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IAF SPACE POWER SYMPOSIUM (C3)
Space Power System for Ambitious Missions (4)

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# MARS HABITAT POWER CONSUMPTION CONSTRAINTS, PRIORITIZATION, AND OPTIMIZATION

**Abstract**

The Hawaii Space Exploration Analog and Simulation (www.hi-seas.org) is an experiment that simulates life in a Mars habitat for long duration and is currently in its sixth mission. Power for the simulation is generated by solar energy which varies in production rates daily. During days with cloud cover, crew need to adapt their work schedule and support systems to ensure they can continue to function over the duration of low power constraints. Presented here is the method developed and implemented by the crew from Mission V that creates power budget profiles for low, moderate, and high-power production days. The power budget profile dictates which systems and devices can be used and for what duration. The HI-SEAS systems are characterized though power audits and data from daily use trends. Developed tools to enable prioritization of components for crew-member usage and compliance with restrictions are discussed. Through this an optimization method is outlined which would enable the habitat systems to discover and modify the most efficient power usage profiles. This work is applicable to most manned space systems with the goal of providing the most optimal power consumption in a variety of conditions.