ÖSTERREICHISCHES WELTRAUM FORUM
AUSTRIAN SPACE FORUM

The AMADEE-20 Mars Simulation

04-31OCT2021, NEGEV DESERT, ISRAEL

AMADEE-20 is a Mars analog simulation in the Negev Desert, Israel, managed by the Austrian Space Forum hosted by the Israeli Space Agency: For 4 weeks, a carefully selected crew of 6 analog astronauts will emulate selected aspects of a human Mars mission in the Ramon Crater, Negev desert as a topographic and geological model region for the Red Planet.

The crew will be supported by a Mission Support Center in Austria, emulating the "ground segment" of an actual Mars mission, including operations teams, flight planners, remote science support and the infrastructure necessary to coordinate a complex set of experiments in the fields of engineering, geoscience and human factors. It is the 13th mission of its kind managed by the Austrian Space Forum.

MISSION AIMS

- Study equipment behavior involving the simultaneous deployment of instruments and robotic vehicles with humans-in-the-loop, including research-grade spacesuit simulators,
- develop platforms for testing life-detection or geoscientific techniques, robotic support tools providing a high situational awareness,
- catalyze the visibility of planetary exploration,
- evolve the know-how of managing crewed missions to Mars by deploying a realistic Mission Support decision making framework.

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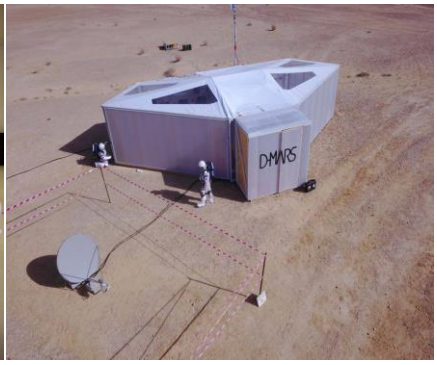


TIMELINE

21-23May2019	Dress Rehearsal I: Hardware arrives in Austria for first integrated hardware tests and procedure training; Mission Support Center facility set-up, team training
10-12Jul2020	Dress Rehearsal II: Final version of experiment hardware in Austria, team SOP training
28-30 Aug 2020	Dress Rehearsal III: Virtual integrated training
04-06Jun	Dress Rehearsal IV: Procedural training field crew and Mission Support Center
13-15Aug2021	Dress Rehearsal V: Integrated dry-run of all mission elements
Sep2020	Shipping to test site
04-31Oct2020	**AMADEE-20 Field Mission**
Nov2021	Return of hardware to Innsbruck, shipment back to home institutions
May2022 (tbd)	AMADEE-20 Science & Technology Workshop (location tbd)

ABOUT THE AUSTRIAN SPACE FORUM

The Austrian Space Forum (Österreichisches Weltraum Forum, OeWF) is an organization of engineers, scientists and people with a passion for space. The research organization is involved in cutting-edge space exploration research. So far, the OeWF has led 12 international expeditions in Mars-like regions, such as the Northern Sahara of Morocco, USA/Utah, southern Spain or Oman as well as high altitude missions on glaciers.

JOURNAL REFERENCES

- Gruber, S., Groemer, G., Paternostro, S., & Larose, T. L. (2020). **AMADEE-18 and the Analog Mission Performance Metrics Analysis: A Benchmarking Tool for Mission Planning and Evaluation**. Astrobiology. doi: 10.1089/ast.2019.2034
- G.Groemer, S. Oezdemir-Fritz: "**Planetary Analog Field Operations as a Learning Tool**", Front. Astron. Space Sci., 30 July 2020, DOI: https://doi.org/10.3389/fspas.2020.00032

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MEDIA REFERENCES

- CNN on the OeWF AMADEE-18 expedition: https://edition.cnn.com/2018/02/28/middleeast/mars-oman-mission-oewf/index.html
- 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 Headline 1
- Haaretz: https://www.haaretz.com/middle-east-news/MAGAZINE-oman-desert-hosts-field-tests-for-manned-mission-to-mars-1.5805659

AMADEE-20 CONTACT / AUSTRIAN SPACE FORUM

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AMADEE-20 EXPERIMENT

Name	Description	Institution
MICROBIOM *Biology/Medical*	Investigating the development of astronauts' microbiome during and after an isolation mission	• Research Unit Comparative Microbiome, Helmholtz Center Munich, Germany • Tech. Univ. Munich, Germany
MSG *Human Factors*	Data collection on social density and spatial density in the Mars base habitat	• Eco-encounter therapy program in ENAV NGO, Israel
ACT *Human Factors*	Utilizing Acceptance and Commitment Therapy (ACT) to improve psychological flexibility, performance & error measures	• Goldsmiths University of London, UK
AEROSCAN *Robotics*	Test an autonomous solar-powered Vertical take-off and Landing (VTOL) drone for the Martian surface analysis	• University of Houston, USA • Airvision srl, Italy
AMAZE *Robotics*	Visual-inertial Navigation for aerial Planetary Exploration for the NASA PERSEVERANCE mission	• Univ. of Klagenfurt, Austria
SHARE *Human Factors*	Situational awareness testing of analog astronauts during extra-vehicular activities	• Ecole Nationale Supérieure de Cognitique, Bordeaux INP, France
SANDEE *Geosciences*	Sand transport during aeolian processes in the Negev Desert: Electrical Effects and implications for Mars	• Interdisciplinary Center (IDC) Herzliya, Israel • Ben-Gurion Univ. of the Negev, Israel
EXOSCOT *Robotics*	Scouting rover and autonomous navigation	• Techn. University of Graz, Austria
MICRO-POTENTIAL *Astrobiology*	Evaluation of Microbial Potential Contamination & DNA analysis of contamination vectors	• Dead Sea and Arava Science Center • Tel Aviv University • Weizmann Institute of Science, Israel
HUMAIN *Human Factors*	Human- Machine Interface Research for Space Suit Head-Up Displays	• Austrian Space Forum, Austria • Delft Univ. of Tech, The Netherlands
MEROP *Robotics*	Remote operation of planetary ground robots using advanced human-machine interfaces	• University of Lisbon, Portugal
MOVE *Medical*	Effect of Environmental Stressors on Frequency and Consistency of Bowel Movements among Mars Analog Crew	• International Space University, France

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PSYCHSCALE *Human Factors*	Human Performance Evaluation of Environmental Stressors via Anonymous Standardised Psych. Assessment	• International Space Univ., France • University of Cadiz, Spain • NTNU, Norway
VFR-eFAST *Medical*	Feasibility of focused ultrasonography of the abdomen and thorax (eFAST)	• Lindesberg Hospital, Sweden • Univ. Hospital of Cologne, Germany • Eur. Soc. of Aerospace Med., Germany
TUMBLEWEED *Robotics*	Student experiment on a wind-driven sphere with environmental sensors	• Austrian Science and Engineering Students
RETINA *Medical*	Diagnostic instrument for eye health monitoring and studying the Spaceflight Associated Neuro-ocular Syndrome.	• German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), Institute for Aerospace Medicine
OGH *Engineering*	Monitoring of habitat consumables and telemetry data	• D-MARS, Israel
INTERTEAM *Human Factors*	Studying the teamwork process of groups under pressure in an operational environment	• Univ. of Bremen, Germany, ZARM - Center of Applied Space Technology and Microgravity & Faculty of Business Studies and Economics
POLLY *Human Factors/Engineering*	Conversational User Interface (CUI) for astronaut scientists, specifically for information retrieval and logistics	• Univ. of Bremen, Germany, ZARM - Center of Applied Space Technology and Microgravity & Human-Computer Interaction
MARSLOCK *Engineering*	Investigation on material transfers of Martian habitat airlocks for the MAMBA station	• Univ. of Bremen, Germany, ZARM - Center of Applied Space Technology and Microgravity & Human-Computer Interaction