MEx/OMEGA characterization of Terra Meridiani, Mars

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The analysis of the surface of Terra Meridiani that was selected for the NASA Mars Exploration Rover Opportunity benefited from recent hyperspectral data from OMEGA on board the ESA Mars Express spacecraft. The combination of spatial and near-infrared spectroscopic observations has lead to new or expanded insights into the nature of this region. Hydrated minerals (sulfate and hydroxide-like minerals) are mappable for hundreds of kilometers to the North and East of the landing site. There is a clear correlation between these hydrated areas and the Etched Terrains defined as a geological unit (called ET) by previous studies based on geomorphysical and thermophysical properties. OMEGA has also detected the presence of hydrated deposits in the floor of numerous craters in the North of Terra Meridiani. Of particular interest is the detection of a few small spots exhibiting the spectral signatures of Fe-rich phyllosilicates. These observations unambiguously show that the water-rich outcrops at the landing site are not a local phenomenon and confirm the extended presence of surface or near-surface water over this large region of Mars. Moreover, the presence of various hydrated minerals could indicate that different steps of aqueous alteration occured in this region. The surface composition of each geomorphologic unit of this region has been also characterized: unit MCT (Mantled Cratered Terrains) is covered by a cemented layer of anhydrous nanophase oxides (commonly called martian dust), unit DCT (Dissected Cratered Terrains) is composed of pyroxene (both low calcium and high calcium components), unit P (Plains) is spectrally multiple, from dust in the western part to pyroxene-rich in the eastern part. The spectra over Unit Ph (Hematite Plains) are characterized by very weak but unique spectral features which are attributed to a mixture of a dark and featureless component (gray hematite is a good candidate) and a small amount of olivine in some locations.