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Review of the First 100 sols of Measurements of the Rover Environmental Monitoring Station (REMS) on the Mars Science Laboratory

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The Rover Environmental Monitoring Station (REMS) on the Mars Science Laboratory (MSL) mission has sensors recording air and ground temperature, pressure, relative humidity, wind speed in the horizontal and vertical directions, as well as ultraviolet radiation in different bands. REMS collects data from all sensors simultaneously daily during the course of the mission.

REMS will add significantly to the environmental record collected by prior missions through the range of simultaneous observations including relative humidity; the ability to take measurements routinely through the night; the intended minimum of one Martian year of observations; and the first measurement of surface UV irradiation. The capability of multiple, consistent, and simultaneous data is essential for meaningful interpretation of near-surface processes including the characterization of soil thermal properties. The Martian atmosphere is generally transparent to solar radiation, but atmospheric dust absorbs solar radiation and heats the atmosphere, while UV radiation ionizes atmospheric gases and is harmful to any potential Martian organisms (past or present). For this reason, knowledge of the UV radiation flux at the surface of Mars is important for the understanding habitability conditions, one of the main goals of the MSL mission. Moreover UV radiation is a significant driver in the photochemistry of the atmosphere and surface. In this paper we present a first analysis of REMS measurements, the status of the different sensors and the potential of REMS for Mars environmental studies.

All the REMS measurements are being analyzed carefully since the beginning of operations on Mars. Here, we describe the REMS instrument performance, and science findings during the first 100 sols of operations. Besides the fact that REMS data are very useful for many science applications, they are also supporting investigations by other MSL instruments and MSL operations.