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Radiative forcing by stratospheric aerosol in a CCM with interactive aerosol module

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Multiyear studies with the atmospheric chemistry general circulation model EMAC with the aerosol module GMXe demonstrate that stratospheric aerosol formation is controlled by COS oxidation and SO_2 injected by low-latitude volcanic eruptions. The model consistently uses the same parameters in the troposphere and stratosphere for 7 aerosol modes applied. Calculated radiative heating by aerosol feeds back to stratospheric dynamics. Radiative forcing by stratospheric aerosol can be diagnosed separately. The simulations include the medium size tropical eruptions in 2003, 2005 and 2006 but also the major eruption of Pinatubo in 1991. We show that calculated radiative forcing by stratospheric aerosol agrees well with the corresponding satellite derived quantity and that the medium size tropical eruptions should not be neglected in climate simulations. Changes in temperature, dynamics and tracer transport due to interactive aerosol will be also presented. We show also that calculated aerosol and SO_2 concentrations are consistent with the observations by SAGE and by MIPAS on ENVISAT.