

Exploration Mission Benefits From Logistics Reduction Technologies

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Technologies that reduce logistical mass, volume, and the crew time dedicated to logistics management become more important as exploration missions extend further from the Earth. Even modest reductions in logistical mass can have a significant impact because it also reduces the packaging burden. NASA's Advanced Exploration Systems' Logistics Reduction Project is developing technologies that can directly reduce the mass and volume of crew clothing and metabolic waste collection. Also, cargo bags have been developed that can be reconfigured for crew outfitting, and trash processing technologies are under development to increase habitable volume and improve protection against solar storm events. Additionally, Mars class missions are sufficiently distant that even logistics management without resupply can be problematic due to the communication time delay with Earth. Although exploration vehicles are launched with all consumables and logistics in a defined configuration, the configuration continually changes as the mission progresses. Traditionally significant ground and crew time has been required to understand the evolving configuration and to help locate misplaced items. For key mission events and unplanned contingencies, the crew will not be able to rely on the ground for logistics localization assistance. NASA has been developing a radio-frequency-identification autonomous logistics management system to reduce crew time for general inventory and enable greater crew self-response to unplanned events when a wide range of items may need to be located in a very short time period. This paper provides a status of the technologies being developed and their mission benefits for exploration missions.

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