



Exploring volcanic forcing and its impacts to develop regional climate change prediction benchmarks

Caspar M. Ammann

National Center for Atmospheric Research, Climate and Global Dynamics Division, Boulder, CO, United States
(ammann@ucar.edu)

Volcanic forcing has long been recognized as an important driver of climate. At continental or global scales, volcanic cooling over a few years following an eruption is well documented, and systematic effects on atmospheric circulation have been recognized. However, it is generally very difficult to recognize the direct effects of any radiative forcing at regional or local scales, and therefore comparing climate models against the short instrumental record is generally impractical and a longer perspective is necessary. Using the historical record augmented by paleo proxy information provides the proper basis for testing the gained understanding and for evaluating its contribution to climate variability over time. This step is particularly important as climate research is increasingly focusing on regional scales with the paramount challenge of predicting regional and local climate change. Focusing on the effects from volcanic forcing has some advantages (but also some disadvantages) over other forcings. Namely its large magnitude, its distinct timing and its relatively well established history over past centuries provide sufficient statistical power to isolate systematic effects. In some regions the response is mostly radiative, in others its a combination of radiative and dynamical changes that lead to the regional change. Most recently attention has been expanded beyond the immediate response and questions regarding persistence of volcanic effects through modulation of internal modes of variability are raised. Indeed, some results promise improved insight into the climate systems response to changes in boundary conditions (such as forcing). Although challenges with regard to the forcing as well as the climatic records remain, the new angle gained from a system-wide impact of radiative forcing informed through the study of volcanic effects could serve as important benchmarks for regional climate change impact studies.