Determining Key Contributors to the Maintenance and Regulation of Team Function and Performance on Long Duration Exploration Missions at the HI-SEAS Habitat

K. A. Binsted; W. Bedwrll; B. Caldwell; A. Doumas; J. B. Hunter; S. W. J. Kozlowski; C. A. Miller; P. Roma; B. Shiro

HI-SEAS (Hawaii Space Exploration Analog and Simulation, hi-seas.org) is a small habitat on an isolated Mars-like site on the Mauna Loa side of the saddle area on the Big Island of Hawaii at approximately 8200 feet above sea level. HI-SEAS is unique, in addition to its setting in a distinctive analog environment, as:

- We select the crew to meet our research needs (in serendipitous analogs, such as Antarctic stations, crew selection criteria are not controlled by researchers).
- The conditions (habitat, mission, communications, etc.) are explicitly designed to be similar to those of a planetary exploration mission.
- The site is accessible year round, allowing longer-duration isolated and confined environment studies than at other locations.
- The Mars-like environment offers the potential for analog tasks, such as geological field work by human explorers and/or robots.

The ability to select crew members to meet research needs and isolate them in a managed simulation performing under specific mission profiles makes HI-SEAS ideal for detailed studies in space-flight crew dynamics, behaviors, roles and performance, especially for long-duration missions.

Over the next three years, we will measure and track the factors expected to have significant impacts on team function and performance, and assess that impact, over three high-autonomy missions of differing durations (four, eight, and twelve months). During crew selection for each mission we will measure participants' cognitive capacities, communication skills, preferred communication strategies, interpersonal strategies, coping strategies, mission and crew role specific knowledge, and planning and collaborative problem solving ability. During the missions we will monitor crew communication, communication strategies, crew coping strategies, crew work load and job sharing, and conflict resolution and conflict management, as well as taking several measures of crew performance. Finally, we will examine how each of the factors affects crew performance during the missions.

In addition to the above research, we are recruiting 'opportunistic' projects to be carried out over these three missions. These projects must: a) address NASA's goals; b) require a long-duration simulated mission to be carried out and c) not interfere with the primary research. Not only will these projects allow us to maximize the science return of the HI-SEAS missions, but they will also provide extra opportunities to assess crew performance.

At the time of writing this abstract, we are in the process of selecting the pool of crew candidates from which we will select all three crews. The next stage is to select the six participants who will form the first crew. We expect the first mission to begin in late February 2014.

Figure 1: The HI-SEAS habitat on Mauna Loa, with Mauna Kea in the background.