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# The construction of a 3D aerosol climatology from CALIOP for the improvement of tropospheric trace gas retrievals from satellites

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For the correct interpretation of satellite measurements of trace gases, the airmass factor (or weighting function) of a measurement needs to be well known. This airmass factor depends on solar and viewing geometry, but is also strongly influenced by clouds and aerosols — particularly in the troposphere. Differences in assumptions of aerosol amount, profile and type lead to large errors in trace gas retrievals: for example, the vertical column density of $NO_2$ over China can vary by a factor of 2 depending on the choice of aerosol parameters. The attenuated backscatter profile product by the CALIOP lidar team presents an unprecedented opportunity to improve the airmass factor calculations by including measured aerosol profiles (as opposed to model data) on a global scale. The profiles can be combined with MODIS monthly mean aerosol optical depth, which is an extensively validated product with much better statistics compared to the CALIOP product.

We here present first attempts at the construction of such a 3D aerosol climatology: Level 1 attenuated backscatter profiles are filtered for contributions from clouds and the surface using the CALIOP vertical feature mask product. For the purpose of a tropospheric climatology only data below 8 km is used. Furthermore profiles are corrected for Rayleigh scattering and collocated orbits are averaged. A spatial resolution of 5 km along-track and 150 m vertically is conceivable, with a time resolution of seasons or even months.