The 1.27 μm O2 day glow and ozone in Martian atmosphere from OMEGA Mars Express measurements

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OMEGA is the imaging spectrometer on board the Mars Express ESA mission acquiring spectra in the range from the visible to 5.1 μm with a mean spectral resolution of about 15 nm. Although this resolution is not enough to resolve the O2 day glow band at 1.27 μm, the spectral data allow estimation the total intensity of this emission and a high spatial resolution (up to 1 km at the limb) enables to obtain the vertical profile of the emission. The O2 day glow is a result of the photolysis of ozone: about 90 % of ozone molecules produce oxygen at the $a^1\Delta g$state de-activated by emission or by collisions with the CO2 molecules (below some level of the atmosphere). In this work the OMEGA limb observations are used to determine the vertical distribution of the O2 emission and the apparent ozone abundance and to retrieve the vertical profile of the ozone number density. To estimate the vertical profile of the O3 number density we need to take into account a quenching effect. From limb profile of the O2 emission we estimate the quenching parameter k= 0.7 e-20 cm3 s-1, which is of 3 times less than existing upper limit. To include into consideration the collisions with the CO2 we use simultaneously obtained vertical CO2 profiles from the PFS LWC data. From the OMEGA nadir observations are obtained the latitude, local time and seasonal distribution of the apparent ozone abundance in the Martian atmosphere. We acknowledge the ESA Headquarters and IFSI-INAF for support to Russian CoIs and the Russian Foundation of Basic Research for grant RFFI 04-02-16856a.