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Sample analysis of organic matter and minerals in support of future space missions

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A strategic search for life on Mars needs a thorough interdisciplinary preparation phase that includes sample analysis techniques, instrument development and calibration and extensive terrestrial field tests at Mars analog sites. In this paper, we report on the results of chemical and physical measurements of samples collected during the EuroGeoMars campaign at Utah Mars Desert Research Station (MDRS) in February 2009. We investigated those samples with different techniques including Laser desorption mass spectrometry (see Figure 1), Infrared and Raman spectroscopy, X-ray diffraction, Gas chromatography and High performance liquid chromatography.

We describe the results of the physical and chemical properties including elemental composition, salt concentrations as well as carbon and amino acid abundances. The analyses of organics and minerals show that the subsurface mineral matrix represents a key to our understanding of the survival of organics on Mars.

The presented laboratory and field studies provide limits to exobiological models, evidence on the effects of subsurface mineral matrices, support current and planned space missions and address planetary protection issues.

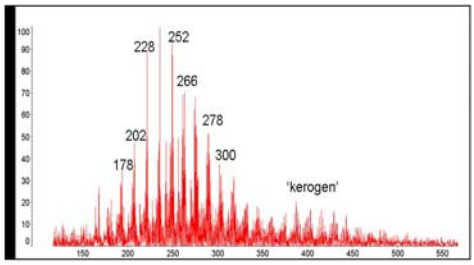

Figure 1. Laser desorption mass spectra of desert soil sample from Utah Mancos formation showing the presence of macromolecular carbon.