



Methane in Martian atmosphere: average spatial, diurnal and seasonal behaviour

A.Geminale, V. Formisano and M. Giuranna

Istituto di fisica dello spazio interplanetario, Rome Italy.

anna.geminale@ifsi-roma.inaf.it

A large number of spectra measured by the Planetary Fourier Spectrometer aboard the European Mars Express mission has been studied to identify the average properties of methane in the martian atmosphere. Using the line at 3018 cm^{-1} we have studied the seasonal, diurnal, and spatial variations of methane through the analysis of large averages of spectra (more than 1000 measurements). Methane mixing ratio has been obtained simultaneously with water vapour mixing ratio and water ice content, by best fitting the computed averages with synthetic spectra. These spectra were computed for different values of the 3 parameters (methane and water vapour mixing ratio, and water ice optical depth).

The methane mixing ratio shows a slow decrease from northern spring to southern summer with an average value of (14 ± 5) ppbv (part per billion by volume) and it does not show a particular trend with the latitude with an average value of 21 ppbv. The methane mixing ratio seems not to be uniform in longitude in the martian atmosphere, as already reported by Formisano et al. (2004). Two maxima are present at -40° (20 ppbv) and $+70^\circ$ (25 ppbv) East longitude with a zonal-mean value of (16 ± 5) ppbv. In local time the methane mixing ratio seems to follow the water vapour diurnal cycle. The most important point for future understanding is, however, that there are special orbits in which methane mixing ratio has a very high value.