SULFATE RICH DEPOSITS IN CANDOR CHASMA, VALLES MARINERIS, N. Mangold[1], J-P. Bibring[2], A. Gendrin[3], C. Quantin[4], J. F. Mustard[3], F. Poulet[2], S. Pelkey[3] [1]IDES Orsay, CNRS and Univ Paris Sud, bat 509, 91405 ORSAY, mangold@ geol.u-psud.fr [2]IAS, Orsay Campus, France. [3]Dept.of Geological Sciences, Box 1846, Brown University, Providence, RI 02912 [4] Smithonian Institute, Washington.

The OMEGA instrument on Mars Express has revealed a great number of hydrated minerals as sulfate rich deposits throughout the Valles Marineris, Margaritifer and Terra Meridiani regions, and phyllosilicates rich outcrops in Noachian terrains, especially in Nili Fossae and Mawrth Valles region [1, 2, 3]. The two types of hydrated minerals address different aspects of the early martian conditions. Landing sites proposed on clay rich outcrops are described in two companion abstracts in this meeting by Bibring et al. and Mustard et al. Here, we focus on sulfate rich deposits in Candor Chasma as an example of sulfate rich deposits inside the Valles Marineris region.

Scientific requirements: OMEGA has identified three main types of sulfates, Mg-rich (kieserite), Ca-rich (gypsum) sulfates, and polyhydrated sulfates, being more hydrated Mg-sulfates (epsomite) or more complex sulfate molecules [2]. In West Candor Chasma, sulfates are detected over diverse types of layers, from strongly exposed 100m thick layers to thin meter thick layers (Fig. 1). These layers might have formed through deposition of sediments emplaced in subaqueous environment or as eolian sediments or ash layers subsequently altered by acidic groundwater circulation [2]. Candor Chasma thus fits scientific requirements with large outcrops of layered deposits of hydrated minerals that might have preserved the conditions of their formation in the vicinity of volcanically formed layers of the canyons flanks.

Engineering requirements: Candor Chasma exhibits a strong variation of elevations from –4 to + 3 km, thus being mainly beneath the maximum of 2 km for landing sites. The sulfates associated to layered deposits are found almost everywhere including large through where 10 km ellipse can be fitted. The slope and roughness could be a matter of problem due to the complexity of the topography. Ellipses of 10 km length can be fitted inside the Chasma with slopes reaching the constraints, i.e. <3° at MOLA scale, over the whole ellipse of 10 km (Fig. 2). Slopes < 15° at local scale should be tested from HiRise data in the future. Local roughness is also large but outcrops correspond to layers of poorly indurated rocks different than the lava boulders usually expected for landing sites. If Candor Chasma does not fit engineering requirements, other sites rich in sulfates might be of strong interest, such as rounded deposits on the Melas Chasma floor, Juventae Chasma gypsum rich hill or Ganges Chasma foothill.

References: [1] Bibring J.-P. et al., Science 307, 1576-1581, 2005 [2] Gendrin et al.., Science 438, 623-627, 2005. [3] Poulet et al., Nature, 438, 623-627.

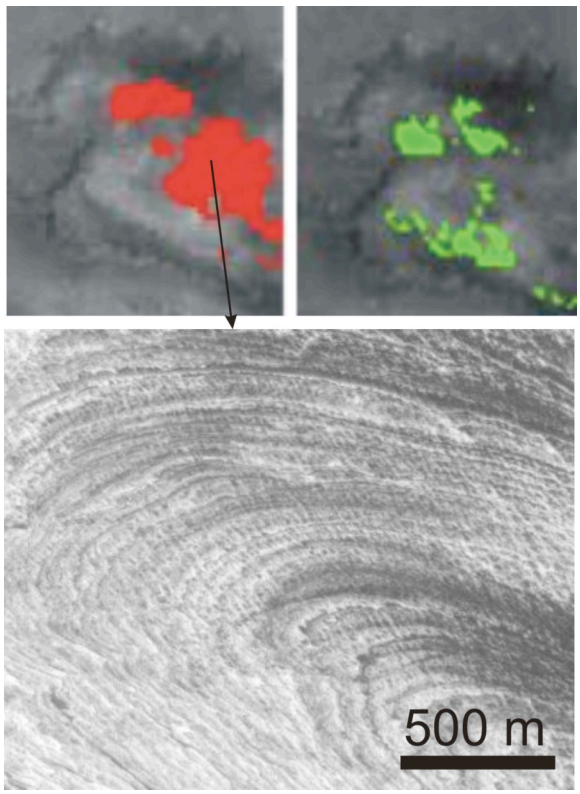

Figure 1. OMEGA identification of kieserite (red) and polyhydrated sulfates (green) in West Candor Chasma. MOC close-up shows meter-thick layering in the sulfate rich area at the foot of Candor Mensa.

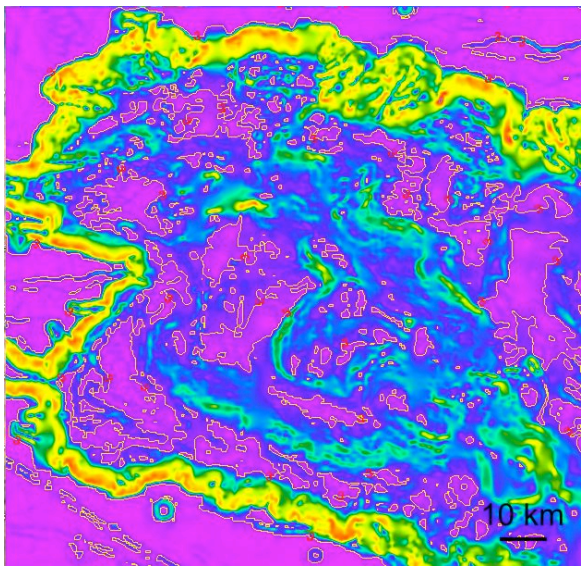

Figure 2: MOLA slope map of western Candor Chasma. Purple colors represent slopes <3°.