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Still unexploited atmospheric OMEGA/Mex observations

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Introduction: Since the beginning of the mission (January 2004) OMEGA, the VIS-NIR hyperspectral imager onboard Mars Express has acquired regular limbs observations in conjunction with others instruments (HRSC, PFS, SPICAM and VMC). Scattering by clouds and dust was detected at different Ls, altitude, locations and local time, as well as specific emission (O2, H2O, CO2, CO). Composition and grain sizes can be derived from these measurements. Atmospheric detections are also made in nadir mode. This constitutes an important database largely unexploited at this point. We will present examples of detections concerning clouds, dust and emissions, and identify themes of potential collaborations.

Examples of available observations:

Atmospheric observations acquired by OMEGA include :
- nadir spectral images of the morphology, grain size and composition of ice clouds (Figure 1)
- vertical sampling of the atmosphere above the limbe (Figure 2-6) at various spatial resolutions, from local studies above rovers (Figure 6) to global overview at a given time (Figure 3).

All observations of the spatial distribution of clouds, either lateral of vertical, come with compositional spectral measurments covering the 0.4 to 5.1 microns range for most observations (Figures 1 ; 4-6).

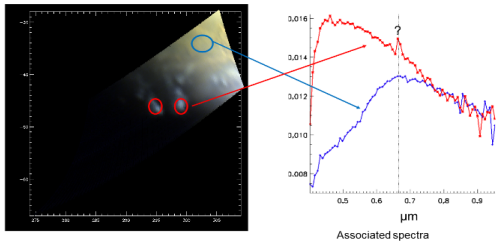

Fig 1: Clouds observed at sunset (SEA -2°) in visible

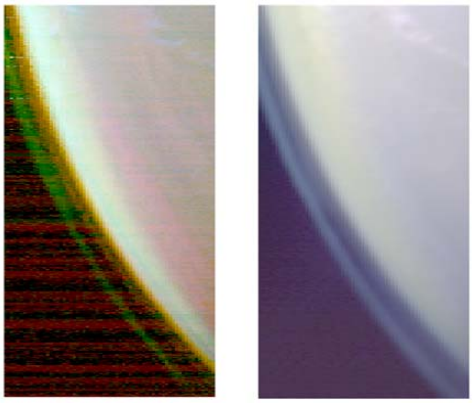
Fig 2 : deteched layer observed in IR and visible

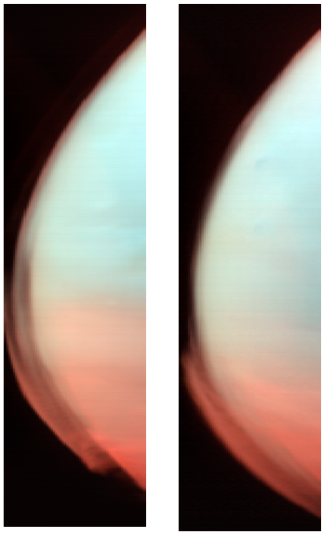

Fig 3 : Dust storm observed in december 2014

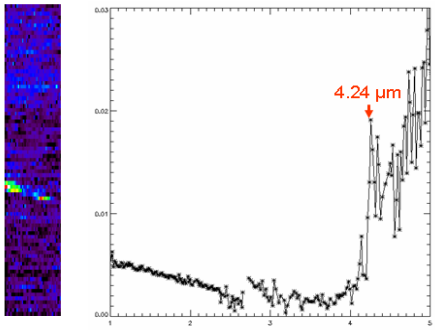

Fig 4 : CO2 clouds detected during limb observation. The grain size can be derived fom the shape of the visible part of the spectra.

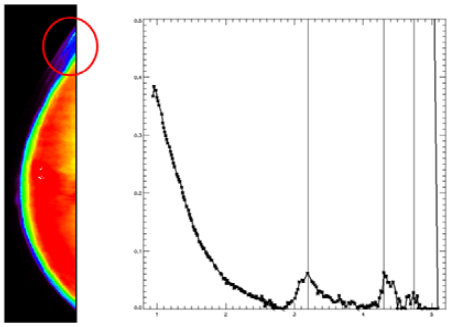

Fig 5: detached layer and associated spectrum (H2O and CO2 emissions)

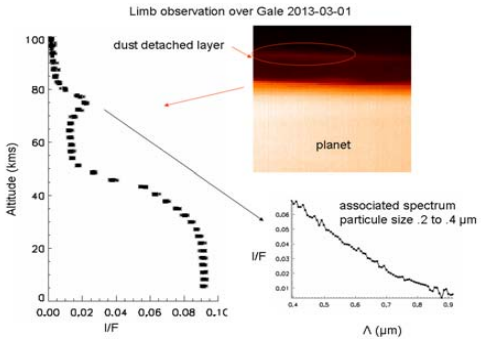

FIG 6 : Detached layer observation over Gale crater

Discussion and Conclusion:

OMEGA measurements gathered over more than 12 years offer an opportunity to explore the yearly variability of the Martian atmosphere, with sufficient time sampling or spatial coverage to put constrains on several aspects of the atmospheric dynamic. OMEGA still provides unique aerosols compositional characterization capabilities that enable detailed analyses of CO2 clouds and other poorly known high altitude aerosols layers. Ongoing and upcoming collaborations with the Martian atmospheric community will further reveal the richness of this dataset for atmospheric studies.