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Lithostratigraphical analysis in northern Sinus Meridiani, Mars.

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In the Terra Meridiani- Arabia Terra region of Mars, layered rock units with a range of stratal patterns have been widely reported in the literature, and the record of the spectral signatures indicative of hydrate minerals suggests the existence of aqueous activity in at least some of the stratigraphic units.
. In this work we investigated the area in the northern region of Sinus Meridiani located between 2°N to 3°N latitude and 2°W to 1°E longitude, using multiple remote sensing data sets to identify, characterize in detail, and understand the origin and evolution of the selected units in this region of Mars. MOLA and HiRISE data were used in combination to classify and correlate surface units recorded in distinct stratigraphic logs, based on planimetric configuration, topography, morphological and litho-facies characteristics. In particular, detailed analyses were focused on the layered units discovered in the walls of two impact craters located at a distance of about 100 km to each other within the study area. The stratigraphic interval analysed here corresponds to the upper part of the well known “light-toned layered deposits” identified by several authors.
Distinct competent layers are observed in the internal slopes of both craters. Our observations indicate that the lithostratigraphic sections can be divided in three units. The lower unit consists of very thick bodies of light-toned bouldery breccia deposits. In the HiRISE images these white-coloured beds are composed of irregularly-shaped, white nodules which are either isolated or coalescent, distributed between bedding planes. The middle unit mainly consists of alternating thin strong layers and thicker sequences of relatively weak layers, horizontally bedded. The strong, competent layers maintain steeper erosional profiles and play a major role in controlling the overall shape and geomorphology of the wall slopes. The upper unit can be traced laterally in the surrounding ground level, displaying mesa shape morphology. This unit consists of alternating very competent layers and layers apparently composed of light-toned bouldery deposits. The topmost competent layer in this area is well preserved and easy to identify in outcrops especially on the western part of the study area.
The occurrence of similar facies in the stratigraphic sequences exposed in the two craters, indicates the large lateral extension of the units. In addition, the facies characteristics in the stratigraphic stack allow us to interpret the depositional processes, such as a possible cyclic deposition in shallow water evaporitic setting.