

FIRST RESULTS OF PFS (PLANETARY FOURIER SPECTROMETER) AT MARS.

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PFS is a Fourier spectrometer developed for Mars 96 first and for Mars Express later. Mars express was launched from Baikonour on June 2, 2003 , and reached the Martian orbit on December 25 , 2003. The spectrometer covers the wavelength range from 1.2 to 5 microns and from 5 to 50 microns. At Mars we have operated the experiment on 20 orbits roughly, up to now. A power problem on the spacecraft and the poor familiarity with the needed complex operations have reduced the number of possible activities. A total of less than 5000 spectra have been collected up to now. The 15 microns CO₂ band allows us to retrieve the vertical temperature- pressure profile from a single spectrum. A case will be shown in which the orbit was passing over the Olympus Mons (a 25-27 Km volcano). The same band (by means of the multiple Q-branches) allows us to identify and study the abundance of the CO₂ in all the possible isotopic combinations (16-12-16, briefly 626, but also 627, 628 , 728 , 828 , 637, 638 and so on). The atmospheric minor components CO and H₂O are well measured in many bands or groups of lines, from 300 cm⁻¹ to 7500 cm⁻¹. The high spectral resolution allows us also to identify a number of small signatures which possibly will bring us to the identification of minor compounds (at the moment a good candidate is ammonia). Depletion of CO over the big volcanos and enrichment of H₂O indicates a possible photochemical process which reduces the carbon monoxide mixing ratio. Soil features are observed over the South polar cap, indicating the presence of CO₂ and H₂O ice, while in other areas, like the Gusev crater, where the Spirit rover is operating, there is indication of idratation of the soil minerals. The main problem for further studies is the poor knowledge of the solar spectrum, measured (indirectely) from space for the first time with PFS in certain IR spectral regions.