

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3) Space Station Utilization (3)

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INTERNATIONAL SPACE STATION ACCOMPLISHMENTS UPDATE: SCIENTIFIC DISCOVERY, ADVANCING FUTURE EXPLORATION, AND BENEFITS BROUGHT HOME TO EARTH

Abstract

Throughout the history of the International Space Station (ISS), crews onboard have conducted a variety of scientific research and educational activities. Well into the second year of full utilization of the ISS laboratory, the trend of scientific accomplishments and educational opportunities continues to grow. More than 1500 investigations have been conducted on the ISS since the first module launched in 1998, with over 700 scientific publications. The ISS provides a unique environment for research, international collaboration and educational activities that benefit humankind. This paper will provide an up to date summary of key investigations, facilities, publications, and benefits from ISS research that have developed over the past year. Discoveries in human physiology and nutrition have enabled astronauts to return

from ISS with little bone loss, even as scientists seek to better understand the new puzzle of “ocular syndrome” affecting the vision of up to half of astronauts. The GeneLAB campaign will unify life sciences investigations to seek genomic, proteomic, and metabolomics of the effect of microgravity on life as a whole. Combustion scientists identified a new “cold flame” phenomenon that has the potential to improve models of efficient combustion back on Earth. A significant number of instruments in Earth remote sensing and astrophysics are nearing completion for launch, making ISS a significant platform for understanding of the Earth system and the universe.

In addition to multidisciplinary research, the ISS partnership conducts a myriad of student led research investigations and educational activities aimed at increasing student interest in science, technology, engineering and mathematics (STEM). Over the past year, the partnership compiled new statistics of the educational impact of the ISS on students around the world. More than 43 million students, from kindergarten to graduate school, with more than 28 million teachers located in 49 countries have participated in some aspect of ISS educational activities. These activities include student-developed investigations, education competitions, classroom versions of ISS investigations, participating in ISS investigator experiments, ISS hardware development, educational demonstrations, and cultural activities. Through the many inquiry-based educational activities, students and teachers are encouraged to participate in the ISS program thus motivating the next generation of students to pursue careers in STEM.