

# The Complex Refractive Indices of Mineral Aerosols and Why they Matter

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Aerosol refractive indices are fundamental parameters that are generally measured by spectroscopists with specialized knowledge. We in the Earth science community frequently utilize these refractive indices because they are essential for computing aerosol radiative effects and retrieving aerosol composition. Unfortunately, there are a wide variety of refractive indices with significant differences for some aerosol species (e.g., hematite) and a lack of refractive index choices for other aerosols (e.g., clay minerals, goethite), and this hinders our ability to accurately compute the radiative effect of mineral dust. Additionally, the mineral refractive indices used in atmospheric science are not necessarily linked to the mineral reflectances used to identify surface mineralogy; this creates a disconnect between the atmosphere and the surface that frustrates closure analyses.

In this talk, we will present an overview of some refractive indices of radiative importance in aeolian dust (illite, kaolinite, montmorillonite, hematite, goethite). We will discuss how mineral refractive indices are used in aerosol retrievals, and how we can use remote sensing retrievals to narrow the range of viable choices. We will also discuss how we can use published spectroscopic measurements to extrapolate the refractive indices that are inferred at a handful of visible and near-infrared wavelengths to the longwave regime. Finally, we will discuss how working groups like MIRA (*Models, In situ, and Remote sensing of Aerosols*; <https://science.larc.nasa.gov/mira-wg/>) and community repositories like TAO (Tables of Aerosol Optics) can improve radiative closure by enhancing interactions between the three disciplines.