Challenges Facing US Leadership in Space Biological and Physical Sciences Research

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Core Area: U.S. Research in Fundamental Biological and Physical Sciences

During its more than 50-year history, NASA’s success in human space exploration has depended on the agency’s ability to effectively address a wide range of biomedical, engineering, physical science, and related obstacles, an achievement made possible by NASA’s strong and productive commitments to life and physical sciences research for human space exploration, and by its use of human space exploration infrastructures for scientific discovery on earth. However, over the years the agency has evolved away from this heritage because of budgetary commitments to operations and engineering programs. Of the $18B NASA budget, life and physical science research receives about $60M. This funding level is 1/5 of the budget the research had 10 years ago. The program was significantly reduced in scale and scope to help cover the cost of a vehicle build program called “Constellation”. As a result, the agency remains poorly positioned to take full advantage of the scientific opportunities offered by International Space Station, and other space-based platforms. Despite the recommendations by the National Research Council of the National Academies in 2011 to reinvigorate the community, NASA provides no clearly articulated strategic programmatic support to this research. The research increases STEM opportunities across the U.S. In 2004, there were over 4,500 scientists and students engaged in this research. Today there are 85% fewer U.S. students and scientists doing this discovery based biological and physical sciences research in space. This has reduced the pipeline at a critical time when ISS is open for business, yet the research community has been diminished. More concerning is the lack of crew time available to do research on the ISS. The life and physical science research currently is placed at the lowest priority to receive this precious ISS resource.

This space research has applications in reproductive biology, microbial drug resistance and virulence, agriculture, fluid physics, combustion, and materials science. Renewing our commitment to this research allows the U.S. to take advantage of the rapid advances in bio-analytics and bioinformatics. The research 1) enables space exploration. It is scientific research that is needed to develop advanced exploration technologies and processes, and 2) is enabled by access to space. It is scientific research in the life and physical sciences that takes advantage of unique aspects of the space environment to significantly advance fundamental scientific understanding. Thanks to Congress, some restoration has occurred, but still the step needs to be taken to formalize the science as a stand-alone programmatic entity within NASA.

Recommended Actions:

✦ Articulate to NASA, the importance of a discovery based space biological and physical sciences ground and flight research program as an integral part of the overall NASA science mission.

✦ Question NASA – Why is the space biological and physical sciences not a program with the agency? Why does it reside within the jurisdiction of the ISS program? What is the strategic plan for life and physical science research at NASA?

✦ Direct NASA to renew its commitment to life and physical science research by re-establishing a program with clear programmatic strategies, based on input from the NRC Life and Physical Science Decadal Study, and the external scientific community.

✦ Fully support the house NASA FY15 Authorization H.R.810, section 718 language

✦ Articulate the importance to make life and physical science research a priority on the ISS.

About the Organization

The American Society for Gravitational and Space Research (ASGSR), founded in 1984, provides a forum to foster research, education and professional development in the multidisciplinary fields of gravitational research. ASGSR brings together a diverse group of scientists and engineers from academia, government and industry to promote research, education, training and development in the areas of space biology and physical science research. The knowledge gained leads to a better understanding of gravity on living and physical systems on Earth and enables space exploration.

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