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Current distributions and behaviors of dust and water on the surface of Mars

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Dust and water are fundamentally important for the current status of both martian atmosphere and surface deformations. While the amount of airbone dust largely varies with seasons and the presence of dust storm, dust exists on the surface of Mars permanently through geological timescale. Theoretical studies find out that airborne dust significantly contributes to the thermodynamics of the atmosphere, which indicates that dust should play important role even in the past climatic conditions. On the other hand, the presence of dust on the surface significantly controls the condition of the martian surface in terms of such as thermal inertia, albedo, and transmittance. These are controlling factors for the formations of currently-active geological features, including as aeolian features and ice deposits, which distribute all over the surface of Mars at least as remnants. Water is a minor component for the martian atmosphere, but plays important roles for the evolutions of the regolith layer and deposits in the polar regions. The formations of water/ice-related features are resulted from the strong link between surface/subsurface reservoirs of water and atmosphere, and thus, water can be considered as an important indicator of the atmospheric transportation-mechanisms and seasonal climatic changes.

The orbiter of the MELOS mission will study martian meteorology by measuring atmospheric transportations of water and dust. The lander of the MELOS mission, which is now considered as an EDL experimental unit as a precursor of the MELOS-2 mission, may perform meteorological observation. In this talk, we will review geological aspects of dust- and water-related features to discuss the possible contribution of lander measurements for the states of airborne dust and water at the martian surface level to understand the martian meteorology and climate history.

Keywords: Mars, MELOS, dust, water, geology, atmoshere