



ÖSTERREICHISCHES WELTRAUM FORUM
AUSTRIAN SPACE FORUM



AMADEE-18

Junior Researchers Program

FEBRUARY 2018
OMAN

oewf.org

AMADEE-18

Junior Researchers Program

In February 2018, the Austrian Space Forum – in partnership with international research organizations – will conduct an integrated Mars analog field simulation in the Dhofar region, Oman. Directed by a Mission Support Center in Austria, a small field crew will conduct experiments preparing for future human Mars missions in the fields of engineering, planetary surface operations, astrobiology, geophysics/geology, life sciences and other.

Students from Europe and Oman are invited to submit experiment proposals for this extraordinary expedition.

THE SUCCESSFUL TEAMS WILL:

- > Define research questions and implement the experiment
- > Train the field crew and interact with the Mission Support Center of the Austrian Space Forum
- > Observe (*and tele-operate if necessary*) the experiment during its implementation
- > Analyze and interpret the data and publish them in a final experiment report and present the findings at the AMADEE-18 science workshop in mid-2018.

EXAMPLES OF PREVIOUS JUNIOR RESEARCHERS PROJECTS:

- > **SOLAR CELLS:** Can an automated brush significantly preserve the power output of solar cells in the desert? Highschool students designed an experiment for the MARS2013 Mars simulation in the Northern Sahara
- > **COMMUNICATION:** A student developed a signal travel time measurement box which was used to determine the distance between the sender and the receiver for medium-range exploration on Mars without a GPS.

ABOUT THE MARS-SIMULATIONS OF THE ÖWF

- > The AMADEE.18 expedition in Oman: oewf.org/en/portfolio/amadee-18
- > The AMADEE-15 Mars simulation on a glacier: oewf.org/en/portfolio/austria-amadee-15



AMADEE-18 Oman test site description

The deserts of Dhofar, the largest governorate in the Sultanate of Oman, have a resemblance to various Mars surface features, such as sedimentary structures dating back to the Paleocene and Eocene, salt domes of the South Oman Salt Basin and ancient river beds. The test site offers a wide range of sand and rocky surfaces combined with a broad variability in inclination.

The nearest major city is Salalah, expected temperatures at the test site in February typically range between 16-27°C with less than 10 mm of precipitation.

The AMADEE-18 “landing site” in the Dhofar governorate is embedded in a hyper-arid desert within a predominantly flat, windy terrain. Aeolian landscape formation is evident. The test site is classified as a subaerial environment, where water is or was derived only from precipitation or ambient-temperature groundwater. This environment can support the preservation of mineralogical, chemical, isotopic and structural (paleo-) biosignatures.

Climate

The Climate of Oman is a subtropical dry, hot desert climate with low annual rainfall. A hot, dust-laden wind, the Shamal, blows in the spring and summer-period, from March till August.

Sparse low perennial vegetation is growing on the high rim hillslope and wadis (dry streams). Small bushes are located in the wadis in the crater bottom.

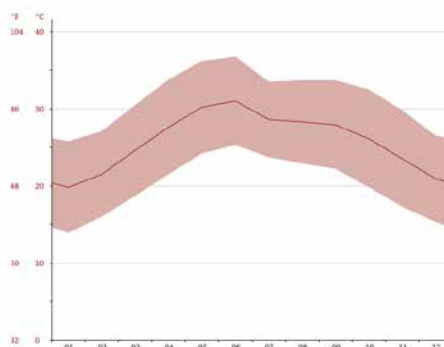
Hazards

The region is inhabited by several venomous snake and scorpion species. However, incidents are considered very rare. Flash floods may occur during winter and the transient season over the duration of typically 4-6 hours. In the vicinity of selected gas harvesting fields, there is a risk of gas traps. These are clearly marked with warning signs.

For aerial vehicles, wind gusts might need to be considered – detailed wind data and their diurnal variation patterns are available upon request.



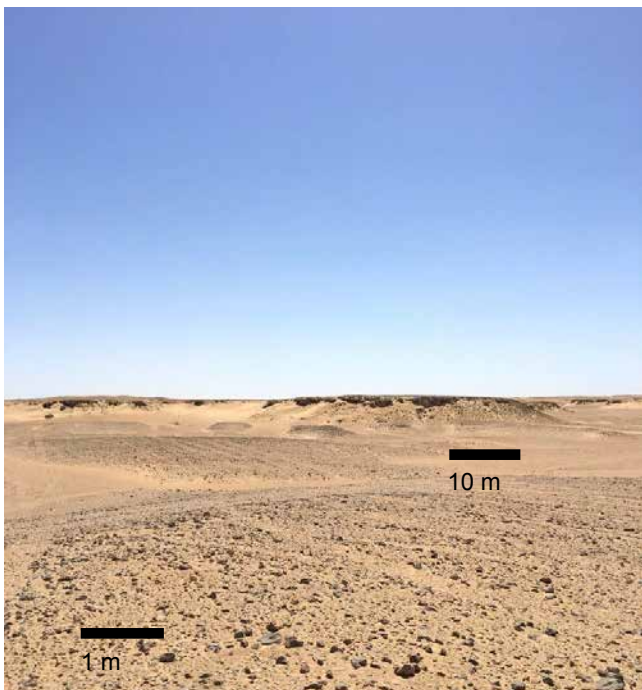
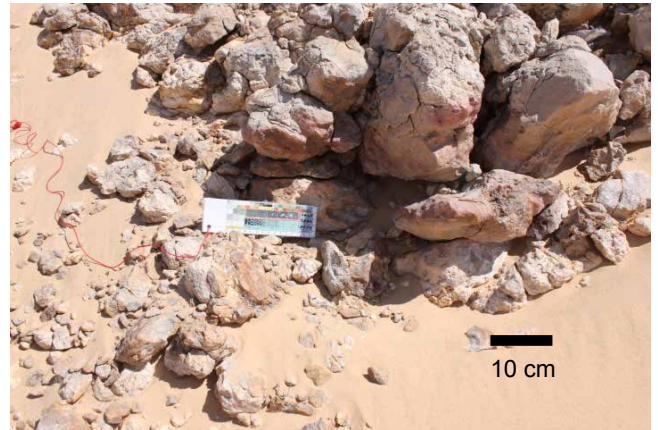
● Location of the AMADEE-18 test site



month	Jan	Feb	Mar
mm	0	5	6
°C	19.8	21.5	24.6
°C min	13.9	16.0	18.7
°C max	25.8	27.1	30.5

Figure 2: Temperature of Marmul region

AMADEE-18 Oman test site description



Panoramas and close-ups of the test site and representative neighbouring sites. (Elevation is approximately 250m above sea level.)

AMADEE-18

Oman test site description

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. 15 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:

- > Broadband internet access and 230V/50Hz electrical power
- > A basic mechanical and electrical workshop (*including 3d-printer*) & basic mobility
- > Remote support team (*Mission Support Center, Innsbruck/Austria*)

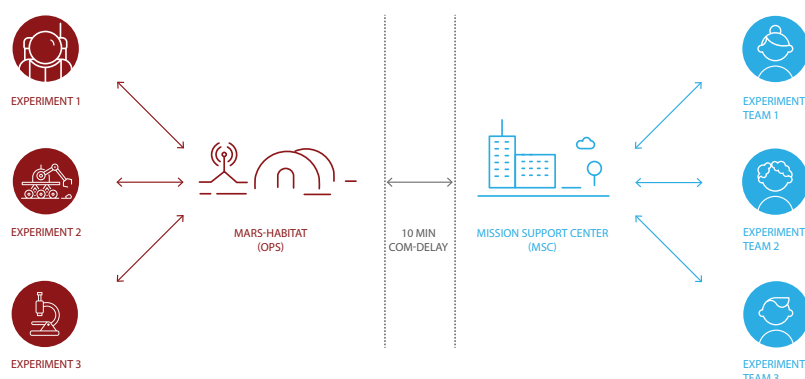


Figure 2. Conceptual architecture of the AMADEE-18 expedition: A 10min time delay reflects the signal travel time between Earth and Mars. The Mission Support Center in Innsbruck/Austria is the single-line-of-contact between “Earth” and “Mars”.

Terms & Conditions

WHO CAN SUBMIT AN EXPERIMENT PROPOSAL?

This call is open to all fields relevant to space exploration (*such as engineering and natural sciences*) including art, media and design. Students from Member states of the European Space Agency¹ as well as the Sultanate of Oman aged between 15-25 years. We strongly encourage the formation of teams with at least 3 team members.

LOGISTICS AND FINANCIAL SUPPORT

- > Experiments will have to be self-funded by the student teams.
- > The Austrian Space Forum provides ...
 - the transportation between Innsbruck/Austria and the test site in Oman, including customs operations
 - Provision of infrastructure at the test site, such as internet connectivity, power etc.
 - Support in the implementation of the student experiment (*consulting by the Remote Science Support and the Flight Planning teams*), support for designing the analog astronaut training for the respective student experiment as well as support for media activities.
- > For travel or shipping expenses for the student teams (*e.g. for shipping costs to/from Innsbruck*) or travel costs for team members for training the field crew in Innsbruck, up to 500 €/team can be covered by the Austrian Space Forum.
- > Also, the option for tele-operated experiments is available. Participating student teams are required to be online and available when their respective experiment is conducted in Oman in February by the field crew.

MILESTONES

- > **30Jun2017**: Experiment proposal submission deadline
- > **15Jul2017**: Decision on the acceptance/non-acceptance of the proposal
- > **30Sep2017**: Experiment review by the Austrian Space Forum
- > **08-10Dec2017**: Analog astronaut training for the Junior Researchers experiments
- > **Mid-Dec2017**: Shipment of the hardware to Oman
- > **February 2018**: AMADEE-18 expedition
- > **May2018 (tbc)**:
AMADEE-18 Science workshop (in Austria)

IMPORTANT: BY SUBMITTING, YOU ARE AGREEING TO ...

- > fulfill the requirements put forward in this Announcement of Opportunity, including deadlines, and documentation.
- > be available during the mission for remote science support (*e.g. at school or in Innsbruck during the conduct of your experiment*).
- > be able to cover the funding for your experiment, to deliver the experiment hardware in time to Innsbruck/Austria.
- > participate in the preparatory teleconferences and training workshops as necessary (*either virtually or in person*) as well as in the post-simulation science workshop. This applies especially to the 3rd Dress Rehearsal (*Scientific Dress Rehearsal*).
- > Be willing to proactively participate in the media activities of AMADEE-18, 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, discussing 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.

QUESTIONS?

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¹ Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom as well as ESA-associated countries: Canada, Slovenia, Bulgaria, Cyprus, Lithuania, Malta, Latvia and Slovakia.

Terms & Conditions

FORMAT FOR JUNIOR RESEARCHERS 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 (<i>name, school/university, postal address, email, telephone</i>).	
SCIENTIFIC DESCRIPTION	A detailed description of the experiment, following the standard outline of a scientific proposal: <ul style="list-style-type: none"> > Research rationale (<i>why it is important to perform your experiment</i>) > scientific, engineering or operational hypothesis (<i>testable statement being the core of this specific experiment</i>) > proposed methodology & expected results 	≤ 2 pages
TECHNICAL DESCRIPTION	The scientific, technical and managerial implementation description, including heritage and maturity. <ul style="list-style-type: none"> > Duration of experiment in the field (<i>e.g. 10 x 2 hrs total</i>) and Suit tester time requested (<i>projected training and actual test time</i>) > Power requirements (<i>if >100 W: e.g. 1500 W, 4 hrs per day</i>) and Communication (<i>if >500 kB/s: for how long/day?</i>) > First estimate of shipment sizes & weights 	≤ 2 pages
SUBMISSION DEADLINE	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 .	