

EuroMoonMars 2018 Workshop: Ground Control Center during Analogue Simulations

Elise Clavé (1,2,3), Louis C. Dubois (1,2,3), Germaine van den Sanden (1,2) and Bernard H. Foing (1,2)
(1) ESA-ESTEC, Noordwijk, the Netherlands, (2) ILEWG, Noordwijk, the Netherlands, (3) ISAE-Supaero, Toulouse, France
(eliseclav96@gmail.com)

1. Introduction

On the 19th and 20th of April 2018, the International Lunar Exploration Working Group (ILEWG) and ESA-ESTEC held the annual *EuroMoonMars* Workshop and gathered speakers and participants involved or interested in the Moon-Mars Villages topic. The second day of the Workshop consisted of two analogue simulations. Three teams were involved: two crews and the Ground Control Center (GCC).

2. Objectives of the Ground Control Center

The team consisted of the *Flight Director*, the *Capcom* (responsible for communication with the crews), the *Public Affairs Officer* and different experts. Their aim was to assist the crews in performing their different activities successfully.

3. Communication with the crews

One of the main issues in analogue simulation is often communication, and for the Ground Control team it is indeed essential. Without proper and efficient communication, the *Flight Director* does not know how his astronauts are doing, and thus the Ground Control Center cannot fulfil his aim of assisting the crews in need. During our simulation, communication between the crews and Ground Control was via a single-channel communication system allowing audio and chat communication. It also allows sharing screens and live videos with Ground Control to keep them informed. It was quite efficient; however, it was a challenge for the Capcom to manage the two communication channels (vocal with one crew and through chat with the other) at the same time.

It was very interesting for the team in Ground Control to have live views from the facilities and the lander. Thus, they could follow the activities of the astronauts and be better prepared to assist on a specific task.

At the beginning of the second simulation, there were some communication problems: one crew was left with no mean to communicate with the Ground Control Center for some time, but it was eventually dealt with and the rest of the simulation went very well.

When astronauts used the communication protocols, exchanges were efficient. That is why it is so important to train all astronauts to communication protocols before the beginning of the simulation.

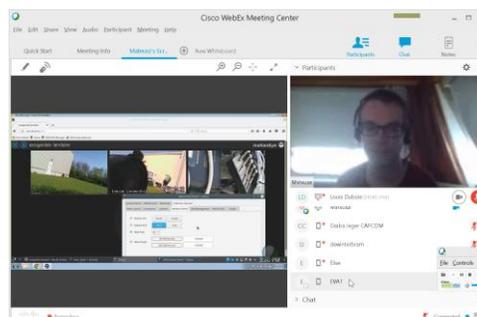


Figure 1 -WebEx interface for communication with crews. The system provided GCC with images of the astronauts inside the facilities as well as the surroundings of the base thanks to cameras on the lander.

4. Technical assistance

The morning simulation was “result oriented”: the crewmembers had experience either as analogue astronauts or in the operating of the different instruments. Therefore, they did not require much technical assistance. However, the afternoon crew was less used to the running of the different tests and thus often asked guidance to the Ground Control

team, who provided it efficiently every time. From that point of view, the second simulation was a great success.

4. Participation of guest attendees

While our astronauts were performing their different activities in the lunar analogue facilities and Ground Control team assisted, other attendees were all given a role in the Ground Control Center and asked to give their opinion, ask questions and assist the team. Some raised very interesting points about religion in space and the place of women, for example.

Acknowledgements

We would like to thank the International Lunar Exploration Working Group (ILEWG), all the attendees who participated to the workshop and all the analogue astronauts who helped us to prepare and carry out the simulations. We give special thanks to Csaba Jeger and Hugo Schravessande who took active parts in the GCC during the simulations.

References

- [1] Foing, B.H. et al ILEWG EuroMoonMars: Research Technology and Field Simulation Campaign [2017LPICo2041.5073F](#)
- [2] Foing, B.H., Stoker, C. , Ehrenfreund, P. : Astrobiology field research in Moon/Mars analogue environments, [2011IJA&B..10..137F](#)
- [3] Foing, B.H, Orgel, C., Stoker, C. et al: Gale Crater Analogue Geology Studies at Multiple Scales [2014LPICo1791.1462F](#)