

## Concept of Mars meteorological orbiter

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A Mars meteorological orbiter mission is under study. The primary objective of the orbiter will be exploration of meteorological processes with focusing on dust cycle. Water cycle and photochemistry will also be addressed.

In spite of tremendous efforts in Mars weather monitoring in previous Mars missions, dust and water cycle are far from fully understood. Though Mars Global Surveyor and Mars Climate Orbiter has provided a wealth of information on the seasonal cycle of large-scale dust storm and water vapor distributions, observations of individual meso- to synoptic-scale transport processes are limited due to spatially and temporary sparse sampling inherent in low-altitude polar orbits.

The Mars orbiter under study will address material transport over wide spatial and temporal scales with continuous, high-resolution global monitoring of dust, clouds, water vapor, minor gases, and temperature field from an elliptical, equatorial orbit. The apoapsis of the orbit will be located always near the local noon. The observation strategy resembles that of Earth's meteorological weather satellites, but the instruments are optimized to Mars weather monitoring. A polarimetric camera will visualize lofted dust grains and characterize the dust size distribution. A sub-millimeter sounder will obtain three-dimensional distributions of atmospheric temperature, water vapor, other minor gases and their isotopes. A thermal imager will monitor the global distributions of dust and atmospheric temperature, and also vertical profiles of dust with limb imaging. Radio occultation will obtain high-precision temperature profiles. The observations will complement other future Mars missions such as ESA's Trace Gas Orbiter, which focuses on high-sensitivity trace gas observations.

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