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THE INTERNATIONAL SPACE STATION AS A PLATFORM FOR ADDRESSING SUSTAINABILITY
AND GLOBAL SOCIETAL ISSUES

Abstract

The International Space Station (ISS) U.S. National Laboratory is enabling a new era of research in space to improve life on Earth—spanning the areas of life sciences, physical sciences, remote sensing, technology development, and education. The purpose of this paper is to expand understanding of how the unique capabilities provided by the ISS National Lab facilitate sustainability innovation. This paper will review cases in which access to the space environment and facilities onboard the ISS National Lab helped to catalyze solutions to address sustainability issues on Earth, with the goal of spurring additional opportunities for partnerships and research aimed at developing space-based sustainability solutions from low Earth orbit (LEO).

Like other satellites, the Earth observation sensors onboard the ISS have and will continue to provide valuable data for addressing various sustainability and societal issues. Democratization of LEO imagery further enables use of this data by a diverse group, including commercial fisheries, water resource management organizations, and public health organizations.

The truly unique value provided by the ISS National Lab, however, is the ability to conduct science experiments that take advantage of the space environment, particularly microgravity. Texas-based Cemsica is currently developing a new approach to synthesize de novo nanoporous membranes using calcium-silicate particles to separate CO₂ molecules from the air or post-combustion gases. Insights gained from the company's experiment conducted in the microgravity environment of the ISS National Lab could ultimately significantly improve membrane technologies on Earth, providing a low-cost separation technology that is more energy-efficient, stable, and durable and demonstrates exceptional CO₂ selectivity.

There is tremendous opportunity in partnerships between the ISS National Lab and technology providers (entrepreneurs and academics) and sponsoring entities (corporations and organizations with social responsibility goals). For example, the ISS Cotton Sustainability Challenge, resulting from a partnership between the ISS National Lab and Target Corporation, solicited ideas for ISS experiments to address sustainable cotton production and conservation of Earth's water resources in agriculture.

Lastly, in addition to terrestrial applications, the ISS National Lab is uniquely positioned to address sustainability issues in space, such as orbital debris and space situational awareness. There is great potential in thinking creatively and taking advantage of the unique environment, facilities, and accessibility to space provided by the ISS National Lab and its partners for developing innovative technology and solutions to address sustainability and global societal issues of all kinds.