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Agenda Item 3
Discussed at Plenary

Subject	**STATUS OF NOAA CURRENT AND FUTURE SATELLITE PROGRAMS – REPORT TO CGMS-53**
In response to CGMS action/ recommendation	In response to CGMS-53 Plenary Agenda item on "New Developments and Long Term Plans by CGMS Space Agency Members since CGMS-52."
HLPP reference	N/A
Executive Summary	This document summarizes the status of NOAA current and future LEO, GEO, and Space Weather satellite systems. The reporting period for the current satellite operations is June 1, 2024 to June 1, 2025. For future satellites, progress to date at the time of writing is included. For each of the current satellite programs discussed in this paper, updates are provided for the status of the spacecraft(s), instruments on the spacecraft, ground segment(s), space weather effects, and data transmission. Current GEO missions discussed include GOES-15, -16, -17, -18, -19. Current LEO missions discussed include Jason-3, Suomi-NPP, NOAA-15, -18, -19, -20, -21, and plans for JPSS-3, and -4, which are part of the current JPSS-mission series, but have not yet launched. Current Space Weather missions discussed include DSCOVR. For each of the Future satellite programs discussed in this paper, updates are provided on the mission objectives, including spacecraft, payload, instruments, products, and program status, including space, system and ground segments. Further LEO missions discussed include JPSS -3 and -4, the final two missions in the JPSS series. Future Space Weather missions discussed include the Space Weather Follow On Mission.
Action/Recommendation proposed	CGMS is invited to take note.

1 INTRODUCTION

This paper reports on the status of NOAA current and future satellite systems. The reporting period for current satellite operation is 1 June 2024 to 1 June 2025. For future satellites, progress to date at the time of writing is included.

2 CURRENT SATELLITE SYSTEMS

2.1 Current GEO Satellites

Sector	Satellites in orbit P= pre-operational Op=operational B=back-up L=limited availability	Location	Launch Date	Details on near real time access to L0- L1 data (links)	Environmental payload and status
GOES-East	GOES-19 (Op)	75.2°W	06/25/2024	https://www.ospo.noaa.gov/Organization/About/access.html	Terrestrial weather (ABI, GLM); Space Weather (EXIS, SUVI, SEISS, MAG, CCOR). All payloads are operational
GOES-West	GOES-18 (Op)	137.0°W	03/01/2022	https://www.ospo.noaa.gov/Organization/About/access.html	All payloads are operational
Standby	GOES-16 (B)	104.7°W	11/19/2016	https://www.ospo.noaa.gov/Organization/About/access.html	Backup for GOES-East and GOES-West
Standby	GOES-17 (B)	89.5°W	03/01/2018	https://www.ospo.noaa.gov/Organization/About/access.html	Backup for GOES-East and GOES-West
Storage	GOES-14 (B)	105°W	06/27/2009	https://www.ospo.noaa.gov/Organization/About/access.html	Storage mode

2.2 Current LEO Satellites

Orbit Type ECT=Equator Crossing Time (for sun- synchronous orbit)	**Satellites in orbit** P= pre-operational Op=operational B=back-up L=limited availability	**Equator Crossing Mean Local Time First Ascending Node**	**Mean altitude**	**Launch Date**	**Details on near real time access to L0/L1 data (links)**	**Instrument payload and status**
Low-orbit, 24° inclination, non-SSO	COSMIC-2 (Op)	N/A	520 km	June 25, 2019	https://www.cosmic.ucar.edu/what-we-do/cosmic-2/data	Green: All TGRS, VIDI and RFB instruments. Neutral atmosphere products assimilated into NWS GFS in May 2020 and other GWP centers.
Polar, non- SSO	JASON-3 (OP)	N/A	1336 km	Jan 17, 2016	https://www.ospo.noaa.gov/Organization/About/access.html	All Green: Poseidon-3B Altimeter, DORIS, AMR-2, GPSP, LRA, CARMEN-3, LPT
Polar, SSO, Afternoon	NOAA-21 (OP)	13:25	834 km	Nov 10, 2022	https://www.ospo.noaa.gov/Organization/About/access.html	VIIRS, ATMS, CrIS, CERES, OMPS
Polar, SSO, Afternoon	NOAA-20 (OP)	13:25	834 km	Nov 18, 2017	https://www.ospo.noaa.gov/Organization/About/access.html	VIIRS, ATMS, CrIS, CERES, OMPS
Polar, SSO, Afternoon	Suomi-NPP (Op)	13:25	833 km	Oct 28, 2011	https://www.ospo.noaa.gov/Organization/About/access.html	Yellow: CrIS Green: VIIRS, ATMS, CERES, OMPS
Polar, SSO	NOAA-19 (L)	21:08 as of 2/15/2024	870 km	Feb 6, 2009	https://www.ospo.noaa.gov/Organization/About/access.html	Yellow: MHS, AVHRR Green: AMSU-A1/2, ADCS, SEM and HIRS, SBUV, APT
Polar, SSO	NOAA-18 (L)	22:39 as of 2/14/2024	854 km	May 20, 2005	https://www.ospo.noaa.gov/Organization/About/access.html	Red: HIRS, MHS, and SBUV Yellow: SEM Green: AVHRR, AMSU- A1/2, APT, DCS
Polar, SSO	NOAA-15 (Op)	19:23 as of 2/15/2024	813 km	May 13, 1998	https://www.ospo.noaa.gov/Organization/About/access.html	Red: AMSU-B Yellow: HIRS Green: AVHRR, AMSU-A1, SARR, SEM are Yellow, and AMSU- A2, and DCS, and APT

2.3 Current Space Weather Satellites

Sector	Satellites in orbit P=pre- operational Op=operational B=back-up L=limited availability	Location	Launch date	Details on near real time access to L0/L1 data (links)	Instrument payload and status
L-1	DSCOVR (Op)	Sun-Earth Lagrange Point 1 (L1)	2/11/2015	https://epic.gsfc.nasa.gov/; Faraday Cup (FC), Magnetometer (MAG): https://www.swpc.noaa.gov/products/real-time-solar-wind	Operational Space weather instruments: Faraday Cup (FC), Magnetometer (MAG) - nominal; terrestrial instruments (EPIC and NISTAR)- nominal; DSCOVR attitude control system - nominal and operational

3 STATUS OF CURRENT GEO SATELLITE SYSTEMS

3.1 Mission objectives, payload/instruments, products

The goals of the Geostationary Operational Environmental Satellite (GOES) system program are to:

- Maintain continuous, reliable, operational, environmental, and storm warning systems to protect life and property
- Monitor the earth's surface and space environmental conditions
- Introduce improved atmospheric and oceanic observations as well as data dissemination
- Develop and provide new and improved applications and products for a wide range of federal agencies, state and local governments, and private users

The GOES system functions to accomplish an environmental mission serving the needs of operational meteorological, space environmental, and research users, including:

- Warnings to U.S. public – detect, track, and characterize - hurricanes, severe storms including flash floods, winter cyclones, and forest fires
- Imagery for weather forecasting
- Derived products for analysis and forecasting – surface temperatures, wind for aviation and NOAA National Weather Service (NWS) numerical models, sounding and radiances for NWS models, air quality, and rainfall estimates
- Environmental data collection – platforms including buoys, rain gauges, river levels, and ecosystem monitoring

3.2 Status of spacecraft

GOES-19
GOES-19 launched on June 25, 2024. After completing a successful on-orbit checkout and testing of its instruments and systems, GOES-19 was handed over to the NOAA Office of Satellite and Product Operations in January 2025. The satellite then underwent additional testing of its data products. GOES-19 went into operational service as GOES-East on April 7, 2025, replacing GOES-16.

GOES-18
GOES-18 launched on March 1, 2022. After completing a successful on-orbit checkout and testing of its instruments and systems, GOES-18 was handed over to the NOAA Office of Satellite and Product Operations in October 2022. The satellite then underwent additional testing of its data products. GOES-18 went into operational service as GOES-West on January 4, 2023, replacing GOES-17.

GOES-17
GOES-17 was launched on March 1, 2018. GOES-17, located at 104.7°W, serves as an on-orbit standby for the operational GOES-East or GOES-West. GOES-17 has ABI performance degradation due to an issue with the instrument's thermal subsystem. A great deal of progress was made optimizing the performance of the GOES-17 data and the instrument is currently delivering a significant majority of the data it was intended to provide.

GOES-16
GOES-16 was launched on November 19, 2016. It was located at 75.0°W, serving as GOES-East from December 18, 2017 until GOES-19 took over as GOES-East on April 7, 2025.GOES-16 will become the primary backup to GOES-East and GOES-West after reaching its new position near 105°W on June 6, 2025. All of the GOES-16 payload instruments are nominal.

GOES-15
The U.S. Congress approved the property transfer of GOES-15 to the U.S. Space Force (USSF) on June 7, 2023. The USSF accepted the transfer of GOES-15 in September 2023 and the satellite was rebranded as EWS-G2 This satellite will replace EWS-G1 as the operational EWG-G2 to support DoD observations over the Indian Ocean domain. GOES-15, launched on March 4, 2010, is currently moving westward from 128°W to 61.5°E at approximately 0.35 deg/day. A Yaw-flip maneuver is required at equinox to mitigate a sounder temperature control blanket anomaly. The Star tracker 1 failed in 2014 and star tracker 2 failed in 2015, so GOES-15 is operating with a single star tracker. GOES-15 SXI and XRS are backup instruments for the Space Weather Prediction Center (SWPC).

GOES-14
GOES-14, launched on June 27, 2009, is located at 105°W in storage mode. All of the GOES-14 payload instruments are in storage mode.

3.3 Ground segment matters

The availability of the GOES ground systems was nominal in the reporting period. There are three GOES-R antennas at the Wallops Command and Data Acquisition Station (WCDAS) in Wallops, Virginia, and three at the Consolidated Backup Facility (CBU) in Fairmont, West Virginia, which have been tested and certified for GOES NOP operations.

3.4 Data transmission

Data transmission for GOES NOP is handled through the Processed Data Relay (PDR) direct broadcast service in the GOES Variable (GVAR) transmission format. The GOES-R series GOES Rebroadcast (GRB) is the primary relay of full resolution,

calibrated, near-real-time direct broadcast space relay of Level 1b data from each instrument and Level 2 data from the Geostationary Lightning Mapper (GLM). The Environmental Satellite Processing Center (ESPC) collocated with the NSOF also provides data directly to users, including the National Weather Service and field users.

3.5 Projects, services

NOAA does not have new projects to list at this time.

3.6 User statistics

NOAA does not maintain user statistics.

4 STATUS OF CURRENT LEO SATELLITE SYSTEMS

4.1 Mission objectives, payload/instruments, products

NOAA's Joint Polar Satellite System (JPSS)
NOAA's Joint Polar Satellite System (JPSS) provides global observations that serve as the backbone of both short- and long-term forecasts, including those that help us predict and prepare for severe weather events. NOAA is currently flying three of the five satellites scheduled in the fleet: NOAA/NASA Suomi National Polar-orbiting Partnership (Suomi NPP), NOAA-20, previously known as JPSS-1, and NOAA-21, previously known as JPSS-2. Each satellite carries at least four state-of-the-art instruments, including the Advanced Technology Microwave Sounder (ATMS), the Cross-Track Infrared Sounder (CrIS), the Visible Infrared Imaging Radiometer Suite (VIIRS), the Ozone Mapping and Profiler Suite (OMPS). Further, NOAA-20 carries the Clouds and Earth's Radiant Energy System (CERES) instrument and the planned JPSS-4 satellite is slated to carry the Libera instrument when it launches in December 2027. Both of these instruments measure the Earth's energy budget.

One of NOAA's previous Polar-orbiting Operational Environmental Satellites (POES) satellites, NOAA-19 (launched in Feb 2009), remains the primary PM satellite only for services such as SARSAT and the Argos Data Collection System (collecting data from small remote environmental transponders worldwide). Two of the residual spacecrafts, NOAA-18 and NOAA-15 provide additional payload data and observational capability. In April 2013, NOAA declared EUMETSAT's Metop-B as NOAA's mid-morning primary operational spacecraft. Metop-C is the successor to Metop-B and Metop-A, and it carries four POES-legacy instruments: The Advanced Very High-Resolution Radiometer (AVHRR), the Advanced Microwave Sounding Units, AMSU-A1 and AMSU-A2, and the Space Environment Monitor, SEM-2. AVHRR captures visible and infrared imagery of clouds, oceans, the atmosphere, ice, and land surfaces. AMSU-

A1 and AMSU-A2 measure global atmospheric temperature, humidity, precipitation and snow and ice cover in all weather conditions. And the Space Environment Monitor studies energetic particles in the upper atmosphere.

Jason-3
Jason-3 is the fourth mission in the U.S.-European series of satellite missions that measure the height of the ocean surface. NOAA operates JASON-3, but it is owned by the Centre National d'Etudes Spatiales (CNES, France's governmental space agency). JASON-3 is an international cooperative mission in which NOAA is partnering with CNES, European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), and National Aeronautics and Space Administration (NASA).

FORMOSAT-7/COSMIC-2
FORMOSAT-7/COSMIC-2 is a joint U.S.-Taiwan satellite mission being conducted under an agreement between the American Institute in Taiwan (AIT) and the Taipei Economic and Cultural Representative Office in the United States (TECRO). NOAA is AIT's designated representative, and the Taiwan Space Agency (TASA) is TECRO's designated representative. The six FORMOSAT-7/COSMIC-2A satellites launched into low earth parking orbits with altitude of 720 km and inclination of 24º on June 25, 2019. Each satellite carries one primary mission payload, called the TriG Global Navigation Satellite System (GNSS) Radio Occultation (RO) System (TGRS) which tracks GNSS signals and infers the deviations in each signal's straight-line path caused by temperature, pressure, moisture and electron density gradients. The six equatorial satellites also each carry two U.S. secondary science payloads, an Ion Velocity Meter (IVM) and a Radio Frequency Beacon (RFB).

4.2 Status of spacecraft

NOAA-21
The Joint Polar Satellite System-2 (JPSS-2) mission launched from the Vandenberg Space Force Base in Lompoc, California on November 10, 2023, and was re-designated as NOAA-21 when it became operational. On March 1, 2024, NOAA-21 was designated the Primary PM Weather satellite in the JPSS constellation, NOAA's next generation of weather satellites. It is operating advanced instruments including the Visible Infrared Imaging Radiometer Suite (VIIRS), the Advanced Technology Microwave Sounder (ATMS), the Cross-track Infrared Sounder (CrIS), the Clouds and the Earth's Radiant Energy System (CERES), and the Ozone Mapping and Profiler Suite (OMPS). The vehicle and instruments are all operating within specifications, except the primary Ka-Band Transmitter, which failed shortly after launch, requiring NOAA-21 to operate off of its backup Ka-Band Transmitter.

NOAA-20

The Joint Polar Satellite System-1 (JPSS-1) launched on November 18, 2017 and was re-designated NOAA-20 after handover. NOAA-20 operated as the Primary PM Weather satellite from February 12, 2019, until NOAA-21 was designated the primary satellite in the JPSS fleet in March 2024. At that time NOAA-20 was re-designated as the Secondary PM Weather satellite within the JPSS Constellation, and was also relocated half an orbit out of phase with NOAA-21. NOAA-20 is operating the Visible Infrared Imaging Radiometer Suite (VIIRS), the Advanced Technology Microwave Sounder (ATMS), the Cross-track Infrared Sounder (CrIS), the Clouds and the Earth's Radiant Energy System (CERES), and the Ozone Mapping and Profiler Suite (OMPS) and is contributing to the continuity of observations that are critical for environmental monitoring and prediction. The vehicle and instruments are all operating within specifications.

S-NPP

Suomi National Polar-orbiting Partnership (S-NPP) was launched on Oct 28, 2011, and operated as the Secondary PM Weather satellite until November 2023, when it was re-designated as the Tertiary PM Weather Satellite within the JPSS Constellation. S-NPP is now being operated in a best effort manner with no latency and or performance requirements left on its Science Mission data. S-NPP was the pathfinder of the NOAA JPSS satellites. It is operating the Visible Infrared Imaging Radiometer Suite (VIIRS), the Advanced Technology Microwave Sounder (ATMS), the Cross-track Infrared Sounder (CrIS), the Clouds and the Earth's Radiant Energy System (CERES), and the Ozone Mapping and Profiler Suite (OMPS). The vehicle and instruments are all operating within specifications, except that the CrIS instrument is now only providing shortwave IR information due to a digital signal processor issue and it also incurred a failed Middle Solar Panel approximately a year after launch.

NOAA-19

NOAA-19, launched in February 2009, remains the primary NOAA polar environmental satellite for SARSAT and Argos Data Collection System (NOAA-20 is the primary environmental data satellite in the PM orbit). Along with Metop satellites, it operates the Advanced Very-High- Resolution Radiometer (AVHRR), the High-resolution Infrared Radiation Sounder (HIRS), the Advanced Microwave Sounding Unit (AMSU) A, the Microwave Humidity Sounder (MHS, in place of the AMSU- B), the Solar Backscatter Ultraviolet Instrument (SBUV/2), and the Space Environment Monitor (SEM), as well as SARSAT and the Argos Advanced Data Collection System (ADCS), improved over the version in older satellites. NOAA-19’s instruments are fully functional, with the exception of its HIRS and MHS payloads, which are operating in a degraded mode.

NOAA-18

NOAA-18, launched in May 2005, is currently a secondary PM polar environmental satellite. Along with Metop satellites, it is operating the Advanced Very-High-

Resolution Radiometer (AVHRR), the High-resolution Infrared Radiation Sounder (HIRS), the Advanced Microwave Sounding Unit (AMSU) A, the Microwave Humidity Sounder (MHS, in place of the AMSU-B), the Solar Backscatter Ultraviolet Instrument (SBUV/2), and the Space Environment Monitor (SEM), as well as SARSAT and the Argos Data Collection System (DCS) payloads. NOAA-18's instruments are mostly fully operational, though the SBUV/2, MHS and HIRS are inoperative. SAR and Argos DCS payloads are both fully functional.

NOAA-15
NOAA-15, launched in May 1998, is currently a secondary AM polar environmental satellite, along with Metop-A/B. Along with the Metop satellites, it is operating the Advanced Very-High- Resolution Radiometer (AVHRR), the High-resolution Infrared Radiation Sounder (HIRS), the Advanced Microwave Sounding Unit (AMSU) A and B, and the Space Environment Monitor (SEM). Most of the instruments are operating in a degraded mode, with the HIRS and AMSU-B non- operational and the SEM and AMSU-A2 units remaining fully operational. At 20+ years old, it is the oldest of the NOAA satellites. NOAA-15 also carries a SARSAT payload, as well as the Argos DCS payload. The SAR unit on NOAA-15 is operating in a degraded mode and the Argos DCS payload is fully operational.

JASON-3
Jason-3 launched Jan 17, 2016. It is operating under an Extended Routine Operations Phase until December 2025. The partners in this mission are discussing a future extension of the Extended Routine Operations Phase.

FORMOSAT-7/COSMIC-2
The six COSMIC-2 spacecraft completed orbit lowering in February 2021 and are now in their final, evenly spaced mission orbits. The Neutral atmosphere observations are now available through the WMO Global Telecommunications System (GTS) and are used operationally by several Numerical Weather Prediction Centers including at NOAA, the U.S. Air Force 557th Weather Wing and ECMWF. The Ionospheric products have been validated and are operational at the USAF 557th Weather Wing, and Total Electron Content (TEC) became operational at NOAA SWPC in March of 2022.

4.3 Ground segment matters

NOAA's Joint Polar Satellite System (JPSS)
NOAA's legacy POES Ground System transitioned in November 2023 to an Commercial Provider to both provide a Cloud based Ground System and to perform Outsourced Operations for NOAA-15, NOAA-18 and NOAA-19 - this operations paradigm continues under a best effort basis only until decommission.

The JPSS Ground System supports Suomi NPP, NOAA-20, NOAA-21 and a diverse set of low-Earth-orbiting satellites used for operational weather forecasting, environmental monitoring and climate research.

The Ground System is a series of antennas, communications networks, and processing facilities that command and control the satellites, bring their data down to Earth, route data to processing facilities, create data products and distribute them.

The JPSS Ground System also provides services to the following missions:

- Japan Aerospace Exploration Agency's Global Climate Observation Mission-Water 1 (GCOM-W1)
- U.S. Department of Defense's Defense Meteorological Satellite Program
- U.S. missions supported by NASA's Space Communications and Navigation networks (such as Terra, Aqua, Aura, Landsat)
- European Organization for the Exploitation of Meteorological Satellites' (EUMETSAT) meteorological operations missions
- National Science Foundation's (NSF) Antarctic research program at McMurdo station

FORMOSAT-7/COSMIC-2
For satellites in the low-inclination orbit, ten (10) receiving stations are strategically placed around the equator in Taiwan, Hawaii, Honduras, Guam, Kuwait, Australia, Brazil, Ghana, Tahiti, and Mauritius Island. The TASA Satellite Operations Control Center (SOCC) provides command and control of the COSMIC-2 constellation. The Mark IV-B antennas in Hawaii, Honduras, Guam, and Kuwait are provided by the U.S. Space Force. The Australian Bureau of Meteorology (BoM) provides an antenna in Darwin. The Brazil National Institute of Space Research (INPE) operates an antenna at their facility in Cuiaba, Brazil. NSPO provides antennas in Taiwan as part of the FORMOSAT-7/COSMIC-2 mission. Mauritius antenna services are provided to NOAA under a Program Implementation Plan with the Norwegian Space Centre, and NOAA has contracted for antenna services in Ghana and Tahiti.

4.4 Data transmission

NOAA's Joint Polar Satellite System (JPSS)
Data transmission for POES is handled through the Environmental Satellite Processing Center (ESPC) collocated with the NOAA Satellite Operations Facility at Suitland, Maryland. Data is provided to users, including the National Weather Service, through the ESPC, and to field users directly through the High Resolution Picture Transmission (HRPT) direct broadcast service. S- NPP, NOAA-20 utilize the OSPO Data Exploitation (NDE) / Product Distribution and Access (PDA) and the Interface

Data Processing Segment (IDPS) to ingest and distribute products to users worldwide as well as High Resolution Data (HRD) direct broadcast service. NOAA-21 uses the NESDIS Common Cloud Framework (NCCF) for NDE capabilities, and also utilizes the same EPSC PDA and the JPSS IDPS segment to ingest and distribute products to users worldwide.

FORMOSAT-7/COSMIC-2

The data collected by FORMOSAT-7/COSMIC-2 are downlinked to the tracking stations and then transferred to the U.S. Data Processing Center (USDPC) at the University Corporation for Atmospheric Research (UCAR) as well as to the Taiwan Data Processing Center (TDPC). The TDPC is the mirror site of the USDPC to serve the users in Taiwan. The USDPC serves as a complete mission data analysis center for the FORMOSAT-7/COSMIC- 2 mission.

4.5 Projects, services

NOAA does not have any new projects to list at this time.

4.6 User statistics

NOAA does not maintain user statistics.

5 STATUS OF CURRENT SPACE WEATHER SATELLITE SYSTEMS

5.1 Mission objectives, payload/instruments, products

The Deep Space Climate Observatory (DSCOVR) mission monitors solar wind activity from L1 in order to provide early warning for Earth orbiting satellites and ground-based systems that are susceptible to disturbances in solar wind. The PlasMag instrument, which includes a Faraday Cup (FC), Electrostatic Analyzer (ESA), and Magnetometer (MAG), collects the solar wind and magnetic-field data for downlink to SWPC. The data is downlinked 24/7 through NOAA's ground stations (WCDA, FCDA) and Real Time Solar Wind Network (RTSWNet) around the globe.

Additionally, DSCOVR collects Earth observations from a pair of Earth-pointing instruments; the Earth Polychromatic Imaging Camera (EPIC) and U.S. National Institute of Standards and Technology (NIST) Advanced Radiometer (NISTAR).

5.2 Status of spacecraft

DSCOVR spacecraft is operational with all instruments operating as intended. DSCOVR was placed in safe-hold due to life limiting issues associated with Z-axis laser gyro in April 2019 and flight software modifications were deployed in January 2020 to utilize star tracker for attitude determination - in early March 2020 DSCOVR resumed full operations. SWPC switched operations from NASA's Advanced Composition Explorer (ACE) to DSCOVR on July 27, 2016. ACE is still being utilized as back-up.

5.3 Ground segment matters

NOAA currently does not have any ground segment matters to report.

5.4 Data transmission

DSCOVR space weather data are collected through NOAA's CDAS (Command and Data Acquisition System) and RTSWNet and distributed to U.S. and international users by the NOAA NWS's SWPC. Terrestrial data and images are distributed by NASA's DSCOVR Science Operations Center (DSOC).

5.5 Projects, services

EPIC images are provided to the public through the following web link: http://epic.gsfc.nasa.gov/. Real-time solar wind data are available at SWPC: https://www.swpc.noaa.gov/products/real-time-solar-wind.

5.6 User statistics

NOAA does not maintain user statistics.

6 FUTURE SATELLITE SYSTEMS

6.1 Future GEO Satellites

Orbit Type ECT=Equator Crossing Time (for sun-synchronous orbits)	**Satellites in orbit** P= pre-operational Op=operational B=back-up L=limited availability	**Location**	**Launch Date**	**Details on near real time access to L0/L1 data (links)**	**Instrument payload and status**
Geostationary	GeoXO-Imager 1 (P)	West	2032	N/A	Imager, Ocean Color, Lightning Mapper
Geostationary	GeoXO-Imager 2 (P)	East	2034	N/A	Imager, Ocean Color, Lightning Mapper
Geostationary	GeoXO-Sounder 1 (P)	Central	2035	N/A	Hyperspectral Sounder, Atmospheric Composition
Geostationary	GeoXO-Imager 3 (P)	West	2039	N/A	Imager, Ocean Color, Lightning Mapper
Geostationary	GeoXO-Imager 4 (P)	East	2040	N/A	Imager, Ocean Color, Lightning Mapper
Geostationary	GeoXO-Sounder2 (P)	Central	2042	N/A	Hyperspectral Sounder, Atmospheric Composition

6.2 Future LEO Satellites

Orbit Type ECT=Equator Crossing Time (for sun-synchronous orbits)	**Satellites in orbit** P= pre-operational Op=operational B=back-up L=limited availability	**Equator Crossing Mean Local Time First Ascending Node**	**Mean altitude**	**Launch Date**	**Details on near real time access to L0/L1 data (links)**	**Instrument payload and status**
Polar, SSO	JPSS-4 (P)	1330	824	2027	https://www.ospo.noaa.gov/Organization/About/access.html	ATMS, CrIS, VIIRS, OMPS-N, Libera, RB
Polar, SSO	JPSS-3 (P)	1330	824	2032	https://www.ospo.noaa.gov/Organization/About/access.html	ATMS, CrIS, VIIRS, OMPS-N, RB

6.3 Future Space Weather Satellites

Sector	Satellites in orbit P=pre-operational Op=operational B=back-up L=limited availability	Location	Launch date	Details on near real time access to L0/L1 data (links)	Instrument payload and status
L-1	Space Weather Follow On at Lagrange 1 (SWFO-L1) (P)	Sun-Earth Lagrange Point 1 (L1)	9/23/2025	NA	Magnetometer (MAG), Solar Wind Plasma Sensor (SWiPS), SupraThermal Ion Sensor (STIS), Compact Coronagraph 2 (CCOR-2) - Integrated, launch-ready
L-1	Space Weather Observations at Lagrange 1 (SOL-A) (P)	Sun-Earth Lagrange Point 1 (L1)	2029	N/A	SwSCOR coronagraph, Solar Wind Plasma Sensor, (SWiPS) Suprathermal Ion Sensor (STIS), X-ray Flux Monitor (XFM)
L-1	Space Weather Observations at Lagrange 1 (SOL-B) (P)	Sun-Earth Lagrange Point 1 (L1)	2032	N/A	SwSCOR coronagraph, Solar Wind Plasma Sensor, (SWiPS) Suprathermal Ion Sensor (STIS),X-ray Irradiance Instrument (XRIS)

7 STATUS OF FUTURE GEO SATELLITE SYSTEMS

7.1 Mission objectives, spacecraft, payload/instruments, products

NOAA has begun implementation of the Geostationary Extended Observations (GeoXO) program, the satellite series that will follow GOES-R. GeoXO completed the System Requirements Review and was baselined by NOAA and its parent Department of Commerce in 2022. Phase A Studies with industry for the instruments and the spacecraft were completed in 2023 and helped to define performance, risks, costs, and development schedule. The results of the studies were used to set performance requirements for the development contracts. Implementation contracts for two of the instruments, the Imager and Sounder were awarded in 2023, and contracts for the remaining instruments and spacecraft were awarded in 2024. In 2025-26, the GeoXO program will re-baseline and is expected to restructure the constellation configuration to prioritize weather observations to ensure operational continuity. The GeoXO program is planning its first launches in 2032 and 2034.

7.2 Ground segment matters

Nothing to report.

7.3 Data transmission

For GeoXO, data distribution will be primarily accomplished using the NESDIS Common Cloud Framework. Additionally, the GeoXO East and West satellites will provide DCS relay and command capability. Other rebroadcast functions are planned to be accomplished with commercial communications satellites. NOAA plans to work with the user community to define the content of a “high rate” and “medium/low rate” data service for GeoXO. NOAA will contract with a commercial communications satellite to provide these broadcast services.

8 STATUS OF FUTURE LEO SATELLITE SYSTEMS

8.1 Mission objectives, spacecraft, payload/instruments, products

JPSS-4 and JPSS-3 are scheduled for launch in 2027 and 2032 respectively. They are the final two satellites of the NOAA JPSS program.

NOAA’s Near-Earth Orbit Network (NEON) Program will develop future low-Earth orbit (LEO) environmental satellites. Low and medium Earth observations are critical for weather forecasting, environmental observation, and public safety. NEON sets the stage for NOAA to manage future polar and other low Earth and medium Earth orbit

satellite observations as loosely coupled projects. The NEON Program will supplement and eventually replace NOAA's Joint Polar Satellite System (JPSS). JPSS will continue to operate its series of polar orbiting satellites through the late 2030's. NEON will lay the groundwork for the next generation of LEO satellites long before the final JPSS launch takes place. NEON will continue, improve and extend NESDIS' global observations for weather forecasting and disaster management. The LEO satellites from NOAA, NASA and international partners contribute to more than a half-century of unbroken data records. LEO satellites are the backbone of global long-range weather forecasting models, supplying more than 80 percent of the numerical weather prediction model data used for 3 to 7-day forecasts. These satellites help predict severe weather, while also detecting and monitoring hazards such as fires, droughts, floods, coral bleaching events, unhealthy coastal waters and others. NOAA and its interagency and international partners use LEO data every day to meet ongoing mission needs. The NEON program will usher in a new paradigm for NOAA to continue to provide for these environmental measurements to support a wide variety of atmospheric, terrestrial, marine and polar observations. Data uses include the numerical weather prediction models, fire and flood models, atmospheric chemistry observations and multiple land imagery products that have been crucial pieces of the NOAA strategic goal to build both a "Weather Ready Nation". NEON will use commercial best practices to the maximum extent possible, to include operation in order to deliver data to users worldwide.

8.2 Ground segment matters

JPSS-3 and JPSS-4 will use the same ground segment as NOAA-20 and NOAA-21. Ground segment plans for NEON are under development. NOAA will provide that information in future papers.

8.3 Data transmission

JPSS-3 and JPSS-4 will use the same data transmission as NOAA-20 and NOAA-21. Data transmission plans for NEON are under development. NOAA will provide that information in future papers.

9 STATUS OF FUTURE SPACE WEATHER SATELLITE SYSTEMS

9.1 Mission objectives, spacecraft, payload/instruments, products

NOAA's space weather strategy will ensure continuity of SWPC forecasting capabilities for the space weather effects outlined above. The NESDIS primary space-weather goals include:

- Provide continuous 24/7 imagery of coronal mass ejections (CMEs) to maintain SWPC's required operational effectiveness
- Provide continuous 24/7 data of key solar wind variables to SWPC. The variables include plasma density, bulk velocity, and temperature; vector magnetic field; and suprathermal ion flux at several energies.
- Continue to update and operate a robust space and ground architecture.

9.1.1 Space Weather Follow On Lagrange 1 (SWFO-L1)

In advancing this strategy, NOAA has recently developed the multifaceted Space Weather Follow On (SWFO) program which aims to:

a) add SWFO-L1 to the monitoring spacecraft at L1; and
b) place a CCOR telescope with a field of view (FOV) of 3-22 sun on the geostationary satellite GOES-19 (former GOES-U, section 3) so as to replace NASA's Solar and Heliospheric Observatory (SOH) in supplying coronal images essential in SWPC's forecasting capabilities.

The SWFO-L1 spacecraft will also carry a Solar Wind Instrument Suite (SWIS) comprising a plasma instrument to measure the solar wind (Solar Wind Plasma Sensor, or SWiPS), a magnetometer (MAG), and an energetic particle detector (SupraThermal Ion Sensor, or STIS). The first two are specified to be significantly better than those of DSCOVR, and STIS is a new NOAA capability. Images of the Sun's corona will be generated at 15- minute intervals with a 30-minute latency while solar wind and magnetic-field variables will have a 1-minute cadence with a 5-minute latency.

SWFO sustains NOAA's foundational set of space-based space weather observations and measurements to ensure continuity of critical data. SWFO-L1 is planned for launch in September 2025 as a rideshare on the launch of NASA's Interstellar Mapping and Acceleration Probe (IMAP) mission. The SWFO-L1 observatory and instruments have been fully integrated and are in storage before being shipped to Cape Canaveral in summer 2025 for integration on the launch vehicle. The SWFO Ground Segment (Command & Control, SWFO Antenna Network, and Product Generation and Distribution) continues to develop and is on track to support the launch of the SWFO-L1 mission).

SWFO-L1 will provide both coronal imaging and in situ measurements of the solar wind and its magnetic field, all of which are used by SWPC's forecasters and its numerical models. The CCOR-1 on GOES-19 and CCOR-2 on SWFO-L1 will complement each other to provide a robust and resilient system to provide continuous 24/7 CME imagery.

9.1.2 Space Weather Next (SW Next)

Space Weather Next (SW Next) will maintain and extend space weather observations from several observing points, selected to most efficiently provide the comprehensive knowledge of the Sun and the near-Earth space environment. NESDIS is planning for the development, sustainment, and augmentation of observations from:

- Lagrange Point 1 (L1)
- Lagrange Point 5 (L5)
- GEO
- LEO
- Highly Elliptical Orbit (HEO)

The SW Next Program and the SOL Project are currently in the formulation phase of missions SOL-A and SOL-B. The program is engaging stakeholders through user outreach targeting civil aviation, electric grid, and satellite operator communities. NOAA has established agreements with NASA, the Naval Research Lab (NRL), and European Space Agency for the L1 & L5 cooperation and is pursuing other agreements for observational support and exchange of space weather data.

9.2 Ground segment matters

NOAA has developed a complete and resilient SWFO Antenna Network (SAN) for 24/7 telemetry and data acquisition for SWFO-L1 with three primary and three backup stations. In addition to NOAA's ground station network which includes the Wallops Command and Data Acquisition Station (WCDAS) at Wallops, Virginia, Fairbanks Command and Data Acquisition Station (FCDAS) at Fairbanks, Alaska, and the Consolidated Backup (CBU) facility at Fairmont, West Virginia, NOAA has two stations in Southern Europe and two stations in Australia/New Zealand for a total of six stations.

NOAA is also investigating the use of ground stations by other agencies (NASA, Air Force). The agency has also entered into agreements with international partner organizations to sustain the RealTime Solar Wind network (RTSWnet) originally developed for ACE and DSCOVR. Participating organizations include NICT (Japan), KASA (Korea), University of Kiel and DLR (both in Germany). In December 2022, NOAA signed an agreement with Japan's National Institute of Information and Communications Technology (NICT) for cooperation to develop and implement an international ground network to support collection and distribution of operational data from space-based space weather missions, including but not limited to the NESDIS SWFO-L1 mission. In January 2024, NOAA signed a similar agreement with Korea's Radio Research Agency (RRA) to cooperate on operational space weather, including but not limited to SWFO-L1.

9.3 Data transmission

The coronal images and solar wind data acquired by SWFO-L1 and CCOR-1 on GOES-19 will be downlinked to the tracking station of the ground networks and then transferred to OSPO's NSOF. SWPC will process the data and images, generate data products, and distribute them directly to operational users. NCEI will archive the SWPC and its own retrospective (science-based) data products and make both types available to retrospective users.

10 ACTIONS AND/OR RECOMMENDATIONS FOR CONSIDERATION BY CGMS PLENARY SESSION

NOAA has no actions or recommendations for consideration by the CGMS-53 Plenary Session.

11 CONCLUSIONS

This document summarizes the status of NOAA current and future satellite systems. CGMS is invited to take note.