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NASA HABITATION SYSTEMS CAPABILITY GAP CLOSURE PLANS AND PROGRESS

**Abstract**

Over the past year, NASA has refined its capability gaps to align with latest exploration architecture and mission planning and identified test and validation platforms needed to close those gaps. Habitation systems including life support, environmental monitoring, fire safety, logistics management, and crew health systems encompass a large percentage of these critical capability gaps. Complemented by ground tests and analogs, the International Space Station (ISS) remains the key enabling platform for the evolution and testing of these habitation systems. The ISS provides a permanently-crewed microgravity environment necessary for demonstration of performance and long-duration reliability of these systems before they are deployed into habitation elements for lunar and Mars missions. Although the ISS systems have successfully supported a crew of six for more than 10 years, improvements and additional capabilities are necessary to increase reliability, further close the air and water recovery loops, and reduce consumables and dependence on ground resupply. Evolution of the ISS systems into deep space exploration-capable systems is underway, with plans to conduct integrated testing for the duration of the ISS lifetime. This paper will provide an update of NASA's habitation system capability gaps, closure plans, and current progress.