

Supplements: Ozone Profile Retrieval from nadir TROPOMI measurements in the UV range

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S1 Sensitivity study: Correction of Ring effect and polarisation

To estimate the effectiveness of ring and polarisation correction, synthetic spectra with and without ring or polarisation were simulated. The radiances with polarisation/Ring were processed by using the ozone profile retrieval containing the respective correction. For a comparison, the synthetic spectra including polarisation/Ring were retrieved without the corrections. Figures S1 and S2 in the supplements show the effect of polarisation and ring effect when these are not considered in the retrieval. With polarisation, a larger scattering is shown below 20 km. That is to be expected, since polarisation occurs mainly in the longer wavelengths and these influence the profile near the ground. The Rotational Raman Scattering (Ring effect) also influences the lower part of the ozone profile, but is effective up to about 35 km. If the Ring effect is completely ignored in the retrieval, very large deviations of well over 50% occur.

Including the corrections for polarisation (Fig. S3) and Ring (Fig. S4), the previous deviations disappear completely (see figure 1 in the publication).

S2 Data: Ozone sonde and lidar measurements

The the location, name and number of profiles of the used ozone sonde and lidar station are given in Table S1.

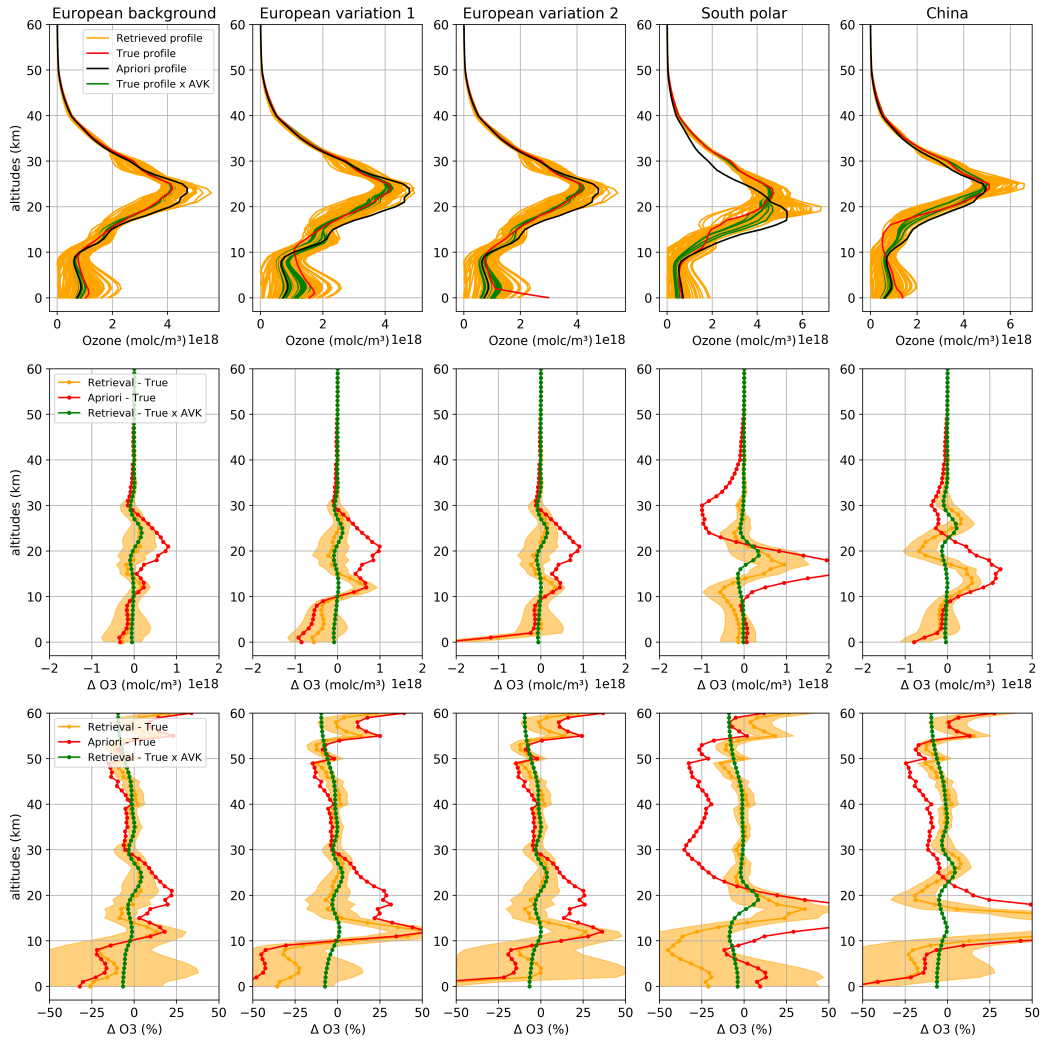


Figure S1: Ozone profile retrieval without polarisation correction for all geometry and albedo settings. The simulated radiance used as input include polarisation.

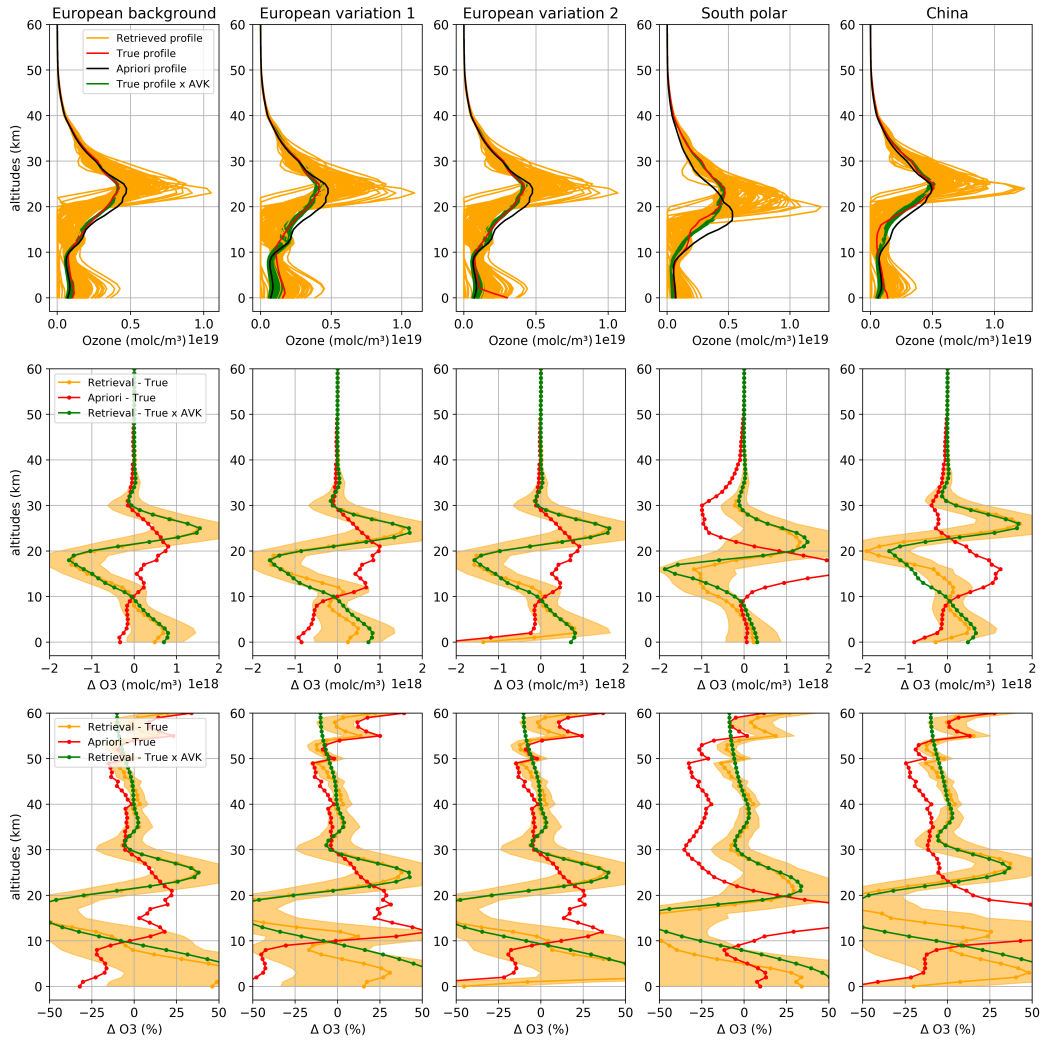


Figure S2: Ozone profile retrieval without Ring correction for all geometry and albedo settings. The simulated radiance used as input include the Ring effect.

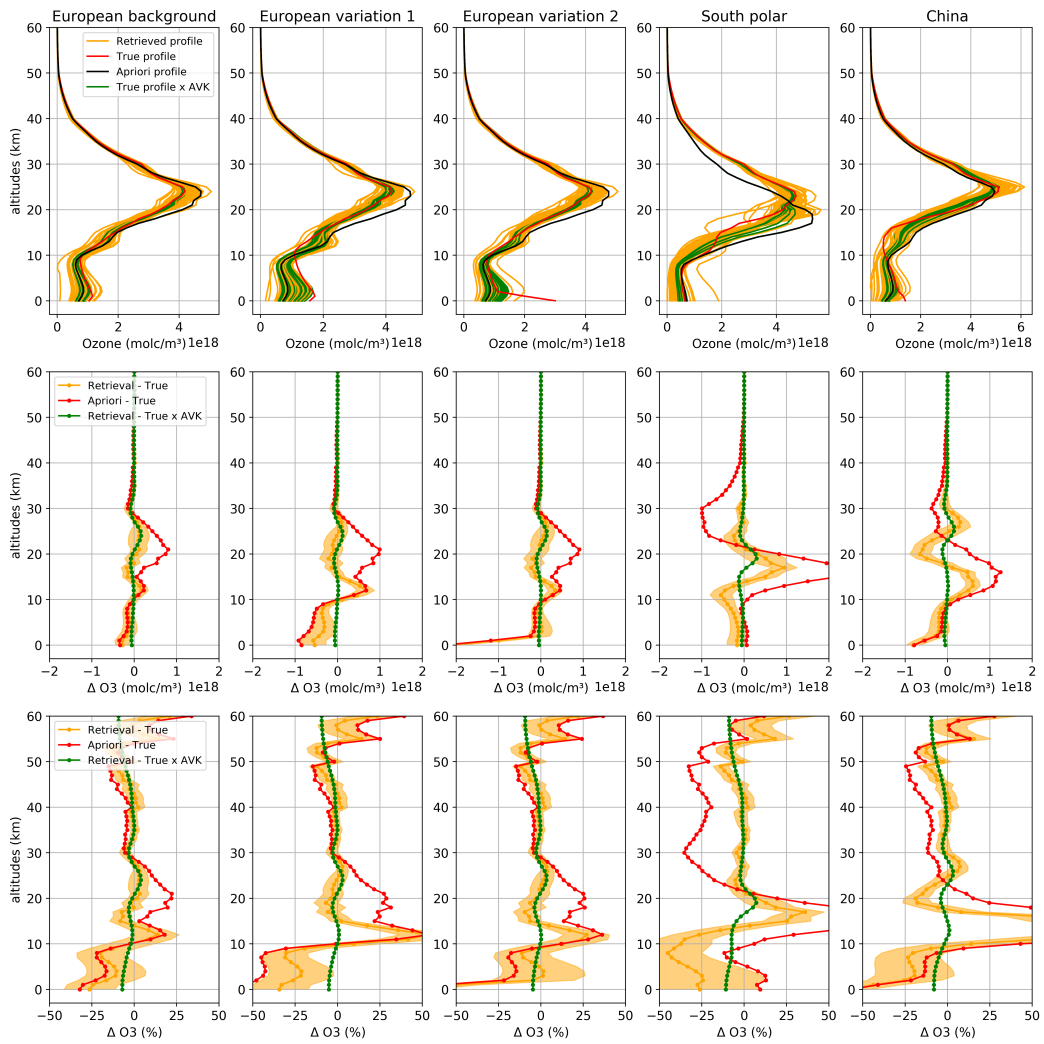


Figure S3: Same as S1, but the retrieval contains polarisation correction.

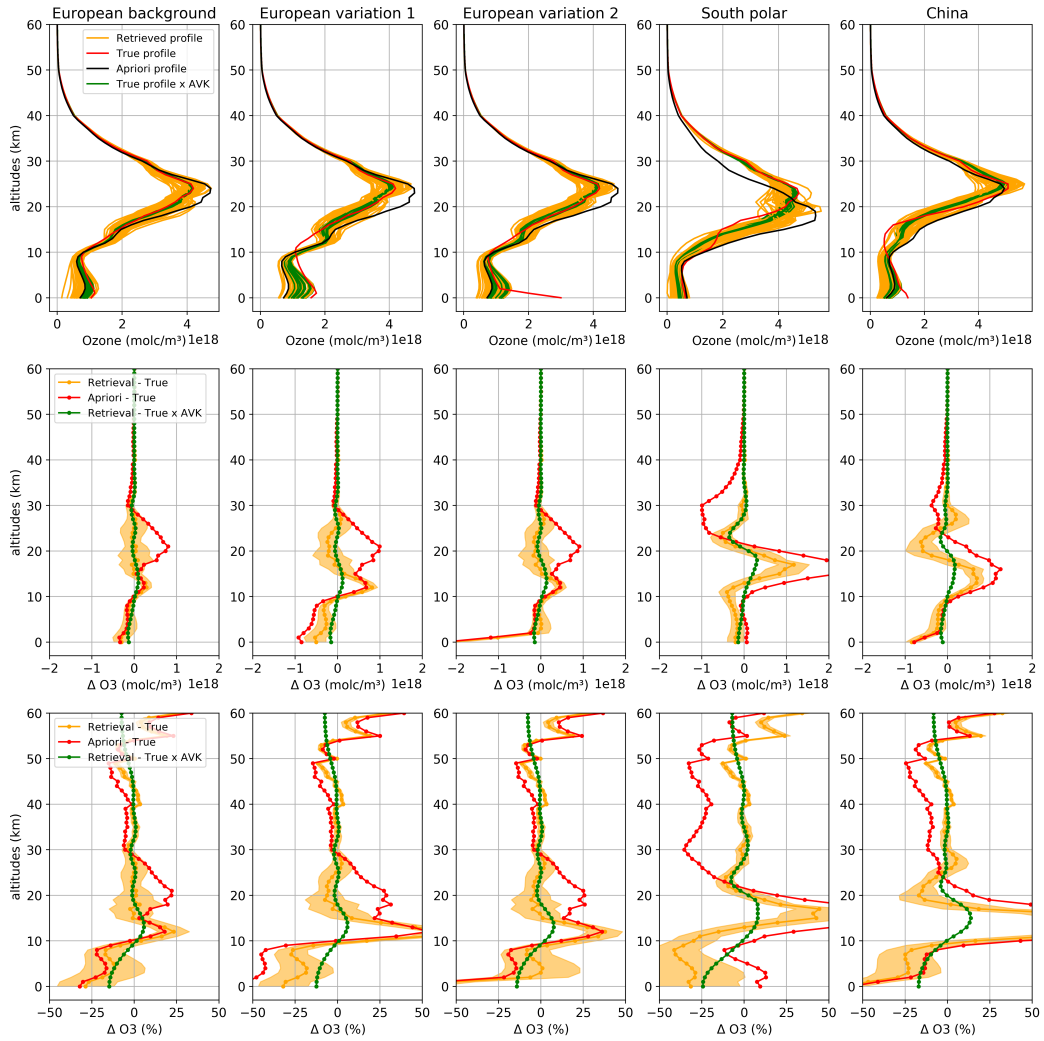


Figure S4: Same as S2, but the retrieval contains Ring correction.

Table S1: Ozone sonde and Lidar Stations

Ozone sonde station	Latitude	Longitude	nr. of profiles
King's Park	22.31	114.17	14
Alert	82.49	-62.34	1
Broadmeadows	-37.69	144.95	17
Churchill	58.74	-94.07	2
Davis	-68.58	77.97	3
De Bilt	52.1	5.18	17
Easter Island	-27.17	-109.42	3
Edmonton	53.54	-114.1	2
Eureka	79.98	-85.94	2
Goose Bay	53.31	-60.36	5
Hohenpeissenberg	47.8	11.0	29
Lauder	-45.04	169.68	9
Legionowo	52.41	20.96	15
Marambio	-64.23	-56.62	5
Macquarie Island	-54.5	158.94	8
Madrid	40.47	-3.58	15
Paramaribo	5.81	-55.21	2
Payerne	46.49	6.57	37
Pohang	36.03	129.38	7
Port Hardy	50.68	-127.38	2
Praha	50.0	14.44	8
Resolute	74.7	-94.96	2
Syowa	-69.01	39.58	4
Tateno (Tsukuba)	36.06	140.13	11
Uccle	50.8	4.35	19
Ushuaia	-54.85	-68.31	3
Valentia	51.93	-10.25	2
Yarmouth	43.87	-66.11	5
Hanoi, Vietnam	21.02	105.8	1
Hilo, HI	19.4	-155.4	6
Irene, South Africa	-25.9	28.2	1
Kuala Lumpur, Malaysia	2.73	101.7	1
Nairobi, Kenya	-1.3	36.8	6
Pago Pago, Am. Samoa	-14.2	-170.6	5
Paramaribo, Surinam	5.81	-55.21	3
Suva, Fiji	-18.1	178.4	4
Ozone lidar station	Latitude	Longitude	nr. of profiles
Hohenpeissenberg	47.8	11.02	24
Lauder	-45.04	169.68	10
Maunaloa	19.54	-155.58	40
OHP	43.94	5.71	35
Tablemountain	34.4	-117.7	68