



National Aeronautics and  
Space Administration

# NASA earth

**Earth Science Division Community Forum**

**May 8, 2024 • Earth Science to Action Strategy**

Dr. Karen St Germain, Ph.D.  
Director, Earth Science Division  
Science Mission Directorate, NASA





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Enter your questions into the Q&A section



This webinar will be recorded

The NASA Earth logo, featuring the words 'NASA' and 'earth' in white, with 'earth' in a larger, lowercase font. The background is a colorful, textured image of Earth's surface, showing various geographical features like mountains and oceans in shades of blue, green, and yellow.

NASA  
earth

An aerial photograph of a river delta, likely the Colorado River, showing a complex network of channels and distributaries. The land is colored in shades of green and brown, indicating vegetation and terrain. A large, semi-transparent blue overlay covers the top-left and bottom-left portions of the image, framing the central text.

# Earth Science to Action Strategy

# We are at a pivotal moment



# **A new strategy to meet the moment: Earth Science to Action**



An aerial photograph of a river delta, showing a network of channels branching out from a larger river into a body of water. The land is green and brown, and the water is blue. A semi-transparent blue overlay covers the top-left and bottom-left portions of the image.

# Setting the stage

The National Academies of  
SCIENCES • ENGINEERING • MEDICINE

CONSENSUS STUDY REPORT

# THRIVING ON OUR CHANGING PLANET

A Decadal Strategy for Earth Observation from Space



## Key National Academies Guidance

**Increase the impact of Earth science  
for the response to climate change**

“Pursue increasingly ambitious objectives and innovative solutions that enhance and accelerate the science/applications value of space-based Earth observations and analysis to the nation and the world in a way that delivers great value, even when resources are constrained, and ensures that further investment will pay substantial dividends.”

*- Thriving on Our Changing Planet: A Decadal Survey for  
Earth Observations from Space, 2017*

# Earth Science to Action: the basics

The Earth Science to Action strategy is the Earth Science Division's 2024-2034 strategic plan. This strategy is our plan of action designed to achieve our vision, mission and

strategic goals in response to 2017 Decadal Survey and other national priorities

- Drives next iteration of programs, missions, initiatives
- Informs budget approach
- Informs employee performance expectations



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# Earth Science: who's included

When we refer to “Earth science” we’re referring to our very large Earth science community, which represents a broad and diverse array of talent, disciplines and approaches, including but not limited to:

## Disciplines

- Agronomy
- Atmospheric sciences
- Biogeochemistry
- Biology
- Cryospheric sciences
- Ecology
- Geology
- Geophysics
- Human geography
- Hydrology
- Land use science
- Meteorology
- Oceanography
- Physics
- Radiation sciences

## Approaches

- In situ measurements
- Airborne observations
- Remote sensing
- Research
- Modeling
- User engagement
- Decision support
- Capacity building

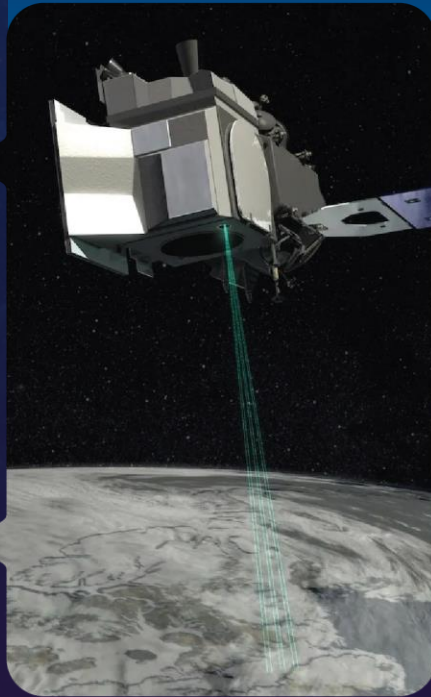


# Earth Science: who's included

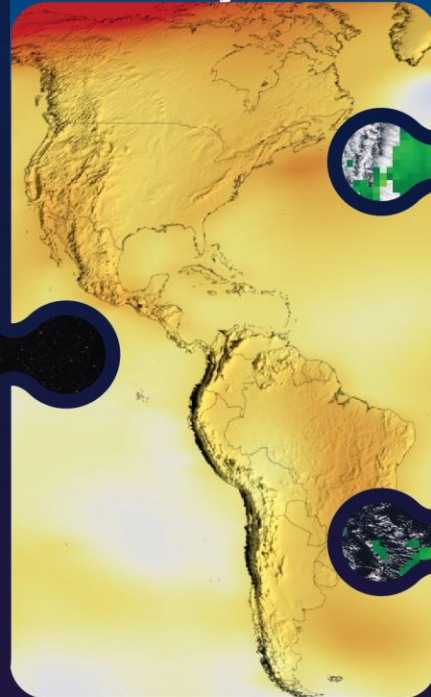
Technology



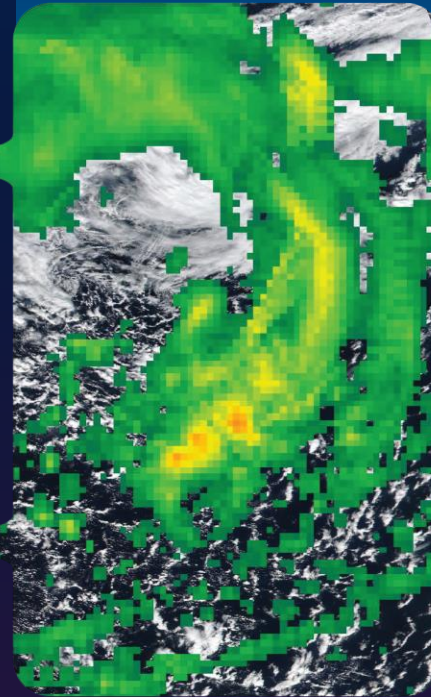
Flight



Research and Analysis



Data and Compute



Earth Action



# What do we mean by “action”?

Our definition of action is accelerating the use of Earth science to support policy and decision-making for society’s well-being

- **Scale up:** Scale up existing efforts to get NASA science and data into hands of end users to solve real-world challenges
- **Build bridges:**
  - Build structural and cultural bridges between research, technology, flight, data, and Earth action elements
  - Identify and remove barriers to collaboration
- **Be user centered:** Prioritize info exchange with end users to allow their experiences to inform future programs



# Are we cutting the research budget to do this?

**No!** The strategy does not call for defunding some efforts to start others. Work to implement this strategy will take place across all elements.

- R&A is a critical part of the strategy
- In some parts of ESD, implementation will be shared between R&A and Earth Action elements
- The overall goal is to realign responsibilities to enable deeper integration



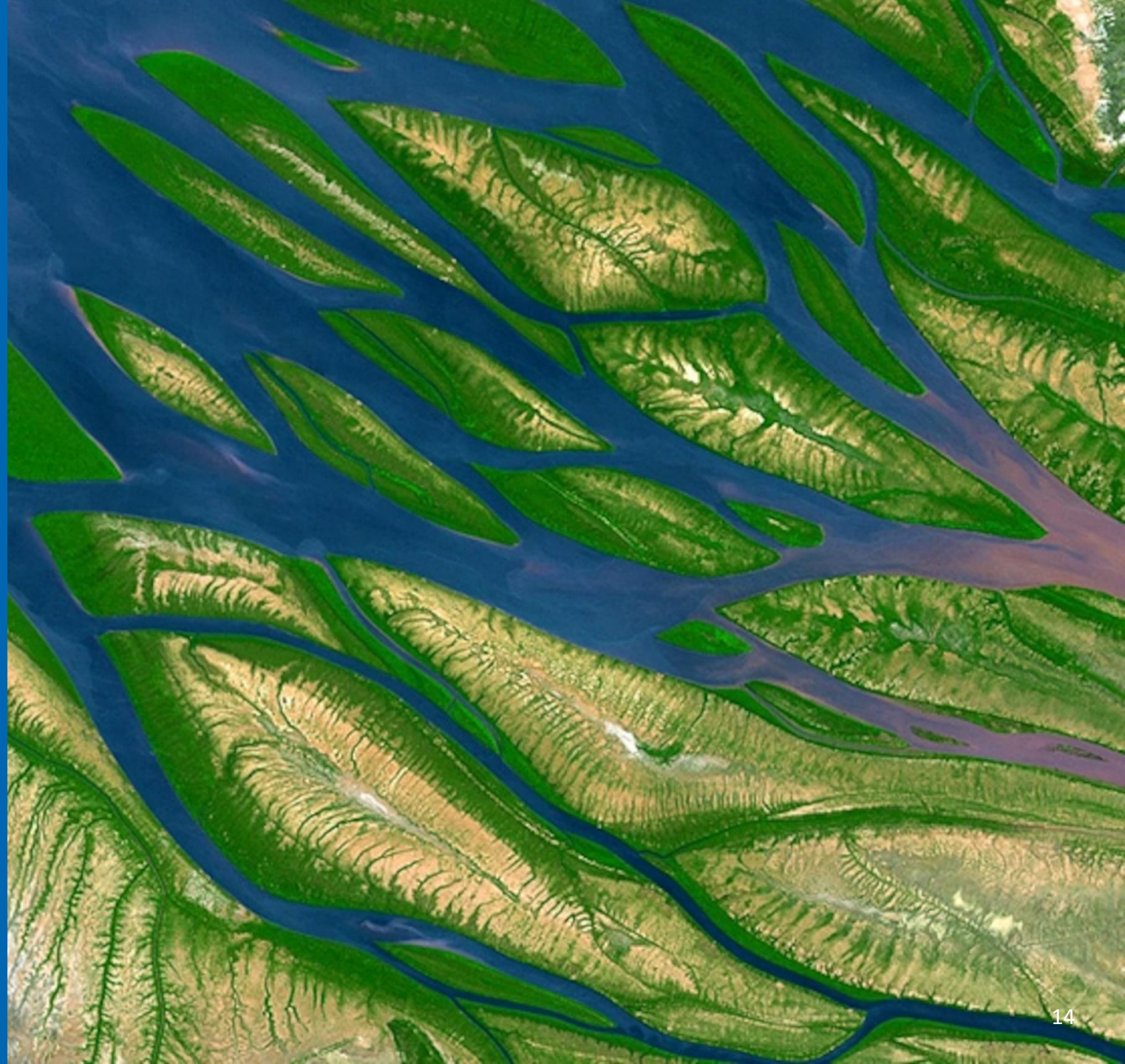
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An aerial photograph of a river delta, showing a complex network of channels and distributaries. The land is green and brown, indicating vegetation and soil. A large, semi-transparent blue overlay covers the top and bottom portions of the image, framing the central text.

# Strategy content

# OUR VISION

A thriving world, driven  
by trusted, actionable  
Earth science

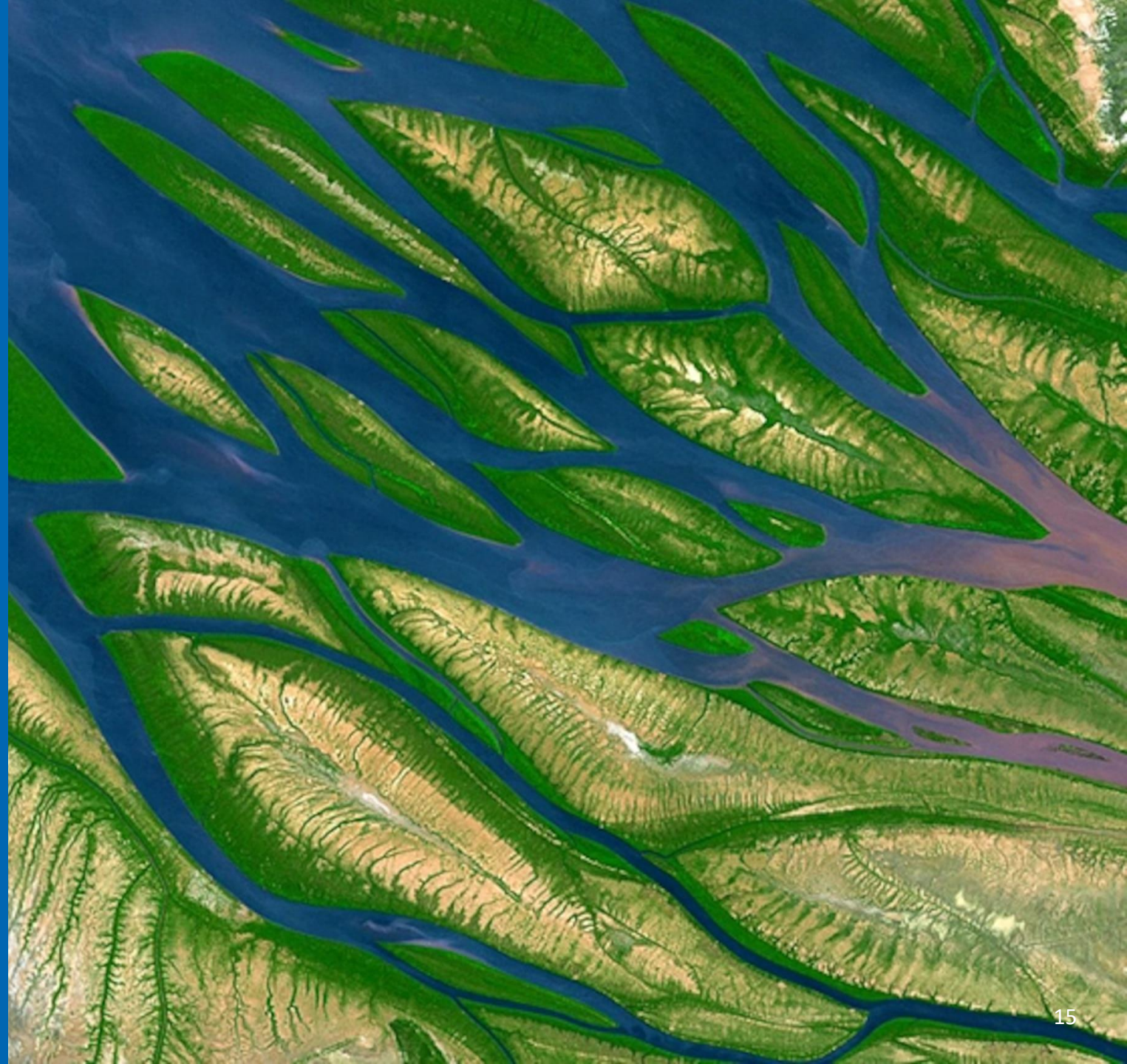


# OUR VISION

A thriving world, driven by trusted, actionable Earth science

# OUR MISSION

Compelled by our planet's rapid change, we innovate and collaborate to explore and understand the Earth system, make new discoveries, and enable solutions for the benefit of all



**We are**

Innovating  
Collaborating  
Discovering  
Delivering

**Tapping the power of Earth  
science to benefit all**







# Aren't we already doing this?

Our work has been excellent to date. Here are some examples to paint a picture of why change is still needed



## A farmer managing crops

- Successfully used tools and techniques learned from previous generations to manage crops
- With increased frequency of drought and flooding, these tools, while previously effective, no longer suffice
- Makes changes and upgrades to remain successful under new conditions



## Cascading effects

- Global warming is changing growing regions, impacting what grows where
- To address this new changing landscape, we must connect in ways we haven't needed to before
- For example, moving from one mission at a time, to building integrated observatories that must work together

# STRATEGIC GOAL

Within a decade, we will advance and integrate Earth science knowledge to empower humanity to create a more resilient world.





# Objective 1

Holistically observe, monitor and understand the Earth system

**Key Result 1.1:** The most advanced Earth observing system in the world

**Key Result 1.2:** Cutting-edge technology

**Key Result 1.3:** Integrated and trusted Earth system data

**Key Result 1.4:** Scientific breakthroughs to better understand Earth



## Objective 2

○ Deliver trusted information to  
drive Earth resilience  
activities

**Key Result 2.1:** Models that capture the intricacies of the Earth system

**Key Result 2.2:** Co-designed solutions and tools to support users

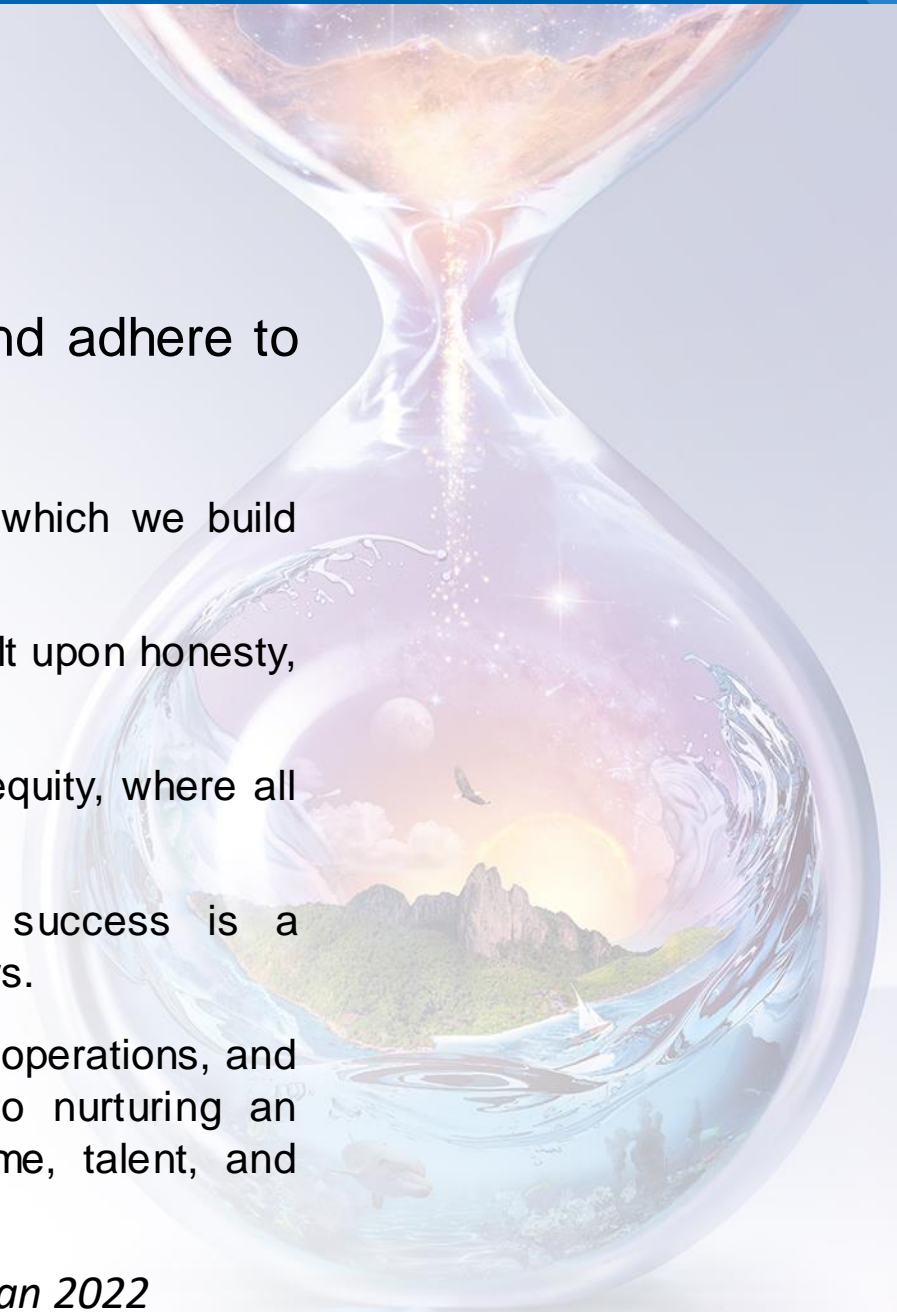
**Key Result 2.3:** Science-based information we can trust and act on

**Key Result 2.4:** Promotion of Earth information as a national asset

# NASA Core Values

As part of our NASA Earth science enterprise, we adopt and adhere to the fundamental five NASA core values:

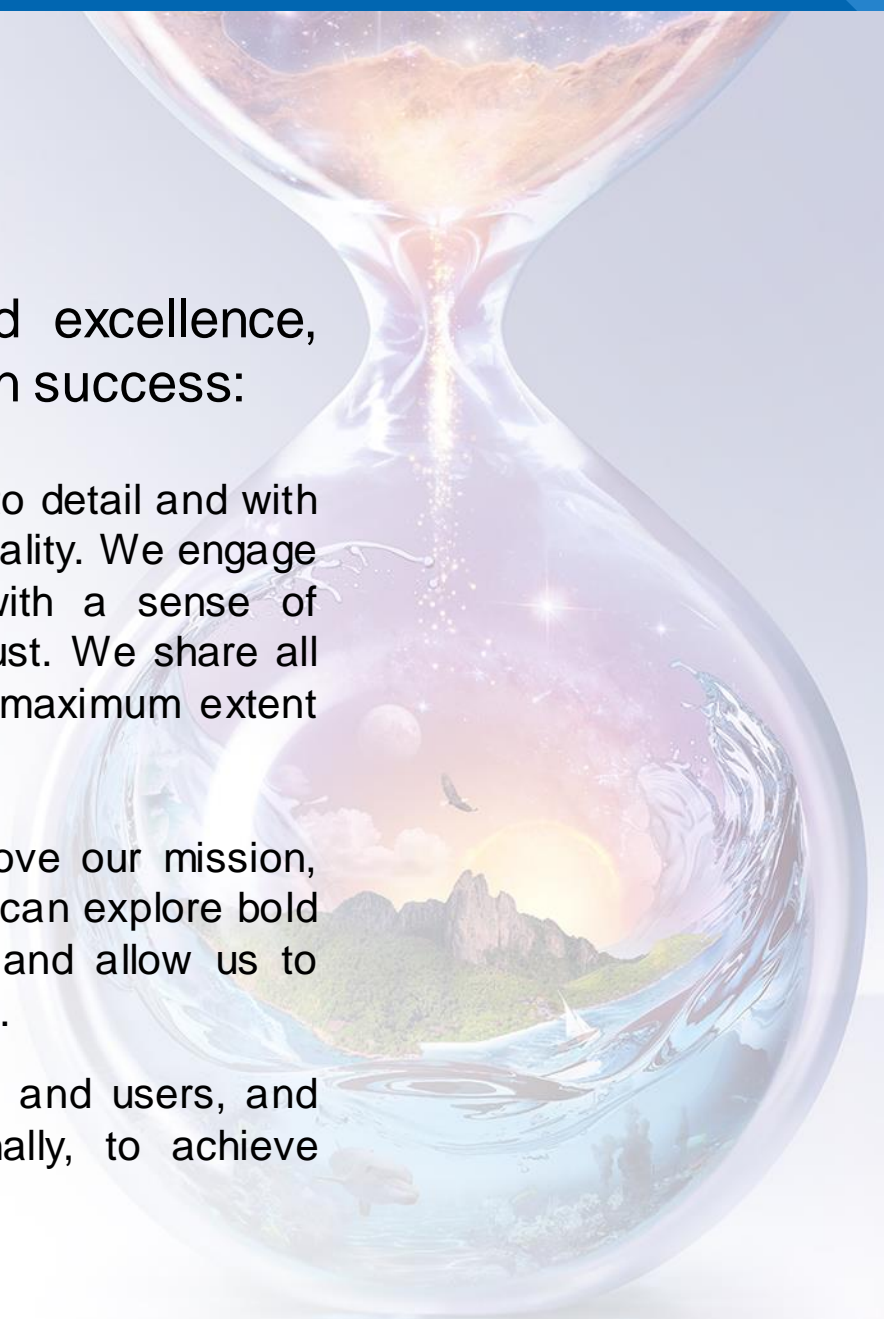
- **Safety:** NASA's constant attention to safety is the cornerstone upon which we build mission success.
- **Integrity:** NASA is committed to maintaining an environment of trust, built upon honesty, ethical behavior, respect, and candor.
- **Inclusion:** NASA is committed to a culture of diversity, inclusion, and equity, where all employees feel welcome, respected, and engaged.
- **Teamwork:** NASA's most powerful asset for achieving mission success is a multidisciplinary team of diverse, talented people across all NASA Centers.
- **Excellence:** To achieve the highest standards in engineering, research, operations, and management in support of mission success, NASA is committed to nurturing an organizational culture in which individuals make full use of their time, talent, and opportunities to pursue excellence in conducting all Agency efforts.



# Areas of Emphasis

Augmenting NASA's core values of integrity, teamwork, and excellence, Earth science identifies three additional values critical to mission success:

- **Trustworthiness:** Our work is undertaken with transparency and attention to detail and with quality-control processes in place to ensure a high level of credibility and quality. We engage with our partners, users, and stakeholders, as well as the public, with a sense of responsibility, truthfulness, and humility to establish and maintain social trust. We share all aspects of what we do (data, science, knowledge, methodologies) to the maximum extent possible to ensure high confidence in our findings.
- **Innovation:** We initiate and encourage activities with a potential to improve our mission, even if the end result is uncertain. We take thought-out risks to ensure we can explore bold and innovative ideas, keep us at the edge of science and technology, and allow us to advance the state of the art and remain an innovation hub for Earth science.
- **Collaboration:** We work collaboratively, we co-develop with our partners and users, and reach out across agencies, across sectors, nationally and internationally, to achieve maximum value and build added-value partnerships.



# Guiding Principles

1. Amplify impact and augment our capabilities through enhanced partnerships
2. Engage a diverse workforce and the wider Earth science community
3. Use a balanced approach when faced with competing factors
4. Encourage innovation to maintain cutting edge capabilities
5. Ensure robustness and resilience in our programs



An aerial photograph of a river network, likely a delta or a large confluence, with blue overlays highlighting specific channels and their tributaries. The background is a natural color satellite image showing green vegetation and brownish terrain. The blue overlays are semi-transparent and follow the main channels and their immediate tributaries, illustrating a specific flow path or strategy.

# Visualizing the strategy at work



# Earth Science to Action Strategy

Earth Science to Action



## Virtuous Cycle

- User needs inform next iteration of programs, missions and initiatives

## Public Understanding & Exchange

- Put more scientific understanding into public sphere
- Deliver applied science to users
- Participate in multi-way info exchange
- Use input to inform subsequent work

## Solutions & Societal Value

- Offer models, scientific findings and info through Open-Source Science principles
- Support climate services
- Provide science applications and tools to inform decisions

## Earth System Science & Applied Research

- Grow scientific understanding of Earth's systems
- Develop predictive modeling for science applications and tools to mitigate, adapt and respond to climate change

## Foundational Knowledge, Technology, Missions & Data

- Technology innovation
- Earth observations missions
- Data collected from space, air and ground

# Example: Landsat to Landsat Next

Earth Science to Action



## Virtuous Cycle

- User needs inform development of Landsat Next

## Public Understanding & Exchange

- Seeking input from end users at Commodity Classic conference

## Solutions & Societal Value

- OpenET

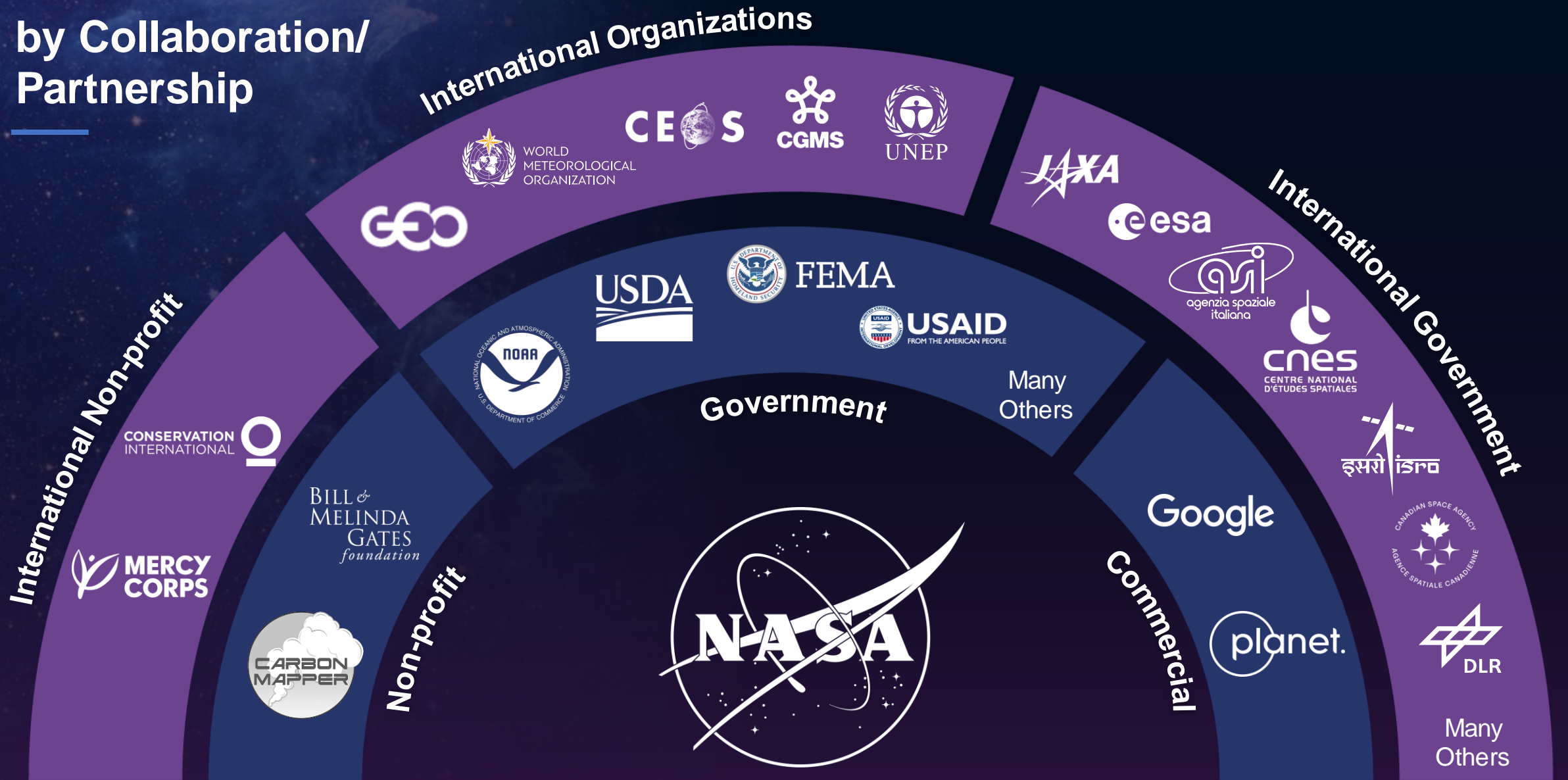
## Earth System Science & Applied Research

- Ensemble of satellite-driven models used to map evapotranspiration

## Foundational Knowledge, Technology, Missions & Data

- Landsat satellite data

# What Do We Mean by Collaboration/Partnership

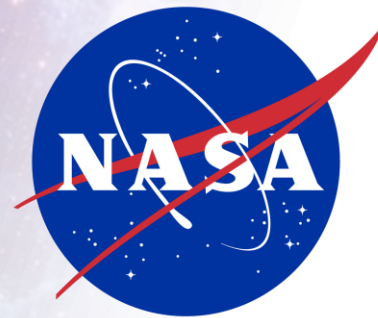


**Urgency**  
**Responsibility**  
**Ownership**





OF DIVISION



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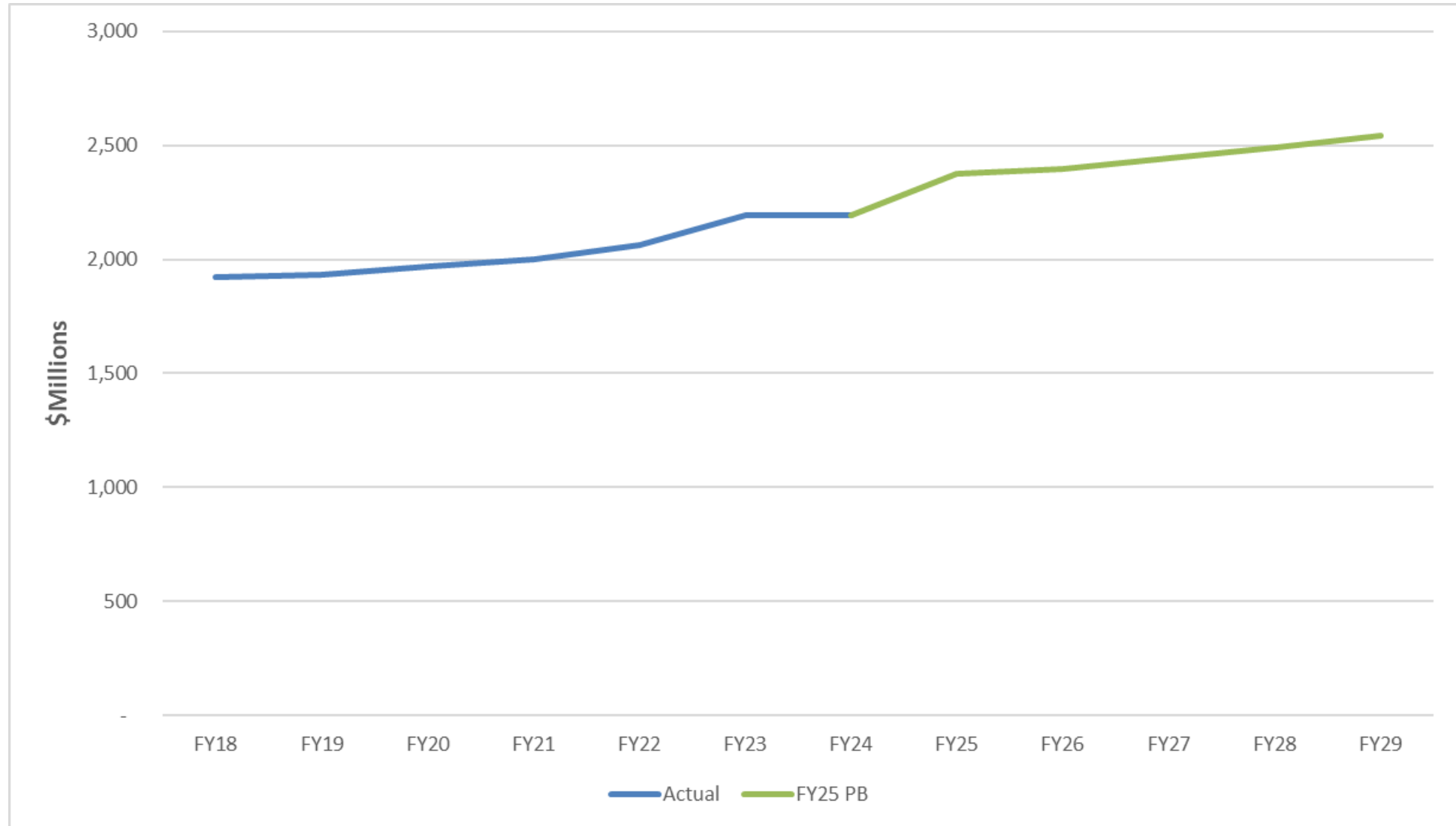
[science.nasa.gov/earth](https://science.nasa.gov/earth)

Your Home. Our Mission.

An aerial photograph of a river delta, likely the Colorado River, showing a complex network of channels and distributaries. The land is a mix of green and brownish-yellow, indicating vegetation and arid terrain. A large, semi-transparent blue overlay covers the top-left and bottom-left portions of the image, while a smaller, more transparent blue overlay is positioned in the top-right. A dark blue horizontal bar spans the width of the image, containing the title text.

# ESD Budget Refresher

# ESD Budget In Context



# Big-Picture Earth Science Budget Priorities

## Explore/Innovate/Partner/Inspire

Achieve high priority science objectives within a cost constrained environment through the integrated missions of the **Earth System Observatory** and provide continuity and advancement of the capabilities of economically critical **Landsat Next**.

Adapt implementation of **Earth Venture** and **Senior Review** process to ensure their sustainability, in response to National Academies review

Consolidate our strategy to improve the impact and management of our support of information about changes in the Earth system across Federal and international partners through the realigned **Responsive Science Initiatives** program.



# Decadal Missions

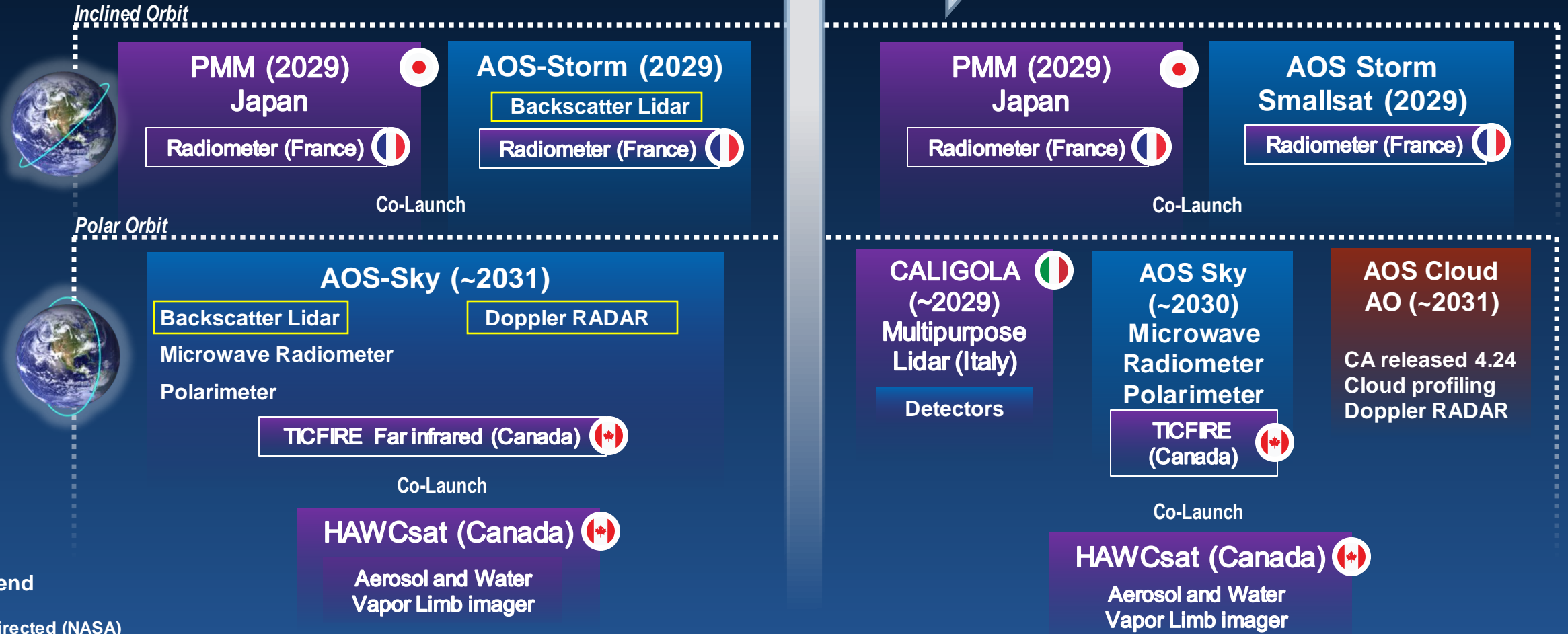
- **Implements the 2017 Decadal Survey** for Earth System Observatory, Landsat-Next, Earth System Explorers and Earth Venture, Preserves the Earth System Observatory, selects the best science for each observable, and emphasizes competition in austere budget environments
- **Venture & Explorer**, establishes **PolSIR** from EVI-6; **integrated cadence** better supports proposal development pacing over the budget window, 1-year delay of **EVS-5**
- **Earth System Observatory** with a “**Decouple, Partner, and Compete**” approach to reduce cost and scope without canceling a major mission area in Earth System Science, each mission schedule decoupled
  - **GRACE-C** (formerly **Mass Change**), no change (launch 2029)
  - **SBG-TIR** retained as an instrument contributed to a partner mission, successor to ECOSTRESS, is a far better imager for addressing heat stress than Landsat capabilities, leverages cost effective partnering, and will be launched years before Landsat Next (launch 2028)
  - **SBG-VSWIR** delayed by 2.5 years (launch now NET 2032), successor to EMIT with 20x coverage including methane, critical minerals
  - **AOS-Sky** restructured for ACCP designated observables collected by a mix of competed and directed missions with decoupled schedules.
    - Details of plans for competition will be released in a community announcement as soon as possible after the PBR (launch 2030-2031)
  - **AOS-Storm** replaced with launch to meet partner commitments JAXA **Precipitation Measurement Mission (PMM)** and a co-launch of a second CNES-built radiometer on a GSFC-integrated platform (launch 2029)

# Changes in the AOS Planned Acquisition under the Decouple, Partner and Compete Approach

Tightly Coupled Architecture



Decoupled Architecture



Legend

- Directed (NASA)
- Open Phase A Trade
- Partner Contribution
- Competed (NASA)