



The Interactive Stratospheric Aerosol Model Intercomparison Project (ISA-MIP): Motivation and experimental design

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The Stratospheric Sulfur and its Role in Climate (SSiRC) interactive stratospheric aerosol model intercomparison project (ISA-MIP) explores uncertainties in the processes that connect volcanic emission of sulphur gas species and the radiative forcing associated with the resulting enhancement of the stratospheric aerosol layer. The central aim of ISA-MIP is to constrain and improve interactive stratospheric aerosol models and reduce uncertainties in the stratospheric aerosol forcing by comparing results of standardized model experiments with a range of observations. In this paper we present 4 co-ordinated inter-model experiments designed to investigate key processes which influence the formation and temporal development of stratospheric aerosol in different time periods of the observational record. The “Background” (BG) experiment will focus on microphysics and transport processes under volcanically quiescent conditions, when the stratospheric aerosol is controlled by the transport of aerosols and their precursors from the troposphere to the stratosphere. The “Transient Aerosol Record” (TAR) experiment will explore the role of small- to moderate-magnitude volcanic eruptions, anthropogenic sulphur emissions and transport processes over the period 1998-2012 and their role in the warming hiatus. Two further experiments will investigate the stratospheric sulphate aerosol evolution after major volcanic eruptions. The “Historical Eruptions SO₂ Emission Assessment” (HErSEA) experiment will focus on the uncertainty in the initial emission of recent large-magnitude volcanic eruptions, while the “Pinatubo Emulation in Multiple models” (PoEMS) experiment will provide a comprehensive uncertainty analysis of the radiative forcing from the 1991 Mt. Pinatubo eruption.