



## NOAA Satellite and Information Service Space Weather Follow On Program

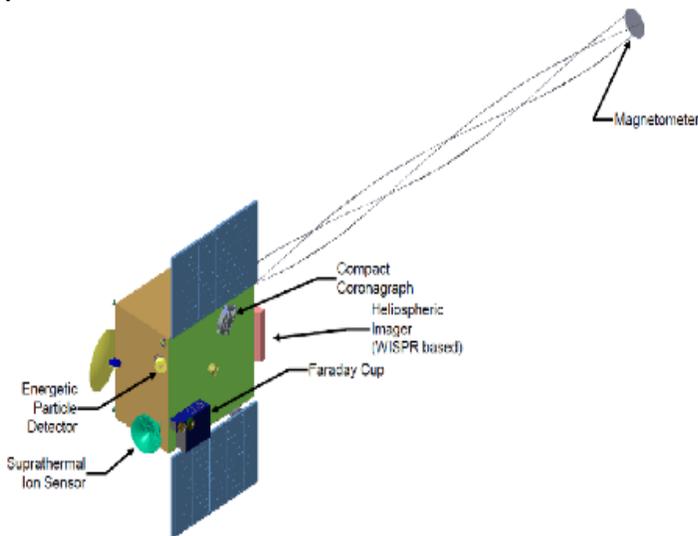
### Background:

The Space Weather Follow On (SWFO) Program aims to provide operational continuity of space weather forecast services of the National Weather Service's Space Weather Prediction Center (SWPC) to replace earlier NOAA and National Aeronautics and Space Administration (NASA) missions. NOAA is partnering with NASA, the Naval Research Laboratory (NRL), and the European Space Agency (ESA) on this satellite program. Instruments will be carried by the Space Weather Follow On – Lagrange 1 (SWFO-L1) observatory and by the GOES-U satellite of NOAA's Geostationary Operational Environmental Satellite (GOES) Program.

SWFO-L1 will operate at the Lagrange 1 (L1) point between Sun and Earth while GOES-U will be in a geosynchronous equatorial orbit (GEO). Both spacecraft will have imaging capabilities for the solar corona while SWFO-L1 will have in-situ measurement capabilities for observing plasma, particles and the magnetic field upstream of Earth.

### Impact:

- Space weather monitoring
- Space weather forecasting



### At-a-Glance:

Space Weather Follow On – Lagrange 1 Observatory

**Orbit:** Lissajous orbit around the Sun-Earth L1 point

**Mission Life:** 5 years plus consumables for 5 year extended mission

**Key NOAA Partners:** NASA, NRL, and ESA

**Space Weather Data:** Solar coronal images in visible light; solar wind plasma, particles, and magnetic field

**Latency:** 30 minutes for coronal images; 5 min for solar wind data

### Links:

[SWPC](#)

[ESA Space Situational Awareness \(SSA\)](#)

[RTSWnet](#)

[GOES-R](#)

[NASA IMAP](#)

SWFO-L1 will provide images and data critical for space weather forecasting through evaluation by SWPC forecasters and ingestion into numerical weather prediction (NWP) models. Solar images will be used to identify coronal mass ejections (CMEs) directed towards Earth and calculate their time of arrival. Imaging will be provided by the Compact Coronagraph (CCOR) built by NRL. Measurements of the solar wind's magnetic field and the plasma speed and density at L1 upstream of the Earth will be used to rapidly calculate the starting time and intensity of the geomagnetic storms and other disturbances that solar wind will produce when it reaches Earth several tens of minutes later. Highly sophisticated models will be used at SWPC to predict changes in the Earth's magnetosphere and ionosphere with significant forecast skill and lead time.



The users of the space weather information resulting from L1 and GEO data are numerous and diverse. They include the satellite industry providing telecommunications and navigation services, the electric power industry, commercial aviation, and many other sectors, as well as the Air Force and other defense units. The dual solar imaging capability provides significant resiliency for NOAA and reduces the dependence on partner missions.

**Program Details:**

NOAA provides programmatic authority, program management, requirements, oversight and resources, and procurement and management of the Ground Segment for the SWFO program. NASA provides procurement and management for the SWFO-L1 observatory spacecraft and instruments, joint program management, and will provide launch as a rideshare with the NASA IMAP mission. NRL will provide the CCOR telescope for both spacecraft, managed by GOES-R for the SWFO Program. ESA will contribute an X-ray flux monitor for SWFO-L1. The NOAA-developed the ground segment is based on its enterprise infrastructure including product development and distribution.

Instrument	Measurement	Agency/Manufacturer
Compact Coronagraph (CCOR; two units for SWFO-L1, GOES-U)	Observes the solar corona in visible light and detects CMEs many hours before they reach Earth	NRL
Solar Wind Plasma Sensor (SWIPS)	Measures the density, velocity, and temperature of the solar wind plasma	SwRI
Magnetometer (MAG)	Measures the vector magnetic field at the spacecraft	SwRI, UNH
SupraThermal Ion Sensor (STIS)	Measures the flux of energetic ions including hydrogen and helium	UC Berkeley
X-ray Flux Monitor	Measure the flux of solar X-ray photons	ESA

**Ground Segment Details:**

NOAA will operate a mission operations center and ground stations to support mission operations and data downlink. NOAA is seeking international partners, such as the Real Time Solar Wind network (RTSWnet) in Europe, Japan, and Korea, for additional downlink services.

