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The permafrost in the Imuruk Lake basaltic field (Alaska) as a martian permafrost analogue: microbiological diversity.

F. Gómez (1), D.C. Fernandez-Remolar (1), E. Gonzalez-Pastor (1), J. Torres (1), D. Gómez Ortíz (2), J.S. Kargel (3), M. Fernández Sampedro (1), M.P. Martín Redondo (1), C. González de Figueras (1), J. Gómez-Elvira (1) and O. Prieto-Ballesteros (1)

(1) Centro de Astrobiología-INTA, 28850 Torrejón de Ardoz. Spain(gomezgf@inta.es). (2) Rey Juan Carlos University, 28933 Móstoles, Spain.

(3) University of Arizona, Tucson AZ 85721, USA.

We are studying the permafrost in the Imuruk lake volcanic field area (Alaska) from an Astrobiological perspective, in order to reach three main objectives: 1) Define preservation patterns of biosignatures in cold environments that may be used in future space exploration missions; 2) develop new instrumentation for detecting life in situ or remotely, and 3) develop new instrumentation for detection and mapping of permafrost niches where life (or biochemical tracers of past life) may be preserved. These aims will be achieved by permafrost characterization using geophysical sounding and drilling, sampling different levels of the rock cores and analyzing their mineralogy, geochemistry and microbiology.

In order to map the permafrost underground, electric tomography sounding was performed. Resulting tomographic data indicate that the permafrost of the studied area is at a mean depth of 0.50 meter from the surface, sometimes even shallower. Drilling points were selected depending on the permafrost depth known from the tomographic data analysis. Three perforations were done all along the hill. Samples were collected at several depths in the three holes for mineralogical, geochemical and biological analysis. They were *in situ* fixed with formaldehyde in order to be maintained till laboratory analysis was developed. Several growth fresh media were inoculated with samples from different depths in the field for microorganisms enrichment.

First results report enrichment in several inoculated media including some specific for heterotrophic aerobic bacteria, anaerobic chemolithotrophic and methanogen bacteria. Two different molecular methods are being used for microbial determination: “In situ” hybridizitation (was used for microbial determination and cell counting also) and 16S rRNA genes amplification, cloning and sequencing. First results in cell counting determined a population density gradient vs. depth.

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