



Interannual study and vertical profiles of the oxygen day-glow in the Martian atmosphere with data of PFS-MeX

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Nadir observation

In this work we study the nadir observations of oxygen day-glow at Mars with the Planetary Fourier Spectrometer on board the Mars Express ESA mission (PFS-MEX). The map of the airglow over the planet during four Martian years starting from orbit 640 (2004-07-20, Martian year 27, Solar Longitude $LS = 63^\circ$) to orbit 9550 (2011-06-26, Martian year 30, $LS = 318^\circ$) indicate that the maximum oxygen emission occurs at equinoxes over the polar regions. An emission at middle-low latitudes is observed at the aphelion with lower values respect to the polar regions.

Although the seasonal trend is the same for all the years, the values of emission intensity are different being higher during the Mars years 27 and 30 than in years 28 and 29 due to the fact that most of the data acquired in the vicinity of the poles have incidence angles of 58° and 67° for years 27 and 30 respectively, while these values are around 75° and 72° for Mars years 28 and 29 respectively.

Limb observation

We consider data acquired when the distance from the spacecraft to the target point goes from 1000 to 2150 km which corresponds to a vertical resolution from 28 to 60 km since the field of view of PFS in the short wavelength channel is 1.6° [4]. We average spectra in altitude ranges of 20 km and in order to explore all altitudes between 0 and 150 km a shift of 5 km is considered. For example, we average spectra taken at altitudes between 20 and 40 km, 25 and 45 km, and so on, obtaining in this way a smooth vertical profile of the oxygen emission. The vertical resolution is then given by taking into account the vertical resolution of each spectrum in the average. The profiles of O_2 emission over the poles during equinoxes show a maximum between 20 and 30 km and over the south pole during spring equinox also a second intense peak at 60 km.