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A determination of the CO mixing ratio on Mars using OMEGA/Mars Express and ground-based millimeter measurements

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Ground-based observations of CO on Mars, both in the millimeter range (Clancy et al., 1983, 1990, Lellouch et al., 1991) and in the near-infrared range (Billebaud et al., 1992, 1998) have led to mean CO mixing ratios ranging from 600 to 1000 ppm, with no local variations higher than about 40 percent. A comparable value (700 ppm) was obtained from the ISO satellite using the Short Wavelength Spectrometer (Lellouch et al., 2000) and with submillimeter observations using the ODIN satellite (Biver et al., 2005). However, recent variations with latitude were reported by Krasnopolsky (2002). Using the high spatial capabilities of the OMEGA instrument aboard Mars Express (Bibring, 2004), we have started a study of the CO abundance using the depth of the (2-0) vibrational band at 2.35 microns. This study, however, is limited by variations of the continuum due to mineralogic features which appear at some locations. In parallel, in June 2001 and November 2005, we have observed Mars using the IRAM 30m antenna in the four CO millimeter lines [(1-0) and (2-1) transitions of 12CO and 13CO] to obtain an absolute calibration of the CO mixing ratio, and to search for large-scale variations. Preliminary results will be presented and compared to previous analyses. References : Bibring J-P, 2004. ESA-SP 1240, 37-49 Billebaud F et al, 1992Astron. Astrophys. 261, 647-657. Billebaud F et al., 1998. Astron. Astrophys. 333, 1092-1099. Biver N et al., 2005. Astron. Astrophys. 435, 765-772. Clancy R T et al., 1983Icarus 55, 282-301. Clancy R T et al, 1990. J. Geophys. Res. 95, 14543-14554. Krasnopolsky VA, 2002. J. Geophys. Res. 108, E2, 4-1. Lellouch E et al., 1991. Plan. Space Sci. 39, 219-224. Lellouch E et al., 2000. Plan. Space Sci. 48, 1393-1405.