

ATS/CIRA Colloquium

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Climate effects of volcanic aerosol: past and future

Hosted by Jeff Pierce

1 p.m. Friday, Sept. 25

[Microsoft Teams meeting link](#)

Volcanism is a major driver of climate variability and has played a critical role in the long-term evolution of Earth's atmosphere and habitability through the release of gases including sulfur species, water, carbon dioxide, and halogens. In this talk, I will summarize my work on volcanic sulfur emissions from volcanic eruptions of different styles, magnitudes, and durations. The general mechanisms by which volcanic eruptions affect climate are well understood today. Until recently, research efforts mainly focused on the direct radiative, dynamical and chemical effects of sulfate aerosol particles formed by large-magnitude explosive eruptions such as Mt. Pinatubo in 1991. Since the late 2000s, it has become clear that eruptions much smaller in magnitude than 1991 Mt. Pinatubo routinely decrease the transparency of the stratosphere to a degree that a cooling effect is discernible in upper tropospheric temperature measurements. I will make a case for the need to include these small-magnitude eruptions in climate model simulations. In addition, I will show that weakly explosive, continuously degassing or effusive eruptions, emitting gas and volatile species mainly into the lowermost troposphere, are gaining increasing attention in the scientific community. This is because they are (almost) perfect "natural labs" that may allow us to better quantify how aerosol particles cool Earth's climate via the modification of the microphysical properties of low-level liquid water clouds.

Colloquia page: atmos.colostate.edu/colloquia