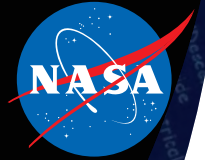


National Aeronautics and  
Space Administration



Marshall Space Flight Center

# SCIENCE AND INSTRUMENT DEVELOPMENT

Marshall Space Flight Center  
advances ground-breaking  
scientific discoveries that  
improve our understanding  
of Earth, the solar system,  
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enabling the next generation  
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## Astrophysics

A leader in high-energy astrophysics with an emphasis on X-ray and Gamma-ray space flight missions to include advancing lightweight, high-resolution X-ray optics

Researching gravitational waves and their electromagnetic counterparts through multi-messenger and multi-wave-length astrophysics

Developing instrumentation and mirror system technologies, including normal incidence/ultraviolet, optical, and infrared (UVOIR)

## Heliophysics and Space Weather

Advancing understanding of the interconnected Earth-Sun system to provide knowledge and predictive capabilities essential to future use and exploration of space and protection of infrastructure, such as electric power transmission grids and GPS systems on Earth

Space weather experts model data for planned missions to reduce risk and ensure future spacecraft are well prepared to withstand space environments

Unique expertise in space weather and solar physics includes instrumentation development, sounding rocket flight, and research focusing on energy transfer across physical scales throughout the solar atmosphere, specifically investigating processes converting magnetic energy into heat, particle acceleration, and dynamic plasma motions

## Data Science

Integrating AI and machine learning with Earth observation networks to produce accurate models and simulations

Providing research to operations products for researchers, forecasters, and the public, enabling real-time decision support for the benefit of all on Earth

Using the vantage point of space to increase our understanding of our home planet, improve lives, and safeguard our future

## Earth Science

Integrating space-borne observations, data, and models to advance understanding of the Earth's weather and its energy and water cycles and develop solutions to challenging coupled Earth-atmosphere systems problems

Providing integrated scientific understanding of the Earth that enables government agencies and other stakeholders to make more informed decisions on critical issues that impact society.

## Lunar and Planetary Science

Research on the origin, composition, and evolution of terrestrial planetary bodies, focusing on geological and geophysical mapping and models; instrumentation development; and observations conducted in the field, laboratory, and via analysis of remotely sensed data from space-based missions

## Science & Exploration Integration

Providing knowledge required to reduce risk, increase effectiveness, and improve the design of robotic and human space exploration missions

Earth Science — understanding our home planet and its varied physical processes; using NASA data to help to protect our planet and increase knowledge and understanding for space exploration

Heliophysics — understanding the drivers for space weather helps us protect our exploration assets in cislunar space and beyond

Astrophysics — understanding the space radiation environment and sources of high-energy particles helps us protect astronauts

Planetary — understanding the surface and atmospheric environments, as well as the material properties on destinations for robotic and human exploration/ISRU

Biological & Physical Science — making use of the spaceflight environment to study scientific phenomena in ways that cannot be done on Earth

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