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Pinatubo Emulation in Multiple Models (POEMs): planned co-ordinated experiments for the SPARC Stratospheric Sulphur and it's Role in Climate initiative (SSiRC)

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The World Climate Research Program's SPARC initiative has a new international activity "Stratospheric Sulphur and its Role in Climate" (SSiRC) to better understand changes in stratospheric aerosol and precursor gaseous sulphur species.
A powerful new technique to quantify and attribute sources of uncertainty in complex global models is described by Lee et al. (2011). This involves "conditioning" a Gaussian emulator to replicate (gridbox by gridbox) the results from an ensemble of runs with the full complex 3D model. Once trained on the ensemble, a Monte Carlo simulation with the fast emulator can be carried out for a full variance-based sensitivity analysis. For example, Carslaw et al., (2013, Nature) used the approach to quantify the uncertainty in indirect aerosol forcing from a 3D global chemistry-aerosol-microphysics model, decomposing the variance attributed to 28 uncertain emissions-types/processes-parameters/model-structures.
One component of SSiRC involves an intercomparison of a new generation of Earth System Models that simulate the stratospheric aerosol layer interactively. Following the kick-off meeting for SSiRC in October 2013, one component of the SSiRC activity will be for each model to run "perturbed physics ensembles" (PPEs) of the Pinatubo eruption across several uncertain parameters. The Gaussian emulation approach will the be carried out on each model to characterise and intercompare the magnitude and uncertainty of simulated climate effects.
In this poster presentation we will present the overall plan for this "POEMS" analysis including the outcome of an expert elicitation to finalise which uncertain parameters are to be varied and their uncertainty ranges.