Österreichisches Weltraum Forum

Austrian Space Forum

Mission Report

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All images, unless stated otherwise were taken by the AMADEE-15 expedition photographers Paul Santek and Claudia Stix.

About the Austrian Space Forum

The Austrian Space Forum (Österreichisches Weltraum Forum, OeWF) is a national network for aerospace engineers, scientists and people with a passion for space. The citizen-science organization is involved in cutting-edge space exploration research and serves as a communication platform between the space sector and the public; it is embedded in a global network of specialists from the space industry, research and policy.

www.oewf.org

1. Preface of the Federal Minister Alois Stöger

Austria is internationally recognized as aerospace nation and our contributions are highly appreciated. Our domestic technologies have an excellent reputation and in the meanwhile there is nearly no mission of NASA or ESA which is led without technology and knowhow from Austrian universities, institutes and companies. The Federal Ministry of Transport, Industry and Technology annually invests about EUR 65 million in the field of aerospace technologies and research and herewith significantly supports the "aerospace community" which has grown to more than 50 institutions from industry and research guaranteeing over 1,000 jobs.

In this context it is an international distinction that in August 2015 the Austrian Space Forum with international partners have organised a two-week Mars simulation on the ice and rock glaciers in the Kaunertal valley in Austria and a small field crew will carry out experiments in preparation of future Mars missions. At the same time it is a pleasure for me that my Ministry together with the Austrian Space Forum organizes the Junior Researchers Program (JRP AMADEE15) and within the framework of fti-remixed (www.ftiremixed.at). 12 young persons between 16 and 19 years from Austria will participate in the Mars simulation AMADEE15 between 2 and 4 August 2015 and will experience this event first hand as journalists.

It is my special wish to gather young talents with innovative companies in science and research and to let them contribute in the development of future technologies of tomorrow. Since the start of the talent program 8,500 young persons with the support of the Federal Ministry for Transport, Innovation and Technology have completed this program and also this year again about 1,500 young persons will be able to have a special look behind the scenes of research and technology.

I wish all participants of the international Mars simulation an exciting time and a lot of success in their experiments and I have the pleasure to express my gratitude to Mr. Dr. Gernot Grömer and to his team for the tireless commitment in the field of aerospace.

Federal Minister Alois Stöger

2. Foreword of the Govenor of Tirol, Günther Platter

As Governor of Tirol I am very pleased that Tirol is reaching for the stars with the Mars field simulation AMADEE-15: The Austrian Space Forum chose the Kaunertal glacier for fieldwork to find important insights for future manned missions to Mars.

I would like to emphasize the fact that linked to the field research is a scientific educational project: twelve pupils between 16 and 19 years from Austria and Switzerland will work on the mission for two days, thus getting hands-on experience in space exploration.

They will inspire other youths as “Ambassadors for Space Exploration” to find their interest in research, technology and nature sciences.

I wish all participants two successful weeks at the Kaunertal glacier and I am convinced that the scientific insights won from the AMADEE-15Mission will be an important contribution by the Austrian Space Forum to manned space travel.

Günther Platter
Governor of Tirol

3. AMADEE-15 at a glance

In August 2015, the Austrian Space Forum and partners from 19 nations conducted a two-week Mars field simulation mission in the Kaunertal glacier region, Austria.

Directed by a Mission Support Center in Innsbruck/Austria, a small field crew performed experiments preparing for future human Mars missions in the fields of engineering, planetary surface operations, astrobiology and geosciences.

Analog astronauts in spacesuit simulators, in partnership with robotic vehicles, supported by an international Remote Science Support team emulated the exploration of a Martian (rock) glacier.

The AMADEE-15 mission was organized by the Austrian Space Forum in the framework of the PolAres research program in partnership with individuals and institutions from 19 nations. This document describes the infrastructure of the mission and the general mission sequence of events as well as lessons learned and the mission performance metrics.

The aims of AMADEE-15 were to…

- **Investigate** the limitations and opportunities of studying a Martian (rock) glacier with human explorers, using state-of-the art instrumentation.
- **Test** novel mission support strategies, decision making workflows and near-real time data analysis for flight planning.
- **Serve** as a high-visibility showcasing of analog field research, including a dedicated education and outreach component.

Science & Technology

Based upon a peer review process, a complimentary set of experiments was selected. These experiments focussed on the geo-scientific exploration of a (rock) glacier, astrobiology, mission operation aspects, spacesuit and robotic systems and the flight planning and remote science support workflows pertinent to complex missions with time delayed communication.

Observers from industry, space agencies and academia experienced AMADEE-15 first hand during two professional observer days at the Mission Support Center, at the test site and also virtually.

Analog Astronauts

These carefully selected and trained individuals conducted most of the science field activities, and they were also the public face of the mission, serving as STEM-ambassadors for media and education activities. Analog astronauts are trained to conduct spaceflight-simulations in Mars-like regions on Earth, testing and evaluating equipment procedures as well as human factors and workflows relevant to human exploration. They contribute to the development of spacesuit simulators and other relevant instrumentation and equipment. AMADEE-15 was the first deployment of the five new ones of the class of 2015.

Outreach and Education

Within the Junior Researchers program, there was a significant emphasis on education, where students interacted closely with the research teams. In cooperation with science centers, the public participated virtually.

Based upon the experiences of previous OeWF expeditions, such as in the Northern Sahara, Rio Tinto/Spain and others, the Austrian Space Forum received a global media interest by the media in the mission - complemented by Social Media campaigns.

3.1 Synergies with NASA Design Reference Architecture 5.0

The NASA Design Reference Architecture DRA 5.0 defines a set of trade-off studies and scenario for a human Mars mission. It identifies existing and desirable technologies that would likely be used for such a mission and points out gaps and challenges that need to be overcome beforehand. The following table highlights mission features that are relevant to the ÖWF in order to show how AMADEE-15 contributes towards the DRA 5.0.

Chapter	Content	Relevance for and contribution by the ÖWF
Goals and Objectives	Explores the motives and vision driving a human Mars mission (Section 2.2.2)	ÖWF shares the vision that humans should go to Mars and focuses its work towards this goal
	Scientific goal I: Determine whether life ever arose on Mars (Sec. 2.2.3)	AMADEE-15 featured biological experiments which aimed at detecting life in a Mars-like environment (MASE, L.I.F.E.)
	Scientific goal III: Determine the evolution of the surface and interior of Mars (Sec. 2.2.3)	AMADEE-15 included experiments studying the geologic features of a Mars-analog glacier (GPRoG, LICHEN, WoRIS)
	Scientific goal IV: Objectives related to Preparation for Sustained Human Presence (Sec. 2.6)	AMADEE-15 tested reliable and robust exploration systems (PULI, Cliffbot), resource-saving devices (FOG-shower) and medical technology (MaDe), promoted the development of partnerships with the industry and public engagement through media initiatives
DRA 5.0 Overview	Gives a run-through of the proposed mission design, including timetables for procedures and sequences (Sec. 4.2)	ÖWF evaluation of mission planning for analog missions can help optimize the proposed timetables for the surface activities.
	Mission Risk and Risk Mitigation Strategies lack robust assessments of surface operations and EVAs (Sec. 4.3)	ÖWF analog missions can help identifying and mitigating EVA risks, including their likelihood and potential severity.
	Flight Crew selection process not yet determined, higher degree of autonomy due to communication delay requires	ÖWF analog astronauts selection and their performance during simulations with comm. delay can

	new type of personalities (Sec. 4.4)	help determine relevant character traits in astronauts and what expertises are required.
	Mission operations for ground support never featured communication delay (Sec. 4.5)[1]	AMADEE-15 tested field-ground communication with 10 minutes delay each way (20 minutes for signal round-trip)
Surface Systems	EVA systems that allow geologic work to be conducted on the Martian surface need to be developed (Sec. 6.4)	AMADEE-15 ran EVAs under Mars-like conditions which focused on geologic experiments and studied terrain limitations
	Surface mobility systems to assist astronauts during their EVAs need to be developed (Sec. 6.4)	AMADEE-15 tested several systems which assisted the analog astronauts during their EVAs by exploring the environment (Bock, Cliffbot, BCC)
	EVA design and operational guidelines are still subject of ongoing discussions, such as EVA protocols and dealing with time delay (6.4.1)	Evaluation of AMADEE-15 EVAs can deliver answers to various design problems, such as finding the right degree of autonomy for astronauts or developing optimal FCT/MSC procedures
Key Challenges	Mars crew needs to be able to autonomously treat medical issues (Sec. 7.1.3)	AMADEE-15 ran an experiment testing autonomous dental treatment (MaDe)
	EVA productivity needs to be optimized to maximize scientific gains of missions (Sec. 7.3.2)	Evaluation of the planned vs. executed EVA usage of ÖWF missions improves productivity for future missions
	Vertical sampling requires devices that grant subsurface access (Sec. 7.3.3)	Ground-penetrating radar to map subsurface structures in Mars-like environments was tested during AMADEE-15 can help determining optimal drilling spots
	Technologies that minimize planetary contamination for future missions need to be developed (Sec. 7.3.5)	Spacesuit simulator Aouda.X and the MASE experiment explored ways to avoid sample contamination

[1] Although this has been later addressed during field simulation, like during NASA D-RATS field campaigns.

		during EVAs
Outreach and Strategic Public Engagement Opportunities	Long, costly and risky Mars missions require public support at all times to ensure mission sustainability and thus need constant public engagement opportunities (Sec. 8.1)	As a citizen science organization, ÖWF is experienced in reaching out and engaging the public as well as in attracting and working with industrial and institutional partners
	Guiding principle: Participation (Sec. 8.2.2)	ÖWF invited the public to follow its missions through livestreams, public mission days, various contests and a Junior Researcher Program which invited students to visit the mission
	Guiding principle: Connectivity (Sec. 8.2.3)	ÖWF establishes partnerships with different actors of society through outreach work, open access for media, a Professional Observers Program as well as working with industrial partners
	Guiding principle: Inclusion (Sec. 8.2.4)	AMADEE-15 united team members with different professional backgrounds from 19 nations under a common vision, including non-traditional space-faring nations.

3.2 AMADEE-15 performance indicators

In order to evaluate mission performance both within the analog missions of the Austrian Space Forum as well as external Mars analog missions, the number of performance indicators have been assessed post-mission.

Performance Indicator	Value	Comments
Team members	88 persons	
Man-hours	3400 + 1800 = 5200 hrs	MSC + Field = Total hrs
Average number of people in MSC per day	30 persons	excluding visitors
Number of conducted experiments	11	SPTSP could not take place
Number of industrial partners	13	

Media activities

KPI	Value	Comments
website visitors	+117%	In comparison to the two weeks in advance of AMADEE-15
Total number of tweets using #AMADEE15 (hashtracking.com)	942	198 out of 942 came from the OeWF account
People reached via Twitter	1.173.935	Highly catalysed by ESA and NASA Orion Spacecraft account support
People reached via Facebook	66.966	
Facebook likes	+2.26%	In comparison to the two weeks in advance of AMADEE-15
Facebook posts	44	MARS2013: 111
Youtube videos uploaded	10	MARS2013: 3

Time frames

KPI	Value	Comments
Average deviation in Donning start planned vs. executed (min.)	21	Aouda X.
Average deviation in Donning start planned vs. executed (min.)	19	Aouda S.
Average deviation in Doffing end planned vs. executed (min.)	48	Aouda X.
Average deviation in Doffing end planned vs. executed (min.)	63	Aouda S.
Total time in SIM (h:min.)	46:12	
Total EVA time (h:min.)	40:34	
Time spent in EVA-mode in comparison to 24h (%)	15.2	11 days

Longterm development

As the overall aim of all ÖWF analog missions is the same, it is interesting to compare the feedbacks from the previous missions. While some points were only related to the mission specific terrain (i.e. Sandstorms), other points were definitely comparable.

Previous Mission	Previous issues and challenges	Improvements during AMADEE-15
Rio Tinto 2011	As only laptops were available, it was difficult to repair the hardware	Workstations with fixed computers were installed
Rio Tinto 2011	No time delay in communication	Time delay in communication (10 min.)
Rio Tinto 2011	Routines were not defined	SOPs were created and trained
MARS2013	Eddy just showed one suit at the same time	BMEs could observe both suits simultaneously
Rio Tinto-MARS2013	BME questionnaire was not practicable	BME questionnaire was implemented without problems
Rio Tinto-MARS2013	Problems with handovers	Handover reports introduced

Soft factors

Three Teleconferences and a three-day Dress Rehearsal block were held in advance of the AMADEE-15 mission in order to train the MSC and field crew. In total over 100 people participated in the AMADEE-15 mission. In comparison with that number, only few people attended the training sessions.

Training	Participants	Number of participants from previous trainings
Teleconference I	39	-
Teleconference II	No data available	No data available
Teleconference III	26	21
Dress Rehearsal	52	29

Fluctuation in MSC

Indicator	Value	Comment
Average changes in FCT per day	4,5	In comparison to previous day
Team members from MARS2013 who participated in AMADEE-15	16	

Single-point-of-failure:

The following persons resemble essential hubs in terms of information flow and do not have sufficient backup. Hence, the dropout of one of these persons is a potential threat to the whole mission as important information and knowledge would be lost.

Name	Position	Information	Possible mitigation
Gernot Grömer	Project lead, EXLEAD	• Overall mission planning • Interviews	Introduce EXLEAD-Assistant, or consider BASE as EXLEAD-deputy
Olivia Haider	MediaCom	• Finances • Coordination media team • Outreach • Single-point-of-contact	Introduce financial officer (or make GS responsible) for missions
Sebastian Sams	IT	IT structure	Introduce IT team lead
Nina Sejkora	Flight Plan lead	• PI change requests • Traverse planning and collecting coordinates	Information about experiments needs to be spread over several people

Mission goals

The AMADEE-15 mission managed to achieve its goals in the following ways:

Goals	Achievement
Reach more people	• Via print: 4-5 Million people • Via TV: 3,8+ Million people • Via Facebook: 66.966 people • Via Twitter: 1.173.935 people
Raise ***awareness*** and increase ***brand reputation***	• Junior researchers • Professional Observer program • sponsoring requests
Generate enthusiasm towards the idea of sending humans to Mars	• Fan art was created, pubic participation n the "I am a Mars pioneer"-campaign • Requests for internships saw a boost • "Question of the day" introduced many mission-related questions from the public
Informing why analog field research helps preparing for human spaceflight	AMADEE-15 answered questions regarding risks which could occur and helped preparing for possible EVAs
Convey the ***professionalism & expertise*** of the team	• Professional observers program • publications • science workshop

Level of representativeness of the target site compared to the planetary surface:

The blinding of the remote science team was not an aim of AMADEE-15. Therefore one can compare the already known geology of the Kaunertal glacier with the findings on Mars to show the level of representativeness of the target site.

Alpine glaciers (Kaunertal)	Mars
Rock glaciers	✓
Glaciers	✓

4. Key team members

Project lead:

- **Dr. Gernot Groemer**, Austrian Space Forum, Sillufer 3a, 6020 Innsbruck, Austria, (gernot.groemer@oewf.org, Tel. +43 676 61 68 336)

Mission Support Center / Sillufer 3a, 6020 Innsbruck

- **Flight Directors:**
  - Alexander Soucek (Lead FD, alexander.soucek@oewf.org)
  - Clemens Plank (FD, clemens.plank@oewf.org)
  - Laura Zanardini (FD, laura.zanardini@oewf.org)
- **Flightplan Team lead:** Nina Sejkora (nina.sejkora@oewf.org)
- **Remote Science Support Team lead:** Dr. Anna Losiak (anna.losiak@oewf.org)
- **Ground support:** Sophie Gruber (sophie.gruber@oewf.org)
- **IT/SDO:** Berry Bishop (baz.bishop@oewf.org)
- **Media officer:** Monika Fischer (monika.fischer@oewf.org)
- **Safety Officer:** Michael Klicker (Michael.klicker@oewf.org)

Site operator: Kaunertal Gletscherbahnen GmbH

- **Kaunertaler Gletscherbahnen liaison:** Marcus Herovitsch, Marketing (m.herovitsch@tirolgletscher.com)
- **Operations Manager:** Franz Wackernell (f.wackernell@tirolgletscher.com)

5. Mission chronology

All milestones and deadlines were observed as designed in the AMADEE-15 roadmap about one year prior to the mission begin.

When	What	Comments
• 12Jun2015 • 19Jun2015 • 27Jun2015	Virtual training / Standard Operating Procedures (SOP)	Via Mumble, 20:00-22:00 CEST (=18:00-20:00 GMT)
10-12Jul2015	**Dress Rehearsal**	Final training of all MSC and field crew
14Jul2015	Mission Manifest Release III	Mission content was frozen, changes from then on needed to be authorized via FP and FLIGHT.
27Jul-31Jul:	Deployment of field hardware Finalizing MSC set-up	Arrival of MSC teams and field crew in Innsbruck
01-02Aug2015	Media photo/film shootings MSC internal Training	Filming, professional photography for industrial partners, internal interviews. Junior researchers programme
03Aug2015	Public day **„LANDING DAY“** • Professional observers program • Junior researchers program	General public is allowed on-site, Science & Family-programme, general media interaction / press conference & showcasing of research hardware
03-14Aug2015	**Mission phase**	03Aug2015: Public Day, including media activities, junior researchers program and professional observers program 04Aug2015: Professional observers and junior researchers at MSC
14-16Aug2015	Demobilization	Dismantling of hardware, return of h/w
Early/Mid 2016	AMADEE-15 Science Workshop	

6. Test site: Kaunertal Glacier Region

The Kaunertal valley is 28 km in length and runs southeast from the town of Prutz (884 m) to the Kaunertal Glacier. A toll road leads to the glacier site at 2750m altitude.

- **Closest village:** Feichten (Political district: Landeck), 45 min by car to the test site
- **Test site center coordinates:** N 46.86320, E 10.71401 (Base station)
- **Altitude of test site:** 2800 m a.m.s.l. (Base station; the highest points reached during the simulation was at 2887 m).
- Distance to nearest airport/hub: Innsbruck (2 hrs by car)

Weather was dynamic…

As predicted, the test site exhibited highly dynamic and local weather conditions, ranging between anything from warm, sunny conditions to severe cold rain. Hence, a dedicated meteorology team at the Mission Support Center provided a prediction service.

Weather conditions:

- Temperature typically 6 - 16°C
- Precipitation: 90 mm/month on average
- Sunshine: 5,2 hrs/day on average

6.1 Base Station

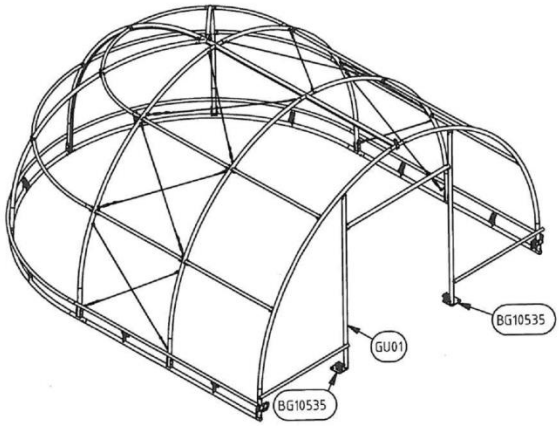
The base station was established on a parking lot next to the glacier restaurant, where basic infrastructure was available. The BASE was the logical representation of a base station habitat on Mars, hence a real-time communication between field units (analog astronauts or rovers) and the Operations Station (OPS) within the BASE was possible with high bandwidths. Mobile, battery-powered routers with directional antennas allowed for the data relay from the field.

Logistics available at the Base Habitat 1

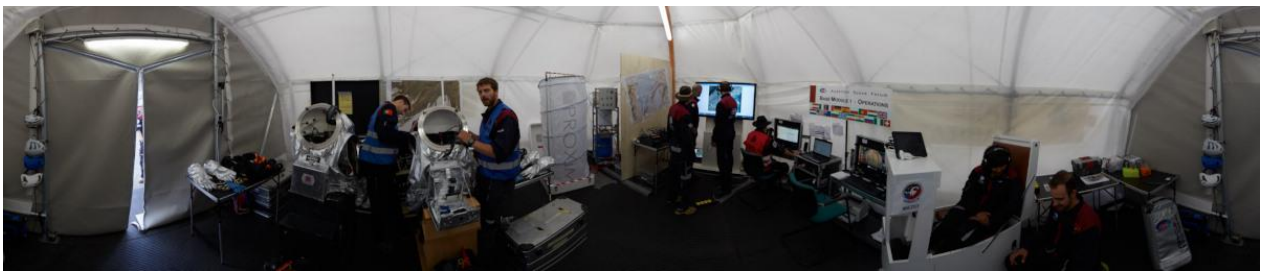
- **Power:** 230V 50Hz AC (plug-standard: Typ F = CEE 7/4) was available at the base station and the buildings directly from the power grid.
- **Connectivity:** We utilized a glass fiber link to the Feichten office of the Kaunertaler Gletscherbahnen. From there we had a shared SDSL connection (16 MBit/s up, 16 MBit/s down), exclusively for mission usage. For private usage, there was an open WiFi available at the base station.

- **Communication:** Mobile telephone networks were available at the site, but hardly any data connection (Edge, sometimes 3G);
- **Mobility:** Besides walking the area, four Quadbikes were provided, mostly for use by the analog astronauts and SAFETY.

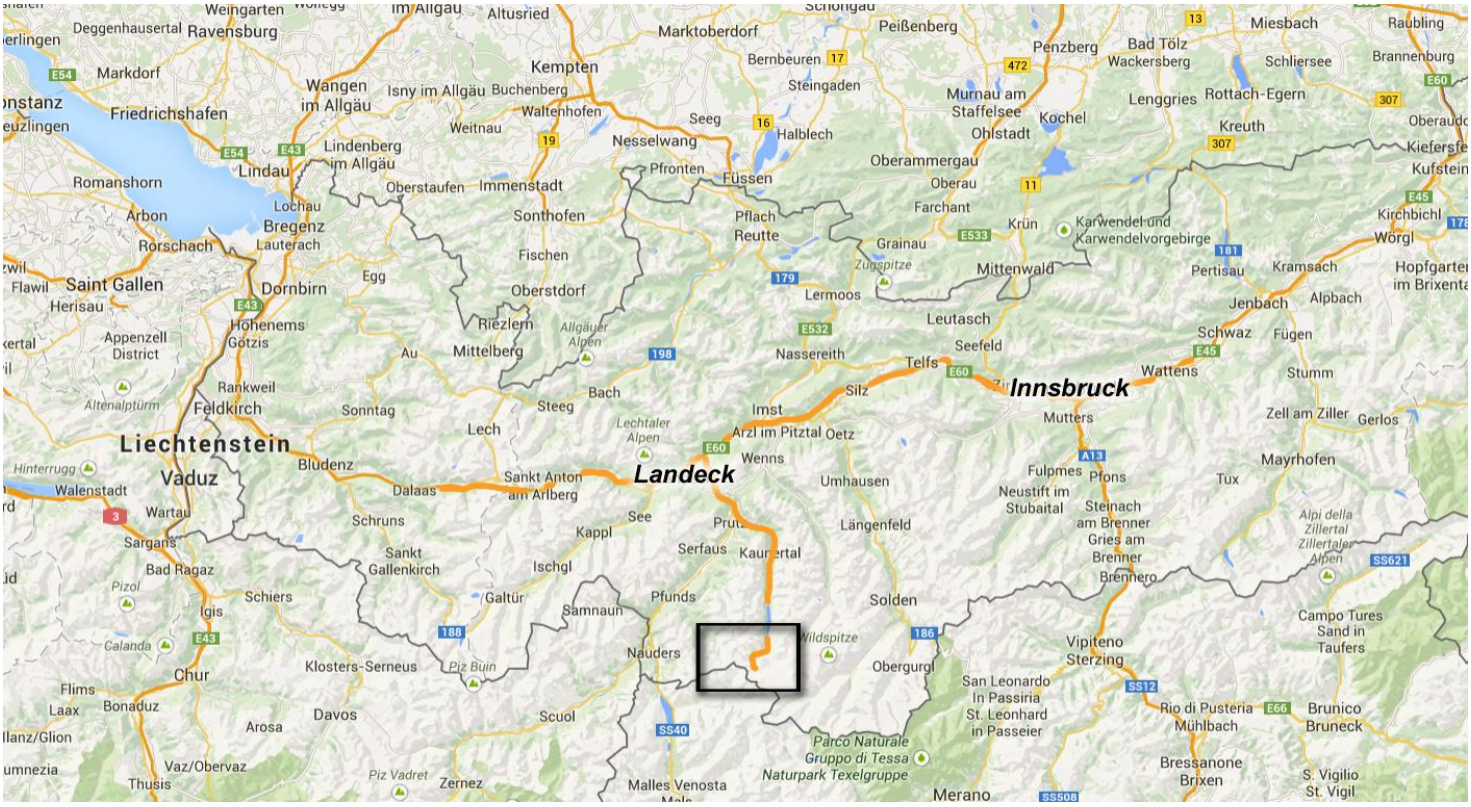
The current baseline was a ruggedized base station tent, measuring 7 x 6 m. Inside the tent, the operations stations, suit storage and donning areas, laboratory corner and space for selected experiments will be provided in addition to a small meeting area.



The base habitat setup looked like this (manufactured by Agrotel, Germany):



6.2 Overview Map



6.3 Geology & Topography

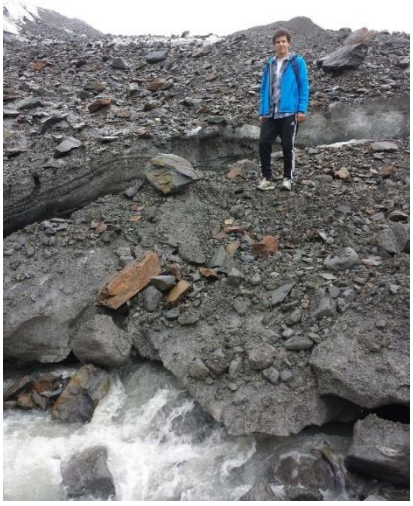
The Alps form part of a Cenozoic orogenic belt of mountain chains. Their northern part is mostly sedimentary rock (predominantly limestone - Northern Calcareous Alps). To the south, metamorphic rock (schist, phyllite, gneiss etc) and igneous rock (basalt, granite, diabase etc.) are prevailing.

Did you know?

In August 2014, a scouting team evaluated the test site: The report, including images and KMZ-files with the waypoints is available upon request.

Rock glaciers are lobate to tongue-shaped bodies of frozen debris 20-100 m thick, with interstitial ice cement, ice lenses, or a core of massive ice. They are a common landform within a permafrost zone of the alpine region. Rock glaciers are typically located at the foot of rock free faces with a high supply of talus. Active rock glaciers move with speed from <0.1m/year up to ~1 m/year, which is slower than normal glaciers. Inactive rock glaciers do not move anymore but have an ice layer below thick debris. Fossil rock glaciers are devoid of ice and indicate permafrost degradation in the area. Although the retreat of glaciers since the Little Ice Age is well documented, the distribution, thickness and ice volume of Alpine permafrost is almost unknown.

Hence, the test site offered both ice glaciers, active and inactive rock glaciers and numerous small springs. Surface boulder sizes ranged from 10m-scale to mm-sized gravel. Examples of the terrain are shown below.



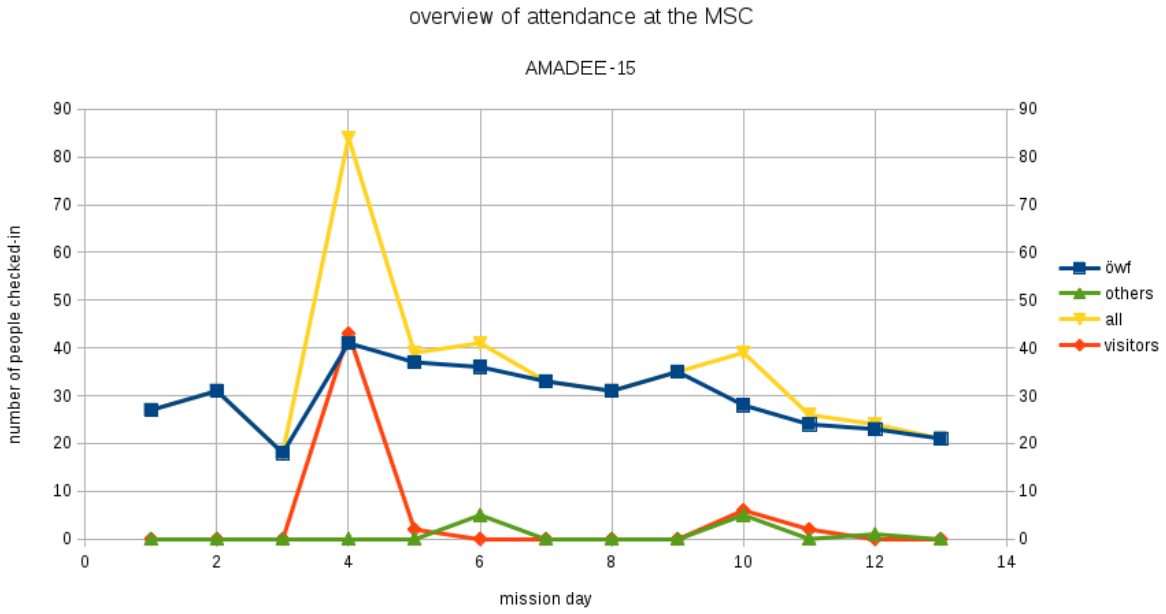

46.864375°/ 10.719012°

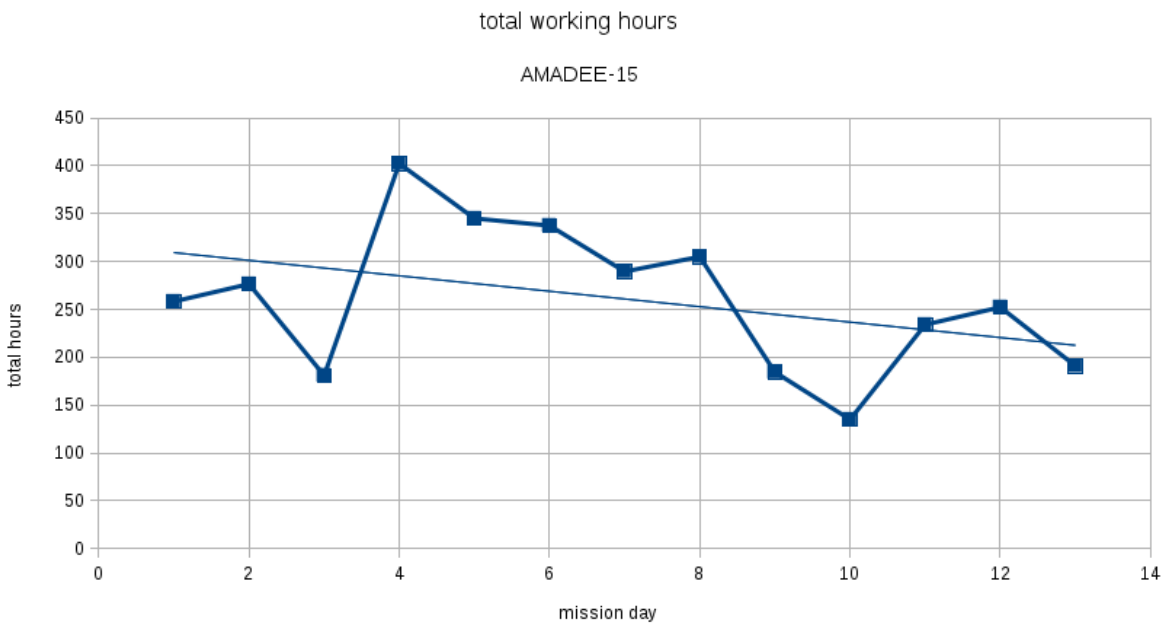
7. Mission Support Center

The MSC for AMADEE-15 was located at the spacesuit laboratory of the Austrian Space Forum in Innsbruck at approximately 200 m² on two floors.

The flight controllers and MSC team members were either veteran analog mission participants from previous missions, or recruited across Europe. Many of the flight controllers had undergone the “Basic MSC training” at the Austrian Space Forum. All of them had to train by means of a series of compulsory readings, followed by team specific virtual meetings, plus, a series of four consecutive integrated Mumble-based training telecons.

Once prepared, they gathered for a training periode of three days during the Dress Rehearsal physically in Innsbruck to train at the respective consoles with the actual MSC hardware.





7.1 MSC infrastructure

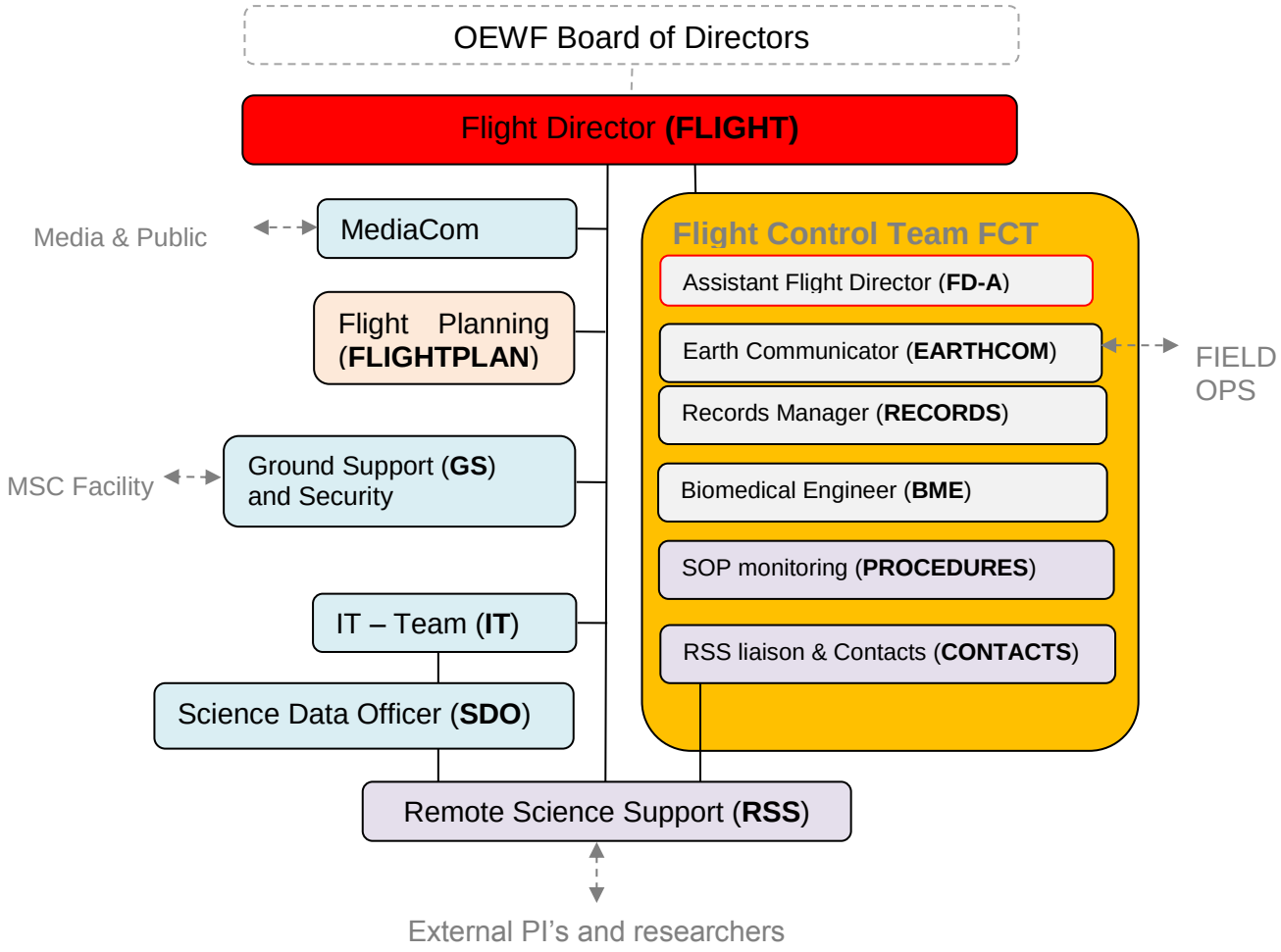
- Entry point / registration desk
- **Flight Control Team Room:** The heart of the Mission Support Center was the Flight Control Team Room (“FCT”), where the Flight Controllers managed the mission.
- **MEDIACOM:** This room housed the traditional and web-based media teams and was the gateway to the public, including image or text releases, blogs, video editing and managing media inquiries.
- **RSS:** This room was the center of the scientific operations, where the science data were received, analyzed and interpreted in near real-time.
- **FLIGHTPLAN:** Based upon input from the RSS, operational needs, safety considerations and external requests the flight planning team compiled the directives

for the field crew to be authorized by the Flight Director.

- **Ground Support & Security + IT/SDO:** The “gateway to the MSC”: This room hosted the team managing the facility, ensuring the access control and handling logistics, including transportation. - The Science Data Officer was responsible for the data pipeline between the field and the MSC, including the management of the data archive.

7.2 MSC organization and positions

The figure below represents the MSC configuration; designations are given in full and their respective abbreviation (e.g. Flight Director as "**FLIGHT**", which was also his/her call-sign). The Flight Director was on duty 24 hours every day throughout the mission.



7.3 Flight Director ("FLIGHT")

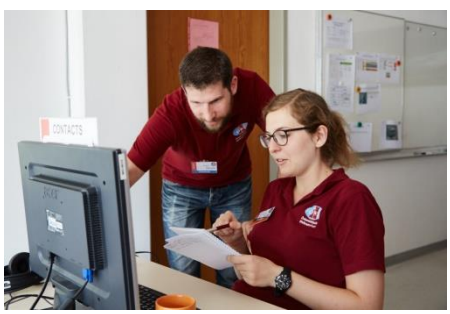
The Flight Director (FLIGHT) was responsible for the overall AMADEE-15 mission operation. (selected responsibilities were shared with EXLEAD). During mission/simulation preparation, the FLIGHT was responsible for ensuring (at a management-level) that the resources of the MSC and the supporting operational ground segment were adequate to conduct mission operations.

FCT leadership for the AMADEE-15 mission		
		
Laura Zanardini	*Alexander Soucek* *(Lead Flight Director)*	*Clemens Plank*

7.4 Flight Director Assistant (FD-A)

The FD-A acted as the "first officer" to FLIGHT. In principle, FLIGHT can delegate any task to the FD-A. However, the final responsibility and decision making authority stays with FLIGHT. Interactions are the same as the FLIGHT. The Flight Director Assistant is – together with MediaCom - responsible for updating the MediaCom news feed of the OEWF website as part of the outreach activities of the MSC.

7.5 Contacts



The science console and contact manager was the "gateway" to external teams. This role acted as the single-point-of-contact for remote science support

teams and PIs not present at the MSC. Usually, during ongoing external experiments, the CONTACTS monitored the connectivity and ensured a high level of situational awareness of the external parties. The decision on allowing external parties who were not experiment teams to access the telemetry stream beyond the public stream was taken by the Flight Director and the MediaCom.

7.6 Records

RECORDS ensured a continuous log file of what is happening in the field as well as in the Mission Support Center. This position was vital for the recording of the "as-was flight plan", which in turn is an element of the science data archive (maintained by SDO). The position also provided the input for the update for the external experiments to update them on recent events relevant to their activities. Biomedical recordings were NOT part of the RECORDS logfiles, but were maintained by the BME due to their personal and sensitive nature.

7.7 Science Data Officer / Information Technologies (SDO/IT)

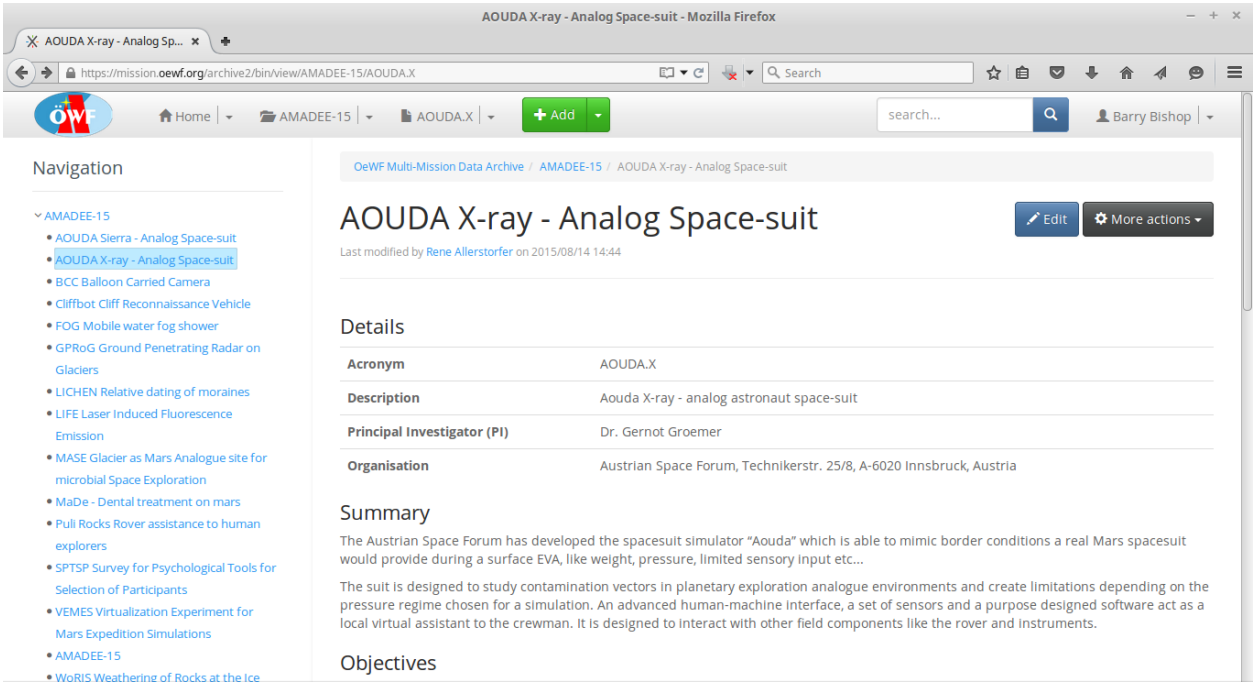
The Science Data Officer (SDO) managed the acquisition and archiving of experiment-specific and environmental data during field missions of the Austrian Space Forum. SDO/IT ensured that on a long term perspective, field experiment data are accessible after the missions, a central building block for the body of knowledge maintained as mission heritage.

This team consisted of two SDOs and four IT support personnel. The SDO on duty was responsible for:

- all data transfers from MSC to FIELD, e.g. uploading of flight plans, experiment procedures, reports and other ad hoc files
- all data transfers from FIELD to MSC, e.g. experiment results (video, text files, spreadsheets, images, etc), reports, publicity media
- collection and storage of all data generated during thié mission, including: Earthcom chat, reports, station logs, publicity media and (of course) experiment data
- publication of experiment data via the multi-mission data archive

The SDO also attended to various ad hoc IT-related requests, usually to do with transferring files within MSC and to/from experiment PIs, as well as ad hoc processing of data, e.g. extracting GPS locations from suit-telemetry so that RSS could verify location tags on various media.

Experiment data was published to the multi-mission data archive:



Aouda.X page from the multi-mission data archive

For every day that an experiment was conducted, links were added to each experiment's page in the archive. Each link provides access to all data files collected for that experiment on that day. Access restrictions are in place for all experiments, except Cliffbot and WoRIS, so that only authorised OeWF members are able to download data files.

All data collected from the mission is stored on the mission server here:

```
mission.oewf.org:/srv/mission-archive/science/amadee15
```

in the following sub-directories:

DataArchive	All science data - links from the multi-mission data archive point to sub-directories from here
OewfInternalData	Mission related data, including logs, reports, etc
OewfMedia	Publicity media, comprising mostly video and images, but also audio and text files

The IT support staff were responsible for maintaining the mission infrastructure and resolving IT-related problems. The bulk of the MSC IT hardware is installed in a dedicated data-centre, mostly within a single 19 inch rack.

7.8 Procedures (SOP Monitoring)

PROCEDURES maintains the compilation of the standard operating procedures as well as experiment procedures and ensures that the field crew as well as the MSC personal had access to the most recent edition at any time. During the simulation, PROCEDURES observed if the sequence of events was in accord to any given procedures.

7.9 Biomedical Engineer and Medical Officer (BME/MEDO)

The BME had the overall responsibility at the MSC for crew health related issues, whereas the MEDO was doing the same for the field crew. One of them was commissioned as the head of the BME/MEDO Team and had the overall organizational decisional responsibility w.r.t. medical issues. The BME/MEDO provided support for all issues relating to crew health and medical data management, including pre-flight preparation, real-time monitoring, real-time conferences and post-flight rehabilitation. The BME also provided support regarding medical or life science payloads, hazardous operations and medical policy making within the complete PolAres program and was available to help with health-related issues among the MSC staff.

7.10 Remote Science Support (RSS)

The Remote Science Support Team had the overall responsibility at MSC for the operation and readiness of all experiments conducted. That included the scientific experiment activity planning and balancing time, power and data rate requests from multiple experiments in cooperation with FLIGHTPLAN. The general activity recording was done by RECORDS, the science data archiving was maintained by SDO.

7.11 Earth Communicator (EARTHCOM)

The Earth Communicator or EARTHCOM is responsible for coordinating the use and distribution (enabling/disabling) of Space-to-Ground communications and voice link with the Crew for operations. The position gives the space-to-ground communications a necessary comradely touch amongst all the pressures of mission schedule and payload operations duty. EARTHCOMs also explain to field crew or MSC staff the point of view of the respective other group.

7.12 Media Communication (MediaCom)

The Media Communication Team (MediaCom) is responsible for coordination of media activities and managing of the media equipment. This position is also responsible for the implementation of user video product requirements and supporting the distribution of video products for the purposes of public relations. MediaCom is responsible for event planning, especially involving interaction with VIPs. MediaCom is also responsible for website and The Media Communication Team (MediaCom) was responsible for coordinating media activities and managing the media equipment. This position was also responsible for the implementation of user video product requirements and supporting the distribution of video products for the purposes of public relations. MediaCom was responsible for event planning,

especially involving interaction with VIPs. Furthermore, MediaCom was responsible for website and Social Media content generation.

7.13 Flightplan

The Flightplan Team was the link between the Remote Science Support Team, external experiment teams and the Media Communications Team on one side and the Flight Control Team on the other side. The team was responsible for the creation of the (strategic) Mission Plans, (tactical) Activity Plans as well as the Traverse Plans for the field crew.
These plans were created during pre-mission and in-mission operations respectively.

Tasks included:

Pre-Mission:

- Implement mission architecture from mission management
- Develop a mission plan based on the available data
- Understand and implement procedures, experiments and experimental locations from the PIs via the science team
- Implement requirements from the media team

In-Mission:

- Implement information from records and logfiles and activity requests
- Check activity requests with availability of infrastructure and the resource report from the field
- Develop the Activity and Traverse Plan according to the used planning strategy
- Obtain authorisation for the plans by the Flight Director and arrange submission to the Field

Post-Mission: Activity analysis

- Structured compilation
- Finalize a report
- Publication of results

7.13.1 Mission Plan

The Mission Plan was a preliminary pre-mission schedule including all field activities, in-sim as well as off-sim. It allocated certain activities to certain days of the mission without going into too much detail or allocating exact times. The Mission Plan served as a basic structure for the later Activity Planning and evolved during the planning process

- **Mission Plan 1:** Basic overview which experiment is to be conducted when (only minor attention to resources)
- **Mission Plan 2:** Tasks (experiments, housekeeping, telemetry, etc.) assigned to roles (Analog-Astronaut, BASE, DOC, etc.), detailed attention paid to resources
- **Mission Plan 3:** Names assigned to roles, implementation from feedback to MP2 and from dress rehearsal

7.13.2 Activity Scheduling

Activity Scheduling was primarily an organisational task, being the core competence of the flight planning team. People responsible for Activity Scheduling connected all information, requests, feedbacks and near real-time (NRT) analyses in order to create a working schedule, the Field Activity Plan (FAP), according to the Field Activity Plan Procedures. Additional information such as extra activities, traverse plans, special procedures, etc were then included together with the FAP into the Daily Activity Package DAP according to the Daily Activity Package Procedures. The DAP was presented by one person in charge of Activity Scheduling in daily internal team meetings to cross-check with other task areas (Activity Analysis, Traverse Planning) and obtained the authorisation of the flight plan team leadership.

Tasks:

- obtaining all necessary data (see chapter “Interaction with Other Teams”)
- obtaining latest activity analysis
- obtaining all internal and external activity requests (for deadlines see chapter “Interaction with other Teams”)
- generating the FAP according to Field Activity Plan Procedures

- providing the person(s) in charge of Traverse Planning with FAP
- integrating general information and traverse plan into the DAP according
- adapting the FAP to traverse durations if necessary
- presenting and cross-checking the DAP in daily team meeting

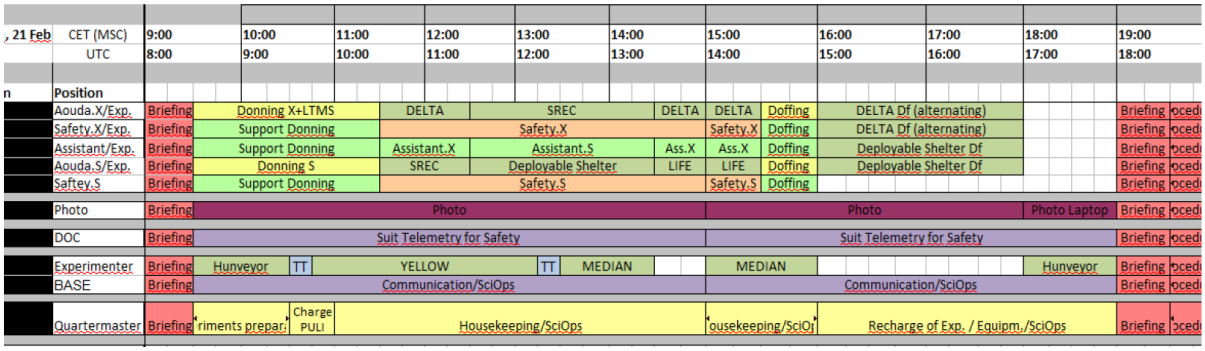


Figure 1: Example of a Field Activity Plan

7.13.3 Traverse Planning

Traverse Planning consisted of organisational as well as scientific work, since the responsibilities of this position lay within the planning and analysis of activity locations and traverses. In order to perform these tasks, information had to be obtained from the log files provided by RECORDS and SCIOPS. The input for the Traverse Planning came from the FAP and the analysis of previous traverses regarding duration, obstacles or discovered points of interest (POIs). The activity locations and traverses were determined, cross-checked and integrated into the DAP in collaboration with RSS.

Tasks:

- obtaining the log file data of RECORDS, SCIOPS and SCIENCE
- analysing previous EVA traverses and experiment locations
- obtaining all necessary information on experiment location, transportation and terrain specifics
- obtaining planning input and known limitations from FAP
- obtaining recently updated maps from RSS
- allocating of best possible activity locations in interaction with RSS
- finding and calculating best suitable traverse
- cross-checking of calculated traverse times with scheduled time slots
- providing emergency traverse alternatives

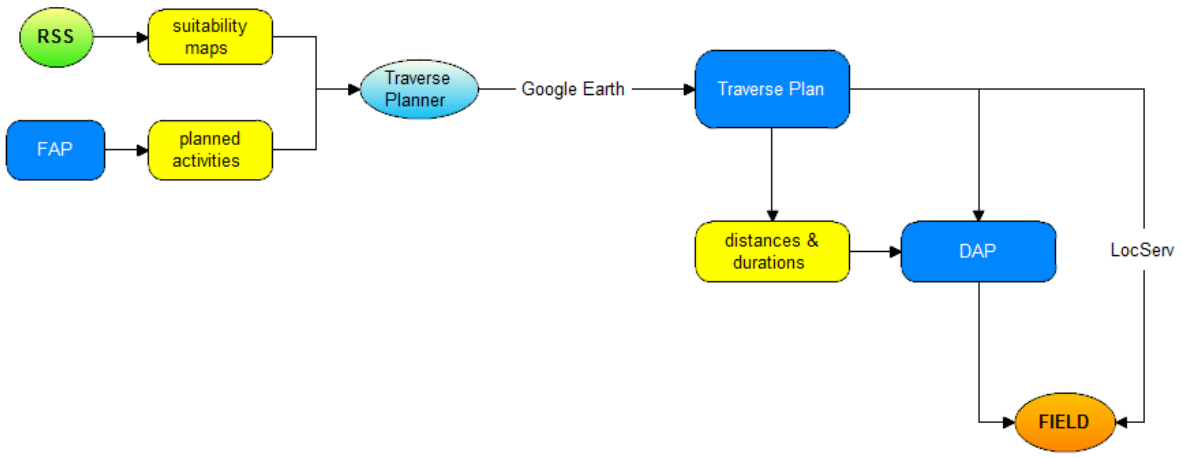


Figure 2: Schematic diagram of the workflows around the Traverse Plan

7.13.4 Interaction with Other Teams

In order to be able to do its work the Flightplan Team needs to get important information and feedback by other teams reliably and in time. A smooth information flow avoids delays, unnecessary work for the FP Team and others and confusion. The in-mission deadlines were listed for one, two and three days in advance planning.

7.14 Ground Support (GS) – Logistics & Security

The Ground Support (GS) was responsible for the management of all the MSC and on site ground facilities necessary to support mission operations. The GS provided support to both the real time and preparation activities for the MSC and on site operations, infrastructure services and partner communications support. The GS provided MSC facility management and supported the MediaCom in public outreach activities. The GS was responsible for meeting arriving team members and briefing them about the way the MSC works.

STANDARD OPERATING PROCEDURES

All major workflows of the mission were defined via the OeWF Standard Operating Procedures (SOP). These were substantiated by experiment procedures, supported by background workflow documents of the respective science teams.

Several teams had extensions to the SOP's, such as the Biomedical Engineering Team or the Flight Directors, which included access to privileged information (such as confidential medical records, or security-related matters).

8. Field Crew positions

The field crew (including the Analog Astronauts) was responsible for conducting all analog science mission activities during the simulation („*in-sim*“), including all extravehicular activities (EVA) and scientific experiments. They observed safety procedures, maintained provisions inventories, kept track of and were trained to repair equipment.

8.1 Expedition Lead (EXLEAD)

The Expedition Leader (EXLEAD) had overall responsibility at the field test site for the operation and readiness of all personnel working on-site and all equipment used on-site. That included overall activity planning and scheduling tasks. This position was in direct contact with the Flight Director outside simulation, e.g. during contingency situations or for managing policy or administrative issues. The EXLEAD has final authority on all decisions to be taken at in the field, especially in the case of contingency situations. The EXLEAD was responsible for maintaining contact with local authorities and media on-site.

8.2 Operations Station (OPS)

OPS (red jacket) coordinated – similar to the FD-A at the MSC - the operational activities as directed by the EXLEAD and EARTHCOM. This position was the counterpart of the MSC EARTHCOM, usually communicating in time-delay mode via text protocol. Off-Sim and during emergencies, OPS could switch to real-time audio communication. This position represented the “extended eyes and ears” of the MSC, providing MSC with a continuous update on field activities. OPS communicated with the field crew at the test site (including Analog Astronauts) and ensured a continuous flow of information from the EVA and experiments to “Earth”.

8.3 SCIOPS ("Field Science Officer")

As an "extended arm", the RSS had a RSS liaison function available in the field. This position, called "SCIOPS", was managing the scientific hardware in the field and procured the samples obtained. SCIOPS had to be aware of all scientific activities carried out at any given moment, including what had actually been accomplished, where the samples were, what instruments were in which status etc. SCIOPS assisted the SDO in maintaining the science data flow to the MSC.

8.4 Medical Officer (MEDO) & SAFETY

The on-site Medical Officer (MEDO) was an Emergency Medical Technician (or higher qualified, with an active first aid license, preferably with an advanced Emergency Medical Technician license, or licensed physician) at the field site for team - and crew health related issues. From the medical perspective, SAFETY supported the Medical Officer, including support for all issues related to crew health and medical data management, including real-time monitoring and real-time conferences. The SAFETY also provided support regarding medical - or life science payloads, hazardous operations and medical policy making during the field campaign.

The Medical Officer was the expedition medical doctor. He / She usually was not tasked with the role as SAFETY (to be available to all expedition team members anytime) if both suits were operating at different locations. SAFETY was "shadowing" the respective suit, hence there could be two SAFETY's, one for each Analog Astronaut in case they work separately.

8.5 Quartermaster

The expedition's quartermaster was the person responsible for managing supplies and field resources, keeping track of consumables and maintaining equipment.

8.6 Analog astronauts

These carefully selected and trained individuals executed most of the science field activities and were also the public face of the mission, serving as STEM-ambassadors in the media and education activities.

Analog Astronauts are trained to conduct spaceflight-simulations in Mars-like regions on Earth, testing and evaluating equipment procedures, human factors and workflows relevant to the human exploration. They conduct experiments in field campaigns in an international and interdisciplinary environment, typically lasting a few days up to one month. Analog Astronauts contribute to the development of spacesuit simulators and other relevant instrumentation.

9. AMADEE-15 Team members

AMADEE-15 involved more than 100 team members from 19 countries, they were either experienced OeWF team members from previous missions, newly certified analog astronauts and individuals recruited, carefully selected and trained from across Europe.

Each experiment team had on average three team members, leading to 33 additional individuals. Hence, the mission combined more than 114 people from nineteen nations, plus the OeWF members for the public day (approx. additional 10 people, such as security and education event staff) as well as the standing OeWF teams during missions, such as accounting, legal services, background media work and others.

#	FLIGHT DIRECTORS
1	Alex Soucek
2	Laura Zanardini
3	Clemens Plank
#	FCT & GS
4	Reinhard Tlustos
5	Willibald Stumptner
6	Bianca Gubo
7	Simone Paternostro
8	Stefan Übermasser
9	Georg Fiedler
10	Tilo Kauerhoff
11	Wolfgang Jais
12	Erik Unger
13	Sophie Gruber

14	Judith Kuemmel
15	Hannes Mayer
16	Christiaan van Ommeren
17	Rene Allerstorfer
18	Baz "Barry" Bishop
19	Joao Lousada
20	Kartik Kumar
21	Carmen Kohler
22	Vanessa Wachter
#	BME
23	Christian Lüthen
24	Rochelle Velho
25	Florian Pinterits
26	Adrianos Golemis
27	Vangelis Kaimakamis

#	**Media**
28	Olivia Haider
29	Monika Fischer
30	Petra Groll
31	Daniela Scheer
32	Susanne Pieterse
33	Alexandra Hoffmann
34	Maximilian Betmann
35	Alexandra Kiener/MedEl
36	Michal Czapski

#	**Interns & Support**
37	Irsana Paezullaeva
38	Claudia Kobald
39	Daniel Schrott
40	Sarah Wuertl
41	Philip Winter
42	Rene Allerstorfer
43	Pradyumna Vyshnav
#	**Field Crew**
44	Gernot Grömer
45	Carmen Köhler
46	Inigo Munoz
47	Stefan Dobrovolny
48	Kartik Kumar
49	Christoph Gautsch
50	Luca Foresta
51	Joao Lousada
52	Sebastian Sams
53	Michael Müller
54	Rochelle Velho

55	Christian Luithen
56	Nadine Sommerfeld
57	Julia Neuner
58	Paul Santek
59	Claudia Stix
#	**RSS**
60	Anna Losiak
61	Agata Krzesinska
62	Oscar Kamps
63	Izabela Golebiowska
64	Luca Foresta
65	Jane MacArthur
66	Linda Moser
#	**Flightplan**
67	Ali Alizadeh
68	Silvio de Carvalho
69	Carmen Felix
70	Leila Qasemzadeh
71	Thomas Hauser
72	Michael Müller
73	Isabella Pfeil
74	Andreas Rieser
75	Nina Sejkora
76	Marcello Valdatta
77	Peter Hartmann
78	Claudia Rieger
79	Andrea Steiner
80	Michael Tiefgraber
81	Helge Tuschy

10. AMADEE-15 Experiments

Additional in-depth context information had been detailed in the Standardized Experiment Information Forms (SEIF's), managed by the flight planning team.

A15-01	**10.1 Cliffbot** **(CLIFF RECONNAISSANCE VEHICLE)**
Description	Vertical exploration robot; lowered down by a human to explore steep terrain 
PI	Dr. Alain Souchier, Planete Mars Association, French chapter of the Mars society 205 Rue de Verdun, 27200 VERNON, France alain.souchier@gmail.com , Tel. (+33)232213582
Organization	Planete Mars Association, French Chapter of the Mars Society
Summary	The cliffbot was a vehicle designed to operate on slopes or in holes under manual operations and guidance of an operator situated uphill. Through a video camera it gave information on terrains which are not securely accessible by an operator in a spacesuit.
Objectives	• Exploration of holes, crevasses and potential waterfalls on the glacier.
Resources requested	Per experiment: 30 min (without walking time)
Logistics footprints	Power: 100 W during 10 hours (Vehicle) Laptop battery: 200 W Storage of instrument: 70 x 50 x 30 cm suit case

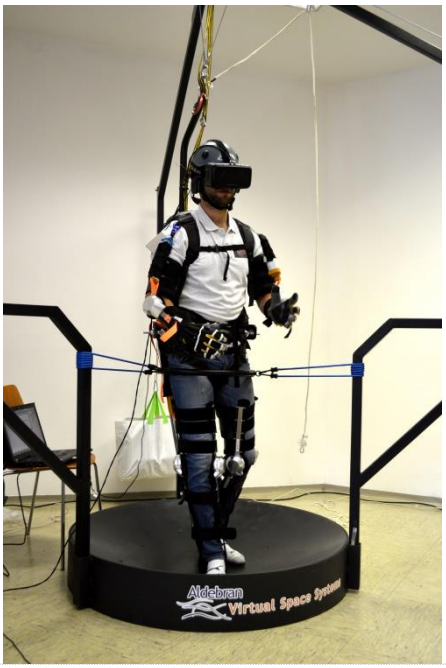
A15-02	10.2 BCC / Balloon Carried Camera
Description	Utilization of a balloon carried camera to document analog EVAs 
PI	Dr. Alain Souchier Planete Mars Association, French chapter of the Mars society 205 Rue de Verdun, 27200 VERNON, France alain.souchier@gmail.com , Tel. (+33)232213582
Organization	Planete Mars Association, French Chapter of the Mars Society
Summary	A balloon carried camera was a way of documenting analog EVAs. The balloon was tethered to the analog astronaut thus following the astronaut traverse. A balloon is a viable solution for Mars even taking into account the low atmospheric density.
Objectives	• Map astronaut EVA tracks. • Give context image of sampling sites. • Get information on non accessible areas.
Resources requested	Preparation time: 45 min (to inflate the balloon). Min. EVA requested: 1 EVA.
Logistics footprints	Power: camera battery Helium bottle is requested. Storage of instrument: 40 x 40 x 30 cm cardboard box.

A15-03	**10.3 L.I.F.E.** **LASER-INDUCED FLUORESCENCE EMISSION APPLICATION OF A NOVEL NON-INVASIVE IN-SITU TOOL**
Description	Detection and quantification of porphyrin derivates in extreme environments. 
PI	Klemens Weisleitner, Institute of Ecology, Austrian Polar Research Institute, Univ. of Innsbruck Technikerstraße 25, 6020 Innsbruck, Austria Klemens.Weisleitner@student.uibk.ac.at Tel.: +43(0)6503007892
Organization	University of Innsbruck, Institute of Ecology
Summary	A non-destructive, in-situ laser-induced fluorescence emission technique (L.I.F.E.) have developed based on the fact that glacier surface communities are highly autotrophic. These organisms can be traced by the detection of intracellular porphyrin derivates. Porphyrins are widely acknowledged as a suitable biomarker for the detection of life.
Objectives	• Detection of fluorescence biosignatures in supraglacial habitats (e.g. cryoconite holes, bare rock surfaces, ice surfaces, snow covers, soils). • Non-invasive and in-situ quantification of chlorophylla and phycobiliproteins of selected specimen by the L.I.F.E. instrument. • Sampling of the measured specimen for validation of the collected field data, using a standard laboratory approach for chlorophylla extraction and quantification. • Raman spectroscopy of the collected specimen for further comparison of our results. • Assessment of local environmental parameters (light, temperature) that potentially influence the L.I.F.E. measurements. • Sampling for further experiments under a simulated Martian environment at the German Aerospace Center in Cologne and Berlin.

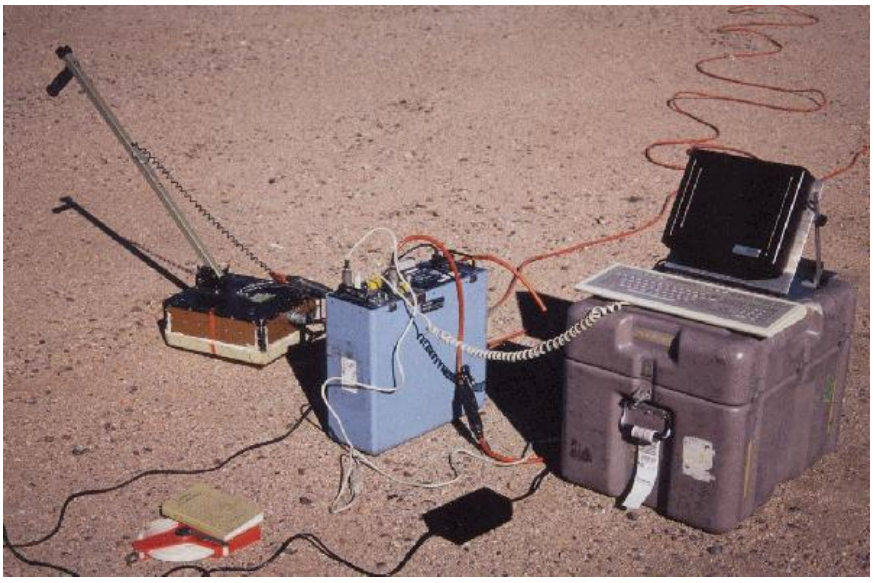
A15-04	**10.4 Glacier-MASE** **(GLACIER AS MARS ANALOG SITE FOR MICROBIAL SPACE EXPLORATION)**
Description	Change of our understanding of Martian habitability and our ability to detect organisms that might have made use of early Mars habitable environments. 
PI	Christine Moissl-Eichinger, Medical University Graz, Department of Internal Medicine Postal address: Auenbruggerplatz 15, 8036 Graz, Austria Email: christine.moissl-eichinger@medunigraz.at ; Tel: +43 316 385 72808
Organization	Medical University Graz, Department of Internal Medicine
Summary	Assessing the habitability of Mars and detecting life, if it was ever there, depends on the knowledge of life itself and its tolerance towards (extreme) environmental conditions. In particular, many combinations of stress, such as high radiation conditions combined with high salt and low temperature, relevant for early Mars, have not been investigated.
Objectives	• Isolate and characterise anaerobic microorganisms from selected sites that closely match environmental conditions that might have been habitable on early Mars. • Study their responses to realistic combined environmental stresses that might have been experienced in habitable environments on Mars. • Investigate their potential for fossilisation on Mars and their detectability by carrying out a systematic study of the detectability of artificially fossilised organisms exposed to known stresses. • Optimize technologies for life detection (ATP, immune-assay-based methods) and application in field campaigns.
Resources requested	Experiment duration time: 3x3h Training of the analog astronauts: 2 h

A15-06	10.5 FOG MOBILE WATER FOG SHOWER SUITCASE WITH A LOW WATER CONSUMPTION
Description	Test of the effectiveness of washing a human body in the experimental low water consumption mobile shower cabin under the conditions of limited water resources. 
PI	Krzysztof Jędrzejak / Wojciech Kowalik PROXiM ul. Piękna 68, IIp, 00-672 Warszawa, Poland; Email: k.jedrzejak@proxim-solutions.com, Tel. +48 662 291 719
Organization	PROXiM, Poland
Summary	The aim of the project is to confirm that it is fully possible to effectively wash the human body using water mist and so, to solve the problems connected with the limited water resources.
Objectives	• ...to measure and compare the time required for washing a man, using both an old fashioned solution, and the water mist shower. • ... to prove a close relation between efficiency of work and both the method and quality of meeting the human basic physiological needs.
Resources requested	10 min/day
Logistics footprints	Power: 20 kW/day Storage of tools: 1200x800x1200 cm + 220 L water tank +220 L waste water tank + water pump + heating boiler

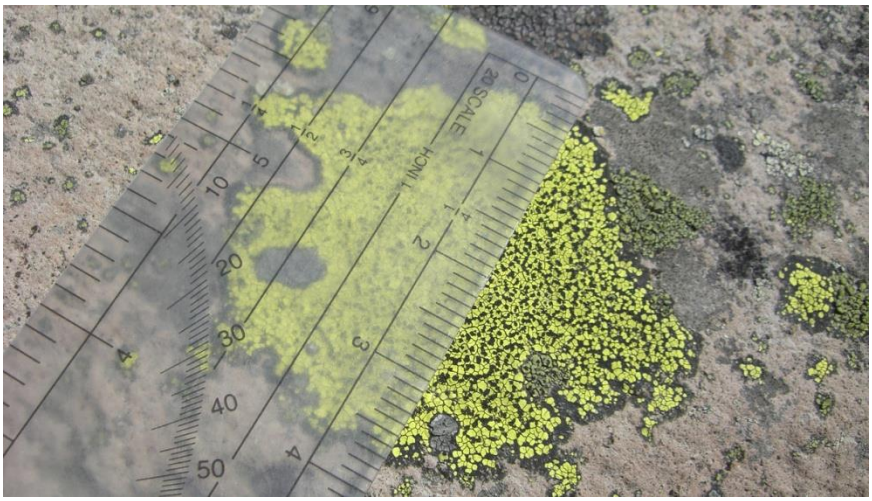
A15-07	10.6 VEMES VIRTUALIZATION EXPERIMENT FOR MARS EXPEDITION SIMULATIONS

Description	The **E**uropean Ma**R**s **A**nalogue **S**tation for Advanced Technologies Integration (**ERAS**) is a program spearheaded by the Italian Mars Society (IMS) which main goal is to provide an effective test bed for field operation studies in preparation for manned missions to Mars. 
PI	Franco Carbognani, Italian Mars Society franco.carbognani@marssociety.it / Tel.: +39 050 936038 or +39 3669826503
Organization	Mars Society/Italy
Summary	The utilization of the V-ERAS infrastructure for substituting elements of future Mars analog missions with virtual components for both training and exploration technology testing activities.
Objectives	• Assessing the capabilities of a virtual reality system to support EVA's both on-site and the MSC. • Conduct of a simplified DELTA parcours during AMADEE-15 • Testing the usability of the VEMES infrastructure for RSS
Resources requested	EVA: 2x2h each Training (MSC + field crew): half a day Communication to the field
Logistics footprints	Power: 1500 W Storage place: 120 cm x 3. Weight: 80 kg

A15-09	10.7 PULI ROCKS
Description	Rover assistance to human explorers to find relevant rock samples by scouting/mapping the exploration area 
PI	Tibor Pacher, Puli Space Technologies, CEO tibor.pacher@pulispace.com Cell phone: +36 20 32 82 464 / +49 171 62 69 530
Organization	Puli Space Technologies, Hungary
Summary	Team Puli aims at a similar setup as it had in Morocco, during MARS2013, but will use own field communication channels.
Objectives	To be detailed
Resources requested	tbd
Logistics footprints	Suit tester time requested: as it emerges, according to the description. In any case, two simulated cases with „finds“ should be planned. Estimated time for this per case: max. 1 hour. No training necessary for Suit Testers. • Power requirements: in case to charge the rover, overnight. • Communication: we plan to use own communication channels on the field (Rover-Mars habitat) and / or direct GPRS communication from the Puli Mission Control Centre. • Storage/shipment sizes & weights: rover size approx. 100 cm x 50 cm x 40 cm, mass ~ 11 kg

A15-10 OeWF Internal	**10.8 GPRoG** **Ground Penetrating Radar on Glaciers**
Description	We plan to use Ground Penetrating Radar for mapping and visualizing bedrock topography, estimating ice thickness and volume of the Kaunertal glacier. 
PI	Alexandra Zavitsanou, Department of Geophysics and Seismology, University of Athens *Address*: 31, Athanasiou Diakou, Pallini, Athens *E-Mail*: azavits0@gmail.com
Organization	University of Athens & ÖWF RSS Team
Summary	In this survey, ground penetrating radar data will be collected using a GSSI SIR System 2000 will be used, equipped with low frequency antenna of 15 MHz and 35 MHz with constant spacing between sender and receiver in point mode (constant-offset profiling). Data are gained by fixed-offset reflection profiling.
Objectives	In this study we plan to: • Map bedrock topography, • Estimate ice thickness • Estimate glacier volume.
Resources requested	• Duration of the experiment in the field: ?? hour/EVA • Suit tester time requested (EVA time): min. 3 EVA, 3*3 hours • Power: Battery charge, full charge duration: 3-4 hours • Communication: Raw data after EVA or during evenings. • Storage/shipment size: ?
Logistics footprints	• GPR device

A15-11	10.9 MaDe **Mars Dental Rescue**
Description	Emulating a dental treatment during a human Mars mission
PI	Sandra Haeuplik-Meusburger, space-craft Architektur, 1010 Wien, Tel. +43 (0)699-19413757
Organization	Space-Craft Inc, Austria
Summary	Detecting, diagnosing and treating a dental problem during a Human mission, including advanced manufacturing methods for dental treatment.
Objectives	Demonstrate the workflow of a dental treatment with remote support and advanced manufacturing techniques
Resources requested	Power and operating space
Logistics footprints	Clean workspace

A15-12 OeWF internal	10.10 LICHEN **Relative dating of moraines**
Description	Date moraines via studying lichens, boulder frequency and boulder height, depending on availability in study region. 
PI	Maciej Dąbski, University of Warsaw, Poland
Organization	OeWF / RSS
Summary	Measurements can be taken by analogue astronauts to test the suits and field training of basic skills. Measurements can also be taken by unsuited personnel if constrained by logistics. 10 lichen stations with areas of 200 sq metres should be chosen, and the diameters of at least 10 of the

	largest lichens at each station should be measured to ±1 mm accuracy. The stations should be selected where possible away from prolonged snowpatch accumulation and fluvial activity on proximal moraine slopes. Relative weathering techniques should be performed at the 10 lichen stations to substantiate results via a different method.
Objectives	Dating Moraines
Resources requested	• Duration of experiment in the field: 30 minutes at each new location • Suit test time requested: As available • Communication: - field personnel report measurements back to base to be recorded • Equipment: ruler, Schmidt hammer, profile gauge, measurement scales for relative weathering techniques tbc by RSS team • Power requirements, storage, special needs? - n/a
Logistics footprints	Not yet available

A15-13 **OeWF internal**	**10.11 WoRIS** Weathering of Rocks at the Ice Surface
Description 	Weathering within ice has been recently proposed as one of the most important geologic processes active currently on the surface of Mars. Studies of the terrestrial analog sites such as alpine glaciers, can teach us about this process without necessity to go to the surface of Red Planet. During the AMADEE mission we will perform a field experiment to determine influence of albedo and emissivity of the objects laying on the surface of glacier on the rate of its melting. Analog astronauts and system of automated cameras will be measuring depth and width of pits (called cryoconite holes) developed within ice surface on the contact with rocks. We will compare those results with values predicted by numerical modelling. Additionally, we will study the rate of weathering of basaltic dust placed on the surface of the glacier. This study will help to better understand factors influencing the rate of melting of terrestrial glaciers, and the process of weathering on the current Mars.
PI	Anna Losiak Institute of Geological Sciences, Polish Academy of Sciences Podwale 75, 50-449 Wrocław, Poland anna.losiak@twarda.pan.pl Tel: +48 660 53 56 57, Skype: anna.losiak
Organization	Polish Academy of Sciences / OeWF RSS
Objectives	Investigation of the rate of cryoconite development (that is increase

	in their depth and width through time) depending on 1) Albedo of the rocky particle, 2) Emissivity of the rock particle, 3) Size of the rock particle, 4) Thermal conductivity of ice.
Resources requested	• Setting up: experiment should be set up in the first day of the mission by suited or unsuited analog astronaut. This will take **1 x 3-4 hours.** • 2. Depth and width of cryoconite holes measurements during the mission: taken by suited or unsuited analog astronaut. This activity will take up to 30 minutes every day. Those measurements should be taken just before sunset (so that melting cycle for particular day will be completed). **7 x 0.5 hour.** • 3. Technical maintenance of the cameras (changing batteries etc.): **7 x 0.25 hour.** • 4. Sample preparation in the camp (drying sample and packing them safely): **7 x 0.25 hour.** **Suit tester time requested** • If it is decided to use suited astronauts for this experiment, suit time required is **3-4 hours in the first day**, and about **0.5 hour every day**. **Power requirements** • No special needs **(<100 W**).
Logistics footprints	<**30 kg** and fit into >**1m³** container.

11. Mission Plan

This chapter outlines the general sequence of events of the field activities. It was determined by operational, scientific and media needs as devised by the flight planning team and authorized by FLIGHT.

Experiment teams

Experiment teams were requested to be observe strict availability when their respective experiment was carried out (contact person & back-up contact person), either at the Mission Support Center or at least virtually by following the telemetry stream from the field.

- "Black Day" meant a day off for both the field crew and the Mission Support Center team. No science, logistics or media activities were scheduled during this period.
- The Mission Plan was a living online document. Experimenters were advised to check on a regular bases (e.g. weekly before the mission, daily during the mission) if their respective experiment is on-schedule or has been shifted.
- Changes to the mission plan were possible according to a workflow specified in Mission Manifest III and had to be authorized by Flight Plan and the Flight Director.

Based upon the Mission Plan and complemented by additional inputs (e.g. weather data, traverse plans based upon the Digital Elevation Data, taking into account the current logistics status of the field assets), a Daily Activity Plan (DAP) was relayed to the field crew on the preceding eve of each mission day. This was also the default plan to be followed in case of a communication loss between MSC and the field crew.

Preparation/Setup	**(nominal) EVA time = 4 hours!!!**
Travel and Traverse	11th Aug is the last day to be scheduled! End of mission is fixed as the 14th; that means if the landing day needs to be shifted from 3rd to 6th, we have only 8 days of sim (i.e. corresponding to 3rd to 11th)
Scientific Experiments	
Suit Support	
Safety/Recovery	**COMMENTS:**
Veryfying/Checking	Experiment runs on Media Days and Landing day should be considered as "bonus runs", as with media attendance poorer data quality has to be expected
Permanent/Monitoring	FOG: no suit time needed
All Hands Activity	MaDe: no suit time needed
Media	LICHEN: no suit time needed (only 1 "demo run")
	VEMES & MaDe in beginning of mission
G ... staying on glacier overnight	For the slot "Media" on 1st-3rd all experiments need to be used -> media runs of participating eperiments

11.1 FAP & Traverse from 02Aug2015

Sun, 02.08	UTC	05:00	06:00	07:00	08:00	09:00	10:00	11:00
	UTC+2	07:00	08:00	09:00	10:00	11:00	12:00	13:00
PERSON:	POSITION:							
Kartik Kumar	Aouda.X		Briefing	Donning X		Photo		
Iñigo Muñoz-Elorza	Safety.X		Briefing	Video-Log	Support Donning	Safety.X		
João Lousada	Aouda.S		Briefing	Donning S		Photo		
Michael Müller	Safety.S		Briefing	Support Donning		Safety.S		
Stefan Dobrovolny	Assistant		Briefing	Support Donning		AA Support		
Sebastian Sams	BASE		Briefing	Suit Ops and Communication				
Julia Neuner	SciOPS		Briefing	Suit Ops and Communication				
Christian Lüthen	MEDO		Briefing	Suit Telemetry for Safety				
Nadine Sommerfeld	Experimenter	WoRIS	Setup Puli	Briefing	Support Donning	WoRIS	GPRoG	
Paul Santek	Photo		Briefing	Video-Log	Photo			
Claudia Stix	Photo		Briefing	Photo				
Gernot Grömer	EXLEAD		Briefing					
Jurrian Brobbel	ext. Photo			Photo				

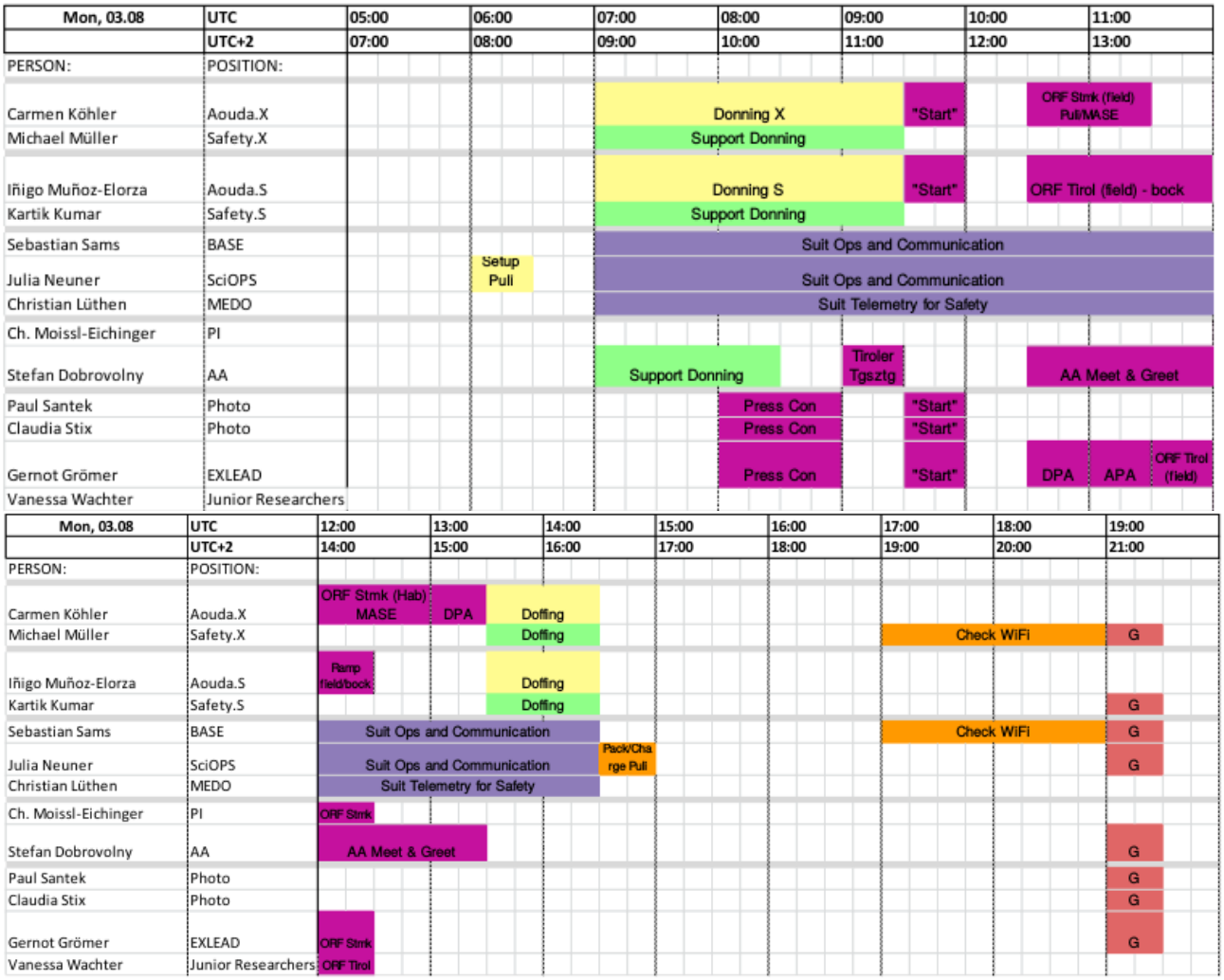
Sun, 02.08	UTC	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
	UTC+2	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00
PERSON:	POSITION:								
Kartik Kumar	Aouda.X	Photo	Doffing						
Iñigo Muñoz-Elorza	Safety.X	Safety.X	Doffing		Check WiFi				G
João Lousada	Aouda.S	Photo	Doffing						
Michael Müller	Safety.S	Safety.S	Doffing						G
Stefan Dobrovolny	Assistant	AA Support	Doffing						
Sebastian Sams	BASE	Ops and Communication			Check WiFi				G
Julia Neuner	SciOPS	Ops and Communication							G
Christian Lüthen	MEDO	Suit Telemetry for Safety							
Nadine Sommerfeld	Experimenter	WoRIS	Doffing	Pack/Charge Puli				WoRIS	G
Paul Santek	Photo	Photo							G
Claudia Stix	Photo	Photo							G
Gernot Grömer	EXLEAD								G
Jurrian Brobbel	ext. Photo	Photo							

V1

no traverse plans

11.2 FAP & Traverse from 03Aug2015

V3



traverse AX (left) and AS (right)

11.3 FAP & Traverse from 04Aug2015

V4

04.Aug.15	UTC	05:00	06:00	07:00	08:00	09:00	10:00
	UTC+2	07:00	08:00	09:00	10:00	11:00	12:00
PERSON:	POSITION:						
Iñigo Muñoz-Elorza	Aouda.X			Donning X		TT LIFE/BCC log LIFE/BCC	TT
Kartik Kumar	Aouda.S		LIFE	Donning S		TT LIFE/BCC	TT
Stefan Dobrovolny	Safety			Support Donning		Safety	
Carmen Köhler	Exp 1/Assistant			Support Donning		TT LICHEN	TT
Michael Müller	Exp2 /Assistant		Setup Puli	Support Donning		Check Cliffbot location	
Sebastian Sams	BASE			Suit Ops and Communication			
Julia Neuner	SciOps			Support Donning		Suit Ops and Communication	
Christian Lüthen	MEDO			Suit Telemetry for Safety			
Paul Santek	Photo		Photo				
Claudia Stix	Photo		Photo				
Gernot Grömer	EXLEAD						
MaDe team			MaDe				

04.Aug.15	UTC	11:00	12:00	13:00	14:00	15:00	16:00	17:00
	UTC+2	13:00	14:00	15:00	16:00	17:00	18:00	19:00
PERSON:	POSITION:							
Iñigo Muñoz-Elorza	Aouda.X	Dof	VEMES(virtual)	Dof FOG				
Kartik Kumar	Aouda.S	Dof	VEMES(virtual)	Dof FOG				
Stefan Dobrovolny	Safety	Dof	Safety	Dof		Check WiFi		G
Carmen Köhler	Exp 1/Assistant	Dof	Assist VEMES	Dof				G
Michael Müller	Exp2 /Assistant	WoRIS	FOG	Dof	Pack/Charge Puli			G
Sebastian Sams	BASE	Suit Ops and Communication				Check WiFi		G
Julia Neuner	SciOps	Suit Ops and Communication						G
Christian Lüthen	MEDO	Suit Telemetry for Safety						G
Paul Santek	Photo	Photo						G
Claudia Stix	Photo	Photo						G
Gernot Grömer	EXLEAD							
MaDe team		MaDe						

traverse AX und AS

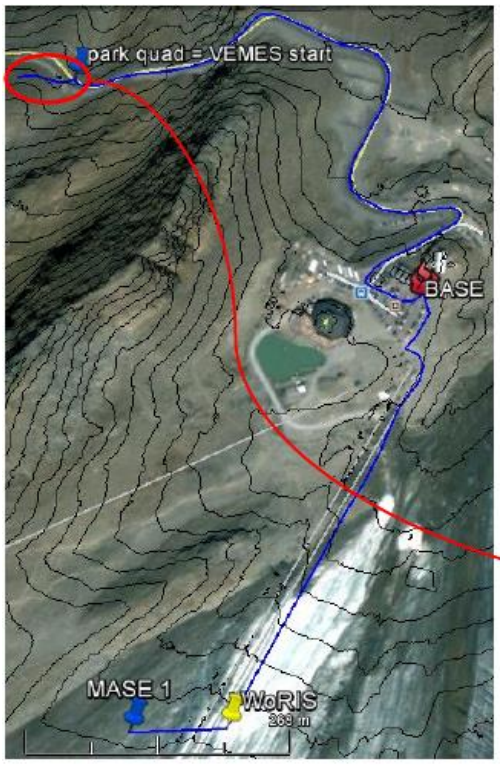
11.4 FAP & Traverse from 05Aug2015

05.Aug.15	UTC	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00
	UTC+2	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00
PERSON:	POSITION:								
Kartik Kumar	Aouda.X			Donning X		VEMES (real+combined)		TT MASE 1st site	TT
Stefan Dobrovolny	Aouda.S			Donning S		VEMES (real+combined)		TT MASE 1st site	TT
Carmen Köhler	Safety			Support Donning		Safety			
Sebastian Sams	Assistant			Support Donning		Assistent VEMES		TT GPRoG	TT
Christian Lüthen	Medical Officer			Suit Telemetry for Safety					
Julia Neuner	BASE		Setup Puli	Suit Ops and Communication					
Iñigo Muñoz-Elorza	SciOps			Support Donning		Suit Ops and Communication			
Gernot Grömer	EXLEAD, Exp 2			YPS	BR			TT GPRoG	TT
Paul Santek	Photo			Photo					
Claudia Stix	Photo			Photo					
Michael Müller	Exp 1			WoRIS					

05.Aug.15	UTC	13:00	14:00	15:00	16:00	17:00
	UTC+2	15:00	16:00	17:00	18:00	19:00
PERSON:	POSITION:					
Kartik Kumar	Aouda.X	Doffing X	FOG			
Stefan Dobrovolny	Aouda.S	Doffing S	FOG			
Carmen Köhler	Safety	Support Doffing				
Sebastian Sams	Assistant	Support Doffing		Check WiFi		G
Christian Lüthen	Medical Officer	Suit Telemetry				G
Julia Neuner	BASE	Ops and Comm	Pack/Charge Puli	Check WiFi		G
Iñigo Muñoz-Elorza	SciOps	Support Doffing				
Gernot Grömer	EXLEAD, Exp 2					G
Paul Santek	Photo	Photo				G
Claudia Stix	Photo	Photo				G
Michael Müller	Exp 1	WoRIS				G

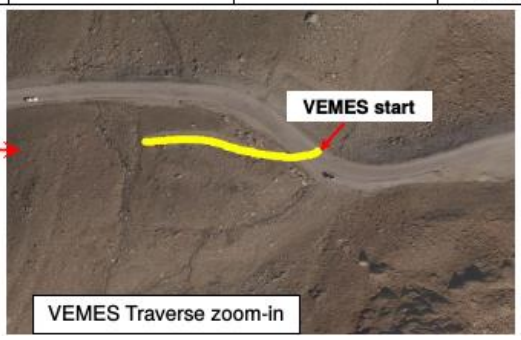
V4

Traverse AX und AS

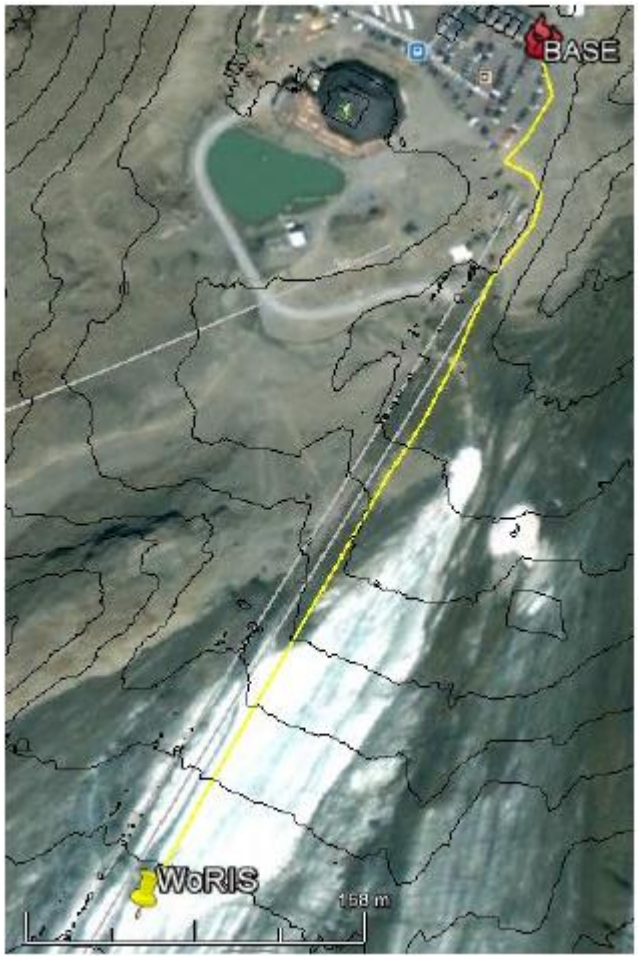


Safety first - if a traverse or location seem unsafe, use common sense to complete the experiment. Report the deltas to MSC.

Location	WGS 1984	MGI Austria GK West	Travel time
BASE	46.864036° N 10.714024° E	29049.43 R 191732.14 H	0 min
VEMES start	46.866387° N 10.708422° E	28621.04 R 191991.46 H	6 min (quad)
BASE			6 min (quad)
WoRIS	46.859933° N 10.711533° E	28861.68 R 191275.11 H	3 min (quad)
MASE 1	46.85991°N 10.71022° E	28761.56 R 191272.07 H	6 min (foot)
BASE			10 min (quad & foot)



traverse unsuited



11.5 FAP & Traverse from 06Aug2015

06. Aug 15	UTC	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00
	UTC+2	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00
PERSON:	POSITION:								
Carmen Köhler	Aouda.X	Briefing		Donning X		MASE 2nd site		MASE 3rd site	
Iñigo Muñoz-Elorza	Aouda.S	Briefing		Donning S		MASE 2nd site		MASE 3rd site	
Stefan Dobrovolny	Safety	Briefing	Setup Wifi	Support Donning		Safety			
Christian Lüthen	Medical Officer	Briefing		Suit Telemetry for Safety					
Michael Müller	BASE	Briefing	Setup Pull	Suit Ops and Communication					
Sebastian Sams	SciOps	Briefing	Setup Wifi	Support Donning		Suit Ops and Communication			
Julia Neuner	Exp 1	Briefing	Setup Wifi	Support Donning		Scouting - Accesebility			
Gernot Grömer	EXLEAD	Briefing							
Paul Santek	Photo 1	Briefing		Photo			Sponsor Photo	Photo	
Claudia Stix	Photo 2	Briefing		Photo					
Kartik Kumar	Exp 2	WoRIS	Briefing	Setup Wifi	LICHEN		Scouting - Accesebility		

06. Aug 15	UTC	13:00	14:00	15:00	16:00	17:00	18:00
	UTC+2	15:00	16:00	17:00	18:00	19:00	20:00
PERSON:	POSITION:						
Carmen Köhler	Aouda.X	Doffing FOG					
Iñigo Muñoz-Elorza	Aouda.S	Doffing FOG					
Stefan Dobrovolny	Safety	Doffing		Check WiFi			G
Christian Lüthen	Medical Officer	Suit Telem					G
Michael Müller	BASE	Suit Ops	Pack/Charge Pull				G
Sebastian Sams	SciOps	Doffing		Check WiFi			G
Julia Neuner	Exp 1	Doffing					G
Gernot Grömer	EXLEAD						
Paul Santek	Photo 1	Photo					G
Claudia Stix	Photo 2	Photo					G
Kartik Kumar	Exp 2					WoRIS	G

V4

traverse AX und AS

traverse unsuited

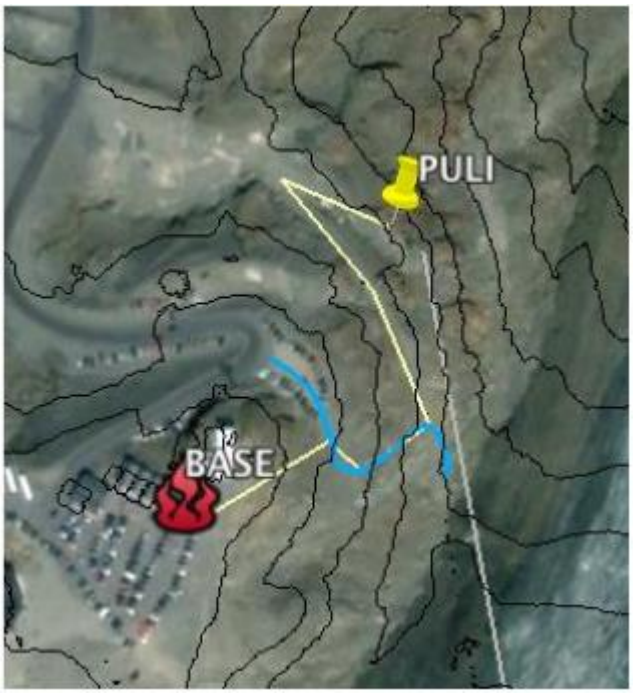
11.6 FAP & Traverse from 07Aug2015

07.Aug.15	UTC	05:00		06:00	07:00	08:00	09:00	10:00	11:00
	UTC+2	07:00		08:00	09:00	10:00	11:00	12:00	13:00
PERSON:	POSITION:								
Iñigo Muñoz-Elorza	Aouda.X		Briefing		Donning X			Cliffbot	Puli
Stefan Dobrovolny	Safety.X		Briefing	Setup WIFI	Support Donning			Safety	
Carmen Köhler	Aouda.S		Briefing		Donning S			LIFE	
Michael Müller	Safety. S / Exp	Setup Puli	Briefing	Setup WIFI		LICHEN		Safety	
Christian Lüthen	Medical Officer		Briefing		Support Donning			Suit Telemetry for Safety	
Sebastian Sams	BASE		Briefing	Setup WIFI	Suit Ops and Communication				
Julia Neuner	SciOPS		Briefing	Setup WIFI	Support Donning			Suit Ops and Communication	
Paul Santek	Photo		Briefing		Photo			Assistant Cliffbot	Sponsor Photo
Claudia Stix	Photo 2		Briefing		Photo				
Gernot Grömer	EXLEAD	WoRIS	Briefing		Reuters TV/ RTL Aktuell				

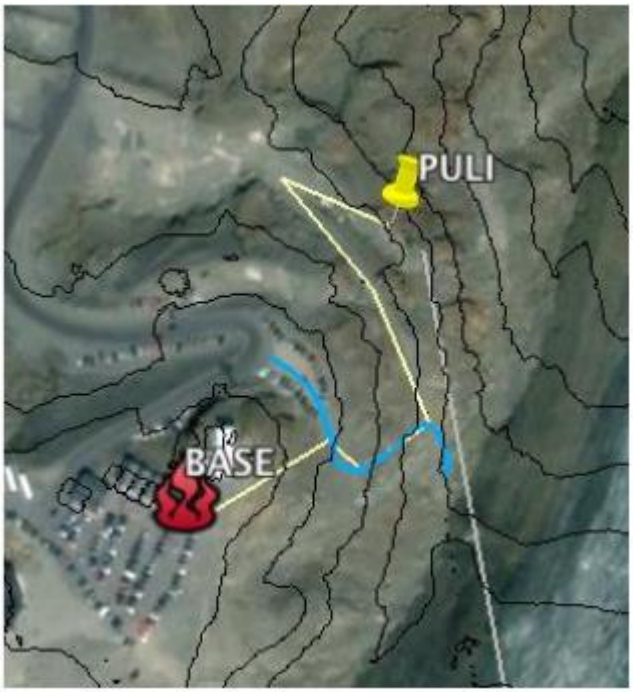
07.Aug.15	UTC	12:00		13:00	14:00		15:00		16:00	17:00	18:00	19:00	
	UTC+2	14:00		15:00	16:00		17:00		18:00	19:00	20:00	21:00	
PERSON:	POSITION:												
Iñigo Muñoz-Elorza	Aouda.X		TT	LICHEN	TT	Doffing	Video	FOG	Hangout				
Stefan Dobrovolny	Safety.X			Safety		Doffing							G
Carmen Köhler	Aouda.S		TT	LICHEN	TT	Doffing		FOG	Hangout				
Michael Müller	Safety. S / Exp			Safety		Doffing		Pack/Charge Puli	Check WiFi				G
Christian Lüthen	Medical Officer			Suit Telemetry for Safety		Doffing							G
Sebastian Sams	BASE			Suit Ops and Communication					Check WiFi				G
Julia Neuner	SciOPS			Suit Ops and Communication	FOG	Doffing							G
Paul Santek	Photo			Photo									G
Claudia Stix	Photo 2			Photo									G
Gernot Grömer	EXLEAD											WoRIS	G

V4

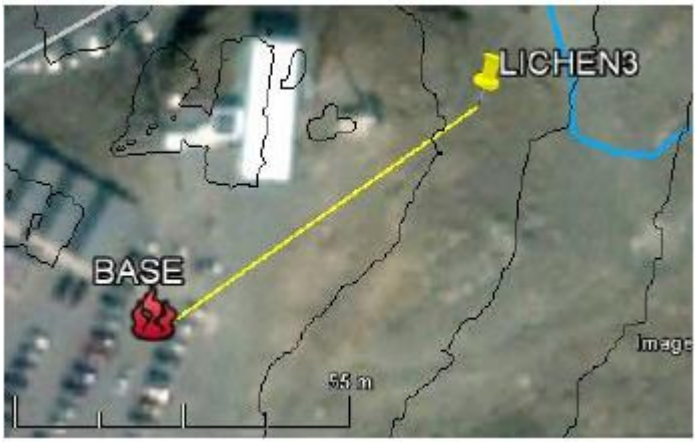
traverse AX



traverse AX and AS (left) and AS (right)



traverse unsuited



11.7 FAP & Traverse from 07Aug2015

07.Aug.15	UTC	05:00		06:00	07:00	08:00	09:00	10:00	11:00
	UTC+2	07:00		08:00	09:00	10:00	11:00	12:00	13:00
PERSON:	POSITION:								
Iñigo Muñoz-Elorza	Aouda.X		Briefing		Donning X			TT LICHEN	TT
Stefan Dobrovolny	Safety.X		Briefing	Setup WIFI	Support Donning			Safety.X	
Carmen Köhler	Aouda.S		Briefing		Donning S			TT LICHEN	TT
Michael Müller	Safety. S / Exp	Setup Puli	Briefing	Setup WIFI		LICHEN		Safety.S	
Christian Lüthen	Medical Officer		Briefing		Support Donning			Suit Telemetry for Safety	
Sebastian Sams	BASE		Briefing	Setup WIFI	Suit Ops and Communication				
Julia Neuner	SciOPS		Briefing	Setup WIFI	Support Donning			Suit Ops and Communication	
Paul Santek	Photo		Briefing		RTL				
Claudia Stix	Photo 2		Briefing		Photo				
Gernot Grömer	EXLEAD	WoRIS	Briefing			Reuters TV/ RTL Aktuell			Setup LIFE

V5

07.Aug.15	UTC	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	
	UTC+2	14:00	15:00	16:00	17:00	18:00	19:00	20:00			
PERSON:	POSITION:										
Iñigo Muñoz-Elorza	Aouda.X	TT Cliffbot	TT	Photo	Doffing	Video	FOG	Hangout			
Stefan Dobrovolny	Safety.X	Safety.X			Doffing						G
Carmen Köhler	Aouda.S	LIFE			Doffing		FOG	Hangout			
Michael Müller	Safety. S / Exp	Safety.S			Doffing		Pack/Charge Puli	Check WiFI			G
Christian Lüthen	Medical Officer	Suit Telemetry for Safety			Doffing						G
Sebastian Sams	BASE	Suit Ops and Communication						Check WiFI			G
Julia Neuner	SciOPS	Suit Ops and Communication		FOG	Doffing						G
Paul Santek	Photo	RTL									G
Claudia Stix	Photo 2	TT Assist. Cliffbot	TT	Photo							G
Gernot Grömer	EXLEAD	Assistant LIFE				Hangout				WoRIS	G

traverse AX (left) and AX and AS (right)

traverse AS (left) und unsuited (right top and right bottom)

11.8 FAP & Traverse from 08Aug2015

V4

08.Aug.15	UTC	05:00	06:00	07:00	08:00	09:00	10:00	11:00
	UTC+2	07:00	08:00	09:00	10:00	11:00	12:00	13:00
PERSON:	POSITION:							
João Lousada	Aouda.X	Briefing		Donning X			Cliffbot	
Carmen Köhler	Safety.X	Briefing	Setup WIFI	Support Donning			Safety X	
Stefan Dobrovolny	Aouda.S	Briefing		Donning S			MASE 1st site	Cliffbot
Luca Foresta	Safety.S	Briefing	Setup WIFI	Support Donning			Safety S	
Iñigo Muñoz-Elorza	Assistant.S/X	Briefing		Support Donning			Assistant Cliffbot	
Christian Lüthen	Medical Officer	Briefing		Suit Telemetry for Safety				
Rochelle Velho	MEDO Trainee	Briefing		Suit Telemetry for Safety				
Sebastian Sams	BASE	Briefing	Setup WIFI	Suit Ops and Communication				
Julia Neuner	SciOPS	Briefing		Support Donning			Suit Ops and Communication	
Gernot Grömer	EXLEAD	Briefing				Radio 1		
Michael Müller	Exp. 1	Setup Puli	Briefing	Setup WIFI	WoRIS			
Paul Santek	Photo 1	Briefing		Photo				Sponsor Photos
Claudia Stix	Photo 2	Briefing		Photo				Sponsor Photos

08.Aug.15	UTC	12:00	13:00	14:00	15:00	16:00	17:00	18:00
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PERSON:	POSITION:							
João Lousada	Aouda.X	Scouting	LICHEN	Doffing	FOG			G
Carmen Köhler	Safety.X	Safety X		Doffing		GPRoG-Test		
Stefan Dobrovolny	Aouda.S	Scouting	LICHEN	Doffing	FOG			
Luca Foresta	Safety.S	Safety S		Doffing		GPRoG-Test		
Iñigo Muñoz-Elorza	Assistant.S/X	Assistant		Doffing		GPRoG-Test		G
Christian Lüthen	Medical Officer	Suit Telemetry for Safety						
Rochelle Velho	MEDO Trainee	Suit Telemetry for Safety						
Sebastian Sams	BASE	Suit Ops and Communication				Check WiFi		G
Julia Neuner	SciOPS	Suit Ops and Communication		Doffing		Check WiFi		G
Gernot Grömer	EXLEAD			FOG				G
Michael Müller	Exp. 1	WoRIS			Pack/Charge Puli			G
Paul Santek	Photo 1	Photo						G
Claudia Stix	Photo 2	Photo						G

traverse AX and AS

traverse AS (left) and unsuited (right top and right bottom)

11.9 FAP & Traverse from 09Aug2015

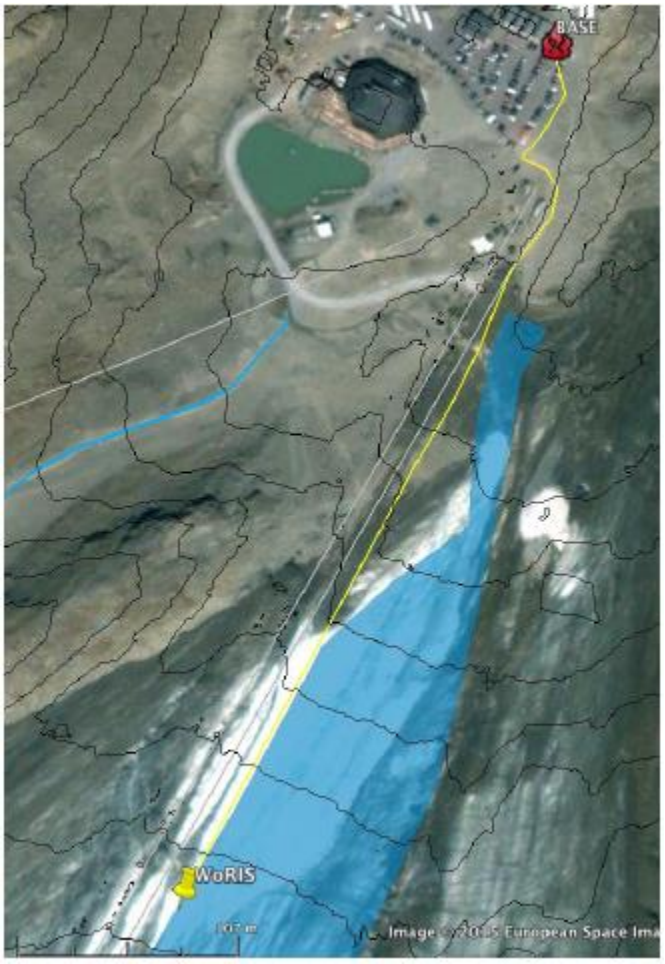
09.Aug.15	UTC	5:00	6:00	7:00	8:00	9:00	10:00	11:00
	UTC+2	7:00	8:00	9:00	10:00	11:00	12:00	13:00
PERSON:	POSITION:							
João Lousada	Aouda.X	Briefing		Donning X		MASE	Pull + BCC	
Luca Foresta	Aouda.S	Briefing		Donning S		MASE	Pull+ BCC	
Stefan Dobrovolny	Safety	Briefing	Setup WIFI	Support Donning		Safety		
Iñigo Muñoz-Elorza	Assistant	Briefing	WoRIS	Support Donning		GPRoG		
Rochelle Velho	Medical Officer	Briefing		Support Donning		Suit Telemetry for Safety		
Sebastian Sams	BASE	Briefing	Setup WIFI	Suit Ops and Communication				
Michael Müller	SciOPS	Briefing	Setup WIFI	Support Donning		Suit Ops and Communication		
Gernot Grömer	EXLEAD/Assist	Briefing			LIFE Setup	GPRoG		
Paul Santek	Photo 1	Briefing		Photo			Sponsor Photos	
Claudia Stix	Photo 2	Briefing		Photo			Sponsor Photos	

09.Aug.15	UTC	12:00	13:00	14:00	15:00	16:00	17:00
	UTC+2	14:00	15:00	16:00	17:00	18:00	19:00
PERSON:	POSITION:						
João Lousada	Aouda.X	LIFE		Doffing	FOG		
Luca Foresta	Aouda.S	LIFE		Doffing	FOG		
Stefan Dobrovolny	Safety	Safety		Doffing			
Iñigo Muñoz-Elorza	Assistant	Assistent LIFE		LOG	Pack/Charge Pull	WoRIS	
Rochelle Velho	Medical Officer	Suit Telemetry for Safety					
Sebastian Sams	BASE	Suit Ops and Communication				Check WiFi	
Michael Müller	SciOPS	Suit Ops and Communication		Doffing		Check WiFi	
Gernot Grömer	EXLEAD/Assist						
Paul Santek	Photo 1	Photo					
Claudia Stix	Photo 2	Photo					

V7

traverse AX and AS

traverse unsuited



On 10Aug2015 no mission operation scheduled. Except for briefings and meetings and basic station maintainance, this day was assigned as a free day.

11.10 FAP & Traverse from 11Aug2015

V5

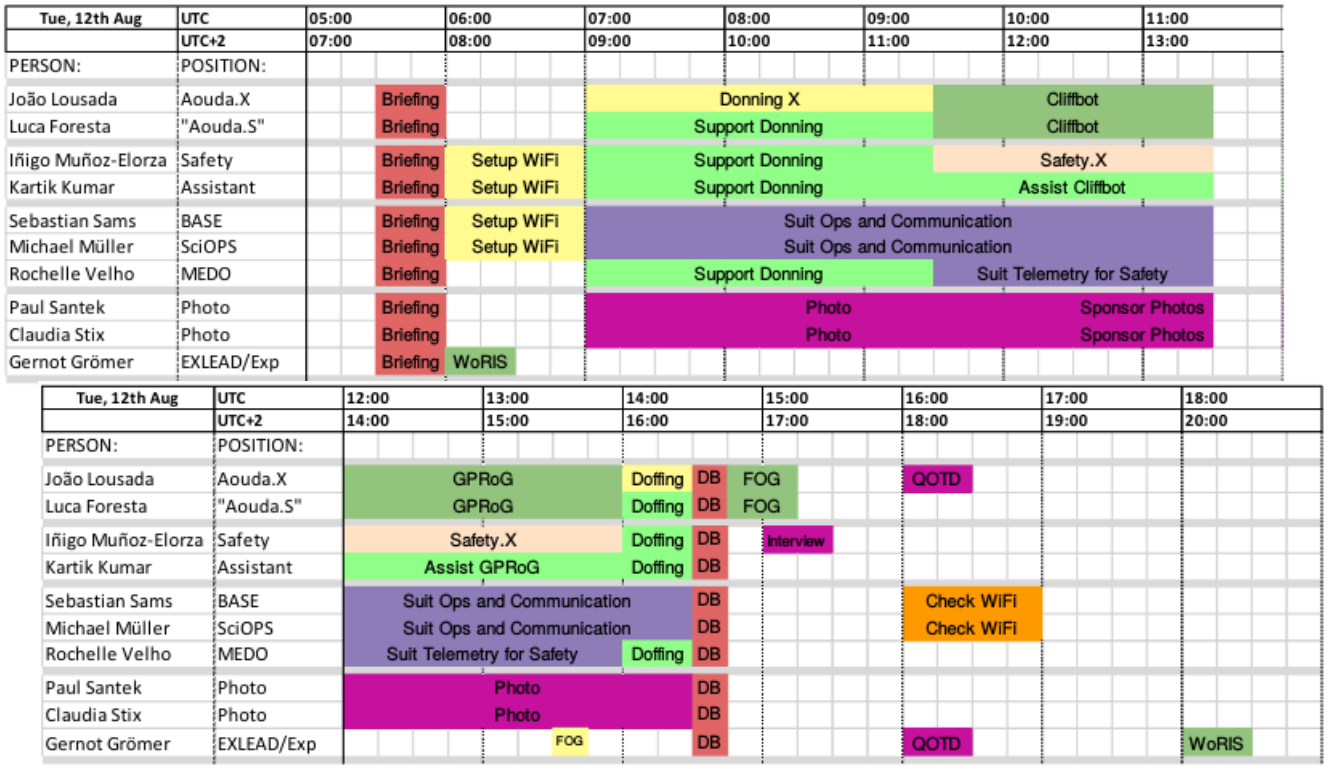
11.Aug.15	UTC	5:00	6:00	7:00	8:00	9:00	10:00	11:00
	UTC+2	7:00	8:00	9:00	10:00	11:00	12:00	13:00
PERSON:	POSITION:							
Iñigo Muñoz-Elorza	Aouda.X	Briefing		Donning X			BCC + LIFE	
Kartik Kumar	Aouda.S	Briefing		Donning S			BCC + LIFE	
Luca Foresta	Safety	Briefing	Setup WiFi	Support Donning			Safety	
João Lousada	Assistant	Briefing	Setup WiFi	Support Donning				
Rochelle Velho	Medical Officer	Briefing	Setup WiFi	Suit Telemetry for Safety				
Sebastian Sams	BASE	Briefing	Setup WiFi	Suit Ops and Communication				
Michael Müller	SciOPS	Briefing	Setup Puli	Support Donning			Suit Ops and Communication	
Gernot Grömer	EXLEAD/Assist	Briefing				BR Interview		
Paul Santek	Photo 1	Briefing		Photo				Sponsor Photos
Claudia Stix	Photo 2	Briefing		Photo				Sponsor Photos
Katia Zanella-Kux	Photo 3	Briefing		Photo				Sponsor Photos

11.Aug.15	UTC	12:00	13:00	14:00	15:00	16:00
	UTC+2	14:00	15:00	16:00	17:00	18:00
PERSON:	POSITION:					
Iñigo Muñoz-Elorza	Aouda.X	Log GPRoG		Doffing	FOG	
Kartik Kumar	Aouda.S	GPRoG		Doffing	FOG	
Luca Foresta	Safety	Safety		Doffing		
João Lousada	Assistant	Assistant GPRoG		Doffing	Pack/Charge Puli	Check WiFi
Rochelle Velho	Medical Officer	Suit Telemetry for Safety				
Sebastian Sams	BASE	Suit Ops and Communication				Check WiFi
Michael Müller	SciOPS	Suit Ops and Communication		Doffing		
Gernot Grömer	EXLEAD/Assist					
Paul Santek	Photo 1	Photo				
Claudia Stix	Photo 2	Photo				
Katia Zanella-Kux	Photo 3	Photo				

traverse AX and AS

11.11 FAP & Traverse from 12Aug2015

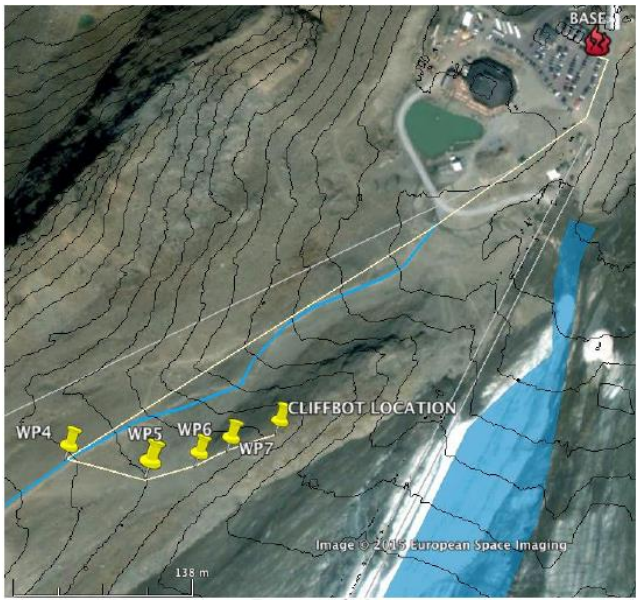
V4

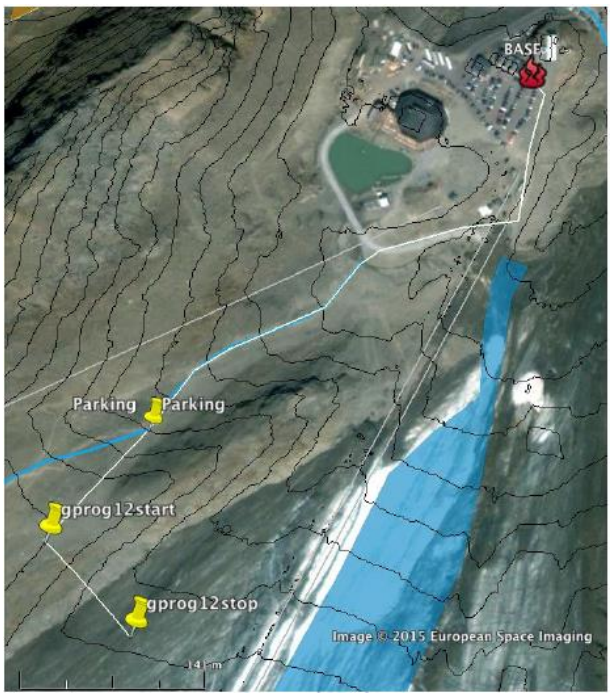


Tue, 12th Aug	UTC	05:00	06:00	07:00	08:00	09:00	10:00	11:00
	UTC+2	07:00	08:00	09:00	10:00	11:00	12:00	13:00
PERSON:	POSITION:							
João Lousada	Aouda.X	Briefing		Donning X			Cliffbot	
Luca Foresta	"Aouda.S"	Briefing		Support Donning			Cliffbot	
Iñigo Muñoz-Elorza	Safety	Briefing	Setup WiFi	Support Donning			Safety.X	
Kartik Kumar	Assistant	Briefing	Setup WiFi	Support Donning			Assist Cliffbot	
Sebastian Sams	BASE	Briefing	Setup WiFi	Suit Ops and Communication				
Michael Müller	SciOPS	Briefing	Setup WiFi	Suit Ops and Communication				
Rochelle Velho	MEDO	Briefing		Support Donning			Suit Telemetry for Safety	
Paul Santek	Photo	Briefing		Photo				Sponsor Photos
Claudia Stix	Photo	Briefing		Photo				Sponsor Photos
Gernot Grömer	EXLEAD/Exp	Briefing	WoRIS					

Tue, 12th Aug	UTC	12:00	13:00	14:00	15:00	16:00	17:00	18:00
	UTC+2	14:00	15:00	16:00	17:00	18:00	19:00	20:00
PERSON:	POSITION:							
João Lousada	Aouda.X	GPRoG		Doffing DB	FOG	QOTD		
Luca Foresta	"Aouda.S"	GPRoG		Doffing DB	FOG			
Iñigo Muñoz-Elorza	Safety	Safety.X		Doffing DB	Interview			
Kartik Kumar	Assistant	Assist GPRoG		Doffing DB				
Sebastian Sams	BASE	Suit Ops and Communication		DB		Check WiFi		
Michael Müller	SciOPS	Suit Ops and Communication		DB		Check WiFi		
Rochelle Velho	MEDO	Suit Telemetry for Safety		Doffing DB				
Paul Santek	Photo	Photo		DB				
Claudia Stix	Photo	Photo		DB				
Gernot Grömer	EXLEAD/Exp		FOG	DB		QOTD		WoRIS

traverse AX and AS





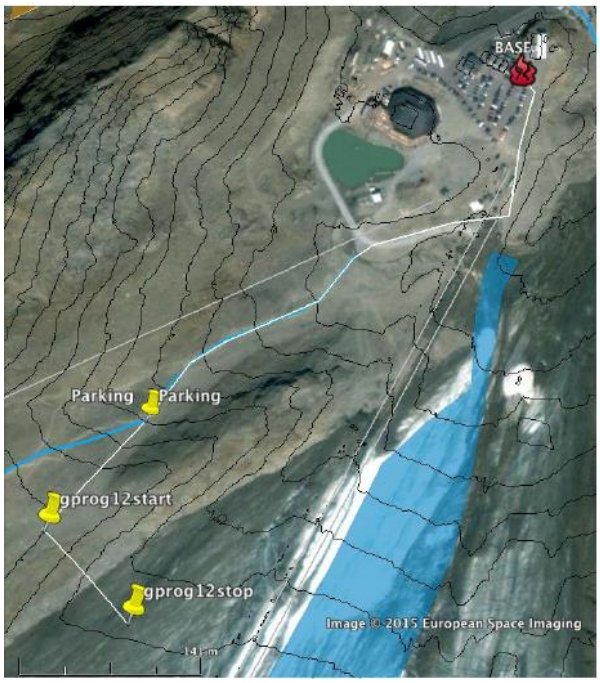
11.12 FAP & Traverse from 13Aug2014

V3

13.Aug.15	UTC	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00
	UTC+2	07:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00
PERSON:	POSITION:								
Iñigo Muñoz-Elorza	Aouda.X		Briefing		Donning X			GPRoG	
João Lousada	Aouda.S		Briefing		Support Donning			GPRoG	
Luca Foresta	Safety		Briefing	Setup WIFI	Support Donning			Safety	
Gernot Grömer	EXLEAD/Assist		Briefing	set PULI	Support Donning			Assistant GPRoG	
Rochelle Velho	Medical Officer		Briefing		Support Donning			Suit Telemetry for Safety	
Sebastian Sams	BASE		Briefing	Setup WIFI	Suit Ops and Communication				
Michael Müller	SciOPS		Briefing	Setup WIFI	Support Donning			Suit Ops and Communication	
Kartik Kumar	Experimenter		Briefing	WoRIS					
Paul Santek	Photo 1		Briefing		Photo				Sponsor Photos
Claudia Stix	Photo 2		Briefing		Photo				Sponsor Photos

13.Aug.15	UTC	13:00	14:00		15:00		16:00	17:00	18:00
	UTC+2	15:00	16:00		17:00		18:00	19:00	20:00
PERSON:	POSITION:								
Iñigo Muñoz-Elorza	Aouda.X	GPRoG	ORANGE	Doffing	DB	FOG			
João Lousada	Aouda.S	GPRoG	ORANGE	Doffing	DB	FOG			
Luca Foresta	Safety	Safety	ORANGE	Doffing	DB				
Gernot Grömer	EXLEAD/Assist	Assistant GPRoG	ORANGE		DB	Pack/charge Puli			
Rochelle Velho	Medical Officer	Telemetry FOG	ORANGE		DB				
Sebastian Sams	BASE	Suit Ops Comm	ORANGE		DB	Check WiFi			
Michael Müller	SciOPS	Suit Ops Comm	ORANGE	Doffing	DB	Check WiFi			
Kartik Kumar	Experimenter	WoRIS							
Paul Santek	Photo 1	Photo	ORANGE		DB				
Claudia Stix	Photo 2	Photo	ORANGE		DB				

traverse AX and AS



11.13 FAP & Traverse from 14Aug2015

V4

14.Aug.15	UTC	5:00	6:00	7:00	8:00	9:00	10:00	11:00
	UTC+2	7:00	8:00	9:00	10:00	11:00	12:00	13:00
PERSON:	POSITION:							
Kartik Kumar	Aouda.X	Briefing		Donning X		Cliffbot	LIFE Sampling	
Luca Foresta	Aouda.S	Briefing		Support Donning		Cliffbot	LIFE Sampling	
João Lousada	Safety	Briefing	Setup WIFI	Support Donning		Safety		
Iñigo Muñoz-Elorza	Assistant	Briefing	Setup WIFI	Support Donning		Assistant Cliffbot	Assist LIFE	
Rochelle Velho	Medical Officer	Briefing		Support Donning		Suit Telemetry for Safety		
Sebastian Sams	BASE	Briefing	Setup WIFI	Suit Ops and Communication				
Michael Müller	SciOPS	Briefing	Setup WIFI	Support Donning		Suit Ops and Communication		
Gernot Grömer	EXLEAD	Briefing	Setup Puli					
Paul Santek	Photo 1	Briefing		Photo			Sponsor Photos	
Claudia Stix	Photo 2	Briefing		Photo			Sponsor Photos	

14.Aug.15	UTC	12:00	13:00		14:00	15:00
	UTC+2	14:00	15:00		16:00	17:00
PERSON:	POSITION:					
Kartik Kumar	Aouda.X	LICHEN + Geo Exc	Doffing	DB		EoM ceremony
Luca Foresta	Aouda.S	LICHEN + Geo Exc	Doffing	DB		EoM ceremony
João Lousada	Safety	Safety	Doffing	DB		EoM ceremony
Iñigo Muñoz-Elorza	Assistant		Doffing	DB		EoM ceremony
Rochelle Velho	Medical Officer	Suit Telemetry		DB		EoM ceremony
Sebastian Sams	BASE	Ops and Comm		DB		EoM ceremony
Michael Müller	SciOPS	Ops & Comm	Doffing	DB		EoM ceremony
Gernot Grömer	EXLEAD	Interview Kuwait		DB	Pack/Charge Puli	EoM ceremony
Paul Santek	Photo 1	Photo		DB		EoM ceremony
Claudia Stix	Photo 2	Photo		DB		EoM ceremony

traverse AX and AS

12. Mission Meteorological Service

Compiled by: FD (Clemens Plank) Updated by: Peter Hartmann, Claudia Rieger, Andrea Steiner, Michael Tiefgraber and Helge Tuschy

For the first time, an OeWF mission had the privilege of a dedicated meteorological service. The rationale for this premiere was the small-scale variations expected for the Kaunertal region as well as its high dynamics.

In retrospective, three main challenges needed to be adressed during the mission:

- Which **kind of forecasts** are required (which parameters, which timescales)?
- How can weather forecasts be **incorporated in the daily routines** at the MSC and in the FIELD?
- How should the forecasts be disseminated /**communicated**?

12.1 forecasts required (which parameters, which timescales)?

In advance to the mission, an excel-template for disseminating written weather forecasts for +1, ... ,+5 days had been developed. The weather parameters mentioned in this template proved to be appropriate and useful. It turned out that weather monitoring and nowcasting is very important for the FIELD crew. The prevailing weather situations during the mission, especially the potential for development of local thunderstorms, made it even more relevant.

12.2 Incorporation of forecasts in the daily routines?

During the morning briefing a short forecast for the day was given, so that everyone could adjust to the expected weather situation. Thereafter, the written weather forecasts (excel-sheet) were produced. The +1 day forecast thereof was then incorporated in the DAP for the next day. Within Flight Plan, an extended oral presentation of the weather forecast was given in the later morning if necessary, so that possible weather changes or periods of unfavorable weather conditions could be considered in flight planning. Throughout the day, oral weather forecasts were disseminated within the MSC and short text messages were compiled which could be sent to the FIELD. A written weather forecast was prepared, which was presented by the FP-lead at the pool-party.

12.3 Dissemination/Communication of weather forecasts

The written weather forecasts were disseminated as follows:

- The excel-sheet was copied to the workbench:
  \\mission.oewf.org\workbench\Flightplan\WeatherForecasts
- FP was informed when the updated excel-sheet was ready and a short weather update was provided upon request.
- SDO was asked to upload the new excel-file with the forecasts to the FIELD.
- FD was informed (orally or via the internal chat by contacting EarthCOM), that there was an updated weather forecast available on the workbench and that SDO had it uploaded.

Intra-day forecasts or nowcasting, respectively, was disseminated through the chat and personal communication. FIELD considered these updates very valuable gien the dynamics of the local weather patterns. Any information for FD or the FIELD (mostly both) was sent to EarthCOM via the internal chat, such as the following:

> *"Meteo to EarthCOM: Information for FD and FIELD: #weather: A shallow shower formed about 20 km south of the base. It is very weak and not moving. There's no lightning connected to any of these showers*."

Short information on the weather development given by FIELD was appreciated, as it can be used to improve the forecasts. Questions concerning the forecast were issued via EarthCOM or directly by FD, which then could be answered immediately.

13. Media activities and Outreach

The Austrian Space Forum was coordinating and leading the communication campaign to inform the public and the general media about AMADEE-15.

Media milestones included:

- **VERAS Vienna "Sand in the City":** In cooperation with T-Mobile, the V-ERAS experiment has been highlighted on two days (24th + 25th of August) in Vienna in a public event where the virtual reality set-up could be experienced by the visitors of this very popular event.
- **Media productions:** 2 days were dedicated to film and photo shootings for various broadcasters, print and online media.
- **Public day on 3rd of August:** On the landing day, the general public, media, professional observers, Junior Researchers and industrial partners were invited to get in touch with AMADEE-15 researchers, analog astronauts, Mission Support Center personnel as well as field hardware. During this day, the general public was also invited to join the field crew.
- **Junior researchers Program:** High school and university students were invited to experience first-hand the field activities and the Mission Support Center.
- **TEDx-Talk on 8th of August**: Analog astronaut Kartik Kumar gave a televised TEDx-Talk to an amphitheater in Kreta/Greece.

- **Google Hangout:** On 7th of August, the field crew answered questions during a live hangout from the Kaunertal Glacier (Video can be found here: https://www.youtube.com/watch?v=KZq241HV07s).
- **Mars Pioneer contest:** During the mission and until the end of August, followers of the mission were invited to participate in the Austrian Space Forum's 'I am a Mars Pioneer' contest in order to win prizes including a book signed by astronaut Chris Hadfield.

Questions about media activities should be directed to **Ms Monika Fischer**, head of the MEDIACOM team (monika.fischer@oewf.org).

The expedition photographers were:

- **Paul Santek** (mail@paulsantek.com)
- **Claudia Stix** (mail@claudiastix.com)

complemented by

- **Vanessa Weingartner** (vanessa.weingartner@oewf.org, corporate photography)

The OeWF can be found on the following channels:

- **Twitter:** www.twitter.com/oewf
- **Facebook:** www.facebook.com/spaceforum
- **YouTube:** www.youtube.com/oewf
- **Website:** www.oewf.org

Mission and Goals:

The Austrian Space Forum's media strategy aimed to **reach** the wider public, to **raise awareness** about OeWF and its expertise in Mars analog simulations and to **increase brand reputation**. It **generates enthusiasm** towards the idea of sending humans to Mars, while **informing** and making people **understand** the challenges of such a mission and why analog field research helps preparing humans in this respect. At the same time, it conveyes the **professionalism & expertise** of the team and presents its scientific and technological **achievements**.

What did the OeWF communicate?

- An experience: the adventure of exploring planet Mars. **(Enthusiasm)**
- A technological and human challenge – highest altitude Mars simulation ever **(Awareness)**

- Know How & Expertise in Mars simulations **(Professionalism)**
- Innovative education & outreach **(Understanding)**
- International cooperation, led by the Austrian Space Forum **(Reputation)**

Target Groups:

- General public/lay people, 18-55, connected online
- Scientists and future cooperation partners
- Students, 14-18, connected online (via Junior Researchers Program)

Social Media Activities:

The official hashtag for the AMADEE-15 mission was #AMADEE15, complemented, where applicable, by #simulateMars (Twitter has a restriction of max. 140 characters per post, which means that the second hashtag was often left out on that channel).

- **Wake-Up Songs (Enthusiasm):** Each day, the daily Wake-Up Song was posted on Twitter in order to let the public participate in the ongoing activities.
- **Mars Pioneer campaign (Enthusiasm):** This image campaign focused on the persons behind the mission in order for students and the general public to identify themselves with the mission's participants. During AMADEE-15, the campaign was extended and transformed into a contest where the general public could post pictures of themselves posing with the 'I am a Mars Pioneer' logo. Concludes on 31st of August. While many OeWF members participated so far, only one person from the general public sent their picture.
- **Question of the day (Awareness/Education):** Every day of the mission, an article explaining a specific element of the mission including a picture from the field was published to have the general public get a better impression of the mission. Most articles focused on one of the experiments conducted during AMADEE-15, while others were more general and focused on analog astronauts, planet Mars and analog missions.
- **Question contest (Enthusiasm/Education):** In order to get the general public actively engage and participate in the mission, this contest allowed them to post a question about the planet Mars or Mars analog missions of which one would be chosen as a winner and answered in a video log by the field crew. 20 people participated and sent in their questions, of which a question about the psychological effect of the color red on astronauts during a Mars mission was selected to be the most creative and interesting one.

- **Video log (Enthusiasm):** Analog astronaut Inigo Munoz Elorza recorded several videos explaining various aspects of the mission, such as experiments, EVAs or safety. These were posted to the OeWF YouTube channel and promoted on social media.

Numbers/Statistics:

- **Media coverage:** Due to the proximity of the mission site, the public day attracted many journalists and photographers which resulted in a widespread news coverage of the mission. Noteworthy is especially the presence of **Reuters and dpa** (German press agency), who gather and distribute their news coverage to almost every German speaking news outlet. Highlights of the coverage include:
    - Print: An article in **Tiroler Tageszeitung** (84.000 – 100.000 daily copies), an article in **Kronen Zeitung** (809.000 daily copies), a picture on the front page of German **BILD-Zeitung** (2.100.000 daily copies) and an article in **Frankfurter Allgemeine** (270.000 daily copies).
    - Online: Almost every major Austrian news page picked up the story and published an article, including '**Der Standard**', '**nachrichten.at**', and '**ORF**'. Several major German news outlets did the same, such as '**Die Welt**', '**Spiegel Online**' or '**n-tv**'. Regarding English language coverage, the most prominent outlet to publish an article was the '**Washington Post**'.
    - TV: Several ORF formats showed a news clip about the mission ('**heute mittag**', '**Tirol heute**' and '**ZIB 2**' with more than 1 million viewers). In Germany, the second most-viewed news show '**ZDF heute**' aired a news piece on the mission, which is regularly watched by about 3.8 million people.
- **Homepage:** A total of **seven articles** were published on the OeWF page during the mission (counting only one language). These consist of two press releases (mission starting and mission ending), two contests ('Send us your questions' and 'Are you a Mars Pioneer?'), two blog posts from the media team (Media-Logbook #1 and #2) as well as the 'Question of the day' series, which, if each question was counted as an individual article, would raise the total count to **21 articles**. This stands in **difference to the Mars2013 mission**, where 64 articles were published, and needs some explaining:
    - Mars2013 ran for twice as long, so the series 'Picture of the day' (comparable to 'Question of the day') accounted for twice as many articles.
    - The 'people behind the simulation' series produced 12 articles, which is comparable to the 'Mars pioneer' campaign that was run in advance to the

mission and was reduced to a single article published a week before the mission started.

- ‘OeWF on Mars’ series produced 18 articles written by guest contributors. This was not featured during AMADEE-15.
- Mars2013 had eight news articles summarizing the events and activities happening during the mission. During AMADEE-15, this type of information was conveyed by different channels, mainly through social media updates (e.g. Video logs posted to YouTube or picture updates posted to Flickr).

(via Google Analytics): During the mission, the **OeWF website increased the traffic significantly** (1st – 15th of August vs. 4th – 18th of July: + 129% sessions, +117% of users, +156%) in page views. In the same time, the bounce rate was reduced by 11% and we declined about 1% in new sessions. The decline of new sessions is because we managed to increase the amount of returning visitors slightly from 35% to 35.7% compared to July 2015.

The **most popular day was the 3rd of August** (Landing Day) with +635% in sessions compared to Monday, 6th of July, followed by 4th of August. This is directly correlated to the newspaper articles published online on 3rd and 4th of August.

Country wise, the **most popular country was Austria** (48% of all sessions came for Austrian based users), followed by Germany (17%), Denmark (5%), US (4%) and Italy (3%), and technology wise, 68% of the users still used a desktop device, followed by mobile device with 24% and tablet with 8%.

During the mission, we could **increase the traffic via Organic Search & Referral** which can be also traced back to our media outreach. 1/3 of the referral traffic can be traced back to online newspaper articles, 1/3 goes to Facebook & Twitter and the rest is different websites incl. our partners (e.g. Puli & Planete Mars), but also some contest websites like gewinnspielverzeichnis.at. For the organic traffic, the **top four keywords** during the missions were: AMADEE15 (various notations), Mars, Aouda and analog astronaut.

In summary, despite fewer articles than during MARS2013 we could generate more traffic than usual to the OeWF website. **A direct comparison to MARS2013 is not valid**, as MARS2013 was a longer mission and therefore generated for a longer time traffic to the OeWF website than during AMADEE-15. In addition, the channel report for traffic acquisition, which gives a good overview over the impact of the media outreach, is not available for MARS2013.

	Mission	Trad. Media	Social Media	Marketing partners
February				
	AA photoshooting	NL: introduce current AA		
March				
20.-22.3.	AA media training AMADEE experiment teams deliver PR material		SpaceUp ESA-Cologne Live link to AA Suitlab	
23.3.		PA Introduction new AAs local media contacted (at their respective place of origin/current city)	AMADEE-15 team members: Introduction of all new AAs (spread over several weeks) **Blogs:** Kosmologs/E. Reichl Scienceblogs/F. Freistetter, etc	Start Promotion Amadee-15
April				
				T-Mobile: G.Groemer Testimonial-Story for their Website /Business Blog
13.4.	Experiments FRR			
17.-19.4.	AA Training Block III			
May				
01.03.5.	AA Training Block IV	Filming possible during training	Release of AMADEE-Badge	
15.-17.5.	AA Training Block V		15.05.2015 19:00 CEST Google Hangout 01: Theme AA/Training	
20.5.		Invitation to AA graduation ceremony / offering interview opportunities	AMADEE-15 Partner: Introduction of all supporters & marketing partners	T-Mobile: Story on http://www.wie-wir-wollen.at/,

June				
			AMADEE-15 Experiments Google Hangout 02: Theme: AMADEE-15 Science AMADEE-15 team members: *"I am a Mars pioneer*	
4.6. (tbd)	AA Graduation Ceremony			
July				
				T-Mobile Social Media Campaign: "Mars wie ich will"
10.-12.7.	Dress Rehearsal (Innsbruck MSC)		10.07.2015: 19:00 CEST Google Hangout 03: Theme: Mission Support Center	
15.7.		Invitation press conference & media day @ glacier Deadline press kit & key visuals	AMADEE-15 Menschen: "I am a Mars pioneer"	
23.-30.7.	Set-up field hardware			
27.7.		Reminder press conf & media day		
August				
2.8.				
3.8.	Public day incl. JRP/POP	Press conference & media day	Selfie-Spot Competition Google Hangout 04: Theme: Live from the simulation	
	First public lectures		Details during sim are in prep (picture of the day, 2min clips, blogging, partner websites, etc)	
September				
	Public lectures		Fading Out: Highlights of the mission Fun stories / extraordinary Mission video "Thank you" to team & partners	

14. Industrial partners

The AMADEE-15 mission was supported by a number of industrial partners with in-kind and financial support, also joining efforts in the outreach and education sector.

Main Partners	
T · ·Mobile Austria	• Marketing and media support • Conduct of a nationwide contest (2 winners visit the field campaign during the public day and the MSC)
LANCOM Systems	• Donation of the second generation W-LAN networking hardware for our field campaigns
Major Partners	
HE SPACE it's all about people	• In-kind & direct contributions, sponsoring of DH Dinner & goodies
Together ahead. RUAG	• Direct contribution
MED EL	• Marketing/Social Media support, direct contribution and invitation of key customers to the field
BÖHLER EDELSTAHL	• Development of the next Aouda helmet evolution 2015
AGROTEL®	• Development of the AMADEE-15 base station module

Minor Sponsors & Partners	
TECHNOLOGIE- UND WIRTSCHAFTSPARK INNSBRUCK	• Media partnership and direct contribution
fairrescue INTERNATIONAL	• Provision of first aid and general safety equipment
WGT ELEKTRONIK	• Manufacturing of electronics components for the spacesuit simulators
Oetner und Stanger Wir haben (*fast) alles.	• Donation of workshop Equipment for the base habitation module
EMPL AUSTRIA	• Fire fighting equipment
MATTRO	• Provision of a prototype for a 250kg rover

The Bock rover (provided by Mattro) was deployed for heavy-duty (up to 250 kg) cargo transportation in the field.

15. Professional observers

The Austrian Space Forum offered space agencies, industry and academia representatives the opportunity to participate as a professional observer at both the Mission Support Center in Innsbruck as well as at the field site at the Kaunertal glacier.

The Professional Observer Programme was intended for researchers, project managers and industry representatives for…

- …providing them with an **insight** into state-of-art European Mars analog research activities with a human-robotic and geosciences focus. AMADEE-15 included more than a dozen of research and engineering experiments, embedded in an operational environment managed by a dedicated Mission Support Center.
- …getting to **know the operational infrastructure** of the Austrian Space Forum and its partner organizations during an actual mission. This might be of interest for potential later cooperation or joint research activities.
- **…networking** with analog research-focused teams from industry and academia.

Important dates:

- **03Aug2015: "Landing Day"** – mission started; observers at the field test site
- **04Aug2015: "MSC Day"** – observers visited the MSC during actual operations.

The Professional Observers Opportunity is not open to the public or the media. There was dedicated OeWF personnel to guide the observers both at the MSC and the field test site and be available for questions. Safety and security measures were available on site according to OeWF standards. Registration deadline for the professional observers was 01May2015.

Professional observes:

- had access to the Mission Manifest detailing the mission infrastructure.
- were asked to sign a legal waiver when participating in the field and had a valid health insurance.

Name	Institution	EMail
Martin WEBER	TUM/LRT	m-ibk.weber@tum.de
Thomas USSMÜLLER	Univ. Innsbruck	thomas.ussmueller@uibk.ac.at
Manuel FERDIK	Univ. Innsbruck	Manuel.Ferdik@uibk.ac.at
Jürgen SEILER	Friedrich-Alexander-Universität Erlangen-Nürnberg	seiler@LNT.de
Jean-Pierre DE VERA	DLR / Institut f. Planetenforschung | Exp.Planetenphysik	jean-pierre.devera@dlr.de
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16. Junior researchers program

In cooperation with PLANSINN GmbH, an experienced provider of science education and under contract with the Austrian Federal Ministry for Transportation, Innovation and Technology, the Austrian Space Forum managed the Junior Researchers Program for AMADEE-15. 12 Austrian students and 2 Swiss students aged between 16 to 19 years joined the mission for two days along the professional observers program.

This innovative program of having students engaged in an actual Mars analog field mission is a pilot project studying the engagement mechanisms and efficiency of science communication in an innovative way.

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Project contract: BMVIT-621.119/0021-III/I2/2015 „Medienpädagogische Begleitung von Jugendlichen während der Marssimulation“.

JRP Training workshop, Innsbruck

In cooperation with PlanSinn GmbH and under contract with the Austrian Federal Ministry for Transportation, Innovation and Technology (fti-remixed initiative) the Junior Researchers Programme was implemented as part of AMADEE-15. Thirteen students from Austria and two from Switzerland aged between 16 to 20 got the chance to join the mission for two days and experience field research first hand both at the glacier and the MSC.

Sequence of events

Starting from May 2015 cooperation partners, like the Childrens University in Upper Austria, the Carinthian Economic Chamber, the Childrens University Innsbruck and the Swiss Space Museum, began to select the participants for the program. In July, as all the participants were chosen, the students got a short description of the experiments which were planned to be conducted on the glacier in order to pick one and 'adopt' it. Therefore, they established contact with the PIs of their experiments to learn about the respective experiments in depth. The purpose behind that was to encourage the participants to get in touch with researchers and to get to know them, so it will be easier to talk to them in person on the glacier.

On 02Aug2015, the participants started with a media workshop with a professional photographer. Followed by the Public Day, where the students had the opportunity to accompany the field crew on the glacier. After the general welcome speech the participants were able to telecommand the Dignity Rover, meet Analog Astronaut Stefan Dobrovolny, visit the Base Habitat, as well as see most of the experiments and talk to the PIs in person. The schedule was as follows:

08:00 - 10:00	Bus ride from Innsbruck to the Kaunertal glacier & presentations of experiments
11:30	Helmet closure: Gathering in front of the base station habitat & comments on the last steps of the donning process
12:00	Lunch in glacier restaurant
13:00	Steering the Dignity Rover
13:30	Meet&Greet with Stefan Dobrovolny
14:00	Visiting the base station & meeting field crew members
14:30	Break
15:00	Experiments station: Glacier-MASE, PULI-ROCKS, VEMES, Geoscience-Experiments, LICHEN, Cliffbot, MedEl
16:30	Departure

Dr. Alain Souchier / Association Planete Mars
explains the Cliffbot hardware to JRP participants

On 04Aug2015 the participants visited the MSC in Innsbruck where they learned about previous missions of the Austrian Space Forum and got an overview of the setup of the MSC. Furthermore, the day in the MSC offered the students the opportunity to wear a training version of the spacesuit gloves and test the VEMES experiment, to be shown around in the MSC where they could talk to the team members and to have a career talk with professionals, like Norbert Frischauf, Rudolf Albrecht or Petra Rettberg. The exact schedule is presented below.

09:30 - 10:00	Welcome
10:15 - 11:30	VEMES & spacesuit gloves
11:30 - 13:00	MSC tour
13:00 - 14:00	Lunch break
14:00 - 15:00	Career Talk
15:00 - 15:30	Reflection of the two days

After their participation in the mission the students act as space exploration ambassadors, sharing their experiences with a wider audience in their respective social and work environments.

JRP participant giving an interview to the Austrian Broadcoasting Cooperation ORF

Motivation

As already stated above, the main motivation behind implementing the Junior Researchers Program was to create young ambassadors who experience live a real Mars mission simulation and pass their impressions to others in their social environment. As a consequence, a wider audience, especially younger people, learn about AMADEE-15 and their interest in research should be aroused as it is more appealing to get information of someone that participated at the mission and who is around the same age as oneself.

In addition, the program also followed the goal to widen the knowledge of the participants regarding technology and research. The program aimed at enabling teenagers to

- get an insight in the field of space research,
- get to know scientists and observe them at their work,
- widen their knowledge of social media, photography and research

and to

- spread information about AMADEE-15,
- create more synergies with *fti...remixed* and
- set an example for participative science communication with teenagers,

all under the principles that communication between teenagers and adults takes place on an equal footing and that the teenagers are accompanied and coached by experts.

All in all the participants seemed to be very greatful that they had the unique opportunity to be part of the Junior Researchers Programme, which is summarized by a statement of one of the participants that reflects the opinion of most of them.

> '*I'm still deeply impressed with what I was able to witness at close range on the 3rd and 4th of August. Lots of the things I was allowed to see will accompany me through my life. The fascinating activity of the Austrian Space Forum will surely shape my future.'*
>
> - Michael Berghold