

Life Sciences as Related to Space (F)

Astrobiology: Mars Analogue Sites on Earth and Experiments in Earth Orbit and Beyond (F3.2)

Consider for oral presentation.

TOLERANCE OF ARCHAEA AND BACTERIA AGAINST PERCHLORATE AND HYDROGEN PEROXIDE

Kristina Beblo-Vranesevic, kristina.beblo@dlr.de

DLR - Inst. of Aerospace Medicine, Cologne, Germany

Maria Bohmeier, maria.bohmeier@dlr.de

DLR - Inst. of Aerospace Medicine, Germany

Petra Rettberg, petra.rettberg@dlr.de

DLR - Inst. of Aerospace Medicine, Koeln, Germany

Due to the ability of (hyper-) thermophilic Bacteria and Archaea to live in extreme habitats on Earth (e.g. boiling acidic springs, black smoker chimneys, hyper-salinic brines) one could suggest, that these organisms can also outlast other harsh conditions, e.g. prevailing in space or on Mars. On Mars the occurrence of different utilizable nutrition components is limited. The Phoenix lander detected significant amounts (0.4 – 0.6 %) of perchlorate ions in Martian soil. Therefore, we examined the ability of the perchlorate metabolizing Archaeon *Archaeoglobus fulgidus* as well as phylogenetically deep-branching Bacterium *Hydrogenothermus marinus* to survive and grow in the presence of perchlorate (NaClO₄) and hydrogen peroxide (H₂O₂). The investigated microorganisms were able to tolerate high concentrations of NaClO₄ without any changes in their growth pattern. After the addition of 280 mM perchlorate *H. marinus* showed significant changes in cell morphology. This organism is normally growing as single motile short rods; treated with high concentrations of perchlorate long chains were built. *A. fulgidus* can tolerate concentrations up to 300 mM. On the contrary, both microorganisms were negatively affected in their survival after a treatment with low concentrations (<50 mM) of H₂O₂. In summary (hyper-) thermophiles have so far unknown high tolerances against cell damaging treatments and may serve as model organisms for future space experiments.