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Author: Mr. Tomas Ducai
University of Vienna, Austria, tomas@ducai.net

Ms. Eleonore Poli
University of Cambridge, Switzerland, eleonorepoli27@gmail.com

ANALOGUE SPACE MISSIONS AS TESTING PLATFORMS FOR A BROADER ACCESS TO SPACE FOR PARASTRONAUTS

Abstract

Although human missions to Mars are on the horizon, the health condition of astronauts returning from Mars is still an enigma. As it is with astronauts on-board the international space station for long periods of time, it is likely that some astronauts returning from Mars will suffer from some kind of (long-term) disability or some form of debilitation, such as cardiovascular weakening, impaired vision and low bone and muscular density. Furthermore, introduction of permanent settlements on Mars and possibly, creation of a human society on Mars, means that there will be humans with disabilities on Mars, either from accidents occurring during missions, from long exposure to radiation and microgravity from the flight, or simply by birth. Some restrictions will disappear as soon as astronauts return to Earth, others may be irreversible.

It is therefore essential to tackle this issue in simulated, controlled environments, in order to elevate theoretical knowledge, as well as practical experiences for any upcoming human mission to Mars, and to explore the field of parastronauts. In space, some disabilities become hyperabilities (astronauts without legs will experience less cardiovascular changes from microgravity). As space missions remain costly however, it is in the interest of agencies and aerospace industries to first prepare missions and crews on Earth - within analogue space missions - and identify the adjustments to undertake for parastronauts.

The advantage of analogue space missions is their number, variety and modularity. This means that a large variety of disabilities could be tested, in a large array of environments for different durations (several days, weeks or months) with relatively low costs. Typical impacts of having these analogue space missions with parastronauts will be the adaptation of the habitat, of the flight plan, of the protocol and the protocol medium (use of Braille for instance), the communication between MCC and the astronauts as well as the health and safety protocols

An example of such a mission is the ICAres-1 mission at LunAres Research Station, Poland where the crew welcomed an analogue astronaut who had lost both eyes and an arm, and the station as well as procedures were adapted.

Making missions for parastronauts will improve the flexibility of space missions, promote inclusion – in addition to being one of the Sustainable Development Goals (SDGs) - and facilitate the preparation for injured astronauts, thus benefiting the aerospace field at large as well as opening space to all.