



**National Oceanic and
Atmospheric Administration**

Outlook on Earth Observations

NOAA Earth Observation Programs – Where We Are and Where We're Going

Prepared for: ITU/WMO Seminar

Delivered on: 30 September 2026

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for NOAA NESDIS

Extreme Weather Prediction Starts with NOAA Satellites



DEEP SPACE



GEOSTATIONARY ORBIT



LOW EARTH ORBIT

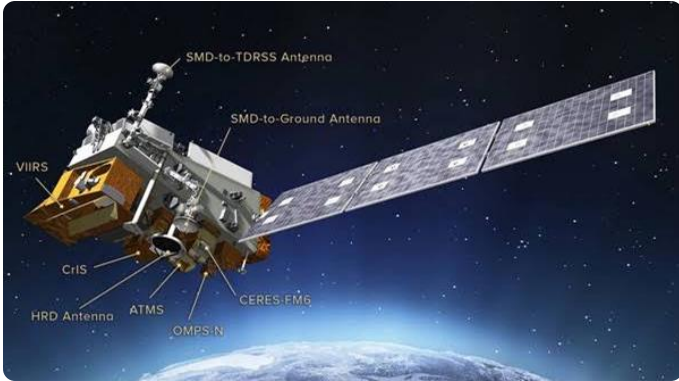


NOAA/NESDIS also collaborates with partners to exchange data, which is not represented in this graphic.

- JAPAN
- SOUTH KOREA
- CANADA
- SPAIN
- USA
- FRANCE
- NOAA
- EUMETSAT
- EUROPEAN COMMISSION
- TAIWAN SPACE AGENCY (TASA)
- EUROPEAN SPACE AGENCY
- NASA
- DEPARTMENT OF DEFENSE
- COMMERCIAL DATA PURCHASE

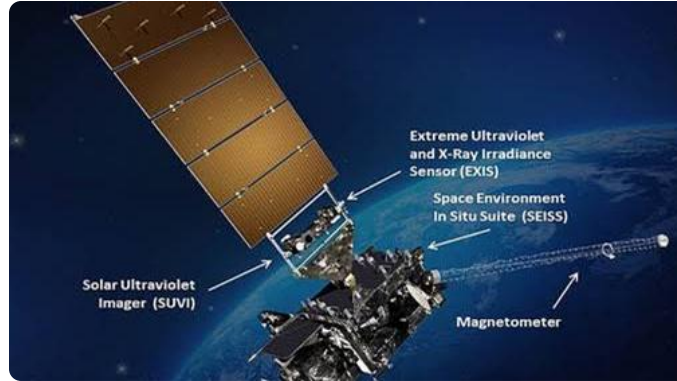


NOAA Observations: Buy, Partner, Build



Low Earth Satellites (LEO)

500 miles above Earth



Geostationary Satellites (GEO)

22,000 miles above Earth



Space Weather Satellites

Lagrange 1: ~1 million miles from Earth and other observation points

NOAA relies on commercial weather data alongside government program and partner observations to **improve coverage** and **achieve more accurate weather forecasts** at the **best value**.

NESDIS Commercial Data Program Supports NOAA's Strategy

The **Commercial Data Program (CDP)** acquires and evaluates space-based environmental data used in NOAA's terrestrial and space weather forecasting and monitoring in order to:

diversify, streamline, and improve observations

to meet NOAA's mission objectives.

Piloting

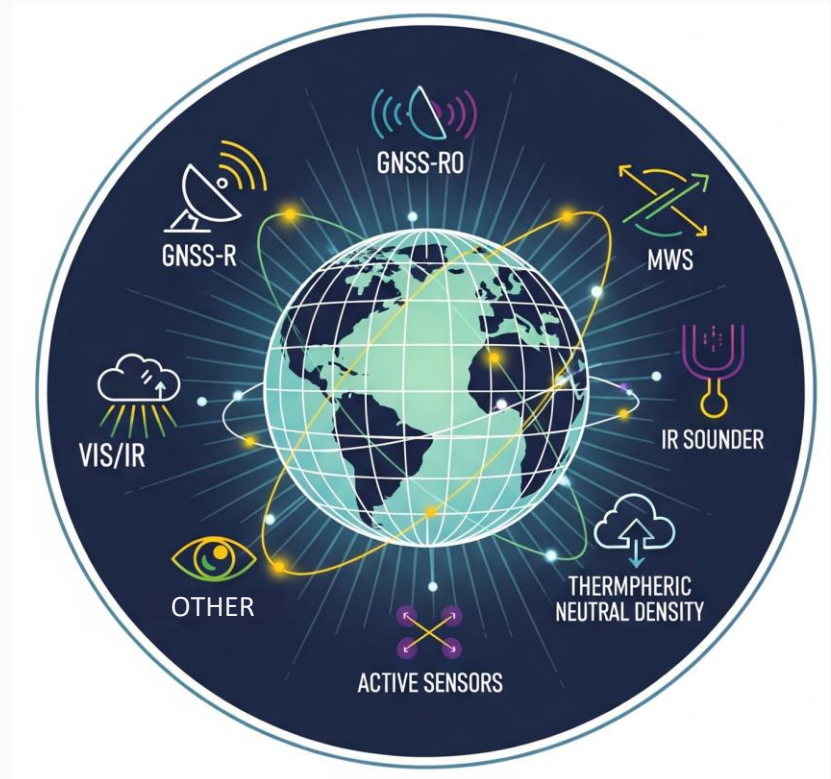
Commercial Data Pilots

Demonstrating the quality and impact of commercial data for NOAA applications through active testing and evaluation.

Operations

Commercial Data Purchases

Procuring data-as-a-service (DaaS) from commercial vendors to support operational weather forecasting and space environment needs.



More info on CDP: nesdis.noaa.gov/commercial-data-program

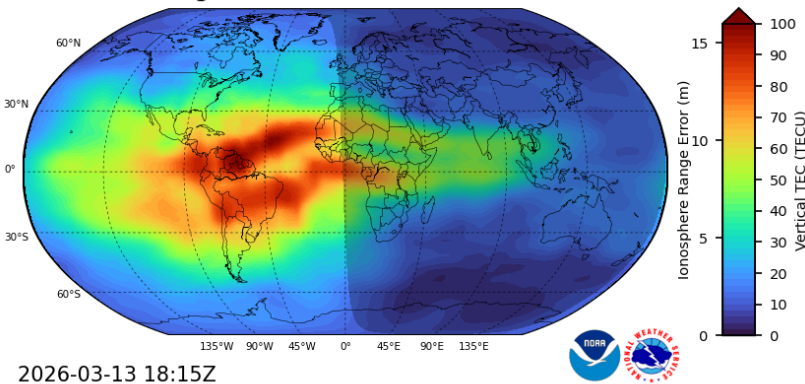
Commercial Data Types

Successful Transition to Operations (T2O):

- Radio Occultation (RO)
- Total Electron Content



GPS L1 Range Error from Total Electron Content



GloTEC Total Electron Content (TEC) (ground + COSMIC-2 + PlanetIQ)

Current/FY26 Piloting:

- GNSS-Reflectometry
- Microwave Sounder
- IR Imagery (for Wildfires)
- Hyperspectral Microwave



Tomorrow.io Microwave Sounder rendering

Future Considerations:

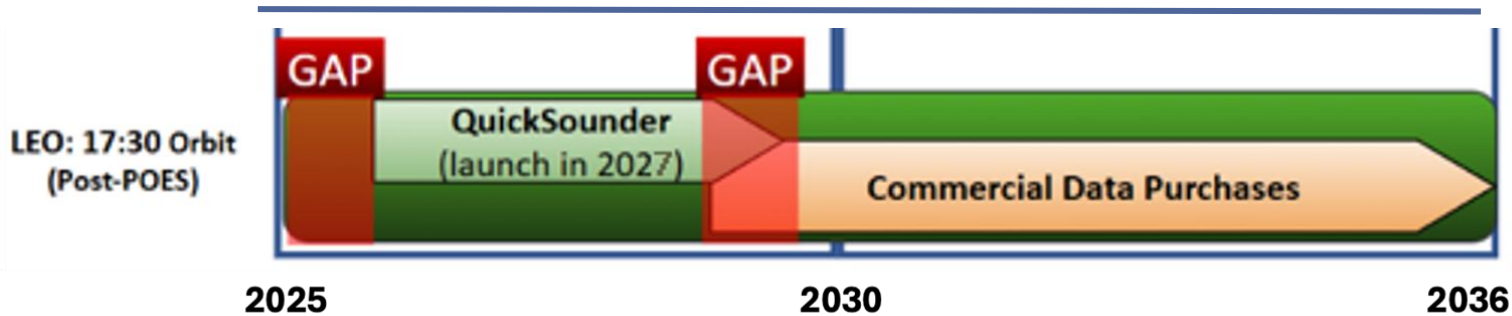
- Thermospheric Neutral Density
- Scintillation (RO-derived)
- Scatterometry
- Multispectral Imagery
- Active Sensors
- IR Sounders



2026 Northeast Blizzard GOES Visible Image



Near-Term Priority: Prevent Gaps for Critical Continuity



Microwave Sounding

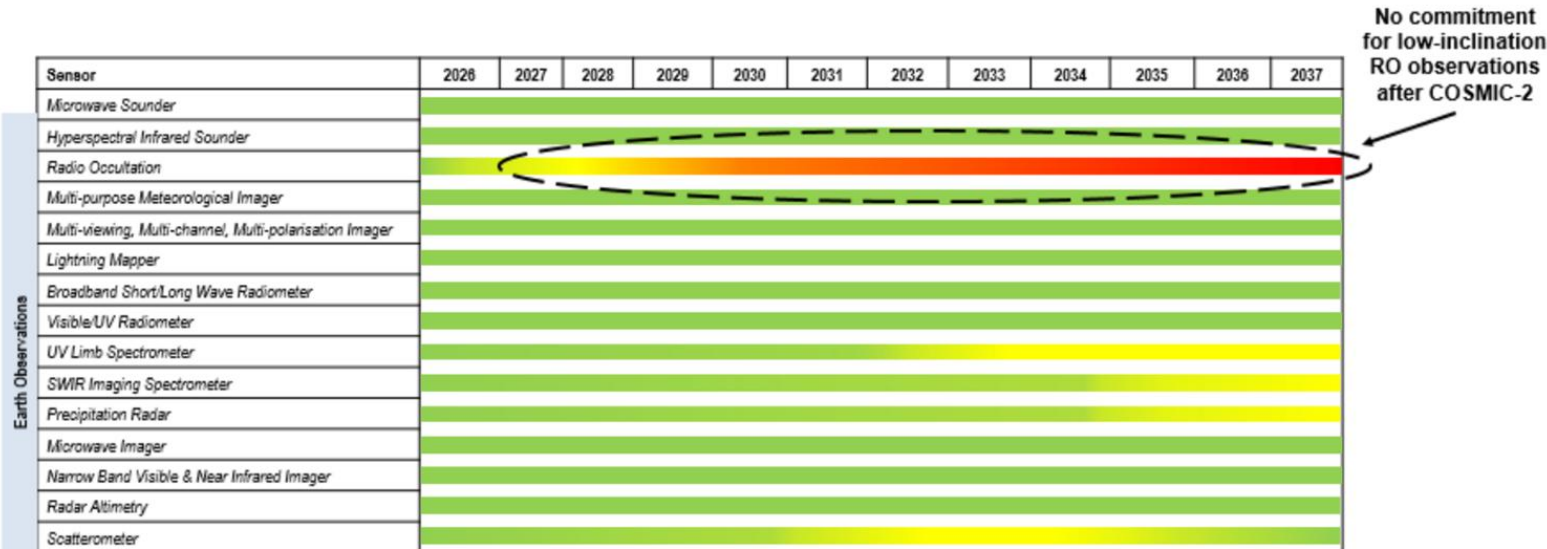
NOAA plans to procure commercial data to supplement the government backbone, particularly beyond QuickSounder in the 17:30 orbit.

Coordination Group for Meteorological Satellites - CGMS

Top-Level Risk Assessment - Earth Observations (2026)

Equatorial RO

As announced in April 2025, NOAA plans to procure commercial data to maintain critical continuity as the COSMIC-2 satellites approach end of operational lifetimes.



THE CORE CHALLENGE: ENVIRONMENTAL INTELLIGENCE UNDER THREAT

shield

A NEW ERA...

Integrating and securing advanced environmental and radiometric intelligence streams.

New capabilities are required to address emerging environmental risks and data integration complexities.

balance

POLICY CONFLICT...

Conflicting priorities, resource constraints, and geopolitical pressures are impacting consistent environmental policies.

Strategic policy resolution is critical to maintaining operational stability.

public

THE GLOBAL STAKES...

Strengthening international data sharing networks and cooperation is essential.

Maintaining reliable, high-quality global data feeds is a fundamental necessity for planetary intelligence.

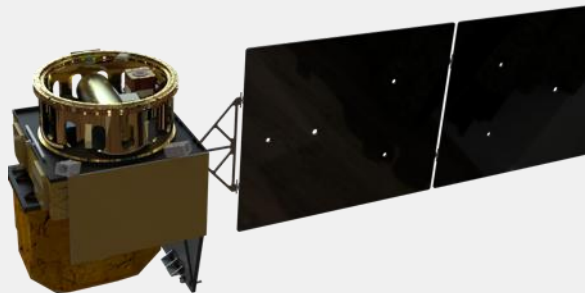
NEON Program Initial Scope

QuickSounder Project

Demonstrate operational observations can be obtained with a small, commercial-based satellite on a compressed schedule



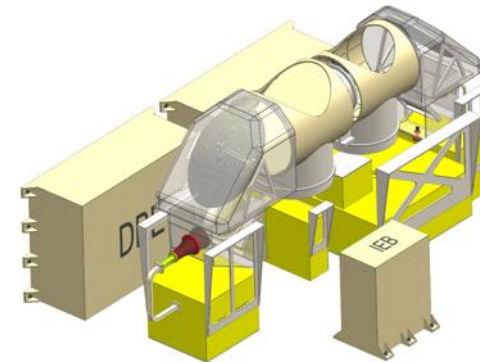
ATMS EDU



QuickSounder Concept

Series-1 Project

Provide microwave sounding observations essential to the performance of the NWP models using a block of small, single instrument satellites



Sounder for Microwave-based Applications (SMBA)

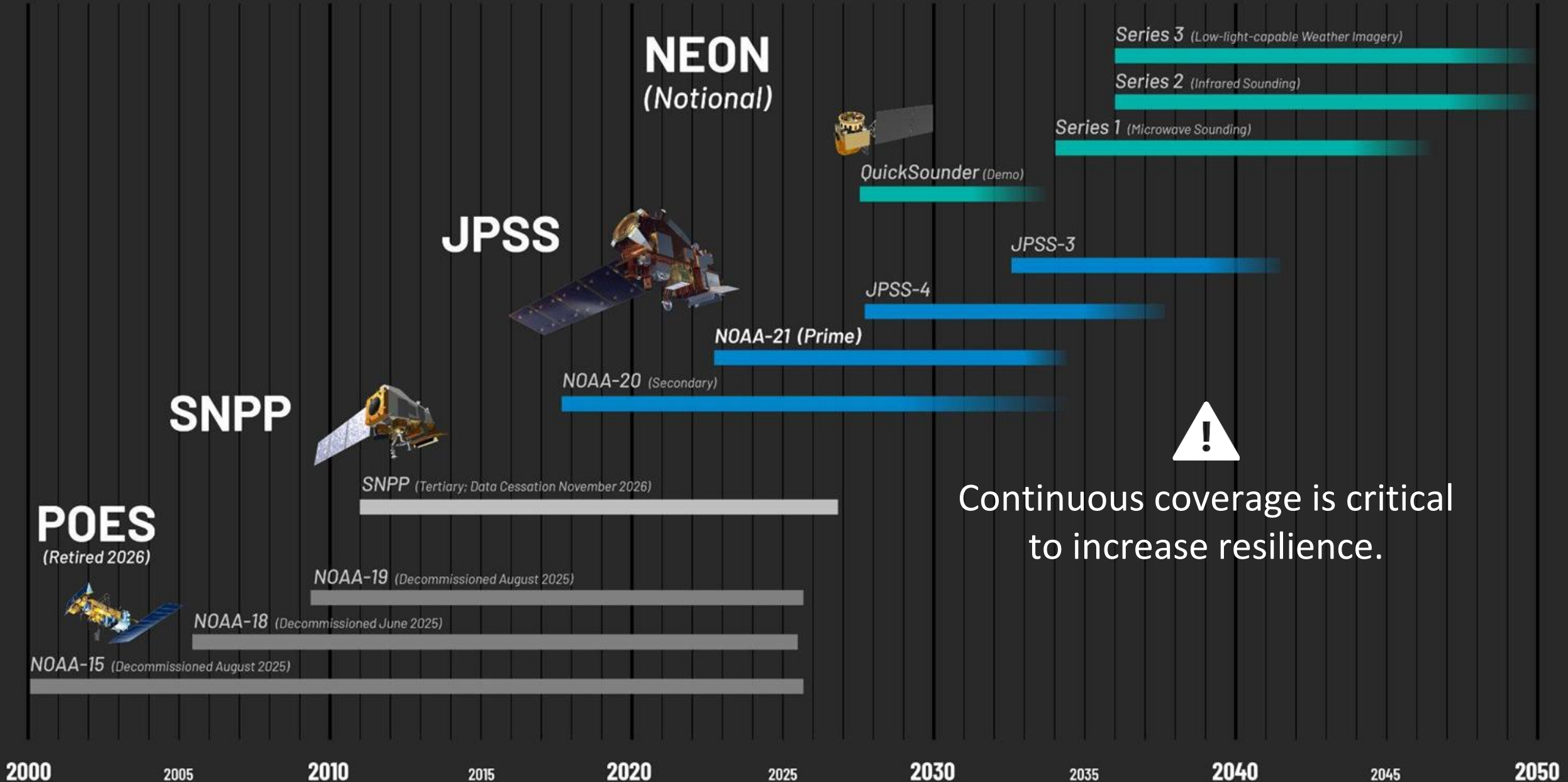


Series-1 Satellite Concept

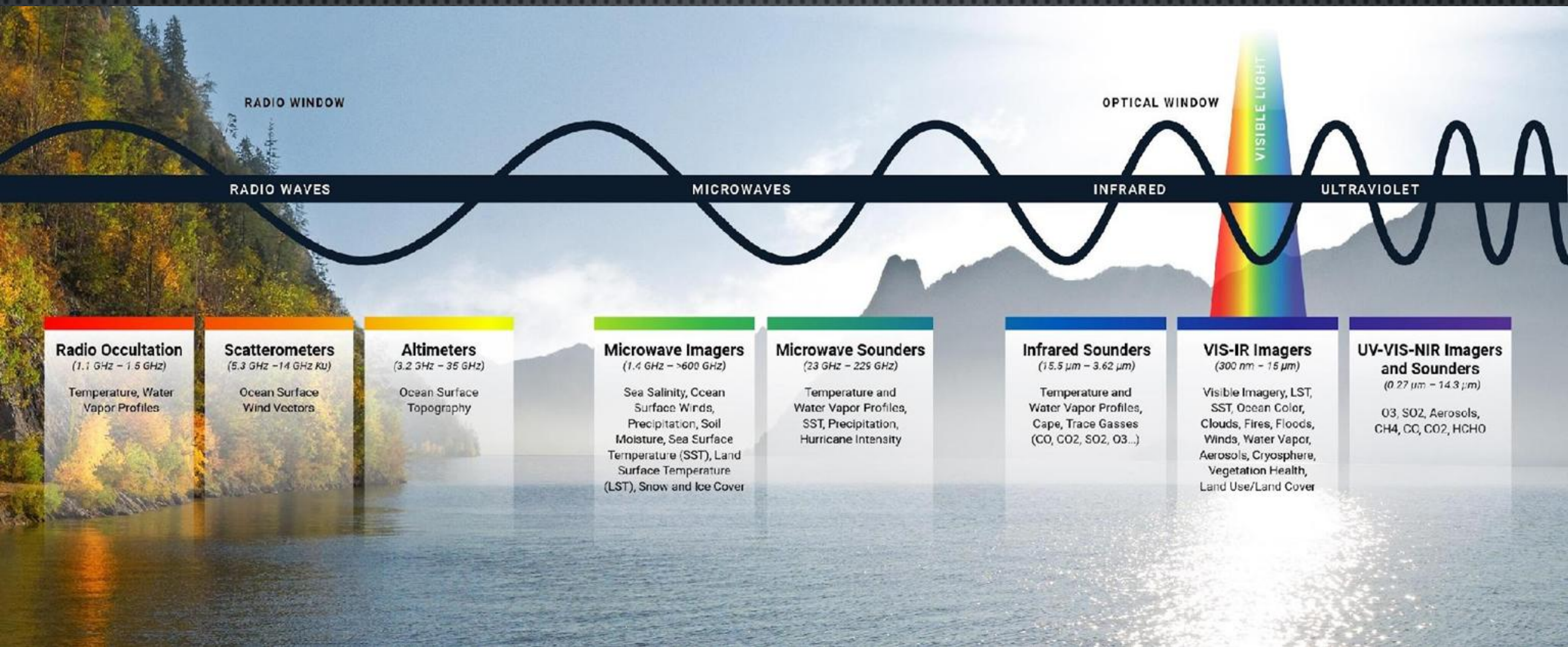
QuickSounder Render Credit: Southwest Research Institute/Richard Menchaca



NOAA LEO Satellite Programs

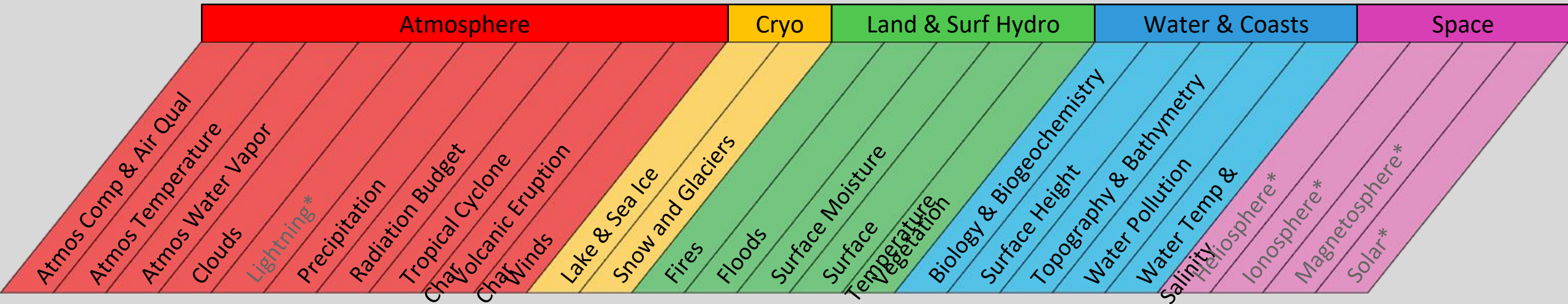


LOW EARTH ORBIT MEASUREMENTS COVER ALL USABLE REGIONS OF THE ELECTROMAGNETIC SPECTRUM



LEO Observations Contribute to Most Geophysical Products in the NESDIS Level Requirements

NESDIS Level Requirements–Geophysical Products

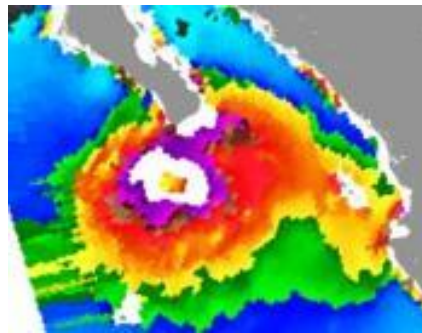


*Products derived from non-LEO observations

Multipurpose VIS/NIR/IR



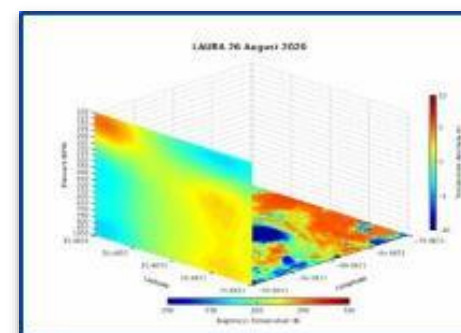
MW Imagery



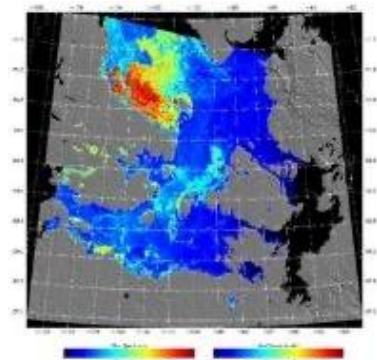
UV Imagery



Soundings from IR/MW/RO



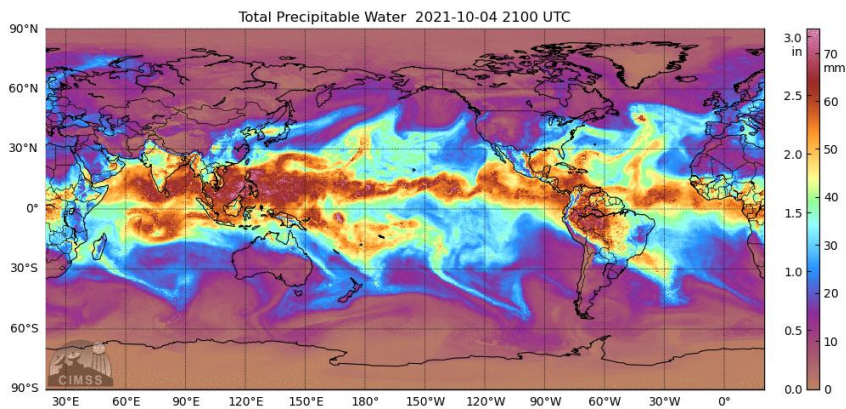
Radar Imagery



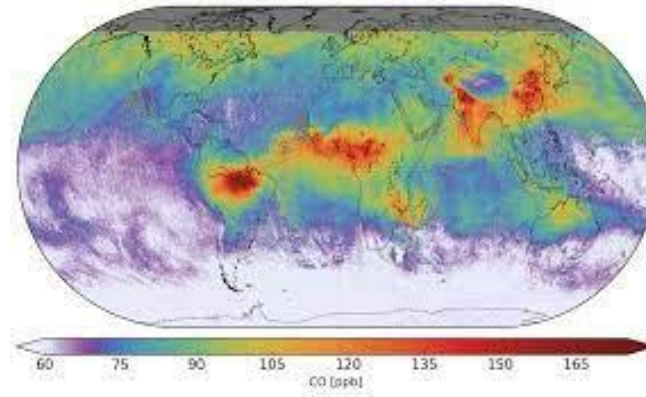
Growing User Needs in Low Earth Orbit

Users expect NOAA to provide improved global observations and forecasts, to meet new requirements with new observations, and to provide novel climate products and services to meet developing challenges and needs.

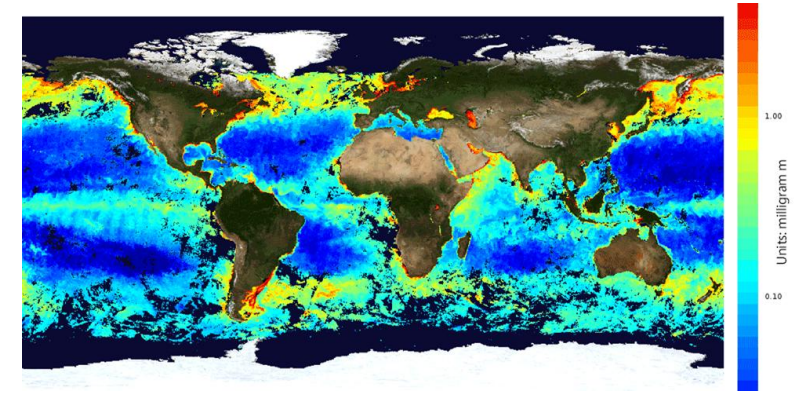
Improved MW and IR Soundings



Enhanced Atmospheric Chemistry Sensor



Hyperspectral Ocean Color



NEON Will Support:

- the development of next generation instruments to support the continuity of JPSS and partner mission critical observations
- the evolution of the LEO architecture to an enterprise system-of-systems that can exploit and deploy new observational capabilities

the prioritization of new observations that leverage partnerships and commercial approaches



GEOSTATIONARY EARTH ORBIT FLEET

CONTINUOUS HEMISPHERIC MONITORING & OBSERVATIONS

ORBITAL PROGRAM // GOES-R

GOES-R Series Fleet

The GOES-R series operates four satellites at geostationary locations including 75.2W, 137.2W, and 104.7W. These satellites collect atmospheric parameters using instruments sensing in visible, near-infrared, and thermal infrared frequencies. Notably, GOES-R is the first satellite in the GOES series to utilize X-band frequencies.



NEXT-GENERATION // GeoXO

GeoXO Constellation

Launch of first satellite: Dec 2032

General objective: Earth observation. GeoXO will bring new and improved capabilities for short term forecasts and warnings. Collect numerous atmospheric and surface parameters. The Hyperspectral IR Sounder will contribute to better numerical weather prediction and forecasts for severe weather. Several broadcast services offered by GOES-R have been discontinued on GeoXO, including GRB, HRIT/EMWIN, SAR.

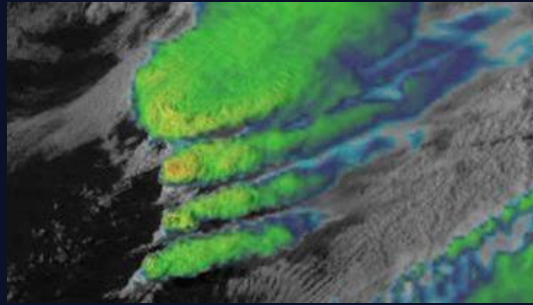


GOES-R SATELLITES: ADVANCED CAPABILITIES

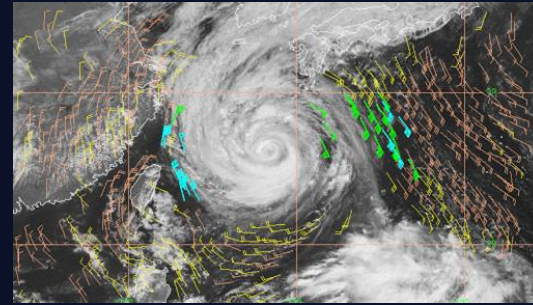
- **METEOROLOGICAL OPERATIONS:** IMAGERY AND LIGHTNING DATA ARE ESSENTIAL FOR MESOSCALE AND SHORT-RANGE FORECASTING, AND FOR ISSUING CRITICAL WATCHES AND WARNINGS.
- **SPACE WEATHER OBSERVATION:** SOLAR AND IN SITU MEASUREMENTS PROVIDE REAL-TIME DATA FOR SPACE WEATHER FORECASTS AND HAZARDS MONITORING.



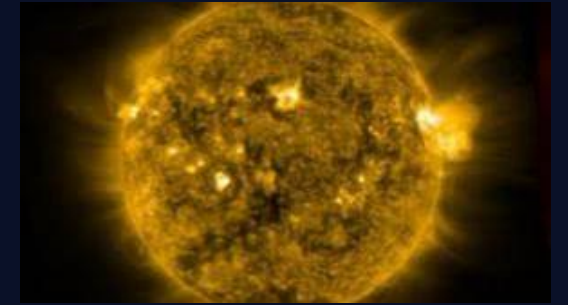
Tropical Cyclone Tracking
and Evolution



Severe Storms
Convective Hazards



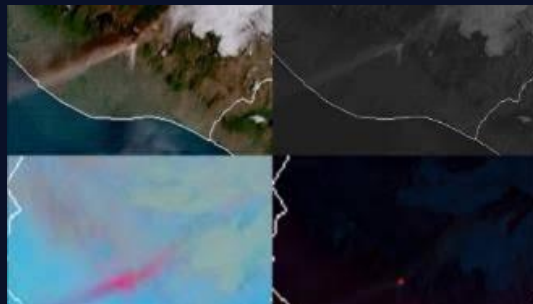
Atmospheric Winds
Aviation & Jet Stream



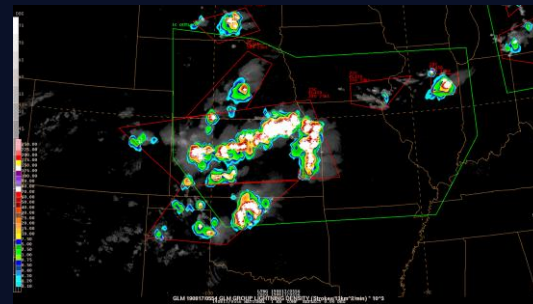
Solar Activity
Space Weather Source



Wildfire Detection
and Characterization



Volcanic Ash Tracking
Aviation Flight Safety



Lightning Mapping
Continuous GLM Sensor



Space Weather
In Situ Conditions

Programmatic Spectrum Priorities (2026–2045)

Critical Focus Areas by Mission

Program	Lifecycle	Primary Spectrum Focus
 GOES-R Series	2016 – 2035 	Protecting L-band downlinks; managing X-band growth
 GeoXO	2032 – 2055 	Protecting L-band downlinks; managing X-band growth
 JPSS/NEON	2017 – 2040 	5G RFI in 24 GHz, S- and L-band transitions
 Space Weather Next	2025 – 2045 	Protecting coronagraph and plasma sensor links

**Thank
You!**

