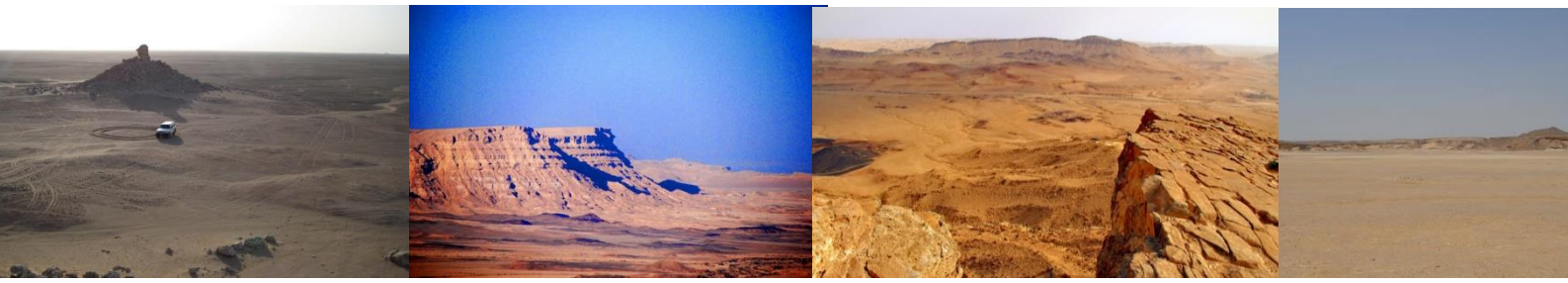
ÖSTERREICHISCHES WELTRAUM FORUM
AUSTRIAN SPACE FORUM



February 2018
Middle East

AMADEE-18 Mars Simulation

Announcement of Opportunity for Experiments

In February 2018, the Austrian Space Forum will conduct an integrated Mars analog field mission in Oman or Israel, in the framework of the PolAres research program. The mission will be carried out in a Martian terrestrial analog and directed by a Mission Support Center (OeWF), a small field crew will conduct experiments preparing for future human and robotic Mars exploration missions.

The Austrian Space Forum invites the scientific community to submit experiment proposals in the fields of geosciences, engineering, planetary surface operations, life sciences including astrobiology, human factors. The deadline for submissions is 30Jun2017. The announcement of the selected proposals will be presented on 15Jul2017.

Document Titel	AMADEE-18 AO
Tracking Nr.	P10_016B
Version/Date	V1.1 / 09Mar2017
Book captain	Gernot Groemer

Public

AMADEE-18 aims

Simulating Mars human-robotic surface activities in terrestrial analogs has evolved into an efficient tool for developing exploration mission architectures. These simulations seek to understand the advantages and limitations of future human planetary missions, add value for the development of remote science operations, and help to understand the constraints and opportunities of the technology and workflows.

The test sites will be selected for their geological and topographical similarity to Mars. The AMADEE-18 mission presents an excellent opportunity to:

- Study equipment behaviour involving the simultaneous usage of instruments with the option of humans-in-the-loop (via two high-fidelity spacesuit simulators, portable system, etc.)
- Develop platforms for testing life-detection or geoscience techniques, robotic support tools for future human missions and test concepts for high situational awareness of remote support teams.
- Study the analog as a model region for their Martian counterparts.
- Serve as a catalyst to increase the visibility of planetary sciences and human exploration.
- Evolve the know-how of managing human missions to Mars in deploying a realistic model for a Mission Support Center, astronaut actions and the encompassing decision-making framework.

AMADEE-18 candidate sites

The final test site(s) will be selected in April 2018. The current default regions for selecting the test site are the Negev desert of Israel and Mars-analog sites in Oman. Terrains will include both rocky and sandy surfaces with varying inclinations and boulder size distribution.

The AMADEE-18 field simulation

After 11 previous international Mars analog mission simulations, the Austrian Space Forum has established a field campaign infrastructure and associated workflows in the field of human-robotic mission simulations. The field activities will be scheduled, organized and planned through a “flight plan” like an actual flight mission.




Figure 1. Conceptual architecture of the AMADEE-18 expedition

Preparatory phase (“Bridgehead phase”, days 01-07)

During the initial preparatory activities and the establishment of an operational base camp as well the local infrastructure in-situ, this period offers an opportunity for guest researchers and media to be present on site on a case-to-case base.

Instruments which cannot be operated by the OeWF field crew (e.g. due to the experiment sensitivity, operator training requirements etc.) may be operated by the researchers in the field. Selected pilot & calibration measurements may be conducted.

Isolation phase (“Research phase”, days 08-29)

After the preparatory phase, the MSC Innsbruck/Austria will direct the crew limited to ca. 10-14 crewmembers who will conduct experiments according to a flight plan. The field data will be analyzed in near-real time by the remote science support team, which receives a telemetry stream. A 10 minutes time-delay between “Earth” and “Mars” will be introduced. Research teams will have to rely on the data generated in the field, including a time-delay of 10min each way.

During both phases, the following infrastructure will be available*:

- General logistics (accommodation in tents, water/food/medical care, basic hygiene)
- Broadband internet access and 230V/50Hz electrical power
- A basic mechanical and electrical workshop (including 3d-printer) & basic mobility (tbc)
- Remote support team (Mission Support Center, Innsbruck/Austria)

Mission Timeline

March 2017	Announcement of Opportunity
30Jun2017	**Submission deadline for experiment proposals**
15Jul2017	Notification of Acceptance/Non-Acceptance
August 2017	Experiment interactions defined in detail, preliminary mission definition, release of the AMADEE-18 Mission Manifest (the main expedition planning reference document)
November 2017	Hardware arrives in Innsbruck, field and SC team training
08Jan2018	Shipping to target site starts
01Feb-02Mar2018 (tbc)	**AMADEE-18 Field Mission**
End of March 2018	Return of hardware to Innsbruck, shipping back to home institutions, debriefings
26-27May2018 (tbc)	AMADEE-18 Science & Technology Workshop (Austria, tbd)

Experiment selection process

1. The Submissions of proposals MUST reach the Austrian Space Forum office via Email not later than **30Jun2017** in electronic form.

2. All proposals will undergo a peer-review process following these criteria:
   - Scientific, technical or operational merits.
   - Detailed plan of the research that clearly states:
     - Importance and feasibility of the proposed project, including the potential for data fusion with other experiments and alignment with the aims of the OEWF research programme.
     - Experiment needs versus resources available, ability to assess and mitigate programmatic, engineering and safety risks (“Can it work reliably and safely?”)
     - Ability to process, analyze, share and publish the experiment data in a timely manner.

3. The experiments will also have to be self-funded, but the scientific and logistical infrastructure will be provided by the Austrian Space Forum. Also, the option for purely tele-operated experiments is available.

4. Depending on the outcome of the selection board recommendations, experiments will either be selected “as is”, “with a request for modifications” (where the Principal Investigator still has the option to decline), or “not selected”.

Acknowledging the short timeframe for submitting and processing proposals to national funding institutions, experiments can also be submitted as “subject to funding decisions”. In this case, the final decision on the PI-side has to be provided by 30Aug2017 at the latest to allow for the flight planning.

Administrative aspects

Junior Researchers Program

The Austrian Space Forum has a tradition of implementing a “Junior Researchers” program: Students at high school or university level may submit research projects for AMADEE-18. Participation shall allow them to experience the full life-cycle of an experiment from formulating a research question to data interpretation. The review process for Junior Researchers will be independent from the formal selection.

Media activities

A major media attention is expected for the mission, as it was the case in previous simulations. The Austrian Space Forum as project owner will coordinate and manage all media activities to ensure a professional media campaign.

Funding

Experiments have to be self-funded, including the development of the hardware, documentation, transport of hardware and personnel to and from Innsbruck (Austria), as well as to and from the mission site. For experiment-specific personnel participating in the field, the expenses for infrastructure and consumables will be distributed amongst the experiments. (Ca. € 300-500 /field person-week, tbd).

Legal disclaimer

Although very unlikely, the Austrian Space Forum reserves the right to cancel the field mission. Hence, teams submitting a research proposal do so at their own discretion, expenses and risks without guarantee of success. Experiment teams will be asked to enter a legal agreement for their respective experiment after a successful review.

Human factors research

In case human test subjects are involved (e.g. medical experiments), the Austrian Space Forum requires an ethics commission approval (including appropriate insurances) at the time of the experiment. This does not apply to man-in-the-loop experiments where the focus is purely engineering-oriented. The Medical Team of the Austrian Space Forum might require ethics commission approval.

Important: By submitting, you are agreeing to...

- fulfill the requirements put forward in this Announcement of Opportunity, including deadlines, documentation, etc.
- be available during the mission for remote science support, either at your home institution or in the Mission Support Center in Austria.
- potentially share data for data fusion and joint experiments on a case-to-case bases.
- be able to cover the funding for your experiment and deliver the experiment hardware in time to Innsbruck/Austria, including documentation and customs clearances
- participate in the preparatory teleconferences and training workshops as necessary (either virtually or in person) as well as the post-simulation science workshop. This applies especially to the 3rd Dress Rehearsal (Scientific Dress Rehearsal).
- be willing and able to process, analyze and publish the results of your experiment within a reasonable time after the end of the field campaign.
- Be willing to proactively participate in the media activities of AMADEE-18 and adhere to the mission-wide media milestones, including for social media.

Next steps after selection

Upon selection, representatives of the OeWF Remote Science Support and the Flight Planning team will get in touch with the experiments' Principal Investigators to discuss the experiment implementation, training requirements for the field crews, bandwidth and power topics as well as experiment-specific hazards and risks. These deliberations lead to the creation of the Standard Experiment Information Form which is the basis for the operational and contingency procedures.

Contact

Austrian Space Forum / Spacesuit Laboratory
Dr. Gernot Groemer, gernot.groemer@oewf.org, +43 (0)676 616 8336
Sillufer 3a, 6020 Innsbruck, Austria

Journal references

- Losiak, A. at al. (2014): Remote Science Support during MARS2013: Testing a Map-Based System of Data Processing and Utilization for Future Long-Duration Planetary Missions, Astrobiology 14:5, pp 417-430
- Groemer, G. et al. (2014): The MARS2013 Analog Mission, Astrobiology 14:5, pp 360-376
- Groemer, G. et al. (2016): The AMADEE-15 Mars Simulation, Acta Astronautica, Vol 129, pp 277–290

Media references

- CNN on the OeWF spacesuits: http://edition.cnn.com/2014/01/30/tech/innovation/the-spacesuit-inspired-by-medieval-armor/
- BBC about the Rio Tinto Mission: http://www.bbc.com/news/science-environment-13161635
- NBC on astrobiology research at the Austrian Space Forum: http://www.nbcnews.com/id/43549253/ns/technology_and_science-space/t/how-do-you-keep-spacesuits-germ-free-mars/#.WGPbw1ynznM

Format for experiment proposals

Title	An informative title such that by reading the title a person can understand the goal of the proposed investigation; plus a one-word name or acronym for the proposal.	Cover page ≤ 1 page
Summary & Contact details	The detailed contact coordinates of every member in the proposing team (name, affiliation, postal address, email, telephone). There is no limit on the number of Co-Investigators.	
Expertise	A brief outline of the expertise that each investigator will contribute to the proposed investigation.	one paragraph per person
Scientific description	A detailed description of the experiment, following the standard outline of scientific proposal: • Research rationale (why it is important to perform your experiment, including a brief literature review) • scientific, engineering or operational hypothesis (testable statement being the core of this specific experiment) • proposed methodology & expected results • publication plan & potential for collaboration This part of the proposal shall demonstrate the scientific/technical relevance and feasibility.	≤3pages
Technical Description	The scientific, technical and managerial implementation description, including heritage and maturity. Indicate if you would need to be present in the field (exceptions are possible for the bridgehead phase) or the Mission Support Center (preferred) or remotely from your institution. This section should include: • Duration of experiment in the field (e.g. 10 x 2 hrs total) and Suit tester time requested (projected training and actual test time) • Power requirements (if >100 W: e.g. 1500 W, 4 hrs per day) and Communication (if >500 kB/s: for how long/day?) • Storage/shipment sizes & weights: Do you have any other special needs? (e.g. legal/IPR issues, ITAR-restrictions, special needs of team members, etc.)	≤ 3 pages

The proposal shall be sent as a pdf-file to **info@oewf.org** with cc: to **gernot.groemer@oewf.org** and **sophie.gruber@oewf.org** no later than 30Jun2017.