NASA GSFC Heliophysics Science Division view of space weather

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Heliophysics Science Division

Heliophysics Science Goals

Solve the Fundamental Mysteries of Heliophysics

Explore the physical processes in the space environment from the Sun to the Earth and throughout the solar system

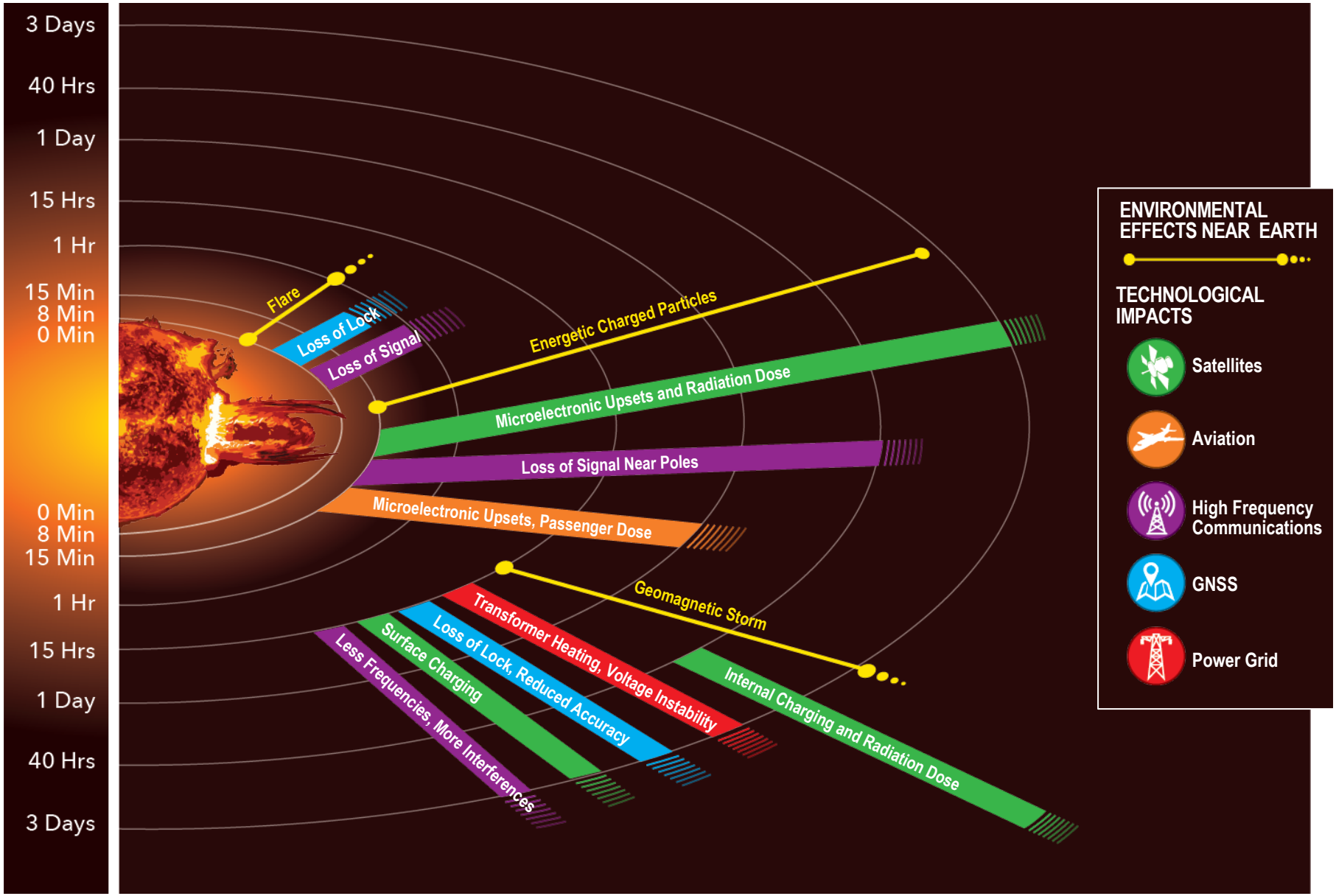
Understand the Nature of Our Home in Space

Advance our understanding of the connections that link the Sun, the Earth, planetary space environments, and the outer reaches of our solar system

Build the Knowledge to Forecast Space Weather Throughout the Heliosphere

Develop the knowledge and capability to detect and predict extreme conditions in space to protect life and society and to safeguard human and robotic explorers beyond Earth

Space Weather



Heliophysics Science Division

Solar Physics Lab

Chief: Dr. Nick Arge

Heliospheric Physics Lab

Chief: Dr. Adam Szabo

Space Weather Lab

Chief: Dr. Judy Karpen

Geospace Physics Lab

Chief: Dr. Eftyhia Zesta

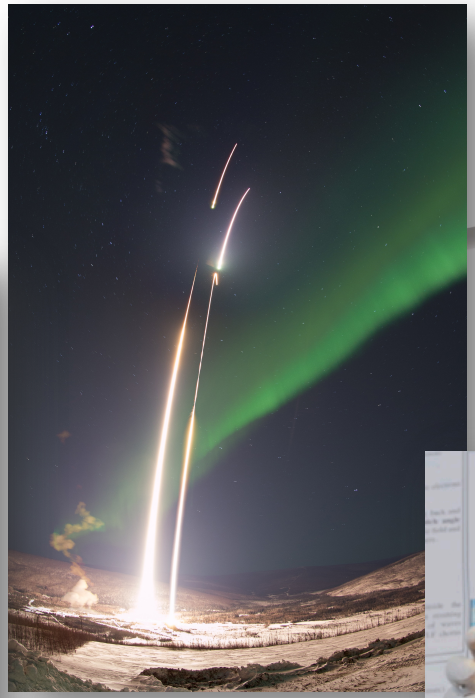
Ionospheric, Thermospheric, Mesospheric Physics Lab

Chief: Dr. Doug Rowland

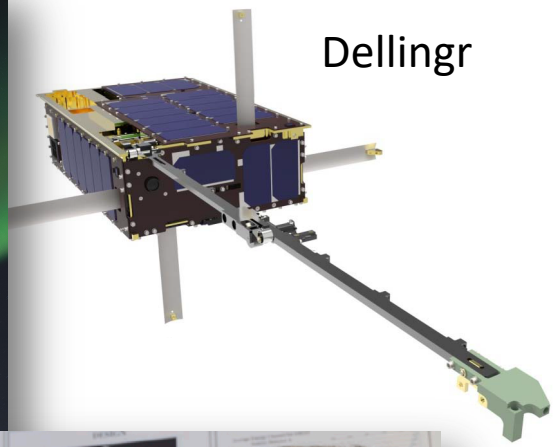
Heliophysics Science Division

Space Physics Data Facility (Project Scientist: R. McGuire)

STEREO mission Science Center (Project Scientist: J. Gurman)



Auroral Arcs mission (PI R Pfaff)



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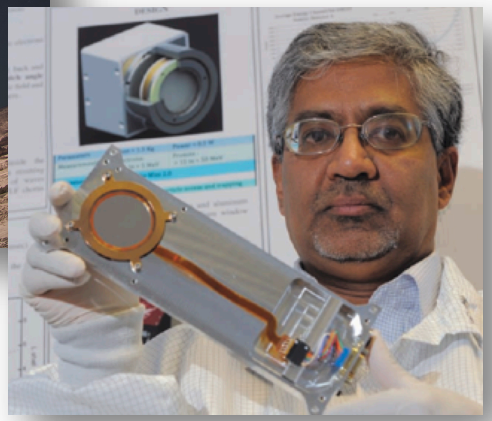
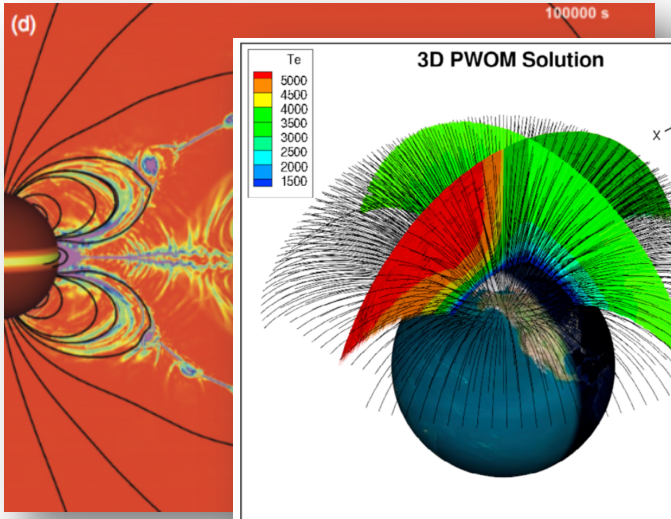


The Miniaturized Electron and Proton Telescope (PI S. Kanekal)

Examples only!

Heliophysics Science Division

Solar eruption modeling
(J. Karpen et al.)



Polar Wind Outflow
Model (A. Glocer et al.)

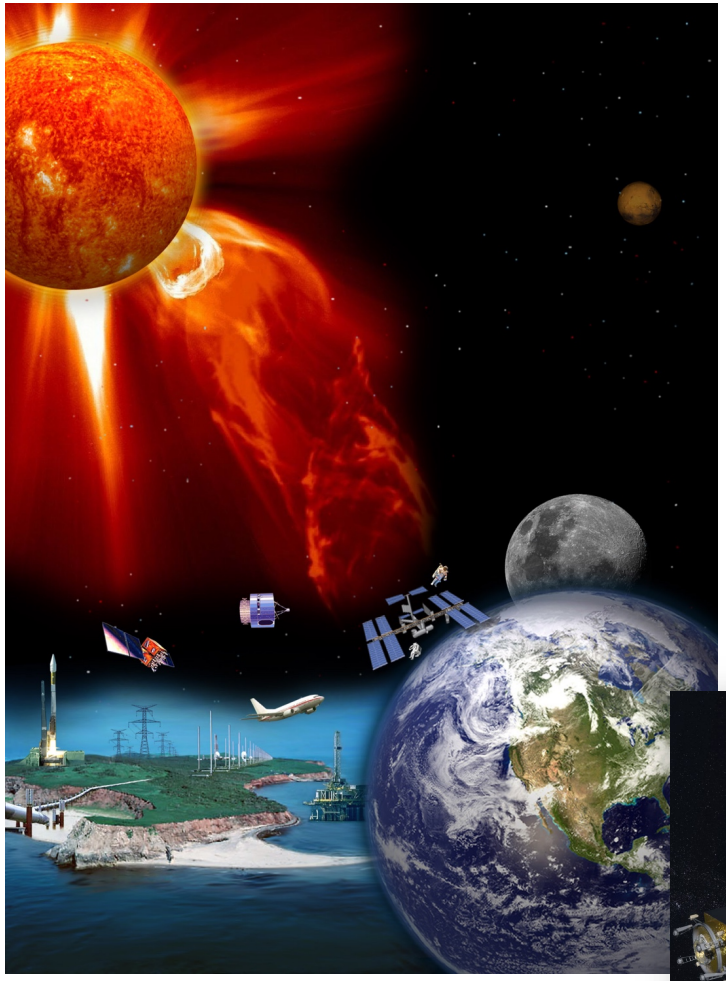
Space weather services

Community Coordinated Modeling
Center (Director: M. Kuznetsova)

Heliophysics Science Division Peer Awards 2018

Examples only!

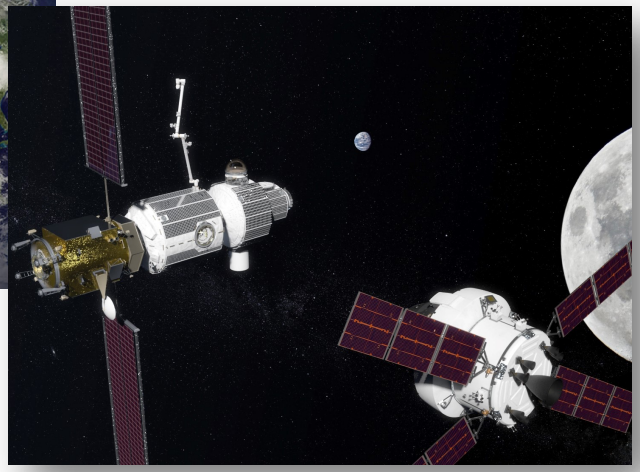
Deep Space Human Spaceflight



While low-inclination LEO (ISS orbit) is fairly benign from the space radiation perspective, deep space environment poses a much more significant challenge.

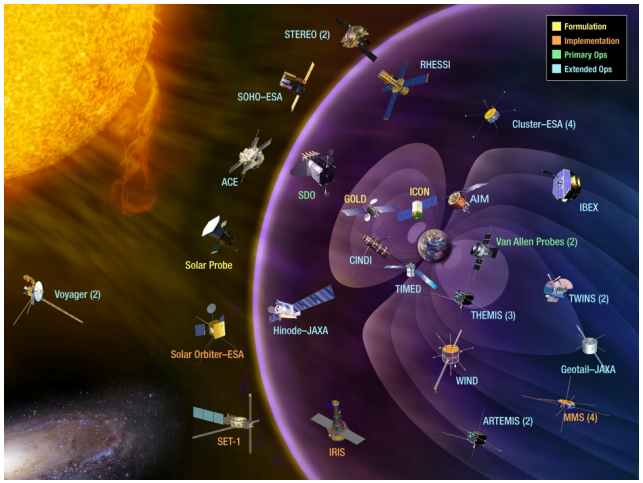
Consequently, human spaceflight missions to lunar environment and planetary targets require novel capabilities in terms of space weather monitoring, modeling and forecasting.

Lunar and Martian environments are also important targets for heliophysics science investigations, which presents a great opportunity to utilize heliophysics capabilities *both for science and safeguarding the crew*.



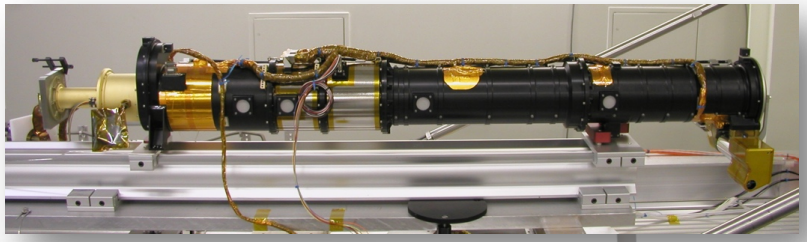
Deep Space Human Spaceflight

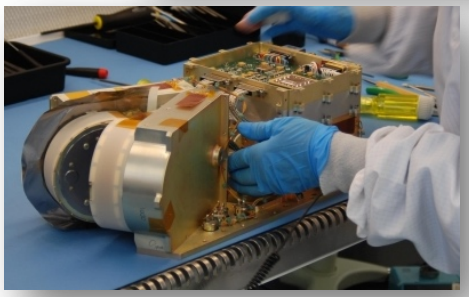
NASA GSFC provides unique end-to-end heliophysics capabilities that can support and leverage Artemis & Moon to Mars programs

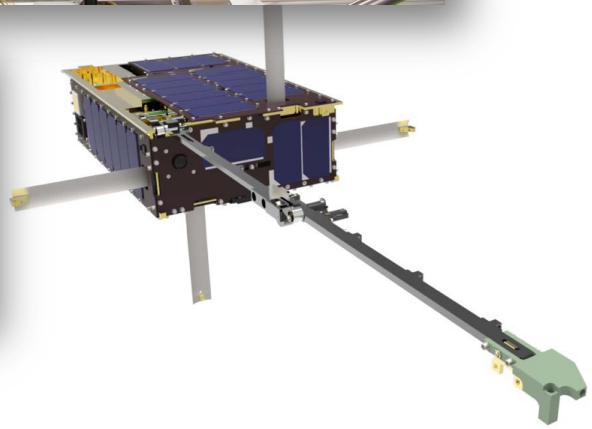


GSFC built and operates many of the missions in the existing Heliophysics Systems Observatory – observations are being used and will be used also for space weather purposes.

GSFC develops heliophysics missions and instruments that can provide the observational information needed for safeguarding the crew onboard lunar and Mars missions. The same instruments can be used also for science investigations.



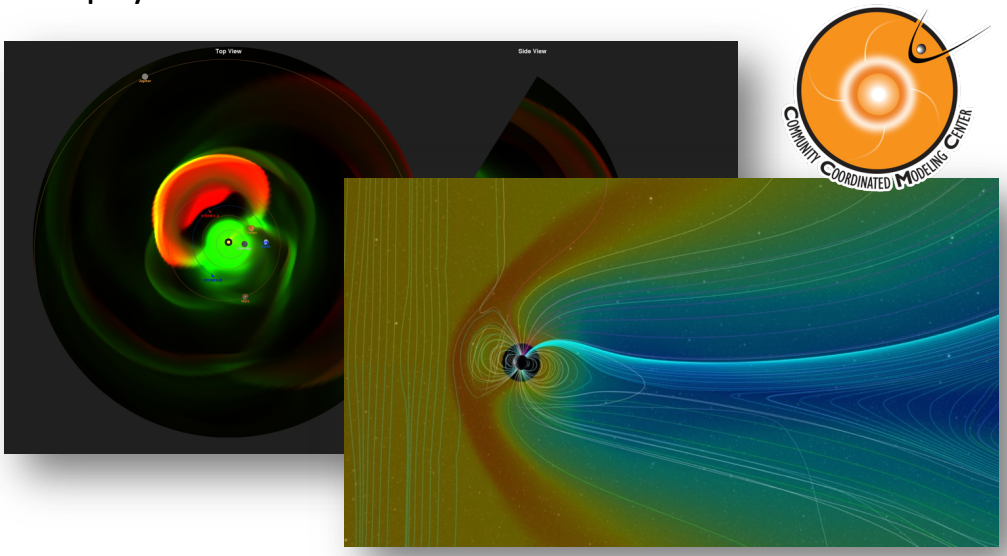




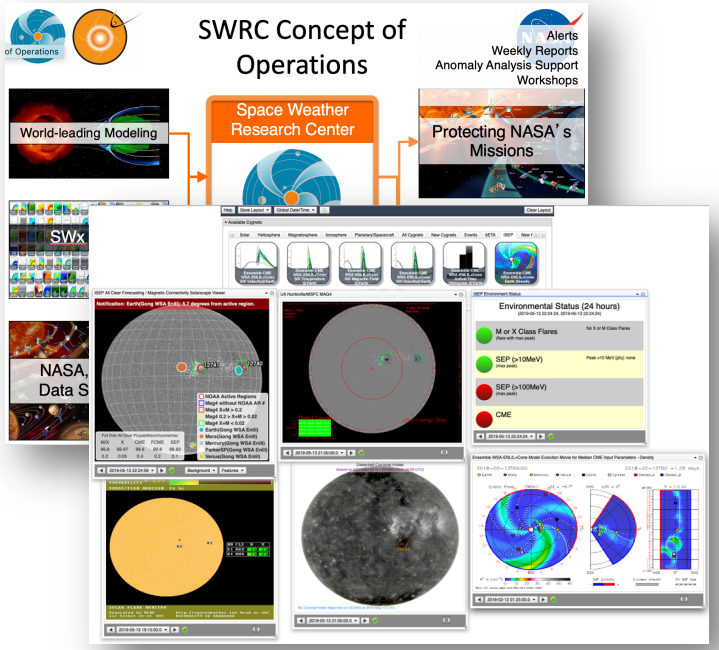
Deep Space Human Spaceflight

NASA GSFC provides unique end-to-end heliophysics capabilities that can support and leverage Artemis & Moon to Mars programs

GSFC heliophysicists develop models that are being used also for space weather forecasting purposes. Community Coordinated Modeling Center (CCMC) that hosts a very large collection of state-of-the-art heliophysics models resides at GSFC.



GSFC provides space weather services to NASA robotic missions operating across the solar system – the space weather team closely collaborates with JSC/SRAG that provides space weather services for human spaceflight activities.



Outlook

- Space weather is growing in importance, and the trend applies also to human spaceflight activities.
- Addressing the space radiation challenge requires Agency-level coordination and close collaboration with government, academic and commercial entities.
- NASA GSFC Heliophysics Science Division looks forward to continue contributing to these collaborations!