Geophysical Research Abstracts
Vol. 18, EGU2016-6560, 2016
EGU General Assembly 2016
© Author(s) 2016. CC Attribution 3.0 License.

Easy Volcanic Aerosol

Matthew Toohey (1,2), Bjorn Stevens (1), Hauke Schmidt (1), and Claudia Timmreck (1)

(1) Max Planck Institute for Meteorology, Hamburg, Germany, (2) GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany

Radiative forcing by stratospheric sulfate aerosol of volcanic origin is one of the strongest drivers of natural climate variability. Transient model simulations attempting to match observed climate variability, such as the CMIP historical simulations, rely on volcanic forcing reconstructions based on observations of a small sample of recent eruptions and coarse proxy data for eruptions before the satellite era. Volcanic forcing data sets used in CMIP5 were provided either in terms of optical properties, or in terms of sulfate aerosol mass, leading to significant inter-model spread in the actual volcanic radiative forcing produced by models and in their resulting climate responses. It remains therefore unclear to what degree inter-model spread in response to volcanic forcing represents model differences or variations in the forcing. In order to isolate model differences, Easy Volcanic Aerosol (EVA) provides an analytic representation of volcanic stratospheric aerosol forcing, based on available observations and aerosol model results, prescribing the aerosol's radiative properties and primary modes of spatial and temporal variability. In contrast to regriddings of observational data, EVA allows for the production of physically consistent forcing for historic and hypothetical eruptions of varying magnitude, source latitude, and season. Within CMIP6, EVA will be used to reconstruct volcanic forcing over the past 2000 years for use in the Paleo-Modeling Intercomparison Project (PMIP), and will provide forcing sets for VolMIP experiments aiming to quantify model uncertainty in the response to volcanic forcing. Here, the functional form of EVA will be introduced, along with illustrative examples including the EVA-based reconstruction of volcanic forcing over the historical period, and that of the 1815 Tambora eruption.