Geophysical Research Abstracts, Vol. 6, 04838, 2004 SRef-ID: 1607-7962/gra/EGU04-A-04838 © European Geosciences Union 2004



HYDROTHERMAL DEPOSITS AND EXTREMOPHILES OF THE SOLFATARA CRATER, ITALY, AS POSSIBLE ANALOGUE TO MARS

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The Solfatara crater is placed in the central-eastern part of the Campi Phlegrei Caldera (central-southern Italy). Solfatara is geologically young, subareal, volcanic formation ($\frac{1}{0} \times \frac{1}{10} \times \frac{$ and acidic (pH 1.7) environment, exhibiting strong sulphur and iron mineralization characteristic of hydrothermal sites. We tried to demonstrate necessity of multidisciplinary investigation: paleontological, biogeochemical and biological; in search for microbial remains or more precise biosignatures. Today, activity of the Solfatara crater is localised on hydrothermal emission sites: hydrothermal springs, and fumarolic activities. The whole area is tectonically controlled by local and regional fault systems. Products of Solfatara's activity, that have been sampled, consist of: breccia, stratified deposits of pisolitic ashes and coarse ashes. Base surge structure containing beds of well sorted pumice lapilli. Solfatara's volcanics are mostly incoherent, with trahytic occurrences. Water samples and mud from the springs, as well as, iron and sulphur rich crusts have been collected. Thermal characteristics of the Solfatara crater. along with low pH value result in the presence of moderate to extreme thermoacidophilic organisms. Gechemical analysis showed very low values of: TOC (0.13 to $0.53\{\)$, $\colored{0.13}\$ (-17.09 to -27.39 per mille), and total N $(0.03 \text{ to } 0.12\{\\%\})$, suggesting communities inhabiting crater, during the past as well as today, are composed only of micro-organisms. That has been confirmed by field and laboratory observations. Deposits characteristics,

such as the lack of carbon component, way of minerals alteration and low pH imply mainly a reduced habitat for micro-communities. Light microscopy in combination with SEM observation revealed presence of a delicate net-like structure composed of iron oxy-hydroxide. Microbes whose influences on mineral alteration or development of structures have been detected are involved in sulphur cycle, and iron production within the Solfatara deposits. Search for organo-chemical biosignatures resulted in the identification of linear alkanes and hopanoids, that together with absence of steroids suggest that bacteria were the main constituents of microbial community. Low diversification of microbial world, living at Solfatara, is partially confirmed by biological analysis.

The site of Solfatara, with its extreme environment, geological and chemical characteristics, is a very good analogue to possible hydrothermal systems on Mars. In this term we have initiate our study in the area of Dao Vallis near the Hellas impact basin and Zephyra Patera that is placed within Durius Vallis.