Paper ID: 66586
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19th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Systems (2A)

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TESTING EXPLORATION ECLSS ON ISS

Abstract

NASA is using the International Space Station (ISS) to test the Environmental Control and Life Support Systems (ECLSS) needed for a lunar surface habitat and a Mars transit habitat. These habitats are planned for launch around 2030. To sustain long missions such as a roundtrip to Mars – which could take three years – the life support systems must be highly reliable to reduce maintenance and the mass of spare parts that must be brought from Earth. Reliability testing of ECLSS subsystems will be done on ISS in parallel with integrated system testing on the ground.

The ECLSS technologies being demonstrated include scrubbers to remove carbon dioxide from the air, oxygen generation and recovery, wastewater processing, a compact toilet, radiation sensors, environmental monitoring instruments to detect trace gas contaminants, and a miniature DNA sequencer to identify the bacteria species on board. Autonomous systems technologies will be used to detect and recover from faults, to predict when maintenance will be needed, and to improve overall system performance and reliability. The system performance goals are to recycle 98

Technologies and methods to ensure crew health and performance will also be demonstrated on ISS. These include food production from crops grown in space, exercise countermeasures to keep the crew fit, and exploration medical capabilities to keep them healthy.