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Atmospheric profiles from the MEx/SPICAM solar occultations in the UV

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We will present observations of aerosol and ozone profiles derived from MEx/SPICAM solar occultations in the ultraviolet. This dataset allows the retrieval of vertical profiles of the abundance of gaseous species (CO_2, O_3), aerosol optical depth in the UV, and the particle size through the Ångström coefficient, as described by Montmessin et al. (2006). The vertical inversion used is based on Quémerais et al. (2006). The profiles are acquired in the middle atmosphere of Mars with an average vertical resolution of 500m or less. The occultation method is a self-calibrating method, since we use the transmissions: spectra divided by a reference spectrum observed outside the atmosphere. Thus the occultation observations are not influenced by any drift or degradation of instrumental calibration during the mission. The first results were presented by Listowski et al. (2011). Since then, the SPICAM technical team has provided has provided new corrections for the data, giving access to previously unused orbits, and new, more precise geometry files. A data analysis code, including a correction for mechanical oscillations induced by the MARSIS radar antennae, has been developed and used in the analysis. We have analysed all solar occultations of adequate quality between orbit numbers 0-10000 (Mars Years 27-30) spanning 4 MY with a good seasonal and spatial coverage. The results reveal the dust haze near the surface, and detached layers (possibly clouds) at high altitudes. Large variations in the thickness of the near-surface dust layer are observed in the course of seasons, and in particular during the dust storm of Mars Year 28. The high-altitude detached layers show variations as well and the highest layers (70-80 km) are found during the dust storm of Mars Year 28. We can also retrieve the particle size of the aerosols (assuming a certain composition) in the radius range 30-300 nm. Ozone profiles are acquired for certain seasons and are compared to LMD Mars GCM simulations. We will present a global overview of the results and some specific cases of interest from the several hundreds of occultations analysed and compare them with previously published results on aerosols and ozone.

References :
Listowski et al. 2011: Solar Occultation with SPICAM/UV onboard Mars Express: Retrieving Aerosol and Ozone Profiles. The Fourth International Workshop on the Mars Atmosphere: Modelling and observations, 8-11 Feb, 2011, Paris, France. Published online at http://www-mars.lmd.jussieu.fr/paris2011/program.html, pp.191-194

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