CO_2 CLOUDS AT MARS: 6 MARTIAN YEARS OF SURVEY BY OMEGA/MEX.

B. Gondet, J.-P Bibring, M. Vincendon , *Institut d'Astrophysique Spatiale, UniverSud, Paris, Orsay France (brigitte.gondet@ias.u-psud.fr*

Mesospheric clouds have been detected first from Earth (Bell et al 1996 [1]), then from Mars orbit (MGS/TES and MOC, Clancy et al 1998 [2]). Their composition (CO2) was inferred from temperature. Similar detection and temperature-inferred composition was then performed by Spicam and PFS on board Mars Express (Montmessin et al., 2006 [3]; Formisano et al., 2006 [4]).

The first direct detection and characterization (altitude, composition, velocity) was performed by OMEGA/ Mars Express, further coupled to HRSC/ Mars Express, and confirmed by CRISM/MRO (Montmessin et al., 2007 [5]; Maattanen et al., 2010 [6]; Scholten et al., 2010 [7]; Vincendon et al., 2011 [8]).

OMEGA is very well suited to the study of these clouds as it enables the identification of their CO_2 composition, based on a diagnostic near-IR spectral feature located at 4.26 µm [5] (figures 1,2,3). The survey OMEGA has covered so far extends from the very first operations of the mission, back in early 2004. Thanks to the highly eccentric polar orbit of Mars Express, OMEGA observes these clouds from a variety of altitudes (from > 10,000 km apocenter distances, down < 500 km at pericenter), and at a variety of local times, at essentially all seasons

We will present the result of 6 Martians years of observations. Theses CO_2 clouds appear at specific locations and seasons, and exhibit a good correlation with the dust activity (fig 4, 5). Some variations in their time of appearance/disappearance, from year to year, have been observed, and will be presented.

OMEGA has also detected some mesospheric H_2O clouds, which will also be presented.

The discoveries and monitoring of the mesospheric H_2O and CO_2 clouds, in their time and space location, give direct insights in the global atmospheric circulation and, beyond, on the physics of the upper Martian envelopes in their complex interactions.

Figures:

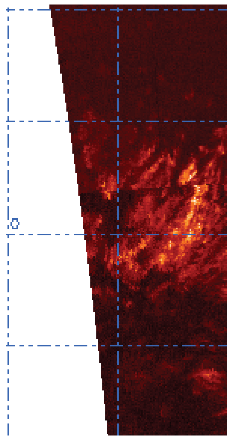

Figure 1: Cloud at 4.26µm
MY 27, local time: 09:00, Mex altitude 2000 kms

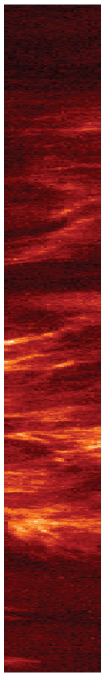

Figure 2: Cloud at 4.26µm
MY 29, local time: 15:00, Mex altitude 400 kms

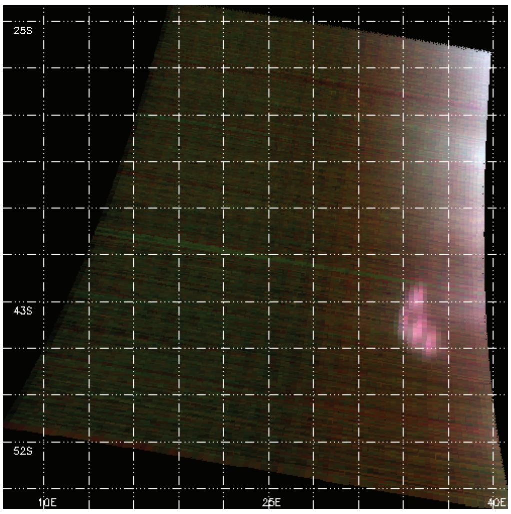

Figure 3: Cloud at 4.26µm
MY 32, local time: 06:00, Mex altitude 12000 kms

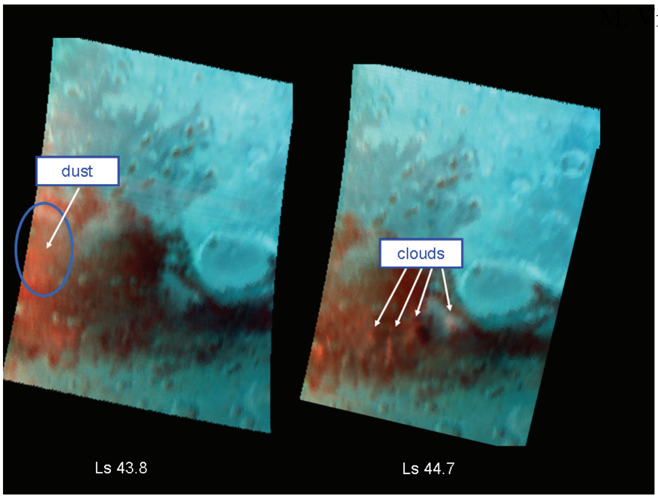

Figure 4: Clouds in RGB
MY 31, local time: 09:00, MEx altitude 7000 kms
3 days between the 2 observations

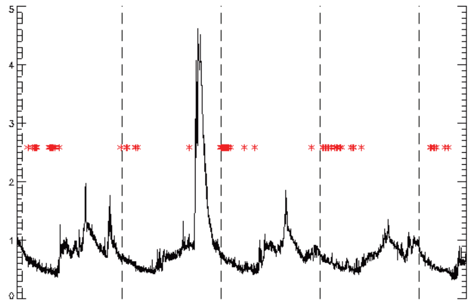

Figure 5: comparison between atmospheric opacity (black) @ Opportunity (PanCam) and clouds appearance (red)

References [1] JF Bell. et al. JGR 1996; [2] RT Clancy et al., GRL 1998 [3] F. Montmessin et al. JGR 2006; [4] V. Formisano et al., Icarus 2006; [5] F. Montmessin et al JGR 2007 [6] A. Määttänen et al. Icarus 2010; [7] F. Scholten et al. PSS 2010; [8] M. Viencendon et al. JGR 2011