



## **Retrieval of aerosol optical depth and vertical distribution using O<sub>2</sub> A- and B-band SCIAMACHY observations.**

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The vertical profile of aerosol can provide a clear picture of transport processes, and can be an indicator of secondary aerosol formation or primary aerosol sources close to the surface. The vertical extent of clouds and aerosols also governs the sign and magnitude of their net radiative forcing. From a remote-sensing perspective, retrievals of many trace-gases suffer from uncertainties due to aerosol and would benefit from co-located information on the amount and vertical distribution of aerosol loading. Ground-based networks presently provide much of this information, however their sampling of 3D data is limited due to scarce or uneven coverage. This motivates the development of methods to retrieve vertical information on aerosols using satellite data, which offer the advantage of global coverage. SCIAMACHY onboard ENVISAT provides spectral data at moderate resolution in the UV/VIS including the O<sub>2</sub> A- and B-bands, which contain vertical information due to the exactly known vertical profile of O<sub>2</sub>. We make combined use of these bands in an optimal estimation based algorithm applicable both over bright and dark surfaces to retrieve the parametrized vertical profile of aerosol, in addition to the optical thickness and Angstrom exponent from SCIAMACHY data. We present a case study over Kanpur, India, showing good agreement with coincident AERONET data, and also capturing seasonal cycles and a periodic wind-blown dust event over Kanpur.