Geophysical Research Abstracts
Vol. 20, EGU2018-16359, 2018
EGU General Assembly 2018

Modeling Climate Impacts of the 1783-1784 Laki Eruption in Iceland

Brian Zambri (1), Alan Robock (1), Anja Schmidt (2), and Michael Mills (3)

(1) Rutgers University, Department of Environmental Sciences, New Brunswick, New Jersey, United States (bzambri@envsci.rutgers.edu), (2) Department of Chemistry and Department of Geography, Cambridge University, Cambridge, United Kingdom, (3) Atmospheric Chemistry Observations and Modeling Laboratory, National Center for Atmospheric Research, Boulder, Colorado, United States

The Laki eruption in Iceland, which began in June 1783, was followed by many of the typical climate responses to volcanic eruptions: suppressed precipitation and droughts, crop failure, and surface cooling lasting two to three years. In contrast to the observed cooling in 1784-1786, the summer of 1783 was anomalously warm in western Europe, with July temperatures reaching more than 3°C above the mean in some areas. While climate models can generally reproduce the surface cooling and decreased rainfall associated with volcanic eruptions, model studies have failed to reproduce the extreme warming in western Europe that followed the Laki eruption. As a result of the inability to reproduce the anomalous warming, the question remains as to whether this phenomenon was a response to the eruption, or merely an example of internal climate variability. Using the Community Earth System Model from the National Center for Atmospheric Research, we investigate the role of the aerosol indirect effect of the "Laki haze," and the effect of the eruption on Europe's climate. Results indicate that the extreme summer temperatures may be attributed to natural variability. On the other hand, the unusually cold winter in Europe appears to have been partially due to the eruption, which forced a positive phase of the El Niño Southern Oscillation. Understanding the cause of this anomaly is important not only for historical purposes, but also for understanding and predicting possible climate responses to future high-latitude volcanic eruptions.