Supplement of

MIPAS O_3 retrieval version 8: middle and upper atmosphere measurements

Manuel López-Puertas et al.

Correspondence: Manuel López-Puertas (puertas@iaa.es)

This document serves as a reference for the definitions of the representative atmospheres used for the calculation of the middle atmosphere (MA) and upper atmosphere (UA) measurement modes ozone error budgets. The representative atmospheric conditions are listed in Tables S1 and S36. This document also collects the respective error budgets of both modes, which are listed in Tables S2–S35 for the MA data and in Tables S37–S70 for the UA data. The errors are also depicted in figures S1–S34 for the MA data and in figures S35–S68 for the UA data.

The errors are given as relative values in percentage, even if they are of additive nature, i.e., do not scale with the retrieved volume mixing ratio. They were calculated with respect to the average ozone profile calculated from the single geolocations contributing to the respective representative atmospheres.

S1 Errors budget for O_3 MA data

In this section we provide the errors for the MA data.

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

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

Table S2. Ozone error budget for Northern polar winter day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	3.9	<0.1	5.0	2.0	1.0	1.5	5.1	1.5	1.9	6.4	4.8
30	6.8	<0.1	0.2	2.2	0.3	1.5	8.2	0.7	1.0	1.6	8.6
40	6.1	<0.1	<0.1	2.3	0.4	1.2	7.4	0.7	2.0	2.4	7.8
50	3.4	0.3	<0.1	2.1	0.7	1.8	7.2	1.4	3.4	4.2	7.5
60	0.8	1.1	<0.1	1.0	2.2	2.1	6.9	3.3	7.6	8.8	7.1
70	0.2	2.5	<0.1	0.9	2.0	1.5	6.6	2.2	16	17	6.9
80	0.3	6.7	<0.1	0.9	3.7	1.9	4.2	<0.1	17	18	5.9
90	1.2	6.0	<0.1	1.3	7.4	1.3	3.5	0.5	24	26	5.5
96	0.7	6.6	<0.1	1.9	11	1.2	3.8	0.6	37	39	6.1
100	1.3	8.1	<0.1	1.4	12	1.5	3.2	0.8	41	43	8.9

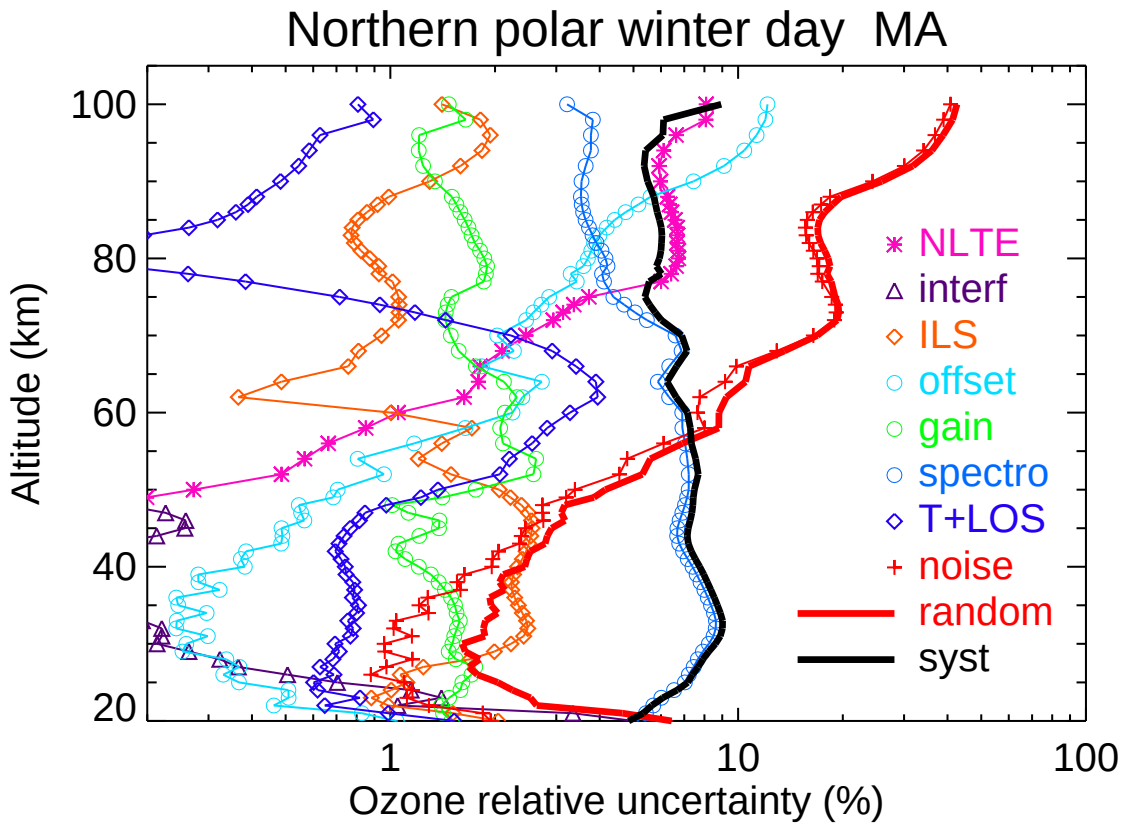

Figure S1. V8R_O3_561 Northern polar winter day.

Table S3. Ozone error budget for Northern polar winter night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	3.6	<0.1	3.4	2.2	0.9	1.6	6.2	1.7	2.2	5.2	6.2
30	5.6	<0.1	0.2	2.7	0.3	1.5	9.0	0.9	1.3	2.5	9.3
40	5.0	<0.1	0.1	2.8	0.4	1.1	7.9	0.8	2.0	3.4	8.0
50	2.3	0.6	0.1	2.2	0.9	1.9	8.0	1.3	3.6	6.1	7.1
60	1.5	1.5	<0.1	1.8	1.8	1.9	3.6	2.5	6.1	7.1	4.3
70	3.3	6.4	<0.1	1.2	4.0	2.8	6.1	5.8	7.1	13	5.5
80	1.0	10	<0.1	1.0	3.2	2.5	4.1	0.5	11	15	5.4
90	7.2	6.2	<0.1	1.3	2.4	1.4	3.2	1.2	13	14	3.4
96	7.4	5.2	<0.1	3.1	4.1	0.9	3.2	1.5	18	19	4.6
100	5.7	5.4	<0.1	4.7	7.5	1.6	3.5	1.2	28	30	6.2

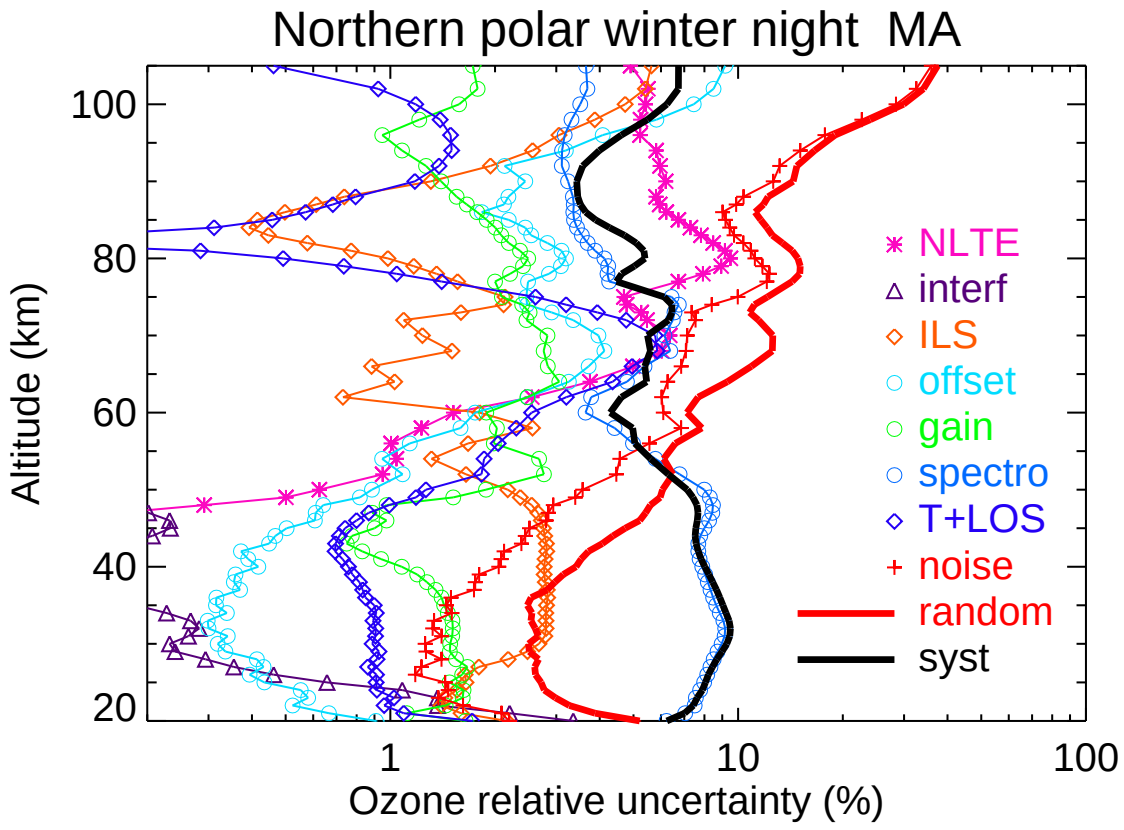

Figure S2. V8R_O3_561 Northern polar winter night.

Table S4. Ozone error budget for Northern polar spring day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	4.2	<0.1	2.9	2.2	1.2	2.7	4.6	1.8	2.4	4.6	5.6
30	4.8	<0.1	0.2	2.6	0.3	1.7	7.2	0.7	1.3	2.4	7.7
40	5.9	<0.1	<0.1	2.6	0.4	1.4	6.5	0.7	1.6	2.0	7.1
50	2.1	<0.1	0.2	2.5	0.5	0.8	5.2	0.7	2.6	2.8	5.8
60	0.7	0.5	<0.1	1.8	1.6	1.5	5.0	1.9	4.9	5.7	5.3
70	0.2	3.3	<0.1	0.5	2.5	1.1	4.9	1.8	11	12	5.5
80	0.1	5.4	<0.1	0.9	2.3	1.0	3.7	0.3	15	16	6.0
90	0.6	4.8	<0.1	2.6	6.0	0.9	3.2	1.6	22	23	6.1
96	0.4	8.1	<0.1	4.1	10	0.9	3.8	2.0	35	37	7.5
100	0.5	8.4	<0.1	3.8	12	0.7	3.5	2.1	40	41	10

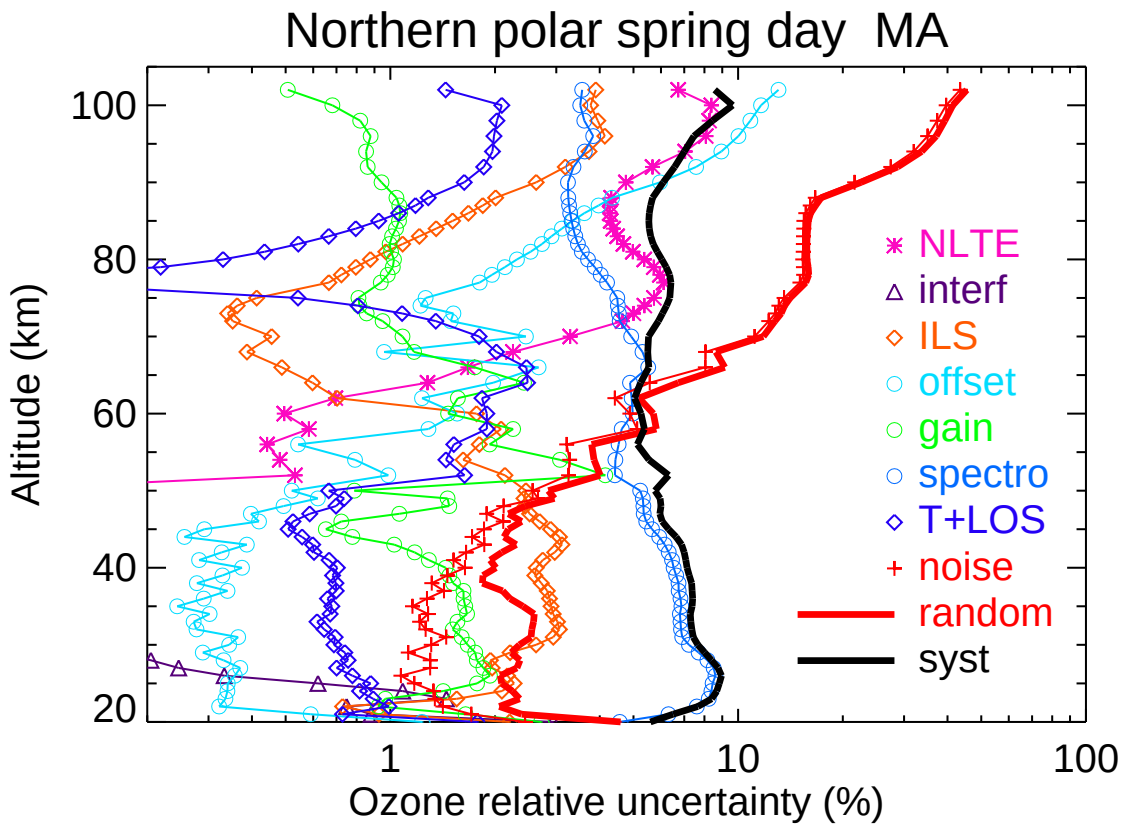

Figure S3. V8R_O3_561 Northern polar spring day.

Table S5. Ozone error budget for Northern polar spring night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	4.0	<0.1	2.8	1.9	1.2	2.5	4.7	1.7	2.3	4.5	5.4
30	6.0	<0.1	0.2	2.5	0.3	1.6	7.1	0.7	1.2	1.8	7.6
40	6.4	<0.1	<0.1	2.6	0.3	1.5	7.2	0.8	1.6	2.1	7.8
50	2.4	<0.1	0.2	2.4	0.6	1.2	5.0	0.7	2.7	2.9	5.6
60	1.4	0.6	<0.1	1.7	1.5	1.6	3.8	2.1	4.1	5.0	4.3
70	1.1	2.5	<0.1	1.4	2.9	1.3	4.7	4.0	8.0	10	5.2
80	0.2	4.0	<0.1	0.6	1.2	0.8	3.1	<0.1	14	14	4.9
90	6.5	3.6	<0.1	1.4	1.9	1.5	2.8	2.8	11	11	4.8
96	8.7	5.4	<0.1	2.3	3.0	1.3	2.7	3.4	13	14	5.8
100	5.1	5.0	<0.1	4.0	5.7	1.4	2.8	2.8	23	24	6.5

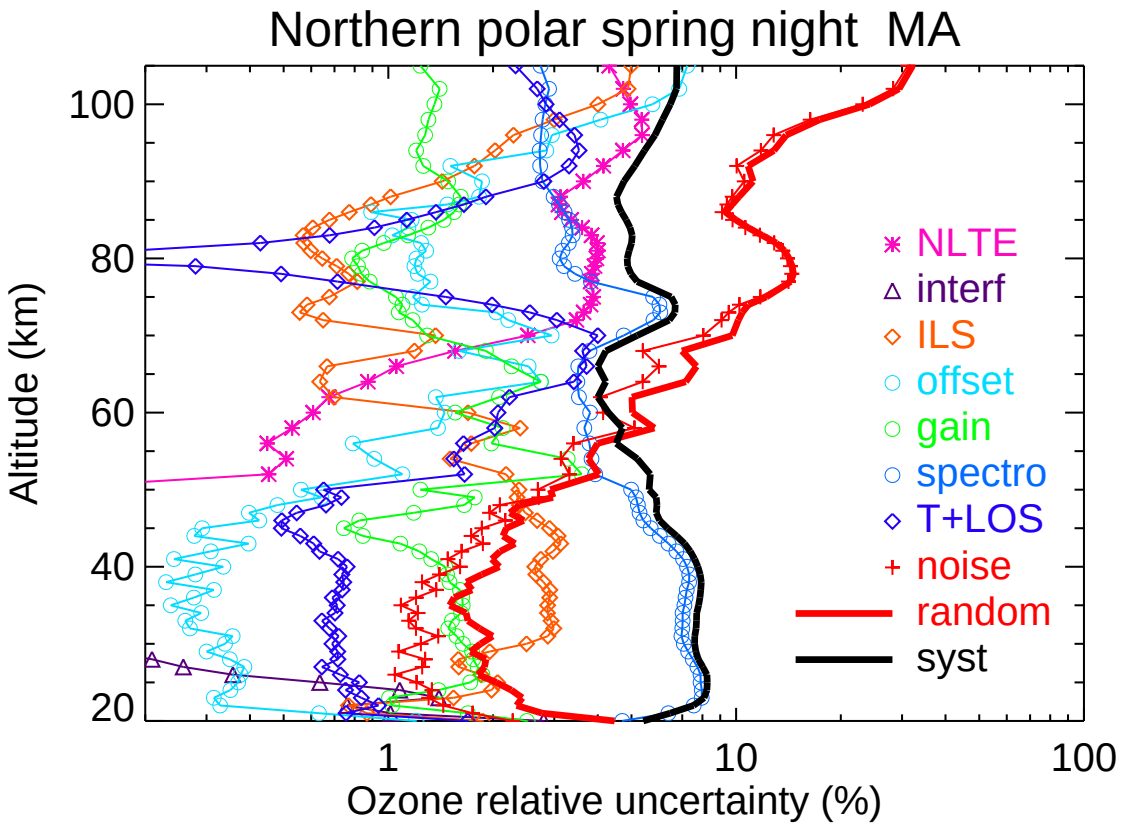

Figure S4. V8R_O3_561 Northern polar spring night.

Table S6. Ozone error budget for Northern polar summer day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.3	<0.1	3.9	1.5	1.0	2.4	4.0	1.4	2.2	5.0	4.8
30	4.6	<0.1	0.2	2.4	0.3	1.8	5.9	0.4	1.0	1.5	6.5
40	5.9	<0.1	<0.1	1.7	0.3	1.7	5.8	0.6	1.4	1.6	6.3
50	2.4	<0.1	0.2	2.5	0.5	1.6	4.5	0.6	2.3	2.5	5.4
60	1.1	0.2	<0.1	1.3	1.2	1.5	4.6	1.7	3.3	4.1	4.9
70	0.4	4.1	<0.1	1.6	2.3	0.9	6.0	2.1	8.6	9.3	7.3
80	0.1	7.5	<0.1	0.8	2.4	0.7	4.0	1.4	15	16	7.9
90	1.0	8.1	<0.1	1.2	4.9	1.2	3.3	4.7	17	19	6.6
96	0.6	12	<0.1	2.6	8.4	1.8	4.4	5.1	31	33	10

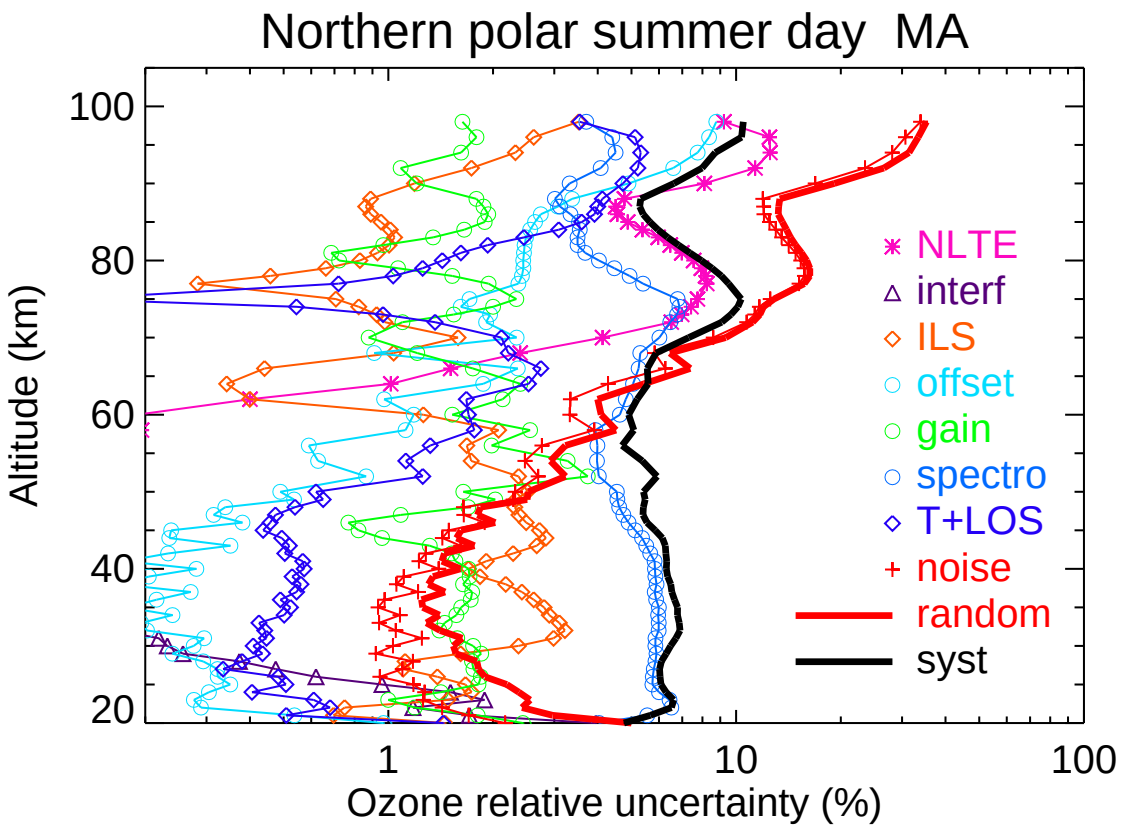

Figure S5. V8R_O3_561 Northern polar summer day.

Table S7. Ozone error budget for Northern polar summer night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.4	<0.1	3.3	1.3	1.0	2.1	3.9	1.4	2.0	4.5	4.4
30	5.2	<0.1	0.2	2.4	0.3	1.7	6.6	0.5	1.0	2.2	7.0
40	6.4	<0.1	<0.1	1.9	0.3	1.6	6.7	0.7	1.5	1.7	7.1
50	2.7	<0.1	0.1	2.4	0.5	1.5	4.9	0.6	2.6	2.8	5.6
60	1.4	0.3	<0.1	1.3	1.5	1.5	4.2	2.1	4.0	4.8	4.5
70	1.1	3.8	<0.1	1.9	3.1	0.9	4.4	3.4	8.8	10	6.0
80	0.1	5.1	<0.1	1.1	1.8	0.7	3.4	1.2	15	15	6.0
90	3.7	4.4	<0.1	1.7	2.0	1.2	2.8	3.1	12	13	5.3
96	4.0	5.2	<0.1	2.9	5.3	1.1	3.0	2.6	22	23	6.3
100	2.0	5.4	<0.1	4.2	8.2	1.3	3.4	2.0	32	33	7.0

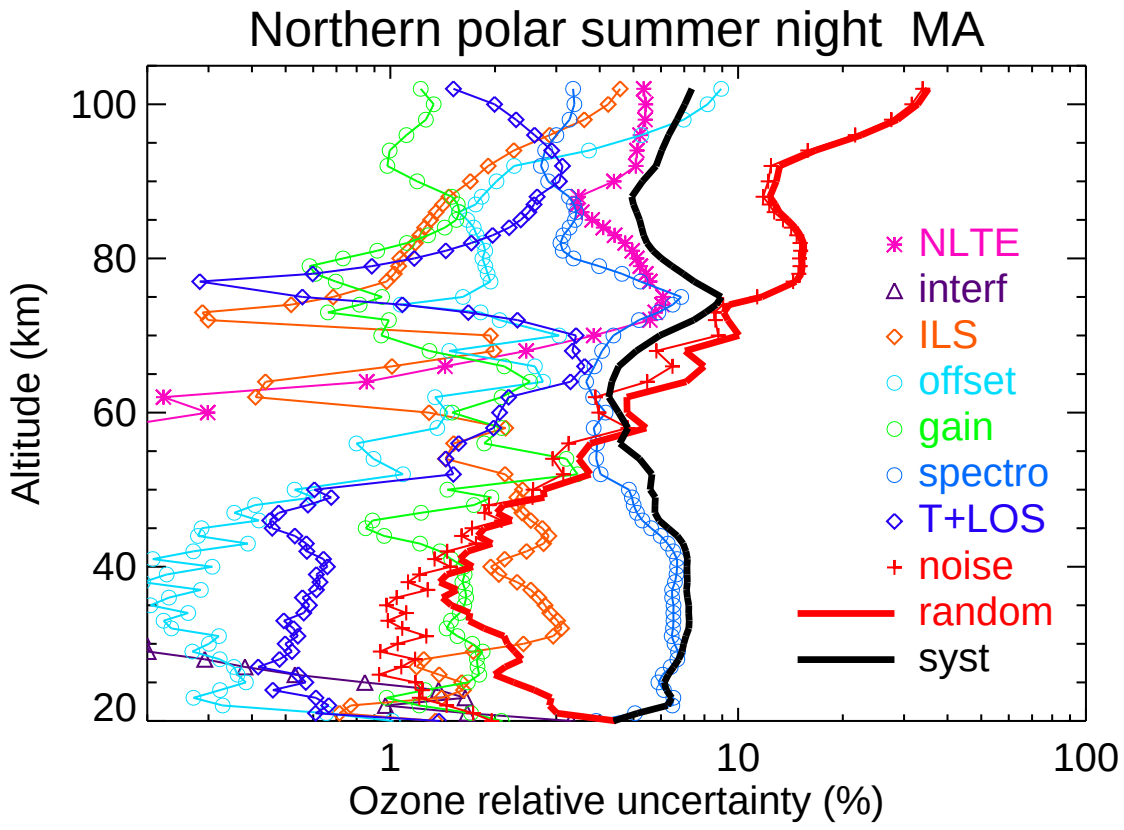

Figure S6. V8R_O3_561 Northern polar summer night.

Table S8. Ozone error budget for Northern polar autumn day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.6	<0.1	4.7	2.3	1.1	2.2	4.1	1.5	2.0	5.8	4.8
30	4.7	<0.1	0.2	2.5	0.3	1.6	7.7	0.7	1.3	2.7	7.9
40	5.9	<0.1	<0.1	2.7	0.4	1.4	7.2	0.8	1.8	2.6	7.6
50	2.4	<0.1	0.1	2.5	0.6	0.7	6.6	0.8	2.9	3.2	7.0
60	0.7	0.6	<0.1	1.5	1.9	1.6	5.5	2.2	5.9	6.7	5.9
70	0.2	2.3	<0.1	0.5	2.4	1.3	5.5	2.0	12	13	5.7
80	0.1	4.1	<0.1	1.1	3.4	1.0	3.7	0.1	17	17	5.5
90	0.8	6.1	<0.1	2.2	7.2	0.9	3.6	1.0	24	25	6.7
96	0.5	8.5	<0.1	3.4	11	0.8	3.8	1.3	36	38	7.9

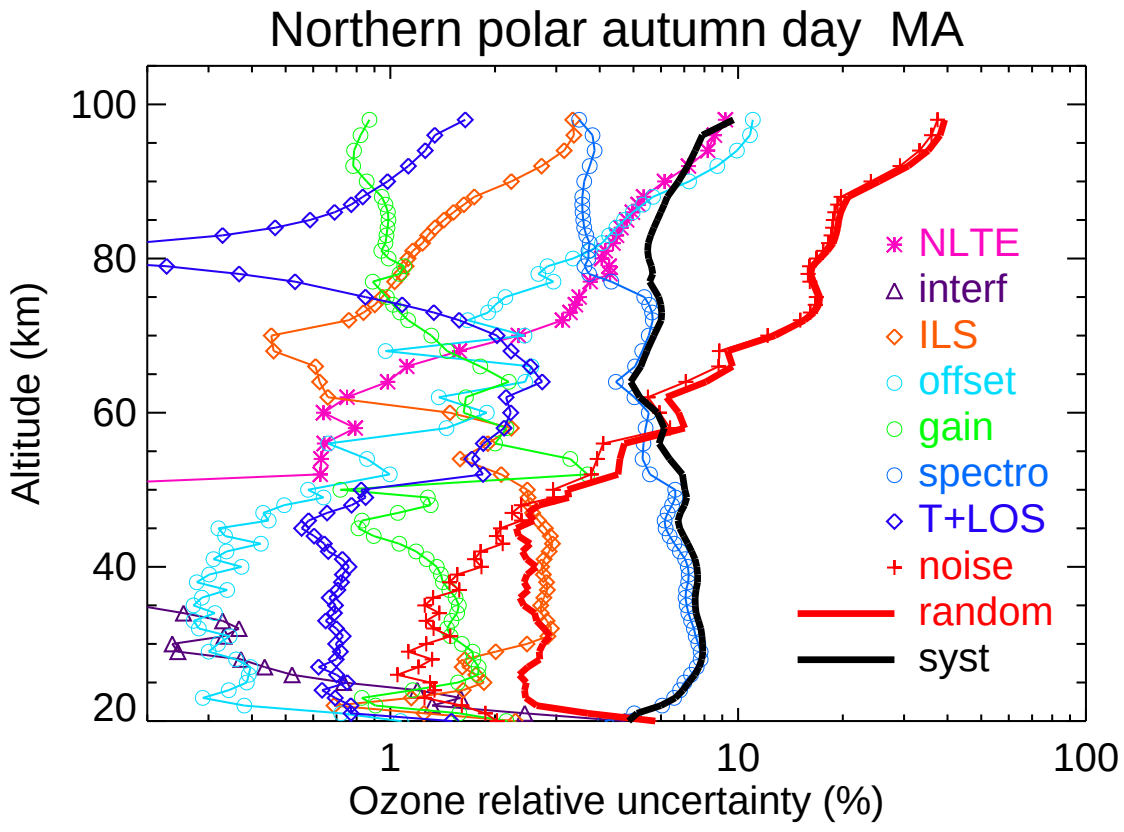

Figure S7. V8R_O3_561 Northern polar autumn day.

Table S9. Ozone error budget for Northern polar autumn night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.6	<0.1	4.5	2.7	1.0	2.0	5.1	1.5	2.0	5.5	5.9
30	3.6	<0.1	0.3	2.7	0.3	1.6	8.3	0.7	1.4	2.3	8.8
40	4.7	<0.1	<0.1	2.9	0.4	1.3	7.1	0.7	2.0	3.3	7.3
50	2.4	0.2	0.2	2.4	0.7	1.1	6.3	0.8	3.2	3.4	6.8
60	1.3	1.1	<0.1	1.6	1.7	1.9	3.6	2.2	4.8	5.6	4.4
70	1.5	2.7	<0.1	1.1	4.0	2.3	3.8	4.9	9.0	12	3.8
80	0.7	3.8	<0.1	1.1	1.3	1.2	4.1	1.2	13	13	4.7
90	12	7.0	<0.1	1.2	1.6	1.5	3.0	1.3	11	11	7.2
96	12	7.1	<0.1	3.0	2.8	1.2	2.8	2.4	14	14	7.6
100	8.7	6.5	<0.1	4.4	5.6	1.3	2.9	2.3	23	24	7.6

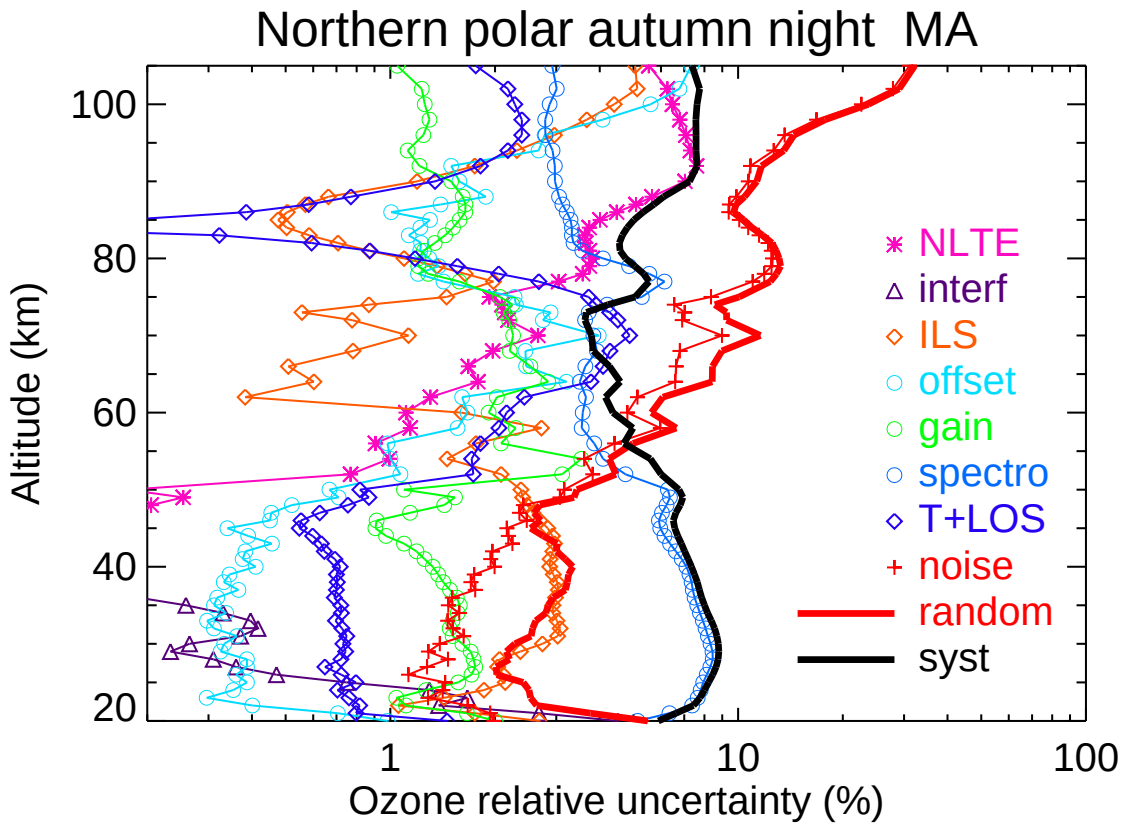

Figure S8. V8R_O3_561 Northern polar autumn night.

Table S10. Ozone error budget for Northern midlatitude winter day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	3.1	<0.1	1.9	0.6	0.7	0.6	5.3	1.2	1.7	4.2	4.4
30	6.7	<0.1	0.2	2.7	0.3	1.5	7.6	0.7	0.9	1.6	8.1
40	7.4	<0.1	<0.1	2.5	0.4	1.4	7.0	0.7	1.6	1.9	7.5
50	2.6	0.3	<0.1	2.2	0.7	3.2	5.9	1.3	2.4	3.2	6.9
60	0.8	0.6	<0.1	1.4	1.7	1.8	5.4	2.4	5.2	6.1	5.7
70	0.3	3.0	<0.1	0.5	2.4	1.1	5.5	2.9	11	12	6.0
80	0.1	3.6	<0.1	1.3	3.2	1.1	3.8	<0.1	17	18	5.1
90	0.9	5.0	<0.1	2.2	6.7	0.9	3.9	0.7	23	24	5.7
96	0.6	6.2	<0.1	3.2	11	1.0	4.3	1.0	36	37	6.7
100	0.8	4.8	<0.1	2.2	10	0.9	3.6	0.9	36	37	6.5

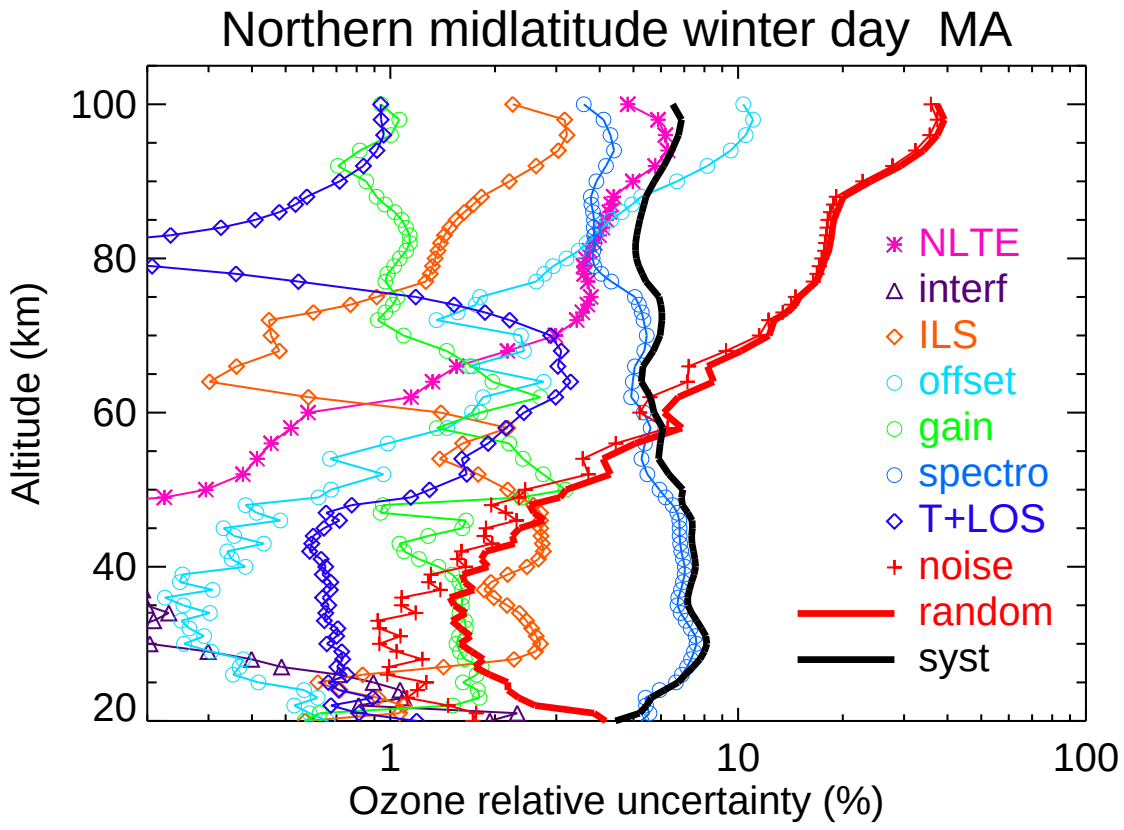

Figure S9. V8R_O3_561 Northern midlatitude winter day.

Table S11. Ozone error budget for Northern midlatitude winter night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	3.6	<0.1	1.8	0.8	0.7	1.2	5.3	1.1	1.8	4.0	4.7
30	6.7	<0.1	0.3	3.0	0.3	1.6	8.2	0.7	1.1	1.7	8.8
40	7.3	<0.1	0.1	2.4	0.3	1.4	7.6	0.7	1.5	1.9	8.1
50	2.7	0.3	<0.1	2.3	0.7	2.2	5.8	1.1	2.7	3.6	6.3
60	1.4	0.5	<0.1	1.7	1.6	1.4	4.2	2.3	6.3	7.2	4.5
70	1.1	1.6	<0.1	1.1	2.5	2.0	4.9	4.3	8.2	10	4.8
80	0.4	3.5	<0.1	1.3	2.2	2.5	3.8	0.3	13	14	3.6
90	5.4	4.1	<0.1	1.0	2.1	1.4	3.0	1.4	12	13	4.7
96	8.7	5.3	<0.1	1.5	3.0	1.1	2.8	1.5	14	15	5.1
100	7.1	4.8	<0.1	2.8	5.7	0.8	2.8	0.9	23	24	5.3

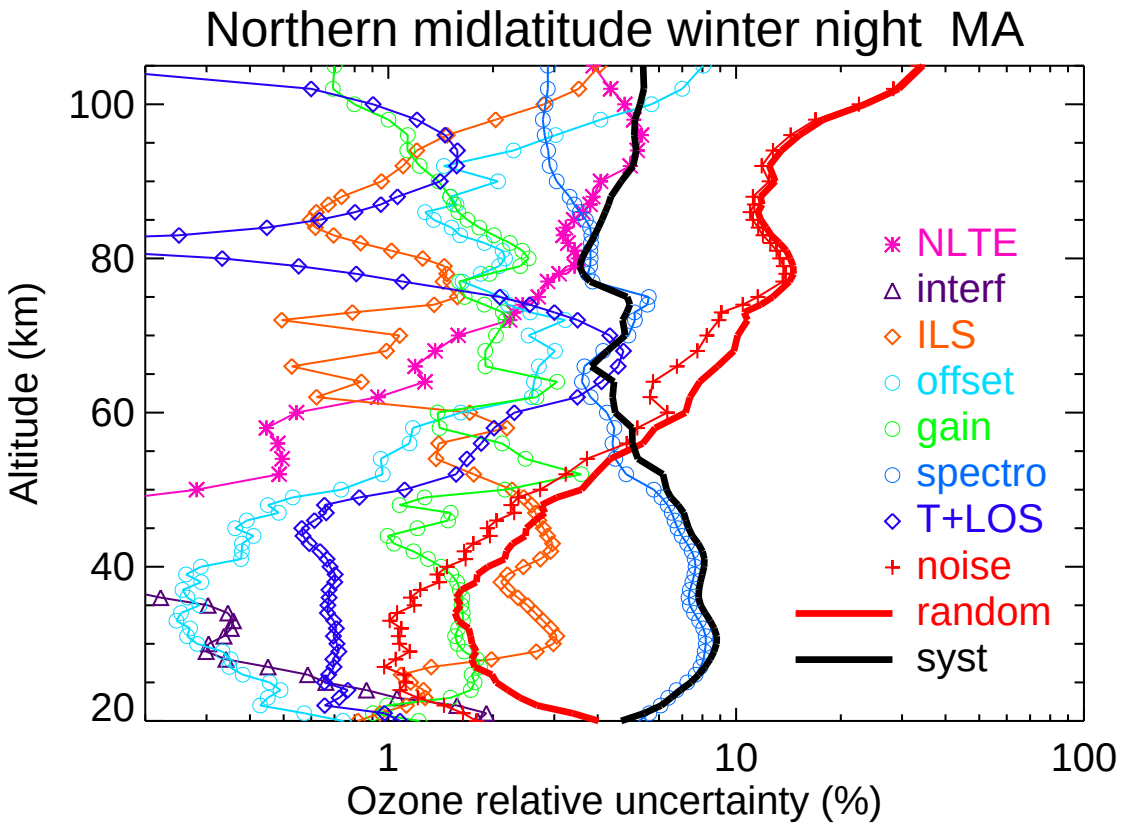

Figure S10. V8R_O3_561 Northern midlatitude winter night.

Table S12. Ozone error budget for Northern midlatitude spring day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.9	<0.1	2.7	0.8	1.0	1.9	4.0	1.4	1.9	4.1	4.1
30	8.1	<0.1	0.2	2.4	0.3	1.7	6.7	0.6	1.1	1.7	7.3
40	6.8	<0.1	0.2	2.1	0.3	1.6	7.1	0.7	1.4	1.8	7.6
50	2.5	<0.1	0.1	2.4	0.4	0.5	5.4	0.6	2.3	2.6	5.9
60	1.0	0.2	<0.1	2.0	1.7	1.1	5.4	2.2	6.1	6.8	5.7
70	0.2	4.1	<0.1	0.5	1.6	1.1	5.3	2.3	11	11	6.6
80	0.2	5.9	<0.1	0.7	2.2	0.9	3.6	0.2	15	15	6.8
90	0.7	5.6	<0.1	2.7	6.4	1.0	3.3	1.5	23	24	6.3
96	0.3	6.1	<0.1	3.9	10	0.7	3.2	1.9	36	37	7.3

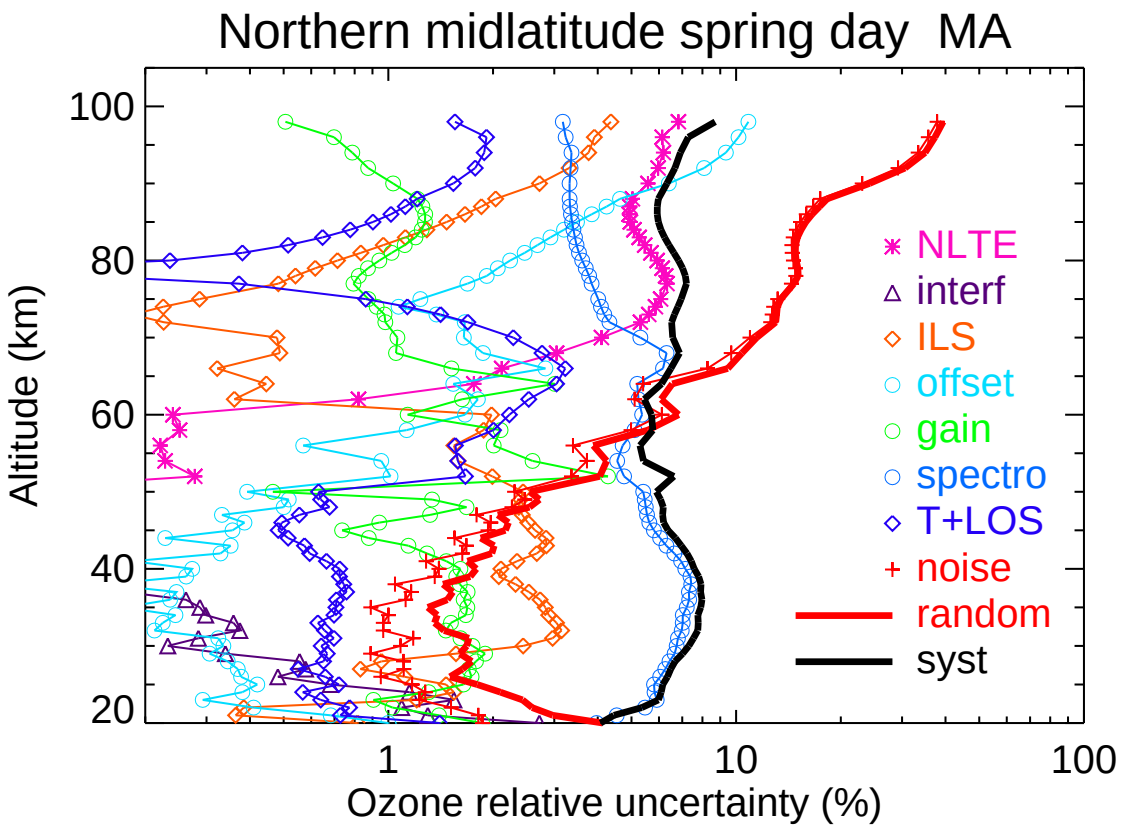

Figure S11. V8R_O3_561 Northern midlatitude spring day.

Table S13. Ozone error budget for Northern midlatitude spring night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.9	<0.1	2.7	0.8	1.0	1.9	4.1	1.4	1.9	4.2	4.2
30	7.7	<0.1	0.2	2.4	0.3	1.7	6.9	0.7	1.1	1.6	7.5
40	7.0	<0.1	0.2	2.3	0.3	1.5	7.4	0.8	1.5	1.9	7.8
50	2.7	<0.1	0.1	2.4	0.5	1.0	5.1	0.6	2.5	2.7	5.7
60	1.4	0.4	<0.1	1.7	1.6	1.4	3.9	2.2	4.8	5.6	4.4
70	1.1	2.3	<0.1	1.6	2.8	1.6	4.2	4.1	7.8	10	4.9
80	0.2	4.6	<0.1	0.8	1.3	0.9	3.2	<0.1	14	15	5.3
90	7.2	4.4	<0.1	1.0	2.2	1.6	2.9	3.4	11	12	5.1
96	12	6.9	<0.1	1.4	3.0	1.2	2.7	3.8	12	14	6.9
100	7.3	6.7	<0.1	3.1	5.4	1.2	2.8	2.7	21	22	7.1

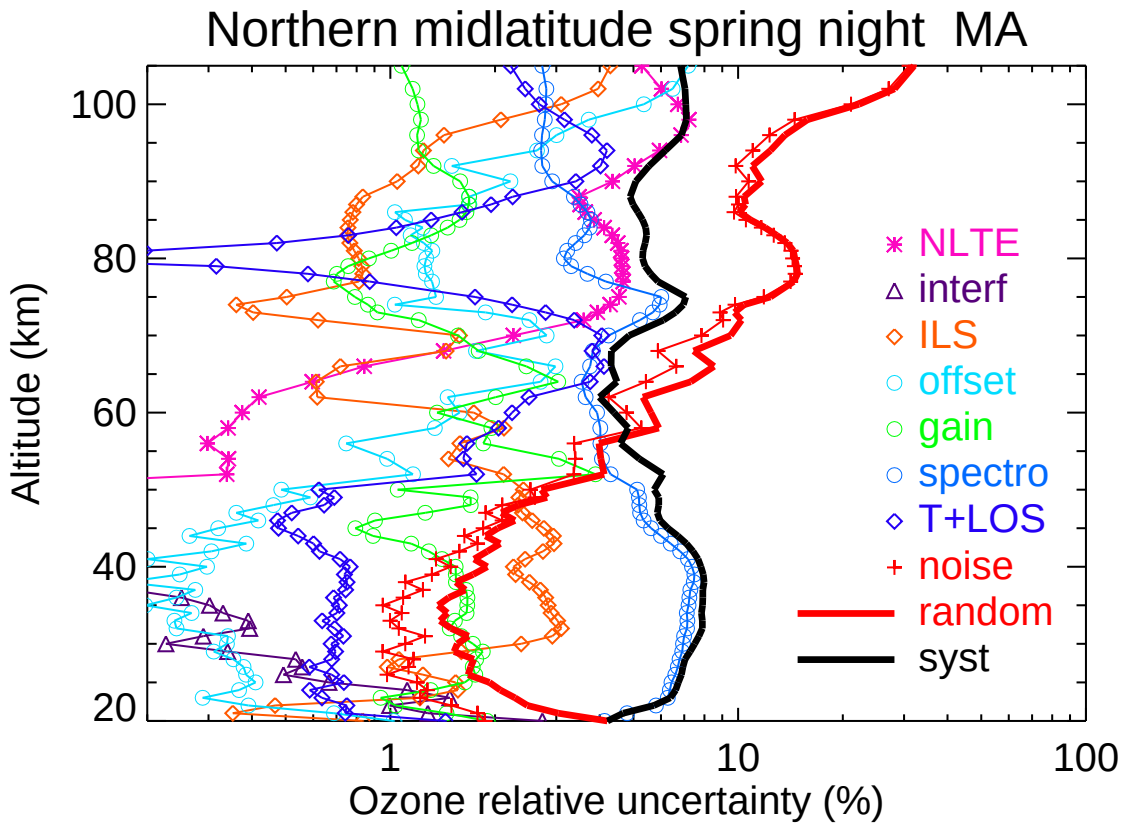

Figure S12. V8R_O3_561 Northern midlatitude spring night.

Table S14. Ozone error budget for Northern midlatitude summer day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.2	<0.1	2.5	0.5	0.9	1.5	4.0	1.3	1.8	3.7	4.1
30	7.1	<0.1	0.3	2.4	0.3	1.8	6.6	0.5	1.0	1.5	7.3
40	6.6	<0.1	0.2	1.8	0.3	1.7	6.8	0.7	1.4	1.7	7.3
50	2.6	<0.1	0.1	2.5	0.4	0.9	5.0	0.6	2.3	2.5	5.6
60	1.1	0.2	<0.1	1.6	1.5	1.0	5.2	2.1	5.0	5.8	5.4
70	0.3	5.9	<0.1	1.0	1.7	0.6	6.9	2.1	11	11	8.9
80	0.1	7.5	<0.1	0.6	2.2	1.2	3.9	1.8	15	16	7.5
90	1.2	11	<0.1	2.5	5.3	0.9	3.5	3.3	20	22	8.9
96	0.7	14	0.1	4.3	9.1	1.7	4.0	2.7	34	36	12

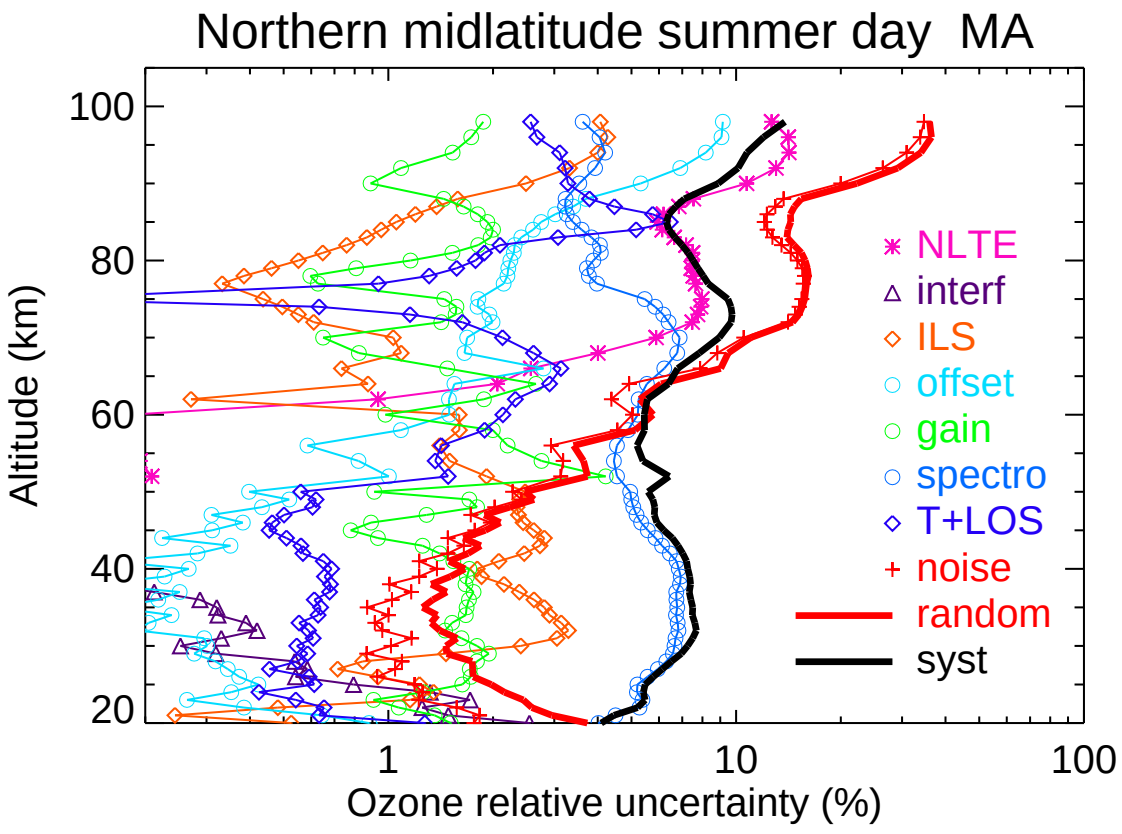

Figure S13. V8R_O3_561 Northern midlatitude summer day.

Table S15. Ozone error budget for Northern midlatitude summer night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.2	<0.1	2.8	0.5	0.9	1.8	3.9	1.3	1.8	3.9	4.2
30	7.0	<0.1	0.2	2.2	0.3	1.8	6.3	0.5	1.0	1.5	6.9
40	6.5	<0.1	0.2	1.7	0.3	1.7	6.6	0.7	1.4	1.7	7.0
50	2.8	<0.1	0.1	2.4	0.5	1.4	4.5	0.5	2.4	2.6	5.3
60	1.5	0.3	<0.1	1.2	1.4	1.0	4.5	2.0	4.1	4.9	4.6
70	1.1	5.1	<0.1	2.2	2.8	1.2	4.9	3.6	8.9	10	7.1
80	0.2	10	<0.1	0.9	1.3	2.4	4.6	2.0	13	15	7.9
90	6.8	11	<0.1	1.4	2.8	1.2	2.9	4.4	11	14	10
96	5.8	11	<0.1	2.6	4.9	1.4	3.5	2.7	20	22	10
100	2.1	11	<0.1	4.2	7.4	1.3	3.7	2.0	29	31	10

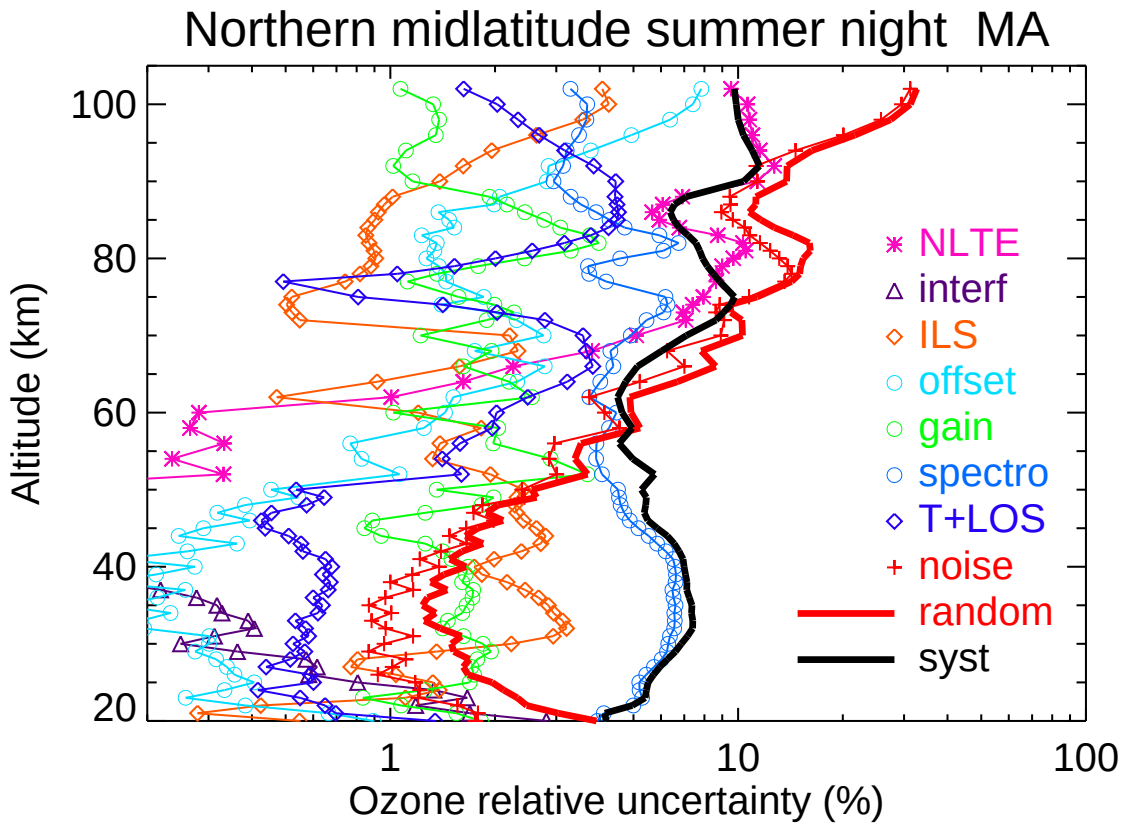

Figure S14. V8R_O3_561 Northern midlatitude summer night.

Table S16. Ozone error budget for Northern midlatitude autumn day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.2	<0.1	2.9	1.3	1.0	1.6	3.9	1.3	1.7	4.0	4.1
30	6.7	<0.1	0.2	2.4	0.3	1.7	7.1	0.7	1.1	1.9	7.5
40	7.3	<0.1	0.1	2.2	0.3	1.5	7.3	0.8	1.6	1.9	7.7
50	2.6	<0.1	0.1	2.4	0.5	0.6	6.0	0.7	2.6	2.8	6.5
60	0.8	0.4	<0.1	1.6	1.8	1.4	5.8	2.3	6.3	7.1	6.0
70	0.3	3.4	<0.1	0.3	2.0	1.3	4.8	2.2	11	12	5.6
80	0.1	5.2	<0.1	0.8	2.8	1.1	3.7	0.1	16	17	6.1
90	0.9	6.7	<0.1	2.2	6.3	1.1	3.5	1.0	22	24	6.7
96	0.5	7.9	<0.1	3.1	10	0.7	3.4	1.5	35	37	8.0

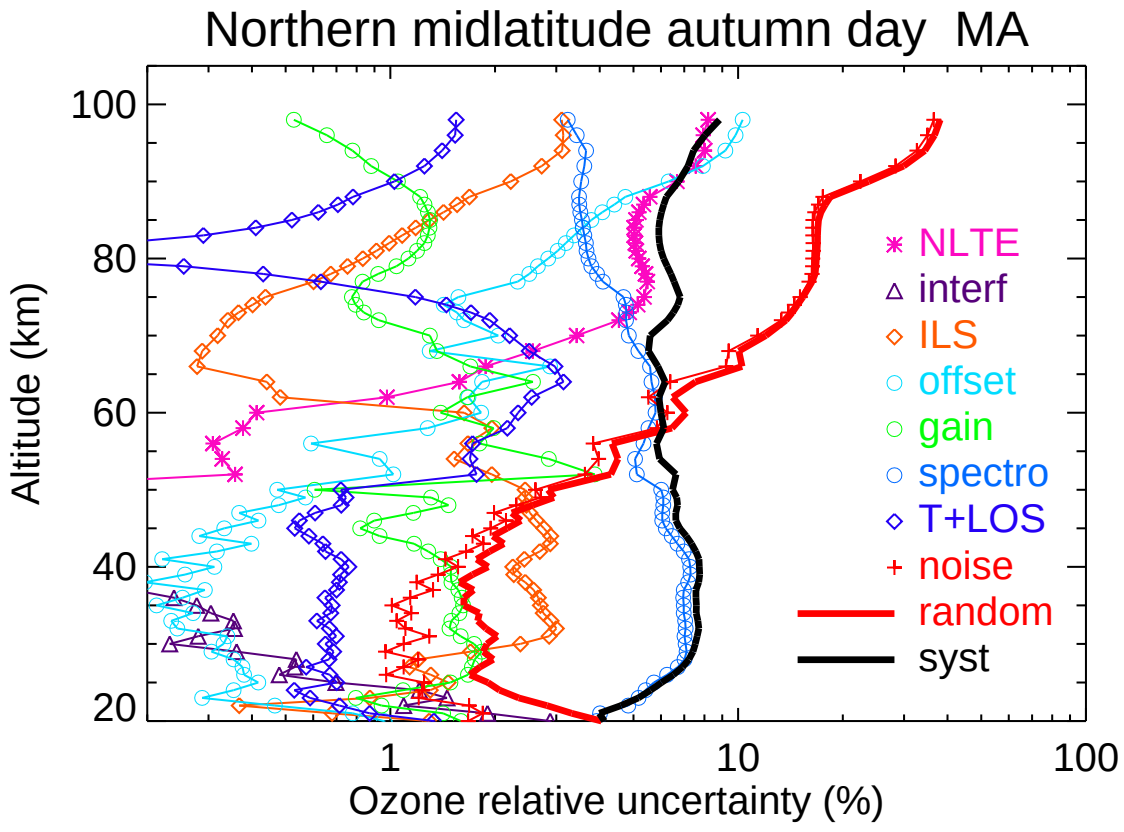

Figure S15. V8R_O3_561 Northern midlatitude autumn day.

Table S17. Ozone error budget for Northern midlatitude autumn night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.3	<0.1	2.8	1.1	1.0	1.6	4.3	1.3	1.7	4.2	4.2
30	6.8	<0.1	0.2	2.4	0.3	1.7	7.4	0.7	1.1	1.8	7.9
40	7.2	<0.1	0.1	2.3	0.3	1.5	7.4	0.7	1.6	2.0	7.8
50	2.9	<0.1	0.1	2.4	0.5	0.9	6.0	0.7	2.8	3.1	6.5
60	1.4	0.4	<0.1	1.4	1.8	1.6	4.3	2.5	5.5	6.4	4.6
70	1.0	2.3	<0.1	1.0	3.0	1.8	4.6	4.5	9.4	11	4.8
80	0.4	4.1	<0.1	0.6	1.4	1.6	3.6	0.5	14	15	4.9
90	11	6.3	<0.1	0.9	2.2	1.6	2.9	1.6	11	12	6.6
96	12	7.3	<0.1	1.7	2.7	1.1	2.7	2.2	13	14	7.6
100	8.7	7.1	<0.1	2.9	5.1	0.9	2.7	2.1	21	22	7.3

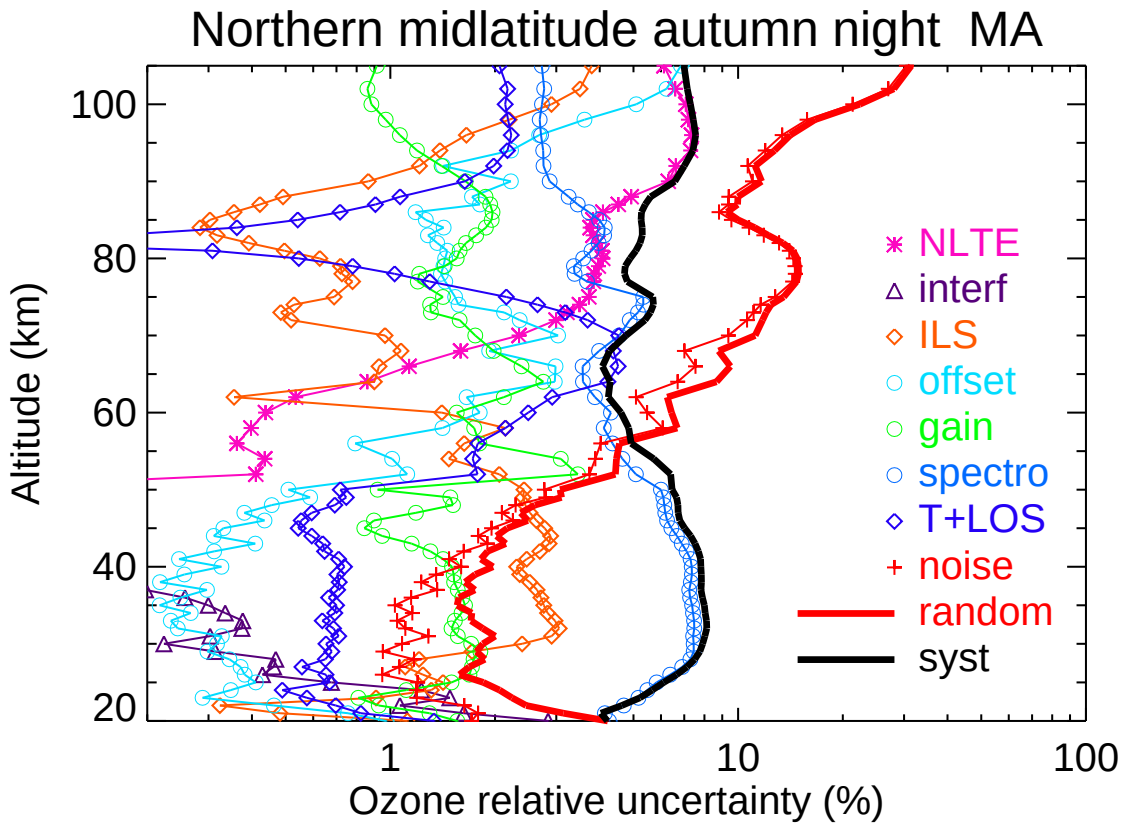

Figure S16. V8R_O3_561 Northern midlatitude autumn night.

Table S18. Ozone error budget for Tropics day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	1.0	<0.1	2.8	1.8	1.1	0.4	9.1	1.9	3.7	5.3	9.2
30	11	<0.1	0.2	2.3	0.3	1.8	6.8	0.7	1.0	1.4	7.4
40	6.7	<0.1	0.2	2.0	0.3	1.6	6.9	0.7	1.3	1.7	7.3
50	2.6	<0.1	0.1	2.4	0.4	0.5	5.3	0.6	2.2	2.4	5.8
60	1.1	0.2	<0.1	1.8	1.6	0.8	5.6	2.2	6.3	7.0	5.8
70	0.2	5.1	<0.1	0.4	1.3	0.9	6.4	2.5	12	12	8.1
80	0.2	6.1	<0.1	0.6	2.3	1.2	3.4	0.1	16	16	6.9
90	1.0	6.7	<0.1	2.2	4.8	1.0	3.3	1.3	19	20	7.0
96	0.7	11	<0.1	3.6	9.3	0.9	3.9	1.7	33	36	9.0
100	0.7	10	<0.1	3.5	10	0.7	3.4	1.6	37	38	10

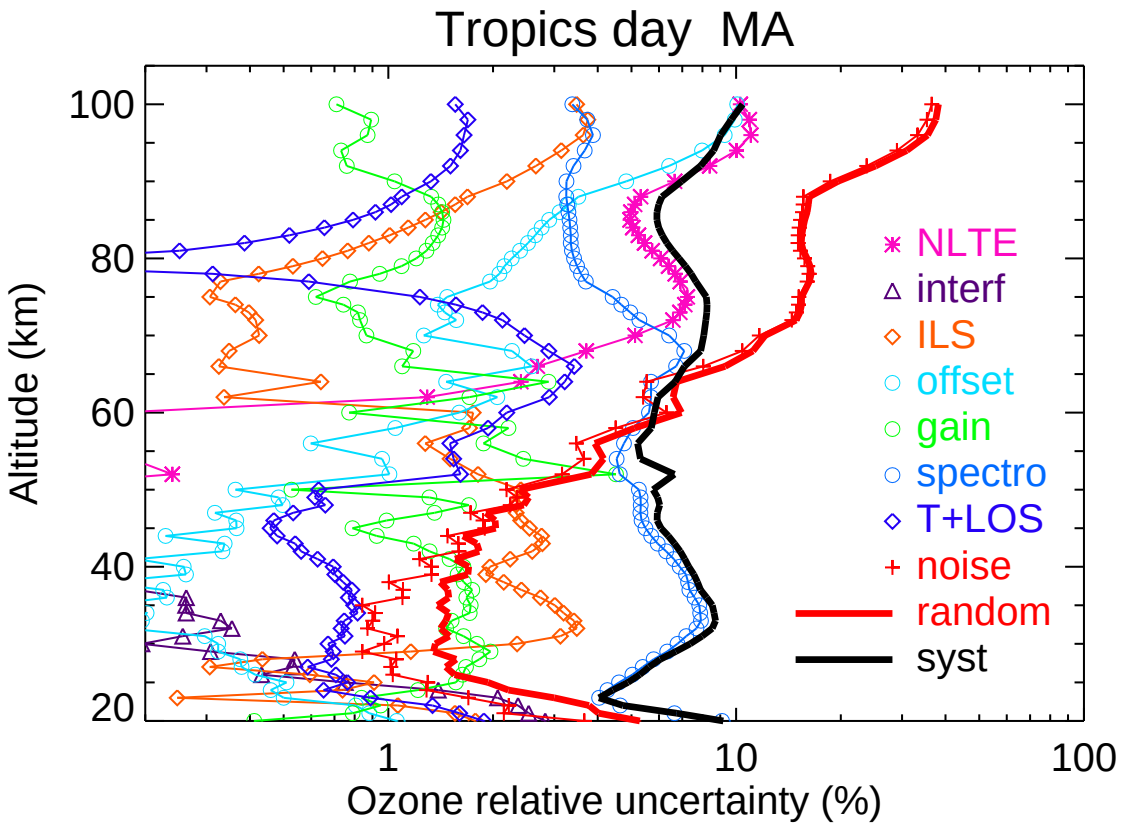

Figure S17. V8R_O3_561 Tropics day.

Table S19. Ozone error budget for Tropics night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	1.0	<0.1	2.5	1.7	1.0	0.4	8.7	1.8	3.6	5.0	8.8
30	11	<0.1	0.2	2.2	0.3	1.8	6.7	0.7	0.9	1.3	7.3
40	6.7	<0.1	0.2	2.0	0.3	1.6	7.0	0.7	1.4	1.8	7.4
50	2.8	<0.1	0.1	2.4	0.4	0.9	5.0	0.6	2.4	2.6	5.5
60	1.5	0.2	<0.1	1.6	1.6	1.0	4.3	2.2	5.3	6.0	4.6
70	1.1	5.2	<0.1	1.6	2.4	1.3	4.8	5.0	9.3	11	7.0
80	0.5	5.9	<0.1	0.6	1.3	2.1	3.6	<0.1	13	14	6.8
90	8.9	7.5	<0.1	0.9	2.6	1.6	2.8	2.1	11	12	7.9
96	14	11	<0.1	0.8	2.8	1.1	2.6	2.7	12	13	11
100	11	10	<0.1	1.9	4.3	0.7	2.8	2.2	17	18	9.3

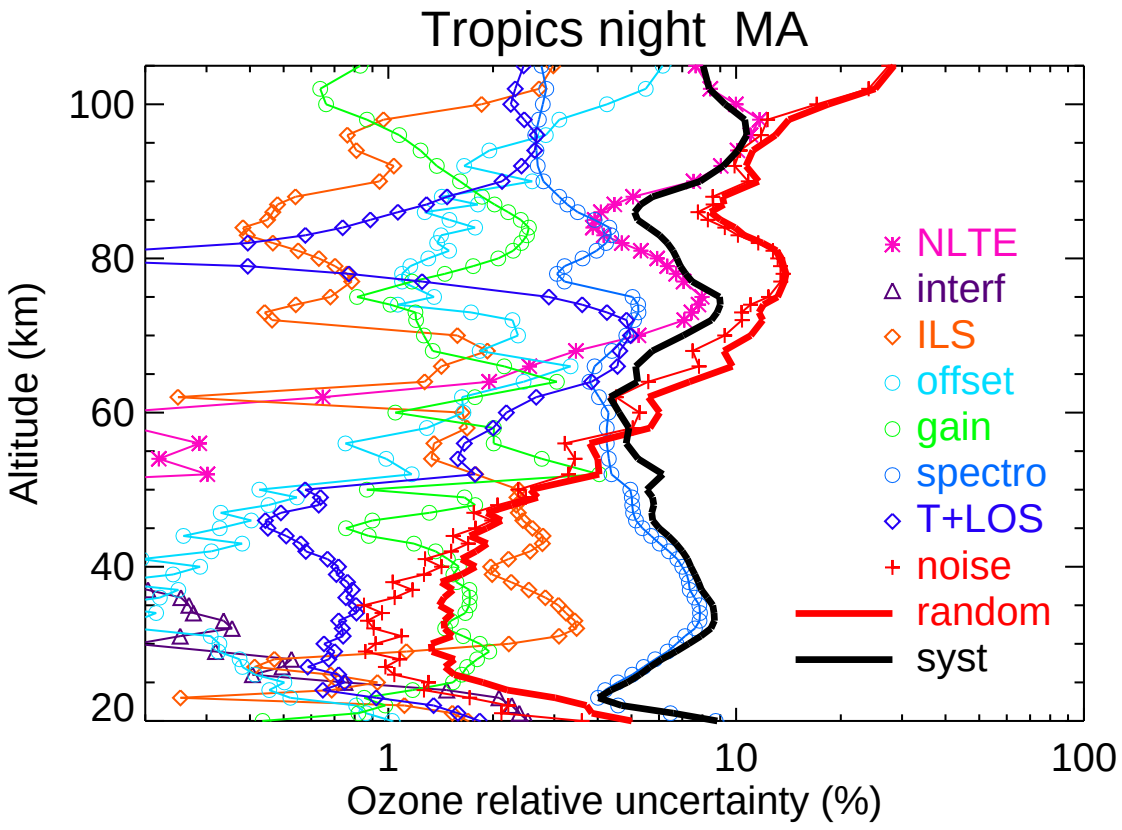

Figure S18. V8R_O3_561 Tropics night.

Table S20. Ozone error budget for Southern midlatitude winter day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	3.2	<0.1	3.0	1.7	0.9	1.5	4.5	1.4	1.5	4.5	4.5
30	7.3	<0.1	0.3	2.0	0.3	1.8	7.4	0.7	1.0	2.2	7.7
40	7.1	<0.1	0.1	2.6	0.3	1.3	7.6	0.8	1.6	2.3	8.0
50	2.6	<0.1	0.1	2.3	0.7	1.3	5.9	0.8	3.1	3.6	6.4
60	0.9	0.9	<0.1	1.1	1.6	2.0	5.4	2.3	5.4	6.3	5.6
70	0.3	5.5	<0.1	0.4	2.1	1.1	5.5	2.8	13	14	7.2
80	0.1	4.6	<0.1	1.1	3.7	1.2	3.6	0.2	18	18	5.9
90	0.7	6.0	<0.1	2.3	7.6	1.1	3.4	1.2	26	27	6.4
96	0.5	8.4	<0.1	3.0	10	0.8	3.5	1.5	36	38	7.9

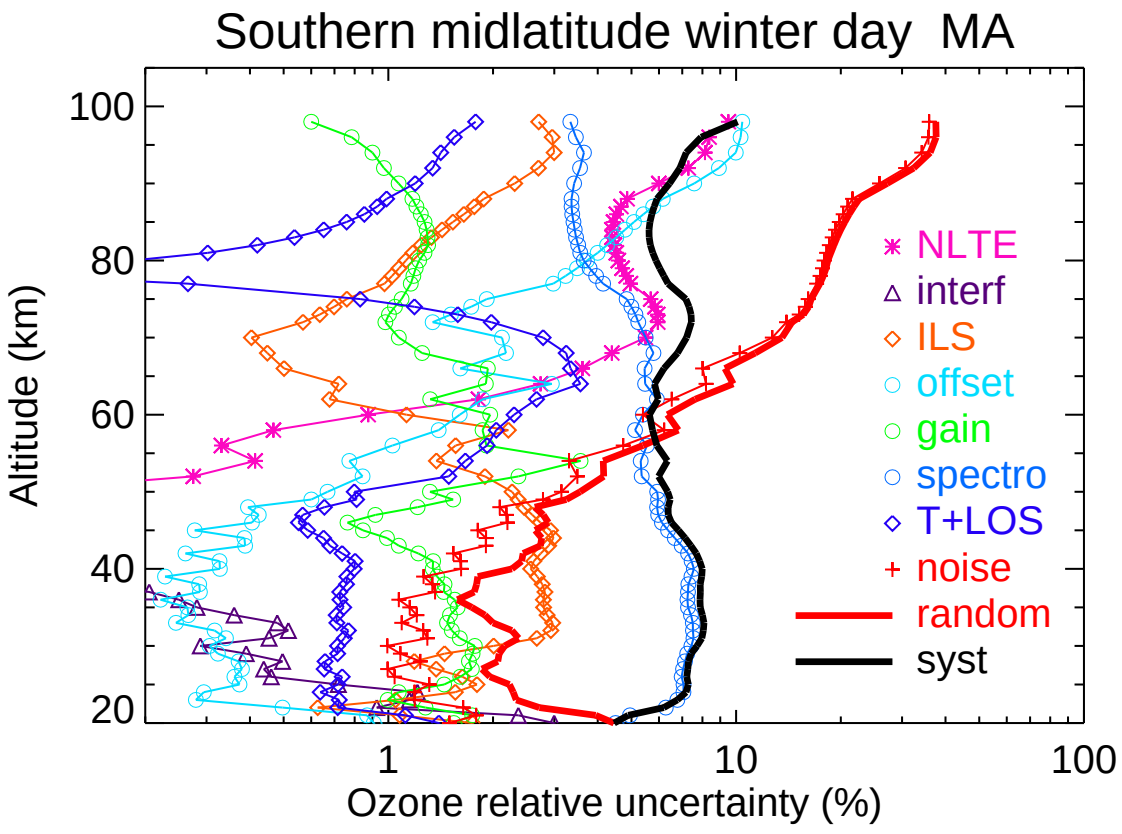

Figure S19. V8R_O3_561 Southern midlatitude winter day.

Table S21. Ozone error budget for Southern midlatitude winter night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	3.3	<0.1	2.8	1.6	1.0	1.8	3.9	1.6	1.6	4.1	4.2
30	6.3	<0.1	0.2	2.2	0.3	1.6	7.5	0.8	1.2	2.3	7.8
40	6.8	<0.1	0.1	2.9	0.4	1.2	7.9	0.9	1.8	2.7	8.4
50	2.3	0.1	0.2	2.5	0.7	1.5	5.8	0.8	3.2	3.9	6.1
60	1.3	0.8	<0.1	1.2	1.5	2.1	3.8	2.2	4.8	5.7	4.3
70	1.0	3.9	<0.1	0.7	3.1	1.7	4.8	4.3	10	12	5.4
80	0.4	3.5	<0.1	0.5	1.3	1.6	3.3	<0.1	14	14	4.3
90	5.5	4.4	<0.1	1.5	1.3	1.3	2.9	2.0	12	12	5.3
96	6.6	5.5	<0.1	2.8	3.7	1.2	2.7	2.0	16	17	5.9
100	4.1	5.3	<0.1	4.0	7.0	1.1	2.8	1.4	28	29	6.4

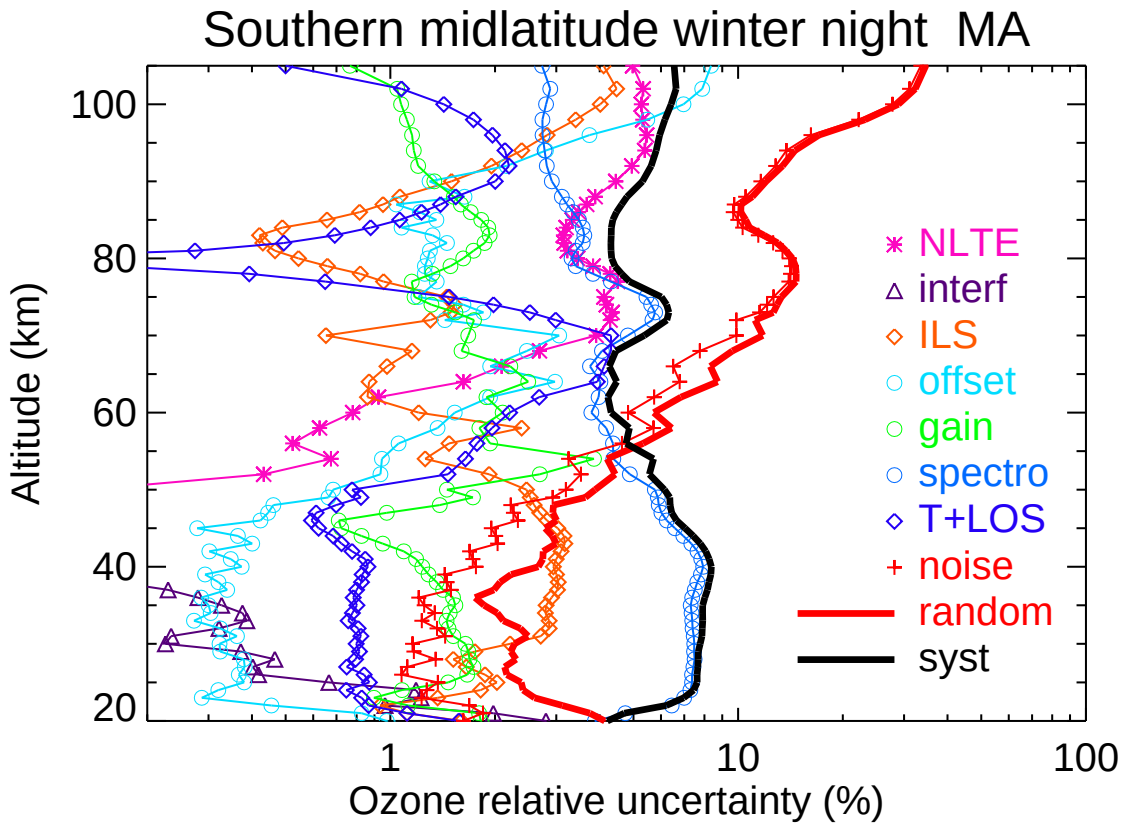

Figure S20. V8R_O3_561 Southern midlatitude winter night.

Table S22. Ozone error budget for Southern midlatitude spring day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	3.3	<0.1	3.9	2.3	1.0	2.2	4.0	1.4	1.6	5.0	4.6
30	7.9	<0.1	0.2	2.1	0.2	1.8	7.2	0.6	0.9	1.5	7.6
40	6.8	<0.1	0.1	2.3	0.3	1.5	7.1	0.7	1.5	2.3	7.4
50	2.6	<0.1	0.2	2.4	0.7	1.6	5.9	0.8	3.0	3.4	6.5
60	0.9	0.4	<0.1	1.3	1.4	2.1	5.2	2.1	4.7	5.4	5.6
70	0.3	4.2	<0.1	0.4	2.2	1.1	5.2	2.2	12	13	6.5
80	0.2	5.8	<0.1	0.8	2.3	1.1	3.7	0.2	15	15	6.8
90	0.7	6.1	<0.1	2.4	6.3	1.1	3.5	1.4	23	24	6.5
96	0.4	7.8	<0.1	3.5	10	0.8	3.6	1.8	36	38	7.5

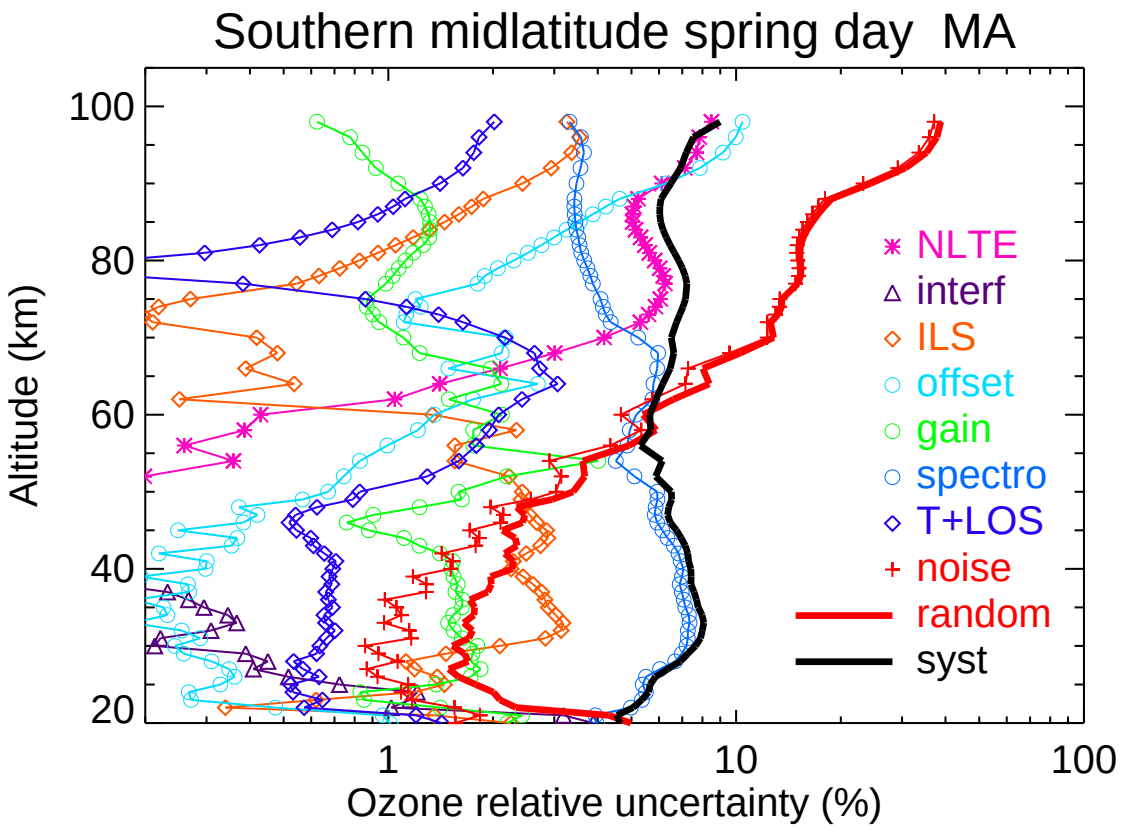

Figure S21. V8R_O3_561 Southern midlatitude spring day.

Table S23. Ozone error budget for Southern midlatitude spring night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	3.2	<0.1	3.8	1.5	1.2	1.9	4.3	1.6	1.8	4.9	4.6
30	8.2	<0.1	0.2	2.2	0.3	1.8	7.2	0.6	0.9	1.5	7.7
40	7.4	<0.1	0.1	2.1	0.3	1.6	7.4	0.7	1.5	2.2	7.7
50	2.8	<0.1	0.1	2.5	0.6	1.5	5.5	0.7	2.8	3.1	6.1
60	1.4	0.4	<0.1	1.2	1.6	1.7	4.1	2.2	4.5	5.4	4.5
70	1.2	2.8	<0.1	1.3	3.4	1.7	4.4	4.4	9.3	11	5.1
80	0.2	5.0	<0.1	0.8	1.4	1.5	3.6	0.2	14	15	5.4
90	8.3	5.6	<0.1	1.3	1.2	1.6	3.0	2.8	10	11	6.1
96	13	7.9	<0.1	1.8	2.2	1.2	2.7	3.4	11	13	7.7
100	9.3	6.5	<0.1	2.9	4.9	0.9	2.7	2.9	20	21	6.9

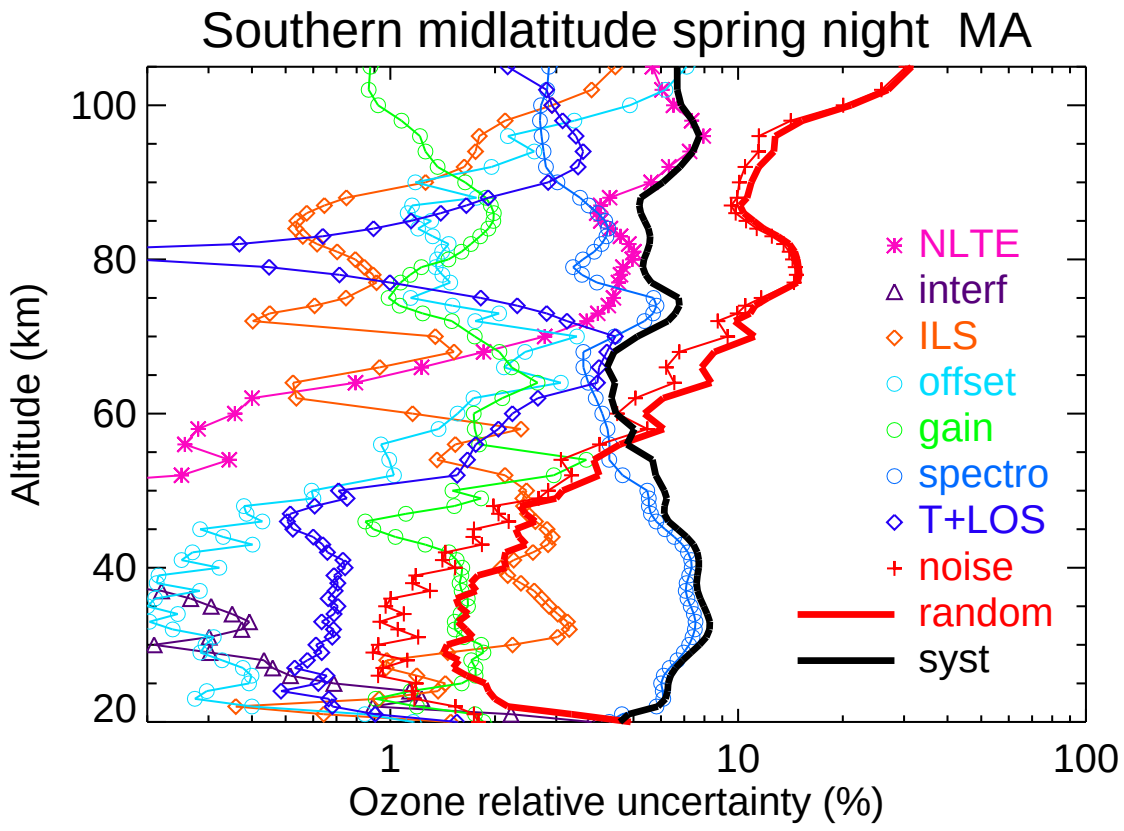

Figure S22. V8R_O3_561 Southern midlatitude spring night.

Table S24. Ozone error budget for Southern midlatitude summer day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.1	<0.1	2.3	0.6	1.0	1.6	4.5	1.2	1.9	3.7	4.5
30	7.1	<0.1	0.3	2.8	0.3	1.7	6.6	0.6	1.1	1.7	7.3
40	6.2	<0.1	0.2	1.8	0.2	1.6	6.5	0.6	1.3	1.5	6.9
50	2.6	<0.1	0.1	2.4	0.4	0.9	5.1	0.6	2.1	2.5	5.6
60	1.1	0.2	<0.1	1.6	1.5	1.2	5.5	2.1	5.1	6.0	5.6
70	0.3	5.2	<0.1	0.8	2.5	0.9	6.8	2.2	11	12	8.3
80	0.1	6.6	<0.1	0.6	2.3	0.8	3.6	0.9	16	16	7.3
90	1.1	7.9	<0.1	2.3	4.8	0.9	3.3	1.7	18	19	8.2
96	0.7	11	<0.1	3.6	9.4	0.9	3.7	1.9	34	36	10
100	0.5	12	<0.1	3.5	11	0.6	3.3	1.8	37	39	13

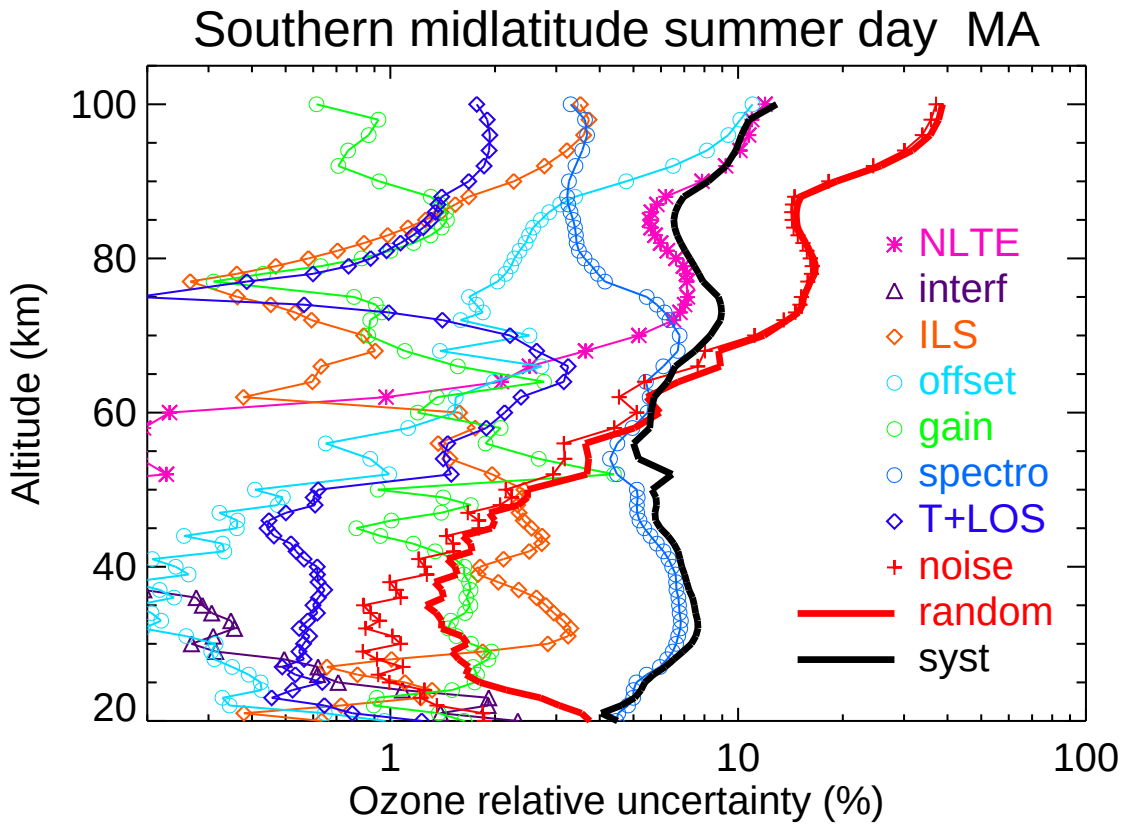

Figure S23. V8R_O3_561 Southern midlatitude summer day.

Table S25. Ozone error budget for Southern midlatitude summer night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.1	<0.1	2.5	0.6	0.9	1.3	4.4	1.2	1.7	3.6	4.4
30	7.1	<0.1	0.3	2.7	0.3	1.8	6.7	0.5	1.0	1.6	7.3
40	6.1	<0.1	0.2	1.7	0.3	1.7	6.5	0.6	1.3	1.6	6.9
50	2.7	<0.1	0.1	2.4	0.5	1.4	4.6	0.6	2.3	2.6	5.3
60	1.4	0.3	<0.1	1.4	1.5	1.9	4.5	2.0	4.0	5.0	4.8
70	1.2	4.2	<0.1	2.3	3.5	1.6	4.0	4.1	8.5	10	6.0
80	0.2	6.3	<0.1	0.9	1.5	1.3	3.3	1.1	14	15	6.8
90	4.0	8.4	<0.1	2.4	1.6	1.4	3.3	2.9	11	13	7.5
96	6.7	9.1	<0.1	1.7	3.1	0.9	3.0	2.0	14	15	8.9
100	4.5	8.5	<0.1	3.4	6.1	0.7	3.3	1.6	24	25	8.3

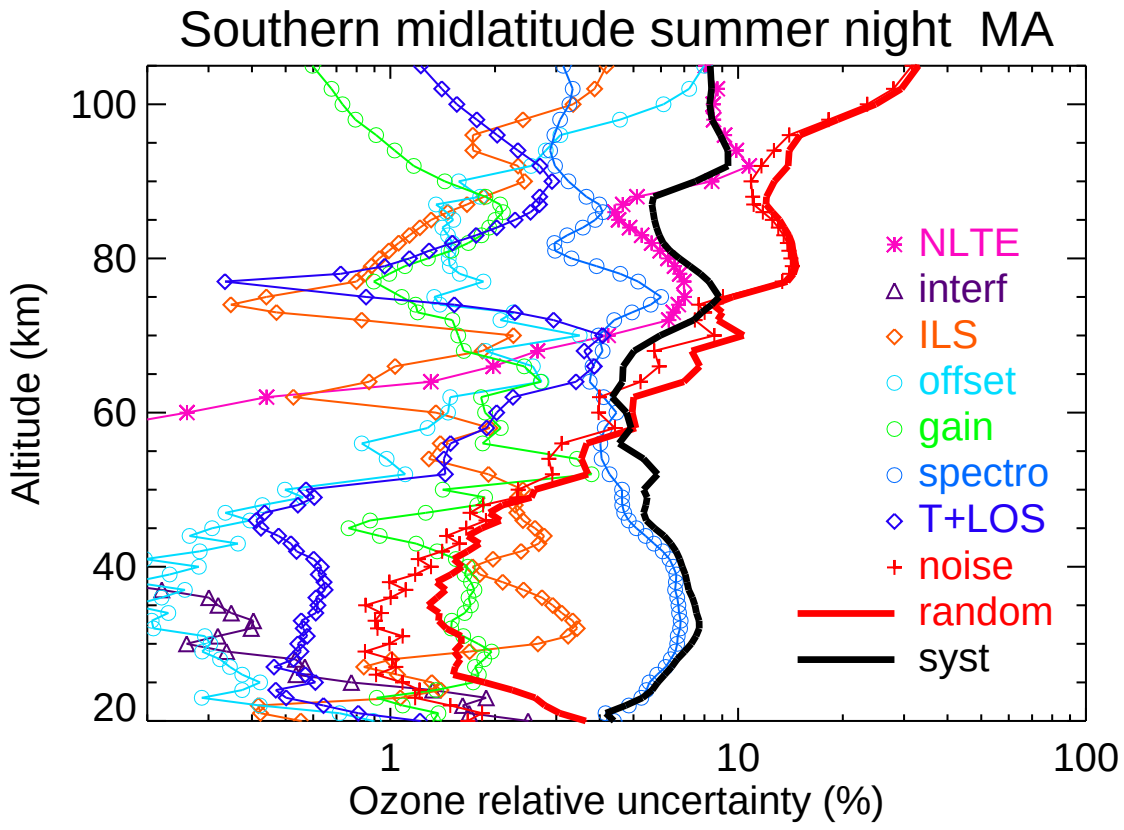

Figure S24. V8R_O3_561 Southern midlatitude summer night.

Table S26. Ozone error budget for Southern midlatitude autumn day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.1	<0.1	2.4	0.9	0.8	1.0	4.6	1.2	1.5	3.6	4.5
30	6.7	<0.1	0.2	2.2	0.3	1.8	7.5	0.7	1.0	1.7	7.9
40	7.0	<0.1	0.1	2.4	0.3	1.4	7.3	0.7	1.6	1.9	7.8
50	2.8	<0.1	0.1	2.4	0.6	1.3	6.3	0.8	3.1	3.3	6.8
60	0.9	0.7	<0.1	1.1	1.7	1.7	6.0	2.5	5.7	6.6	6.2
70	0.3	2.9	<0.1	0.3	2.4	1.4	5.1	2.3	12	13	5.8
80	0.1	4.8	<0.1	0.9	3.1	1.1	3.6	<0.1	17	17	6.0
90	0.9	6.9	<0.1	2.3	6.7	1.1	3.4	1.0	24	25	7.1
96	0.5	8.6	<0.1	3.3	10	0.9	3.3	1.5	35	37	8.4

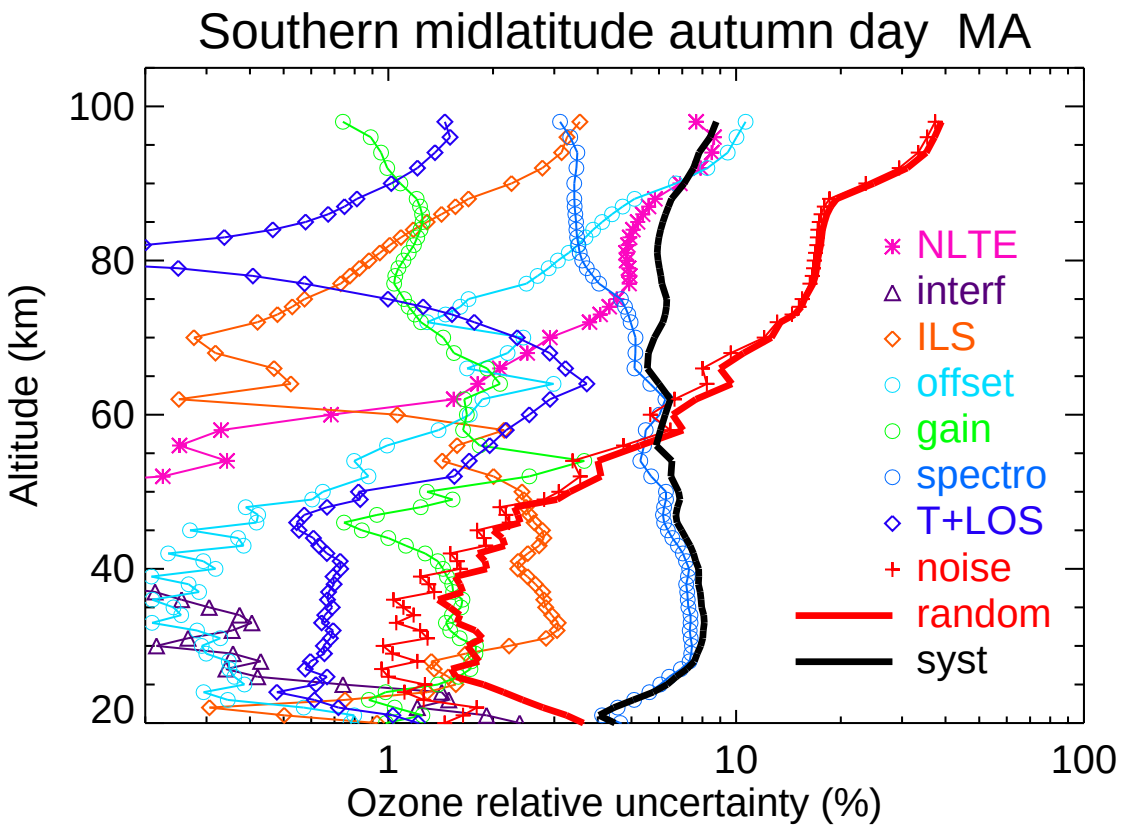

Figure S25. V8R_O3_561 Southern midlatitude autumn day.

Table S27. Ozone error budget for Southern midlatitude autumn night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.1	<0.1	2.5	1.0	0.8	1.1	4.5	1.3	1.5	3.7	4.4
30	6.5	<0.1	0.2	2.2	0.3	1.7	7.1	0.7	1.0	1.5	7.6
40	7.0	<0.1	0.1	2.3	0.3	1.4	7.0	0.7	1.6	1.9	7.5
50	2.9	<0.1	0.1	2.3	0.6	1.4	5.8	0.8	3.1	3.3	6.4
60	1.4	0.4	<0.1	1.1	1.6	1.7	4.3	2.6	5.3	6.3	4.6
70	0.9	1.8	<0.1	0.6	3.2	1.9	5.2	4.3	10	11	5.3
80	0.2	3.4	<0.1	0.6	1.4	0.9	3.1	0.6	15	16	4.5
90	10	6.8	<0.1	0.9	1.1	1.6	3.0	1.8	10	11	7.0
96	11	7.6	<0.1	2.1	2.6	1.1	2.7	2.0	14	14	7.6
100	7.5	6.5	<0.1	3.3	5.6	0.9	2.8	1.9	23	24	6.7

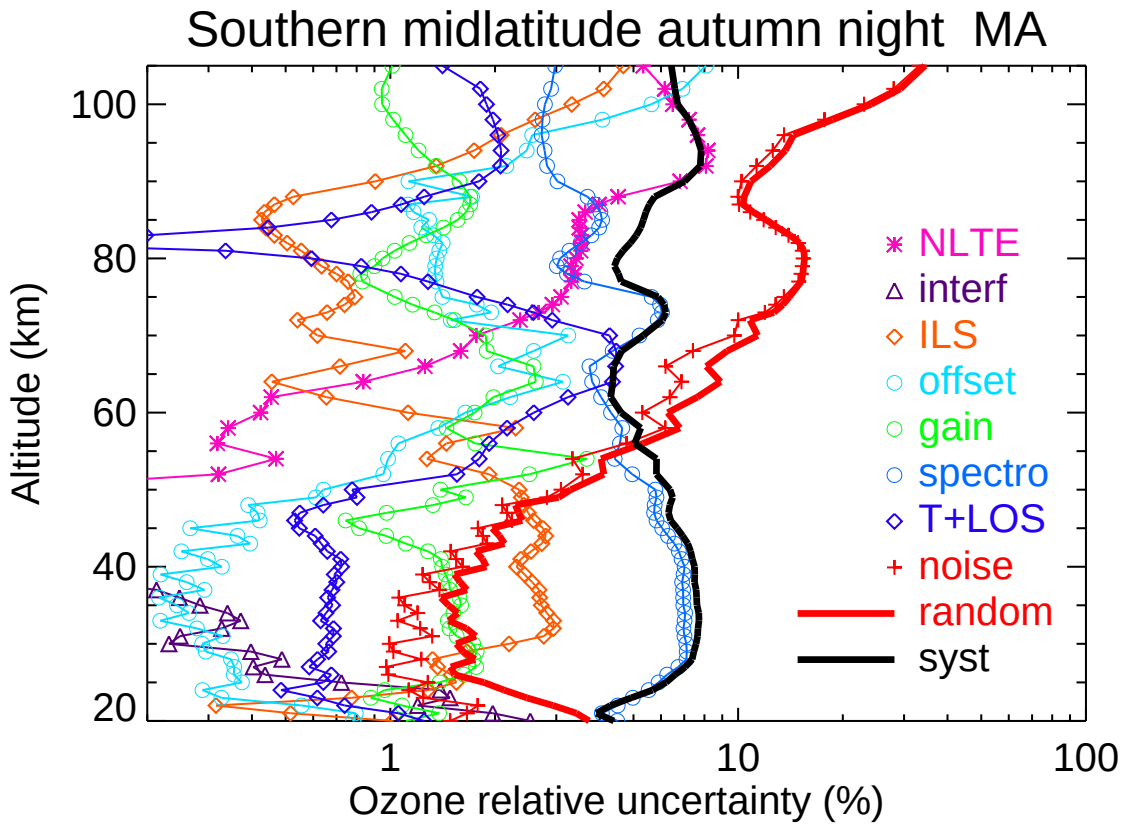

Figure S26. V8R_O3_561 Southern midlatitude autumn night.

Table S28. Ozone error budget for Southern polar winter day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.4	<0.1	2.9	2.5	0.8	1.8	6.9	1.8	1.9	5.5	6.6
30	5.0	<0.1	0.2	2.7	0.4	1.6	6.9	0.8	1.4	1.9	7.5
40	4.5	<0.1	<0.1	3.0	0.3	0.9	6.3	0.7	1.7	2.5	6.8
50	1.7	0.1	0.2	2.1	0.8	1.4	5.1	0.8	3.5	4.0	5.5
60	0.6	0.8	<0.1	1.9	1.4	1.8	4.9	1.9	5.7	6.4	5.3
70	0.2	7.1	<0.1	0.9	1.3	0.9	5.6	2.8	13	14	8.0
80	0.1	4.1	<0.1	1.0	3.3	1.3	3.4	0.2	17	18	5.3
90	0.7	5.8	<0.1	2.4	6.9	1.2	3.3	1.0	24	25	6.2
96	0.4	7.6	<0.1	3.3	10	1.0	3.3	1.2	36	38	7.8

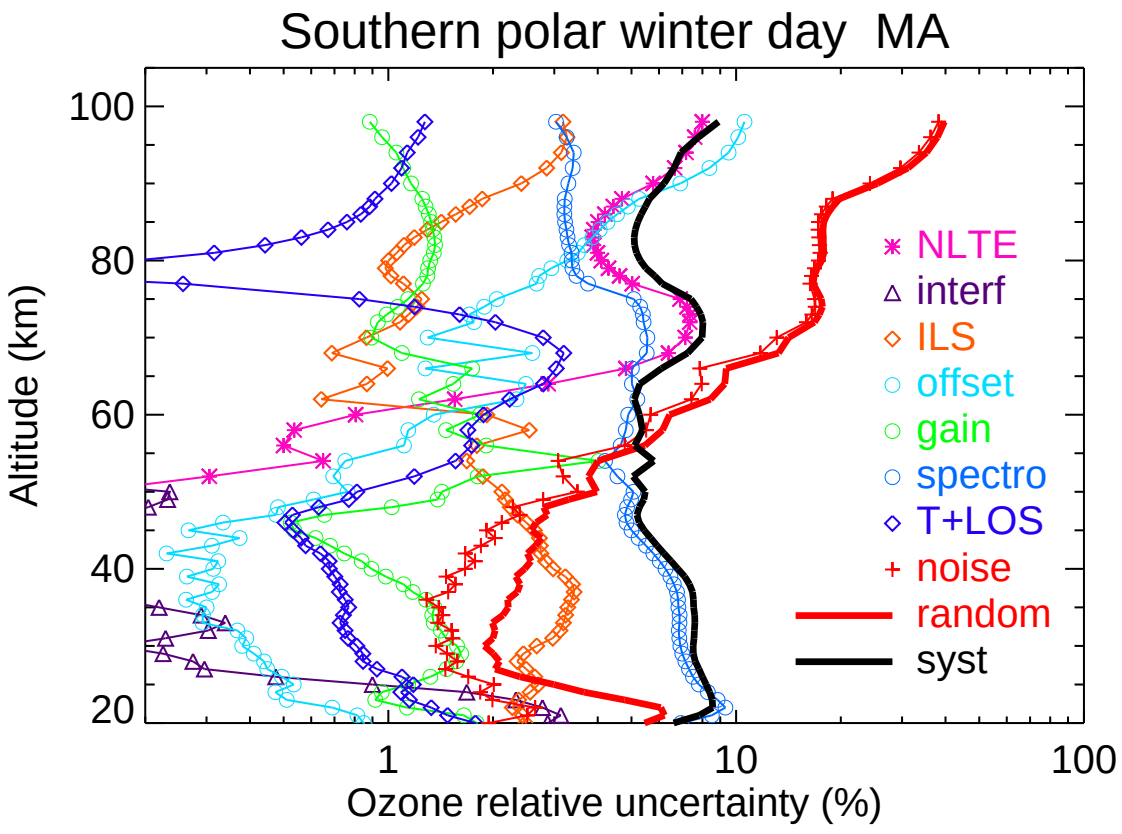

Figure S27. V8R_O3_561 Southern polar winter day.

Table S29. Ozone error budget for Southern polar winter night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.5	<0.1	2.4	1.9	0.9	2.0	4.6	1.7	1.9	4.5	4.7
30	5.3	<0.1	0.2	2.7	0.4	1.5	6.9	0.8	1.3	1.9	7.5
40	4.4	<0.1	<0.1	3.1	0.3	0.9	6.5	0.7	1.6	2.7	7.0
50	1.8	0.2	0.2	2.2	0.8	1.9	4.8	0.8	3.5	4.0	5.4
60	1.3	0.8	<0.1	1.9	1.4	2.4	3.6	1.8	5.3	6.0	4.5
70	1.3	4.7	<0.1	1.1	2.3	1.6	3.7	6.0	8.8	11	5.4
80	0.7	4.8	<0.1	0.9	1.2	2.4	4.0	1.2	12	12	5.1
90	7.1	6.0	<0.1	2.0	1.9	1.3	2.9	1.0	11	12	6.5
96	6.2	5.5	<0.1	3.7	3.6	1.2	2.7	1.8	16	16	6.4
100	3.6	5.4	<0.1	5.3	6.7	1.2	2.7	2.2	27	28	7.2

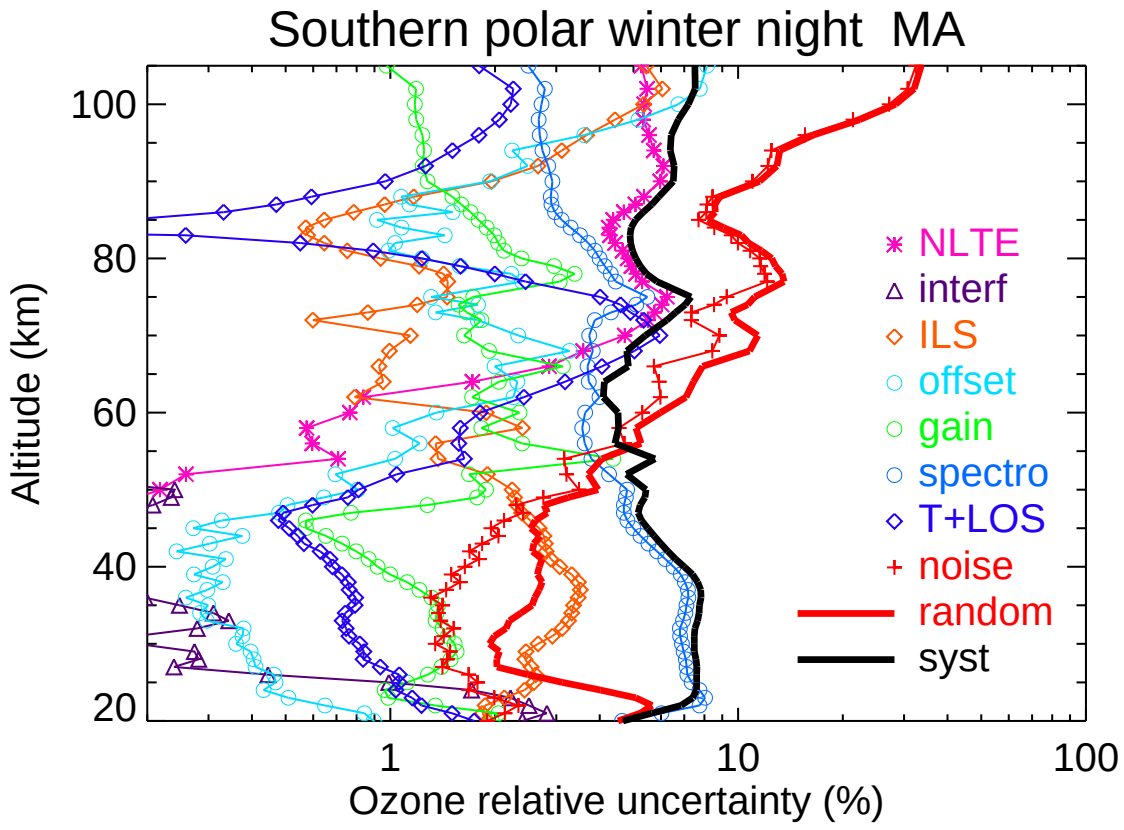

Figure S28. V8R_O3_561 Southern polar winter night.

Table S30. Ozone error budget for Southern polar spring day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	1.4	<0.1	5.5	3.7	1.3	2.7	7.0	1.6	3.0	9.4	5.1
30	6.8	<0.1	0.1	2.6	0.2	1.7	6.2	0.4	0.8	2.0	6.7
40	4.9	<0.1	<0.1	2.1	0.3	1.5	5.9	0.5	1.4	2.8	6.0
50	2.6	<0.1	0.2	2.2	0.7	1.8	5.3	0.8	3.0	3.3	5.9
60	0.9	0.3	<0.1	1.6	1.2	2.4	5.1	1.9	4.7	5.4	5.8
70	0.3	5.0	<0.1	0.6	1.8	1.0	5.4	2.1	11	11	7.2
80	0.1	6.2	<0.1	0.7	2.0	1.2	3.6	0.5	15	16	6.8
90	0.9	6.7	<0.1	2.2	4.6	1.2	3.1	1.7	18	19	7.0
96	0.6	13	<0.1	3.5	8.7	0.9	3.8	2.1	33	36	10
100	0.7	13	<0.1	3.1	10	0.7	3.2	2.2	37	39	13

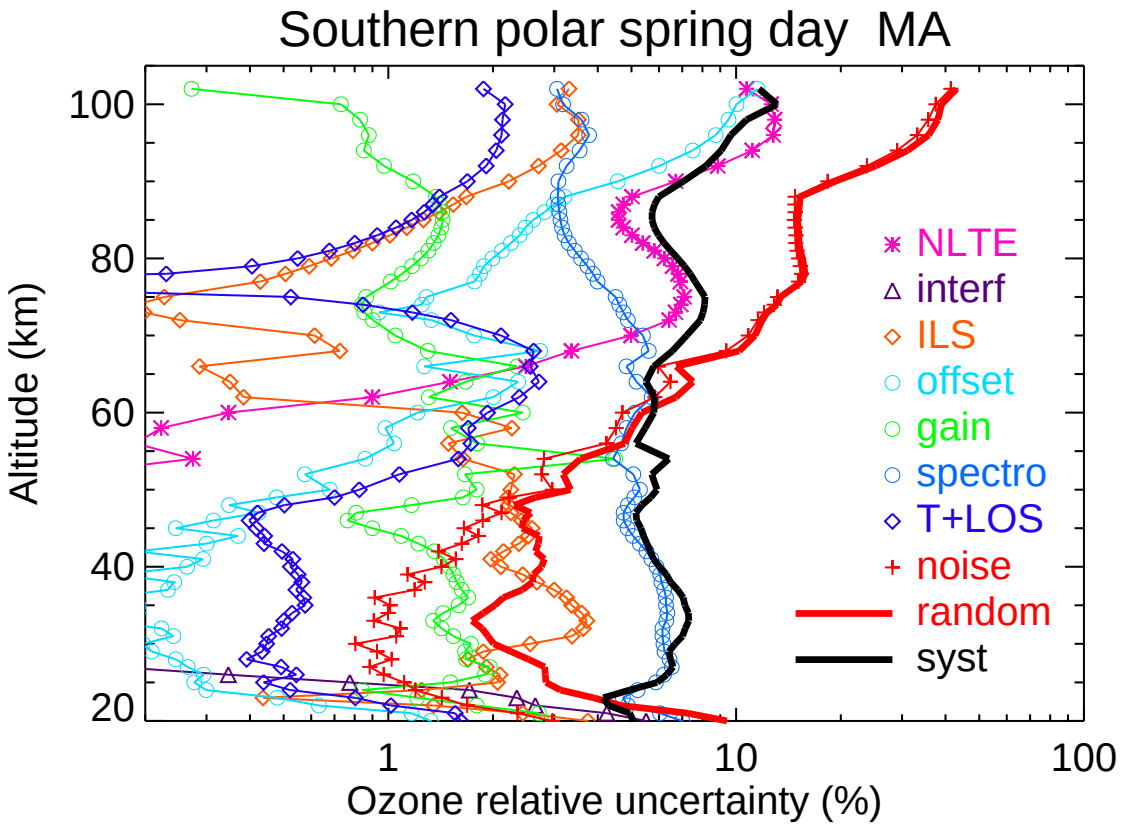

Figure S29. V8R_O3_561 Southern polar spring day.

Table S31. Ozone error budget for Southern polar spring night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.1	<0.1	5.3	2.6	1.4	2.5	6.0	1.6	2.2	8.0	4.7
30	7.3	<0.1	0.1	2.8	0.2	1.8	6.9	0.5	0.8	2.0	7.5
40	5.4	<0.1	<0.1	2.0	0.3	1.6	6.4	0.6	1.5	2.6	6.6
50	2.7	<0.1	0.2	2.4	0.7	1.9	5.2	0.8	3.0	3.4	5.9
60	1.4	0.3	<0.1	1.5	1.4	2.3	4.0	2.1	4.7	5.4	4.7
70	1.2	4.1	<0.1	1.7	2.9	1.6	4.0	4.6	9.3	11	5.8
80	0.2	4.8	<0.1	0.7	1.2	1.6	3.2	0.2	14	14	5.6
90	7.1	5.7	<0.1	1.2	1.8	1.6	2.9	3.1	10	11	5.8
96	10	7.0	<0.1	1.6	2.7	1.1	2.8	3.7	12	13	6.8
100	5.6	6.6	<0.1	3.1	5.5	0.9	3.0	3.2	22	24	6.7

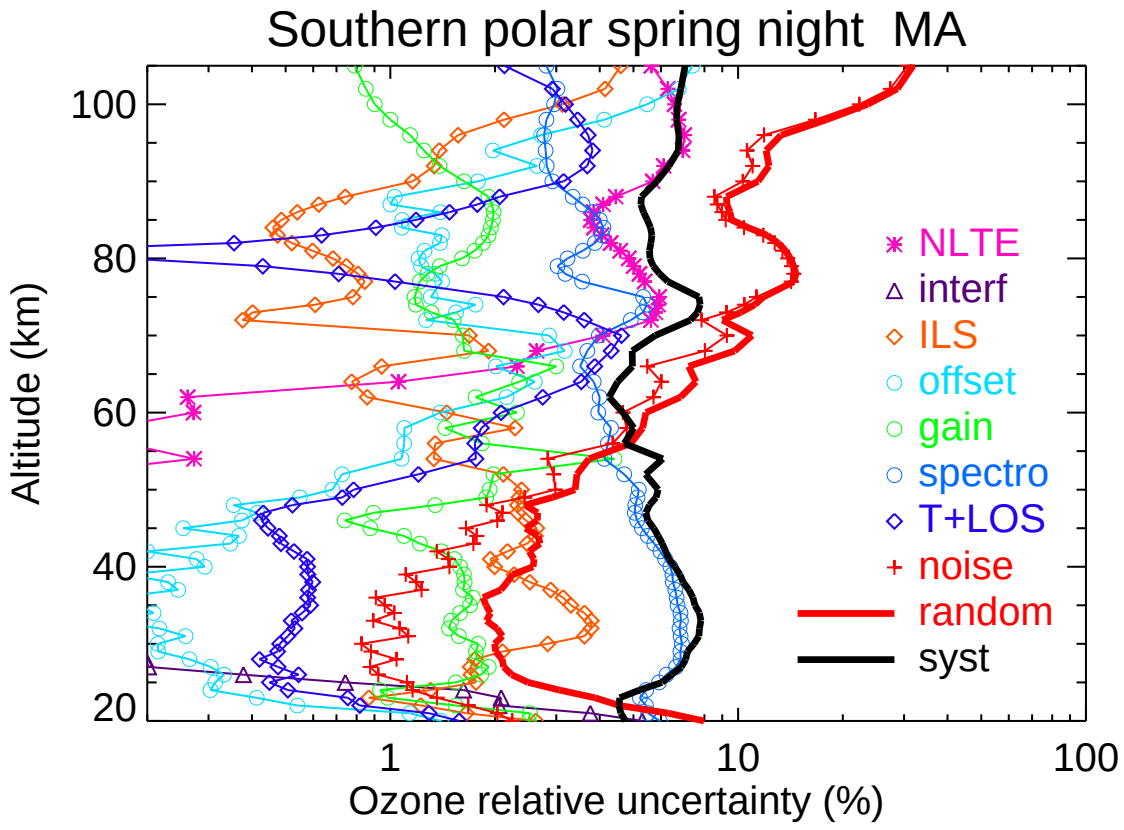

Figure S30. V8R_O3_561 Southern polar spring night.

Table S32. Ozone error budget for Southern polar summer day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.9	<0.1	4.1	1.7	0.9	2.1	4.1	1.3	1.6	4.9	4.7
30	4.4	<0.1	0.2	2.3	0.2	1.8	5.9	0.4	0.9	1.6	6.5
40	5.3	<0.1	<0.1	1.9	0.3	1.7	5.5	0.5	1.2	1.5	6.0
50	2.3	<0.1	0.2	2.3	0.6	2.1	4.5	0.7	2.5	2.8	5.4
60	1.0	0.2	<0.1	1.6	1.1	3.0	4.1	1.8	3.5	4.2	5.3
70	0.3	3.3	<0.1	1.3	2.6	1.3	5.7	2.4	9.2	10	6.6
80	0.1	7.5	<0.1	0.7	2.5	0.6	4.3	1.7	16	16	8.0
90	0.8	6.1	<0.1	2.0	4.6	1.4	3.0	3.5	16	18	6.0
96	0.4	8.9	<0.1	3.6	8.3	1.0	3.6	3.4	31	33	8.4

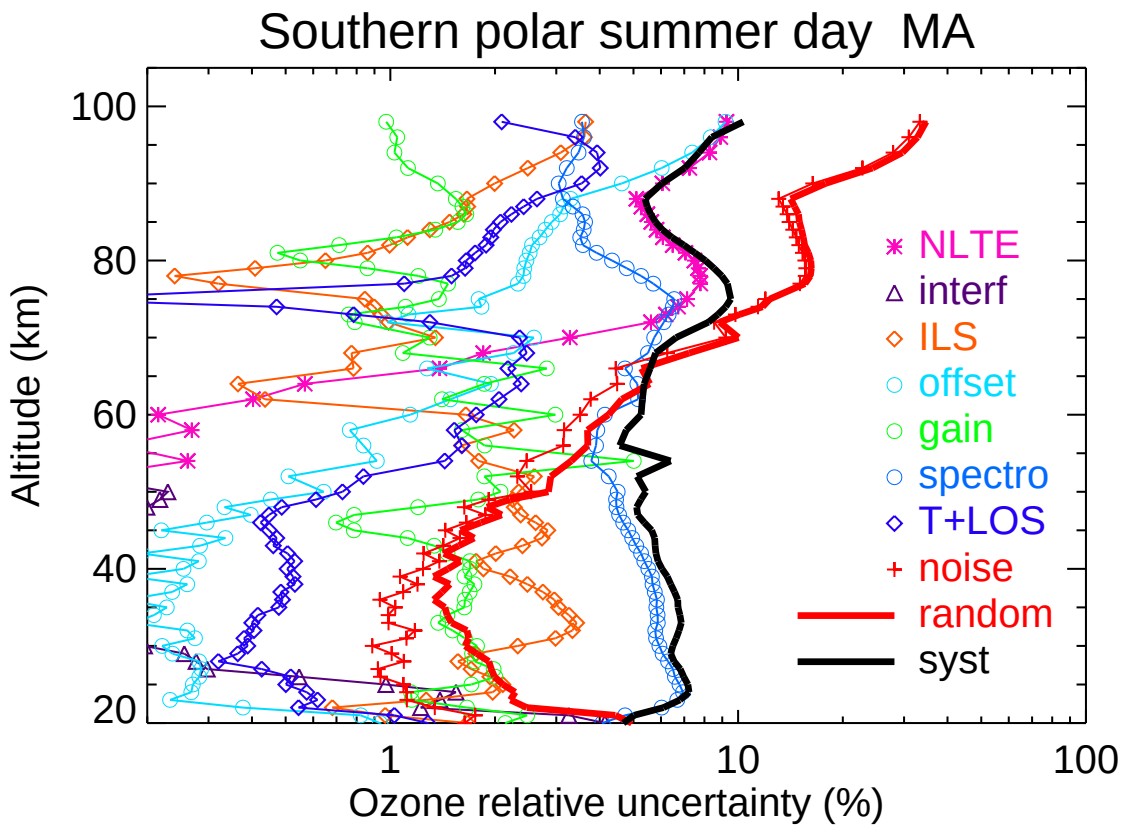

Figure S31. V8R_O3_561 Southern polar summer day.

Table S33. Ozone error budget for Southern polar summer night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.7	<0.1	3.6	1.9	0.9	1.8	4.1	1.2	1.5	4.6	4.5
30	5.3	<0.1	0.2	2.3	0.3	1.7	6.4	0.5	1.0	1.5	6.9
40	5.8	<0.1	0.1	2.0	0.3	1.6	6.3	0.6	1.4	1.6	6.8
50	2.6	<0.1	0.2	2.4	0.7	2.0	4.9	0.7	2.8	3.1	5.7
60	1.4	0.2	<0.1	1.5	1.3	2.2	4.0	1.9	4.2	4.9	4.7
70	1.1	3.4	<0.1	1.5	3.0	1.6	3.9	3.8	8.4	10	5.4
80	0.1	5.7	<0.1	1.0	1.7	1.1	3.3	1.1	15	15	6.5
90	3.7	7.1	<0.1	2.1	1.9	1.3	3.3	2.7	12	13	6.6
96	5.6	7.8	<0.1	2.2	4.2	1.0	3.0	2.1	17	18	7.7
100	2.7	7.5	<0.1	3.8	7.6	1.1	3.3	1.5	29	30	7.7

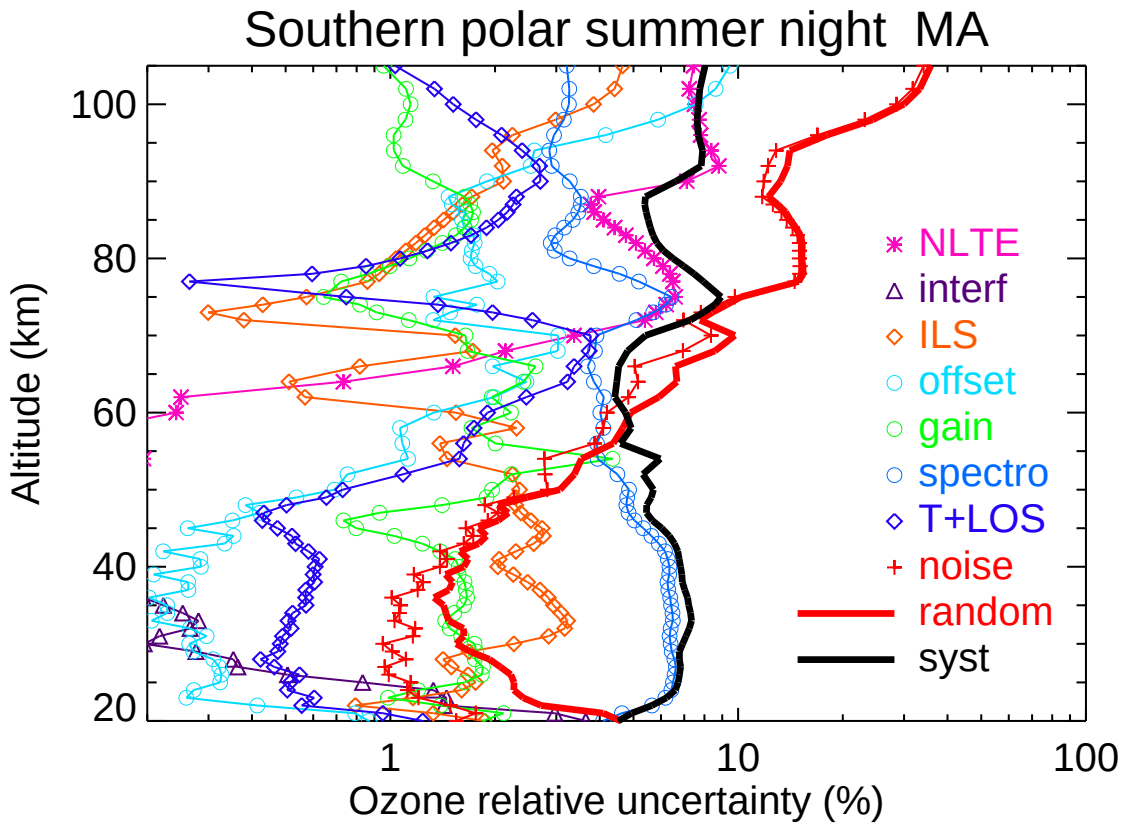

Figure S32. V8R_O3_561 Southern polar summer night.

Table S34. Ozone error budget for Southern polar autumn day, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.9	<0.1	3.4	2.8	0.8	1.6	5.1	1.3	1.5	4.4	5.7
30	4.3	<0.1	0.2	2.5	0.3	1.7	8.1	0.7	1.3	2.5	8.4
40	5.6	<0.1	<0.1	3.0	0.4	1.2	7.3	0.8	1.8	2.8	7.8
50	2.3	0.2	0.2	2.4	0.8	1.2	6.8	1.0	3.6	3.9	7.3
60	0.7	0.8	<0.1	1.9	1.4	1.9	4.9	2.1	6.3	6.9	5.6
70	0.2	2.5	<0.1	0.9	1.3	1.2	6.3	2.2	14	14	6.6
80	0.1	3.5	<0.1	1.0	3.5	1.1	3.6	<0.1	18	18	5.1
90	1.0	6.6	<0.1	1.9	6.3	1.2	3.7	0.8	22	23	6.8
96	0.8	10	<0.1	2.7	10	1.1	4.4	1.3	35	37	8.3
100	1.1	7.6	<0.1	2.0	11	1.1	3.6	1.4	38	40	8.5

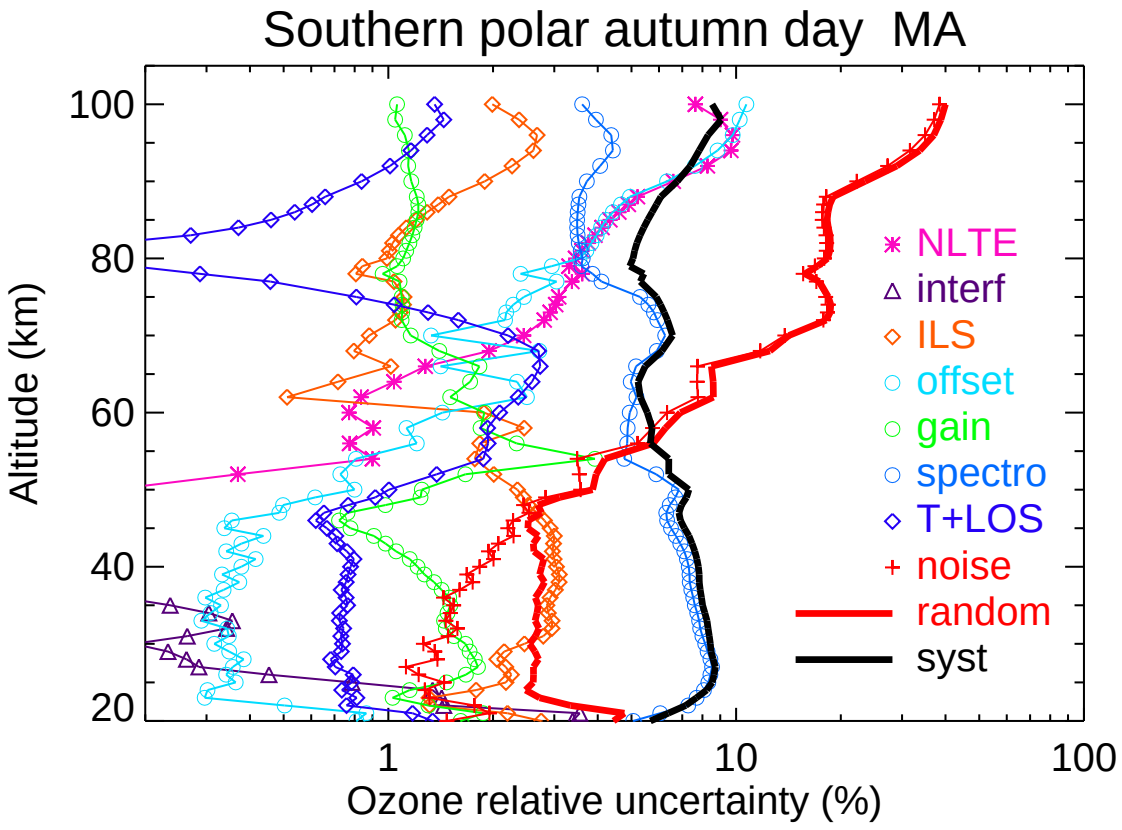

Figure S33. V8R_O3_561 Southern polar autumn day.

Table S35. Ozone error budget for Southern polar autumn night, MA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
20	2.8	<0.1	3.7	3.1	0.8	2.0	5.5	1.5	1.6	5.3	6.0
30	3.9	<0.1	0.7	2.5	0.3	1.6	7.9	0.8	1.3	2.6	8.2
40	5.0	<0.1	8.3	3.0	0.4	1.2	7.0	0.7	1.9	9.0	7.3
50	2.3	0.3	0.5	2.4	0.9	1.5	6.5	1.0	3.6	4.0	7.0
60	1.3	1.3	<0.1	2.1	1.6	2.3	3.6	2.1	6.2	6.9	4.7
70	1.8	2.4	0.1	1.1	2.9	2.4	3.7	5.2	7.7	10	3.9
80	0.7	2.7	0.2	0.9	1.2	1.5	3.6	1.1	14	14	4.1
90	11	5.5	0.1	1.1	2.1	1.4	2.9	0.7	12	12	6.0
96	12	6.7	<0.1	2.9	3.1	1.1	2.8	1.7	14	15	7.2
100	7.8	5.7	0.1	4.5	6.1	1.0	2.8	1.9	25	26	7.0

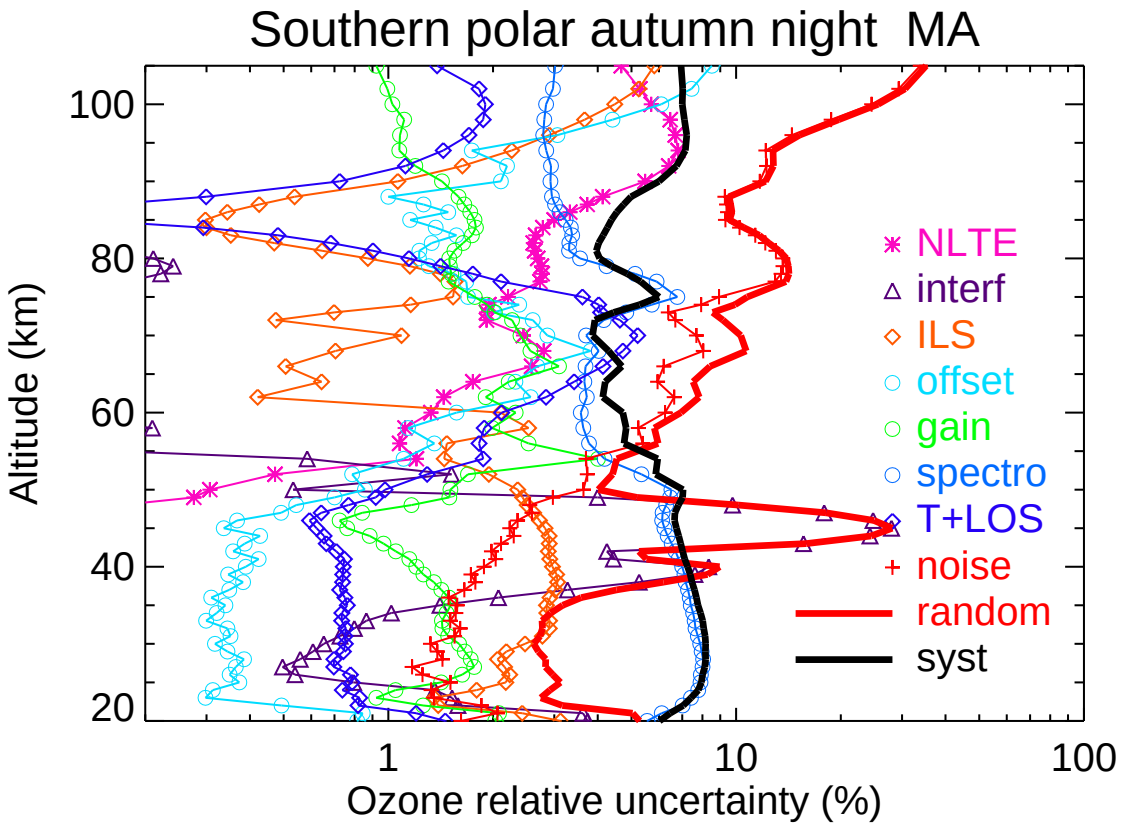

Figure S34. V8R_O3_561 Southern polar autumn night.

S2 Errors budget for O_3 UA data

In this section we provide the errors for the UA data.

Table S36. Labels and definitions of the representative atmospheric conditions which were used to calculate the error budget for UA data.

representative atmosphere label	month(s) used	latitude range	solar zenith angle range
Northern polar winter day	Jan, Feb	65°N – 90°N	< 90°
Northern polar winter night	Jan, Feb	65°N – 90°N	> 100°
Northern polar spring day	Apr	65°N – 90°N	< 90°
Northern polar spring night	Apr	65°N – 90°N	> 100°
Northern polar summer day	Jul, Aug	65°N – 90°N	< 90°
Northern polar summer night	Jul, Aug	65°N – 90°N	> 100°
Northern polar autumn day	Oct	65°N – 90°N	< 90°
Northern polar autumn night	Oct	65°N – 90°N	> 100°
Northern midlatitude winter day	Jan, Feb	40°N – 60°N	< 90°
Northern midlatitude winter night	Jan, Feb	40°N – 60°N	> 100°
Northern midlatitude spring day	Apr	40°N – 60°N	< 90°
Northern midlatitude spring night	Apr	40°N – 60°N	> 100°
Northern midlatitude summer day	Jul, Aug	40°N – 60°N	< 90°
Northern midlatitude summer night	Jul, Aug	40°N – 60°N	> 100°
Northern midlatitude autumn day	Oct	40°N – 60°N	< 90°
Northern midlatitude autumn night	Oct	40°N – 60°N	> 100°
Tropics day	Apr	20°S – 20°N	< 90°
Tropics night	Apr	20°S – 20°N	> 100°
Southern midlatitude winter day	Jul, Aug	40°S – 60°S	< 90°
Southern midlatitude winter night	Jul, Aug	40°S – 60°S	> 100°
Southern midlatitude spring day	Oct	40°S – 60°S	< 90°
Southern midlatitude spring night	Oct	40°S – 60°S	> 100°
Southern midlatitude summer day	Jan, Feb	40°S – 60°S	< 90°
Southern midlatitude summer night	Jan, Feb	40°S – 60°S	> 100°
Southern midlatitude autumn day	Apr	40°S – 60°S	< 90°
Southern midlatitude autumn night	Apr	40°S – 60°S	> 100°
Southern polar winter day	Jul, Aug	65°S – 90°S	< 90°
Southern polar winter night	Jul, Aug	65°S – 90°S	> 100°
Southern polar spring day	Oct	65°S – 90°S	< 90°
Southern polar spring night	Oct	65°S – 90°S	> 100°
Southern polar summer day	Jan, Feb	65°S – 90°S	< 90°
Southern polar summer night	Jan, Feb	65°S – 90°S	> 100°
Southern polar autumn day	Apr	65°S – 90°S	< 90°
Southern polar autumn night	Apr	65°S – 90°S	> 100°

Table S37. Ozone error budget for Northern polar winter day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
40	6.4	<0.1	<0.1	2.4	0.5	0.9	6.4	0.8	2.4	2.7	6.8
50	3.0	0.2	0.1	2.0	0.8	1.1	7.8	1.4	3.7	4.3	8.0
60	0.7	1.2	<0.1	1.4	2.3	2.0	6.3	3.0	7.9	8.9	6.6
70	0.2	2.9	<0.1	1.5	2.0	1.6	6.8	2.0	16	17	7.3
80	0.3	6.5	<0.1	0.9	3.7	1.7	4.2	<0.1	17	18	6.4
90	1.2	6.0	<0.1	1.5	6.9	1.3	3.8	0.5	25	26	5.9
96	0.8	6.3	<0.1	1.9	10	1.1	3.8	0.7	37	39	6.5

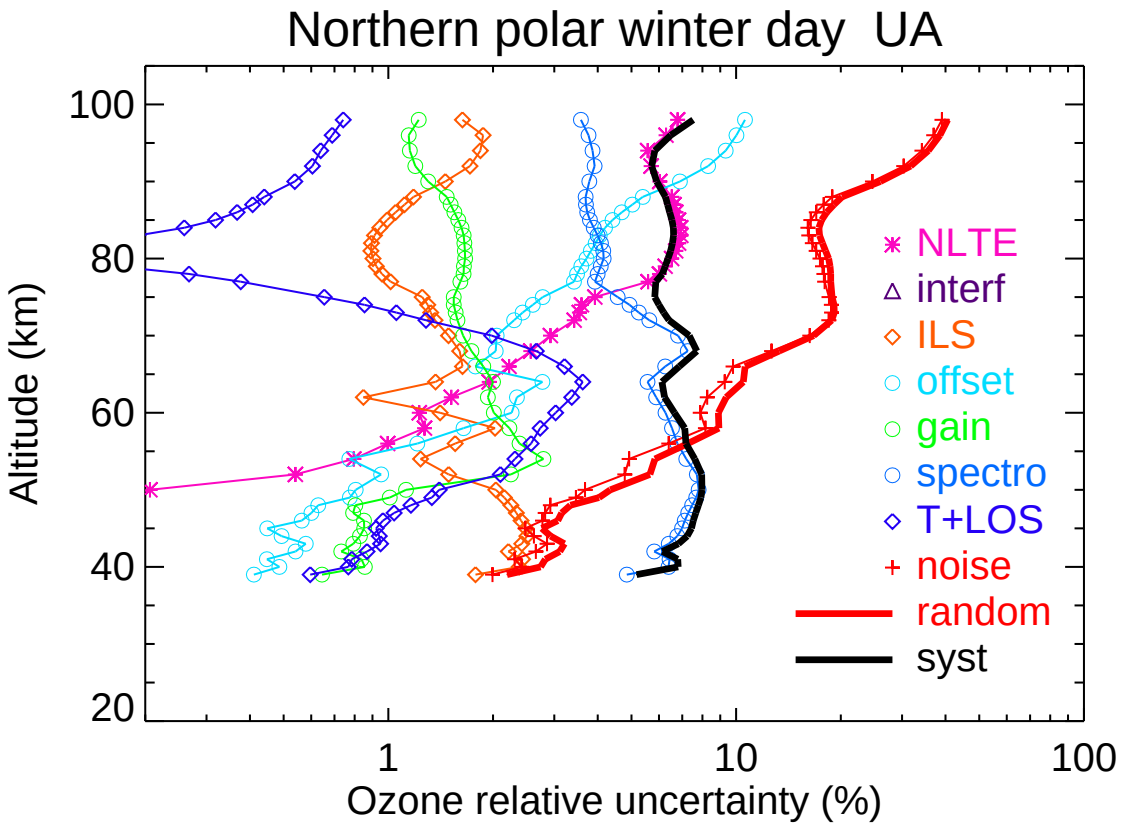

Figure S35. V8R_O3_661 Northern polar winter day.

Table S38. Ozone error budget for Northern polar winter night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	1.6	0.4	0.2	1.7	0.9	1.1	5.8	0.9	3.7	4.4	5.9
60	1.5	1.7	<0.1	2.2	1.6	1.8	3.4	2.2	4.8	5.9	4.3
70	2.3	2.3	<0.1	0.9	3.7	2.1	4.5	5.1	7.9	11	4.2
80	1.0	2.8	<0.1	0.9	2.2	2.0	4.2	0.6	12	12	3.6
90	9.2	5.3	<0.1	1.2	1.7	1.4	3.5	1.4	11	12	4.8
96	7.4	4.2	<0.1	3.2	3.5	0.9	3.3	1.7	17	18	5.8
100	4.9	4.7	<0.1	5.0	6.8	1.0	3.6	1.5	28	29	6.8

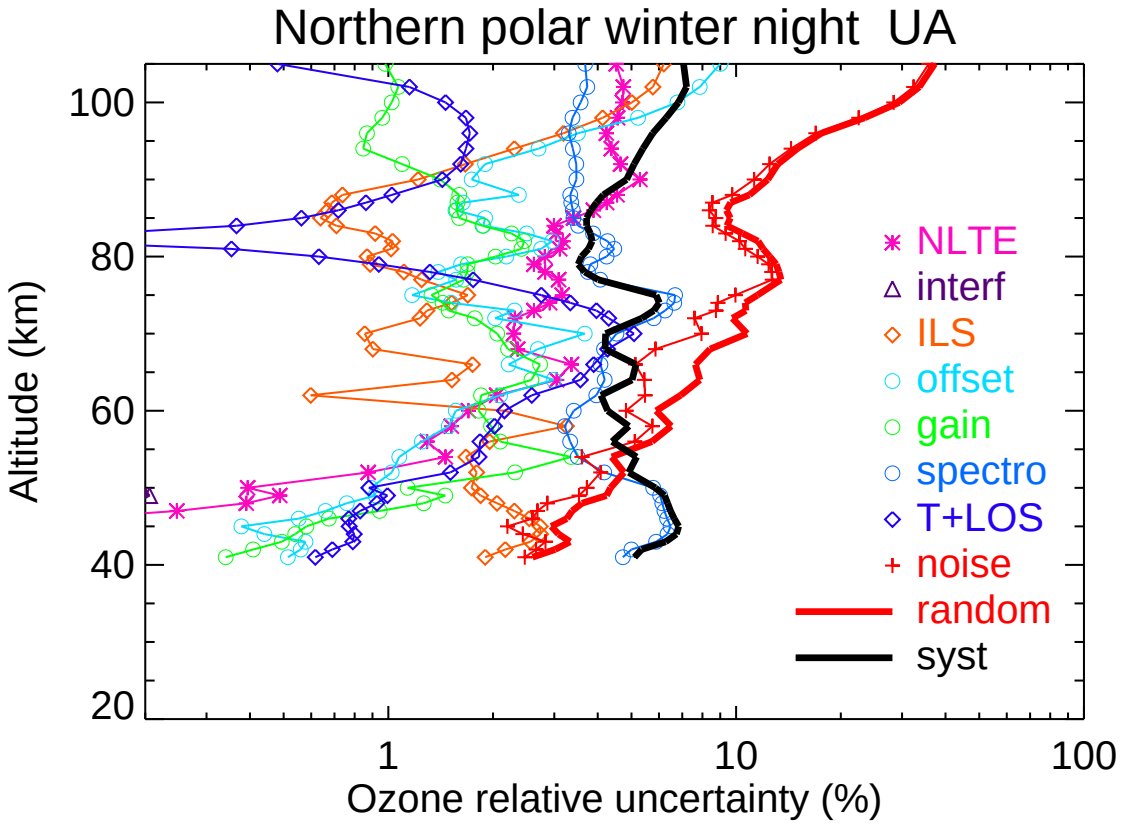

Figure S36. V8R_O3_661 Northern polar winter night.

Table S39. Ozone error budget for Northern polar spring day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.3	<0.1	0.2	2.4	0.6	1.3	5.4	0.8	2.8	3.0	6.0
60	0.8	0.4	<0.1	2.0	1.5	1.6	4.7	2.0	4.1	5.0	5.2
70	0.2	3.7	<0.1	1.1	2.7	1.2	4.9	2.0	12	12	6.0
80	0.1	5.9	<0.1	0.6	2.0	1.0	3.8	0.4	15	16	6.4
90	0.6	4.9	<0.1	2.3	5.3	1.1	3.3	1.6	21	22	6.0
96	0.3	7.6	<0.1	3.9	8.7	0.9	3.7	2.2	35	36	7.3

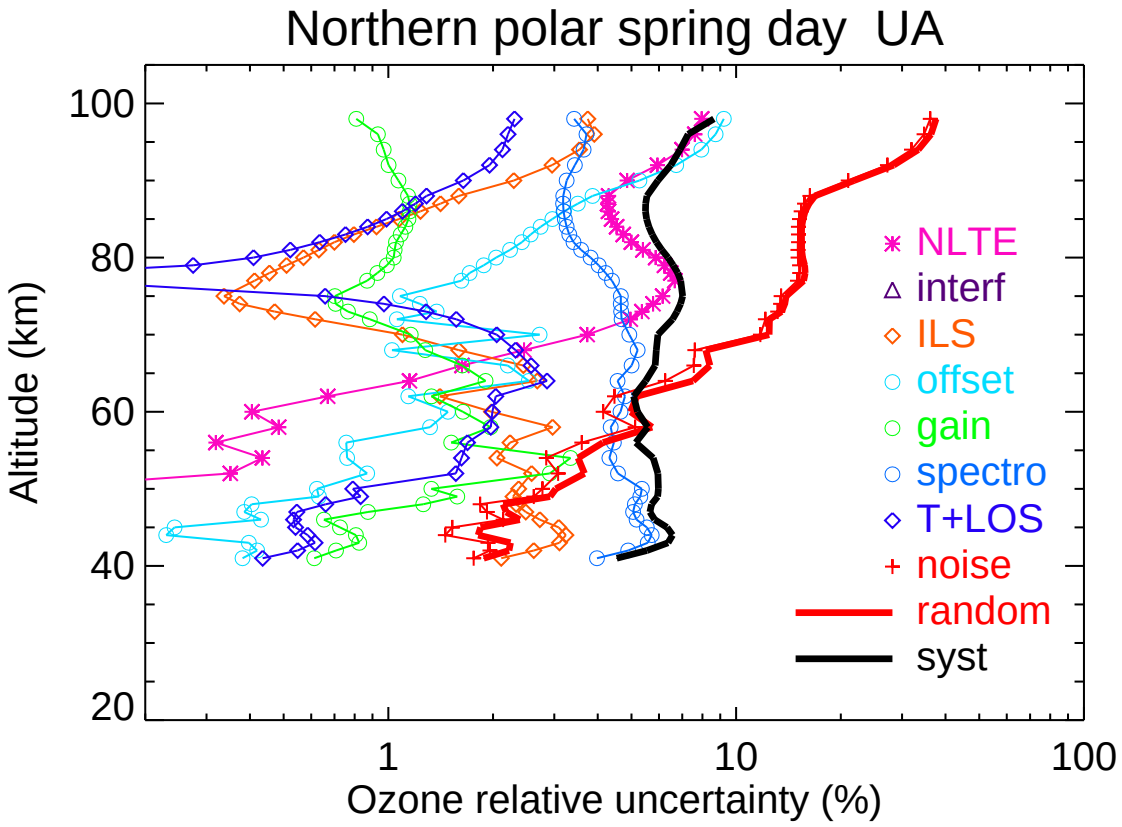

Figure S37. V8R_O3_661 Northern polar spring day.

Table S40. Ozone error budget for Northern polar spring night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
40	6.7	<0.1	<0.1	2.9	0.4	1.1	6.7	0.7	1.7	1.9	7.3
50	2.5	<0.1	0.2	2.2	0.6	1.5	5.2	0.8	2.8	3.2	5.7
60	1.4	0.5	<0.1	2.2	1.5	1.7	3.5	2.2	4.2	5.2	4.3
70	1.2	2.0	<0.1	1.0	3.3	1.7	4.2	4.0	8.5	10	4.5
80	0.3	4.2	<0.1	0.4	1.0	1.0	3.3	<0.1	14	14	4.8
90	7.7	4.4	<0.1	0.9	1.4	1.6	2.9	2.7	10	11	4.9
96	10	6.0	<0.1	2.2	2.4	1.2	2.9	3.4	12	13	6.0
100	6.4	5.3	<0.1	4.0	4.8	1.2	3.0	2.9	21	22	6.4

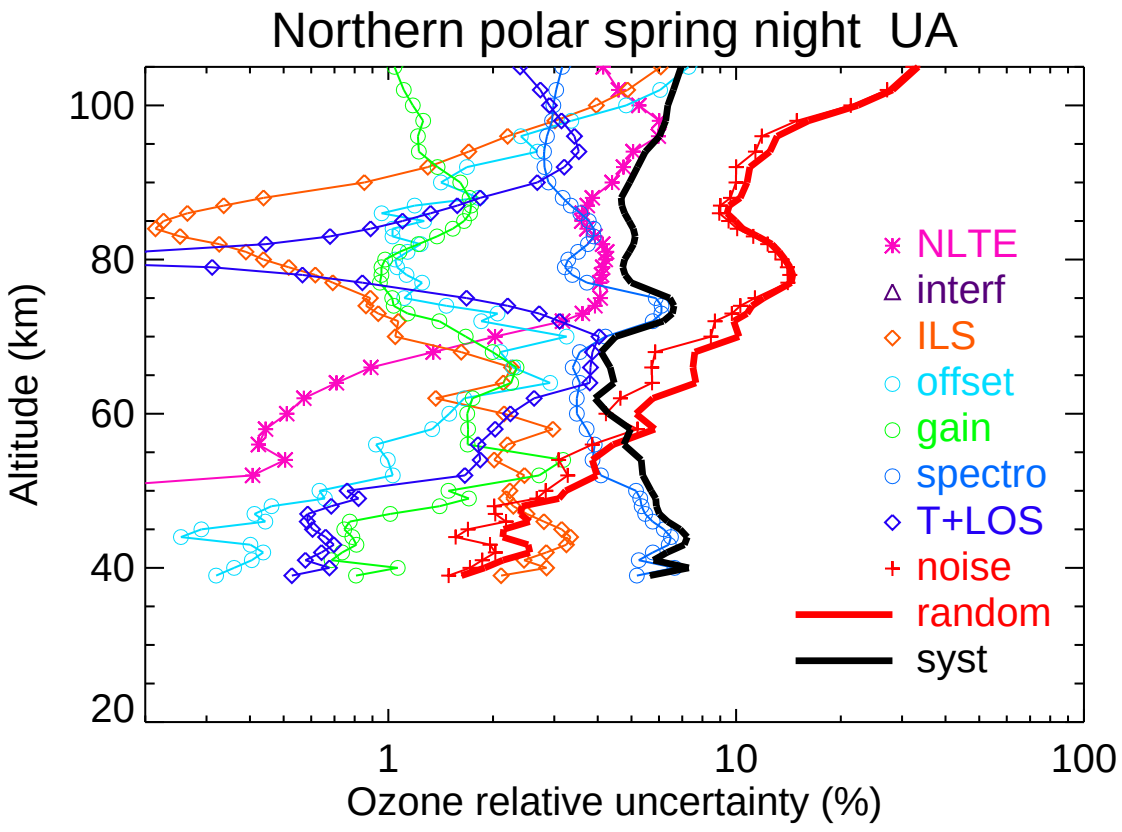

Figure S38. V8R_O3_661 Northern polar spring night.

Table S41. Ozone error budget for Northern polar summer day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.5	<0.1	0.2	2.4	0.5	1.5	4.6	0.6	2.3	2.5	5.3
60	1.1	0.2	<0.1	1.9	1.2	1.4	4.4	1.8	3.4	4.2	4.9
70	0.3	4.1	<0.1	0.7	2.4	0.8	6.1	2.3	9.0	10	7.1
80	0.1	7.0	<0.1	0.4	2.3	0.6	3.9	1.9	16	16	7.6
90	1.1	8.5	<0.1	1.7	4.7	1.1	3.6	4.3	18	20	7.5
96	0.5	13	<0.1	2.6	7.8	1.5	4.9	4.8	31	33	11

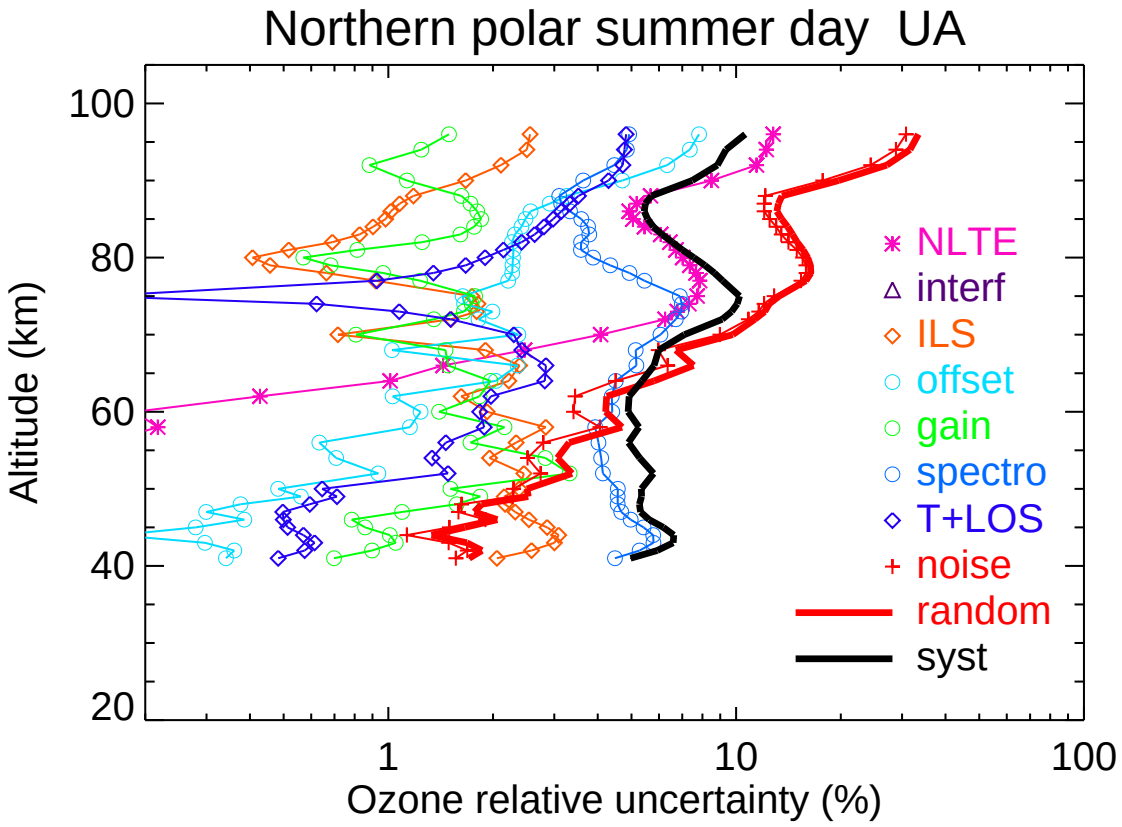

Figure S39. V8R_O3_661 Northern polar summer day.

Table S42. Ozone error budget for Northern polar summer night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.6	<0.1	0.2	2.2	0.6	1.6	4.8	0.7	2.6	2.8	5.5
60	1.4	0.2	<0.1	1.8	1.4	1.4	3.8	2.1	3.7	4.6	4.4
70	1.1	3.8	<0.1	1.1	3.2	1.0	4.3	3.6	9.0	10	5.5
80	0.1	5.3	<0.1	0.7	1.7	0.7	3.4	1.2	15	15	6.2
90	3.6	5.0	<0.1	1.9	1.9	1.3	3.0	3.5	12	13	5.6
96	4.6	6.8	<0.1	3.3	4.5	1.3	3.2	2.5	20	21	7.4
100	2.0	7.1	<0.1	4.6	7.3	1.5	3.7	2.0	31	32	7.9

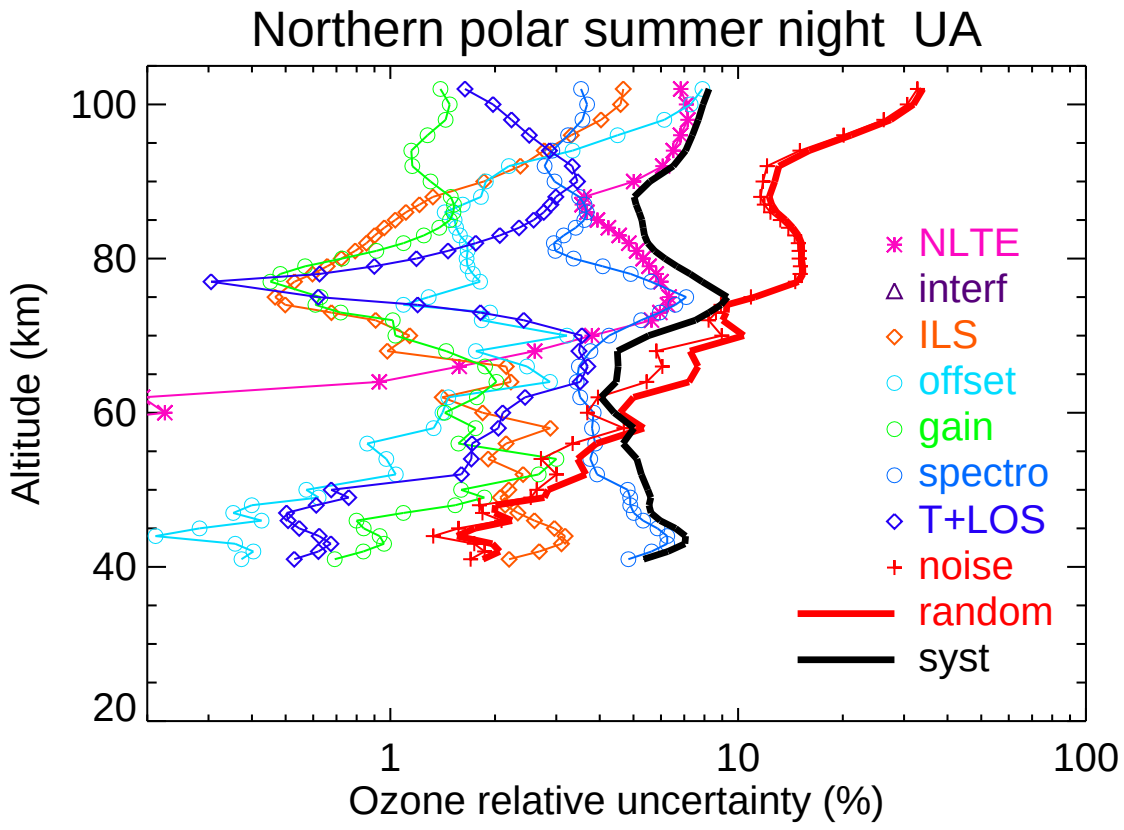

Figure S40. V8R_O3_661 Northern polar summer night.

Table S43. Ozone error budget for Northern polar autumn day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.4	0.1	0.1	2.3	0.7	1.0	6.3	0.9	3.2	3.4	6.8
60	0.7	0.7	<0.1	1.8	1.9	1.7	5.4	2.2	5.7	6.5	5.8
70	0.2	2.4	<0.1	1.2	2.4	1.3	5.7	2.2	13	13	5.9
80	0.1	4.1	<0.1	0.8	2.7	1.1	3.7	<0.1	17	17	5.3
90	1.1	6.4	<0.1	1.7	5.7	1.0	3.6	0.9	22	23	6.9
96	0.7	10	<0.1	2.9	9.3	0.7	4.2	1.4	36	38	8.5
100	1.0	11	<0.1	2.5	10	0.4	3.9	1.9	37	39	12

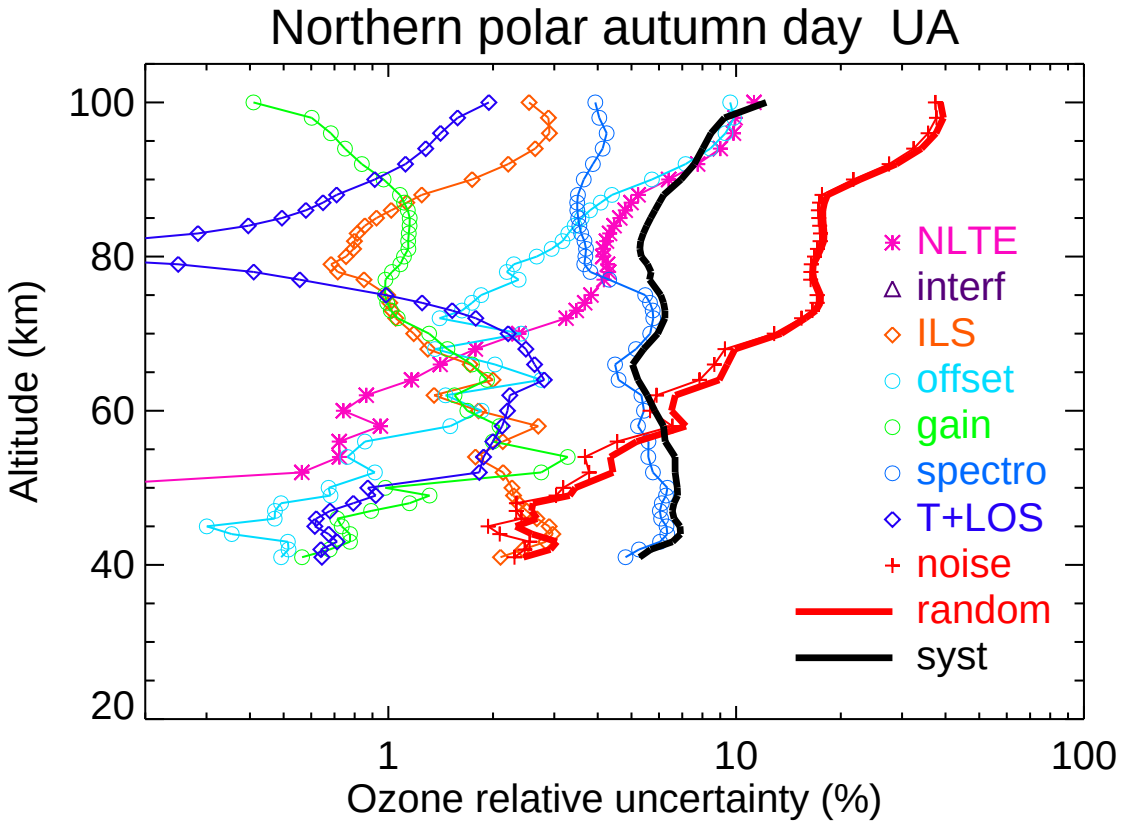

Figure S41. V8R_O3_661 Northern polar autumn day.

Table S44. Ozone error budget for Northern polar autumn night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.3	0.3	0.2	2.2	0.8	1.2	6.9	1.1	3.5	3.9	7.3
60	1.2	1.4	<0.1	2.0	1.6	1.9	3.5	2.2	5.1	5.9	4.4
70	2.1	2.8	<0.1	1.0	3.9	2.1	4.1	5.6	8.4	11	3.9
80	0.8	3.5	<0.1	1.0	1.5	1.6	3.3	1.3	13	14	3.7
90	14	7.1	<0.1	0.7	1.3	1.4	3.4	1.3	10	11	6.6
96	12	4.7	<0.1	2.5	2.3	1.0	3.2	1.8	14	14	5.7
100	9.0	5.1	<0.1	4.1	5.1	0.8	3.4	2.1	23	24	6.3

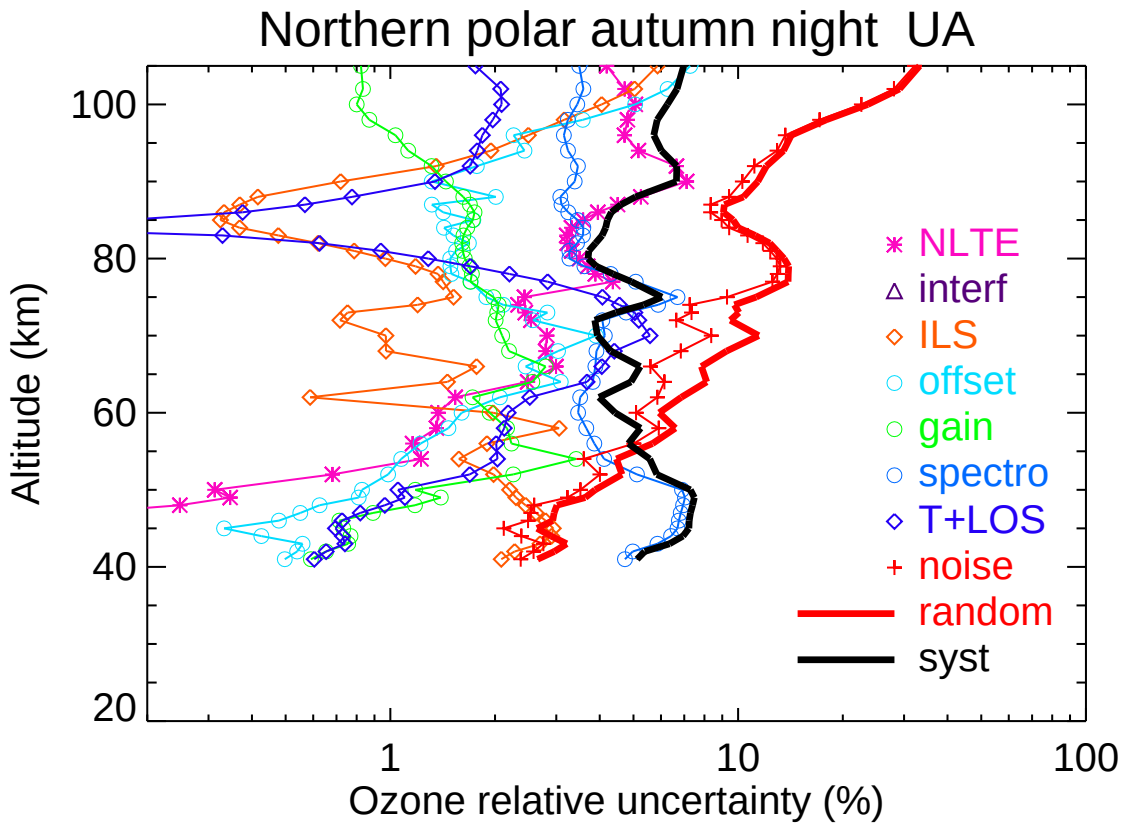

Figure S42. V8R_O3_661 Northern polar autumn night.

Table S45. Ozone error budget for Northern midlatitude winter day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
40	7.2	<0.1	<0.1	2.7	0.4	1.0	6.5	0.7	1.8	2.1	7.0
50	2.5	0.2	0.1	2.3	0.7	1.9	6.1	1.1	2.9	3.8	6.5
60	0.8	0.7	<0.1	1.9	1.8	1.6	5.0	2.4	5.3	6.2	5.4
70	0.3	3.4	<0.1	0.9	2.5	1.2	5.2	2.9	12	12	5.9
80	0.1	4.0	<0.1	1.1	3.4	0.9	4.1	<0.1	18	18	5.5
90	0.7	4.9	<0.1	2.2	7.1	0.9	3.8	0.8	25	26	5.8
96	0.5	6.1	<0.1	3.2	10	0.8	3.7	1.0	36	38	6.7

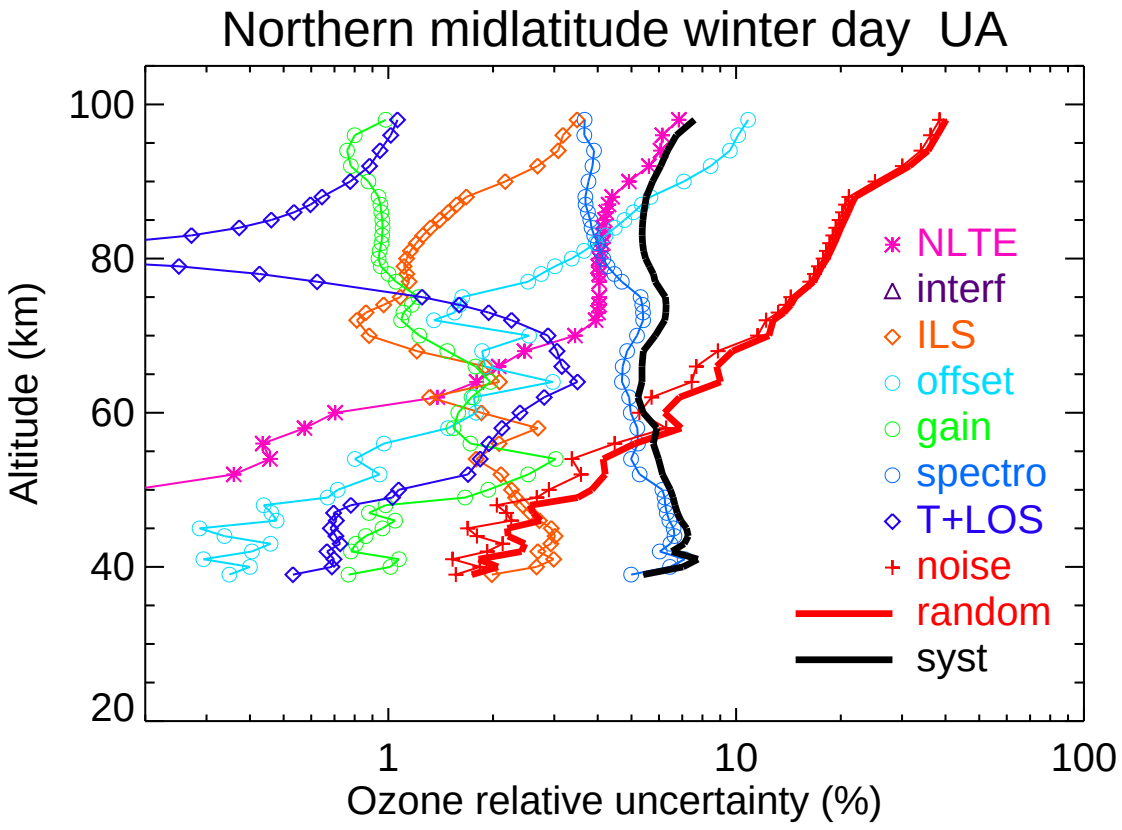

Figure S43. V8R_O3_661 Northern midlatitude winter day.

Table S46. Ozone error budget for Northern midlatitude winter night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
40	7.2	<0.1	<0.1	2.5	0.4	0.8	6.1	0.6	1.9	2.1	6.6
50	2.8	0.2	0.1	2.4	0.7	1.4	6.6	0.9	3.2	3.9	6.9
60	1.4	0.8	<0.1	1.9	1.8	1.5	4.2	2.6	5.7	6.8	4.6
70	0.9	1.6	<0.1	1.1	3.4	2.0	5.1	4.4	9.4	11	4.8
80	0.4	3.8	<0.1	1.1	2.3	2.1	4.3	0.3	14	15	3.8
90	5.0	3.7	<0.1	0.7	1.8	1.5	3.1	1.1	13	13	3.7
96	7.1	4.9	<0.1	2.3	3.1	1.0	2.9	1.4	15	16	5.5
100	5.4	5.4	<0.1	3.4	6.2	0.9	2.9	1.2	26	27	6.2

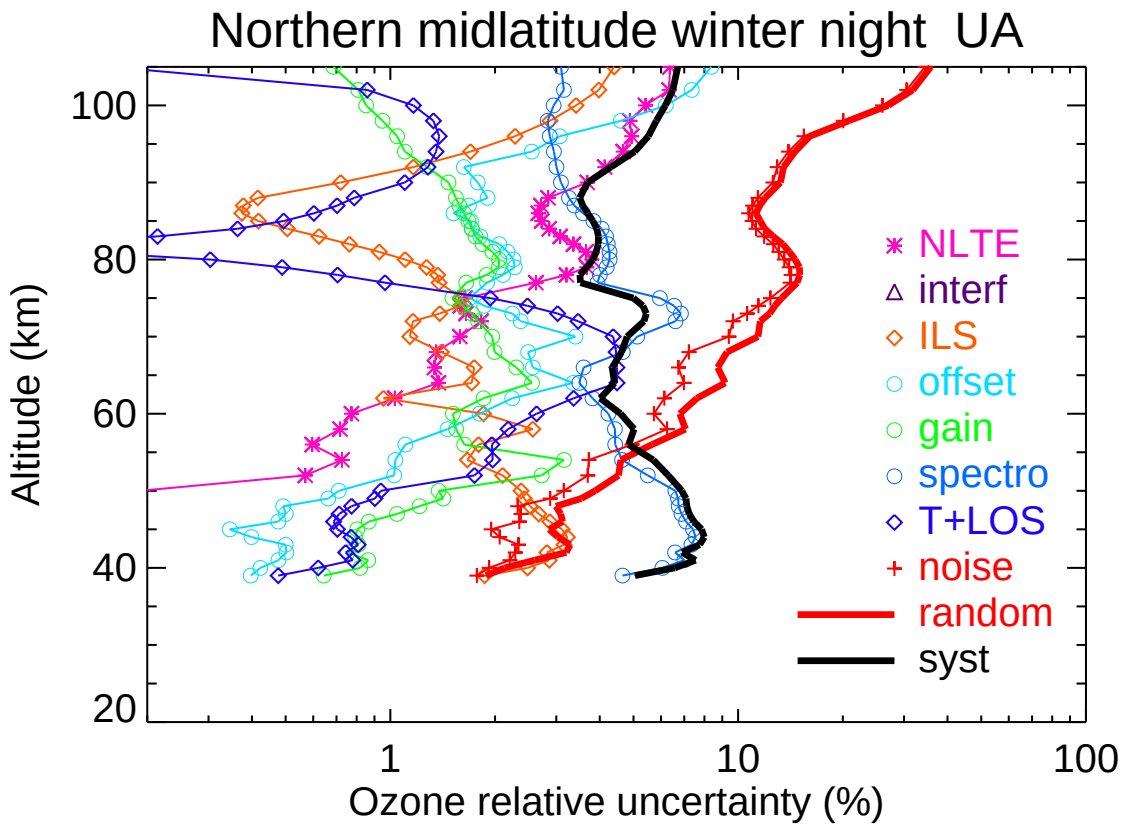

Figure S44. V8R_O3_661 Northern midlatitude winter night.

Table S47. Ozone error budget for Northern midlatitude spring day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.5	<0.1	0.2	2.3	0.6	1.3	5.6	0.8	2.8	3.1	6.2
60	1.0	0.4	<0.1	1.9	1.7	1.4	5.1	2.3	4.8	5.7	5.5
70	0.3	3.8	<0.1	0.9	2.5	1.1	5.2	2.3	12	13	6.2
80	0.2	5.7	<0.1	0.5	2.0	1.1	3.6	0.2	14	15	6.6
90	0.6	5.0	<0.1	2.4	6.0	1.1	3.4	1.4	24	25	6.1
96	0.3	6.6	<0.1	3.7	9.4	0.8	3.6	1.7	36	38	7.1

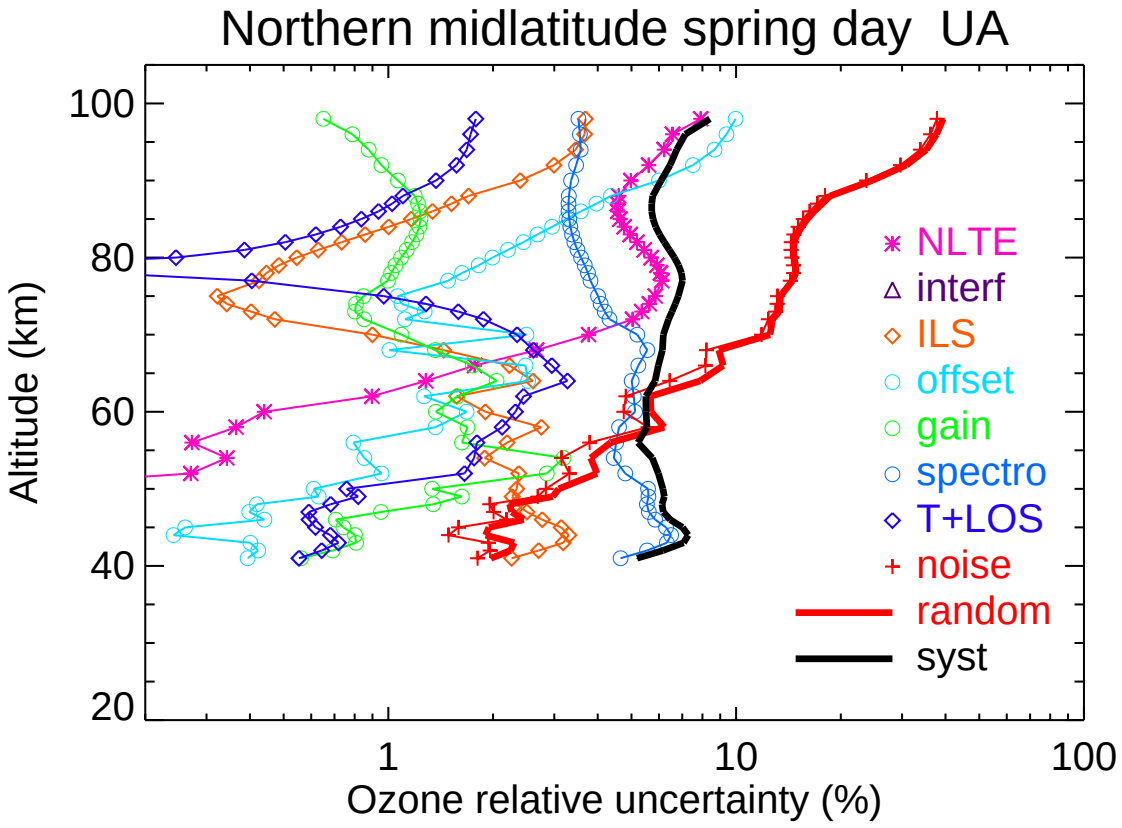

Figure S45. V8R_O3_661 Northern midlatitude spring day.

Table S48. Ozone error budget for Northern midlatitude spring night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
40	7.3	<0.1	<0.1	2.7	0.3	1.1	7.0	0.8	1.7	1.9	7.6
50	2.7	<0.1	0.1	2.2	0.6	1.6	5.2	0.8	2.8	3.2	5.8
60	1.5	0.2	<0.1	1.7	1.5	1.5	3.7	2.3	4.2	5.2	4.3
70	1.2	3.7	<0.1	0.9	3.6	1.4	3.8	5.2	10	12	5.0
80	0.2	4.9	<0.1	0.6	1.1	1.3	3.1	<0.1	14	14	5.4
90	7.2	4.9	<0.1	0.7	1.4	1.5	3.1	3.4	10	11	5.6
96	12	9.0	<0.1	1.7	2.3	1.2	2.8	3.6	12	14	8.2
100	7.6	9.2	<0.1	3.1	4.6	1.4	3.1	2.9	20	22	7.8

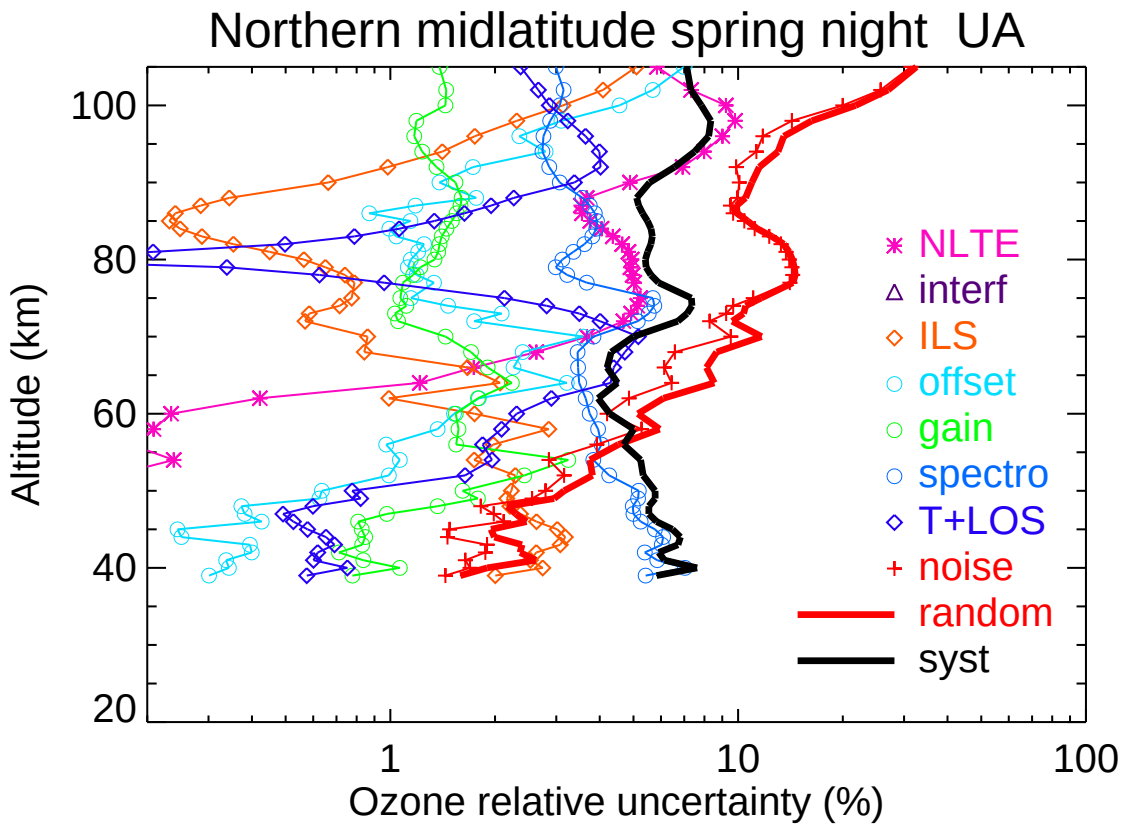

Figure S46. V8R_O3_661 Northern midlatitude spring night.

Table S49. Ozone error budget for Northern midlatitude summer day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.6	<0.1	0.1	2.3	0.6	1.5	5.2	0.7	2.6	2.9	5.8
60	1.1	0.5	<0.1	1.7	1.6	1.2	5.1	2.3	4.5	5.4	5.4
70	0.3	6.5	<0.1	0.9	2.4	1.2	7.1	2.5	12	13	9.2
80	0.2	7.1	<0.1	0.4	2.2	1.4	3.6	1.8	16	16	7.3
90	1.3	12	<0.1	2.5	5.4	0.9	3.8	2.5	20	22	10
96	0.7	13	<0.1	3.3	10	1.0	4.2	2.3	34	37	11

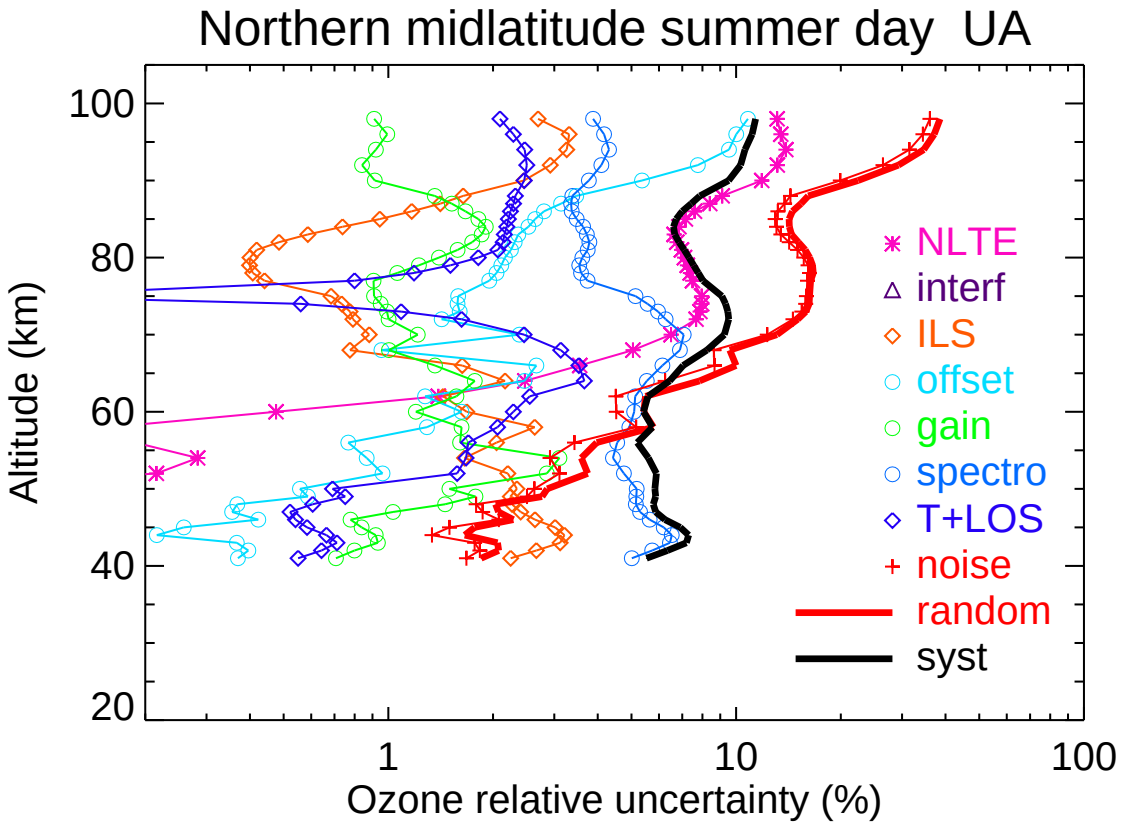

Figure S47. V8R_O3_661 Northern midlatitude summer day.

Table S50. Ozone error budget for Northern midlatitude summer night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.8	<0.1	0.1	2.2	0.5	1.5	4.9	0.6	2.6	2.8	5.5
60	1.5	0.2	<0.1	1.5	1.6	1.2	4.1	2.3	4.3	5.3	4.4
70	1.2	4.7	<0.1	1.4	3.2	1.3	4.4	4.2	10	11	6.2
80	0.1	5.9	<0.1	0.9	1.4	1.4	3.0	1.1	15	15	6.3
90	4.2	6.8	<0.1	1.2	1.9	1.2	3.1	3.3	12	13	6.7
96	6.0	8.5	<0.1	2.4	4.0	1.1	3.0	2.7	18	19	8.4
100	2.7	9.0	<0.1	3.7	6.7	1.2	3.3	2.1	29	30	8.6

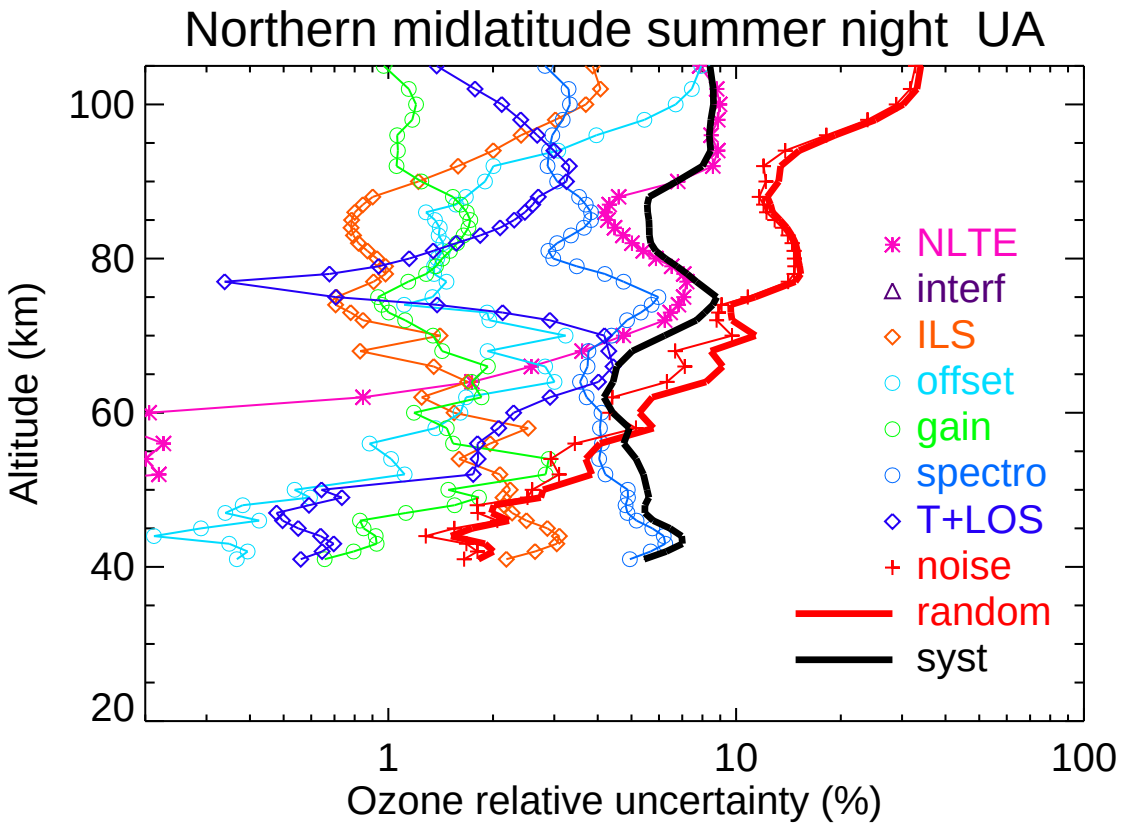

Figure S48. V8R_O3_661 Northern midlatitude summer night.

Table S51. Ozone error budget for Northern midlatitude autumn day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.7	<0.1	0.1	2.4	0.6	1.1	6.1	0.8	2.9	3.2	6.6
60	0.9	0.6	<0.1	1.9	1.9	1.4	5.5	2.5	5.7	6.6	5.8
70	0.2	4.4	<0.1	0.8	2.3	1.0	5.5	2.9	13	14	6.7
80	0.2	5.0	<0.1	0.7	2.5	1.2	3.6	0.1	16	17	5.8
90	1.0	5.8	<0.1	1.9	5.8	1.1	3.5	1.0	23	24	6.4
96	0.5	8.0	<0.1	2.9	9.2	0.7	3.8	1.4	35	37	7.6

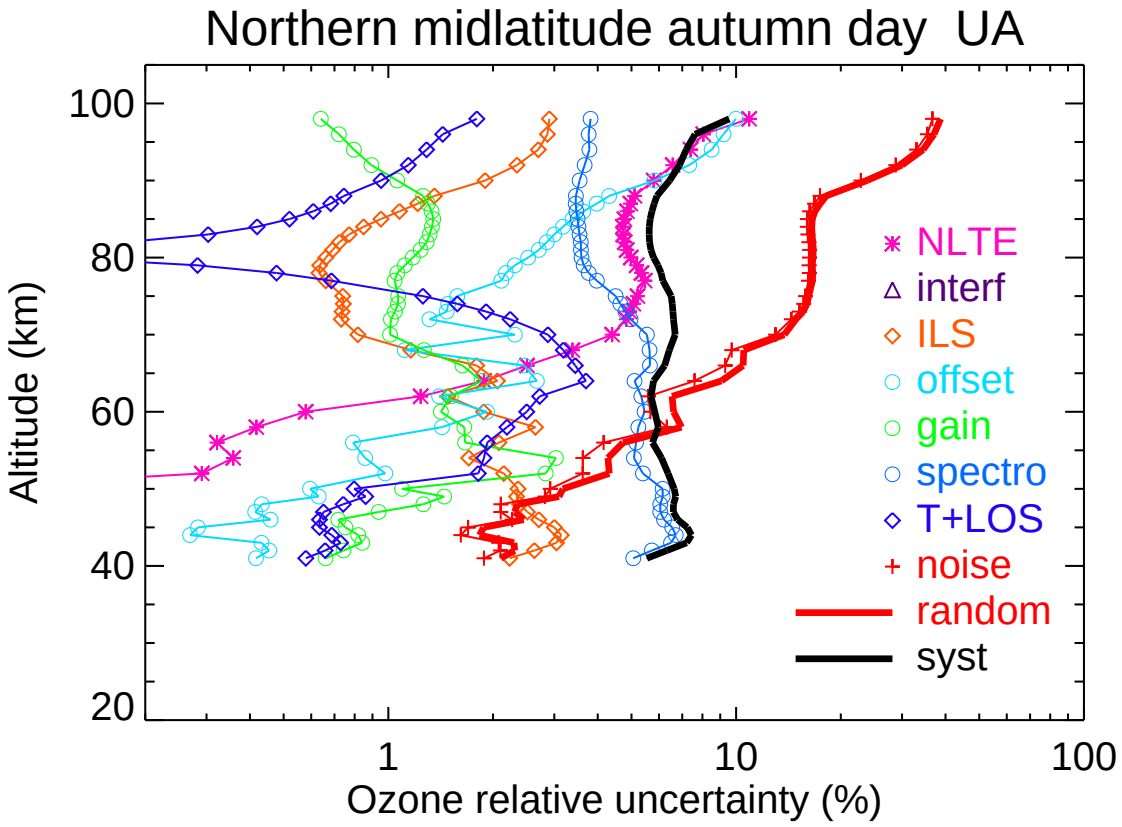

Figure S49. V8R_O3_661 Northern midlatitude autumn day.

Table S52. Ozone error budget for Northern midlatitude autumn night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.8	<0.1	0.1	2.3	0.7	1.3	6.1	0.8	3.1	3.5	6.6
60	1.4	0.6	<0.1	1.8	1.7	1.6	3.8	2.5	5.2	6.2	4.3
70	1.0	2.7	<0.1	1.0	3.4	1.7	4.6	4.8	10	12	4.8
80	0.4	4.4	<0.1	0.4	1.4	1.5	4.1	0.6	14	15	4.8
90	10	5.0	<0.1	0.7	1.7	1.6	2.9	1.4	11	11	5.4
96	11	7.1	<0.1	1.9	2.1	1.1	2.8	2.0	13	14	7.2
100	8.6	5.6	<0.1	3.6	4.5	2.8	2.9	2.1	21	22	6.2
110	1.5	0.4	<0.1	2.9	7.4	1.6	2.6	1.3	35	36	4.2

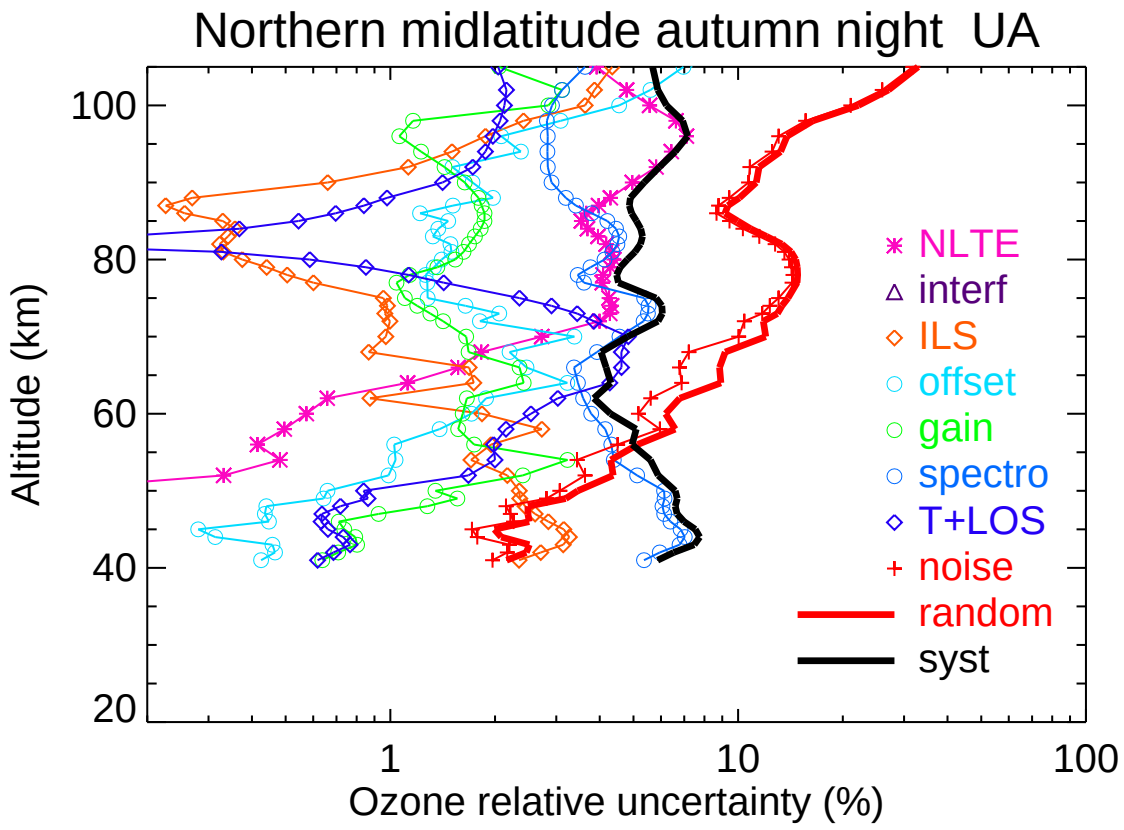

Figure S50. V8R_O3_661 Northern midlatitude autumn night.

Table S53. Ozone error budget for Tropics day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
40	6.6	<0.1	0.1	2.1	0.3	0.7	4.9	0.5	1.5	1.7	5.3
50	2.6	<0.1	0.1	2.3	0.6	1.4	5.3	0.8	2.6	3.0	5.8
60	1.1	0.5	<0.1	2.0	1.6	1.3	5.3	2.3	5.1	6.1	5.6
70	0.2	5.6	<0.1	0.7	1.9	0.8	6.8	2.9	12	13	8.6
80	0.2	5.9	<0.1	0.6	2.1	1.3	3.4	0.1	16	16	6.7
90	0.9	6.1	<0.1	1.7	4.5	1.1	3.3	1.2	19	20	6.3
96	0.7	12	<0.1	3.1	8.5	1.2	4.0	1.5	33	36	8.4
100	0.7	14	<0.1	3.0	9.3	1.8	3.9	1.7	36	39	12

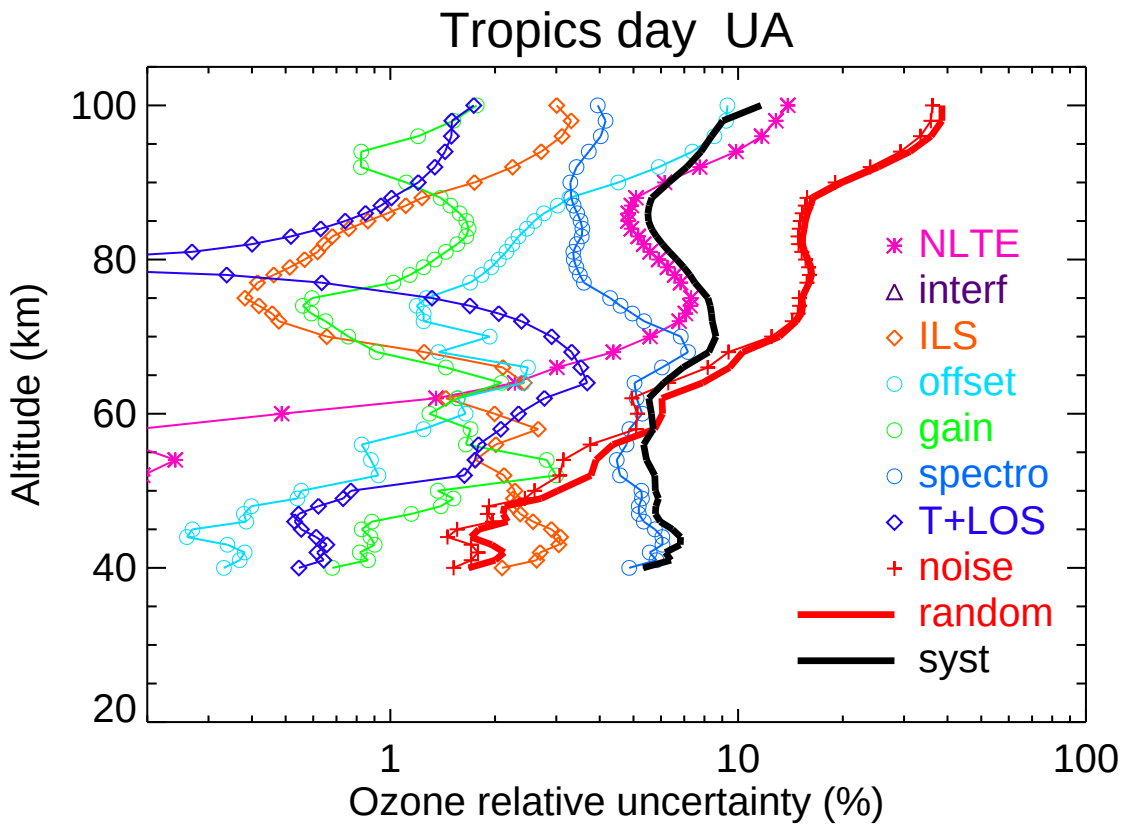

Figure S51. V8R_O3_661 Tropics day.

Table S54. Ozone error budget for Tropics night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.8	0.1	0.2	2.2	0.7	1.8	5.2	0.9	2.9	3.2	5.9
60	1.4	0.3	<0.1	2.1	1.5	1.8	3.8	2.4	4.3	5.3	4.6
70	1.2	5.9	<0.1	1.2	3.2	1.4	4.2	5.7	11	13	6.9
80	0.7	5.9	<0.1	0.3	1.5	2.2	5.1	0.1	12	13	7.1
90	8.6	6.9	<0.1	0.8	1.4	1.5	2.8	2.0	10	10	7.2
96	15	13	<0.1	1.3	2.0	1.2	2.7	2.8	11	13	12
100	12	10	<0.1	2.4	3.8	1.0	2.8	3.2	17	18	10

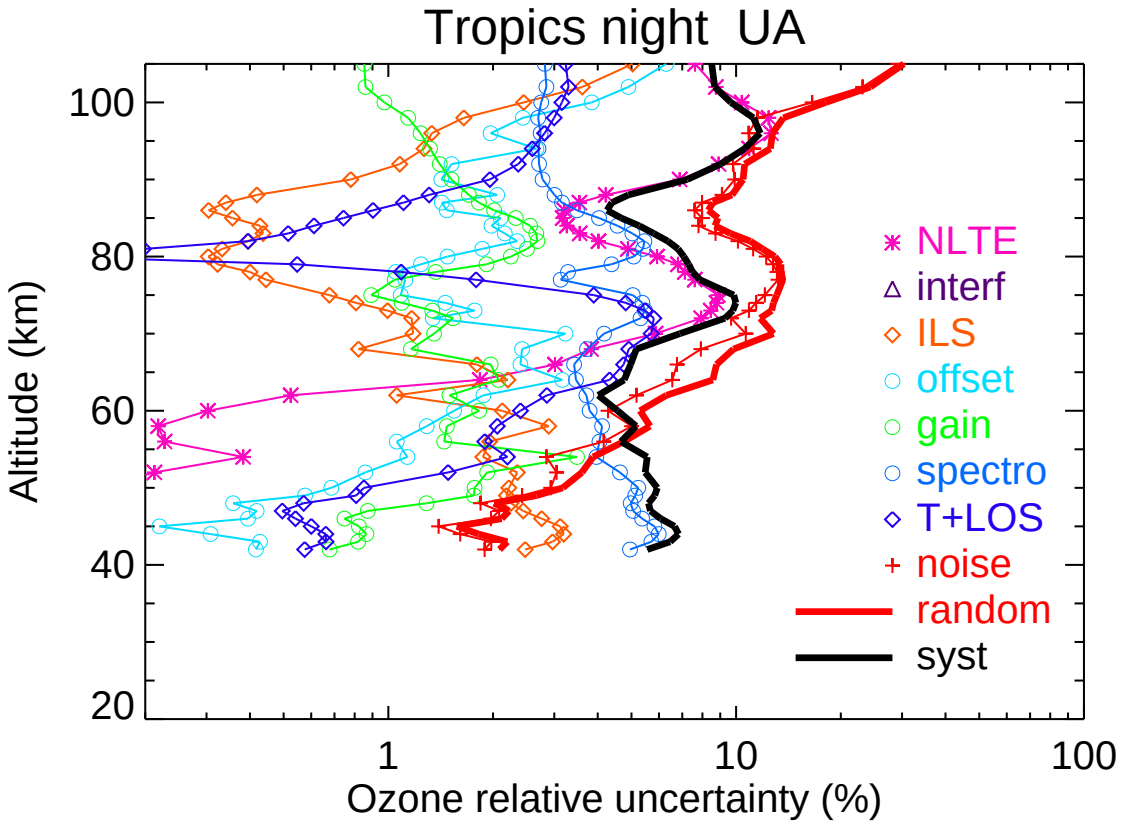

Figure S52. V8R_O3_661 Tropics night.

Table S55. Ozone error budget for Southern midlatitude winter day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.2	<0.1	0.2	2.3	0.8	1.2	6.2	0.9	3.4	4.2	6.4
60	0.7	0.8	<0.1	2.1	1.6	1.7	5.2	2.4	6.2	7.1	5.6
70	0.2	3.9	<0.1	1.3	1.7	1.2	5.5	2.3	13	14	6.4
80	0.1	3.7	<0.1	0.8	2.9	1.3	3.6	0.2	17	18	5.0
90	0.8	5.3	<0.1	2.0	6.6	1.1	3.6	1.0	25	26	6.2
96	0.4	5.9	<0.1	2.8	10	1.0	3.4	1.2	37	38	7.1

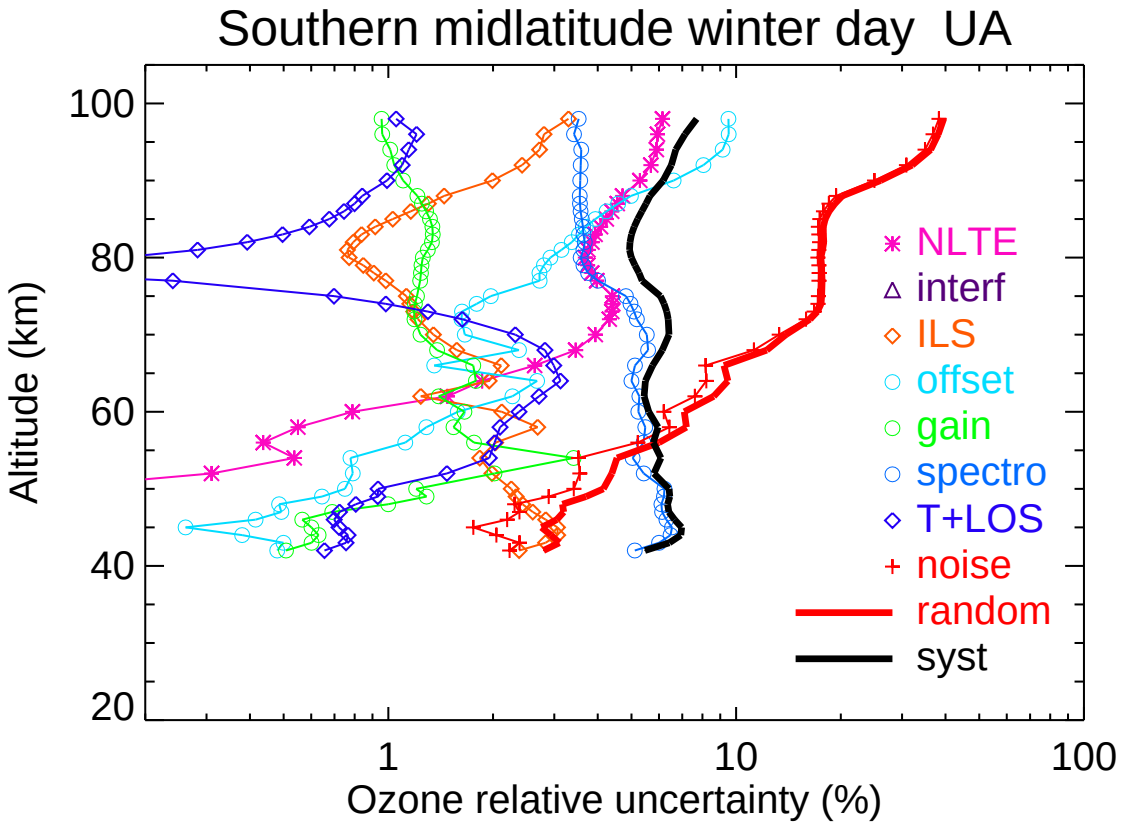

Figure S53. V8R_O3_661 Southern midlatitude winter day.

Table S56. Ozone error budget for Southern midlatitude winter night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.4	0.1	0.1	2.3	0.7	1.3	6.2	0.9	3.3	4.0	6.5
60	1.3	0.9	<0.1	2.0	1.6	2.0	3.8	2.4	5.0	6.1	4.5
70	0.9	3.3	<0.1	1.3	3.2	1.7	4.8	4.1	10	12	4.9
80	0.4	3.9	<0.1	0.6	1.4	1.7	3.8	<0.1	14	15	4.3
90	5.1	4.5	<0.1	1.3	1.3	1.3	3.0	1.8	12	13	5.0
96	6.2	5.0	<0.1	3.1	4.0	1.0	2.9	1.7	18	19	6.0
100	3.3	4.7	<0.1	4.3	7.0	1.0	2.9	1.3	30	31	6.5

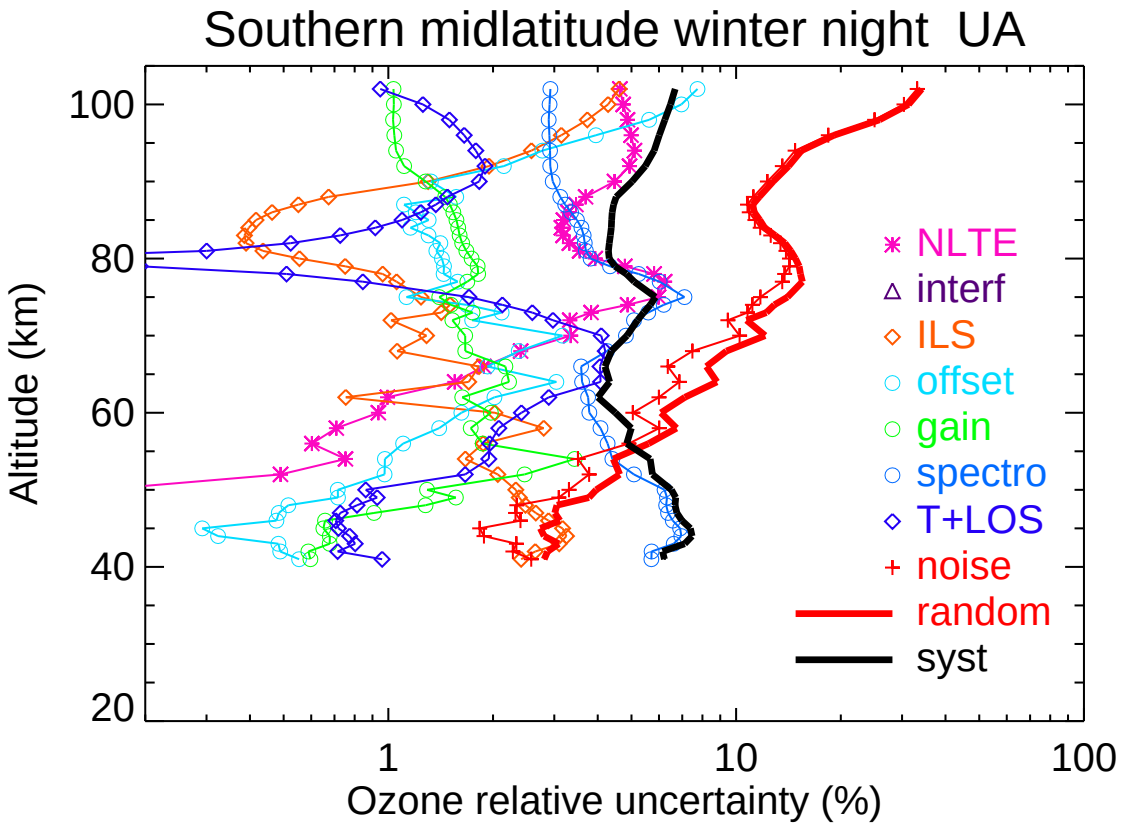

Figure S54. V8R_O3_661 Southern midlatitude winter night.

Table S57. Ozone error budget for Southern midlatitude spring day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.5	<0.1	0.2	2.3	0.7	1.6	5.7	0.9	3.0	3.5	6.2
60	0.9	0.5	<0.1	2.1	1.4	1.7	5.0	2.2	4.8	5.6	5.6
70	0.2	4.7	<0.1	0.7	2.0	1.0	5.1	2.5	12	13	6.7
80	0.2	5.8	<0.1	0.6	2.0	1.2	3.6	0.2	15	15	6.6
90	0.8	6.2	<0.1	1.9	5.2	1.1	3.5	1.3	21	22	6.4
96	0.5	10	<0.1	3.2	8.5	1.0	3.7	2.0	34	36	8.3
100	0.5	11	<0.1	3.0	8.7	0.8	3.0	2.2	36	37	12

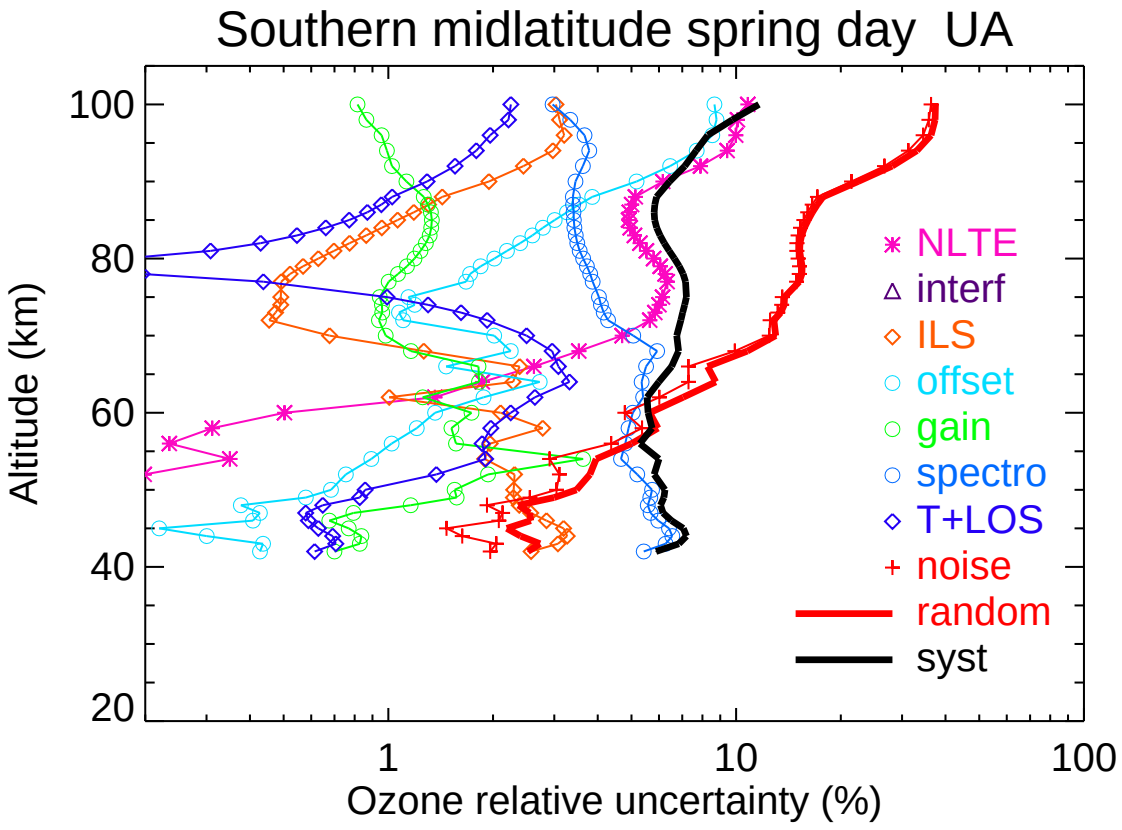

Figure S55. V8R_O3_661 Southern midlatitude spring day.

Table S58. Ozone error budget for Southern midlatitude spring night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.7	<0.1	0.2	2.2	0.7	1.7	5.3	0.8	2.9	3.2	5.9
60	1.4	0.3	<0.1	2.1	1.5	1.7	3.7	2.3	4.3	5.2	4.5
70	1.2	3.6	<0.1	0.6	3.4	1.4	3.7	4.8	10	11	4.8
80	0.2	5.0	<0.1	0.4	1.1	1.1	3.2	0.2	14	14	5.5
90	8.1	6.3	<0.1	1.2	1.0	1.6	3.1	2.9	10	11	6.4
96	13	8.5	<0.1	2.2	2.0	1.4	2.7	3.2	11	12	8.5
100	7.7	7.6	<0.1	3.5	4.8	1.1	2.8	2.7	22	23	8.0

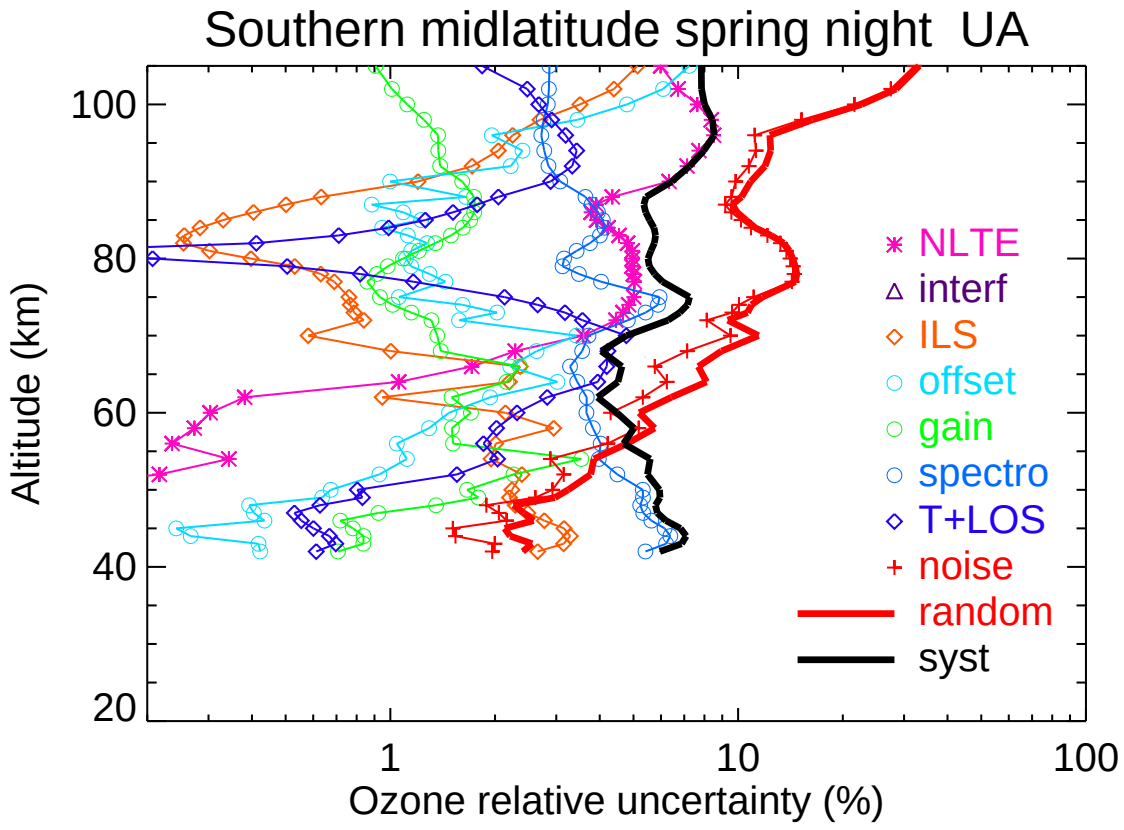

Figure S56. V8R_O3_661 Southern midlatitude spring night.

Table S59. Ozone error budget for Southern midlatitude summer day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.4	<0.1	0.2	2.2	0.7	1.7	5.1	0.8	2.8	3.1	5.8
60	1.0	0.5	<0.1	2.3	1.3	2.1	4.5	2.6	3.9	5.0	5.5
70	0.3	5.7	<0.1	0.5	2.5	0.7	6.6	2.9	12	13	8.6
80	0.2	7.1	<0.1	0.3	2.0	1.2	3.6	1.6	15	16	7.3
90	1.1	8.8	<0.1	1.9	4.7	1.0	3.6	2.2	19	20	8.5
96	0.6	11	<0.1	3.3	8.7	0.8	4.0	2.2	34	36	11
100	0.4	8.9	<0.1	3.2	10	0.4	3.7	1.5	38	39	10

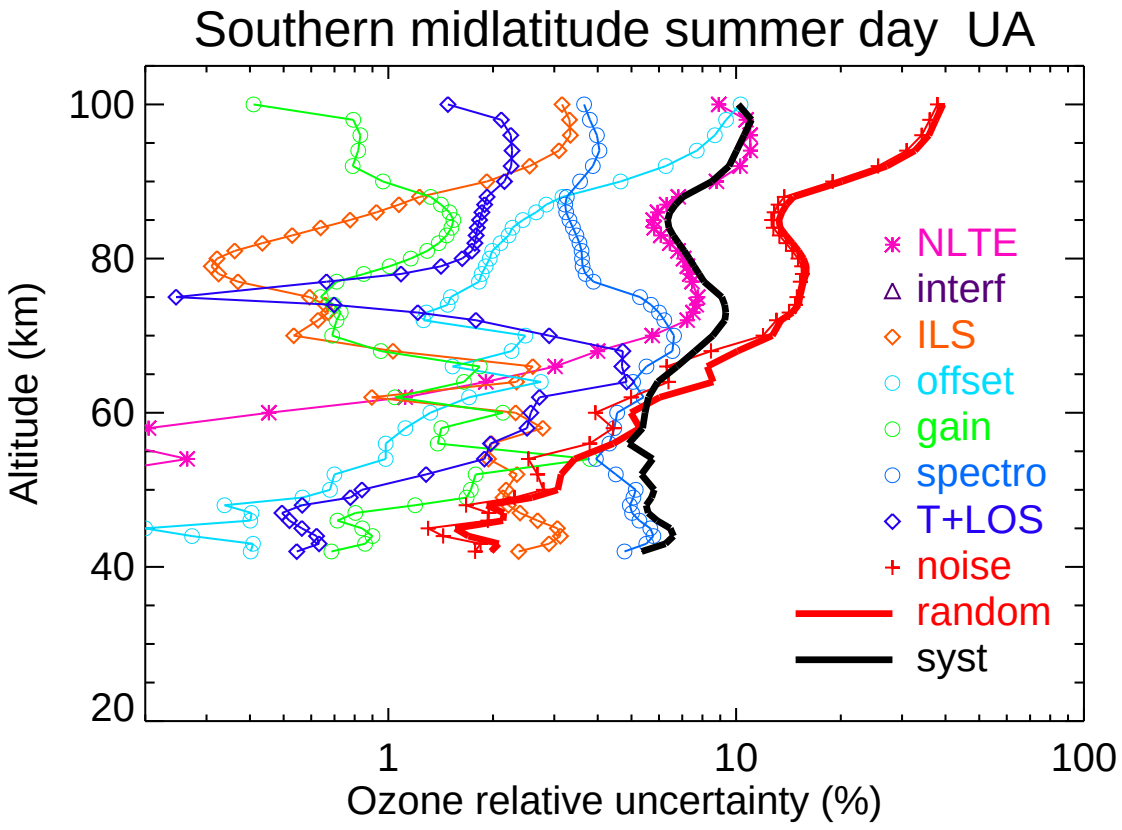

Figure S57. V8R_O3_661 Southern midlatitude summer day.

Table S60. Ozone error budget for Southern midlatitude summer night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.8	<0.1	0.2	2.2	0.7	1.8	5.0	0.8	2.8	3.1	5.7
60	1.4	0.3	<0.1	2.3	1.5	2.0	3.7	2.3	4.2	5.2	4.7
70	1.1	4.5	<0.1	1.0	3.4	1.3	3.6	4.7	9.2	11	5.6
80	0.1	6.0	<0.1	0.9	1.4	1.4	3.2	1.0	15	15	6.4
90	3.4	5.4	<0.1	1.6	1.4	1.3	3.3	2.4	12	13	6.0
96	6.4	7.7	<0.1	1.9	3.0	1.1	2.8	2.1	14	15	7.6
100	3.9	7.4	<0.1	2.9	6.1	1.0	3.0	1.8	26	27	7.7

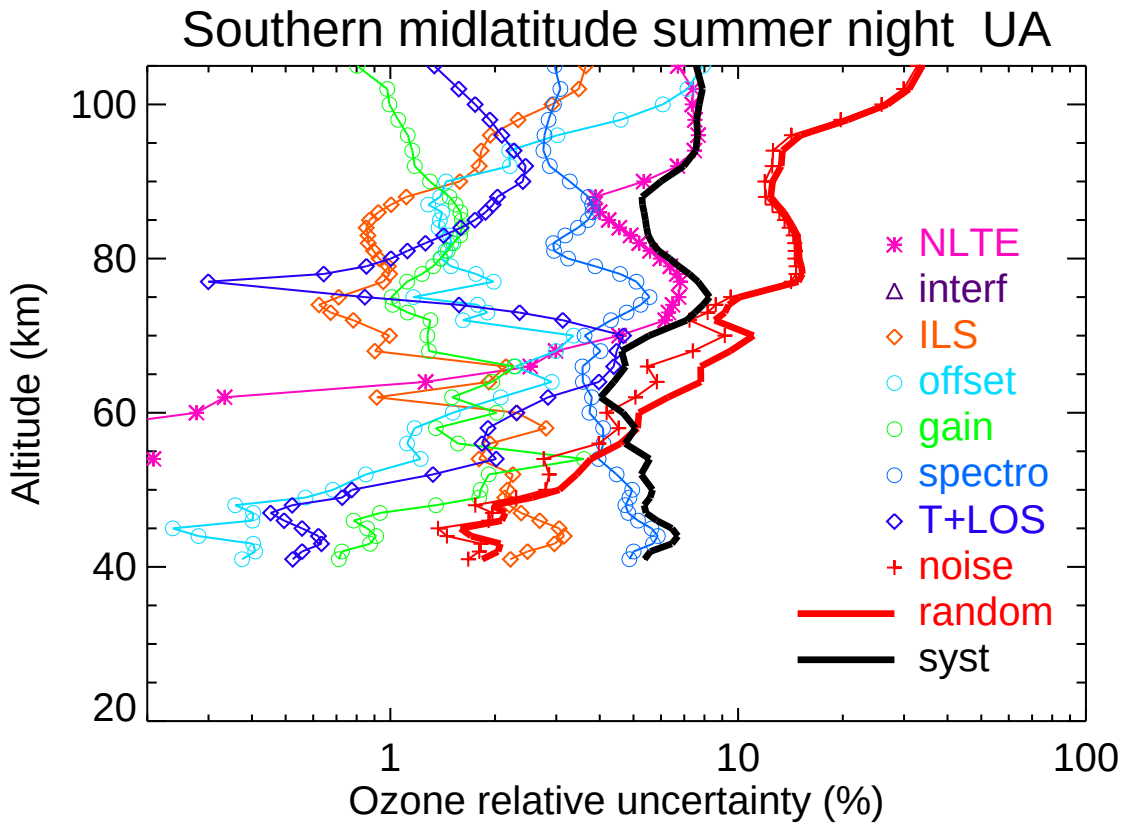

Figure S58. V8R_O3_661 Southern midlatitude summer night.

Table S61. Ozone error budget for Southern midlatitude autumn day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.7	<0.1	0.1	2.4	0.7	1.3	6.7	1.0	3.4	3.7	7.2
60	0.8	0.8	<0.1	1.9	1.6	1.6	5.8	2.6	6.4	7.3	6.2
70	0.3	2.4	<0.1	1.2	1.8	1.5	5.3	2.3	12	12	5.8
80	0.1	4.5	<0.1	0.7	3.1	1.1	3.7	<0.1	17	18	5.7
90	0.9	6.7	<0.1	1.8	6.4	1.1	3.6	1.0	24	25	6.9
96	0.6	9.3	<0.1	2.8	9.0	0.8	3.8	1.5	35	37	8.6

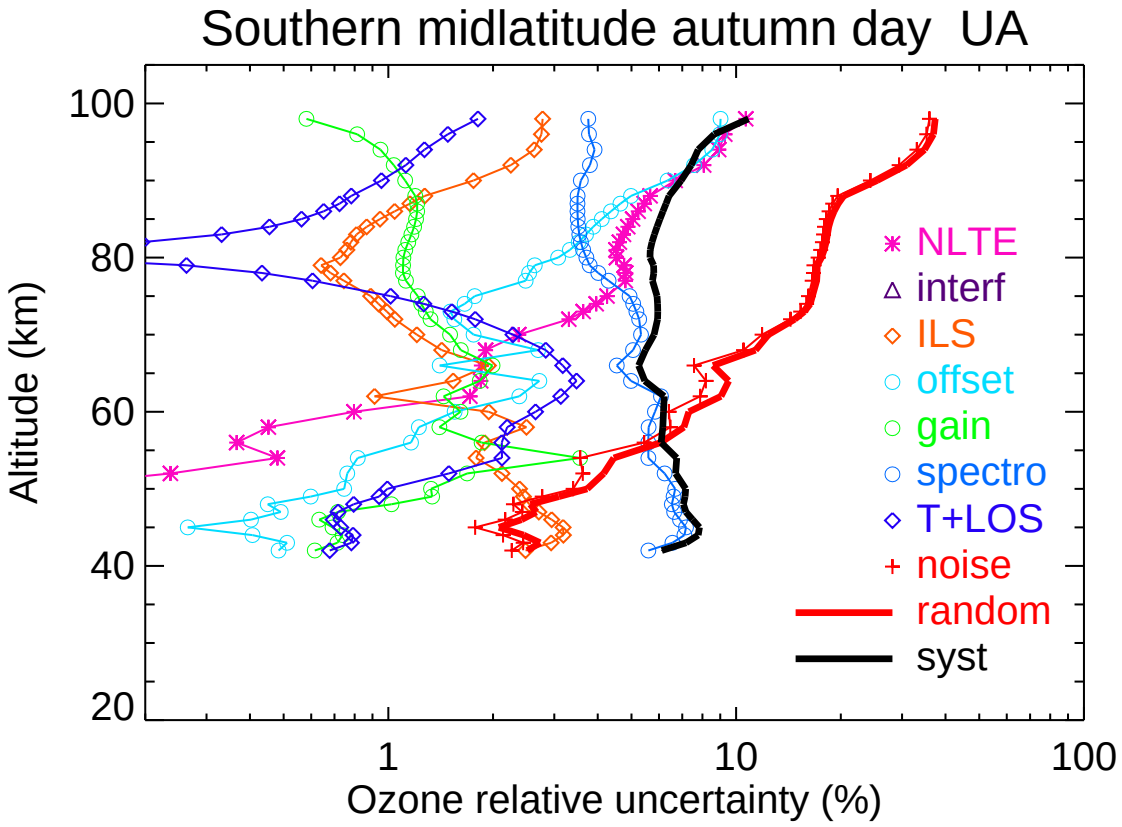

Figure S59. V8R_O3_661 Southern midlatitude autumn day.

Table S62. Ozone error budget for Southern midlatitude autumn night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.8	<0.1	0.1	2.3	0.7	1.5	5.9	0.9	3.3	3.5	6.5
60	1.4	0.5	<0.1	2.0	1.5	1.6	4.3	2.7	5.8	6.8	4.7
70	1.0	1.7	<0.1	1.2	3.0	1.9	5.0	4.4	10	11	5.3
80	0.3	3.8	<0.1	0.3	1.2	1.0	3.3	0.6	15	15	4.4
90	10	6.5	<0.1	0.6	1.3	1.6	3.1	1.6	11	11	6.7
96	11	7.4	<0.1	2.3	2.4	1.1	2.7	1.9	14	14	7.4
100	6.6	6.6	<0.1	3.7	5.5	1.1	2.7	2.0	25	26	7.1

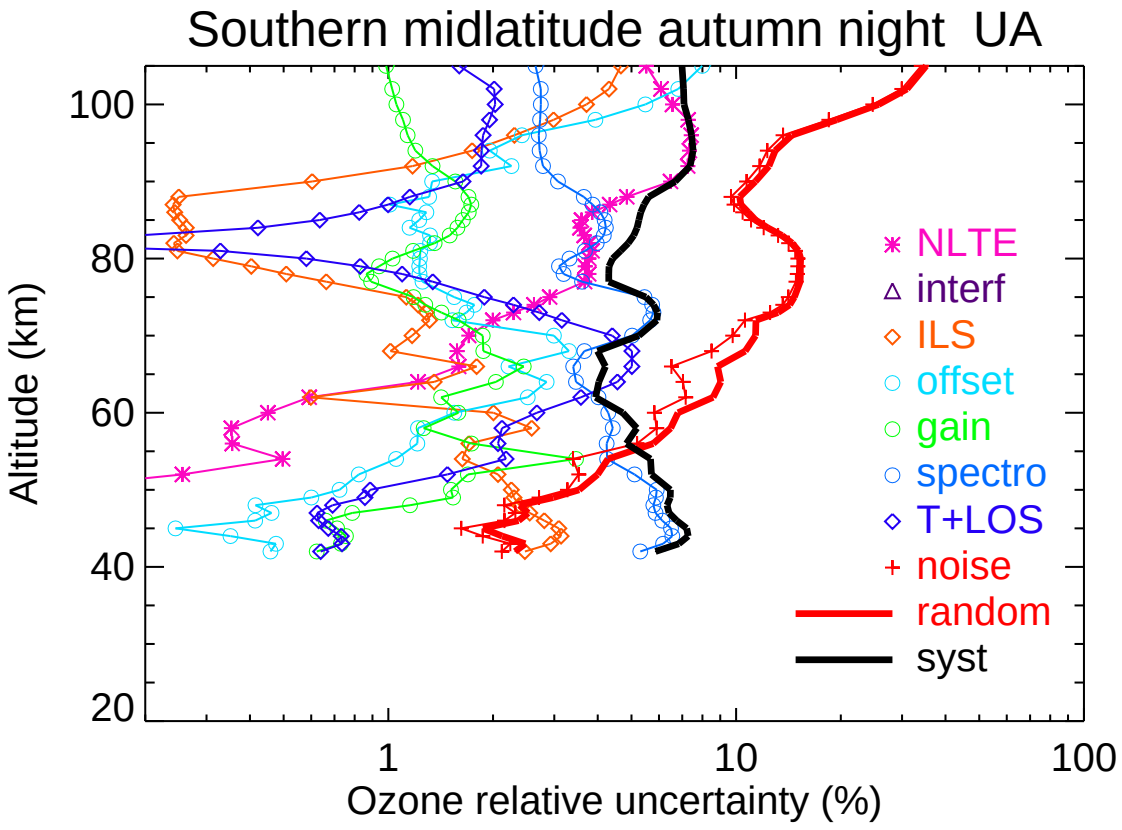

Figure S60. V8R_O3_661 Southern midlatitude autumn night.

Table S63. Ozone error budget for Southern polar winter day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	1.5	0.2	0.2	1.8	0.8	0.9	5.2	0.9	3.7	4.2	5.4
60	0.5	0.8	<0.1	2.4	1.4	1.7	4.5	1.8	6.0	6.6	5.2
70	0.1	2.6	<0.1	1.4	1.3	1.2	5.1	1.5	15	15	5.6
80	0.1	3.8	<0.1	0.8	3.6	1.1	3.7	0.2	18	19	5.0
90	0.6	5.5	<0.1	2.1	7.4	1.1	3.6	1.0	27	28	6.0
96	0.4	6.5	<0.1	2.7	10	0.9	3.5	1.1	38	40	7.0

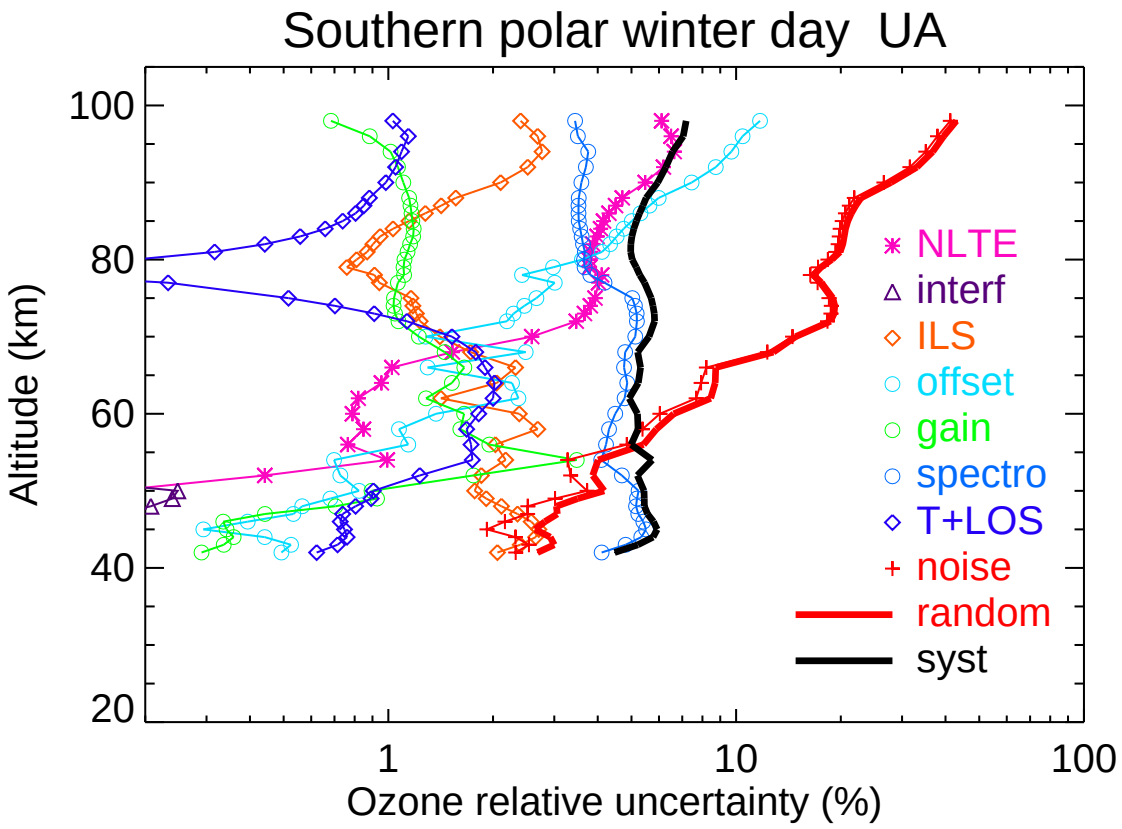

Figure S61. V8R_O3_661 Southern polar winter day.

Table S64. Ozone error budget for Southern polar winter night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	1.4	0.5	0.2	1.5	0.9	1.2	5.4	0.9	4.0	4.4	5.6
60	1.4	2.1	<0.1	2.5	1.4	2.0	3.2	1.9	5.6	6.3	4.7
70	1.7	2.7	<0.1	0.6	2.9	2.1	4.5	4.6	8.6	11	4.4
80	0.8	2.8	<0.1	0.7	1.2	1.6	3.4	0.9	13	13	3.8
90	6.9	6.2	<0.1	1.5	1.6	1.2	3.1	0.9	13	13	6.4
96	7.9	6.9	<0.1	3.6	3.9	0.9	3.0	1.8	18	19	7.6
100	5.0	6.8	<0.1	5.0	6.8	0.9	3.1	2.3	29	30	8.2

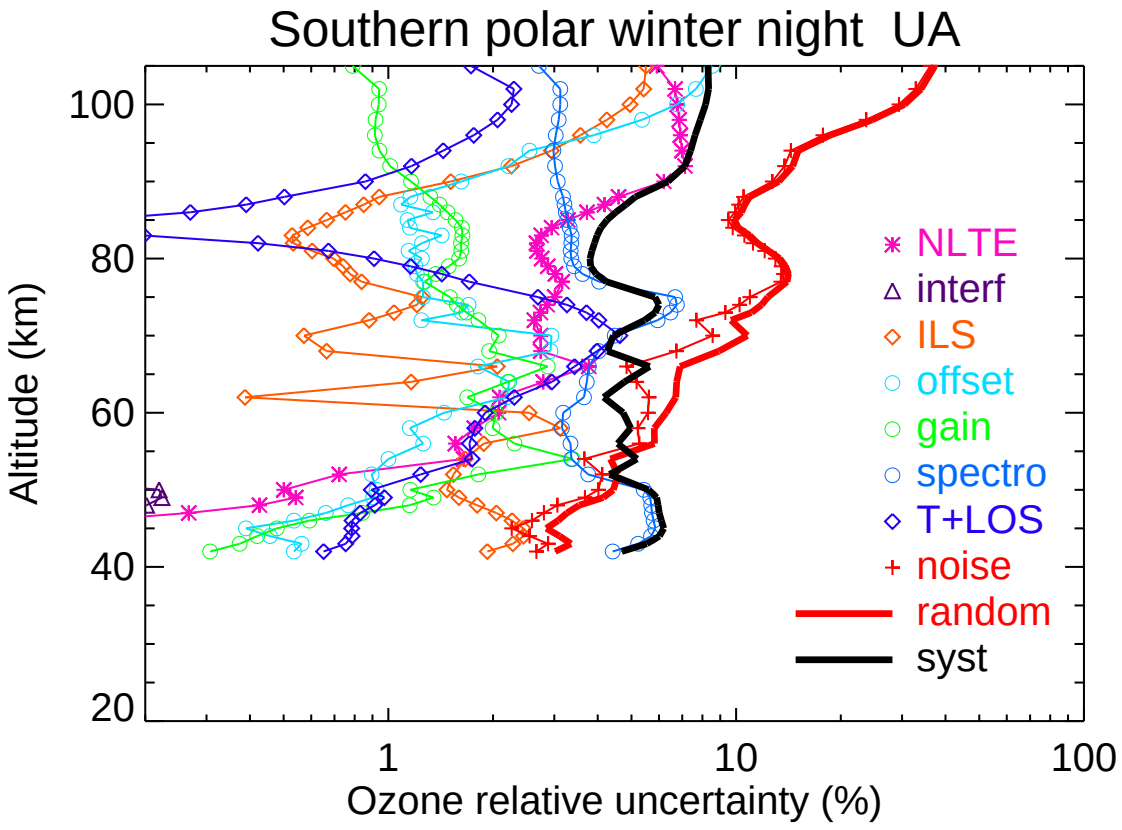

Figure S62. V8R_O3_661 Southern polar winter night.

Table S65. Ozone error budget for Southern polar spring day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.3	<0.1	0.2	2.3	0.7	1.7	4.9	0.9	2.8	3.2	5.6
60	0.9	0.2	<0.1	2.4	1.1	2.1	4.5	2.0	4.1	4.8	5.4
70	0.3	4.4	<0.1	0.8	2.2	0.9	5.7	2.0	11	12	7.1
80	0.1	6.7	<0.1	0.5	2.0	1.1	3.7	0.6	15	16	6.9
90	0.7	6.4	<0.1	2.1	4.6	1.2	3.1	1.9	19	20	6.2
96	0.4	9.0	<0.1	3.5	8.2	1.0	3.4	2.3	34	36	7.8
100	0.4	6.5	<0.1	3.6	11	0.7	2.9	1.9	40	42	8.0

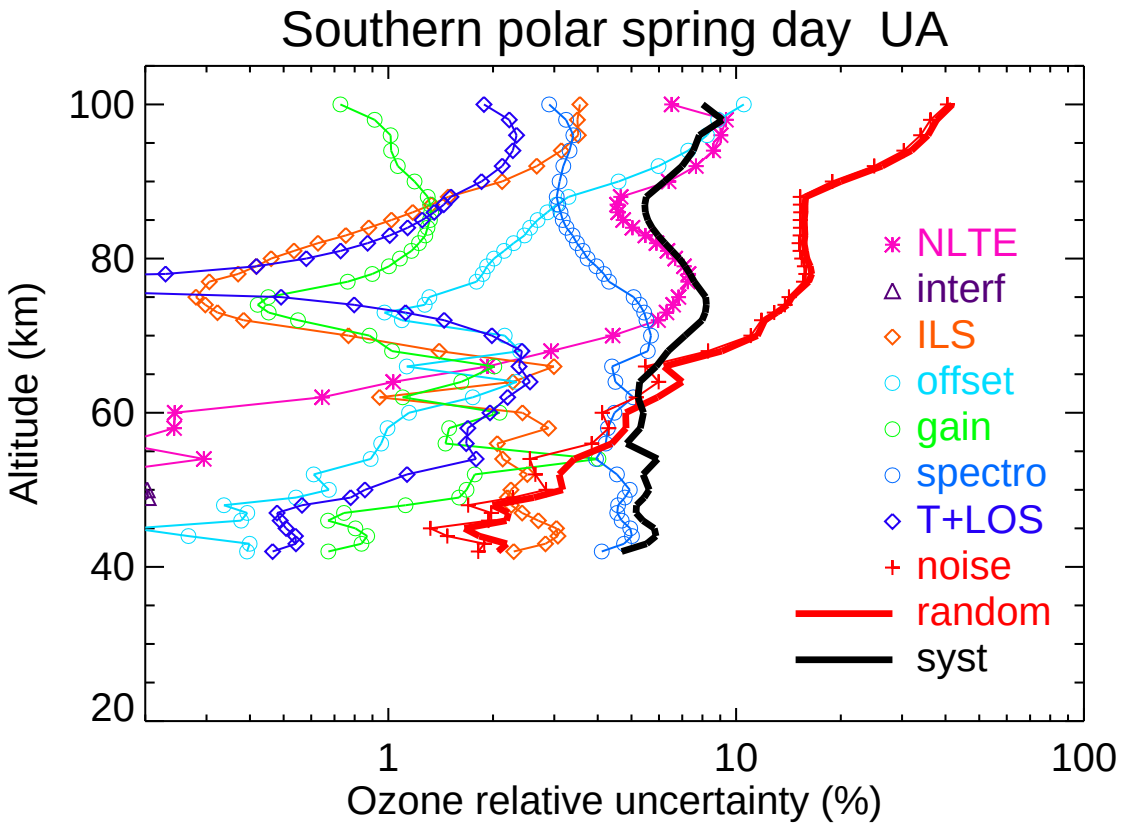

Figure S63. V8R_O3_661 Southern polar spring day.

Table S66. Ozone error budget for Southern polar spring night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.5	0.1	0.2	2.3	0.7	1.7	5.4	0.8	3.0	3.5	5.9
60	1.4	0.4	<0.1	2.2	1.4	1.9	3.8	2.3	4.8	5.7	4.5
70	1.2	4.8	<0.1	0.8	3.0	1.6	3.8	5.2	10	12	5.8
80	0.3	4.4	<0.1	0.3	1.1	1.5	3.4	0.2	14	14	5.4
90	10	6.7	<0.1	0.8	1.6	1.6	2.9	2.7	10	11	7.0
96	12	7.2	<0.1	2.2	2.1	1.3	2.7	3.3	11	12	7.7
100	7.3	6.3	<0.1	3.6	4.5	1.1	2.6	3.1	21	21	7.2

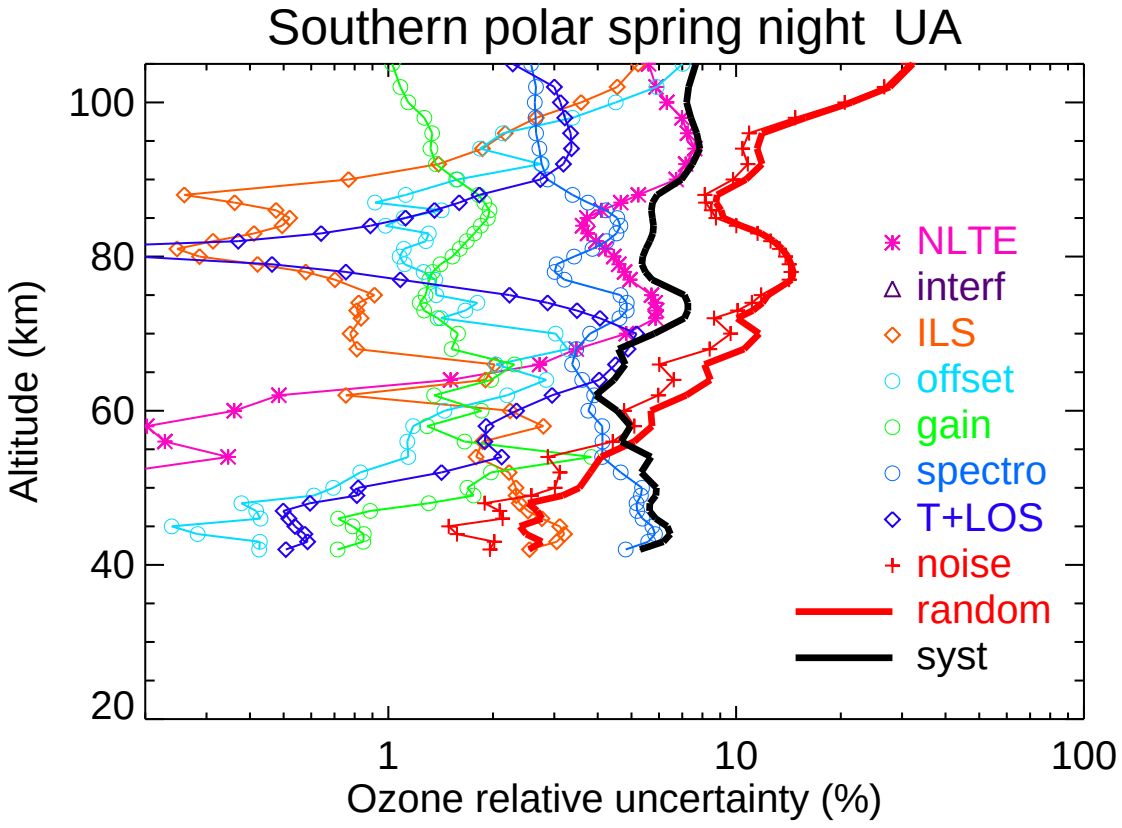

Figure S64. V8R_O3_661 Southern polar spring night.

Table S67. Ozone error budget for Southern polar summer day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.3	<0.1	0.2	2.1	0.6	2.0	4.3	0.8	2.5	2.8	5.2
60	1.0	0.2	<0.1	2.8	1.3	3.0	3.6	2.0	3.3	4.2	5.4
70	0.4	3.2	<0.1	1.5	2.8	1.4	5.4	2.0	9.1	10	6.3
80	0.1	7.5	<0.1	0.3	2.2	0.4	4.2	1.2	16	16	8.2
90	0.9	8.1	<0.1	2.0	3.7	1.4	3.2	3.5	15	17	6.7
96	0.6	14	<0.1	3.9	7.4	1.7	4.8	3.2	30	33	11

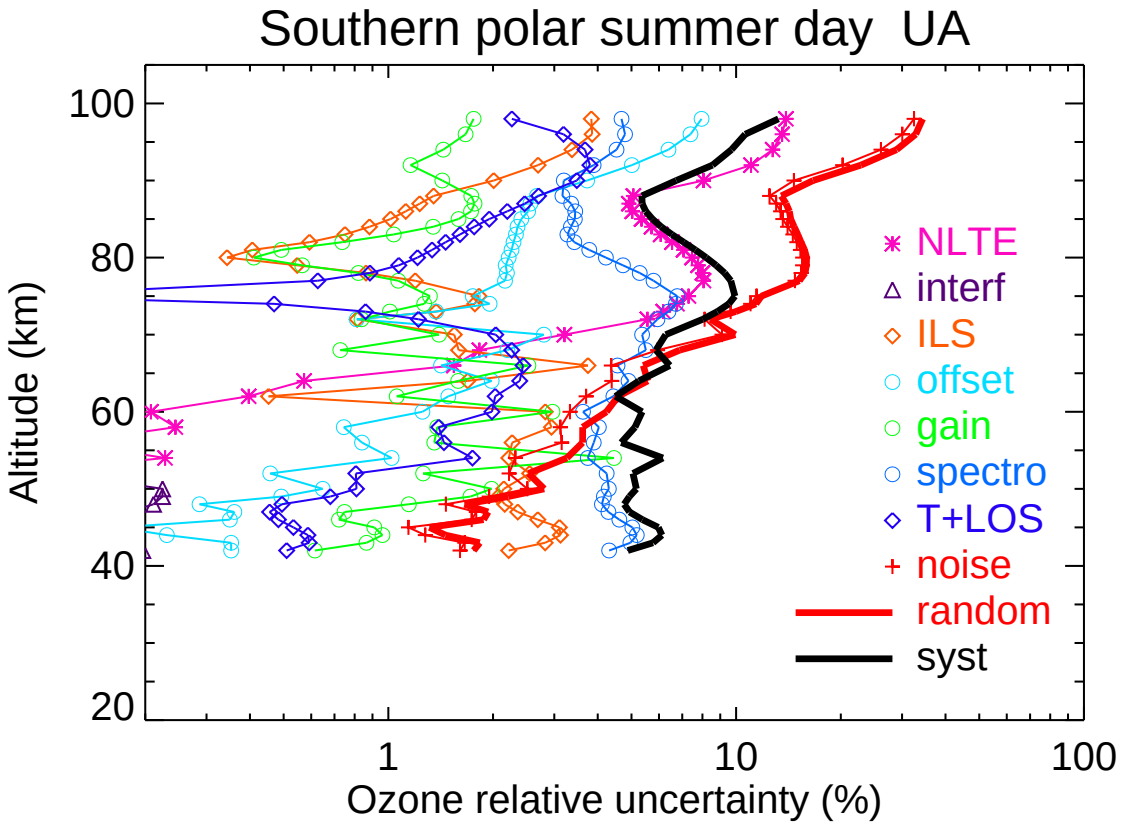

Figure S65. V8R_O3_661 Southern polar summer day.

Table S68. Ozone error budget for Southern polar summer night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.6	<0.1	0.2	2.1	0.7	1.9	5.0	0.8	2.9	3.2	5.7
60	1.4	0.2	<0.1	2.7	1.4	2.1	3.7	2.2	4.3	5.1	4.9
70	1.2	3.7	<0.1	0.8	3.0	1.2	3.7	4.2	8.6	10	5.1
80	0.1	5.8	<0.1	0.8	1.5	1.2	3.2	1.2	15	15	6.4
90	3.9	5.6	<0.1	1.8	1.9	1.3	3.2	2.7	12	13	6.2
96	6.2	7.2	<0.1	2.7	3.7	1.2	2.9	2.0	16	17	7.7
100	3.3	6.6	<0.1	3.9	6.6	1.2	3.2	1.5	28	29	7.5

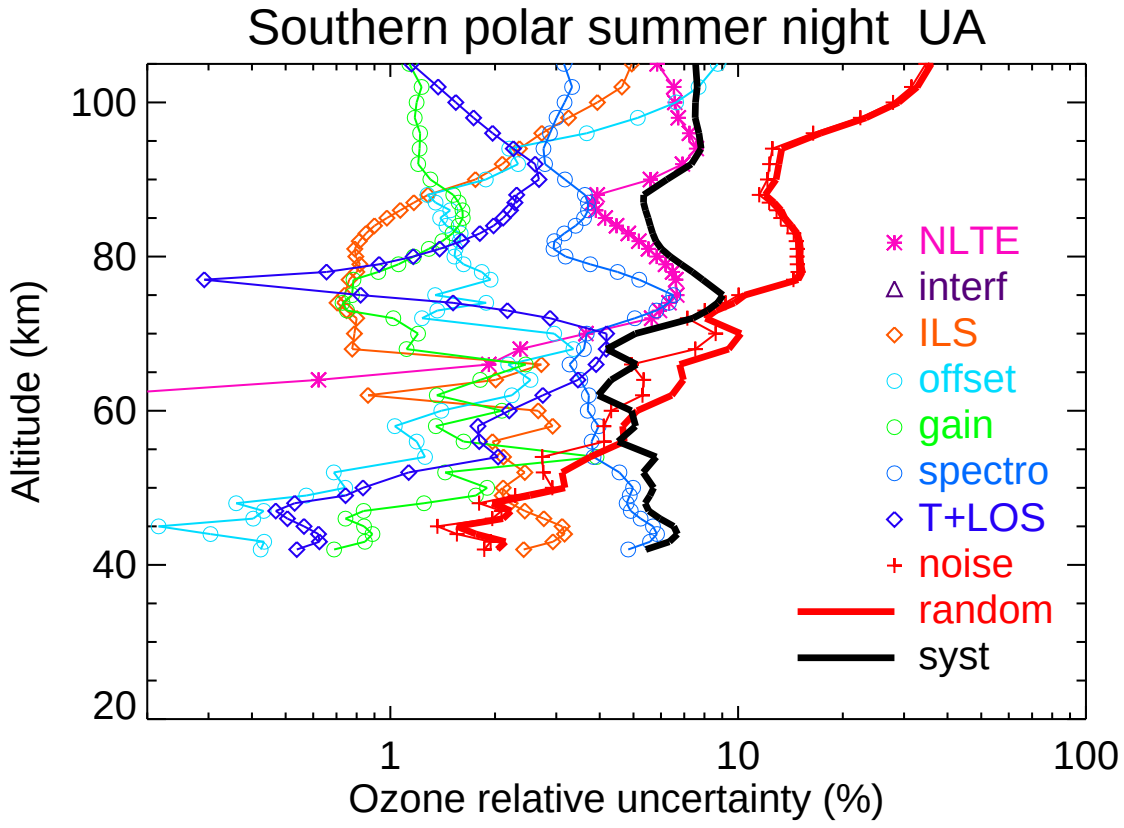

Figure S66. V8R_O3_661 Southern polar summer night.

Table S69. Ozone error budget for Southern polar autumn day, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.3	0.2	0.1	2.2	0.7	1.3	6.6	1.1	3.3	4.0	6.8
60	0.7	0.9	<0.1	2.2	1.5	1.7	5.1	2.1	6.3	7.0	5.7
70	0.2	2.0	<0.1	1.4	1.5	1.2	6.2	2.1	14	14	6.5
80	0.1	3.7	<0.1	0.7	3.2	1.0	3.9	<0.1	18	18	5.2
90	1.0	5.9	<0.1	1.7	6.5	0.9	3.9	0.8	24	25	6.8
96	0.7	7.4	<0.1	2.3	10	0.8	4.2	1.1	37	39	7.8
100	0.8	8.4	<0.1	2.3	12	1.1	4.1	1.5	41	43	9.4

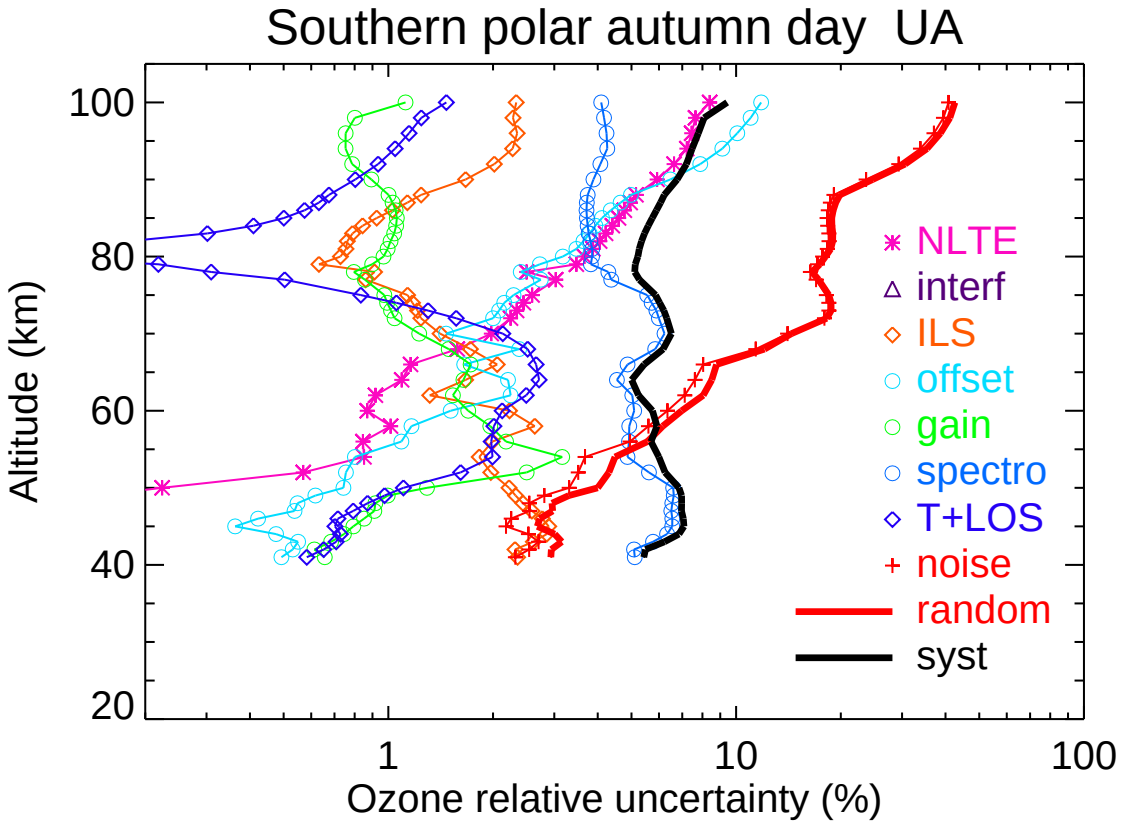

Figure S67. V8R_O3_661 Southern polar autumn day.

Table S70. Ozone error budget for Southern polar autumn night, UA. All uncertainties are 1σ.

altitude (km)	mean O_3 vmr (ppmv)	NLTE (%)	interf (%)	ILS (%)	offset (%)	gain (%)	spectro (%)	T+LOS (%)	noise (%)	random (%)	syst (%)
50	2.2	0.4	0.2	2.0	0.9	1.4	6.7	1.1	3.8	4.2	7.1
60	1.3	1.4	<0.1	2.8	1.6	2.0	3.2	2.1	6.5	7.1	4.7
70	2.4	2.2	<0.1	0.7	2.9	2.0	4.2	5.5	7.1	10	3.9
80	0.8	2.1	<0.1	0.8	1.2	1.5	3.5	1.2	13	14	3.8
90	11	4.7	<0.1	0.8	2.2	1.4	3.2	0.7	12	12	5.5
96	12	7.1	<0.1	3.2	2.8	1.0	3.0	1.8	14	15	7.6
100	8.8	5.9	<0.1	4.7	5.3	0.9	3.2	2.1	24	25	7.6

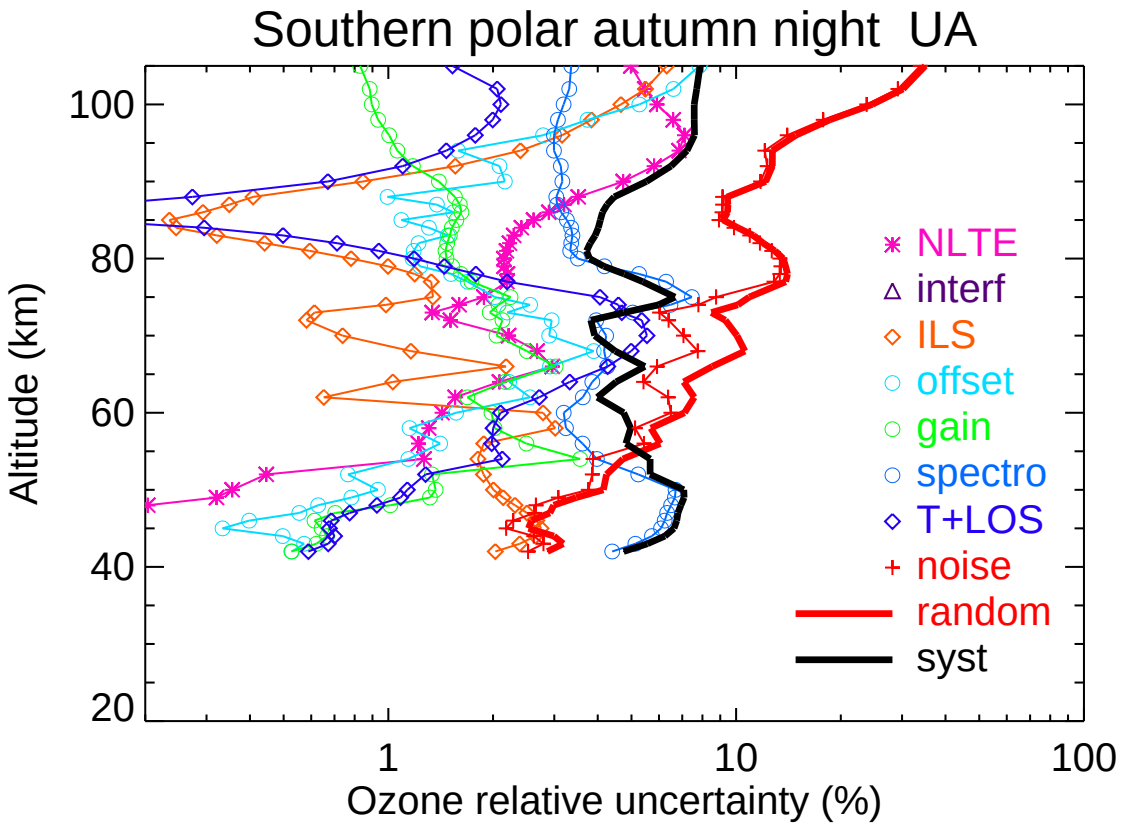

Figure S68. V8R_O3_661 Southern polar autumn night.