Project: 885

Project title: Stratospheric Sulfur and its Role in Climate (SSiRC) data project

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The World Climate Research Programs SPARC initiative has an international activity "Stratospheric Sulfur and its Role in Climate" (SSiRC) http://www.sparc-ssirc.org/ to better understand changes in stratospheric aerosol and its precursor gaseous sulfur species that are a direct input of major volcanic eruptions. One part of SSiRC aims to better understand changes in stratospheric aerosol and its precursor gaseous sulphur species via an international model data intercomparison project with four co-ordinated intercomparison studies. Unfortunately the definition of the experiment protocols and therefore also the performance of these experiments have been delayed, so that a multi model analysis could not be carried out so far. The protocol is however now defined, see table 1. A paper will be submitted to Geoscientific Model Development soon (Timmreck et al., in prep.) describing the rationale, observations and experimental specifications and the design was presented at the AEROCOM/AERCHEMIP/CCMI workshop in early October in Rome. The co-ordinated intercomparison will now start. So global aerosol modeling groups will start submitting BG, MITAR & HErSEA experiment data in early 2016 and PoEMS data probably in 2016/7. An audit of global models with interactive stratospheric aerosol find 16 global models with range of sophistication in resolution, aerosol scheme and chemistry. DKRZ resources consumed so far have been used for evaluation purposes. These evaluations have contributed to the definition of the protocol.

<u>Name</u>	<u>Focus</u>	<u>Boundary</u> <u>conditions</u> (SST, seaice, GHGs, ODSs)	Anthopogenic Emissions	<u>Ensemble</u> Size	<u>Years</u> per memb er	<u>Total</u> years	Knowledge-gap to be addressed
BG	Stratospheric sulphur budget in volcanically quiescent conditions	Timeslice year-2000 monthly-varying	Year-2000 from MACC-CITY (Granier et al., 2011)	1	10	10	Chemistry, aerosol and dynamical processes affecting quiescent stratospheric aerosol conditions
MiTAR	Transient stratospheric aerosol properties over 1998 – 2011	Transient 1998-2011 monthly-varying	Time-varying from MACC-CITY (Granier et al., 2011)	3	14	42	Understand drivers for observed stratospheric aerosol increase
HErSEA	Perturbation to stratospheric aerosol from & SO ₂ emission appropriate for 1991 Pinatubo 1982 El Chichon 1963 Agung	Transient for each period (1991-1995 1982-1986 1963-1967)	Time-varying From MACC-City (Granier et al., 2011)	6 for each (x3) eruption (Control, median and 4 (2x2) of hi/lo deep/shall ow)	5	270	Assemble stratospheric aerosol observations to benchmark datasets for constraining simulated volcanic perturbation. Assess how injected SO2 propagates through to aerosol properties in the different interactive stratospheric models. Gain new obsconstrained volcanic forcing datasets (simulated SW and LW radiative affects)
PoEMS	Perturbed parameter ensemble of runs to quantify uncertainty in each model's predictions (Lee et al, 2013)	Fransient for 1991-1995	Fime-varying from MACC-CiTY (Granier et al., 2011)	model to vary 7, 5 or 3 of 8 parameters (7 per parameter = 49, 35 or 21)	5 per param eter	245, 175 or 105 7, 5 or 3)	Quantify sensitivity of predicted Pinatubo perturbation to stratospheric aerosol properties and radiative effects to uncertainties in injection settings and model processes

Table1 Overview of SSIRC model experiments (Timmreck et al., in prep for Geopyhs. Mod. Dev.)

References:

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Lee, L. A., Carslaw, K. S., Pringle, K.J., Mann, G.W., and Spracklen, D. V. Emulation of a complex global aerosol model to quantify sensitivity to uncertain parameters, Atmos. Chem. Phys., 11, 12253–12273, doi:10.5194/acp-11-12253-2011, 2011

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