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FIELD ANALOGUE GEOLOGY AND ASTROBIOLOGY IN SUPPORT OF MARS SCIENCE LABORATORY: CORRELATION OF ORGANICS WITH TOPOGRAPHIC UNITS

Abstract

In August of 2012 the Curiosity rover with the Mars Science Laboratory instruments will land on Mars with the goals to investigate the history of habitable conditions on early Mars, to characterize the geology of the planet, in particular minerals that are related to the presence of organic matter and water, and to prepare for human exploration. A Mars analogue terrain was investigated to support this mission in its selection of sampling sites most likely to preserve organic matter (possibly indicative of life.)

We shall report on results from ILEWG EuroMoonMars campaigns in February-March 2012 and earlier campaigns from the area around the Mars Desert Research Station (MDRS) in Utah, USA (Canyonlands area), a region known for its morphological and geochemical similarity to Mars. Since the depositional environment, geology and mineralogy influence the detection of organic matter, soil and rock samples are collected from different topographic units within a single geological unit, the Brushy Basin member.

The objective of this study is to determine the variability of organic matter between different topographic units, on a plain, below a cliff and within a canyon, and to determine which topographic unit most likely contains organics. The different topographic units, are similar to the topographic units the MSL will visit on Mars within the Gale Crater and hence the results will be relevant to this mission.

The samples are analyzed to determine organic content (Total Organic Carbon, Total Organic Nitrogen), and the mineralogy of the soils using X-Ray Diffraction, similar to the CheMin X-Ray Diffraction instrument on the MSL. We are investigating how the mineralogy varies within the topographic units and whether it influences the organic matter contents.

We predict that the topographic units influence the organic matter contents. Higher organic preservation and contents is predicted within canyons and below cliffs, where debris and landslides may occur and act as additional protection from climatic conditions, as well as the supply of water, if present. Nevertheless, these areas are most influenced by erosion and weathering and may influence the preservation of organic matter. First results from this study will be reported at the meeting.