Ground-Based Preparatory Activities (11)
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MARS ANALOG MISSIONS: ARE WE GO OR NO GO?

Abstract

This is arguably one of the most exciting times in space exploration with the Artemis program planning on sending the first women to the Moon and the successful integration of the private industry sending astronauts to the International Space Station. Space exploration brings with it exciting opportunities but risks also that need to evaluated and mitigated as effectively as possible.

Analog missions are invaluable in looking for possible safeguards to the hazards of life in space. They offer insight into processes and ground truth data for understanding human risks and challenges in complex situations that can be applied to space missions. This allows us to discover, test potential counter-measures and build strategies for future manned missions to the Moon and Mars.

There are several types of Mars analog missions, but no classification exists to standardise them currently. Missions hugely vary in location, duration and research output. This leads to inter- and intra-variability between missions making any decision-making process variable, less replicable and fragmented. A proposed classification for analog missions is based on fidelity level (risk) and class (mission duration). This allows a reference for mission preparation, design and implementation.

The current COVID-19 pandemic has challenged many researchers particularly field researchers who have been affected by travel restrictions, lockdowns and social distancing measures. Many resorting to doing "desktop research" instead. Analog missions aim to improve on existing knowledge in addition to gaining new understanding to the hazards of life in space as well as testing new hardware and counter-measures. Acquiring primary data enhances originality and authenticity unlike using secondary data.

So how do we still safely navigate missions during a pandemic? Halting experiments completely is not the answer. Mission planning is paramount with risk assessment for exposure to COVID-19 and methods to minimise those risks. Some analog missions in United States have resumed (HI SEAS and MDRS) but many missions that rely on international volunteers are still postponed.

There needs to be flexible, safe and robust COVID-19 planning strategies so that other missions can restart. Some proposed solutions would be: (i) pre-travel self-quarantine for 14 days, pre-travel COVID-19 PCR screening/lateral flow tests, having adequate medical indemnity and insurance cover; (ii) mask adherence (including other PPE), social distancing measures, hand hygiene, donning and doffing of

space suits and self-reporting of symptoms; (iii) contingency plan if crew members become symptomatic including retrieval and repatriation if necessary; (iv) post-mission follow up of crew.