

## PFS-MEX OBSERVATIONS OF NON LTE EMISSION AT 4 – 5 MICRONS

Formisano V.,<sup>a</sup> Maturilli A.,<sup>a</sup> Giuranna M.,<sup>a</sup> D'Aversa E.,<sup>a</sup> M.A. Lopez-Valverde,<sup>b</sup>

<sup>a</sup> IFSI – INAF, Via del Fosso del Cavaliere 100, 00113 Roma, Italy

<sup>b</sup> Instituto de Astrofísica de Andalucía (CSIC), Apdo. 3004, 18080 Granada, Spain

We report on PFS – MEX ( Planetary Fourier Spectrometer on board Mars Express ) limb observations of the non Local Thermodynamic Equilibrium emission by CO and CO<sub>2</sub> isotopic molecules. The CO emission is observed peaking at altitudes lower than the CO<sub>2</sub> emission peak. Two orbits have been considered, which explore latitudes from 75 to 15 degrees. In general in the season considered (northern summer) the emission intensity increases going to lower latitudes. The peak emission height is also decreasing with decreasing latitude. The CO<sub>2</sub> isotopic molecules are emitting radiance out of proportion with respect to the normal isotopic abundance: the measured intensity of the 636 and 628 isotopes are comparable (within a factor roughly 2) with the emission of the molecule 626, while their isotopic abundance is of the order of 1/90 and 1/250 respectively.

By comparison with Hitran data base we can identify the emitted bands as the second hot band for the 626 and 636 molecule, while for the 628 and 627 the band emitted are possibly the third hot band. Other minor bands or lines are also observed in emission.

In one of the two orbits considered ,the orbit 1234 of MEX, we also observe at altitudes 80- 85 Km scattered radiation, with indication of CO<sub>2</sub> ice aerosols as scattering centers . At the same altitude the Pathfinder descending measurements show a temperature that allows CO<sub>2</sub> condensation. Pathfinder measurements were at 0300 local time, while our observations are : orbit 1234 showing CO<sub>2</sub> ice signature at 1130 local time (the second observation being at 6.6 local time). Figure 1 shows the spectrogram of the observations for orbit 1234, while figure 2 shows the average spectrum observed.

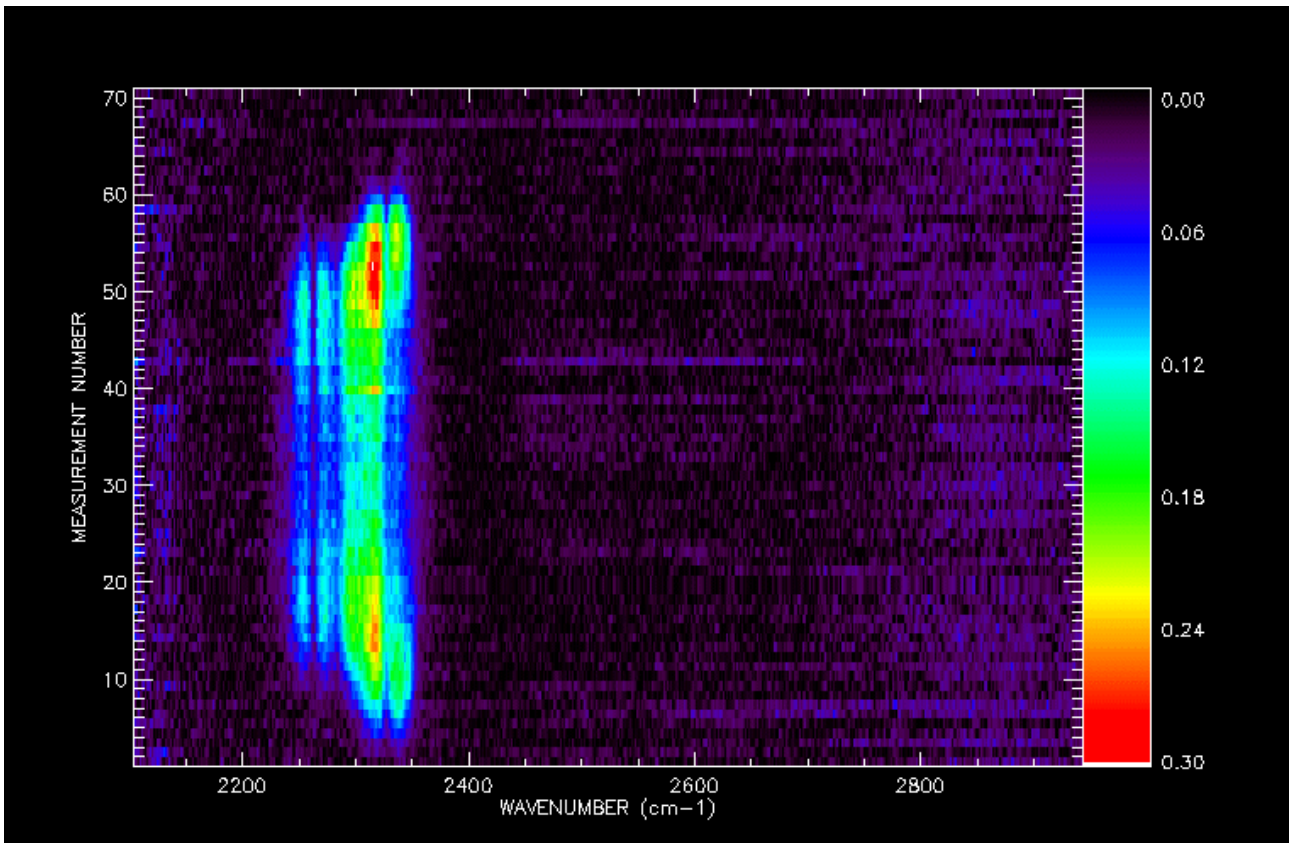


Figure 1 – Orbit 1234 . Spectrogram of the measurements of the SW channel between 2100 and 2950  $\text{cm}^{-1}$ . The colour code is automatically chosen to span all colours over the available radiance variation and is given on the right in  $\text{ergs}/(\text{s sr cm}^2 \text{ cm}^{-1})$  .

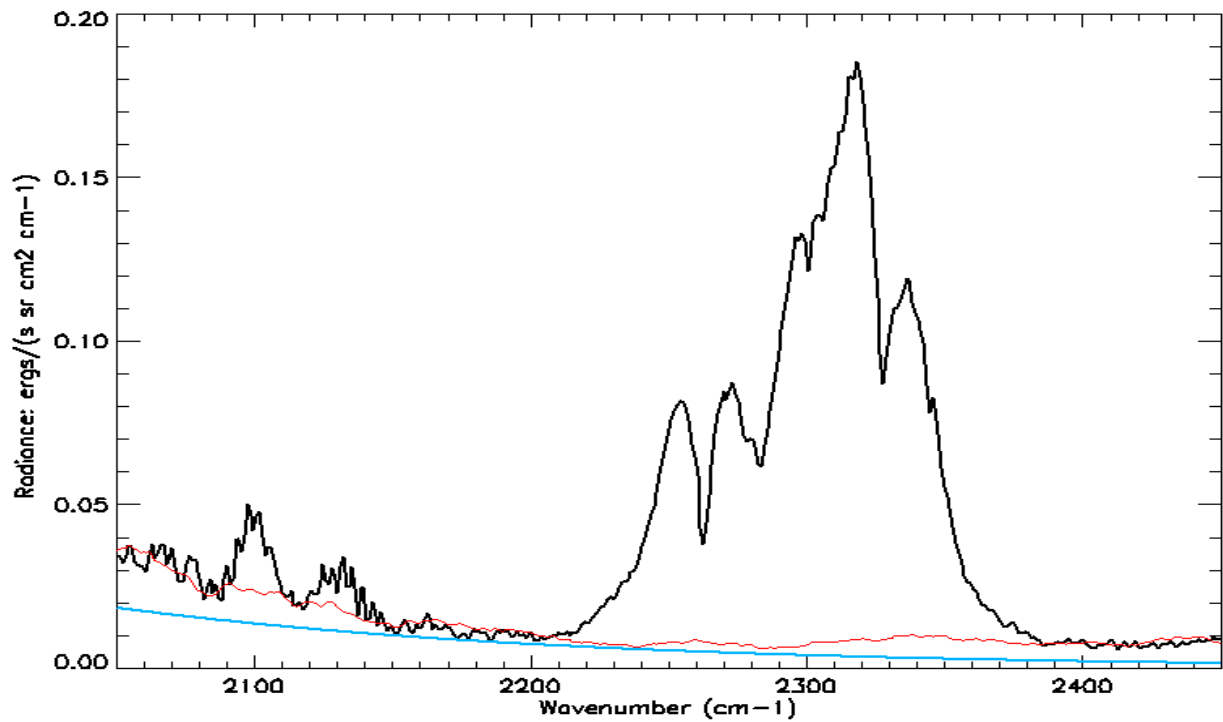


Figure 2 – Average spectrum over the entire set of measurements. Note the presence of the CO emission at  $2100 \text{ cm}^{-1}$ . The red line is the deep space signal, while the blue curve is a Planckian at 190 K.