



15OCT-15NOV 2020 / NEGEV DESERT, ISRAEL

# AMADEE-20 Junior Researchers Program Announcement of Opportunity

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Book captain	Gernot Grömer

**PUBLIC**



## AMADEE-20 Junior Researchers Program

**Between 15Oct-15Nov2020, the Austrian Space Forum – in cooperation with the Israel Space Agency as the host agency and D-MARS - will conduct an integrated Mars analog field mission in the Negev Desert in Israel. The expedition will be carried out in a Martian terrestrial analog and directed by a dedicated Mission Support Center in Austria. A small field crew of highly trained analog astronauts with spacesuit simulators will conduct experiments preparing for future human and robotic Mars exploration missions.**

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

Submission deadline: **25Mar2019, 23:59 CET, (Announcement of the selected proposals: 15Apr2019)**

The successful teams will

- Define research questions and methods to implement the experiment
- Build the experiment hardware, including testing and documenting it
- Train the analog astronauts and field crew members, as well as interact with the Flight Planning and Remote Science Support team of the Austrian Space Forum
- Observe the experiment during its implementation from their home institution or the Mission Support Center in Innsbruck, Austria.
- Analyze and interpret the data and publish them in a final experiment report and present the findings at the AMADEE-20 science workshop in mid-2021.

This call is open to all fields relevant to space exploration (such as engineering and natural sciences) including art, media and design.



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 team of high school students developed a radio navigation system for EVAs on planets without GPS (see Figure 1)
- **Additive manufacturing:** How can 3D printing technology be implemented in planetary surface operations? Undergraduate students investigated the operational benefits of 3D printing technologies during AMADEE-18 in Oman.



Figure 1 Junior researcher experiments during AMADEE-18: left: radio navigation system for planets without GPS; right: analog astronauts use 3D printed tools for geological sampling tasks.

About the Mars-Simulations of the OeWF

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

## The AMADEE-20 test site

The test site is located in the Negev desert in southern Israel within the erosion structures of the Ramon Crater: Although not an impact crater, but a rare form of erosion structures, it has a resemblance to various Mars surface features, and a variety of terrain types relevant to Mars exploration. The test site offers a wide range of sand and rocky surfaces combined with a broad variability in inclination. The nearest city is Mitzpe Ramon. Expected temperatures at the test site in November typically range between 10-20°C with low chance of precipitation.

## Mission architecture

### 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.

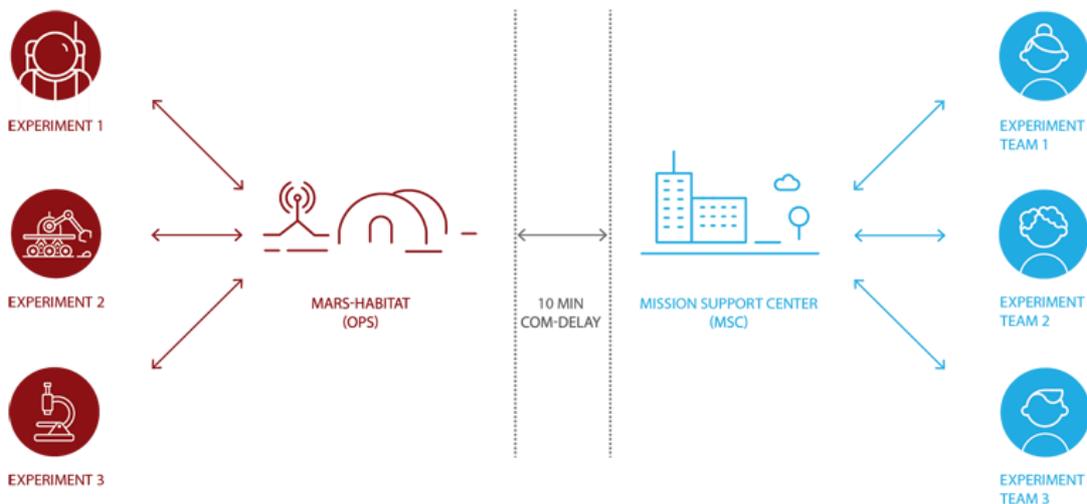


Figure 2. Conceptual architecture of the AMADEE-20 expedition: A 10min time delay reflects the signal travel time between Earth and Mars. The Mission Support Center in Innsbruck/Austria is the single-line-of-contact between “Earth” and “Mars”.

### Isolation phase (days 08-25)

After the preparatory phase, research teams leave the site, the Mission Support Center (MSC) Innsbruck/Austria will now direct the crew limited to six crewmembers who will conduct experiments according to a flight plan. The analog astronauts are supported by a small “On-Site Support”-team (OSS), performing activities necessary for the simulation, but not available on Mars (e.g. Safety, managing local W-LAN infrastructure etc). OSS will not directly interact with the analog astronauts. The field data will be analyzed in near-real time by the remote science support team at the MSC Innsbruck in cooperation with the experimenters’ teams. A 10 minutes

time-delay between “Earth” and “Mars” mimics the signal travel time between Earth and Mars (see Figure 2).

During both phases, the following infrastructure will be available:

- General logistics (accommodation in base station or nearby Mitzpe Ramon, water/food/medical care, basic hygiene, site security)
- 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)

### Milestones

<b>25Mars2019</b>	Submission deadline for experiment proposals
<b>15Apr2019</b>	Notification of Acceptance/ Non-Acceptance
<b>May2019</b>	AMADEE-20 Science Definition Workshop
<b>Nov2019</b>	Experiment interactions defined, preliminary mission definition, release of the first iteration for the AMADEE-20 Mission Manifest (the main expedition planning reference document)
<b>Jun2020</b>	Hardware arrives in Innsbruck
<b>Jul-Sep2020</b>	3 (tbc) Dress Rehearsals, Innsbruck Austria
<b>Sep2020</b>	Shipping to target site starts
<b>15Oct-15Nov2020</b>	<b>AMADEE-20 Field Mission</b>
<b>Dec2020-Jan2021</b>	Return of hardware to Innsbruck, shipment back to home institutions
<b>May2021 (tbd)</b>	AMADEE-20 Science & Technology Workshop (location tbd)



## Terms and Conditions

### Who can submit an experiment proposal?

Students from Member states of the European Space Agency<sup>1</sup> as well as Israel aged between 15-25 years. We strongly encourage the formation of teams with at least 3 team members.

### Logistics

- > 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 Israel, 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.
- > 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 Israel.

### Questions?

Dr. Gernot Groemer  
gernot.groemer@oewf.org,  
Austrian Space Forum / Spacesuit Laboratory  
Etrichgasse 18  
6020 Innsbruck, 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 Science Definition Workshop and at least 2 Dress Rehearsals.**

... Be willing to proactively participate in the media activities of AMADEE-20, 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.

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<sup>1</sup> 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.

## Format for Junior Researchers experiment proposals

<b>Title</b>	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
<b>Summary &amp; Contact details</b>	The detailed contact coordinates of every member in the proposing team (name, school/university, postal address, email, telephone).	
<b>Scientific description</b>	A detailed description of the experiment, following the standard outline of a scientific proposal: <ul style="list-style-type: none"> <li>• Research rationale (why it is important to perform your experiment)</li> <li>• scientific, engineering or operational hypothesis (testable statement being the core of this specific experiment)</li> <li>• proposed methodology &amp; expected results</li> </ul>	≤2 pages
<b>Technical Description</b>	The scientific, technical and managerial implementation description, including heritage and maturity. <ul style="list-style-type: none"> <li>• Duration of experiment in the field (e.g. 10 x 2 hrs total) and Suit tester time requested (projected training and actual test time)</li> <li>• Power requirements (if &gt;100 W: e.g. 1500 W, 4 hrs per day) and Communication (if &gt;500 kB/s: for how long/day?)</li> <li>• First estimate of shipment sizes &amp; weights</li> </ul>	≤ 2 pages

The proposal shall be sent as a pdf-file to [amadee20@oewf.org](mailto:amadee20@oewf.org) no later than 25Mar2019, 23:59 CET. A confirmation will be sent, triggering the review process.