



Study of water ice clouds above Mons Olympus

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Topographic clouds associated with the volcanoes have been known and quantitatively studied for a long time through telescopic and spacecraft observations. Mars Global Surveyor Mars Orbiter Camera found that clouds activity in the Olympus Mons was generally confined in the seasonal range described by $L_s = 0^\circ - 220^\circ$ with a peak in cloud area near $L_s = 100^\circ$. The Viking Orbiters (1971-1972) have also observed martian atmospheric phenomena for eight seasons and the ice clouds close to the giant volcanoes on the Tharsis Region. Observation of water ice clouds is among the main scientific goals of the Planetary Fourier Spectrometer (PFS), a payload instrument of the European Mars Express Mission. To study the water ice clouds above the Olympus Mons we consider the observations of both the long (LWC) and short wavelength channel (SWC). Within a spectral range of 220-8000 cm^{-1} with a spectral resolution of 1.2 cm^{-1} . (Formisano et al. 2005). We report some results obtained in several orbits taken in different seasons: orbit 1111 ($L_s = 121$), orbit 1177 ($L_s = 130$), orbit 1199 ($L_s = 133$) and orbit 1221 ($L_s = 136$). The water ice is identified in the spectra by the presence of its main features, with the most pronounced around 825 cm^{-1} in the LWC and around 3000 cm^{-1} in the SWC. In the last feature, during the aphelion cloud belt ($L_s = 45-150$), we can see the fresnel peak at 3250 cm^{-1} (Raut et al. 2004). That depends on the size of the particles and their amount in the atmosphere (Rinaldi et al 2005, submitted). This peak appears when the radius of water ice particles is greater than about 2 μm (Type II particles, Clancy and Wolff (2003)). Then, during the aphelion cloud belt. The first preliminary results from our calculation, and their comparison with PFS data, indicate that in the flank of Mons Olympus we have to consider water ice clouds particles of size close to 3-4 μm and a clouds altitude of 40-50 km. In this work, we focus on the following topics: 1-vertical distribution of the water ice in the atmosphere: cloud altitude 2-the radius of the water ice particles 3-water ice opacity

4- seasonal cloud evolution