

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Behaviour, Performance and Psychosocial Issues in Space (1)

Author: Ms. Veronica Martin Estrana
SUPAERO- Ecole Nationale Supérieure de l'Aéronautique et de l'Espace, France,
veronica.martin-estrana@student.isae-superaero.fr

Ms. Federica Vagnone
SUPAERO- Ecole Nationale Supérieure de l'Aéronautique et de l'Espace, France,
federica.vagnone@student.isae-superaero.fr

Dr. Raphaëlle N. Roy
ISAE-Superaero University of Toulouse, France, raphaelle.roy@isae.fr

Prof. Stéphanie Lizy-Destrez
SUPAERO- Ecole Nationale Supérieure de l'Aéronautique et de l'Espace, France,
stephanie.lizy-destrez@isae.fr

TELEOP: IMPACT OF CONFINEMENT AND ISOLATION ON CREW PERFORMANCES DURING
LONG-DURATION MISSIONS

Abstract

In the last decades, most space agencies have been focusing on manned flight missions. Therefore, to ensure the success of long-term space mission, new factors like confinement and isolation need to be studied. The TELEOP project investigates these effects on crew's performance during Human-Robot Interactions (HRI), such as cargo docking operations or remote control of a rover for surface exploration of the Moon or Mars.

Confinement implies living in narrow spaces with limited privacy, those conditions mostly characterize human space missions. In order to study its impact, TELEOP has conducted several analog mission campaigns, MDRS-189 (Utah desert) and Ares-II (in Lunares, Poland). The subsequent mission will soon be carried out in the IBMP (Institute of Bio-Medical Problems of Moscow) NEK (In Russia) facility during SIRIUS-19 campaign, with the collaboration of NASA, and the next MDRS-206 expedition. In the following years, the aim is to run the experiment in more realistic and confined environments: the ISS and the Concordia station in Antarctica.

In order to assess confinement and isolation and their impact on teleoperation performance, an innovative protocol has been designed. This enables us to have a complete overview on factors linked to teleoperation performance (execution time and accuracy), such as participant's personality, physiological and psychological traits.

Teleoperation performance was evaluated for the guidance of a rover, a task that was performed by each crew member several times per mission. During the task, physiological activity was recorded using an ECG (Electrocardiogram) , whereas assessment of both physiological and personality aspects were performed using questionnaires. The latter two intended to assess the mood, motivation, confinement feeling and subjective effort.

As a result of the analysis of the data gathered during both the MDRS-189 and Ares-II missions, important results were uncovered. The main finding demonstrated a dependency between motivation

and positive feelings or personality and confinement . Moreover, the outcomes showed a strict link of relatedness with confinement and teleoperation performance.

Thanks to this unique approach in studying the impact of confinement in such realistic environments, TELEOP allows us to learn more about this unexplored field and consequently to better prepare for future missions to Mars and to the Moon.