

Space Weather Observations Office Support of Space Exploration

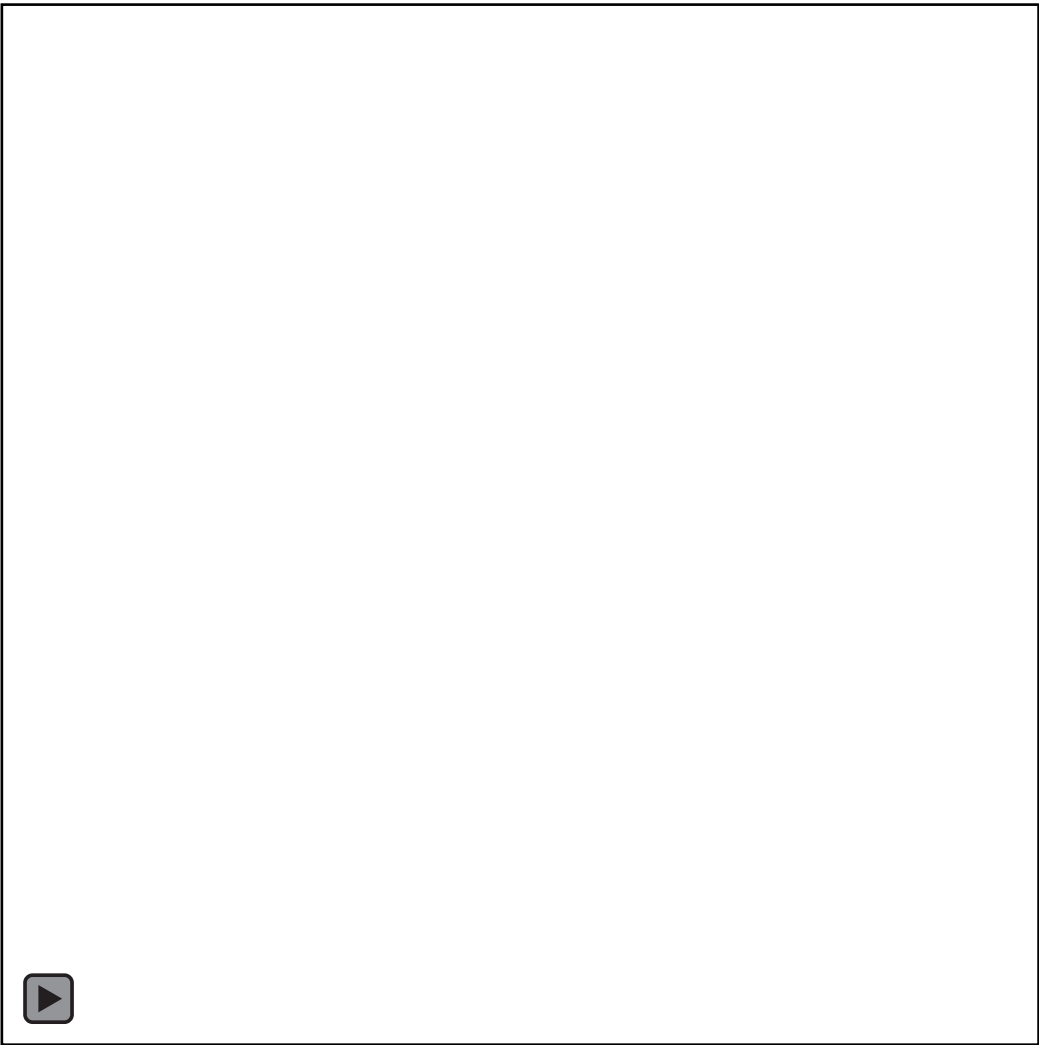
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NOAA NESDIS/SWO**

Acknowledgments to: *I. Azeem, E. M. Lynch, J. F. Spann, T. Van Sant, B. Nowak, S. Owens, C. H. Delee, A. Barfknecht,
,J. Panek, R. Ullman, E. Guerrero-Martin, A. Greeley and the SWO Team*

Current Space Weather Observations at L1

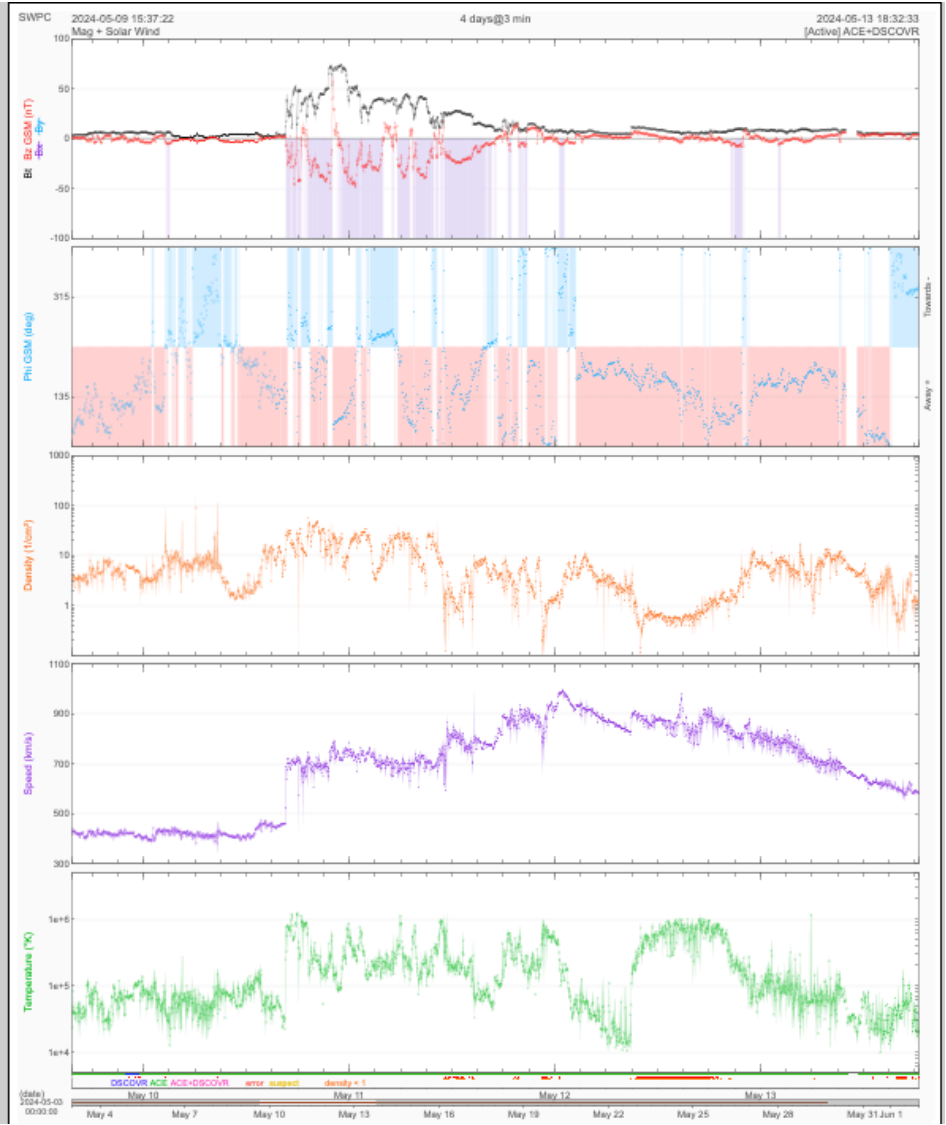
Solar Observations

CMEs

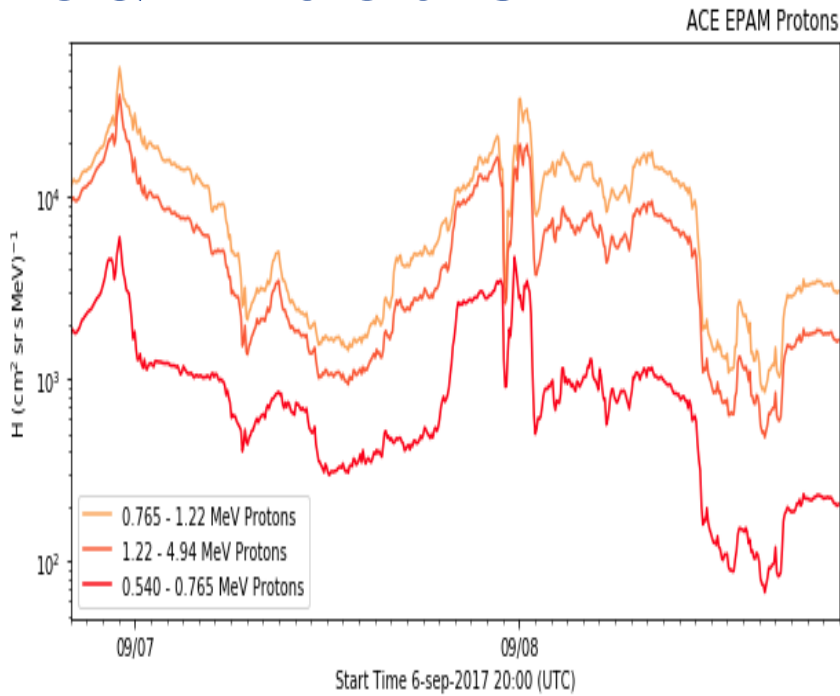


Heliospheric Observations & Drivers of SWx

Magnetic Field

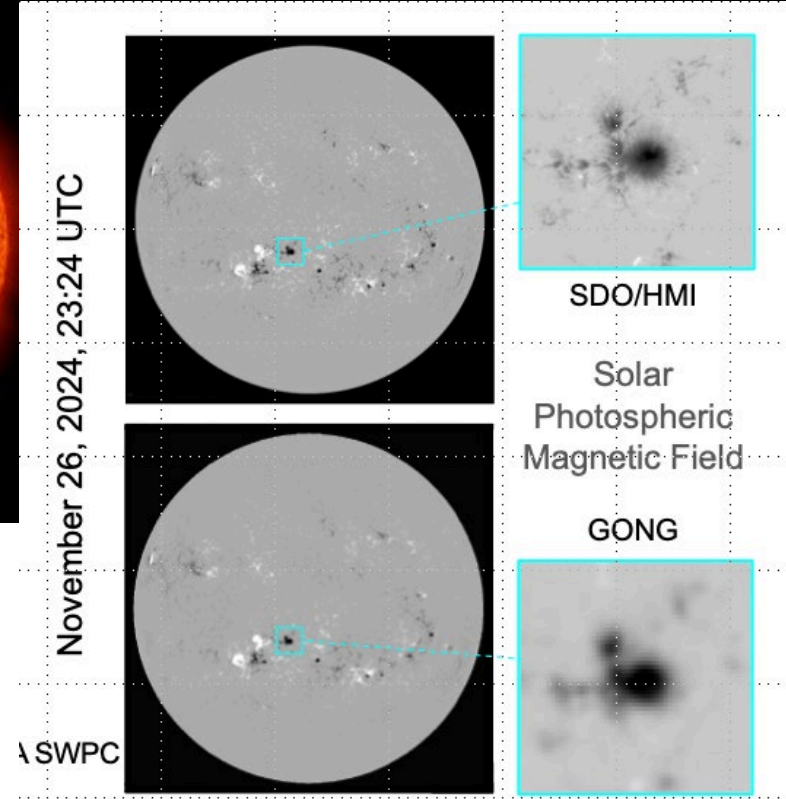
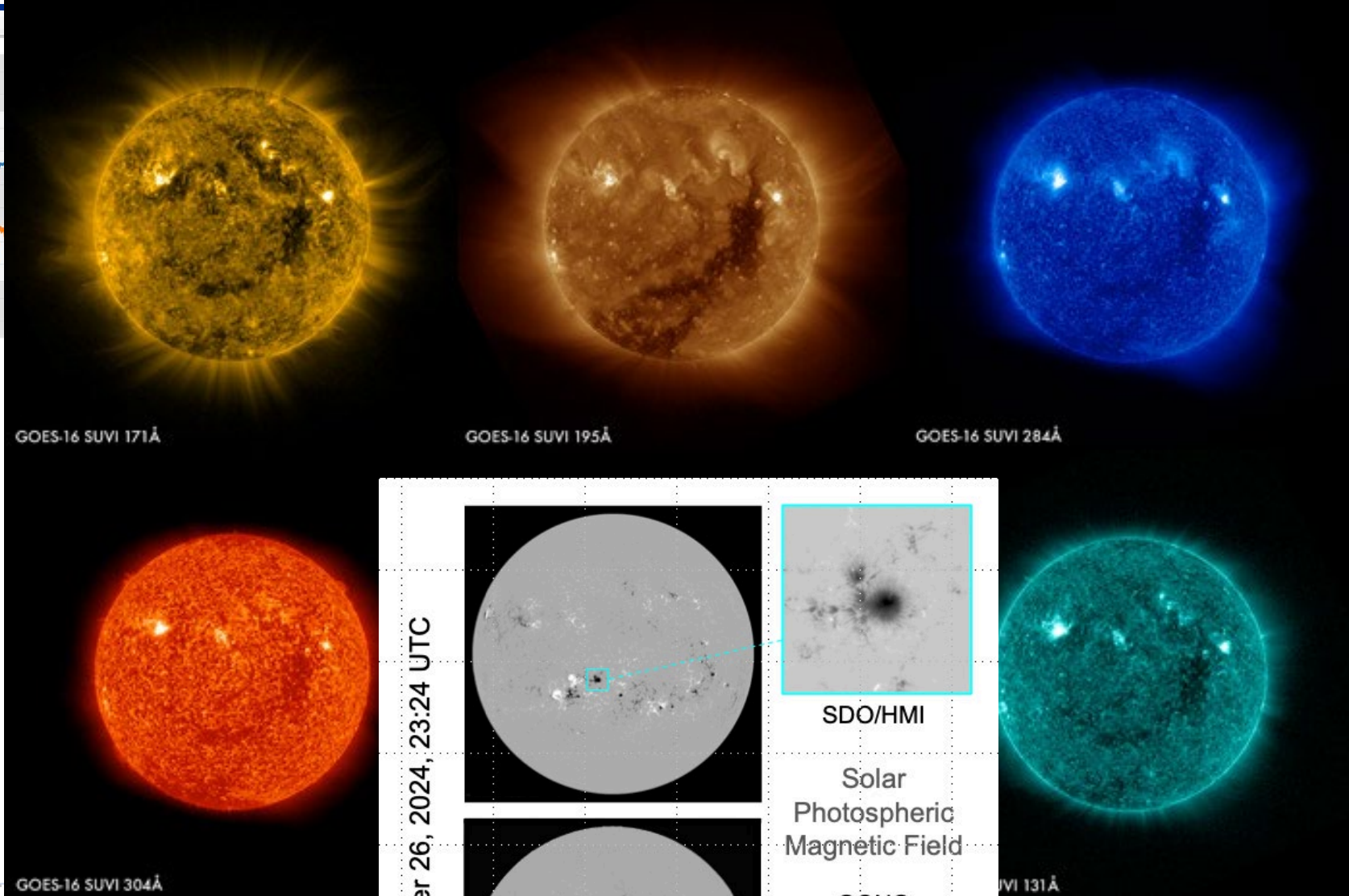
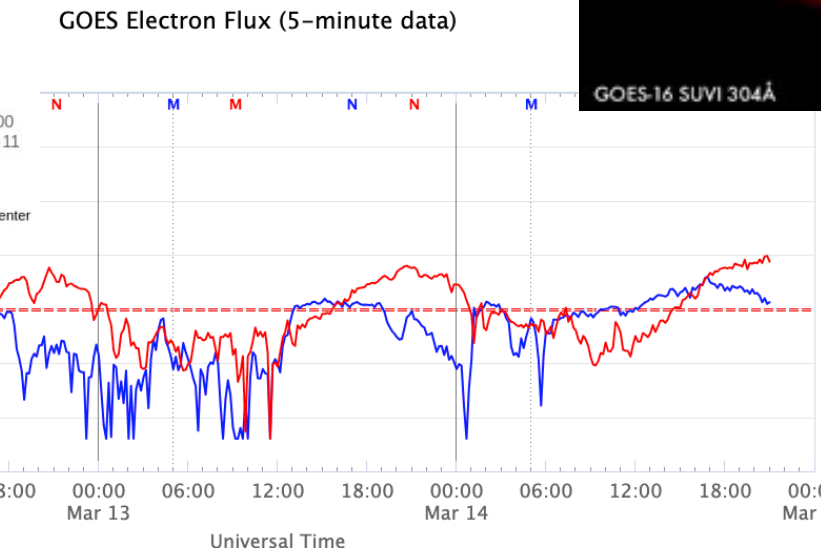
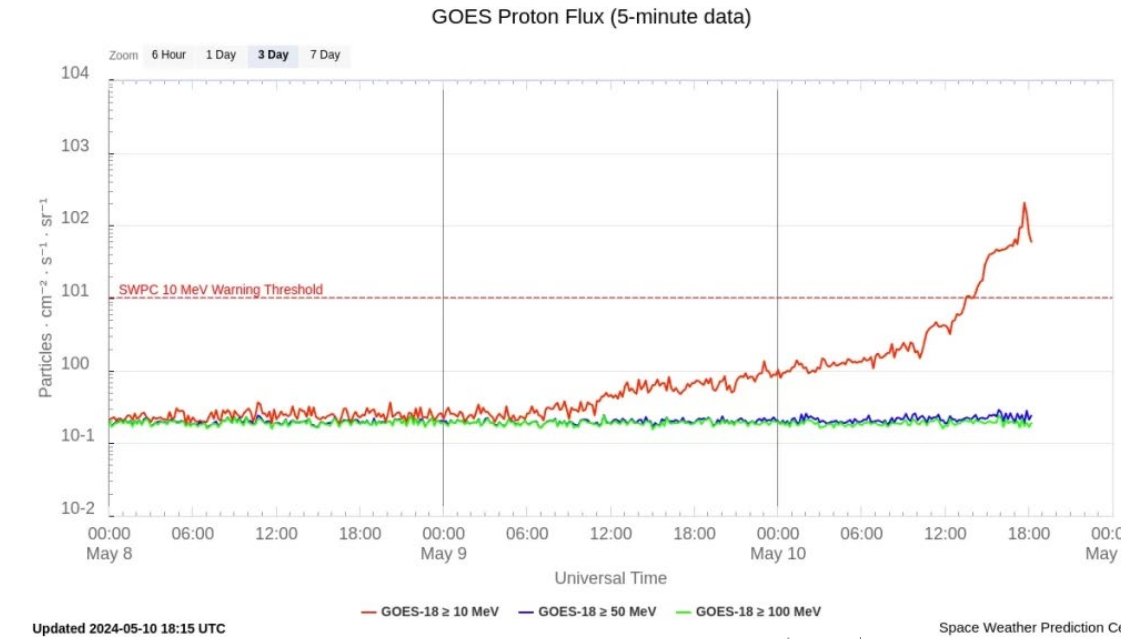
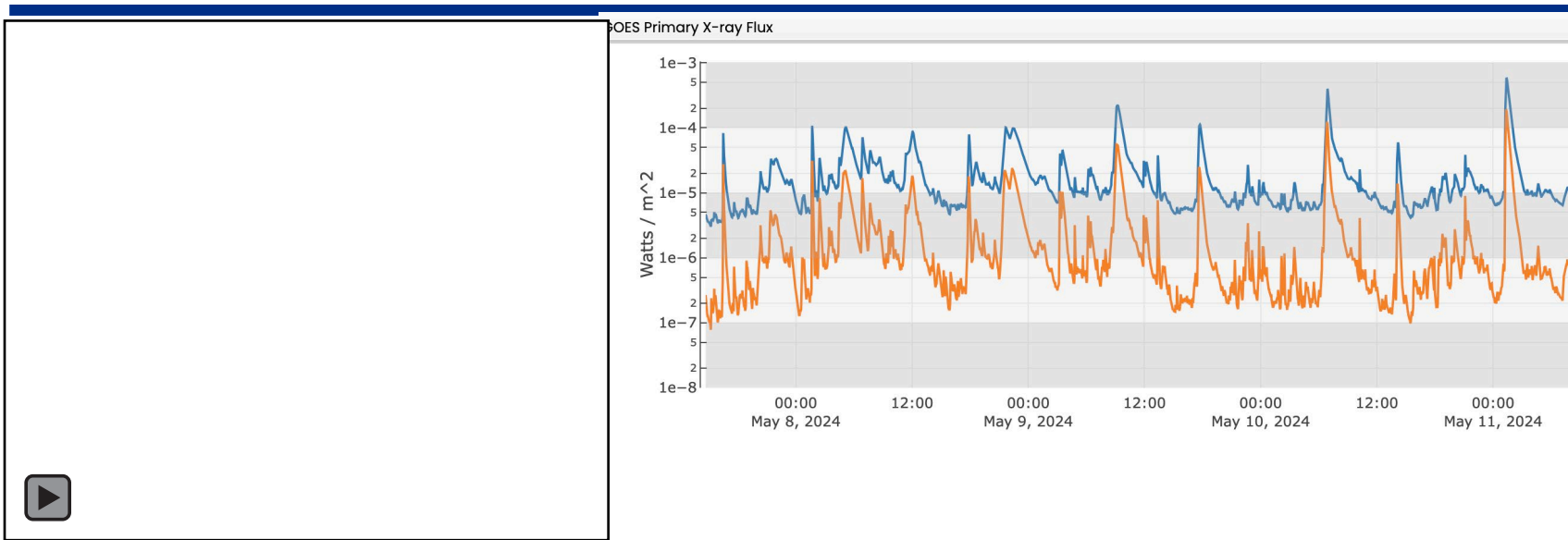


Solar Wind Plasma



Suprathermal Ions

Current Space Weather Observations at GEO



NOAA • NASA Space

Office of Space Weather Observations

SWO addresses critical observation needs of the Space Weather Prediction Center (SWPC)

Space Weather Follow On Program

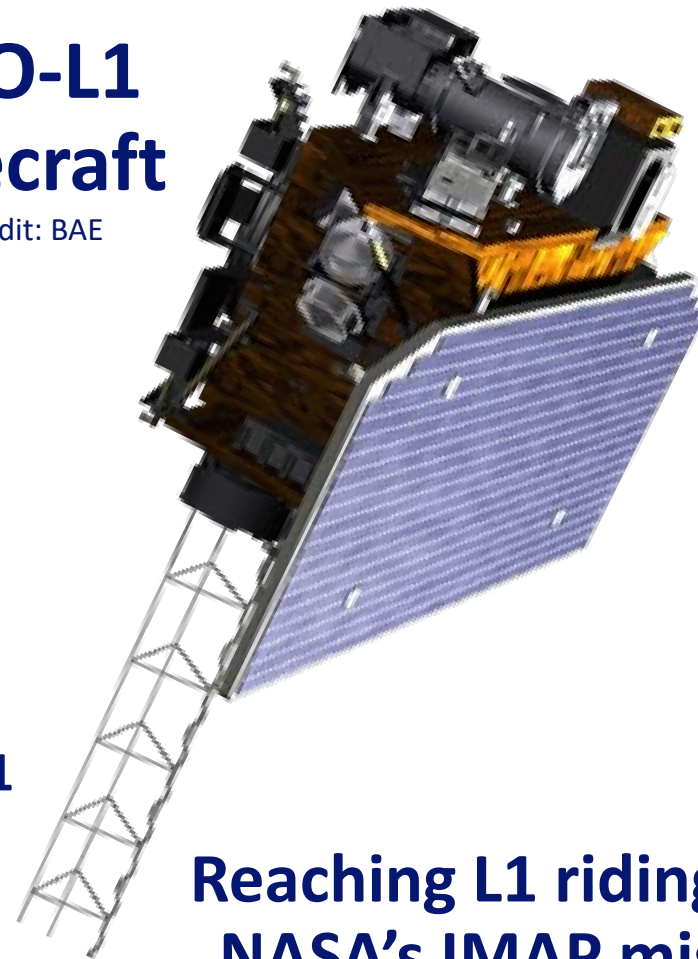
CCOR-1 integration onto GOES-19

Image Credit: Lockheed Martin



SWFO-L1 Spacecraft

Image Credit: BAE



Launch Info



CCOR-2 on SWFO-L1
Together with:
Solar Wind Plasma
Ion Sensor
Magnetometer

Reaching L1 riding with
NASA's IMAP mission

Space Weather Next Program

- Planning for **continuity** and enhanced capability with **observations** from:
 - L1 extended continuity
 - L5 Orbits – ESA Partner
 - Geostationary Orbit
 - Low Earth Orbit
- Development of Space Weather Ground Support Networks

GOES-19 spacecraft

Hosts NOAA first operational coronagraph and continues other space weather observations of the GOES-R Series

FOV is 3.7-17 Rs

50 arcseconds

1 image every 15 mins

Latency – 30 mins

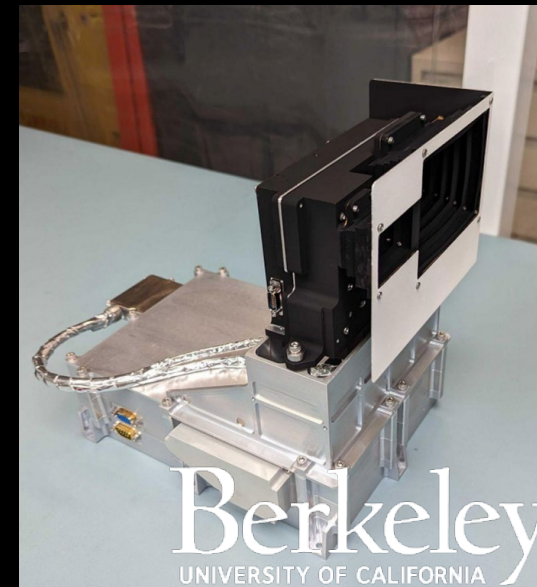


<https://testbed.spaceweather.gov/products/ccor-1-coronagraph>

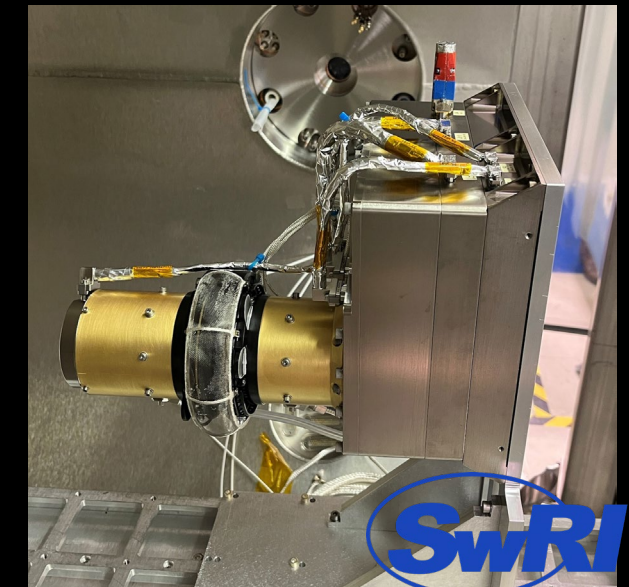
SWFO-L1 spacecraft

Launch in 2025 will be the first of a satellite constellation needed to replace aging satellites at L1

Rendering of the SWFO-L1 satellite



SupraThermal Ion Sensor (STIS)

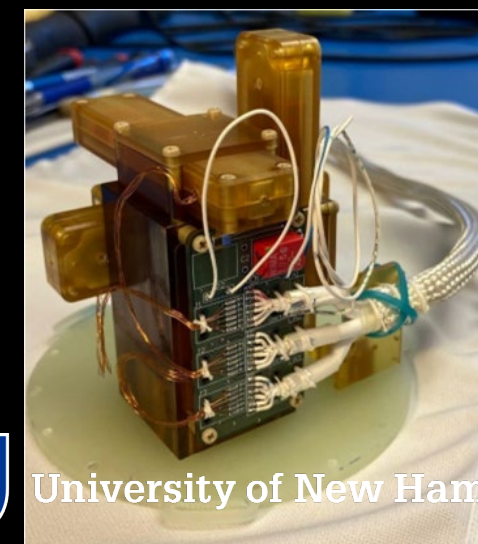


Solar Wind Plasma Sensor (SWiPS)



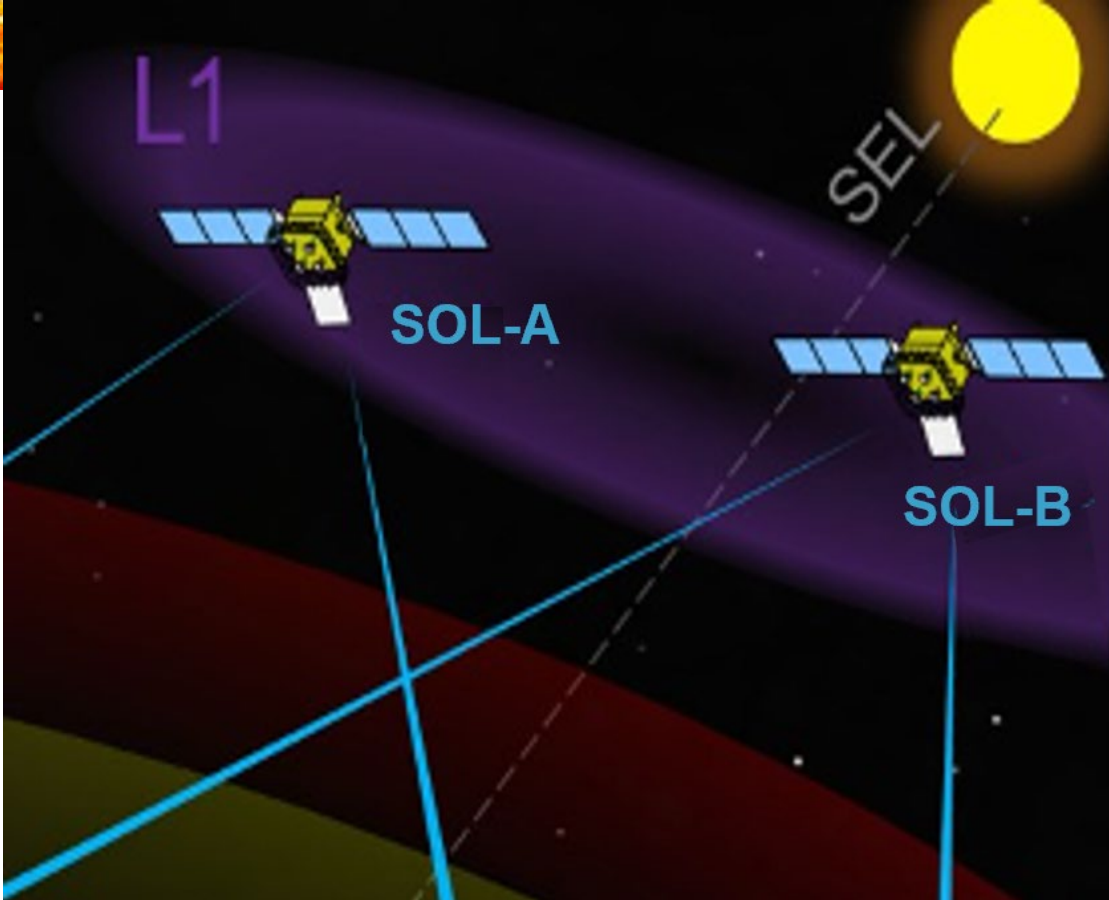
Compact Coronagraph (CCOR-2) installation on SWFO-L1

Launch Info



University of New Hampshire

Magnetometer (MAG) Sensor



Space weather Observations at L1 (SOL) Project

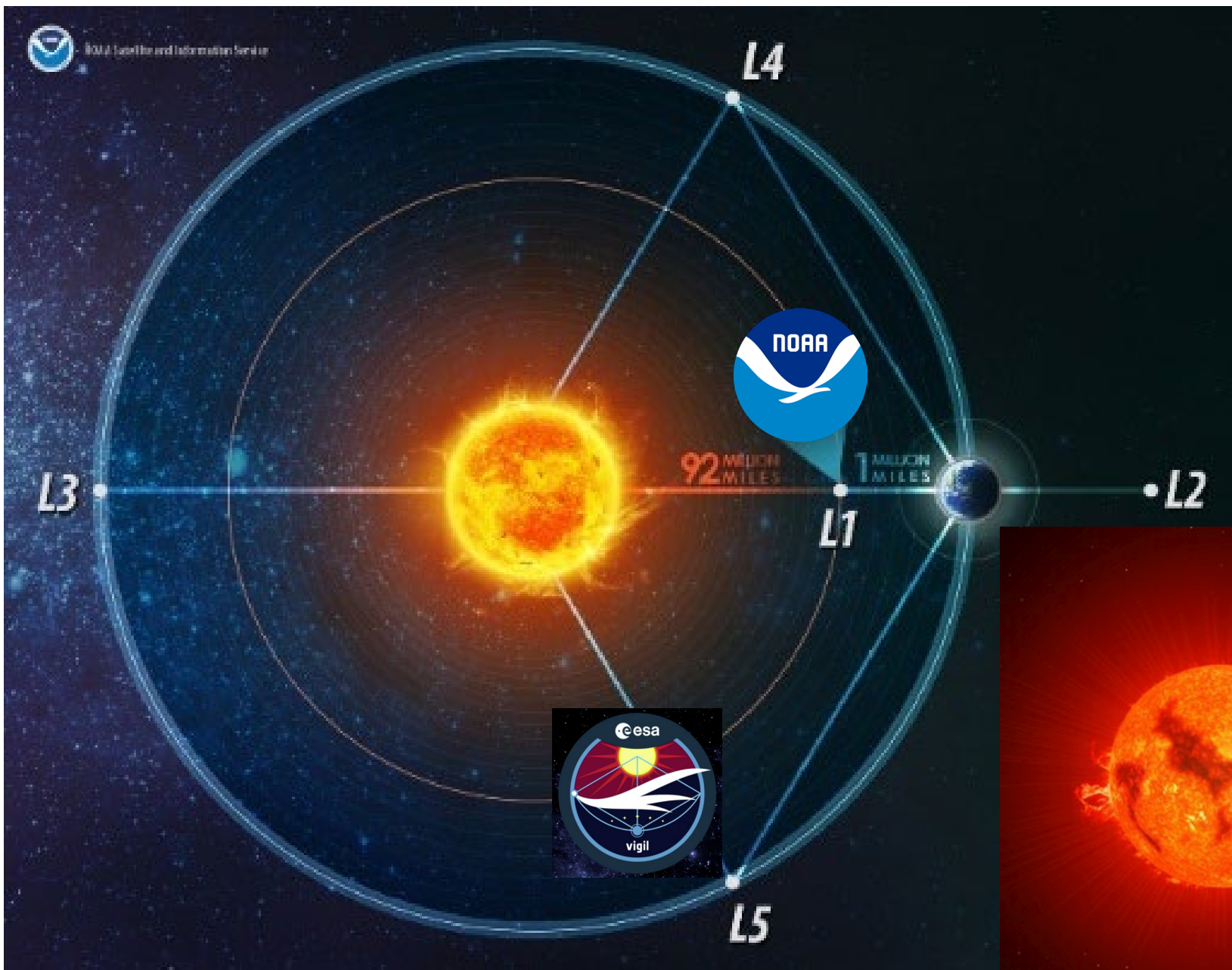
Two spacecraft, SOL-A and SOL-B on the Sun-Earth line at Lagrange 1

- Independently launched payloads on dedicated LVs
- 3-axis stabilized / sun pointing
- S/C wet mass < 500 kg
- Operating Power: 700 W
- X-band downlink at 400 kbit/sec; S-band uplink/downlink w/ ranging
- Extend and adapt SWFO ground segment for antenna network command and control
- Product Operations will be in NESDIS Common Cloud Framework
- **We are now on Phase B**

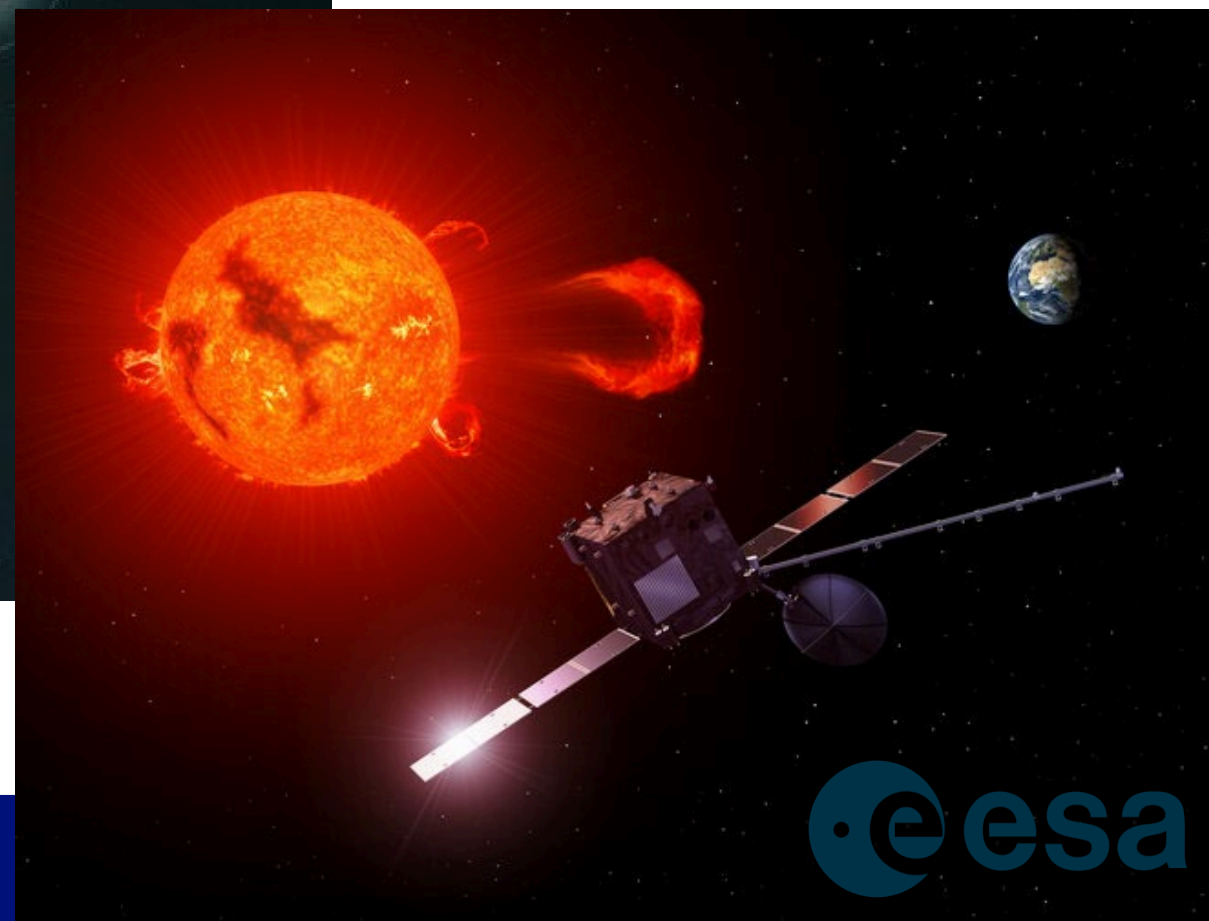
Instrument	Selections
Coronagraph	 SOUTHWEST RESEARCH INSTITUTE
Solar Wind Plasma Sensor (SWiPS)	 University of New Hampshire
Suprathermal Ion Sensor (STIS)	 JOHNS HOPKINS APPLIED PHYSICS LABORATORY
Magnetometer (MAG)	 SOUTHWEST RESEARCH INSTITUTE
X-ray Flux Monitor (XFM)	
X-ray Irradiance Sensor (XRIS)	Solicitation to be developed for SOL-B mission
Partner-Contributed Instrument (PCI)	To be identified

Bold indicates High Availability Product

SWO-ESA Collaboration - L5



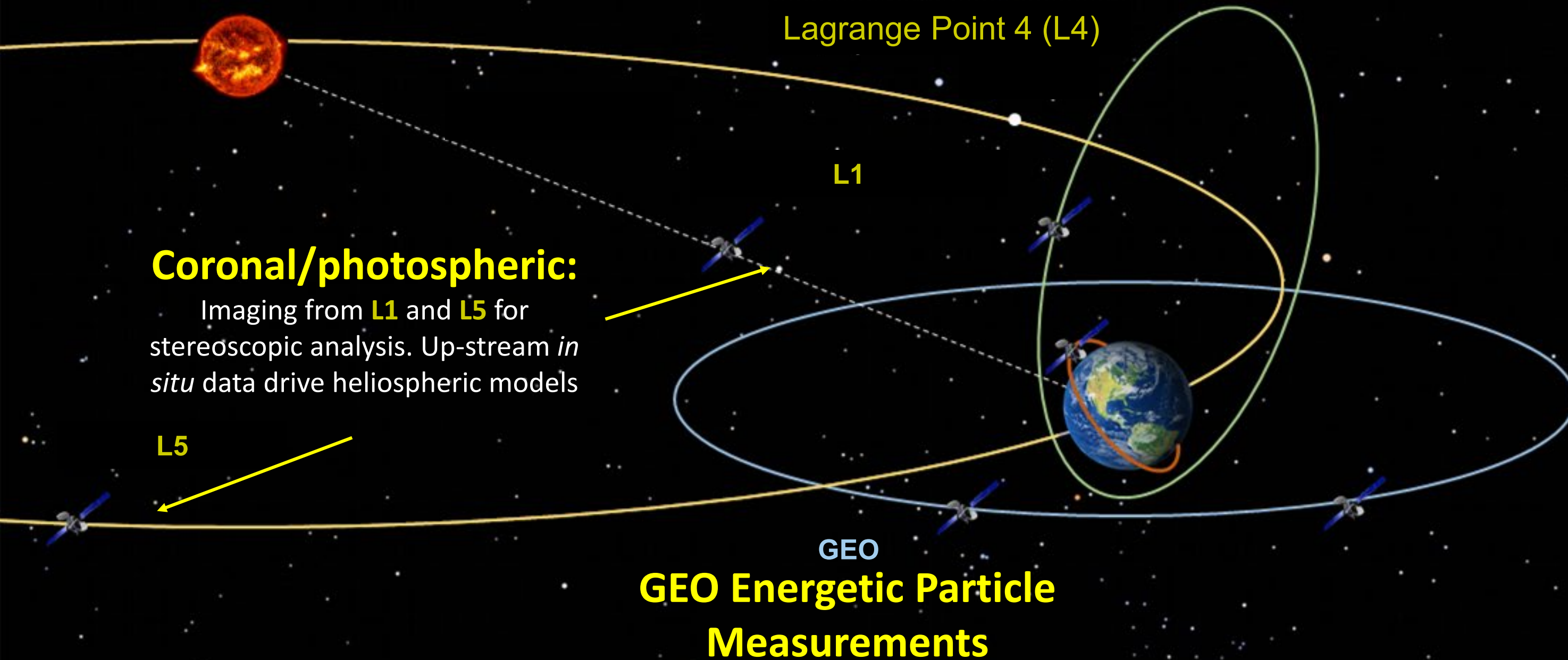
- Coronagraph - (USA, NOAA), Naval Research Lab (CCOR-3)
- Magnetograph - (Germany), Max Planck Institute for Solar System Research
- Heliospheric Imaging - (Italy, Belgium), Leonardo SpA/CSL, Belgium
- EUV Imaging - (USA, NASA), Southwest Research Institute
- Solar Wind Plasma - (UK), Mullard Space Science Lab
- Magnetic Field - (UK/Austria), Imperial College London/IWF Graz



***Continuous Observations
of the Sun and the
heliosphere in near real
time from the L5 vantage
point.
Launch NLT 2031***

Observations Relevant for Space Exploration Support

L4 Exploring Collaboration





Space Weather Prediction Center



The official source of space weather decision-support services, forecasts, watches, and warnings, and alerts for the United States

“Safeguarding Society with Actionable Space Weather Information”



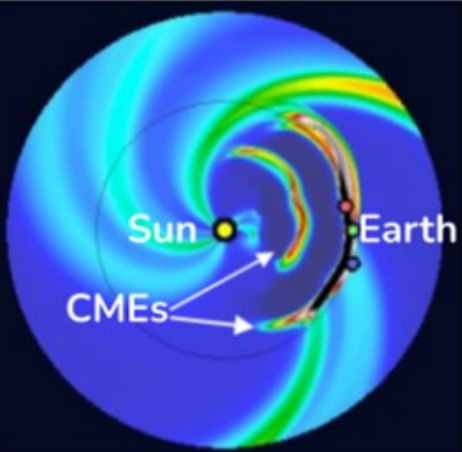
G5 Conditions Observed

Updated 2024-May-10 1930 EDT

WHAT: First Observed G5 Since October 2003

KEY MESSAGES: EXTREME (G5) conditions reached Earth at 6:54 pm EDT. Geomagnetic storming is likely to persist through the weekend as several additional Earth-directed Coronal Mass Ejections (CMEs) are in transit.

IMPACTS: HF/VHF/UHF communications, GPS, power grids, spacecraft, satellite navigation, and other technologies may be affected. *Critical infrastructure operators have been notified.*



on Space Weather Prediction Center; Boulder, CO

servations





Summary

- The NOAA NESDIS Office of Space Weather Observations will **provide continuity for critical space-based observations as well as enhanced capabilities** to support operational space weather forecasting at NOAA SWPC.
- We are working in different vantage points and orbital regimes, including **L1, L5 with our collaboration with ESA, GEO, LEO and others.**
- We understand how **critical some of the current observations are which has driven to the developments of new critical requirements.** These requirements include observations that are critical for the the future of space weather forecasting in support of the nation and space exploration.

THANK YOU!

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