



## **The aerosol cloud of major volcanic eruptions: Sensitivity studies with respect to the geographical latitude**

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Volcanic aerosols are an active component of the climate system and play multiple roles in physical and biogeochemical exchanges between the atmosphere, land, surface and ocean. To study the influence of volcanic aerosol on atmospheric dynamics and composition, dependent on the geographical latitude, interactive simulations of major volcanic eruptions are required. For our studies we use the middle atmosphere general circulation model MAECHAM5 including the global aerosol module HAM. HAM calculates the aerosol microphysics of sulfate and other species and their source and sink processes. The model setup has been validated for the Pinatubo eruption, showing good agreement with satellite data. Model studies have been performed for different major volcanic eruptions in the tropics and mid and high Northern latitudes (Pinatubo, Vesuvius, Katmai) with the strength and the eruption height of the Pinatubo eruption. All volcanic eruptions have been initialized in Northern Hemisphere summer and calculated for two years. The global distribution of the aerosol optical depth shows that the Pinatubo cloud is distributed over both hemispheres and has a global effect on climate. Volcanic aerosol of the Vesuvius eruption is mostly located in the Northern Hemisphere and has a more hemispheric effect but a certain fraction is also found in the Southern Hemisphere. Similar to the Pinatubo eruption the Vesuvius cloud is distributed fast to the north with the transition from summer to winter circulation. The volcanic aerosol of a Katmai eruption is only found in the Northern Hemisphere between 30°N und 90°N. The atmospheric life time of the volcanic aerosol varies with the geographic latitude of the volcano, Katmai has the shortest life time with 1.5 years and Pinatubo the longest one with 2.5 years. The strongest stratospheric temperature anomalies occur for the Pinatubo eruption in the tropics although chemical feedback mechanism not included in our simulation which might dampen the effect.