HIGH ALTITUDE MARS ANALOG RESEARCH
RESULTS FROM THE AMADEE-15 GLACIER MARS SIMULATION

G. GROEMER AND R. ALBRECHT, AUSTRIAN SPACE FORUM
- Citizen science organisation since 1998, led by professionals
- 180 team members
- High public visibility & space outreach & academic involvements
- Level-of-effort methodology
OEWF Research Focus

- **Hardware development:**
  - Aouda.X spacesuit simulator
  - Mars analog rovers
  - Stratospheric balloons & Cubesats
  - 3 operational ground stations by 2017

- **Research focus**
  - Planetary surface operations
  - Planetary protection
  - Optimizing remote science support

- **11 major field campaigns**
  - E.g. Rio Tinto 2011, Dachstein 2012 (NASA/JPL, Exomars-h/w, Morocco 2013)
Analog astronaut class of 2015 (from 100 candidates, 5 months basic training)

Mission rationale

- Mission operations on planetary surfaces is different from e.g. ISS operations and needs new concepts (time-delay, long duration autonomy,…)
- OeWF and its partners have identified “doable niches”, where a significant contribution can be made → (almost) open-source body-of-knowledge on human Mars mission operations

Mission objectives

- **Investigate** the limitations and opportunities of studying a Martian (rock) glacier
- **Test** mission support strategies, decision making workflows and near-real time data analysis for flight planning.
- **Serve** as a high-visibility showcase of analog field research

- NASA DRA 5.0 – 19 matches

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Mission Support Center Innsbruck/Austria

+ ext. Rover control room (Budapest/Hungary)

OeWF Multi-Mission Data Archive

Welcome to the multi-mission Science Data Archive of the Austrian Space Forum.

This archive contains information about the scientific and engineering experiments of our field missions, the type and quantity of data collected as well as information about the Principal Investigators and how to contact them.

For questions, please send us a message via the "Contact Us" link.

https://mission.oewf.org/archive
Experiments

- **Surveillance / Recon**
  - Cliffbot / Aerostat
  - PULI ROCKS: GLXP rover terrain tests
  - Ground Penetrating Radar

- **Astrobiology**
  - L.I.F.E.: Biomarker fluourescence instrument
  - Glacier-MASE: glacial extremophile inventory
  - WORIS: Lichenometry
  - Moraine Dating

- **Human Factors & Operations**
  - VEMES Pilot-A: Virtual & Blended reality tests
  - FOG: aerosol shower for low water usage
  - Aouda Suit monitoring
  - Dental procedures: 3d manufacturing

VERAS/VEMES PILOT-A Study
APPLICABILITY | L.I.F.E.

- Chlorophyll gradient
- Standard approach impossible

High spatial resolution measurement with L.I.F.E. instrument!

- Spatial resolution: 30µm px$^{-1}$
- Spectral resolution: 5nm px$^{-1}$
- Detection limit chl$_a$: 500pg ml$^{-1}$
- Detection limit PE: 10ng ml$^{-1}$
L.I.F.E. FIELD DATA

Groemer et al., 2014
L.I.F.E. @ AMADEE-15
glacierMASE  - extremophile inventory
(EU/FP7 project, ongoing)
Challenges

• Single-gateway of communication
• Experimental readiness
  (traditional field science vs spaceflight operations)
• Safety: significant effort in high alpine environments

Upsides

• Science/Exp-driven
• AA selection & training +++
• Workflows/SOP’s
• Communication pathways
• Base station

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