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An analysis of Martian atmospheric dust based on laboratory measurements and a radiative transfer model

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It is very difficult to obtain reliable information about the mineralogy of the Martian dust, comparing directly laboratory and remote sensing data, especially in the thermal range. The interpretation of spectral remote sensing data is not straightforward because observed spectra are the results of a combination of different contributions: thermal emission from the surface, transmission and emission of atmospheric gases, aerosol particles, and water-ice clouds. It is therefore important to use a correct approach for analysing remote sensing data taking into full account the radiative process due to the presence of a complex atmosphere. In addition such evaluation process can be very useful for discriminating between surface and atmospheric dust contribution and, altogether, for a better understanding of Mars. Our method for the interpretation of the Martian spectra is based on a careful comparison of the observational data with synthetic spectra produced by means of an appropriate radiation transfer model, based on the spectral properties of convenient materials measured in laboratory under controlled conditions. The great advantage of using this radiative transfer model is that it takes into account, in the simulation of the total radiance, the cumulative effects of all components, but it is possible to model separately each component, allowing a better understanding of their contribution to the observed spectra. We have applied our method to TES spectra collected in quasi-limb geometry, obtaining some new results, about the composition of the suspended dust, that will be extensively discussed in the presentation.