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Supplement of

Intercomparison of MAX-DOAS vertical profile retrieval algorithms: studies using synthetic data

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This document presents supplemental material for the manuscript 'Intercomparison of MAX-DOAS Vertical Profile Retrieval Algorithms: Studies using Synthetic Data' submitted to AMTD. While the main paper only presents unfiltered profiles based on noisy measurement data (version v1n), this supplement presents the comparison of vertical profiles of aerosols, NO_2 and HCHO after removing all profiles marked as invalid, as well as profiles retrieved using non-noisy data (version v1). Significant differences between filtered and unfiltered data occur for MAPA aerosols (and to a lesser extent also trace gases), as well as bePRO data products in the visible (477 nm aerosols and NO_2).

360 nm Aerosols, v1n, filtered

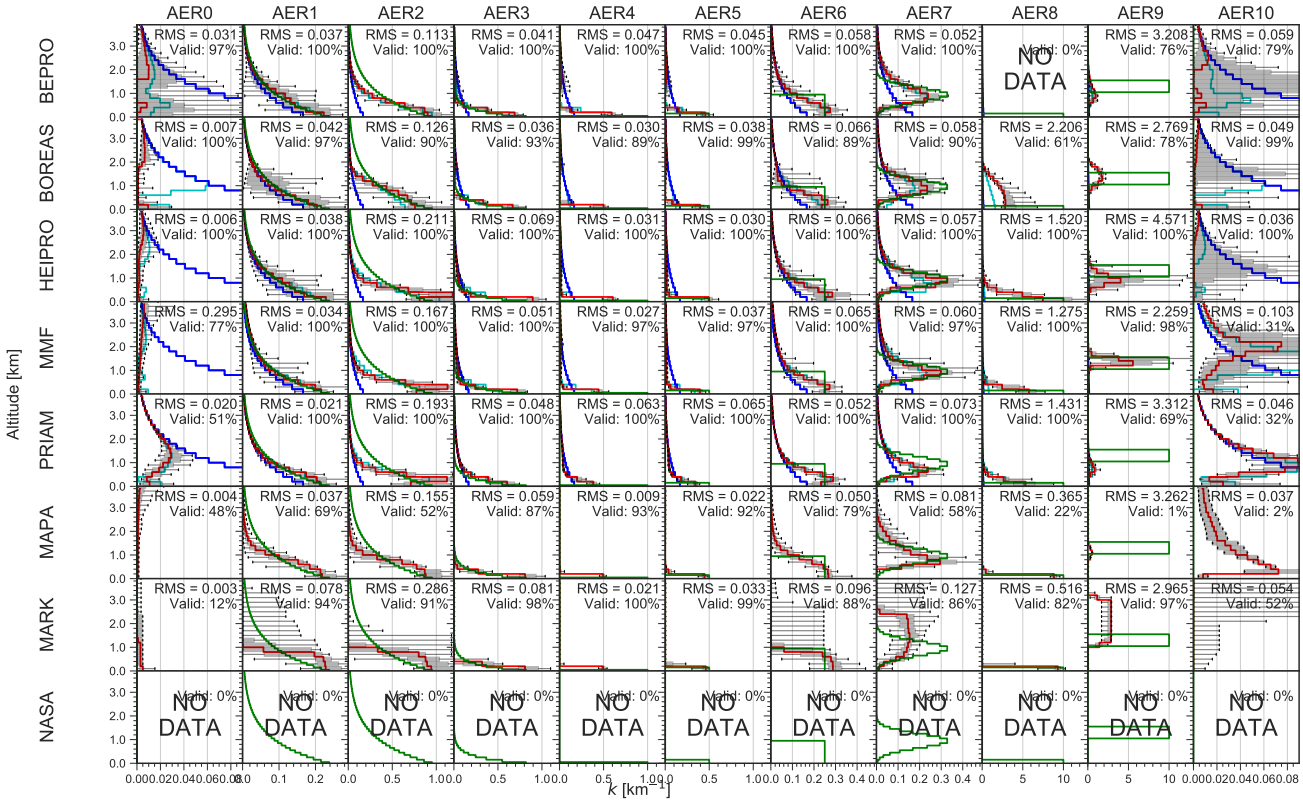

Figure S1. Comparison of retrieved (red solid line, version v1n) and true (green solid line) vertical profiles of aerosol extinction at 360 nm for each aerosol scenario (columns) and algorithm (rows). The retrieved profiles are the medians for all SZA/RAA combinations. The (25% - 75%) and (5% - 95%) percentiles are shown as gray areas and whiskers, respectively. The a priori profile and the true profile convoluted with the averaging kernel are shown as blue and cyan line (OEM algorithms only). In contrast to Figure 11 of the main paper, only valid profiles are plotted with the percentage of valid data shown in the legend.

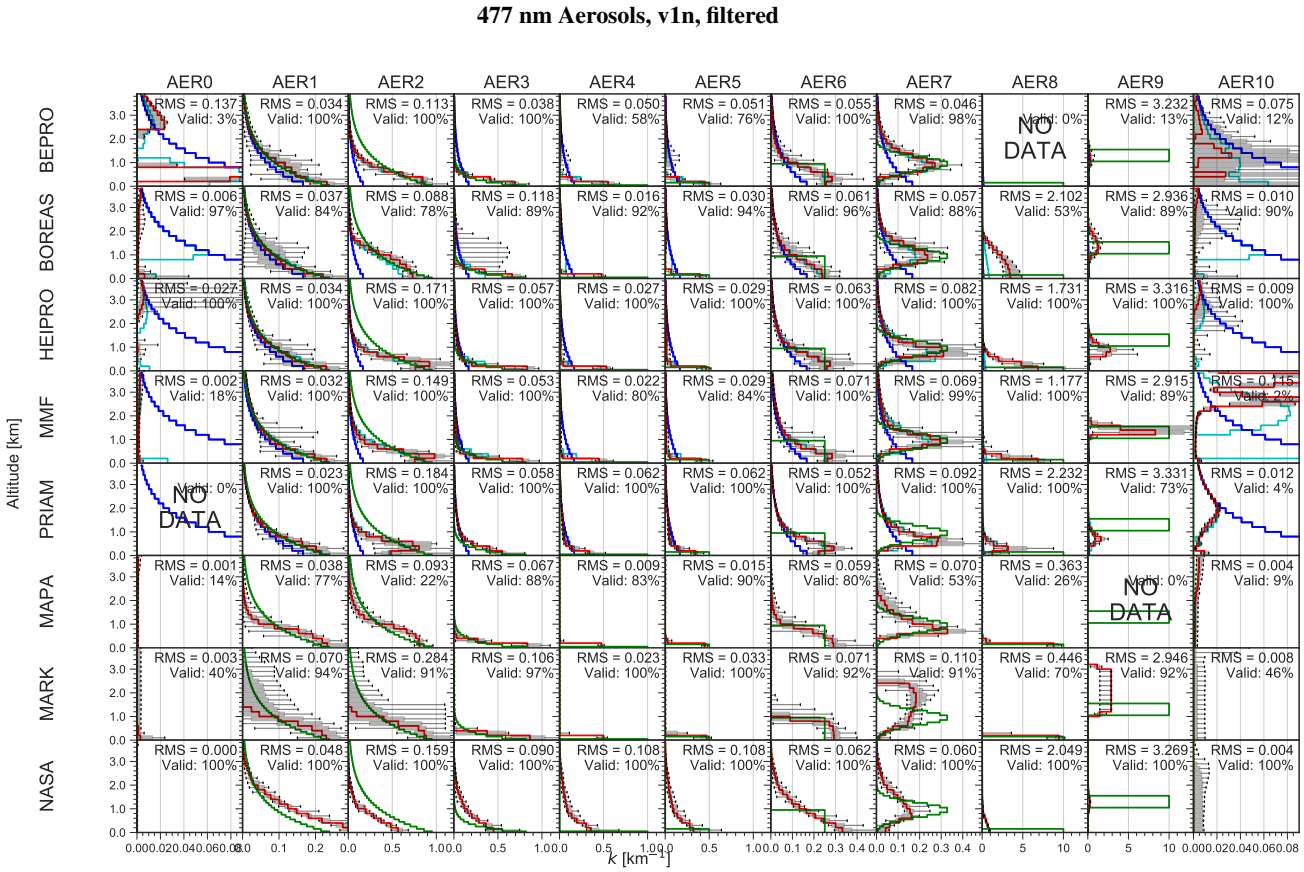

Figure S2. Same as Figure S2, but for aerosols at 477 nm (cf. Figure 12 of the main paper).

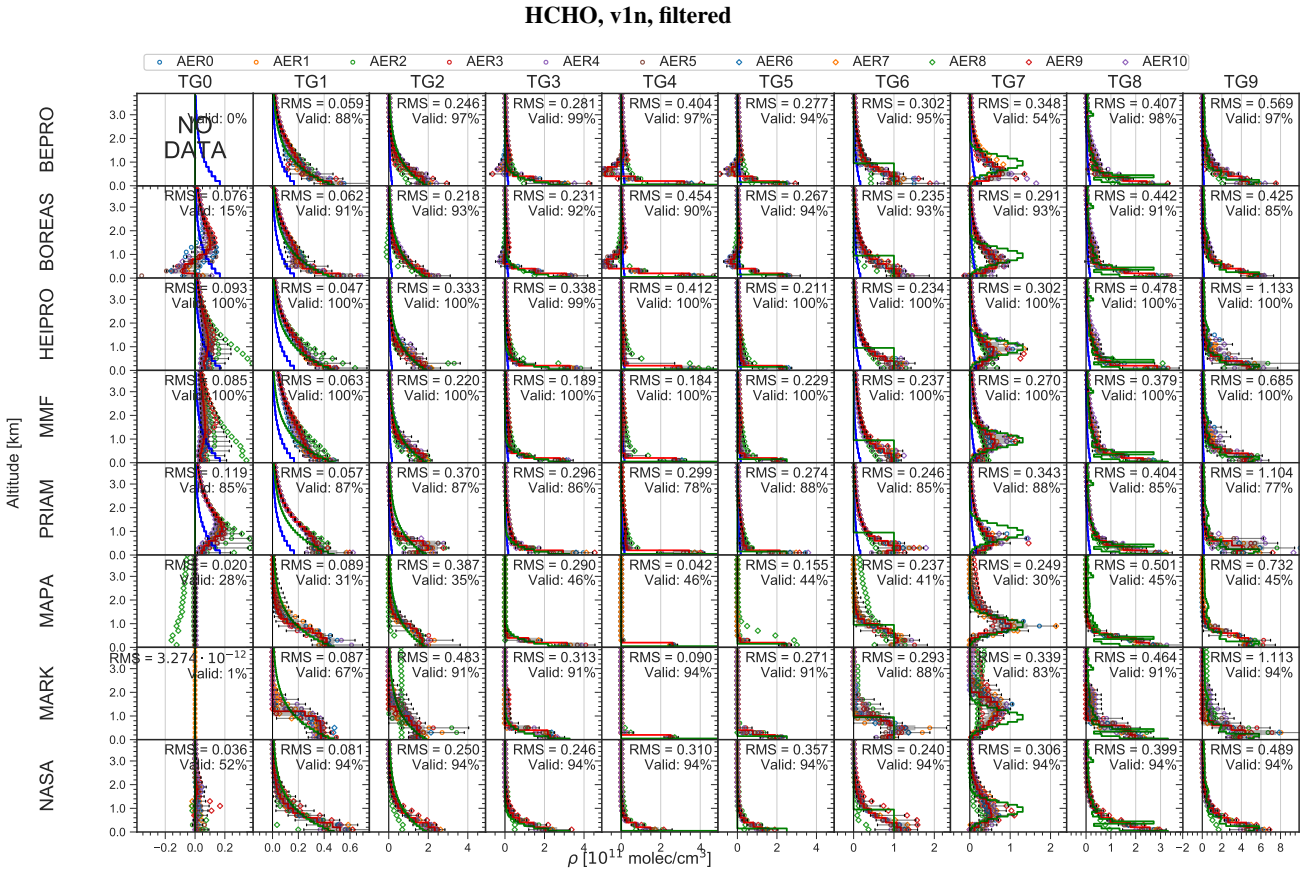

Figure S3. Comparison of retrieved (red solid line, version v1n) and true (green solid line) vertical profiles of HCHO for each trace gas scenario (columns) and algorithm (rows). In addition to the median profiles for all aerosol scenarios, SZAs and SAAs shown in red, the median concentration profile for each aerosol scenario is shown as coloured symbols as denoted in the legend. The RMS (true - retrieved extinction) is shown in units of 10^{11} molec/cm^3. In contrast to Figure 13 of the main paper, only valid profiles are plotted with the percentage of valid data shown in the legend.

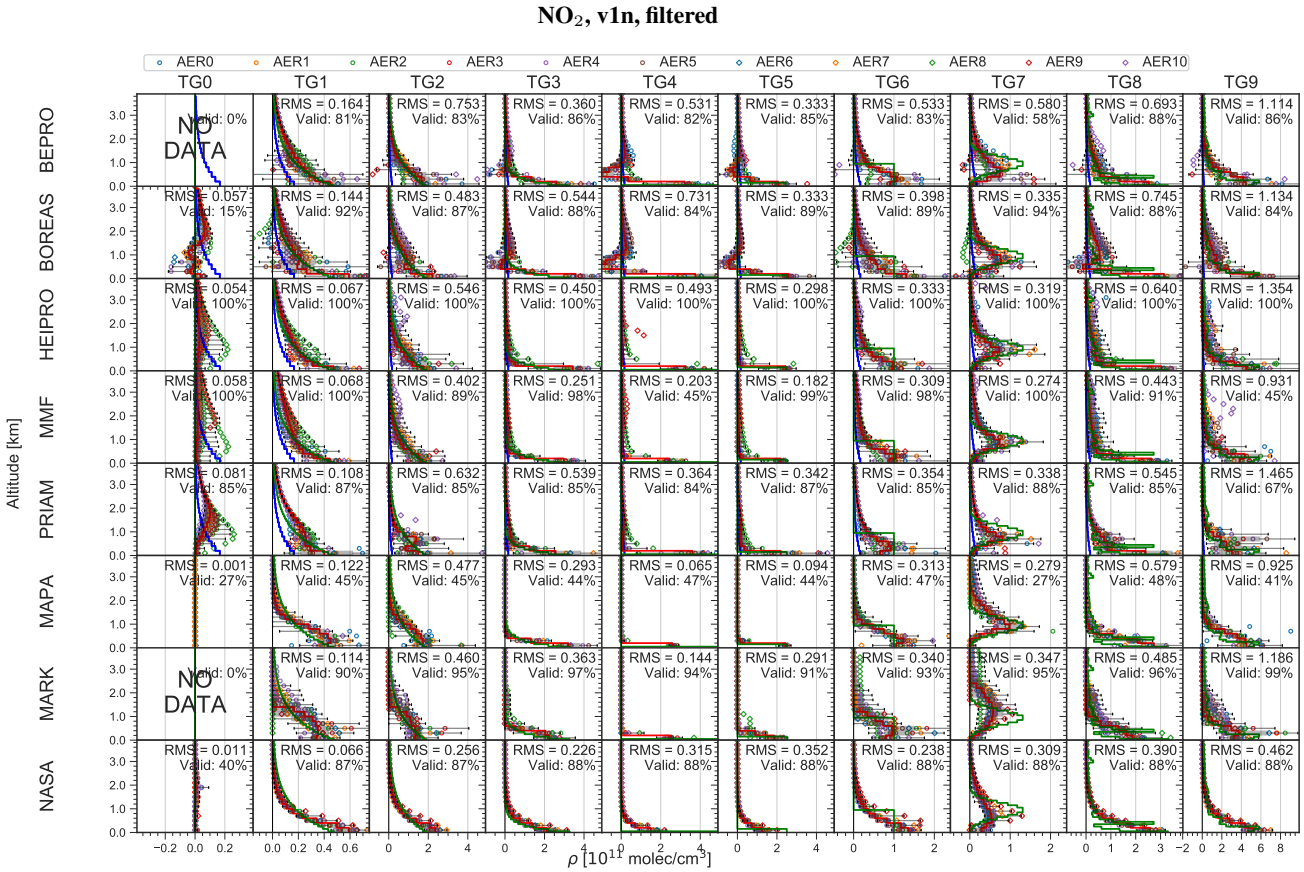

Figure S4. Same as Figure S3, but for NO_2 (cf. Figure 14 of the main paper).

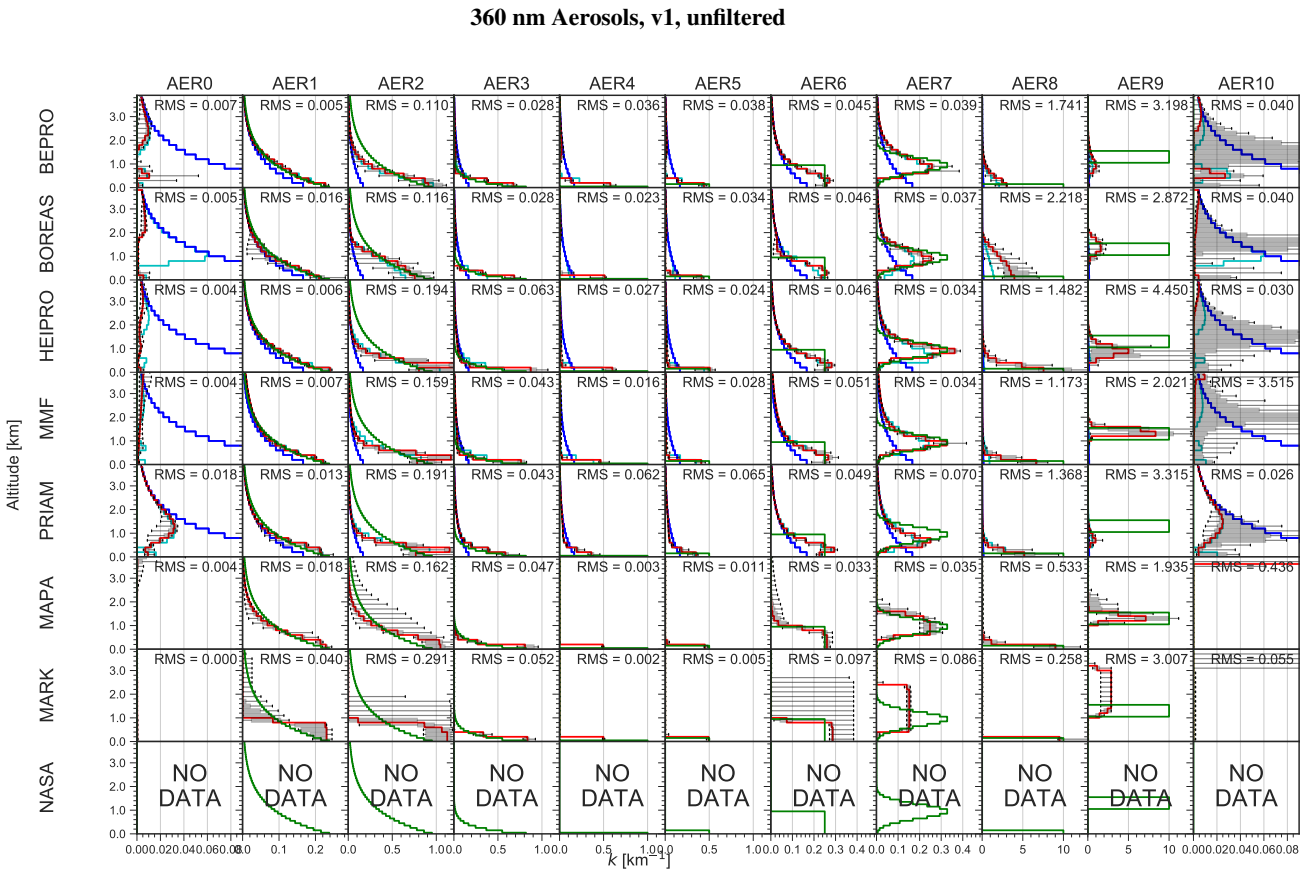

Figure S5. Aerosol extinction profiles at 360 nm as in Figure 11 of the main paper, but retrieved using measurements without noise (version v1). All profiles are shown.

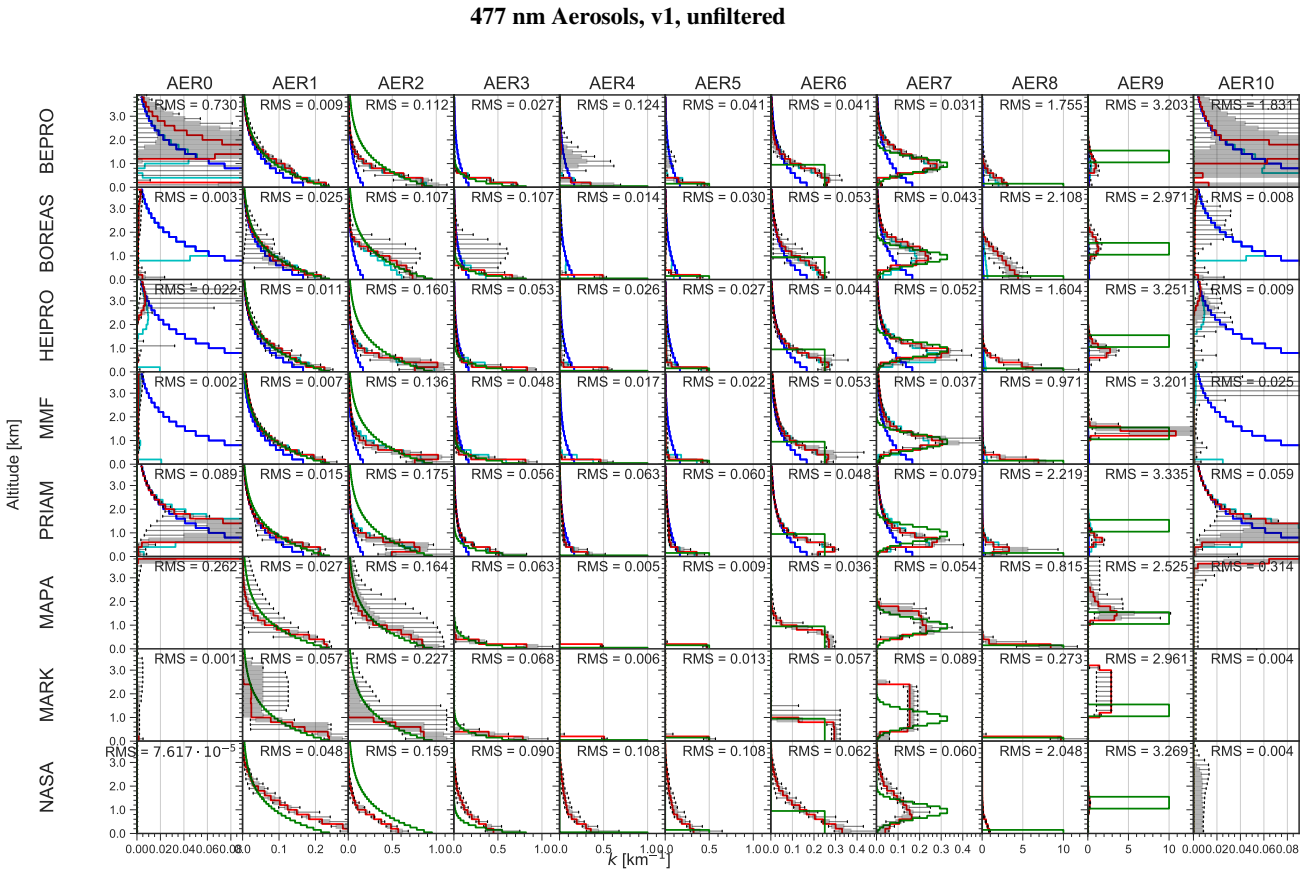

Figure S6. Same as Figure S5, but for aerosols at 477 nn (cf. Figure 12 of the main paper).

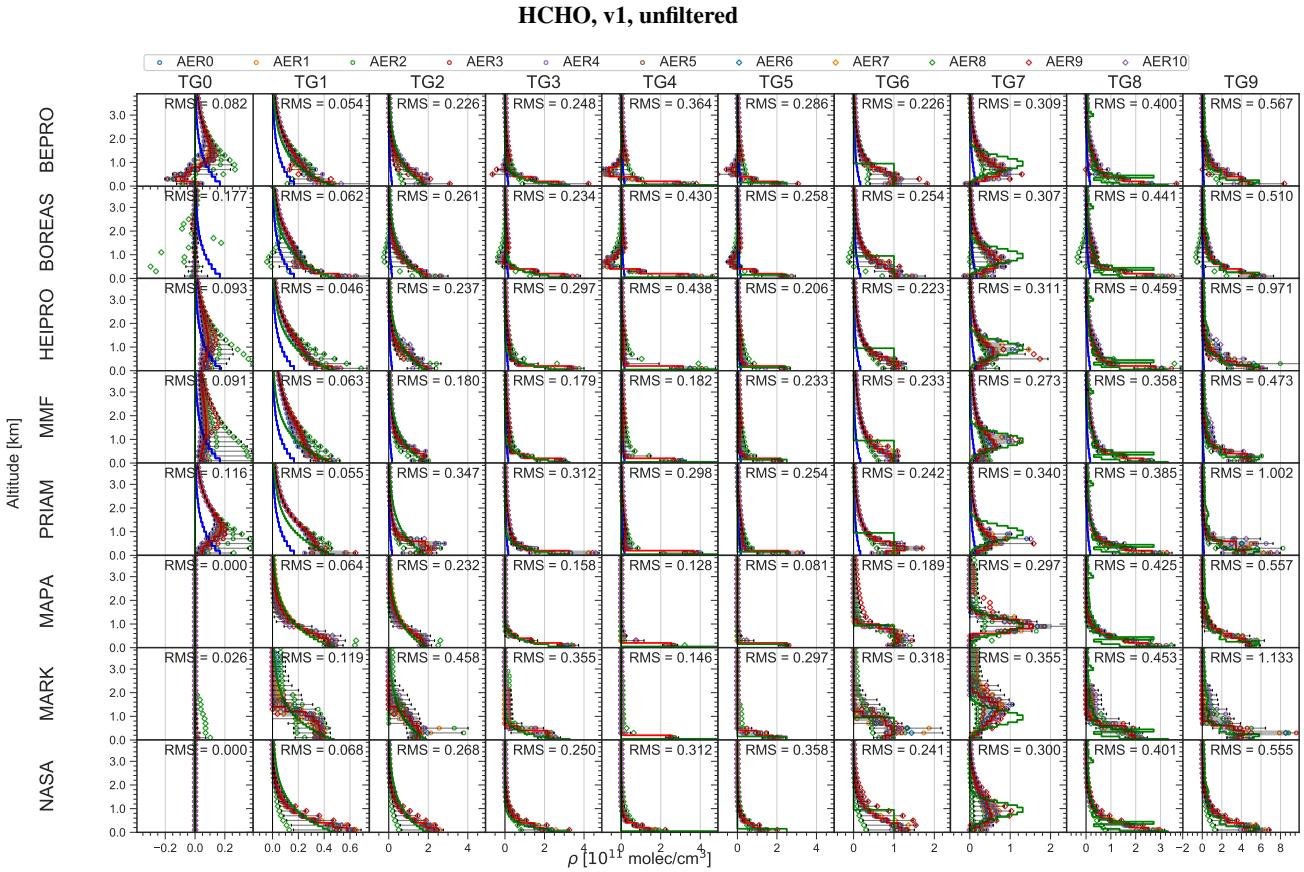

Figure S7. HCHO profiles as in Figure 13 of the main paper, but retrieved using measurements without noise (version v1). All profiles are shown.

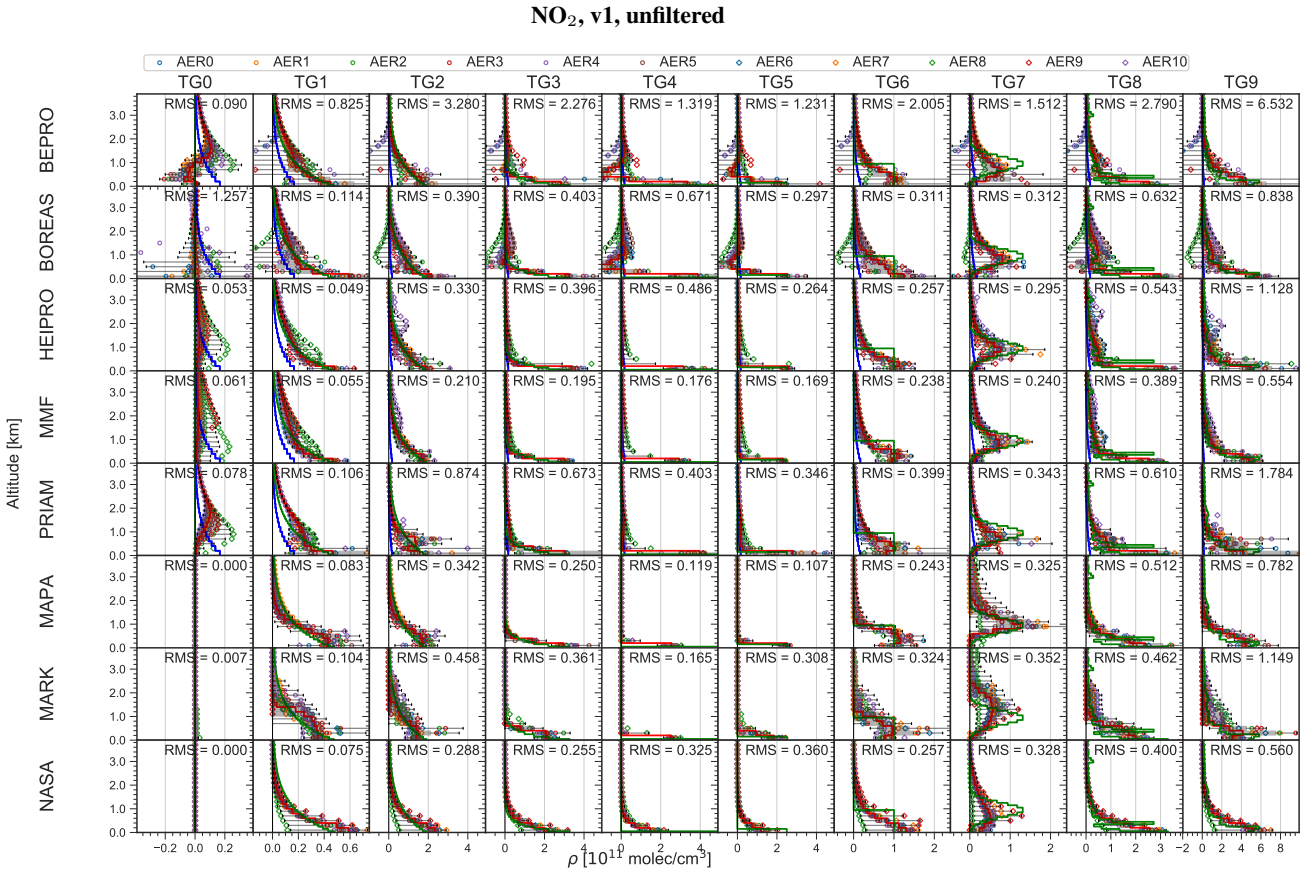

Figure S8. Same as Figure S7, but for NO_2 (cf. Figure 14 of the main paper).

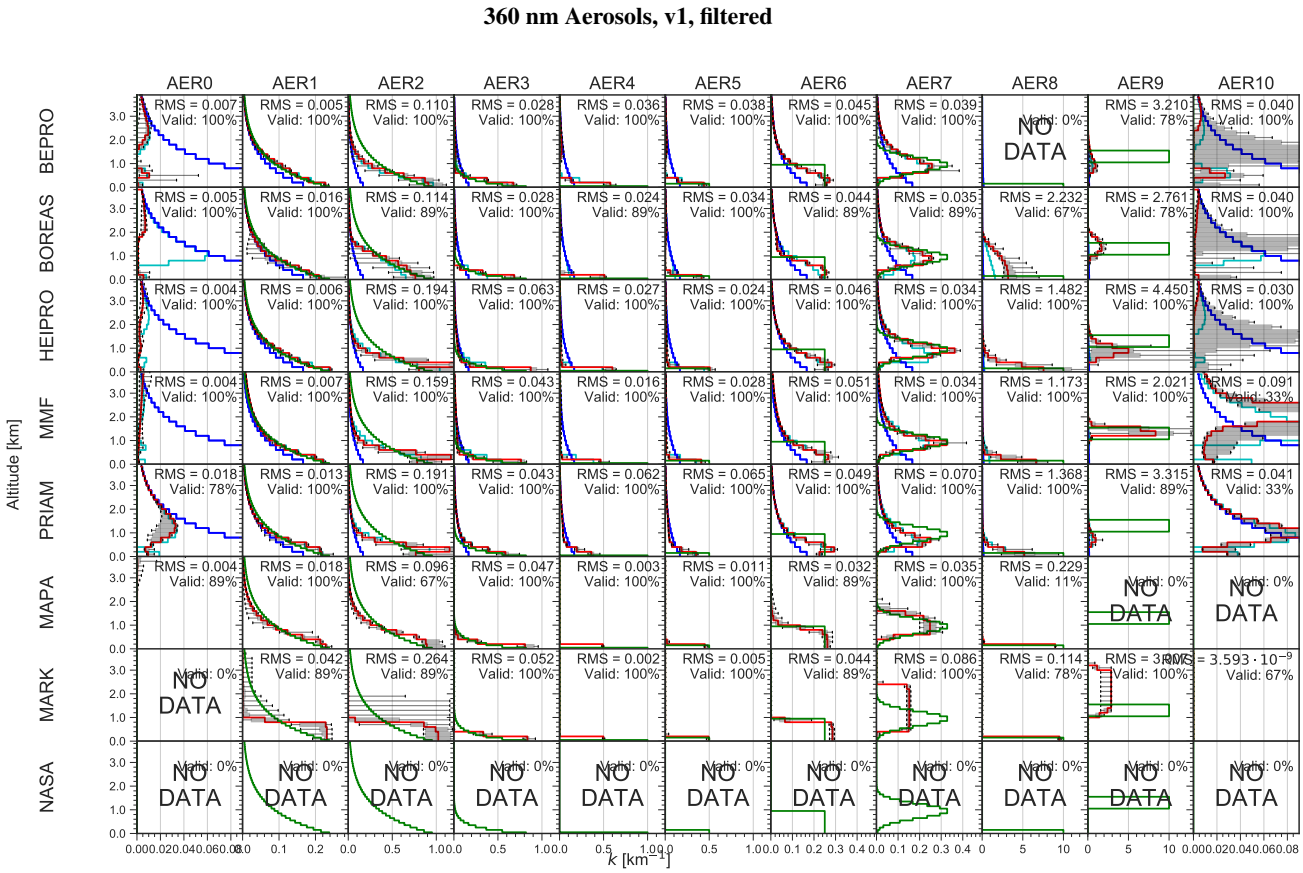

Figure S9. Same as Figure S5, but with profiles marked as invalid excluded.

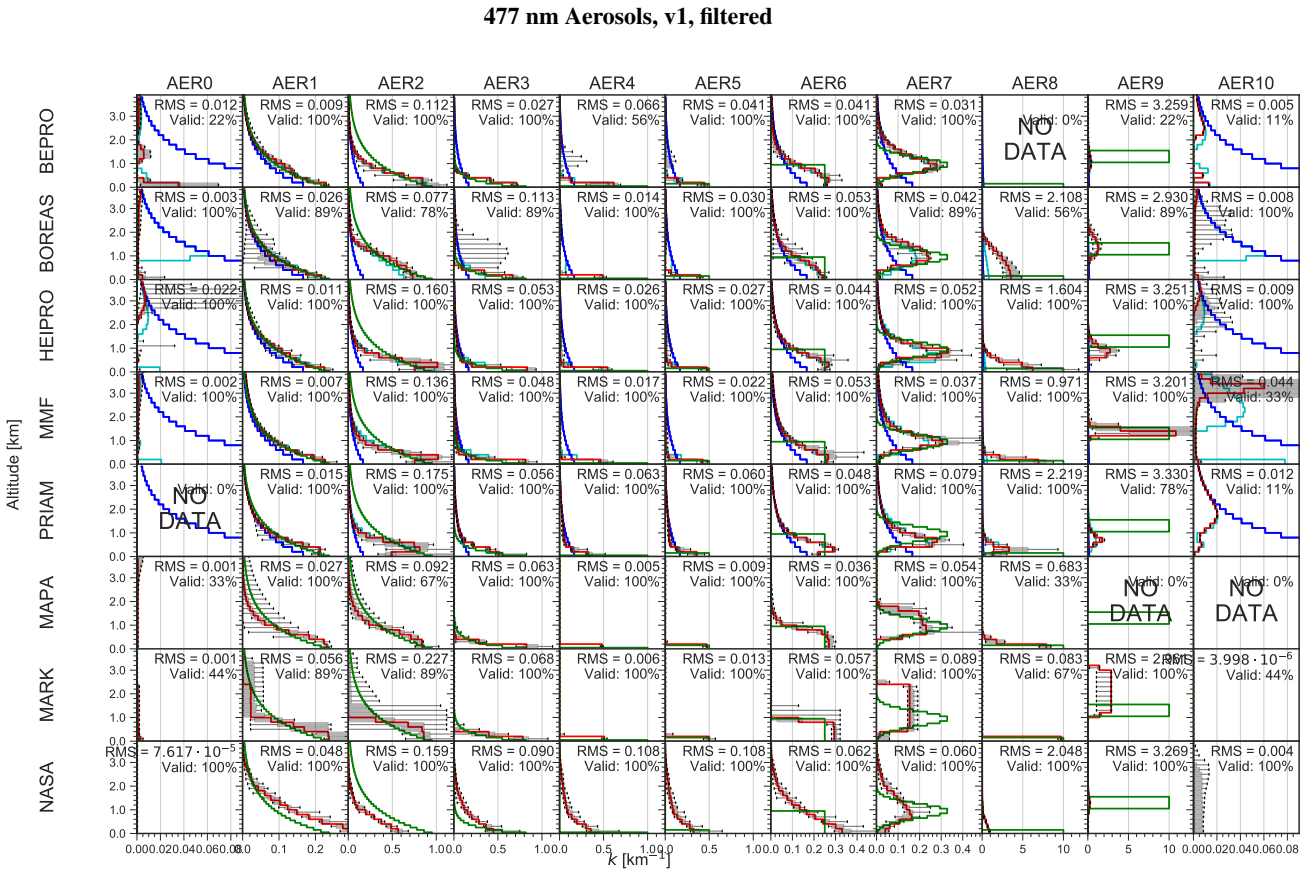

Figure S10. Same as Figure S6, but with profiles marked as invalid excluded.

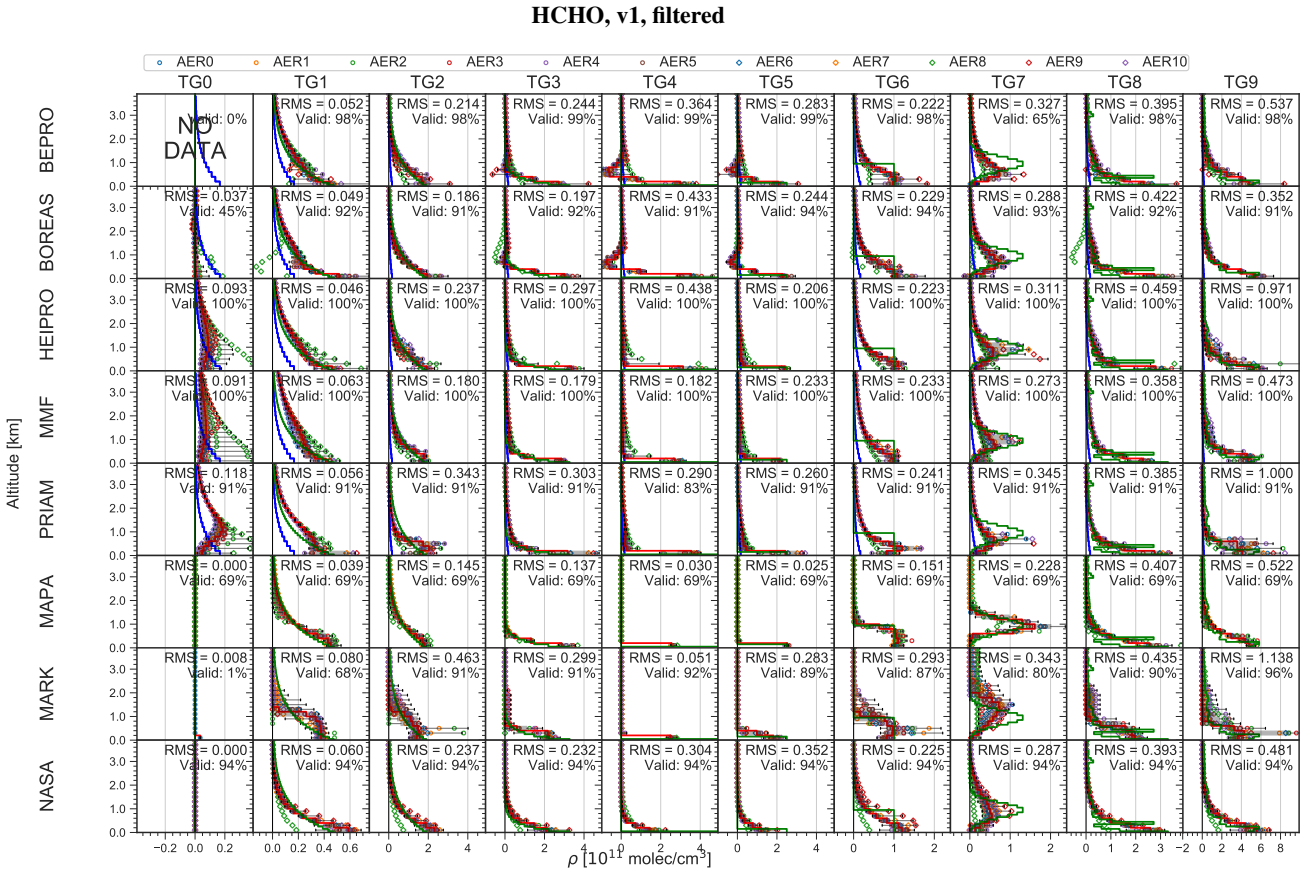

Figure S11. Same as Figure S7, but with profiles marked as invalid excluded.

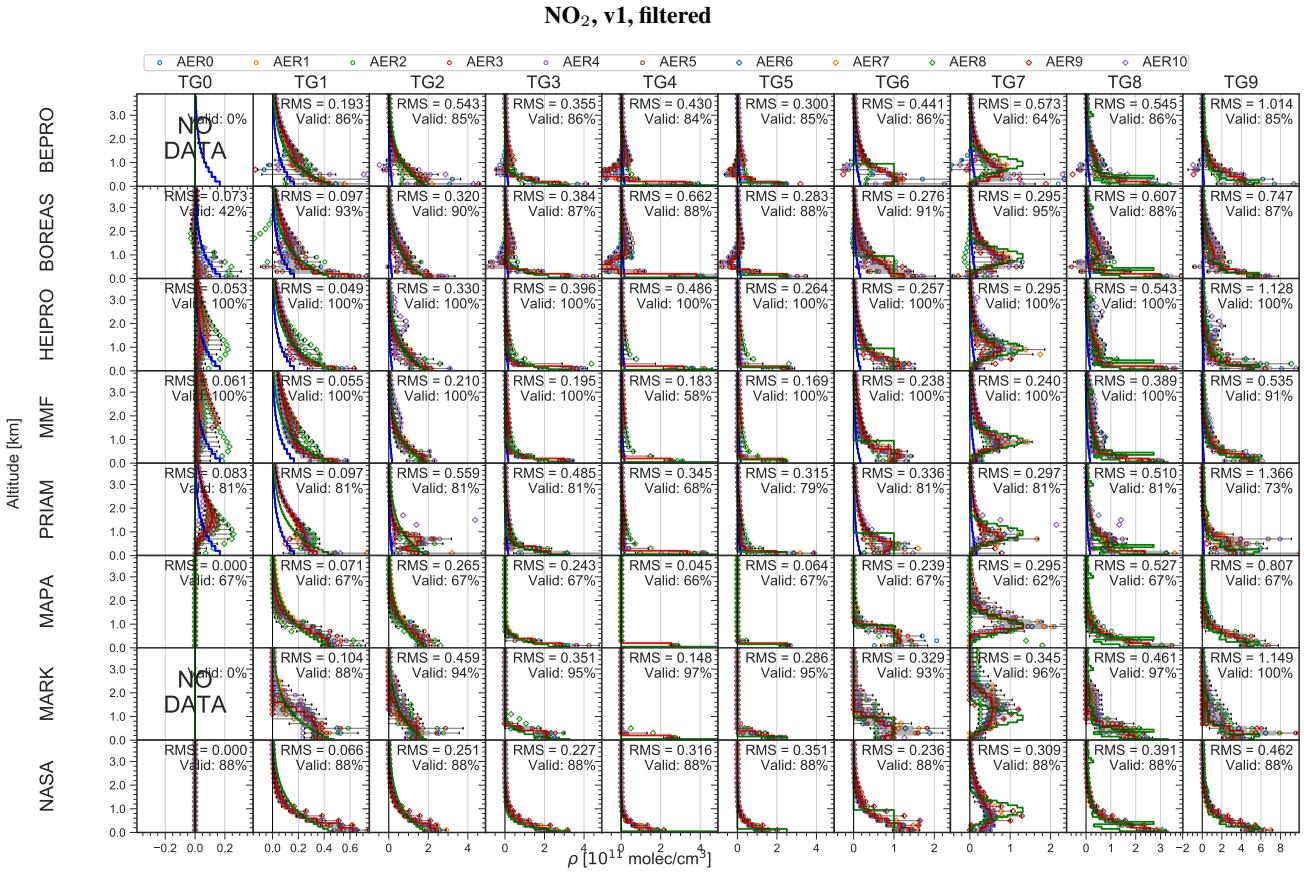

Figure S12. Same as Figure S8, but with profiles marked as invalid excluded.