

NASA Agency Update



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NASA Headquarters

International Ocean Color Science Team Meeting

14 November 2023

- (Pre)Formulation
- Implementation
- Primary Ops
- Extended Ops

NASA Earth Science Missions: Present through 2023

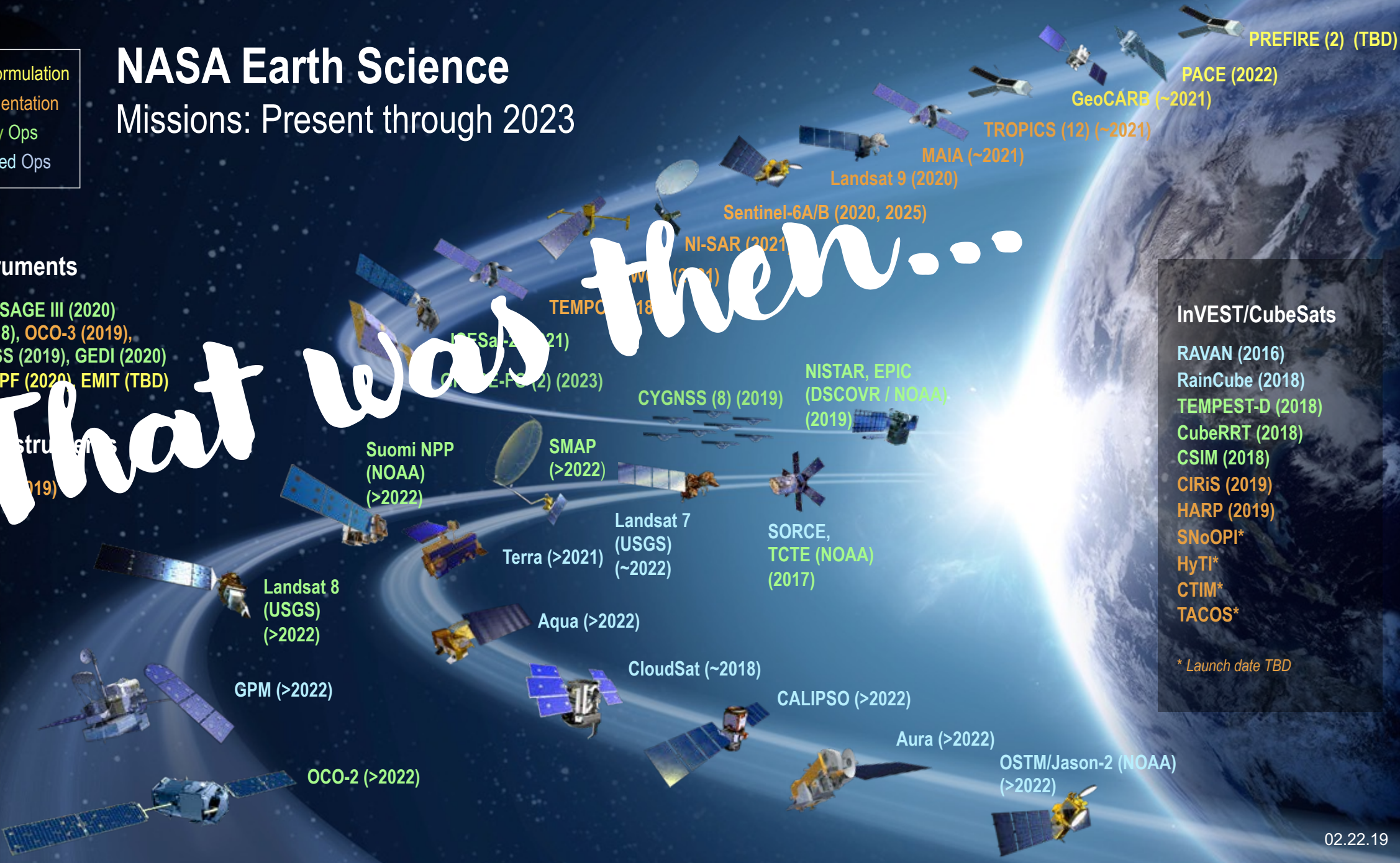
ISS Instruments

LIS (2020), SAGE III (2020)
 TSIS-1 (2018), OCO-3 (2019),
 ECOSTRESS (2019), GEDI (2020)
 CLARREO-PF (2020), EMIT (TBD)

JPSS-2 Instruments

OMPS-Lim (2019)

That was then...



- ### InVEST/CubeSats
- RAVAN (2016)
 - RainCube (2018)
 - TEMPEST-D (2018)
 - CubeRRR (2018)
 - CSIM (2018)
 - CIRiS (2019)
 - HARP (2019)
 - SNoOPI*
 - HyTI*
 - CTIM*
 - TACOS*
- * Launch date TBD



EARTH FLEET

And this is now!



INVEST/CUBESATS

- NACHOS 2022
- CTIM 2022
- NACHOS-2 2022
- MURI-FD 2023
- SNOOPI* 2024
- HYTI* 2024
- ARGOS* 2024

JPSS INSTRUMENTS

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

ISS INSTRUMENTS

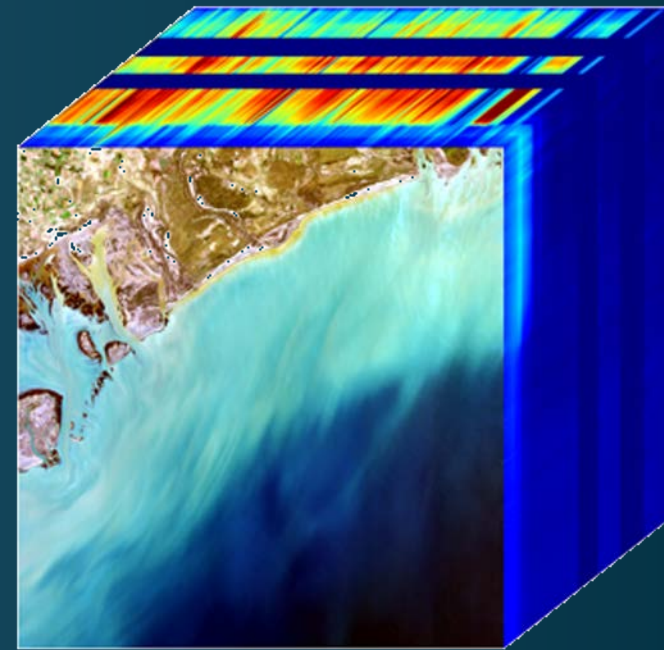
MISSIONS

KEY

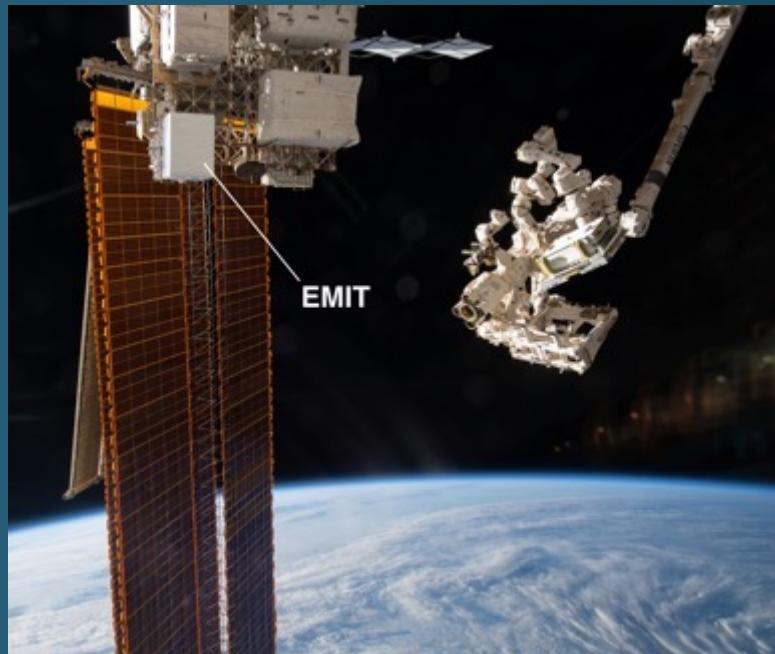
- INTERNATIONAL PARTNERS
- U.S. PARTNER
- ISS INSTRUMENT
- JPSS INSTRUMENT
- CUBESAT
- LAUNCH DATE TBD
- (PRE) FORMULATION
- IMPLEMENTATION
- OPERATING
- EXTENDED

EMIT (EVI-4)

- Launched aboard SpaceX CRS-25 on July 14, 2022
- Earth Surface Mineral Dust Source Investigation (EMIT) is analyzing airborne dust impact on climate, and a lot of other things!

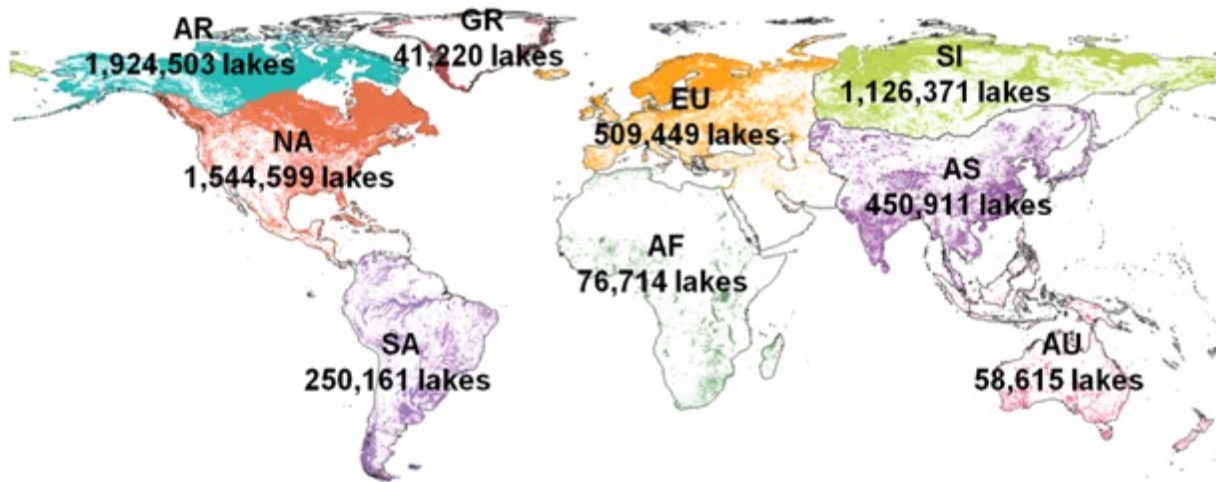


EMIT acquisition of a coastal environment off the coast of Bahía Blanca, Argentina. EMIT data can be used to observe aquatic targets.



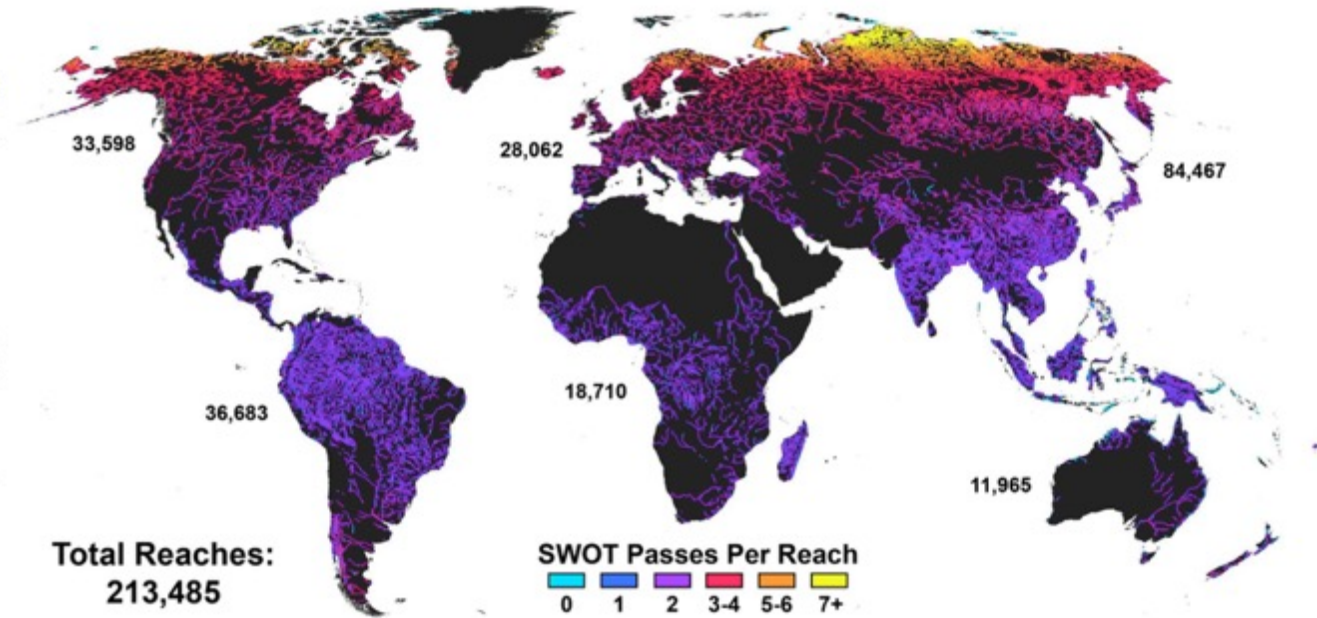
Global mapping of 100's of methane and carbon dioxide plumes, dust transport and its impact on ecosystems.

Distribution of Lakes Observed from SWOT



Total: 5,982,543 Lakes >0.01 km²

River spatial coverage from SWOT



Total Reaches:
213,485

SWOT Passes Per Reach
0 1 2 3-4 5-6 7+

SWOT will provide unique observations every 1-7 time per 21-day cycle on:

Lake water level, extent and volume change on lakes > 0.01 km²
elevation, width, slope, and discharge for the world's rivers wider than 50-100 m

Sea level, ocean energetics, wave height, eddies, fronts, turbulence, seafloor mapping > 15 km

With implications for

Water resources, flood & disaster management, weather and ocean forecast, hydraulics, hydropower, navigation, water quality, ecosystems



Recent Launch: TEMPO



First space-based instrument for hourly monitoring of daytime air pollutants across the North American continent, launched April 7, 2023

Will fly as part of global constellation including Sentinel-4 over Europe and GEMS over Asia

Science to be provided to NOAA, EPA



GLIMR — Geostationary Littoral Imaging and Monitoring Radiometer



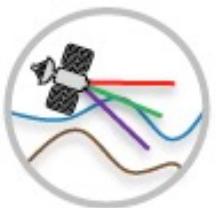
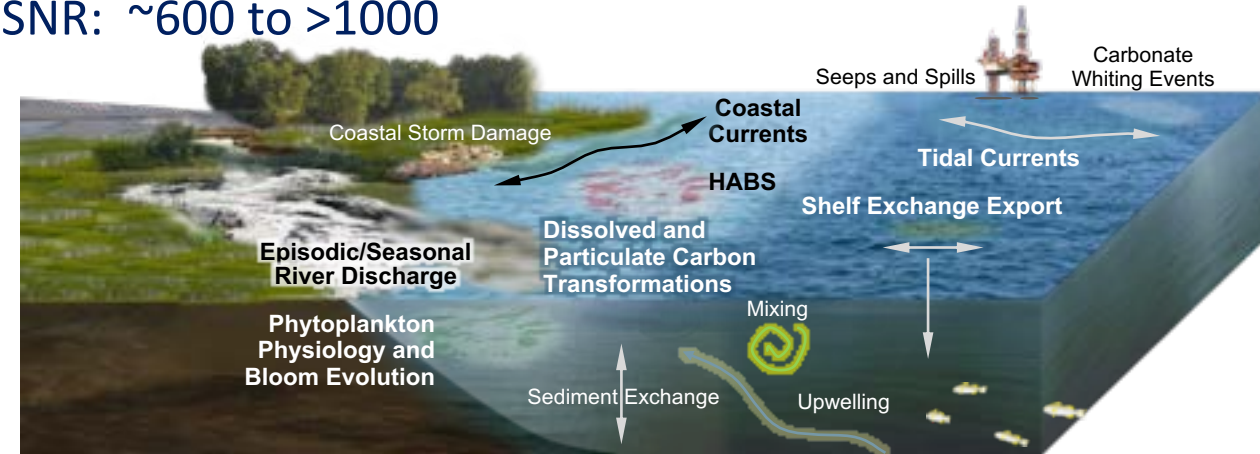
NASA EVI-5 Managed by UNH: Joseph Salisbury (PI), Antonio Mannino (Deputy PI); Instrument by Raytheon

Hyperspectral (350-1040 nm) ocean color sensor in Geostationary orbit

- Targeting Gulf of Mexico and other coastal/ocean waters of N. and S. America
- **Hourly imaging** frequency; spatial resolution of 300 m (nadir)
- Spectral sampling and resolution: ~7 nm and 10 nm; SNR: ~600 to >1000

Short Term Coastal Processes:

Investigate how high frequency fluxes of organic matter, sediments, and other materials between and within coastal ecosystems regulate the productivity and health of coastal ecosystems.



CALIGOLA — Cloud Aerosol Lidar for Global scale Observation of the ocean-Land-Atmosphere System

ASI, Universita degli Studi di Basilicata, Leonardo, NASA

- Space-based Raman LIDAR mission with a primary focus on the atmosphere, and priorities in further studying the Ocean. Has applications relevant to cryospheric and terrestrial sciences.
- NASA plans to contribute the detectors.

AOS

MCR: May 2022
KDP-A: Jan 2023

SBG

MCR: Jun 2022
KDP-A: Nov 2022

Grace-C

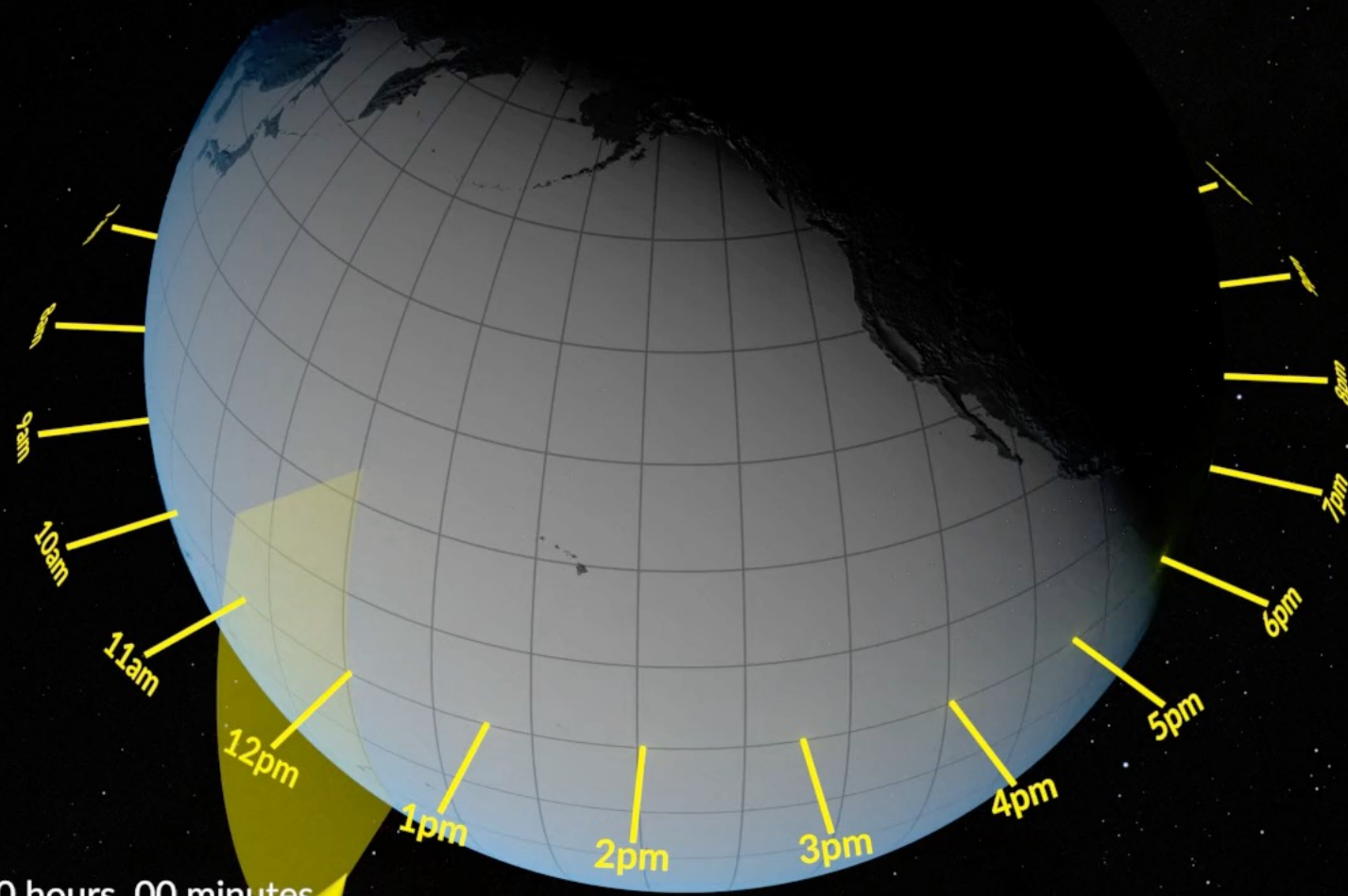
MCR: Jun 2022
KDP-A: March 2023

SDC

Remaining in extended
Study Phase - Met by
NISAR launch in 2024

ESO Core Missions

- Successfully completed Mission Concept Reviews in summer 2022
- Missions passed KDP-A and now in Formulation
- SDC will remain in extended study phase to take advantage of NISAR mission lessons learned
- ESO Independent Review Board, July - October 2022
 - RB report and NASA response posted at nasa.gov/reports
- New Earth System Explorers - AO closed August 2, 2023. PI-Managed Mission Cost cap of \$310M (FY24 \$)



Orbit: 01 elapsed: 00 hours 00 minutes

System Vicarious Calibration (SVC)

4-year competitive award that began in 2020
Intended to select best approaches & hardware for
OCI SVC

(1) HyperNAV

OSU, SeaBird Scientific

- radiometric float
- small, portable
- profiling
- long-duration
- COTS legacies

multi-site operations

test deployments
conducted (e.g., Crete)

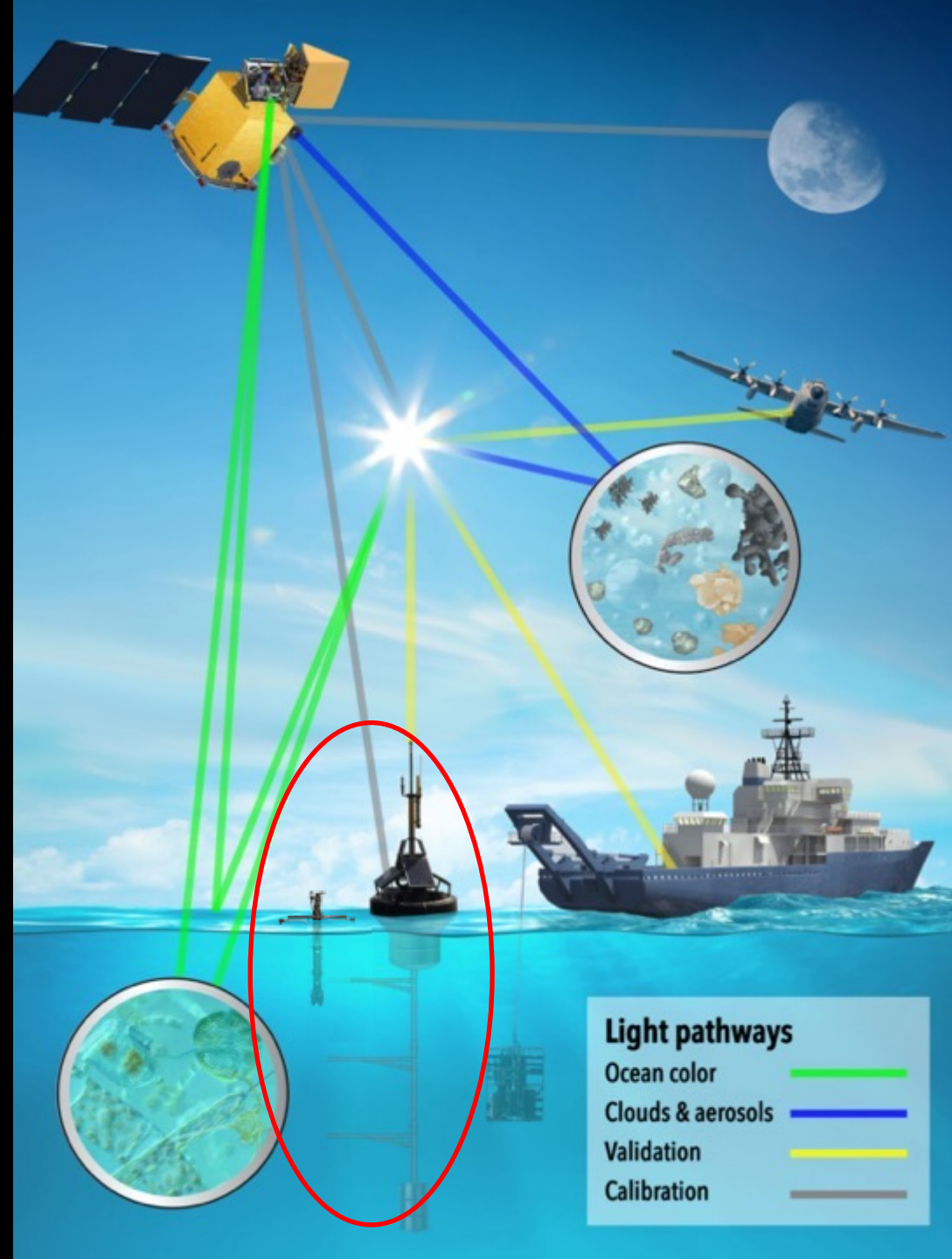
(2) MarONet

U.Miami, NIST

- radiometric buoy
- large, 20' container
- 3 fixed arms
- long-deployment
- MOBY legacy

migration to Perth, Australia

test deployments conducted
(e.g., Lanai)



Post-launch validation activities

PACE Validation Science Team (PVST)

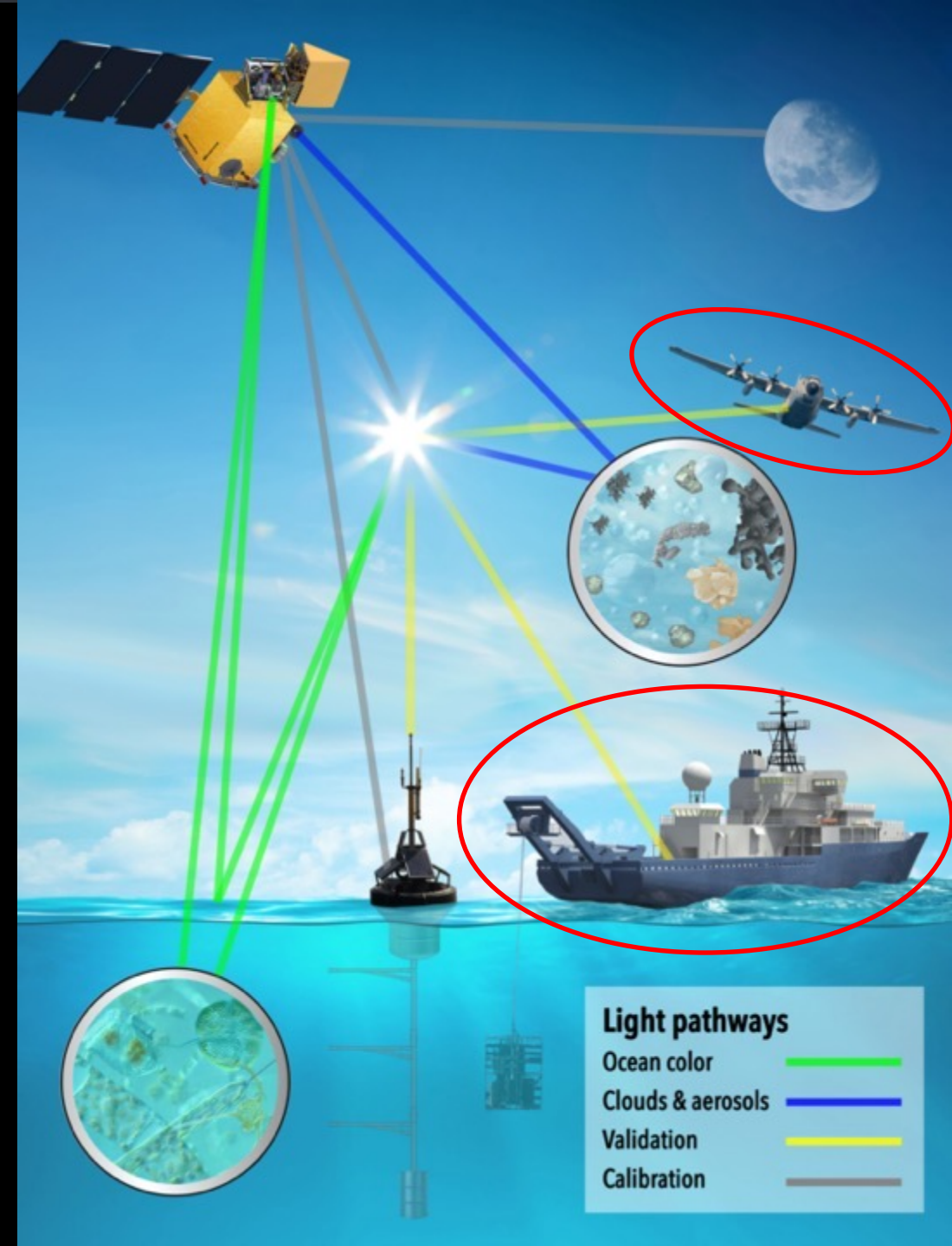
- 23 teams selected in late summer 2023
- Composition, scope, & execution addresses PACE products (required and advanced)
- In the field after first light (~spring 2024)

PACE Science and Applications Team (SAT-3)

- Proposals due December 5, 2023.

PACE Post-launch Airborne eXperiment (PACE-PAX)

- US west coast, Sep 2024
- Direct & proxy measurements
- Aircraft (+ in-/on-water TBD)
- Planning underway (docs hosted @ pace.oceansciences.org/campaigns.htm)
- Synergy with PVST anticipated
- Not competed

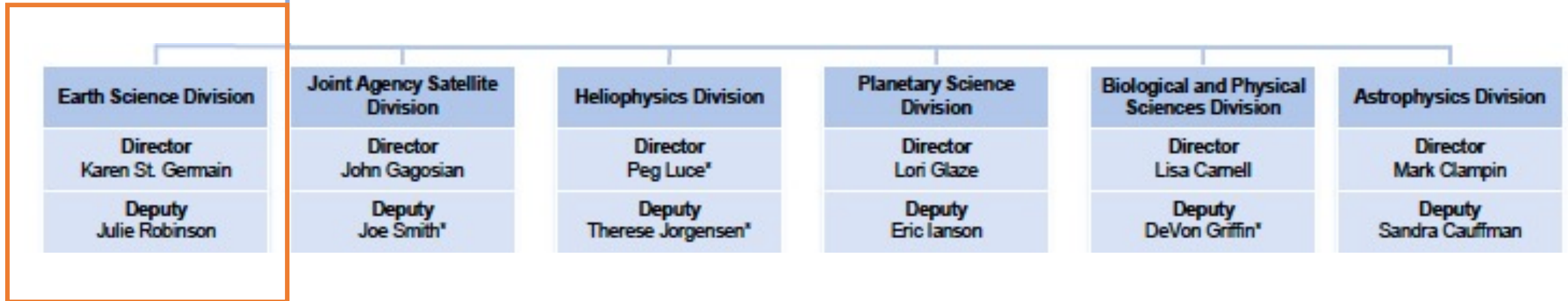




Science Mission Directorate and Ocean
Biology and Biogeochemistry

SMD – Science Leadership

Office of the Associate Administrator			
Associate Administrator (AA) Nicola Fox			
Deputy AA Sandra Connelly			
Deputy AA - Management Karen Flynn	Deputy AA - Exploration Joel Kearns	Deputy AA - Research Michael New	Deputy AA - Programs Wanda Peters
Assistant Deputy AA Dan Woods	Assistant Deputy AA Brad Bailey	Assistant Deputy AA Dan Evans	Assistant Deputy AA Shannon Fitzpatrick



**NASA HQ
Science Mission
Directorate**

**Earth Science
Division**

**Leadership &
Organizational
Support**



**EARTH SCIENCE
TECHNOLOGY OFFICE**

Associate Director
Michael Seablom

Deputy Associate Director
Vacant

Administrative Business Partner
Jacob Aldridge (C)

Operations Officer
Teresa Kauffman

**FLIGHT
PROGRAMS**

Associate Director (Acting)
Scott Schwinger

Deputy Associate Director
Vacant

Administrative Business Partner
Pat Thomas (C)

Operations Officer
Paula Villegas Morera (C)

**EARTH SCIENCE
DATA SYSTEMS**

Earth Data Officer
Katie Baynes

Deputy EDO
Vacant

Administrative Business Partner
Darcia Stewart (C)

Operations Officer
Hannah Townley (C)

**RESEARCH &
ANALYSIS**

Associate Director
Jack Kaye

Deputy
Lucia Tsaoussi

Rotational Deputy
David Considine (D)

Admin Business Partner
Bryan Johnson (C)

Operations Officer
Christine Mataya (C)

EARTH ACTION

Associate Director
Thomas Wagner

Deputy Associate Director
Emily Sylak-Glassman

Administrative Business Partner
Natasha Donawa (C)

Operations Officer
Amanda Moore (C)

Earth Science to Action Strategy



SMD Highlights and Heads Up

- We depend on our community for selecting the best science NASA can fund – **THANK YOU** to all of our reviewers! If you want to review, please don't be shy!
- Dual anonymous peer review – number will continue to increase in ROSES. OBB and The Science of PACE will be DAPR.
- Inclusion Plans: Will continue to increase in ROSES elements. Resources can be found at <https://science.nasa.gov/researchers/inclusion>
- Changes to TWSC: Now a stand-alone notice of funding opportunity (NOFO) released Oct 13, 2023, that will be open for 3 years to reduce burden; <https://go.nasa.gov/twsc24nofo>
- Improving the Usability of ROSES RFI seeks information from the broad community to identify and reduce barriers to proposing relevant research to one of NASA SMD's research programs. Response Date: January 24, 2024. <https://go.nasa.gov/irosesurfi>
- Open Science continues to be a priority in SMD; OSSDP.
- Next Decadal Survey – We're halfway through the current one – aquatic sciences need to be ready for the next one! National Academies recently requested feedback.
- Changes in ESD; Earth Venture announcements soon.



Ocean Biology and Biogeochemistry

OBB focuses on describing, understanding, and predicting the biological, ecological, and biogeochemical regimes of the upper ocean. It uses **in-situ and airborne data, together with remote sensing data**, to:

- Understand and quantifying the impacts and feedbacks of Earth System processes, particularly oceanographic mechanisms, on the global and regional spatial and temporal variability of ocean biology, ecology, and biogeochemistry.
- Explore the development of new biological, ecological, and biogeochemical observations from space-based assets.
- Improve future climate predictions (impacts and feedbacks) by incorporating a dynamic understanding of ocean biology, ecology, and biogeochemistry into global biogeochemical and ecological models.

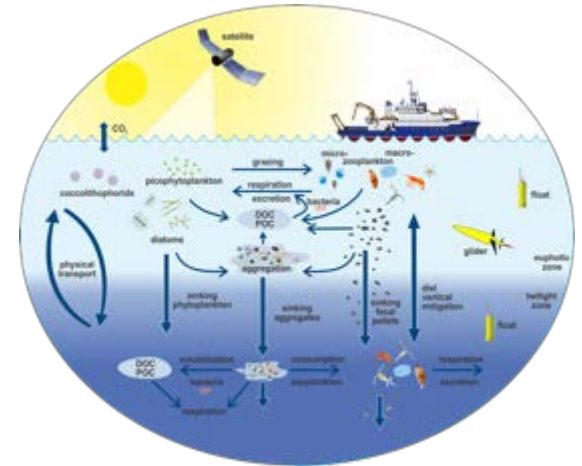
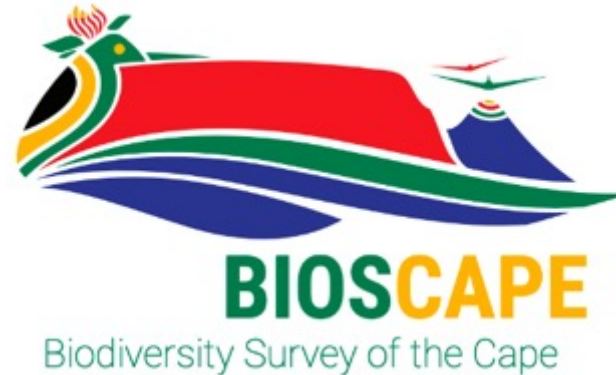
OBB Science Vision released earlier this year - The Science Vision is built around five Grand Challenges, which will link together science questions facing the OBB community over the coming decade. https://cce.nasa.gov/ocean_biology_biogeochemistry/

Field Campaign Planning/Field Project Updates

- EXPORTS Phase I has been completed. Phase II (synthesis) anticipated no earlier than 2024.
- BioSCape (happening now, South Africa): Biodiversity focused on South Africa's Greater Cape Floristic Region, including surrounding coastal and marine environments.
- ASTraL/EKAMSAT (ONR led; Arabian Sea, 2023-2025): Exchange across the Air-Sea interface in the Arabian Sea.
- Continued support for in situ measurements (e.g SOCCOM).
- Arctic-COLORS (Arctic, NET 2026): improve understanding and prediction of land-ocean interactions in the Arctic coastal zone.

EXPORTS

<https://oceanexports.org/index.html>





Arctic COLORS

Arctic - Coastal
Land Ocean
Interactions

**Science Definition Team
kicked off in Feb. 2023**

Arctic COLORS aims to quantify the coupled biogeochemical/ biological and ecological response of the Arctic nearshore system to rapidly changing terrestrial and ice conditions, in the context of environmental (short-term) and climate (long-term) change



Funding Opportunities

Research Opportunities in Space and Earth Sciences

<http://nspires.nasaprs.com/> Annual release mid-February

- Rapid Response and Novel Research in Earth Science – ROSES 2023 A.25 – [rolling deadline] - No budget for this –funded out of core programs.
- Topical Workshops, Symposia, Conferences – No longer under ROSES [rolling deadline] - No budget for this –funded out of core programs.
- A.38 PACE Science and Applications Team – Proposals due December 5, 2023.
- A.6 Carbon Monitoring System – [TBD, ROSES-2023]
- F.5 FINESST released Nov, 6 - proposals due Feb. 6, 2024; pre-proposal teleconference on December 1, 2023, at 3:30 PM Eastern Time, see Section 12.8.
- Carbon Cycle Science – ROSES-24
- Ocean Biology and Biogeochemistry – ROSES-24
- The Science of PACE – ROSES 2024

A satellite image of Earth showing a portion of South America and the surrounding oceans. A red dot is placed on the coast of South America, with a red arrow pointing to it from the text "Yes, you are here". The text is written in a white, cursive font.

Yes, you are here

Questions/Thank you!