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HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Human Exploration of Mars (2)

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# FACIAL INDICATORS AS A MECHANISM FOR PREDICTION OF PERFORMANCE AND STRESS DURING A FOUR MONTH HI-SEAS MARS SIMULATION

**Abstract**

The second Hawaii Space Exploration Analog Simulation (HI-SEAS) has a crew of six researchers who will live and work within an isolated habitat located on the slopes of the active Mauna Loa volcano simulating a Martian mission. The crew will perform a variety of mission activities such as: extra vehicular activities (EVAs), geological sampling, habitat maintenance, and exploration of the surrounding area. During the four month mission crew will experience stresses such as isolation, limited resources, delayed communications, and psychosocial factors increasing the realism of the simulation.

The simulation provides a platform to monitor the crews' performance and stress level as it relates to facial changes that occur during of the four month simulation. Changes in facial features may occur due to the unique environment and may be linked to specific stressor such as confinement, isolation, increased or decreased stress, workload, and biomedical conditions. Changes will be measured through photographic images taken periodically throughout the simulation, twice weekly and pre/post EVA. These images will be analyzed focused on specific facial features such as eyes, cheeks, nose, lips, and jawline looking for correlations to performance.

Measures of physical and cognitive performance will be measured twice weekly with a series of exercises and cognitive testing. These tests will be given scores based on the outcome to correlate the performance level of the participant at the time of the photographic data collection. Physical data on health will be collected through a general health survey and vital signs and will be done with any photographic data collection.

Development of passive predictive measures for performance and general health through facial monitoring could lead to more efficient and viable indicators for crew readiness throughout a long duration mission. By gaining a better understanding of the general changes associated with isolation measures can be developed to better predict performance readiness for long duration space and planetary missions.