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Optical properties of volcanic ash: improving remote sensing observations.

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Many times each year explosive volcanic eruptions loft ash into the atmosphere. Global travel and trade rely on aircraft vulnerable to encounters with airborne ash. Volcanic ash advisory centers (VAACs) rely on dispersion forecasts and satellite data to issue timely warnings. To improve ash forecasts model developers and satellite data providers need realistic information about volcanic ash microphysical and optical properties. In anticipation of future large eruptions we can study smaller events to improve our remote sensing and modeling skills so when the next Pinatubo 1991 or larger eruption occurs, ash can confidently be tracked in a quantitative way.

At distances >100km from their sources, drifting ash plumes, often above meteorological clouds, are not easily detected from conventional remote sensing platforms, save deriving their quantitative characteristics, such as mass density. Quantitative interpretation of these observations depends on a priori knowledge of the spectral optical properties of the ash in UV (>0.3μm) and TIR wavelengths (>10μm). Incorrect assumptions about the optical properties result in large errors in inferred column mass loading and size distribution, which misguide operational ash forecasts. Similarly, simulating ash properties in global climate models also requires some knowledge of optical properties to improve aerosol speciation.