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WHAT CAN GO WRONG, WILL GO WRONG: THE BUG-OUT PROCEDURES TESTED DURING ICARES-1 ANALOG MARS MISSION AT THE LUNARES HABITAT IN PILA, POLAND

Abstract

Analog missions are a useful tool for testing solutions for space flights and future inhabitation of extraterrestrial locations. One of the key points to address in this field of research is well-being and social dynamics of a small group of people in a confined space, facing stressful situations. ICAres-1 analog Mars mission was a 2 week long simulation run in Lunares habitat in Pila, Poland.

The mission was unique in the following aspects. First, it was the first mission to ever include a person with disabilities, therefore the procedures and habitat could be tested for their compatibility with the needs of an injured astronaut. Second, the mission simulated a settlement that was successively gaining more independence, and hence some tasks were delegated to the crew as the mission progressed, which in the end included also day scheduling. Third, due to circumstances unrelated to the mission, one of the analog astronauts had to leave the habitat during the mission, which enabled for a simulation of a death of an astronaut. Fourth, although initially planned for a crew of 6 people, the mission proceeded with the crew of 5, who had to readapt to the altered circumstances and handle a similar workload: a series of biological experiments including hydroponic plant cultivation, leech and fly cultures in microgravity simulated conditions, earthworm culture in meteorite ground, EVA procedures, bionic hand 3D printing, and more. Fifth, the crew endured a day of caloric restriction.

During the mission, the psychological state of the analog astronauts was monitored and evaluated by a mission psychologist with the use of specialised questionnaires. For the assessment of the social dynamics of the group, we equipped astronauts with custom-made SocSenSys personal badges connected to a distributed beacon system in the habitat, which allowed to register various essential sociometric parameters throughout the mission.

In this paper we will describe the in-depth background of the ICAres-1 mission with a special focus on presenting the difficulties faced by the crew, and discussing their impact on analog astroanauts' psychological shape and social interactions.