

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

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NEW ANALOG MISSIONS FOR NEW SETTLEMENT CHALLENGES ON THE MOON AND
BEYOND.

Abstract

Space agencies have long established analog missions to understand, simulate and prepare for space missions. In recent years, the new leads for human space exploration and long-term settlement on the Moon (e.g. Moon village), have highlighted new needs both in terms of human adaptation and autonomy over extended periods and the design of their habitat and environment. Thus, new challenges are to be met in terms of astronaut recruitment, training, team management and leadership, but also in the design of living quarters. To address these challenges, we propose a new methodology of analog missions and scientific studies to better understand and prepare future long-duration lunar missions.

The objective of this paper is to present the methodology for setting up a new type of analog mission scenario that is distinguished by its natural environment: a large cave; by the number of people participating in the mission: 15 equal numbers of women and men (excluding the expedition leader); and by the integrative and global approach of the scientific studies conducted. Thus, the Deep Time mission (2021) consisted of a voluntary confinement of 15 people for 40 days the Lombrives cave (France), without access to sunlight or any temporal indicators. The aim was to understand the mechanisms of temporal cognitive perception and the biological and social synchronisation capacity of a group in a situation of temporal anomie. And more generally their capacity to adapt.

Beyond the results of studies in cognition, physiology, sensoriality and emotional state, and mental aptitudes, we will endeavour to present here the first results on the efficiency of the organisational system opening the door to new similar missions. We observed several major results. (i)The importance for team members to live in a natural environment and the ability to explore it, especially regarding the wonder that this brings to the team members. (ii)The ways in which leadership is exercised are essential to cope with the different emotional phases and their implications in terms of coordination experienced within the mission. (iii)The number of team members and gender equality is an essential asset for the success of the mission, as human ethology studies first results suggest. (iv)The absence of a permanent communication link with the logistic team outside the cave is not a hindrance over a medium period and, on the contrary, it helps to build and project a new life in a new environment.