Mars analogues for space exploration (MASE project)

V. Marteinsson, C.S. Cockell, P. Rettberg, K., E. Monaghan Beblo-Vranesevic, M. Bohmeier, E. Rabbow, P., Schwendner; F. Westall, F. Gaboyer, N. Walter, C. Moissl-Eichinger, A. Perras, F. Gomez, R. Amils, L.Garcia, P. Ehrenfreund , P. Vannier

Is life out there? In order to assess the habitability of Mars, which is (or has been) the most Earth-like planet in our Solar System, the first step is to investigate microorganisms thriving in terrestrial biotops with Mars similar conditions (0.13% O_2 in the atmosphere, low nutrients, low temperatures, high salinity and oxidising compounds, acidity) and comparable multi-stresses. The MASE (Mars analogues for space exploration) consortium is a team of researchers from all over Europe, combining a broad spectrum of interdisciplinary expertise. Five major sampling sites (dedicated campaigns: cold sulfur springs in Germany, potash mine in England, cold acidic lake in Iceland; samples already available: Rio Tinto in Spain, permafrost samples from Svaldbard) were chosen with the major goal to cultivate and characterize novel anaerobic microorganisms which are specifically adapted to harsh conditions. Samples from these different Mars analogue areas on Earth were collected and anaerobic microorganisms adapted to these extreme conditions are being isolated. These new strains will be subjected to mars-relevant environmental stress factors alone and in combination in the laboratory under controlled conditions, e.g. radiation, high salt concentrations, low water activity, oxidising compounds. The aim is to understand how combined environmental stresses affect the habitability of a number of Mars analogue environments on Earth, specifically for anaerobic organisms and to find out, if these organisms are also able to survive under Martian conditions. Crucial to assessing the habitability of any environmental system is a detailed understanding of the geological, physiochemical and biological context in which the environment is set. One of the key outcomes of MASE is a comparison and synthesis of just such a collection of context data from a varied set of Mars analogue sites. The future experiments in the MASE project aim at the identification of the underlying cellular and molecular mechanisms and the comparison to other new isolates from Mars analogue environments on Earth.

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