Geophysical Research Abstracts, Vol. 9, 04242, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04242

The impact of Martian aerosols on the retrieval of temperature profile from PFS measurements

P. Wolkenberg (1), D. Grassi (2), V. Formisano, (3), A. Jurewicz (1)

(1) Space Research Center PAS, Warsaw, Poland, (paulina@cbk.waw.pl / Fax: +48228403131), (2) LESIA-Observatoire de Paris, MEUDON Cedex, France, (3) Istituto di Fisica dello Spazio Interplanetario INAF-IFSI, Rome, Italy

This research focuses on the error assessment in the retrieval of atmospheric temperature related to the presence of aerosol in the Martian atmosphere. It aims to quantify the related uncertainties in the atmospheric temperature profiles derived from radiance measurements of the Planetary Fourier Spectrometer (PFS), currently operating on the Mars Express orbiter. First, the impacts of size distributions and vertical distributions of dust particles and water ice crystals on brightness temperatures and weighting functions are considered for a reference model atmosphere. From the analysis of the model atmosphere including dust and water ice crystals with different size distributions it results that the dust component affects weighting functions and brightness temperatures less than water ice crystals. A similar situation is also observed when different vertical distributions are considered. Unlike dust, water ice with different crystals evidently influences weighting functions and brightness temperatures. The impact of the considered water ice vertical distributions on brightness temperatures is slightly noticeable, and only near to 840 cm^{-1}. For the analysed examples of real PFS (Planetary Fourier Spectrometer) measurements the impact of different dust vertical distributions on the retrieval of temperature profile is prominent only in layers close to the surface, contrary to vertical distributions of water ice crystals, which affect the retrieval of reasonable temperature profiles for all altitudes. This means that, in the cases of expected heavily loads water ice crystals, their vertical distribution in the Martian atmosphere should be known from other observations before the retrieval of the temperature profile is attempted. All influences of dust on weighting functions and brightness temperatures can be neglected if the noise equivalent radiance (NER) of PFS is taken into account.