



## Volcanic impact on stratospheric ozone

Matt Toohey (1), Katja Matthes (2), Elisa Manzini (3), Claudia Timmreck (4), Kirstin Krueger (1), Georgy Stenchikov (5), and the CCMVAL Team

(1) Leibniz Institute of Marine Sciences (IFM-GEOMAR), Kiel, Germany (mtoohey@ifm-geomar.de), (2) GFZ German Research Centre For Geosciences, Potsdam Germany, (3) Istituto Nazionale di Geofisica e Vulcanologia, Bologna Italy, (4) Max-Planck-Institut for Meteorology, Hamburg, Germany, (5) King Abdullah University of Science and Technology (KAUST) Thuwal Kingdom of Saudi Arabia

Volcanic eruptions play a significant role on the global climate of the Earth system and have led to significant ozone loss in mid-latitudes observed after the El Chichon and Mt. Pinatubo eruptions. It is thus important to include the effect of such volcanic eruptions in the climate model simulations of the past if one wants to accurately reconstruct past ozone abundances. We present here analysis of a series of chemistry climate model runs of the 20th century (REF\_B1) in the frame of the SPARC Chemistry-Climate Model Validation Activity (CCMVal). Our analysis shows that CCMVal-2 REF-B1 runs show a considerable spread in their simulated response to volcanic eruptions as seen in examination of modeled temperature and ozone. The fact that many fundamentally different methods have been employed to parameterize the direct effect of volcanic aerosols on the radiative transfer of the stratosphere helps explain, at least in part, the wide range of post-eruption temperature anomalies seen in the different models. Total column ozone changes after eruptions are well correlated with changes in lower stratospheric ClO. It thus appears that while most models use a common aerosol SAD data set to drive anomalous post-eruption chemistry, the models display differing degrees of sensitivity to those aerosols, which is likely due to biases in model temperatures and background chemical fields.

By examining the models response to volcanic eruptions, we are thus able to qualitatively identify some model deficiencies, as well as test the robustness and consistency of the volcanic parametrization schemes used.