RESULTS AND OPPORTUNITIES—THE DECADE OF UTILIZATION

1st Annual ISS Research and Development Conference

Edited by
Julie A. Robinson
David B. Spencer

American Astronautical Society

Volume 114
SCIENCE AND TECHNOLOGY SERIES

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The 1st Annual ISS Research and Development Conference was organized by the American Astronautical Society in cooperation with the Center for the Advancement of Science in Space Inc. (CASIS) and NASA.

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Front Cover Illustration:

S119-E-009662 (25 March 2009) — Backdropped by a blue and white Earth, the International Space Station is seen from Space Shuttle *Discovery* as the two spacecraft begin their relative separation. Earlier the STS-119 and Expedition 18 crews concluded 9 days, 20 hours and 10 minutes of cooperative work onboard the shuttle and station. Undocking of the two spacecraft occurred at 2:53 p.m. (CDT) on March 25, 2009. Photo credit: NASA.


1ST ANNUAL ISS RESEARCH AND DEVELOPMENT CONFERENCE
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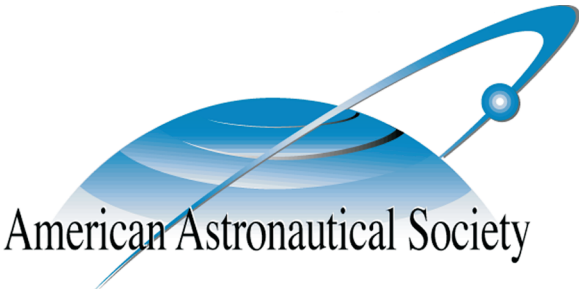

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A Supplement to Advances in the Astronautical Sciences

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FOREWORD

The 1st Annual ISS Research and Development Conference—Results and Opportunities: The Decade of Utilization showcased the remarkable results obtained so far through ISS research. The highly successful ISS R&D conference held in Denver, Colorado on June 26–28, 2012 hosted approximately 400 participants from government, industry, academia and venture capitalists. The conference highlighted exciting science and technology results from ISS investigators from universities, medical centers, commercial organizations, international organizations, NIH, DOE, NRL, USDA, EPA, NIST, DOD and NASA.

The event highlighted the full breadth of research and technology development on the ISS—past, present and future. Because most scientific conferences focus on one discipline, this was a highly anticipated opportunity for attendees to hear results from multidisciplinary ISS studies in the areas of physical and life sciences, biology and biotechnology, Earth and space sciences, spacecraft and exploration systems technology demonstrations, and education.

Plenary sessions highlighted major results and pathways to future opportunities. Panels also discussed upcoming ISS research opportunities through both NASA and CASIS (Center for the Advancement of Science in Space, the new ISS National Laboratory management organization) that will enable researchers from all over the world to put their talents to work on innovative experiments that could not be done anywhere else. Parallel technical sessions provided tracks for scientists and technologist to be updated on significant accomplishments to date within their disciplines.

The Opening Session began with a welcome message from Frank Slazer, President of AAS, and Industry Remarks by John Karas, Vice President and General Manager Lockheed Martin Space Systems Company. ISS crew members Don Pettit and Joe Acaba kicked off the conference with a video message from on orbit, describing the unique microgravity environment and research capabilities of this remarkable laboratory.

Opening remarks and keynote speakers included NASA Associate Administrator for Human Exploration and Operations, William Gerstenmaier, NASA Chief Scientist, Waleed Abdalati, and International Space Station Program Manager, Michael Suffredini. Their presentations echoed the three major themes of new knowledge resulting ISS research. Those themes include benefits to life on Earth, benefits to future space exploration, and basic discovery.

Luncheon speakers, Astronaut Mike Fincke and Cosmonaut Sergey Adveev entertained attendees with their first-hand accounts of living and working in space. Fincke concluded with an inspiring message for the audience, “Do something amazing!” Andrei Kounine, Principal Research Scientist at MIT presented a status on results from the first 18 billion cosmic rays that have been detected from the Alpha Magnetic Spectrometer (AMS). The first day concluded with a reception at the Denver Museum of Nature and Science.

ISS Program Scientist Julie Robinson moderated a discussion panel that highlighted some of the top research and technology results from the assembly and early utilization phases of the ISS. Varied topics discussed included protein crystallography that has led to potential drug therapies for Duchenne muscular dystrophy, mechanisms and treatments of infectious diseases such as salmonella, hyperspectral remote sensing of the Earth, spacecraft fluid management via capillary flow and recent developments in astronaut vision health.

In a panel discussion on "enabling exploration beyond Earth orbit," moderated by ISS Technology Demonstration Manager George Nelson, presenters described exploration technologies in development and testing on ISS, such as the Robot Refueling Mission (RRM) which is paving the way for robotic refueling and repair of satellites and vehicles. Other presentations included spacecraft life support technologies, environmental life support systems, and testing of new modes of communication between Earth and ISS using lasers.

Throughout the conference, 19 parallel technical sessions provided investigators an opportunity to share the results of their ISS experiments and update attendees on significant accomplishments in their field to date. These sessions kept the community informed on findings, while also providing inspiration for future areas of research. The sessions included papers on Human Research, the SPHERES Facility, Communications & Navigation Technologies, Space Science on ISS, Plant Biology in Space, Biotechnology, Materials Science & Combustion Science, Spacecraft Systems Technology, Technical Earth Imaging, Fundamental Physics, Technologies for Exploration Applications, Earth Science, Cell Biology & Tissue Engineering, Human Exploration, Education, Small Business & Innovative Research Successes, Animal Biology in Space, Robotics and Fluid Physics.

A New Investigators Workshop was held to help new investigators understand how to build partnerships and get their experiment to the ISS. Vendor and Implementation Partner displays were available throughout the day.

The Conference was organized by the American Astronautical Society (AAS) in cooperation with CASIS and NASA. The Conference Executive Chairs were Walt Faulconer, AAS, and Donna Shortz, NASA. The Conference Technical Chairs were David Spencer, Pennsylvania State University, and Julie Robinson, NASA. The Conference Planning Committee included:

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Julie A. Robinson
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Volume Editors

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