



National Aeronautics and  
Space Administration

# NASA earth

**CESAS Meeting | Nov. 4-5, 2024**

**Earth Science Division Highlights**

**Karen St. Germain, PhD**

Director

Earth Science Division



# Agenda: Advancing Earth Science

**01** Flight: Mission  
Milestones

**02** Research &  
Analysis: Discovery

**03** Earth Action:  
Useful, Useable  
Science

**04** ESTO: Technology  
Innovations

**05** Earth Data:  
Stewardship &  
Accessibility

**06** Telling our Earth  
Science Story

The background of the right side of the slide is a satellite image of Earth, showing a large, swirling storm system over the ocean. The colors are a mix of blue, green, and yellow, representing different atmospheric or oceanic features. The NASA Earth logo is overlaid on this image.

**NASA**  
**earth**



An aerial photograph of a river delta, likely the Amazon, showing a complex network of blue water channels and green land. A semi-transparent blue overlay covers the left and bottom-left portions of the image. A dark blue horizontal band across the center contains the title text.

# Flight: Mission Milestones



# NISAR (NASA-ISRO Synthetic Aperture Radar)

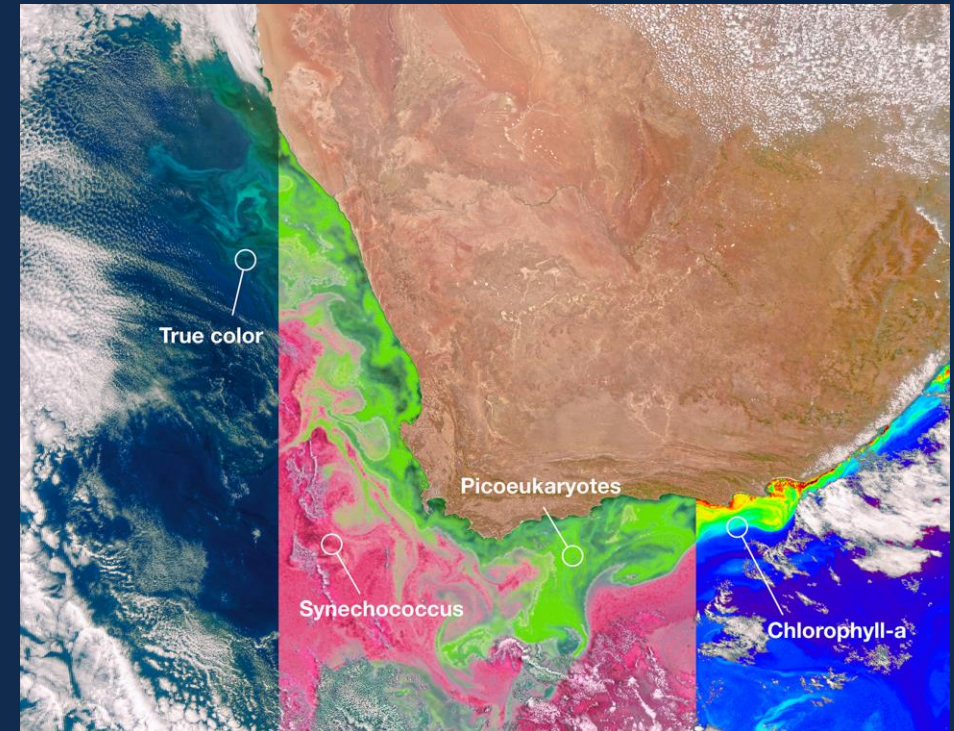
- Joint Earth-observing mission between NASA and the Indian Space Research Organization (ISRO)
- NASA L-band and ISRO S-band radars will allow the mission to observe a wider range of changes than either instrument one alone
- NISAR observations address the “Surface Deformation and Change” designated observable including ecosystems, dynamic surfaces, and ice masses with applications to biomass, natural hazards, sea level rise, groundwater & more
- Global observations with 12-day regularity on ascending and descending passes, sampling Earth on average every 6 days for a baseline 3-year mission
- Launch in early 2025



October 2024 Packaging and transport of NISAR and Beginning of Integration in India

# PACE Launch, Commissioning, PLAR, and First Light

- February 8: PACE Successfully launched
- April 5: **Plankton, Aerosol, Cloud, ocean Ecosystem (PACE)** completed all commissioning activities two days ahead of schedule.
- April 9: PACE successfully passed its Post-Launch Assessment Review (PLAR)
- April 10: PACE transitioned to the Earth Science Mission Operations (ESMO) team.
- April 11: NASA released the first image from PACE's Ocean Color Instrument (OCI), which detects light across a hyperspectral range, and gives scientists new information to differentiate communities of phytoplankton.

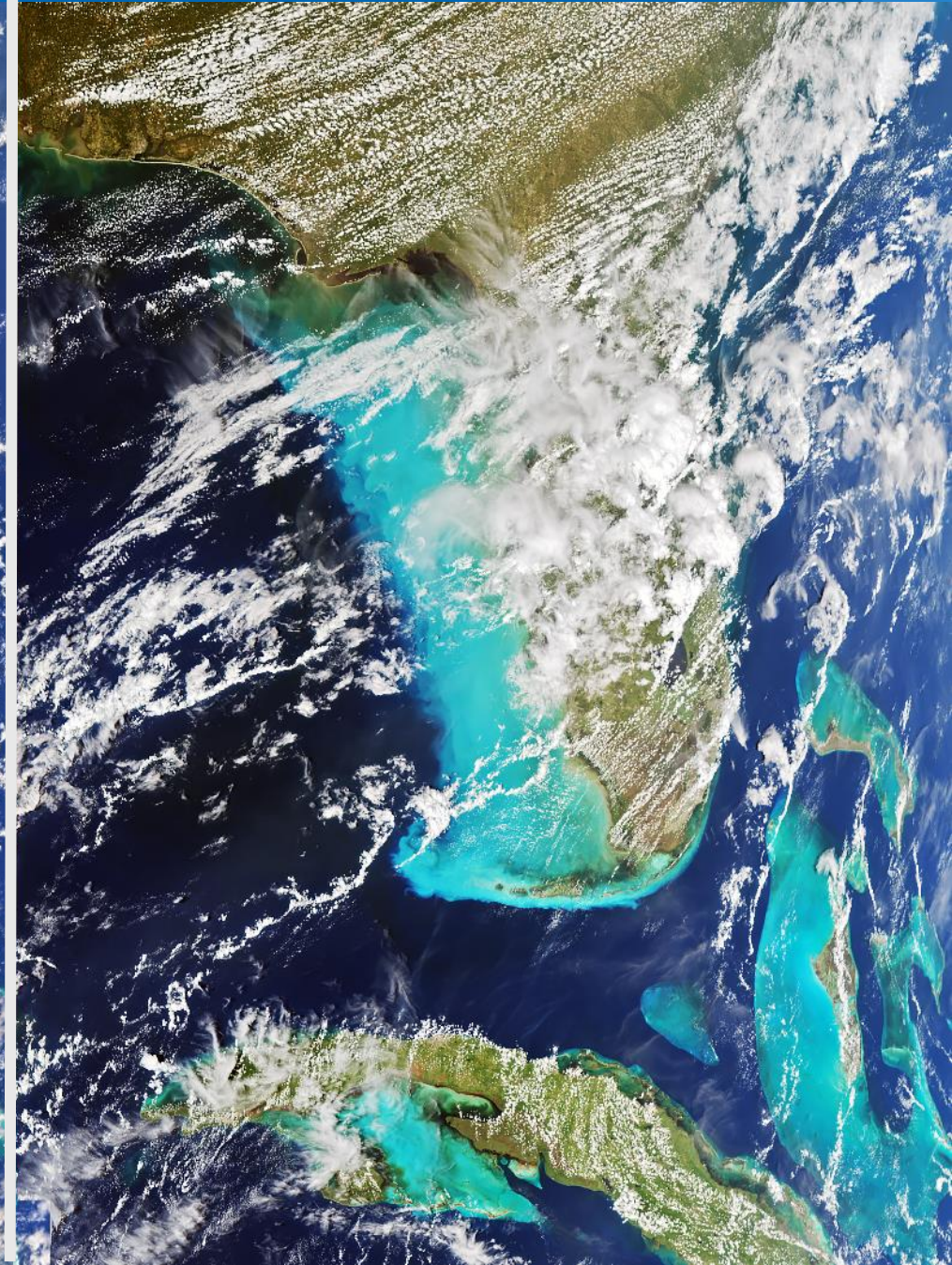


*This first image released from OCI identifies two different communities of these microscopic marine organisms in the ocean off the coast of South Africa on Feb. 28, 2024. The central panel of this image shows Synechococcus in pink and picoeukaryotes in green. The left panel of this image shows a natural color view of the ocean, and the right panel displays the concentration of chlorophyll-a, a photosynthetic pigment used to identify the presence of phytoplankton. Credit: NASA*



# PACE OCI: Before and after Hurricane Helene

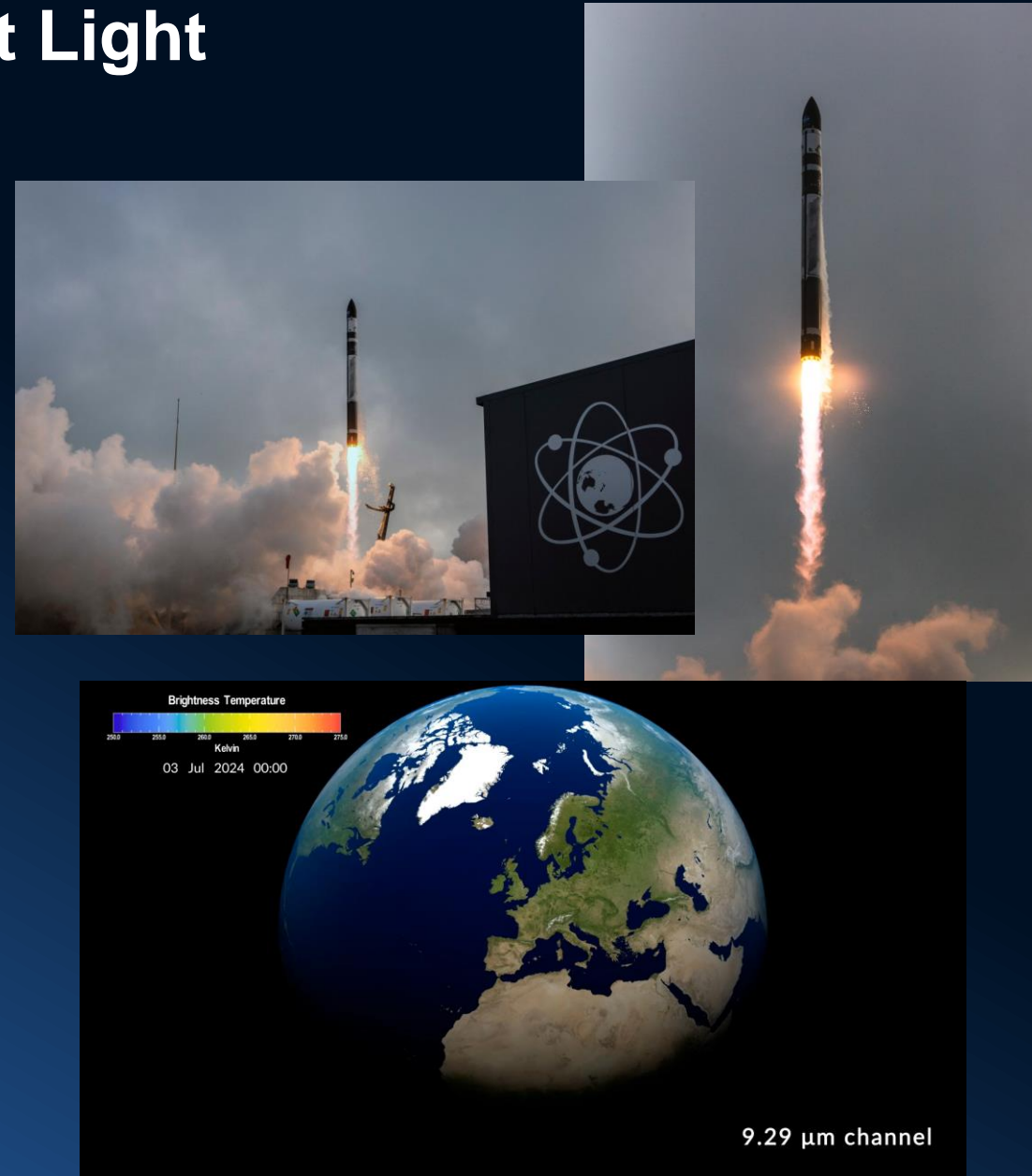
Sept 22, 2024-  
Sept 28, 2024





# PREFIRE Launch and First Light

- May 25 (7:41pm NZST): First Launch of PREFIRE CubeSat from Māhia, New Zealand on Rocket Lab Electron Rocket
- June 4 (3:15pm NZST): Second Launch of PREFIRE CubeSat from Māhia, New Zealand on Rocket Lab Electron Rocket
- Sept. 3: Release of First Light of visualization of PREFIRE data (on bottom) shows brightness temperatures — or the intensity of radiation emitted from Earth at several wavelengths, including the far-infrared, over Greenland
- First systematic measurements of far infrared radiation at the poles
- Understanding of when and where Earth's polar regions emit far-infrared radiation to space, as well as how atmospheric water vapor and clouds influence the amount that escapes



# ASIA-AQ



ASIA-AQ conducted airborne sampling over multiple Asian cities in collaboration with local partners

Improve our understanding of the factors controlling air quality through multi-perspective observations and modeling

377 total flight hours flown between the DC-8 and G-III, February-March 2024

Final mission for the DC-8 following a storied history supporting Earth Science research





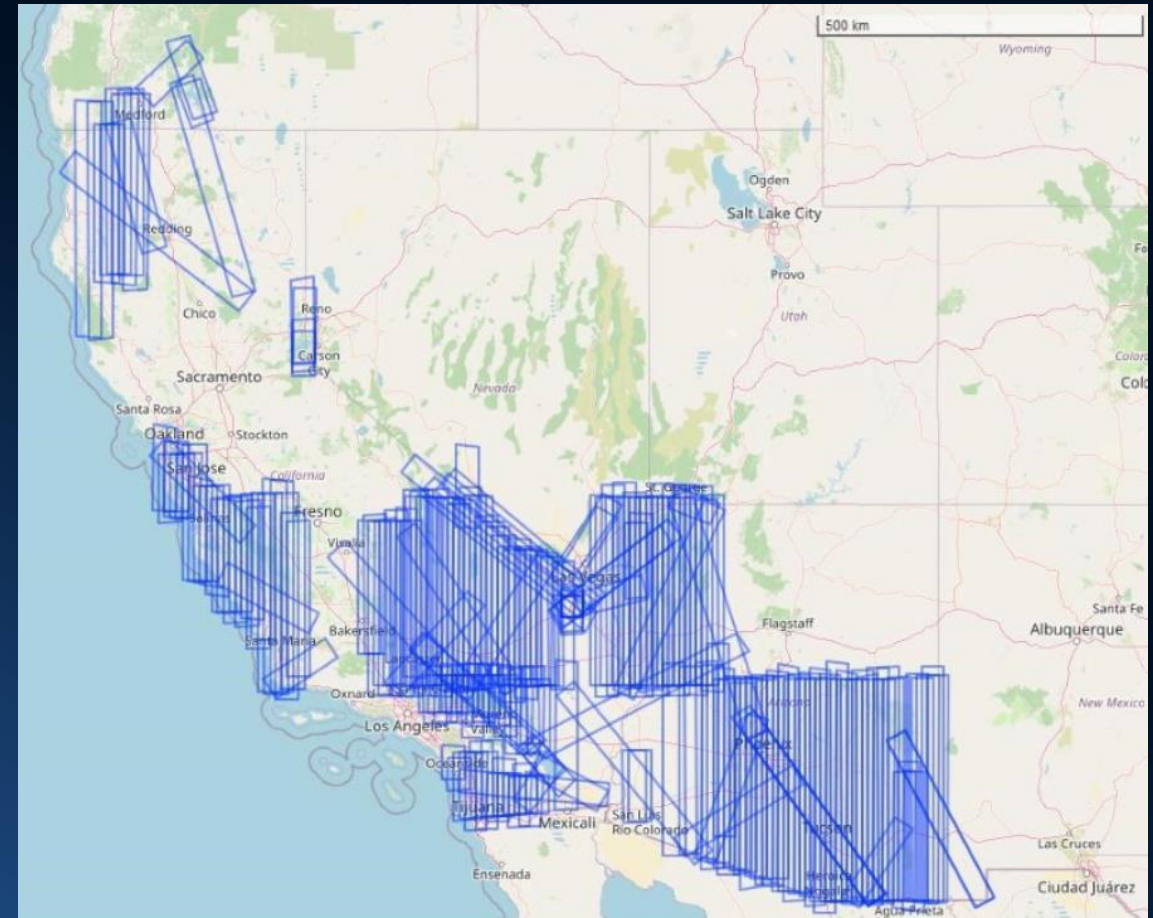
# GEMx campaign



Joint NASA -USGS campaign to map portions of the southwest United States for critical minerals using advanced imaging spectrometry.



Raymond F. Kokaly,  
USGS Research  
Geophysicist, performing  
field work during one of  
the GEMx Science Flights  
identifying and mapping  
critical minerals critical to  
meet expected demands  
with the anticipated shift to  
a renewable energy  
economy



140.2 flight hours flown on NASA's ER-2 aircraft April-June 2024



# EVS-4 Selections (announced April 19, 2024)

## Arctic Coastlines—The Frontlines of Rapidly Transforming Ecosystems (FORTE)

- **Lead Investigator:** Maria Tzortziou, City College of New York
- **Targeted Observable:** Changes in river systems on the North Slope of Alaska

## Injected Smoke and PYRocumulonimbus Experiment (INSPYRE)

- **Lead Investigator:** David Peterson, Naval Research Laboratory
- **Targeted Observable:** Study of pyrocumulonimbus clouds, which form when wildfires burn hot enough to make their own weather

## Hemispheric Airborne Measurements of Air Quality (HAMAQ)

- **Lead Investigator:** James Crawford, NASA Langley Research Center
- **Targeted Observable:** Investigate areas of poor air quality and test how satellite information can help improve ground-based forecasting and mitigation strategies, over Mexico City and a U.S. city to be determined

## Landslide Climate Change Experiment (LACCE)

- **Lead Investigator:** Alexander Handwerger, NASA Jet Propulsion Laboratory
- **Targeted Observable:** Track the way slopes and landslides are changing as water moves differently across the landscape

## Snow4Flow

- **Lead Investigator:** John Holt, University of Arizona
- **Targeted Observable:** Quantify the retreat of glaciers and ice sheets in ways that can lead to better projections of land-ice change

## FarmFlux

- **Lead Investigator:** Glenn Wolfe, NASA Goddard Space Flight Center
- **Targeted Observable:** Measure the amount of greenhouse gases, nitrogen, and other pollutants that are emitted from agricultural lands across the United States



# ESE Step 1 Selections (announced May 7, 2024)

## Carbon Investigation (Carbon-I) - JPL

- **PI:** Christian Frankenberg; California Institute of Technology in Pasadena
- **Targeted Observable:** Greenhouse Gases
- Would enable simultaneous, multi-species measurements of critical greenhouse gases and potential quantification of ethane to provide unprecedented spatial resolution and global coverage that would help better understand the carbon cycle and the global methane budget.

## Earth Dynamics Geodetic Explorer (EDGE) - GSFC

- **PI:** Helen Amanda Fricker; University of California in San Diego
- **Targeted Observable:** 3D Ecosystem Structure; Ice Elevation
- Would observe the three-dimensional structure of terrestrial ecosystems and the surface topography of glaciers, ice sheets, and sea ice as they are changing in response to climate and human activity

## Stratosphere Troposphere Response using Infrared Vertically-Resolved Light Explorer (STRIVE) – GSFC

- **PI:** Lyatt Jaegle; University of Washington in Seattle
- **Targeted Observable:** Ozone and Trace Gases
- Would provide near global daily measurements of temperature, various atmospheric elements, and aerosol properties from the troposphere to the mesosphere.
- Would also measure vertical profiles of ozone and trace gasses to monitor and understand ozone recovery.

## Ocean Dynamics and Surface Exchange with the Atmosphere (ODYSEA) - JPL

- **PI:** Sarah Gille; University of California in San Diego
- **Targeted Observable:** Ocean Surface Winds and Currents
- Would measure ocean surface currents and winds to improve our understanding of air-sea interactions and surface current processes that impact weather, climate, marine ecosystems, and human wellbeing



# Earth Science Flight Opportunities (FY25)

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 Launched in May 2023
<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 2024
<b>EVC-1</b> (Libera)	Class C JPSS-Hosted Radiation Budget Instrument	2018	2020	Delivery NLT 2025
<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, PYREX, HAMQ, LACCE, Snow4Flow, FarmFlux)	Suborbital Airborne Campaigns	2023	2024	Selections announced April 2024
<b>ESE</b> (STRIVE, ODYSEA, EDGE, Carbon-I)	Explorer Mission	2023	2025	Launch ~2030 & ~2032; step-1 selections announced May 2024
<b>AOS-Cloud</b>	Radar cloud and convection profiling mission	2025	2027	Launch ~2031; Community Announcement released April 2024
<b>EVX*</b>	Orbital instrument, mission, or continuity	2026	2027	Launch ~2032
<b>EVS-5</b>	Suborbital Airborne Campaigns through ROSES	2027	2028	N/A
<b>EVX*</b>	Orbital instrument, mission, or continuity	2028	2029	Launch ~2034
<b>ESE</b>	Explorer Mission	2029	2031	Launch ~2037
<b>EVX*</b>	Orbital instrument, mission, or continuity	2030	2031	Launch ~2036

**EVS**  
Sustained sub-orbital investigations (~4 years)

**EVX**  
Small-size orbital instruments and missions (~2 years)

**ESE**  
Medium-size orbital instruments and missions (~3 years)

Open solicitation/In review

Completed solicitation

\*EVX Mission type will be dictated by PoR needs when AO is released.

This fits into ESD strategy for portfolio flexibility and resilience

# EARTH SYSTEM OBSERVATORY

INTERCONNECTED  
CORE MISSIONS

## SURFACE BIOLOGY AND GEOLOGY

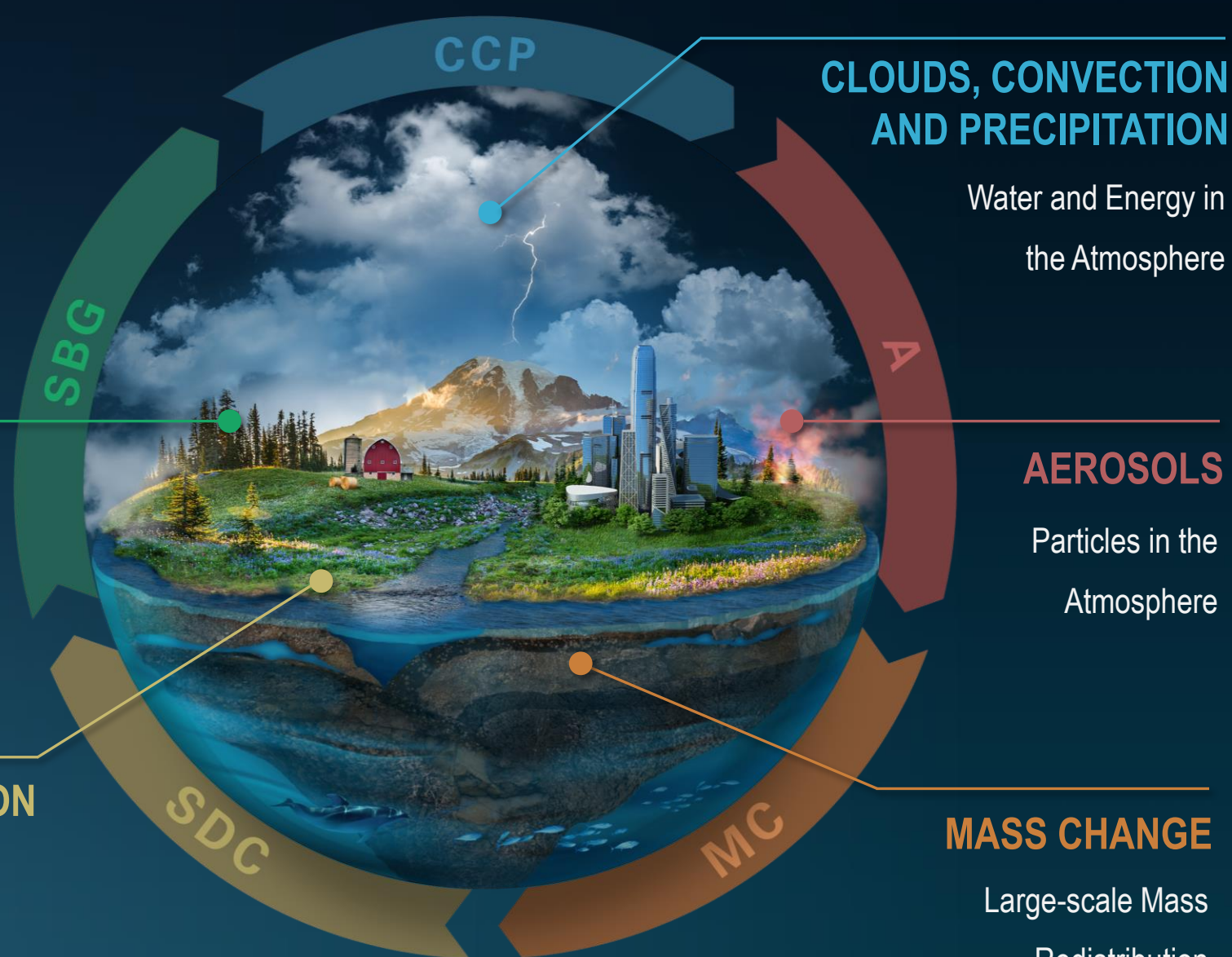
Earth Surface & Ecosystems

SBG-TIR  
SBG-VSWIR

## SURFACE DEFORMATION AND CHANGE

Earth Surface Dynamics

Met by **NISAR** launch in 2024

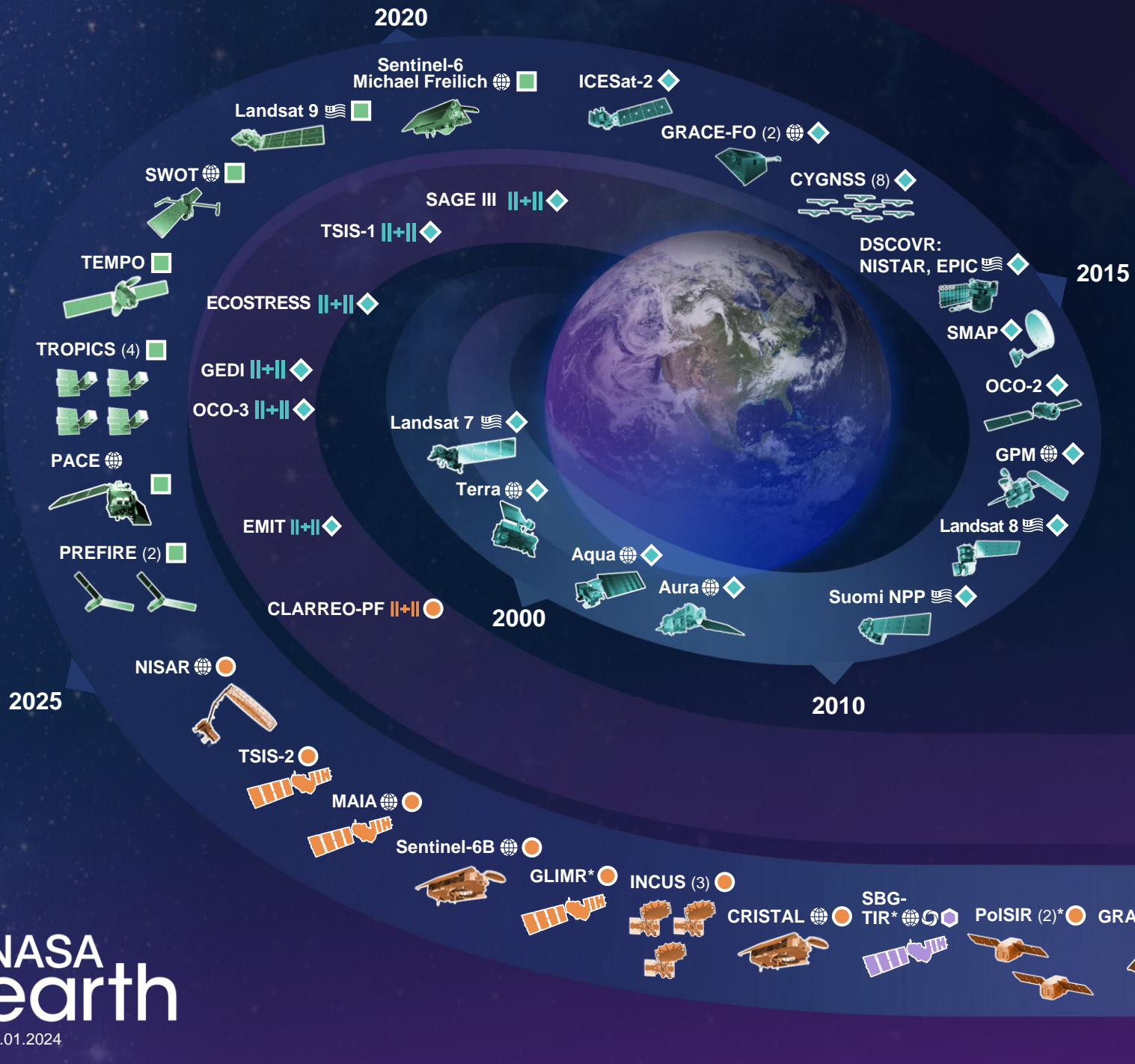


### ATMOSPHERIC SCIENCE MISSIONS

AOS-Storm  
(PMM and  
C2MODO)  
AOS-Sky  
AOS-Cloud



# EARTH FLEET



Key

International Partners

U.S. Partner

ISS Instrument

JPSS Instrument

Cubesat

Launch Date TBD

Earth System

Observatory Mission

(Pre) Formulation

Implementation

Operating

Extended

Invest/CubeSats

MURI-FD 2023

ARGOS\* 2025

ARCSTONE\* 2025

ACMES\* 2025

GRITSS-FD\* 2025

GRATTIS\* 2025

JPSS Instruments

OMPS-LIMB 2022

LIBERA 2027

OMPS-LIMB 2027

OMPS-LIMB 2032

## ISS INSTRUMENTS

## MISSIONS



2020

National Aeronautics and  
Space Administration



# Early 2030s EARTH FLEET

## Key

- International Partners
- U.S. Partner
- ISS Instrument
- JPSS Instrument
- Cubesat
- Launch Date TBD
- Earth System  
Observatory Mission (Pre) Formulation
- Implementation
- Operating
- Extended

## Invest/CubeSats

- MURI-FD 2023
- ARGOS\* 2025
- ARCSTONE\* 2025
- ACMES\* 2025
- GRITSS-FD\* 2025
- GRATTIS\* 2025

## JPSS Instruments

- OMPS-LIMB 2022
- LIBERA 2027
- OMPS-LIMB 2027
- OMPS-LIMB 2032

2025

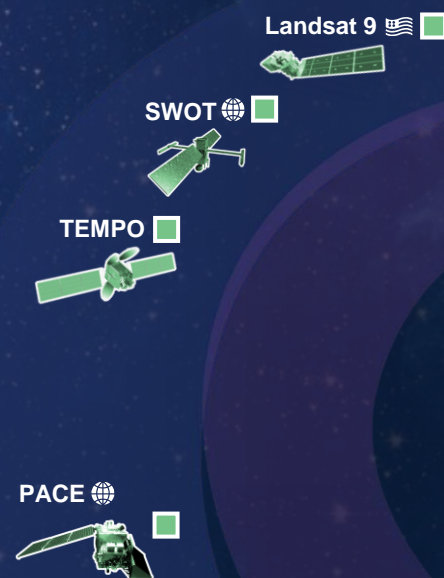
## ISS INSTRUMENTS

NASA  
earth

11.01.2024

2030

## MISSIONS





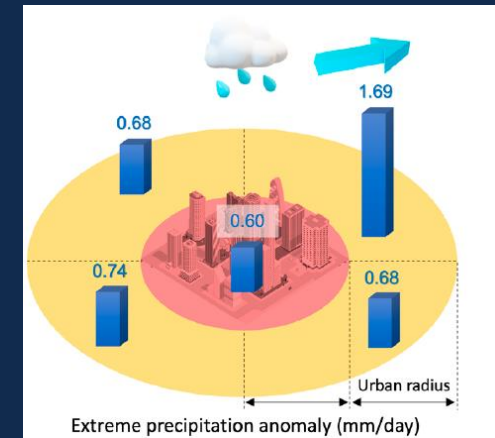
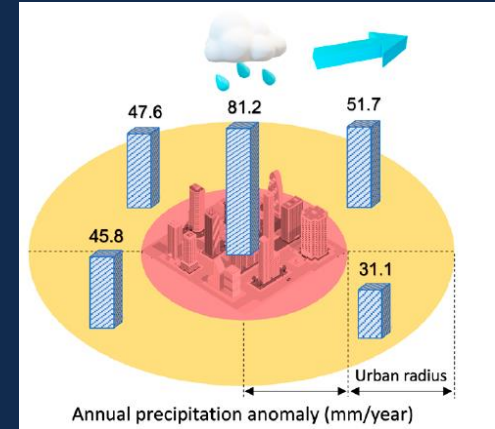
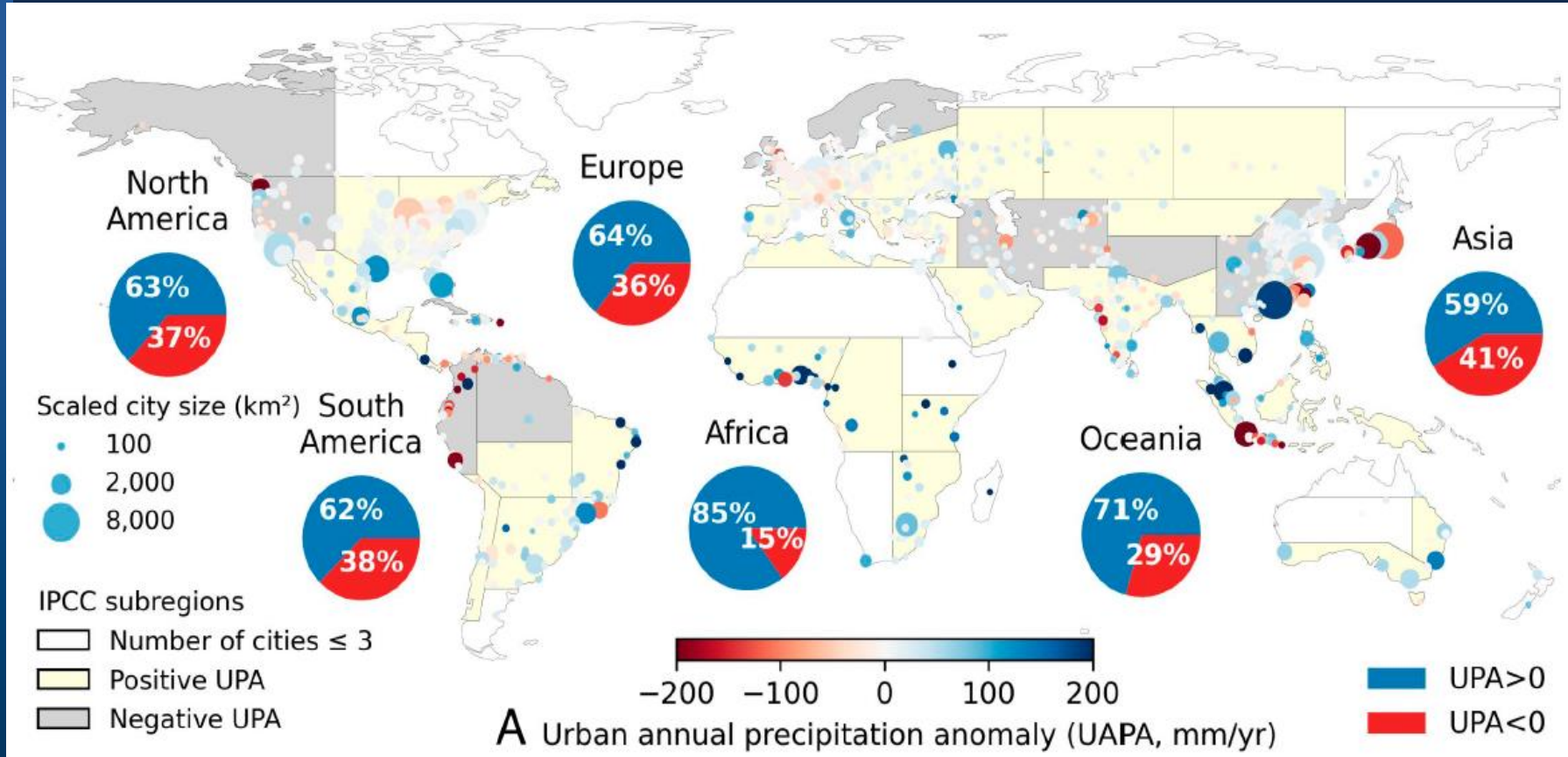
An aerial photograph of a river delta, likely the Amazon, showing a complex network of channels and islands. The land is green, and the water is a deep blue. A semi-transparent blue overlay covers the left and bottom portions of the image, creating a layered effect.

# Research & Analysis: Discovery



# Global scale assessment of urban precipitation anomalies

Sui, X., Yang, Z.L., Shepherd, M. and Niyogi, D., 2024. Global scale assessment of urban precipitation anomalies. Proceedings of the National Academy of Sciences, 121(38), p.e2311496121 <https://doi.org/10.1073/pnas.2311496121>



Average Urban Precipitation Anomalies (AUPA) by IPCC subregion

For 49 cities with populations > 1 million the average annual and extreme ppt anomaly in the cities and the surrounding rural areas. The urban annual ppt hotspot is within cities, while the urban extreme ppt hotspot is in the downwind urban areas.



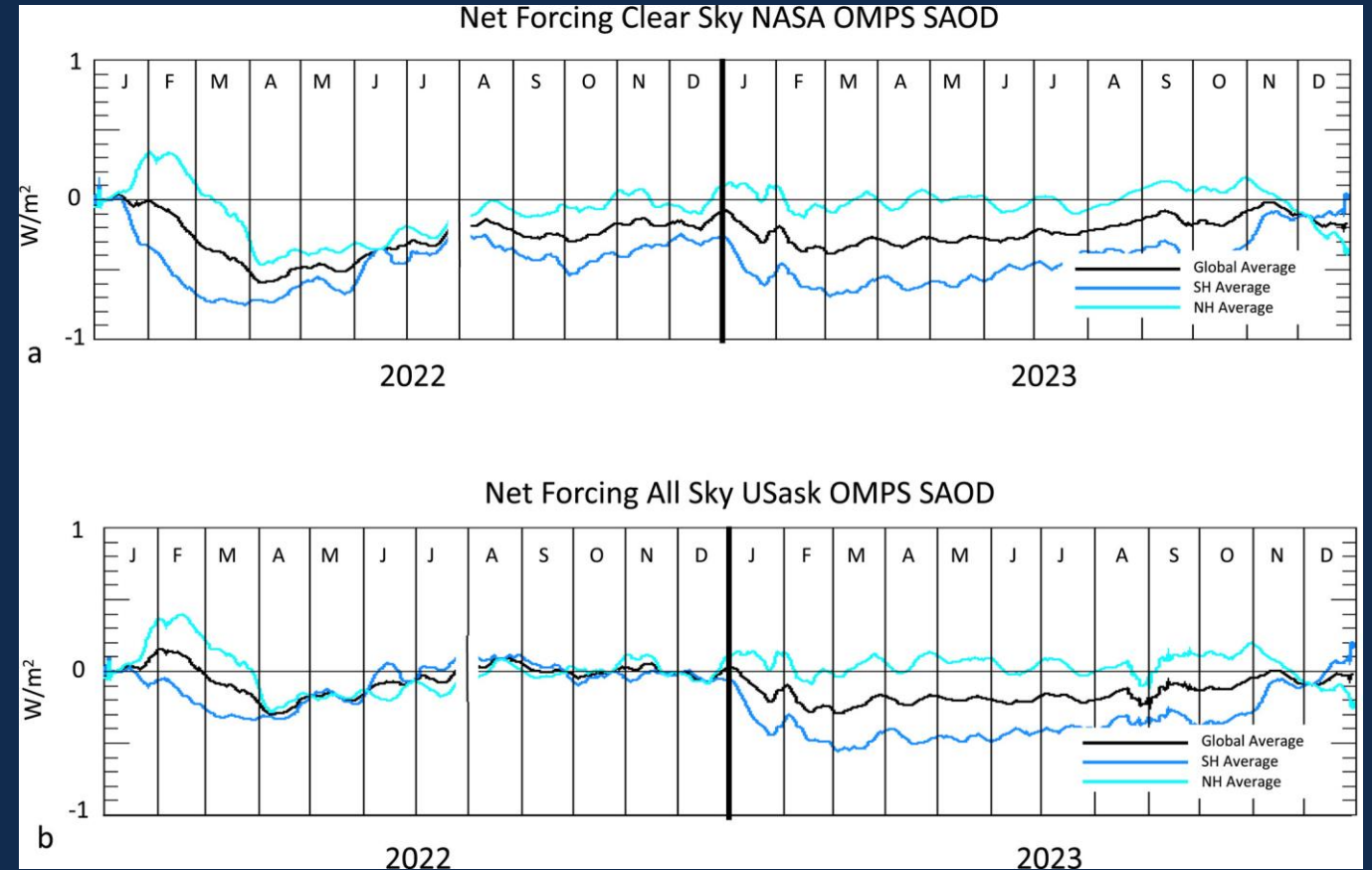
# Evolution of the climate forcing during the two years after the Hunga Tonga-Hunga Ha'apai eruption

Schoeberl, M. R., Wang, Y., Taha, G., Zawada, D. J., Ueyama, R., & Dessler, A. (2024).

Journal of Geophysical Research: Atmospheres, 129, e2024JD041296.

<https://doi.org/10.1029/2024JD041296>

- The January 2022 eruption of the Hunga Tonga-Hunga Ha'apai underwater volcano injected a large amount of water vapor into the mid-stratosphere
- The excess  $\text{H}_2\text{O}$  increases the OH radical, causing a negative global ozone response (2%–10%) in the upper stratosphere and mesosphere
- Given the year-to-year variability of the stratosphere, the magnitudes of these ozone responses may be below the threshold of detectability in observations.

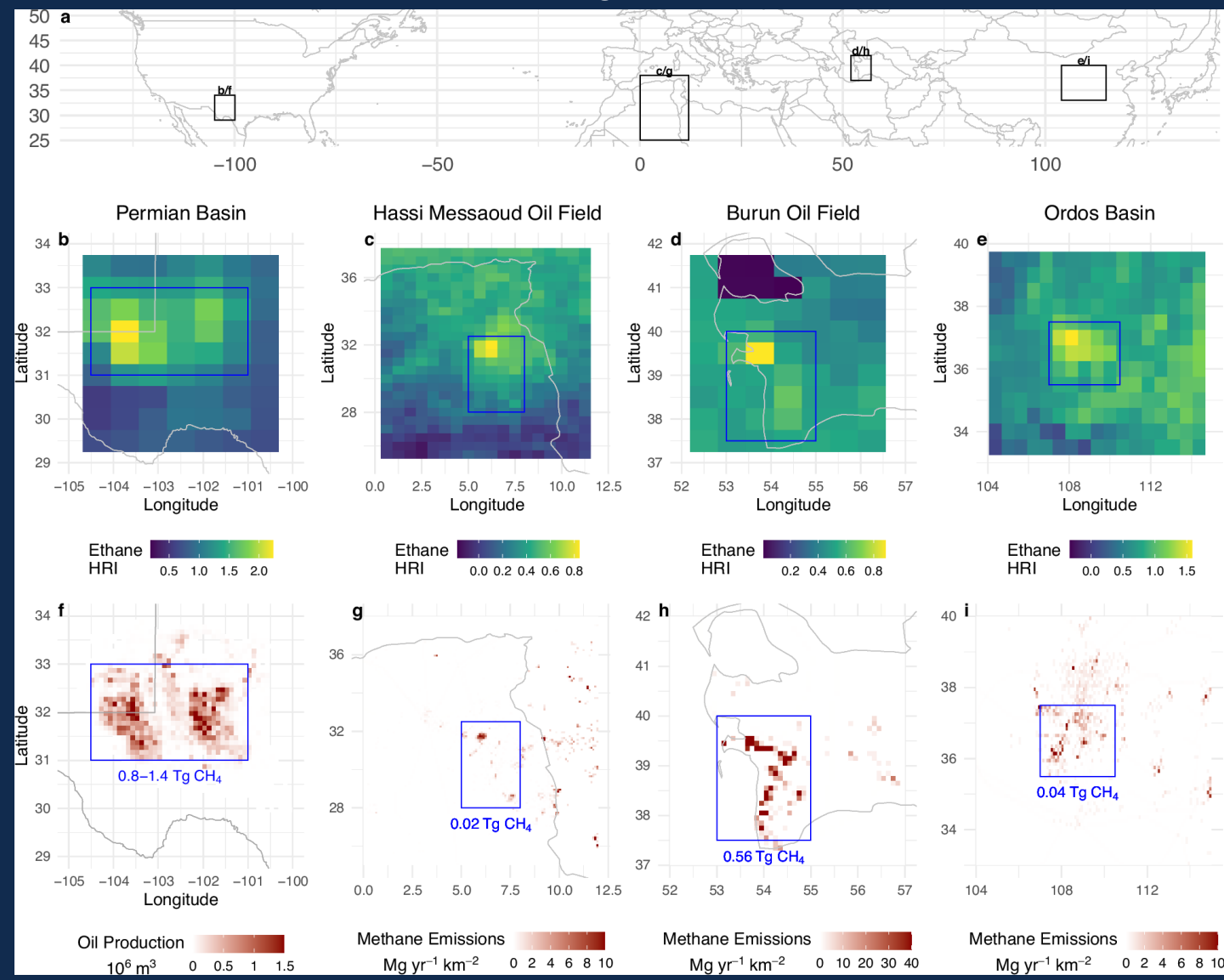


Variations of global (black), SH (blue) and NH (cyan) downward fluxes. Part a, clear sky, NASA OMPS SAOD. Part b, all sky USask SAOD

# Space-based observations of tropospheric ethane map emissions from fossil fuel extraction

Brewer, J. F., Millet, D. B., Wells, K. C., Payne, V. H., Kulawik, S., Vigouroux, C., Cady-Pereira, K., Pernak, R., & Zhou, M. (2024) Nat. Commun., 15, 7829. <https://doi.org/10.1038/s41467-024-52247-z>

- This represents a first step in using the CrIS observations to better understand global ethane emissions from fossil and non-fossil sources.
- The long-term CrIS record is a key community resource for advancing understanding of ozone, reactive nitrogen budgets, and fossil fuel emissions worldwide.
- The CrIS data show that the Permian Basin in Texas and New Mexico exhibits the largest persistent ethane enhancements on the planet, with regional emissions underestimated by seven-fold



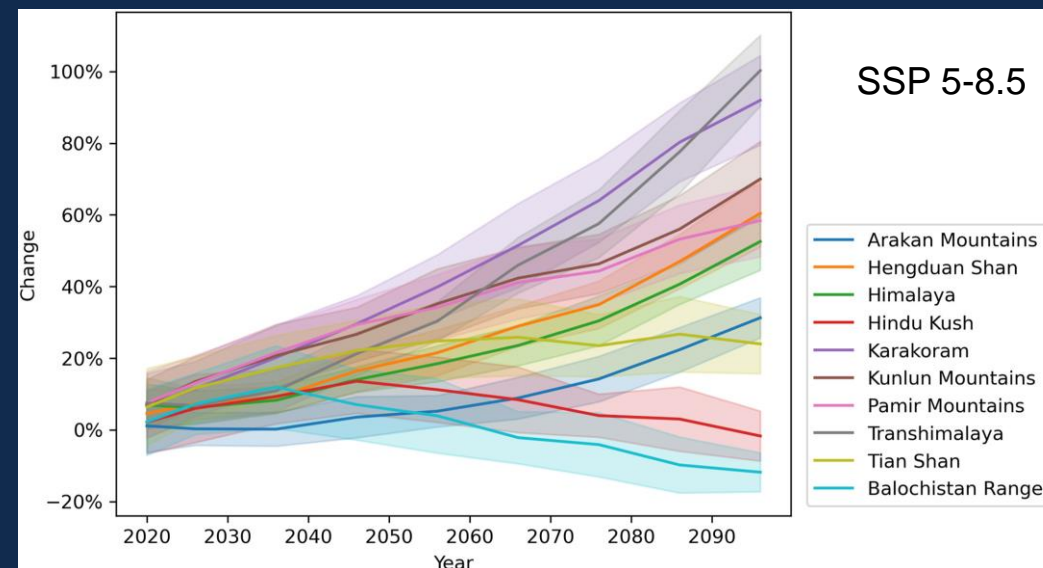
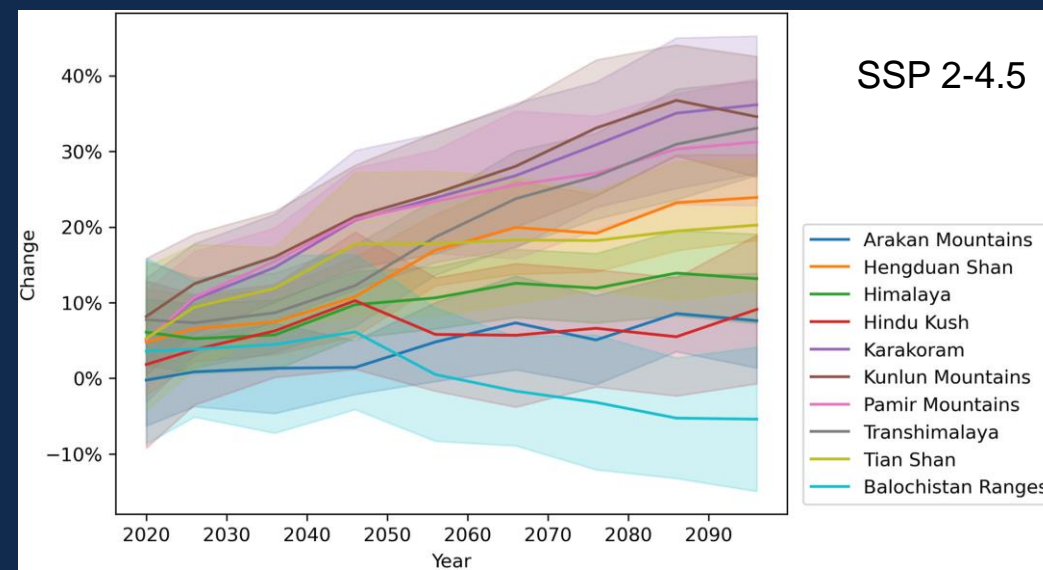


# Landslide hazard is projected to increase across High Mountain Asia

Stanley, T. A., Soobitsky, R. B., Amatya, P. M., & Kirschbaum, D. B. (2024) Earth's Future, 12, e2023EF00432

<https://doi.org/10.1029/2023EF004325>

- We found that the hazard from landslides triggered by rainfall will increase in every major mountain range at some point in the twenty-first century.
- This result implies the need for continued vigilance by engineers, planners, and emergency responders across High Mountain Asia.
- We mapped these potential changes under two scenarios: development along current lines and development that is heavily dependent on the use of fossil fuels



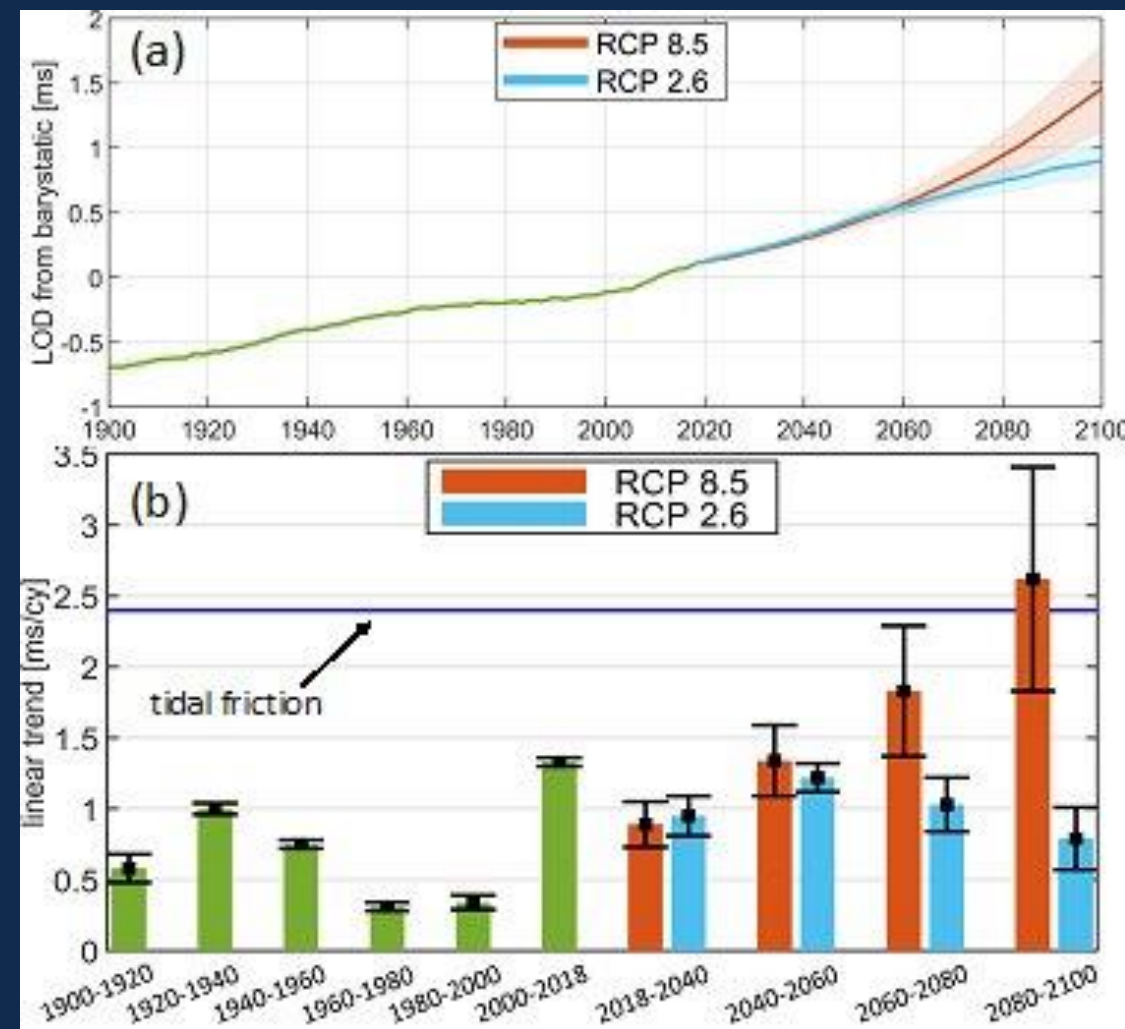
Change in the Landslide Hazard Indicator for most major mountain ranges relative to the base period 1990–2014. Shaded areas represent one std dev.

# The increasingly dominant role of climate change on length of day variations

Shahvandi, M.K., Adhikari, S., Dumbery, M., Mishra, S. and Soja, B.  
2024. PNAS, <https://doi.org/10.1073/pnas.2406930121>

- The 20th century climate-induced LOD trend ranged from 0.3 to 1.0 milliseconds per century (ms/cy)
- GRACE observations of surface mass change, Satellite Laser Ranging measurements of Earth's oblateness, and modeling combine to show an accelerating trend of  $1.33 \pm 0.03$  ms/cy since 2000
- Climatic contributions will continue to increase and may surpass the lunar tidal friction contribution (+2.4 ms/cy) by 2100

The quantified LOD change has relevance for precise timekeeping and Earth and space navigation





An aerial photograph of a river delta, likely the Amazon, showing a complex network of blue water channels and green land. A semi-transparent blue overlay covers the left and bottom-left portions of the image. A dark blue horizontal band across the center contains the title text in white.

# Earth Action: Useful, Useable Science



# Hurricanes Helene & Milton Disaster Response Support

- Hurricanes Helene & Milton caused flooding, landslides, and power outages in communities across the southern U.S., with significant impacts in western N.C. and Florida.
- The Disasters Response Coordination System supported response by FEMA, USGS, American Red Cross, and emergency management divisions in FL, NC, and SC.
- For both events, the DRCS staffed a seat at FEMA's National Response Coordination Center (NRCC) enabling close coordination with response partners.
- The DRCS worked with scientists across six NASA centers to provide a variety of products including:
  - LIS Soil Moisture to assess pre-landfall conditions
  - Daily Black Marble nighttime lights maps to assess power outages
  - Landslide hazard & proxy heat maps, and manual landslide mapping with the USGS using optical imagery
  - OPERA Dynamic Surface Water eXtent
  - MODIS Flood Detections
  - SAR Water Extent and RGB from Copernicus Sentinel satellites and NASA UAVSAR flights over Florida.



New York Task Force conducts search and rescue operations in NC after Hurricane Helene. Credit: FEMA

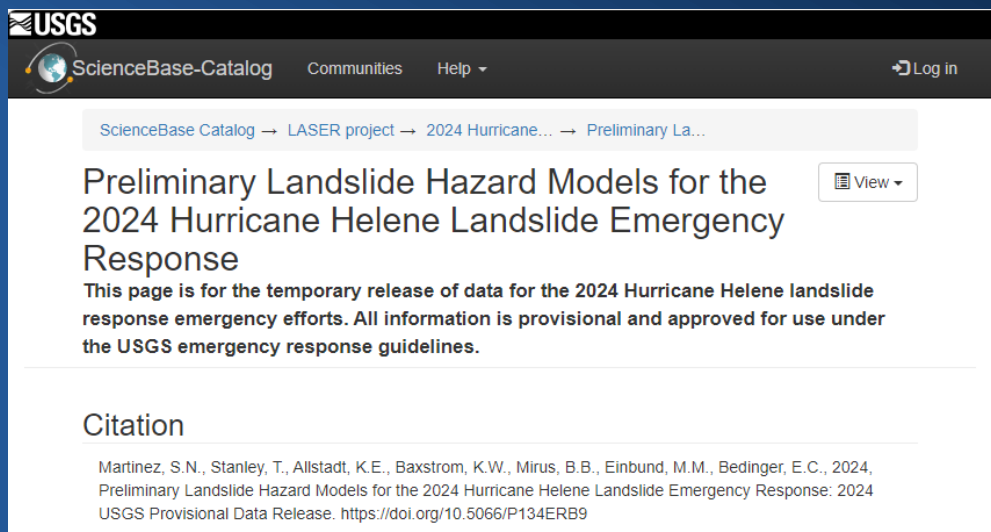


UAVSAR water extents around St. Johns River, FL, from Oct. 14 flights. Credit: NASA



# NASA's Landslide Forecast Models Powered Hazard Response

- NASA issued a useful forecast before hurricane landfall
- USGS used multiple landslide models, including NASA's, to plan aerial reconnaissance
- NASA also issued a post-event landslide heatmap based on Sentinel SAR and provided other detailed mapping to support response through the DRCS and Landslide projects



**USGS** ScienceBase-Catalog Communities Help Log in

ScienceBase Catalog → LASER project → 2024 Hurricane... → Preliminary La...

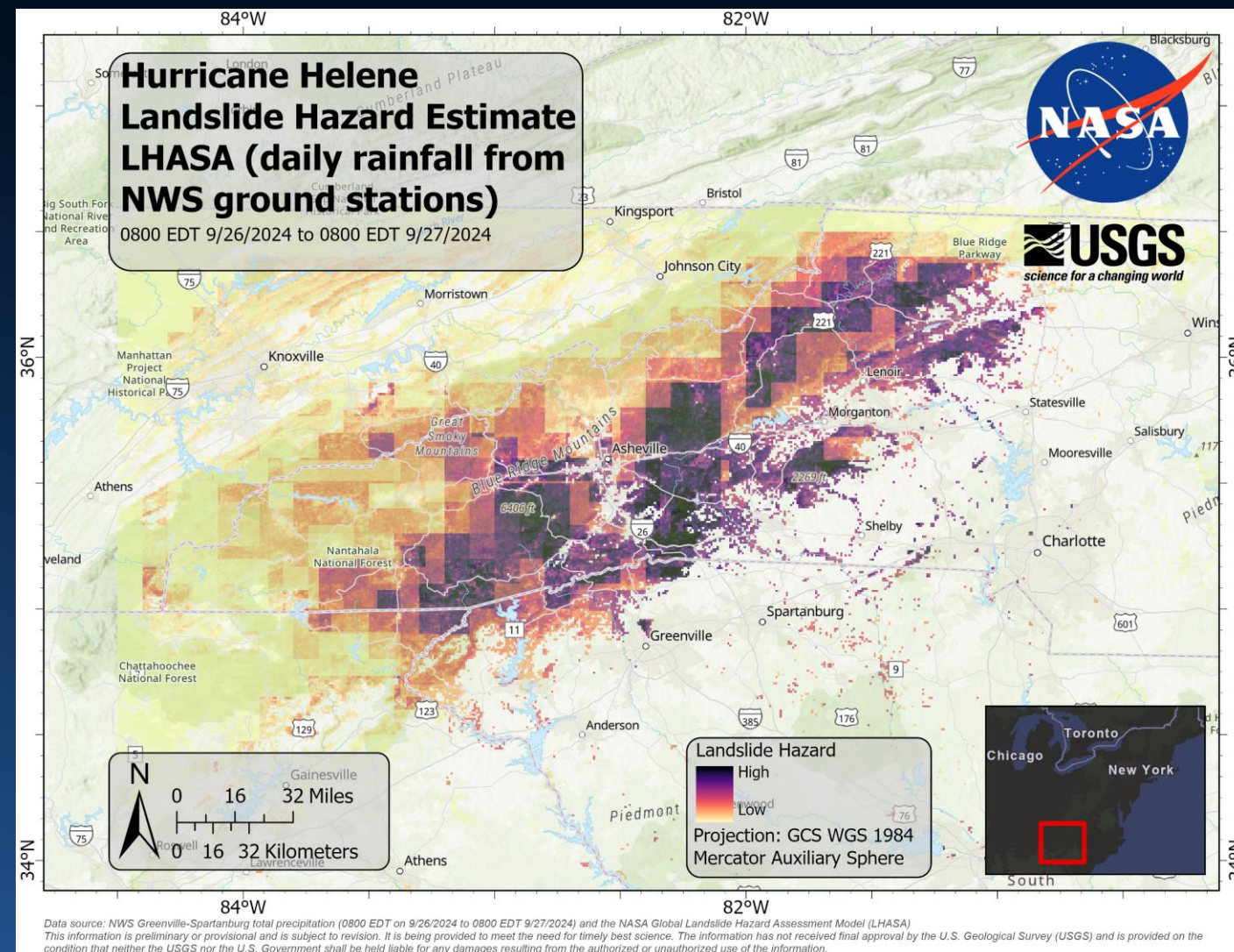
## Preliminary Landslide Hazard Models for the 2024 Hurricane Helene Landslide Emergency Response

This page is for the temporary release of data for the 2024 Hurricane Helene landslide response emergency efforts. All information is provisional and approved for use under the USGS emergency response guidelines.

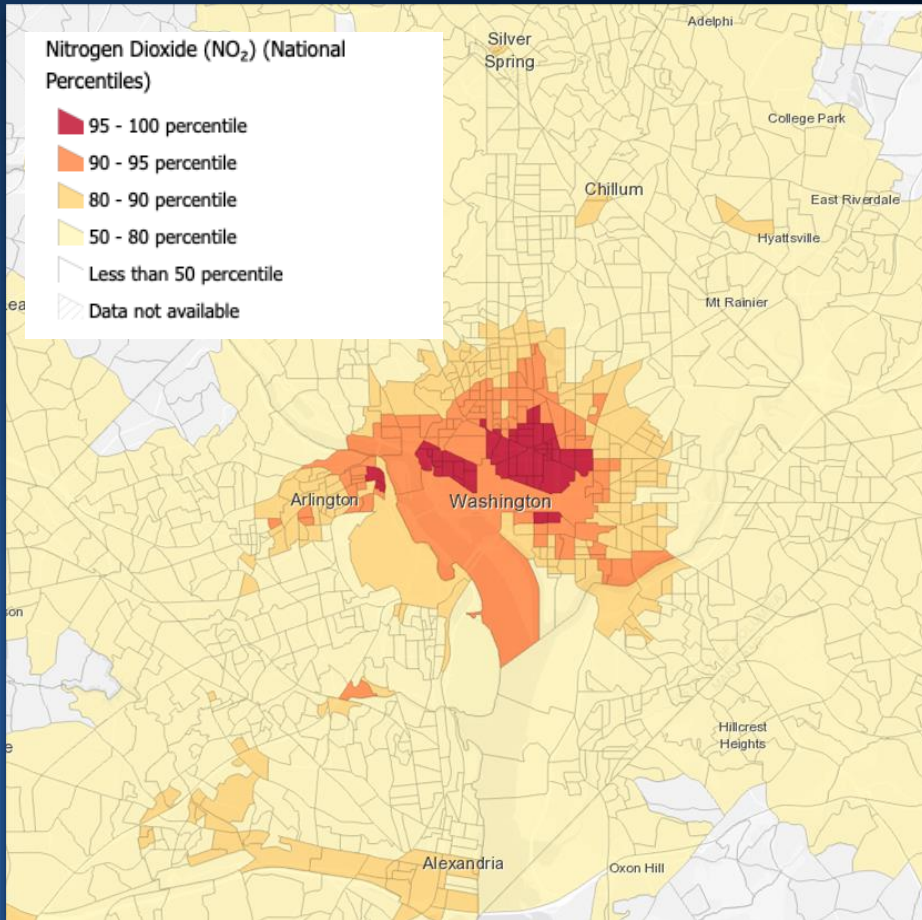
[View](#)

### Citation

Martinez, S.N., Stanley, T., Allstadt, K.E., Baxstrom, K.W., Mirus, B.B., Einbund, M.M., Bedinger, E.C., 2024, Preliminary Landslide Hazard Models for the 2024 Hurricane Helene Landslide Emergency Response: 2024 USGS Provisional Data Release. <https://doi.org/10.5066/P134ERB9>



# NASA Data Incorporated into EPA Environmental Justice Screening and Mapping Tool



- Using data from the Ozone Monitoring Instrument (OMI) onboard Aura, the EPA **EJScreen** tool now includes nitrogen dioxide (NO<sub>2</sub>)
- The NASA Health and Air Quality Applied Sciences Team “Satellite Data for Environmental Justice” tiger team enabled this collaboration

“Having access to this accurate and localized NO<sub>2</sub> data allows organizations like ours to understand the air quality challenges we encounter, and to advocate more effectively for the health and well-being of community residents.” – Samuel Jordan, president of the *Baltimore Transit Equity Coalition*





# NASA Lifelines: Driving Humanitarian Action Powered by Earth Science



The NASA Lifelines D.C. Mural, entitled “Satellites of Hope” by community artist Joel Bergner, was unveiled on Aug 28

- **NASA Lifelines** brings together scientists and humanitarian to use satellite-derived insights for humanitarian action
- Engages over **500** humanitarian practitioners and Earth scientists across **143** countries – including **14** of the 20 on the IRC’s Emergency Watchlist

# NEW EIC at the Smithsonian Museum of Natural History





An aerial photograph of a river delta, likely the Amazon, showing a complex network of blue water channels and green land. A semi-transparent blue overlay covers the left and bottom-left portions of the image. A dark blue horizontal band spans the middle of the image, containing the title text.

# ESTO: Innovations in Tech



# Technology Highlights: HALE InSAR

- Current InSAR assets generally cannot study dynamics with sub-weekly timescales
- To enable revisit times of minutes to hours, the ***High Altitude, Long Endurance Interferometric Synthetic Aperture Radar (HALE InSAR)*** was developed
- Completed 24 hours of testing in mid-August; Additional flights are being planned for 2024-2025



In August, the ***High Altitude, Long Endurance InSAR (HALE InSAR)*** flew onboard a Sceye airship, completing 24 hours of test operations at 55,000 ft in stratosphere. (Credit: Sceye Inc.)



# Technology Highlights: SNOWII

## A New Instrument for Snow:

*SNOWWI* – a new two-frequency interferometer and scatterometer for snow depth, density, height, and SWE – had airborne test flights in January. An eventual goal is to transition SNOWII to a satellite constellation, and a commercial partner (Capella Space) is helping to address key systems engineering challenges.



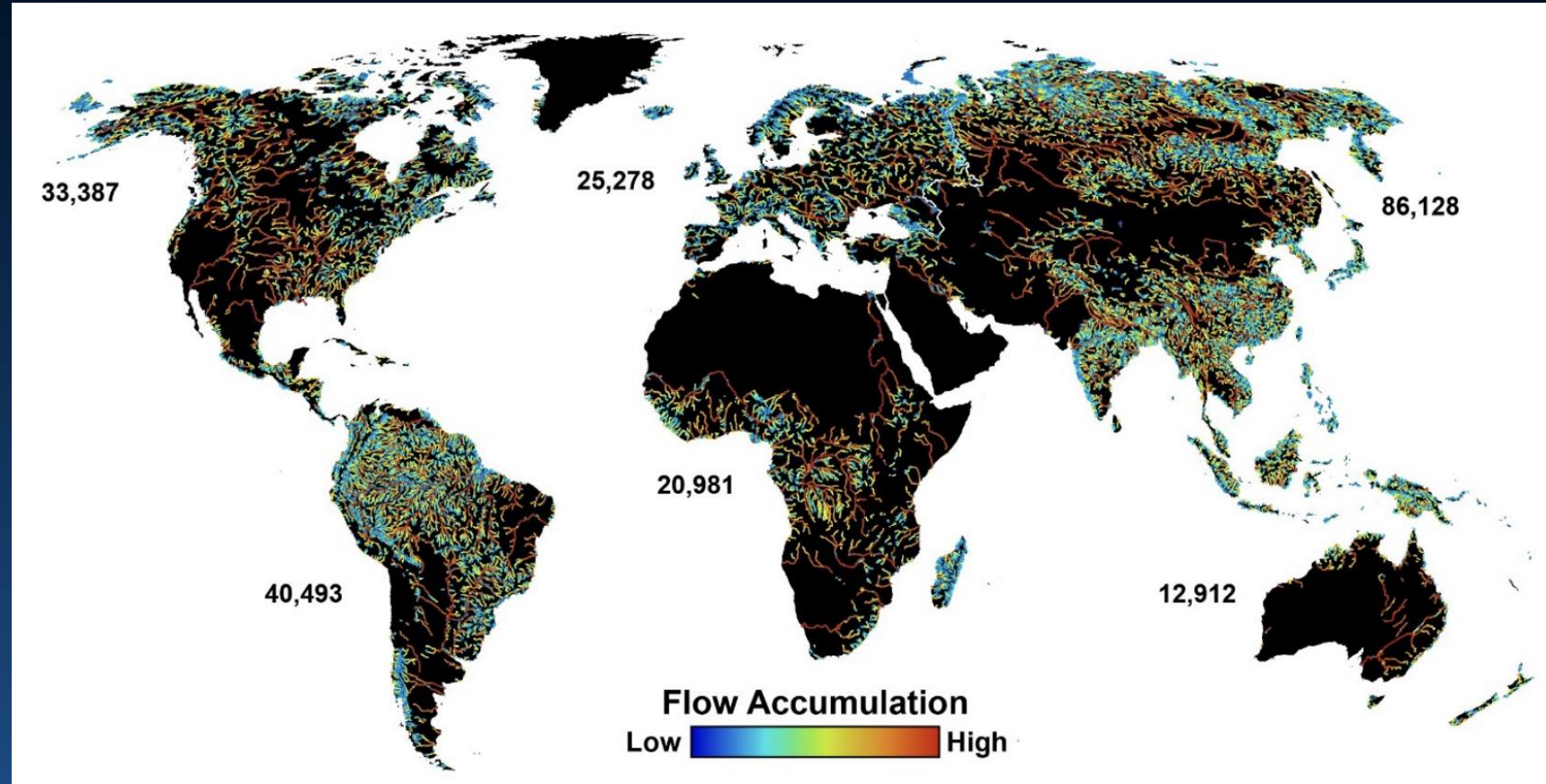
The Revolution Flight's Cessna 208 waiting on the tarmac for takeoff to the Mesa. The re-purposed door from ECCC, that houses the SNOWWI antennas can be seen in the rear. (Credit P. Siqueira)



The SNOWII research team

# Technology Highlights: Confluence

**An Analytic Framework for Global Rivers:** The *Confluence* project has integrated SWOT and Sentinel 2 data in a novel cloud-based analysis framework to estimate river discharge and suspended sediment levels in every river on Earth wider than 50 meters.



A representative image from the SWOT River Database (SWORD) on PO.DAAC (Credit: NASA JPL)



# Decadal Survey Incubation (DSI) Program

Purpose: Support maturation of mission, instrument, technology, or measurement concepts to address specific high-priority science and applications Targeted Observables (TO's) as needed to enable cost-effective implementation

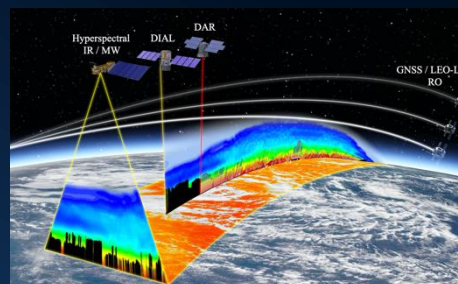
## Planetary Boundary Layer (PBL)

Community Meeting April 23-24

Westcoast & Heartlands Hyperspectral Microwave Sensors Intensive Experiment (WH<sup>2</sup>yMSIE) field campaign with ER-2 & G-III aircraft in collaboration with NOAA & DOE

AURORA (Atmospheric Ultra-high Resolution Optical Radiometer) Pathfinder: TRL 6 spaceborne instrument

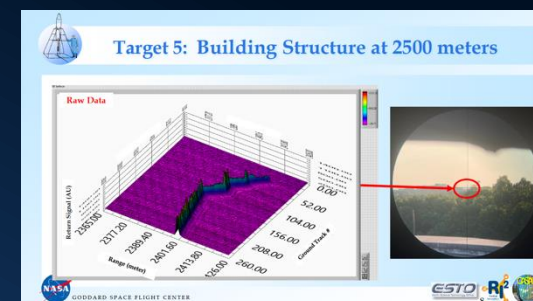
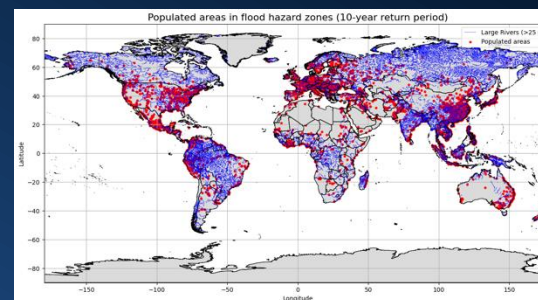
White Papers in development for next Decadal Survey: Cloudy PBL, Convection and Extreme Weather, Surface Interaction



## Surface Topography & Vegetation (STV)

Concurrent Artificially-intelligent Spectrometry and Adaptive Lidar System (CASALS) lab and rooftop test September 2024. 256 track 3D imaging performance at 1040 nm frequency. Instrument at LaRC awaiting integration on G-III after WH<sup>2</sup>yMSIE concludes

STV Community Meeting October 28-29



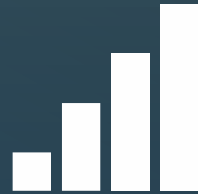
DSI-24 Solicitation out now. Proposals due 12/17/2024

# ESTO FY24 Program Metrics

## FY24 Program Metrics



**>600 collaborators**  
from >140 organizations in 33 states



**~47% advanced**  
one or more Technology Readiness Levels (TRLs) during the fiscal year



**At least 9 infusions**  
into science missions, campaigns, and other operational or commercial activities



**157 projects active**  
from >70 organizations in 27 states



**4 tech demos on-orbit**  
and at least 9 projects tested on airborne platforms



**>250 students**  
from >69 institutions are involved, with at least 90 students attending MSIs

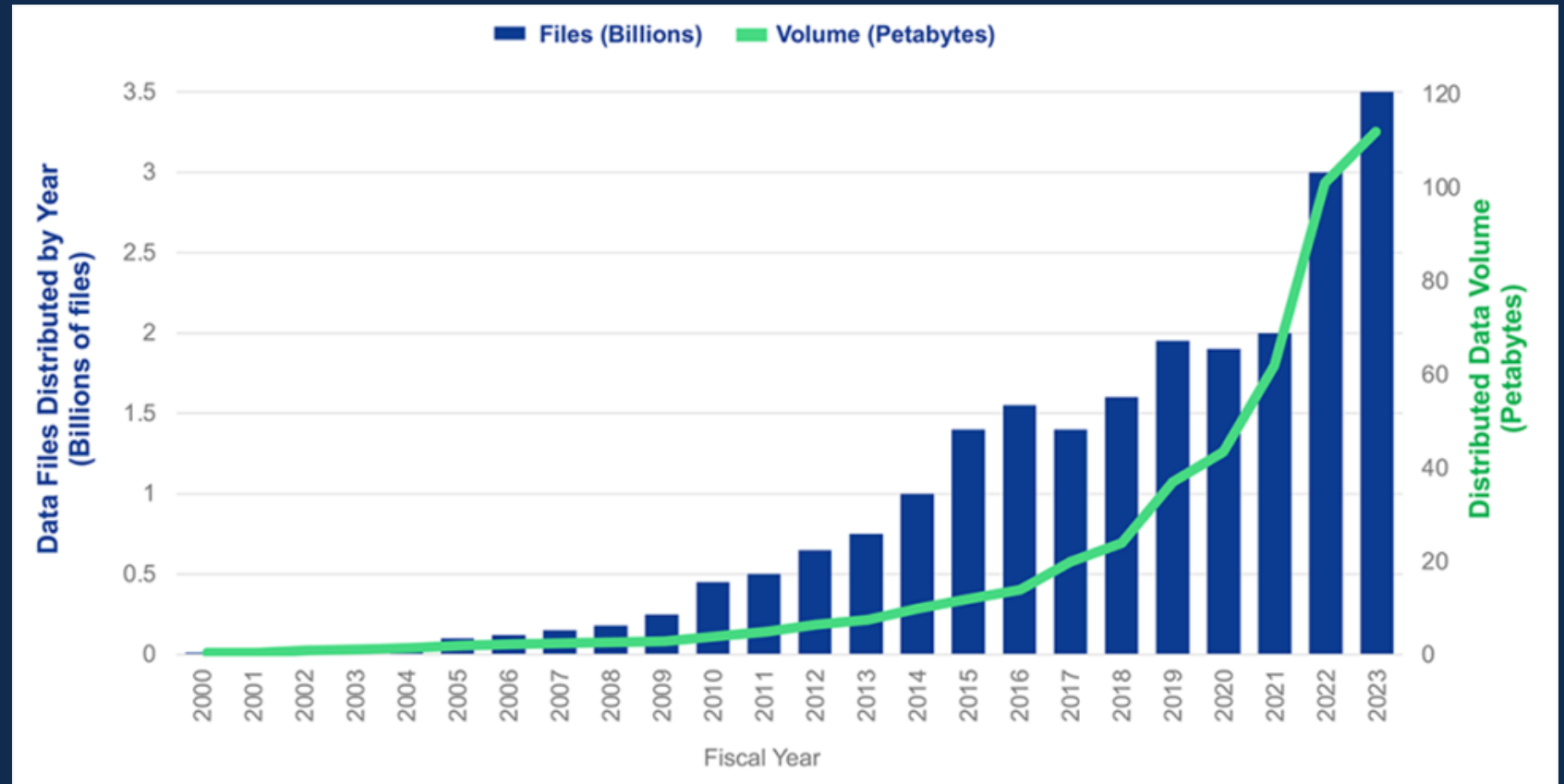


The background of the slide is an aerial photograph of a river delta, likely the Amazon, showing a complex network of blue water channels and green land. A semi-transparent blue rectangular overlay covers the central portion of the image, serving as a background for the title text.

# Earth Science Data Systems: Stewardship & Accessibility

# Earth Science Data Systems (ESDS)

- ESDS manages NASA's Earth Observing System Data and Information System (EOSDIS) archive with over 120 Petabytes (PB) of data as of September 2024
- NASA Openscapes started in 2021 and has grown as a mentor community of data experts from across the NASA data archives supporting scientific researchers to move their NASA Earth science data workflows to the cloud
- ESDS and NOAA's National Environmental Satellite Data and Information Service (NESDIS) Office of Common Services are collaborating to adopt the Common Metadata Repository (CMR), a NASA Earth science metadata system, as a common resource to enable efficient user access to both NASA and NESDIS environmental data holdings



**EOSDIS archive growth**



# Earth Science Data Systems (ESDS)

- The Citizen Science for Earth Systems Program (CSESP) completed funding for nine projects proposed in the CSESP 2024 ROSES call. CSESP projects must demonstrate a clear link between citizen science and NASA observation systems to advance the agency's Earth science mission through collection of new data by volunteer citizen scientists. Projects funded this year range from the poles to the equator and from marine, freshwater, hail and snow, to terrestrial and air quality observations. Highlighted NASA missions include GEDI, TEMPO and ECOSTRESS as well as the upcoming MAIA and NISAR missions. At least three of the projects will have a connection to GLOBE as well.
- The NASA Understanding Needs to Broaden Outside Use of NASA Data (UNBOUND) project focuses on new user communities and helping to identify barriers in using NASA Earth science data through a series of targeted and well-coordinated workshops, including air quality and coastal issues, tribal needs, and energy and water priorities
  - Workshop Report on [UNBOUND for Tribal Food, Energy, and Water Priorities](#) released to broaden the use of and access to NASA data and tools for food, water, and energy priorities in Tribal communities

# Earth Science Data Systems (ESDS)



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## Your Gateway to NASA Earth Observation Data

The Earth Science Data Systems (ESDS) Program provides open access to NASA's archive of Earth science data, empowering researchers and decision makers to better understand and protect our home planet.





The background of the slide is a composite image. The top half features a deep blue sky with soft, wispy white clouds. The bottom half is a detailed aerial photograph of a river delta, showing a complex network of blue water channels and green, vegetated islands. The text "Telling Our Earth Science Stories" is centered in a white, bold, sans-serif font within a dark blue horizontal band that spans the width of the image.

# Telling Our Earth Science Stories

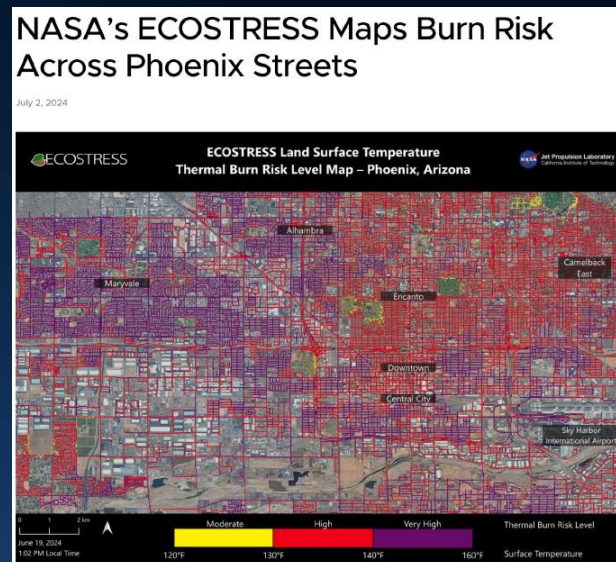


# Sharing stories of impact on multiple platforms



'Tremendous' NASA Video Shows CO2 Spewing From US Into Earth's Atmosphere  
Published Jul 24, 2024 at 2:14 PM EDT

Mesmerizing NASA Video Reveals Carbon Dioxide Churning in The Sky  
ENVIRONMENT 26 July 2024 By EVAN GOUGH, UNIVERSE TODAY



ECOSTRESS story on JPL site got pickup from Scientific American, Axios, and FOX Phoenix, and media enquiries from Washington Post and New York Times  
July 2, 2024

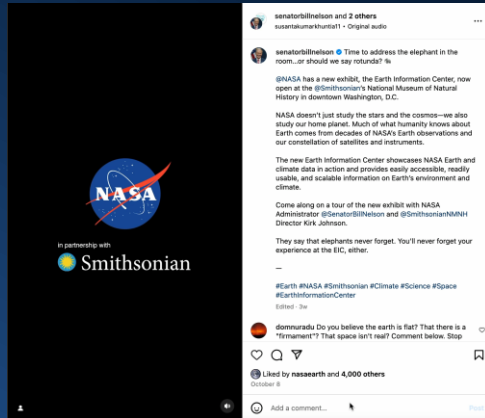


NASA Disasters Program Manager Shanna McClain explains NASA's role post-Milton on Fox Weather Oct. 15, 2024

Data visualization of carbon dioxide generated significant media pickup and was a top performing story on science.nasa.gov in July, 2024



# Building community + reaching new audiences on social



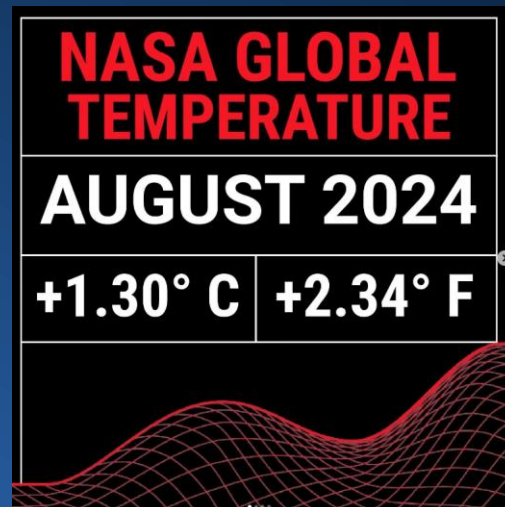
Collaborating with @SenatorBillNelson and @smithsonianNMNH  
Oct 8, 2024



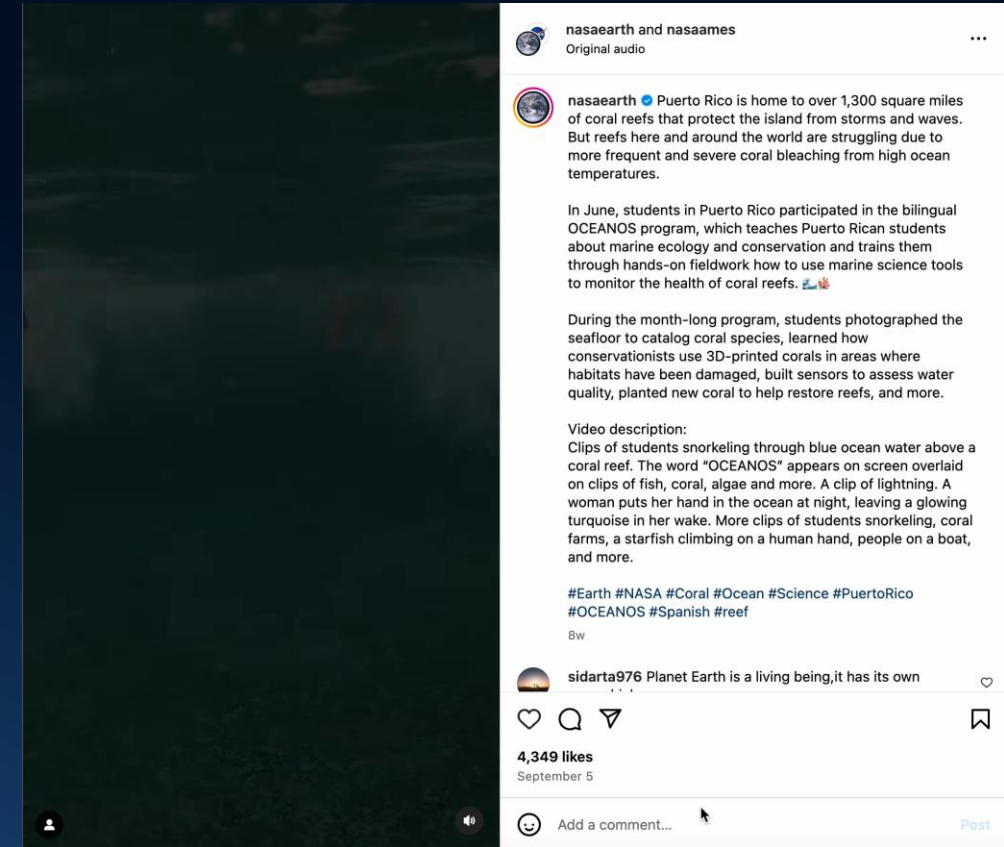
Drafting off relevant, appropriate trends  
Sept 12, 2024



Explaining Earth system phenomena  
June 27, 2024



Providing timely updates + answering questions  
Sept 10, 2024



Connecting with Spanish-speaking audiences  
Sept 5, 2024



NASA  
earth

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

Your Home. Our Mission.