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Stratospheric Sulphur – 3D Chemical Transport Model Simulations and MIPAS/ENVISAT Satellite Measurements

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In this study processes that regulate the atmospheric distribution, and the budget of carbonyl sulphide (OCS), sulphur dioxide (SO_2) and stratospheric sulphate aerosols are investigated in the upper troposphere / lower stratosphere. Sulphate aerosols impact the Earth's climate by backscattering parts of the incoming solar radiation. This negative radiative forcing can lead to reduced surface temperatures and is thought of as one reason for the recent global warming "hiatus". Our study is based on the comparison of modeled and observed data. An isentropic chemical transport model is used, spanning the region from 330 to 3000 K potential temperature ($\sim$ 8 – 66 km), driven by ERA-Interim Reanalysis data. The simulations are compared to observations from MIPAS (Michelson Interferometer for Passive Atmospheric Sounding), a limb sounder on the satellite ENVISAT that was operational from July 2002 to April 2012. The focus of our study lies on volcanically emitted SO_2 and its dispersion, as main precursor for sulphate aerosol during volcanically perturbed times, with its simulated distribution and lifetime, in comparison to MIPAS SO_2 measurements. Moreover data for OCS, as the main source for stratospheric sulphur during volcanically quiescent periods. Furthermore, first results of sulphuric aerosol-mass retrievals from MIPAS are presented. These will be combined with the gaseous sulphur species to obtain a global budget of stratospheric sulphur.