

LOGISTICS FOR MOONMARS SIMULATION HABITATS: EXOHAB ESTEC AND LUNARES POLAND.,

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Introduction: ILEWG developed within Euro-MoonMars research programme since 2008 a Mobile Laboratory Habitat (ExoHab) at ESTEC. Its organization led to logistic concerns our team had to work on. EuroMoonMars 2017 contributed also to the installation of LunAres Analog Research Station in Poland.

Organisation of the ExoHab @ ESTEC:

As a multi-purpose moon habitat, the ExoHab works as a geological laboratory, a communication center and a resting place for the crew.

The ExoHab's compartmentalization

When designing its interior, we had to compartmentalize the space to make it easy to use and efficient. Some places in the ExoHab were well defined (sleeping quarters), we had to organize the rest of the Habitat.

We decided to implement two working zones, one being used as a communication center, the other being separated from the rest of the ExoHab and therefore quiet. The bathroom would be used as an airlock due to its limited and confined space. The working plan would be used as a laboratory, where instruments for sample analysis, microscopes and probes were installed.

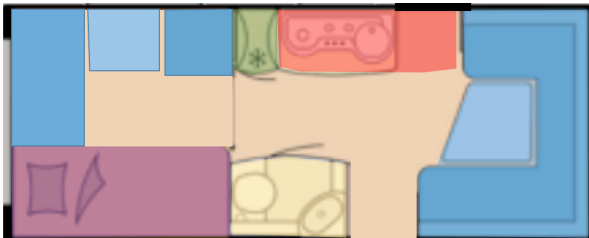


Fig 1: Map of the interior of the ExoHab in work mode. In Blue: working zones (desks). In red: laboratory zones (geology). In green: EVA wardrobe. In yellow: airlock. In purple: sleeping quarters.

The ExoHabs's inventory

In order to ease the work of the astronauts, an inventory of the ExoHab was made. It consisted in:

- 1) A brief description of every object that could be found in the ExoHab
- 2) A precise description of the object's location
- 4) An entry to update its location if the object was to be moved
- 5) An entry for the object's state

Doing the inventory was also useful to clean the ExoHab and getting rid of overused and/or useless items.

Poland logistics and LunAres Habitat: We have worked on the final installation of building of the Lunares habitat in Pila, Poland for five days.

Travel logistics

We transported some of the ESTEC furniture for its habitat to use them in the Lunares habitat, in order to have them used by Analog Astronauts in longer simulations. They will stay in the Lunares Habitat until the end of October 2017. We also brought the ILEWG ExoGeoLab Lander to be used as an experiment bench during the PMAS, Lunex1 astronaut missions.

Transporting the material required a logistic investment. We used a van and had to organize it efficiently in order to fit the luggage of 5 crew, the Lander and a dozen crates of lab furniture elements.

Installing the LunAres Habitat

We were in Pila as helpers for the working team. We worked on various tasks in and out of the habitat, e.g.:

- 1) enhancing the outer appearance by hanging posters and cleaning the walls.
- 2) ensuring the dome was waterproof by applying silicone and tape.
- 3) installing the laboratories, and adding our furniture.



Fig 2: Lunares Habitat during the day in Pila, Poland.

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References:

- [1] B.Foing et al. Vol. 12, EGU2010-13688, <http://meetingorganizer.copernicus.org/EGU2010/EGU2010-13688.pdf>;
- [2] B.Foing et al Abscicon conference 2010 <http://www.lpi.usra.edu/meetings/abscicon2010/pdf/5625.pdf>;
- [3] <http://scienceinpoland.pap.pl/en/news/news,415249,moon-mars-base-lunares-opened-at-the-airport-in-pila-on-saturday.html>