

## *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) in the MIPAS nominal measurement mode, which are listed in tables S36–S69 and depicted in figures S35–S68, and in the MIPAS middle atmosphere measurement mode, which are listed in tables S70–S103 and depicted in figures S69–S102.

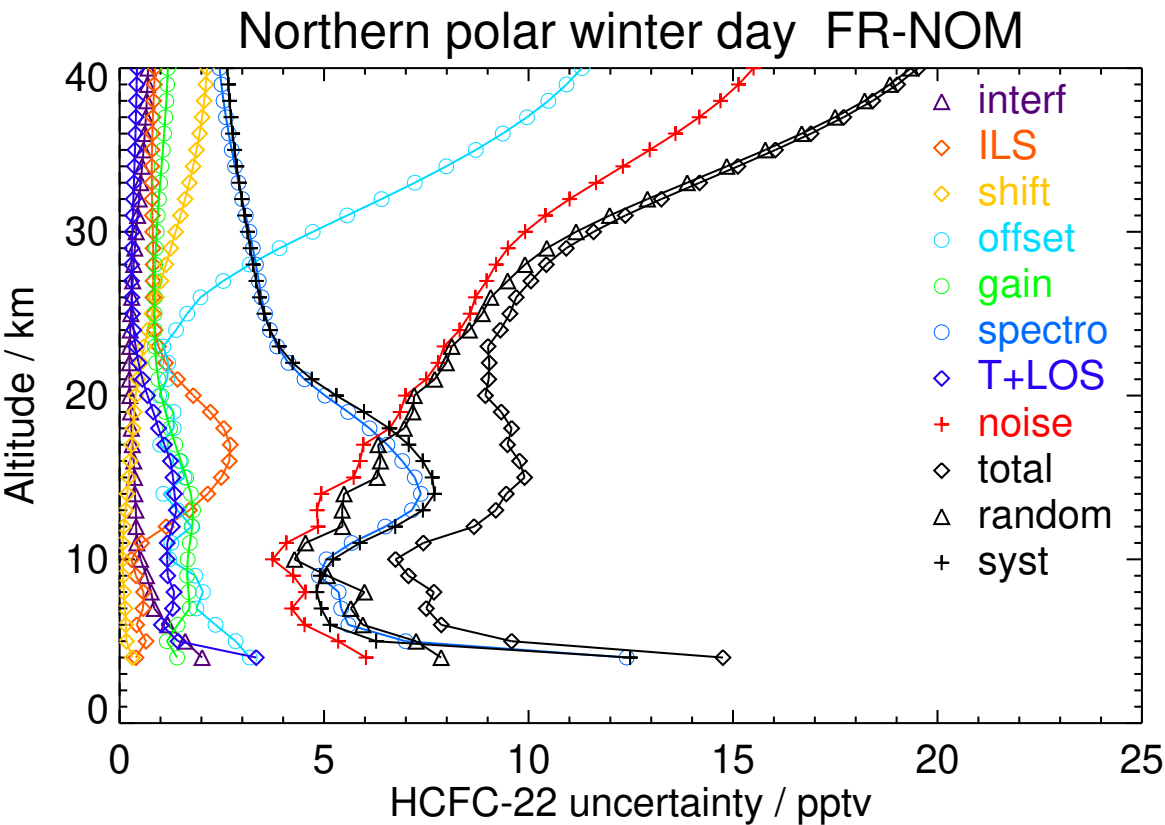
The errors are presented as absolute errors in pptv.

**Table S1.** Labels and definitions of the representative atmospheric conditions which were used to calculate the error budget for FR and RR nominal measurement mode data ( $\beta_{\max} = 95^\circ$ ) and RR middle atmosphere measurement mode data ( $\beta_{\max} = 98^\circ$ ).

representative atmosphere label	month(s) used	latitude range	solar zenith angle range
Northern polar winter day	Jan, Feb	$65^\circ\text{N} - 90^\circ\text{N}$	$< 90^\circ$
Northern polar winter night	Jan, Feb	$65^\circ\text{N} - 90^\circ\text{N}$	$> \beta_{\max}$
Northern polar spring day	Apr	$65^\circ\text{N} - 90^\circ\text{N}$	$< 90^\circ$
Northern polar spring night	Apr	$65^\circ\text{N} - 90^\circ\text{N}$	$> \beta_{\max}$
Northern polar summer day	Jul, Aug	$65^\circ\text{N} - 90^\circ\text{N}$	$< 90^\circ$
Northern polar summer night	Jul, Aug	$65^\circ\text{N} - 90^\circ\text{N}$	$> \beta_{\max}$
Northern polar autumn day	Oct	$65^\circ\text{N} - 90^\circ\text{N}$	$< 90^\circ$
Northern polar autumn night	Oct	$65^\circ\text{N} - 90^\circ\text{N}$	$> \beta_{\max}$
Northern midlatitude winter day	Jan, Feb	$40^\circ\text{N} - 60^\circ\text{N}$	$< 90^\circ$
Northern midlatitude winter night	Jan, Feb	$40^\circ\text{N} - 60^\circ\text{N}$	$> \beta_{\max}$
Northern midlatitude spring day	Apr	$40^\circ\text{N} - 60^\circ\text{N}$	$< 90^\circ$
Northern midlatitude spring night	Apr	$40^\circ\text{N} - 60^\circ\text{N}$	$> \beta_{\max}$
Northern midlatitude summer day	Jul, Aug	$40^\circ\text{N} - 60^\circ\text{N}$	$< 90^\circ$
Northern midlatitude summer night	Jul, Aug	$40^\circ\text{N} - 60^\circ\text{N}$	$> \beta_{\max}$
Northern midlatitude autumn day	Oct	$40^\circ\text{N} - 60^\circ\text{N}$	$< 90^\circ$
Northern midlatitude autumn night	Oct	$40^\circ\text{N} - 60^\circ\text{N}$	$> \beta_{\max}$
Tropics day	Apr	$20^\circ\text{S} - 20^\circ\text{N}$	$< 90^\circ$
Tropics night	Apr	$20^\circ\text{S} - 20^\circ\text{N}$	$> \beta_{\max}$
Southern midlatitude winter day	Jul, Aug	$40^\circ\text{S} - 60^\circ\text{S}$	$< 90^\circ$
Southern midlatitude winter night	Jul, Aug	$40^\circ\text{S} - 60^\circ\text{S}$	$> \beta_{\max}$
Southern midlatitude spring day	Oct	$40^\circ\text{S} - 60^\circ\text{S}$	$< 90^\circ$
Southern midlatitude spring night	Oct	$40^\circ\text{S} - 60^\circ\text{S}$	$> \beta_{\max}$
Southern midlatitude summer day	Jan, Feb	$40^\circ\text{S} - 60^\circ\text{S}$	$< 90^\circ$
Southern midlatitude summer night	Jan, Feb	$40^\circ\text{S} - 60^\circ\text{S}$	$> \beta_{\max}$
Southern midlatitude autumn day	Apr	$40^\circ\text{S} - 60^\circ\text{S}$	$< 90^\circ$
Southern midlatitude autumn night	Apr	$40^\circ\text{S} - 60^\circ\text{S}$	$> \beta_{\max}$
Southern polar winter day	Jul, Aug	$65^\circ\text{S} - 90^\circ\text{S}$	$< 90^\circ$
Southern polar winter night	Jul, Aug	$65^\circ\text{S} - 90^\circ\text{S}$	$> \beta_{\max}$
Southern polar spring day	Oct	$65^\circ\text{S} - 90^\circ\text{S}$	$< 90^\circ$
Southern polar spring night	Oct	$65^\circ\text{S} - 90^\circ\text{S}$	$> \beta_{\max}$
Southern polar summer day	Jan, Feb	$65^\circ\text{S} - 90^\circ\text{S}$	$< 90^\circ$
Southern polar summer night	Jan, Feb	$65^\circ\text{S} - 90^\circ\text{S}$	$> \beta_{\max}$
Southern polar autumn day	Apr	$65^\circ\text{S} - 90^\circ\text{S}$	$< 90^\circ$
Southern polar autumn night	Apr	$65^\circ\text{S} - 90^\circ\text{S}$	$> \beta_{\max}$

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

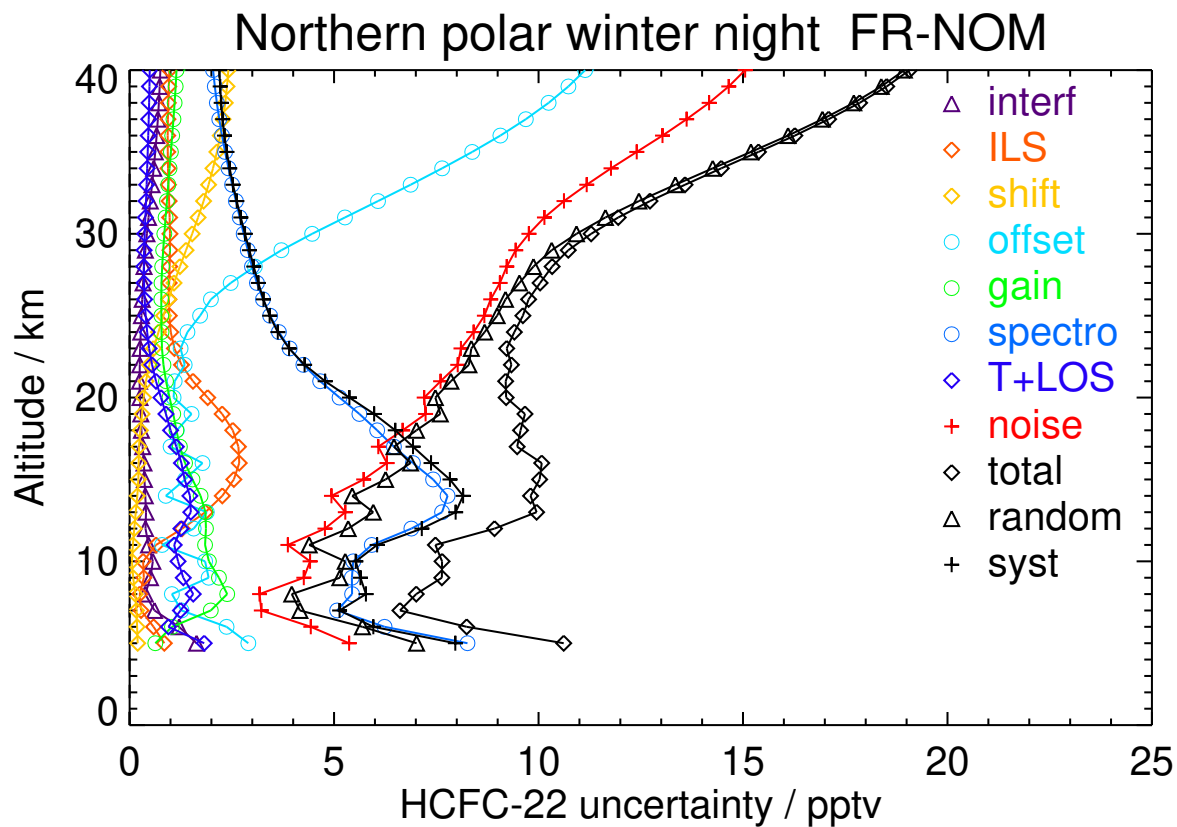
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	168.50	1.60	0.65	0.17	2.84	1.15	6.99	1.43	5.34	7.25	6.27	9.59
8	153.50	0.77	0.58	0.10	2.04	1.69	5.36	1.33	4.55	5.99	4.82	7.69
11	143.53	0.42	0.54	0.07	1.26	1.72	5.67	1.16	4.08	4.55	5.88	7.43
14	127.11	0.37	2.15	0.19	1.07	1.74	7.37	1.34	4.93	5.49	7.70	9.45
17	104.50	0.31	2.71	0.30	0.99	1.36	6.55	1.10	5.96	6.32	7.07	9.48
20	85.63	0.25	1.80	0.39	0.97	1.02	5.02	0.68	6.99	7.20	5.30	8.94
23	75.88	0.25	0.95	0.60	1.07	0.86	3.85	0.39	7.93	8.12	3.90	9.01
26	72.79	0.30	0.82	0.90	1.98	0.85	3.47	0.30	8.70	9.07	3.42	9.70
29	71.06	0.37	0.82	1.25	3.91	0.88	3.26	0.30	9.50	10.45	3.19	10.92
32	69.03	0.48	0.79	1.60	6.41	0.96	3.00	0.34	11.00	12.91	2.99	13.25
35	66.07	0.59	0.79	1.88	8.71	1.06	2.74	0.38	12.96	15.79	2.81	16.04
38	63.32	0.66	0.83	2.07	10.48	1.14	2.54	0.41	14.69	18.22	2.69	18.42
41	60.55	0.71	0.90	2.23	11.55	1.20	2.38	0.44	15.72	19.68	2.59	19.85



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

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

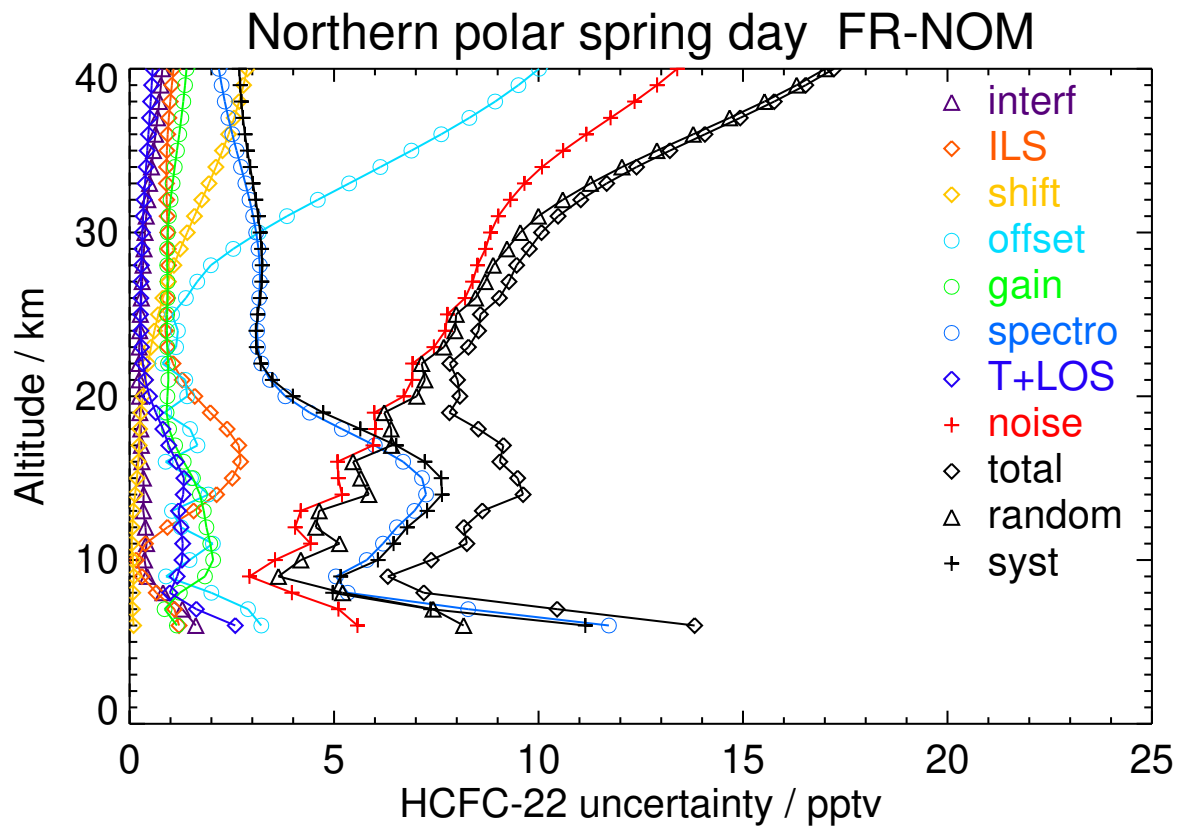
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	162.61	1.64	0.85	0.20	2.90	0.63	8.26	1.82	5.37	7.02	7.96	10.61
8	156.16	0.38	0.25	0.14	1.03	2.39	5.44	1.56	3.18	3.96	5.78	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  $1\sigma$ .

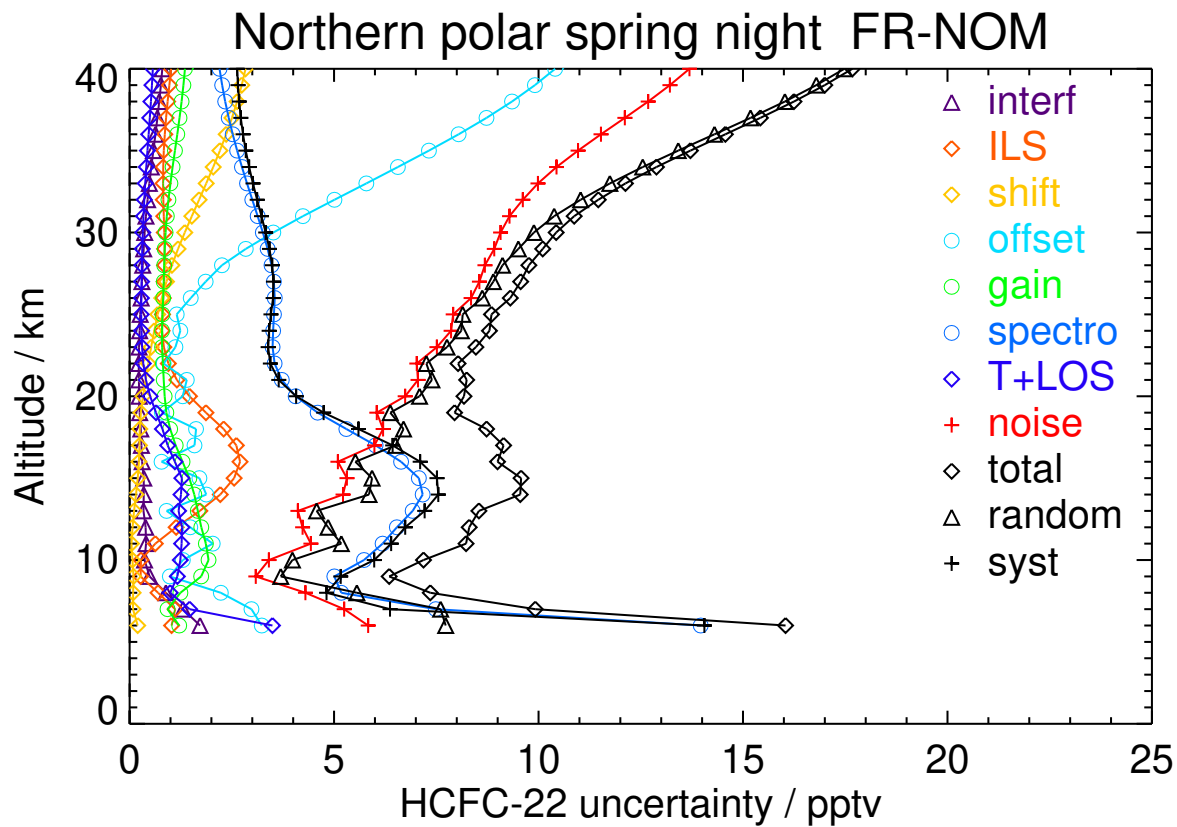
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.76	0.82	0.65	0.08	2.00	1.23	5.33	0.98	3.97	5.21	4.97	7.20
11	139.77	0.41	0.39	0.05	2.04	1.97	6.20	1.30	4.43	5.13	6.46	8.25
14	115.23	0.34	2.13	0.13	1.92	1.72	7.25	1.31	5.19	5.85	7.64	9.62
17	88.52	0.29	2.67	0.23	1.66	1.11	6.00	0.96	5.95	6.41	6.52	9.14
20	72.79	0.24	1.59	0.33	1.41	0.92	3.81	0.49	6.71	7.02	3.99	8.08
23	73.04	0.23	0.93	0.52	1.14	0.92	3.14	0.29	7.44	7.68	3.10	8.28
26	74.28	0.29	0.92	0.81	1.38	0.93	3.17	0.27	8.20	8.46	3.19	9.04
29	74.50	0.35	0.94	1.24	2.53	0.92	3.15	0.30	8.70	9.23	3.23	9.78
32	69.45	0.44	0.91	1.77	4.60	1.00	2.93	0.35	9.31	10.59	3.08	11.03
35	62.81	0.58	0.91	2.27	6.89	1.16	2.62	0.43	10.60	12.89	2.88	13.21
38	56.52	0.73	0.99	2.68	8.94	1.31	2.33	0.52	12.35	15.53	2.73	15.76
41	51.83	0.83	1.12	2.95	10.45	1.42	2.12	0.58	13.82	17.62	2.67	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  $1\sigma$ .

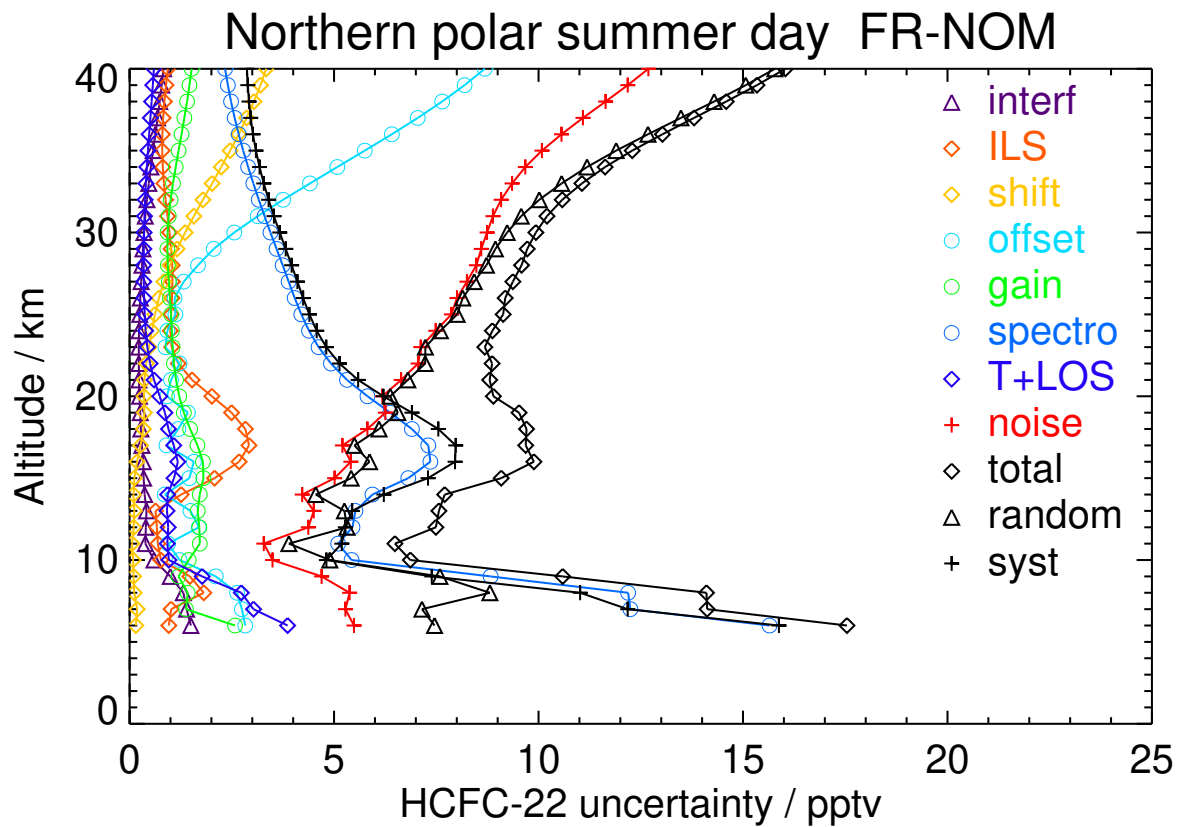
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.54	0.89	0.70	0.09	2.23	1.24	5.18	0.99	4.30	5.56	4.81	7.35
11	136.46	0.40	0.63	0.05	2.03	1.87	6.19	1.27	4.43	5.18	6.40	8.23
14	115.47	0.35	2.22	0.16	1.87	1.58	7.17	1.26	5.22	5.85	7.55	9.55
17	91.60	0.29	2.61	0.24	1.59	1.13	6.02	0.93	5.99	6.50	6.43	9.14
20	78.16	0.23	1.46	0.33	1.30	0.86	4.06	0.50	6.74	7.09	4.07	8.18
23	78.92	0.23	0.84	0.53	1.12	0.79	3.50	0.31	7.51	7.76	3.39	8.47
26	77.64	0.28	0.83	0.79	1.50	0.82	3.55	0.29	8.35	8.62	3.51	9.31
29	71.19	0.34	0.86	1.19	2.84	0.86	3.38	0.31	8.92	9.51	3.42	10.10
32	64.95	0.44	0.82	1.70	5.01	0.95	3.00	0.36	9.62	11.03	3.12	11.46
35	60.57	0.58	0.84	2.21	7.32	1.11	2.63	0.44	10.96	13.42	2.84	13.71
38	57.59	0.72	0.93	2.63	9.35	1.27	2.34	0.52	12.68	16.02	2.68	16.25
41	55.41	0.83	1.06	2.91	10.83	1.38	2.15	0.59	14.10	18.07	2.62	18.26



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

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

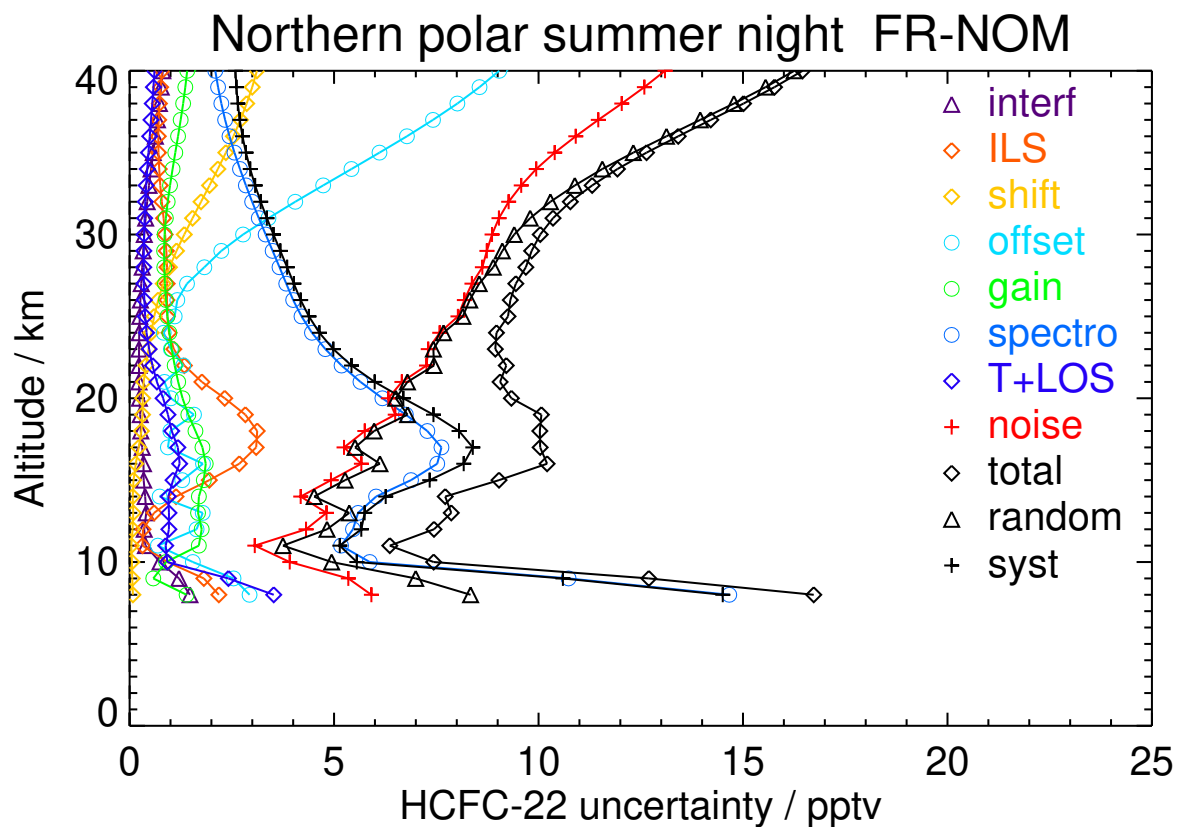
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.82	1.31	1.81	0.11	2.63	1.42	12.19	2.73	5.38	8.81	11.02	14.11
11	151.37	0.39	0.69	0.06	0.94	1.72	5.10	0.92	3.28	3.89	5.19	6.49
14	140.48	0.37	1.26	0.09	0.86	1.72	5.94	0.93	4.22	4.55	6.22	7.70
17	126.11	0.30	2.92	0.27	0.90	1.66	7.30	1.08	5.20	5.50	7.97	9.69
20	104.85	0.24	2.01	0.35	0.92	1.21	5.82	0.74	6.18	6.37	6.20	8.90
23	92.03	0.22	1.03	0.47	0.88	1.05	4.62	0.43	7.12	7.23	4.81	8.69
26	83.95	0.26	1.04	0.72	1.10	0.99	4.04	0.35	8.01	8.15	4.24	9.18
29	77.96	0.33	1.02	1.16	2.06	0.92	3.59	0.35	8.60	8.94	3.82	9.72
32	72.92	0.42	0.88	1.79	3.75	1.00	3.16	0.38	9.08	10.02	3.40	10.58
35	67.29	0.57	0.80	2.46	5.75	1.20	2.78	0.45	10.08	11.90	3.09	12.29
38	62.47	0.74	0.85	3.04	7.64	1.41	2.48	0.54	11.64	14.29	2.92	14.59
41	59.05	0.87	0.98	3.46	9.13	1.56	2.27	0.62	13.14	16.42	2.86	16.67



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

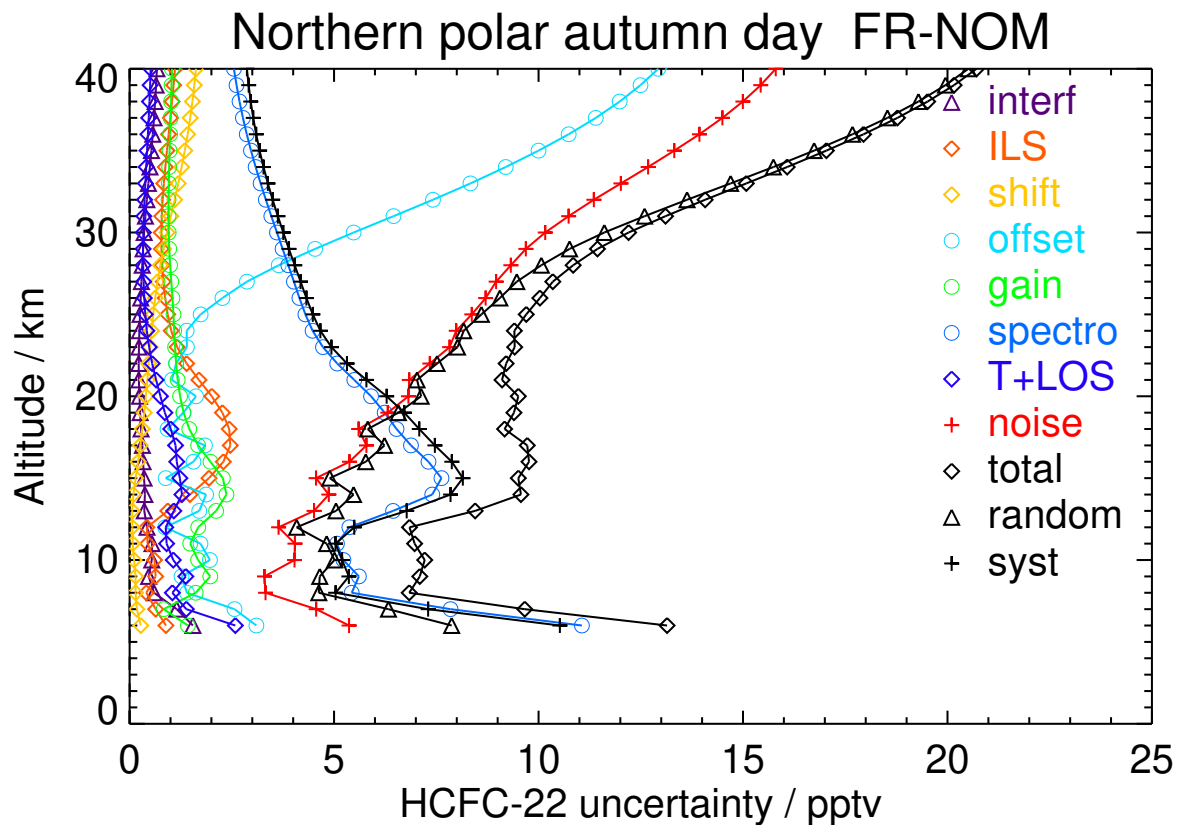
**Table S7.** HCFC-22 error budget for Northern polar summer night. All uncertainties are  $1\sigma$ .

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	155.28	1.48	2.18	0.08	2.93	1.39	14.66	3.53	5.91	8.34	14.50	16.73
11	153.16	0.39	0.32	0.04	0.69	1.69	5.17	0.88	3.06	3.75	5.14	6.36
14	142.72	0.38	1.13	0.08	0.74	1.69	6.03	0.95	4.18	4.51	6.26	7.72
17	127.99	0.31	3.09	0.22	0.94	1.78	7.63	1.18	5.24	5.51	8.39	10.04
20	105.09	0.24	2.33	0.32	1.01	1.29	6.18	0.82	6.33	6.51	6.69	9.34
23	90.16	0.23	1.08	0.46	1.01	1.03	4.79	0.48	7.30	7.43	4.98	8.94
26	81.61	0.26	0.91	0.70	1.17	0.89	4.00	0.36	8.18	8.32	4.18	9.31
29	75.36	0.33	0.90	1.15	2.24	0.84	3.50	0.35	8.74	9.11	3.69	9.83
32	67.50	0.43	0.79	1.75	4.05	0.93	3.00	0.38	9.27	10.29	3.21	10.78
35	60.42	0.58	0.71	2.35	6.11	1.12	2.56	0.46	10.39	12.32	2.85	12.64
38	54.98	0.73	0.73	2.86	8.01	1.31	2.24	0.55	12.03	14.78	2.65	15.01
41	51.30	0.85	0.83	3.21	9.47	1.45	2.04	0.63	13.54	16.88	2.57	17.07

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

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

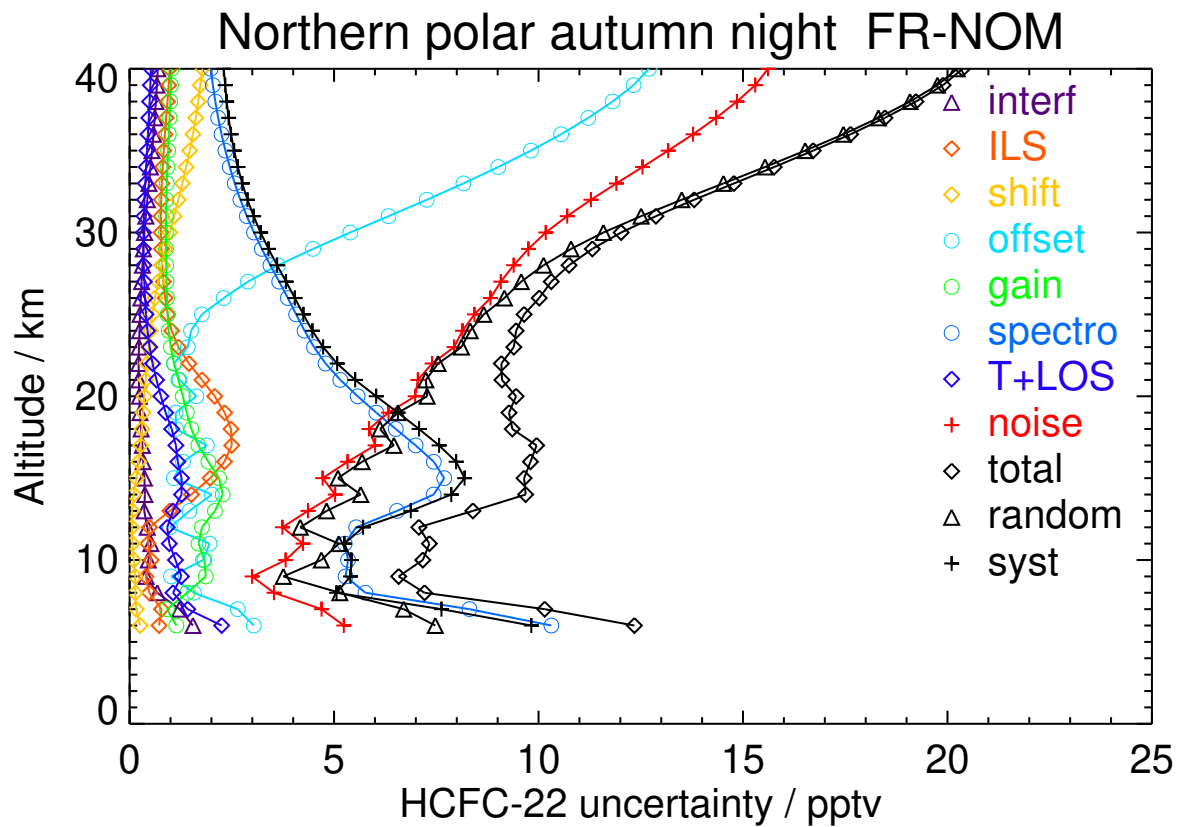
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	162.44	0.60	0.41	0.14	1.40	1.62	5.43	1.05	3.32	4.63	5.04	6.84
11	154.60	0.55	0.44	0.08	1.73	1.48	5.07	0.90	4.04	4.82	5.03	6.97
14	140.07	0.37	1.48	0.09	1.87	2.37	7.40	1.28	4.87	5.48	7.85	9.57
17	117.21	0.31	2.46	0.26	1.84	1.68	6.88	1.12	5.79	6.23	7.46	9.72
20	100.27	0.24	2.01	0.40	1.62	1.23	5.90	0.75	6.82	7.13	6.29	9.51
23	89.48	0.23	1.16	0.50	1.40	1.11	4.73	0.48	7.82	8.02	4.94	9.42
26	82.58	0.27	0.87	0.63	2.27	1.05	4.15	0.36	8.71	9.05	4.32	10.03
29	75.71	0.33	0.78	0.83	4.54	0.97	3.74	0.33	9.69	10.76	3.89	11.44
32	67.03	0.42	0.81	1.10	7.42	0.95	3.33	0.37	11.35	13.63	3.50	14.07
35	59.72	0.53	0.91	1.35	10.00	0.98	2.97	0.43	13.32	16.74	3.18	17.04
38	54.47	0.62	1.04	1.54	11.98	1.02	2.69	0.49	15.00	19.29	2.96	19.52
41	49.14	0.70	1.15	1.78	12.98	1.05	2.40	0.53	15.86	20.61	2.75	20.79



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

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

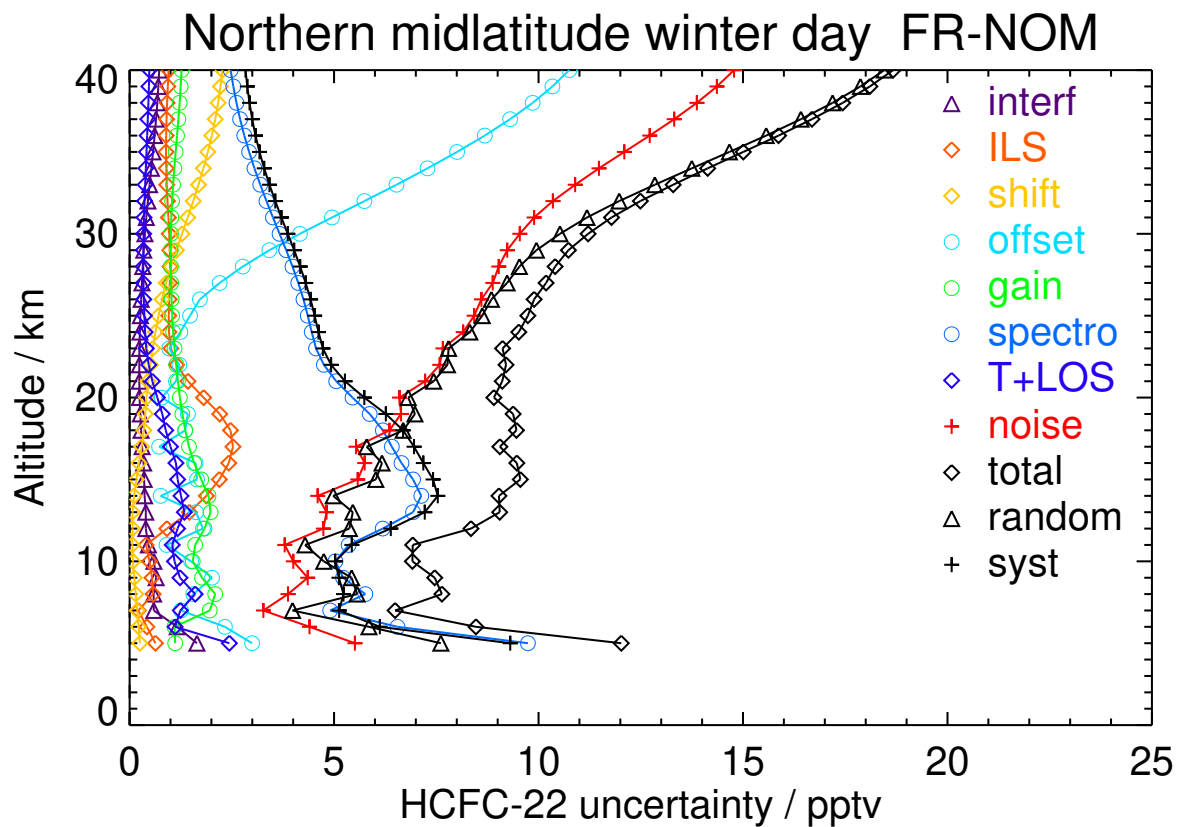
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	160.08	0.68	0.48	0.14	1.57	1.41	5.77	1.06	3.53	5.14	5.06	7.21
11	152.71	0.52	0.44	0.07	1.96	1.69	5.26	0.97	4.24	5.11	5.25	7.33
14	138.24	0.37	1.51	0.10	2.01	2.28	7.43	1.27	5.03	5.65	7.87	9.69
17	113.28	0.31	2.50	0.27	1.89	1.68	6.99	1.13	6.00	6.46	7.57	9.95
20	94.98	0.24	2.08	0.36	1.63	1.30	5.58	0.76	6.98	7.28	6.03	9.45
23	84.37	0.23	1.19	0.46	1.42	1.01	4.51	0.49	7.93	8.12	4.73	9.39
26	75.31	0.28	0.87	0.62	2.30	0.91	3.87	0.38	8.82	9.17	4.04	10.02
29	65.73	0.34	0.78	0.88	4.49	0.89	3.23	0.34	9.75	10.79	3.40	11.32
32	57.65	0.43	0.77	1.19	7.27	0.90	2.71	0.36	11.28	13.50	2.88	13.80
35	52.52	0.55	0.83	1.47	9.81	0.94	2.34	0.43	13.17	16.52	2.56	16.72
38	49.29	0.64	0.93	1.68	11.81	1.00	2.10	0.49	14.85	19.08	2.37	19.23
41	48.32	0.72	1.00	1.91	12.85	1.05	1.91	0.54	15.73	20.44	2.25	20.56



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

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

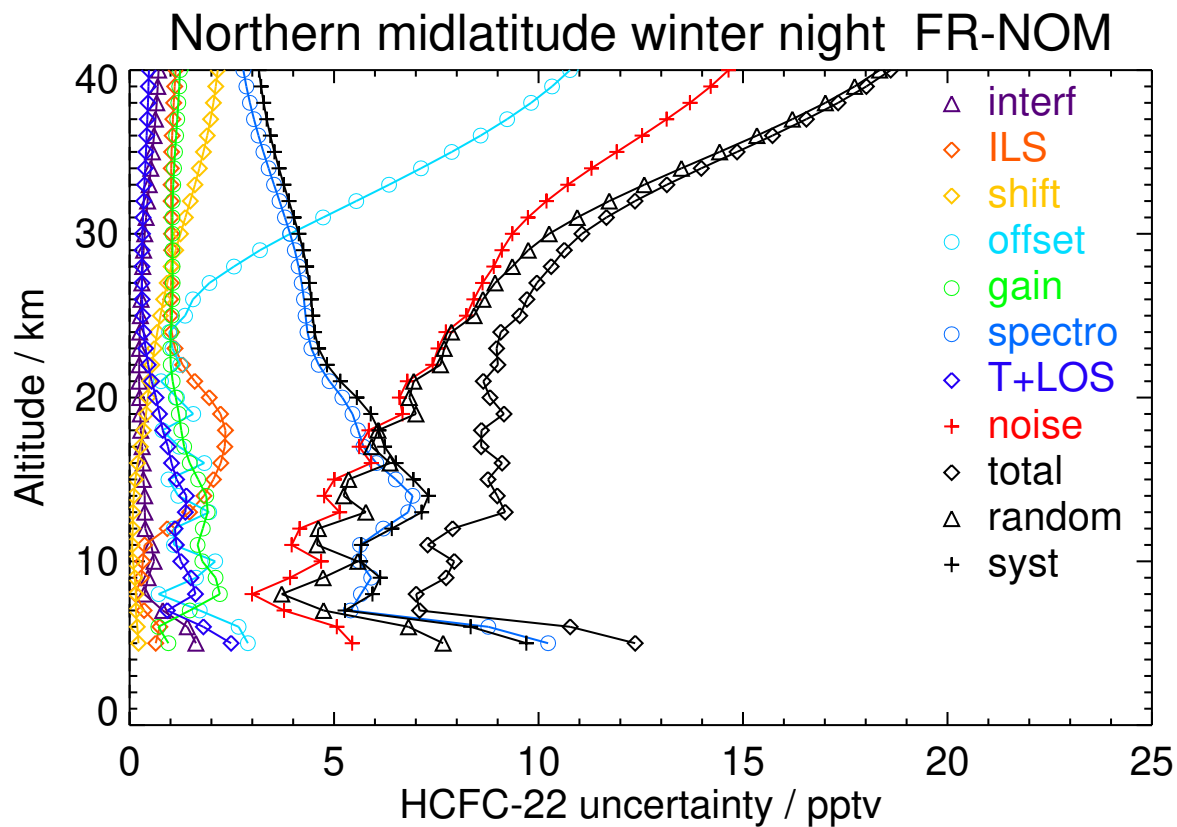
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	161.68	1.65	0.63	0.25	3.00	1.11	9.74	2.44	5.51	7.61	9.31	12.02
8	158.16	0.59	0.58	0.15	1.56	2.09	5.76	1.60	3.87	5.56	5.23	7.64
11	144.79	0.46	0.40	0.07	0.90	1.60	5.36	1.04	3.79	4.29	5.43	6.92
14	130.25	0.37	1.88	0.11	0.76	1.93	7.13	1.26	4.60	4.98	7.54	9.03
17	115.25	0.30	2.53	0.29	0.72	1.45	6.41	1.00	5.54	5.80	6.95	9.05
20	101.52	0.24	1.81	0.41	0.78	1.23	5.45	0.68	6.60	6.81	5.74	8.91
23	95.29	0.24	1.01	0.56	0.97	1.10	4.56	0.41	7.66	7.80	4.73	9.12
26	88.07	0.28	0.97	0.79	1.72	1.03	4.25	0.35	8.60	8.85	4.43	9.89
29	80.17	0.35	0.98	1.14	3.42	1.01	3.83	0.34	9.23	9.95	4.02	10.73
32	70.76	0.45	0.93	1.56	5.74	1.04	3.35	0.37	10.35	11.97	3.56	12.49
35	63.92	0.57	0.89	1.91	8.01	1.13	2.92	0.41	12.10	14.67	3.18	15.01
38	60.01	0.68	0.92	2.16	9.86	1.22	2.61	0.46	13.87	17.19	2.93	17.44
41	57.76	0.74	0.98	2.33	11.05	1.29	2.40	0.49	15.08	18.87	2.79	19.08



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

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

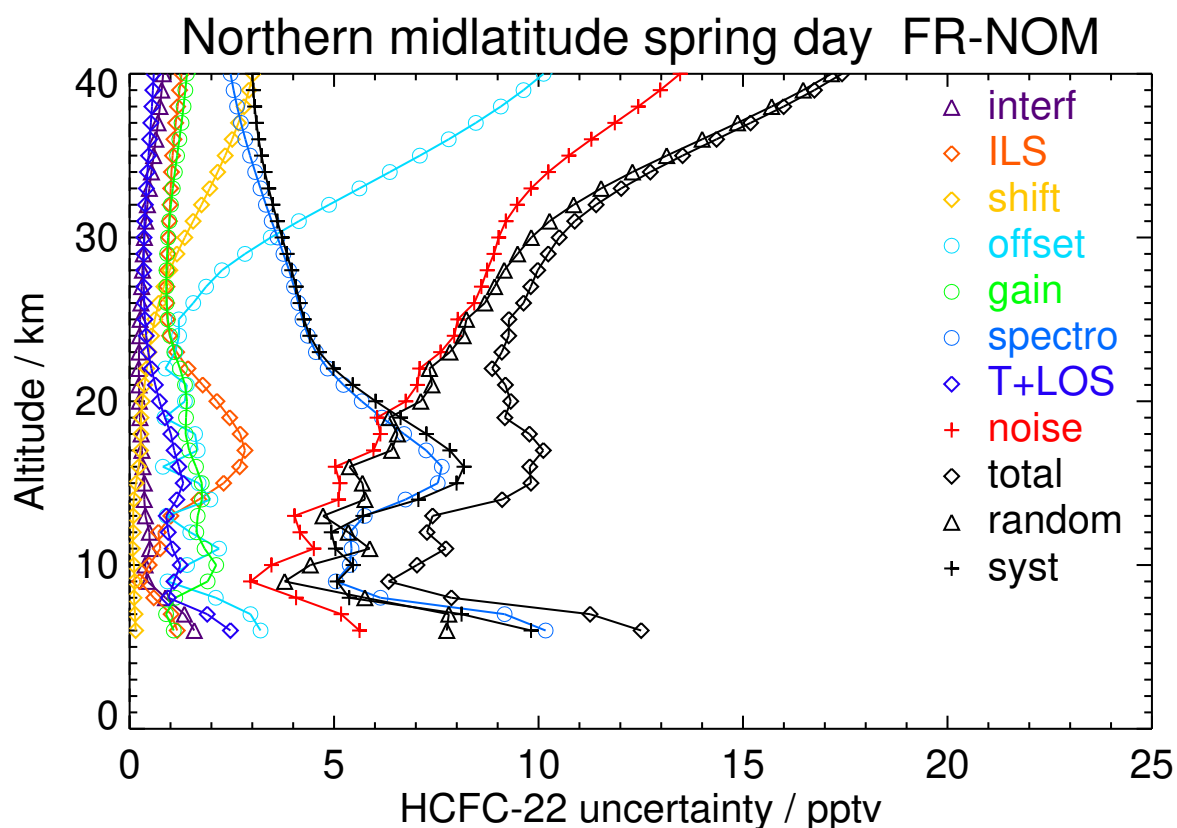
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	161.11	1.62	0.64	0.22	2.89	0.95	10.23	2.48	5.44	7.67	9.70	12.36
8	160.01	0.36	0.14	0.16	0.71	2.21	5.66	1.61	2.99	3.72	5.94	7.01
11	145.53	0.53	0.37	0.06	1.08	1.66	5.63	1.14	3.96	4.58	5.67	7.29
14	125.30	0.37	1.82	0.10	1.19	1.88	6.92	1.39	4.76	5.23	7.31	8.99
17	112.79	0.31	2.33	0.26	1.21	1.33	5.72	0.94	5.61	5.92	6.23	8.60
20	102.24	0.25	1.95	0.45	1.16	1.13	5.20	0.65	6.60	6.84	5.56	8.81
23	95.22	0.24	1.11	0.61	1.05	0.99	4.44	0.39	7.54	7.69	4.62	8.97
26	92.49	0.28	1.00	0.83	1.55	1.05	4.26	0.31	8.42	8.64	4.44	9.72
29	86.30	0.34	1.03	1.13	3.19	1.05	4.04	0.31	9.10	9.75	4.24	10.63
32	78.60	0.44	1.02	1.48	5.54	1.06	3.67	0.35	10.19	11.73	3.89	12.36
35	72.87	0.56	1.03	1.81	7.88	1.11	3.27	0.40	11.91	14.43	3.54	14.86
38	68.93	0.66	1.08	2.05	9.82	1.19	2.94	0.45	13.70	17.01	3.28	17.33
41	65.80	0.73	1.15	2.19	11.15	1.25	2.72	0.48	15.02	18.86	3.12	19.12



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

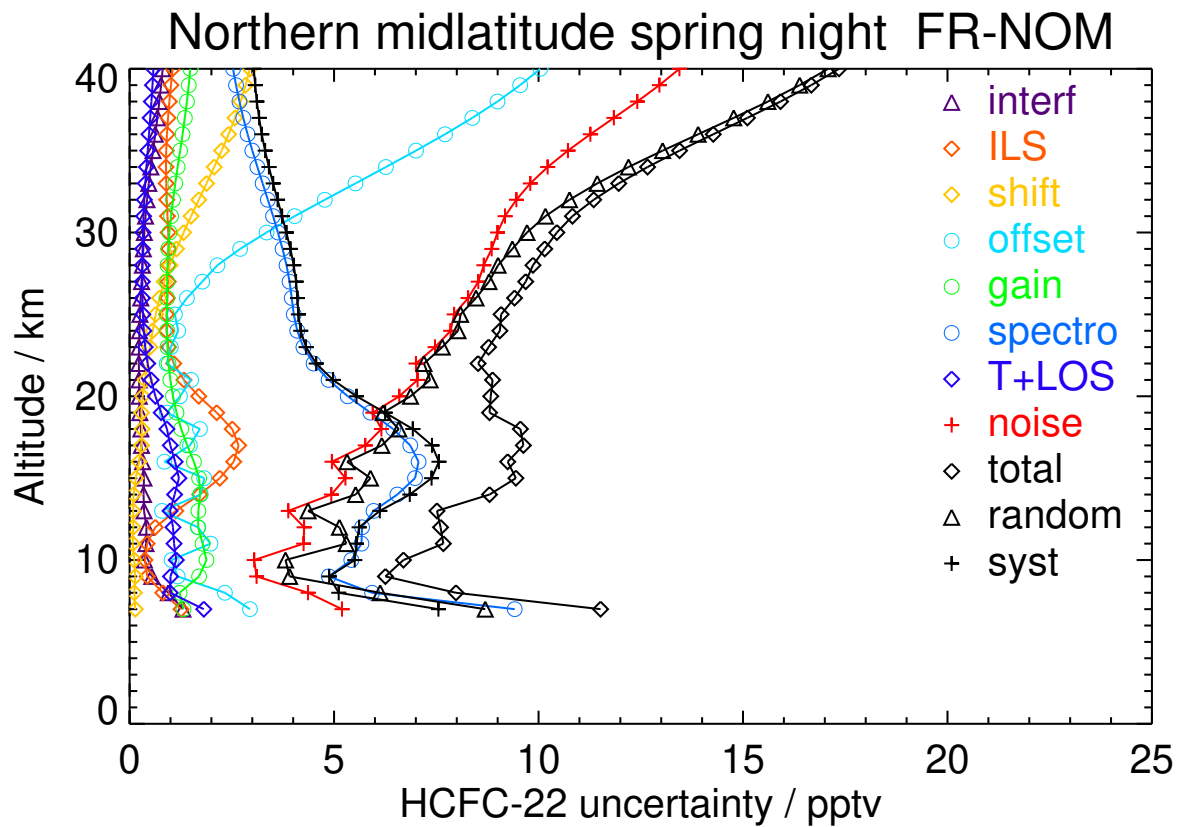
**Table S12.** HCFC-22 error budget for Northern midlatitude spring day. All uncertainties are  $1\sigma$ .

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	155.58	0.88	0.59	0.11	2.11	1.12	6.14	0.95	4.07	5.75	5.37	7.87
11	146.39	0.49	0.75	0.07	2.19	1.83	5.43	1.04	4.50	5.87	5.03	7.73
14	132.72	0.36	1.69	0.10	1.98	1.77	6.75	1.16	5.11	5.76	7.06	9.11
17	116.30	0.30	2.82	0.27	1.66	1.46	7.25	1.09	5.96	6.41	7.83	10.12
20	98.64	0.24	2.14	0.31	1.35	1.40	5.68	0.73	6.75	7.12	6.02	9.32
23	90.57	0.23	1.15	0.47	1.11	1.09	4.56	0.46	7.61	7.83	4.64	9.10
26	84.99	0.28	0.91	0.72	1.56	0.90	4.13	0.36	8.43	8.69	4.17	9.63
29	79.76	0.34	0.94	1.16	2.82	0.92	3.76	0.35	8.91	9.49	3.85	10.24
32	73.15	0.44	0.99	1.76	4.88	1.01	3.33	0.39	9.48	10.86	3.50	11.41
35	68.48	0.59	1.05	2.34	7.10	1.16	2.95	0.46	10.74	13.13	3.23	13.52
38	64.53	0.74	1.17	2.80	9.08	1.32	2.63	0.55	12.44	15.70	3.06	15.99
41	61.13	0.85	1.32	3.10	10.55	1.43	2.41	0.61	13.88	17.76	2.98	18.00

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

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

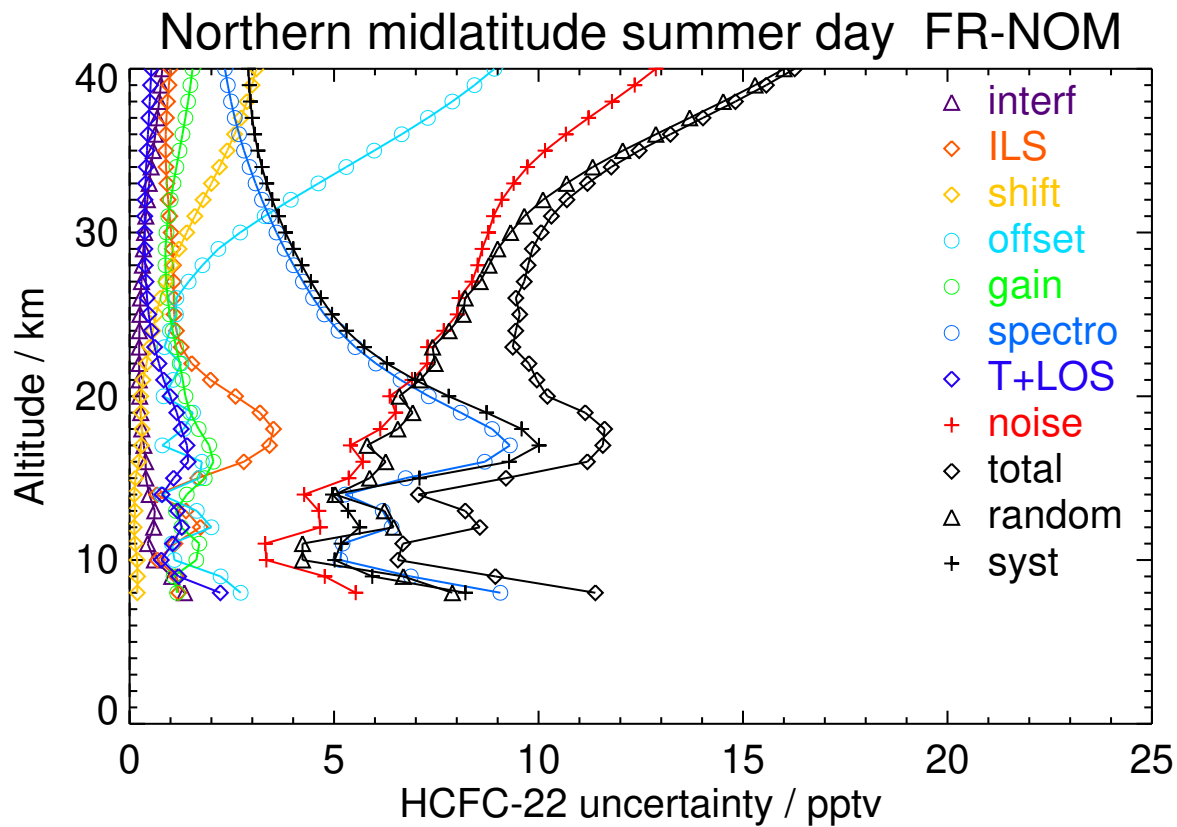
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.05	0.95	0.81	0.12	2.33	1.22	5.93	0.99	4.36	6.13	5.11	7.98
11	141.20	0.40	0.43	0.08	1.98	1.78	5.67	1.09	4.25	5.30	5.55	7.67
14	129.73	0.34	1.71	0.10	1.74	1.73	6.55	1.10	4.93	5.53	6.85	8.80
17	112.49	0.29	2.67	0.29	1.48	1.41	6.86	1.00	5.76	6.17	7.39	9.63
20	96.26	0.24	1.69	0.32	1.23	1.06	5.33	0.63	6.59	6.87	5.55	8.83
23	89.54	0.23	0.95	0.50	1.01	0.93	4.25	0.38	7.47	7.65	4.31	8.78
26	88.34	0.27	0.92	0.73	1.40	0.91	3.97	0.31	8.28	8.47	4.10	9.41
29	84.72	0.34	0.96	1.15	2.70	0.95	3.74	0.32	8.85	9.36	3.93	10.15
32	78.86	0.43	0.91	1.69	4.77	1.06	3.38	0.36	9.46	10.76	3.62	11.35
35	72.23	0.57	0.90	2.25	7.00	1.23	3.00	0.44	10.72	13.03	3.31	13.45
38	66.65	0.73	0.97	2.72	9.00	1.40	2.69	0.53	12.41	15.61	3.11	15.92
41	63.24	0.84	1.09	3.03	10.47	1.51	2.47	0.60	13.87	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  $1\sigma$ .

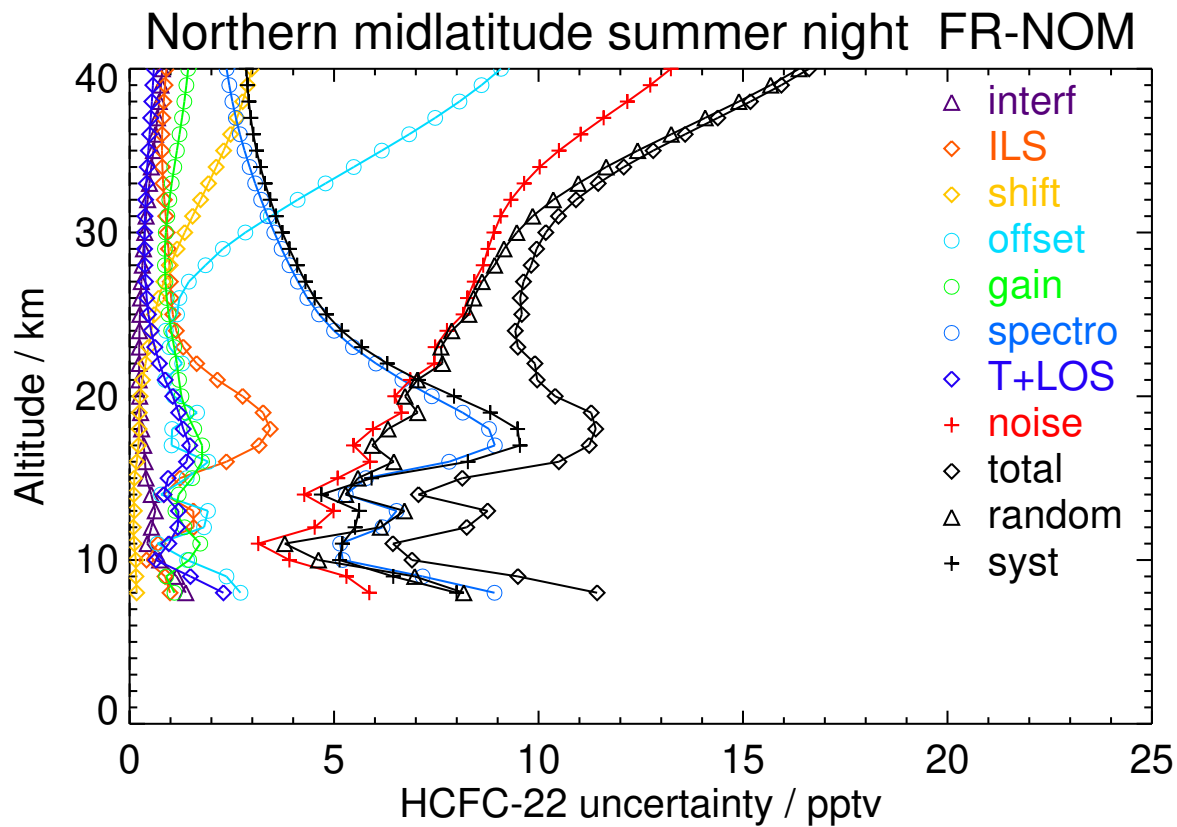
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	156.23	1.34	1.20	0.19	2.72	1.16	9.07	2.22	5.53	7.89	8.21	11.39
11	162.01	0.44	1.11	0.14	1.03	1.70	5.21	1.05	3.31	4.23	5.17	6.68
14	153.08	0.48	0.66	0.11	0.77	1.40	5.27	0.79	4.27	5.03	4.96	7.06
17	136.68	0.35	3.42	0.29	0.80	1.95	9.30	1.40	5.40	5.81	10.01	11.57
20	116.54	0.25	2.59	0.27	0.83	1.37	7.32	0.99	6.36	6.59	7.80	10.22
23	98.97	0.23	1.26	0.49	0.85	1.14	5.52	0.61	7.29	7.41	5.74	9.37
26	87.81	0.27	1.08	0.75	1.15	0.93	4.49	0.43	8.06	8.20	4.68	9.44
29	81.45	0.34	1.05	1.21	2.17	0.88	3.79	0.37	8.62	9.00	4.00	9.85
32	75.08	0.43	0.94	1.80	3.94	1.00	3.24	0.38	9.10	10.11	3.49	10.69
35	69.92	0.58	0.88	2.39	5.98	1.22	2.80	0.43	10.16	12.06	3.14	12.46
38	66.01	0.72	0.93	2.87	7.89	1.43	2.48	0.49	11.80	14.52	2.95	14.81
41	62.98	0.83	1.04	3.19	9.35	1.58	2.27	0.55	13.32	16.62	2.89	16.87



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

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

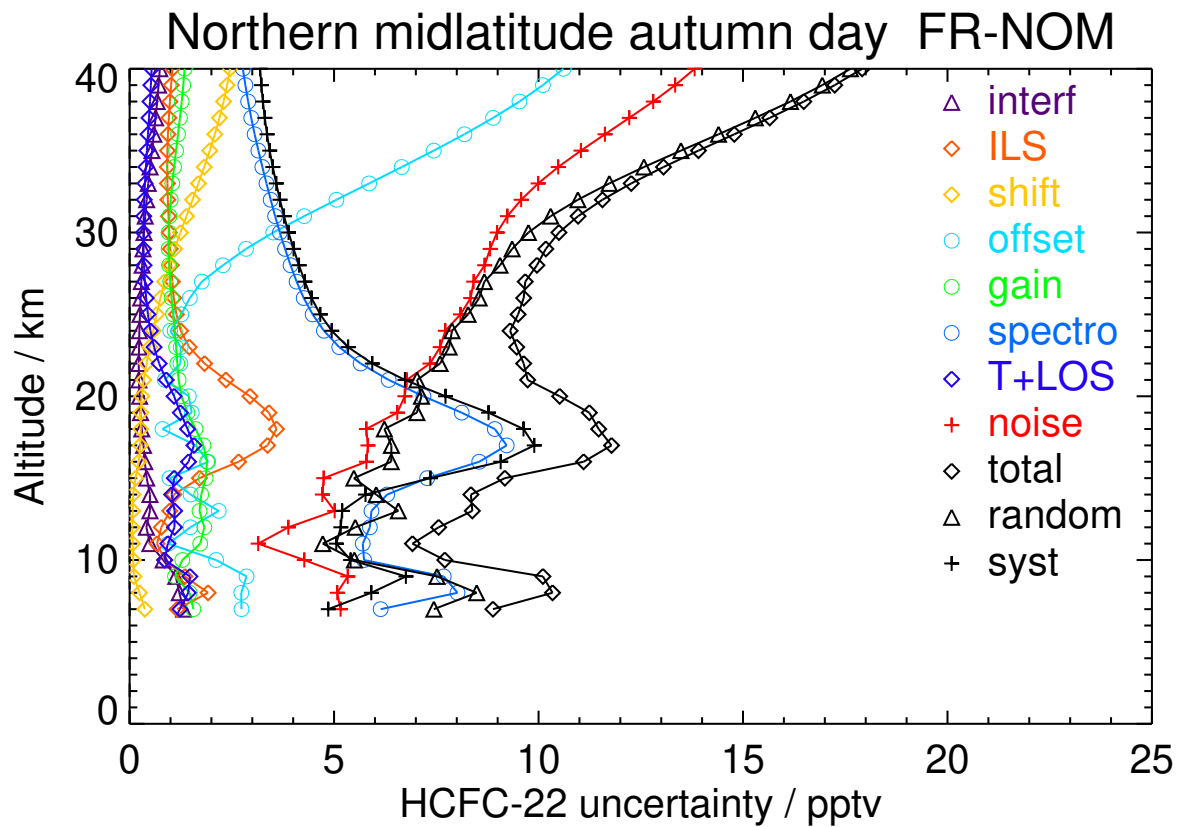
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	165.91	1.37	0.99	0.17	2.71	1.10	8.92	2.29	5.86	8.17	7.99	11.43
11	164.44	0.43	0.70	0.11	0.68	1.73	5.15	0.96	3.15	3.79	5.20	6.44
14	152.71	0.53	0.84	0.10	0.77	1.20	5.29	0.84	4.27	5.28	4.69	7.06
17	135.08	0.35	3.16	0.22	1.03	1.77	8.93	1.47	5.48	5.93	9.54	11.24
20	112.81	0.25	2.77	0.26	1.08	1.27	7.39	1.06	6.48	6.74	7.93	10.41
23	95.05	0.24	1.31	0.46	0.98	1.09	5.46	0.62	7.47	7.61	5.67	9.49
26	87.15	0.27	1.01	0.71	1.22	0.91	4.35	0.42	8.26	8.41	4.53	9.55
29	82.64	0.34	0.95	1.16	2.28	0.86	3.72	0.37	8.76	9.15	3.91	9.95
32	77.05	0.44	0.85	1.74	4.11	0.97	3.22	0.39	9.32	10.36	3.44	10.92
35	72.30	0.58	0.79	2.30	6.17	1.16	2.81	0.46	10.50	12.42	3.10	12.80
38	68.50	0.73	0.84	2.77	8.07	1.34	2.51	0.54	12.17	14.90	2.92	15.18
41	65.12	0.83	0.94	3.08	9.50	1.47	2.31	0.61	13.69	16.99	2.83	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  $1\sigma$ .

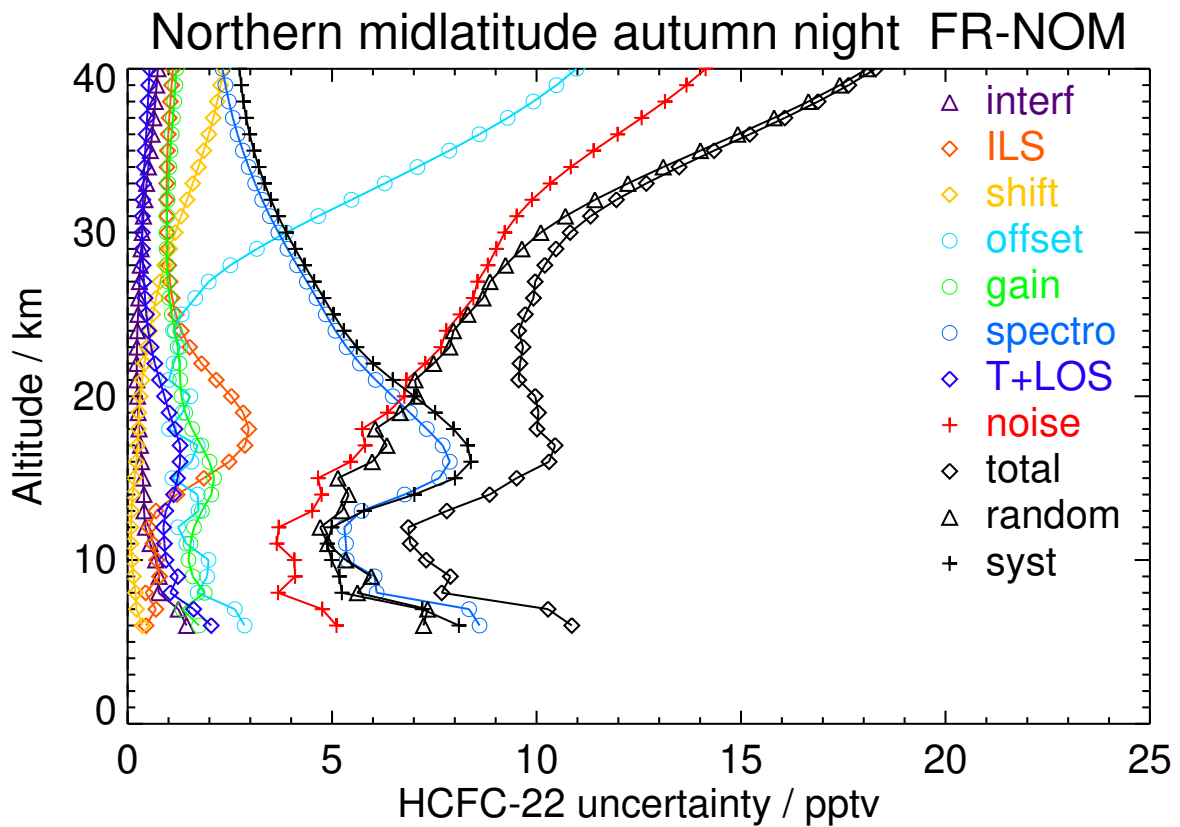
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	163.58	1.22	1.92	0.24	2.73	1.47	8.02	1.43	5.08	8.49	5.91	10.34
11	161.88	0.50	0.67	0.07	0.95	1.73	5.70	0.93	3.15	4.72	5.05	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

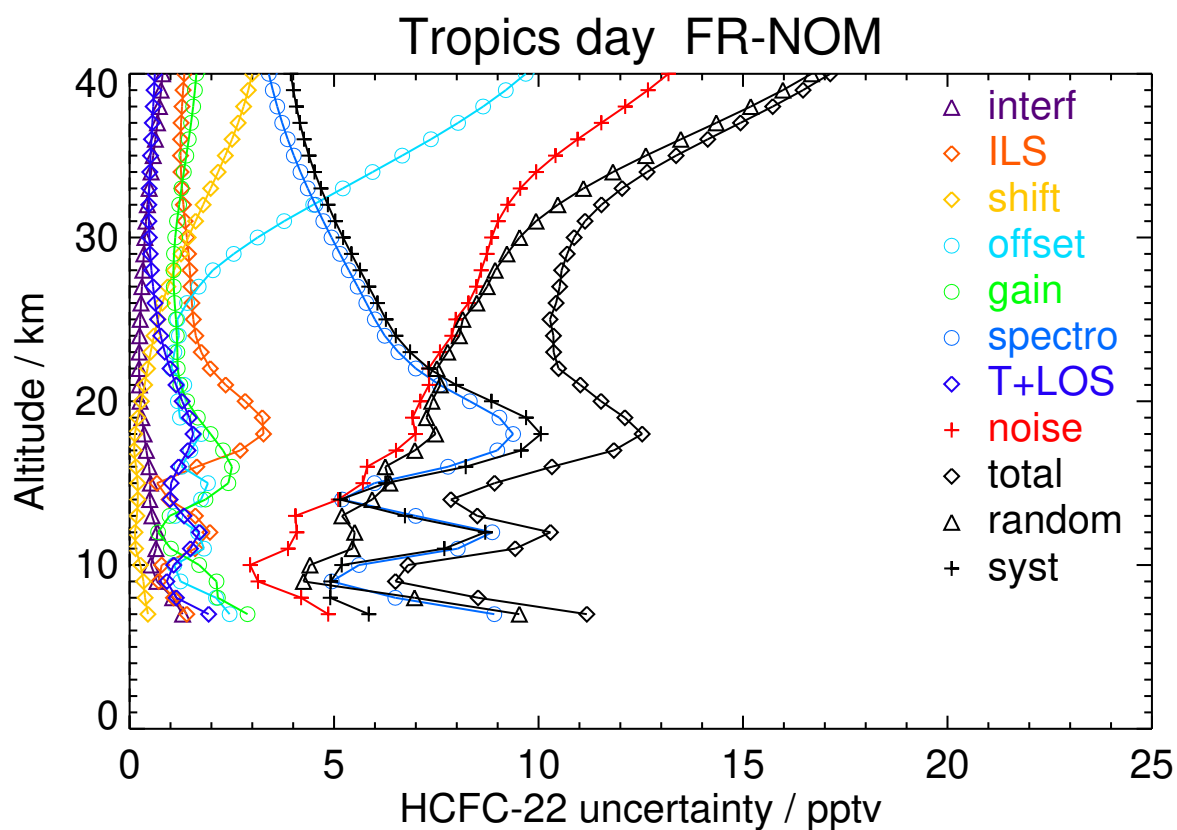
**Table S17.** HCFC-22 error budget for Northern midlatitude autumn night. All uncertainties are  $1\sigma$ .

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	161.97	0.76	0.44	0.19	1.71	1.88	6.09	1.05	3.68	5.62	5.24	7.68
11	157.06	0.55	0.62	0.08	1.44	1.54	5.34	0.90	3.65	4.89	4.88	6.91
14	148.40	0.40	1.21	0.12	1.71	2.05	6.77	1.13	4.74	5.40	7.01	8.85
17	127.64	0.32	2.87	0.25	1.71	1.80	7.70	1.28	5.81	6.34	8.31	10.45
20	109.56	0.24	2.54	0.31	1.53	1.32	6.48	0.90	6.77	7.09	7.01	9.97
23	98.56	0.23	1.52	0.47	1.28	1.23	5.36	0.57	7.66	7.88	5.60	9.67
26	87.23	0.27	1.09	0.70	1.65	1.02	4.62	0.43	8.45	8.69	4.80	9.93
29	78.45	0.33	0.98	1.03	3.16	0.96	3.91	0.36	9.02	9.64	4.10	10.48
32	71.38	0.42	0.95	1.45	5.47	0.97	3.29	0.37	9.89	11.43	3.50	11.95
35	64.88	0.55	0.98	1.86	7.86	1.05	2.82	0.43	11.40	14.01	3.09	14.34
38	60.49	0.68	1.05	2.19	9.92	1.14	2.48	0.50	13.14	16.65	2.83	16.89
41	57.76	0.76	1.14	2.40	11.40	1.21	2.26	0.55	14.54	18.67	2.71	18.87

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

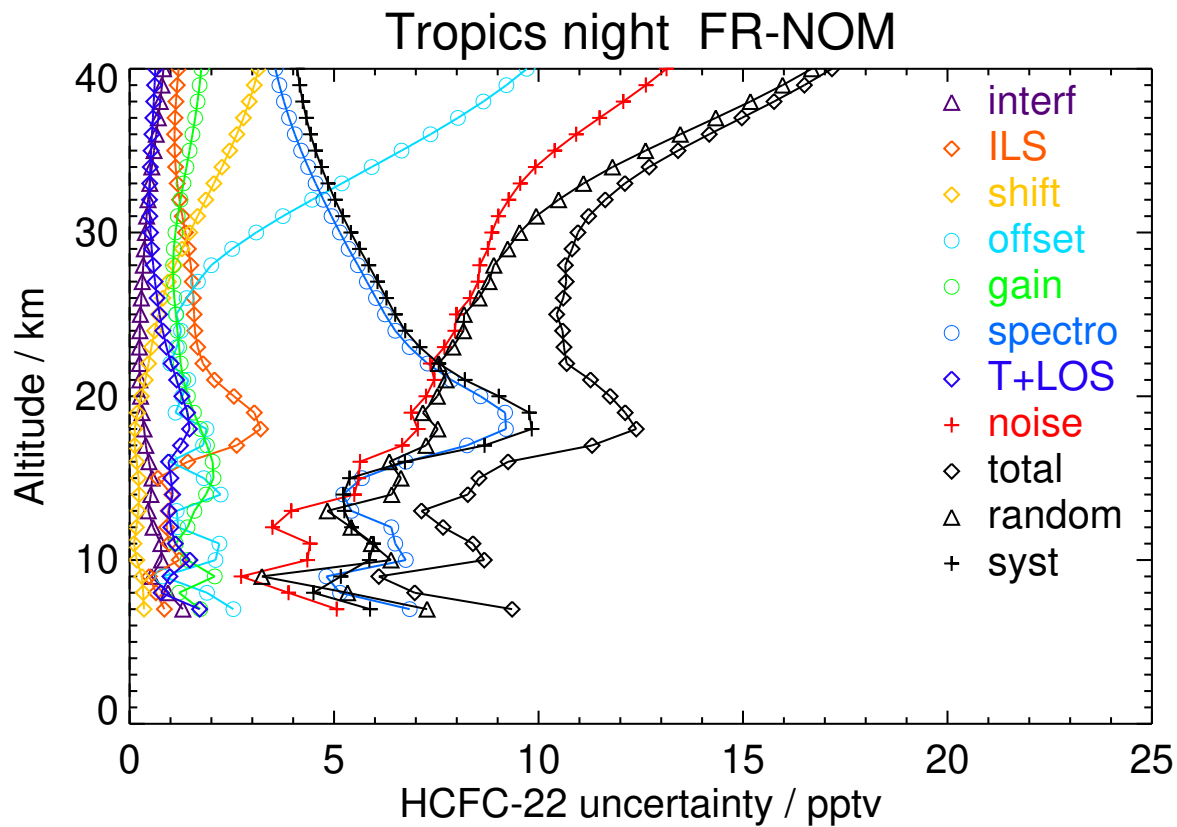
**Table S18.** HCFC-22 error budget for Tropics day. All uncertainties are  $1\sigma$ .

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	151.69	1.05	1.07	0.38	2.11	2.16	6.50	1.14	4.19	6.97	4.91	8.52
11	155.23	0.64	1.60	0.15	1.82	1.01	8.02	1.49	3.87	5.45	7.70	9.43
14	159.87	0.49	0.97	0.20	1.75	1.86	5.19	0.99	5.10	5.93	5.15	7.86
17	151.39	0.41	2.71	0.11	1.49	2.28	8.99	1.43	6.51	6.97	9.57	11.84
20	134.74	0.26	2.83	0.29	1.18	1.41	8.32	1.29	7.11	7.39	8.85	11.53
23	123.14	0.23	1.75	0.52	1.10	1.17	6.57	0.86	7.59	7.78	6.86	10.37
26	115.55	0.28	1.52	0.80	1.41	1.10	5.79	0.62	8.29	8.49	6.06	10.43
29	109.84	0.35	1.44	1.26	2.55	1.09	5.15	0.50	8.74	9.23	5.42	10.70
32	102.24	0.43	1.32	1.80	4.49	1.21	4.54	0.47	9.25	10.47	4.85	11.54
35	96.35	0.58	1.25	2.34	6.67	1.39	4.02	0.51	10.41	12.62	4.38	13.36
38	90.75	0.73	1.28	2.79	8.64	1.55	3.61	0.58	12.12	15.19	4.08	15.73
41	86.51	0.84	1.37	3.08	10.11	1.66	3.32	0.63	13.60	17.27	3.89	17.71

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

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

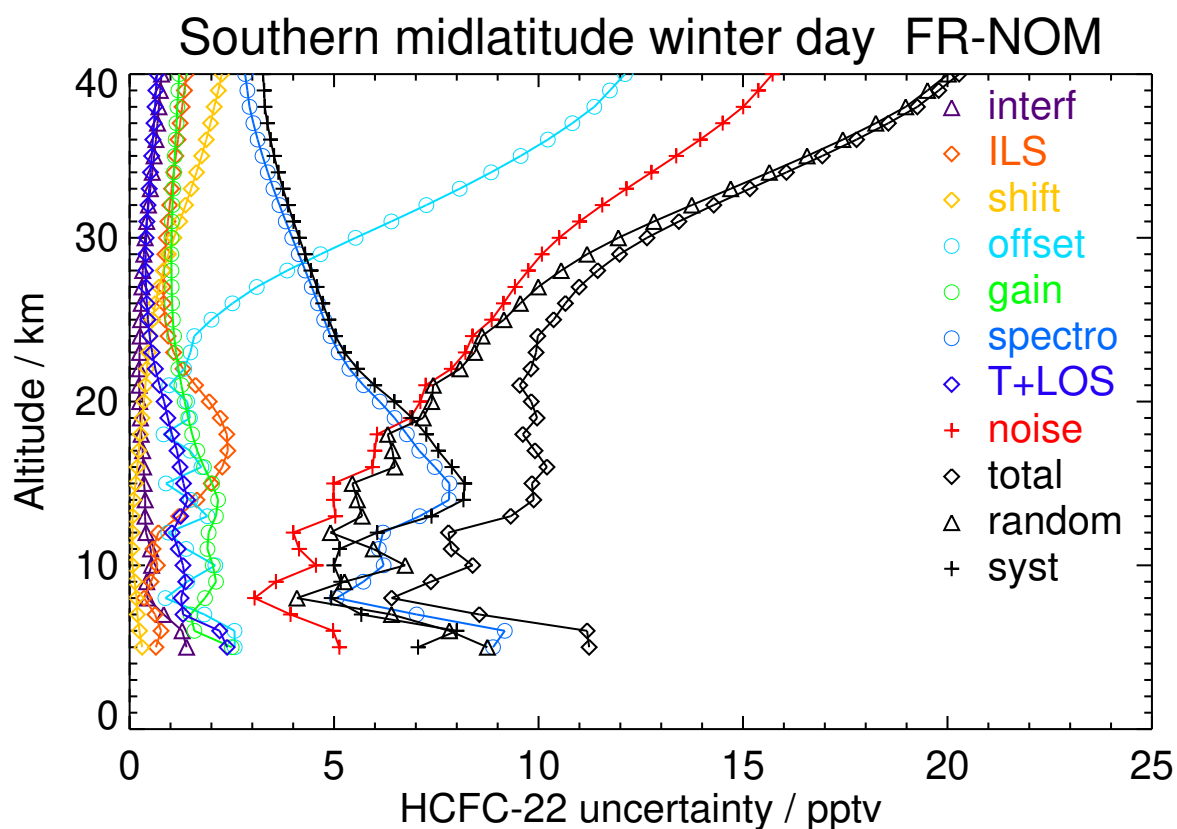
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	149.26	0.94	0.65	0.33	1.89	1.21	5.15	0.77	3.89	5.33	4.50	6.97
11	151.14	0.77	0.96	0.11	2.20	1.13	6.50	1.12	4.41	5.91	5.96	8.40
14	162.58	0.52	1.03	0.23	2.23	1.87	5.22	1.05	5.49	6.41	5.23	8.27
17	151.77	0.40	2.62	0.12	1.80	1.89	8.25	1.25	6.66	7.25	8.68	11.31
20	137.28	0.27	2.55	0.29	1.29	1.43	8.58	1.28	7.25	7.52	9.03	11.75
23	126.63	0.24	1.66	0.54	1.15	1.21	6.85	0.90	7.70	7.90	7.10	10.62
26	120.59	0.29	1.56	0.81	1.39	1.09	6.02	0.67	8.33	8.54	6.28	10.60
29	113.47	0.36	1.44	1.28	2.51	1.08	5.36	0.54	8.76	9.24	5.62	10.82
32	105.73	0.45	1.22	1.86	4.46	1.24	4.74	0.49	9.27	10.49	5.02	11.63
35	98.32	0.60	1.10	2.45	6.65	1.47	4.19	0.53	10.39	12.62	4.55	13.41
38	92.26	0.75	1.13	2.93	8.65	1.66	3.77	0.59	12.07	15.18	4.23	15.76
41	88.18	0.86	1.24	3.24	10.15	1.79	3.48	0.65	13.56	17.29	4.05	17.76



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

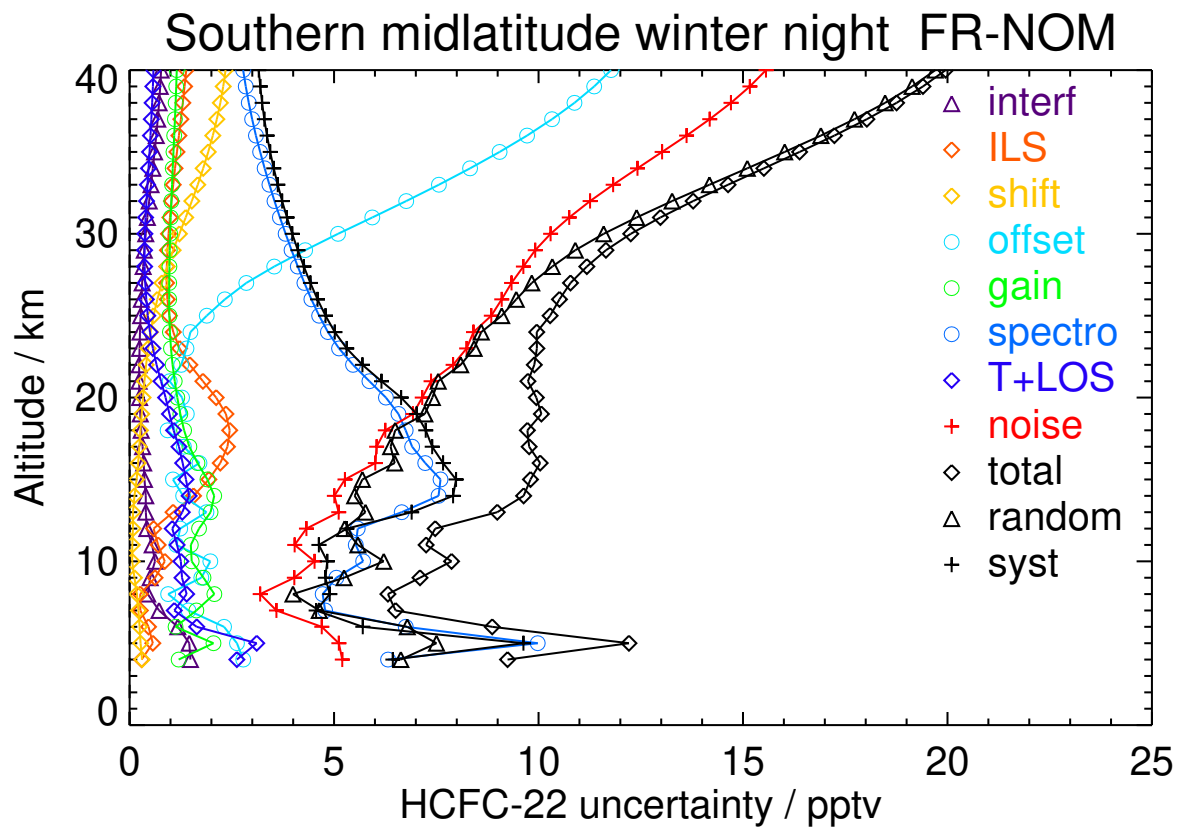
**Table S20.** HCFC-22 error budget for Southern midlatitude winter day. All uncertainties are  $1\sigma$ .

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	1.39	0.64	0.31	2.57	2.50	8.89	2.38	5.13	8.75	7.05	11.24
8	148.71	0.43	0.35	0.17	0.87	1.84	5.06	1.26	3.06	4.09	4.93	6.41
11	148.73	0.51	0.57	0.06	1.38	1.90	6.09	1.19	4.14	5.96	5.13	7.86
14	135.44	0.38	1.65	0.10	1.49	2.16	7.81	1.42	4.99	5.57	8.16	9.88
17	121.62	0.32	2.40	0.22	1.48	1.65	7.08	1.16	5.99	6.43	7.55	9.91
20	105.37	0.25	1.95	0.35	1.41	1.35	6.12	0.84	7.11	7.39	6.47	9.82
23	97.15	0.24	1.08	0.46	1.49	1.13	5.11	0.55	8.21	8.44	5.26	9.94
26	90.52	0.29	0.83	0.63	2.51	1.04	4.61	0.42	9.14	9.55	4.72	10.66
29	84.56	0.35	0.86	0.95	4.67	1.02	4.14	0.39	10.08	11.19	4.29	11.98
32	76.49	0.46	0.98	1.37	7.26	1.05	3.66	0.45	11.56	13.75	3.87	14.28
35	68.78	0.60	1.13	1.76	9.56	1.11	3.25	0.54	13.37	16.57	3.53	16.94
38	63.14	0.72	1.29	2.07	11.36	1.17	2.93	0.62	15.00	18.98	3.31	19.26
41	61.35	0.81	1.46	2.39	12.31	1.23	2.74	0.70	15.95	20.33	3.23	20.59

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

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

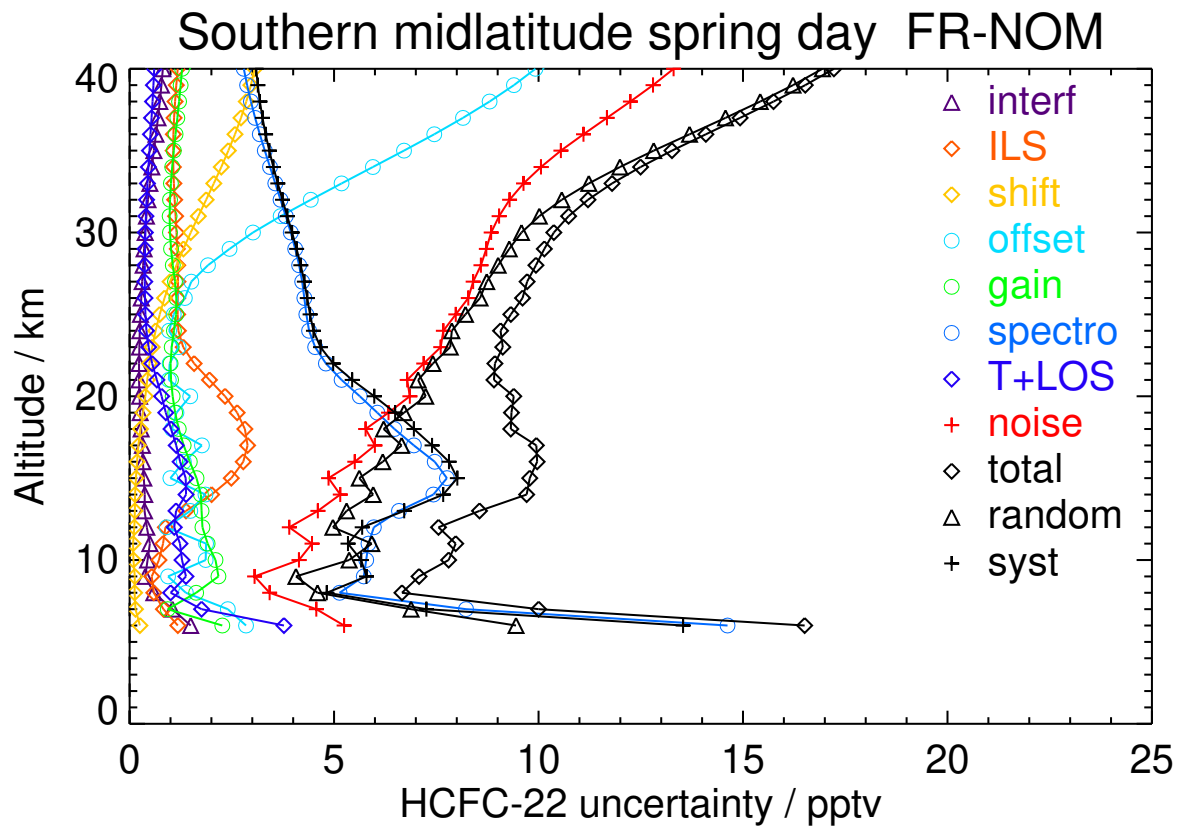
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	148.29	1.46	0.57	0.27	2.63	2.05	9.98	3.11	5.12	7.50	9.63	12.21
8	149.87	0.44	0.26	0.18	0.94	2.07	4.72	1.40	3.19	3.99	4.89	6.32
11	151.99	0.55	0.70	0.07	1.14	1.50	5.53	1.16	4.04	5.58	4.63	7.25
14	137.55	0.39	1.56	0.12	1.31	2.07	7.55	1.46	5.01	5.50	7.91	9.64
17	123.13	0.32	2.39	0.24	1.33	1.46	6.91	1.21	6.04	6.38	7.40	9.77
20	106.88	0.24	2.12	0.33	1.28	1.17	6.27	0.88	7.16	7.40	6.64	9.95
23	94.43	0.24	1.22	0.45	1.39	1.01	5.12	0.57	8.24	8.43	5.31	9.96
26	87.04	0.29	0.92	0.68	2.33	0.97	4.45	0.41	9.10	9.45	4.59	10.51
29	83.03	0.36	0.93	1.06	4.29	0.98	3.96	0.37	9.92	10.90	4.11	11.65
32	77.62	0.48	1.03	1.52	6.76	1.02	3.54	0.41	11.26	13.27	3.73	13.78
35	72.50	0.61	1.16	1.92	9.05	1.07	3.19	0.49	13.02	16.02	3.44	16.38
38	68.32	0.72	1.30	2.22	10.88	1.13	2.91	0.55	14.70	18.47	3.24	18.76
41	65.08	0.79	1.43	2.42	12.11	1.15	2.68	0.60	15.89	20.17	3.10	20.41



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

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

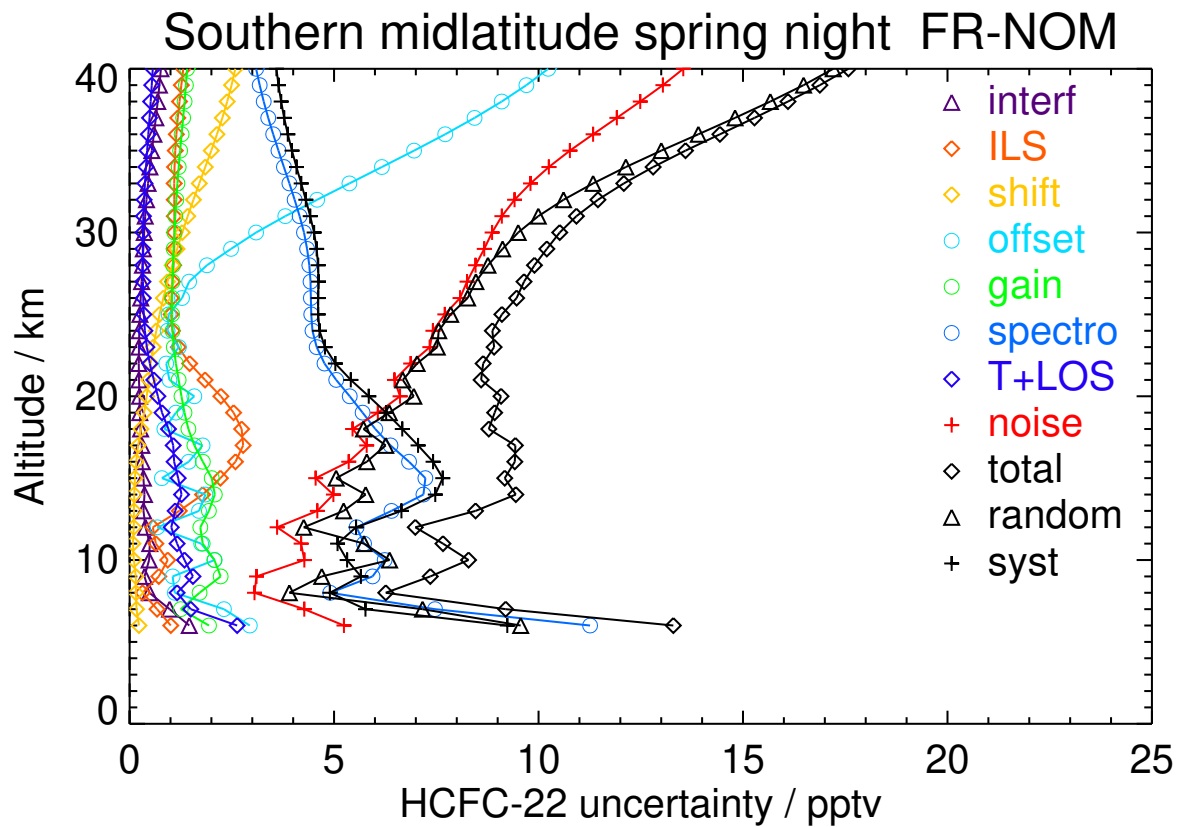
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.23	0.59	0.59	0.12	1.38	1.63	5.13	1.00	3.42	4.59	4.82	6.66
11	144.78	0.50	0.82	0.08	1.87	1.91	5.84	1.23	4.46	5.92	5.34	7.97
14	133.10	0.37	2.00	0.13	1.85	1.74	7.43	1.38	5.15	5.96	7.67	9.71
17	115.39	0.31	2.88	0.21	1.77	1.32	6.95	1.14	6.00	6.65	7.40	9.95
20	99.93	0.24	2.33	0.38	1.48	1.05	5.63	0.78	6.85	7.24	5.98	9.39
23	94.37	0.24	1.31	0.55	1.20	1.03	4.54	0.47	7.61	7.84	4.67	9.13
26	89.47	0.29	1.18	0.85	1.35	1.14	4.27	0.38	8.28	8.57	4.34	9.61
29	83.21	0.35	1.17	1.32	2.44	1.01	4.05	0.38	8.72	9.28	4.08	10.14
32	74.71	0.45	1.10	1.87	4.43	0.99	3.69	0.42	9.29	10.57	3.74	11.21
35	68.32	0.59	1.07	2.42	6.71	1.08	3.31	0.48	10.55	12.82	3.42	13.26
38	64.12	0.74	1.11	2.85	8.80	1.21	2.97	0.56	12.25	15.42	3.19	15.75
41	61.50	0.84	1.21	3.14	10.38	1.31	2.72	0.62	13.74	17.57	3.06	17.84



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

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

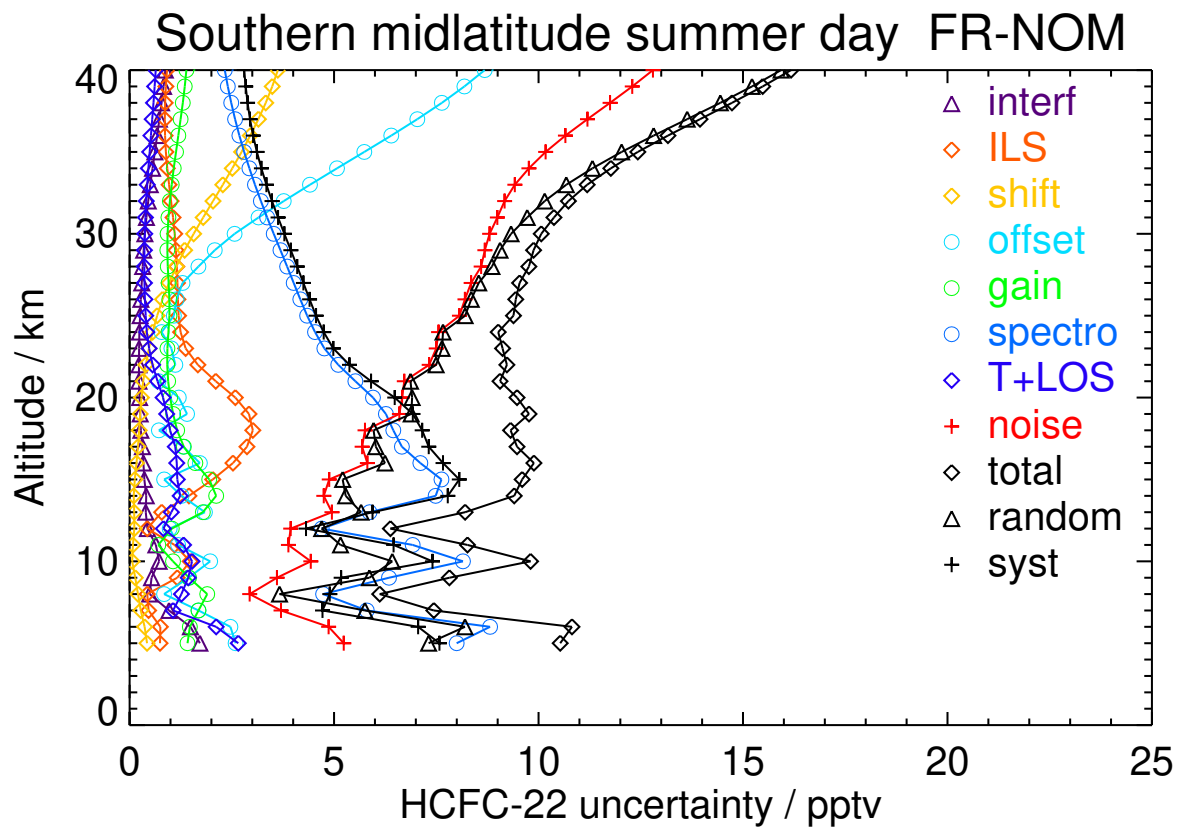
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	153.18	0.48	0.32	0.15	1.11	1.71	4.91	1.16	3.05	3.91	4.90	6.26
11	145.27	0.49	0.64	0.08	1.75	1.79	5.73	1.16	4.19	5.73	5.09	7.66
14	135.36	0.36	1.79	0.11	1.85	2.08	7.19	1.27	4.98	5.77	7.47	9.44
17	118.22	0.30	2.78	0.21	1.78	1.58	6.38	1.07	5.80	6.26	7.05	9.43
20	108.29	0.24	2.23	0.42	1.58	1.27	5.38	0.69	6.61	6.95	5.85	9.08
23	103.60	0.23	1.19	0.58	1.21	1.08	4.57	0.42	7.34	7.52	4.78	8.91
26	102.79	0.27	1.02	0.83	1.28	1.04	4.43	0.33	8.08	8.27	4.61	9.46
29	100.52	0.34	1.09	1.16	2.48	1.08	4.34	0.32	8.67	9.12	4.57	10.20
32	90.26	0.41	1.09	1.56	4.59	1.14	4.04	0.35	9.41	10.61	4.31	11.45
35	81.16	0.54	1.12	2.00	6.96	1.24	3.64	0.43	10.77	13.00	3.97	13.59
38	74.01	0.69	1.22	2.39	9.10	1.34	3.28	0.52	12.49	15.67	3.70	16.10
41	68.86	0.80	1.36	2.66	10.70	1.43	3.02	0.59	13.98	17.84	3.55	18.19



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

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

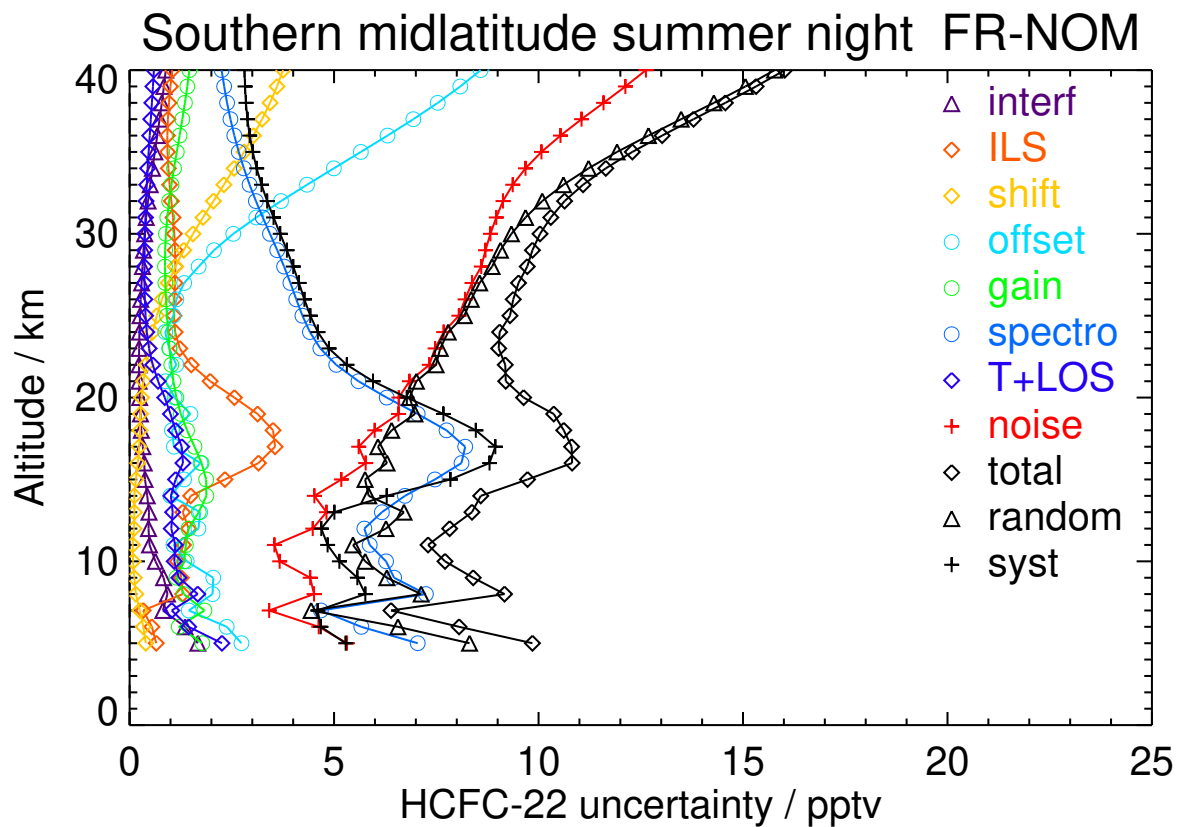
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	142.33	1.72	0.74	0.43	2.59	1.42	8.00	2.66	5.24	7.31	7.58	10.53
8	149.17	0.49	0.43	0.20	0.84	1.90	4.73	1.27	2.94	3.67	4.89	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  $1\sigma$ .

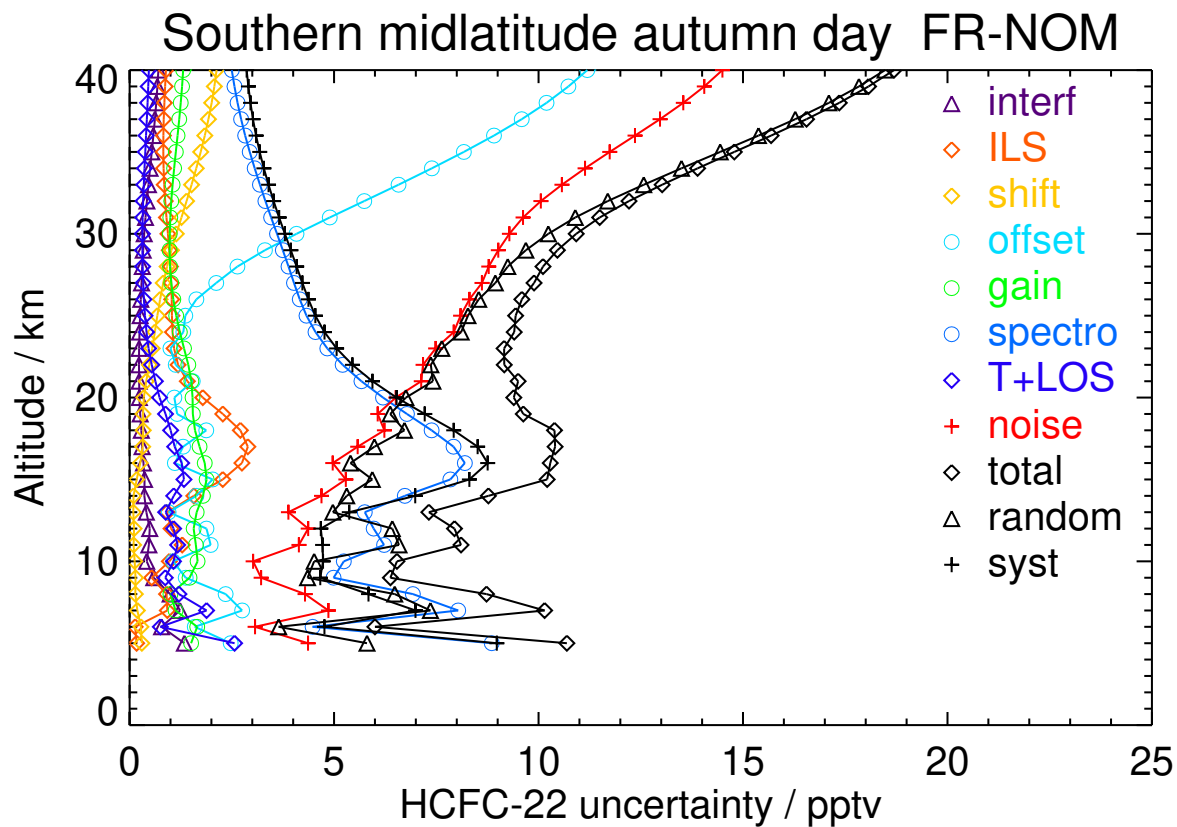
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	146.23	1.67	0.65	0.40	2.74	1.78	7.05	2.26	5.32	8.31	5.28	9.85
8	145.18	0.93	1.30	0.15	2.03	1.32	7.25	1.67	4.51	7.13	5.76	9.17
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  $1\sigma$ .

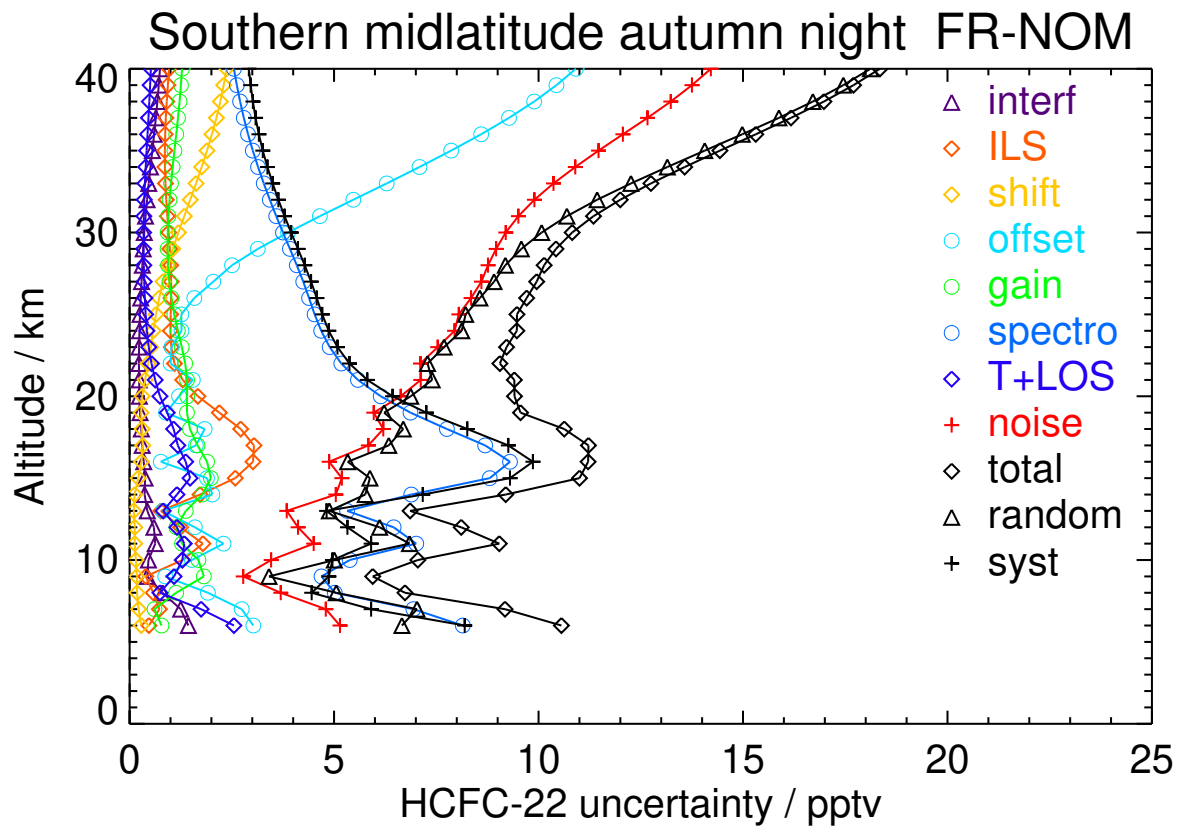
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
5	152.70	1.34	0.17	0.30	2.47	1.50	8.86	2.57	4.36	5.81	8.98	10.69
8	143.39	0.99	0.90	0.14	2.35	1.00	6.93	1.21	4.29	6.48	5.84	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	144.80	0.80	0.58	0.18	1.91	1.14	5.02	0.74	3.70	5.05	4.45	6.73
11	151.95	0.63	1.79	0.13	2.30	1.28	7.01	1.34	4.50	6.84	5.91	9.04
14	145.19	0.37	1.72	0.12	2.02	1.78	6.89	1.16	5.04	5.76	7.17	9.20
17	124.09	0.31	3.04	0.32	1.62	1.66	8.69	1.18	5.84	6.34	9.26	11.22
20	105.38	0.24	1.67	0.31	1.21	1.41	6.14	0.74	6.63	6.87	6.43	9.41
23	95.56	0.23	1.02	0.52	1.02	1.28	4.89	0.47	7.53	7.69	5.08	9.22
26	88.92	0.27	1.01	0.72	1.58	1.02	4.39	0.37	8.35	8.56	4.58	9.71
29	81.50	0.33	0.98	1.06	3.14	0.93	3.92	0.34	8.96	9.58	4.12	10.43
32	72.67	0.43	0.90	1.48	5.47	0.98	3.43	0.36	9.90	11.43	3.64	12.00
35	65.80	0.56	0.86	1.89	7.86	1.10	3.01	0.41	11.47	14.06	3.26	14.44
38	61.44	0.68	0.91	2.22	9.89	1.22	2.70	0.48	13.23	16.71	3.02	16.98
41	58.79	0.77	0.99	2.43	11.32	1.31	2.49	0.53	14.60	18.67	2.88	18.89



**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

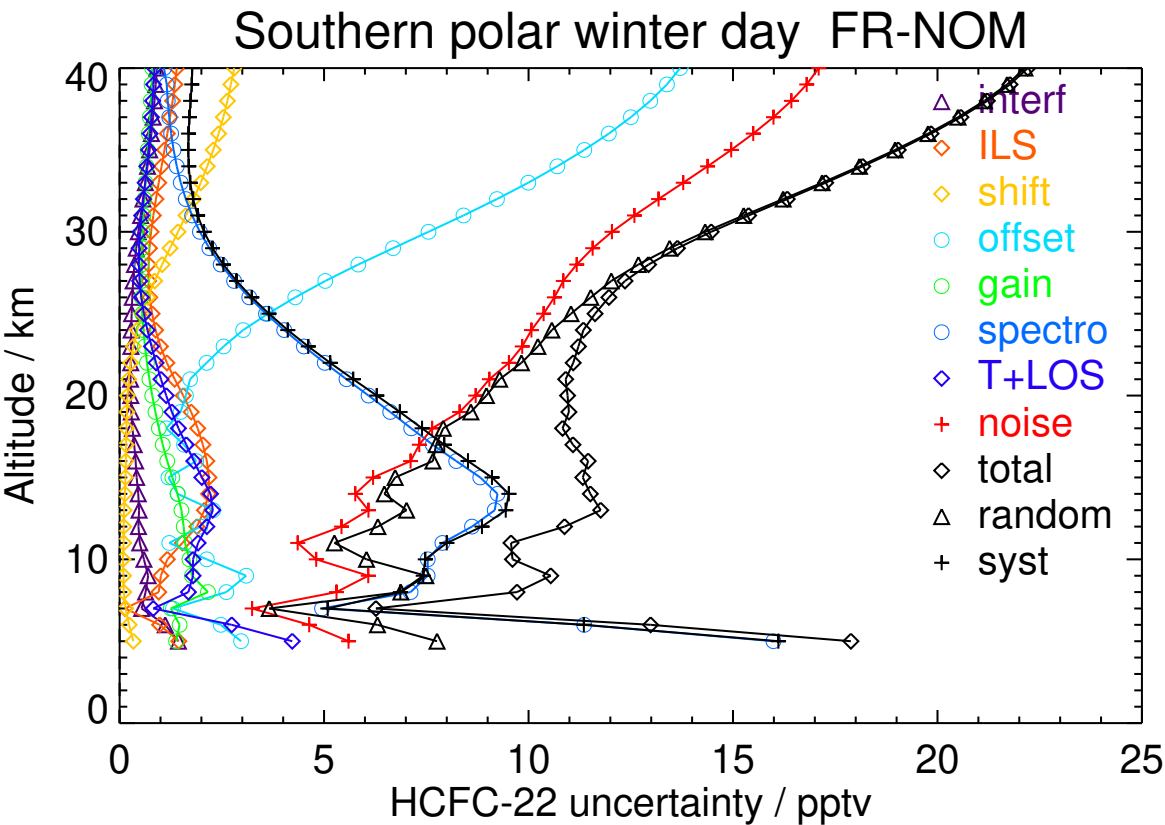


Figure S27. V8H\_F-22\_61 Southern polar winter day

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

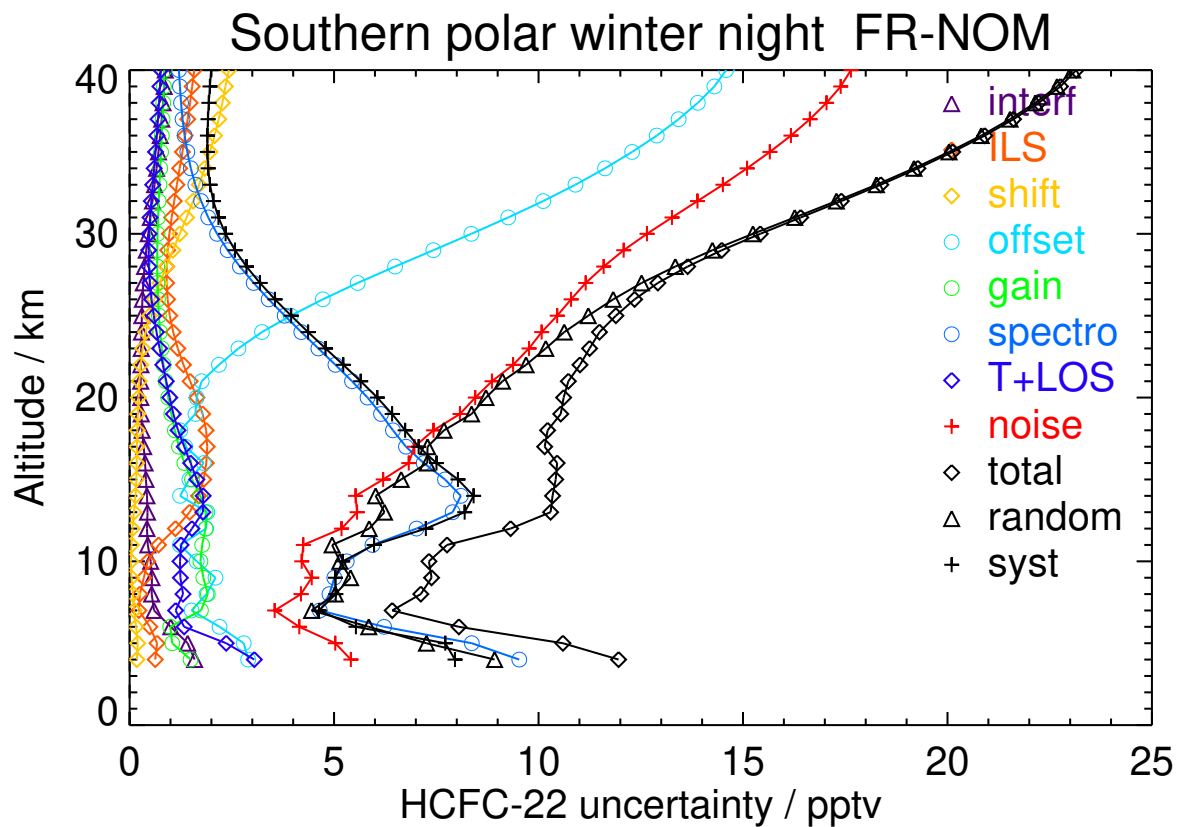
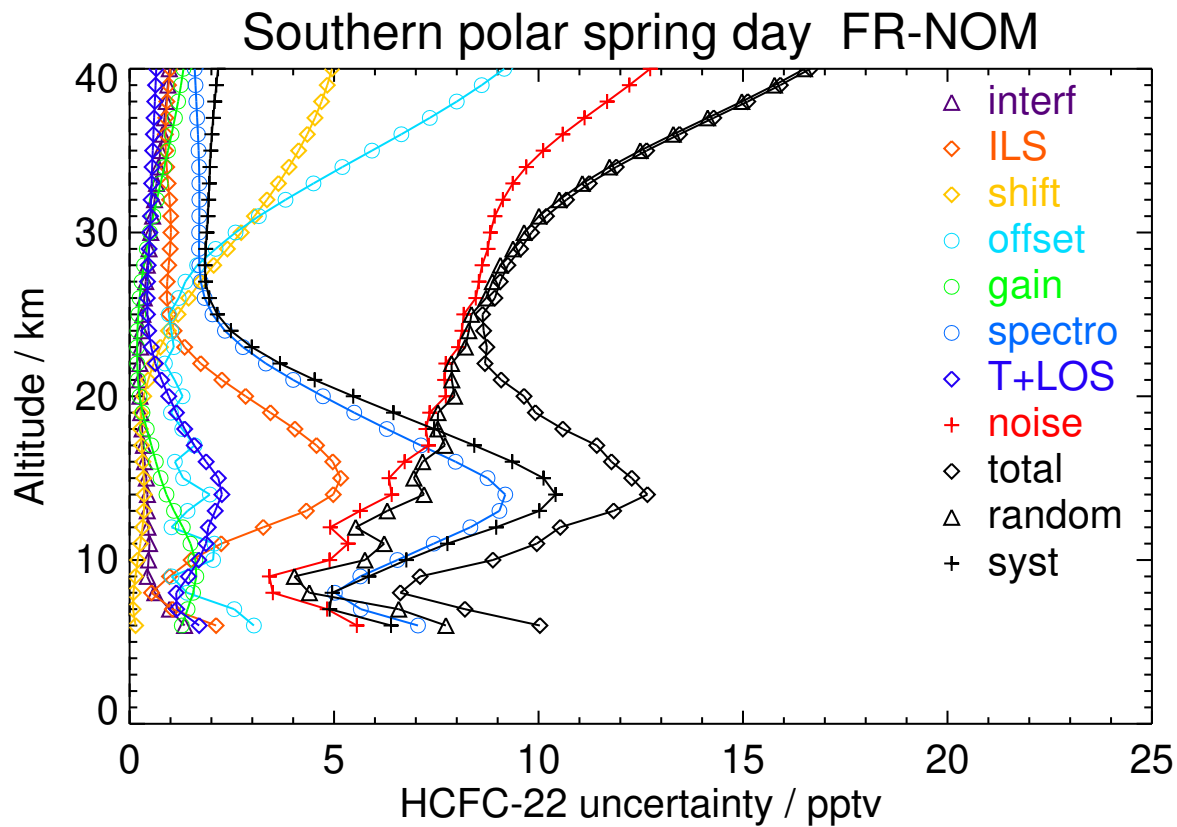


Figure S28. V8H\_F-22\_61 Southern polar winter night

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

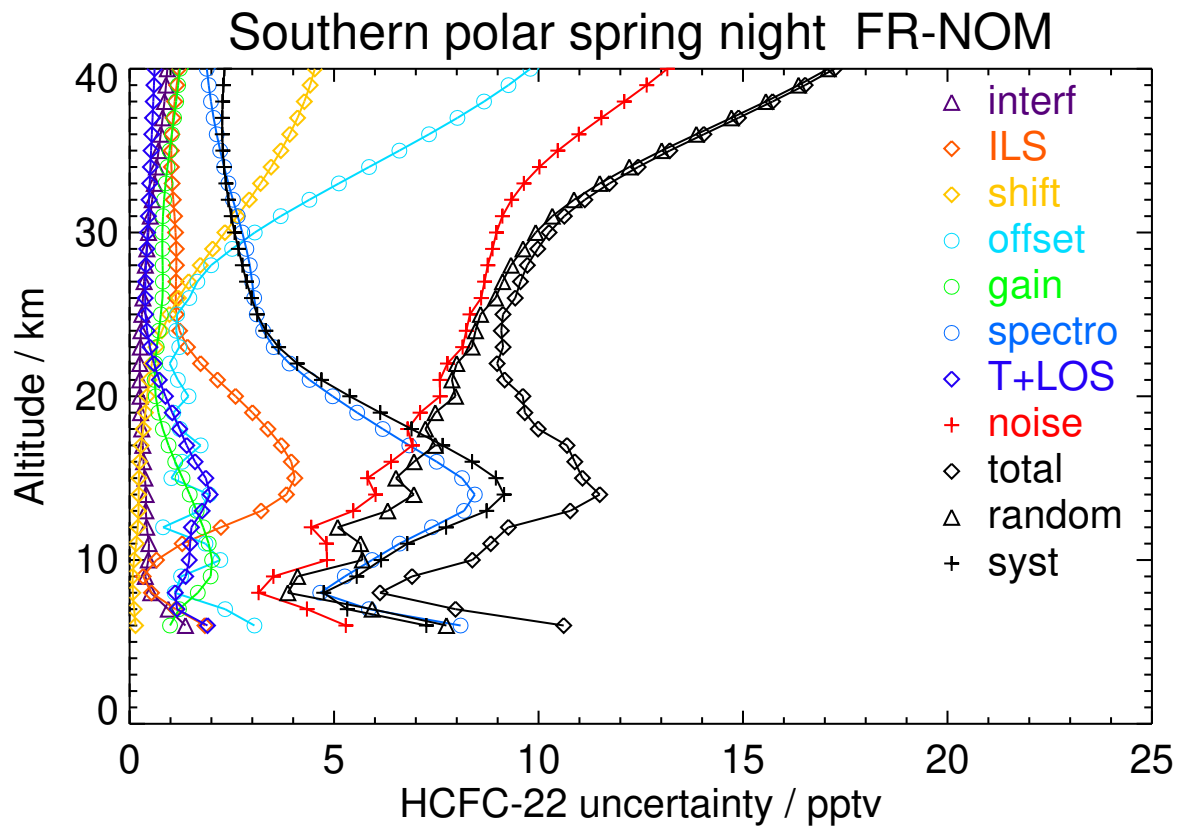
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	151.46	0.62	0.54	0.09	1.41	1.55	5.02	1.14	3.50	4.40	4.95	6.62
11	145.50	0.49	2.24	0.26	2.07	1.49	7.44	1.87	5.34	6.23	7.77	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  $1\sigma$ .

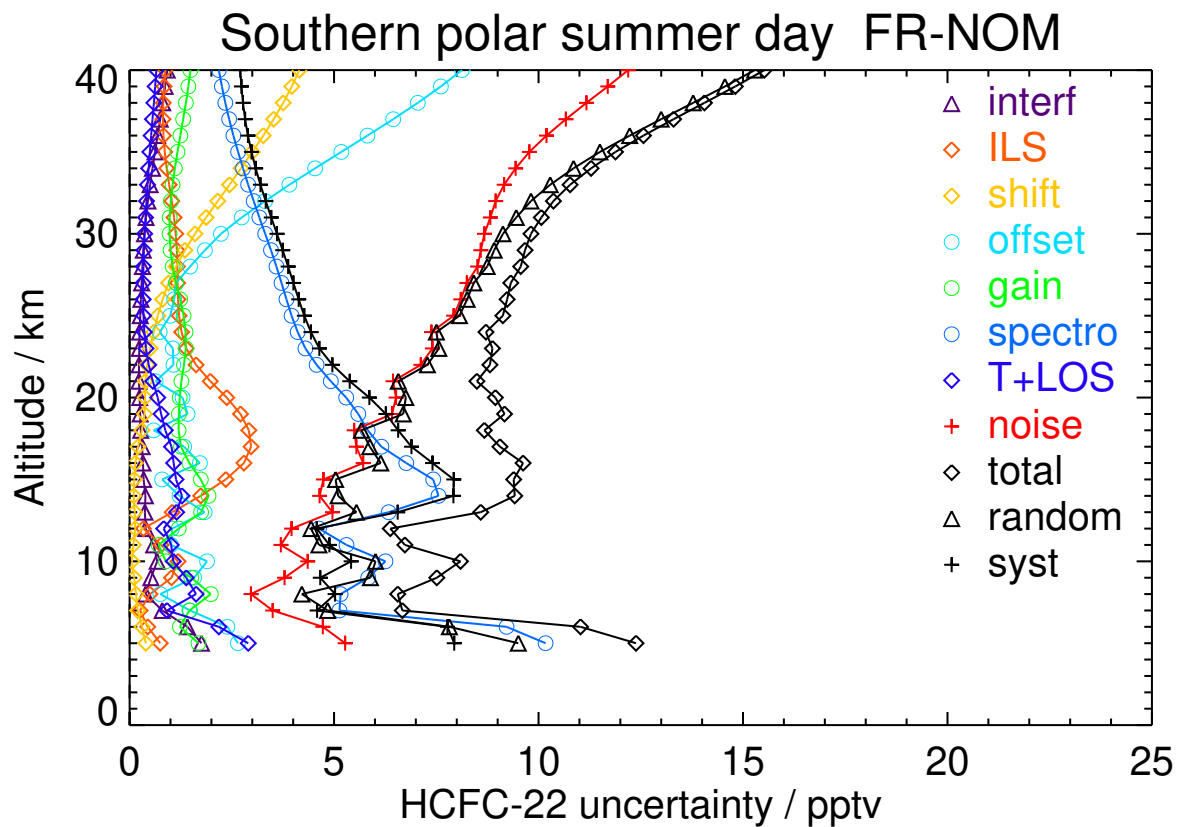
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	152.02	0.52	0.53	0.08	1.10	1.67	4.66	1.12	3.15	3.87	4.75	6.12
11	146.76	0.47	1.29	0.16	1.85	1.93	6.60	1.48	4.81	5.65	6.79	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	141.91	1.76	0.75	0.40	2.65	1.68	10.17	2.90	5.27	9.50	7.94	12.38
8	147.56	0.39	0.50	0.16	0.75	1.99	5.16	1.62	2.97	4.21	5.02	6.56
11	143.10	0.59	0.77	0.09	1.01	0.71	5.30	1.02	3.70	4.63	4.89	6.73
14	130.89	0.39	1.74	0.10	1.22	1.93	7.55	1.28	4.65	5.10	7.92	9.42
17	114.76	0.31	2.97	0.21	1.33	1.26	6.16	1.02	5.54	5.87	6.89	9.06
20	99.18	0.25	2.38	0.38	1.29	1.23	5.30	0.69	6.52	6.75	5.86	8.94
23	90.21	0.24	1.38	0.50	1.06	1.38	4.30	0.40	7.40	7.56	4.64	8.87
26	83.78	0.27	1.18	0.81	1.09	1.24	3.84	0.33	8.10	8.25	4.14	9.23
29	79.14	0.33	1.16	1.35	1.84	1.00	3.46	0.35	8.59	8.92	3.74	9.67
32	72.61	0.45	1.03	2.16	3.31	1.01	3.03	0.41	8.95	9.81	3.33	10.36
35	66.64	0.62	0.86	3.00	5.18	1.17	2.65	0.49	9.78	11.50	2.98	11.88
38	60.94	0.81	0.82	3.76	7.05	1.38	2.34	0.59	11.17	13.78	2.77	14.06
41	56.29	0.97	0.92	4.31	8.59	1.53	2.12	0.68	12.65	15.95	2.69	16.18



**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	1.57	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

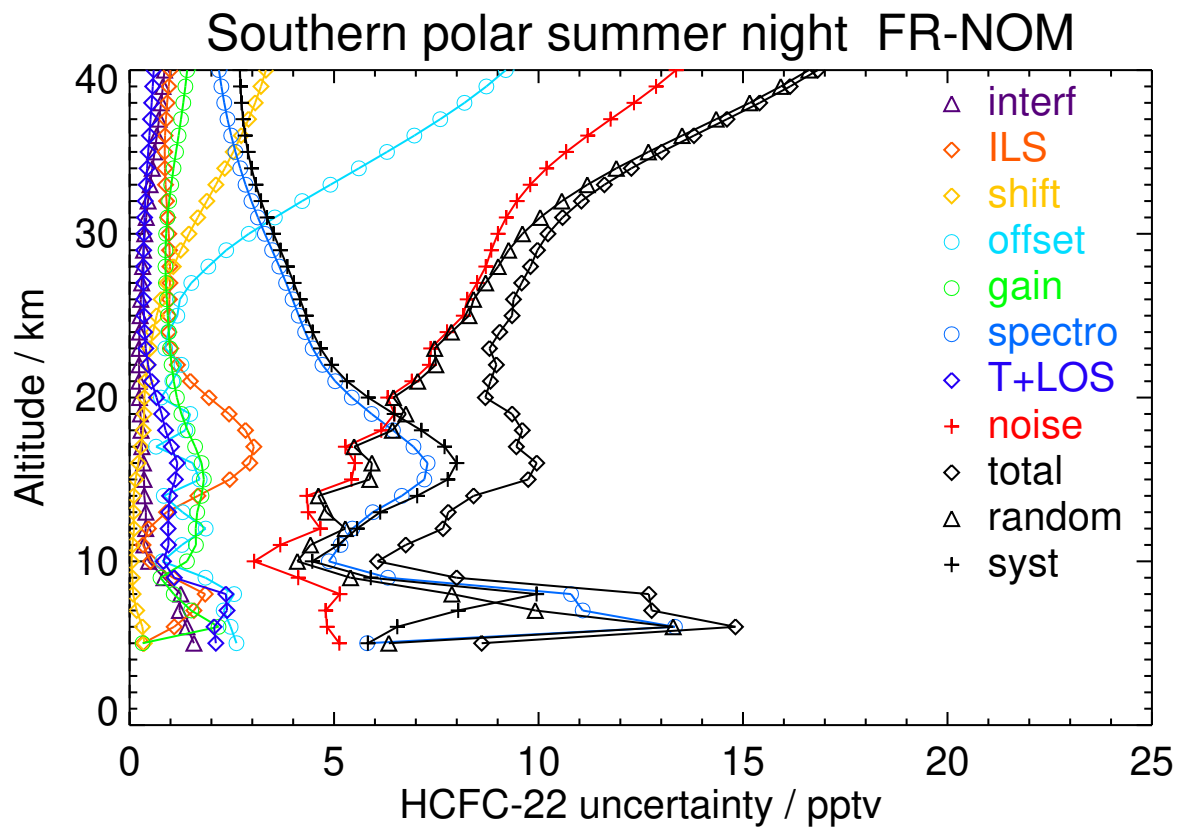
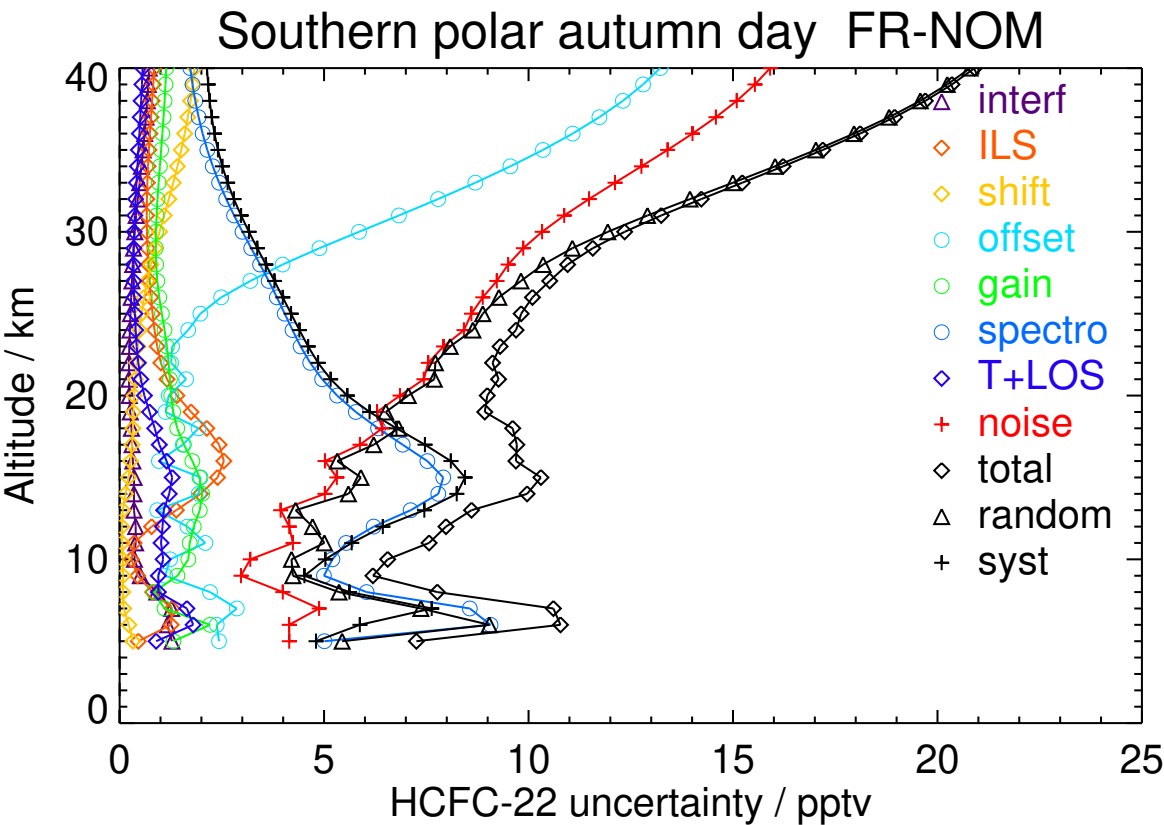


Figure S32. V8H\_F-22\_61 Southern polar summer night

**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	149.76	1.28	0.46	0.32	2.43	1.32	5.01	0.89	4.15	5.44	4.80	7.26
8	145.05	0.91	0.81	0.08	2.21	0.84	6.04	0.95	3.99	5.37	5.62	7.77
11	142.87	0.39	0.35	0.07	2.10	1.71	5.54	1.01	4.24	5.01	5.68	7.57
14	131.62	0.35	1.98	0.15	1.94	2.02	7.79	1.21	5.02	5.60	8.24	9.96
17	107.29	0.30	2.43	0.30	1.55	1.57	6.92	0.97	5.88	6.21	7.47	9.71
20	94.34	0.24	1.40	0.36	1.20	1.26	5.32	0.61	6.86	7.06	5.57	8.99
23	81.74	0.24	0.92	0.45	1.28	1.16	4.43	0.42	7.92	8.08	4.61	9.30
26	73.50	0.28	0.76	0.60	2.49	0.97	3.85	0.36	8.88	9.27	3.99	10.10
29	63.45	0.34	0.68	0.87	4.89	0.88	3.22	0.35	9.87	11.07	3.37	11.57
32	53.00	0.45	0.67	1.20	7.79	0.93	2.61	0.39	11.48	13.95	2.79	14.22
35	45.62	0.57	0.72	1.51	10.35	1.02	2.15	0.46	13.40	17.03	2.41	17.20
38	40.99	0.68	0.80	1.73	12.31	1.10	1.85	0.53	15.09	19.58	2.20	19.70
41	38.35	0.74	0.87	1.88	13.57	1.15	1.68	0.58	16.21	21.25	2.11	21.36



**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

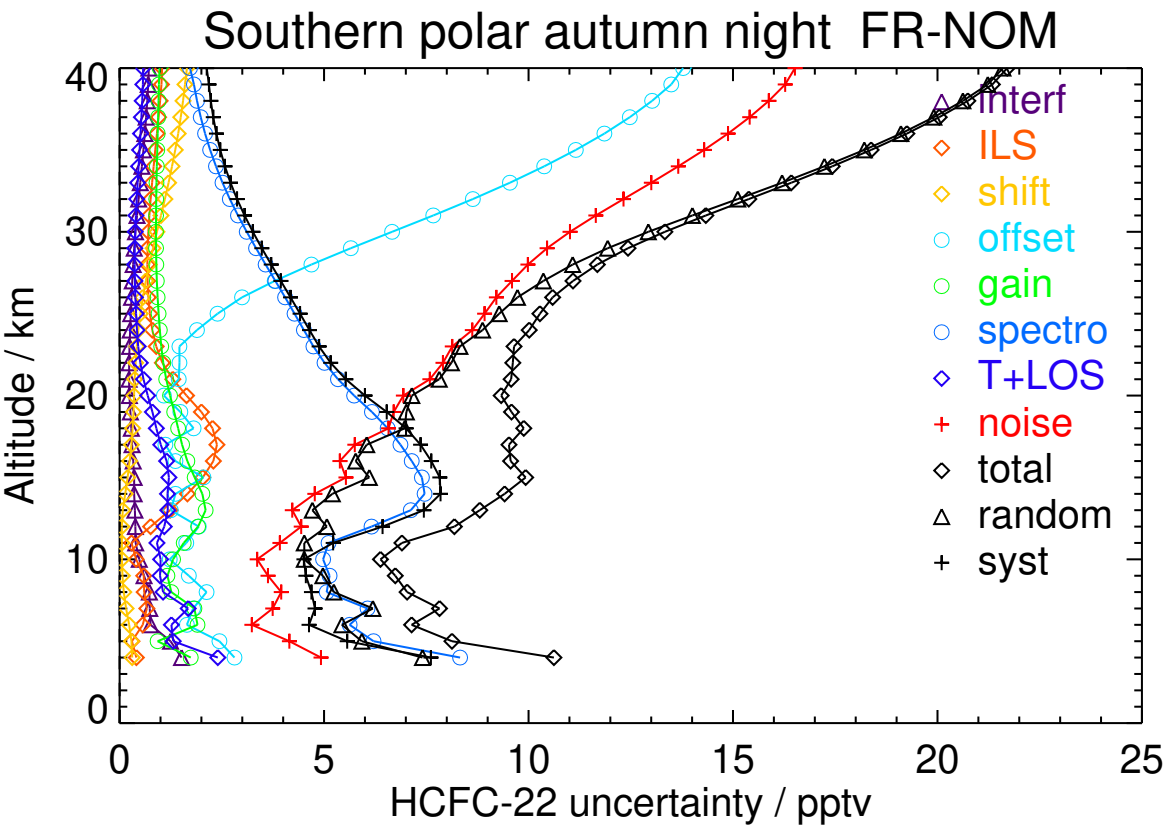
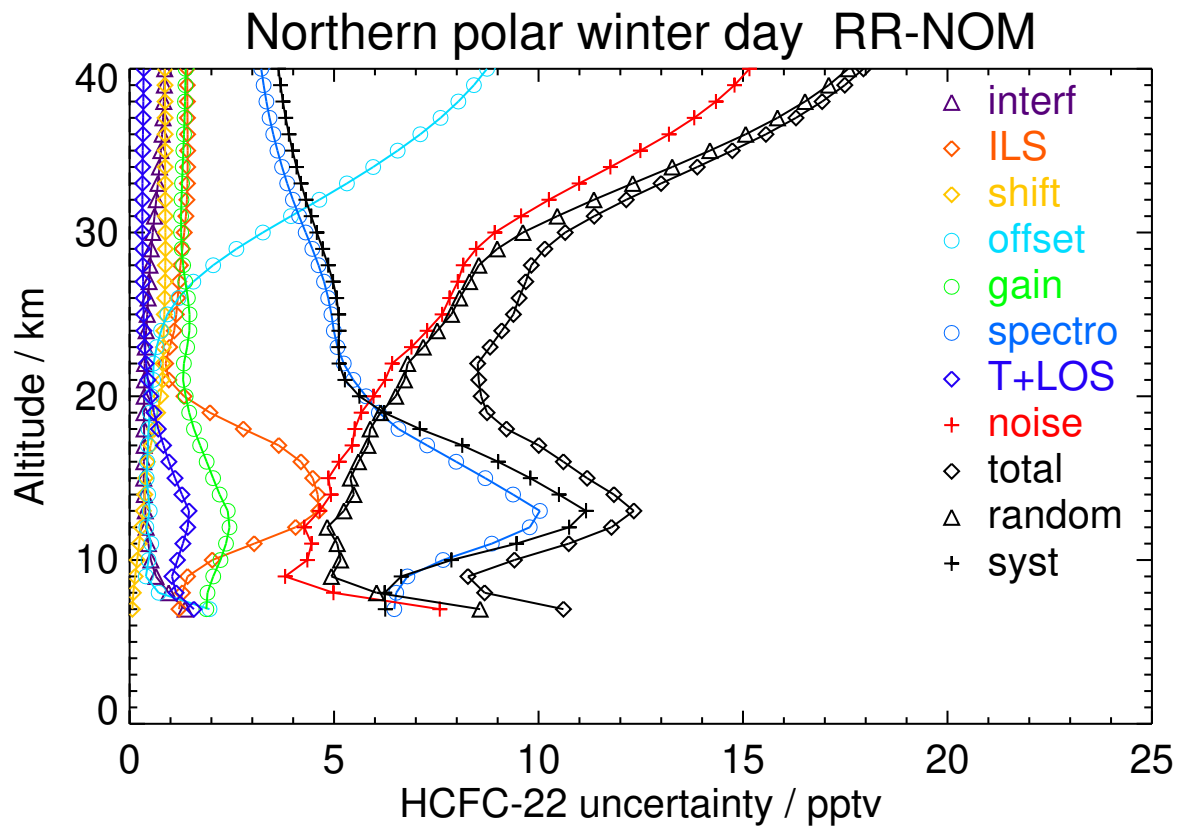


Figure S34. V8H\_F-22\_61 Southern polar autumn night

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

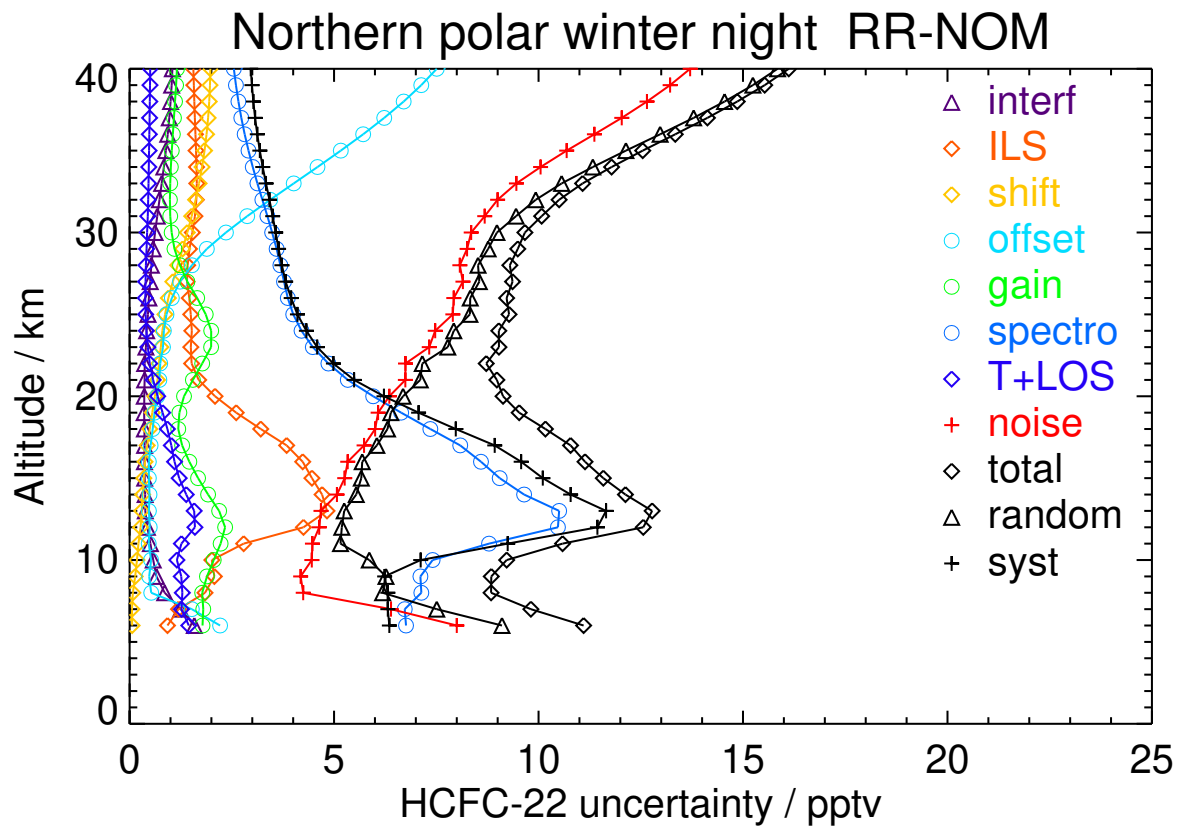
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	197.58	0.96	1.29	0.09	0.71	1.90	6.52	1.14	4.99	6.04	6.24	8.68
11	180.03	0.46	3.05	0.23	0.53	2.36	8.86	1.30	4.45	5.08	9.46	10.74
14	158.96	0.36	4.60	0.37	0.45	2.20	9.38	1.28	4.92	5.48	10.50	11.84
17	135.82	0.36	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	0.38	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	0.76	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	0.90	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  $1\sigma$ .

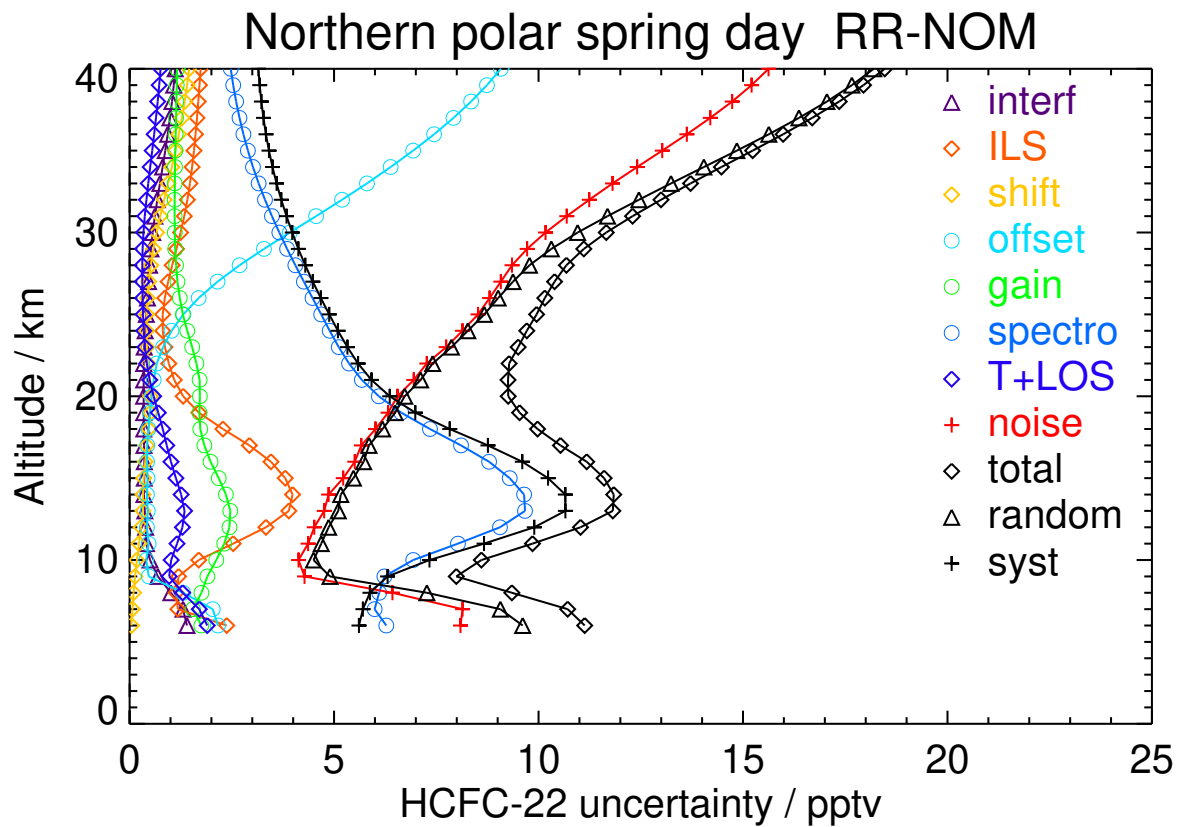
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	203.07	0.86	1.84	0.08	0.53	1.77	7.13	1.29	4.25	6.19	6.31	8.84
11	185.84	0.51	2.79	0.22	0.47	2.23	8.79	1.27	4.47	5.16	9.25	10.59
14	162.03	0.38	4.71	0.32	0.49	1.92	9.65	1.38	5.07	5.54	10.78	12.12
17	135.29	0.37	3.84	0.43	0.51	1.28	8.09	1.02	5.73	6.05	8.93	10.78
20	112.72	0.36	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  $1\sigma$ .

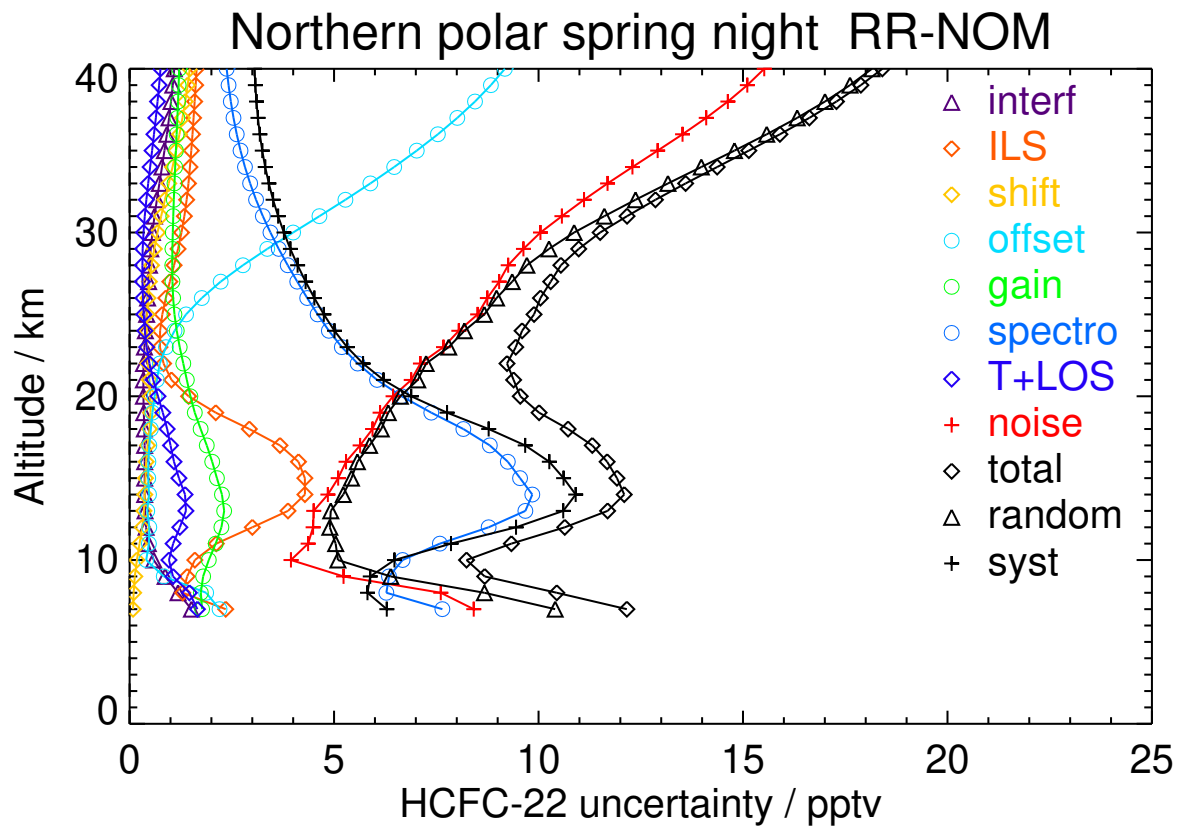
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	185.54	1.01	1.14	0.10	1.31	1.76	6.10	1.30	6.43	7.27	5.88	9.35
11	176.45	0.41	2.53	0.23	0.47	2.31	8.03	1.16	4.36	4.69	8.67	9.85
14	162.15	0.35	3.99	0.33	0.42	2.36	9.65	1.26	4.87	5.16	10.66	11.84
17	137.60	0.35	2.93	0.42	0.43	1.83	8.11	0.91	5.67	5.85	8.76	10.54
20	122.82	0.34	1.31	0.51	0.54	1.72	6.09	0.59	6.55	6.73	6.36	9.26
23	114.47	0.36	0.86	0.42	0.82	1.53	5.11	0.37	7.74	7.87	5.33	9.50
26	103.16	0.44	0.86	0.44	1.69	1.23	4.47	0.32	8.80	9.01	4.68	10.15
29	93.14	0.52	1.15	0.58	3.29	1.11	3.85	0.32	9.72	10.31	4.13	11.11
32	84.16	0.68	1.41	0.85	5.20	1.10	3.31	0.41	11.24	12.45	3.71	12.99
35	76.97	0.87	1.57	1.12	6.93	1.12	2.89	0.55	13.03	14.85	3.41	15.24
38	71.49	1.04	1.68	1.35	8.35	1.14	2.60	0.69	14.74	17.05	3.22	17.35
41	67.45	1.15	1.76	1.50	9.38	1.17	2.42	0.79	15.98	18.66	3.12	18.92



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

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

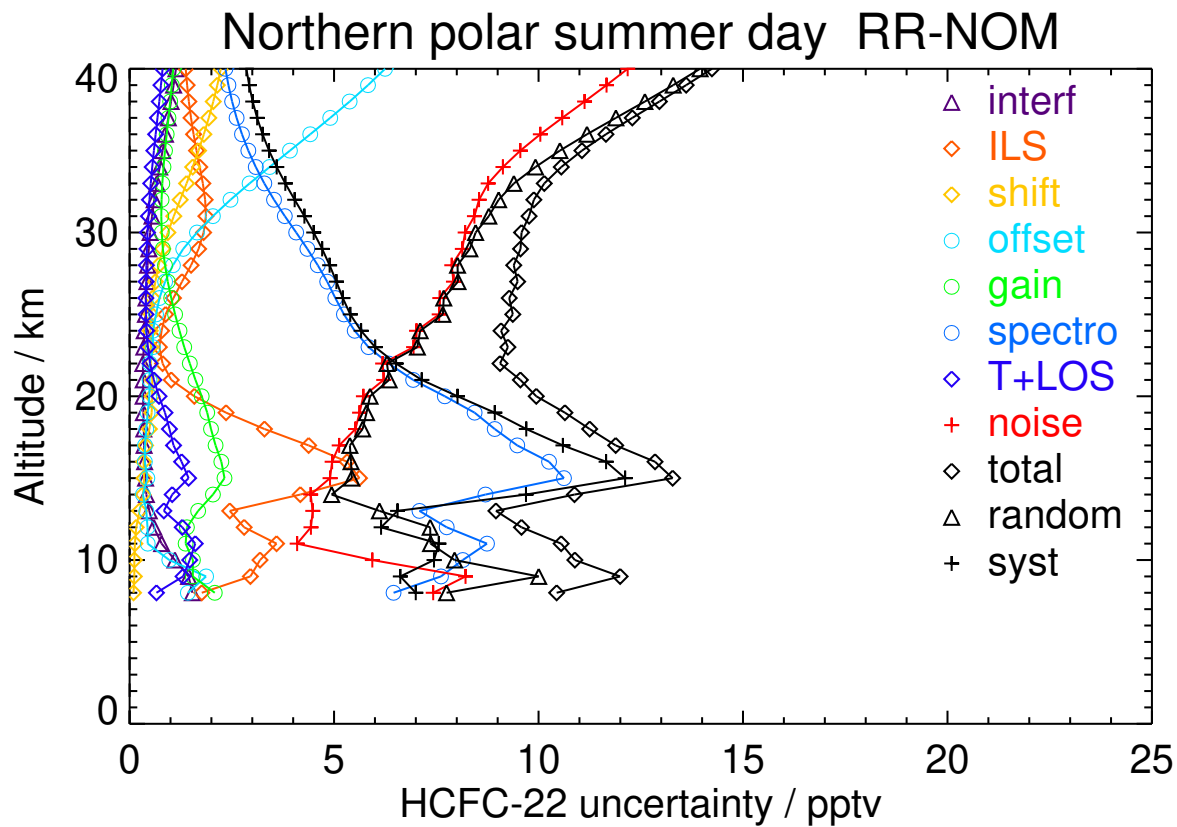
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	187.94	1.18	1.30	0.10	1.87	1.74	6.28	1.46	7.61	8.68	5.82	10.45
11	181.05	0.46	2.12	0.24	0.47	2.11	7.59	1.06	4.36	5.04	7.86	9.34
14	167.27	0.37	4.29	0.37	0.47	2.26	9.85	1.36	4.85	5.23	10.91	12.10
17	147.34	0.37	3.68	0.44	0.48	1.89	8.81	1.00	5.64	5.87	9.67	11.31
20	124.72	0.34	1.44	0.51	0.61	1.49	6.65	0.70	6.44	6.62	6.89	9.55
23	112.24	0.36	0.74	0.43	0.89	1.22	5.19	0.42	7.68	7.80	5.32	9.44
26	103.20	0.44	0.88	0.45	1.77	1.06	4.34	0.33	8.75	8.97	4.52	10.05
29	93.18	0.52	1.18	0.60	3.37	1.05	3.65	0.32	9.63	10.26	3.93	10.98
32	85.31	0.67	1.40	0.86	5.28	1.08	3.09	0.41	11.11	12.37	3.51	12.86
35	79.37	0.85	1.51	1.14	7.02	1.13	2.71	0.55	12.91	14.79	3.24	15.14
38	74.37	1.01	1.59	1.36	8.45	1.18	2.48	0.68	14.63	17.00	3.10	17.28
41	70.69	1.12	1.66	1.51	9.48	1.22	2.33	0.79	15.87	18.61	3.04	18.86



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

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

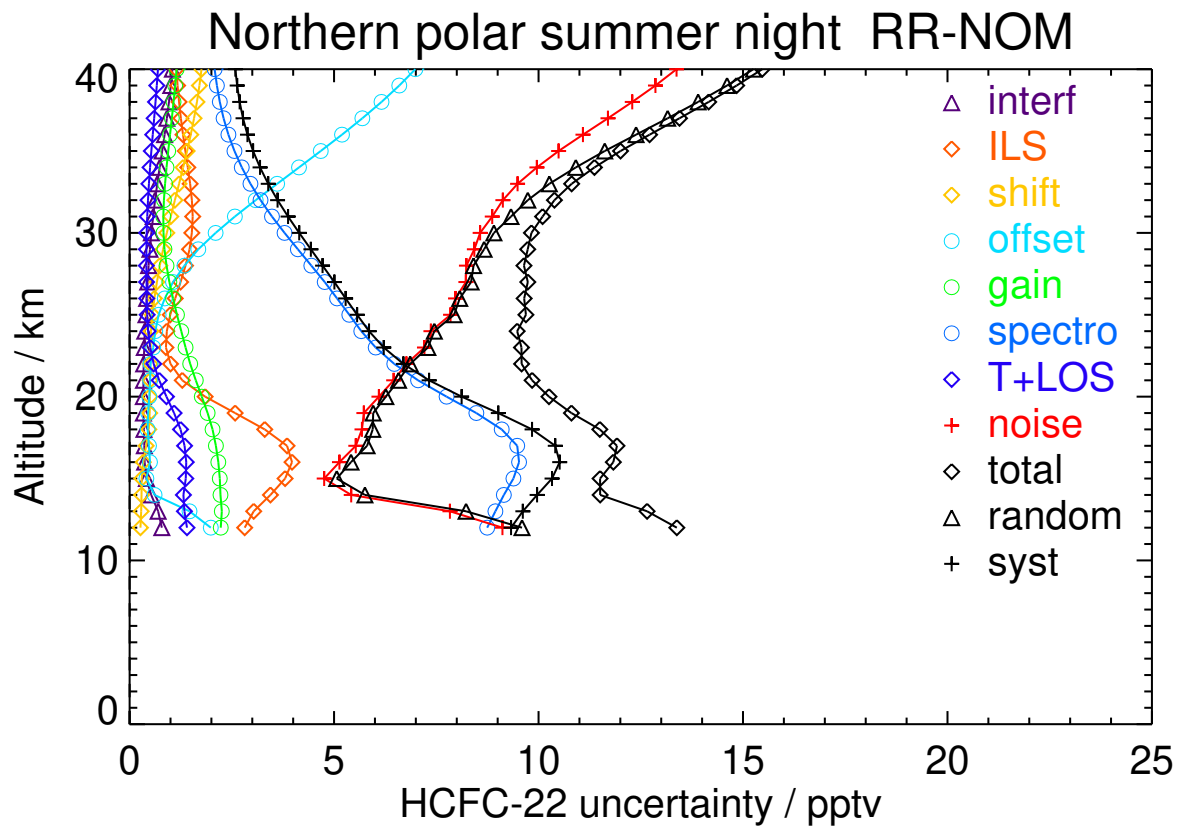
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	215.54	1.53	1.76	0.10	1.42	2.08	6.45	0.66	7.42	7.75	7.00	10.44
11	195.33	0.78	3.59	0.13	0.44	1.37	8.74	1.60	4.10	7.36	7.56	10.55
14	183.08	0.41	4.17	0.33	0.33	2.04	8.70	1.04	4.43	4.94	9.69	10.88
17	167.15	0.35	4.38	0.39	0.38	2.10	9.48	1.07	5.12	5.39	10.60	11.89
20	141.62	0.33	1.58	0.55	0.48	1.76	7.71	0.72	5.72	5.88	8.02	9.94
23	123.33	0.35	0.73	0.52	0.57	1.34	5.84	0.45	6.94	7.04	6.00	9.25
26	116.40	0.40	1.07	0.56	0.73	1.02	5.03	0.40	7.58	7.68	5.21	9.28
29	104.33	0.47	1.69	0.81	1.31	0.81	4.35	0.42	8.14	8.32	4.71	9.56
32	91.05	0.60	1.85	1.24	2.47	0.78	3.53	0.49	8.54	9.02	4.04	9.89
35	80.79	0.81	1.64	1.69	3.92	0.87	2.90	0.59	9.55	10.52	3.41	11.06
38	73.43	1.01	1.45	2.05	5.38	0.99	2.51	0.73	11.13	12.60	3.01	12.96
41	67.80	1.18	1.34	2.30	6.63	1.10	2.28	0.84	12.66	14.56	2.80	14.83



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

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

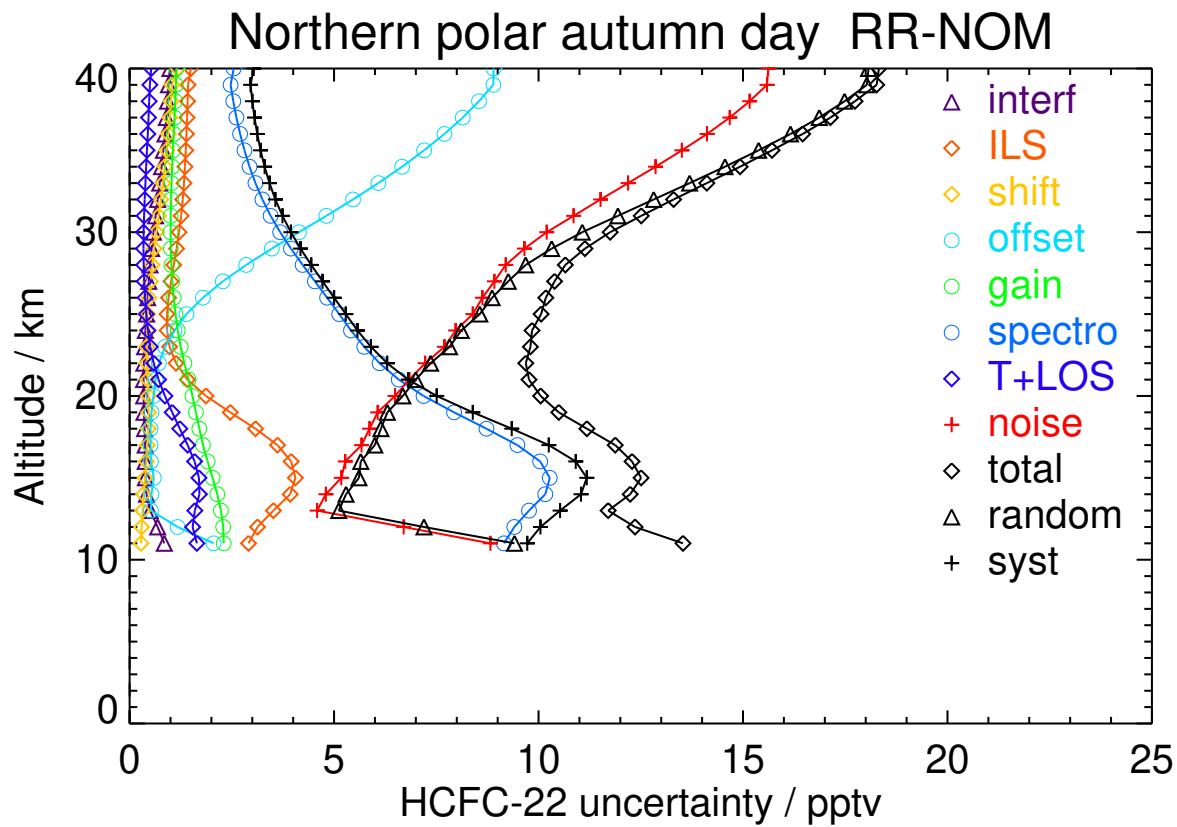
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
14	184.73	0.53	3.44	0.29	0.61	2.22	9.15	1.32	5.42	5.75	9.96	11.51
17	165.18	0.36	3.85	0.41	0.47	2.11	9.48	1.34	5.53	5.81	10.41	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  $1\sigma$ .

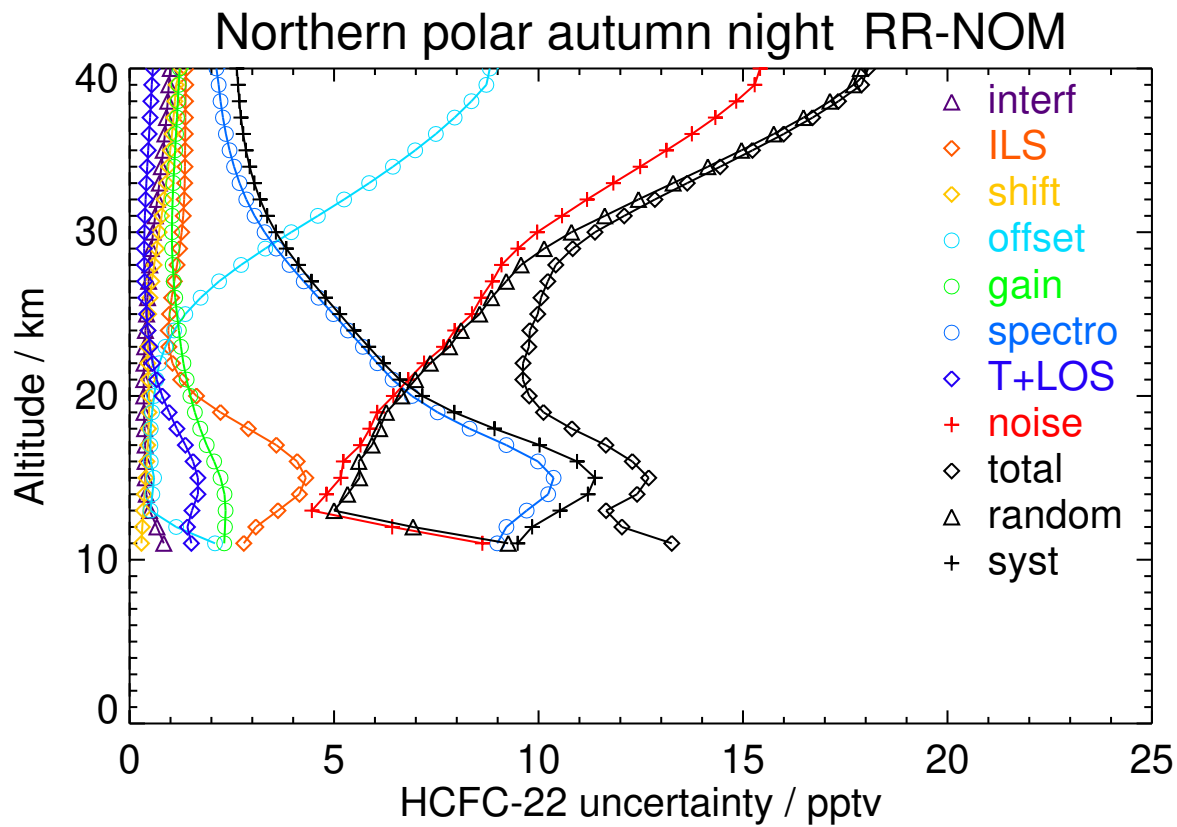
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
11	192.41	0.85	2.91	0.28	2.06	2.30	9.15	1.65	8.82	9.41	9.72	13.53
14	181.44	0.41	3.93	0.34	0.53	2.14	10.16	1.71	4.80	5.29	11.04	12.24
17	153.32	0.38	3.62	0.43	0.51	1.79	9.48	1.42	5.67	6.00	10.25	11.87
20	129.20	0.34	1.87	0.46	0.58	1.54	7.19	0.86	6.49	6.68	7.51	10.05
23	115.12	0.37	0.98	0.42	0.87	1.25	5.74	0.51	7.70	7.82	5.90	9.80
26	100.55	0.44	0.95	0.47	1.79	1.08	4.83	0.38	8.63	8.86	5.00	10.18
29	85.65	0.54	1.15	0.60	3.48	1.01	3.94	0.34	9.65	10.32	4.18	11.13
32	75.32	0.69	1.30	0.76	5.46	1.01	3.25	0.37	11.52	12.82	3.56	13.30
35	70.37	0.83	1.37	0.91	7.20	1.06	2.81	0.43	13.50	15.38	3.20	15.71
38	68.17	0.93	1.42	1.01	8.54	1.12	2.53	0.48	15.16	17.48	3.00	17.74
41	68.30	1.03	1.54	1.35	8.81	1.12	2.44	0.57	15.55	17.99	2.93	18.22



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

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

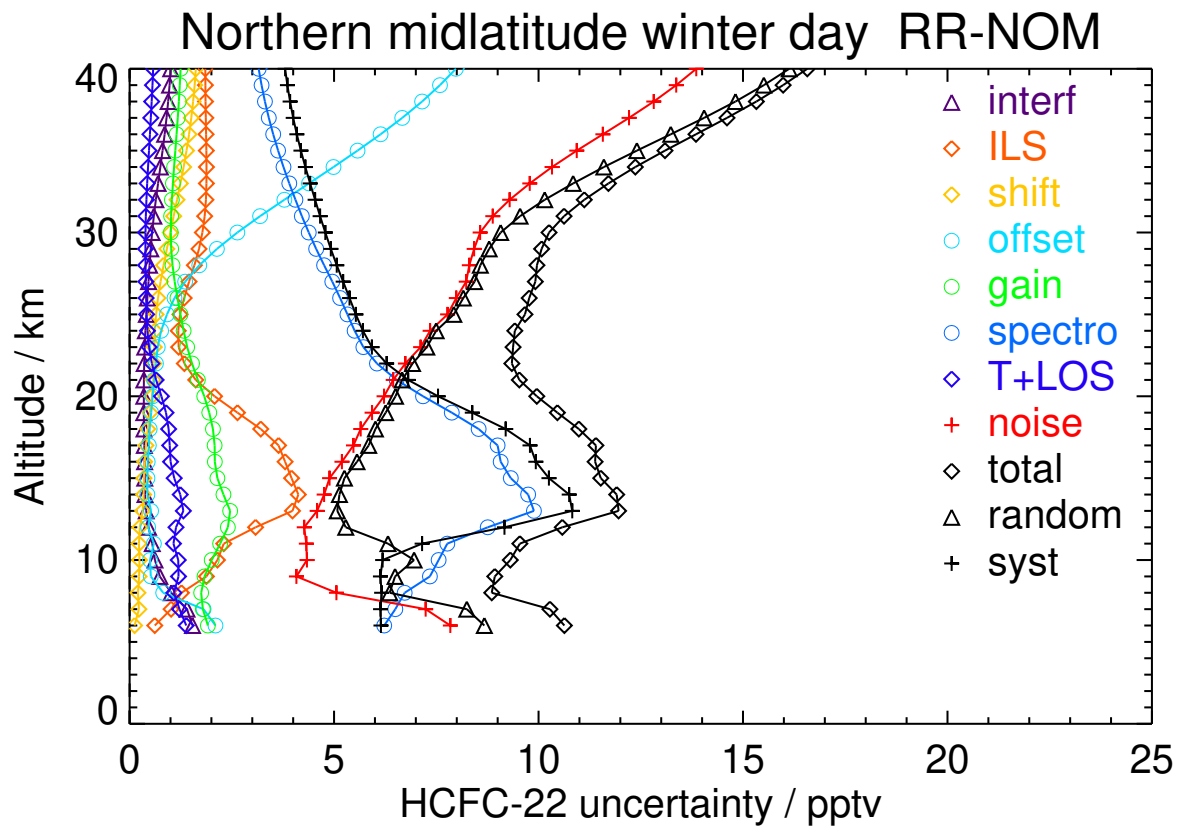
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
11	189.02	0.84	2.79	0.29	2.09	2.31	8.99	1.51	8.63	9.26	9.49	13.26
14	179.37	0.41	4.15	0.36	0.56	2.32	10.23	1.67	4.82	5.33	11.21	12.41
17	148.73	0.38	3.59	0.44	0.51	1.89	9.21	1.36	5.65	5.93	10.03	11.65
20	129.94	0.35	1.64	0.48	0.60	1.49	6.90	0.80	6.45	6.65	7.16	9.77
23	113.18	0.37	0.96	0.44	0.87	1.26	5.70	0.50	7.68	7.82	5.84	9.76
26	96.77	0.44	1.03	0.50	1.74	1.12	4.62	0.39	8.60	8.85	4.79	10.06
29	82.25	0.53	1.22	0.66	3.32	1.04	3.59	0.36	9.49	10.14	3.83	10.84
32	71.67	0.68	1.33	0.84	5.24	1.05	2.85	0.39	11.19	12.44	3.19	12.85
35	65.21	0.82	1.36	0.99	6.98	1.11	2.44	0.45	13.13	14.96	2.85	15.23
38	60.71	0.93	1.37	1.11	8.36	1.18	2.22	0.52	14.83	17.13	2.68	17.33
41	60.48	1.03	1.41	1.39	8.82	1.28	2.21	0.61	15.47	17.94	2.68	18.14



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

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

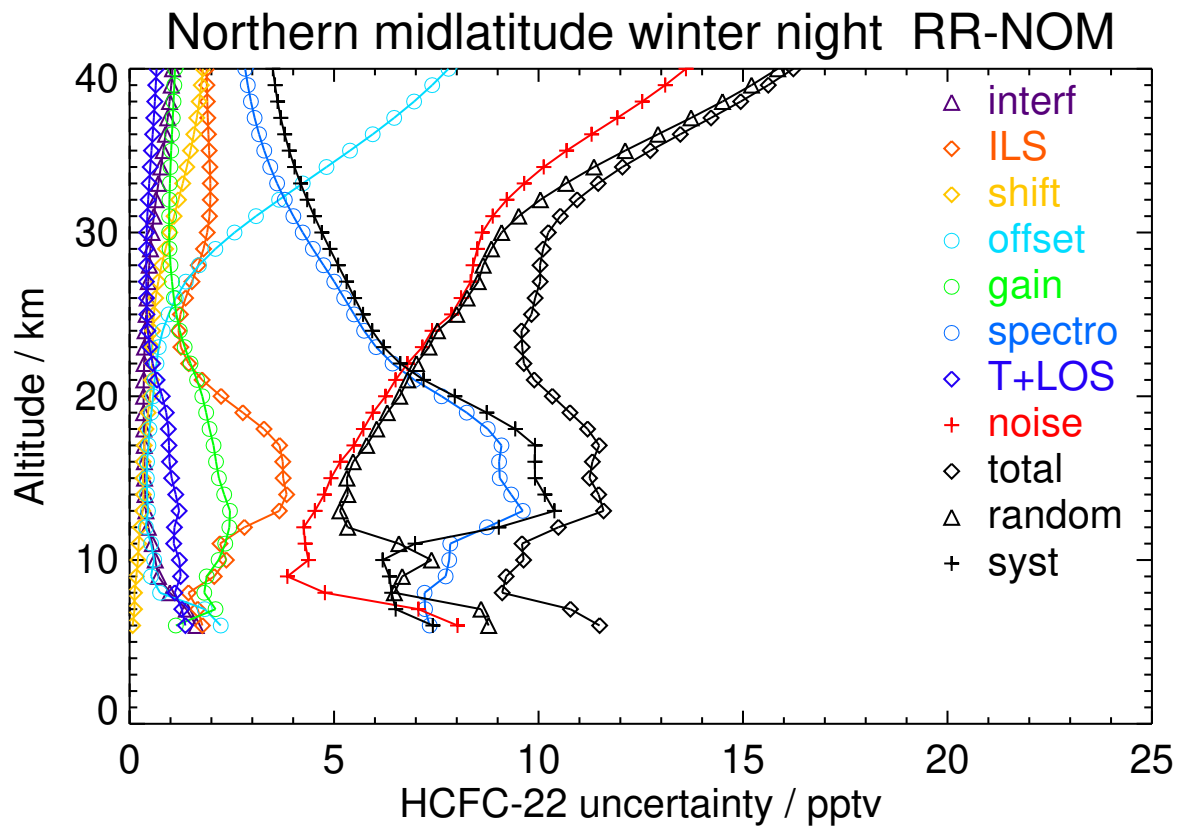
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	200.94	1.02	1.27	0.20	0.82	1.75	6.73	1.08	5.06	6.36	6.16	8.86
11	191.87	0.56	2.30	0.23	0.59	2.21	7.77	1.07	4.32	6.32	7.15	9.54
14	174.70	0.38	4.13	0.34	0.44	2.29	9.75	1.24	4.76	5.13	10.75	11.91
17	159.35	0.36	3.64	0.40	0.47	2.08	9.00	0.98	5.47	5.85	9.79	11.40
20	137.70	0.35	2.08	0.55	0.56	1.83	7.17	0.78	6.22	6.50	7.54	9.96
23	131.06	0.37	1.20	0.60	0.69	1.41	5.72	0.48	7.12	7.27	5.93	9.38
26	122.27	0.43	1.33	0.69	1.10	1.17	5.15	0.40	7.99	8.16	5.38	9.77
29	115.76	0.52	1.70	0.91	2.13	1.02	4.56	0.39	8.42	8.79	4.92	10.08
32	108.24	0.64	1.87	1.16	3.78	1.03	4.05	0.41	9.29	10.15	4.54	11.12
35	98.35	0.81	1.88	1.39	5.57	1.12	3.63	0.47	10.93	12.40	4.19	13.09
38	90.27	0.94	1.86	1.55	7.15	1.20	3.31	0.54	12.82	14.82	3.92	15.33
41	84.85	1.03	1.85	1.64	8.32	1.26	3.09	0.59	14.27	16.66	3.76	17.08



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

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

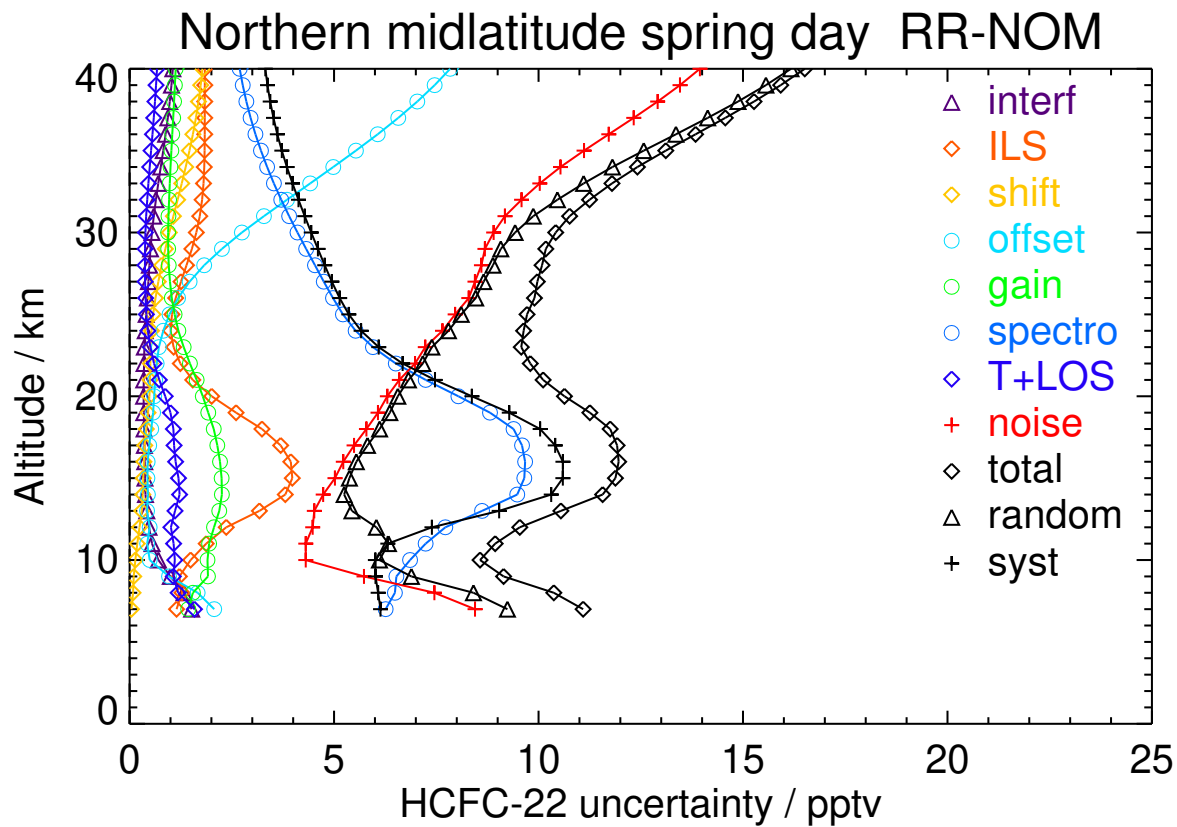
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	202.08	0.98	1.44	0.12	0.75	1.83	7.21	1.11	4.78	6.48	6.41	9.11
11	189.65	0.56	2.21	0.22	0.53	2.34	7.84	1.08	4.29	6.58	6.98	9.60
14	176.88	0.38	3.84	0.34	0.43	2.31	9.33	1.13	4.76	5.33	10.15	11.47
17	160.88	0.36	3.67	0.36	0.46	2.05	9.09	0.96	5.49	5.80	9.91	11.48
20	139.69	0.34	2.24	0.50	0.58	1.78	7.63	0.80	6.26	6.61	7.95	10.34
23	130.48	0.37	1.25	0.56	0.71	1.35	6.03	0.49	7.16	7.32	6.21	9.60
26	123.59	0.43	1.37	0.64	1.13	1.08	5.25	0.41	8.11	8.25	5.50	9.92
29	112.39	0.51	1.81	0.88	2.10	0.98	4.48	0.41	8.51	8.85	4.90	10.11
32	101.89	0.65	1.97	1.19	3.66	0.97	3.80	0.45	9.22	10.04	4.34	10.94
35	93.70	0.82	1.94	1.49	5.39	1.02	3.29	0.53	10.69	12.12	3.90	12.73
38	87.83	0.98	1.90	1.70	6.96	1.07	2.97	0.62	12.53	14.50	3.62	14.94
41	84.15	1.08	1.88	1.82	8.15	1.13	2.77	0.68	14.04	16.40	3.46	16.77



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

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

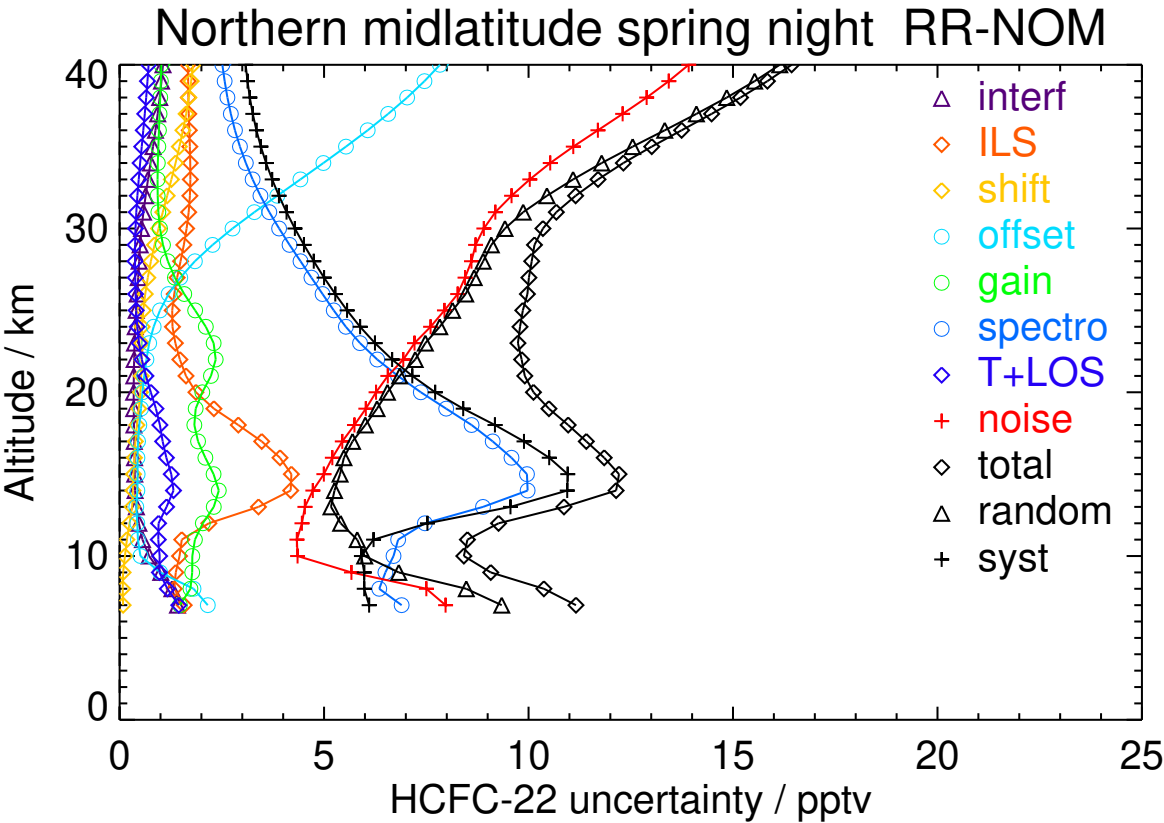
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	196.02	1.33	1.28	0.08	1.66	1.55	6.49	1.19	7.45	8.41	6.08	10.37
11	188.03	0.55	1.87	0.19	0.43	1.94	7.24	1.08	4.31	6.33	6.31	8.94
14	179.49	0.39	3.81	0.32	0.45	2.26	9.48	1.22	4.73	5.25	10.31	11.57
17	165.21	0.36	3.69	0.37	0.48	2.14	9.60	1.09	5.49	5.82	10.41	11.92
20	137.47	0.34	2.01	0.48	0.60	1.79	8.04	0.87	6.30	6.56	8.37	10.63
23	122.17	0.36	1.08	0.51	0.72	1.32	5.95	0.51	7.23	7.39	6.09	9.58
26	116.52	0.44	1.13	0.63	1.18	1.03	4.97	0.39	8.29	8.46	5.14	9.90
29	108.59	0.51	1.52	0.87	2.26	0.94	4.32	0.38	8.69	9.08	4.60	10.18
32	96.46	0.64	1.77	1.17	3.85	0.97	3.71	0.43	9.58	10.46	4.13	11.25
35	85.36	0.82	1.83	1.46	5.53	1.02	3.21	0.53	11.11	12.57	3.72	13.11
38	76.50	0.98	1.84	1.68	7.04	1.09	2.86	0.62	12.91	14.88	3.44	15.27
41	70.53	1.09	1.84	1.82	8.18	1.14	2.63	0.69	14.37	16.71	3.28	17.03



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

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

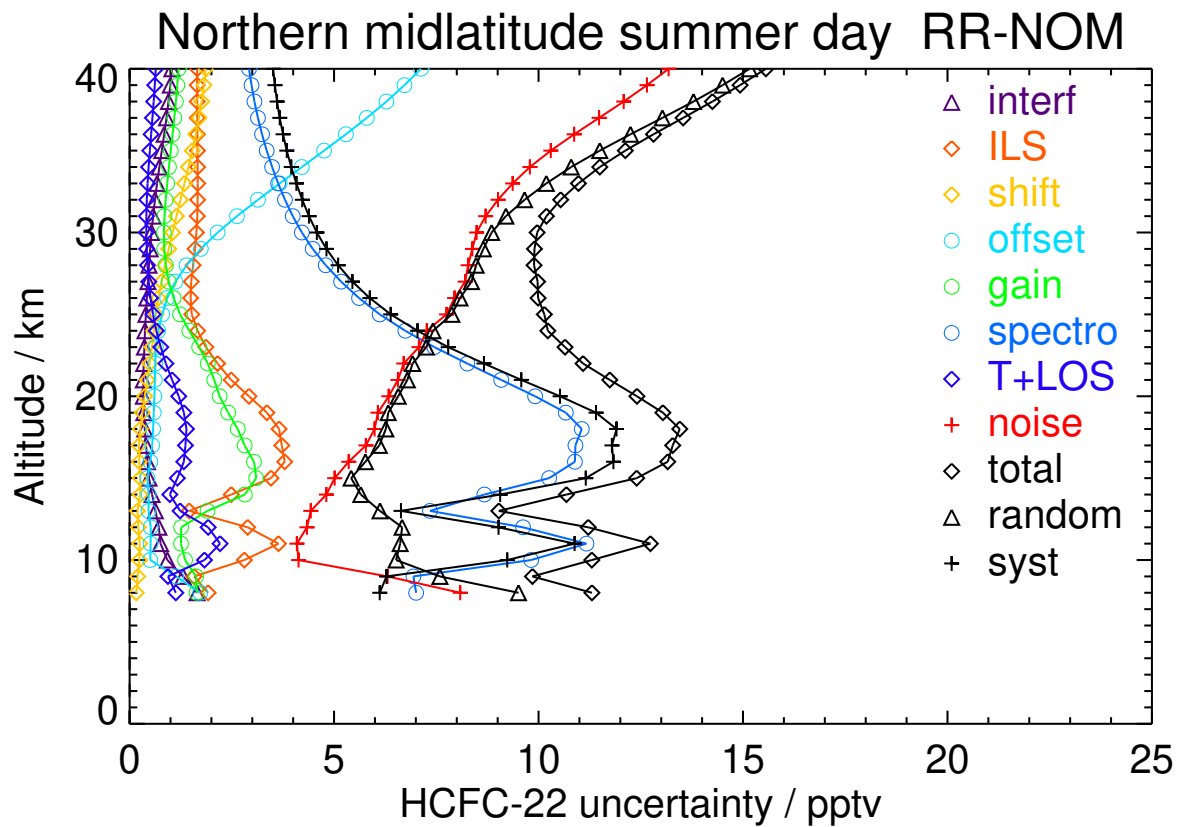
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	194.90	1.28	1.34	0.08	1.81	1.73	6.35	1.17	7.50	8.48	5.98	10.38
11	188.76	0.56	1.52	0.18	0.45	1.84	6.81	0.95	4.34	5.81	6.21	8.51
14	177.06	0.38	4.18	0.33	0.43	2.43	9.98	1.32	4.72	5.25	10.95	12.14
17	155.83	0.36	3.47	0.39	0.45	1.92	9.12	1.05	5.45	5.70	9.89	11.41
20	136.71	0.34	1.87	0.51	0.56	2.02	7.37	0.76	6.27	6.55	7.72	10.12
23	123.45	0.36	1.36	0.54	0.72	2.30	5.88	0.48	7.21	7.48	6.25	9.74
26	116.17	0.43	1.34	0.63	1.20	1.58	4.96	0.39	8.27	8.46	5.27	9.97
29	106.07	0.50	1.57	0.85	2.27	1.06	4.16	0.38	8.71	9.09	4.51	10.15
32	94.83	0.64	1.72	1.16	3.86	0.93	3.44	0.43	9.58	10.45	3.90	11.15
35	84.32	0.82	1.72	1.46	5.54	0.95	2.94	0.54	11.09	12.55	3.45	13.01
38	76.75	0.98	1.68	1.69	7.03	0.99	2.64	0.65	12.89	14.85	3.18	15.18
41	72.01	1.09	1.67	1.84	8.17	1.03	2.47	0.73	14.34	16.68	3.05	16.95



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

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

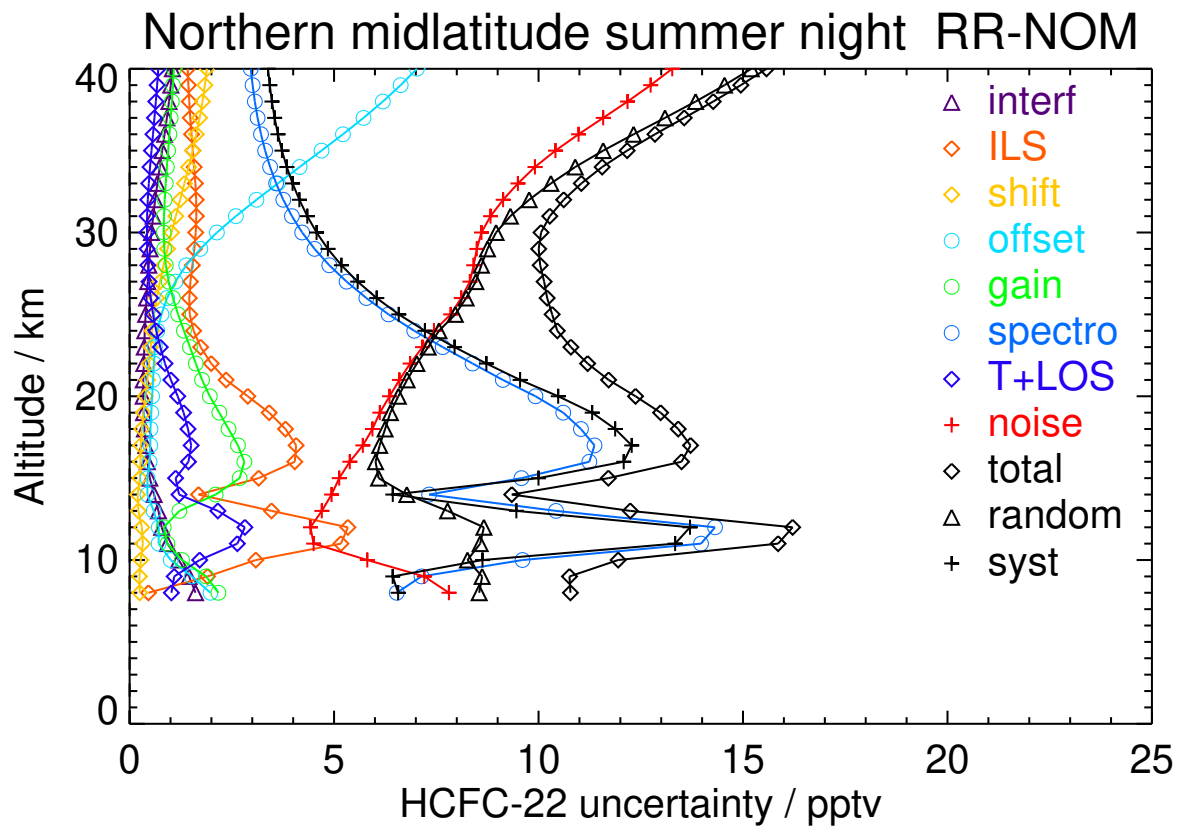
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	202.45	1.65	1.92	0.16	1.73	1.64	7.01	1.13	8.08	9.51	6.12	11.31
11	205.68	0.76	3.64	0.25	0.51	1.26	11.17	2.21	4.09	6.62	10.88	12.73
14	212.21	0.55	2.49	0.26	0.46	2.82	8.68	0.98	4.81	5.65	9.06	10.68
17	194.16	0.40	3.72	0.23	0.55	2.81	10.90	1.36	5.78	6.11	11.79	13.28
20	159.78	0.34	2.92	0.37	0.61	2.20	9.92	1.20	6.34	6.57	10.52	12.41
23	134.23	0.36	1.87	0.55	0.64	1.70	7.45	0.76	7.07	7.26	7.79	10.65
26	120.98	0.42	1.49	0.70	0.92	1.08	5.61	0.51	7.95	8.08	5.88	9.99
29	113.96	0.50	1.60	0.96	1.74	0.85	4.48	0.42	8.38	8.65	4.81	9.90
32	105.92	0.62	1.66	1.24	3.14	0.88	3.80	0.42	9.01	9.66	4.22	10.54
35	97.98	0.79	1.66	1.53	4.76	1.01	3.35	0.49	10.30	11.50	3.84	12.12
38	92.24	0.95	1.65	1.76	6.28	1.13	3.05	0.59	12.08	13.79	3.61	14.25
41	88.45	1.07	1.66	1.90	7.48	1.22	2.87	0.66	13.65	15.74	3.47	16.12



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

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

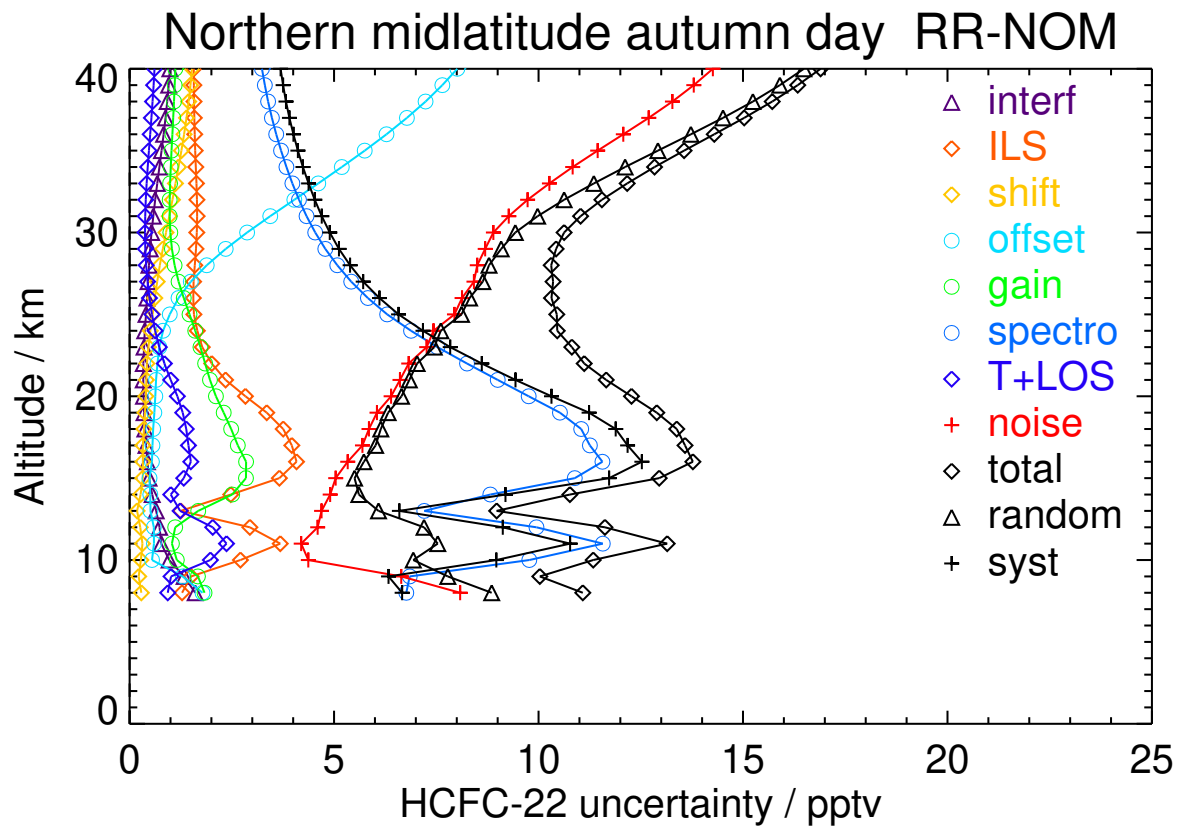
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	213.56	1.61	0.46	0.25	1.98	2.17	6.53	1.02	7.81	8.55	6.57	10.78
11	206.46	0.93	5.17	0.32	0.71	0.92	13.97	2.64	4.50	8.57	13.34	15.86
14	206.48	0.60	1.69	0.20	0.44	2.10	7.32	1.21	4.94	6.78	6.43	9.35
17	190.45	0.39	4.07	0.27	0.51	2.65	11.37	1.50	5.70	6.11	12.28	13.72
20	159.67	0.33	2.89	0.39	0.55	1.96	9.93	1.18	6.36	6.57	10.48	12.37
23	135.86	0.36	1.74	0.51	0.62	1.48	7.66	0.75	7.16	7.30	7.95	10.79
26	122.37	0.42	1.46	0.66	0.92	1.06	5.79	0.52	8.11	8.23	6.04	10.21
29	113.84	0.50	1.58	0.93	1.73	0.85	4.52	0.43	8.49	8.75	4.85	10.00
32	106.72	0.63	1.63	1.24	3.10	0.86	3.76	0.44	9.13	9.77	4.15	10.61
35	101.04	0.80	1.55	1.54	4.69	0.94	3.31	0.54	10.41	11.58	3.73	12.17
38	97.28	0.96	1.46	1.78	6.19	1.03	3.06	0.64	12.18	13.84	3.48	14.27
41	94.68	1.08	1.41	1.93	7.38	1.10	2.93	0.73	13.73	15.78	3.35	16.13



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

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

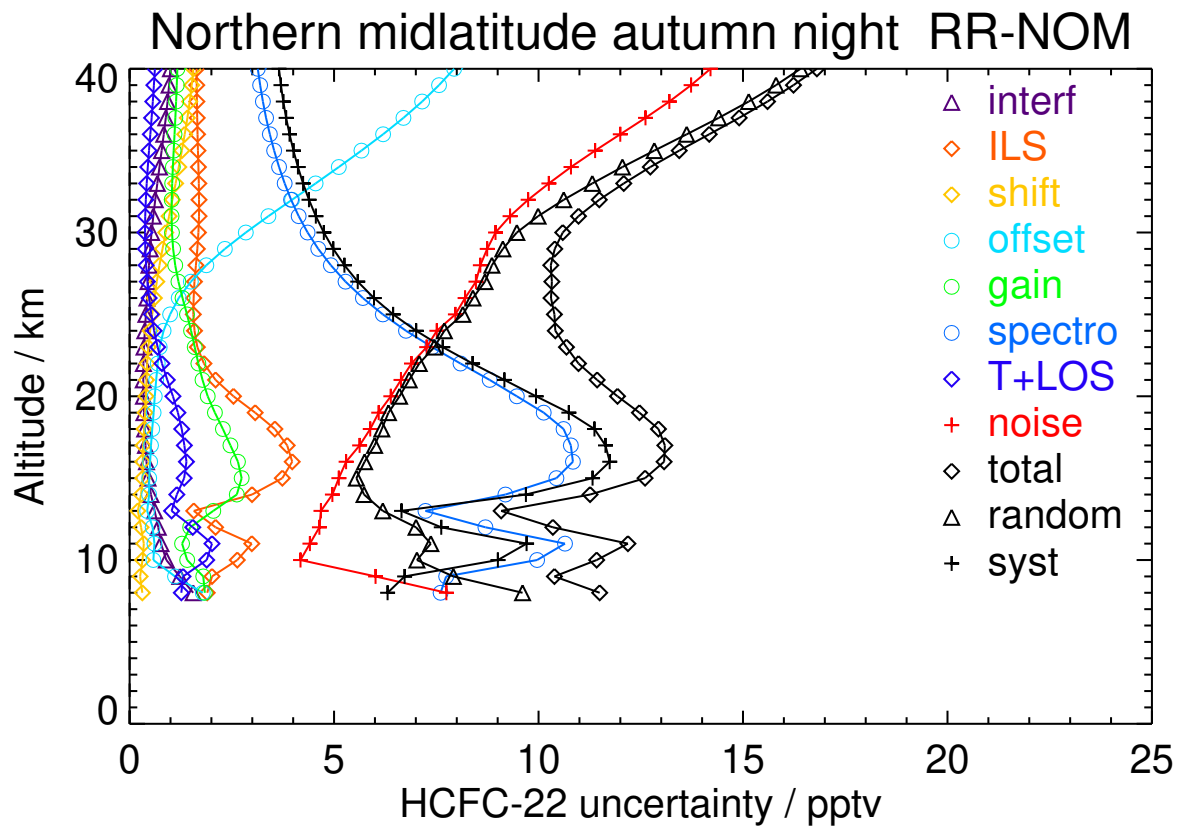
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	206.20	1.60	1.28	0.29	1.78	1.83	6.77	0.93	8.08	8.85	6.66	11.08
11	209.46	0.78	3.68	0.31	0.60	1.04	11.57	2.37	4.20	7.53	10.77	13.15
14	210.43	0.55	2.47	0.27	0.51	2.51	8.82	1.01	4.90	5.61	9.19	10.77
17	190.97	0.40	3.97	0.32	0.56	2.65	11.26	1.44	5.69	6.02	12.18	13.58
20	158.58	0.34	2.83	0.40	0.63	2.11	9.76	1.17	6.39	6.65	10.32	12.27
23	133.48	0.35	1.78	0.46	0.73	1.73	7.53	0.72	7.26	7.45	7.84	10.82
26	123.08	0.42	1.56	0.62	1.20	1.32	5.83	0.49	8.13	8.31	6.11	10.32
29	116.42	0.50	1.62	0.81	2.35	1.03	4.79	0.38	8.69	9.09	5.12	10.43
32	109.61	0.63	1.65	1.05	4.03	0.98	4.14	0.40	9.73	10.63	4.53	11.55
35	102.30	0.78	1.60	1.27	5.75	1.03	3.70	0.47	11.45	12.92	4.12	13.56
38	96.28	0.92	1.58	1.44	7.24	1.09	3.39	0.56	13.27	15.24	3.82	15.71
41	91.82	1.01	1.57	1.55	8.33	1.13	3.18	0.63	14.66	17.00	3.64	17.38



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

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

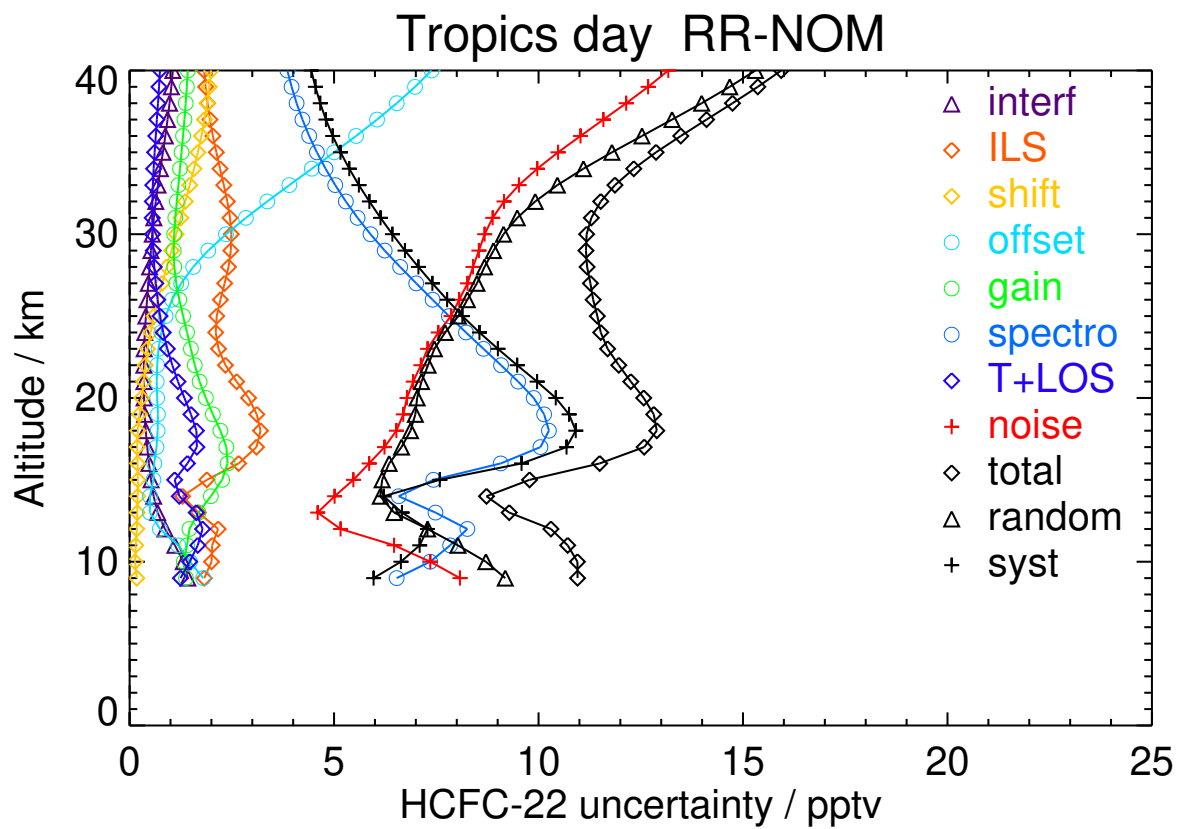
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	200.58	1.55	1.90	0.31	1.79	1.84	7.60	1.27	7.75	9.61	6.31	11.50
11	209.98	0.77	2.99	0.35	0.61	1.28	10.65	2.01	4.41	7.37	9.71	12.19
14	204.62	0.52	2.99	0.28	0.48	2.62	9.19	1.15	4.96	5.73	9.69	11.26
17	182.93	0.39	3.85	0.33	0.52	2.47	10.79	1.34	5.62	5.99	11.64	13.09
20	154.53	0.34	2.54	0.40	0.62	1.91	9.47	1.06	6.39	6.60	9.94	11.93
23	130.82	0.35	1.66	0.46	0.74	1.59	7.40	0.69	7.26	7.45	7.66	10.68
26	121.19	0.42	1.57	0.61	1.20	1.29	5.70	0.48	8.20	8.40	5.98	10.30
29	114.84	0.50	1.66	0.80	2.33	1.06	4.61	0.38	8.74	9.13	4.98	10.40
32	109.20	0.63	1.70	1.05	3.97	1.03	3.95	0.40	9.74	10.62	4.39	11.49
35	104.50	0.78	1.67	1.28	5.67	1.08	3.53	0.47	11.38	12.83	4.01	13.44
38	100.42	0.93	1.65	1.47	7.15	1.14	3.26	0.57	13.20	15.14	3.76	15.60
41	97.36	1.03	1.64	1.59	8.26	1.18	3.09	0.64	14.61	16.92	3.61	17.30



**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	192.81	1.11	2.02	0.15	1.19	1.40	7.84	1.67	6.47	8.03	7.09	10.71
14	197.97	0.59	1.29	0.20	0.50	1.99	6.58	1.22	5.01	6.13	6.21	8.73
17	194.48	0.43	3.10	0.19	0.66	2.37	10.05	1.65	6.23	6.65	10.68	12.58
20	179.23	0.35	2.91	0.30	0.67	1.86	9.88	1.34	6.78	7.03	10.42	12.57
23	163.38	0.35	2.17	0.44	0.71	1.50	8.65	0.92	7.29	7.45	9.01	11.69
26	153.96	0.43	2.22	0.69	1.04	1.22	7.41	0.69	8.06	8.26	7.76	11.33
29	144.80	0.52	2.48	1.02	1.92	1.08	6.24	0.58	8.54	8.90	6.73	11.16
32	133.17	0.64	2.39	1.36	3.37	1.15	5.29	0.56	9.16	9.92	5.86	11.52
35	121.79	0.81	2.12	1.67	5.00	1.27	4.58	0.61	10.48	11.79	5.16	12.87
38	111.82	0.98	1.91	1.90	6.53	1.37	4.08	0.69	12.14	13.99	4.66	14.74
41	104.41	1.09	1.79	2.03	7.75	1.44	3.77	0.76	13.61	15.87	4.36	16.45



**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	190.03	1.15	3.08	0.18	1.14	1.20	9.52	2.18	6.54	8.91	8.52	12.33
14	202.41	0.63	1.21	0.17	0.52	1.75	6.54	1.56	5.16	5.98	6.43	8.78
17	196.89	0.44	3.22	0.19	0.65	2.55	10.52	1.79	6.38	6.89	11.16	13.12
20	174.32	0.36	3.02	0.27	0.67	1.93	10.07	1.46	6.98	7.24	10.65	12.87
23	157.47	0.36	2.21	0.44	0.66	1.47	8.37	0.97	7.46	7.63	8.73	11.59
26	148.16	0.43	2.12	0.69	0.99	1.22	6.99	0.69	8.17	8.36	7.34	11.12
29	140.61	0.53	2.24	1.00	1.90	1.08	5.90	0.56	8.67	9.00	6.35	11.01
32	131.42	0.66	2.13	1.31	3.35	1.14	5.04	0.54	9.39	10.11	5.54	11.53
35	120.40	0.83	1.88	1.59	4.97	1.27	4.39	0.60	10.78	12.04	4.90	13.00
38	110.62	0.98	1.68	1.79	6.47	1.38	3.93	0.68	12.44	14.20	4.45	14.88
41	103.39	1.09	1.58	1.92	7.65	1.46	3.64	0.75	13.87	16.03	4.18	16.56

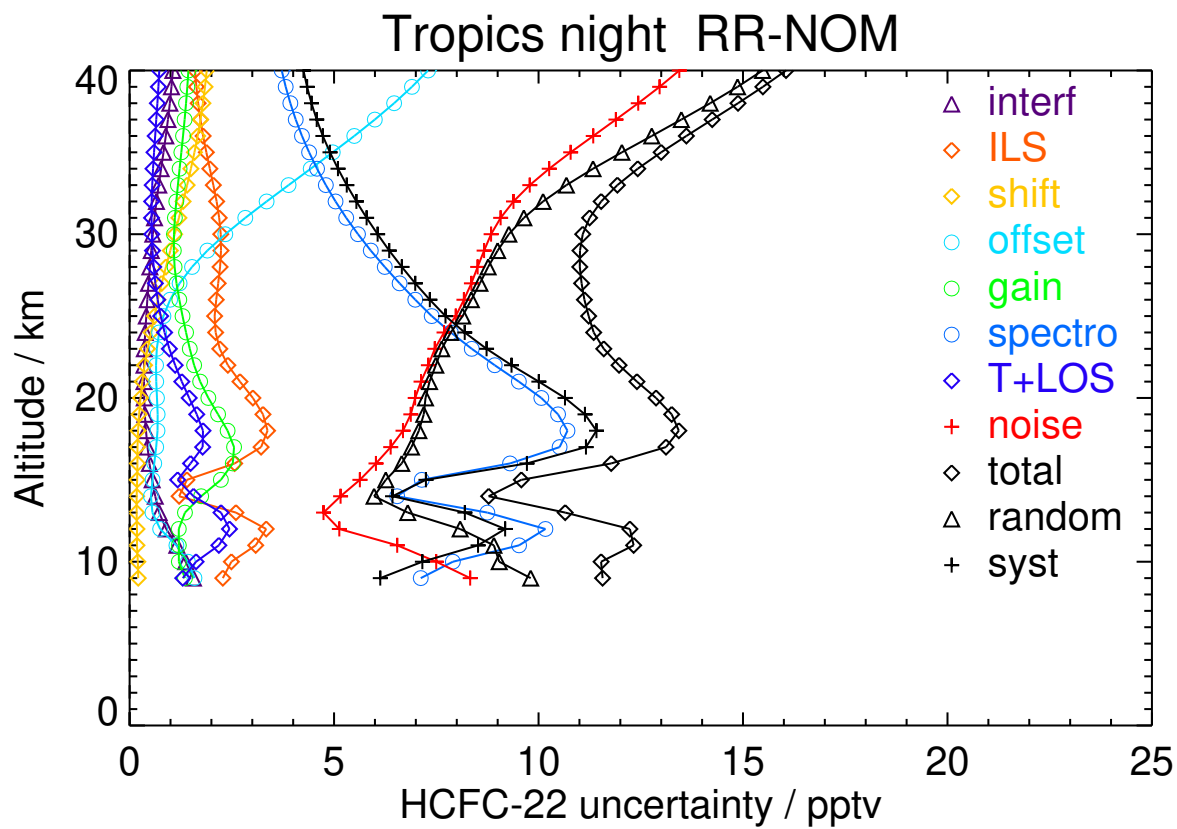
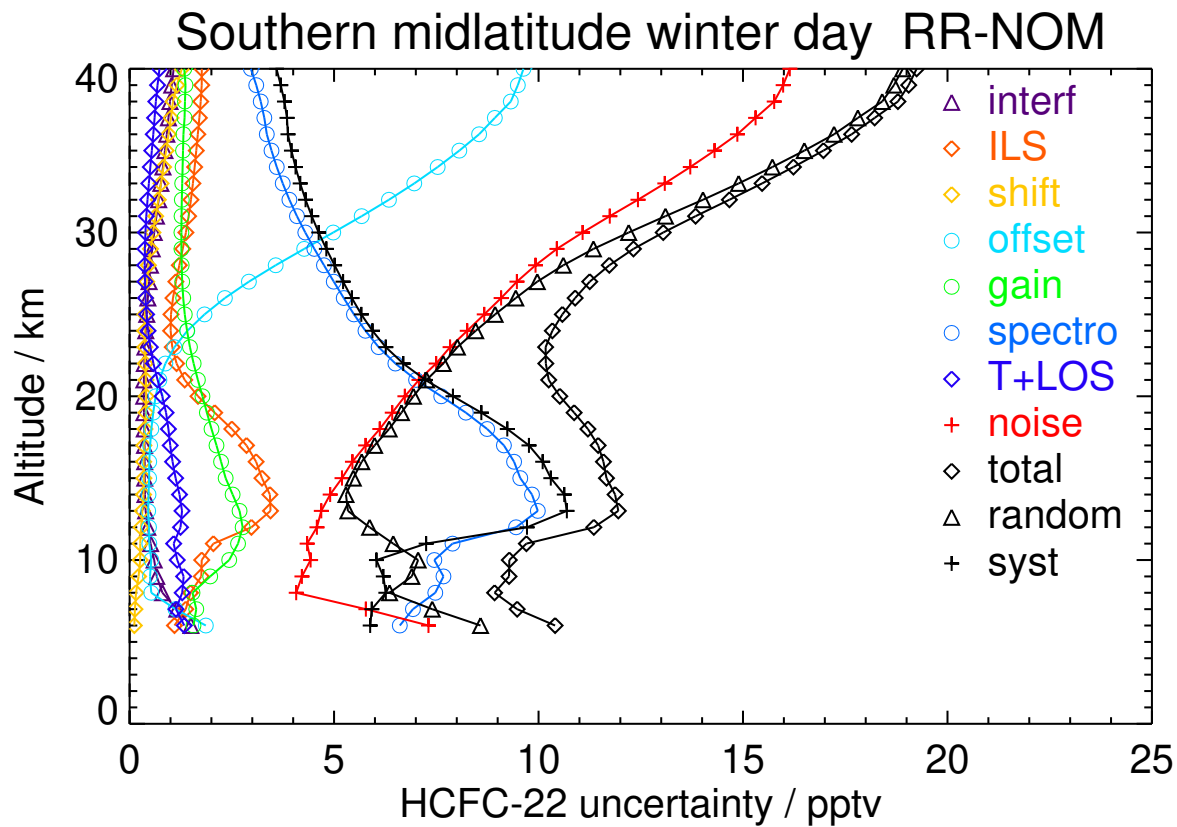


Figure S52. V8R\_F-22\_261 Tropics night

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

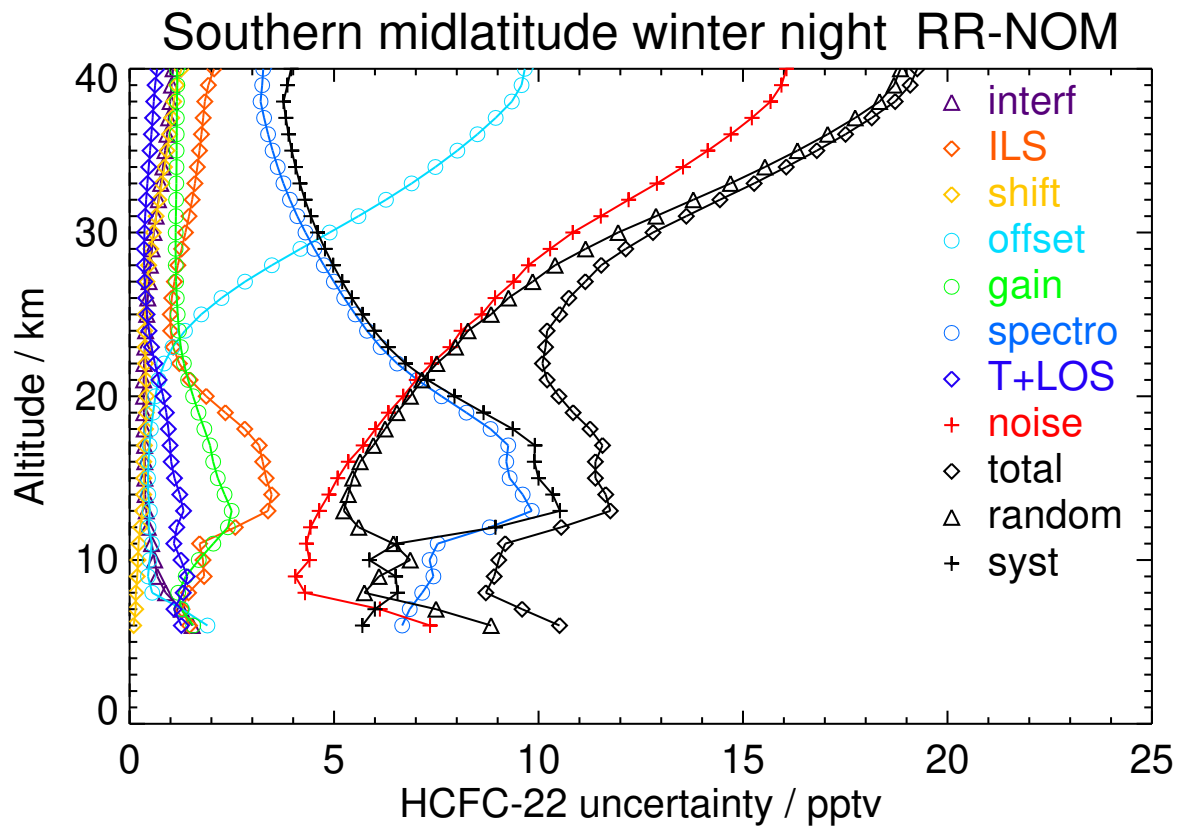
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	187.13	0.80	1.49	0.16	0.53	1.54	7.47	1.29	4.07	6.36	6.27	8.93
11	188.44	0.51	2.05	0.26	0.48	2.65	7.90	1.08	4.34	6.45	7.25	9.70
14	174.72	0.38	3.43	0.34	0.46	2.52	9.84	1.22	4.90	5.29	10.63	11.87
17	154.57	0.36	2.86	0.35	0.50	2.12	9.15	0.99	5.77	5.99	9.77	11.46
20	134.34	0.35	1.67	0.40	0.64	1.78	7.62	0.80	6.73	6.94	7.91	10.52
23	123.28	0.37	1.04	0.37	1.10	1.48	6.09	0.51	7.84	8.02	6.26	10.17
26	116.65	0.45	1.06	0.39	2.33	1.31	5.24	0.39	9.08	9.44	5.44	10.90
29	105.87	0.55	1.30	0.51	4.27	1.27	4.52	0.37	10.45	11.34	4.81	12.32
32	96.73	0.71	1.50	0.70	6.34	1.28	3.91	0.44	12.43	14.02	4.30	14.67
35	89.48	0.86	1.63	0.89	8.06	1.31	3.47	0.54	14.30	16.50	3.96	16.97
38	85.90	0.99	1.74	1.06	9.32	1.35	3.21	0.64	15.76	18.40	3.79	18.79
41	83.58	1.10	1.72	1.37	9.62	1.40	2.87	0.74	16.15	18.92	3.53	19.25



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

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

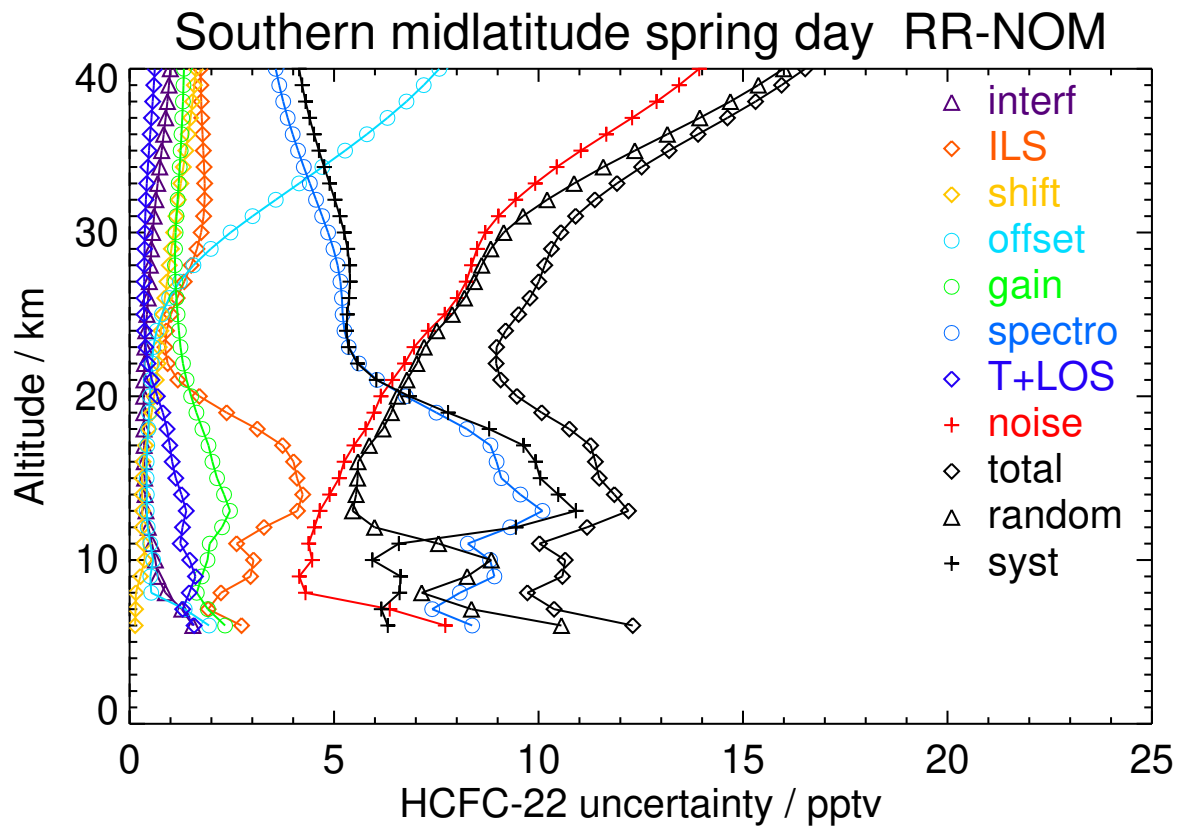
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	189.92	0.88	1.44	0.15	0.55	1.19	7.15	1.31	4.29	5.74	6.55	8.71
11	189.54	0.54	1.71	0.22	0.55	2.05	7.53	1.08	4.32	6.45	6.54	9.18
14	176.86	0.38	3.47	0.34	0.46	2.32	9.61	1.23	4.87	5.34	10.35	11.64
17	158.72	0.37	3.17	0.36	0.49	1.97	9.26	0.99	5.71	5.96	9.91	11.56
20	137.80	0.34	1.87	0.41	0.63	1.55	7.63	0.82	6.69	6.86	7.94	10.50
23	125.04	0.37	1.07	0.38	1.05	1.25	6.14	0.54	7.83	7.97	6.32	10.17
26	114.96	0.45	1.03	0.40	2.25	1.15	5.25	0.39	8.94	9.26	5.44	10.74
29	102.89	0.55	1.27	0.52	4.18	1.13	4.52	0.35	10.28	11.15	4.78	12.13
32	91.48	0.70	1.53	0.72	6.27	1.14	3.92	0.41	12.20	13.78	4.29	14.44
35	83.95	0.87	1.71	0.92	8.01	1.15	3.50	0.50	14.14	16.33	3.96	16.81
38	78.58	0.99	1.84	1.08	9.35	1.16	3.20	0.59	15.67	18.34	3.76	18.72
41	83.89	1.09	2.18	1.36	9.69	1.20	3.38	0.70	16.12	18.91	4.13	19.36



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

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

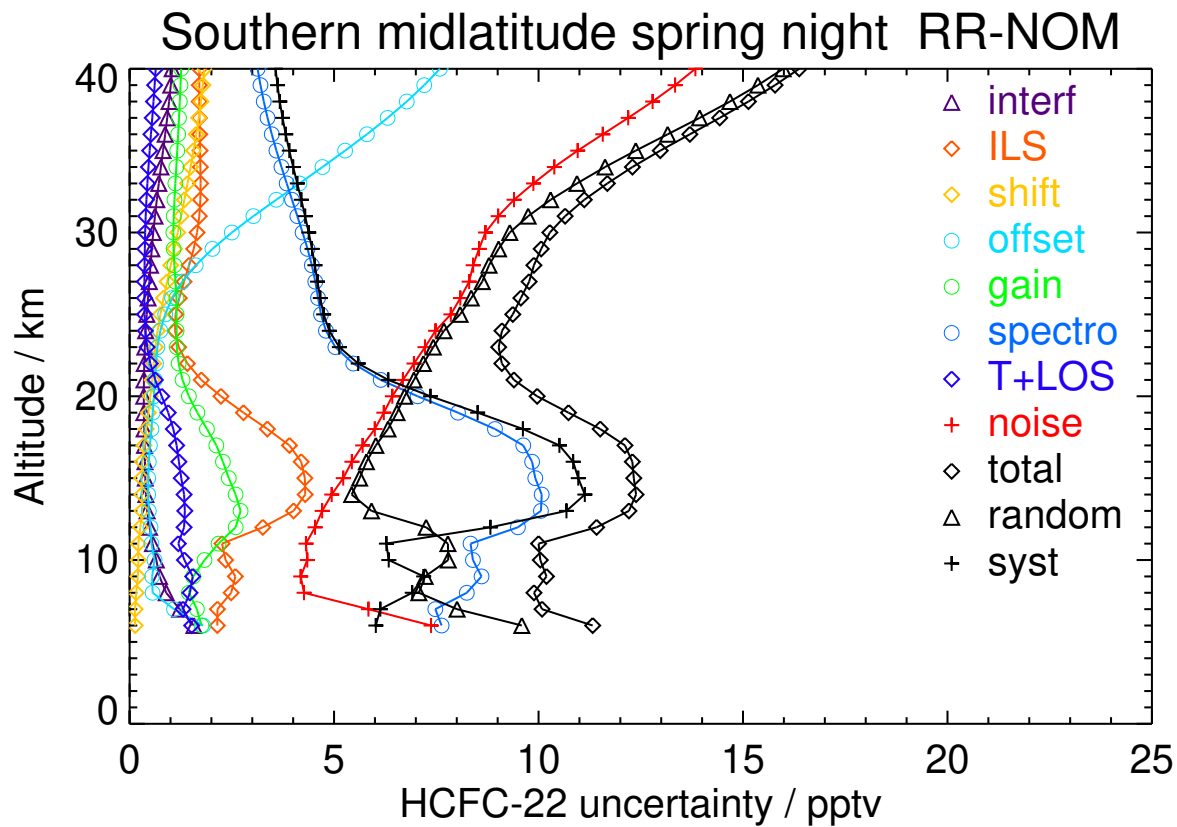
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	192.55	0.88	2.23	0.15	0.53	1.64	8.08	1.46	4.30	7.14	6.60	9.73
11	188.00	0.55	2.62	0.35	0.51	1.96	8.27	1.24	4.38	7.55	6.59	10.02
14	173.81	0.38	4.23	0.31	0.42	2.31	9.56	1.27	4.89	5.54	10.48	11.85
17	152.05	0.36	3.74	0.39	0.43	1.93	8.82	0.98	5.49	5.86	9.63	11.27
20	130.33	0.34	1.71	0.60	0.50	1.51	6.75	0.68	6.14	6.55	6.84	9.47
23	129.55	0.37	0.87	0.72	0.58	1.24	5.36	0.39	6.95	7.20	5.36	8.97
26	134.06	0.45	1.16	0.86	0.97	1.15	5.19	0.35	8.01	8.19	5.37	9.79
29	128.86	0.53	1.65	1.02	1.98	1.11	4.99	0.37	8.50	8.83	5.33	10.32
32	117.88	0.64	1.83	1.19	3.57	1.17	4.56	0.40	9.44	10.21	5.02	11.38
35	107.56	0.78	1.80	1.38	5.27	1.25	4.12	0.47	11.03	12.35	4.63	13.19
38	100.26	0.92	1.75	1.54	6.77	1.30	3.76	0.56	12.89	14.69	4.30	15.31
41	95.15	1.02	1.73	1.65	7.91	1.34	3.50	0.64	14.36	16.53	4.08	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  $1\sigma$ .

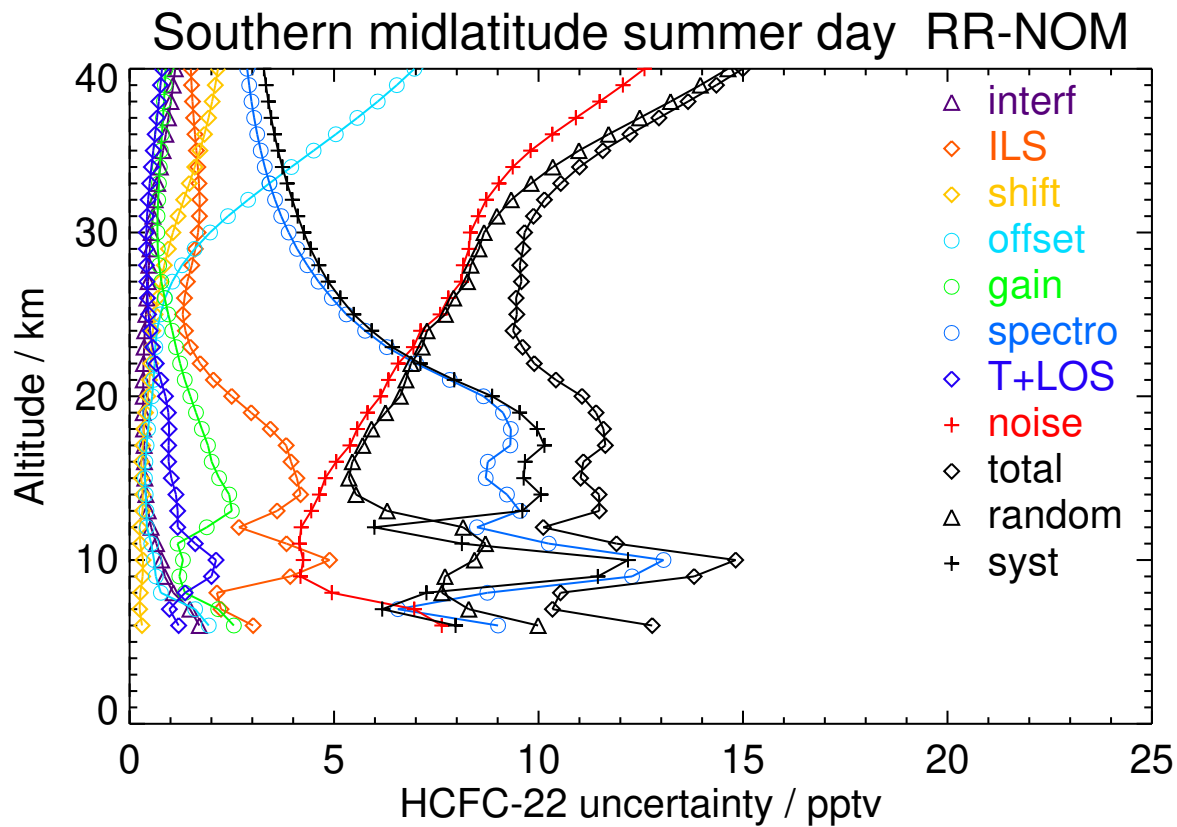
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	194.84	0.89	2.48	0.16	0.56	1.45	8.25	1.48	4.26	7.07	6.91	9.89
11	193.58	0.56	2.26	0.21	0.53	2.18	8.34	1.19	4.31	7.78	6.28	10.00
14	181.52	0.40	4.29	0.30	0.45	2.59	10.08	1.33	4.94	5.43	11.13	12.38
17	151.63	0.37	3.91	0.35	0.50	2.12	9.63	1.15	5.70	6.02	10.51	12.11
20	122.27	0.35	2.23	0.51	0.59	1.45	7.04	0.79	6.42	6.72	7.36	9.97
23	116.35	0.37	1.20	0.63	0.68	1.16	5.03	0.43	7.22	7.43	5.13	9.02
26	118.32	0.45	1.21	0.83	1.04	1.14	4.61	0.36	8.09	8.35	4.66	9.57
29	116.66	0.54	1.57	1.09	2.03	1.08	4.35	0.37	8.54	9.02	4.46	10.06
32	108.27	0.67	1.73	1.34	3.59	1.10	3.97	0.41	9.40	10.30	4.20	11.12
35	98.45	0.82	1.72	1.56	5.27	1.16	3.59	0.49	10.96	12.38	3.90	12.98
38	90.60	0.97	1.70	1.75	6.78	1.23	3.28	0.58	12.79	14.68	3.67	15.13
41	84.80	1.07	1.71	1.86	7.93	1.27	3.07	0.66	14.27	16.52	3.53	16.89



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

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

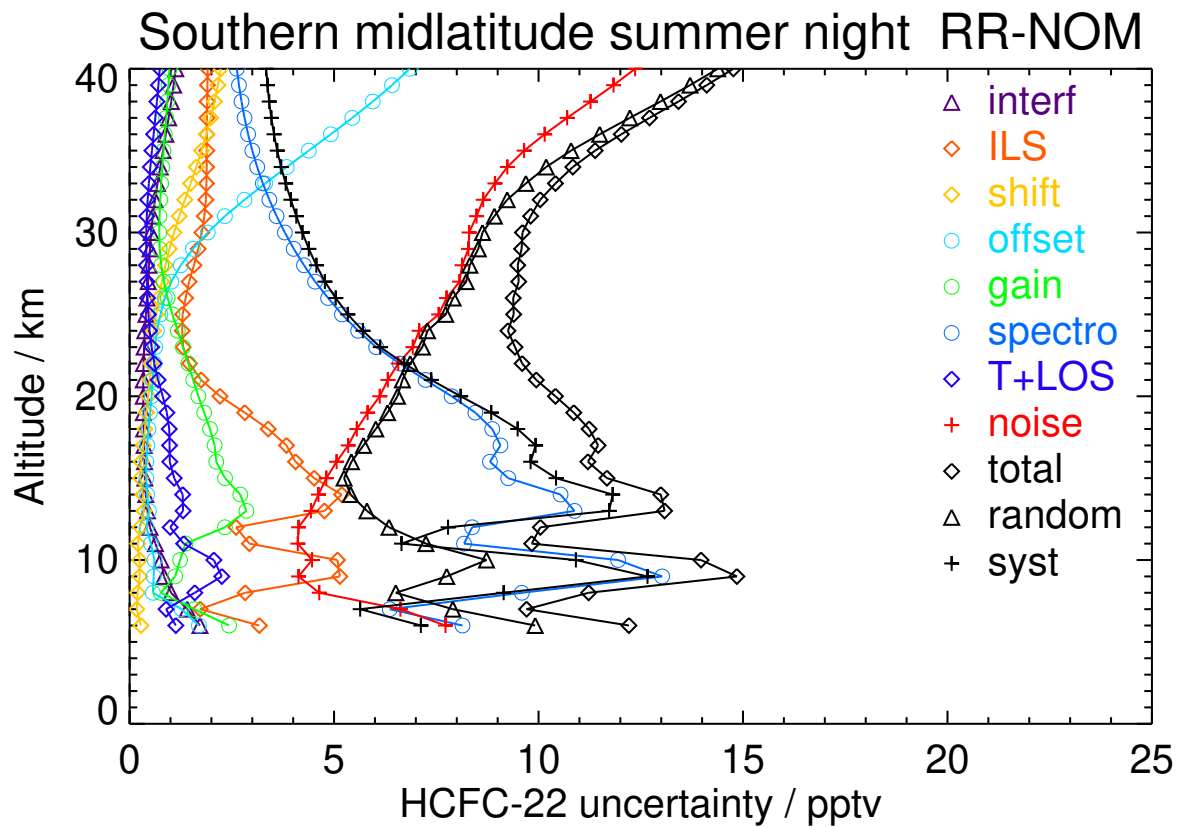
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	183.70	1.07	2.14	0.26	0.76	1.35	8.75	1.36	4.95	7.64	7.26	10.54
11	184.42	0.66	3.84	0.26	0.53	1.17	10.25	1.61	4.15	8.70	8.13	11.91
14	175.12	0.40	4.18	0.32	0.39	2.44	9.23	1.13	4.64	5.54	10.06	11.48
17	163.81	0.36	3.83	0.32	0.42	1.92	9.31	0.95	5.39	5.70	10.14	11.63
20	137.05	0.33	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	0.42	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  $1\sigma$ .

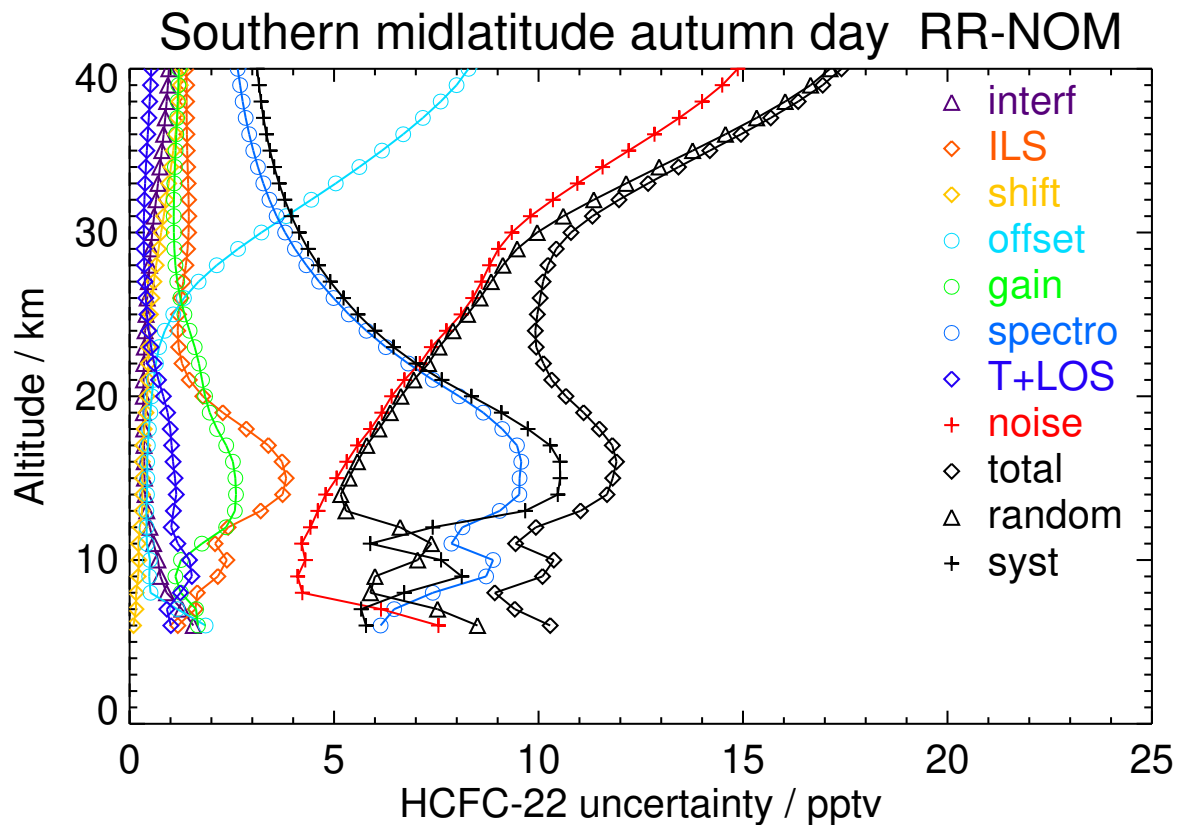
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	183.89	1.01	2.83	0.20	0.57	0.76	9.59	1.59	4.64	6.51	9.15	11.23
11	185.70	0.63	2.93	0.20	0.52	1.37	8.18	1.32	4.11	7.25	6.65	9.83
14	174.42	0.39	5.18	0.33	0.43	2.71	10.54	1.30	4.62	5.40	11.81	12.99
17	157.10	0.36	3.84	0.34	0.44	2.08	9.07	0.98	5.34	5.72	9.93	11.46
20	135.73	0.33	2.21	0.46	0.54	1.68	7.87	0.81	6.12	6.55	8.10	10.41
23	121.06	0.35	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	1.17	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  $1\sigma$ .

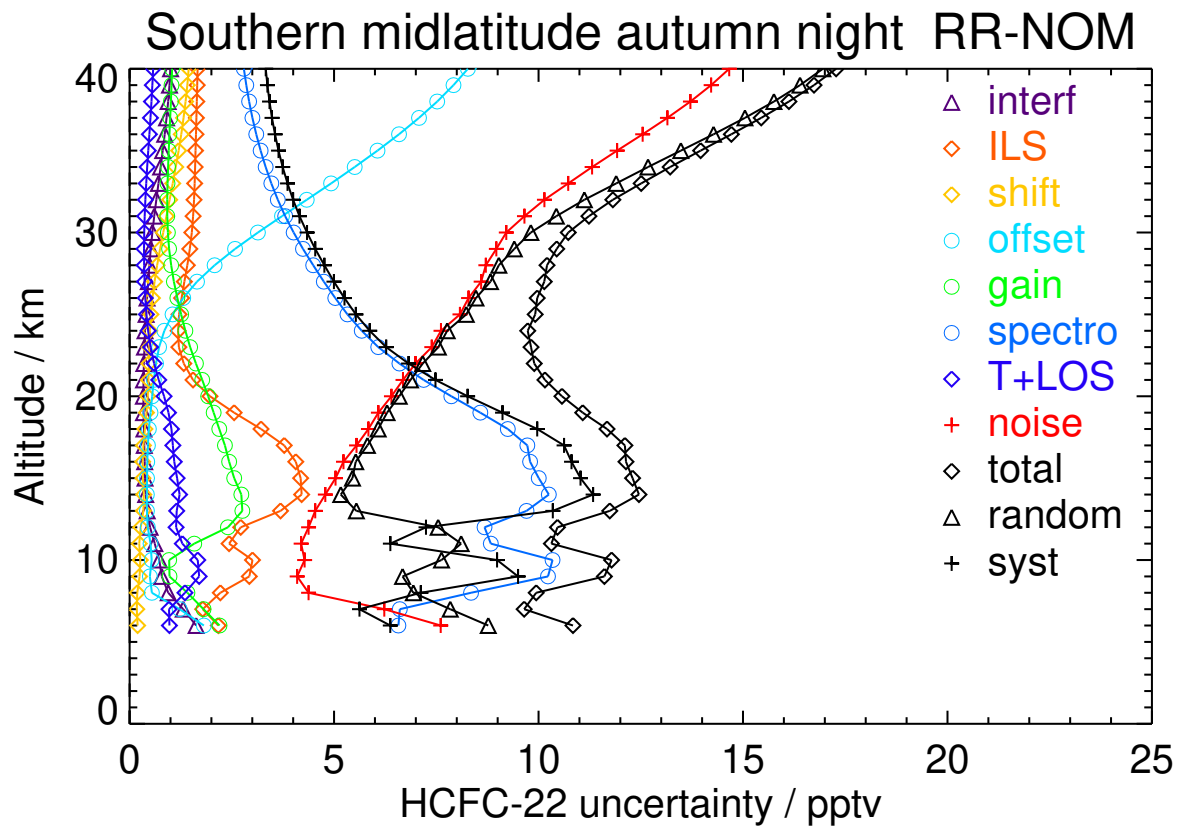
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
8	181.35	0.91	1.65	0.16	0.51	1.25	7.41	1.24	4.22	5.89	6.71	8.93
11	189.12	0.59	2.09	0.21	0.42	1.77	7.87	1.18	4.21	7.38	5.88	9.44
14	181.03	0.38	3.74	0.32	0.43	2.60	9.53	1.14	4.79	5.16	10.47	11.67
17	160.05	0.35	3.39	0.32	0.45	2.36	9.47	1.03	5.57	5.80	10.28	11.80
20	136.44	0.34	1.79	0.43	0.54	1.85	8.06	0.82	6.41	6.63	8.36	10.67
23	120.27	0.36	1.20	0.46	0.72	1.59	6.27	0.53	7.38	7.56	6.45	9.94
26	108.93	0.43	1.25	0.55	1.33	1.24	4.99	0.40	8.39	8.57	5.23	10.04
29	98.65	0.52	1.42	0.71	2.65	1.09	4.04	0.35	9.02	9.48	4.36	10.43
32	90.90	0.65	1.44	0.90	4.44	1.08	3.42	0.36	10.35	11.35	3.79	11.97
35	85.47	0.79	1.41	1.07	6.17	1.12	3.02	0.42	12.20	13.77	3.43	14.19
38	81.52	0.91	1.39	1.21	7.61	1.18	2.76	0.49	14.00	16.03	3.21	16.35
41	79.38	0.98	1.39	1.30	8.59	1.22	2.60	0.54	15.24	17.59	3.09	17.86



**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	184.99	0.94	2.22	0.19	0.55	1.41	8.35	1.35	4.38	6.94	7.12	9.94
11	189.72	0.62	2.43	0.24	0.51	1.58	8.83	1.29	4.19	8.11	6.38	10.32
14	182.87	0.39	4.21	0.35	0.42	2.73	10.25	1.22	4.79	5.16	11.33	12.45
17	162.04	0.36	3.78	0.34	0.45	2.33	9.73	1.06	5.55	5.81	10.62	12.11
20	135.55	0.34	1.97	0.44	0.55	1.92	7.87	0.84	6.40	6.59	8.26	10.57
23	120.44	0.36	1.20	0.48	0.72	1.48	6.08	0.51	7.39	7.55	6.27	9.82
26	112.52	0.43	1.27	0.56	1.31	1.17	5.03	0.38	8.29	8.47	5.25	9.97
29	101.99	0.52	1.47	0.75	2.58	0.97	4.24	0.35	8.97	9.41	4.54	10.44
32	92.03	0.65	1.58	0.98	4.33	0.92	3.62	0.38	10.14	11.12	4.00	11.82
35	86.31	0.81	1.61	1.20	6.06	0.96	3.20	0.46	11.92	13.48	3.64	13.96
38	82.83	0.94	1.64	1.37	7.52	1.01	2.92	0.53	13.71	15.76	3.42	16.12
41	79.99	1.02	1.67	1.47	8.58	1.05	2.74	0.59	15.04	17.43	3.29	17.74



**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	182.83	1.65	0.63	0.13	2.12	1.62	6.96	1.57	7.61	9.11	6.00	10.91
8	190.55	0.68	1.59	0.21	0.59	1.83	7.35	1.34	4.23	6.59	6.09	8.97
11	186.69	0.45	3.04	0.31	0.58	2.82	10.76	1.67	4.66	5.37	11.36	12.57
14	158.30	0.40	3.29	0.30	0.57	2.24	10.40	1.53	5.51	5.90	11.07	12.54
17	129.31	0.39	2.69	0.26	0.67	1.76	8.82	1.15	6.63	6.89	9.31	11.58
20	106.15	0.37	1.83	0.25	1.03	1.32	6.95	0.90	7.83	8.05	7.21	10.81
23	84.21	0.41	1.25	0.25	1.81	0.95	4.93	0.62	8.90	9.17	5.09	10.49
26	72.01	0.46	1.07	0.36	3.18	0.77	3.43	0.42	9.95	10.50	3.59	11.10
29	64.37	0.60	1.21	0.62	5.05	0.71	2.54	0.41	11.15	12.31	2.77	12.62
32	58.93	0.82	1.45	0.93	7.00	0.70	2.11	0.56	13.05	14.90	2.47	15.11
35	55.15	1.03	1.65	1.19	8.64	0.73	1.94	0.73	14.83	17.28	2.44	17.45
38	52.91	1.18	1.79	1.41	9.82	0.73	1.87	0.87	16.19	19.07	2.50	19.24
41	46.34	1.30	1.86	1.66	10.42	0.77	1.81	0.99	16.88	19.99	2.54	20.16

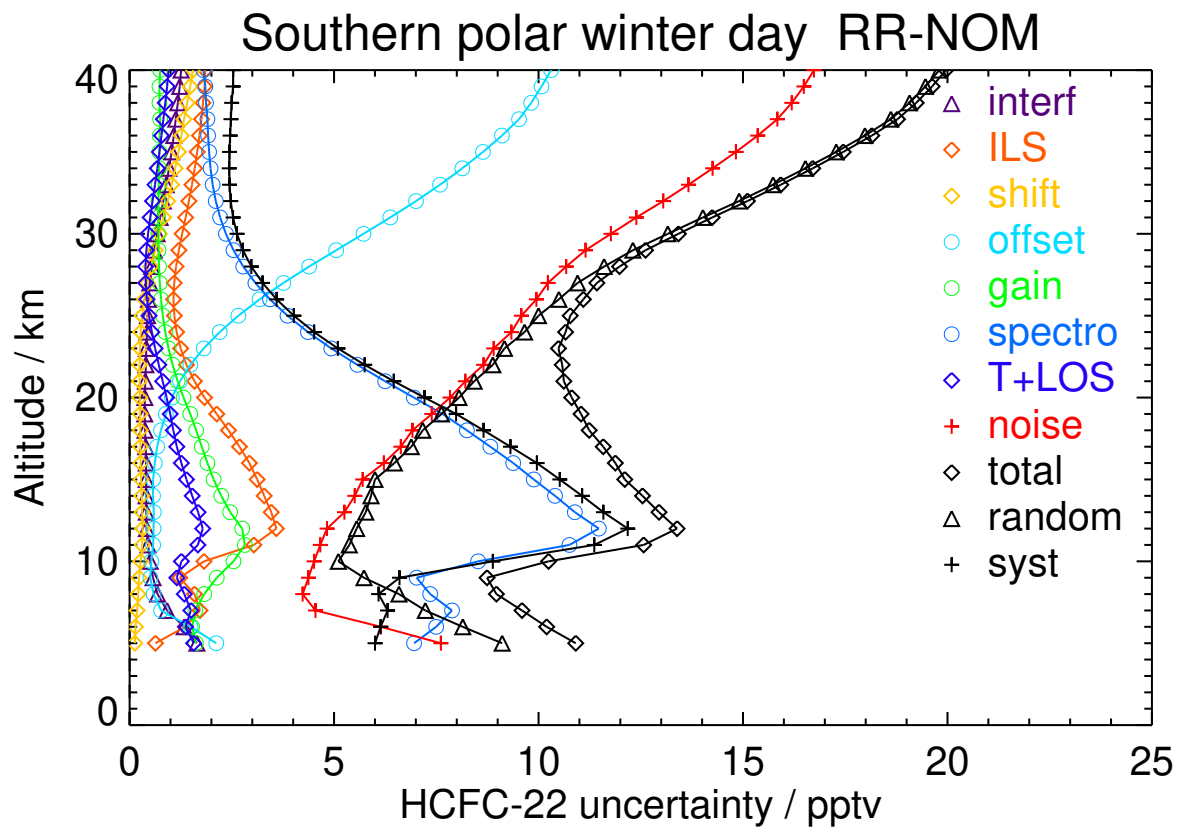


Figure S61. V8R\_F-22\_261 Southern polar winter day

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	187.16	1.75	1.50	0.23	2.10	0.97	8.20	1.95	7.82	9.78	6.87	11.96
8	192.59	0.70	1.70	0.20	0.51	1.49	7.72	1.64	4.14	6.44	6.62	9.24
11	189.91	0.47	2.65	0.28	0.53	2.73	9.70	1.60	4.68	5.35	10.25	11.56
14	165.08	0.40	3.06	0.29	0.55	2.16	9.49	1.46	5.44	5.79	10.14	11.68
17	136.06	0.39	2.87	0.28	0.64	1.68	8.62	1.16	6.49	6.71	9.19	11.38
20	113.52	0.37	2.20	0.26	0.97	1.25	7.17	0.92	7.68	7.88	7.53	10.90
23	92.06	0.41	1.63	0.27	1.76	0.95	5.43	0.68	8.88	9.14	5.68	10.76
26	73.64	0.47	1.42	0.40	3.11	0.78	3.82	0.49	9.95	10.48	4.09	11.25
29	59.91	0.60	1.49	0.67	4.95	0.71	2.62	0.44	11.09	12.21	3.01	12.57
32	50.70	0.82	1.67	0.99	6.87	0.70	1.93	0.54	12.89	14.69	2.54	14.91
35	45.52	1.02	1.83	1.25	8.49	0.72	1.64	0.67	14.62	17.02	2.44	17.19
38	42.90	1.17	1.96	1.46	9.70	0.74	1.55	0.79	16.02	18.85	2.49	19.02
41	47.03	1.30	2.11	1.79	9.95	0.77	1.59	0.88	16.41	19.36	2.66	19.54

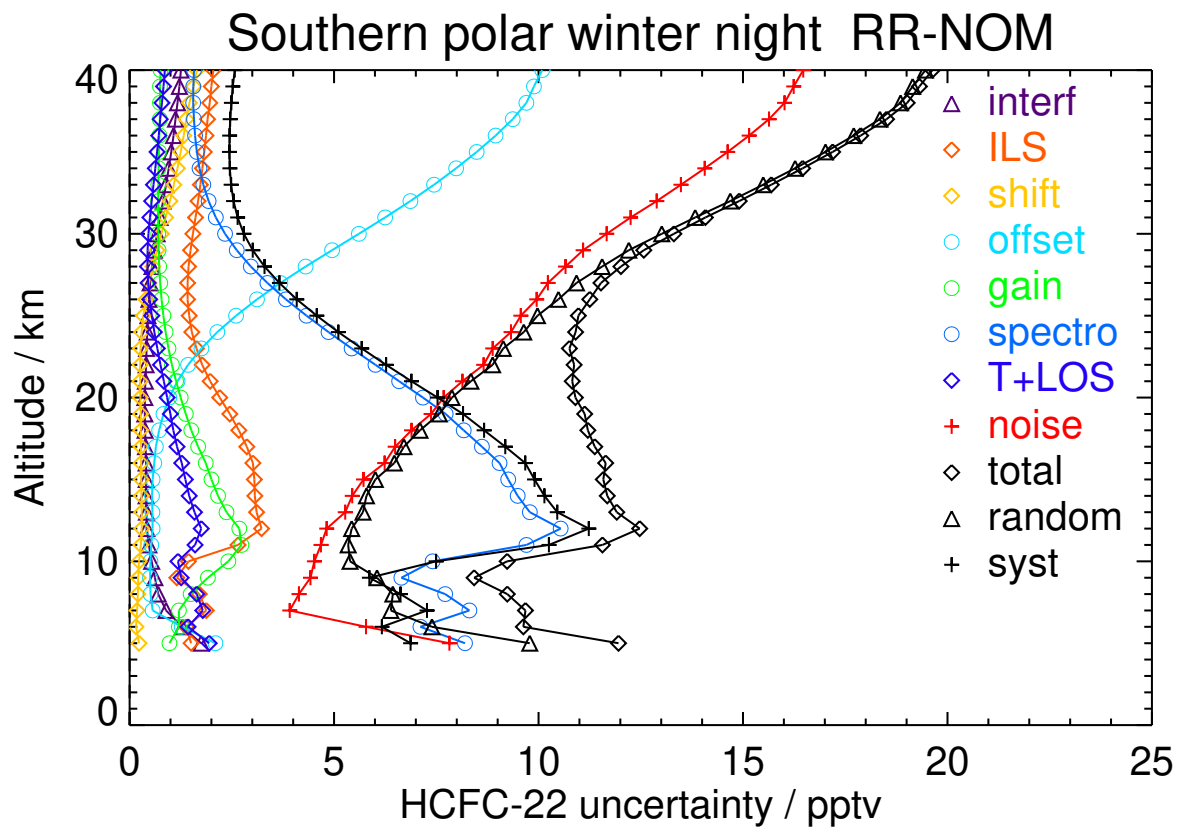


Figure S62. V8R\_F-22\_261 Southern polar winter night

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	189.78	1.72	2.44	0.11	1.95	2.04	7.06	1.35	7.68	9.28	6.43	11.29
8	195.84	0.78	3.14	0.16	0.52	1.65	8.35	1.84	4.33	6.33	8.08	10.26
11	184.83	0.50	4.50	0.23	0.52	2.68	11.17	1.79	4.80	5.69	12.11	13.38
14	148.90	0.39	4.38	0.24	0.48	1.79	9.37	1.50	5.43	6.08	10.27	11.93
17	125.56	0.37	3.12	0.42	0.52	1.15	7.31	1.02	6.11	6.70	7.65	10.17
20	110.83	0.37	1.98	0.60	0.65	0.91	5.86	0.68	6.76	7.27	5.77	9.28
23	103.96	0.41	1.19	0.73	0.72	0.86	4.55	0.46	7.41	7.68	4.50	8.90
26	101.39	0.49	1.03	0.95	1.00	0.92	4.08	0.41	8.32	8.63	3.94	9.49
29	99.25	0.59	1.46	1.30	1.87	0.95	3.91	0.45	8.44	9.00	3.80	9.77
32	95.03	0.77	1.87	1.68	3.35	1.02	3.66	0.53	9.26	10.22	3.76	10.89
35	89.33	0.95	1.95	1.98	5.01	1.10	3.39	0.61	10.73	12.19	3.63	12.72
38	84.67	1.10	1.92	2.18	6.51	1.18	3.15	0.70	12.59	14.50	3.48	14.91
41	80.85	1.19	1.88	2.28	7.65	1.24	2.97	0.76	14.10	16.34	3.37	16.69

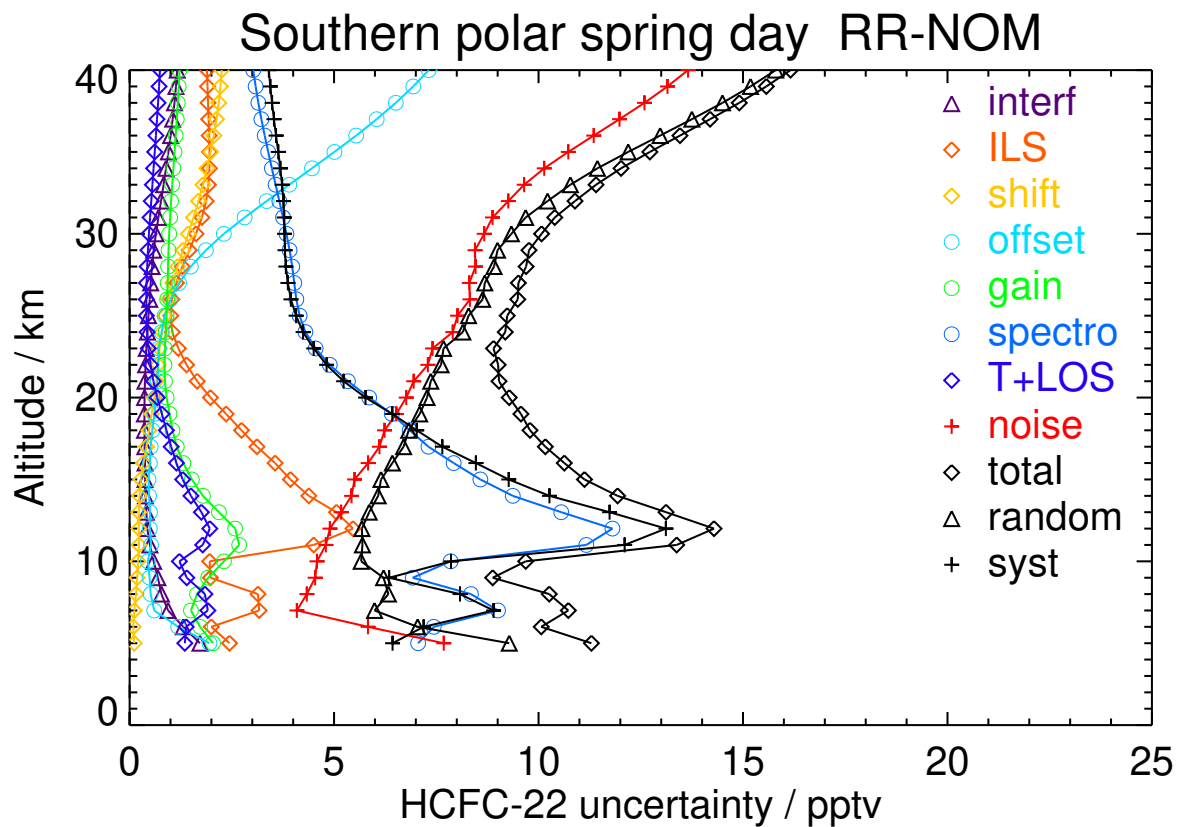


Figure S63. V8R\_F-22\_261 Southern polar spring day

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	191.02	1.71	1.92	0.08	1.91	1.47	6.97	1.46	7.68	8.95	6.47	11.05
8	195.57	0.73	2.59	0.15	0.49	1.50	8.05	1.66	4.40	6.71	7.18	9.83
11	184.33	0.47	4.13	0.23	0.53	2.76	11.22	1.75	4.71	5.54	12.07	13.28
14	151.41	0.37	4.30	0.26	0.44	1.96	8.98	1.31	5.26	5.72	10.00	11.52
17	128.75	0.37	3.58	0.47	0.49	1.41	7.49	0.93	5.90	6.33	8.19	10.35
20	115.39	0.37	1.88	0.69	0.60	1.08	5.72	0.61	6.55	6.98	5.73	9.04
23	111.72	0.41	1.10	0.82	0.68	0.98	4.58	0.41	7.22	7.49	4.55	8.76
26	111.22	0.49	1.11	1.00	0.99	1.03	4.20	0.38	8.21	8.50	4.17	9.47
29	108.09	0.56	1.58	1.25	1.84	1.11	3.95	0.39	8.37	8.85	4.04	9.73
32	101.49	0.72	1.98	1.54	3.31	1.18	3.63	0.45	9.20	10.07	3.97	10.82
35	94.67	0.90	2.07	1.80	4.96	1.25	3.33	0.53	10.68	12.05	3.82	12.64
38	89.36	1.05	2.06	1.98	6.45	1.31	3.09	0.60	12.56	14.37	3.68	14.84
41	85.16	1.14	2.05	2.08	7.61	1.36	2.92	0.66	14.07	16.24	3.59	16.63

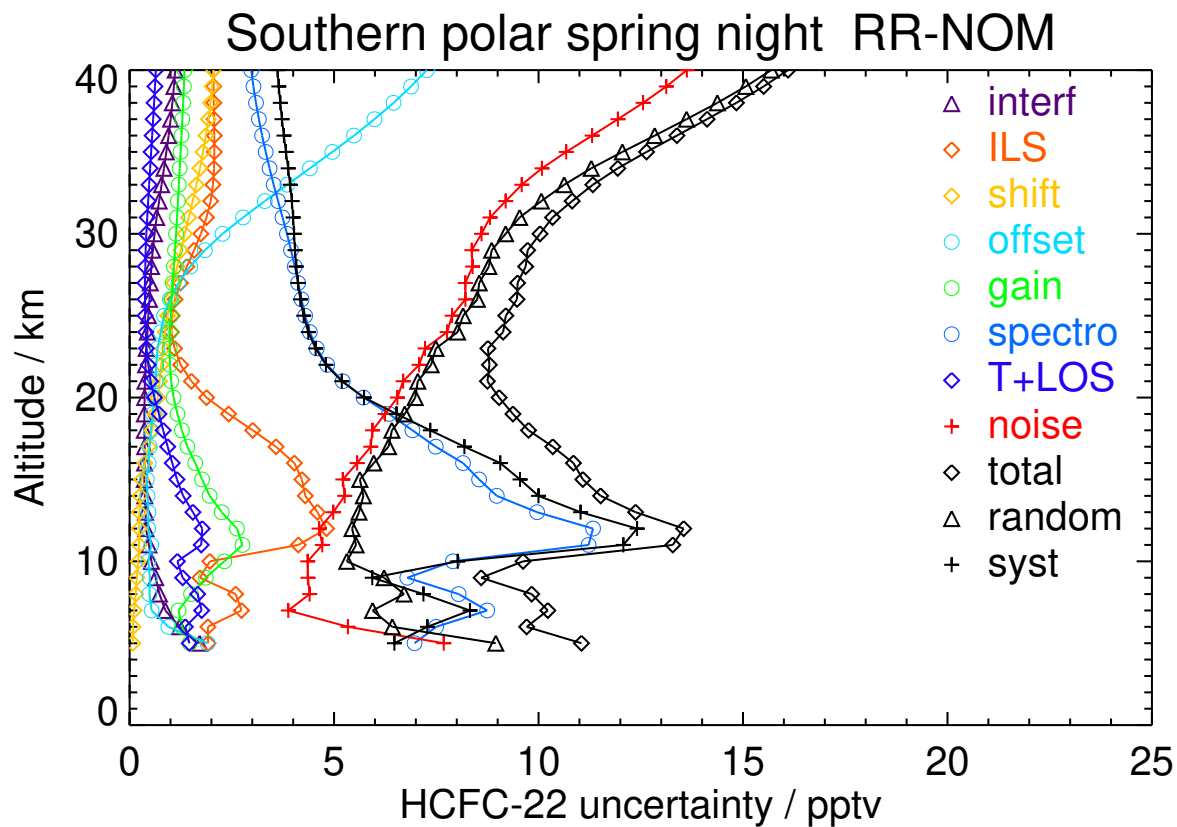


Figure S64. V8R\_F-22\_261 Southern polar spring night

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	186.31	1.76	4.48	0.34	1.79	3.26	10.00	1.51	7.86	9.45	10.58	14.18
8	184.58	0.83	4.63	0.22	0.53	0.65	14.03	2.02	4.05	5.72	14.41	15.50
11	178.44	0.51	2.00	0.20	0.39	2.10	7.92	0.92	4.11	5.92	7.37	9.45
14	171.82	0.37	4.58	0.34	0.35	2.06	8.47	1.00	4.62	5.07	9.69	10.93
17	151.14	0.35	3.74	0.43	0.39	1.92	8.80	0.88	5.22	5.43	9.70	11.12
20	127.03	0.34	1.41	0.62	0.53	1.83	6.75	0.60	5.84	6.07	7.02	9.28
23	116.00	0.35	1.51	0.61	0.58	2.36	5.14	0.38	6.46	6.82	5.52	8.78
26	109.91	0.43	1.56	0.61	0.78	1.76	4.51	0.36	7.80	7.99	4.92	9.38
29	101.56	0.48	1.74	0.77	1.47	1.13	4.02	0.38	8.02	8.24	4.48	9.38
32	95.99	0.61	1.94	1.14	2.76	0.94	3.50	0.45	8.66	9.21	4.08	10.07
35	88.99	0.81	1.86	1.58	4.35	0.93	3.07	0.58	9.72	10.83	3.67	11.43
38	81.75	1.03	1.73	1.94	5.91	0.99	2.76	0.72	11.41	13.07	3.34	13.49
41	76.68	1.19	1.65	2.19	7.20	1.04	2.55	0.84	12.98	15.09	3.14	15.42

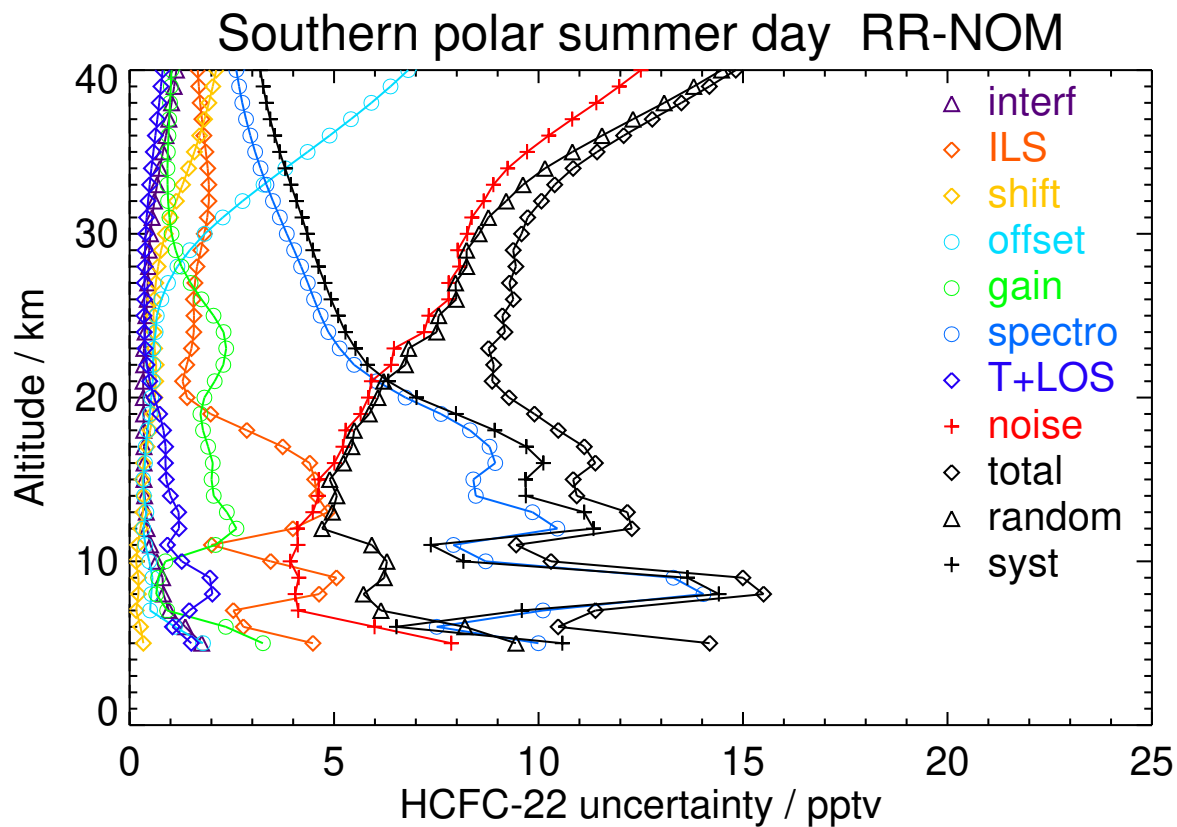


Figure S65. V8R\_F-22\_261 Southern polar summer day

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	181.97	0.82	4.18	0.24	0.51	0.82	13.35	2.00	3.86	5.37	13.69	14.70
11	182.00	0.52	1.29	0.16	0.30	1.74	6.42	0.75	3.90	5.00	6.08	7.88
14	170.12	0.36	4.96	0.32	0.34	2.37	9.25	1.09	4.48	4.84	10.68	11.73
17	155.77	0.35	3.78	0.42	0.39	2.10	8.85	0.88	5.14	5.33	9.81	11.16
20	129.26	0.33	1.39	0.56	0.49	1.62	7.09	0.66	5.84	5.97	7.38	9.49
23	114.77	0.34	0.83	0.54	0.56	1.23	5.21	0.40	6.61	6.70	5.39	8.60
26	107.78	0.43	1.28	0.61	0.84	1.06	4.49	0.37	7.91	8.03	4.75	9.33
29	99.41	0.49	1.76	0.82	1.64	0.90	3.93	0.38	8.18	8.43	4.36	9.49
32	88.59	0.61	1.85	1.17	3.02	0.83	3.32	0.43	8.83	9.45	3.85	10.21
35	79.95	0.80	1.79	1.56	4.67	0.86	2.82	0.53	10.00	11.20	3.40	11.70
38	73.45	0.99	1.76	1.87	6.24	0.92	2.49	0.65	11.74	13.49	3.13	13.85
41	68.53	1.14	1.77	2.07	7.51	0.97	2.30	0.75	13.31	15.50	2.99	15.78

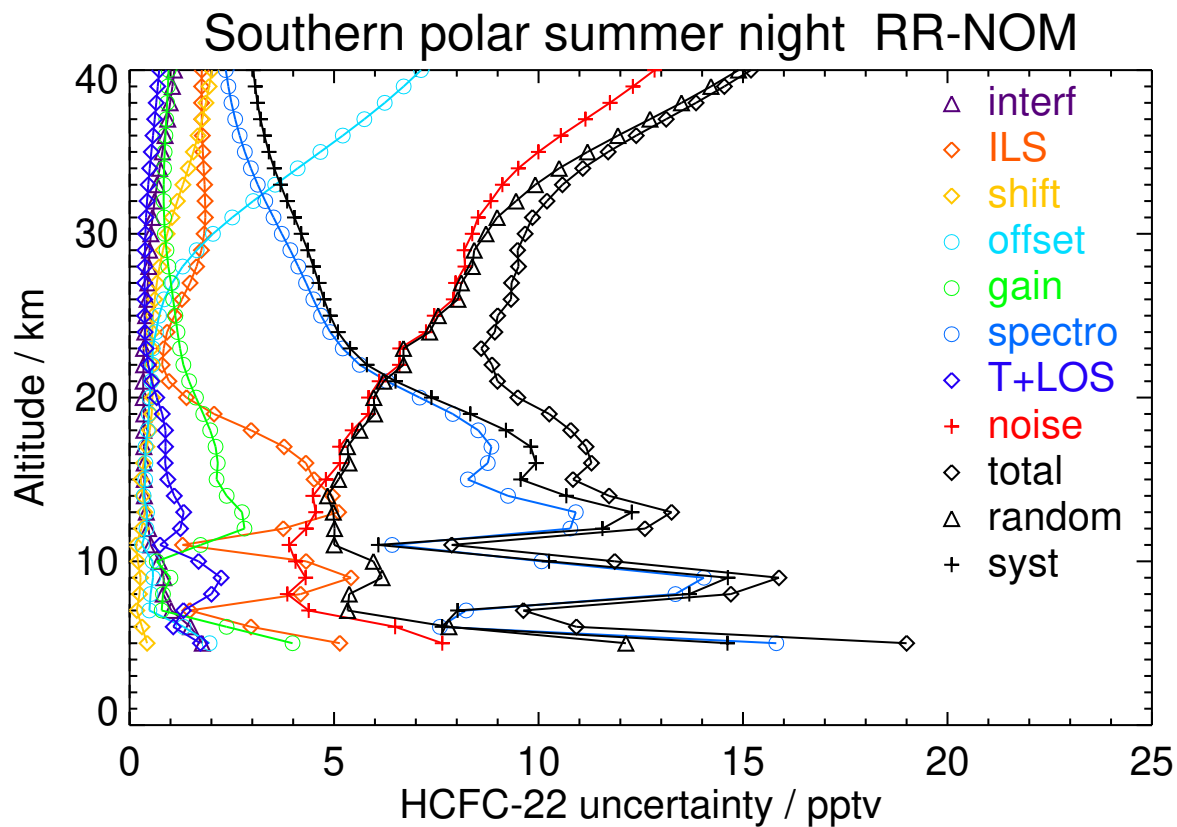


Figure S66. V8R\_F-22\_261 Southern polar summer night

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	1.72	1.86	0.16	2.00	2.32	6.93	1.12	7.67	9.17	6.31	11.13
8	184.62	0.75	1.56	0.14	0.45	1.11	7.42	1.05	4.13	5.22	7.10	8.81
11	184.18	0.49	2.05	0.27	0.46	2.33	8.13	0.95	4.36	5.70	7.98	9.81
14	172.75	0.36	3.73	0.35	0.43	2.58	9.76	1.09	4.98	5.26	10.71	11.93
17	148.39	0.37	2.93	0.39	0.48	2.21	9.03	0.95	5.79	6.00	9.70	11.40
20	124.10	0.34	1.26	0.41	0.59	1.68	6.92	0.68	6.68	6.85	7.15	9.90
23	109.02	0.36	0.82	0.32	0.97	1.40	5.48	0.44	7.64	7.77	5.66	9.61
26	94.70	0.45	0.91	0.34	2.08	1.25	4.50	0.36	8.90	9.19	4.72	10.33
29	82.98	0.55	1.12	0.45	3.96	1.12	3.64	0.34	10.04	10.84	3.92	11.53
32	73.46	0.70	1.32	0.62	6.03	1.08	2.98	0.39	12.13	13.60	3.37	14.01
35	65.95	0.85	1.46	0.77	7.77	1.08	2.56	0.47	14.11	16.18	3.06	16.46
38	61.25	0.95	1.56	0.89	9.08	1.10	2.30	0.55	15.67	18.19	2.89	18.41
41	59.42	1.02	1.60	1.11	9.58	1.15	2.06	0.61	16.26	18.96	2.76	19.16

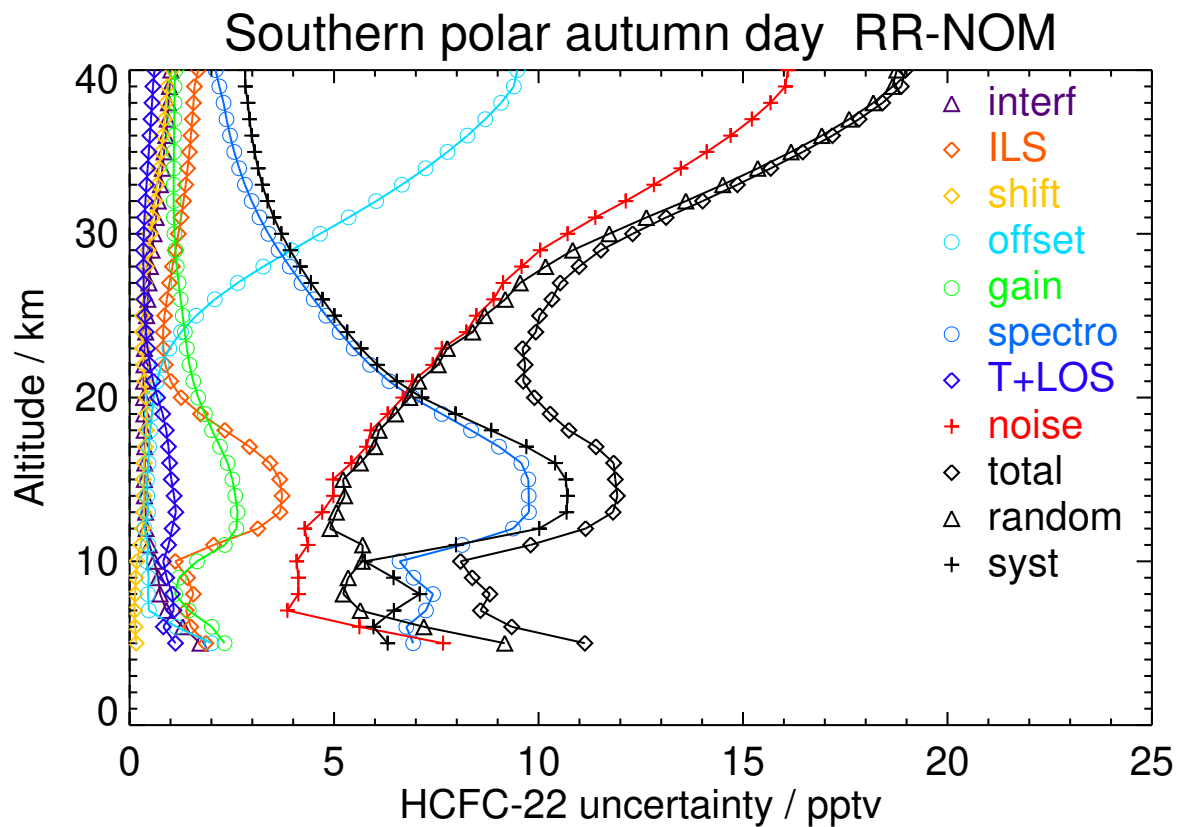


Figure S67. V8R\_F-22\_261 Southern polar autumn day

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	181.19	1.67	1.78	0.17	1.87	2.16	6.36	0.94	7.30	8.21	6.43	10.43
8	185.38	0.78	2.15	0.18	0.49	0.86	8.94	1.41	4.30	5.80	8.54	10.33
11	185.39	0.51	1.88	0.26	0.47	2.27	8.06	0.96	4.45	5.35	8.14	9.75
14	171.68	0.37	3.64	0.34	0.44	2.40	10.08	1.22	5.06	5.35	10.93	12.17
17	140.62	0.37	3.03	0.38	0.51	2.01	9.12	0.99	5.92	6.18	9.73	11.53
20	118.58	0.35	1.38	0.37	0.62	1.47	6.58	0.67	6.83	6.97	6.81	9.75
23	105.15	0.38	0.95	0.29	1.08	1.26	5.30	0.43	7.82	7.96	5.47	9.66
26	91.14	0.45	0.99	0.32	2.29	1.12	4.46	0.36	9.10	9.42	4.67	10.51
29	78.48	0.56	1.20	0.44	4.23	1.04	3.67	0.35	10.33	11.21	3.96	11.89
32	68.83	0.72	1.40	0.60	6.32	1.01	3.02	0.41	12.47	14.03	3.42	14.44
35	62.31	0.87	1.53	0.76	8.05	1.02	2.57	0.50	14.42	16.58	3.09	16.86
38	58.08	0.97	1.64	0.87	9.35	1.04	2.29	0.58	15.93	18.54	2.91	18.76
41	58.99	1.04	1.66	1.13	9.64	1.13	2.21	0.59	16.33	19.05	2.87	19.26

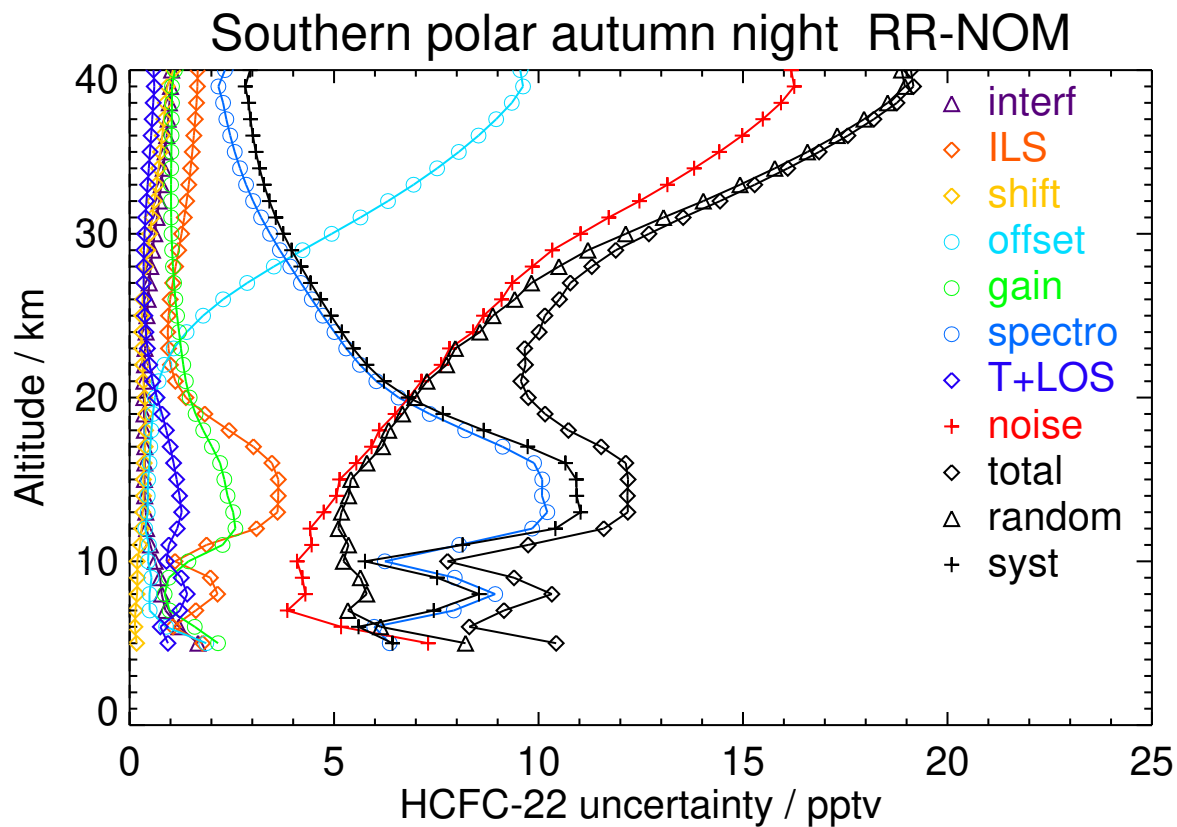
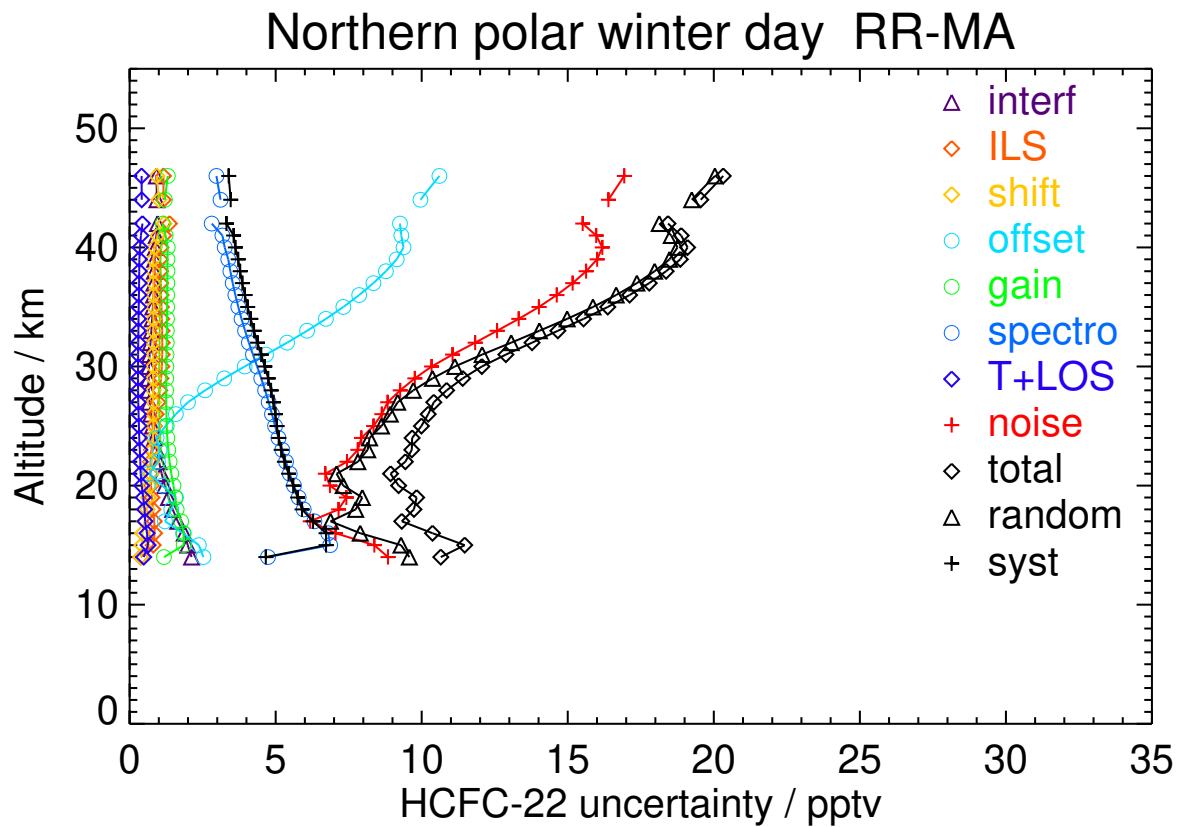


Figure S68. V8R\_F-22\_261 Southern polar autumn night

**Table S70.** HCFC-22 error budget for Northern polar winter day. All uncertainties are  $1\sigma$ .

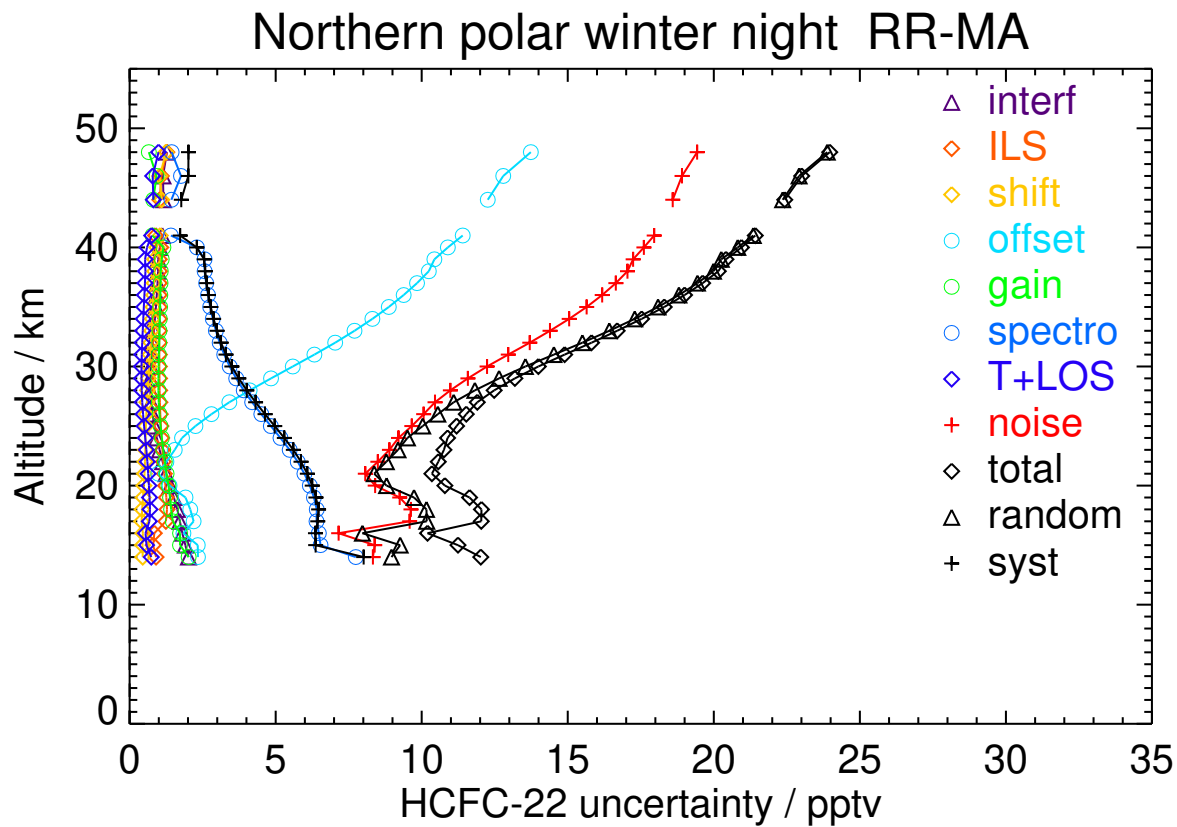
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
14	116.55	2.12	0.39	0.38	2.53	1.18	4.74	0.49	8.84	9.58	4.66	10.65
17	133.63	1.65	0.84	0.51	1.21	1.76	6.33	0.53	6.18	6.88	6.28	9.32
20	127.47	1.21	0.74	0.69	1.12	1.50	5.63	0.41	6.86	7.31	5.60	9.21
23	123.21	0.93	0.75	0.79	1.03	1.32	5.23	0.35	7.81	8.15	5.19	9.66
26	118.96	0.73	0.91	0.81	1.58	1.26	4.87	0.31	8.63	8.92	4.99	10.22
29	111.10	0.65	1.08	0.81	3.24	1.25	4.51	0.29	9.76	10.37	4.74	11.40
32	99.49	0.71	1.12	0.81	5.39	1.27	4.08	0.29	11.83	13.06	4.38	13.78
35	89.40	0.80	1.09	0.81	7.32	1.29	3.72	0.31	14.01	15.86	4.04	16.37
38	82.90	0.85	1.06	0.81	8.77	1.30	3.45	0.33	15.63	17.97	3.78	18.37
41	79.92	0.92	1.17	0.96	9.30	1.23	3.18	0.39	15.97	18.54	3.56	18.88
44	85.18	0.94	1.16	1.01	9.96	1.21	3.11	0.41	16.39	19.25	3.46	19.55
46	78.98	0.92	1.16	0.93	10.60	1.31	2.97	0.41	16.93	20.04	3.39	20.32



**Figure S69.** V8R\_F-22\_561 Northern polar winter day

**Table S71.** HCFC-22 error budget for Northern polar winter night. All uncertainties are  $1\sigma$ .

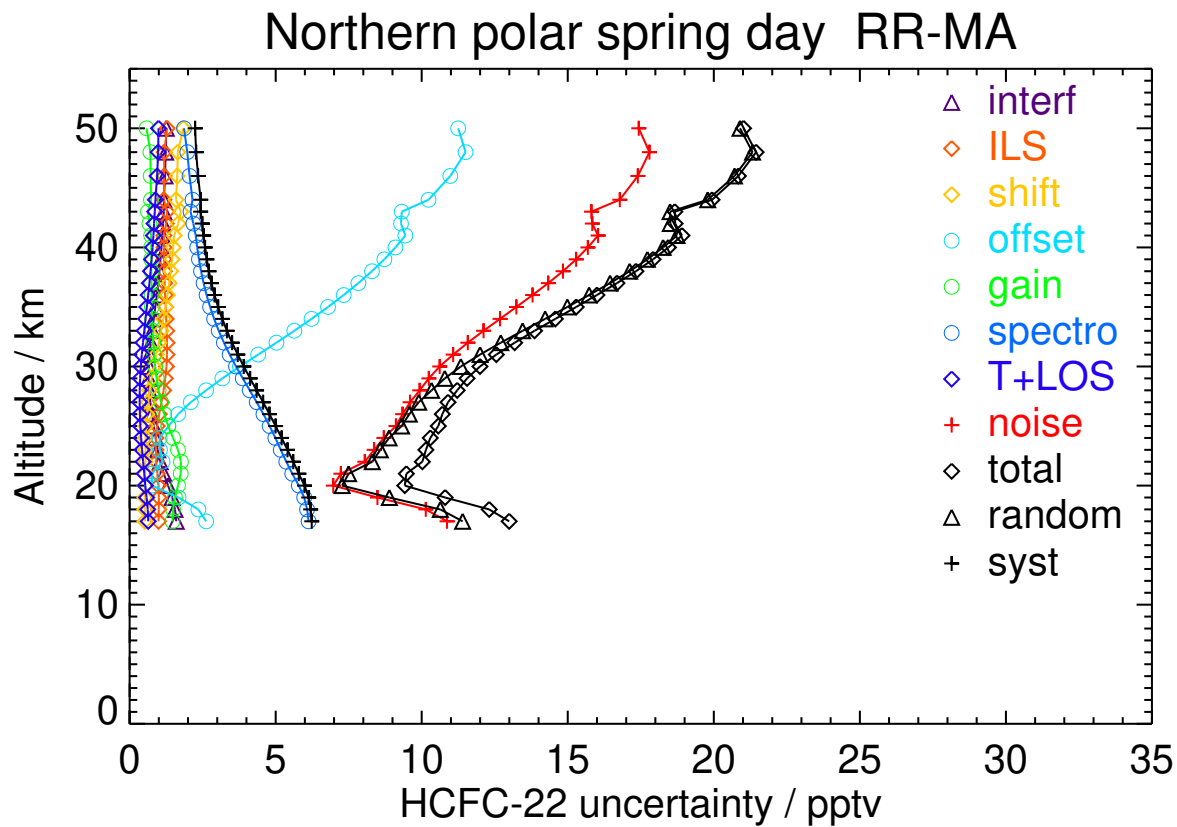
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
14	153.14	2.02	0.91	0.45	2.34	2.02	7.74	0.74	8.33	8.97	8.01	12.02
17	125.74	1.72	1.24	0.41	2.19	1.48	6.40	0.68	9.59	10.17	6.44	12.04
20	120.42	1.38	1.23	0.49	1.37	1.33	6.17	0.66	8.41	8.80	6.25	10.79
23	105.76	1.03	1.12	0.54	1.55	1.15	5.48	0.57	8.89	9.19	5.60	10.76
26	90.26	0.78	1.05	0.57	2.80	1.02	4.51	0.46	10.07	10.55	4.64	11.52
29	79.32	0.71	1.02	0.64	4.84	0.99	3.65	0.41	11.58	12.65	3.74	13.19
32	70.58	0.79	1.02	0.73	7.04	1.01	3.08	0.43	13.70	15.50	3.13	15.81
35	65.03	0.90	1.02	0.80	8.87	1.04	2.76	0.49	15.65	18.09	2.78	18.30
38	61.59	0.98	1.02	0.86	10.24	1.07	2.57	0.54	17.04	19.99	2.59	20.15
41	37.37	1.12	0.89	1.05	11.40	0.78	1.41	0.76	17.96	21.35	1.73	21.42
44	29.55	1.16	1.04	1.10	12.26	0.81	1.43	0.81	18.59	22.36	1.77	22.43
46	44.91	1.14	1.09	1.04	12.79	0.92	1.76	0.79	18.91	22.92	2.01	23.01



**Figure S70.** V8R\_F-22\_561 Northern polar winter night

**Table S72.** HCFC-22 error budget for Northern polar spring day. All uncertainties are  $1\sigma$ .

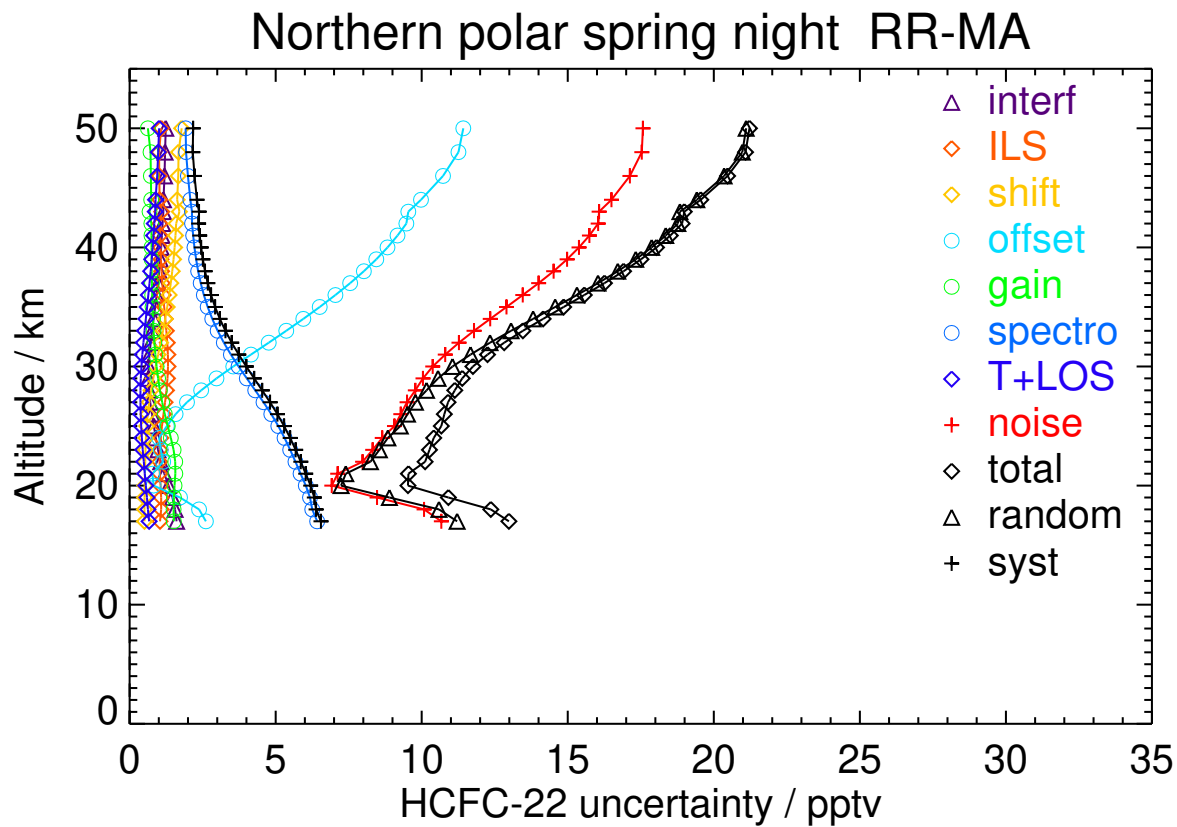
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	128.22	1.60	0.99	0.52	2.62	1.47	6.13	0.64	10.87	11.40	6.23	13.00
20	123.49	1.32	0.98	0.53	0.76	1.66	5.79	0.54	6.97	7.27	5.99	9.42
23	114.33	0.96	0.90	0.54	1.04	1.66	5.18	0.43	8.37	8.58	5.41	10.14
26	103.91	0.77	1.01	0.59	1.66	1.18	4.58	0.35	9.35	9.57	4.79	10.71
29	91.64	0.66	1.22	0.76	3.18	0.93	3.87	0.36	10.24	10.79	4.13	11.55
32	81.64	0.73	1.28	1.00	5.03	0.81	3.23	0.46	11.58	12.71	3.51	13.18
35	73.90	0.88	1.23	1.23	6.79	0.76	2.76	0.59	13.24	14.99	3.03	15.29
38	67.86	1.02	1.19	1.41	8.30	0.74	2.45	0.72	14.84	17.12	2.72	17.33
41	63.36	1.12	1.17	1.52	9.44	0.74	2.26	0.82	16.04	18.74	2.54	18.91
44	60.24	1.17	1.18	1.59	10.24	0.73	2.15	0.88	16.78	19.79	2.43	19.94
46	56.98	1.21	1.18	1.63	10.98	0.72	2.05	0.94	17.40	20.71	2.34	20.84
50	53.89	1.25	1.28	1.84	11.25	0.58	1.86	0.99	17.43	20.90	2.24	21.02



**Figure S71.** V8R\_F-22\_561 Northern polar spring day

**Table S73.** HCFC-22 error budget for Northern polar spring night. All uncertainties are  $1\sigma$ .

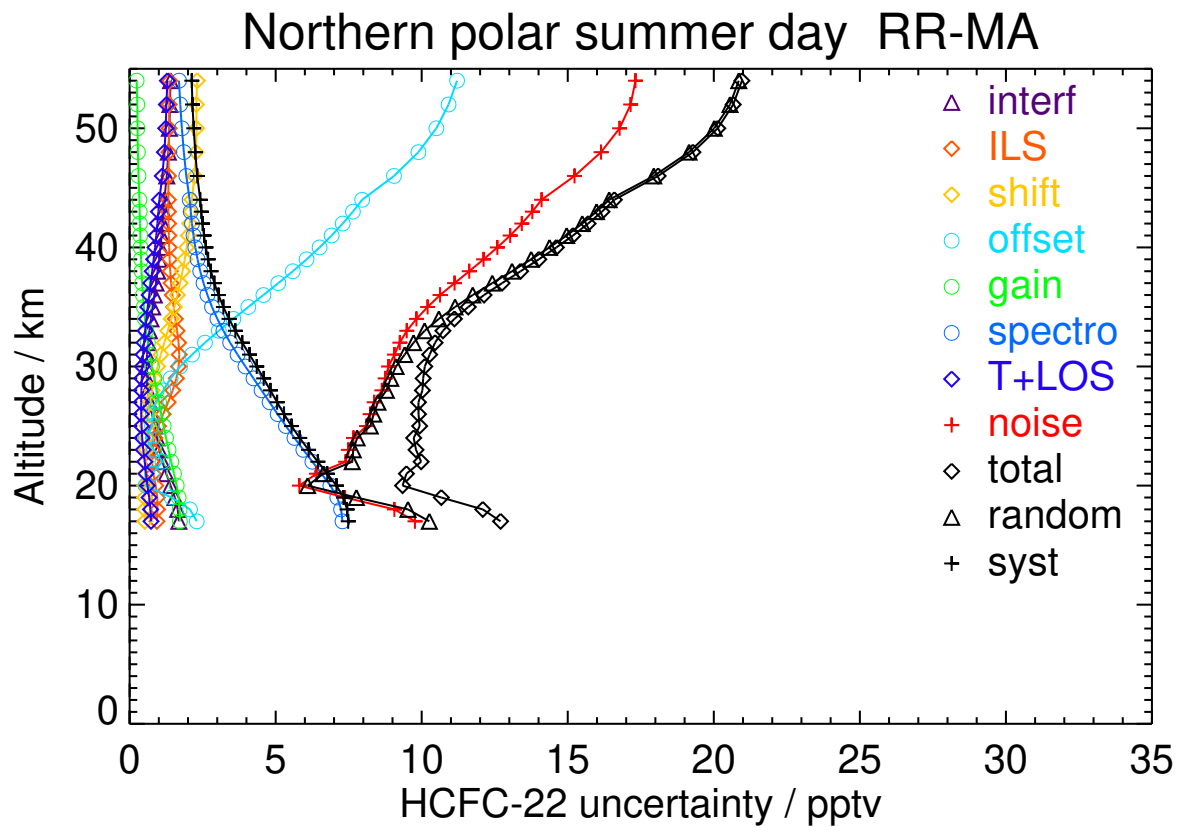
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	133.45	1.61	1.04	0.51	2.61	1.51	6.42	0.67	10.67	11.21	6.55	12.99
20	127.06	1.33	1.06	0.52	0.82	1.54	6.03	0.55	6.92	7.24	6.20	9.53
23	119.24	0.97	1.04	0.54	1.07	1.51	5.50	0.45	8.32	8.55	5.68	10.27
26	109.82	0.76	1.16	0.62	1.57	1.21	4.85	0.38	9.28	9.51	5.06	10.77
29	95.29	0.65	1.30	0.81	2.97	0.97	4.01	0.38	10.04	10.56	4.26	11.39
32	81.47	0.72	1.29	1.06	4.76	0.85	3.23	0.47	11.27	12.34	3.50	12.82
35	71.36	0.88	1.18	1.29	6.51	0.79	2.67	0.60	12.90	14.57	2.93	14.86
38	64.67	1.01	1.09	1.46	8.02	0.76	2.35	0.72	14.52	16.71	2.58	16.91
41	60.55	1.11	1.05	1.57	9.17	0.75	2.18	0.82	15.74	18.35	2.40	18.51
44	57.93	1.16	1.03	1.63	9.98	0.74	2.08	0.89	16.50	19.42	2.30	19.55
46	55.32	1.20	1.02	1.66	10.73	0.73	2.00	0.94	17.13	20.35	2.22	20.47
50	55.13	1.24	1.08	1.78	11.42	0.63	1.92	1.01	17.57	21.11	2.17	21.22



**Figure S72.** V8R\_F-22\_561 Northern polar spring night

**Table S74.** HCFC-22 error budget for Northern polar summer day. All uncertainties are  $1\sigma$ .

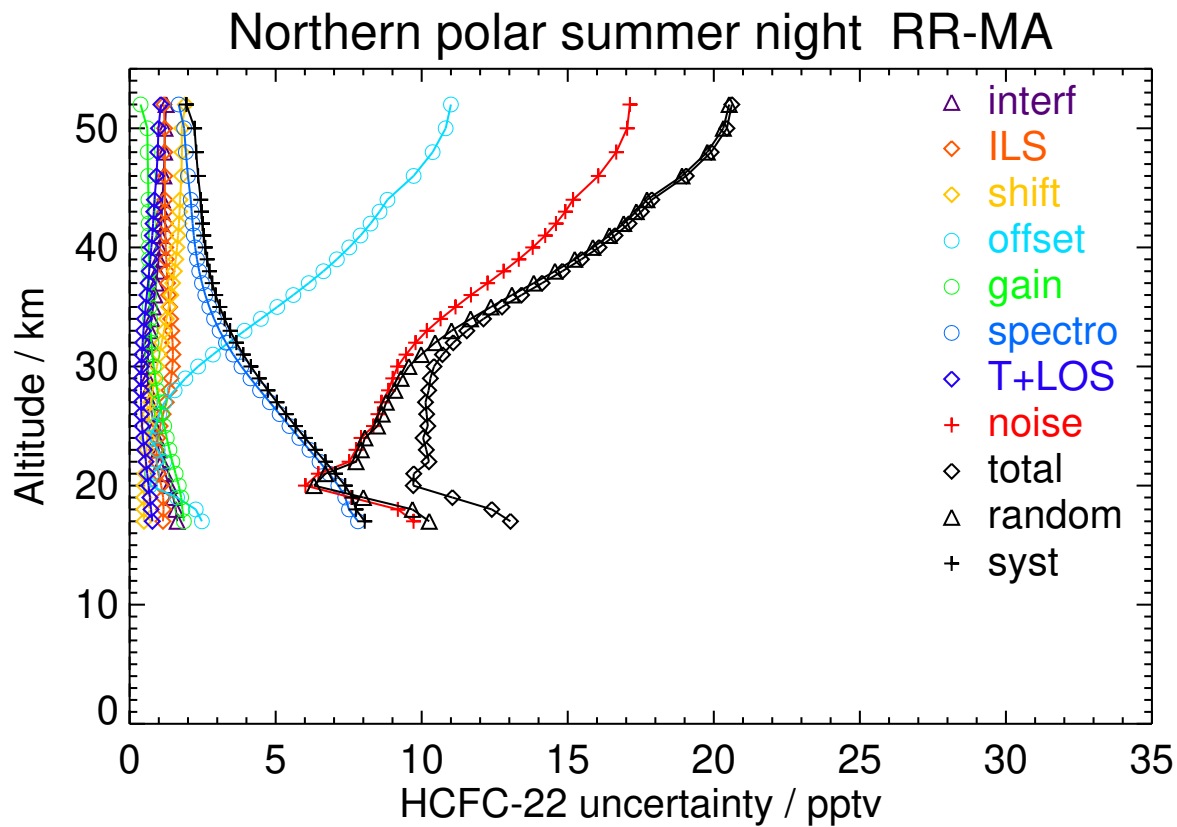
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	151.31	1.69	0.94	0.52	2.30	1.72	7.29	0.73	9.77	10.26	7.48	12.70
20	141.99	1.40	0.89	0.52	0.55	1.61	6.87	0.61	5.81	6.10	7.08	9.35
23	123.58	1.02	0.79	0.56	0.84	1.33	5.95	0.47	7.49	7.66	6.13	9.81
26	111.93	0.77	1.15	0.65	0.80	1.09	5.07	0.40	8.24	8.36	5.29	9.89
29	101.52	0.59	1.60	0.86	1.41	0.85	4.24	0.42	8.75	8.94	4.59	10.05
32	88.63	0.63	1.68	1.19	2.58	0.62	3.44	0.49	9.25	9.72	3.86	10.46
35	77.46	0.79	1.51	1.53	4.06	0.49	2.82	0.62	10.20	11.14	3.21	11.59
38	68.59	0.96	1.39	1.81	5.59	0.41	2.42	0.77	11.63	13.09	2.78	13.39
41	62.92	1.10	1.34	2.01	6.92	0.37	2.19	0.91	13.03	14.96	2.55	15.18
44	59.37	1.19	1.33	2.13	7.96	0.34	2.06	1.02	14.10	16.42	2.42	16.59
46	56.19	1.27	1.33	2.22	9.05	0.30	1.94	1.12	15.23	17.95	2.32	18.09
50	51.38	1.36	1.35	2.29	10.50	0.27	1.79	1.24	16.77	20.02	2.20	20.14



**Figure S73.** V8R\_F-22\_561 Northern polar summer day

**Table S75.** HCFC-22 error budget for Northern polar summer night. All uncertainties are  $1\sigma$ .

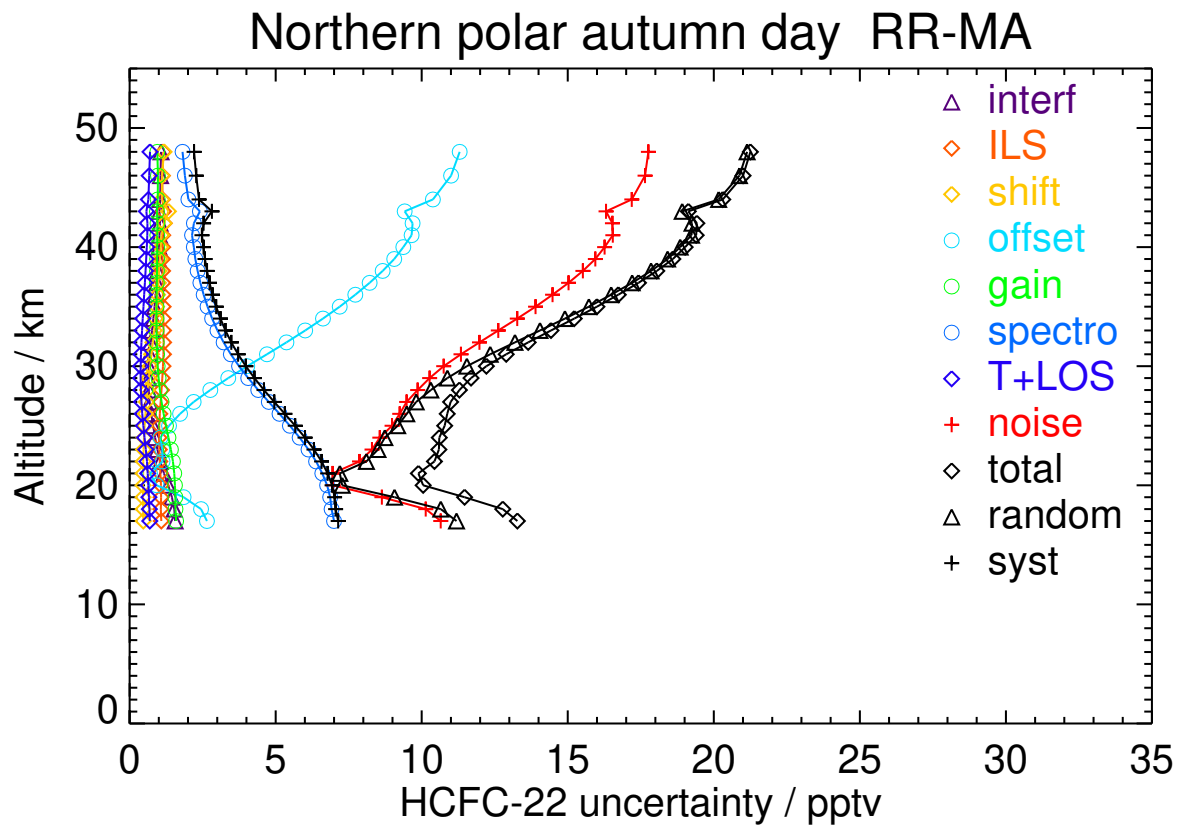
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	154.34	1.63	1.14	0.49	2.48	1.86	7.82	0.78	9.72	10.26	8.05	13.04
20	141.26	1.36	1.08	0.50	0.70	1.68	7.15	0.65	6.02	6.31	7.38	9.71
23	123.90	1.00	0.92	0.58	0.97	1.36	6.16	0.51	7.75	7.93	6.35	10.16
26	111.13	0.77	1.15	0.67	1.01	1.10	5.13	0.40	8.50	8.65	5.36	10.17
29	98.06	0.62	1.42	0.86	1.91	0.88	4.14	0.39	9.01	9.29	4.43	10.30
32	85.15	0.66	1.47	1.10	3.39	0.74	3.30	0.45	9.79	10.46	3.65	11.08
35	75.89	0.80	1.37	1.34	5.05	0.69	2.73	0.55	11.16	12.37	3.09	12.75
38	70.22	0.95	1.28	1.53	6.63	0.66	2.38	0.67	12.81	14.56	2.73	14.81
41	65.82	1.06	1.23	1.66	7.90	0.65	2.20	0.78	14.23	16.42	2.54	16.62
44	62.53	1.12	1.21	1.73	8.83	0.65	2.09	0.85	15.18	17.71	2.43	17.88
46	59.27	1.17	1.20	1.77	9.72	0.63	2.00	0.92	16.04	18.91	2.34	19.06
50	54.95	1.21	1.20	1.79	10.82	0.61	1.87	0.99	17.03	20.33	2.22	20.45



**Figure S74.** V8R\_F-22\_561 Northern polar summer night

**Table S76.** HCFC-22 error budget for Northern polar autumn day. All uncertainties are  $1\sigma$ .

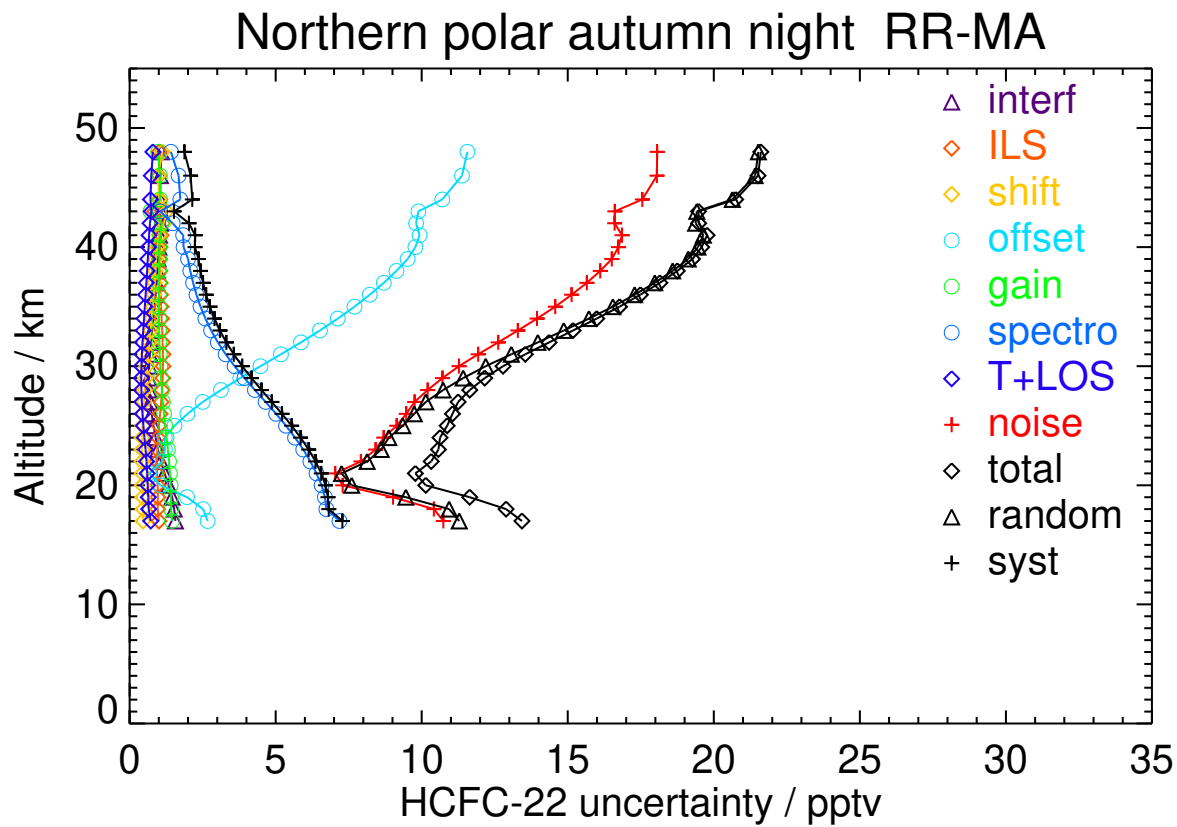
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	141.94	1.56	1.08	0.47	2.65	1.59	7.00	0.69	10.65	11.19	7.14	13.28
20	134.38	1.32	1.07	0.46	0.93	1.55	6.76	0.64	6.96	7.28	6.93	10.05
23	118.48	0.95	1.02	0.48	1.12	1.41	6.13	0.56	8.30	8.50	6.31	10.59
26	101.15	0.74	1.03	0.54	1.73	1.16	5.13	0.43	9.25	9.49	5.31	10.87
29	84.97	0.65	1.12	0.66	3.38	0.99	4.06	0.38	10.27	10.88	4.27	11.69
32	70.59	0.72	1.16	0.80	5.37	0.93	3.22	0.41	11.98	13.19	3.48	13.65
35	61.48	0.86	1.15	0.92	7.19	0.92	2.67	0.47	13.90	15.72	2.96	16.00
38	55.72	0.96	1.13	1.01	8.66	0.94	2.33	0.55	15.52	17.85	2.65	18.05
41	52.54	1.02	1.13	1.09	9.65	0.95	2.14	0.61	16.54	19.24	2.48	19.40
44	49.91	1.05	1.13	1.10	10.38	0.96	2.01	0.64	17.19	20.17	2.38	20.31
46	47.44	1.06	1.12	1.11	11.01	0.97	1.89	0.67	17.64	20.88	2.28	21.00



**Figure S75.** V8R\_F-22\_561 Northern polar autumn day

**Table S77.** HCFC-22 error budget for Northern polar autumn night. All uncertainties are  $1\sigma$ .

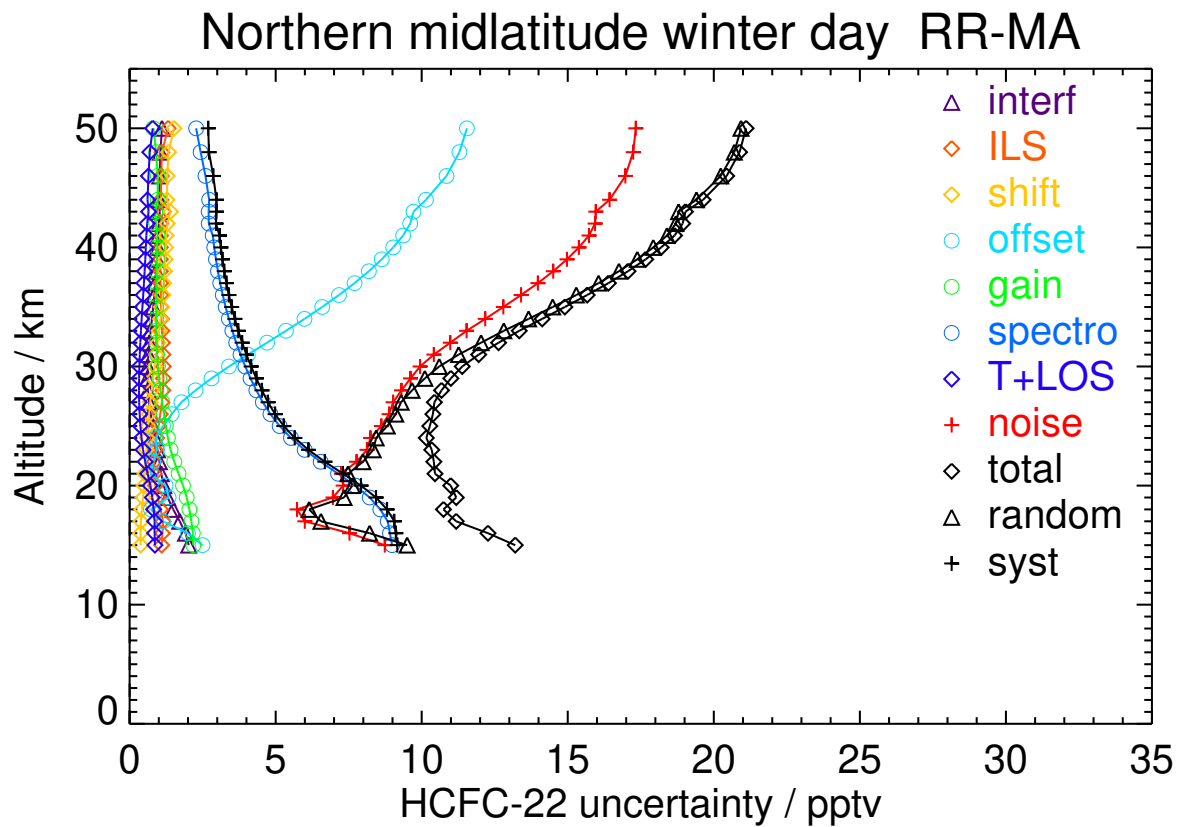
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	141.63	1.57	1.01	0.46	2.67	1.45	7.19	0.72	10.74	11.29	7.28	13.43
20	130.15	1.34	0.96	0.44	1.06	1.40	6.57	0.62	7.29	7.60	6.71	10.14
23	115.01	0.97	0.95	0.43	1.21	1.31	5.94	0.55	8.42	8.61	6.13	10.57
26	97.32	0.76	1.04	0.46	1.98	1.18	5.02	0.44	9.47	9.75	5.22	11.05
29	78.15	0.66	1.13	0.55	3.79	1.08	3.93	0.40	10.71	11.42	4.17	12.16
32	63.12	0.73	1.13	0.68	5.87	1.02	3.02	0.44	12.62	13.98	3.31	14.36
35	53.57	0.86	1.08	0.79	7.70	1.00	2.43	0.52	14.57	16.54	2.75	16.77
38	48.19	0.95	1.04	0.87	9.14	1.01	2.08	0.60	16.11	18.59	2.43	18.75
41	45.02	1.03	1.08	1.01	9.93	1.04	1.83	0.67	16.86	19.64	2.24	19.77
44	43.02	1.05	1.03	1.01	10.70	1.04	1.74	0.71	17.55	20.64	2.15	20.75
46	41.31	1.06	1.00	0.98	11.38	1.04	1.68	0.74	18.05	21.41	2.09	21.51



**Figure S76.** V8R\_F-22\_561 Northern polar autumn night

**Table S78.** HCFC-22 error budget for Northern midlatitude winter day. All uncertainties are  $1\sigma$ .

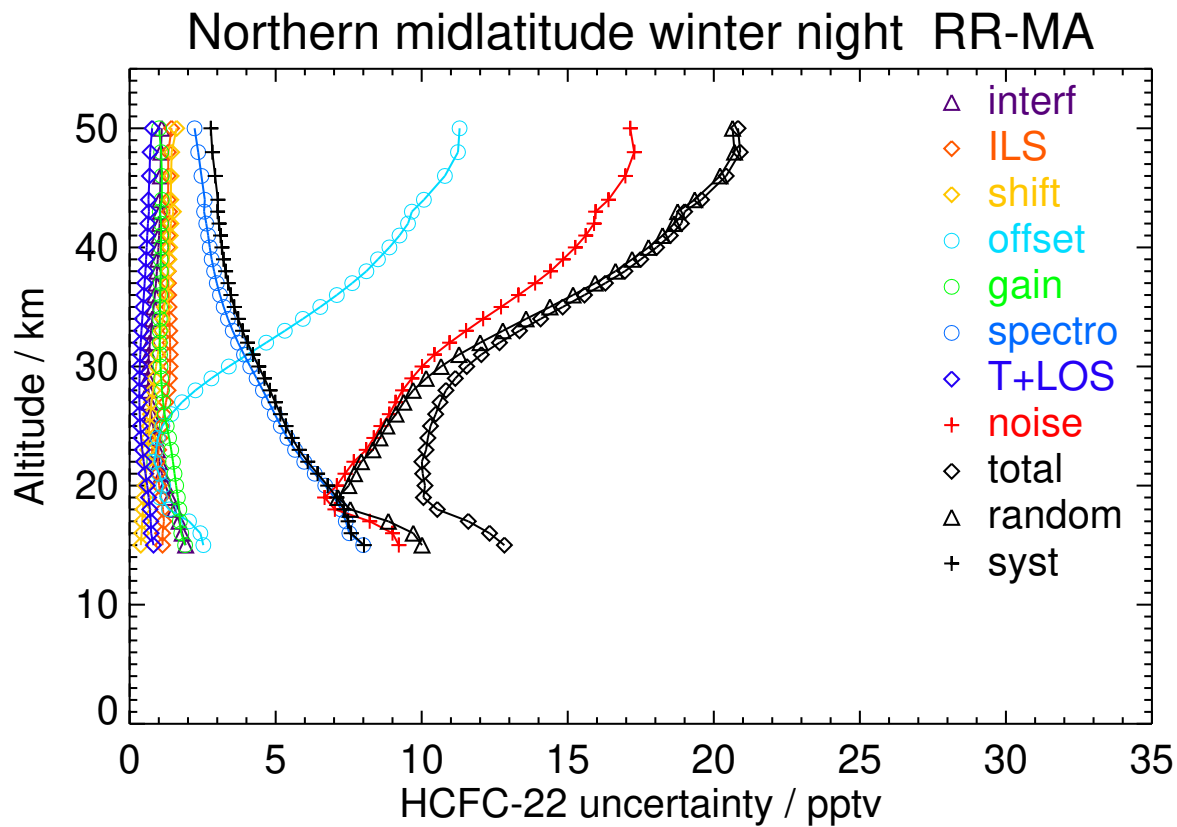
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	161.05	1.72	1.14	0.39	1.14	2.11	8.84	0.85	6.00	6.55	9.06	11.18
20	136.50	1.17	0.88	0.50	1.23	1.83	7.72	0.71	7.31	7.62	7.92	10.99
23	118.37	0.95	0.88	0.57	0.94	1.40	5.99	0.46	8.13	8.34	6.12	10.35
26	111.24	0.72	1.05	0.67	1.44	1.18	4.82	0.34	8.88	9.11	4.98	10.38
29	104.02	0.61	1.16	0.80	2.81	1.01	4.14	0.33	9.62	10.11	4.34	11.00
32	95.10	0.68	1.12	0.96	4.71	0.92	3.65	0.37	10.98	12.03	3.85	12.63
35	88.01	0.81	1.08	1.10	6.59	0.91	3.29	0.44	12.79	14.48	3.49	14.90
38	83.45	0.92	1.06	1.20	8.19	0.93	3.02	0.51	14.50	16.75	3.24	17.06
41	80.53	0.98	1.06	1.25	9.36	0.95	2.85	0.57	15.73	18.40	3.08	18.65
44	78.34	1.01	1.07	1.28	10.15	0.96	2.72	0.61	16.43	19.41	2.97	19.63
46	75.83	1.03	1.08	1.29	10.85	0.96	2.60	0.65	16.97	20.24	2.86	20.44
50	71.66	1.11	1.32	1.52	11.55	0.82	2.28	0.79	17.33	20.93	2.69	21.10



**Figure S77.** V8R\_F-22\_561 Northern midlatitude winter day

**Table S79.** HCFC-22 error budget for Northern midlatitude winter night. All uncertainties are  $1\sigma$ .

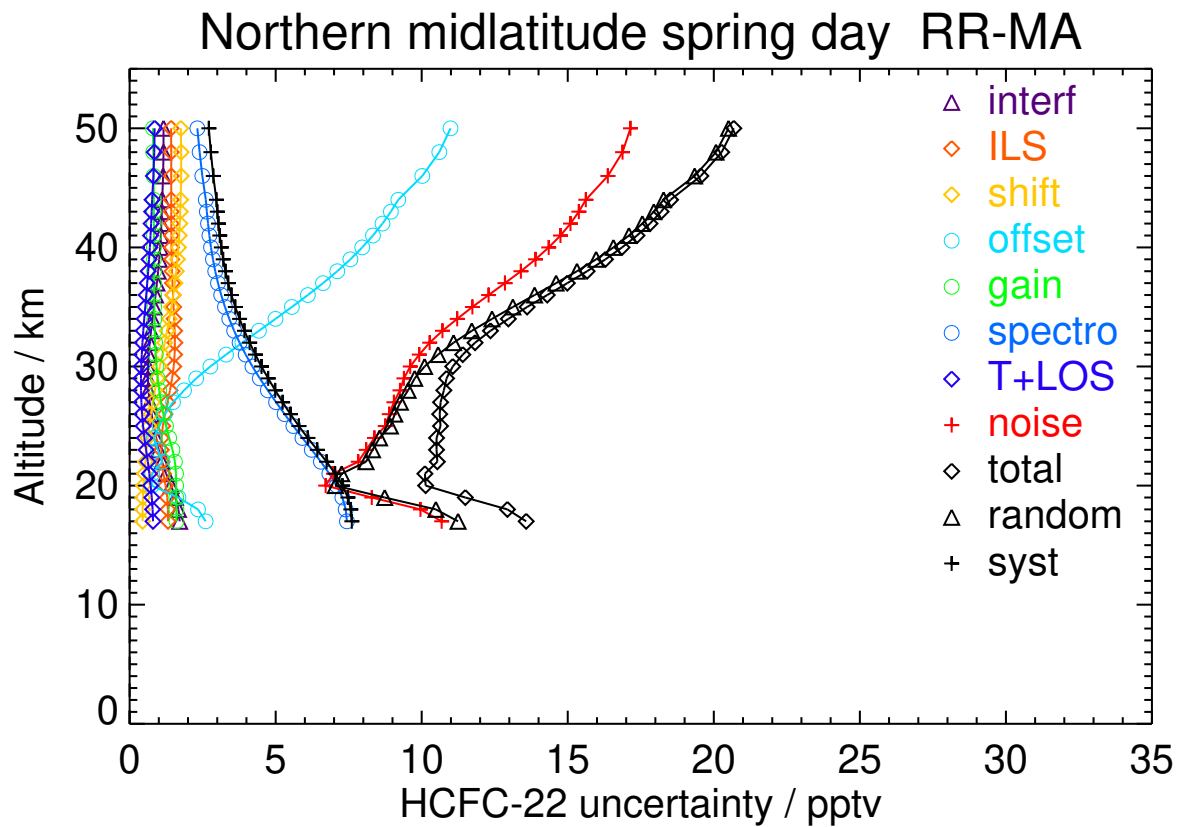
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	142.80	1.70	1.18	0.43	2.03	1.72	7.40	0.72	8.22	8.86	7.48	11.59
20	131.13	1.23	1.01	0.53	1.15	1.59	6.70	0.60	7.10	7.50	6.78	10.11
23	120.57	0.95	0.99	0.62	0.91	1.43	5.66	0.43	8.10	8.33	5.80	10.15
26	116.59	0.74	1.17	0.71	1.43	1.20	4.97	0.35	8.89	9.12	5.16	10.48
29	107.72	0.63	1.36	0.85	2.80	1.08	4.35	0.34	9.66	10.15	4.62	11.15
32	96.14	0.69	1.38	1.02	4.68	1.03	3.71	0.38	10.96	12.00	4.04	12.66
35	87.81	0.82	1.35	1.19	6.53	1.04	3.22	0.46	12.72	14.39	3.58	14.83
38	82.64	0.94	1.32	1.31	8.11	1.07	2.89	0.54	14.41	16.63	3.29	16.96
41	79.29	1.01	1.32	1.39	9.24	1.08	2.69	0.60	15.61	18.25	3.11	18.51
44	76.70	1.04	1.32	1.41	10.07	1.10	2.57	0.65	16.39	19.35	3.02	19.58
46	74.03	1.06	1.32	1.42	10.79	1.10	2.46	0.68	16.97	20.21	2.93	20.42
50	67.86	1.10	1.44	1.61	11.30	1.01	2.22	0.77	17.14	20.64	2.78	20.83



**Figure S78.** V8R\_F-22\_561 Northern midlatitude winter night

**Table S80.** HCFC-22 error budget for Northern midlatitude spring day. All uncertainties are  $1\sigma$ .

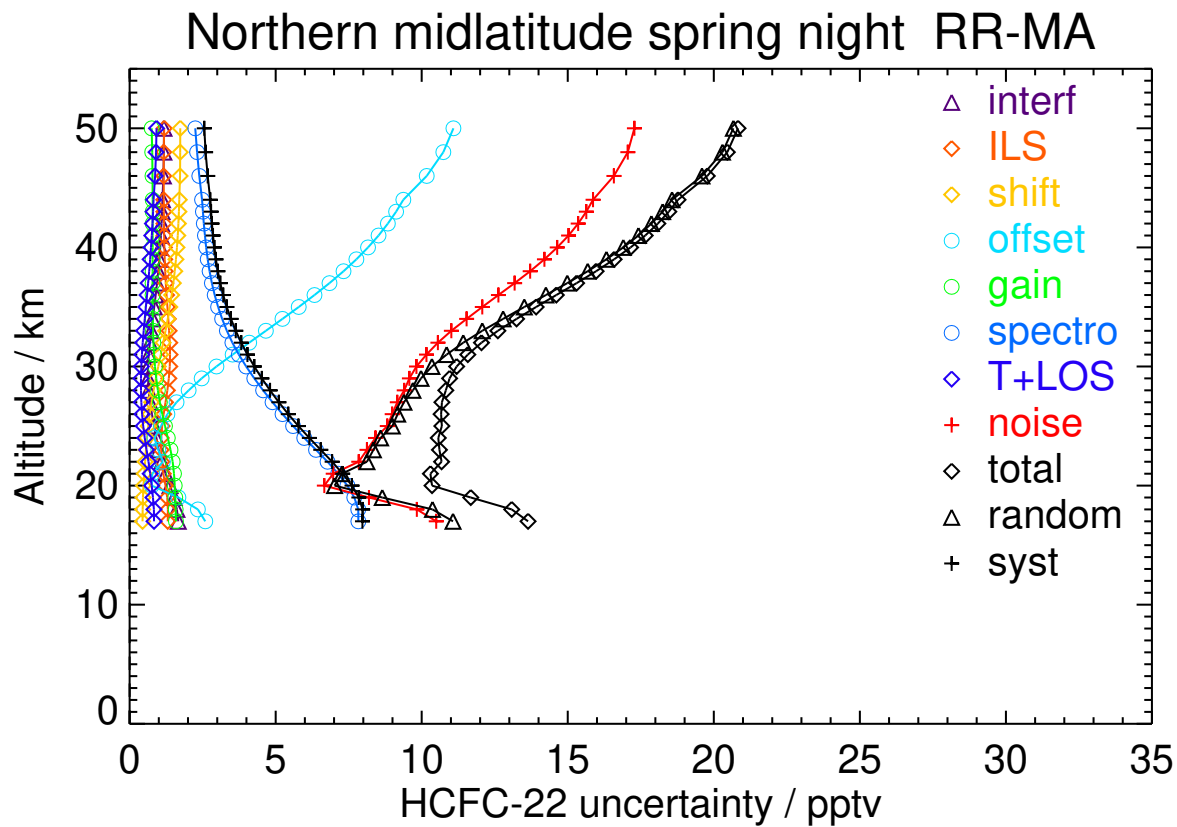
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	148.19	1.71	1.31	0.44	2.60	1.61	7.44	0.80	10.68	11.25	7.61	13.58
20	140.51	1.42	1.23	0.48	0.75	1.59	7.09	0.72	6.71	7.04	7.29	10.13
23	128.03	1.00	1.09	0.58	0.97	1.47	6.24	0.56	8.10	8.32	6.42	10.51
26	119.93	0.75	1.21	0.73	1.21	1.15	5.31	0.43	8.89	9.08	5.51	10.62
29	109.74	0.63	1.46	0.95	2.28	0.96	4.46	0.39	9.39	9.76	4.74	10.85
32	98.32	0.69	1.55	1.20	3.86	0.87	3.77	0.44	10.27	11.09	4.11	11.83
35	88.98	0.84	1.51	1.43	5.56	0.84	3.26	0.53	11.73	13.12	3.62	13.61
38	83.12	0.98	1.45	1.60	7.11	0.84	2.93	0.64	13.39	15.31	3.28	15.66
41	79.30	1.07	1.43	1.70	8.33	0.83	2.73	0.72	14.75	17.09	3.08	17.37
44	76.38	1.12	1.43	1.75	9.20	0.83	2.61	0.77	15.62	18.28	2.97	18.52
46	72.93	1.15	1.43	1.77	10.02	0.82	2.49	0.82	16.37	19.34	2.86	19.56
50	67.63	1.16	1.42	1.75	10.99	0.80	2.32	0.86	17.14	20.51	2.71	20.68



**Figure S79.** V8R\_F-22\_561 Northern midlatitude spring day

**Table S81.** HCFC-22 error budget for Northern midlatitude spring night. All uncertainties are  $1\sigma$ .

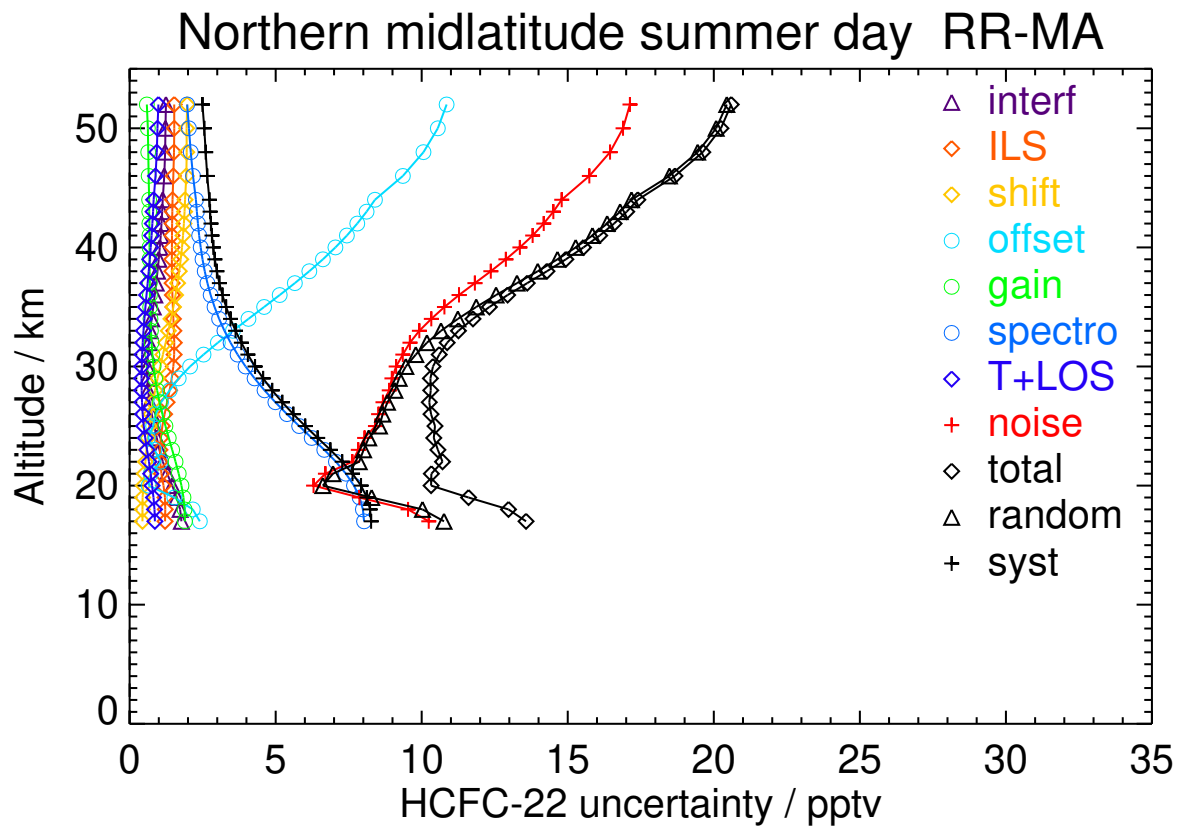
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	151.35	1.67	1.31	0.44	2.59	1.59	7.83	0.84	10.50	11.07	7.97	13.64
20	142.37	1.38	1.23	0.48	0.76	1.54	7.46	0.76	6.67	7.02	7.61	10.35
23	125.04	1.00	1.08	0.56	0.98	1.40	6.38	0.58	8.13	8.35	6.54	10.61
26	115.84	0.76	1.17	0.69	1.30	1.12	5.24	0.43	8.99	9.18	5.43	10.67
29	105.41	0.63	1.34	0.90	2.47	0.91	4.27	0.39	9.58	9.98	4.53	10.95
32	94.11	0.69	1.38	1.15	4.09	0.82	3.52	0.45	10.55	11.42	3.82	12.05
35	86.35	0.84	1.29	1.38	5.79	0.79	3.03	0.56	12.07	13.51	3.33	13.92
38	81.51	0.98	1.22	1.55	7.32	0.79	2.74	0.67	13.71	15.68	3.02	15.97
41	78.70	1.07	1.18	1.65	8.52	0.79	2.58	0.76	15.03	17.42	2.86	17.65
44	76.82	1.12	1.17	1.70	9.37	0.79	2.48	0.82	15.87	18.57	2.76	18.78
46	74.70	1.16	1.17	1.73	10.17	0.78	2.39	0.87	16.58	19.60	2.67	19.78
50	71.39	1.18	1.18	1.73	11.09	0.75	2.25	0.92	17.28	20.67	2.56	20.83



**Figure S80.** V8R\_F-22\_561 Northern midlatitude spring night

**Table S82.** HCFC-22 error budget for Northern midlatitude summer day. All uncertainties are  $1\sigma$ .

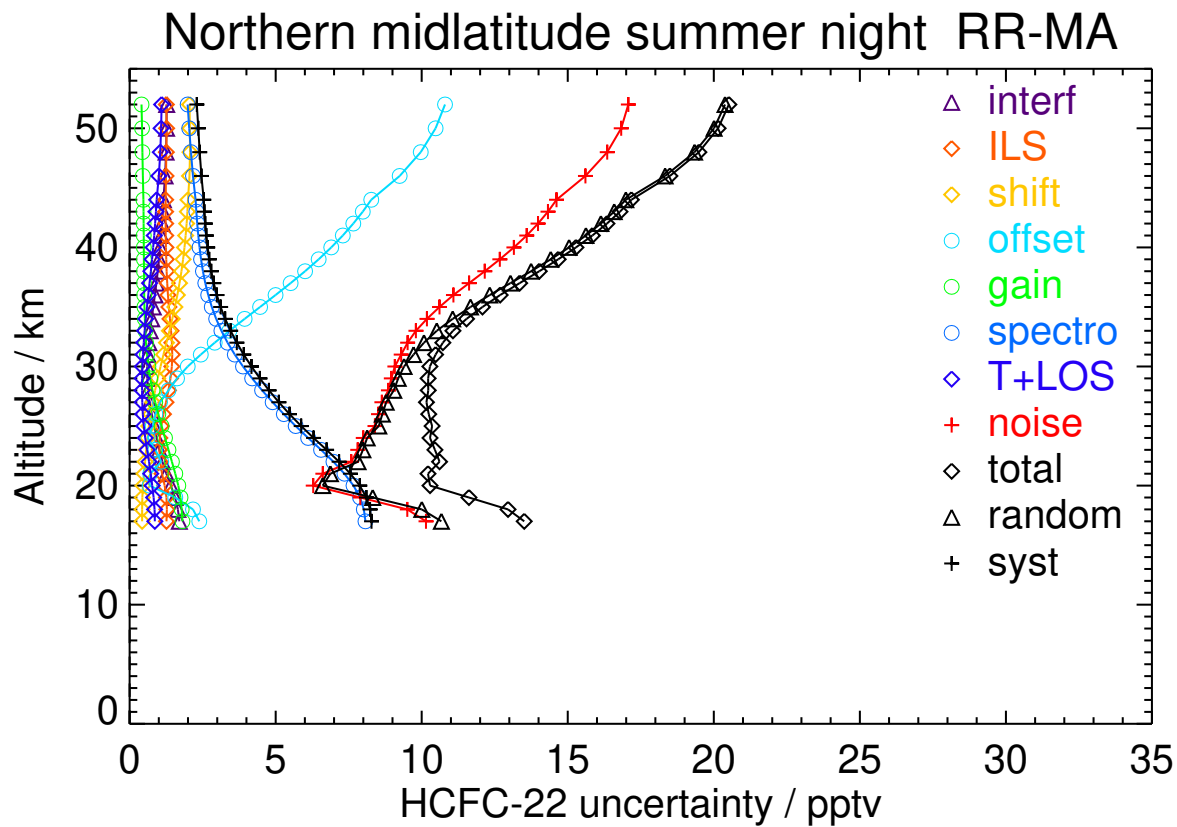
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	157.96	1.77	1.21	0.44	2.40	1.90	8.03	0.87	10.24	10.76	8.27	13.57
20	149.09	1.46	1.16	0.47	0.65	1.78	7.68	0.77	6.30	6.62	7.92	10.32
23	130.37	1.02	1.04	0.58	0.85	1.46	6.67	0.60	7.83	8.01	6.87	10.55
26	115.55	0.76	1.20	0.73	0.89	1.12	5.39	0.45	8.52	8.66	5.60	10.32
29	103.72	0.61	1.44	0.96	1.68	0.87	4.28	0.41	8.98	9.23	4.57	10.30
32	92.77	0.66	1.53	1.24	3.02	0.75	3.46	0.45	9.60	10.18	3.83	10.87
35	84.27	0.81	1.48	1.50	4.61	0.70	2.91	0.54	10.78	11.87	3.30	12.32
38	77.73	0.96	1.45	1.70	6.15	0.69	2.57	0.66	12.37	13.97	2.99	14.29
41	72.85	1.07	1.45	1.83	7.44	0.68	2.38	0.75	13.80	15.84	2.82	16.09
44	69.36	1.13	1.47	1.90	8.40	0.67	2.27	0.82	14.79	17.18	2.73	17.40
46	65.88	1.19	1.50	1.94	9.35	0.65	2.17	0.89	15.74	18.48	2.66	18.67
50	61.18	1.23	1.53	1.95	10.55	0.62	2.03	0.95	16.89	20.08	2.56	20.24



**Figure S81.** V8R\_F-22\_561 Northern midlatitude summer day

**Table S83.** HCFC-22 error budget for Northern midlatitude summer night. All uncertainties are  $1\sigma$ .

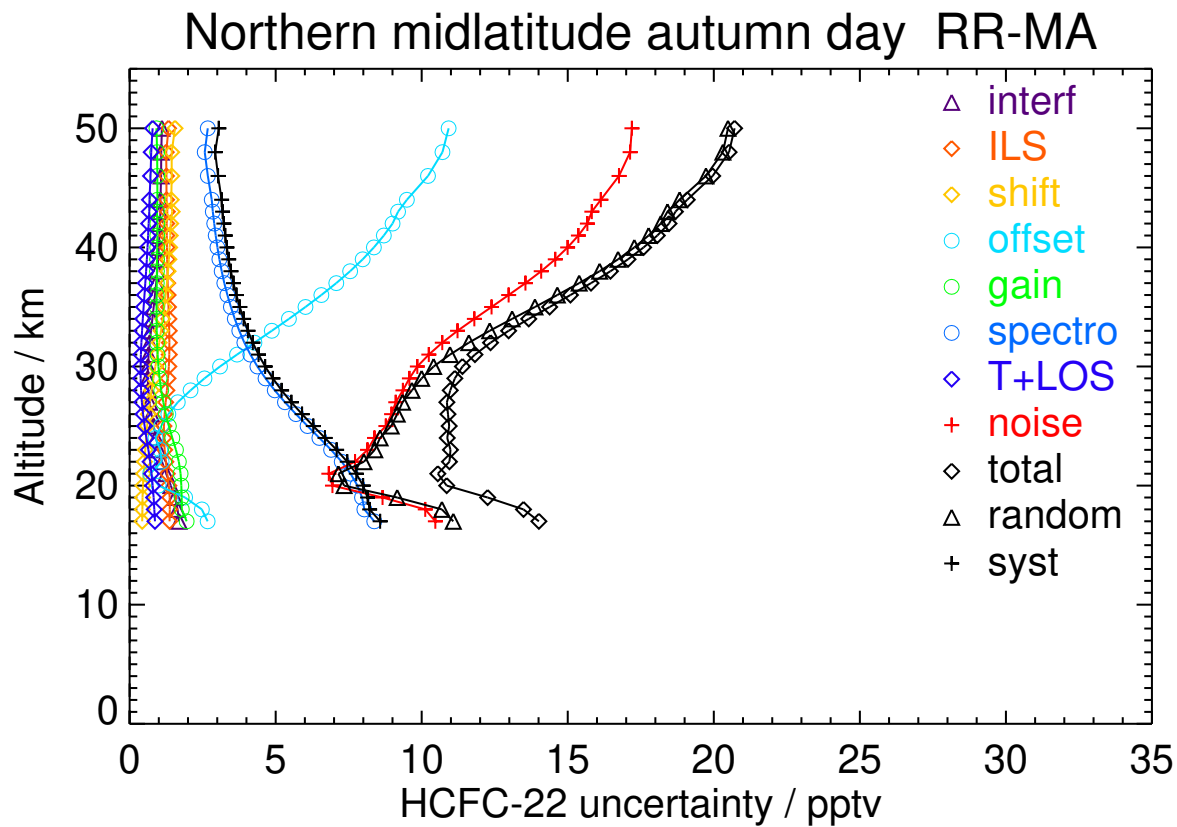
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	157.83	1.70	1.26	0.43	2.38	1.81	8.07	0.86	10.15	10.67	8.28	13.51
20	147.47	1.41	1.20	0.46	0.68	1.67	7.67	0.78	6.29	6.61	7.88	10.28
23	127.24	1.02	1.02	0.57	0.88	1.33	6.55	0.60	7.81	7.99	6.74	10.45
26	113.69	0.76	1.16	0.72	0.88	0.98	5.28	0.45	8.52	8.65	5.48	10.24
29	101.64	0.60	1.40	0.96	1.62	0.71	4.20	0.43	8.96	9.20	4.46	10.22
32	90.48	0.66	1.45	1.26	2.91	0.56	3.35	0.48	9.52	10.08	3.67	10.72
35	82.49	0.81	1.35	1.55	4.47	0.51	2.81	0.59	10.61	11.67	3.12	12.08
38	76.98	0.97	1.27	1.77	6.01	0.49	2.51	0.73	12.16	13.74	2.80	14.03
41	72.93	1.08	1.24	1.92	7.30	0.48	2.35	0.84	13.59	15.62	2.63	15.84
44	69.97	1.16	1.23	2.00	8.27	0.47	2.26	0.93	14.61	16.99	2.54	17.18
46	66.83	1.21	1.25	2.05	9.25	0.45	2.17	1.00	15.61	18.33	2.46	18.50
50	61.89	1.26	1.27	2.06	10.48	0.43	2.04	1.08	16.83	20.01	2.35	20.15



**Figure S82.** V8R\_F-22\_561 Northern midlatitude summer night

**Table S84.** HCFC-22 error budget for Northern midlatitude autumn day. All uncertainties are  $1\sigma$ .

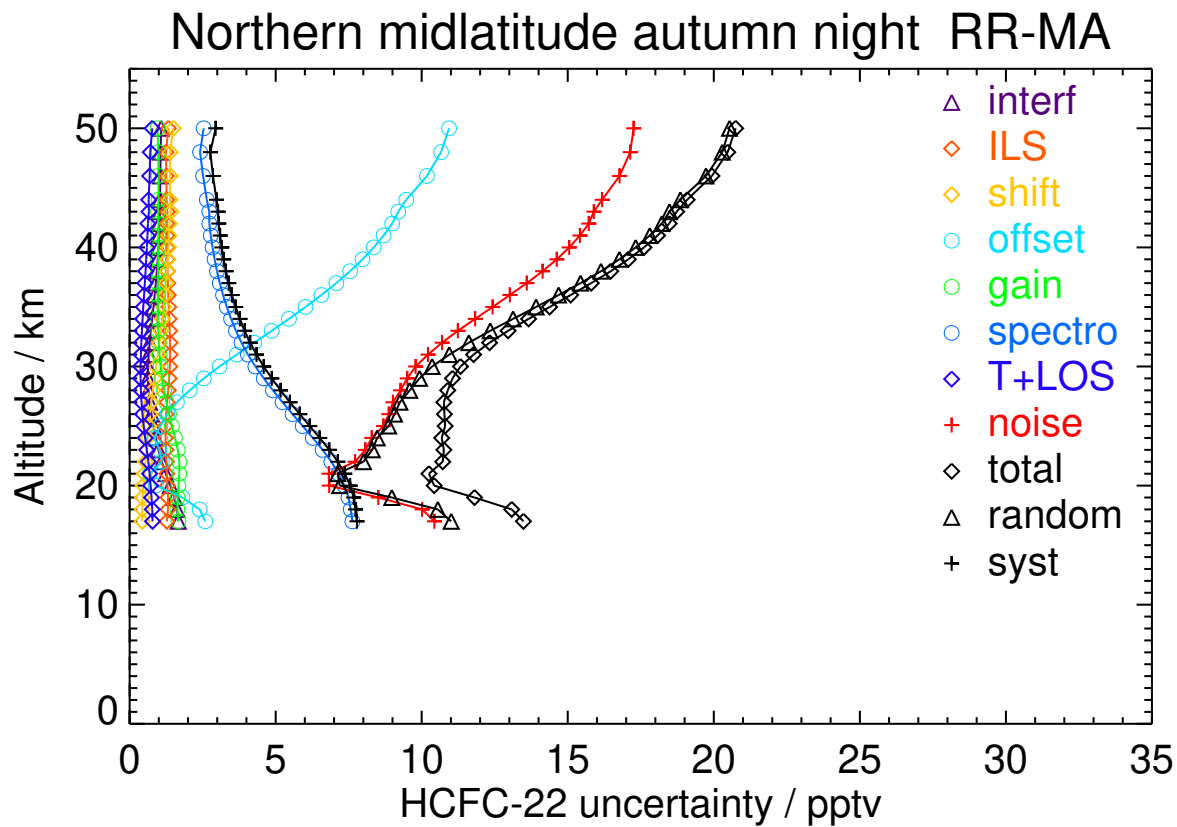
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	160.79	1.69	1.37	0.43	2.67	1.95	8.38	0.87	10.47	11.08	8.58	14.01
20	150.10	1.41	1.34	0.46	1.00	1.77	7.80	0.79	6.94	7.34	7.99	10.86
23	132.60	1.00	1.20	0.53	1.05	1.59	6.90	0.64	8.14	8.39	7.09	10.98
26	117.44	0.75	1.20	0.64	1.33	1.24	5.70	0.46	8.97	9.16	5.90	10.90
29	107.27	0.62	1.31	0.81	2.56	1.03	4.65	0.38	9.58	10.00	4.90	11.13
32	99.52	0.69	1.36	1.01	4.27	0.94	3.93	0.40	10.70	11.61	4.22	12.36
35	93.26	0.83	1.33	1.19	6.02	0.92	3.47	0.48	12.39	13.88	3.77	14.38
38	88.39	0.95	1.29	1.32	7.55	0.94	3.15	0.57	14.09	16.09	3.47	16.46
41	84.92	1.02	1.27	1.39	8.70	0.95	2.95	0.63	15.36	17.77	3.27	18.07
44	82.33	1.06	1.27	1.43	9.49	0.95	2.81	0.68	16.13	18.83	3.15	19.09
46	79.42	1.08	1.26	1.44	10.22	0.95	2.68	0.72	16.75	19.73	3.03	19.96
50	84.26	1.10	1.33	1.55	10.92	0.92	2.68	0.79	17.20	20.49	3.05	20.71



**Figure S83.** V8R\_F-22\_561 Northern midlatitude autumn day

**Table S85.** HCFC-22 error budget for Northern midlatitude autumn night. All uncertainties are  $1\sigma$ .

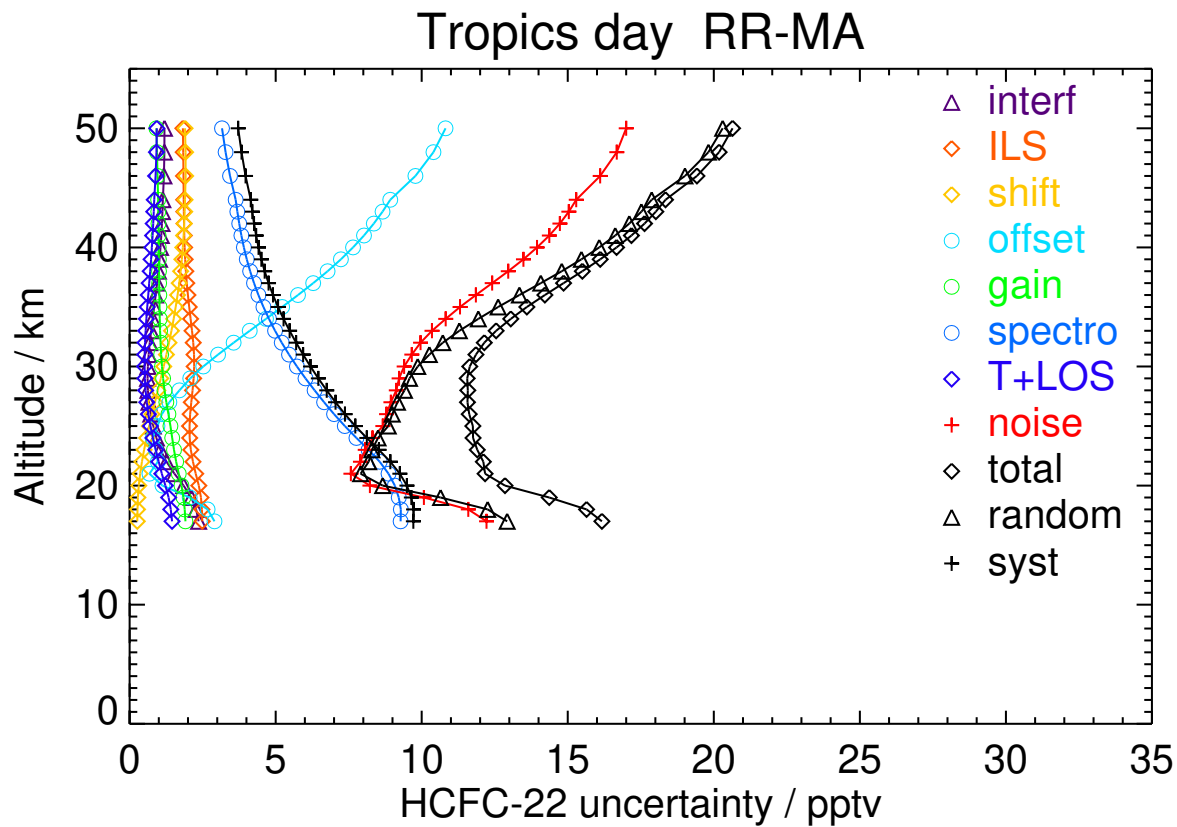
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	150.72	1.67	1.28	0.43	2.59	1.67	7.63	0.79	10.43	11.01	7.78	13.48
20	144.64	1.39	1.30	0.47	0.89	1.67	7.35	0.72	6.83	7.19	7.55	10.43
23	132.58	0.99	1.25	0.58	1.02	1.65	6.61	0.59	8.07	8.31	6.84	10.76
26	119.73	0.75	1.25	0.70	1.30	1.35	5.58	0.44	8.87	9.07	5.82	10.78
29	107.40	0.63	1.36	0.85	2.54	1.11	4.59	0.38	9.50	9.93	4.87	11.05
32	97.24	0.69	1.39	1.02	4.27	1.00	3.83	0.40	10.70	11.61	4.13	12.33
35	88.46	0.82	1.34	1.17	6.02	0.97	3.33	0.47	12.43	13.92	3.63	14.38
38	81.54	0.93	1.30	1.28	7.55	0.97	2.99	0.55	14.14	16.14	3.30	16.47
41	76.79	1.00	1.28	1.35	8.69	0.99	2.78	0.61	15.42	17.81	3.10	18.08
44	73.46	1.04	1.27	1.38	9.47	0.99	2.64	0.65	16.18	18.86	2.97	19.09
46	70.00	1.06	1.26	1.39	10.18	0.99	2.51	0.69	16.78	19.73	2.86	19.94
50	74.25	1.08	1.33	1.50	10.94	0.96	2.54	0.77	17.26	20.54	2.94	20.75



**Figure S84.** V8R\_F-22\_561 Northern midlatitude autumn night

**Table S86.** HCFC-22 error budget for Tropics day. All uncertainties are  $1\sigma$ .

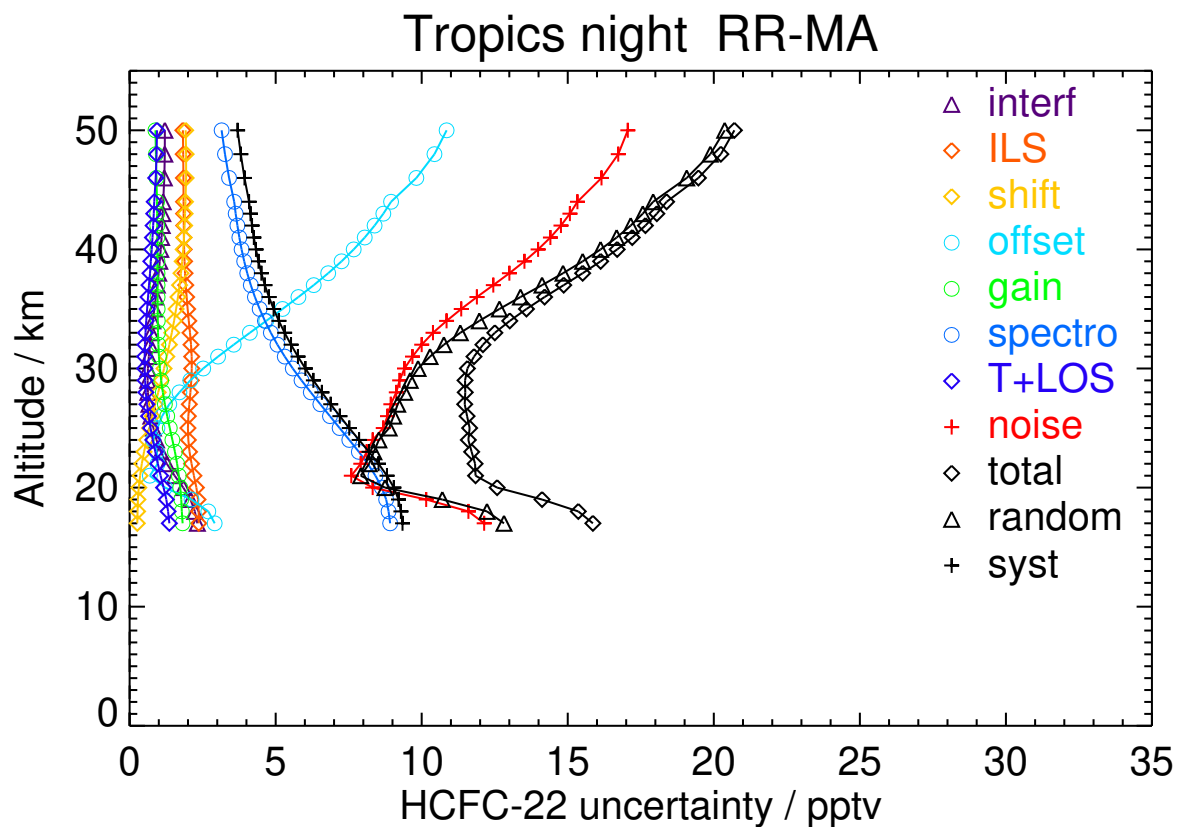
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	178.66	2.36	2.49	0.26	2.91	1.91	9.28	1.45	12.22	12.93	9.71	16.17
20	172.86	1.85	2.37	0.31	1.12	1.78	9.08	1.22	8.23	8.66	9.49	12.85
23	158.38	1.06	2.10	0.50	0.90	1.52	8.18	0.90	8.07	8.30	8.54	11.90
26	151.77	0.73	2.07	0.77	1.11	1.33	7.00	0.64	8.80	8.99	7.37	11.63
29	144.74	0.61	2.19	1.07	2.08	1.15	6.02	0.52	9.23	9.58	6.46	11.56
32	133.19	0.69	2.18	1.35	3.56	1.06	5.21	0.53	9.96	10.72	5.70	12.14
35	122.28	0.84	2.04	1.58	5.22	1.02	4.58	0.61	11.31	12.62	5.08	13.60
38	112.89	0.99	1.93	1.75	6.78	1.01	4.13	0.70	12.96	14.79	4.62	15.50
41	105.55	1.08	1.87	1.85	8.02	0.99	3.83	0.79	14.37	16.63	4.33	17.18
44	100.30	1.14	1.85	1.90	8.92	0.98	3.63	0.84	15.29	17.87	4.15	18.35
46	95.09	1.17	1.84	1.92	9.79	0.96	3.44	0.89	16.11	19.01	3.97	19.42
50	87.42	1.19	1.82	1.90	10.82	0.92	3.16	0.93	17.00	20.30	3.72	20.64



**Figure S85.** V8R\_F-22\_561 Tropics day

**Table S87.** HCFC-22 error budget for Tropics night. All uncertainties are  $1\sigma$ .

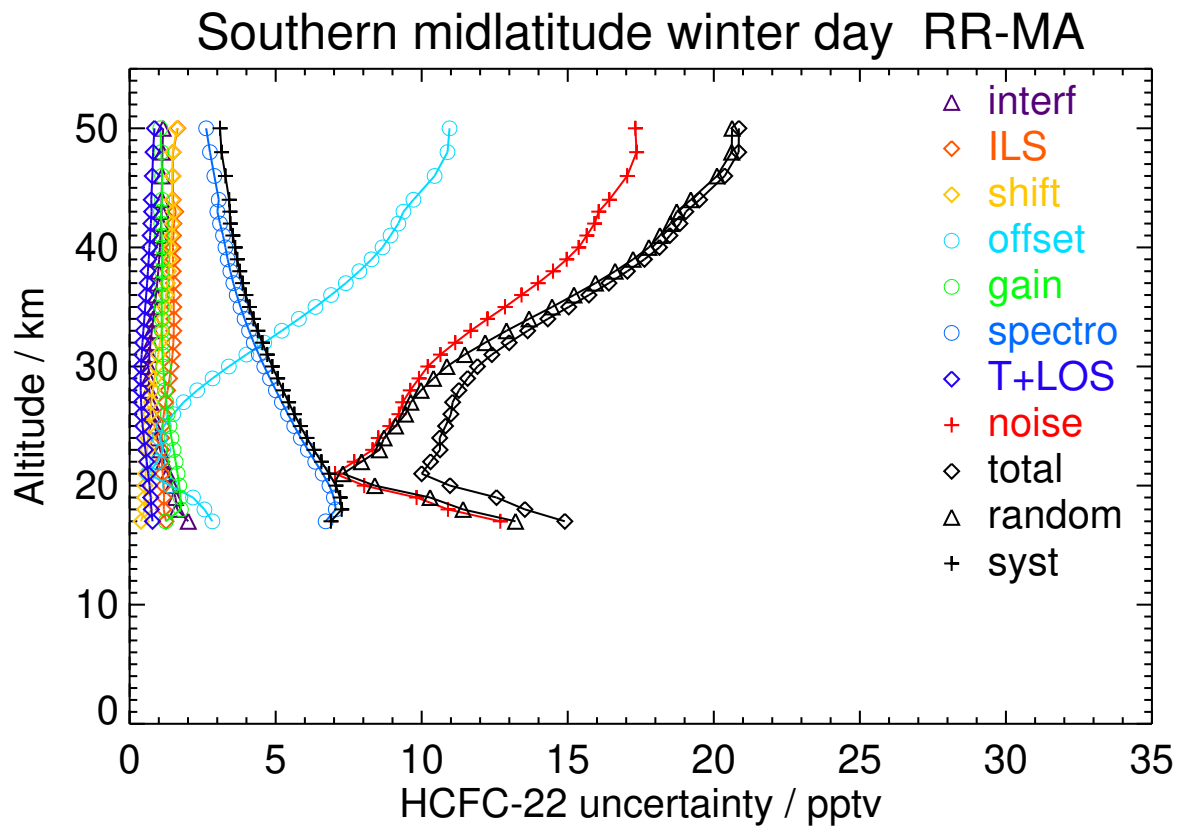
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	175.06	2.32	2.37	0.26	2.91	1.81	8.92	1.36	12.14	12.82	9.34	15.86
20	168.19	1.84	2.29	0.31	1.21	1.73	8.63	1.16	8.32	8.75	9.05	12.58
23	156.09	1.07	2.05	0.49	0.93	1.55	7.85	0.88	8.12	8.36	8.20	11.71
26	149.16	0.73	2.01	0.77	1.11	1.29	6.86	0.65	8.83	9.04	7.20	11.55
29	141.14	0.62	2.11	1.08	2.08	1.08	5.89	0.53	9.24	9.61	6.29	11.48
32	130.96	0.70	2.10	1.36	3.56	0.99	5.06	0.53	10.00	10.76	5.53	12.10
35	121.81	0.85	1.99	1.59	5.23	0.96	4.45	0.60	11.35	12.66	4.93	13.59
38	114.20	0.99	1.90	1.76	6.80	0.96	4.03	0.70	13.00	14.84	4.51	15.51
41	108.44	1.09	1.86	1.86	8.05	0.95	3.76	0.78	14.40	16.67	4.25	17.21
44	104.32	1.15	1.85	1.91	8.95	0.94	3.58	0.84	15.33	17.92	4.09	18.38
46	99.99	1.19	1.84	1.94	9.82	0.92	3.41	0.89	16.16	19.07	3.93	19.47
50	93.35	1.21	1.82	1.92	10.85	0.88	3.15	0.94	17.06	20.37	3.70	20.71



**Figure S86.** V8R\_F-22\_561 Tropics night

**Table S88.** HCFC-22 error budget for Southern midlatitude winter day. All uncertainties are  $1\sigma$ .

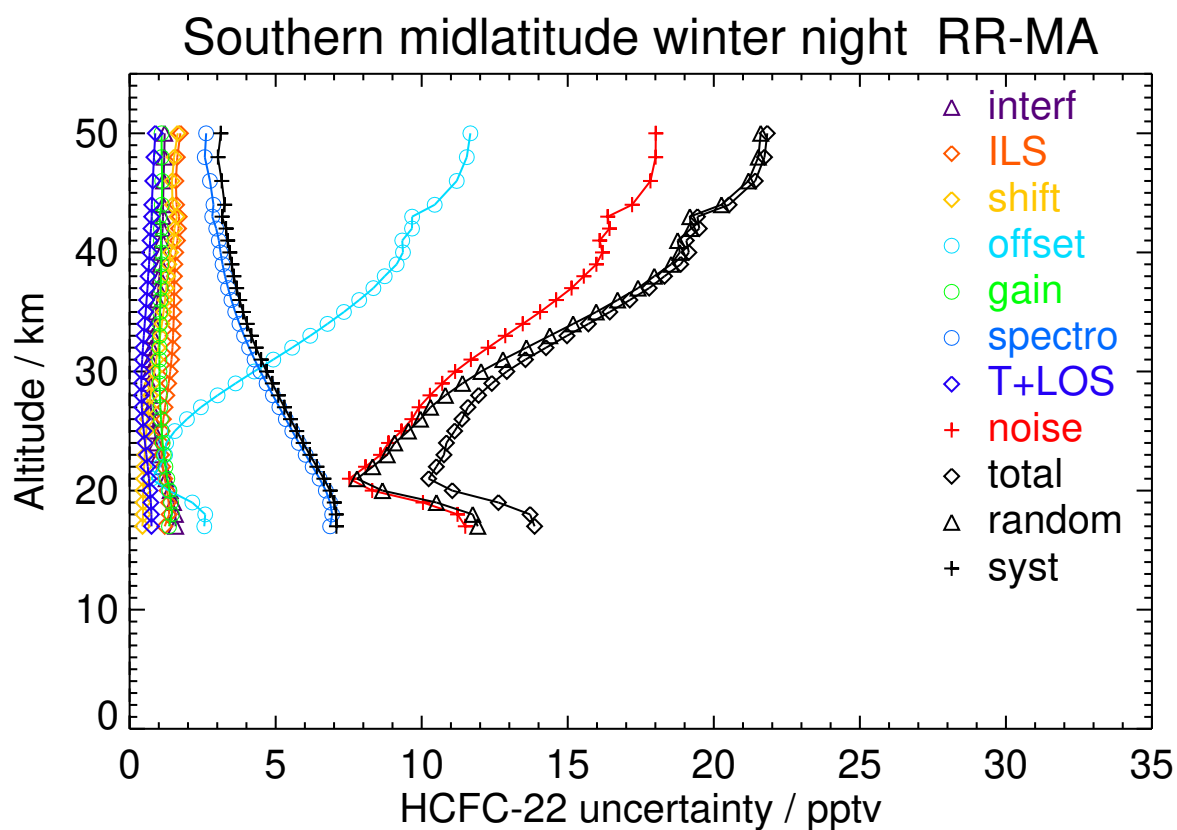
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	132.34	2.01	1.25	0.39	2.83	1.24	6.71	0.78	12.69	13.21	6.89	14.90
20	140.96	1.45	1.17	0.52	1.38	1.70	6.84	0.68	8.03	8.39	7.06	10.97
23	131.14	1.05	1.09	0.60	1.15	1.51	6.10	0.54	8.32	8.55	6.31	10.63
26	125.15	0.79	1.17	0.70	1.49	1.31	5.42	0.41	9.22	9.44	5.64	11.00
29	117.14	0.65	1.37	0.85	2.84	1.18	4.81	0.38	9.91	10.40	5.07	11.57
32	106.90	0.72	1.50	1.04	4.61	1.11	4.25	0.44	11.15	12.17	4.55	12.99
35	96.57	0.86	1.51	1.21	6.36	1.10	3.80	0.54	12.85	14.46	4.10	15.03
38	88.92	0.98	1.49	1.33	7.86	1.11	3.45	0.63	14.50	16.62	3.77	17.04
41	83.76	1.06	1.50	1.43	8.93	1.10	3.20	0.70	15.65	18.16	3.53	18.50
44	80.30	1.09	1.49	1.46	9.72	1.11	3.05	0.74	16.42	19.21	3.41	19.51
46	76.86	1.11	1.48	1.46	10.44	1.11	2.90	0.78	17.04	20.11	3.28	20.37
50	68.21	1.15	1.65	1.62	10.95	1.05	2.62	0.85	17.31	20.63	3.10	20.86



**Figure S87.** V8R\_F-22\_561 Southern midlatitude winter day

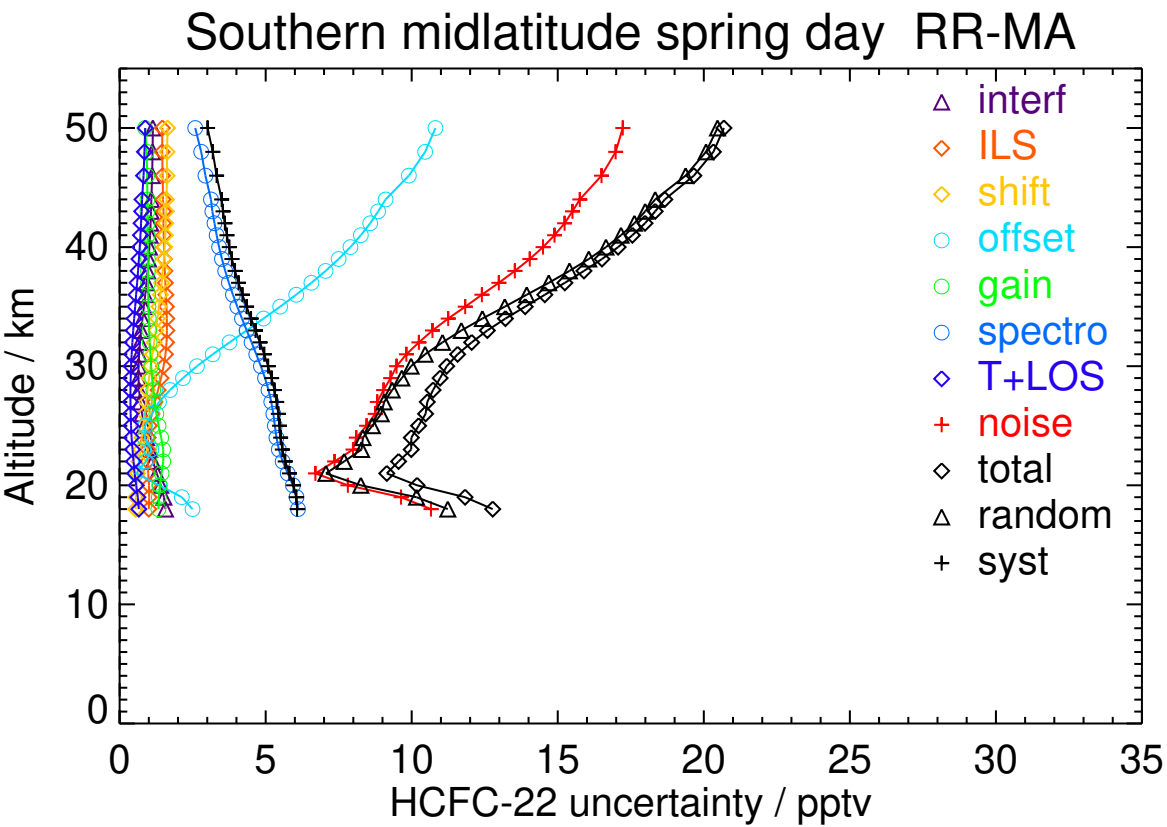
**Table S89.** HCFC-22 error budget for Southern midlatitude winter night. All uncertainties are  $1\sigma$ .

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)
17	144.01	1.58	1.20	0.44	2.56	1.35	6.87	0.75	11.49	11.92	7.08	13.86
20	138.52	1.39	1.28	0.47	1.34	1.36	6.72	0.70	8.31	8.66	6.86	11.05
23	127.14	1.01	1.09	0.52	1.22	1.17	6.03	0.58	8.59	8.82	6.17	10.76
26	119.06	0.78	1.16	0.61	1.96	1.07	5.35	0.45	9.66	9.96	5.51	11.38
29	109.34	0.68	1.34	0.78	3.63	1.03	4.69	0.40	10.70	11.40	4.89	12.40
32	98.79	0.76	1.47	0.98	5.56	1.02	4.09	0.46	12.27	13.58	4.33	14.26
35	90.22	0.90	1.51	1.16	7.34	1.04	3.62	0.55	14.05	15.97	3.88	16.44
38	83.62	1.02	1.54	1.30	8.73	1.07	3.27	0.63	15.55	17.96	3.57	18.31
41	79.19	1.10	1.64	1.50	9.33	1.07	3.06	0.70	16.09	18.76	3.36	19.06
44	75.33	1.15	1.61	1.47	10.45	1.10	2.87	0.76	17.20	20.26	3.25	20.52
46	72.18	1.16	1.58	1.45	11.20	1.12	2.75	0.79	17.83	21.19	3.15	21.42
50	68.16	1.20	1.74	1.65	11.67	1.09	2.62	0.88	18.01	21.61	3.12	21.83

**Figure S88.** V8R\_F-22\_561 Southern midlatitude winter night

**Table S90.** HCFC-22 error budget for Southern midlatitude spring day. All uncertainties are  $1\sigma$ .

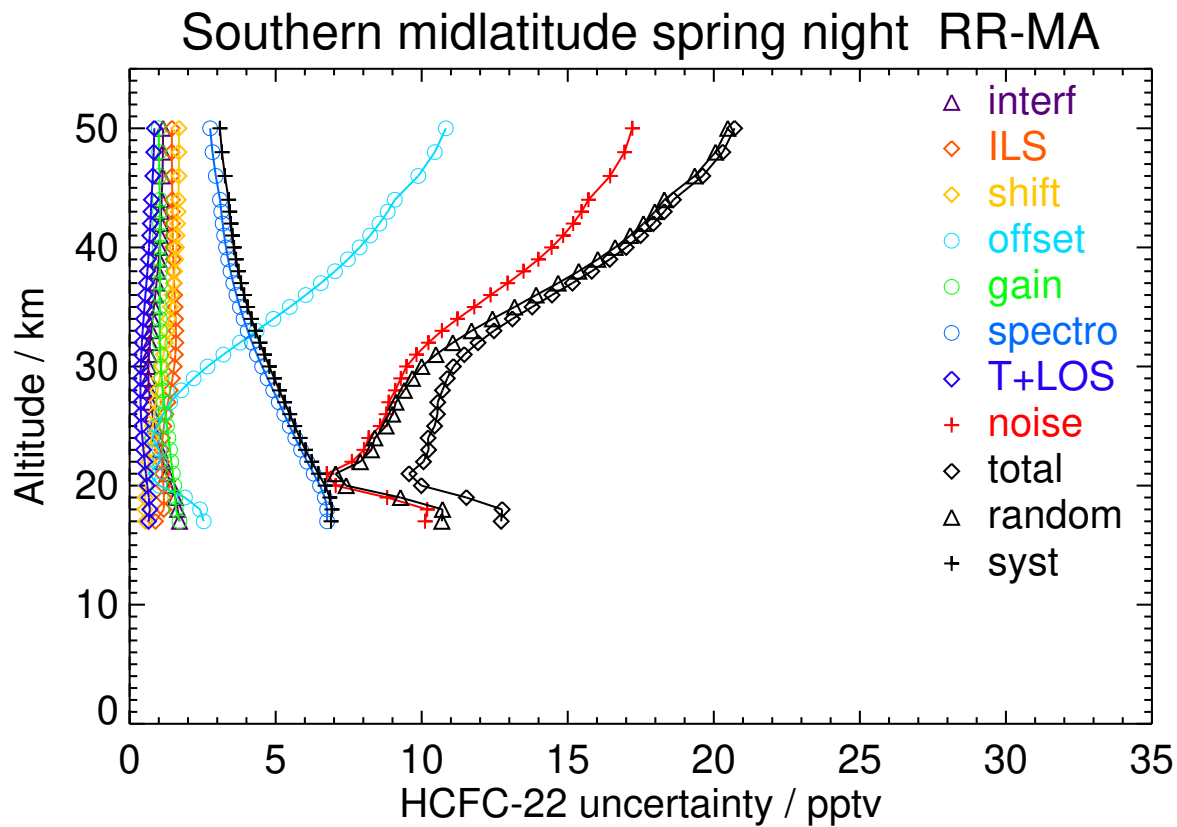
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
20	131.57	1.41	1.01	0.58	1.35	1.38	5.93	0.57	7.82	8.26	5.96	10.18
23	130.57	1.03	0.96	0.71	1.09	1.49	5.45	0.44	7.99	8.28	5.57	9.98
26	132.79	0.77	1.10	0.86	1.11	1.26	5.26	0.38	8.75	8.96	5.43	10.48
29	125.68	0.65	1.42	1.01	2.17	1.11	4.98	0.38	9.28	9.66	5.20	10.97
32	112.34	0.70	1.61	1.18	3.76	1.03	4.52	0.44	10.25	11.05	4.81	12.05
35	98.81	0.83	1.60	1.35	5.50	0.99	4.03	0.53	11.83	13.19	4.35	13.88
38	88.14	0.96	1.55	1.48	7.05	0.97	3.62	0.63	13.53	15.40	3.95	15.90
41	81.19	1.04	1.51	1.56	8.26	0.96	3.32	0.71	14.89	17.17	3.67	17.56
44	77.06	1.09	1.49	1.60	9.11	0.95	3.13	0.77	15.75	18.34	3.49	18.66
46	73.09	1.12	1.47	1.62	9.90	0.94	2.94	0.82	16.50	19.38	3.32	19.66
50	66.18	1.14	1.46	1.64	10.81	0.87	2.59	0.88	17.23	20.47	3.01	20.69



**Figure S89.** V8R\_F-22\_561 Southern midlatitude spring day

**Table S91.** HCFC-22 error budget for Southern midlatitude spring night. All uncertainties are  $1\sigma$ .

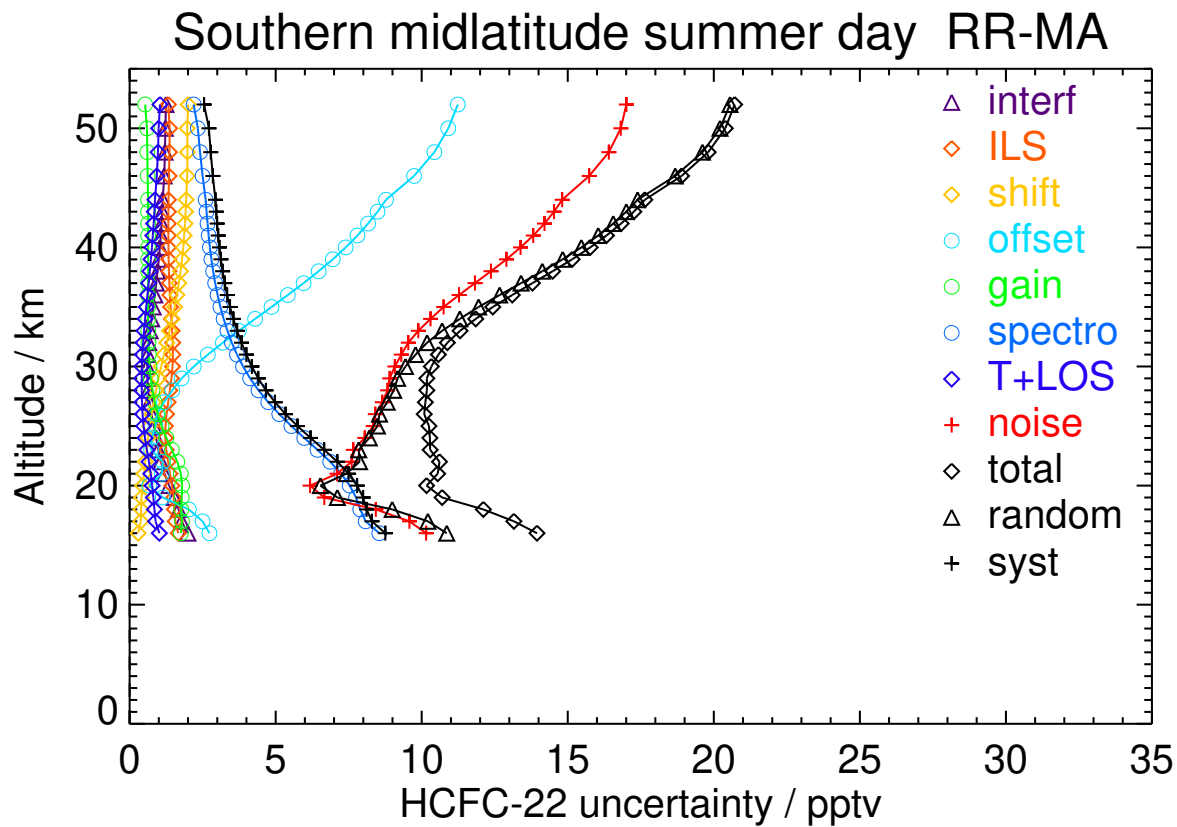
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	140.90	1.71	0.88	0.54	2.54	1.71	6.76	0.65	10.11	10.69	6.89	12.72
20	138.53	1.44	1.16	0.56	1.02	1.53	6.52	0.61	7.05	7.41	6.69	9.99
23	132.06	1.03	1.10	0.69	1.02	1.38	5.87	0.47	8.02	8.28	6.02	10.24
26	126.81	0.78	1.24	0.84	1.15	1.23	5.30	0.39	8.78	9.00	5.48	10.54
29	120.24	0.64	1.47	1.02	2.19	1.10	4.72	0.38	9.28	9.68	4.96	10.88
32	110.08	0.70	1.58	1.22	3.78	1.04	4.20	0.42	10.23	11.06	4.46	11.93
35	101.17	0.83	1.56	1.40	5.49	1.03	3.77	0.51	11.80	13.18	4.04	13.78
38	95.34	0.96	1.51	1.54	7.03	1.04	3.45	0.61	13.49	15.38	3.72	15.82
41	91.51	1.05	1.48	1.63	8.23	1.04	3.24	0.69	14.84	17.14	3.52	17.50
44	88.57	1.10	1.46	1.67	9.08	1.04	3.09	0.75	15.71	18.31	3.39	18.62
46	85.45	1.13	1.45	1.69	9.88	1.02	2.95	0.80	16.45	19.35	3.26	19.62
50	81.30	1.15	1.45	1.69	10.83	0.99	2.76	0.85	17.21	20.48	3.09	20.71



**Figure S90.** V8R\_F-22\_561 Southern midlatitude spring night

**Table S92.** HCFC-22 error budget for Southern midlatitude summer day. All uncertainties are  $1\sigma$ .

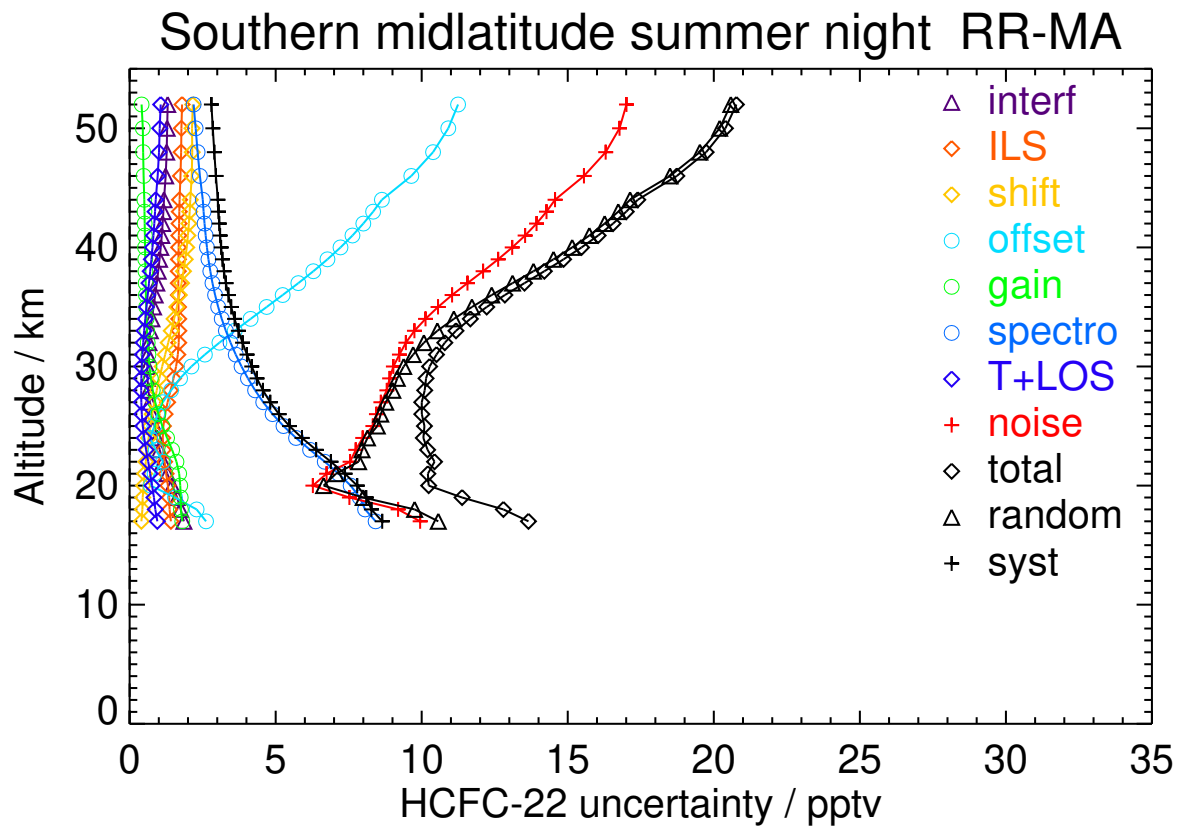
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	156.33	1.78	1.56	0.38	2.50	1.79	8.08	0.89	9.58	10.21	8.30	13.16
20	143.15	1.35	1.45	0.45	0.67	1.80	7.54	0.77	6.18	6.53	7.79	10.17
23	124.17	0.98	1.26	0.58	0.74	1.45	6.43	0.59	7.66	7.84	6.66	10.29
26	110.92	0.75	1.26	0.75	0.93	0.97	5.12	0.44	8.41	8.56	5.34	10.09
29	102.41	0.60	1.43	0.99	1.78	0.72	4.13	0.41	8.90	9.17	4.41	10.18
32	96.29	0.66	1.48	1.27	3.19	0.65	3.50	0.46	9.54	10.18	3.83	10.88
35	92.20	0.81	1.41	1.54	4.86	0.63	3.11	0.57	10.75	11.95	3.44	12.43
38	88.52	0.96	1.35	1.74	6.47	0.64	2.86	0.69	12.37	14.13	3.18	14.48
41	85.23	1.07	1.33	1.87	7.80	0.64	2.71	0.80	13.82	16.04	3.03	16.33
44	82.48	1.13	1.33	1.93	8.78	0.63	2.60	0.87	14.81	17.39	2.94	17.64
46	79.46	1.18	1.35	1.97	9.74	0.62	2.50	0.93	15.73	18.68	2.85	18.89
50	74.90	1.22	1.37	1.97	10.91	0.59	2.34	0.99	16.82	20.21	2.71	20.39



**Figure S91.** V8R\_F-22\_561 Southern midlatitude summer day

**Table S93.** HCFC-22 error budget for Southern midlatitude summer night. All uncertainties are  $1\sigma$ .

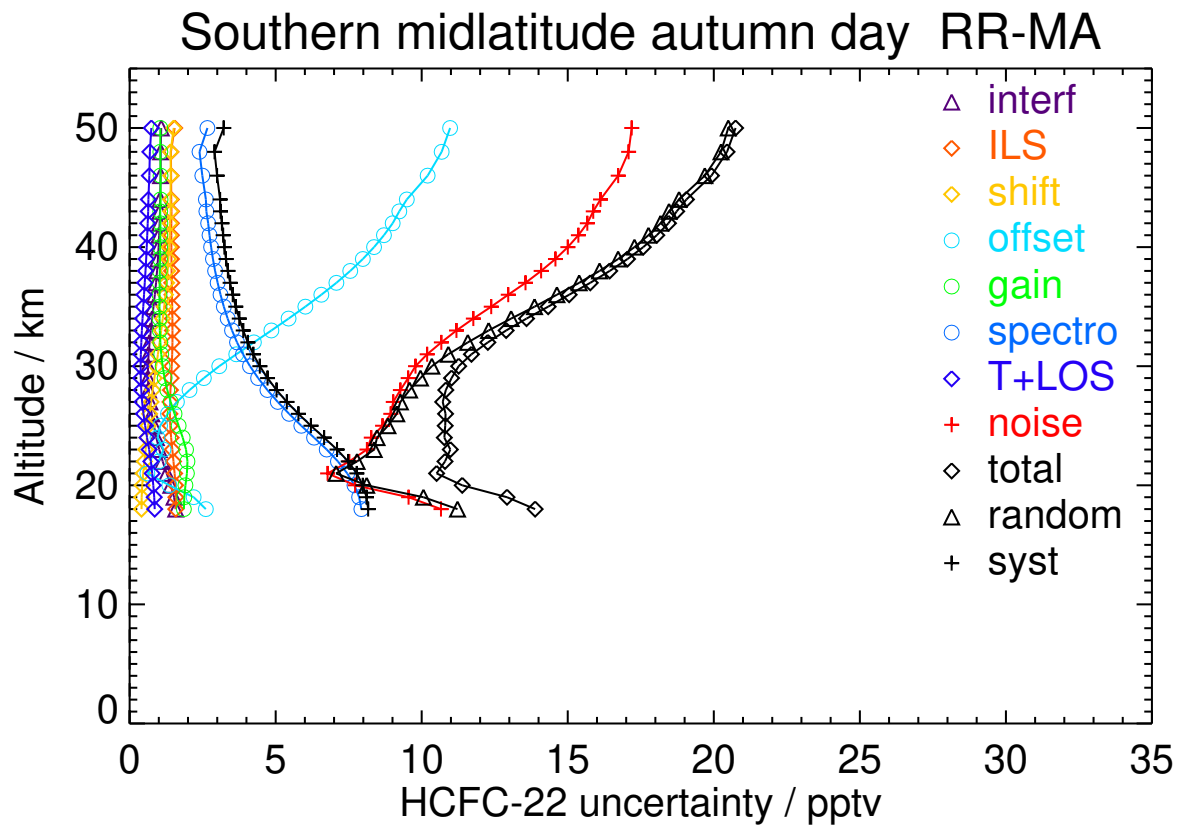
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	156.94	1.86	1.41	0.40	2.62	1.80	8.42	0.95	9.95	10.57	8.65	13.65
20	140.97	1.46	1.31	0.48	0.72	1.73	7.57	0.77	6.28	6.64	7.79	10.24
23	121.21	1.03	1.15	0.60	0.89	1.46	6.18	0.57	7.74	7.96	6.39	10.20
26	111.56	0.77	1.21	0.77	0.95	0.99	4.89	0.42	8.45	8.60	5.11	10.00
29	106.10	0.61	1.50	1.02	1.73	0.73	4.05	0.40	8.90	9.16	4.36	10.15
32	99.31	0.66	1.68	1.32	3.07	0.62	3.46	0.47	9.46	10.07	3.87	10.79
35	91.76	0.82	1.67	1.62	4.69	0.57	3.03	0.58	10.56	11.72	3.48	12.22
38	85.67	0.98	1.67	1.85	6.29	0.54	2.76	0.71	12.10	13.83	3.23	14.20
41	81.26	1.10	1.69	2.00	7.63	0.52	2.60	0.82	13.54	15.74	3.10	16.04
44	78.36	1.18	1.71	2.08	8.64	0.50	2.51	0.89	14.56	17.13	3.02	17.40
46	75.41	1.24	1.74	2.13	9.64	0.48	2.41	0.96	15.55	18.50	2.95	18.73
50	70.92	1.28	1.77	2.14	10.91	0.45	2.26	1.03	16.77	20.20	2.85	20.40



**Figure S92.** V8R\_F-22\_561 Southern midlatitude summer night

**Table S94.** HCFC-22 error budget for Southern midlatitude autumn day. All uncertainties are  $1\sigma$ .

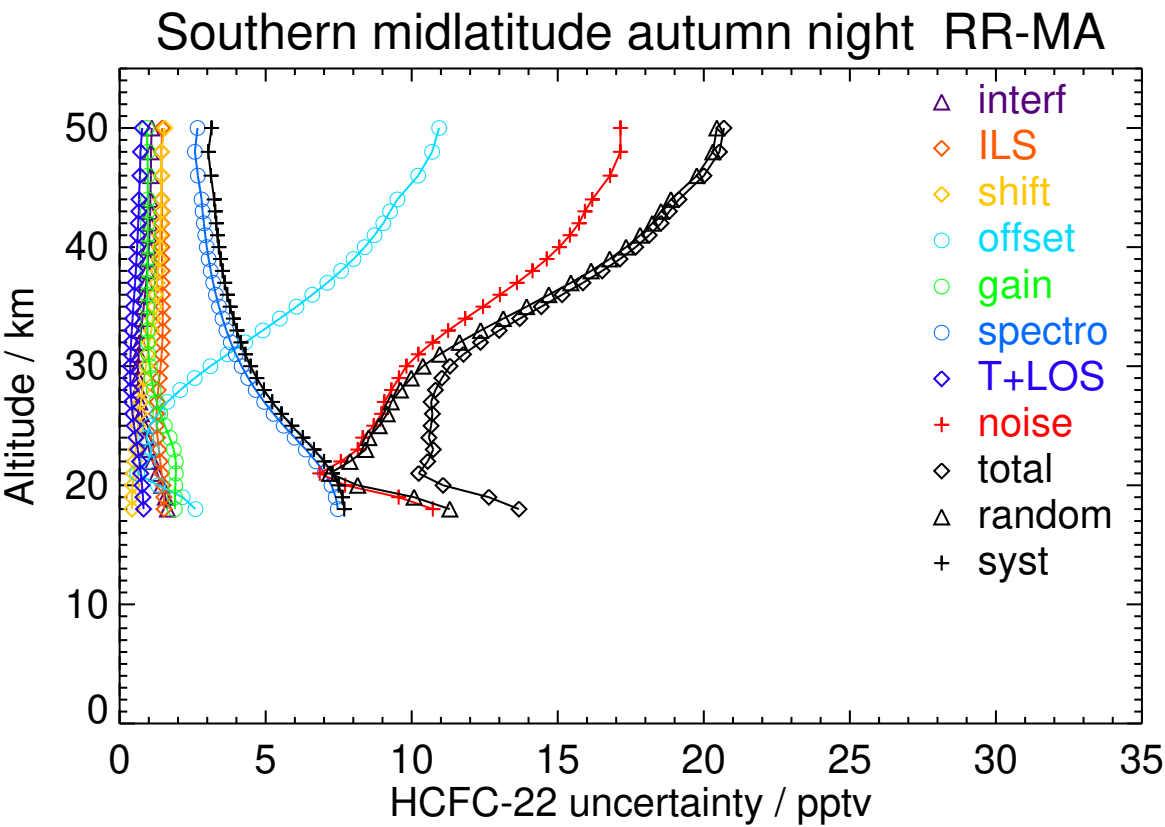
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
20	146.26	1.41	1.57	0.43	1.36	1.91	7.70	0.81	7.72	8.12	7.99	11.39
23	129.10	1.01	1.46	0.55	1.16	1.93	6.75	0.67	8.13	8.37	7.10	10.98
26	115.18	0.76	1.38	0.68	1.31	1.54	5.46	0.47	8.94	9.14	5.78	10.82
29	103.17	0.63	1.42	0.85	2.54	1.20	4.40	0.38	9.54	9.96	4.72	11.02
32	93.77	0.68	1.47	1.03	4.25	1.05	3.68	0.40	10.67	11.58	4.05	12.27
35	87.64	0.82	1.46	1.18	6.02	1.02	3.23	0.47	12.38	13.86	3.63	14.33
38	83.84	0.94	1.44	1.30	7.55	1.04	2.93	0.54	14.09	16.09	3.36	16.44
41	81.16	1.01	1.43	1.37	8.71	1.05	2.74	0.60	15.36	17.76	3.20	18.05
44	79.11	1.05	1.43	1.40	9.49	1.06	2.61	0.64	16.12	18.81	3.10	19.06
46	76.75	1.06	1.42	1.41	10.20	1.06	2.49	0.68	16.73	19.69	2.99	19.92
50	86.51	1.08	1.54	1.51	10.97	1.05	2.66	0.74	17.19	20.50	3.22	20.75



**Figure S93.** V8R\_F-22\_561 Southern midlatitude autumn day

**Table S95.** HCFC-22 error budget for Southern midlatitude autumn night. All uncertainties are  $1\sigma$ .

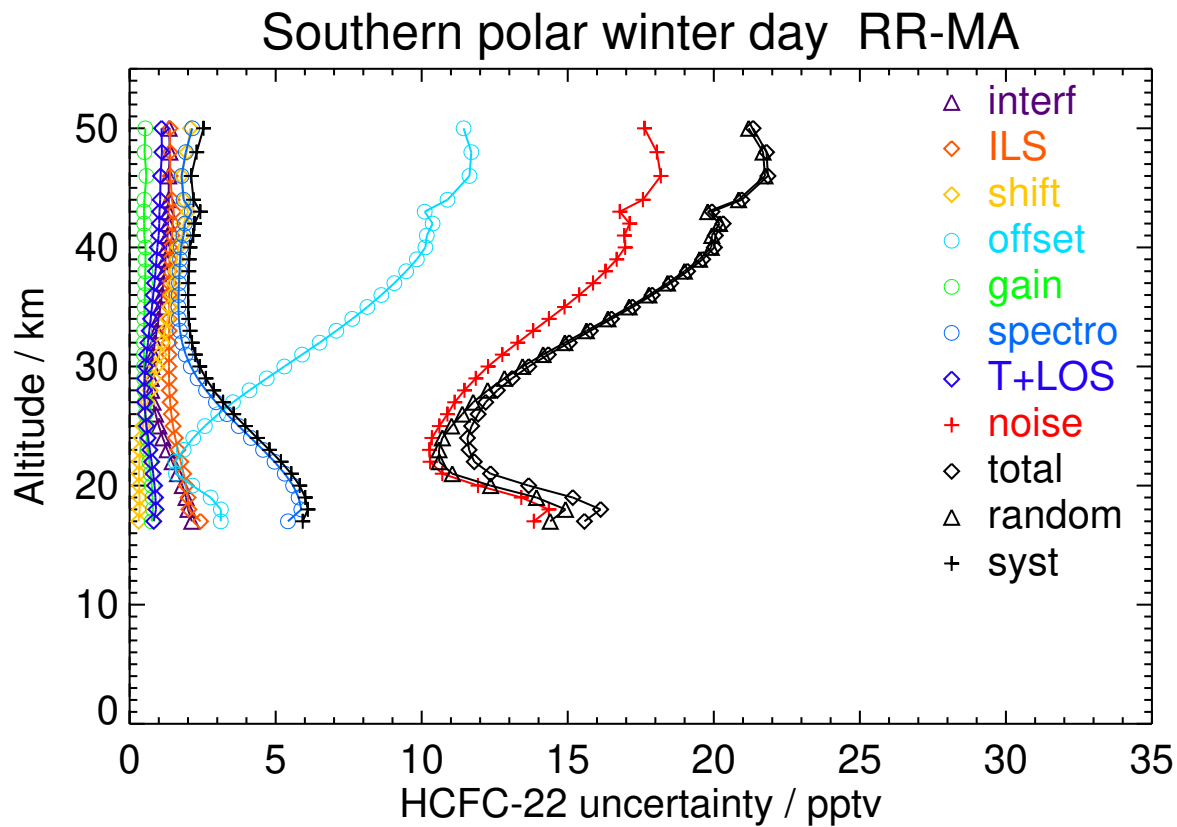
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
20	140.80	1.44	1.49	0.44	1.32	1.91	7.25	0.77	7.72	8.15	7.50	11.07
23	126.87	1.00	1.34	0.55	1.10	1.85	6.38	0.62	8.15	8.43	6.65	10.74
26	116.07	0.75	1.27	0.68	1.31	1.40	5.27	0.44	8.97	9.16	5.54	10.71
29	107.72	0.63	1.36	0.84	2.57	1.09	4.40	0.37	9.56	9.98	4.70	11.03
32	100.96	0.69	1.46	1.03	4.30	0.97	3.81	0.39	10.72	11.64	4.15	12.35
35	94.73	0.83	1.47	1.19	6.06	0.94	3.40	0.47	12.44	13.93	3.78	14.44
38	90.13	0.95	1.46	1.31	7.58	0.95	3.12	0.55	14.14	16.14	3.52	16.52
41	86.49	1.02	1.44	1.38	8.73	0.96	2.93	0.62	15.42	17.82	3.35	18.13
44	83.60	1.05	1.44	1.42	9.51	0.97	2.81	0.66	16.18	18.87	3.24	19.15
46	80.66	1.07	1.44	1.43	10.22	0.96	2.68	0.70	16.79	19.76	3.13	20.01
50	88.39	1.10	1.46	1.54	10.94	0.93	2.67	0.77	17.15	20.45	3.15	20.69



**Figure S94.** V8R\_F-22\_561 Southern midlatitude autumn night

**Table S96.** HCFC-22 error budget for Southern polar winter day. All uncertainties are  $1\sigma$ .

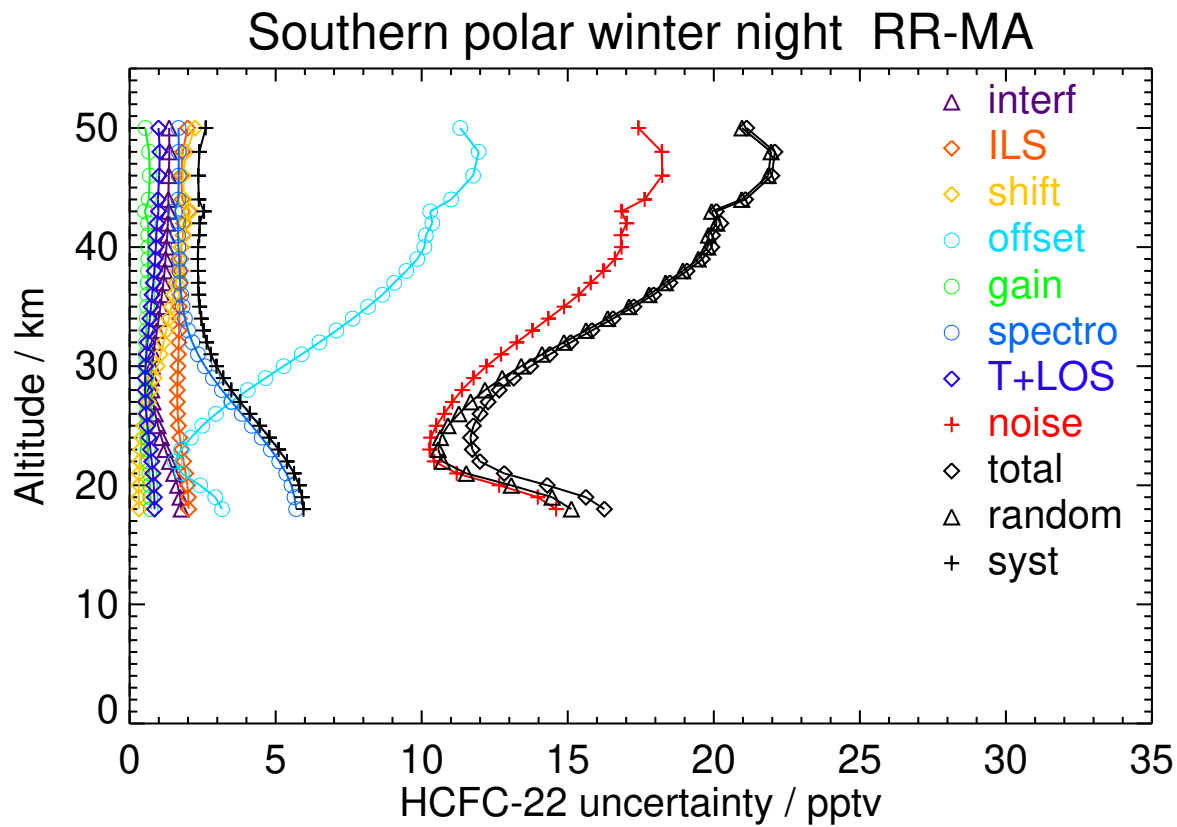
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	105.41	2.13	2.43	0.31	3.12	0.76	5.42	0.82	13.84	14.40	5.93	15.57
20	99.25	1.81	1.94	0.33	2.15	0.76	5.60	0.85	11.93	12.36	5.82	13.66
23	82.64	1.29	1.65	0.36	1.85	0.63	4.57	0.69	10.26	10.59	4.79	11.62
26	67.47	0.89	1.43	0.53	3.03	0.54	3.33	0.54	10.88	11.39	3.56	11.93
29	56.73	0.74	1.35	0.81	4.69	0.50	2.33	0.52	11.85	12.83	2.61	13.09
32	48.83	0.87	1.35	1.12	6.50	0.49	1.80	0.63	13.29	14.90	2.14	15.05
35	43.17	1.05	1.35	1.38	8.14	0.51	1.67	0.77	14.89	17.10	2.01	17.22
38	39.50	1.19	1.36	1.57	9.47	0.54	1.71	0.89	16.29	18.99	2.02	19.10
41	38.88	1.30	1.45	1.81	10.18	0.50	1.85	1.00	16.94	19.93	2.18	20.05
44	36.53	1.34	1.45	1.85	10.88	0.51	1.85	1.05	17.57	20.85	2.19	20.96
46	34.35	1.34	1.39	1.77	11.64	0.57	1.78	1.06	18.18	21.75	2.11	21.85
50	46.73	1.35	1.38	2.08	11.43	0.54	2.14	1.10	17.63	21.19	2.53	21.34



**Figure S95.** V8R\_F-22\_561 Southern polar winter day

**Table S97.** HCFC-22 error budget for Southern polar winter night. All uncertainties are  $1\sigma$ .

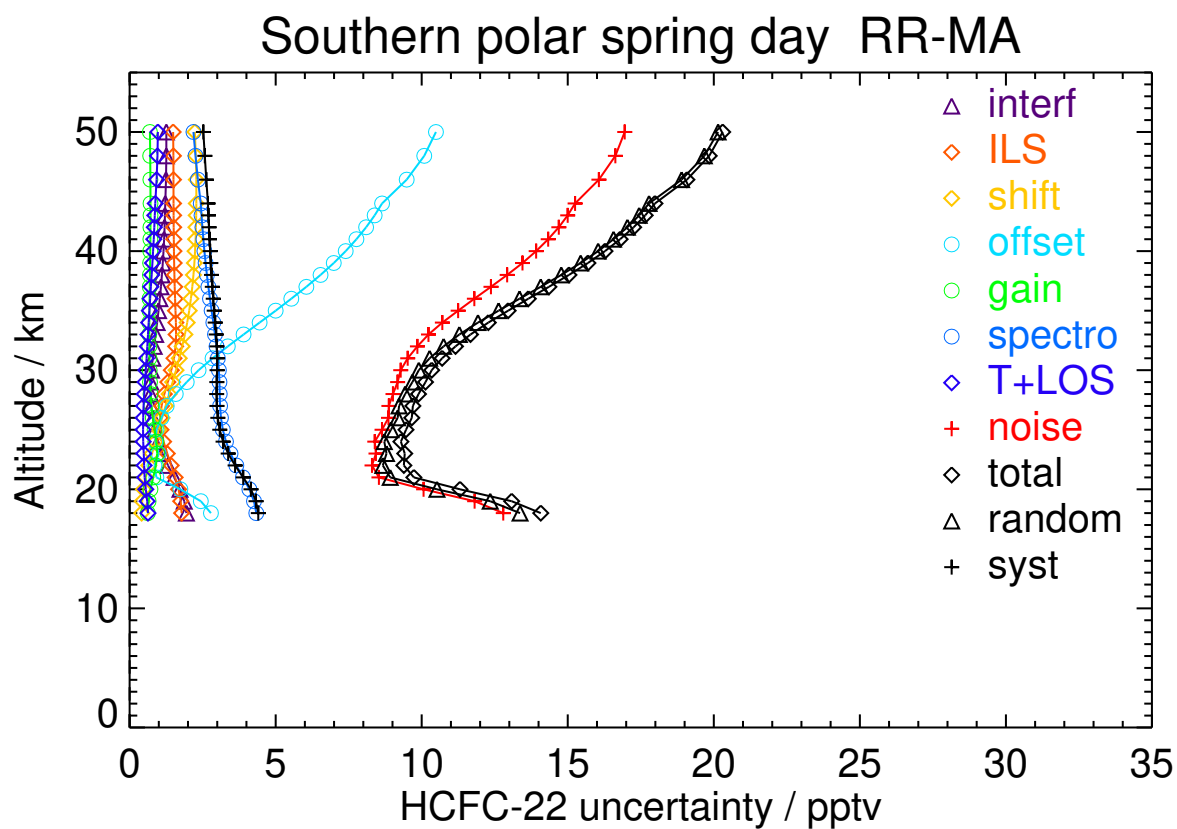
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
20	108.76	1.64	1.98	0.32	2.41	0.70	5.54	0.83	12.65	13.07	5.80	14.30
23	94.99	1.22	1.78	0.38	1.77	0.62	4.84	0.71	10.27	10.57	5.10	11.73
26	79.04	0.88	1.65	0.55	2.95	0.57	3.84	0.57	10.78	11.27	4.12	12.00
29	65.67	0.75	1.64	0.84	4.65	0.55	2.85	0.53	11.77	12.75	3.21	13.15
32	55.00	0.88	1.68	1.16	6.50	0.56	2.15	0.61	13.25	14.87	2.64	15.10
35	48.72	1.05	1.71	1.43	8.16	0.60	1.82	0.73	14.87	17.10	2.40	17.26
38	44.90	1.20	1.74	1.64	9.47	0.63	1.71	0.85	16.22	18.94	2.34	19.08
41	40.82	1.29	1.83	1.86	10.14	0.64	1.66	0.92	16.82	19.82	2.39	19.96
44	40.14	1.33	1.80	1.86	11.01	0.66	1.67	0.97	17.63	20.95	2.37	21.09
46	39.94	1.34	1.77	1.83	11.76	0.69	1.68	1.01	18.23	21.86	2.35	21.99
50	30.20	1.35	1.99	2.24	11.32	0.54	1.68	0.99	17.42	20.96	2.61	21.13



**Figure S96.** V8R\_F-22\_561 Southern polar winter night

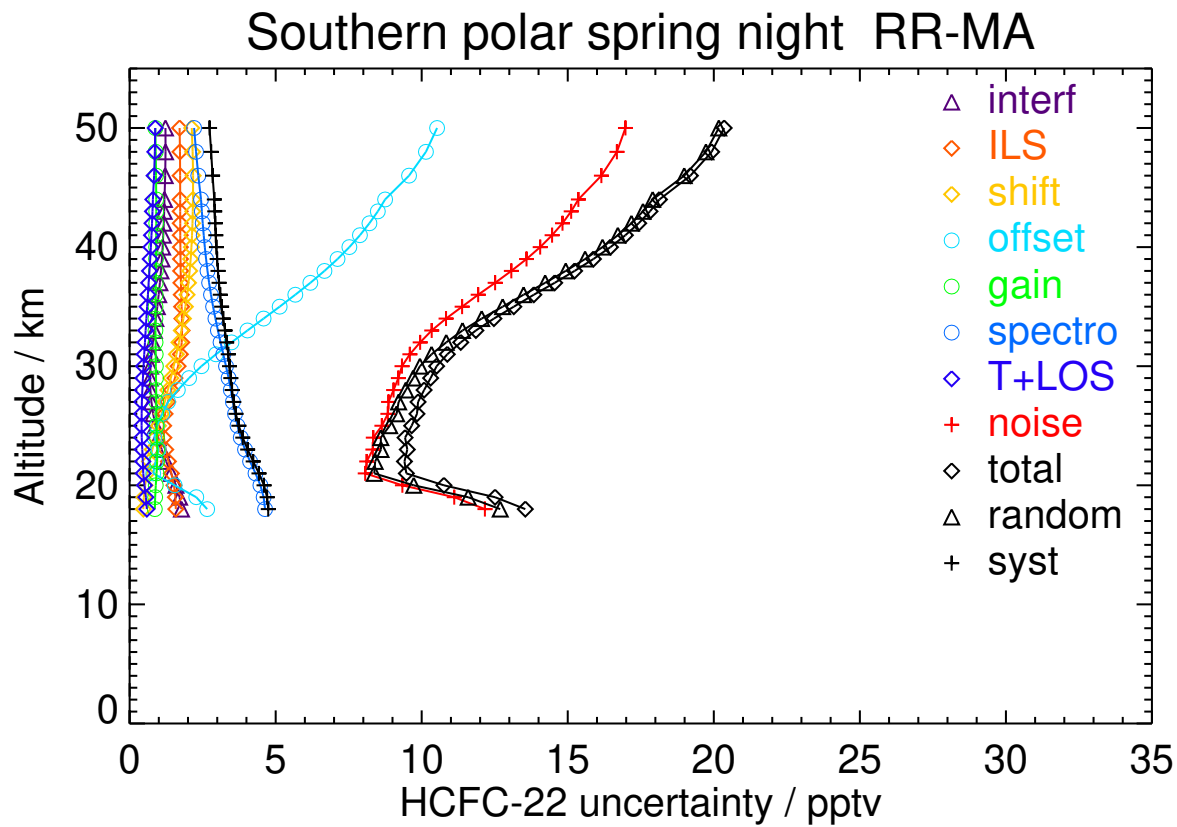
**Table S98.** HCFC-22 error budget for Southern polar spring day. All uncertainties are  $1\sigma$ .

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)
20	83.31	1.73	1.68	0.48	1.74	0.71	4.10	0.55	10.06	10.52	4.15	11.31
23	81.21	1.13	1.29	0.77	1.00	0.94	3.46	0.48	8.43	8.79	3.37	9.42
26	84.22	0.80	1.05	1.11	1.09	0.79	3.13	0.47	8.86	9.18	3.02	9.66
29	82.72	0.72	1.31	1.47	1.96	0.70	3.08	0.53	9.17	9.68	2.98	10.13
32	80.24	0.84	1.57	1.80	3.36	0.68	2.98	0.61	9.85	10.75	2.99	11.16
35	78.12	0.99	1.57	2.04	5.00	0.68	2.81	0.68	11.25	12.63	2.89	12.96
38	75.38	1.11	1.53	2.19	6.54	0.70	2.65	0.76	12.93	14.78	2.80	15.04
41	72.94	1.18	1.51	2.26	7.77	0.71	2.53	0.83	14.33	16.57	2.74	16.79
44	71.24	1.22	1.50	2.28	8.64	0.72	2.44	0.88	15.25	17.78	2.68	17.99
46	69.21	1.25	1.50	2.28	9.49	0.71	2.34	0.92	16.07	18.90	2.63	19.08
50	65.74	1.26	1.49	2.23	10.49	0.70	2.19	0.97	16.95	20.15	2.52	20.30

**Figure S97.** V8R\_F-22\_561 Southern polar spring day

**Table S99.** HCFC-22 error budget for Southern polar spring night. All uncertainties are  $1\sigma$ .

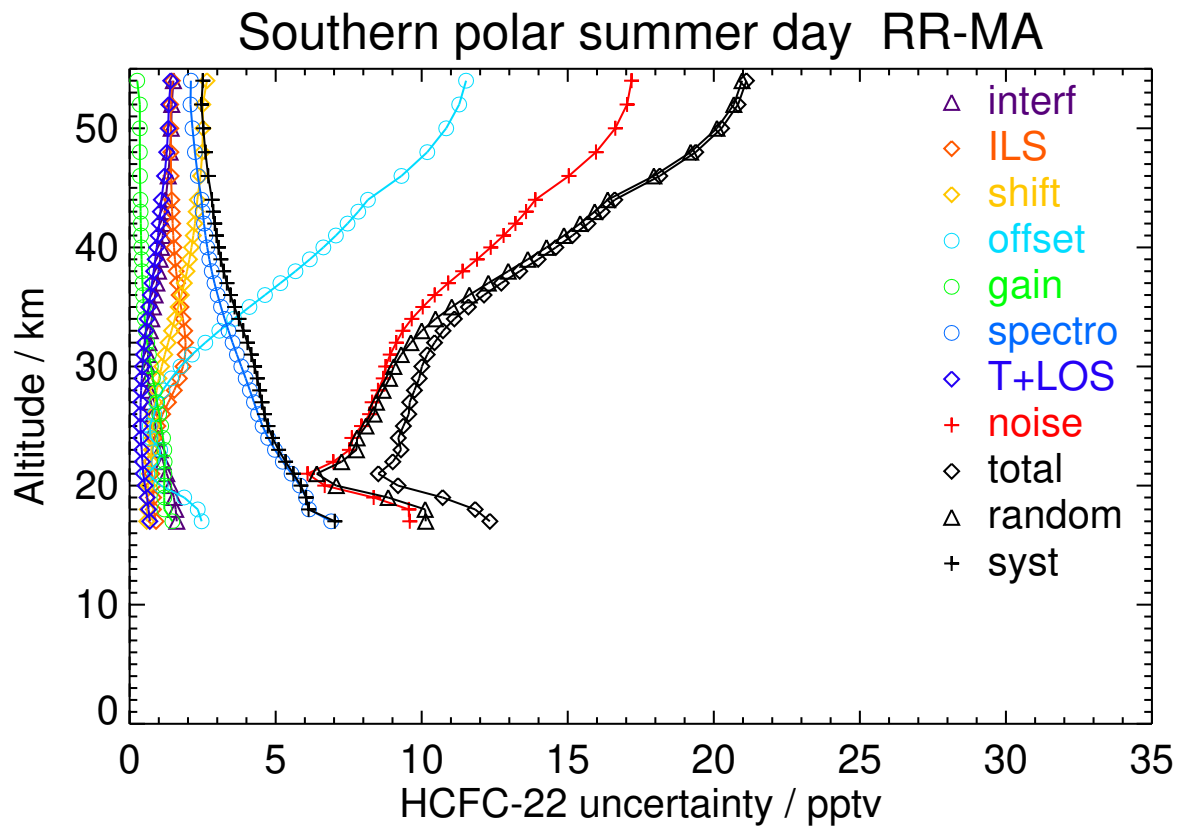
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
20	94.10	1.59	1.52	0.53	1.54	0.90	4.48	0.51	9.34	9.73	4.60	10.76
23	93.05	1.10	1.24	0.78	0.99	0.95	3.95	0.43	8.33	8.61	4.04	9.51
26	96.53	0.81	1.21	1.10	1.12	0.92	3.61	0.41	8.84	9.14	3.64	9.84
29	94.07	0.70	1.55	1.41	2.04	0.91	3.39	0.46	9.20	9.71	3.46	10.31
32	86.92	0.80	1.78	1.69	3.49	0.89	3.11	0.53	9.95	10.84	3.32	11.34
35	81.03	0.95	1.78	1.91	5.14	0.89	2.86	0.60	11.38	12.77	3.15	13.15
38	75.69	1.07	1.75	2.06	6.67	0.90	2.67	0.68	13.07	14.93	3.03	15.23
41	71.91	1.15	1.74	2.14	7.89	0.91	2.54	0.75	14.46	16.71	2.95	16.97
44	69.18	1.19	1.73	2.17	8.75	0.91	2.45	0.80	15.36	17.91	2.90	18.14
46	66.49	1.22	1.73	2.17	9.57	0.90	2.35	0.84	16.15	18.99	2.84	19.20
50	62.33	1.23	1.71	2.13	10.53	0.88	2.21	0.88	16.98	20.17	2.74	20.36



**Figure S98.** V8R\_F-22\_561 Southern polar spring night

**Table S100.** HCFC-22 error budget for Southern polar summer day. All uncertainties are  $1\sigma$ .

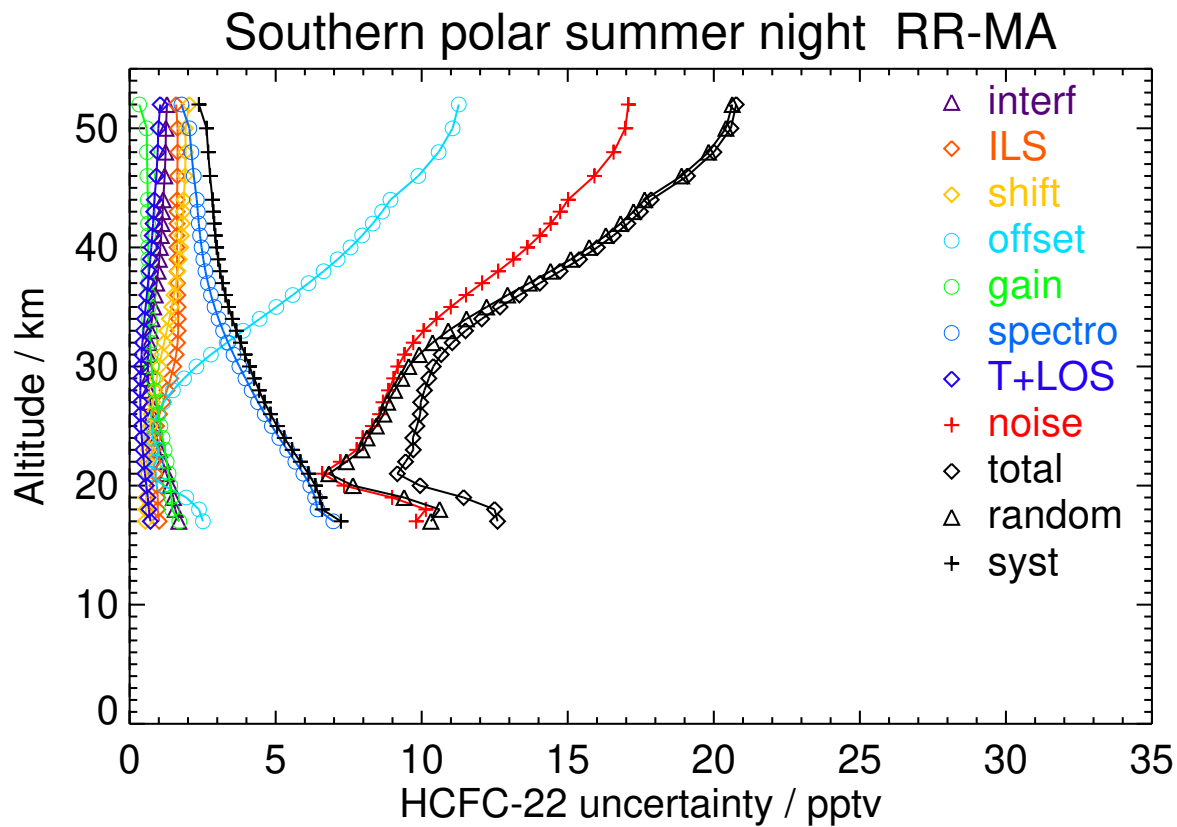
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	142.71	1.61	0.91	0.58	2.47	1.46	6.90	0.69	9.59	10.14	7.03	12.33
20	126.55	1.40	0.80	0.64	1.07	1.19	5.83	0.53	6.68	7.08	5.86	9.19
23	117.94	1.05	0.78	0.75	1.05	1.19	4.98	0.42	7.52	7.77	5.10	9.29
26	111.88	0.80	1.13	0.82	0.85	1.01	4.40	0.37	8.22	8.37	4.62	9.56
29	105.20	0.63	1.70	1.01	1.43	0.80	3.97	0.42	8.68	8.90	4.37	9.91
32	97.59	0.66	1.92	1.32	2.59	0.60	3.53	0.51	9.13	9.63	4.03	10.44
35	89.76	0.82	1.76	1.66	4.10	0.49	3.13	0.66	10.04	11.03	3.59	11.60
38	81.77	0.99	1.59	1.96	5.68	0.42	2.81	0.82	11.40	12.96	3.22	13.35
41	75.14	1.14	1.49	2.18	7.06	0.39	2.60	0.98	12.80	14.87	2.97	15.16
44	70.50	1.23	1.44	2.32	8.16	0.37	2.46	1.09	13.89	16.37	2.82	16.61
46	65.67	1.32	1.42	2.43	9.31	0.36	2.34	1.19	15.04	17.95	2.69	18.15
50	58.55	1.42	1.41	2.51	10.84	0.35	2.15	1.32	16.63	20.11	2.52	20.27



**Figure S99.** V8R\_F-22\_561 Southern polar summer day

**Table S101.** HCFC-22 error budget for Southern polar summer night. All uncertainties are  $1\sigma$ .

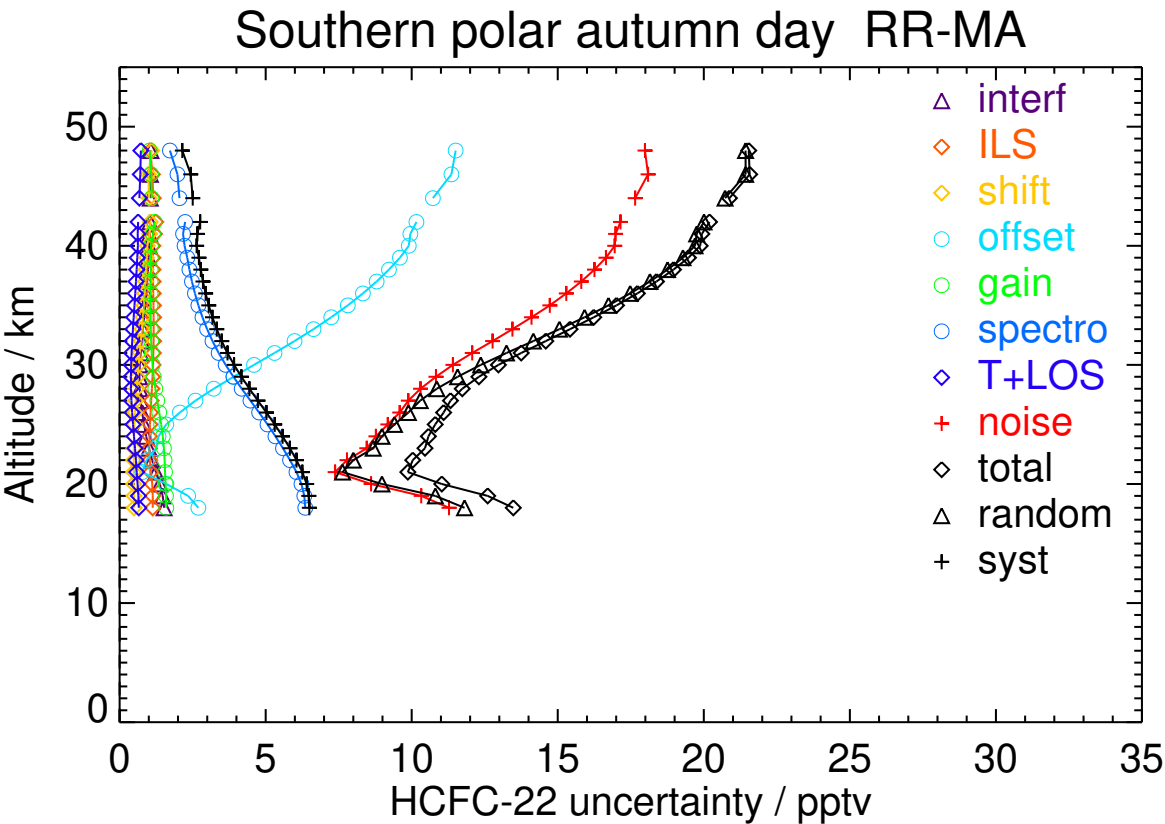
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
17	141.95	1.69	1.01	0.54	2.51	1.70	6.97	0.71	9.81	10.31	7.23	12.60
20	130.85	1.39	0.93	0.56	1.17	1.39	6.19	0.57	7.34	7.65	6.36	9.94
23	116.65	1.03	0.81	0.64	0.99	1.20	5.40	0.45	7.77	7.96	5.57	9.71
26	108.90	0.78	1.03	0.75	0.96	0.98	4.63	0.37	8.56	8.70	4.82	9.95
29	101.21	0.63	1.40	0.93	1.86	0.80	3.97	0.38	9.04	9.31	4.26	10.24
32	91.39	0.67	1.64	1.18	3.32	0.70	3.37	0.44	9.71	10.37	3.80	11.04
35	82.09	0.82	1.66	1.44	5.02	0.66	2.91	0.55	11.00	12.22	3.39	12.68
38	75.39	0.97	1.63	1.65	6.64	0.64	2.60	0.67	12.62	14.41	3.10	14.74
41	71.82	1.08	1.62	1.78	7.96	0.63	2.41	0.77	14.04	16.30	2.93	16.56
44	69.98	1.15	1.62	1.85	8.93	0.62	2.30	0.85	15.01	17.63	2.84	17.86
46	67.98	1.20	1.64	1.90	9.88	0.61	2.20	0.92	15.91	18.90	2.75	19.10
50	64.54	1.24	1.64	1.91	11.06	0.58	2.05	0.98	16.97	20.42	2.63	20.58



**Figure S100.** V8R\_F-22\_561 Southern polar summer night

**Table S102.** HCFC-22 error budget for Southern polar autumn day. All uncertainties are  $1\sigma$ .

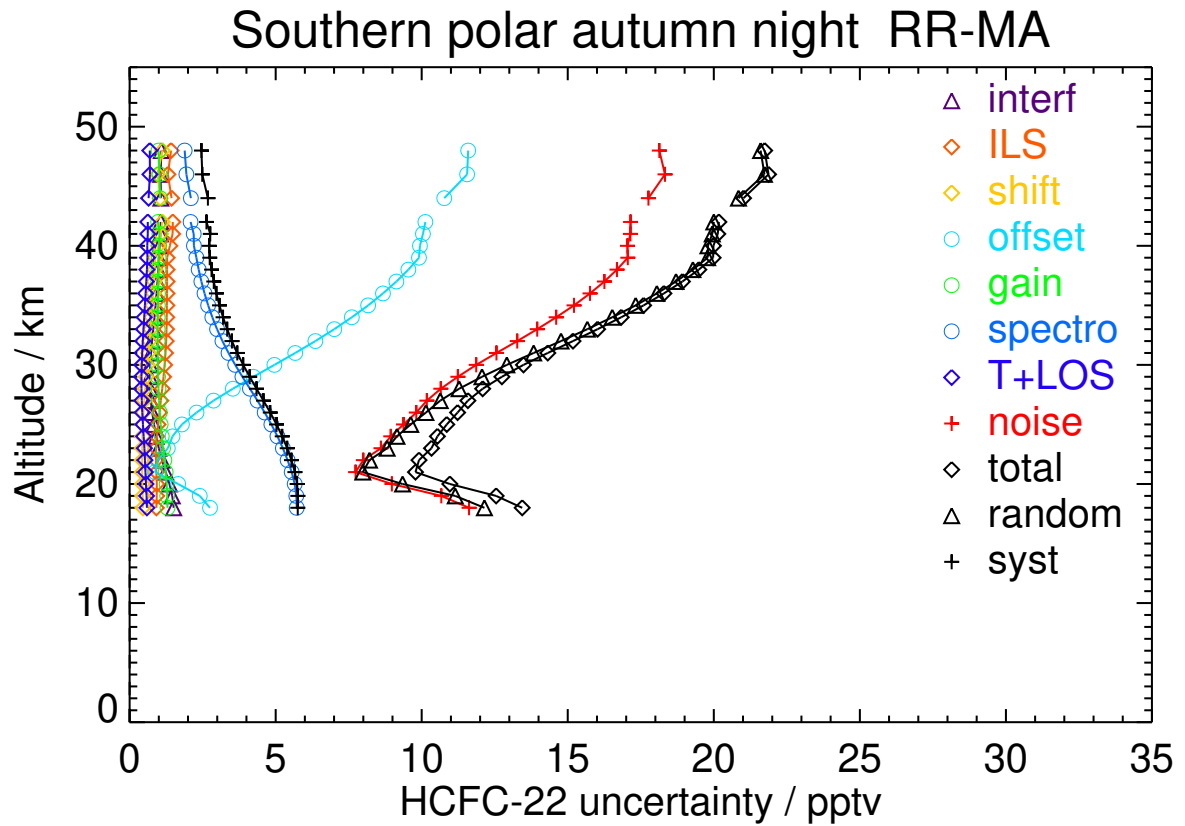
altitude (km)	mean target (pptv)	interf (pptv)	ILS (pptv)	shift (pptv)	offset (pptv)	gain (pptv)	spectro (pptv)	T+LOS (pptv)	noise (pptv)	random (pptv)	syst (pptv)	total (pptv)
20	125.73	1.38	1.12	0.48	1.60	1.57	6.23	0.62	8.61	8.98	6.40	11.03
23	113.10	1.00	1.02	0.49	1.25	1.52	5.59	0.53	8.46	8.68	5.83	10.46
26	99.06	0.77	1.06	0.53	2.06	1.36	4.78	0.43	9.59	9.89	5.03	11.09
29	84.84	0.68	1.13	0.62	3.90	1.17	3.90	0.39	10.83	11.57	4.17	12.30
32	74.10	0.76	1.16	0.73	5.99	1.08	3.18	0.43	12.77	14.16	3.49	14.59
35	66.70	0.88	1.16	0.83	7.81	1.06	2.70	0.51	14.73	16.74	3.05	17.01
38	61.11	0.97	1.14	0.90	9.22	1.07	2.39	0.58	16.26	18.76	2.78	18.96
41	61.74	1.03	1.20	1.03	9.95	1.15	2.17	0.62	16.98	19.76	2.66	19.93
44	55.37	1.05	1.15	1.01	10.73	1.10	2.05	0.68	17.65	20.73	2.50	20.88
46	53.29	1.06	1.12	0.98	11.36	1.08	1.98	0.71	18.09	21.43	2.43	21.57



**Figure S101.** V8R\_F-22\_561 Southern polar autumn day

**Table S103.** 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)
20	118.32	1.36	0.93	0.44	1.66	1.27	5.65	0.56	8.98	9.35	5.73	10.96
23	108.76	1.00	0.91	0.43	1.31	1.14	5.25	0.51	8.60	8.82	5.39	10.34
26	96.23	0.78	1.02	0.47	2.29	1.03	4.63	0.43	9.81	10.15	4.81	11.23
29	82.82	0.69	1.16	0.57	4.24	0.97	3.86	0.41	11.24	12.06	4.11	12.75
32	70.29	0.77	1.25	0.68	6.36	0.96	3.18	0.45	13.27	14.77	3.50	15.18
35	60.91	0.89	1.28	0.79	8.17	0.97	2.69	0.52	15.21	17.32	3.08	17.60
38	55.00	0.98	1.28	0.86	9.54	0.99	2.37	0.59	16.68	19.28	2.81	19.49
41	53.42	1.06	1.47	1.06	10.04	1.02	2.20	0.62	17.15	19.95	2.76	20.14
44	54.19	1.07	1.44	1.05	10.77	1.04	2.10	0.65	17.76	20.85	2.68	21.02
46	48.73	1.06	1.31	0.96	11.55	1.02	1.94	0.70	18.33	21.73	2.49	21.87



**Figure S102.** V8R\_F-22\_561 Southern polar autumn night