The Earth Surface Mineral Dust Source Investigation Planned for the International Space Station

Robert Green, Natalie Mahowald, David Thompson, Roger Clark, Bethany Ehlmann, Paul Ginoux, Olga Kalashnikova, Ron Miller, Greg Okin, Thomas Painter, Carlos Perez, Vincent Realmuto, Gregg Swayze, Elizabeth Middleton, Luis Guanter, and Eyal Ben Dor

(robert.o.green@jpl.nasa.gov)

Mineral dust emitted into the atmosphere under high wind conditions is an important element of the Earth system. Mineral dust impacts direct and indirect radiative forcing, weather, atmospheric chemistry, cryosphere melt, surface hydrology, and the biogeochemistry of ocean and terrestrial ecosystems, and can be a hazard to human populations. The Earth's mineral dust cycle consists of source, transport, and deposition phases. Surface mineral dust source composition knowledge is required for initialization of Earth System Models to accurately simulate the dust cycle to investigate and understand impacts on the Earth system. Today, detailed composition of the Earth's mineral dust source regions is uncertain. The Earth Surface Mineral Dust Source Investigation (EMIT) has been selected by NASA to measure the Earth's mineral dust source regions from the International Space Station (ISS). EMIT will use imaging spectroscopy spanning the visible to short wavelength infrared (VSWIR) spectral region to measure the arid land dust source regions of the Earth. The spectroscopically derived mineral composition from EMIT measurements will be used to improve the dust source region initialization of modern Earth System Models. These models will be used to investigate the impact of direct radiative forcing in the Earth system that depends strongly on the composition of the emitted mineral dust aerosols. These new measurements and related products will be used to address the EMIT science objectives and made available to the science community for additional investigations. We present an overview of the EMIT project, objectives, planned analyses, and expected data products.