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SUPAERO MDRS ANALOG MISSION : STUDENTS' FIRST STEP INTO SPACE

Abstract

For the past 10 years, students from ISAE-Supaero, a French university in aerospace engineering, have been performing analog space missions at the Mars Desert Research Station (MDRS) in Utah, USA. Fully student-run, these yearly missions represent an opportunity for students to get hands-on experience in space research, acting as on-site operators for studies offered by laboratories and researchers who wish to test their equipment and/or protocols in an ICE (Isolated, Confined, Extreme) environment. Recurring members of the project (Crew members returning as commanders or members of the ground control team)

have been confronted to these evolutions, and witness how new teams are shaped. As recurring studies are transmitted from crew to crew, gradually building researchers' confidence and trust in the initiative, it is important to quantify the project's impact on space sciences and the improvements made over the years. This quantification is made complex by the multi-faceted nature of the initiative's evolution: increasing scientific coherence, improving simulation quality (ex. testing a simulated power regulation interface), astronaut time optimization, amount of data gathered, publications, increasing number of correspondents, and others.

This type of student-led research mission is beneficial to both the students and contributing researchers. Students, on the one hand, with the support of their university, have the opportunity to fully organize and form their own research team, coordinating studies spanning various fields (currently: Human Factors, Technology, Space Physiology). Contributing researchers, on the other hand, gain access to qualitative data gathered in an ICE environment, such as MDRS in the case of the ISAE-Supaero initiative. The collected data has been compared to measurements taken in other analog settings (ex. LUNARES) and in the International Space Station. Most notably, the Orbital Architecture study was first implemented at MDRS by a Supaero Crew (2023), improved based on feedback and data provided by the students, and the new iteration was then conducted in the ISS by ESA astronaut Marcus Wandt. For researchers, this is an opportunity that allows them to have engineering students with solid scientific backgrounds as operators and/or subjects of their studies. The crew dynamic that is created each year, closely monitored by standardized questionnaires and core data sets, is especially valuable for Human Factors experiments in confined settings. A system of yearly crew rotations allows subsequent teams to grow from the past teams' experiences and difficulties encountered, highlighting the potential benefits of standardized analog mission initiatives.