

Human Exploration Science Office (KX)

Overview

Tracy A. Calhoun, Manager

<http://ares.jsc.nasa.gov/ares/exploration/index.cfm>

The Human Exploration Science Office supports human spaceflight, conducts research, and develops technology in the areas of space orbital debris, hypervelocity impact technology, image science and analysis, remote sensing, imagery integration, and human and robotic exploration science.

NASA's Orbital Debris Program Office (ODPO) resides in the Human Exploration Science Office. ODPO provides leadership in orbital debris research and the development of national and international space policy on orbital debris. The office is recognized internationally for its measurement and modeling of the debris environment. It takes the lead in developing technical consensus across U.S. agencies and other space agencies on debris mitigation measures to protect users of the orbital environment.

The Hypervelocity Impact Technology (HVIT) project evaluates the risks to spacecraft posed by micrometeoroid and orbital debris (MMOD). HVIT facilities at JSC and White Sands Test Facility (WSTF) use light gas guns, diagnostic tools, and high-speed imagery to quantify the response of spacecraft materials to MMOD impacts. Impact tests, with debris environment data provided by ODPO, are used by HVIT to predict risks to NASA and commercial spacecraft. HVIT directly serves NASA crew safety with MMOD risk assessments for each crewed mission and research into advanced shielding design for future missions.

The Image Science and Analysis Group (ISAG) supports the International Space Station (ISS) and commercial spaceflight through the design of imagery acquisition schemes (ground- and vehicle-based) and imagery analyses for vehicle performance assessments and mission anomaly resolution. ISAG assists the Multi-Purpose Crew Vehicle (MPCV) Program in the development of camera systems for the Orion spacecraft that will serve as data sources for flight test objectives that lead to crewed missions.

The multi-center Imagery Integration Team is led by the Human Exploration Science Office and provides expertise in the application of engineering imagery to spaceflight. The team links NASA programs and private industry with imagery capabilities developed and honed through decades of human spaceflight, including imagery integration, imaging assets, imagery data management, and photogrammetric analysis. The team is currently supporting several NASA programs, including commercial demonstration missions.

The Earth Science and Remote Sensing Team is responsible for integrating the scientific use of Earth-observation assets onboard the ISS, which consist of externally mounted sensors and crew photography capabilities. This team facilitates collaboration on remote sensing and participates in research with academic organizations and other Government agencies, not only in conjunction with ISS science, but also for planetary exploration and regional environmental/geological studies.

Human exploration science focuses on science strategies for future human exploration missions to the Moon, Mars, asteroids, and beyond. This function provides communication and coordination between the science community and mission planners. ARES scientists support the operation of robotic missions (*i.e.*, Mars Exploration Rovers and the Mars Science Laboratory), contribute to the interpretation of returned mission data, and translate robotic mission technologies and techniques to human spaceflight.

Reports on several projects are given in the following pages.