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Space Architecture: Habitats, Habitability, and Bases (1B)

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ANALOGUE RESEARCH PERFORMED AT THE HI-SEAS RESEARCH STATION IN HAWAII, AS
PART OF THE EUROMOONMARS CAMPAIGN

Abstract

The Hawaii - Space Exploration Analog and Simulation (HI-SEAS) habitat is located at 8,200' (2,500 meters) in elevation on the largest mountain in the world, Mauna Loa, on the Big Island of Hawai'i. HI-SEAS has been the home to five successful long duration (4 to 12 month) NASA Mars simulation missions since 2013. A HI-SEAS Mars mission involved six person crews being isolated from the rest of humanity for long periods of time. While in the simulation, communications with "Earth" were delayed by up to 20 minutes each way to simulate Mars being on other side of the Sun from Earth. When the crew left the HI-SEAS habitat, they wore analog space-suits and they went through full extra vehicular activity (EVA) protocols to perform their research in the simulated Martian terrain. HI-SEAS has also been used to perform multiple shorter duration lunar simulated missions, in collaboration with diverse organisations and companies worldwide. As of 2018, the International Moonbase Alliance (IMA), an organization dedicated to building sustainable settlements on the Moon, has been organising regular simulated missions to the Moon, Mars or other planetary bodies at HI-SEAS. The constraints for these missions depend on which planetary body the mission is simulating to be on. For instance, for lunar missions the time delay in communications is only of a few seconds, which is nearly negligible for EVAs and other activities. In 2019, the EuroMoonMars campaign was launched at HI-SEAS, bringing together researchers from the European Space Agency, VU Amsterdam, the International Lunar Exploration Working Group (ILEWG) and IMA. Six scientists, engineers, journalists and photographers spent two weeks at the HI-SEAS station performing research relevant to both the Moon and Mars there. The campaign aims to increase the awareness about the research and technology testing that can be performed in analogue environments, in order to help humans become multiplanetary species. Furthermore, the research and technological experiments conducted at HI-SEAS are going to be used to help build a Moonbase in Hawai'i, and

ultimately to create an actual Moonbase on the Moon, as part of IMA's major goals. Future missions at HI-SEAS include collaborative missions with NASA's Johnson Space Center, University of South Florida and companies such as SIFT and Ketone Technologies.