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Whole-atmosphere aerosol microphysics simulations of the Mt. Pinatubo eruption: Part 2: Quantifying the direct and indirect (dynamical) radiative forcings

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The Mt Pinatubo volcanic eruption in June 1991 injected between 14 and 20 Tg of sulphur dioxide into the tropical stratosphere between about 21 and 28km altitude. Following chemical conversion to sulphuric acid, the stratospheric aerosol layer thickened substantially causing a strong radiative, dynamical and chemical perturbation to the Earth's atmosphere with effects lasting several years.
The simulations are carried out in the UK Chemistry and Aerosol composition-climate model (UKCA) which extends the high-top (to 80km) version of the HadGEM3 climate model. The HadGEM3-UKCA model uses the GLOMAP-mode aerosol microphysics module coupled with a stratospheric chemistry scheme including sulphur chemistry.
In this presentation we show results from model experiments to isolate the different ways the enhanced stratospheric aerosol from Pinatubo influenced the Earth's climate.
By running no-feedback and standard integrations, we separate the main radiative forcings due to aerosol-radiation interactions (i.e. the direct forcings) from those induced by dynamical changes which alter meridional heat transport and distributions of ozone and water vapour.