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Retrieval of Stratospheric Aerosol Properties from SCIAMACHY limb observations

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Balloon-borne and aircraft measurements of stratospheric aerosol properties have been supplemented by satellite measurements since 1975 (Stratospheric Aerosol Measurement program). Ever since, the technological possibilities of satellite measurements increased steadily. Nowadays the large number of satellites provides global data sets of trace gases, clouds and aerosols. Stratospheric aerosol properties are usually determined from observations in occultation or limb geometry. Stratospheric aerosol has an important influence on the global radiation budget (e.g. after strong volcanic eruptions) and stratospheric ozone chemistry (e.g. the chlorine activation inside the polar vortex).

Since the launch of SCIAMACHY on ENVISAT in 2002 measurements in limb geometry for the UV/VIS/NIR spectral range with a vertical resolution of 3.3 km at the tangent point are available. By using these measurements, profile information of stratospheric trace gases (e.g. NO_2, BrO or OClO) can be retrieved. From the broad band spectral dependence of the SCIAMACHY limb measurements, also information on stratospheric aerosol properties can be derived. Pioneering studies (e.g. von Savigny et al., 2005) showed that signatures of polar stratospheric clouds and also stratospheric aerosols can be retrieved from color indices (including the near IR spectral range). In our study we make use of the color index method and additionally investigate the effects of aerosols on the whole UV/VIS/NIR spectral range. Aerosol properties are estimated by comparisons of the measured values with radiative transfer simulations. We investigate different atmospheric phenomena, e.g. volcanic eruptions (e.g. Kasatochi, 2008) or large biomass burning events (e.g. Australia, 2009). We also have a look at the spatio-temporal variation of Polar Stratospheric Clouds in the polar regions and stratospheric aerosol properties on a global scale.