

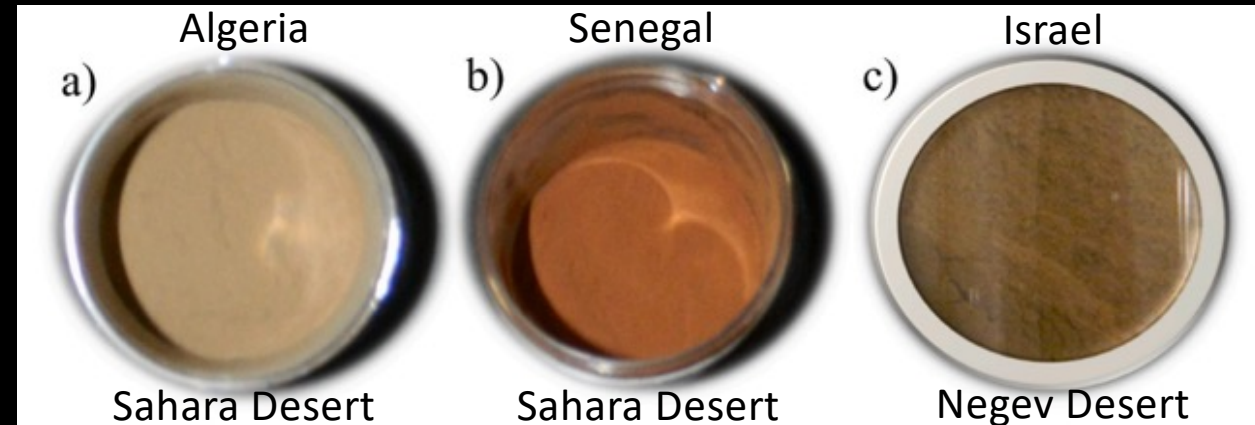
Dust on Earth and Mars: Optical Properties for Remote Sensing and Modeling



Dust plays a key role in many Earth system processes and is ubiquitous in the Martian atmosphere. Researchers are intensively trying to characterize dust optical properties with field campaigns, laboratory analyses, space-based remote sensing missions, and global modeling efforts.

This is a bountiful time for dust scientists, but the uncertainty between measurements and models is complicated by conflicting assumptions. For example, the conversion of satellite radiance measurements into products like aerosol optical depth for model evaluation depends upon aerosol properties like particle size and shape that are often prescribed and not part of the retrieval.

Current measurements of optical properties of bulk dust and fundamental dust mineralogy components vary widely, which creates problems for scientists trying to interpret satellite observations of dust and estimate its climate impacts. Field observations indicate the persistence of coarse and giant dust particles at higher altitudes and farther downwind from their source than previously expected with consequences for climate. The lack of comprehensive and realistic shape models for dust is an outstanding issue in the research community.



Soil samples from desert regions taken for the Fennec field campaign and the Statistical Evaluation of Aerosol Retrievals (STEAR) experiment. The different hues illustrate the high variability of mineral composition of dust sources.