

National Aeronautics and  
Space Administration

# Flight Program Overview

September 3, 2026

**Scott Schwinger**  
Associate Director, ESD Flight

A large, circular graphic on the right side of the slide. It features a central image of Earth from space, surrounded by concentric rings. The rings contain various images: a satellite, a desert landscape, a forest, a river, and a close-up of a plant. A white NASA aircraft is shown flying in the lower right. The text "NASA Earth" is overlaid in the center of the graphic.

# NASA Earth

# Flight Mission Strategy

## Reformulate ESO missions aligned with 2026 appropriation and Presidential priorities

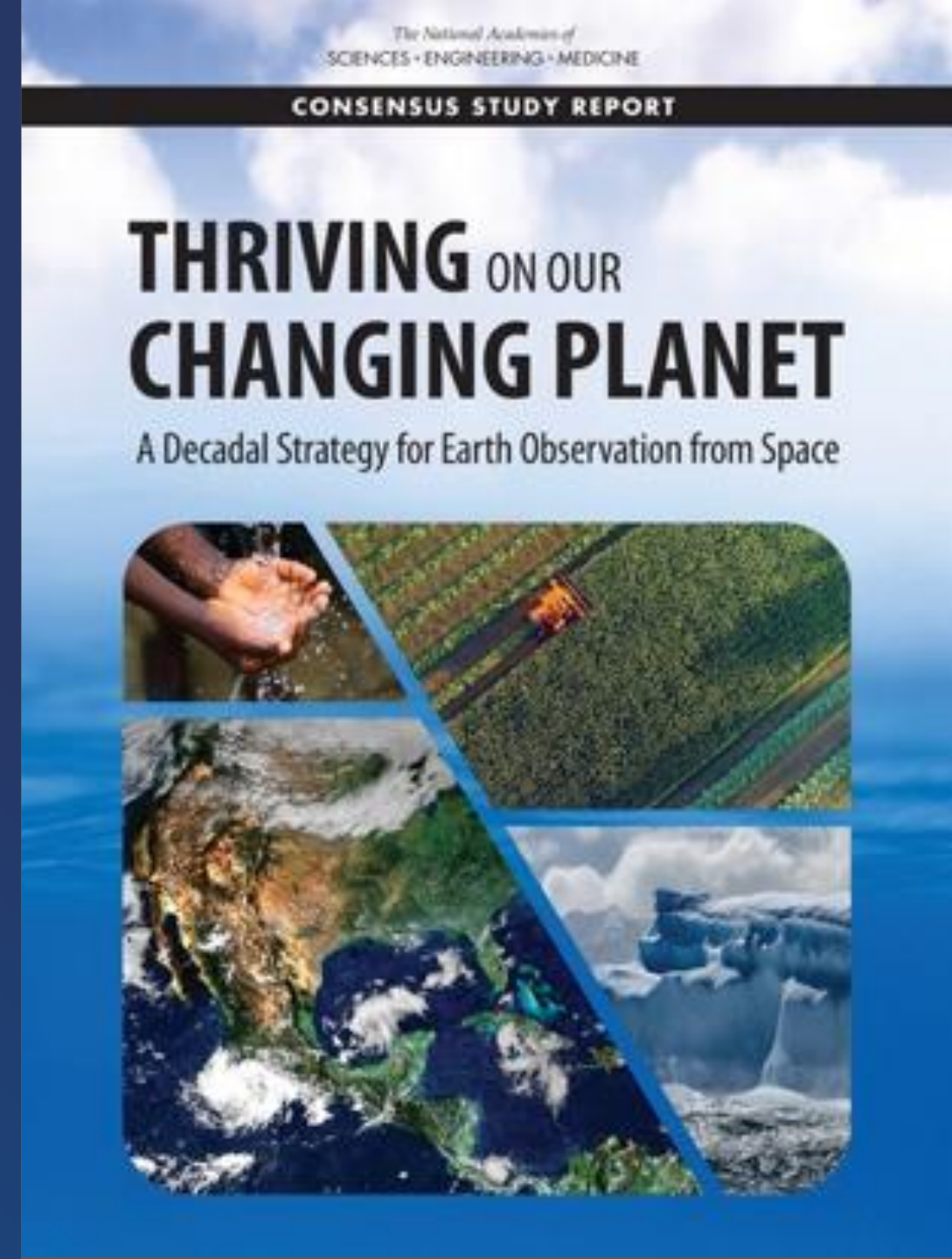
- Directed, streamlined, cost-capped Explorer class missions designed for 36 month delivery
- Linkages to Moon to Mars objectives

## Achieve improved efficiencies and cost management

- Technology maturation
- Rapid on-orbit testing
- Tailored implementation approach
- Cost and schedule caps

## Demonstrate rapid development across the portfolio

- Reducing time to science
- Leveraging commercial products and services



# Adopting a Mission-Class Framework

Shifting focus toward organizing high-priority science objectives into cost-capped, competitive or directed mission classes rather than tying recommendations to rigid, assumed budget profiles



## Venture

- \$35M-\$250M
- < 36 months to orbit
- Higher-risk (tailored Class D and commercial best practices)
- EVO competition (PI-led) or Directed
- Fully commercial missions possible

**Emphasizes rapid development, commercial partnerships, and innovative, high-risk/high-reward science**



## Explorer

- \$251M-\$500M
- 36-48 months to orbit
- Medium-risk (tailored Class C and commercial best practices)
- ESE Competition (PI-led) or Directed

**Enables priority science and decadal objectives not met by Venture or commercial missions**



## Large

- > \$500M
- Directed
- Lower-risk (typically Class C and commercial best practices)

**Delivers transformational science not achievable through smaller or disaggregated approaches**

As of FY2026 Enacted Budget

# EARTH SYSTEM OBSERVATORY

INTERCONNECTED CORE MISSIONS

## SURFACE BIOLOGY AND GEOLOGY

EAGLE-VSWIR  
EDGE  
EAGLE-TIR

## SURFACE DEFORMATION AND CHANGE

NISAR



## CLOUDS, CONVECTION AND PRECIPITATION

INCUS  
PoISIR  
PMM  
FALCON-Radar  
Commercial Radiometry  
FALCON-Lidar Next Gen

## AEROSOLS

FALCON-Lidar Next Gen  
STRIVE

## MASS CHANGE

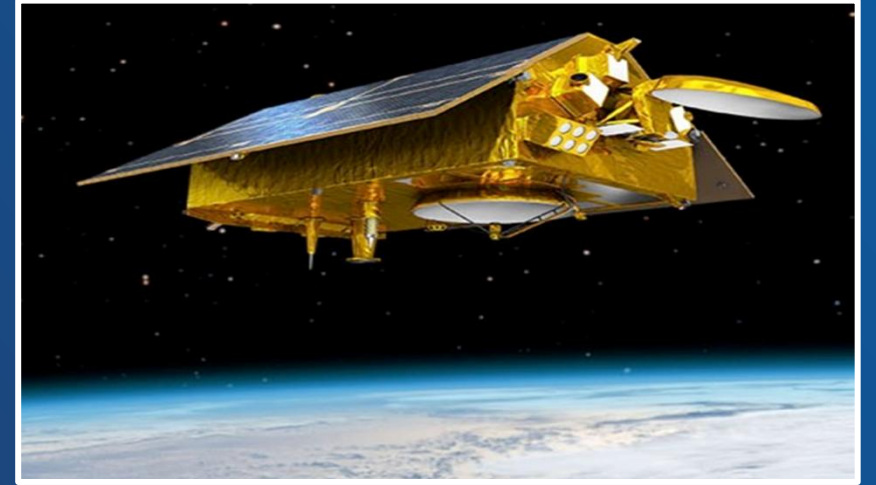
GRACE-C

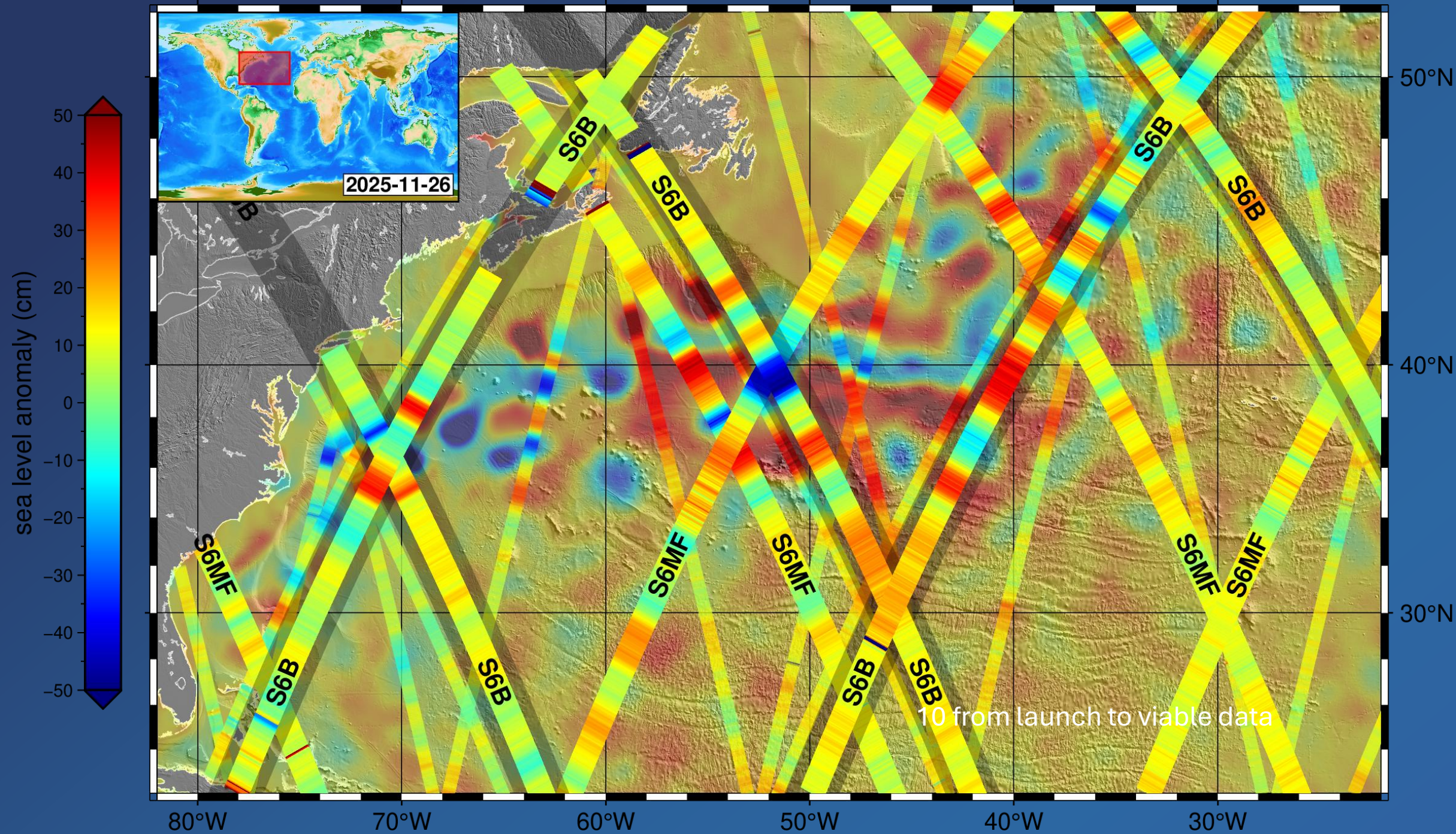


# ESD Flight Launches 2025

# Highlights: Sentinel-6B

- Launched from VSFB on Nov. 16, Sentinel-6B is the second satellite in a series of two (following Sentinel-6A)
- Extends nearly 40 year history of ocean surface topography measurements by satellite altimetry
- Measurements form basis for flood predictions for coastal infrastructure, real estate, energy storage sites, & other coastal assets
- Data also supports:
  - Short-term forecasting for weather predictions and long-term forecasting for seasonal conditions
  - Operational oceanography,
    - Improving forecasts of ocean currents and wind
    - Wave conditions
    - Critical for navigation, search and rescue, and debris tracking





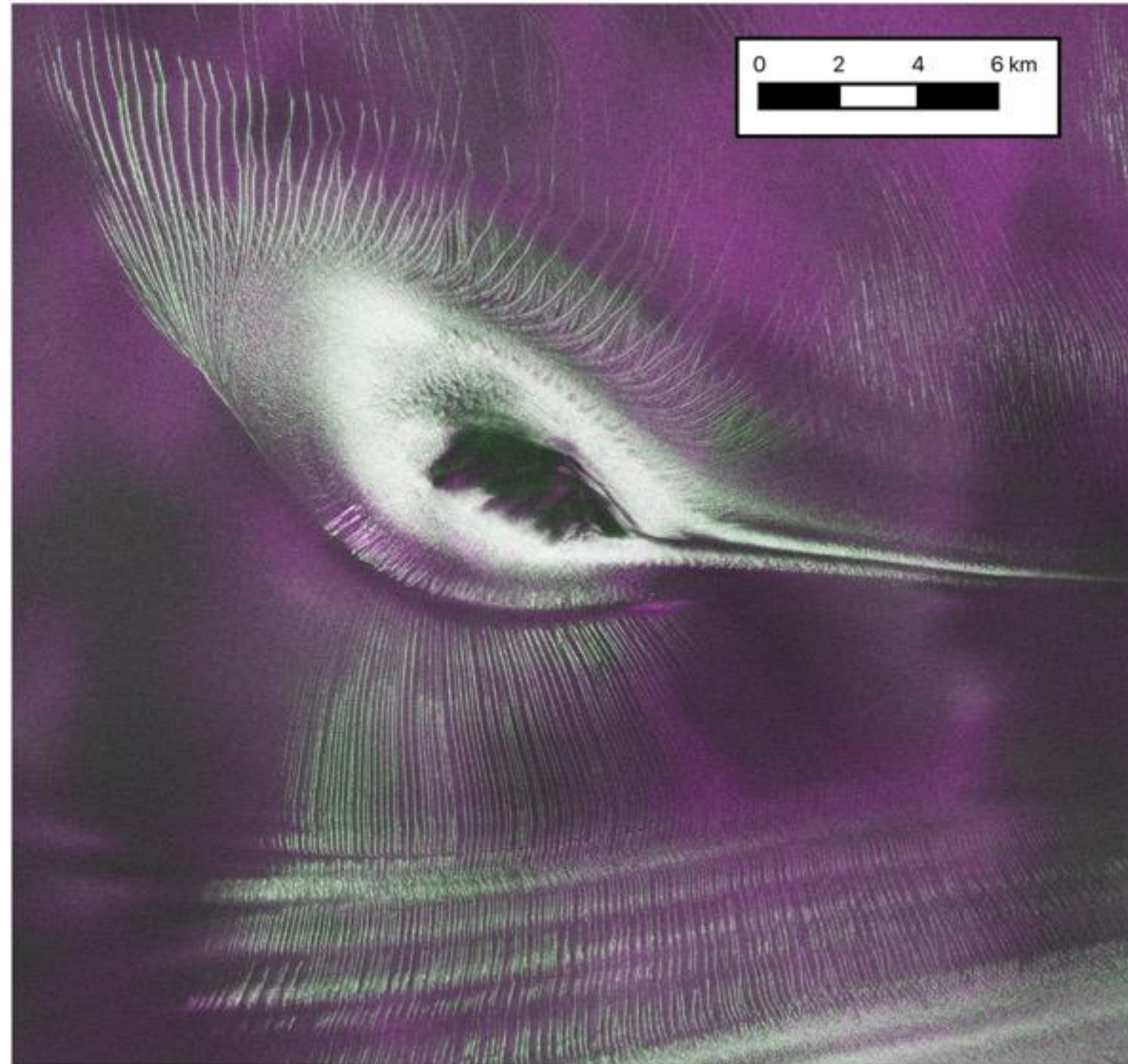
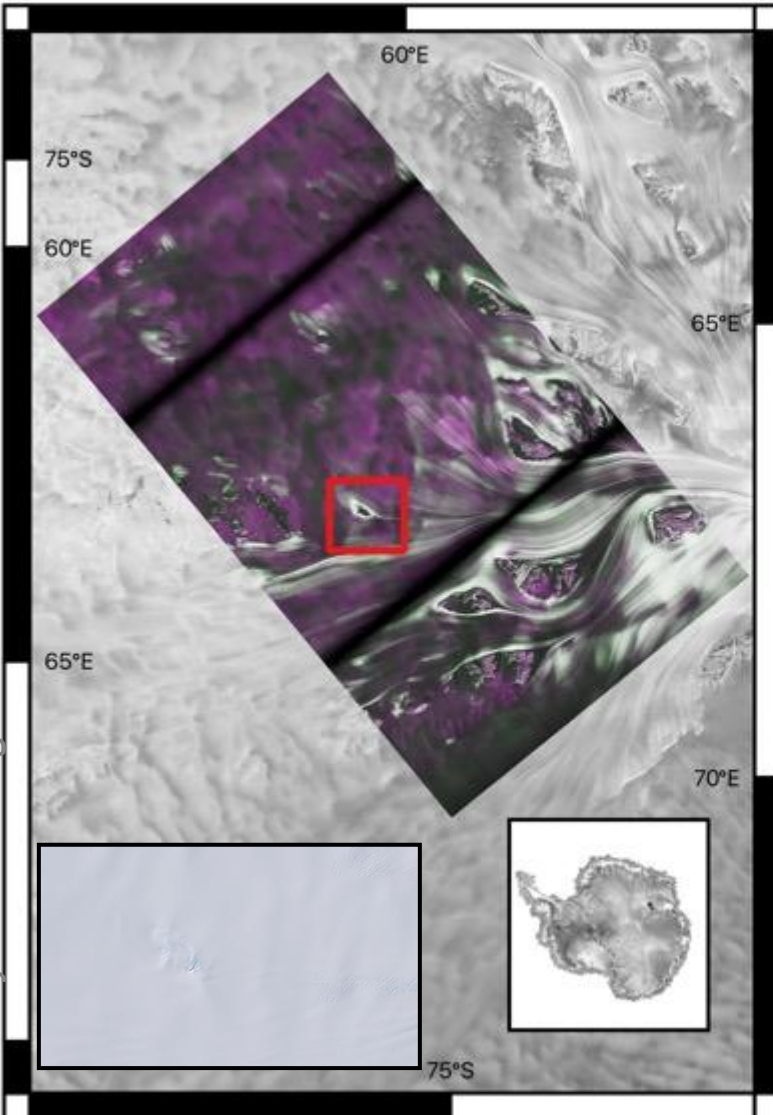
# Highlights: NISAR

## To access the L Band science data...

- Science phase began early November 2025 after completing calibration
- Data and tools available thereafter at Alaska Satellite Facility DAAC: <https://search.asf.alaska.edu>
- Processing software to recreate these products available at <https://github.com/isce-framework/isce3>
- Get ready for 80 TBytes of products per day!



# NISAR dual-polarimetric backscatter over Antarctica



**Left:** NISAR L-band image of the Fisher-Mellor-Lambert glaciers flowing to the Amery Ice Shelf. Flow stripes, bedrock outcrops, and crevasses are visible in HH (magenta) and HV (green). White inset is a Landsat 9 optical image of the red box.

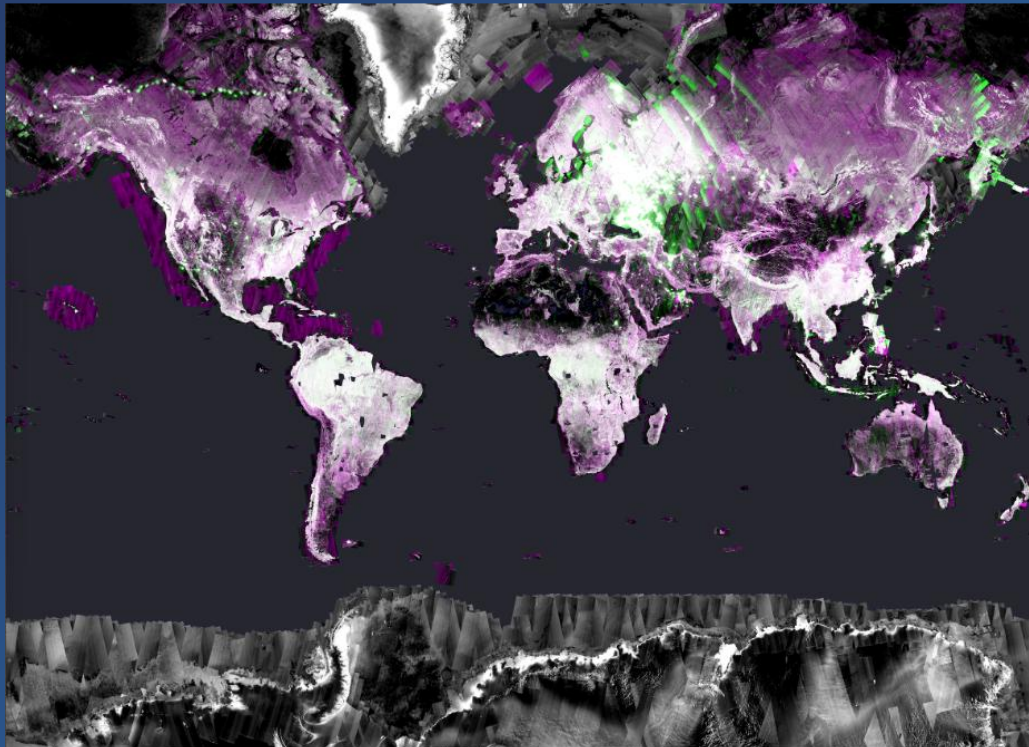
**Right:** Close-up of Nunatak Zaterjavshijsja and surrounding active ice stream, highlighting intense crevassing and surface deformation

# Global Mosaic of NISAR Backscatter

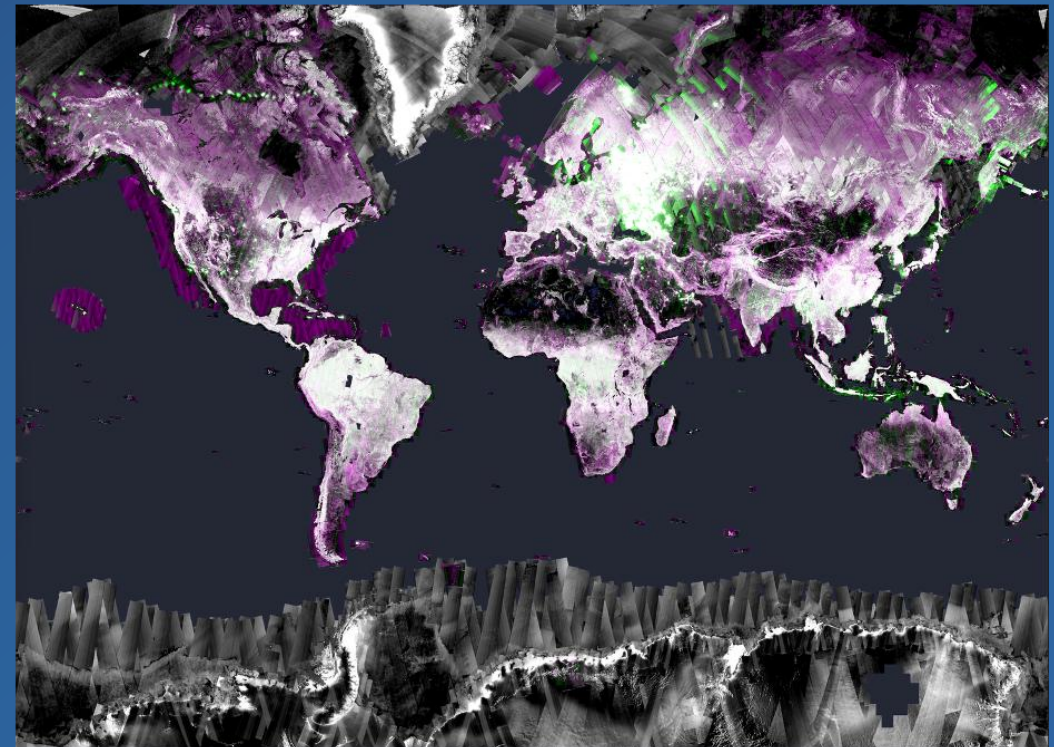
Global NISAR backscatter mosaics for cycles 15 and 16. These are 12-day long cycle that completely image Earth's land and ice. The different colors are from NISAR polarizations (horizontal and vertical) that provide insights to the land/ice/vegetation surfaces. Many of the areas that are green are associated Radio Frequency Interference (RFI): unwanted (from a science perspective) electromagnetic radiation that disrupts NISAR's imagery.

G. Shiroma, JPL

Cycle 15

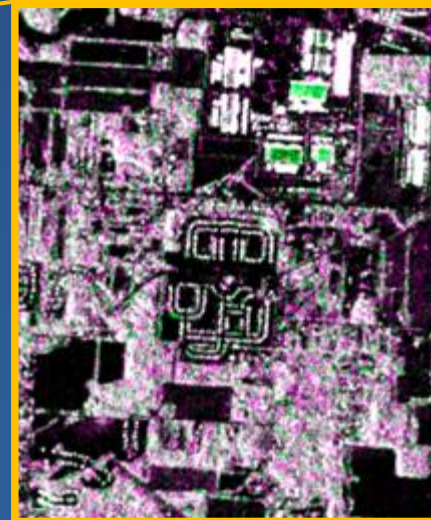
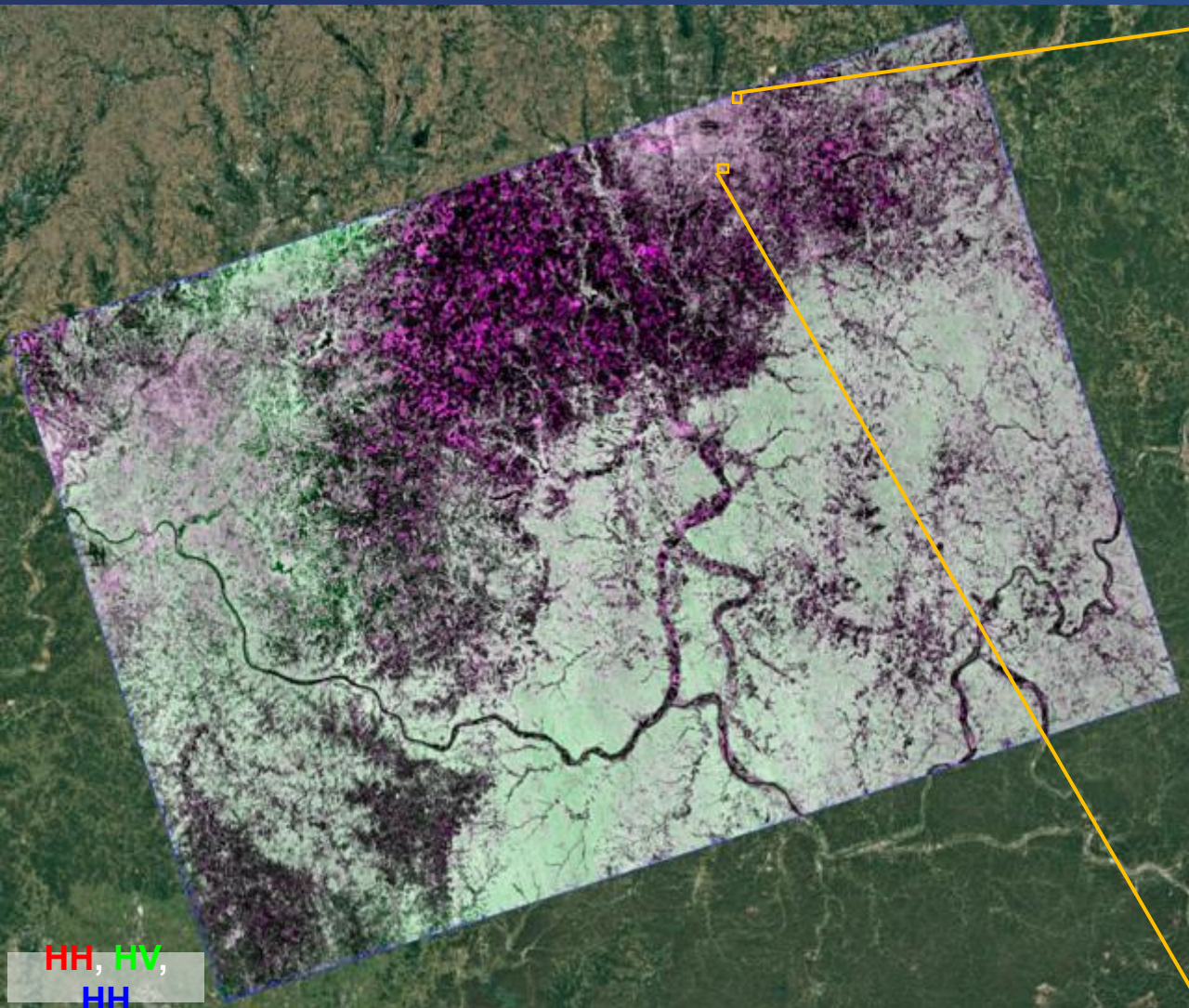


Cycle 16



# Standard NISAR product over North America

NISAR GCOV product over the Columbus and Cincinnati, US, using baseline *dithered-PRF* mode over North America (dual-pol, 40+5 MHz)

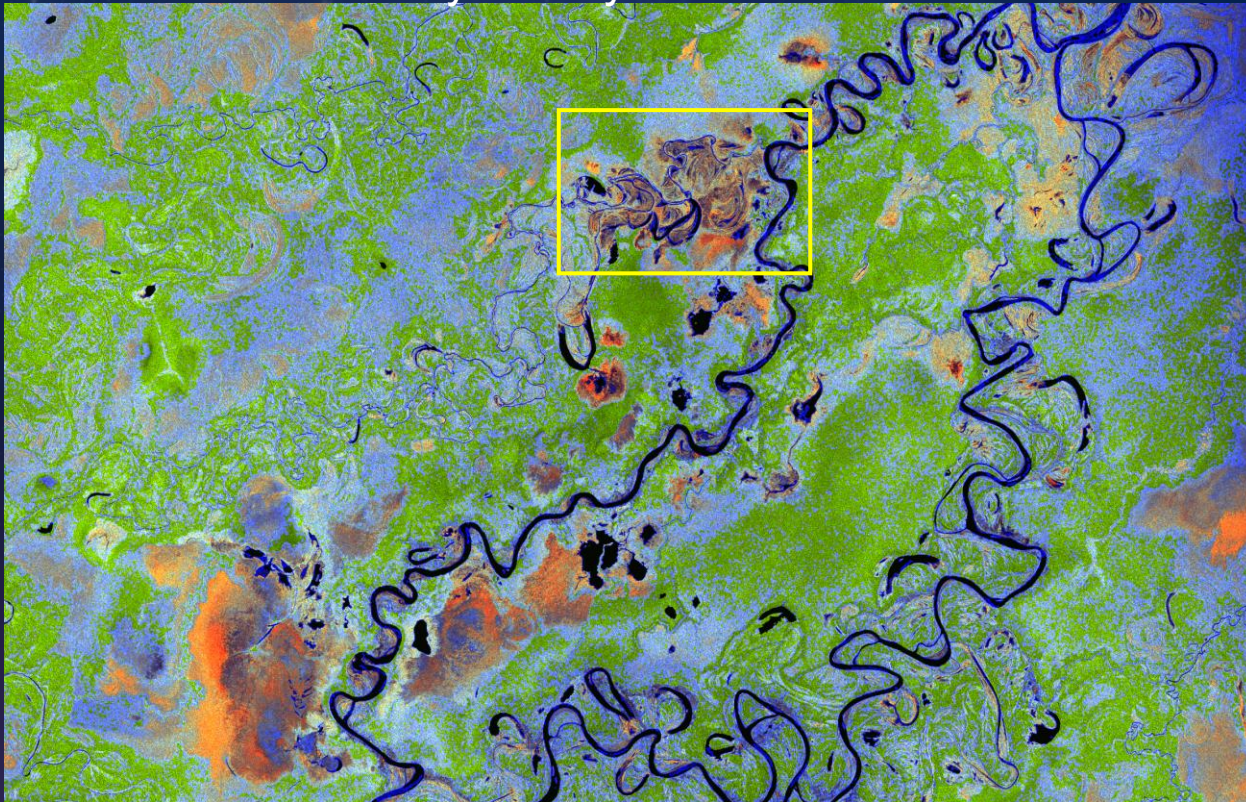


# NISAR Image of the Pacaya Samiria National Reserve

NISAR imagery like this  
collected twice every 12 days

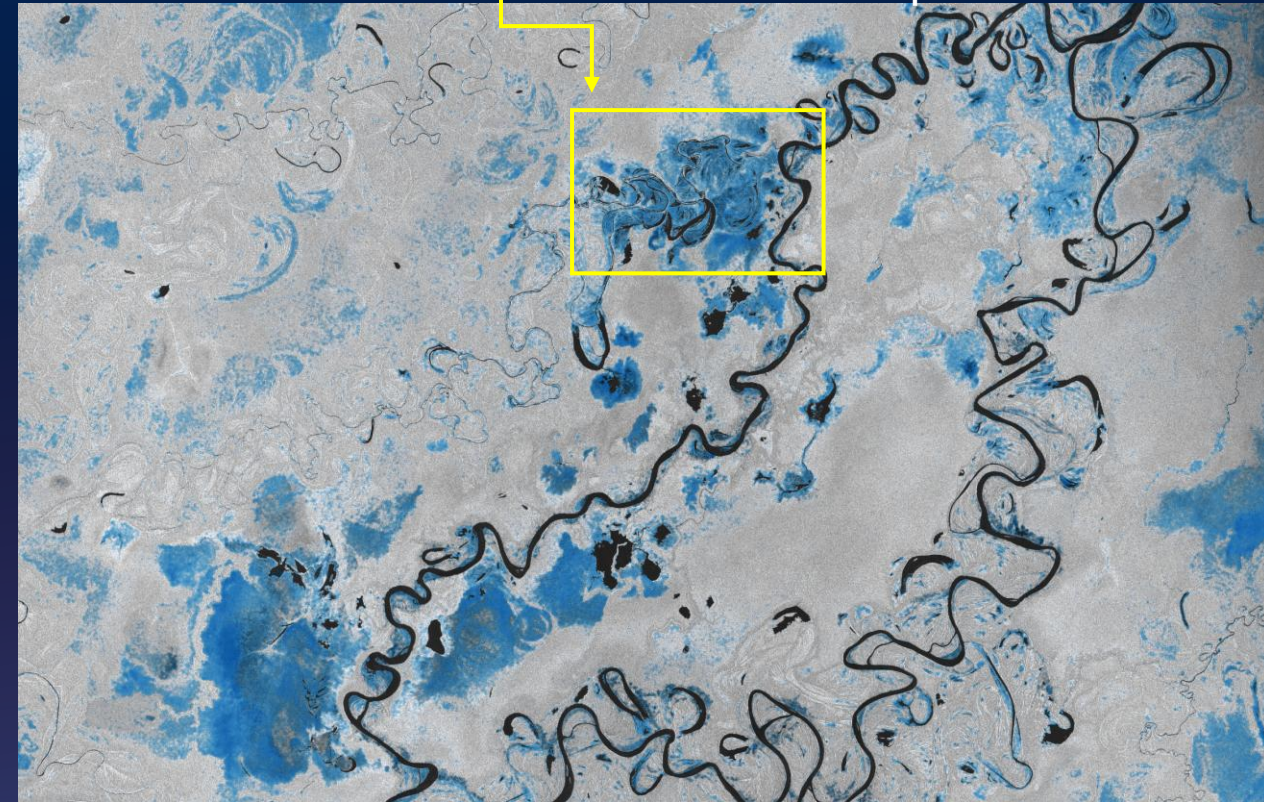
December 26, 2025

A few months after the low  
flood time-period



**False color NISAR image**

Colors are indicating forests, meadows, and surface water

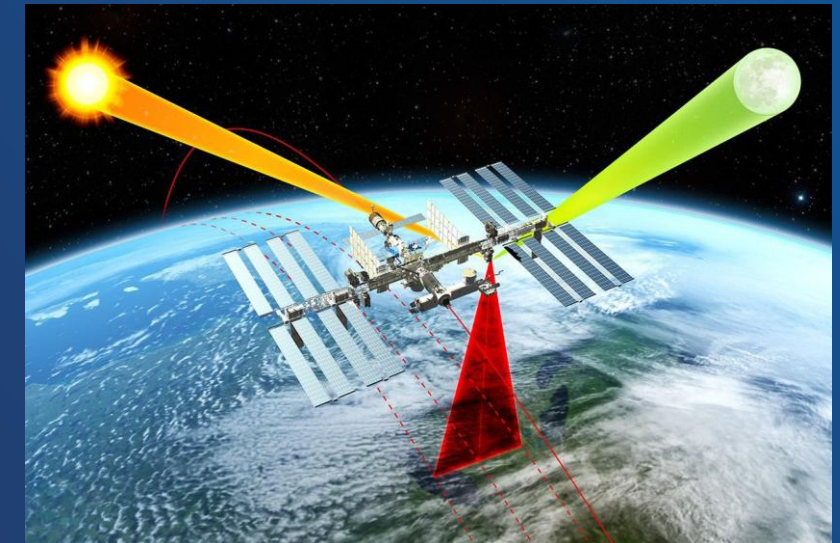
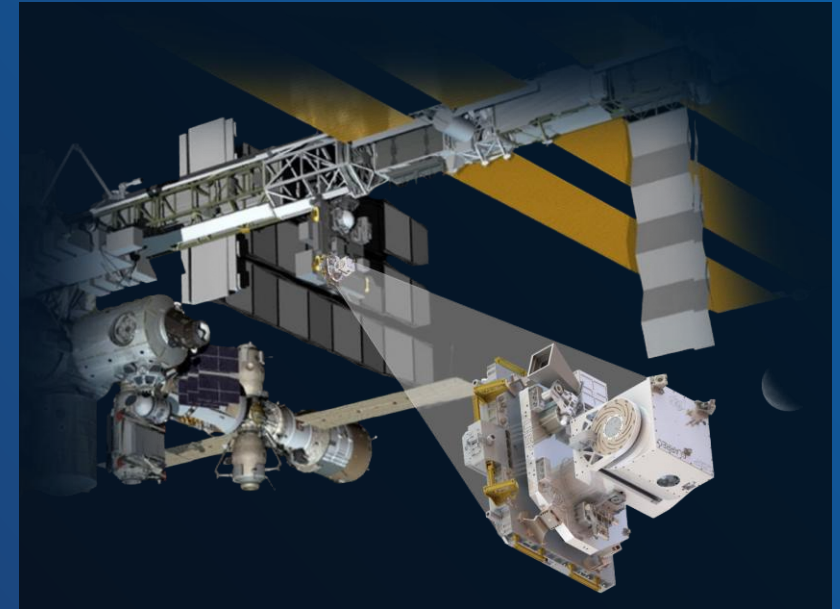


**Surface Water Extent**

Blue: wetlands | Black: open water | Grey: no surface water

# Highlights: CLARREO Pathfinder

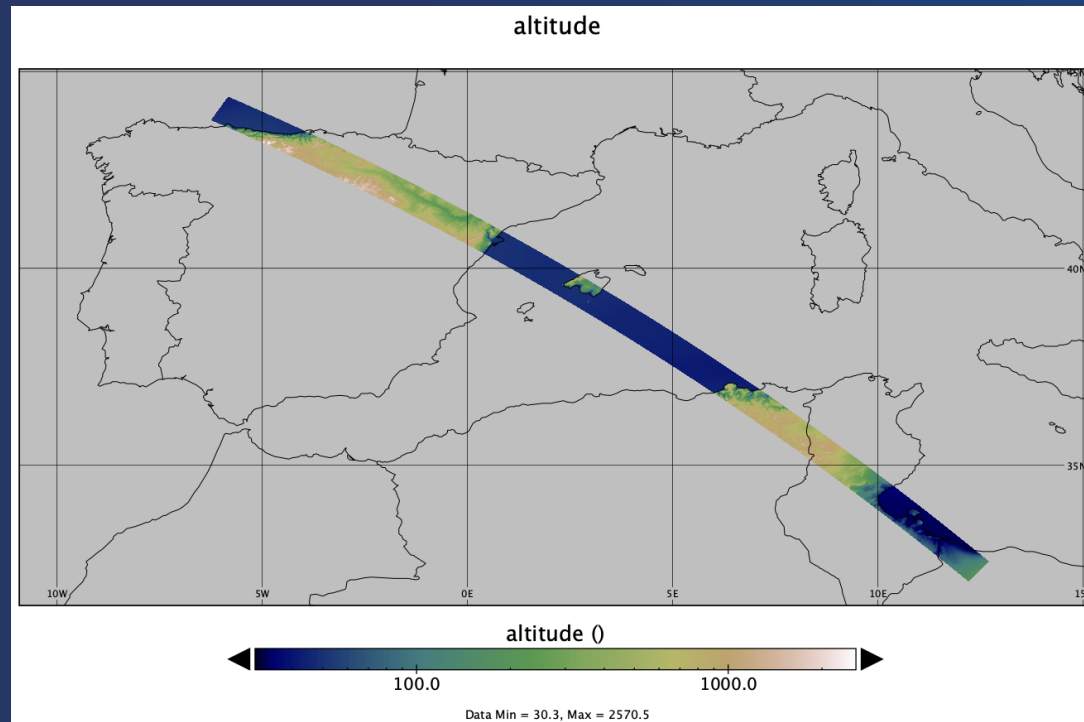
- Launched from KSC on May 15, 2026, at 6:05 pm EDT, on CRS 34 resupply mission
- Operates from the ISS; observes Earth, Sun, and Moon
- Measures sunlight reflected from Earth with extremely high accuracy (5x–10x current capability)
- Serves as an on-orbit intercalibration reference for other satellite instruments
- Measurements will be tied more directly to unchanging international standards than measurements from existing instruments.
- Tying the data to these standards provides the high accuracy needed for CLARREO Pathfinder and other instruments to monitor Earth's variability.



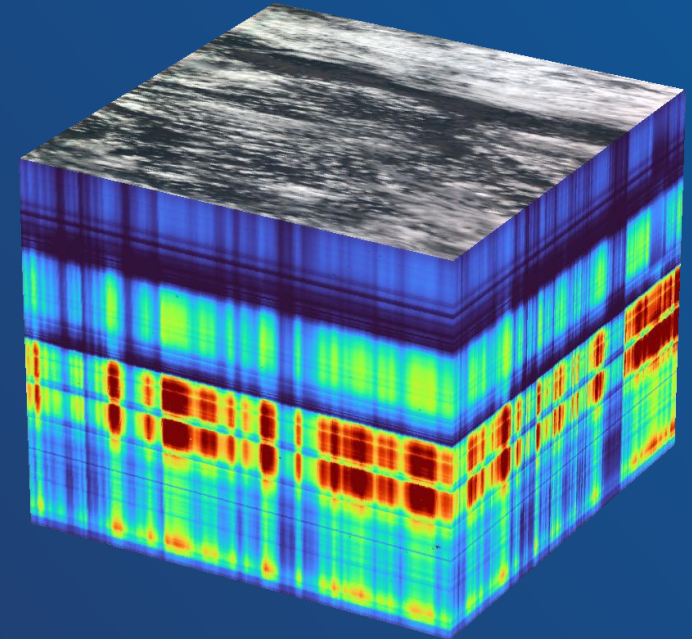
# Highlights: CLARREO Pathfinder First Light

Instrument installed on ISS

The image below shows a scaled color map of the computed altitude, projected onto a map using the computed latitude and longitude and represents successful preliminary geolocation results.



Data Cube  
Generated from  
30 seconds of the  
CLARREO  
Pathfinder first  
light data from  
June 11, 2026.  
The vertical  
dimension shows  
the extensive  
wavelengths in  
CLARREO  
Pathfinder's  
hyperspectral  
measurements.





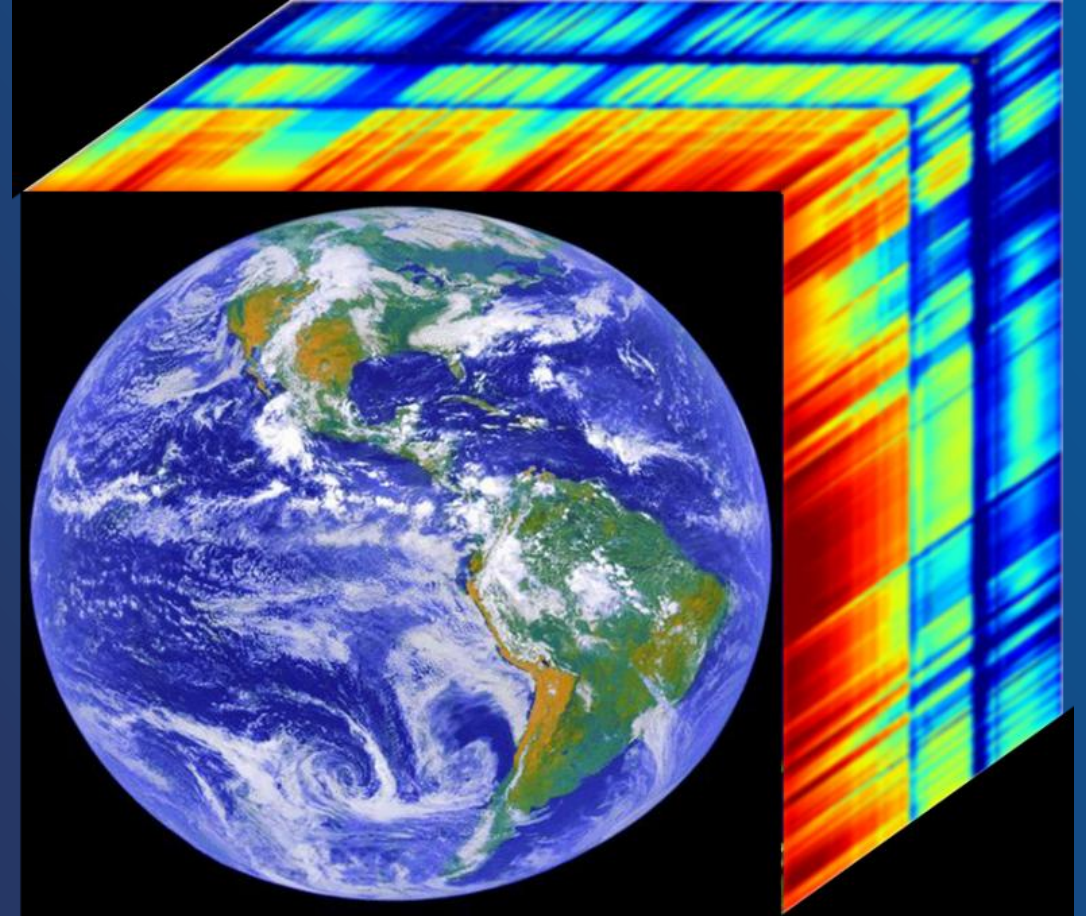
# **Current Missions and Next Flight Opportunities**

# EAGLE: Explorer for Artemis Geology Lunar and Earth

## EAGLE-VSWIR

Directed Explorer Class Mission (JPL)

- Best-in-class imaging spectrometer
- Versatile technology that also supports lunar and Mars missions
- Science and Applications ranging from critical minerals to changing ecosystems, agriculture, wildfires, water quality, and disaster response
- Status: CDR-level instrument in development at JPL, commercial spacecraft on contract
- Target launch: 2029



# EAGLE: Explorer for Artemis Geology Lunar and Earth

## EDGE: Advancing Global Monitoring Land, Ice, and Coastal Regions

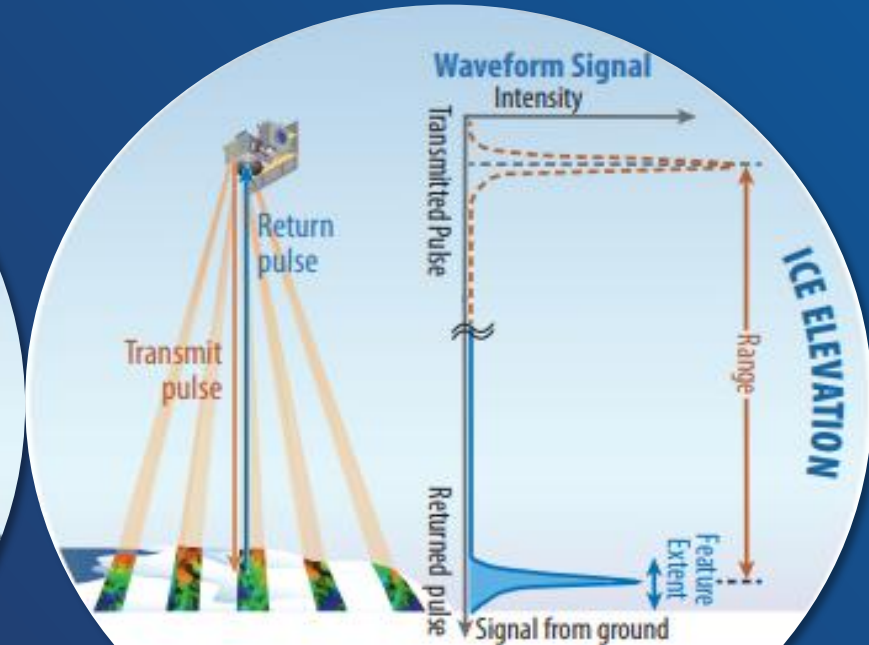
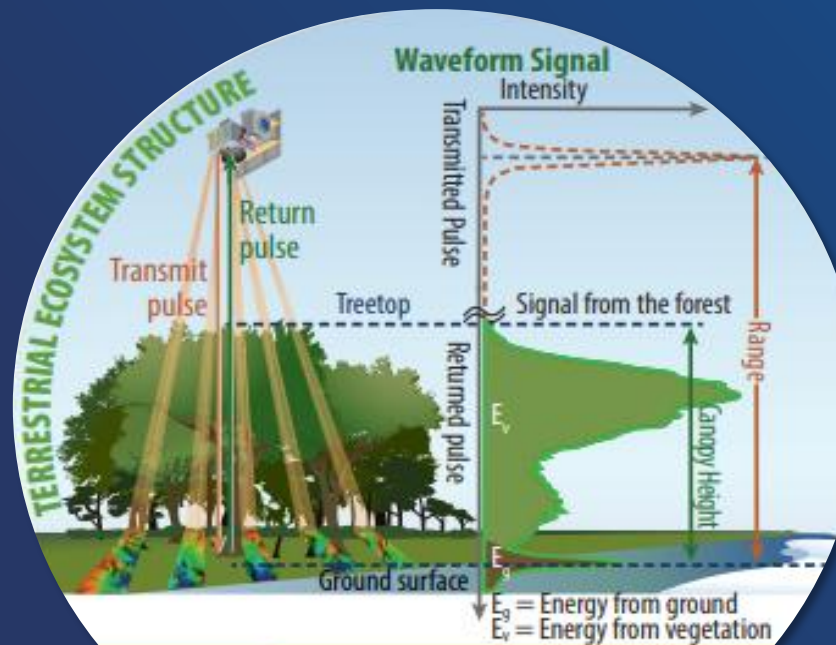
Competed Explorer Class Mission (UCSD/GSFC)

**EDGE (Earth Dynamics Geodetic Explorer)** will track dynamic Earth processes and produce the nation's next-generation global baseline elevation map, delivering global three-dimensional structure of terrestrial ecosystems and surface topography

10X improvement in vertical accuracy

Status: Contract awarded to UCSD, System Requirements Review (SRR) to be held in late September 2026

Target launch: No earlier than 2030



Safer communities



Water security



Navigable seas  
& access to  
essential resources



Full accounting of  
forests & rangeland  
ecosystems



Disaster mitigation



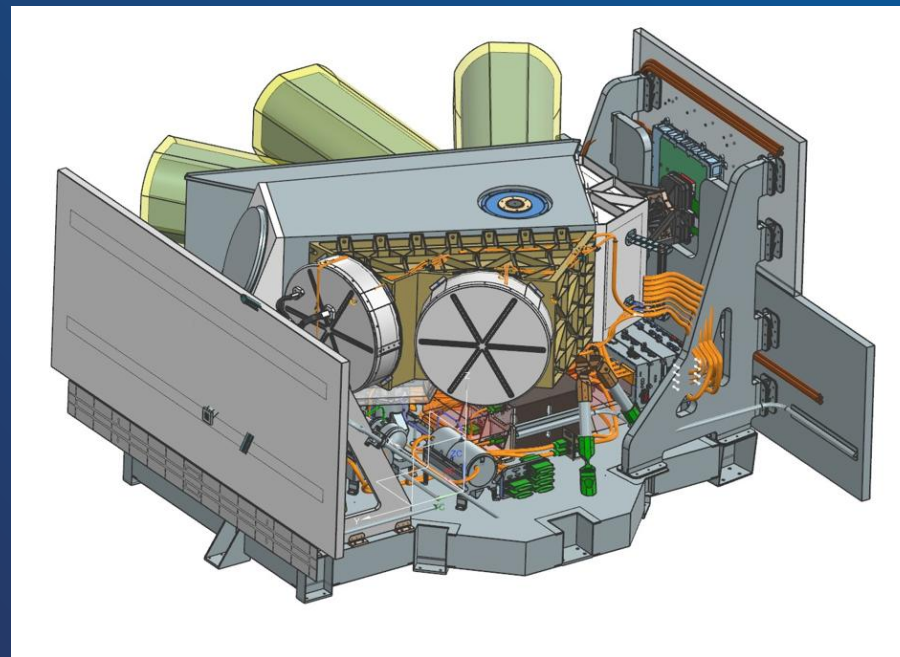
Technological advantage

# EAGLE: Explorer for Artemis Geology Lunar and Earth

## EAGLE-TIR

Directed Explorer Class Mission (JPL)

- High sensitivity thermal imagery with 3-day refresh and unmatched mid infrared bands with early afternoon overpass
- Unsaturated fire and volcano temperature sensing to detect and predict change
- Applications ranging from agriculture to fire risk, urban heat and human health
- Status: Finalizing instrument component designs and building instrument component engineering units; will reuse EAGLE-VSWR instrument architecture
- Target launch: 2031



**EAGLE-TIR Instrument**

# Fleet for the Atmosphere Linking Commercial Observations with NASA **FALCON**

## **PMM (JAXA/GSFC)**

Precipitation profiles

## **FALCON-Lidar (GSFC/LaRC)**

Atmospheric structure and composition measurements

## **FALCON-Radar (JPL)**

Cloud profiles to improve understanding of severe weather drivers.

## **FALCON-Radiometry (Commercial)**

RFI Released at the beginning of April 2026 for contribution options

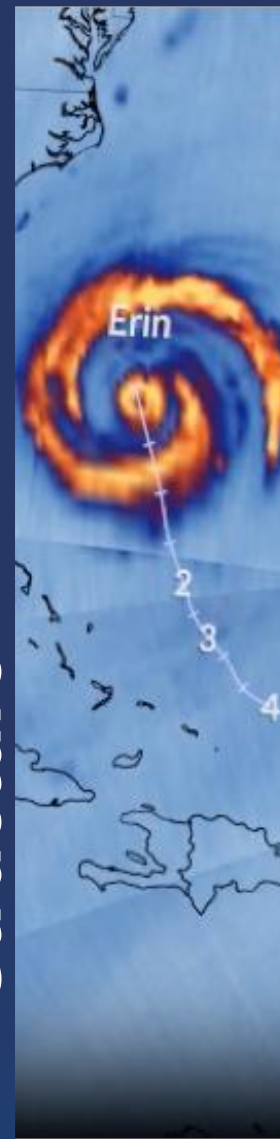
## **Joining the FALCON fleet**

- INCUS (CSU/JPL)
- PoSIR (Vanderbilt/GSFC)
- STRIVE (UW/GSFC)

**Profiles**



**Structure**



**Composition**

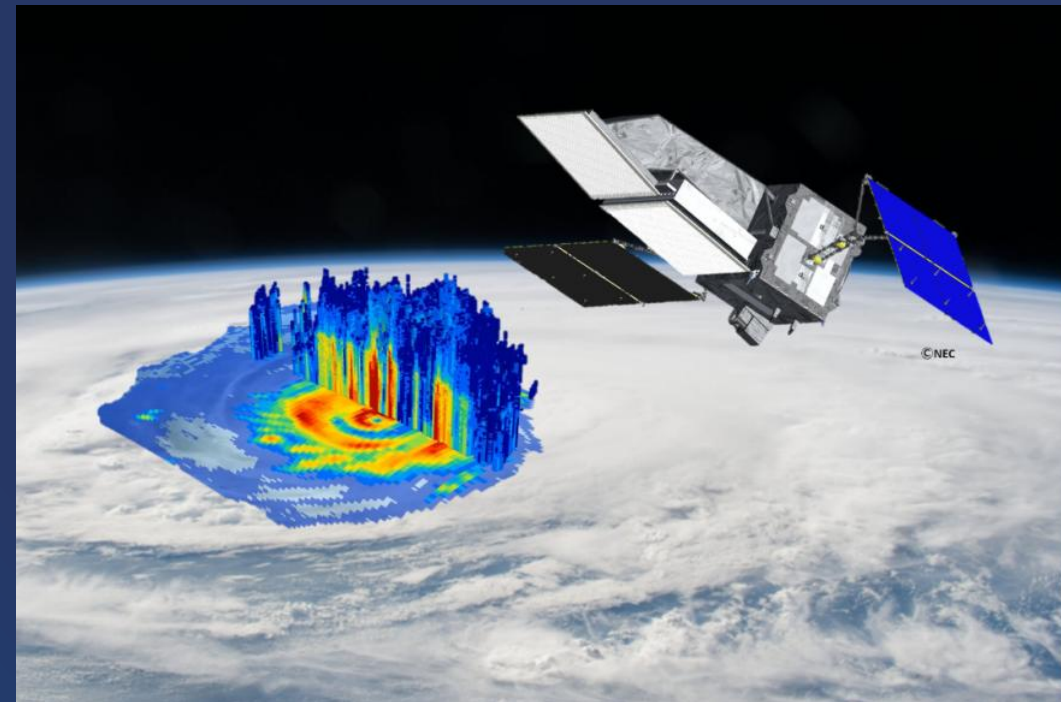


# FALCON: Driving Advancements in Understanding Changing Weather

## Precipitation Measurement Mission (PMM)

Partnership Mission with JAXA

- Reveals the structure of the rain within Earth's strongest storms, exposes the internal motions that drive these events, and enhances our understanding of storm mechanics that lead to intensification helping to improve predictions of which storms become high-impact weather
- Partnership with Japan Aerospace Exploration Agency (JAXA)
- Status: Refining interfaces and drafting launch vehicle solicitation paperwork
- Target launch: 2030



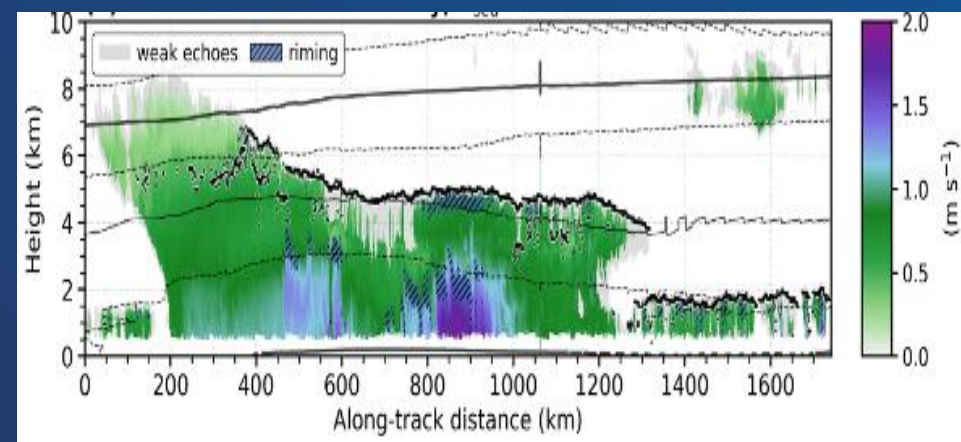
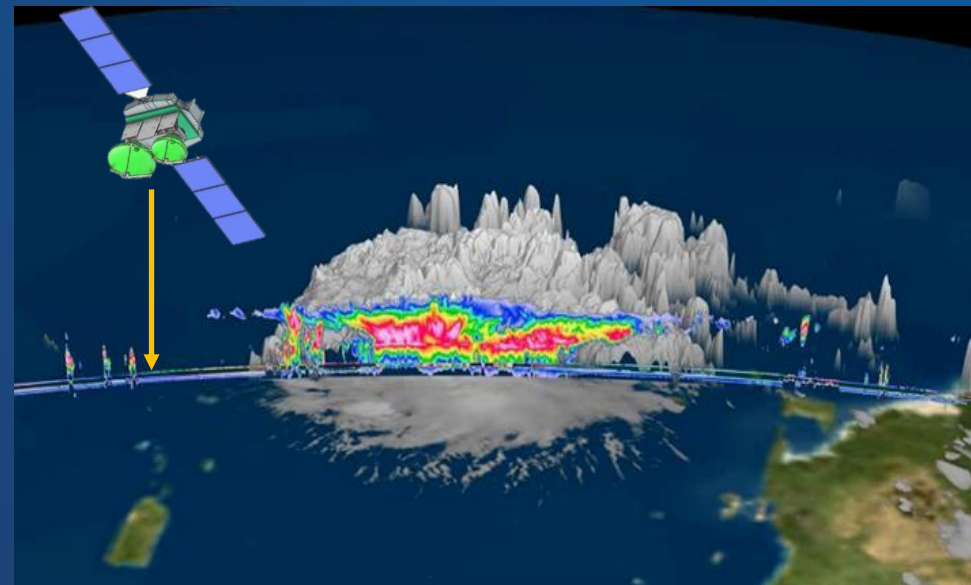
*Image of a three-dimensional reflectivity retrieval and PMM satellite. Graphic © NEC.*

# FALCON: Driving Advancements in Understanding Changing Weather

## FALCON-RADAR

Directed Explorer Class Mission (JPL)

- Provides highly detailed and accurate information on critical cloud and precipitation processes and weather intelligence national need, especially in the Arctic and Antarctic, as expressed by NGA
- Measures aviation risk factors including icing conditions and turbulence
- Advances technology for millimeter wave radar for Earth, with Moon and Mars applications
- Embraces “Faster to Science” and commercial practices
- Status: PDR-level instrument in development at JPL, commercial spacecraft RFP proposals due July 31
- Target launch: 2029

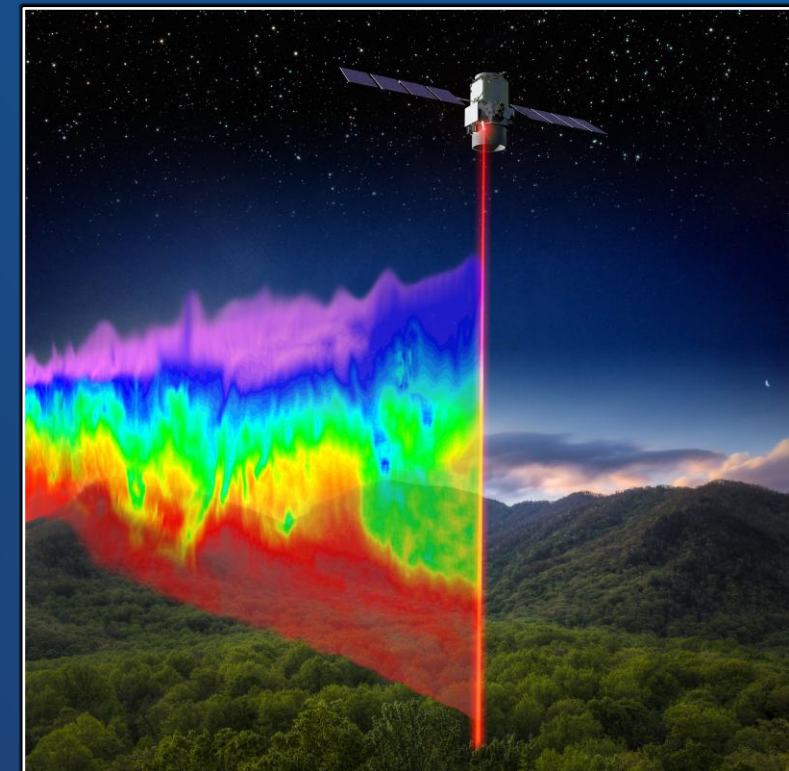


# FALCON: Driving Advancements in Understanding Changing Weather

## FALCON-Lidar Next Gen: First Coincident Aerosol, Cloud, and Water Vapor Lidar profiles

Directed Explorer Class Mission (Goddard)

- Atmospheric observations at multiple wavelengths to see clouds, aerosols, and first ever water vapor profiles in the troposphere (where we live)
- Combination will dramatically advance understanding of coupled behavior, such as how aerosols serve as nuclei for clouds
- Instrument design has direct technology transfer from Earth to Exploration
  - Characterization of atmospheric water vapor and dust content
  - Critical hazard avoidance for entry/decent maneuvers
- Status: Completing long-lead item development (telescope, detectors, and water vapor laser) in advance of instrument development
- Target launch: 2031



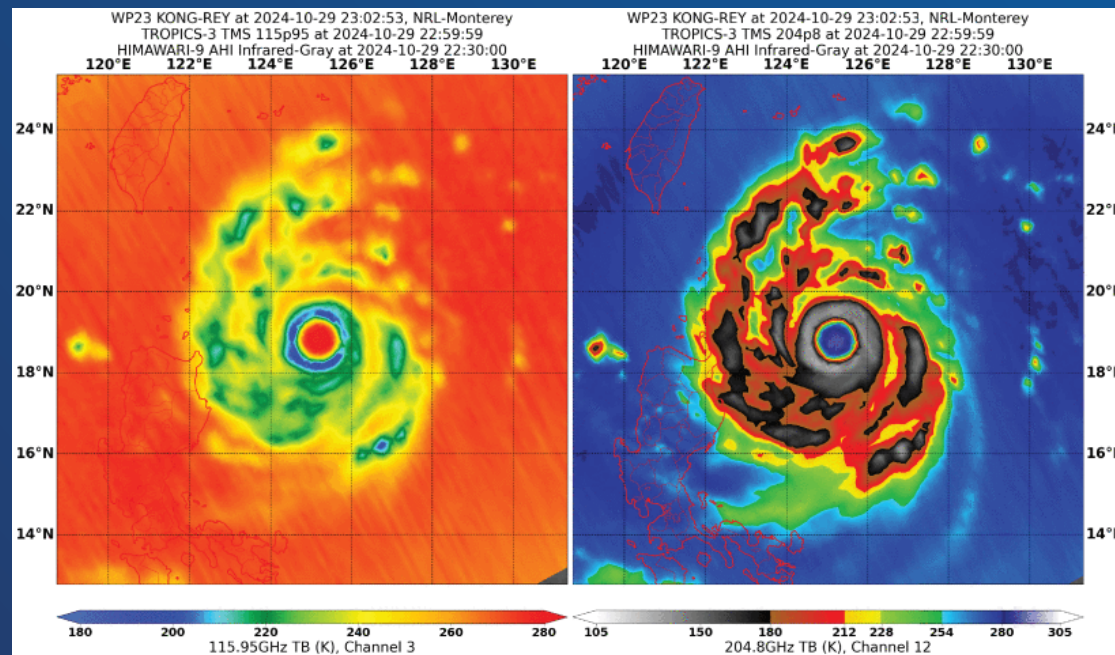
Water Vapor and Aerosol/Cloud Profiling together in ABLE tech maturation, Amin Nehrir, NASA GSFC

# FALCON: Driving Advancements in Understanding Changing Weather

## FALCON-Radiometry

Competed Commercial Capability

- Radiometry provides critical background temperature and water vapor fields that enable all other FALCON capabilities
- FALCON Radiometry RFI sought innovative mission concepts for commercially-owned and operated microwave radiometry observations to fly in formation with the FALCON missions
- RFI yielded a variety of mission concepts with varying capabilities under evaluation
- ESD is exploring synergies among these radiometer requirements across missions to achieve economies of scale and maximize cost efficiency through shared non-recurring engineering (NRE) costs
- Status: Radiometer synergy study in work and solicitation planned for FY27



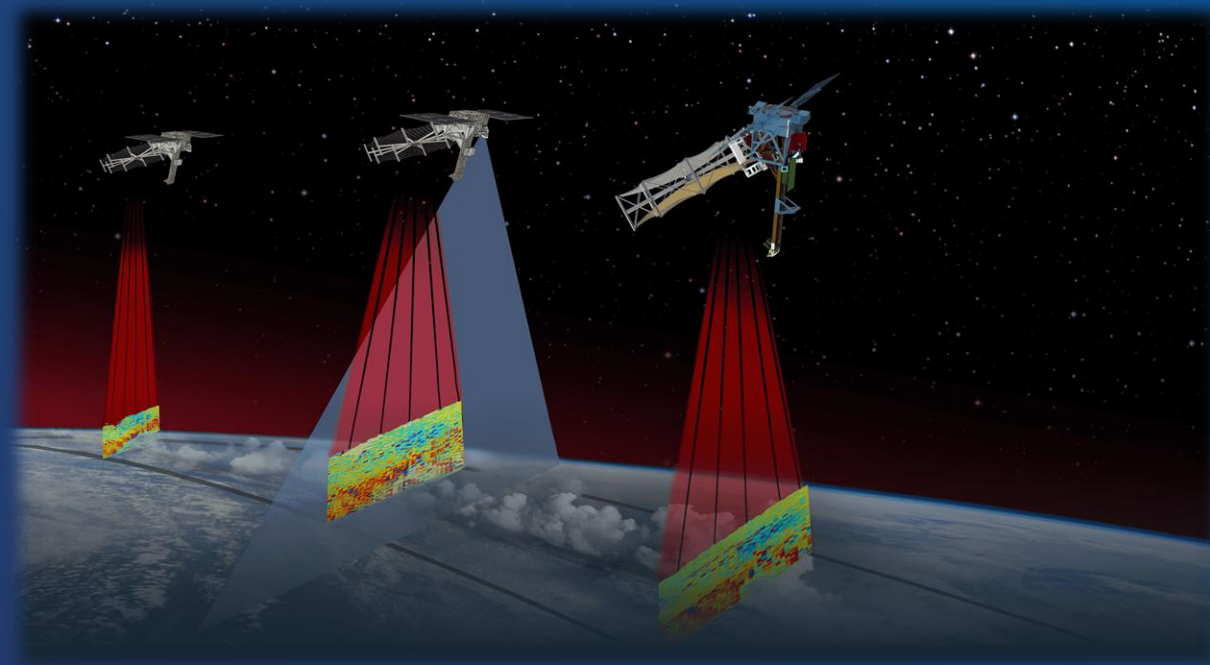
Imagery from the NASA TROPICS mission of Typhoon Kong-REV. The TROPICS microwave radiometer has been transitioned to industry and is now flown and operated by Tomorrow.io (Figure from Blackwell et al. 2025).

# FALCON: Driving Advancements in Understanding Changing Weather

## INvestigation of Convective UpdraftS (INCUS)

Competed Venture Class Mission (CSU/JPL)

- Understand why, when and where tropical convective storms form, and why only some storms produce severe weather
- First ever measurements of how much water and air is lifted (convective mass flux) into the atmosphere to understand and improve prediction of severe weather
- Three smallsats flying in formation
- Status: Contract awarded to CSU, three integrated spacecraft will be delivered to storage by the end of FY26
- Target launch: 2027

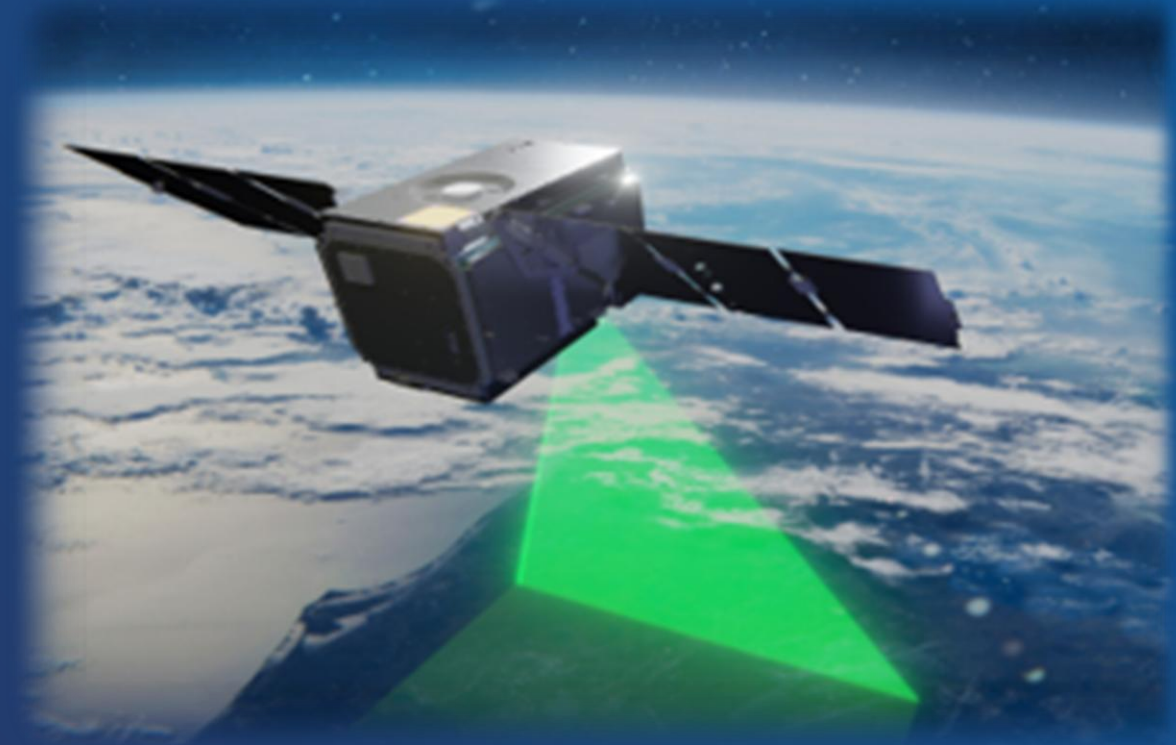


# FALCON: Driving Advancements in Understanding Changing Weather

## Polarized Submillimeter Ice-cloud Radiometer (PoISIR)

Competed Venture Class Mission (Vanderbilt/GSFC)

- Measure high-altitude ice clouds in tropical and sub-tropical regions to understand how they change over the daily cycle
- Deep convection re-distributes energy around the Earth; a complex process that is changing with warming temperatures
- Two CubeSats
- Status: Contract awarded to Vanderbilt, both spacecraft complete and in storage awaiting instruments, which are in environmental test
- Target launch: 2027



# FALCON: Driving Advancements in Understanding Changing Weather

## STRIVE: New Window on Stratosphere-Troposphere Interactions

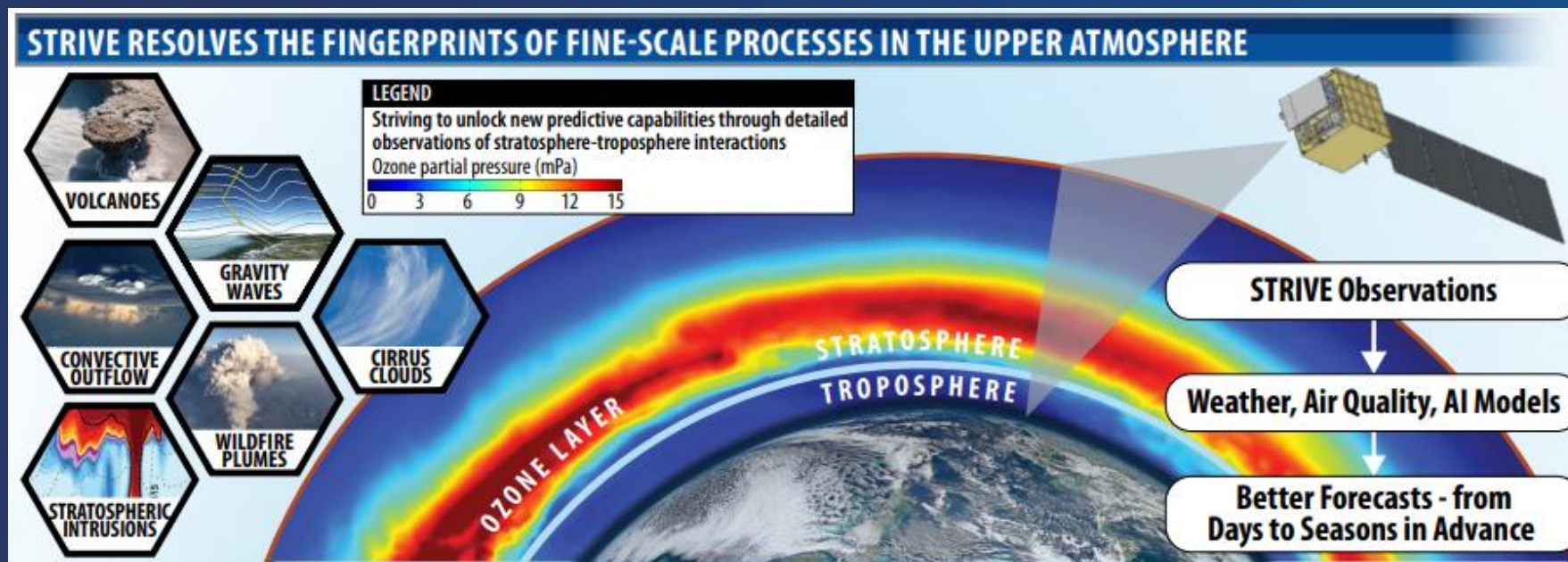
Competed Explorer Class Mission (UW/GSFC)

**STRIVE (Stratosphere Troposphere Response using Infrared Vertically-resolved light Explorer)** is an infrared limb sounder that will deliver an unprecedented view of the atmosphere, with a transformational leap in the accuracy of atmospheric predictions including weather patterns, extreme events, air quality, and the ozone layer

STRIVE will deliver in two months the same number of profiles that MLS/Aura did over 20 years

Status: Contract awarded to UW, System Requirements Review (SRR) held in July 2026

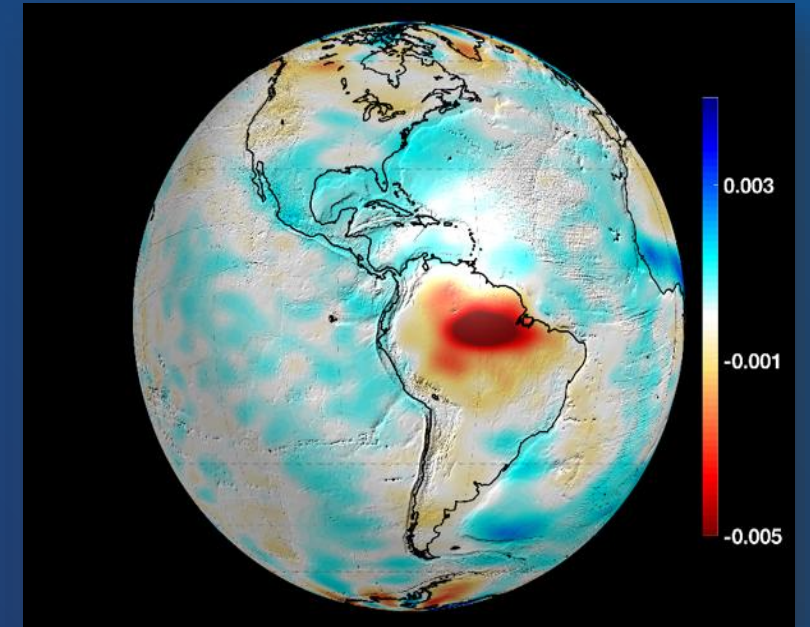
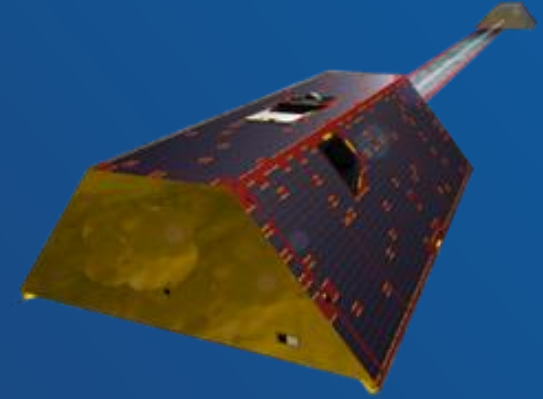
Target launch: No earlier than 2030



# Gravimetry Measurements and Subsurface Water GRACE-Continuity

Directed Explorer Class Mission (JPL)

- The GRACE-C mission will advance more than two decades of large-scale mass change observations by measure changes in Earth's gravitational field
- Advanced accuracy through laser ranging vice previous microwave ranging
- This valuable data is currently used for
  - Ground water estimates for Agriculture
  - Drought assessment and forecasting
  - Water management
  - Glacier and ice sheet change
  - Energy balance
- Status: In observatory integration and test
- Target Launch: July 2029



# Multi-Angle Imager for Aerosols (MAIA)

Competed Venture Class Instrument Investigation (JPL)

- Assess relative toxicity and human health impacts of different types of airborne particulate matter (PM)
- Produce daily 1-km maps of coarse, fine, and chemically speciated fine PM in 12 Primary Target Areas (PTAs) and conduct epidemiological studies
- First competitively selected NASA satellite investigation with societal benefit as its primary objective
- PLATiNO-2 satellite and launch services contributed by Agenzia Spaziale Italiana (ASI)
- Status: Satellite instrument ready for shipment to ASI; surface monitoring network currently active in all PTAs and generating speciated PM data
- Target launch: No earlier than November 2027



*Credit: ASI*

# Libera [lib-er-uh]

Competed 1st Venture Continuity Class Mission (LASP)

- Maintain global data record of Earth's radiation budget started by the Clouds and the Earth's Radiation Energy System (CERES) mission.
- Continuity of Earth's radiation budget record over time reveals long-term trends, connecting energy flow to temperature trends.
- Monitors flow of radiative energy through the Earth – Atmosphere System. This energy drives the motions of the atmosphere and oceans, fuels photosynthesis in plants, forms the protective ozone layer, and sustains all life on Earth.
- Provides fundamental information about the relationship between incoming radiative energy from the Sun and outgoing radiative energy from Earth.
- Status: Libera Instrument integrated within JPSS-4 Satellite. In the final satellite-level testing phase.
- Target Launch: December 2027

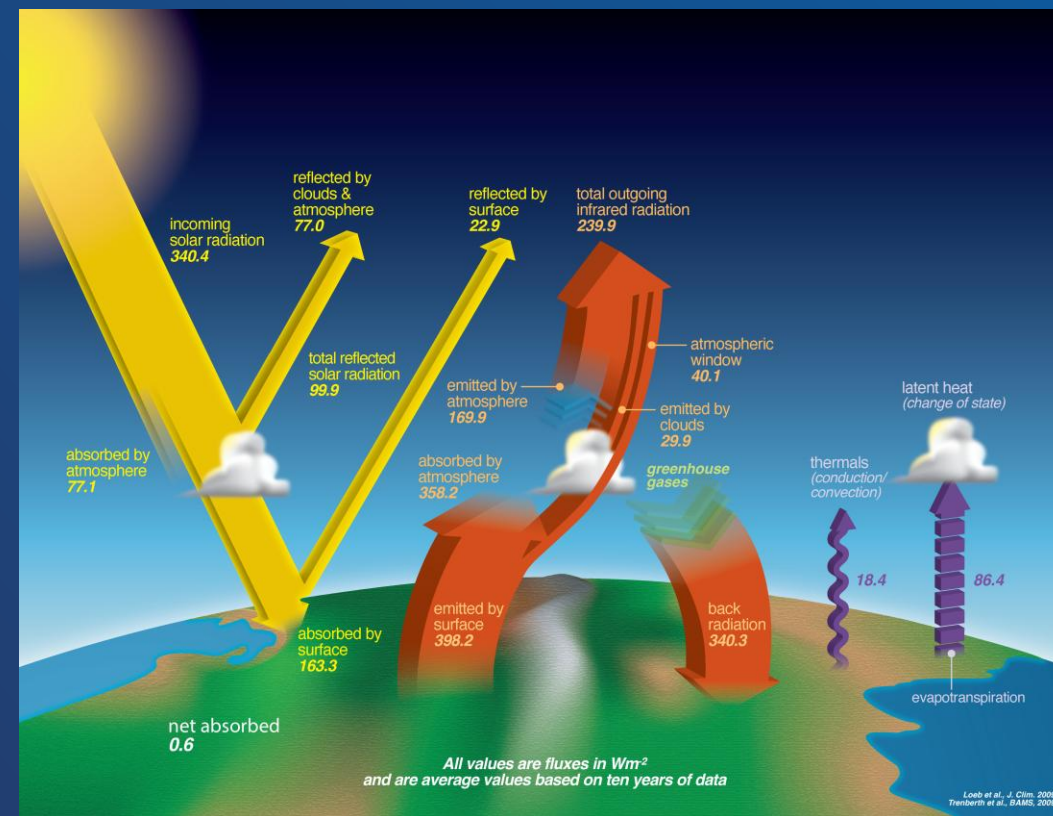


# Total and Spectral Solar Irradiance

## TSIS-2

Directed Venture Class Mission (GSFC)

- TSIS-2 measures small changes in the power reaching the Earth from the Sun over periods of time ranging from days to months and years.
- The record of these solar irradiance measurements from several missions goes back over 40 years. The Sun provides virtually all of Earth's energy, so even small changes can have an impact on Earth's climate.
- TSIS-2 measurements enable the continued study of the Sun's natural influence on Earth's ozone layer, atmospheric circulation, clouds and ecosystems.
- Target Launch: NET Q2 FY2027



# Flight Missions In Development

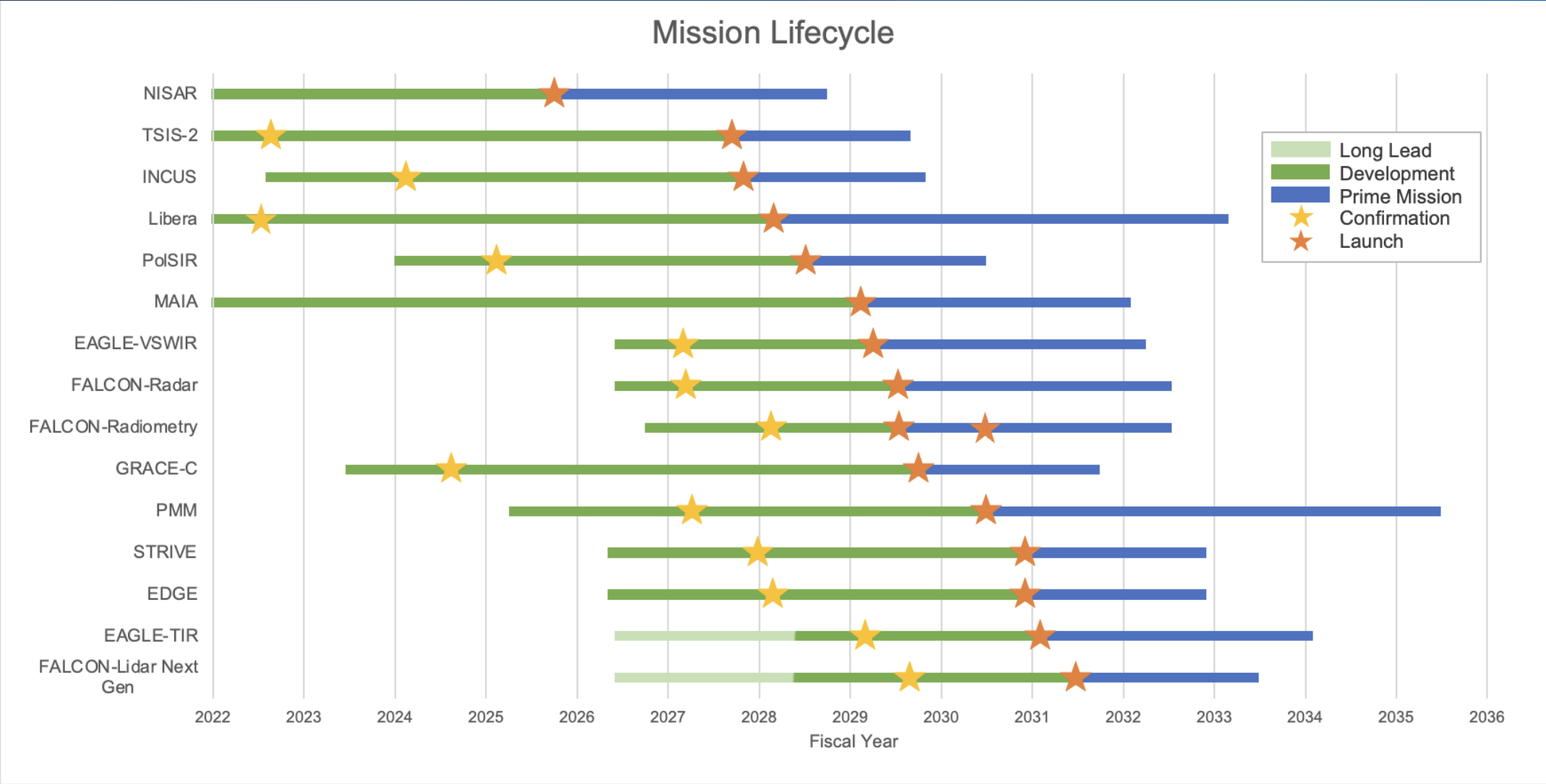
## Other Developments Continuing

- CLARREO Pathfinder (ISS National Lab partnership for operations)
- CRISTAL A (instrument delivered) and B (in development)
- GLIMR (instrument nearly complete)
- GRACE-C (instrument integration)
- TSIS-2 (spacecraft integration)
- Libera (spacecraft integration)
- MAIA (instrument complete)
- OMPS-Limb (integrated to spacecraft and in storage)



# Earth System Observatory

## Notional Development/Launch Schedule Summary



# Notional Earth Science Flight Competed Missions

| Mission                                                          | Mission Type                                                  | Release | Selection | Major Milestone                                                |
|------------------------------------------------------------------|---------------------------------------------------------------|---------|-----------|----------------------------------------------------------------|
| <b>EVS-1</b> (EV-1) (AirMoss, ATTREX, CARVE, DISCOVER-AQ, HS3)   | 5 Suborbital Airborne Campaigns                               | 2009    | 2010      | Completed KDP-F                                                |
| <b>EVM-1</b> (CYGNSS)                                            | Class D SmallSat Constellation                                | 2011    | 2012      | Launched December 2016                                         |
| <b>EVI-1</b> (TEMPO)                                             | Class C Geostationary Hosted Instrument                       | 2012    | 2012      | Launched April 2023                                            |
| <b>EVI-2</b> (ECOSTRESS & GEDI)                                  | Class C & Class D ISS-hosted Instruments                      | 2013    | 2014      | Launched June & December 2018                                  |
| <b>EVS-2</b> (ACT-America, ATOM, NAAMES, ORACLES, OMG, CORAL)    | 6 Suborbital Airborne Campaigns                               | 2013    | 2014      | Completed KDP-F                                                |
| <b>EVI-3</b> (MAIA & TROPICS)                                    | Class C LEO Hosted Instrument & Class D CubeSat Constellation | 2015    | 2016      | MAIA Delivery 2022; TROPICS completed KDP-F                    |
| <b>EVM-2</b> (GeoCarb)                                           | Class D Geostationary Hosted Instrument                       | 2015    | 2016      | Cancelled                                                      |
| <b>EVI-4</b> (EMIT & PREFIRE)                                    | Class C ISS-hosted Instrument & Class D Twin CubeSats         | 2016    | 2018      | EMIT launched to ISS July 2022; PREFIRE launched May/June 2024 |
| <b>EVS-3</b> (ACTIVATE, DCOTSS, IMPACTS, Delta-X, SMODE)         | 5 Suborbital Airborne Campaigns                               | 2017    | 2018      | All in post-deployment phase                                   |
| <b>EVI-5</b> (GLIMR)                                             | Class C Geostationary Hosted Instrument                       | 2018    | 2019      | Delivery NLT 2026                                              |
| <b>EVC-1</b> (Libera)                                            | Class C JPSS-Hosted Radiation Budget Instrument               | 2018    | 2020      | Delivery NLT 2026                                              |
| <b>EVM-3</b> (INCUS)                                             | Class D SmallSats                                             | 2020    | 2021      | Launch ~2027                                                   |
| <b>EVI-6</b> (PoISIR)                                            | Class D CubeSats                                              | 2022    | 2023      | Delivery NLT 2027                                              |
| <b>EVS-4</b> (FORTE, INSPYRE, HAMAQ, LACCE, Snow4Flow, FarmFlux) | Suborbital Airborne Campaigns                                 | 2023    | 2024      | Active campaign planning                                       |
| <b>ESE-1</b> (STRIVE & EDGE)                                     | Explorer Mission (2-Step Proposal Process)                    | 2023    | 2026      | Launches NET 2030                                              |
| <b>EVO-1</b>                                                     | Venture, Community Announcement Released                      | 2027    | TBA       | TBA                                                            |
| <b>ESE-3/ESE-4</b>                                               | Explorer                                                      | 2029    | TBA       | TBA                                                            |
| <b>EVO-2</b>                                                     | Venture                                                       | 2029    | TBA       | TBA                                                            |
| <b>EVS-5</b>                                                     | Suborbital Airborne Campaigns                                 | 2030    | TBA       | TBA                                                            |
| <b>ESE-5/ESE-6</b>                                               | Explorer                                                      | 2031    | TBA       | TBA                                                            |
| <b>EVO-3</b>                                                     | Venture                                                       | 2031    | TBA       | TBA                                                            |

**EVS**  
Sustained sub-orbital investigations

**EVO**  
Small-size orbital instruments and missions

**ESE**  
Medium-size orbital instruments and missions

Open solicitation/In review

Completed solicitation



Questions?



# NASA Earth

Your Home.

**Our Mission.**

[science.nasa.gov/earth](https://science.nasa.gov/earth)



**Back Up**

# Alignment and Advancement of Presidential Priorities

- **Advance Gold-Standard Science:** High-precision airborne measurements for calibration/validation. Foundational observations for long-term scientific records.
- **Drive Technology Innovation:** Advance AI/ML, quantum technologies, and next-generation instrumentation.
- **Enable Economic Growth:** Strengthen commercial satellite data markets and emerging data services. Provide critical observations for agriculture, resources, and industry. Foster partnerships and domestic manufacturing in advanced technology.
- **Boost National & Local Resilience:** Deliver actionable data, tools, and training for disasters, health, and fire response. Improve GPS accuracy through space geodesy investments.
- **Increase Efficiency & Agility:** Automate processing to deliver analysis-ready data. Adopt commercial best practices. Streamline organizational structures for faster decision-making.
- **Leverage Earth Science expertise to inform exploration observations and support the Moon-to-Mars and Artemis architecture:** Apply Earth Science advances in detectors, calibration, and algorithms to map lunar water and minerals. Provide actionable Earth-derived environmental intelligence to enhance astronaut safety. Prove mission-enabling technologies in low Earth orbit for future exploration needs.

# OUR PROBLEM OPPORTUNITY STATEMENT

- Through our missions, the Flight team is tasked to address the growing need for comprehensive and reliable Earth Science data

## WHAT

- To understand and respond to complex changes in Earth's chemical and physical systems

## WHY

- Innovate Mission Capabilities
- Optimize resource allocation
- Leverage Technological Advancements and Commercial Capabilities
- Promote Cross-Disciplinary Research and Collaboration

## HOW