



National Aeronautics and
Space Administration

NASA earth

CESAS Meeting | Nov. 4-5, 2024

**Decadal Midterm Review and Response
Discussion**

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Formal Response

<https://go.nasa.gov/3Ui8GE2>



An aerial photograph of a river delta, likely the Colorado River, showing a complex network of distributaries. A semi-transparent blue overlay is applied to the left and top portions of the image. A dark blue horizontal band across the center contains the title text.

Engaging our Community

Engaging our Community and Stakeholders

What we heard:

- Articulate societal value and urgency of implementing the Decadal (p 30)
- Take full advantage of CESAS meetings to seek feedback (p 37), including seeking input on program balance (p 35)
- Communicate with the community about decisions made, especially those due to budget pressure, through a variety of means (p 54)
- Engage the broader Earth science constituency along with NOAA and USGS in preparation for the next Decadal (p 58)

Articulating value

What we're doing to articulate value and urgency:

- Earth Information Center expansion
- Congressional visits
- Hill briefings/events
- Agriculture roadshows
- Early Adopters Showcase
- Working with people who are influential in their communities



NASA/Heather Hanson



NASA/Bill Ingalls

Two-Way Communication with our Community

More frequent updates:

- Increasing NASA-hosted engagements, including a ROSES release community forum
- Initiated ESD Director Postcard

Information exchange:

- Increasing discussion time with CESAS
- Planning events to get input on Earth Science to Action strategy implementation
- ESO Industry Days
- Establish competed integrated ESO science teams (in addition to mission teams) to prioritize cross-mission science and applications
- Gathering input from end users on uses of ESO data



Subscribe to Postcards from NASA Earth Science
<https://go.nasa.gov/4eMXPkD>

When in an embargo, we continue to use the Decadal decision rules to guide our decisions

Discussion on Articulating Value

- NASA has a role to inform and articulate the value of what we do
- Other voices are also a key part of public discussion:
academia, government laboratories, industry, partners and users
- How do we help others articulate the value of the full integrated portfolio vs. specific missions or activities?
- Might a recurring event (as outlined in the next few slides) facilitate this and other objectives?

NASA Earth Science to Action Event

What

A dialog to enable two-way feedback on the implementation of NASA's Earth Science to Action Strategy

- Multi-way community discussions, education, and information exchange
- Stakeholder feedback, ideas and input
- Strategy updates from NASA Earth
- Facilitating and strengthening partnerships

For Whom

The broad Earth science community, and stakeholders in the public, private, and non-profit sectors (How to handle hybrid??)

When

Annually starting as early as September 2025

Where

Washington, DC



Length

Primary content spans 2 days; optional content on 1 extra day

Session formats

Keynotes, panel discussions, salon-style sessions, breakout groups

Venue

Washington, DC

Attendance

Anticipating 200-500 live attendees + 100-200 virtual?



Discussion on Event Concept

- General thoughts on conference concept
- How to attract diverse attendance across sectors, countries, communities, etc.
- Suggestions for formats or topics
- Feedback on timing, location, logistics

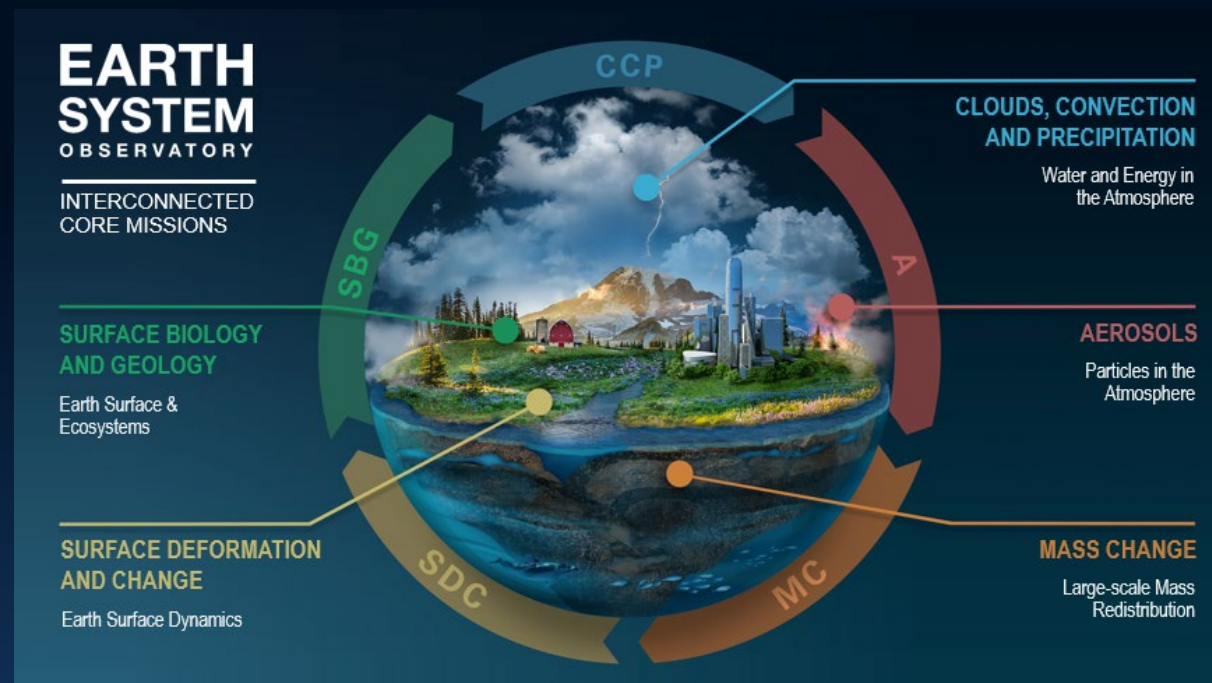
An aerial photograph of a river delta, likely the Colorado River Delta, showing a complex network of distributaries. The image is overlaid with a semi-transparent blue and green geometric pattern. A dark blue horizontal band across the center contains the title text in white.

Developing ESO Through Budget Constraints

Developing the ESO

What we heard:

- Proceed with SBG-TIR on current schedule and maximize achievable overlap with SBG-VSWIR without increasing cost (p 52)
- Simplify requirements and compete parts of AOS (p 52)
- Implement GRACE-C on current timeline; identify long-term continuity solution (p 53)
- Engage Copernicus program to explore potential collaboration to meet SDC objectives; re-evaluate unmet objectives after NISAR launch (p 53)
- Frustration that more missions are not further along (p 37)



ESO in FY25 President's Budget

- **GRACE-C** (formerly **Mass Change**), no change (launch 2029)
- **SBG-TIR** retained as an instrument contributed to a partner mission (launch 2028)
- **SBG-VSWIR** delayed by 2.5 years (launch now NET 2032)
- **AOS-Sky** restructured for ACCP designated observables collected by a mix of competed and directed missions with decoupled schedules (launch 2030-2031)
 - **AOS-Cloud** to be competed
- **AOS-Storm** reconfigured 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)
- **SDC** will not move into formulation as NISAR will meet Decadal observational needs
 - Note ROSE-L / SDC study initiated October 2023; SDC Study Team to lead NISAR Lessons Learned study

ESO Formulation and Development Milestones

AOS

KDP-A: Jan 2023

SBG

KDP-A: Nov 2022
SBG-TIR KDP-B: July 2024

GRACE-C

KDP-C: May 2024

SDC

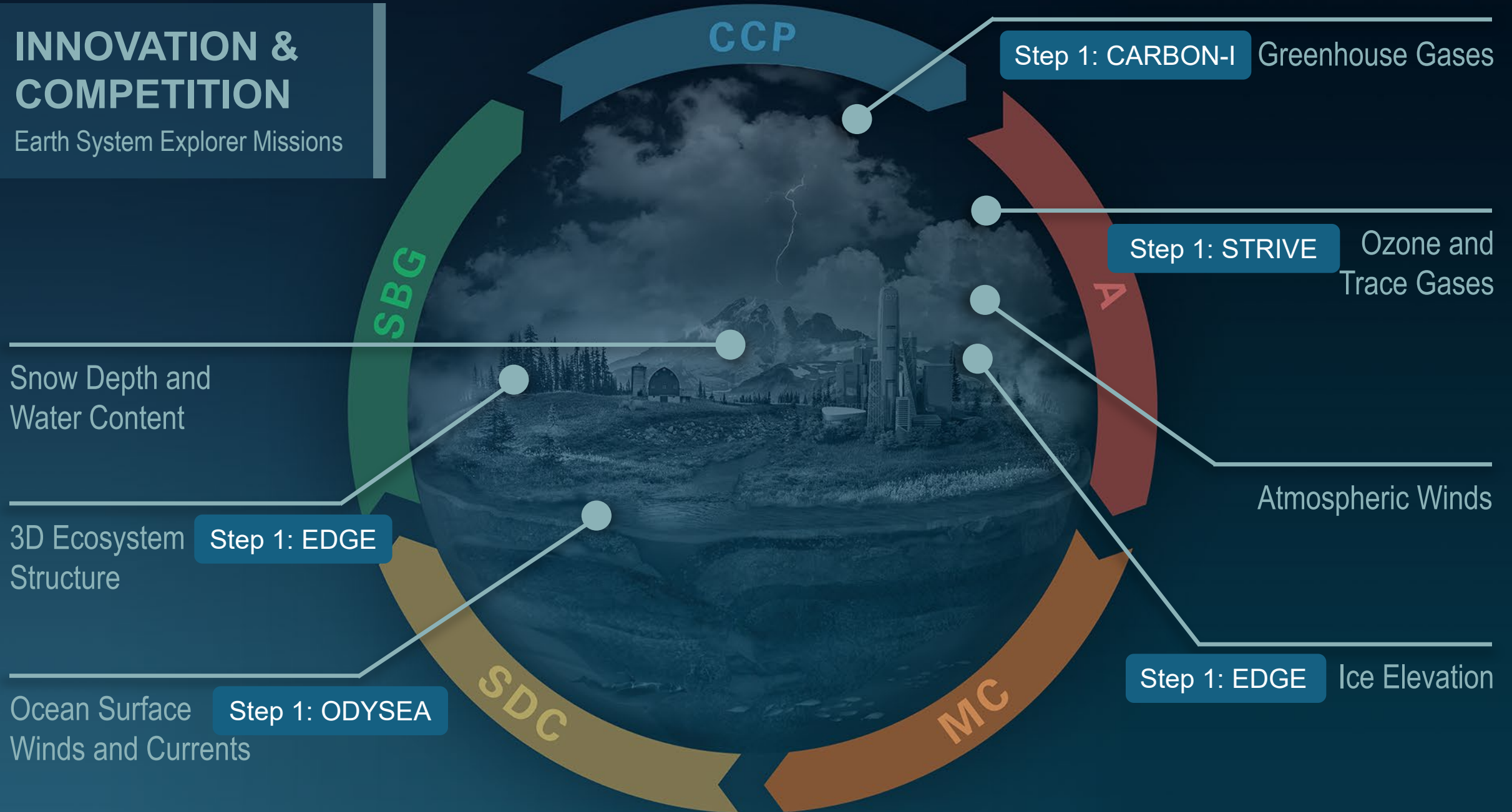
NISAR launch early 2025

- AOS-Cloud Community Announcement released April 2024
 - See <https://explorers.larc.nasa.gov/AOS-Cloud/>
- GRACE-Continuity entered Phase C in May 2024
- SBG-TIR entered Phase B in July 2024

ESO Independent Review Board (2022) report and NASA response posted at nasa.gov/reports

INNOVATION & COMPETITION

Earth System Explorer Missions



Earth System Explorers Step 1 Selections

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

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.

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

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.

Discussion or Questions on ESO?

An aerial photograph of a river delta, likely the Colorado River, showing a complex network of distributaries. A semi-transparent blue overlay covers the upper portion of the image.

Strategic Approaches for Continuity

Continuity

What we heard:

- Observation continuity decisions seem ad hoc; prioritization isn't communicated (p 59)
- This is a multi-agency challenge (p 59)

What we are doing:

- Continue to use a variety of means (Venture, directed, and partner missions) to achieve continuity
- Communicate more clearly about use of the Sustained Observations for Climate Future Missions budget line and other continuity planning
- Work with CESAS and partners to address this national challenge

Framing an ongoing CESAS conversation on Sustained Observations

Key topic for ongoing CESAS engagement/future discussion

- Given that substantial additional funding is unlikely in the near future, our strategy is to maximize the impact of the existing resources
- What observations are we talking about and what are the essential attributes?
 - Observations to enable breakthroughs
 - Sustained observations for understanding Earth system processes and change
 - Measurements that have broad application
 - Observations for operational purposes are very important
- Structured analysis of risks and opportunities

Discussion On Sustained Observations Analysis and Reporting

- What analysis and reporting is most useful for the community to understand?
- How do we handle differing details that matter?
 - Details of the observation resolution, frequency, etc.
 - Partnering approaches
 - Uses for global models vs. economically important measurements and applications
- Advancing a measurement vs. sustaining a record
- Lowering costs and continuous improvement for sustained measurements
- Insight into programmatic decisions (e.g. use of Earth Venture, Explorers, partnerships)

An aerial photograph of a river delta, likely the Amazon, showing a complex network of channels and floodplains. A semi-transparent blue overlay is applied to the left and top portions of the image.

Strategic Approaches for Modeling

Framing an ongoing CESAS conversation on Modeling Strategy

What we heard:

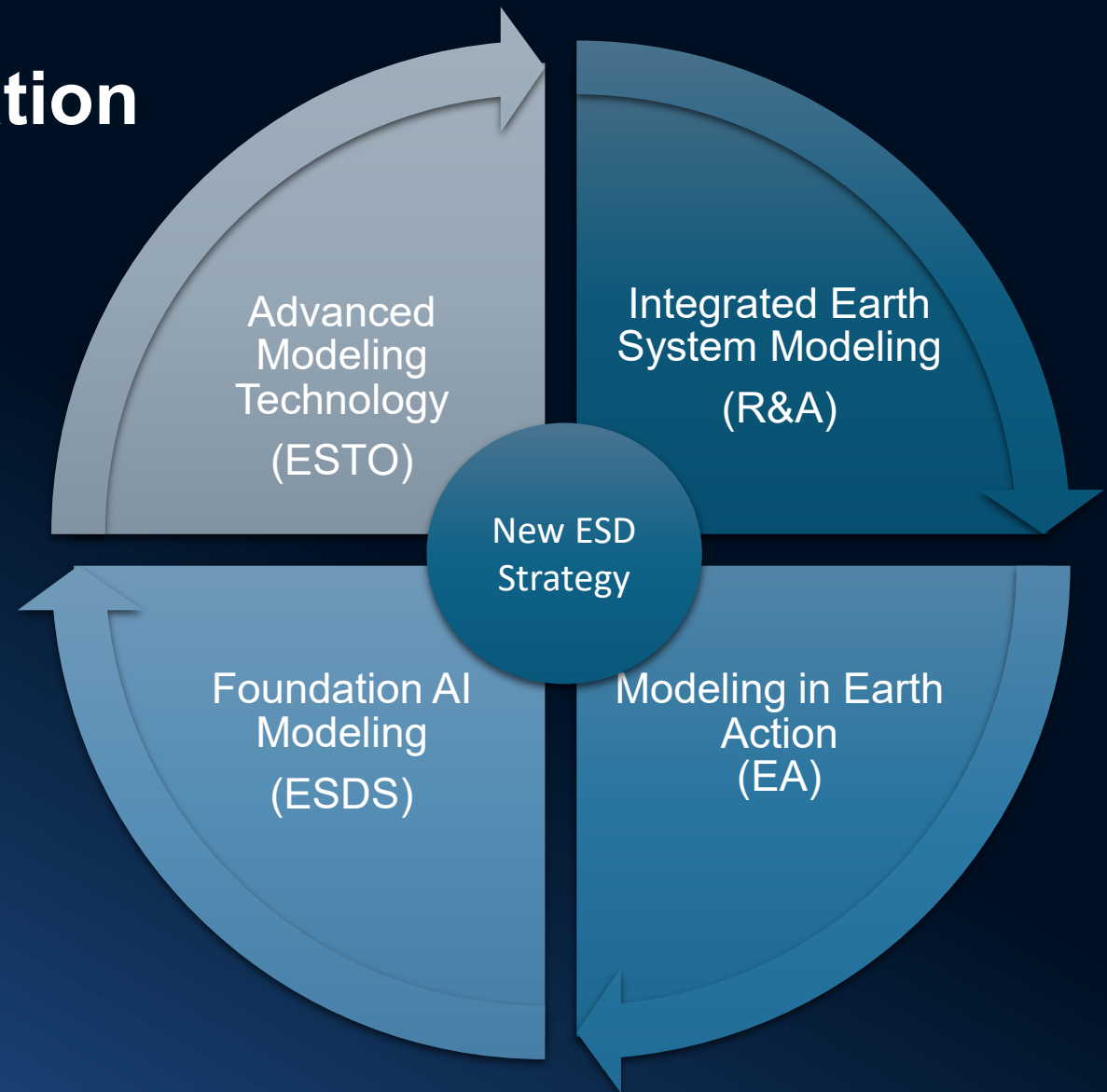
- Engage the community (along with NOAA and USGS) to advance model parameterizations and predictions (p 60)

What we are doing:

- Hired modeling strategy lead, Ivanka Stanjer
- Focusing on integration of many advanced techniques
- Will develop modeling strategy in coordination with other federal agencies and through engagement with CESAS and the community

Framing a CESAS conversation on Earth System Modeling Strategy

- What are the key considerations and most impactful advancements?
- Evolving thinking on physics-based and data-driven ML models
- How might we think about strategic partnerships?
 - US Agencies
 - Private Sector
 - International partners



We will develop an advanced and integrated end-to-end Earth system modeling capability.

An aerial photograph of a river delta, likely the Amazon, showing a complex network of blue water channels branching out into a green, forested landscape. A semi-transparent blue rectangular overlay is positioned on the left side of the image.

Upcoming Events

Recent and Upcoming Engagement

Month	Event	Date
September 2024	Earth Surface and Interior Core 2.0 Science Team Meeting	
	Aster Joint Science Team Meeting	Sep 9-11
	NISAR Science Team & ASF UWG Meetings	Sep 9-13
	Carbon Monitoring System Science Team Meeting & Applications Workshop	Sep 17-19
	CRYO2ICE Symposium	Sep 23
	ECOSTRESS Science and Applications Team Meeting	Sep 30 – Oct 1
October 2024	GRACE-FO Science Team meeting	Oct 8-10
	International Astronautical Congress	Oct 14-18
	Space and Climate Workshop at the Embassy of the Netherlands	Oct 16
	DSCOVr Science Team meeting	Oct 16-18
	CEOS Plenary	Oct 22-24
	Earth Science Division Community Forum	Oct 24
	Western Governors Association Briefing	Oct 29
	Surface Topography and Vegetation Community Meeting	Oct 28-29
November 2024	CESAS Meeting	Nov 4-5
	NASA Power Global Community Summit	Nov 6-7
	APETS Meeting at Lincoln Labs MIT	Nov 13-14
	St. Germain at COP-29 (multiple events)	Nov 13-22
December 2024	American Geophysical Union Fall meeting (ESD Town Hall and Office Hours)	Dec 9-13
January 2025	American Meteorological Society Annual Meeting	Jan 12-16
	ESD Town Hall and Office Hours at AMS	TBD
February 2025	ESD Community Forum	TBD
March 2025	Commodity Classic	Mar 2-4



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