VolMIP

Volcanic Forcings Model Intercomparison Project VolMIP

The CMIP6 endorsed model intercomparison project on the climate response to volcanic forcing (VolMIP) has defined a common protocol to subject coupled climate models to the same volcanic forcing, thus aiming for negligible across-model differences in the applied radiative forcing in order to focus on the climate response. The coordinated experiments will assess the causes of across-model spread linked to the different treatment of physical processes, and separate such model uncertainties from uncertainties in the forcing and internal variability.

VolMIP focuses on the simulated processes that determine two main aspects of climate response to large volcanic eruptions: the immediate dynamical alteration of atmospheric circulation triggered by the volcanically-induced stratospheric thermal anomaly and the associated variations in regional near-surface responses (VolShort); and the decadal-scale response of the oceanic thermohaline and gyre circulations and associated long-term changes in heat transport and ocean-atmosphere coupling (VolLong).

VolMIP defines a set of idealized volcanic perturbations based on historical eruptions . In this context, "idealized" means that the volcanic forcing is derived from radiation parameters of documented eruptions and the experiments do not include information about the actual climate conditions when these events occurred. The experiments are designed as ensemble simulations, with sets of initial climate states sampled from an unperturbed preindustrial simulation. By exploring very different initial conditions, VolMIP aims to constrain the range of post-eruption evolutions that arise from the interplay between ongoing internal climate variability and the imposed radiative perturbation, thus clarifying how much accurate know-ledge of background climate conditions matters when reproducing past volcanic events. Specific attention is given to the concomitant phasing of two dominant modes of climate variability: the El Niño-Southern Oscillation, the most important source of interannual climate variability, and the Atlantic meridional overturning circulation, a measure of the strength of the oceanic thermohaline circulation.