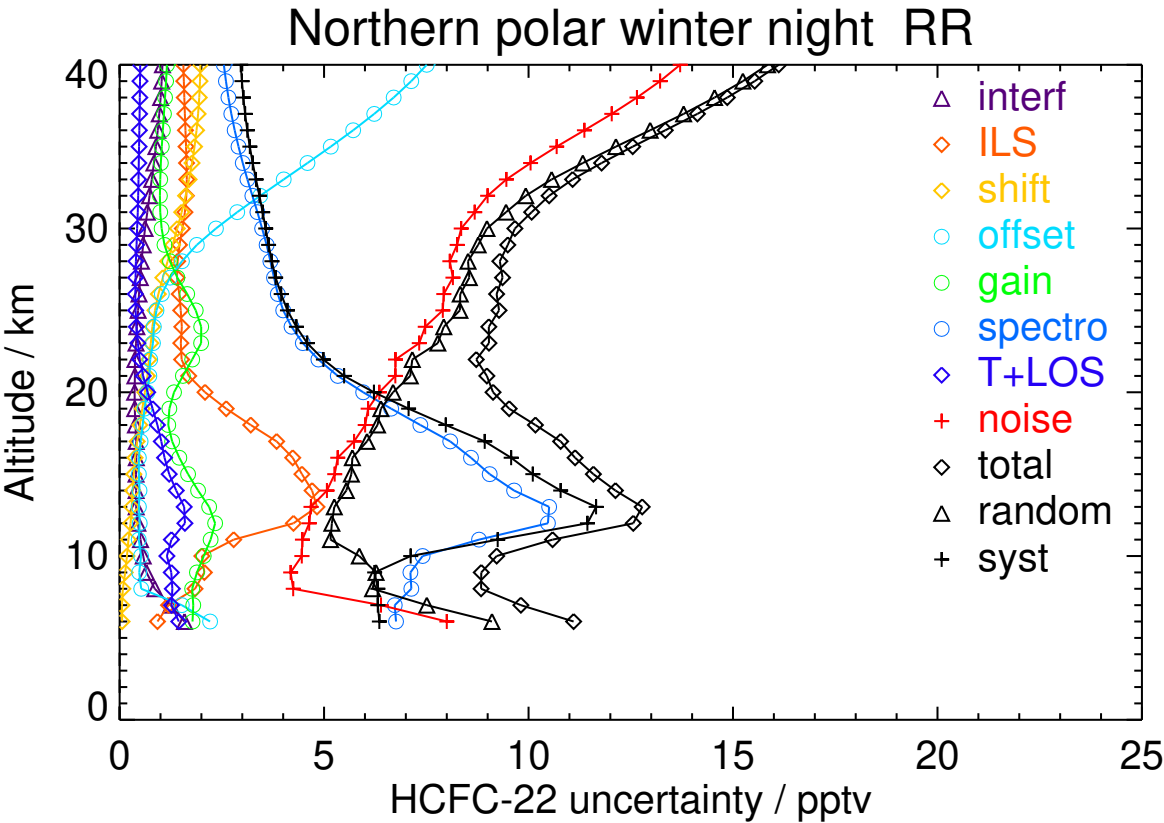
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	197.58	0.96	1.29	0.09	0.71	1.90	6.52	1.14	4.99	6.04	6.24	8.68
11	180.03	0.46	3.05	0.23	0.53	2.36	8.86	1.30	4.45	5.08	9.46	10.74
14	158.96	0.39	4.60	0.37	0.45	2.20	9.38	1.28	4.92	5.49	10.50	11.84
17	135.82	0.40	3.65	0.52	0.45	1.73	7.28	0.83	5.44	5.83	8.13	10.01
20	129.52	0.36	1.33	0.76	0.54	1.37	5.78	0.51	5.96	6.51	5.62	8.60
23	126.31	0.39	0.98	0.83	0.66	1.41	5.08	0.37	6.89	7.18	5.11	8.81
26	119.98	0.45	1.18	0.86	1.20	1.42	4.86	0.34	7.83	8.07	5.06	9.53
29	108.85	0.53	1.29	0.88	2.61	1.27	4.47	0.32	8.48	8.99	4.72	10.15
32	97.46	0.65	1.40	0.87	4.64	1.27	3.99	0.31	10.25	11.35	4.31	12.14
35	88.76	0.77	1.42	0.87	6.56	1.31	3.62	0.32	12.49	14.19	3.98	14.74
38	82.27	0.84	1.41	0.87	8.04	1.36	3.35	0.34	14.34	16.52	3.75	16.94
41	70.72	0.91	1.51	1.04	8.69	1.30	2.75	0.38	15.06	17.47	3.28	17.78



**Figure S35.** V8R\_F-22\_261 Northern polar winter day

**Table S37.** HCFC-22 error budget for Northern polar winter night. All uncertainties are  $1\sigma$ .

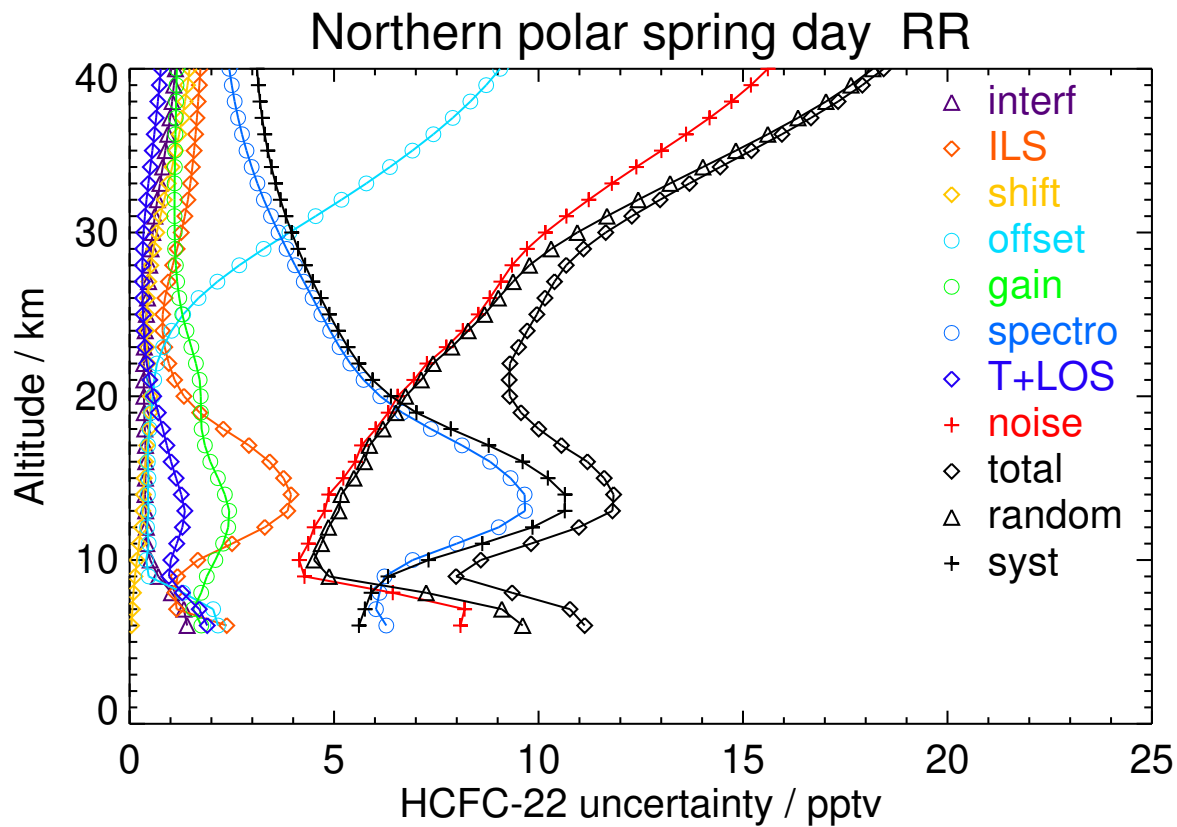
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	203.07	0.86	1.84	0.08	0.53	1.77	7.13	1.29	4.25	6.19	6.31	8.84
11	185.84	0.51	2.79	0.22	0.47	2.23	8.79	1.27	4.47	5.16	9.25	10.59
14	162.03	0.40	4.71	0.32	0.49	1.92	9.65	1.38	5.07	5.54	10.78	12.13
17	135.29	0.41	3.84	0.43	0.51	1.28	8.09	1.02	5.73	6.05	8.93	10.78
20	112.72	0.37	2.09	0.62	0.68	1.33	5.96	0.69	6.35	6.69	6.22	9.13
23	101.75	0.40	1.50	0.76	0.82	1.99	4.48	0.45	7.33	7.78	4.59	9.03
26	99.47	0.47	1.46	0.95	1.03	1.65	3.87	0.38	7.93	8.33	3.95	9.22
29	95.47	0.58	1.46	1.30	1.89	1.10	3.60	0.41	8.25	8.77	3.64	9.49
32	85.95	0.73	1.63	1.61	3.44	0.99	3.25	0.45	9.00	9.93	3.42	10.50
35	77.56	0.89	1.62	1.83	5.16	1.03	2.91	0.48	10.69	12.14	3.18	12.55
38	73.08	1.00	1.58	1.95	6.70	1.11	2.66	0.49	12.65	14.55	3.03	14.86
41	70.26	1.06	1.55	1.98	7.84	1.18	2.51	0.51	14.12	16.36	2.94	16.62



**Figure S36.** V8R\_F-22\_261 Northern polar winter night

**Table S38.** HCFC-22 error budget for Northern polar spring day. All uncertainties are  $1\sigma$ .

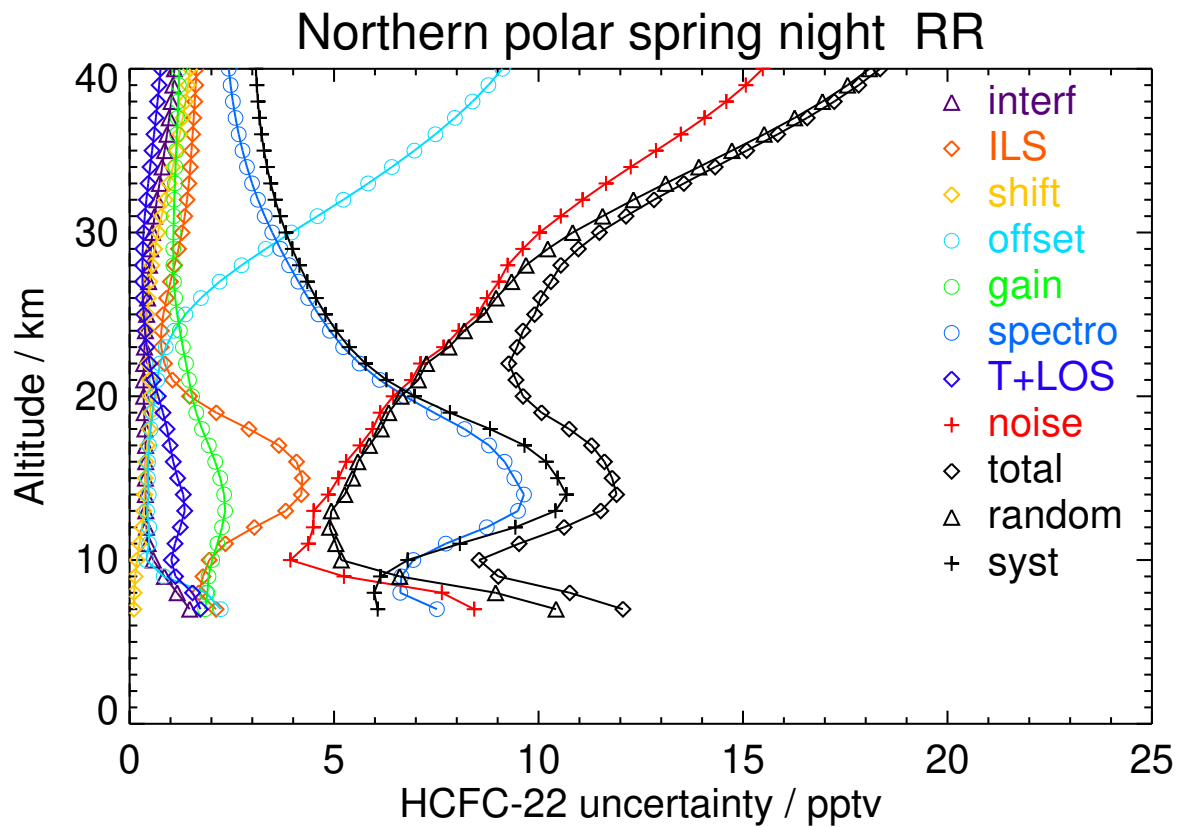
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	186.69	1.03	1.11	0.09	1.31	1.75	6.11	1.29	6.44	7.25	5.91	9.35
11	176.06	0.42	2.50	0.23	0.47	2.29	8.00	1.15	4.37	4.69	8.62	9.82
14	162.11	0.38	3.95	0.34	0.45	2.33	9.66	1.26	4.87	5.17	10.65	11.84
17	137.51	0.39	2.92	0.42	0.45	1.84	8.13	0.91	5.67	5.87	8.78	10.56
20	122.76	0.35	1.33	0.51	0.57	1.74	6.13	0.59	6.55	6.75	6.39	9.29
23	114.29	0.36	0.86	0.42	0.82	1.51	5.13	0.37	7.74	7.87	5.34	9.51
26	103.43	0.44	0.87	0.44	1.69	1.22	4.47	0.32	8.81	9.02	4.68	10.16
29	92.70	0.52	1.16	0.59	3.28	1.11	3.84	0.32	9.72	10.31	4.12	11.10
32	83.28	0.68	1.43	0.85	5.18	1.10	3.28	0.41	11.23	12.44	3.69	12.97
35	76.00	0.87	1.58	1.13	6.92	1.11	2.86	0.56	13.01	14.83	3.38	15.21
38	70.56	1.04	1.68	1.36	8.33	1.14	2.57	0.69	14.72	17.03	3.19	17.32
41	66.56	1.15	1.76	1.51	9.36	1.16	2.39	0.79	15.97	18.64	3.09	18.89



**Figure S37.** V8R\_F-22\_261 Northern polar spring day

**Table S39.** HCFC-22 error budget for Northern polar spring night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	190.11	1.16	1.70	0.11	1.87	1.90	6.62	1.54	7.64	8.95	5.98	10.76
11	179.80	0.45	2.34	0.24	0.47	2.15	7.73	1.11	4.37	5.04	8.08	9.52
14	166.96	0.39	4.20	0.37	0.47	2.31	9.64	1.31	4.86	5.26	10.68	11.91
17	147.91	0.39	3.65	0.44	0.48	1.94	8.79	0.99	5.63	5.86	9.66	11.30
20	125.21	0.34	1.47	0.51	0.62	1.53	6.73	0.70	6.44	6.64	6.97	9.62
23	112.82	0.36	0.77	0.43	0.89	1.30	5.22	0.42	7.68	7.81	5.37	9.48
26	103.86	0.44	0.90	0.45	1.74	1.11	4.37	0.33	8.74	8.96	4.56	10.05
29	94.46	0.52	1.20	0.61	3.33	1.07	3.69	0.32	9.61	10.23	3.98	10.97
32	86.58	0.67	1.40	0.87	5.23	1.09	3.14	0.41	11.08	12.32	3.56	12.82
35	80.82	0.86	1.51	1.15	6.96	1.14	2.76	0.55	12.87	14.73	3.29	15.09
38	75.89	1.02	1.59	1.37	8.39	1.19	2.52	0.68	14.59	16.94	3.14	17.23
41	72.20	1.13	1.66	1.52	9.42	1.23	2.38	0.78	15.84	18.55	3.07	18.80

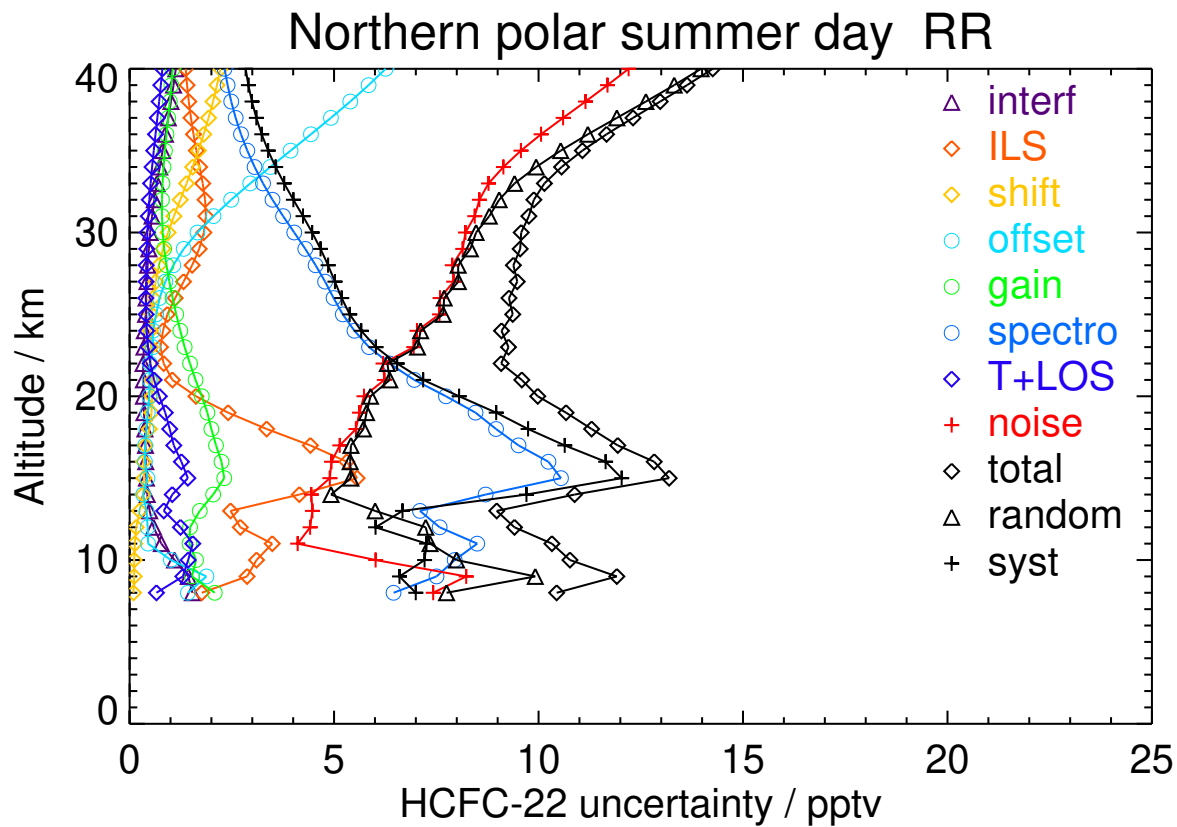


**Figure S38.** V8R\_F-22\_261 Northern polar spring night



**Table S40.** HCFC-22 error budget for Northern polar summer day. All uncertainties are  $1\sigma$ .

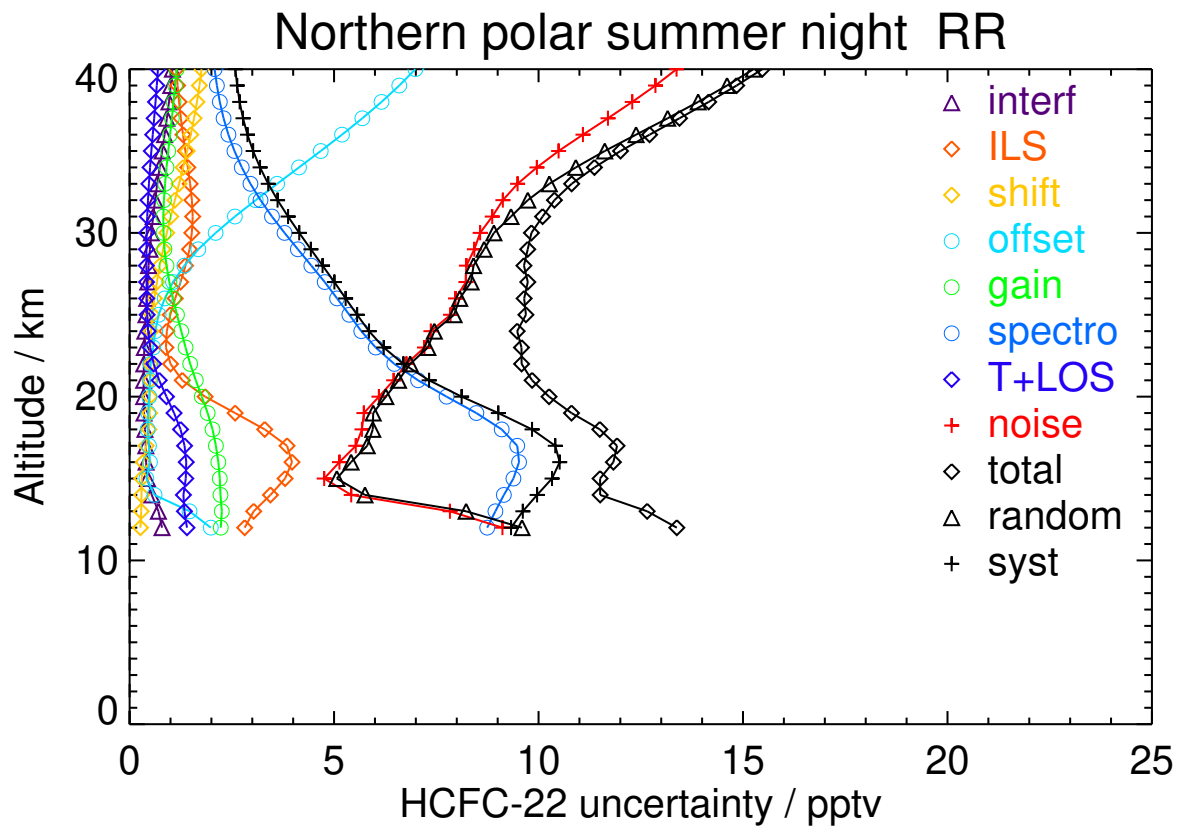
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	215.54	1.54	1.76	0.10	1.42	2.08	6.45	0.66	7.42	7.75	7.00	10.44
11	193.92	0.78	3.49	0.13	0.45	1.46	8.50	1.55	4.11	7.35	7.26	10.33
14	183.26	0.43	4.15	0.33	0.33	2.04	8.71	1.04	4.44	4.92	9.70	10.88
17	167.10	0.39	4.42	0.39	0.38	2.11	9.51	1.08	5.14	5.41	10.64	11.94
20	141.69	0.34	1.62	0.55	0.49	1.77	7.74	0.73	5.73	5.89	8.06	9.98
23	122.95	0.35	0.76	0.52	0.57	1.35	5.86	0.45	6.95	7.04	6.02	9.27
26	115.56	0.40	1.12	0.57	0.73	1.05	4.99	0.40	7.59	7.69	5.19	9.28
29	103.86	0.47	1.70	0.82	1.32	0.84	4.30	0.42	8.15	8.33	4.67	9.55
32	91.00	0.60	1.85	1.24	2.48	0.79	3.49	0.48	8.55	9.04	4.00	9.88
35	80.79	0.81	1.63	1.68	3.94	0.86	2.88	0.59	9.57	10.54	3.39	11.07
38	73.13	1.01	1.45	2.04	5.40	0.98	2.49	0.72	11.15	12.63	2.99	12.97
41	67.33	1.18	1.34	2.29	6.64	1.09	2.26	0.84	12.68	14.58	2.78	14.84



**Figure S39.** V8R\_F-22\_261 Northern polar summer day

**Table S41.** HCFC-22 error budget for Northern polar summer night. All uncertainties are  $1\sigma$ .

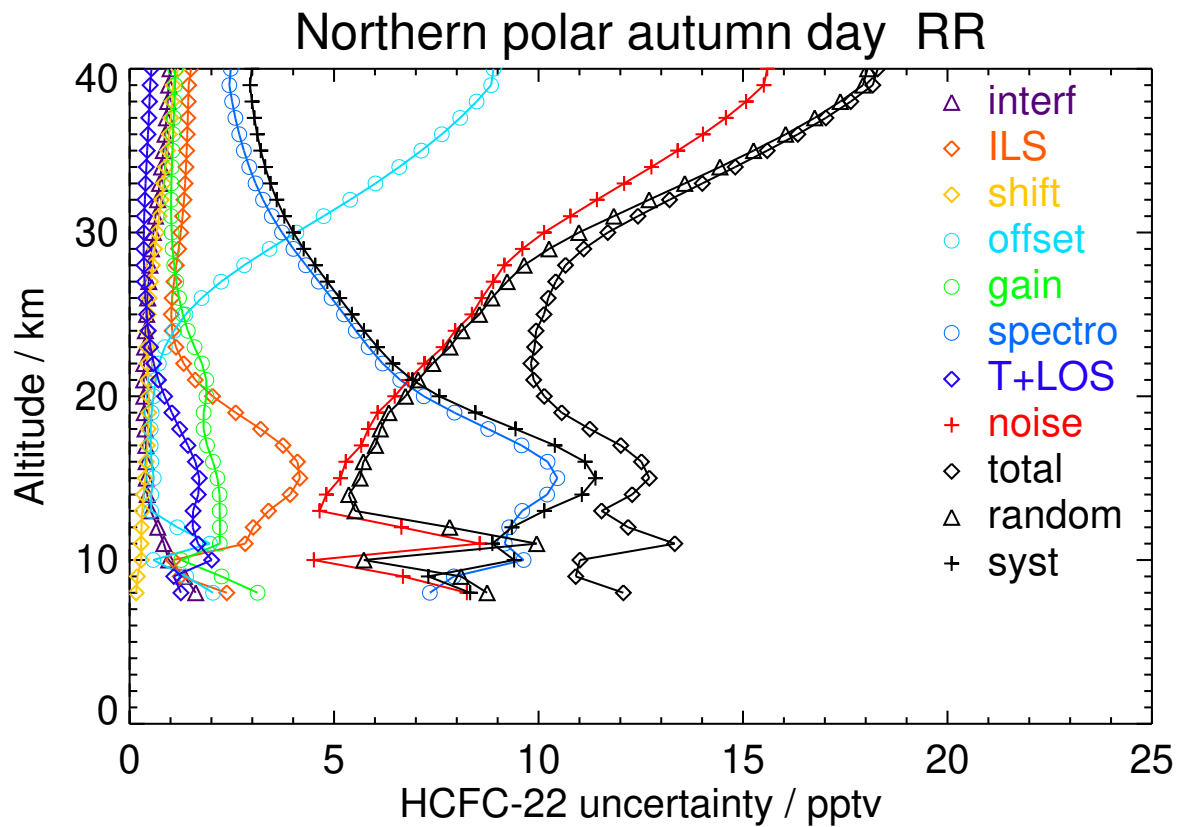
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
14	184.73	0.54	3.44	0.29	0.61	2.22	9.15	1.32	5.42	5.76	9.96	11.51
17	165.18	0.40	3.85	0.41	0.47	2.11	9.48	1.34	5.53	5.81	10.41	11.92
20	140.38	0.34	1.85	0.50	0.48	1.77	7.75	0.90	6.10	6.27	8.12	10.26
23	122.50	0.36	0.89	0.51	0.58	1.37	6.02	0.50	7.21	7.29	6.22	9.58
26	111.09	0.42	1.12	0.61	0.86	1.06	5.07	0.42	7.97	8.07	5.28	9.65
29	95.80	0.50	1.47	0.82	1.68	0.85	4.11	0.41	8.43	8.67	4.43	9.73
32	80.40	0.62	1.52	1.11	3.08	0.84	3.20	0.45	9.13	9.74	3.62	10.39
35	71.13	0.80	1.36	1.41	4.67	0.94	2.56	0.53	10.49	11.62	3.02	12.01
38	65.78	0.96	1.21	1.65	6.16	1.08	2.21	0.63	12.29	13.90	2.69	14.16
41	62.41	1.08	1.12	1.80	7.34	1.18	2.04	0.72	13.83	15.82	2.55	16.03



**Figure S40.** V8R\_F-22\_261 Northern polar summer night

**Table S42.** HCFC-22 error budget for Northern polar autumn day. All uncertainties are  $1\sigma$ .

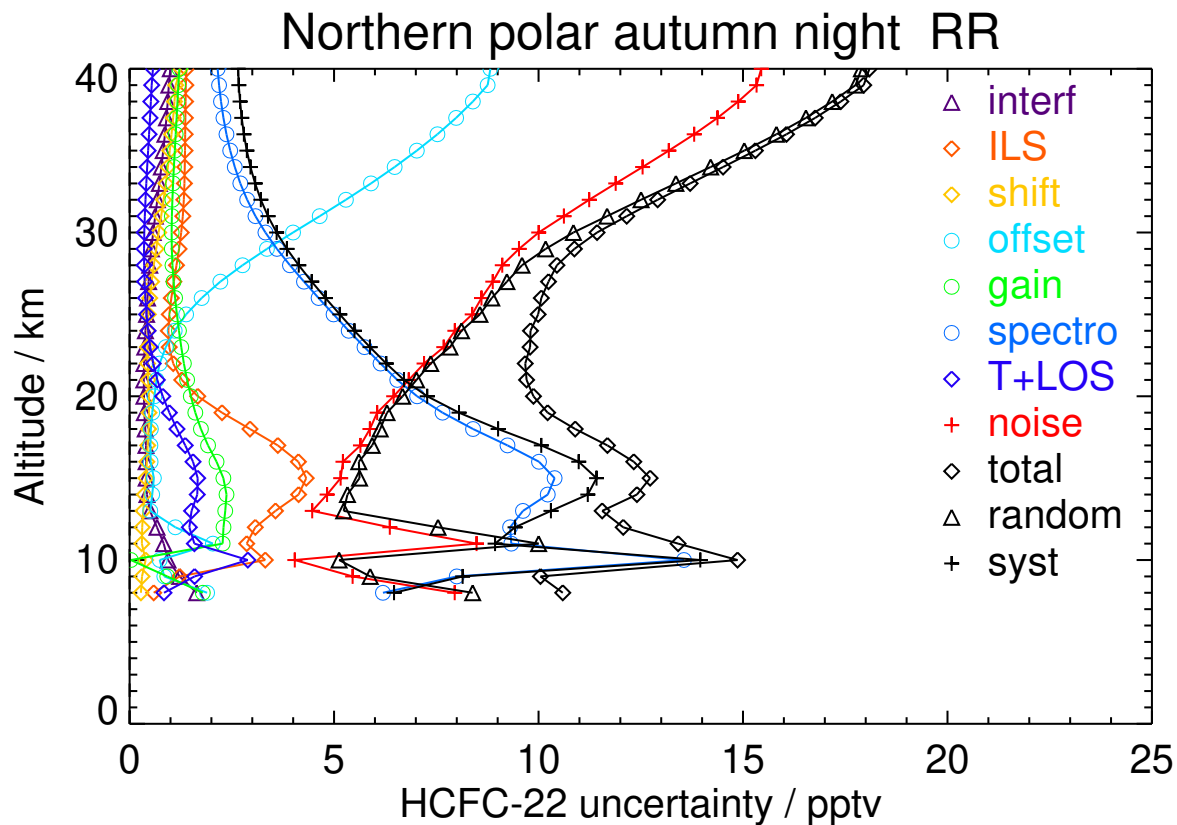
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	219.61	1.62	2.38	0.16	2.04	3.13	7.34	1.25	8.25	8.74	8.33	12.07
11	193.56	0.84	2.83	0.28	1.97	2.20	9.17	1.67	8.56	9.95	8.87	13.33
14	183.19	0.43	3.92	0.34	0.53	2.20	10.21	1.68	4.81	5.36	11.06	12.29
17	153.77	0.40	3.75	0.44	0.52	1.89	9.58	1.43	5.66	6.01	10.40	12.01
20	130.85	0.35	2.03	0.47	0.59	1.88	7.19	0.85	6.48	6.74	7.57	10.14
23	117.48	0.37	1.13	0.43	0.86	1.59	5.84	0.51	7.67	7.83	6.06	9.90
26	102.15	0.44	1.04	0.48	1.76	1.21	4.94	0.39	8.61	8.85	5.14	10.24
29	86.29	0.54	1.20	0.61	3.42	1.05	4.01	0.34	9.60	10.26	4.26	11.10
32	75.09	0.68	1.33	0.78	5.39	1.02	3.26	0.37	11.43	12.70	3.60	13.20
35	69.80	0.83	1.40	0.93	7.13	1.05	2.79	0.43	13.40	15.26	3.21	15.59
38	67.54	0.93	1.43	1.04	8.49	1.10	2.51	0.49	15.08	17.38	2.99	17.63
41	67.14	1.03	1.54	1.33	8.88	1.08	2.37	0.57	15.60	18.06	2.89	18.29



**Figure S41.** V8R\_F-22\_261 Northern polar autumn day

**Table S43.** HCFC-22 error budget for Northern polar autumn night. All uncertainties are  $1\sigma$ .

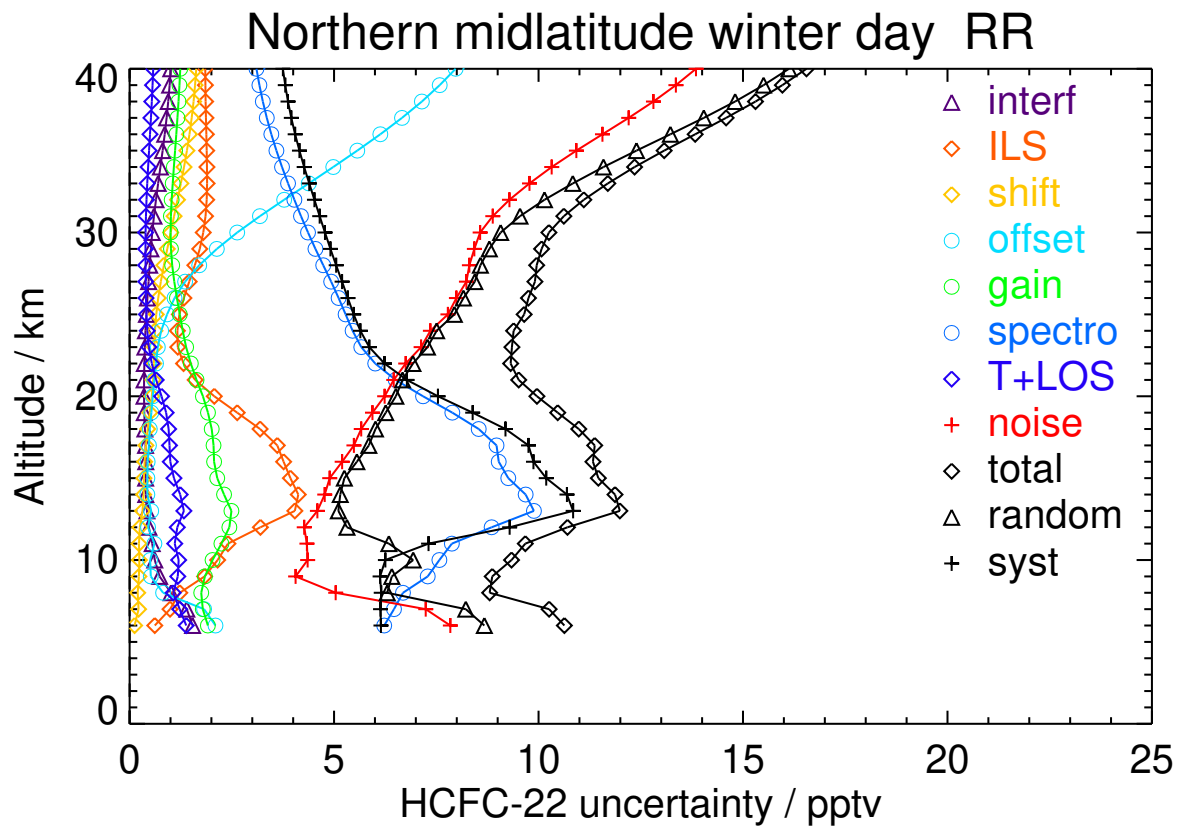
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	206.96	1.64	0.59	0.28	1.90	1.79	6.20	0.84	7.95	8.39	6.47	10.59
11	190.03	0.83	2.86	0.30	2.04	2.28	9.33	1.58	8.48	10.00	8.94	13.41
14	180.12	0.43	4.13	0.36	0.55	2.37	10.23	1.66	4.83	5.33	11.20	12.41
17	150.06	0.40	3.62	0.44	0.51	1.92	9.24	1.36	5.64	5.93	10.07	11.68
20	130.15	0.35	1.67	0.47	0.61	1.50	7.03	0.81	6.46	6.68	7.28	9.87
23	112.24	0.37	0.97	0.44	0.89	1.26	5.74	0.51	7.68	7.83	5.88	9.79
26	96.81	0.44	1.02	0.49	1.76	1.11	4.62	0.39	8.60	8.86	4.79	10.07
29	82.77	0.53	1.21	0.65	3.36	1.03	3.60	0.35	9.52	10.17	3.85	10.88
32	72.43	0.68	1.33	0.83	5.29	1.05	2.87	0.39	11.24	12.51	3.21	12.91
35	66.11	0.82	1.35	0.98	7.02	1.10	2.46	0.45	13.19	15.03	2.87	15.30
38	61.72	0.93	1.37	1.10	8.39	1.17	2.24	0.52	14.88	17.18	2.70	17.39
41	61.80	1.03	1.42	1.37	8.87	1.26	2.23	0.61	15.54	18.02	2.72	18.22



**Figure S42.** V8R\_F-22\_261 Northern polar autumn night

**Table S44.** HCFC-22 error budget for Northern midlatitude winter day. All uncertainties are  $1\sigma$ .

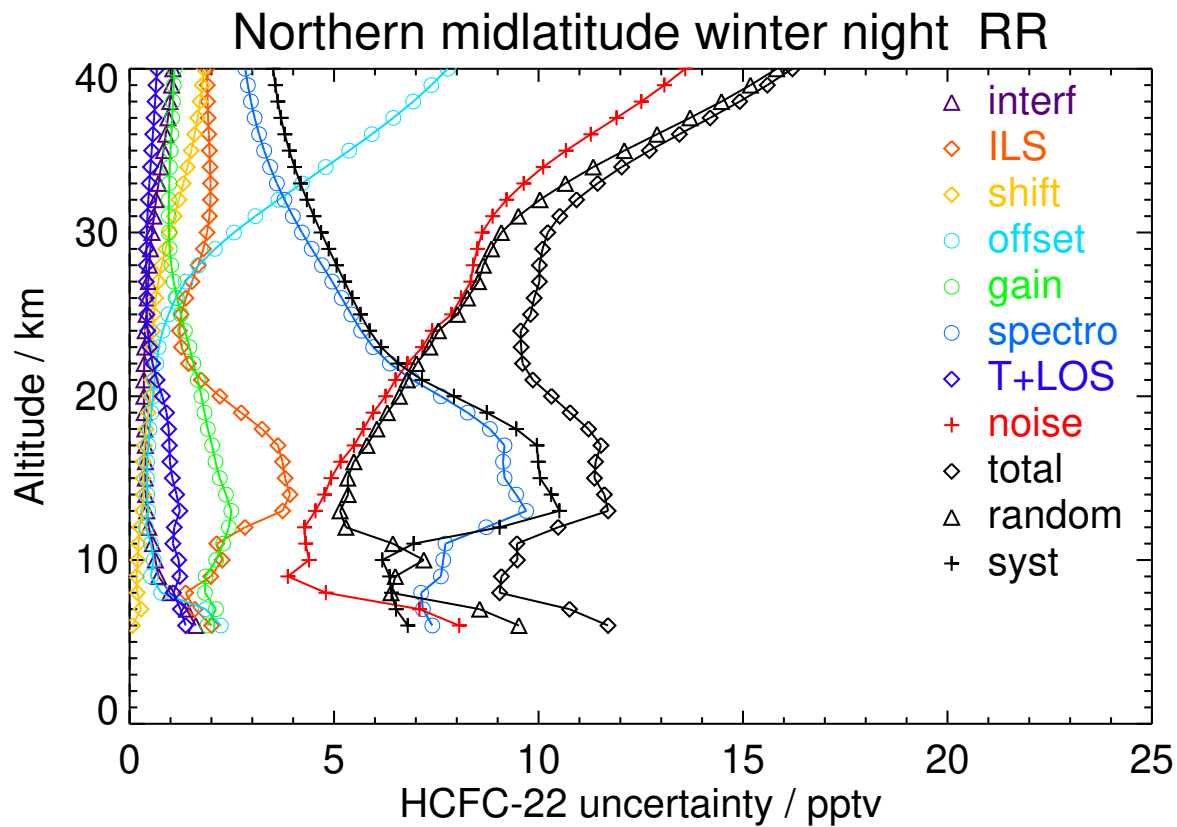
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	201.10	1.01	1.23	0.20	0.82	1.75	6.68	1.07	5.04	6.30	6.15	8.80
11	192.07	0.55	2.40	0.23	0.61	2.24	7.88	1.10	4.33	6.34	7.31	9.68
14	173.55	0.39	4.12	0.34	0.43	2.31	9.68	1.24	4.77	5.15	10.69	11.87
17	159.24	0.39	3.61	0.40	0.47	2.05	8.97	0.98	5.49	5.85	9.75	11.37
20	136.71	0.35	2.07	0.54	0.57	1.79	7.18	0.78	6.24	6.51	7.54	9.96
23	130.43	0.37	1.18	0.61	0.69	1.38	5.67	0.47	7.13	7.28	5.86	9.35
26	122.55	0.44	1.33	0.70	1.10	1.16	5.11	0.40	7.99	8.16	5.34	9.75
29	116.09	0.52	1.71	0.92	2.13	1.01	4.54	0.39	8.43	8.80	4.91	10.07
32	107.69	0.64	1.89	1.17	3.78	1.03	4.03	0.41	9.29	10.15	4.52	11.11
35	96.61	0.81	1.89	1.40	5.57	1.11	3.59	0.48	10.92	12.39	4.15	13.07
38	87.78	0.95	1.86	1.56	7.15	1.20	3.26	0.54	12.81	14.81	3.87	15.31
41	82.00	1.03	1.85	1.65	8.31	1.25	3.04	0.59	14.27	16.65	3.70	17.06



**Figure S43.** V8R\_F-22\_261 Northern midlatitude winter day

**Table S45.** HCFC-22 error budget for Northern midlatitude winter night. All uncertainties are  $1\sigma$ .

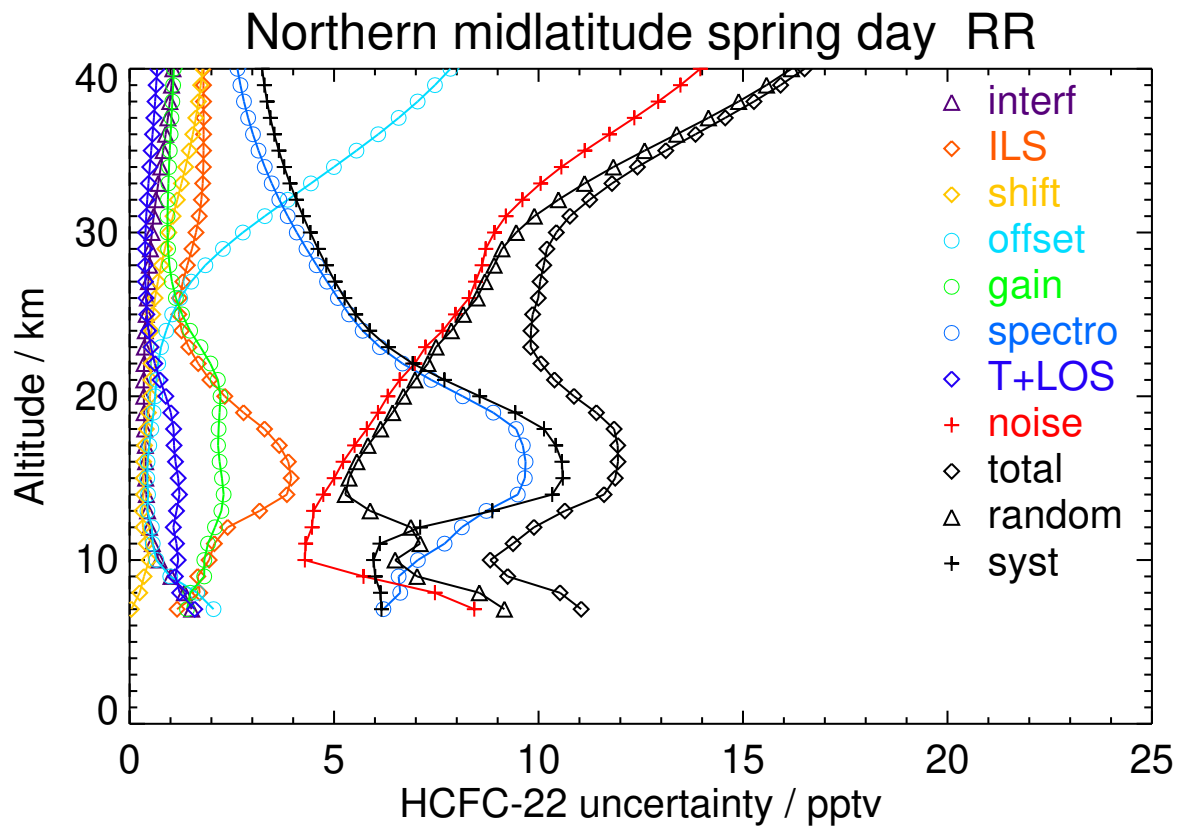
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	202.04	0.99	1.37	0.19	0.77	1.84	7.13	1.07	4.80	6.39	6.40	9.05
11	190.25	0.56	2.13	0.22	0.52	2.29	7.72	1.06	4.30	6.44	6.95	9.47
14	176.96	0.39	3.92	0.34	0.43	2.36	9.45	1.15	4.77	5.34	10.31	11.61
17	160.83	0.39	3.63	0.36	0.46	2.02	9.17	0.97	5.49	5.80	9.96	11.53
20	139.00	0.35	2.21	0.51	0.57	1.76	7.61	0.80	6.26	6.60	7.93	10.32
23	130.12	0.37	1.27	0.56	0.71	1.46	5.95	0.49	7.16	7.34	6.15	9.57
26	123.15	0.43	1.38	0.64	1.12	1.16	5.19	0.41	8.11	8.26	5.45	9.89
29	112.21	0.51	1.80	0.88	2.09	0.98	4.45	0.41	8.51	8.85	4.87	10.10
32	101.87	0.65	1.98	1.21	3.64	0.96	3.79	0.46	9.22	10.03	4.34	10.93
35	93.88	0.83	1.95	1.51	5.37	1.00	3.29	0.54	10.67	12.10	3.90	12.71
38	88.18	0.98	1.91	1.72	6.94	1.06	2.97	0.62	12.51	14.47	3.62	14.92
41	84.43	1.09	1.89	1.84	8.13	1.11	2.77	0.68	14.03	16.38	3.47	16.74



**Figure S44.** V8R\_F-22\_261 Northern midlatitude winter night

**Table S46.** HCFC-22 error budget for Northern midlatitude spring day. All uncertainties are  $1\sigma$ .

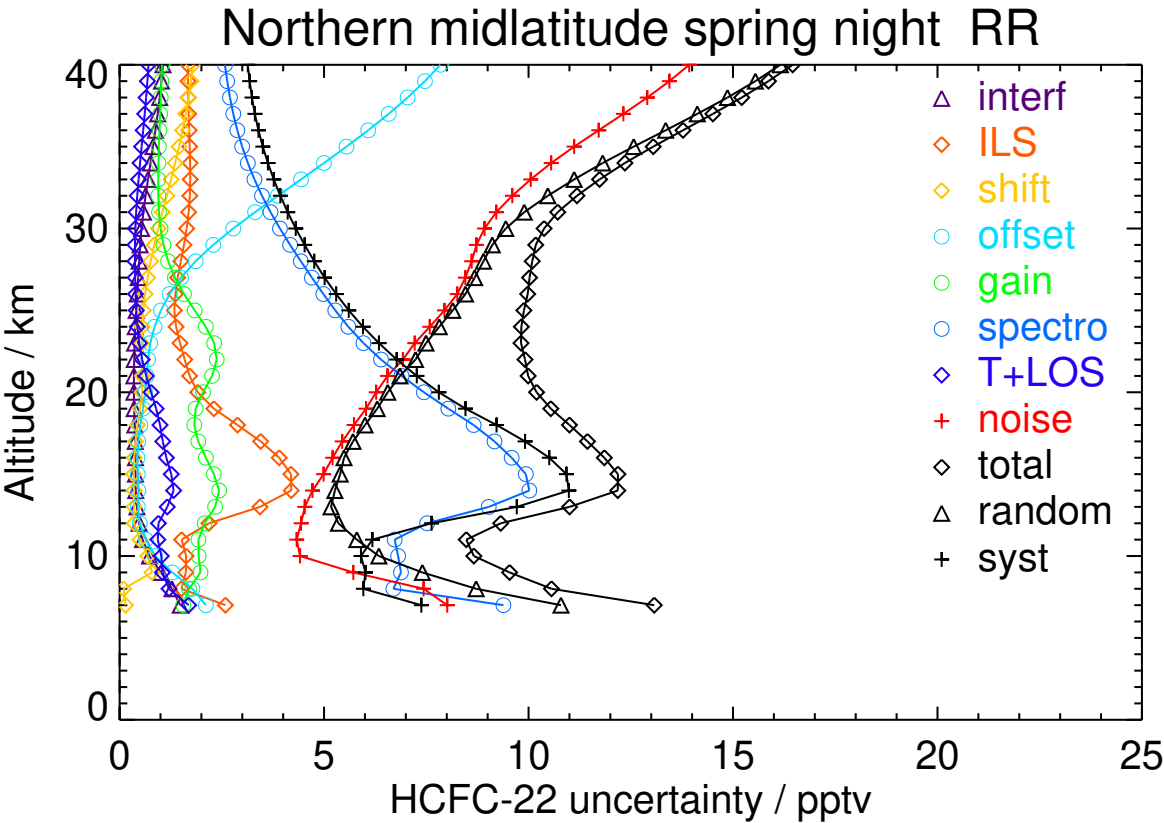
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	195.60	1.34	1.71	0.25	1.65	1.48	6.62	1.22	7.47	8.55	6.13	10.52
11	188.40	0.56	2.07	0.40	0.57	1.92	7.70	1.15	4.30	7.10	6.12	9.38
14	179.93	0.41	3.85	0.34	0.45	2.30	9.49	1.22	4.74	5.27	10.33	11.60
17	166.36	0.39	3.66	0.36	0.48	2.16	9.62	1.09	5.50	5.83	10.42	11.94
20	138.97	0.35	2.33	0.50	0.62	2.22	8.14	0.89	6.31	6.70	8.56	10.87
23	122.90	0.36	1.45	0.52	0.77	1.73	6.12	0.52	7.24	7.49	6.33	9.81
26	115.79	0.44	1.22	0.62	1.24	1.13	5.09	0.40	8.30	8.50	5.26	9.99
29	107.07	0.51	1.52	0.86	2.28	0.94	4.33	0.38	8.71	9.10	4.61	10.20
32	94.74	0.64	1.76	1.17	3.87	0.94	3.66	0.43	9.61	10.49	4.08	11.25
35	83.87	0.82	1.81	1.46	5.55	0.98	3.15	0.53	11.13	12.59	3.65	13.11
38	75.39	0.98	1.81	1.68	7.04	1.04	2.80	0.62	12.93	14.89	3.36	15.27
41	69.70	1.09	1.81	1.82	8.18	1.10	2.58	0.69	14.38	16.72	3.20	17.02



**Figure S45.** V8R\_F-22\_261 Northern midlatitude spring day

**Table S47.** HCFC-22 error budget for Northern midlatitude spring night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	194.26	1.28	1.51	0.10	1.78	1.70	6.70	1.21	7.43	8.72	5.96	10.56
11	189.20	0.56	1.52	0.50	0.64	1.93	6.73	0.93	4.33	5.80	6.18	8.48
14	178.02	0.39	4.20	0.35	0.46	2.43	10.02	1.32	4.72	5.26	10.99	12.18
17	156.66	0.38	3.45	0.39	0.46	1.92	9.17	1.06	5.44	5.71	9.92	11.44
20	137.40	0.35	1.91	0.55	0.62	2.04	7.44	0.77	6.27	6.56	7.81	10.20
23	123.42	0.37	1.48	0.54	0.75	2.31	5.96	0.48	7.22	7.49	6.34	9.82
26	115.91	0.43	1.36	0.62	1.22	1.57	4.98	0.39	8.26	8.46	5.30	9.98
29	106.74	0.50	1.57	0.85	2.29	1.07	4.17	0.38	8.73	9.11	4.52	10.18
32	95.97	0.64	1.72	1.15	3.87	0.95	3.48	0.43	9.60	10.47	3.93	11.18
35	85.98	0.82	1.71	1.45	5.55	0.96	3.00	0.54	11.12	12.57	3.50	13.05
38	78.96	0.98	1.68	1.69	7.04	1.01	2.70	0.65	12.90	14.87	3.24	15.21
41	74.55	1.09	1.67	1.83	8.18	1.05	2.53	0.73	14.35	16.69	3.10	16.98

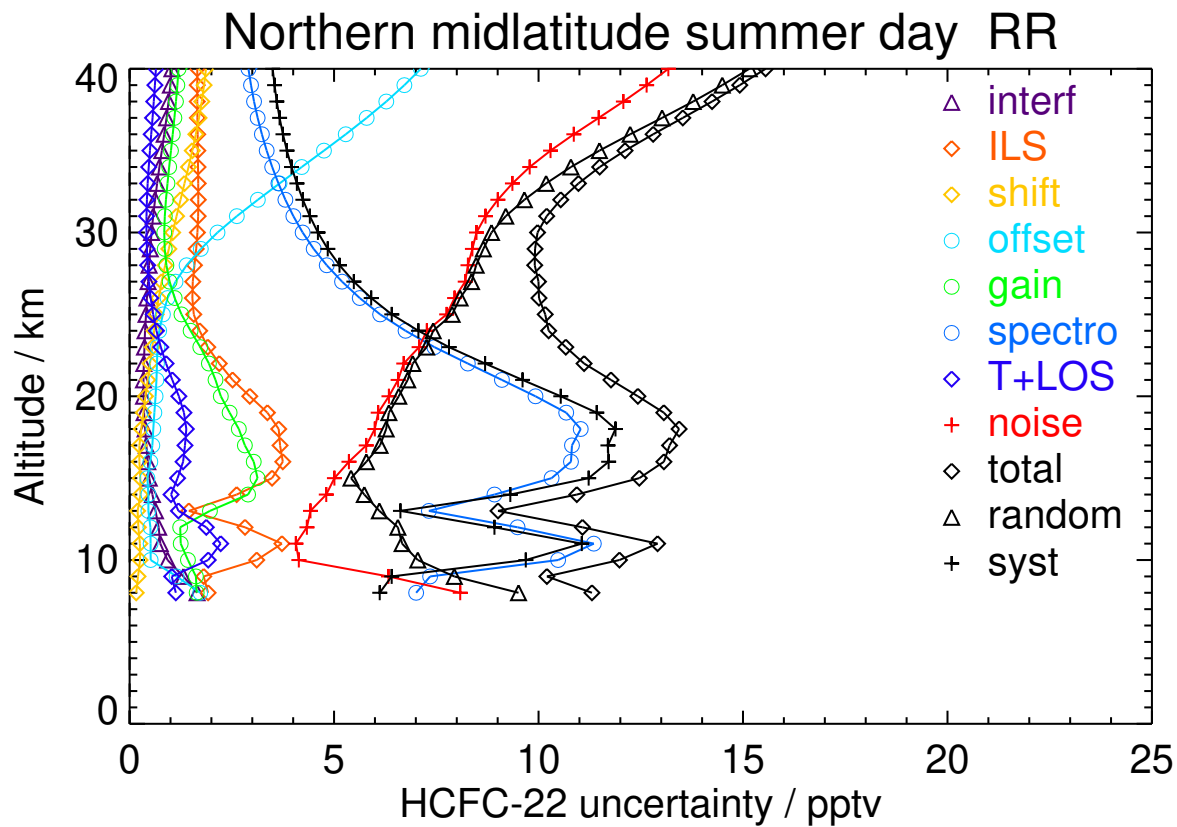


**Figure S46.** V8R\_F-22\_261 Northern midlatitude spring night



**Table S48.** HCFC-22 error budget for Northern midlatitude summer day. All uncertainties are  $1\sigma$ .

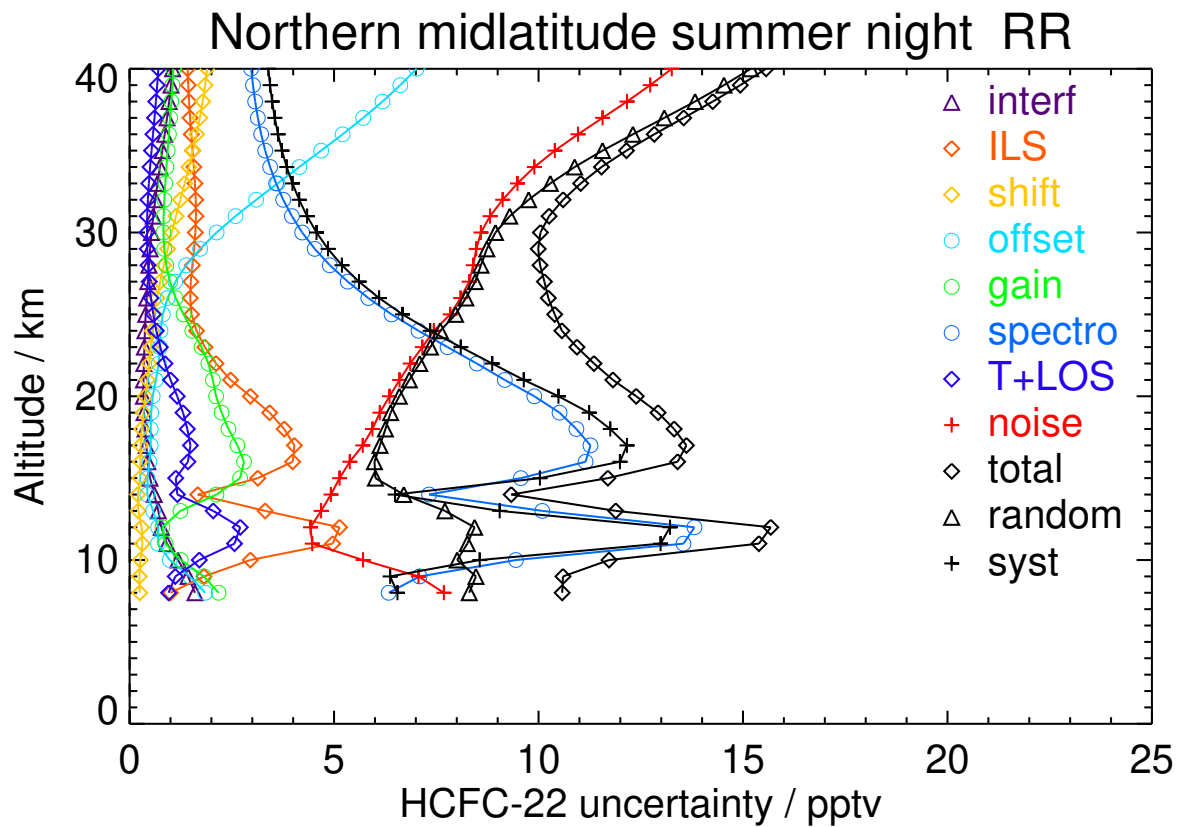
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	202.45	1.65	1.92	0.16	1.73	1.64	7.01	1.13	8.08	9.51	6.12	11.31
11	205.53	0.75	3.73	0.25	0.51	1.25	11.35	2.23	4.07	6.66	11.06	12.91
14	212.33	0.56	2.62	0.26	0.46	2.90	8.92	1.01	4.81	5.74	9.31	10.94
17	194.55	0.41	3.68	0.24	0.56	2.82	10.82	1.35	5.79	6.12	11.70	13.20
20	160.10	0.34	2.94	0.39	0.64	2.23	9.92	1.21	6.34	6.58	10.54	12.43
23	134.29	0.36	1.91	0.56	0.68	1.73	7.45	0.76	7.08	7.26	7.81	10.67
26	121.83	0.42	1.54	0.71	0.93	1.10	5.63	0.51	7.95	8.08	5.91	10.01
29	114.39	0.50	1.63	0.96	1.74	0.86	4.50	0.42	8.38	8.65	4.85	9.91
32	105.75	0.62	1.68	1.25	3.14	0.89	3.81	0.42	9.00	9.65	4.24	10.54
35	97.53	0.79	1.67	1.53	4.75	1.01	3.35	0.50	10.29	11.49	3.85	12.12
38	91.57	0.95	1.66	1.76	6.28	1.13	3.04	0.59	12.07	13.78	3.60	14.24
41	87.56	1.07	1.66	1.91	7.48	1.22	2.85	0.66	13.64	15.74	3.46	16.11



**Figure S47.** V8R\_F-22\_261 Northern midlatitude summer day

**Table S49.** HCFC-22 error budget for Northern midlatitude summer night. All uncertainties are  $1\sigma$ .

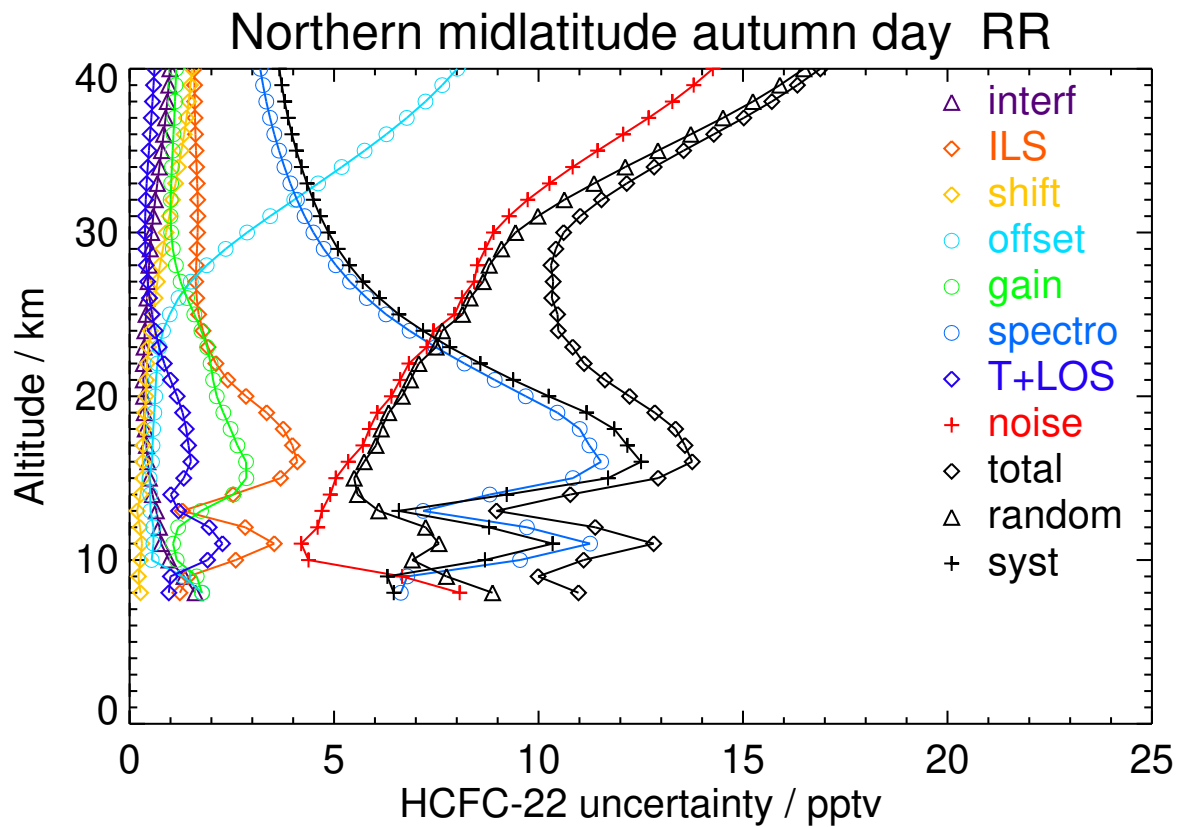
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	210.95	1.60	1.00	0.25	1.85	2.17	6.34	0.95	7.69	8.30	6.55	10.58
11	206.33	0.91	4.97	0.31	0.69	0.88	13.54	2.57	4.47	8.26	12.98	15.39
14	206.40	0.60	1.67	0.20	0.43	2.12	7.32	1.17	4.92	6.70	6.49	9.33
17	189.57	0.41	4.03	0.27	0.51	2.64	11.27	1.49	5.70	6.12	12.16	13.62
20	159.97	0.34	2.95	0.39	0.56	2.11	9.90	1.16	6.36	6.59	10.49	12.39
23	136.58	0.36	1.84	0.52	0.74	1.76	7.78	0.75	7.16	7.36	8.10	10.94
26	122.39	0.42	1.48	0.67	0.93	1.13	5.84	0.52	8.09	8.22	6.10	10.24
29	113.53	0.50	1.58	0.93	1.72	0.85	4.53	0.43	8.48	8.74	4.85	9.99
32	106.67	0.63	1.62	1.24	3.09	0.85	3.76	0.45	9.12	9.76	4.15	10.60
35	101.42	0.80	1.54	1.55	4.68	0.93	3.32	0.54	10.40	11.56	3.72	12.15
38	97.94	0.97	1.45	1.79	6.18	1.02	3.07	0.64	12.16	13.83	3.48	14.26
41	95.55	1.08	1.41	1.94	7.37	1.09	2.93	0.73	13.72	15.77	3.36	16.12



**Figure S48.** V8R\_F-22\_261 Northern midlatitude summer night

**Table S50.** HCFC-22 error budget for Northern midlatitude autumn day. All uncertainties are  $1\sigma$ .

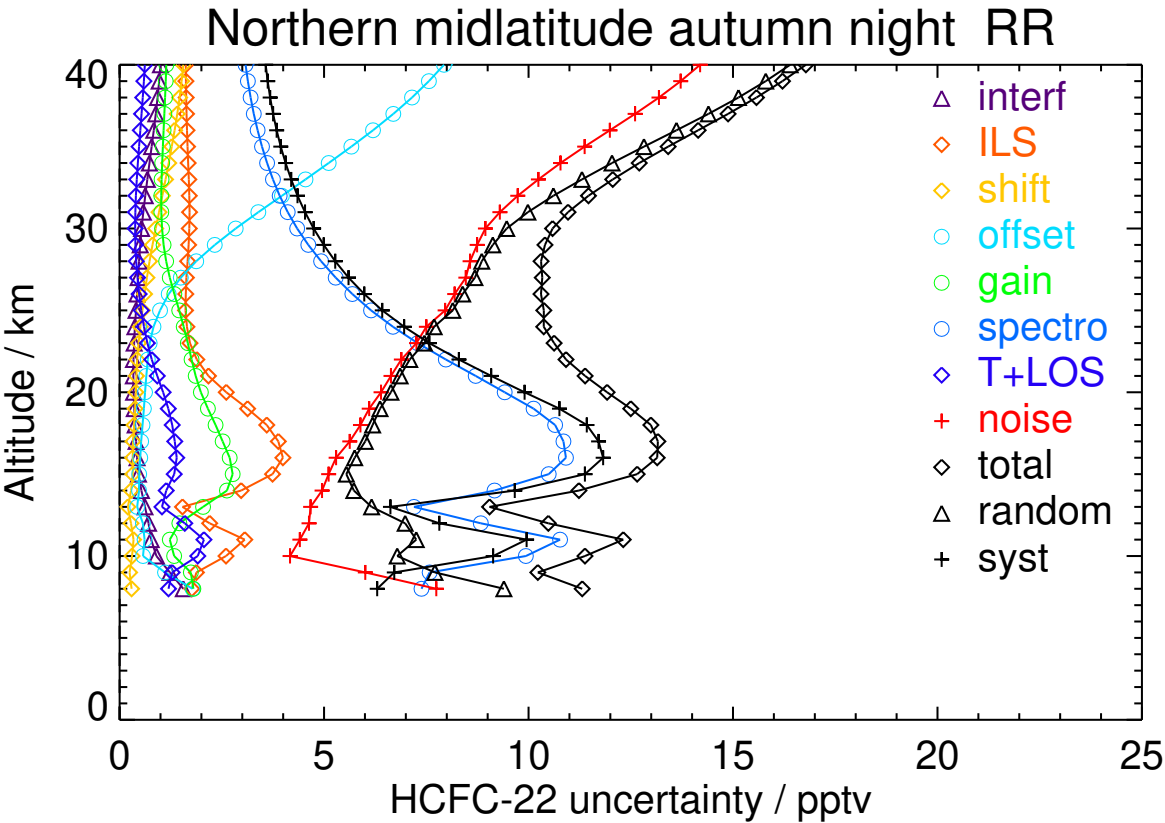
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	202.92	1.60	1.23	0.27	1.78	1.77	6.63	0.96	8.07	8.87	6.46	10.98
11	209.55	0.77	3.54	0.30	0.58	1.06	11.26	2.27	4.20	7.56	10.34	12.82
14	210.45	0.56	2.53	0.27	0.50	2.54	8.81	1.01	4.91	5.57	9.22	10.78
17	190.00	0.41	3.98	0.32	0.56	2.64	11.24	1.44	5.70	6.02	12.17	13.58
20	158.09	0.34	2.84	0.40	0.63	2.13	9.69	1.16	6.40	6.67	10.25	12.23
23	133.51	0.36	1.92	0.46	0.73	1.90	7.48	0.72	7.27	7.49	7.83	10.83
26	122.54	0.43	1.64	0.62	1.20	1.41	5.80	0.49	8.13	8.32	6.11	10.32
29	115.27	0.50	1.65	0.82	2.35	1.06	4.75	0.39	8.70	9.09	5.09	10.42
32	108.39	0.63	1.66	1.05	4.03	1.00	4.09	0.40	9.73	10.63	4.49	11.54
35	101.33	0.78	1.62	1.27	5.75	1.05	3.65	0.47	11.44	12.92	4.08	13.55
38	95.29	0.92	1.59	1.44	7.23	1.11	3.34	0.56	13.27	15.24	3.79	15.70
41	90.80	1.01	1.58	1.56	8.33	1.15	3.13	0.63	14.66	17.00	3.61	17.37



**Figure S49.** V8R\_F-22\_261 Northern midlatitude autumn day

**Table S51.** HCFC-22 error budget for Northern midlatitude autumn night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	201.24	1.56	1.77	0.29	1.78	1.80	7.38	1.20	7.74	9.40	6.30	11.31
11	209.82	0.77	3.06	0.34	0.61	1.23	10.77	2.06	4.41	7.25	9.95	12.32
14	205.04	0.53	2.97	0.28	0.48	2.62	9.17	1.14	4.95	5.73	9.66	11.23
17	183.24	0.40	3.88	0.33	0.53	2.52	10.85	1.35	5.63	6.01	11.71	13.16
20	153.65	0.34	2.61	0.40	0.62	1.99	9.42	1.07	6.39	6.63	9.90	11.92
23	131.09	0.36	1.72	0.46	0.74	1.67	7.29	0.68	7.26	7.45	7.57	10.63
26	121.61	0.43	1.62	0.61	1.20	1.34	5.69	0.48	8.19	8.39	5.98	10.30
29	113.60	0.50	1.69	0.80	2.33	1.08	4.61	0.39	8.74	9.13	4.99	10.40
32	106.70	0.63	1.70	1.04	3.97	1.02	3.91	0.40	9.74	10.61	4.35	11.47
35	101.73	0.78	1.66	1.28	5.67	1.06	3.48	0.48	11.37	12.82	3.94	13.41
38	97.91	0.93	1.63	1.47	7.15	1.11	3.20	0.57	13.19	15.13	3.68	15.57
41	95.11	1.03	1.62	1.59	8.26	1.15	3.03	0.64	14.60	16.91	3.53	17.28



**Figure S50.** V8R\_F-22\_261 Northern midlatitude autumn night

Table S52. HCFC-22 error budget for Tropics day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
11	191.96	1.10	1.95	0.15	1.15	1.43	7.93	1.69	6.35	7.93	7.18	10.70
14	198.68	0.60	1.33	0.21	0.52	2.02	6.68	1.27	5.00	6.25	6.22	8.82
17	195.16	0.44	3.23	0.21	0.66	2.38	10.28	1.65	6.20	6.67	10.91	12.79
20	178.49	0.36	3.00	0.33	0.70	1.85	10.00	1.35	6.77	7.04	10.55	12.68
23	162.51	0.36	2.27	0.47	0.74	1.58	8.57	0.92	7.26	7.45	8.94	11.64
26	153.18	0.43	2.28	0.70	1.04	1.29	7.30	0.68	8.03	8.24	7.68	11.26
29	143.44	0.52	2.48	1.03	1.92	1.09	6.16	0.58	8.53	8.89	6.66	11.10
32	131.23	0.64	2.37	1.36	3.37	1.14	5.21	0.55	9.13	9.89	5.78	11.46
35	120.28	0.82	2.10	1.67	5.01	1.25	4.51	0.61	10.45	11.77	5.08	12.82
38	110.91	0.98	1.88	1.90	6.54	1.34	4.03	0.69	12.12	13.97	4.59	14.70
41	103.82	1.09	1.77	2.04	7.76	1.41	3.72	0.76	13.59	15.85	4.29	16.42

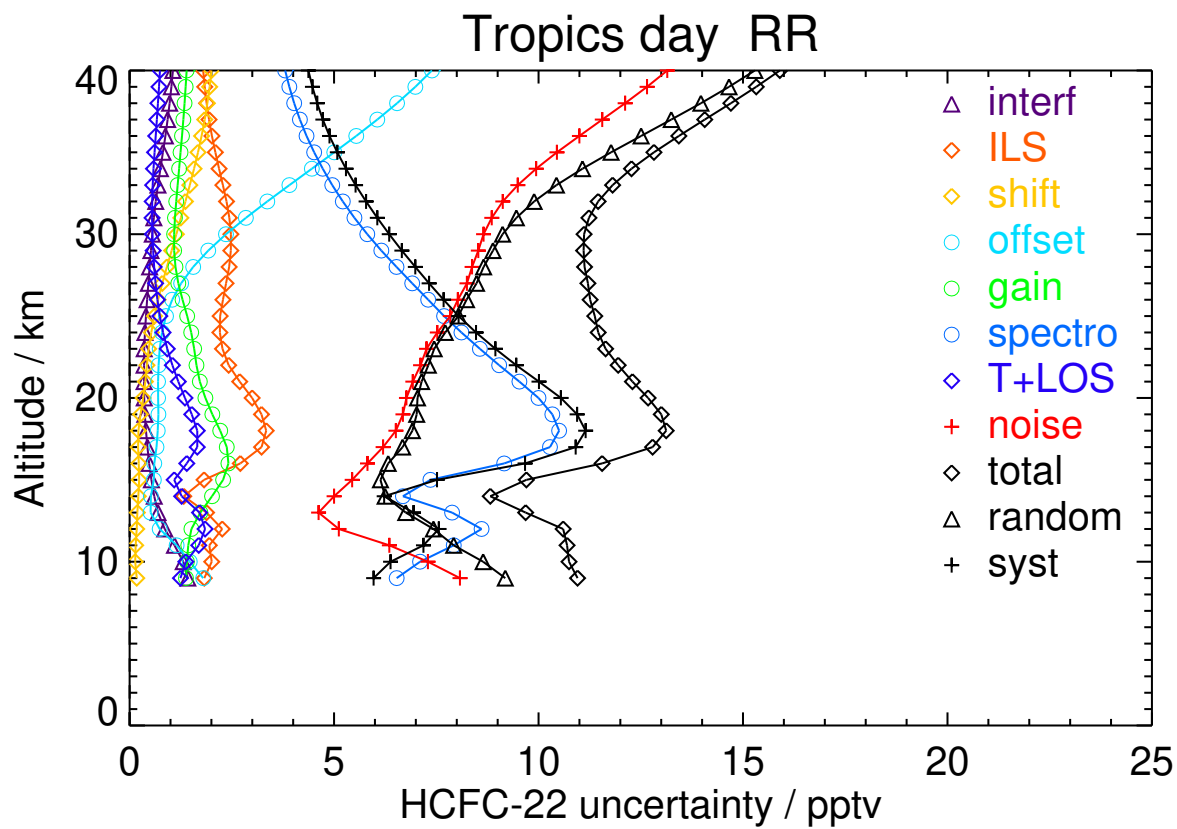


Figure S51. V8R\_F-22\_261 Tropics day

Table S53. HCFC-22 error budget for Tropics night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
11	190.04	1.14	3.08	0.18	1.10	1.18	9.54	2.20	6.41	8.72	8.61	12.26
14	202.58	0.63	1.18	0.17	0.53	1.76	6.53	1.54	5.17	6.00	6.40	8.77
17	196.29	0.44	3.24	0.19	0.65	2.59	10.53	1.80	6.39	6.91	11.19	13.15
20	174.03	0.36	3.02	0.27	0.68	2.01	9.97	1.44	6.98	7.26	10.56	12.81
23	157.99	0.36	2.22	0.44	0.68	1.54	8.33	0.97	7.45	7.64	8.70	11.57
26	148.27	0.44	2.12	0.69	1.00	1.22	6.99	0.69	8.17	8.35	7.35	11.13
29	139.97	0.53	2.23	0.99	1.90	1.08	5.90	0.56	8.67	9.00	6.35	11.02
32	131.18	0.66	2.13	1.31	3.35	1.14	5.03	0.54	9.39	10.11	5.54	11.53
35	120.42	0.83	1.88	1.58	4.97	1.26	4.39	0.60	10.79	12.04	4.90	13.00
38	110.81	0.98	1.68	1.79	6.47	1.37	3.93	0.68	12.44	14.20	4.45	14.88
41	103.74	1.09	1.59	1.92	7.66	1.45	3.64	0.75	13.88	16.03	4.18	16.57

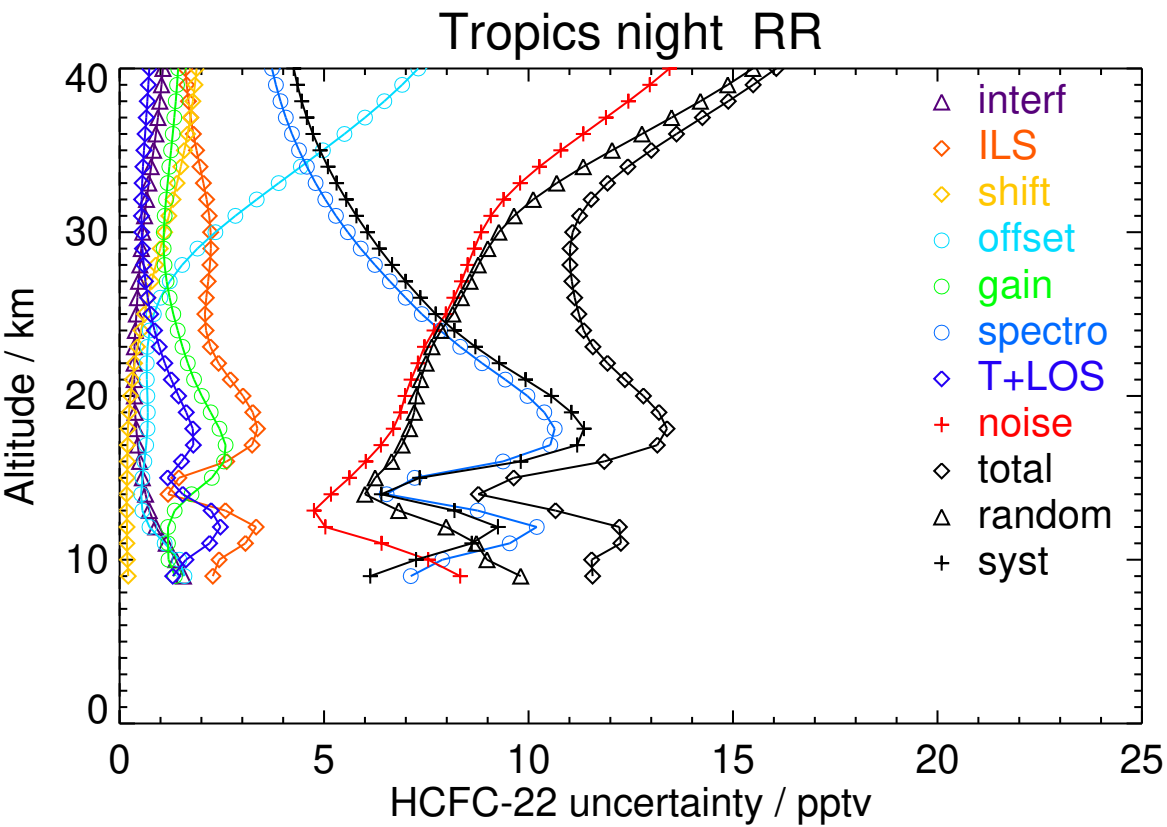
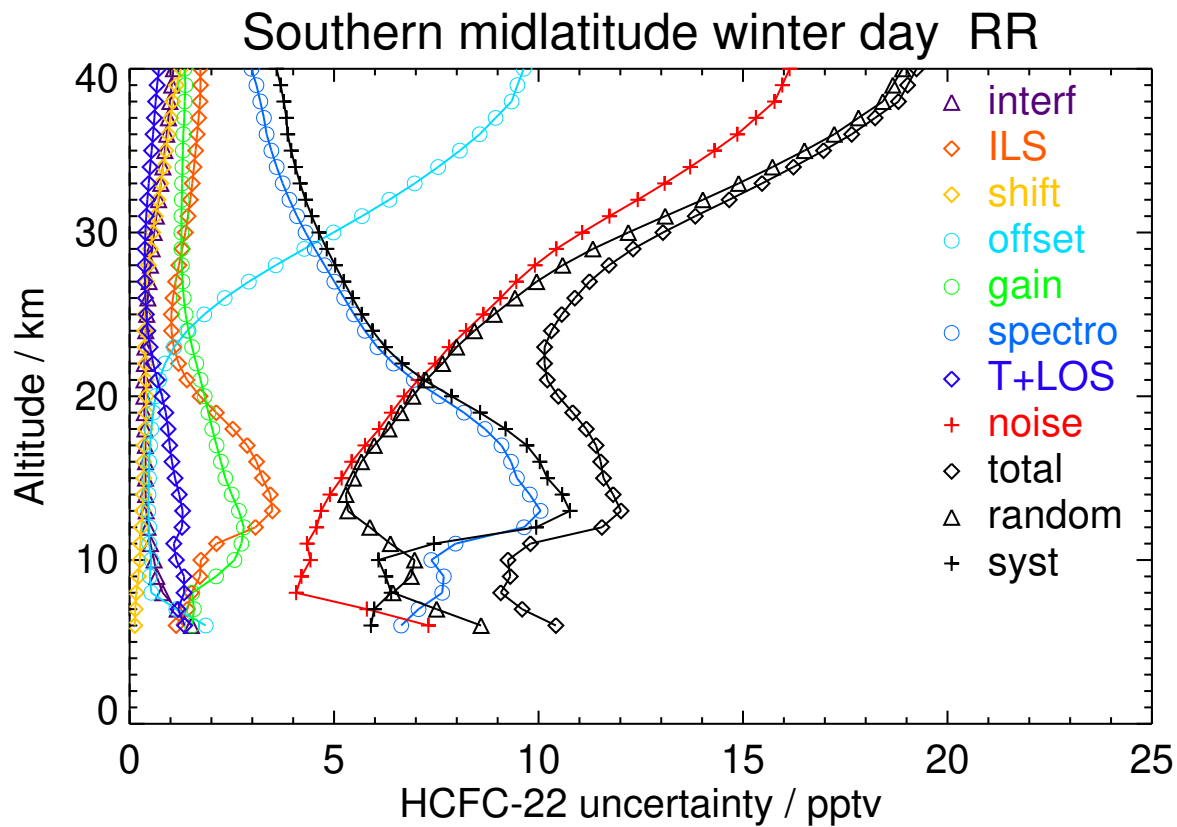


Figure S52. V8R\_F-22\_261 Tropics night

**Table S54.** HCFC-22 error budget for Southern midlatitude winter day. All uncertainties are  $1\sigma$ .

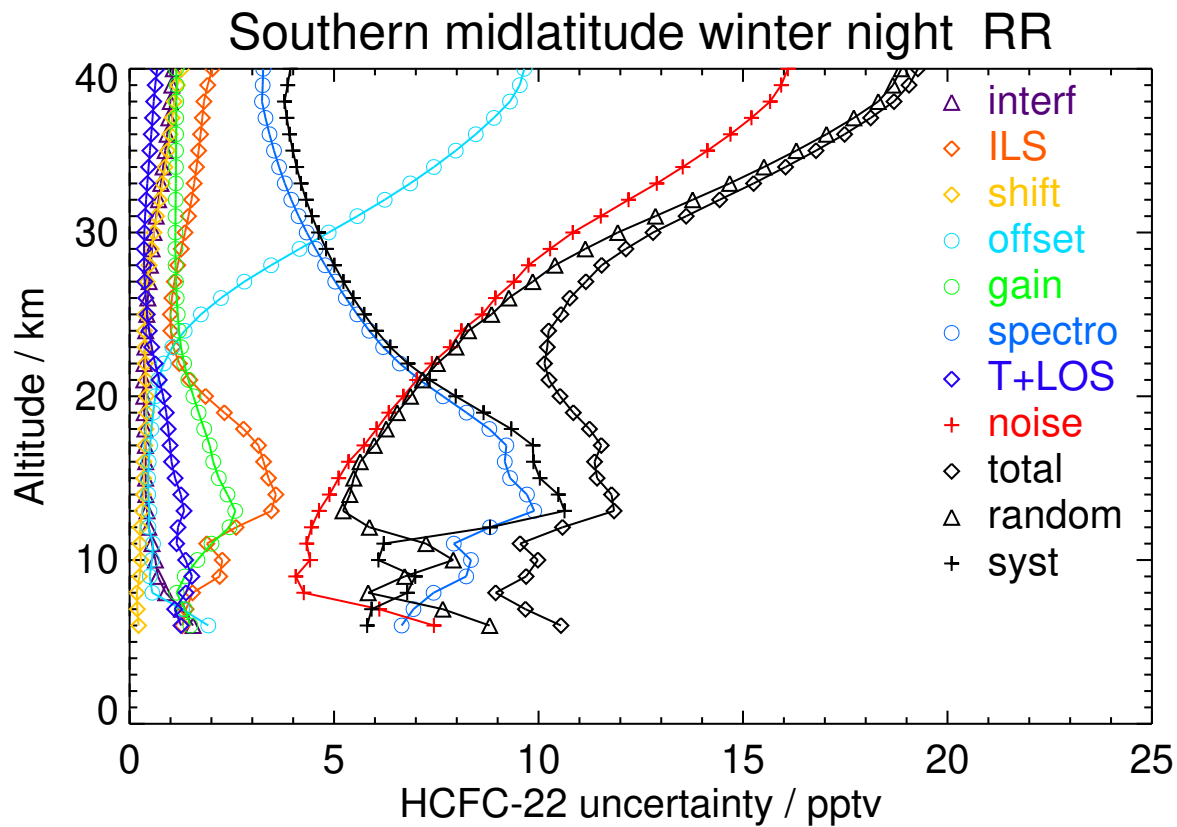
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	187.25	0.81	1.51	0.16	0.53	1.53	7.64	1.33	4.07	6.44	6.40	9.08
11	188.38	0.51	2.13	0.26	0.48	2.73	7.97	1.08	4.34	6.38	7.44	9.80
14	173.87	0.39	3.44	0.34	0.46	2.50	9.79	1.21	4.90	5.29	10.58	11.82
17	154.27	0.39	2.87	0.35	0.50	2.13	9.09	0.98	5.76	5.98	9.71	11.41
20	134.16	0.35	1.72	0.41	0.63	1.84	7.57	0.79	6.71	6.92	7.87	10.48
23	123.88	0.37	1.08	0.38	1.09	1.53	6.06	0.50	7.81	7.99	6.25	10.15
26	117.05	0.45	1.06	0.39	2.33	1.32	5.25	0.39	9.07	9.42	5.45	10.89
29	105.36	0.55	1.29	0.51	4.27	1.27	4.53	0.37	10.43	11.33	4.82	12.31
32	96.32	0.71	1.48	0.70	6.35	1.27	3.91	0.44	12.43	14.02	4.30	14.66
35	89.26	0.86	1.61	0.88	8.08	1.30	3.47	0.54	14.30	16.50	3.95	16.97
38	85.64	0.99	1.72	1.05	9.34	1.35	3.20	0.64	15.77	18.42	3.77	18.80
41	84.58	1.09	1.68	1.34	9.67	1.40	2.89	0.73	16.19	18.97	3.53	19.30



**Figure S53.** V8R\_F-22\_261 Southern midlatitude winter day

**Table S55.** HCFC-22 error budget for Southern midlatitude winter night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	190.04	0.88	1.54	0.17	0.55	1.15	7.43	1.38	4.26	5.83	6.79	8.95
11	190.34	0.55	1.89	0.25	0.57	2.00	7.93	1.15	4.33	7.25	6.22	9.55
14	176.82	0.40	3.58	0.34	0.46	2.39	9.72	1.25	4.89	5.38	10.48	11.78
17	159.04	0.39	3.15	0.38	0.50	1.96	9.21	0.99	5.73	5.98	9.86	11.53
20	138.58	0.35	1.86	0.41	0.63	1.56	7.66	0.82	6.69	6.87	7.97	10.52
23	125.30	0.37	1.07	0.38	1.05	1.26	6.20	0.54	7.84	7.98	6.37	10.21
26	114.46	0.45	1.03	0.40	2.23	1.15	5.29	0.39	8.95	9.27	5.47	10.77
29	103.33	0.55	1.27	0.53	4.15	1.12	4.55	0.35	10.28	11.14	4.80	12.13
32	93.10	0.71	1.51	0.73	6.24	1.13	3.95	0.40	12.20	13.77	4.31	14.43
35	86.01	0.87	1.69	0.93	7.98	1.14	3.53	0.50	14.13	16.30	3.99	16.79
38	80.93	1.00	1.82	1.09	9.30	1.14	3.24	0.59	15.66	18.31	3.79	18.69
41	85.09	1.10	2.14	1.38	9.68	1.17	3.36	0.71	16.15	18.94	4.10	19.38

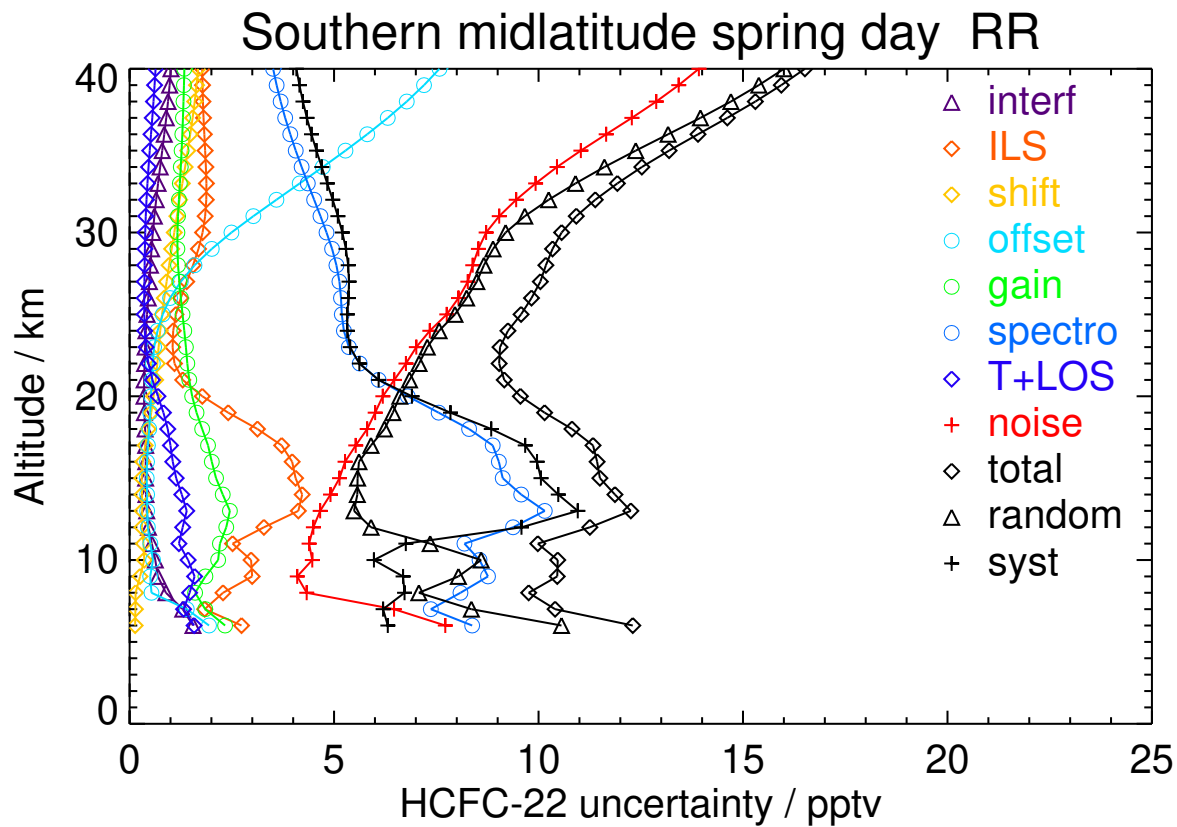


**Figure S54.** V8R\_F-22\_261 Southern midlatitude winter night



**Table S56.** HCFC-22 error budget for Southern midlatitude spring day. All uncertainties are  $1\sigma$ .

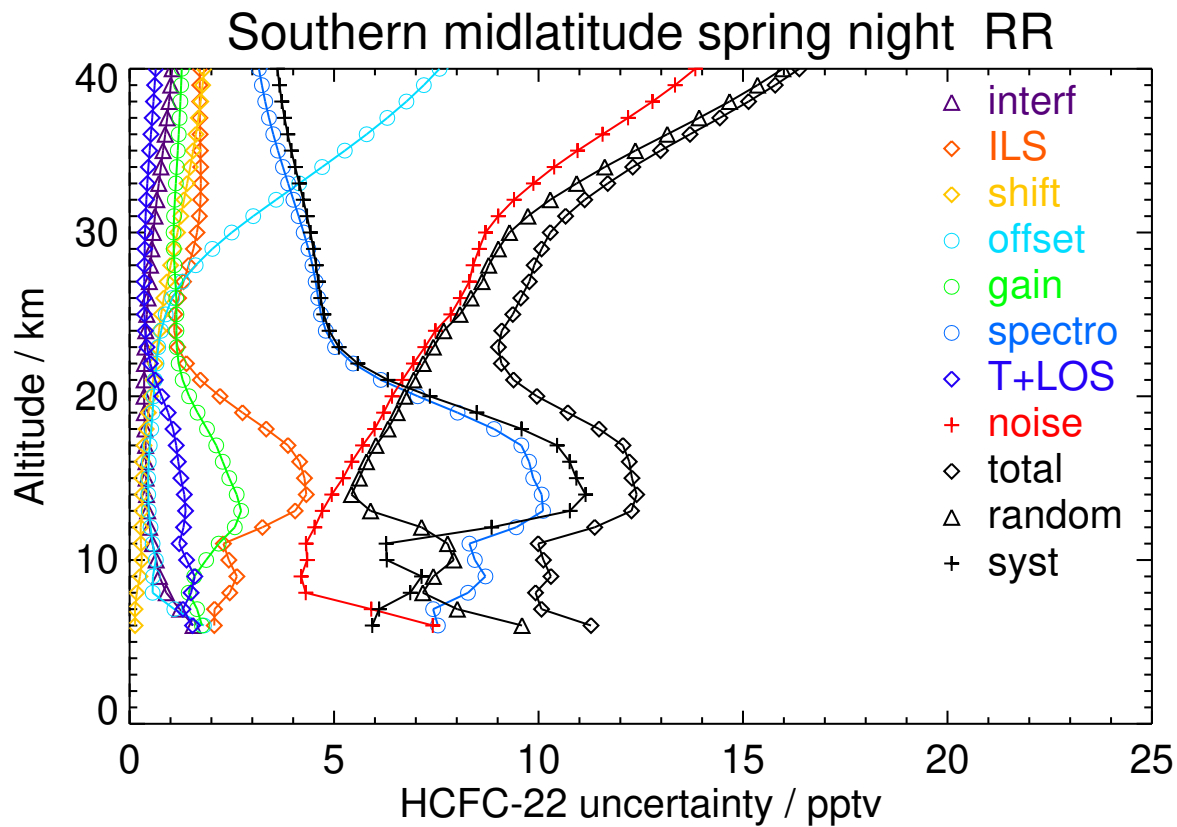
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	192.93	0.89	2.28	0.15	0.53	1.60	8.09	1.47	4.33	7.07	6.72	9.76
11	188.23	0.54	2.52	0.34	0.51	2.21	8.19	1.21	4.39	7.35	6.75	9.98
14	173.82	0.40	4.22	0.30	0.43	2.28	9.58	1.28	4.91	5.57	10.48	11.87
17	151.77	0.39	3.72	0.38	0.45	1.92	8.88	1.00	5.53	5.90	9.67	11.33
20	129.87	0.35	1.78	0.59	0.52	1.53	6.80	0.69	6.19	6.61	6.90	9.56
23	128.67	0.38	1.05	0.71	0.60	1.38	5.36	0.40	7.01	7.28	5.39	9.06
26	133.01	0.46	1.25	0.85	0.99	1.25	5.17	0.36	8.04	8.24	5.35	9.83
29	127.78	0.54	1.68	1.03	2.01	1.17	4.95	0.37	8.53	8.89	5.29	10.34
32	116.59	0.65	1.87	1.22	3.59	1.21	4.51	0.41	9.45	10.25	4.97	11.39
35	105.60	0.80	1.85	1.42	5.28	1.27	4.06	0.49	11.03	12.38	4.57	13.19
38	97.70	0.94	1.79	1.59	6.78	1.32	3.69	0.58	12.88	14.70	4.24	15.30
41	92.37	1.04	1.77	1.71	7.91	1.35	3.43	0.66	14.35	16.54	4.02	17.02



**Figure S55.** V8R\_F-22\_261 Southern midlatitude spring day

**Table S57.** HCFC-22 error budget for Southern midlatitude spring night. All uncertainties are  $1\sigma$ .

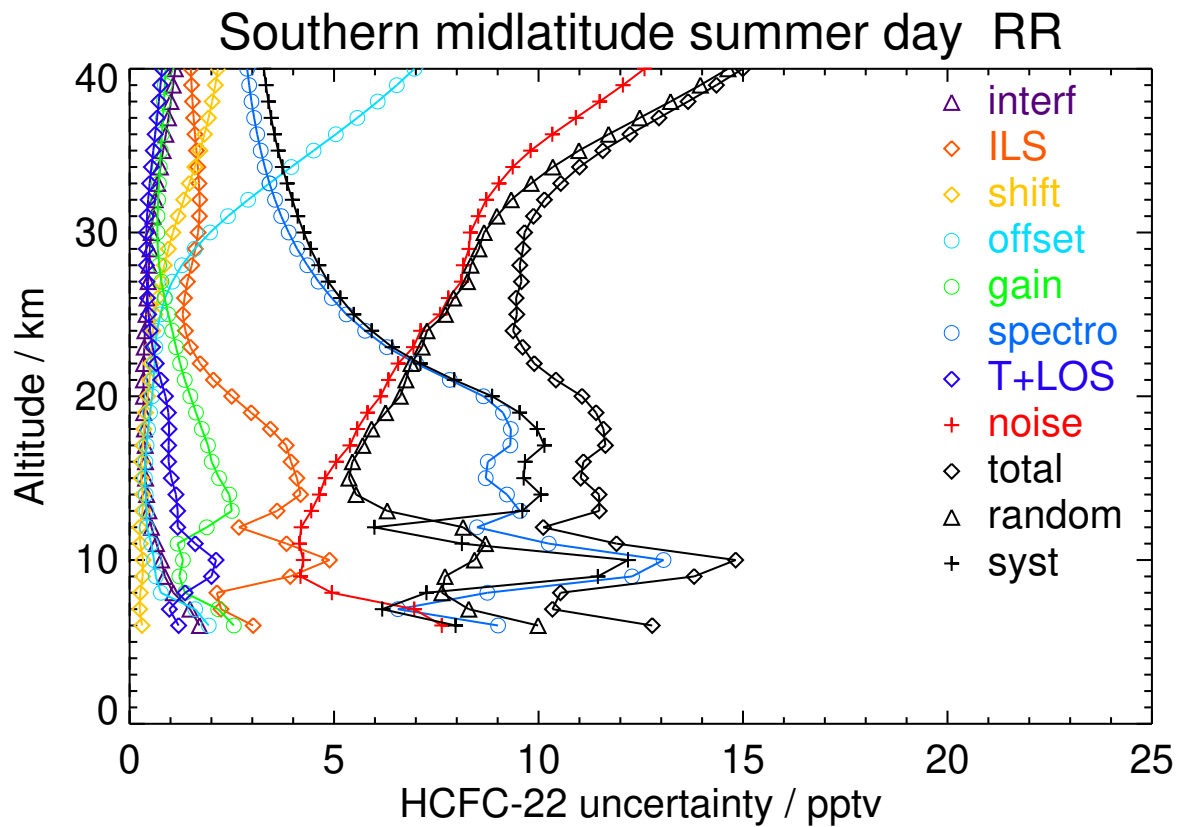
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	194.98	0.90	2.45	0.18	0.56	1.44	8.27	1.50	4.31	7.17	6.86	9.93
11	193.33	0.56	2.29	0.28	0.56	2.18	8.31	1.21	4.31	7.78	6.27	9.99
14	180.97	0.41	4.32	0.31	0.46	2.62	10.08	1.34	4.94	5.43	11.15	12.40
17	151.79	0.39	3.87	0.35	0.49	2.12	9.58	1.14	5.70	6.02	10.45	12.06
20	122.60	0.35	2.21	0.52	0.59	1.46	7.05	0.78	6.42	6.73	7.34	9.96
23	116.78	0.38	1.18	0.68	0.70	1.15	5.02	0.43	7.22	7.43	5.12	9.02
26	119.07	0.45	1.20	0.84	1.04	1.14	4.61	0.36	8.09	8.35	4.67	9.57
29	117.83	0.54	1.56	1.09	2.02	1.08	4.37	0.37	8.55	9.02	4.50	10.07
32	109.57	0.66	1.73	1.33	3.58	1.11	4.01	0.41	9.40	10.29	4.25	11.13
35	99.68	0.82	1.73	1.55	5.26	1.18	3.63	0.49	10.95	12.37	3.95	12.98
38	91.76	0.97	1.72	1.74	6.77	1.24	3.32	0.58	12.79	14.67	3.72	15.14
41	85.91	1.07	1.72	1.86	7.92	1.29	3.10	0.66	14.27	16.51	3.58	16.90



**Figure S56.** V8R\_F-22\_261 Southern midlatitude spring night

**Table S58.** HCFC-22 error budget for Southern midlatitude summer day. All uncertainties are  $1\sigma$ .

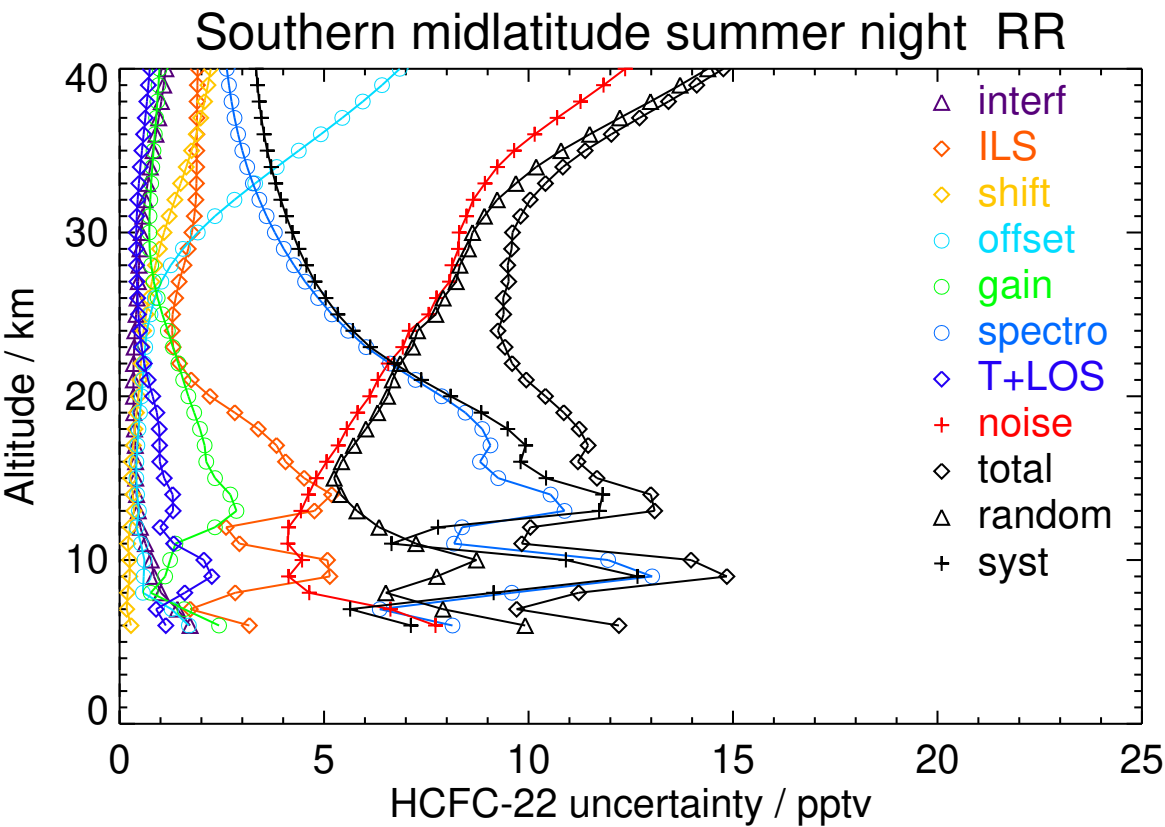
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	183.70	1.07	2.14	0.26	0.76	1.35	8.75	1.36	4.95	7.64	7.26	10.54
11	184.42	0.66	3.84	0.26	0.53	1.17	10.25	1.61	4.15	8.70	8.13	11.91
14	175.12	0.42	4.18	0.32	0.39	2.44	9.23	1.13	4.64	5.54	10.06	11.48
17	163.81	0.38	3.83	0.32	0.42	1.92	9.31	0.95	5.39	5.70	10.14	11.63
20	137.05	0.34	2.50	0.44	0.55	1.49	8.65	0.88	6.14	6.62	8.86	11.06
23	121.32	0.36	1.49	0.54	0.63	1.14	6.29	0.56	6.94	7.15	6.42	9.61
26	112.25	0.43	1.34	0.68	0.87	0.86	4.95	0.44	7.79	7.92	5.15	9.45
29	104.48	0.50	1.61	0.95	1.59	0.69	4.10	0.41	8.30	8.54	4.42	9.62
32	100.98	0.62	1.71	1.32	2.90	0.70	3.56	0.45	8.72	9.33	3.98	10.14
35	97.61	0.82	1.63	1.72	4.50	0.76	3.21	0.58	9.81	10.99	3.63	11.57
38	93.74	1.01	1.54	2.02	6.07	0.84	2.98	0.71	11.49	13.23	3.39	13.66
41	90.12	1.16	1.48	2.21	7.35	0.90	2.83	0.82	13.07	15.24	3.24	15.58



**Figure S57.** V8R\_F-22\_261 Southern midlatitude summer day

**Table S59.** HCFC-22 error budget for Southern midlatitude summer night. All uncertainties are  $1\sigma$ .

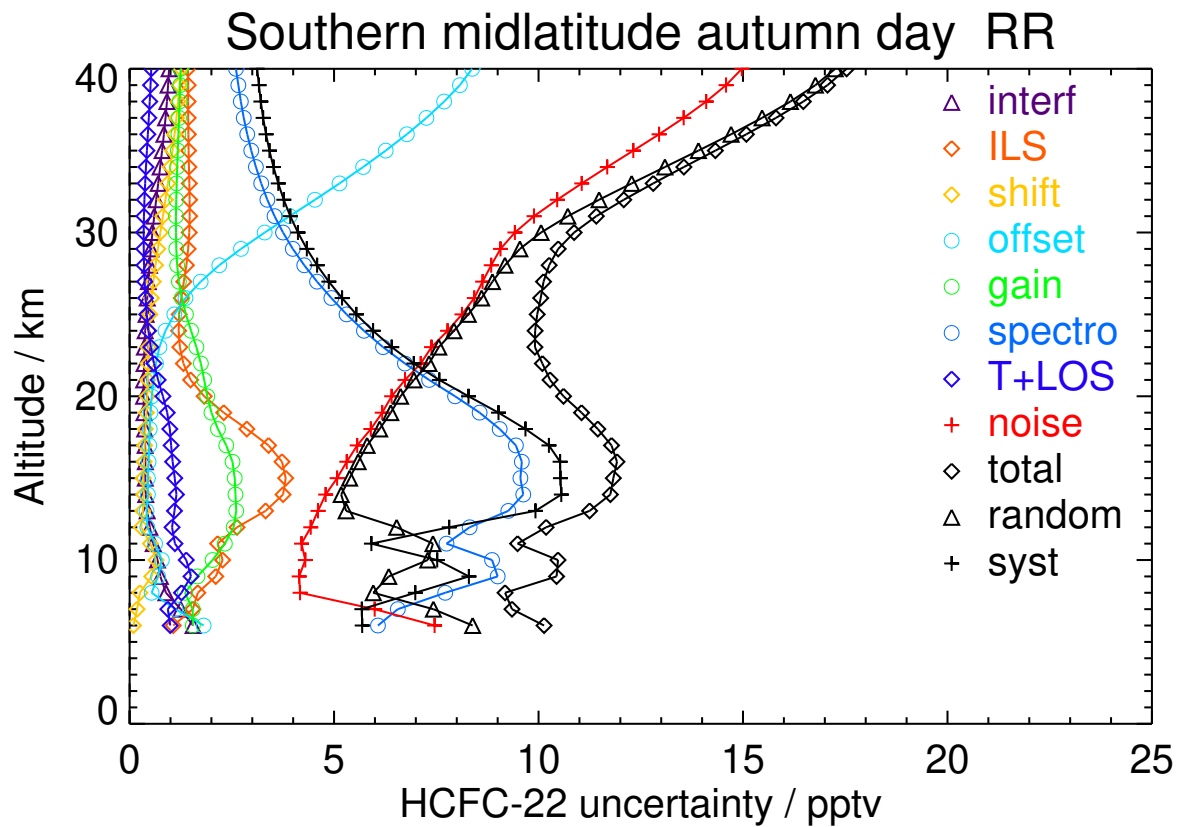
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	183.89	1.01	2.83	0.20	0.57	0.76	9.59	1.59	4.64	6.51	9.15	11.23
11	185.70	0.63	2.93	0.20	0.52	1.37	8.18	1.32	4.11	7.25	6.65	9.83
14	174.42	0.42	5.18	0.33	0.43	2.71	10.54	1.30	4.62	5.41	11.81	12.99
17	157.10	0.38	3.84	0.34	0.44	2.08	9.07	0.98	5.34	5.72	9.93	11.46
20	135.73	0.34	2.21	0.46	0.54	1.68	7.87	0.81	6.12	6.55	8.10	10.41
23	121.06	0.36	1.31	0.55	0.63	1.30	6.03	0.54	6.92	7.16	6.13	9.42
26	113.66	0.43	1.37	0.71	0.86	0.93	4.85	0.44	7.75	7.91	5.04	9.38
29	106.03	0.50	1.68	0.97	1.55	0.73	4.01	0.41	8.29	8.53	4.38	9.59
32	100.68	0.62	1.86	1.35	2.81	0.75	3.42	0.44	8.65	9.23	3.94	10.04
35	94.93	0.82	1.89	1.76	4.38	0.83	3.00	0.55	9.65	10.80	3.61	11.38
38	87.82	1.02	1.90	2.08	5.95	0.92	2.74	0.67	11.27	12.98	3.41	13.42
41	81.71	1.18	1.92	2.29	7.25	1.00	2.58	0.77	12.84	15.00	3.31	15.36



**Figure S58.** V8R\_F-22\_261 Southern midlatitude summer night

**Table S60.** HCFC-22 error budget for Southern midlatitude autumn day. All uncertainties are  $1\sigma$ .

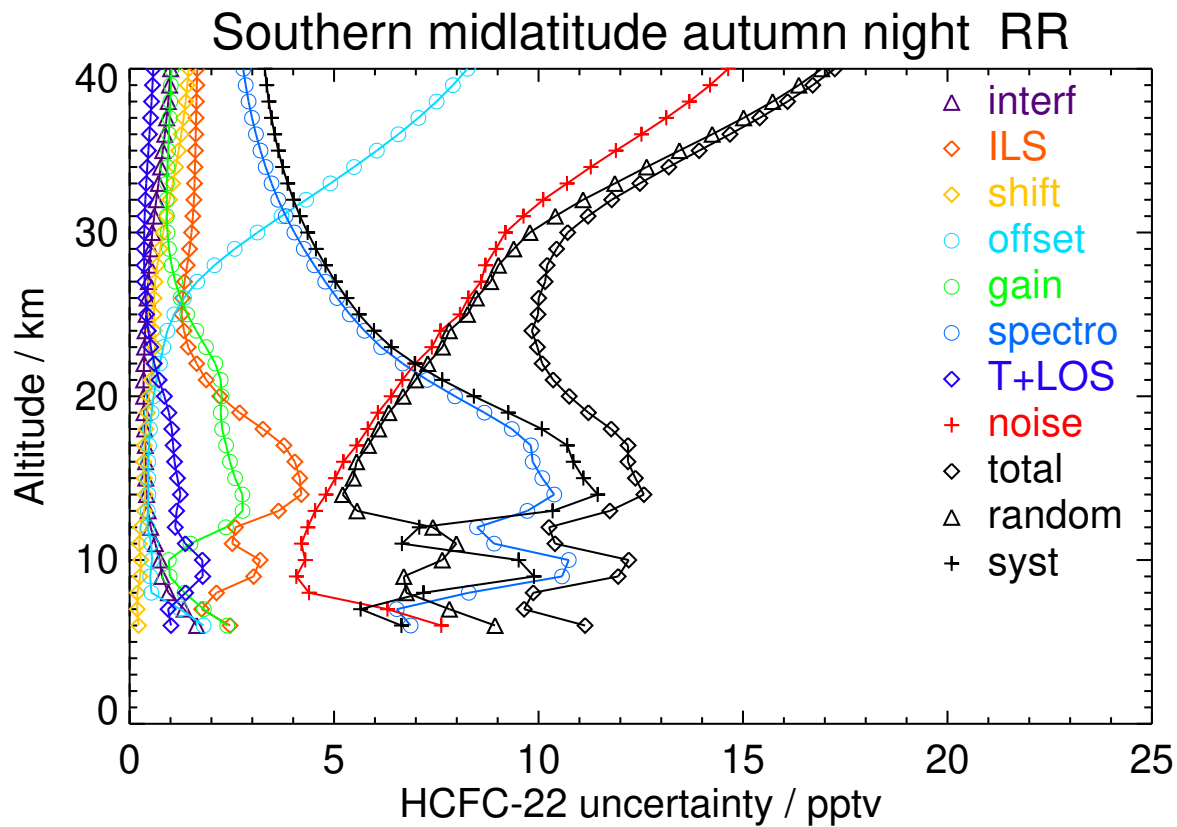
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	182.31	0.89	1.67	0.25	0.54	1.35	7.72	1.27	4.17	5.96	6.99	9.18
11	189.21	0.58	2.15	0.51	0.62	2.33	7.75	1.11	4.20	7.42	5.91	9.49
14	180.48	0.40	3.75	0.35	0.45	2.59	9.63	1.15	4.79	5.17	10.56	11.76
17	159.04	0.38	3.40	0.37	0.48	2.36	9.45	1.01	5.56	5.81	10.25	11.78
20	135.88	0.34	1.82	0.43	0.54	1.90	7.96	0.81	6.41	6.63	8.29	10.61
23	119.63	0.36	1.23	0.46	0.73	1.63	6.20	0.52	7.38	7.56	6.41	9.91
26	108.22	0.43	1.27	0.53	1.37	1.28	4.93	0.39	8.43	8.61	5.20	10.05
29	98.27	0.52	1.43	0.69	2.72	1.14	3.99	0.35	9.07	9.54	4.33	10.48
32	90.12	0.65	1.47	0.88	4.53	1.14	3.37	0.36	10.46	11.48	3.77	12.08
35	84.34	0.79	1.44	1.05	6.26	1.18	2.97	0.42	12.32	13.91	3.42	14.32
38	80.53	0.91	1.43	1.18	7.69	1.22	2.72	0.49	14.10	16.16	3.21	16.47
41	78.40	0.99	1.41	1.29	8.65	1.22	2.56	0.55	15.30	17.67	3.07	17.94



**Figure S59.** V8R\_F-22\_261 Southern midlatitude autumn day

**Table S61.** HCFC-22 error budget for Southern midlatitude autumn night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	185.34	0.95	2.12	0.19	0.53	1.34	8.29	1.37	4.39	6.77	7.19	9.87
11	190.60	0.63	2.51	0.23	0.53	1.49	8.91	1.36	4.20	7.99	6.66	10.40
14	183.50	0.42	4.20	0.38	0.46	2.76	10.38	1.24	4.80	5.21	11.45	12.58
17	162.83	0.38	3.77	0.36	0.47	2.36	9.81	1.06	5.55	5.84	10.70	12.19
20	135.86	0.34	2.21	0.47	0.59	2.25	7.96	0.85	6.40	6.69	8.42	10.75
23	120.97	0.37	1.43	0.62	0.82	1.87	6.15	0.52	7.39	7.65	6.40	9.97
26	112.40	0.43	1.30	0.60	1.33	1.25	5.07	0.39	8.28	8.48	5.31	10.00
29	102.13	0.52	1.47	0.75	2.57	0.96	4.26	0.35	8.96	9.39	4.56	10.44
32	92.42	0.65	1.57	0.98	4.32	0.91	3.63	0.39	10.12	11.09	4.01	11.79
35	86.29	0.81	1.61	1.20	6.05	0.94	3.20	0.46	11.89	13.44	3.64	13.93
38	82.28	0.94	1.63	1.37	7.51	0.99	2.91	0.54	13.69	15.72	3.40	16.09
41	79.18	1.03	1.66	1.47	8.57	1.03	2.73	0.60	15.01	17.40	3.27	17.71



**Figure S60.** V8R\_F-22\_261 Southern midlatitude autumn night

Table S62. HCFC-22 error budget for Southern polar winter day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	181.37	1.66	0.84	0.13	2.11	1.53	7.05	1.64	7.69	9.22	6.06	11.03
8	190.91	0.69	1.57	0.21	0.59	1.82	7.31	1.34	4.24	6.53	6.10	8.93
11	186.70	0.45	3.04	0.31	0.58	2.81	10.77	1.68	4.67	5.38	11.38	12.59
14	158.39	0.41	3.28	0.30	0.57	2.24	10.41	1.54	5.51	5.91	11.07	12.55
17	128.92	0.40	2.69	0.26	0.68	1.76	8.84	1.16	6.64	6.90	9.33	11.60
20	105.36	0.38	1.82	0.25	1.03	1.31	6.91	0.90	7.84	8.06	7.17	10.78
23	83.71	0.41	1.23	0.25	1.80	0.94	4.88	0.62	8.90	9.17	5.02	10.46
26	71.77	0.46	1.06	0.36	3.15	0.76	3.39	0.42	9.94	10.49	3.54	11.07
29	64.34	0.60	1.20	0.63	5.01	0.70	2.52	0.41	11.12	12.27	2.74	12.57
32	59.08	0.83	1.45	0.94	6.96	0.70	2.10	0.56	13.00	14.84	2.46	15.04
35	55.37	1.03	1.65	1.21	8.59	0.73	1.94	0.73	14.78	17.21	2.44	17.39
38	53.17	1.19	1.80	1.42	9.77	0.73	1.87	0.87	16.15	19.01	2.50	19.18
41	47.15	1.30	1.87	1.68	10.36	0.78	1.81	0.99	16.83	19.93	2.56	20.09

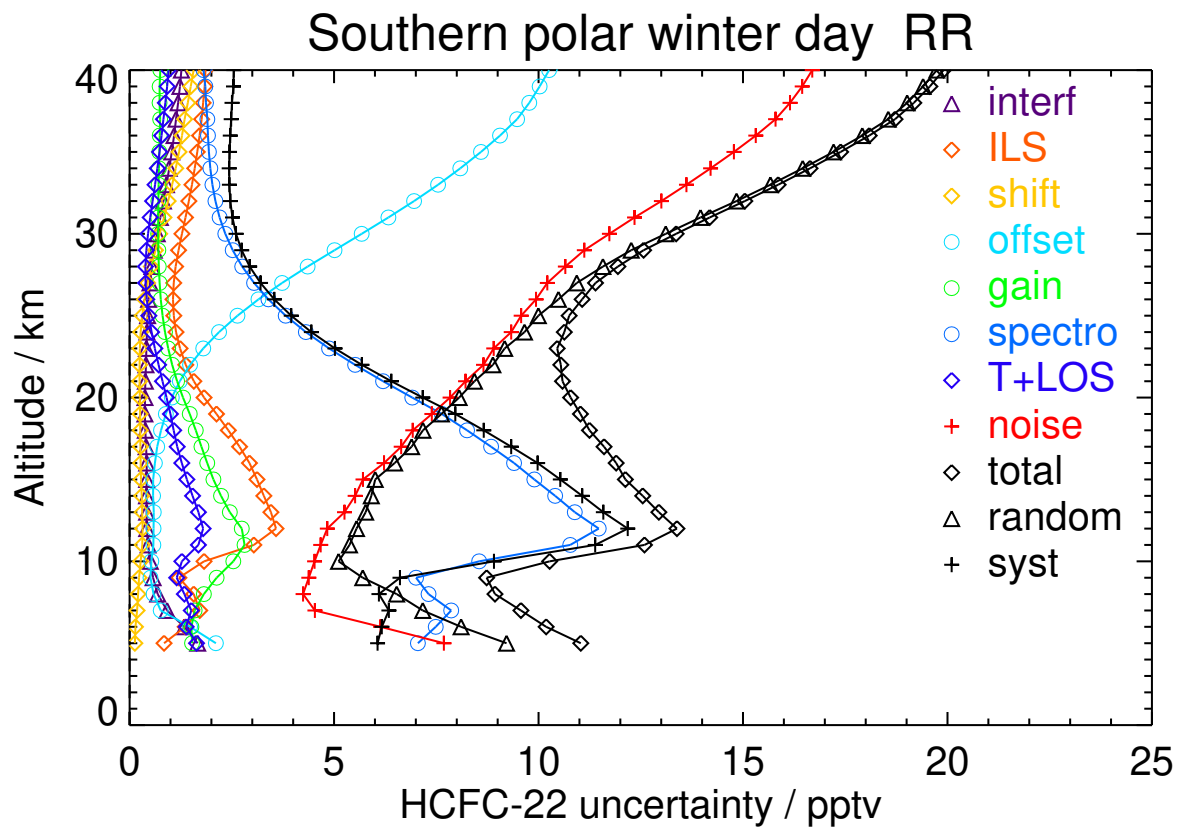


Figure S61. V8R\_F-22\_261 Southern polar winter day

Table S63. HCFC-22 error budget for Southern polar winter night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	185.76	1.75	1.45	0.22	2.10	0.96	8.06	1.93	7.82	9.68	6.83	11.85
8	192.32	0.70	1.68	0.22	0.53	1.48	7.61	1.62	4.12	6.22	6.69	9.13
11	189.72	0.47	2.64	0.28	0.54	2.71	9.76	1.59	4.65	5.32	10.30	11.59
14	164.43	0.41	3.10	0.29	0.55	2.23	9.51	1.45	5.42	5.77	10.19	11.71
17	135.38	0.40	2.85	0.33	0.67	1.71	8.52	1.14	6.47	6.69	9.10	11.29
20	114.48	0.38	2.21	0.32	0.99	1.30	7.18	0.91	7.68	7.89	7.54	10.91
23	93.08	0.42	1.67	0.28	1.78	1.02	5.52	0.68	8.88	9.15	5.78	10.82
26	73.93	0.47	1.44	0.39	3.17	0.82	3.90	0.49	9.98	10.52	4.18	11.32
29	60.39	0.61	1.50	0.66	5.05	0.73	2.67	0.44	11.17	12.31	3.07	12.69
32	51.40	0.82	1.68	0.96	6.98	0.72	1.96	0.54	13.02	14.85	2.58	15.07
35	46.25	1.02	1.84	1.22	8.59	0.73	1.66	0.66	14.76	17.18	2.47	17.36
38	43.19	1.17	1.99	1.45	9.74	0.74	1.55	0.79	16.06	18.91	2.51	19.07
41	48.24	1.30	2.16	1.80	9.97	0.78	1.59	0.89	16.43	19.38	2.71	19.56

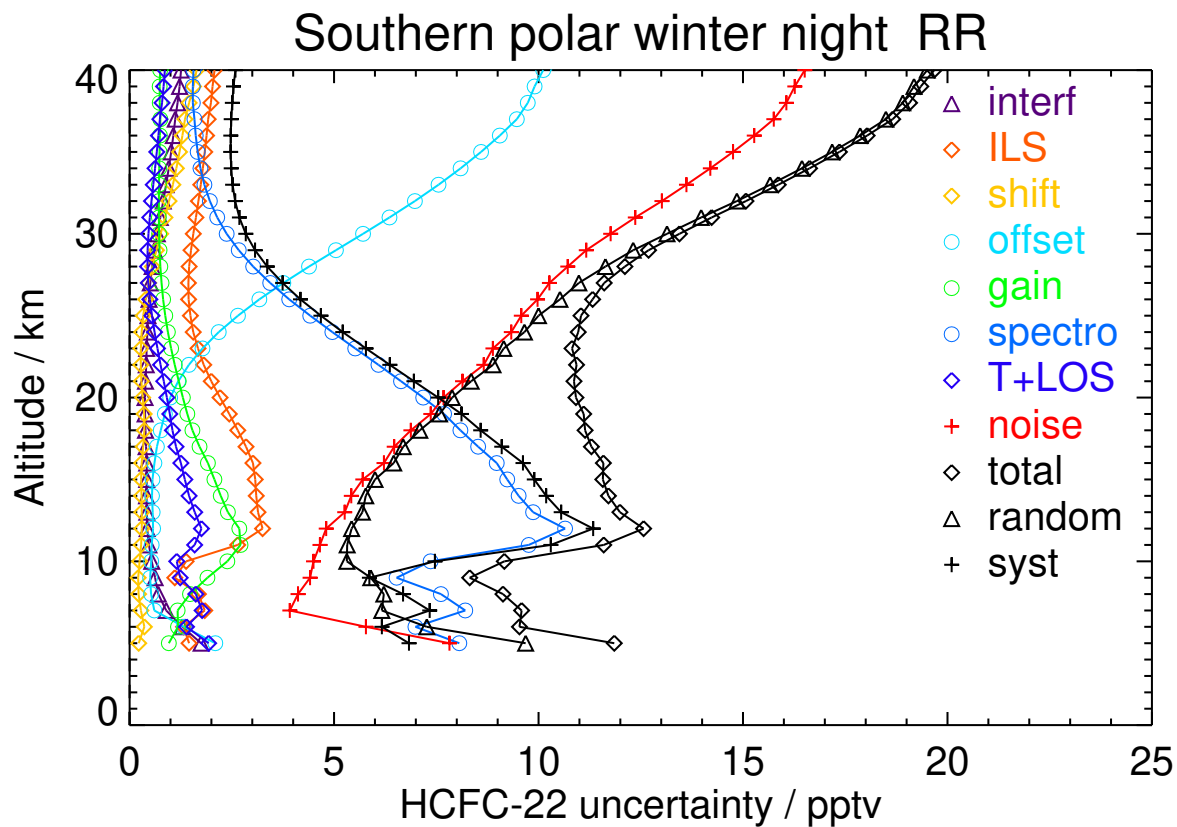


Figure S62. V8R\_F-22\_261 Southern polar winter night



Table S64. HCFC-22 error budget for Southern polar spring day. All uncertainties are 1 $\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	189.27	1.72	2.41	0.18	1.96	2.00	7.03	1.34	7.69	9.25	6.43	11.27
8	195.56	0.78	3.11	0.22	0.54	1.66	8.35	1.84	4.34	6.31	8.10	10.27
11	184.41	0.50	4.55	0.23	0.53	2.70	11.18	1.79	4.80	5.70	12.15	13.42
14	148.25	0.41	4.37	0.24	0.47	1.79	9.30	1.49	5.42	6.07	10.20	11.87
17	126.11	0.42	3.14	0.42	0.51	1.15	7.25	1.00	6.09	6.69	7.60	10.12
20	111.53	0.38	1.97	0.61	0.64	0.91	5.85	0.67	6.75	7.25	5.77	9.26
23	105.01	0.41	1.18	0.74	0.71	0.87	4.56	0.45	7.39	7.66	4.52	8.89
26	102.83	0.50	1.04	0.96	0.99	0.93	4.11	0.41	8.31	8.62	3.99	9.50
29	100.38	0.59	1.48	1.30	1.86	0.97	3.95	0.45	8.44	8.99	3.85	9.78
32	96.00	0.77	1.88	1.68	3.35	1.03	3.70	0.53	9.26	10.21	3.81	10.90
35	90.42	0.95	1.97	1.97	5.00	1.12	3.43	0.61	10.72	12.19	3.68	12.73
38	85.88	1.09	1.93	2.16	6.50	1.20	3.19	0.69	12.59	14.49	3.53	14.92
41	82.19	1.19	1.89	2.26	7.65	1.25	3.01	0.76	14.10	16.34	3.42	16.69

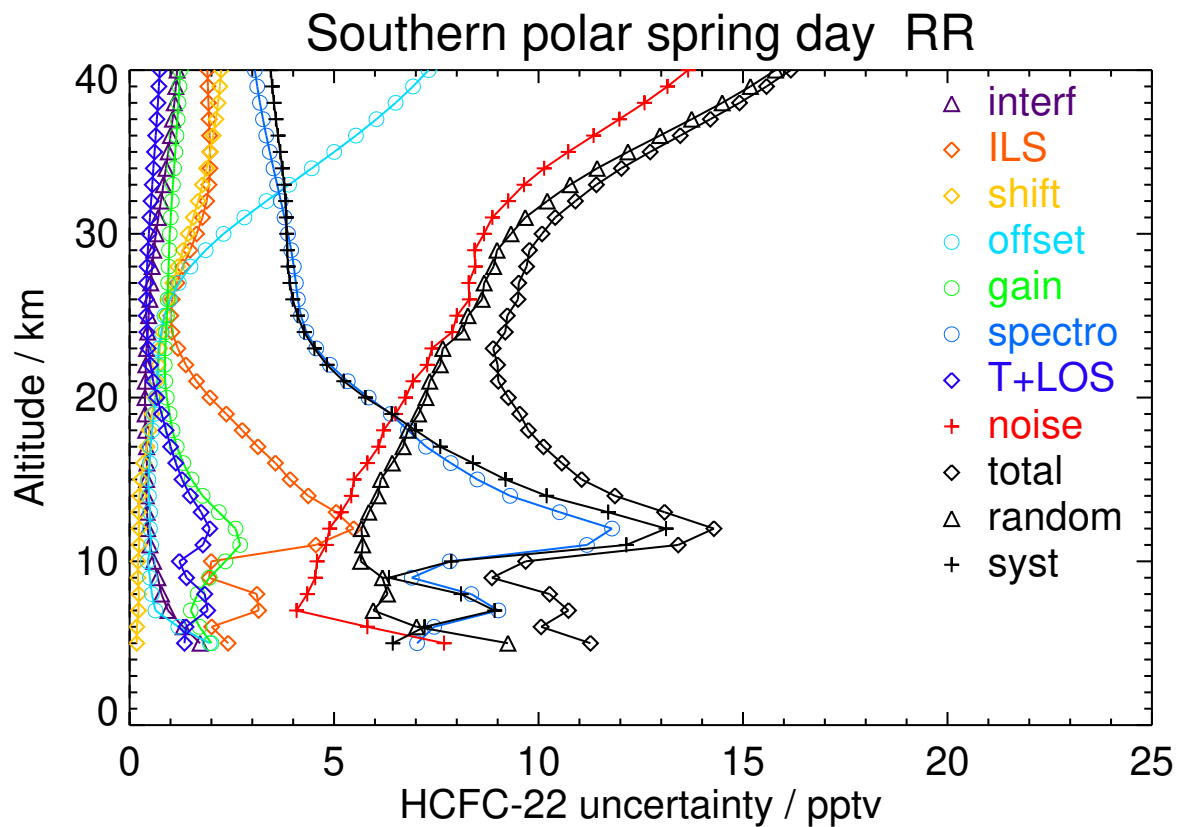


Figure S63. V8R\_F-22\_261 Southern polar spring day

Table S65. HCFC-22 error budget for Southern polar spring night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	191.28	1.72	1.90	0.08	1.90	1.47	7.18	1.44	7.67	9.13	6.44	11.17
8	195.63	0.73	2.54	0.15	0.48	1.51	7.98	1.63	4.39	6.74	7.05	9.75
11	184.57	0.47	4.10	0.23	0.53	2.76	11.97	1.74	4.70	7.15	11.93	13.90
14	151.81	0.40	4.32	0.26	0.44	1.97	9.32	1.31	5.25	6.37	9.93	11.80
17	128.64	0.41	3.58	0.47	0.49	1.41	7.76	0.93	5.88	6.68	8.15	10.54
20	115.18	0.38	1.96	0.69	0.60	1.41	5.75	0.60	6.53	7.04	5.76	9.10
23	111.64	0.41	1.13	0.82	0.68	1.27	4.90	0.41	7.20	7.69	4.59	8.96
26	112.07	0.49	1.10	1.01	0.98	1.06	4.93	0.38	8.19	8.84	4.23	9.80
29	109.56	0.57	1.57	1.25	1.83	1.11	4.63	0.39	8.36	9.14	4.12	10.02
32	102.19	0.72	1.98	1.54	3.30	1.18	4.49	0.45	9.19	10.37	4.04	11.13
35	94.58	0.90	2.08	1.79	4.95	1.25	4.57	0.52	10.67	12.42	3.90	13.02
38	88.84	1.05	2.06	1.97	6.45	1.31	4.73	0.60	12.55	14.79	3.76	15.26
41	84.45	1.14	2.05	2.07	7.60	1.35	4.90	0.66	14.07	16.68	3.66	17.08

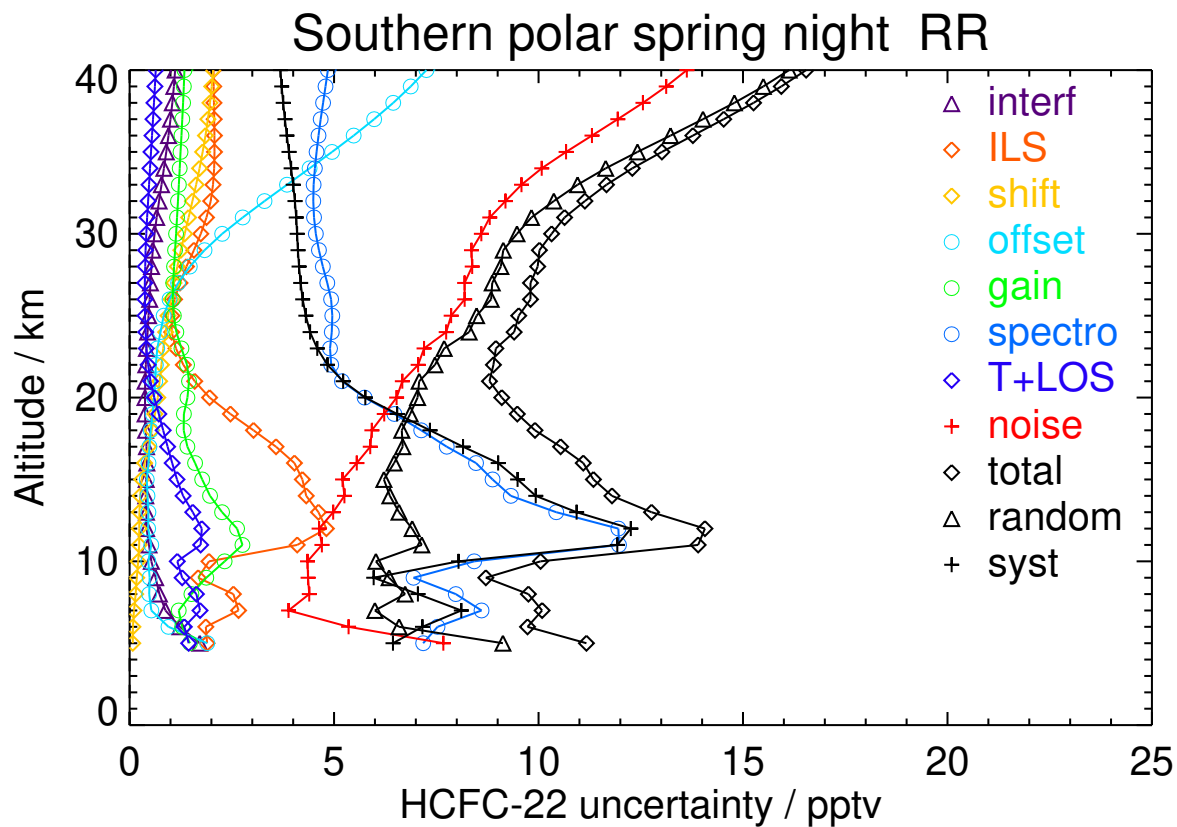


Figure S64. V8R\_F-22\_261 Southern polar spring night

Table S66. HCFC-22 error budget for Southern polar summer day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	186.21	1.77	4.54	0.34	1.79	3.30	9.94	1.50	7.88	9.39	10.62	14.18
8	184.96	0.83	4.64	0.22	0.53	0.64	14.02	2.02	4.06	5.68	14.42	15.50
11	177.76	0.52	1.98	0.20	0.39	2.09	7.87	0.92	4.12	5.84	7.37	9.41
14	171.78	0.38	4.55	0.35	0.35	2.05	8.44	0.99	4.62	5.06	9.66	10.90
17	150.74	0.40	3.72	0.43	0.39	1.91	8.78	0.88	5.22	5.44	9.67	11.09
20	127.09	0.34	1.40	0.66	0.59	1.82	6.76	0.60	5.84	6.08	7.03	9.29
23	115.74	0.35	1.50	0.70	0.67	2.32	5.17	0.38	6.47	6.83	5.54	8.80
26	110.04	0.43	1.55	0.62	0.78	1.74	4.51	0.36	7.80	7.98	4.92	9.38
29	101.66	0.48	1.74	0.77	1.47	1.13	4.02	0.38	8.03	8.24	4.48	9.38
32	95.68	0.61	1.94	1.14	2.77	0.94	3.50	0.45	8.67	9.21	4.08	10.08
35	88.45	0.82	1.86	1.58	4.36	0.93	3.06	0.58	9.73	10.84	3.66	11.44
38	81.17	1.03	1.72	1.93	5.92	0.99	2.74	0.72	11.43	13.09	3.33	13.50
41	76.02	1.20	1.64	2.18	7.21	1.04	2.54	0.84	12.99	15.10	3.13	15.43

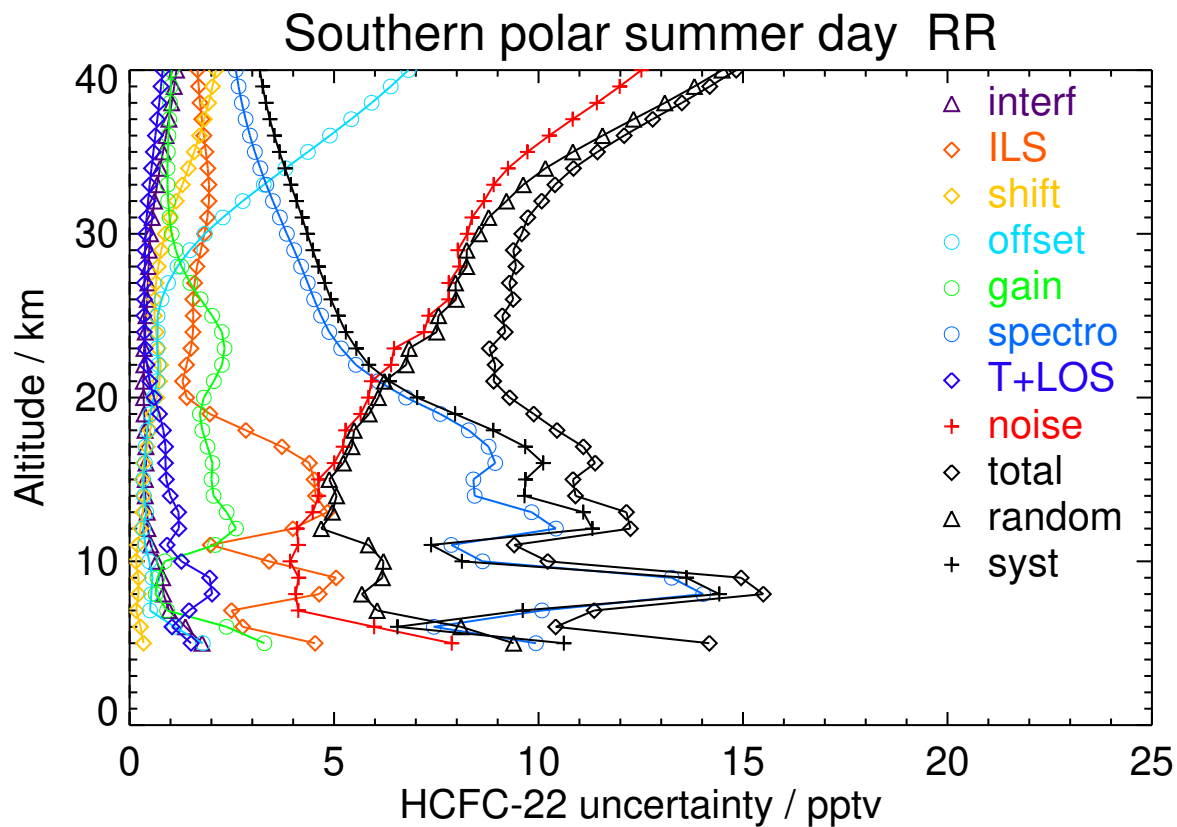


Figure S65. V8R\_F-22\_261 Southern polar summer day

Table S67. HCFC-22 error budget for Southern polar summer night. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	179.51	1.78	5.14	0.43	1.96	3.98	15.81	1.73	7.64	12.14	14.62	19.00
8	182.14	0.82	4.25	0.24	0.52	0.81	13.39	2.02	3.86	5.36	13.76	14.76
11	181.79	0.52	1.25	0.15	0.30	1.72	6.36	0.74	3.89	4.94	6.06	7.82
14	169.64	0.38	4.95	0.32	0.34	2.36	9.22	1.09	4.48	4.83	10.65	11.69
17	155.58	0.39	3.78	0.42	0.39	2.09	8.84	0.88	5.13	5.35	9.78	11.15
20	129.15	0.34	1.39	0.56	0.49	1.62	7.07	0.66	5.84	5.96	7.36	9.47
23	114.77	0.35	0.92	0.55	0.56	1.31	5.21	0.40	6.60	6.70	5.40	8.61
26	107.92	0.43	1.35	0.63	0.84	1.16	4.49	0.37	7.91	8.03	4.77	9.34
29	100.21	0.49	1.78	0.82	1.63	0.93	3.94	0.38	8.17	8.42	4.38	9.49
32	89.46	0.61	1.85	1.17	3.01	0.84	3.33	0.43	8.82	9.44	3.87	10.20
35	80.41	0.80	1.79	1.57	4.65	0.86	2.83	0.53	9.98	11.18	3.42	11.69
38	73.51	0.99	1.76	1.87	6.23	0.91	2.50	0.65	11.73	13.47	3.13	13.83
41	68.28	1.14	1.77	2.08	7.50	0.97	2.30	0.75	13.29	15.48	2.99	15.76

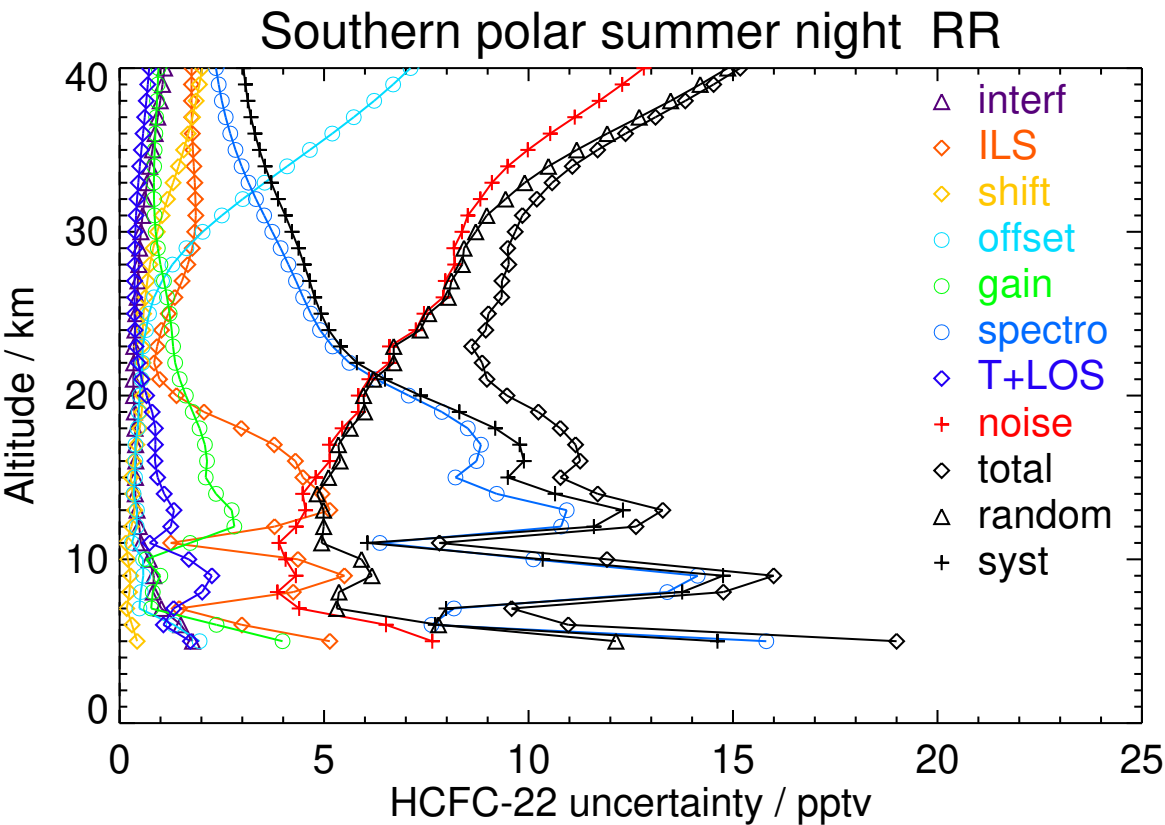


Figure S66. V8R\_F-22\_261 Southern polar summer night

Table S68. HCFC-22 error budget for Southern polar autumn day. All uncertainties are  $1\sigma$ .

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	184.19	1.73	1.86	0.16	2.00	2.32	6.93	1.12	7.67	9.17	6.31	11.13
8	184.51	0.75	1.64	0.14	0.45	1.10	7.49	1.06	4.10	5.25	7.16	8.88
11	183.98	0.49	2.06	0.27	0.45	2.34	8.14	0.95	4.34	5.63	8.03	9.81
14	172.75	0.38	3.73	0.35	0.43	2.58	9.73	1.08	4.96	5.24	10.68	11.90
17	148.32	0.39	2.96	0.39	0.47	2.23	9.02	0.95	5.78	5.98	9.70	11.40
20	124.45	0.35	1.43	0.41	0.59	1.83	6.90	0.68	6.66	6.86	7.17	9.92
23	109.46	0.37	0.95	0.32	0.96	1.52	5.47	0.44	7.62	7.76	5.68	9.62
26	95.17	0.45	0.94	0.34	2.06	1.29	4.50	0.36	8.89	9.17	4.73	10.32
29	83.55	0.55	1.13	0.46	3.92	1.14	3.65	0.34	10.00	10.79	3.94	11.49
32	74.10	0.70	1.32	0.62	5.99	1.09	3.00	0.39	12.09	13.55	3.39	13.96
35	66.73	0.85	1.46	0.78	7.74	1.09	2.57	0.47	14.07	16.12	3.07	16.41
38	62.04	0.96	1.56	0.90	9.05	1.10	2.31	0.55	15.64	18.14	2.91	18.37
41	61.81	1.02	1.58	1.11	9.54	1.15	2.13	0.61	16.24	18.92	2.82	19.13

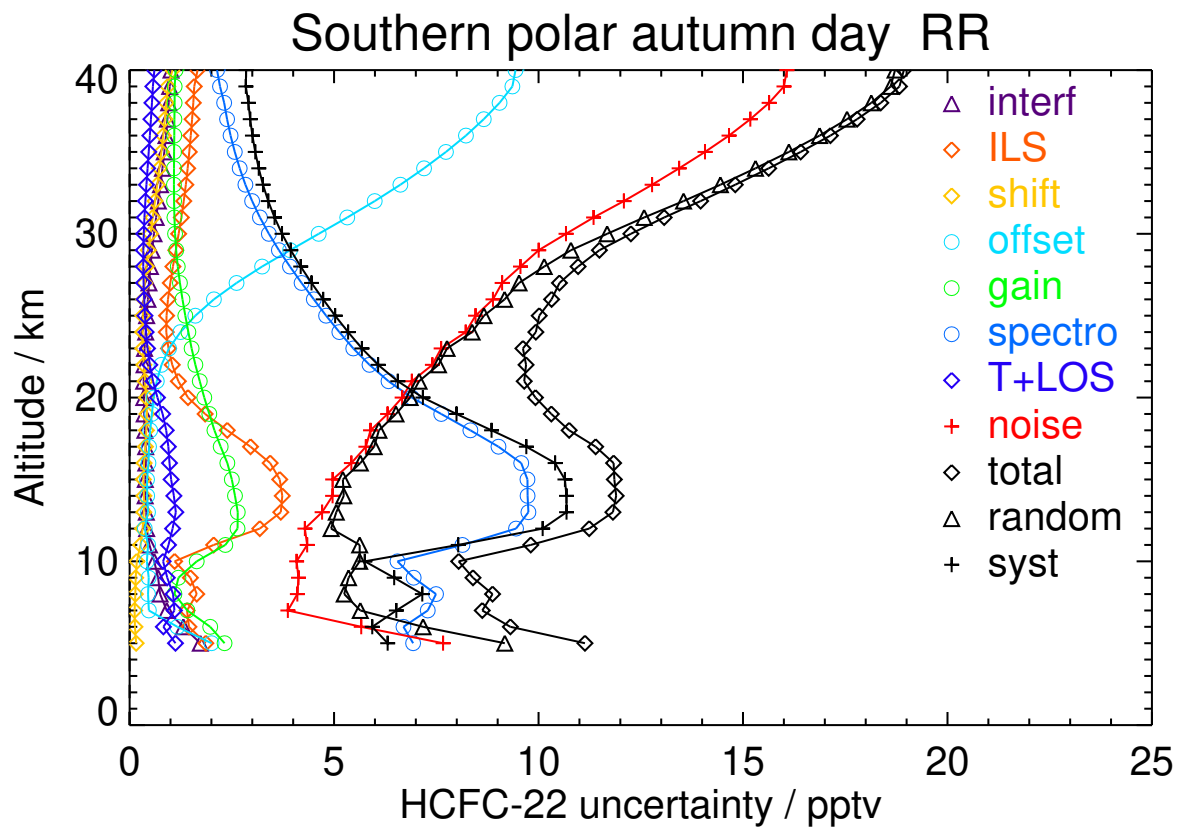


Figure S67. V8R\_F-22\_261 Southern polar autumn day

Table S69. HCFC-22 error budget for Southern polar autumn night. All uncertainties are 1σ.

altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	180.41	1.68	1.78	0.17	1.86	2.18	6.20	0.92	7.31	8.25	6.24	10.35
8	186.04	0.78	2.10	0.18	0.48	0.96	8.77	1.38	4.30	5.77	8.38	10.17
11	184.56	0.51	1.91	0.26	0.47	2.28	8.08	0.97	4.44	5.28	8.22	9.77
14	171.94	0.38	3.60	0.35	0.45	2.39	10.04	1.20	5.06	5.35	10.88	12.13
17	140.97	0.39	3.08	0.38	0.51	2.06	9.17	0.99	5.91	6.18	9.81	11.60
20	118.02	0.35	1.40	0.39	0.63	1.50	6.58	0.67	6.82	6.97	6.82	9.75
23	105.43	0.38	1.00	0.34	1.08	1.31	5.30	0.43	7.82	7.98	5.47	9.67
26	91.53	0.45	1.04	0.33	2.26	1.17	4.46	0.35	9.09	9.41	4.68	10.51
29	78.31	0.56	1.22	0.44	4.19	1.05	3.67	0.35	10.31	11.18	3.97	11.86
32	67.95	0.73	1.41	0.61	6.28	1.01	3.01	0.41	12.43	13.98	3.42	14.39
35	60.93	0.87	1.55	0.76	8.02	1.02	2.55	0.50	14.38	16.53	3.08	16.81
38	56.26	0.98	1.65	0.88	9.32	1.03	2.25	0.58	15.90	18.50	2.90	18.72
41	54.14	1.05	1.69	1.14	9.62	1.10	2.12	0.60	16.32	19.03	2.81	19.24

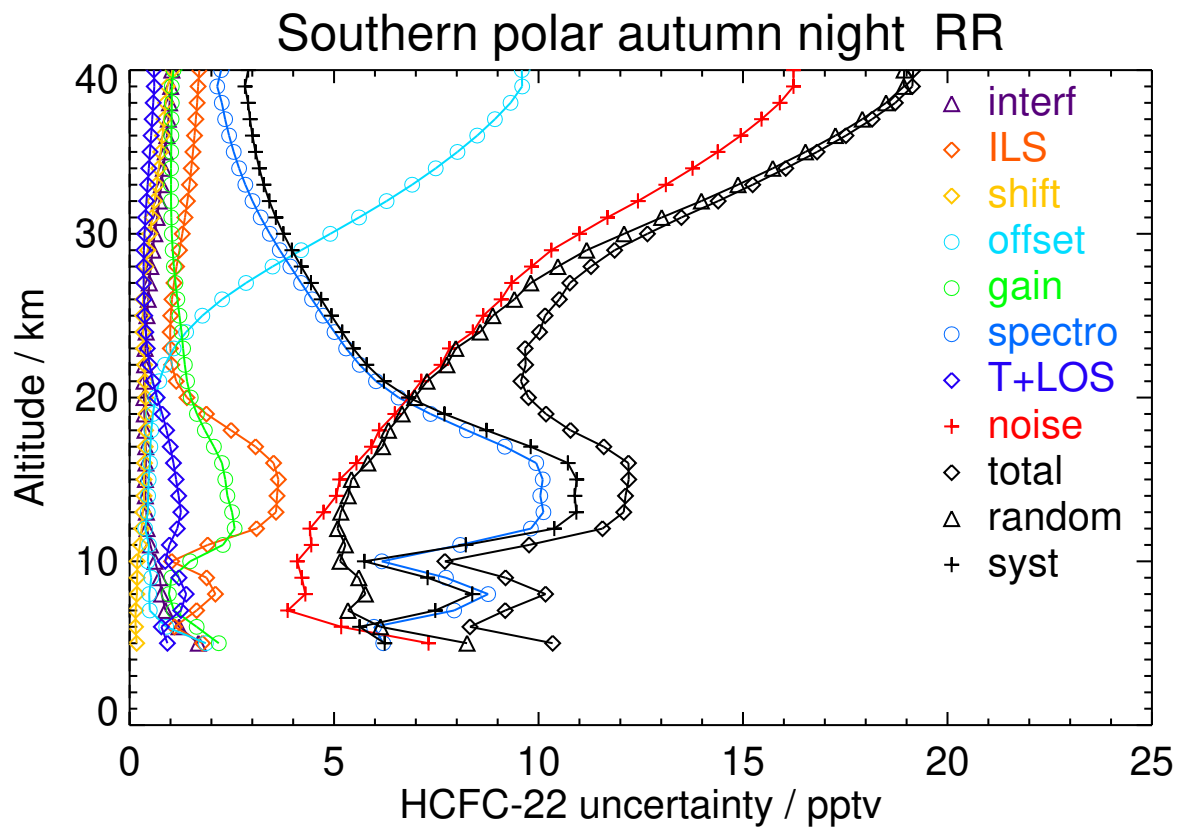


Figure S68. V8R\_F-22\_261 Southern polar autumn night