Dr. Ryan R. Neely III
Lecturer in Observational Atmospheric Science
Affiliate

National Centre for Atmospheric Research
and
Institute for Climate and Atmospheric Science

School of Earth and the Environment
University of Leeds

Stratospheric Aerosols and Climate Variability: The Good, The Bad, and The Ugly of Accurately Representing Volcanic and Anthropogenic Contributions

Understanding climate changes on time scales of years, decades, centuries, or more requires determining the effects of all external drivers of radiative forcing of Earth's climate, including anthropogenic greenhouse gases and aerosols, natural aerosols, and solar forcing, as well as natural internal variability. In this seminar we will explore the radiative forcing associated with the stratospheric sulfate aerosol layer.

Stratospheric aerosols are composed largely of dilute sulfuric acid droplets that efficiently reflect incoming solar energy back to space. The global radiative cooling due to increases in these particles is linked to the associated increases in aerosol optical depth. Recent measurements of stratospheric aerosol optical depth demonstrate that the "background" stratospheric aerosol layer is persistently variable rather than constant, even in the absence of major volcanic eruptions. Yet, we do not accurately represent the radiative forcing created by stratospheric aerosols in our state-of-the-art climate models. Most climate models overestimate the forcing of colossal volcanic eruptions and underestimate the impact of "background" aerosol variability.

We will pick up the discussion here and I will discuss some new research that examines the representation of colossal volcanic eruptions in climate models and how this should be improved, the possible role of stratospheric aerosol in the recent slow down in global temperature increases (i.e. the 'hiatus') and the attribution of anthropogenic and volcanic contributions to stratospheric aerosol variability.