MINERALOGY OF THE PHOENIX LANDING SITES FROM THE OMEGA-MEX IMAGING SPECTROMETER. F. Poulet[1], J. Mustard[2], R. Arvidson[3], J.-P. Bibring[1], Y. Langevin[1], B. Gondet[1], R. Milliken[2], S. Pelkey[2], [1]IAS, CNRS/Université Paris-Sud, 91405 Orsay, France (francois.poulet@ias.fr), [2]Brown university, Providence,USA, [3]Washington University, St Louis, USA.

Introduction: OMEGA-MEx has targeted the three PHOENIX landing sites during the early 2004 summer (Ls=90°-110°). Amongst the primary goals of these observations, there were to detect water ice exposures, identify the presence of altered minerals such as phyllosilicates and/or sulfates, estimate the surface hydration, and check anomalies in the thermal properties. The results for the three landing sites A,B,C are presented.

Mineral distribution: The spectral properties are pretty homogenous for the three boxes: medium (0.25 at 1.1µm) to high albedo (0.35) with albedo(C)< albedo (B)<albedo(A) and the box C albedo being the least uniform, no evident mafic, sulfate, or phyllosilicate minerals, and no thermal anomalies. Overall, the spectral properties in the near-infrared are pretty similar to the martian bright units. There is however two significant discrepancies with the anhydrated dust: the presence of a 1.9 µm feature and a stronger 3 µm hydration band relative to the lower latitudes regions. These two features can be due to adsorbed water on grain surface and/or water bound in the mineral structure. Figure 1 shows an example of the distribution of the 1.9 µm feature at the landing site C, whereas Figure 2 presents spectra of the terrain located in the middle of the box B taken at two different periods. This 1.9 µm band is not associated to any metal-OH band or sulfate features excluding the presence of phyllosilicates and sulfates. The 1.9 µm feature is present for all three landing sites and has been actually identified in most parts of the terrains of latitudes larger than 65°N [2].

Another noticeable aspect of the high-latitude terrains is the increase of the hydration with latitude [2,3]. Estimates of surface water content can be derived from the 3 µm band [3,4]. Inside each box, different estimates are ranged between 5 wt % for the lowest abundances and 10 wt % and more for the largest ones depending on the methodology adopted to calculate the water content (Figure 3). Note these values are significantly larger than those derived at lower latitudes for similar albedos. The enrichement in water content indicated by the presence of a 1.9 µm band without associated phyllosilicate or sulfate mineral features could be explained by an enrichement of water molecules adsorbed on the grains rather than bounded to the crystal structure.

Ice distribution: These latitudes are covered by H_20 ice and CO_2 ice frosts during a large part of the martian year. OMEGA monitored the evolution of the seasonal frosts during the northern spring. During this period, the CO_2 frost sublimated, with a receding edge constitued of water ice frost [1]. At 70° latitude, there is no more CO_2 frost at Ls larger to 40° and no more sign of water ice frost at Ls>70°. At the beginning of the northern summer, no water ice is detected on the surface, except in the east rim of a crater located in box A. HighRes MOC images show that this water-ice-rich region corresponds to bright exposures (Fig. 4). Such exposure is a direct evidence of the presence of water ice close to the surface. However, the depth of this water ice cannot be constrained from these observations alone.

References: [1] Bibring J.-P. et al. (2005) *Science, 307,* 1576-1581. [2] Poulet et al. (2005) *LPS XXXVI,* Abstract #1828. [3] Milliken et al. (2006) *this conf.*. [4] Jouglet D. et al. (2006) *this conf.*

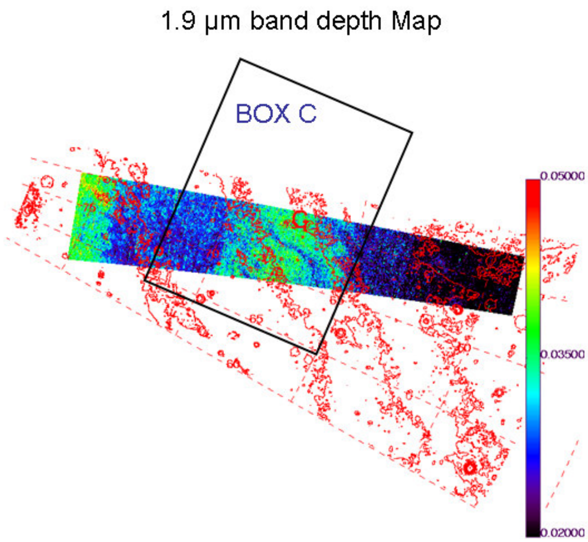

Figure 1: *1.9 µm band depth map derived from a OMEGA track covering a part of box C.Color scale from green to red indicates the presence of this feature.*

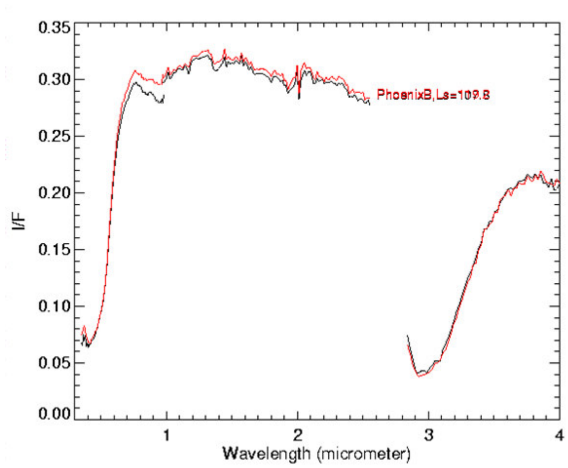

Figure 2*: Spectra of the center of the box B taken at Ls=107.8° (black line) and 109.2° (red). There is evidence for a 1.9 µm feature of a few percents due to the surface. No significant evolution with time is identified.*

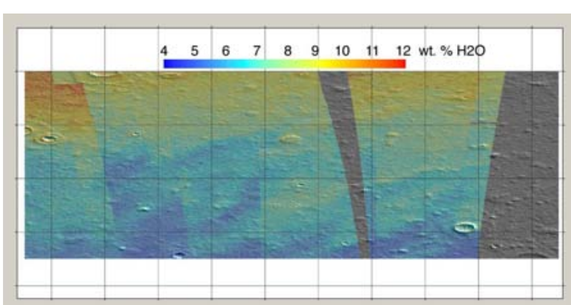

Figure 3 *: Surface hydration for the box C derived from the method presented in [3].*

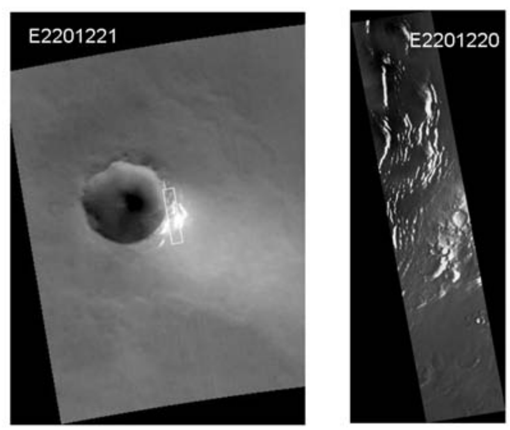

Figure 4: *MOC images of the crater showing bright exposures at its east rim, where OMEGA detected strong water ice bands. This crater is located in the box A.*