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Simulation of aerosol and its radiative effects from 1990 to 2017 by the CCM EMAC as contribution to SSIRC-ISAMIP and StratoClim

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The chemistry climate model EMAC with interactive stratospheric and tropospheric aerosol is used for transient simulation of aerosol radiative forcing including effects of about 500 explosive volcanic eruptions and desert dust. We demonstrate that volcanic SO_2 injections are needed to explain the StratoClim aircraft observations in August 2017 of SO_2 and aerosol properties in the UTLS. This presentation includes studies to ISAMIP concerning aerosol optical depth at different wavelengths and contribution of different aerosol types, involving also multi-instrument satellite observations. We demonstrate that sulfate accumulation from consecutive smaller tropical and subtropical eruptions matters for radiative forcing, as for example in 2016.