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Use of Martian dust analogues in modelling versus the real optical properties of Martian dust.

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Abstract

In the absence of any Martian dust samples, parameters deduced from the Martian landers cameras and remote sensing instruments on orbiters allow to deduce that Mars dust is very fine and most probable a UV absorber.

Simulations of Martian radiative transfer have often used either transparent very fine cloud particles or the lightest desert aerosol of standard models which is derived from Libyan sands containing a small proportion of iron oxides. Simulations will be shown also with particles richer in magnetic elements as shown by for example by Madsden et al (2009) from the MER landers. These absorb in the UV and also in a much wider spectral range. The properties of the minerals identified by Mossbauer spectroscopy by Madsden et al as well as their colorimetric studies allow generalizing their optical parameters. The use of their proposed dust models in radiative transfer simulations will be discussed and new analogues for laboratory studies will be discussed.

This communication intends also to compare these simulated results with actual observations from the Mars-Express SPICAM instruments. The modeled parameters will be used to determine the capability of Martian dust to protect known forms of life against UV radiation from the sun and give indication on the thermal effects of these aerosols during dust storms.

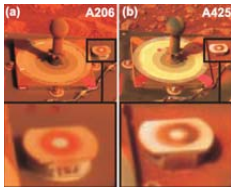

Figure 1: NASA MER image of the Pancam caltarget and sweep magnet before and after events of strong winds. (treatment in false colour by Madsden et al, 2009). These images reveal new optical properties of Martian dust.

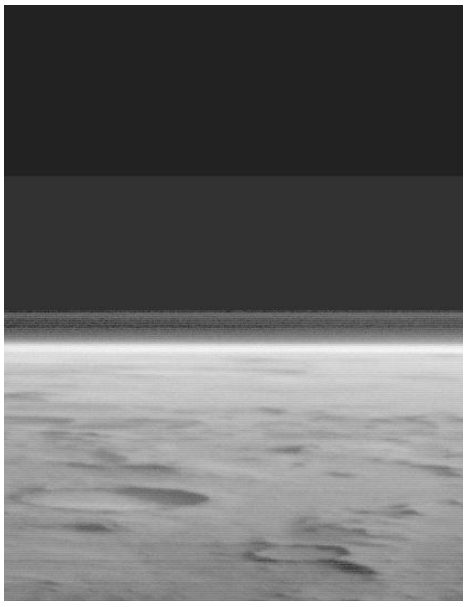

Figure 2: NASA MGS image of the MOC camera, December 2002, this image, with CO2 frost on the surface and a succession of haze and aerosol layers represent a “normal” Martian situation. (NASA document)

Reference

[1] Madsen, M. B., et al. (2009), Overview of the magnetic properties experiments on the Mars Exploration Rovers, J. Geophys. Res., 114, E06S90, doi:10.1029/2008JE003098.