Geophysical Research Abstracts
Vol. 19, EGU2017-4990-1, 2017
EGU General Assembly 2017

Microphysical modelling of volcanic plumes / Comparisons against groundbased and spaceborne lidar data

Julien Jumelet, Slimane Bekki, and Philippe Keckhut
LATMOS - Paris, France

We present a high-resolution isentropic microphysical transport model dedicated to stratospheric aerosols and clouds. The model is based on the MIMOSA model (Modélisation Isentrope du transport Méso-échelle de l'Ozone Stratosphérique par Advection) and adds several modules: a fully explicit size-resolving microphysical scheme to transport aerosol granulometry as passive tracers and an optical module, able to calculate the scattering and extinction properties of particles at given wavelengths. Originally designed for polar stratospheric clouds (composed of sulfuric acid, nitric acid and water vapor), the model is fully capable of rendering the structure and properties of volcanic plumes at the finer scales, assuming complete SO_2 oxydation.
This link between microphysics and optics also enables the model to take advantage of spaceborne lidar data (i.e. CALIOP) by calculating the 532nm aerosol backscatter coefficient, taking it as the control variable to provide microphysical constraints during the transport. This methodology has been applied to simulate volcanic plumes during relatively recent volcanic eruptions, from the 2010 Merapi to the 2015 Calbuco eruption. Optical calculations are also used for direct comparisons between the model and groundbased lidar stations for validation as well as characterization purposes. We will present the model and the simulation results, along with a focus on the sensitivity to initialisation parameters, considering the need for quasi-real time modelling and forecasts in the case of future eruptions.