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 (Monmessin et al [3], Formisano et al [4]. 2006). The first direct detection and characterization (altitude, composition, velocity) was performed by OMEGA/ Mars Express (then coupled to HRSC/ Mars Express, and confirmed by CRISM/MRO (Montmessin et al. [5], 2007, Maattanen et al [6]. Scholten et al. [7], 2010, Vincendon et al [8], 2011).

Omega is a very powerful tool for the study of CO2 clouds as it is able to unambiguously identify the CO2 composition of a cloud based on a near-IR spectral feature located at 4.26 µm [5], (figure 1).

In the visible part of Omega spectrum we can observe clouds with his respective shadows (figure 2). So we can derive altitude of clouds (~70 kms) and the size of the particle, thanks to the Me theory (1.5 µm)

Therefore since the beginning of the Mars Express mission (2004) OMEGA as done a systematic survey of these mesospheric clouds. Thanks to the orbit of Mars Express, we can observe this clouds from different altitudes (from apocenter to pericenter) and at different local times.

We will present the result of 7 Martians years of observations, point out a correlation with the dust activity (figures 4&5) and an irregular concentration of clouds from years to years.
Fig 4: 3 days between 2 observations of Meridiani zone. At first dust is observed (left) then clouds (right)

Fig 5: Clouds observations (red) compared with atmospheric opacity @ Meridiani (Pancam/Opportunity)

The Process of nucleation always remains a mystery. Main ice nucleation candidates are Meteoric Smoke Particles (MSPs) or upward propagated Martian Dust Particles (MDPs) [8]. Recently MAVEN spacecraft has observed an unexplained high-altitude dust cloud [9].

These new results put new constraints on the cloud formation process, at Mars and possibly on Earth. Next step: determine size and composition of nucleation sites