



## **Mars Analog Mission: Glacier Simulation AMADEE-15 by Austrian Space Forum**

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**Austrian Space Forum:** The Austrian Space Forum (OeWF, Österreichisches Weltraum Forum) is a non-profit, citizen-science organization of aerospace specialists and enthusiasts. One of its specialisations is Mars analog research. Analog studies and analog instrument validation supported all planetary surface missions so far [1] and are considered as an effective tool to prepare for future missions to Mars [2,3,4,5,6,7].

Since 2006, OeWF has conducted 11 Mars analog field campaigns in diverse locations that represented: 1) average current Mars conditions (the Mars Desert Research Station (MDRS) in Utah in 2006 [8] and the Northern Sahara near Erfoud, Morocco in 2013 [9]); 2) the early and wet Mars (analog site of Rio Tinto Spain in 2011 [10]); and 3) subsurface exploration (Dachstein Ice Caves in 2012). During these campaigns, 68 experiments and major engineering tests were performed, which were mostly focused on astrobiology, robotics, human factors, geoscience and spacesuit operations.

Major assets of OeWF include two advanced spacesuit simulators Aouda [11], an increasingly evolving Mission Support Center, a dedicated Remote Science Support team [12], and a growing set of Standard Operating Procedures defining major workflows within a mission team. The spacesuit simulators were operated by a total of 18 analog astronauts, who were selected and trained during a >6 month program. Total EVA time is nearly 600 hours, leading to a significant experience in analog field simulations.

**AMADEE-15:** The mission took place between August 2nd and 14th 2015 at the Kaunertal Glacier in Tyrol, Austria. This glacier was selected as a study site because of its accessibility and high number of micro-landscapes analogous to those expected on Mars in locations where abundant water ice is present. As such it is considered a first-tier Mars analog [13]. The Base station was located at N 46.86320, E 10.71401 at 2800 masl, the highest reached location was on elevation of 2887 m.

Eleven experiments were conducted by a field crew at the test site under simulated Martian surface exploration conditions, coordinated by the Mission Support Center in Innsbruck, Austria. A 10-minute satellite communication delay and other limitations pertinent to human planetary surface activities were introduced. A detailed description of the mission should be soon published in [14].

**References:** [1] Preston & Dartnell 2014. *Int. J. Astrobiol.* 13:81–98. [2] Drake et al. 2009. NASA-SP-2009-566.pdf. [3] Ross et al. 2013. *Act. Astronaut.* 90:182-202. [4] Abercromby et al. 2013. *Act. Astronaut.* 91:34-48. [5] Binstead et al. 2015. Human Research Program Investigators Workshop. [6] Imhof et al. 2015. AIAA SPACE 2015 Conference and Exposition. [7] Bessone et al. 2015. 10.1007/978-3-319-15982-9\_37. [8] Groemer et al. 2007. *AustroMars Sci. Worksh.*:4-12. [9] Groemer et al. 2014. *Astrobiol.* 14:360-376. [10] Orgel et al. 2013. *Act. Astronaut.* 94:736-748. [11] Groemer et al. 2012. *Astrobiol.* 12(2):125-134. [12] Losiak et al. 2014. *Astrobiol.* 14:417-430. [13] Soare et al. 2001. *EOS*82, 501. [14] Gernot et al. 2016. *Act. Astronaut.* (in review).