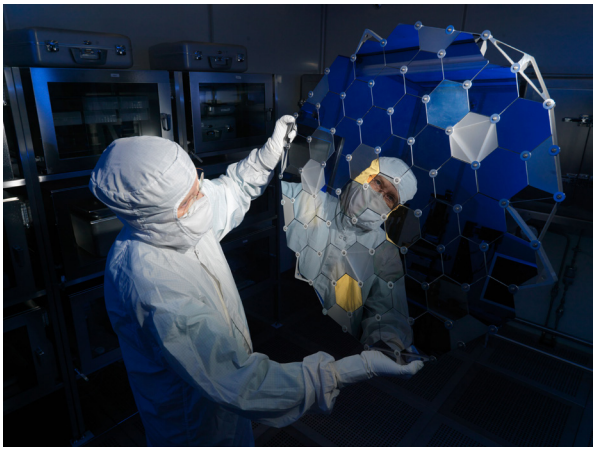
National Aeronautics and Space Administration

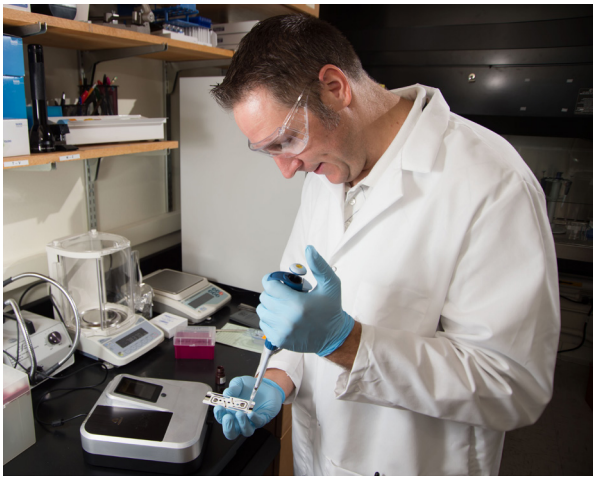
NASAfacts

Astromaterials Research & Exploration Science

The Astromaterials Research and Exploration Science Division, or ARES, combines scientific and engineering expertise to advance knowledge of potential exploration destinations, to integrate terrestrial and planetary science research, to extend extraterrestrials curation capabilities, and to promote success for operational spacecraft by mitigating risk. We are agency leaders in the formulation and operation of robotic and human exploration missions, making possible a sustainable presence beyond Earth.



Solar wind collector, Genesis Mission.



Biomolecular sequencing.

Astromaterials Curation

ARES is NASA's curation team, originating with care, analysis, and lunar expertise for Apollo and NASA's first astromaterials sample collection. We now curate the largest and most comprehensive collection of extraterrestrial samples in the world, with materials from the moon, Mars, the sun, asteroids, comets, other stars, and space-exposed hardware. We develop technologies and techniques to curate and study samples from challenging destinations, including organic-rich asteroids, icy worlds and comets, and Mars.

Planetary Research

ARES specializes in the study of extraterrestrial materials through both laboratory and mission-based research. We are home to a unique, state-of-the-art laboratory suite designed for sample science. The facility is a national resource for scientists across the country, as well as the world, many who partner with us on ground-breaking scientific investigations and discoveries.

Exploration Missions

ARES is a member of several mission teams, constructing and operating spacecraft and sensors. We provide planetary expertise in the definition of mission objectives, spacecraft designs, suit and tool designs, and operating protocols. We provide applied science services to missions, including remote sensing, imagery science and analysis, orbital debris environment predictions, spacecraft debris risk assessments, and spacecraft shielding.

Our Partnerships

Our partners include human and robotic mission programs and teams across the agency as well as academia, commercial spaceflight companies, other federal agencies, foreign agencies, research institutions, and national laboratories. Our scientific collaborations number in the hundreds, most of them representing international teams.

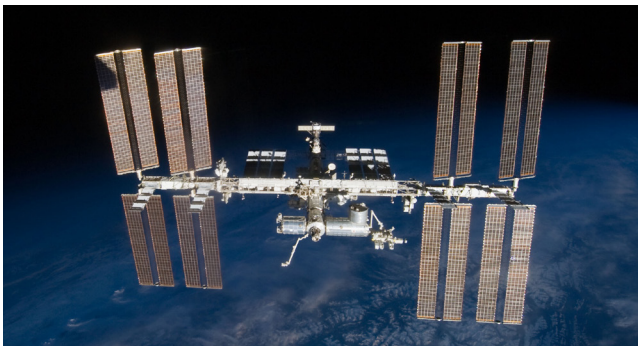
Science Operations

ARES pioneered science operations for human missions through support to Apollo, which has been extended to all subsequent crewed missions, including the International Space Station and Orion missions. We integrate the science operations of Earth sensors onboard the International Space Station and lead the acquisition of Earth imagery by astronauts. We populate Mars mission teams, including the Curiosity, Opportunity and Mars 2020 rovers. We are also integrated into science teams for asteroid missions including Origin's Spectral Interpretation Resource Identification Security Regolith Explorer, or OSIRIS-REx, and Hayabusa2. We lead the development of sensors to enhance the scientific return of planetary exploration, leveraging the International Space Station as a proving ground as needed.

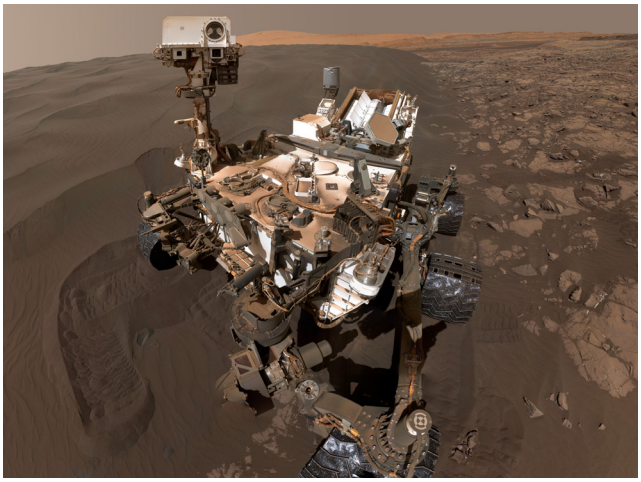
Applied Science Services to Missions

Our unique integrated team of scientists and engineers also provide mission enabling services. We are NASA's designated team for characterizing the orbital debris environment through space-based payloads, ground-based observatories and radar facilities, laboratory studies, and modeling. We use our environmental knowledge to estimate risk to spacecraft and to guide vehicle design to mitigate risk, taking advantage of our in-house development of shielding technology.

Our image analysis team provides real-time support to the International Space Station to assess vehicle condition, configurations, performance, and mission events. The team leads the vision for Orion imaging capabilities to provide real-time insight in to vehicle performance. We specialize in in-flight spacecraft inspections as well as integration of imagery acquisition and assessment, from launch through Earth return.

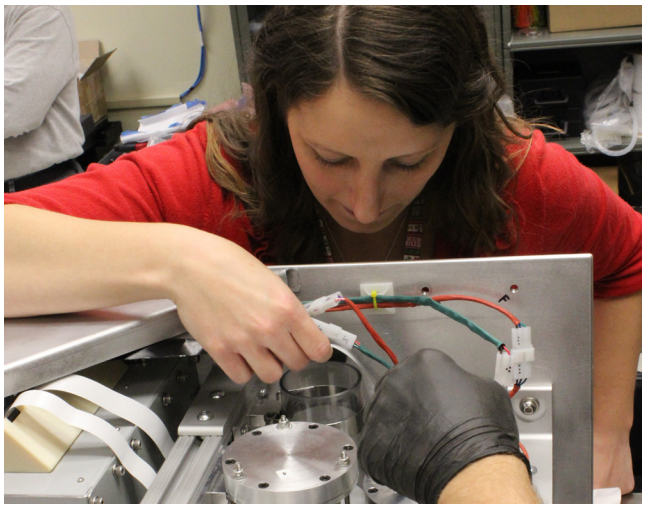


International Space Station support.



Curiosity Rover science operations.

Inspection of flown spacecraft for debris.



Strata payload fabrication.

National Aeronautics and Space Administration
Point of Contact: Cindy Evans
cindy.evans-1@nasa.gov

https://www.nasa.gov/centers/johnson/astromaterials

Publication Number