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## Initial fate of fine ash and sulfur from large volcanic eruptions

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**Abstract.** Large volcanic eruptions emit huge amounts of sulfur and fine ash into the stratosphere. These products cause an impact on radiative processes, temperature and wind patterns. In simulations with a General Circulation Model including detailed aerosol microphysics, the relation between the impact of sulfur and fine ash is determined for different eruption strengths and locations, one in the tropics and one in high Northern latitudes. Fine ash with effective radii between 1  $\mu\text{m}$  and 15  $\mu\text{m}$  has a lifetime of several days only. Nevertheless, the strong absorption of shortwave and long-wave radiation causes additional heating and cooling of  $\pm 20$  K/day and impacts the evolution of the volcanic cloud. Depending on the location of the volcanic eruption, transport direction changes due to the presence of fine ash, vortices develop and temperature anomalies at ground increase. The results show substantial impact on the local scale but only minor impact on the evolution of sulfate in the stratosphere in the month after the simulated eruptions.

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