From Mars analogue environments to space: ground data evaluation of the survivability of *Buttiauxella* sp. MASE-IM-9 and *Salinisphaera shabanensis*

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Mars analogues environments are some of the most extreme locations on Earth. Their unique combination of multiple extremes (e.g. high salinity, anoxia, and low nutrient availability) make them a valuable source of new polyextremophilic microbes in general, and for exploring the limits of life. These are seen as vital sources of information for Astrobiology, with implications for planetary protection and the search for life outside our planet.

Despite this well-recognized relevance, current knowledge on the capability of (facultative) anaerobic microbes as single strains or in communities to withstand extraterrestrial conditions is still very sparse. Addressing this knowledge gap is one of the main goals of the project MEXEM (Mars EXposed Extremophiles Mixture), which is in preparation at the moment.

As part of MEXEM, selected model organisms from all three domains of Life, will be exposed in a 3-month passive experiment with exposure to space conditions under anoxia followed by evaluation after their arrival back on Earth. The launch to the International Space Station is currently foreseen for 2024, and implies a series of preliminary tests and data collection on some of the selected strains.

Here, we report on the survivability of *Salinisphaera shabanensis*, isolated from a deep-sea brine pool within the Red Sea, and of *Buttiauxella* sp. MASE-IM-9 isolated from a German sulphidic spring after exposure to Mars relevant stress factors (like desiccation and UV-radiation under anoxic conditions). Both organisms showed survival after anoxic desiccation for up to three months but this could be further extended by adding low amounts of artificial Mars regolith (MGS-

ts resulted in an elevation of the survival rate after desiccation of up to three orders of magnitude. Survival after desiccation could even be reproduced, if the cells were mixed, as an artificial community, before desiccation treatment. The presence of these two components also positively influenced survival after exposure to polychromatic UV (200 - 400 nm) up to 12 kJ/m^2 in liquid and in a desiccated form.