Universität Bremen

CENTER OF APPLIED SPACE TECHNOLOGY AND MICROGRAVITY

ZARM

Friday, July 28, 2017 at 13:00

Location: ZARM, Room 1730

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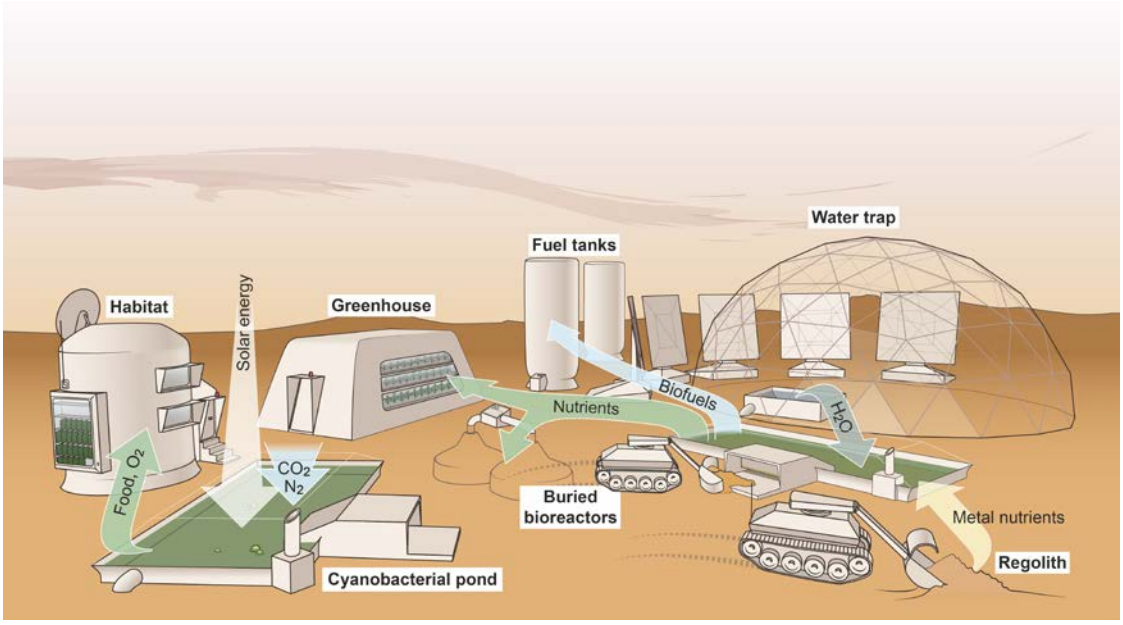
Cyanobacterium-based life-support systems for Mars exploration



Verseux, C., et al. (2016). Sustainable life support on Mars – the potential roles of cyanobacteria. IJA, 15(1), pp. 75-92

Setting foot on the Red Planet is arguably the most ambitious objective of space agencies in the foreseeable future.

While first missions will likely be short-term, a permanently or semi-permanently inhabited outpost, akin to polar stations, will be desirable to perform extensive research activity on site. Unfortunately, sustaining an outpost on Mars by providing all life-support consumables from Earth is unrealistic given launch costs, travel times and risks of failure. If humans are to spend considerable amounts of time on Mars, they will need to learn how to live “off the land” there.

A solution could be to rely on biological systems, as we often do on Earth. Microorganisms, for instance, could be used for the production of drugs, food, oxygen, biomaterials and various industrially useful chemicals, for metal leaching and for waste processing. However, if biological systems rely exclusively on materials imported from Earth, their running time without re-supply is limited. To be sustainable, such systems should be fed with resources found on Mars.

The key could lie in cyanobacteria. Some species could be fed with materials available on Mars due to their photosynthetic abilities, nitrogen-fixing activities and lithotrophic lifestyles. They could be used directly for various applications, including the production of food, fuel and oxygen, but also indirectly: products from their culture could support the growth of other organisms, opening the way to a wide range of life-support biological processes based on Martian resources.

During this talk, I will give an overview of the theory behind, and current progress towards, cyanobacterium-based life-support systems on Mars.