SCIENCE BEHIND THE SCENES: THE REMOTE SCIENCE SUPPORT (RSS) TEAM of AMADEE ANALOG MISSIONS. Ozdemir S.[1] and Grömer G.[1], [1]Austrian Space Forum (OeWF) (Etrichgasse 18, 6020 Innsbruck Austria (seda.ozdemirfritz@oewf.org) and (gernot.groemer@oewf.org).

Introduction: Simulating Mars Human-robotic surface activities in terrestrial analogs has evolved into an efficient tool for developing exploration mission architectures. The Austrian Space Forum has conducted 12 major international Mars simulations in Mars-like test sites ranging from the Northern Sahara, the Dhofar desert/Oman and others. These AMADEE missions (AMADEE-18 and AMADEE-20) test sites have been selected for their geological and topographic similarity to Mars and presents excellent opportunities to study equipment behavior and the analog as a model region for their Martian counterparts, develop platforms for testing life-detection or geoscience techniques and evolve know-how of managing human mission to Mars deploying a realistic model for Mission Support Center (MSC). The MSC is the centerpiece of the "Ground Segment" of the mission, interacting with numerous internal and external organizations and is the single point of contact for the field crew. Here, we present one of the core teams of MSC: the remote science support (RSS) team, their place in the mission architecture and their activities.

The Remote Science Support: The RSS team is composed of a lead, a deputy, coordinators and external researcher and each holds mission specific tasks and ensure the continuous scientific development of the mission. Hence, the RSS performs pre-, during, and post- mission activities.

In the preparation phase of the mission (pre-mission phase), the team is responsible for the scientific inputs, including the proposal selection process, managing the onboarding of external research teams into the operational environment of a mission and to provide scientific support selected experiments. Prior to the mission, the crew science training, e.g. geoscience training, cartography, mapping, scientific instrumentation, analog mission basic and advance training; procedure training such as following up of the protocols of the field experiments are the critical duties of the RSS. During the mission, the RSS is the center of scientific operations, where the science data received, analyzed and interpreted in near real-time. The RSS obtains responsibility of supporting experiments being conducted in the field as well as to represent research teams when they are not present during MSC. After data have been received and verified for integrity and completeness, RSS provides input to flight plan team and serves as a first point of contact for the field crew if problem emerge during the respective experiment conduct. Finally, post mission phase the team compiles and synergizes the scientific output of not only the mission experiments but also entire mission.

The AMADEE-18 Mars Analog Expedition took place in the Dhofar region in the Sultanate of Oman between February 1 and February 28, 2018 with selected crew of 16 researchers and engineers and approximately 200 team members from 25 nations [1]. During this mission, 15 peer-review selected experiments in the fields of engineering, planetary surface operations, astrobiology, geosciences, life science performed. This mission presents crucial experienced on evaluation of the successful deployment of EVA during the mission, application of a serial node distribution of the RSS to achieve integral tasks and application of different communication methods to achieve the best approach (e.g. Slack channel) [2].

The AMADEE-20 will be held in Ramon Crater-Negev Desert, Israel between October 4 and October 31, 2021. Based upon the lessons learned of AMADEE-18 and 12 prior simulated missions, we evaluate the role of RSS team in AMADEE-20 mission. Hereto, 20 peer reviewed experiments were chosen, and interacted with the crew via the RSS. Based on expected experiment data output the scientific background of each experiment is consolidated, possible network and collaborations have been provided between different experiment groups and data delivery is defined by developing workflows.

Exploration Cascade is OeWF's mission algorithm which was developed during AMADEE-18 [3] and defines the sequence of measurements for pursuing pre-defined scientific questions by taking in to account the limitations of the mission [4]. This exploration cascade aims to maximize the scientific output and present reliable and robust workflows by decreasing the efficiency of the deployment of instruments for future human Mars mission. This practical tool simply guides RSS on when and where to deploy instruments; expected data transfer (timing, type, accuracy) and data processing pipeline which leads to decision-making process of the flight planning teams.

References: [1] Lalla E. A. et al. (2020) JSSE, 8:1, 75-85. [2] Groemer G. et al. (2020) Astrobiology 20:11, 1276-1286. [3] Garnitschnig S. (2018) BSc Thesis, Univ. of Innsbruck, 47. [4] Groemer G. and Ozdemir S. (2020) Front. Astron. Space Sci. 7:32.