

National Environmental Satellite, Data, and Information Service (NESDIS)

Dr. Stephen Volz, Assistant Administrator

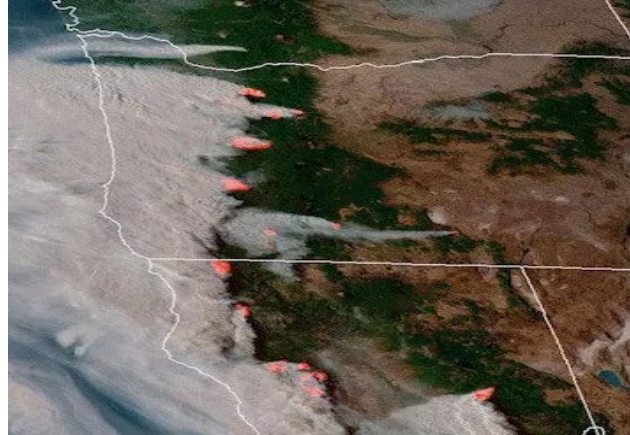
NESDIS Operations, Science, and Data Stewardship



Office of Satellite and Product Operations (OSPO)

24-hour operations for satellites and 24-hour support for weather and environmental forecasting

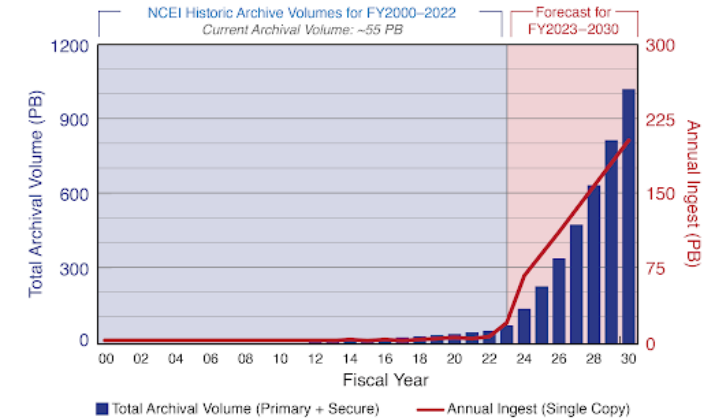
- Orbit determination
- Spacecraft navigation
- Data acquisition
- Command and control of 19 satellites
- Mission control for satellite-assisted search and rescue (SARSAT)
- Operational product processing and dissemination



Center for Satellite Applications and Research (STAR)

Operations-focused research, development, validation, and maintenance of products and applications based on end user needs

- Develops the science to make raw satellite data useful
- Improves data quality, products, and services
- Supports development of next-generation NOAA satellites and missions
- Collaborates with a wide range of domestic and international partners



National Centers for Environmental Information (NCEI)

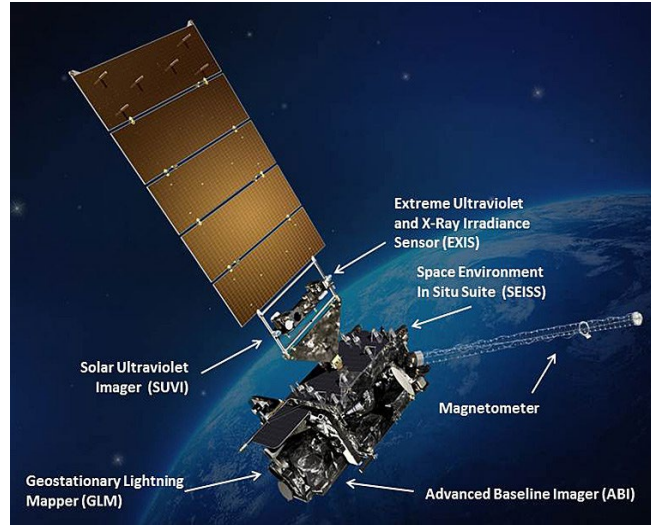
Nation's leading authority for environmental information with one of the most significant data archives on Earth

- Provides essential Space Weather data product development expertise for NWS/SWPC
- Currently holds 55 petabytes of data
- Select value-added environmental products and service, such as:
 - Annual Billion-Dollar Weather and Climate Disasters Report
 - Disseminates monthly assessments of the U.S. and global temperature and precipitation data

NOAA Satellites Operate at Three Observation Viewpoints



Low Earth Satellites
500 miles above Earth



Geostationary Satellites
22,000 miles above Earth



Space Weather Satellites
L1: ~1 million miles from Earth

Current Program:

- Joint Polar Satellite System (JPSS)/ Polar Follow On

Next Generation:

- Near Earth Orbit Network (NEON)
 - QuickSounder

Legacy POES satellites:

- NOAA-15,-18,-19 operated under POES Extension program
- In Situ SEM SpWx instruments mounted on EUMETSAT's Metop satellites

Current Program:

- GOES-R Series

Next Generation:

- Geostationary Extended Observations (GeoXO)

Legacy GOES satellites:

- GOES-14 (on orbit storage)

Current Program:

- DSCOVR + GOES-R space weather instruments
- Space Weather Follow On - GEO and L1
- COSMIC-2

Next Generation:

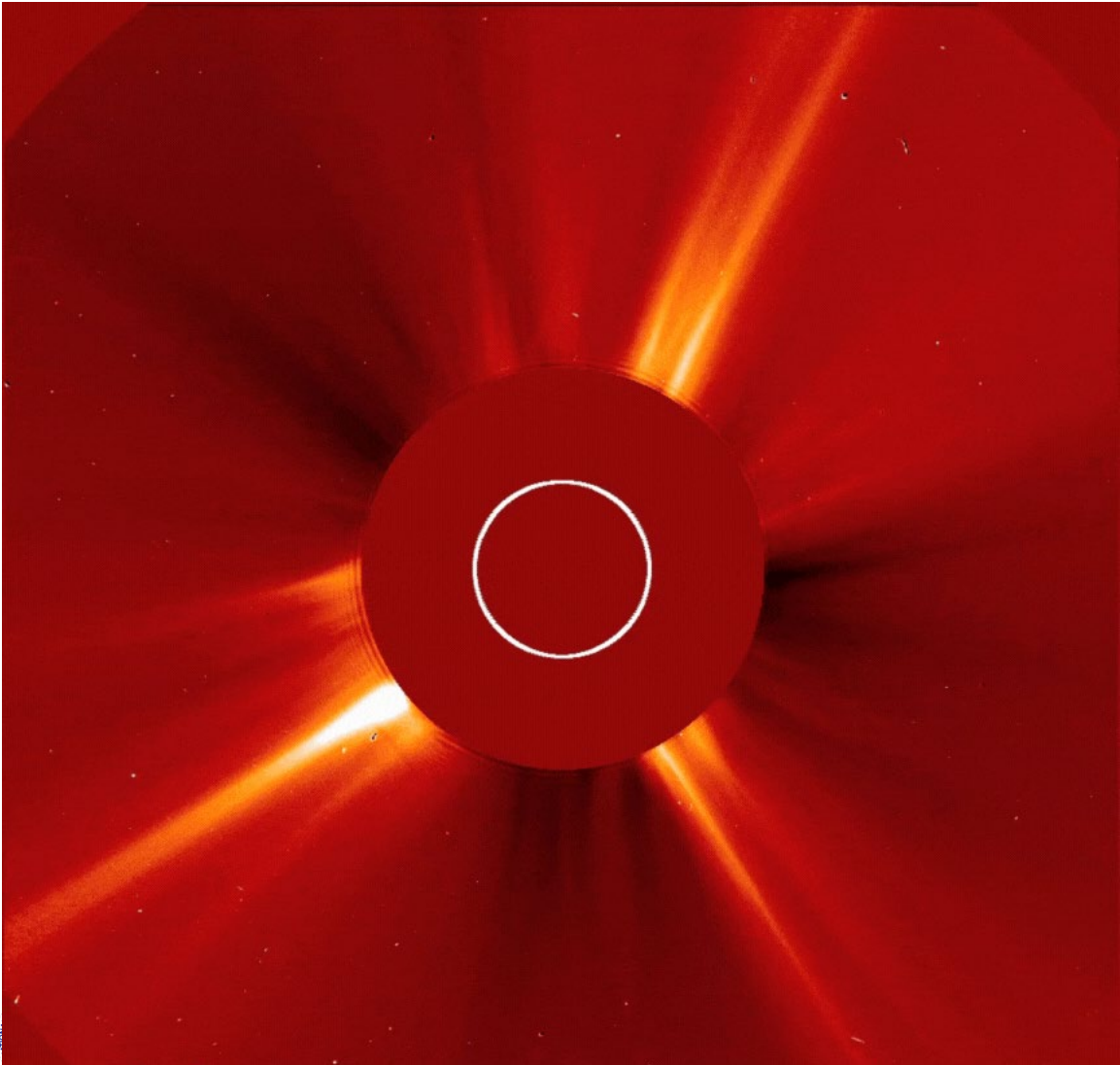
- Space Weather Next (L1, GEO, L5, LEO)

Legacy satellites:

- L1 partner leveraged: ACE (NASA), SOHO (NASA/ESA)
- NOAA POES



Nation's first operational satellite coronagraph (CCOR-1) will deliver CME imagery within 30 minutes of acquisition, compared to LASCO which can take up to 8 hours





GOES-U, which includes CCOR-1, shown arriving at KSC. GOES-U is scheduled to launch on June 25, 2024, and CME observations from CCOR-1 will commence in late 2024.



Space Weather Warnings Protect Critical Infrastructure

Space Operations

- Postpone launch of satellite
- Turn off/safe instruments and/or spacecraft in orbit

Electric Power Grid

- Adjust/reduce system load
- Disconnect components
- Postpone maintenance

Airlines

- Divert polar flights
- Change altitude

GPS/Navigation

- Postpone activities
- Redo survey
- Use backup systems

Communications

- Use backup capabilities
- Alternative frequencies

February 12, 2022

The Washington Post
Democracy Dies in Darkness

CAPITAL WEATHER GANG

How a rather mundane space storm knocked out 40 SpaceX satellites

As the sun enters a more active phase, even minor geomagnetic activity could pose problems for smaller SpaceX satellites.

By [Kasha Patel](#)

February 12, 2022 at 9:00 a.m. EST

Rocket Lab launches 2 satellites, returns booster to Earth after delay from surprise solar storm

By [Mike Wall](#) | Contributions from [Tereza Pultarova](#) last updated 4 days ago

The company's Electron rocket carried two commercial Earth-imaging satellites into orbit Friday (March 24), then splashed down in the ocean.

March 24, 2023

The New York Times

Solar Storm Crashes GPS Systems Used by Some Farmers, Stalling Planting

The storm interfered with navigational systems used in tractors and other farming equipment, leaving some farmers temporarily unable to plant their crops.

Listen to this article - 3:45 min [Learn more](#)

Share full article



May 13, 2024

Farms near Blooming Prairie, Minn. [Tiffany Graham](#)

Communicating Space Weather Information

70k subscribers

Satellite Companies, Airlines, Communications
State and Local Emergency Managers
International Partners



Operations and Watch Centers



557th Weather Wing



NASA Mission Control



Space Weather Prediction Center

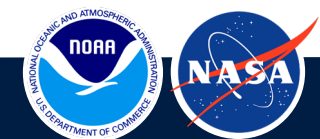


Situation Room



FEMA

NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION





Space Weather Prediction Center (SWPC)

The Nation's official source of space weather decision support services, forecasts, watches, and warnings, and alerts

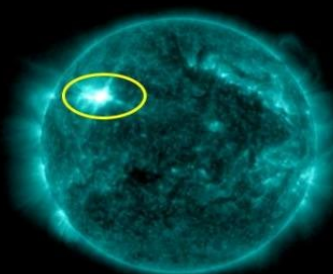
Provides 24x7 analysis and forecasting of space weather storms

“Safeguarding Society with Actionable Space Weather Information”

STRONG Flare Event Updated Feb 22 0146 EST/EDT

WHAT: X1.8 and X1.7 Flares Occurred from NOAA/SWPC Region 3590

R3



EVENT:
A flare is an eruption of energy from the Sun that generally lasts minutes to hours. Flares of this magnitude are not frequent.

TIMING:
The latest flare peaked at 22/0632 UTC

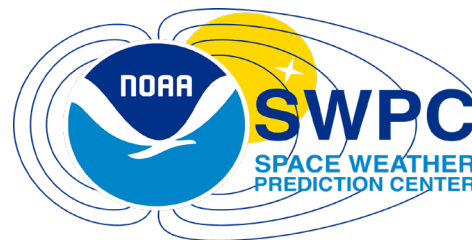
EFFECTS:
Users of high frequency (HF) radio signals may experience temporary degradation or complete loss of signal on much of the sunlit side of Earth. The general public need not be concerned.

GOES-16 SUVI Composite 131 Angstroms 2024-02-22 06:31:43

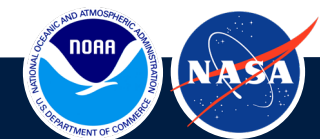
National Oceanic and Atmospheric Administration U.S. Department of Commerce

Safeguarding Society with Actionable Space Weather Information

Space Weather Prediction Center, Boulder, CO

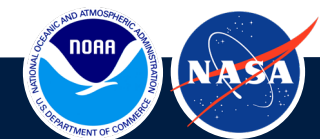


www.spaceweather.gov



SWFO-L1 Contributors span the Nation

Components	Contributors/Developers	
Spacecraft bus	BAE Systems	
Instruments		
<ul style="list-style-type: none"> Compact Coronagraph (CCOR) 	Naval Research Laboratory (NRL)	
<ul style="list-style-type: none"> Magnetometer (MAG) 	Southwest Research Institute (SwRI) University of New Hampshire (UNH)	
<ul style="list-style-type: none"> Solar Wind Plasma Sensor (SWiPS) 	Southwest Research Institute (SwRI)	
<ul style="list-style-type: none"> SupraThermal Ion Sensor (STIS) 	University of California, Berkeley (UCB)	
Ground		
<ul style="list-style-type: none"> Satellite Antenna Network (SAN) (Operating in MD, VA, WV, AK, overseas) 	KBR	(Florida)
<ul style="list-style-type: none"> Command and Control (C2) 	L3Harris	(Virginia)



Partnership Efforts for Research to Operations to Research (R2O2R)

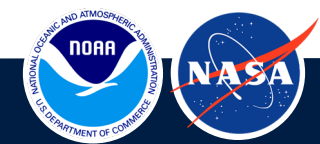
- Published a [formal R2O2R Framework](#) through the Space Weather Operations, Research and Mitigation Subcommittee (SWORM)
- Overall approach authorized by the PROSWIFT Act
- NOAA, NASA, NSF, & DoD signed a Quad agency Memorandum of Agreement (MOA) in December 2023
- Communicates operational needs
- Supports research to improve models and data utilization
- Accelerates transition to operations

SWx Research to Operations to Research Process





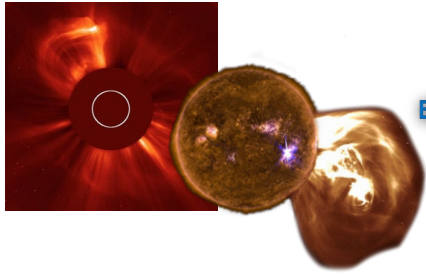
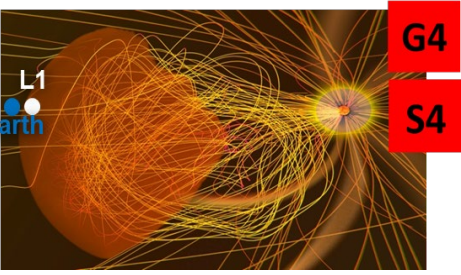
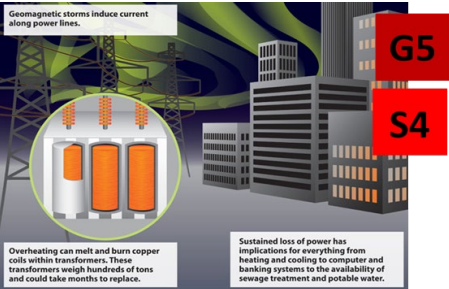

Coordinating, Cooperating, and Collaborating through Interagency Agreements

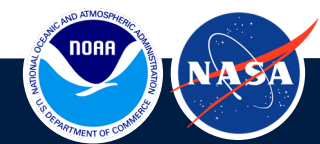




Space Weather Tabletop Exercise 8-9 May 2024

- NASA, NOAA, NSF, and FEMA sponsored an unclassified APL-led exercise to enhance our whole-of-government preparedness and response to a major Space Weather event
 - Senior leaders participated via two locations in Laurel, MD and Denver, CO
- First end-to-end exercise tracking from initial detection through infrastructure impacts
- Many challenges were explored including information sharing; astronaut safety; degraded communications, navigation, and power services; and national security concerns.

Module 0	Module 1	Module 2	Module 3	Module 4
<p>Introduction to Space Weather</p> <p>Other relevant educational and awareness sessions for Senior Leaders</p>	<p>Scenario</p>  <p>Solar drivers</p>	 <p>Radiation Storm Geomagnetic storm</p>	 <p>Extreme geomagnetic storm</p>	 <p>Response and recovery</p>

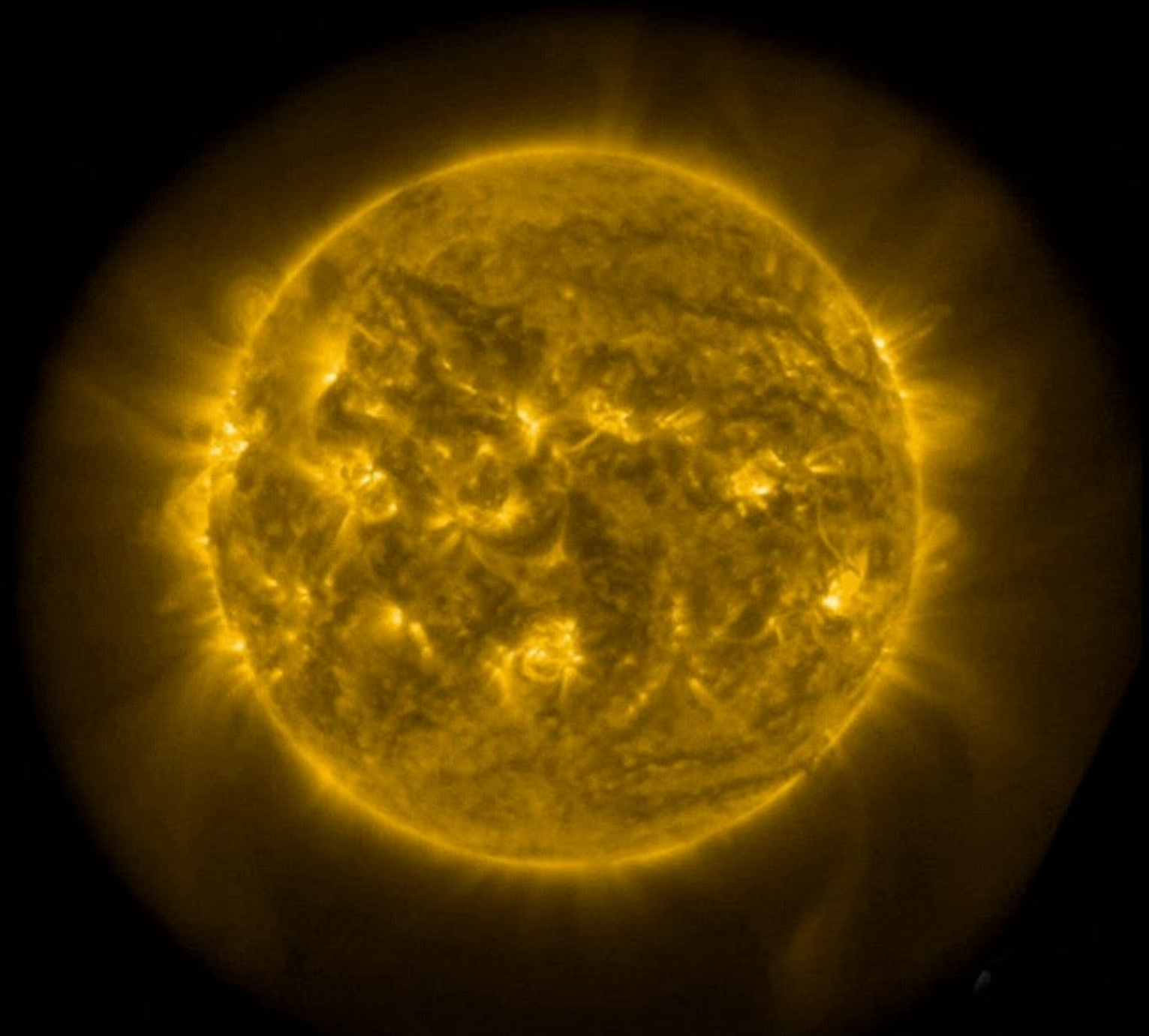




Key Takeaways

- We are becoming a planetary species, not yet traveling to the Moon or Mars, but definitely living in the solar system environment dominated by the Sun.
- As our technological capabilities grow on earth and as the space economy grows, we are focused on developing the necessary observing and forecasting systems to support our activities in the presence of a dynamic sun and active space weather environment.
- We are growing in a collaborative environment in which government, industry, and the American people can better understand and prepare for the effects of space weather.

But there is still a great deal we don't understand. We will need the best from all those participants to meet the challenge of planetary space weather understanding and forecasting.



NOAA