OMEGA/Mars Express LIMB OBSERVATIONS OF THE MARTIAN DUST AND ATMOSPHERIC COMPOSITION

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The martian dust is one of the most difficult atmospheric components to model and observe. Indeed, a remote observer, to infer the dust optical thickness and properties, must discriminate photons scattered by aerosols among photons reflected by the martian surface. Various methods have been use to solve this problem. Here we present results obtained by looking at the Mars limb. Any light detected have been scattered by aerosols, although a fraction of the scattered light may have been reflected on the surface.

But limb observations do not only allow to more accurately disentangle surface and dust contributions to the martian reflectance. They also allow the observer to retrieve the vertical profile of the dust and aerosols (particle density as a function of altitude), while nadir observations are usually only sensitive to column integrated density. Moreover, when the dust slant optical thickness reaches saturation, the reflectance only depends on the single scattering albedo and the phase function of the particles. In these conditions, limb observations become powerful tool to constrain the particle optical properties. Finally, limb observations increase the sensitivity to minor gaseous species, and allows again to measure vertical distribution of some atmospheric constituents like water or oxygen.

The OMEGA spectro-imaging system aboard the Mars Express mission has observed during several limb sessions. OMEGA operates between 0.35 and 5.1 mm with a spectral resolution ranging from 7 to 20 nm. The vertical resolution of the limb observations varies from session to session between 2 and 9 kilometers. Various seasons, latitudes, and local time have been sampled.