

Lunar Exploration (2)
Lunar Exploration (1) (1)

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EMMIHS-III: EUROMOONMARS, INTERNATIONAL MOONBASE ALLIANCE AND HI-SEAS
SIMULATION CAMPAIGN OUTCOMES**Abstract**

The present abstract describes the results and discussions of the EMMIHS-III campaign, which took place between 18th January – 1st February 2020 at the HI-SEAS Habitat on the Northern slope of the Mauna Loa Volcano (Hawai'i, USA).

The International Lunar Exploration Working Group (ILEWG) is a public forum sponsored by the world's space agencies (including NASA and ESA) to support international cooperation towards the exploration and utilization of the Moon. As part of research efforts towards the colonization of the Moon and creation of a Moon Village, ILEWG founded the EuroMoonMars initiative, which comprises of field campaigns in Moon-Mars analogue environments. The EMMIHS campaigns are a collaboration between EuroMoonMars, the International Moonbase Alliance (IMA) and the Hawaii - Space Exploration Analog and Simulation (HI-SEAS) and consist of scientific research, field tests, training and outreach activities.

EMMIHS-III is the third mission in the program and consisted of a crew of 6 (3 males and 3 females, all under the age of 32). The mission focused on scientific research on robotics and lava-cave exploration techniques. Firstly, a magnetometer from GeoMetrics was used to read the magnetic profile of the subsurface, notably mapping the absence of magnetic conductors in the iron-rich basalts of Mauna Loa, which was then used to deduce the structure of the lava tubes. This was then verified through analogue-astronaut-style expeditions inside the lava tubes, and several new lava tubes were hence discovered and successfully mapped.

Secondly, the crew tested three rovers for studies on autonomous navigation: notably, a rover donated by the Pacific International Space Center for Exploration Systems (PISCES), the Rover for EuroMoonMars (REMM) and the Zebro rover developed at the TU Delft. In addition, several human-factor experiments and tests on crew psychology and crew dynamics were implemented. The crew also proposed novel methods of water conservation (officially termed as the most water-efficient crew at HI-SEAS), emergency protocols and waste-limitation, which are active areas of research towards developing a sustainable Moon Village.