

Deimos and Phobos compared observations by OMEGA/MEX. Brigitte Gondet¹ and Jean-Pierre Bibring¹,
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Introduction: The OMEGA imaging spectrometer on board the ESA/Mars Express mission [1] has acquired hyperspectral images of both Phobos and Deimos, with the later only in the VNIR (0.4 – 0.95 μm) channel, while Phobos has been mapped up to 5.1 μm . In addition, given the distances of observations, Phobos is resolved down to a few hundreds of meter scale, while Deimos is essentially unresolved. Therefore, great care is to be taken when comparing the spectra. However, these two objects exhibit distinct spectral characteristics in the visible, which could offer clues as to their origin. Discussion with the pioneer observations by ISM and KRFM on board the Phobos 2 mission [2], and the recent CRISM/MRO [3] will be proposed.

Data sets: the OMEGA dataset consists in 14 observations of Phobos from the start of the orbital mission, in 352 spectral channels from .38 μm to 5.1 μm , from different distances, thus at different spatial resolution (Fig 1) and phase angles.

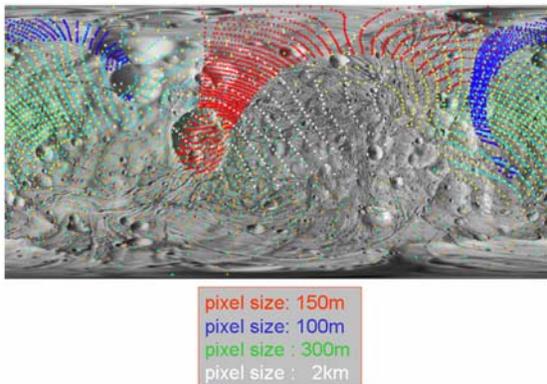


Figure 1: Phobos OMEGA observations

By the end of 2011, we acquired 4 observations of Deimos in the VNIR mode (from .38 μm to .95 μm) from a distance ~ 12 000 kms (Deimos thus fills ~ one OMEGA pixel). Observations including the IR channel from 2.7 μm to 5.2 μm are planned in February 2012, and will also be presented.

Results: the VNIR spectrum of Deimos, integrated pover the entire illulinated disk, exhibits an absorption feature somehow asymmetrical, centered around .65 μm (fig.2, green). By contrast, the Phobos spectrum

averaged to a similar resolution (pixel size: 7 x 7 km^2) is essentially flat in this spectral domain (fig 2, blue).

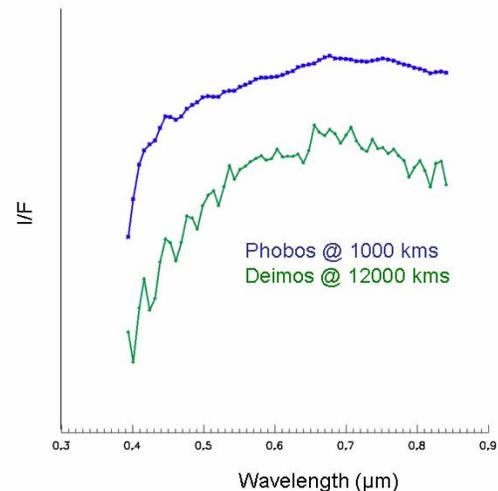


Figure 2: Phobos and Deimos spectra

Discussion: OMEGA Phobos spectra matches those previously acquired on board the Phobos 2 spacecraft. No evidence for neither mafic minerals, or hydrated or carbonaceous phases have been founded. If the 0.65 μm feature is induced by an hydrated constituent at Deimos surface, the upcoming observations covering the 3 μm spectral region should be able to confirm its presence, as well as of potential C-rich species. A distinct composition of Phobos and Deimos would constitute of major clue to decipher their origin.

References: [1] Bibring, J-P. et al. (2004) *Mars Express: The Scientific Payload*, 37-49., [2] Murchie et al. (1996) Spectral properties and heterogeneity of Phobos from measurements by Phobos 2. *Icarus* 123:63, [3] Murchie, S. et al. (2008) MRO/CRISM observations of Phobos and Deimos. *Lunar Planet Sci.* 39:1434.