Geophysical Research Abstracts, Vol. 9, 01665, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01665

Determining the modal mineralogy of the Martian surface using the OMEGA/MEx reflectance data

F. Poulet(1), M. Vincendon(1), Y. Langevin(1), J.-P. Bibring(1), B. Gondet(1)
(1) IAS, CNRS/Université Paris-Sud, 91405 Orsay, France

Using classical methods of spectral identification based on the absorption band depth of minerals (Spectral Parameters, Modified Gaussian Model), OMEGA has provided a new view on the identification and spatial distribution of several classes of minerals on Mars (Bibring et al. 2006, Science, 312). One of the significant challenges for the use of reflectance spectroscopy for analyzing planetary soil mineralogy is the relationships between the band depth absorptions and mineral abundances and grain sizes. It is therefore important to develop a bridge between classical methods of classification and the information in term of type of mixture, mineral abundance and grain size that is available from spectral deconvolution using radiative transfer theories. On Mars, the deconvolution is complicated by the Martian aerosols that can contribute up to 20% of the OMEGA spectra. The first step of our spectral quantitative analysis consists of removing the aerosols contribution thanks to a model that simulates the radiative transfer through atmospheric particles based on Monte-Carlo methods (Vincendon et al., JGR, in press). In order to derive the relative abundances and the grain sizes of the Martian soil from atmospherically corrected OMEGA spectra, we use the approach adopted by Shkuratov et al. (1999, Icarus, 137). This approach is based on the geometrical optics approximation and is used to transform optical constants and grain sizes into a reflectance spectrum for particulate materials. Poulet et al. (2002, Icarus, 160) showed its degree of realism and of efficiency relative to other scattering models, and in particular to the Hapke model and its derivatives. The model has been also tested to determine the type of mixture (sand, areal or bedrock), the relative abundances and the grain sizes of components of laboratory mineral samples (Poulet and Erard 2003, JGR, 109). We apply this model to derive the relative abundances and the grain sizes of several specific regions of Mars enriched in mafic components and hydrated minerals (clays and sulfates).