

The Global Ocean Observing System



WORLD METEOROLOGICAL ORGANIZATION environment programme International Science Council



Session 6.2: Opportunities to engage with the satellite community

Dr Steven Ramage

14th GOOS Steering Committee meeting (SC-14) 19-21 February 2025 | Paris, France



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 - This is communication and stakeholder engagement topic.
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CEOS Mission and Primary Objectives



Mission: CEOS ensures international coordination of civil space-based Earth observation programs and promotes exchange of data to optimize societal benefit and inform decision making for securing a prosperous and sustainable future for humankind.

Primary Objectives:

- To optimise global societal benefit from space-based Earth observation missions
- To serve as the focal point for sustained international coordination among space-based Earth observation programs, remote sensing experts, and activities
- To promote complementarity and compatibility for the benefit of data user communities worldwide

CEOS Long-term Priorities





Ensure that climate observation requirements identified by the Global Climate Observing System (GCOS) – and implications of the Paris Climate Agreement – are addressed.



Ensure, in the context of the Sendai Framework for Disaster Risk Reduction 2015-2030, that CEOS Agency data are made available in support of disaster risk reduction and that CEOS continues engagement with UN agencies and authorities.



Ensure that space-based Earth observation data and products are integral to the success of the next decade of the Group on Earth Observations (GEO), and that CEOS contributions to, and engagement in, GEO governance and leadership are further enhanced.



Systematically engage in and contribute to global efforts on the critical challenges that face humanity in support of the UN 2030 Agenda for Sustainable Development.

CEOS Membership



The Committee on Earth Observation Satellites (CEOS) was established in 1984 under aegis of the G7 Economic Summit of Industrial Nations Working Group on Growth, Technology, and Employment

Now in its fourth decade, CEOS comprises

• 34 Members

(Space Agencies)

• 30 Associates

(UN Agencies, Phase A programmes or supporting ground facility programmes) All of whom contribute to CEOS on a best efforts and voluntary basis.





CEOS Work Plan





3-year plan re-evaluated and updated annually by all CEOS entities and presented for formal endorsement in Q1 of each calendar year.

CEOS undertakes rigorous work planning, monitoring and implementation of its activities, all of which ensure CEOS internal accountability and external credibility.

The Work Plan informs the spectrum of deliverables that CEOS membership agree to undertake.

CEOS deliverables are reconciled and tracked with a dedicated deliverable tracking tool. The CEOS 2023-2025 Work Plan defines 130 deliverables, e.g. GHG Roadmap, ARD Strategy, ocean activities including COAST-VC and other VCs...

Deliver	ables						
Ratus open	Creation year Category	+ Number contains		Title co	ntains	Description contains	Apply Filter
Norther	Tale		Status	Creation year	Completion date	Description	
BAG9:19-04	Relatively responses GEOGLAW ED Data Coordination rearris definitions of "Applications Ready		oper	2019	AD 1585	GEOGLAM will internally lead the development of Divis and ARD- based on both	
AGR-20-01	CEOS Response to GEOGLAW Responsents		oper.	2020	2021 (33	Very eight updates to ED data requirements are expected as result of the ERU	
() BON 2161	Equire the reationship between blodiversity and ecosystem function at difference scales by		apet	2025	2022-04	This work will explore the relationship between biodiversity and ecosystem	
B0N-25-60	Explore concepts to improve the operational connection between BONs and broader information systems		oper.	2021	2022 03	Explore and develop deas with other organizations (including, for	
CARD 17-05	Calified and production of Monnex products from CEOS missions		-	2017	2022 04	Development of a coordinated salval strategy across IAAA and ESA bitmass	
CARE-19-02	Phase 8 KBD Programme for GPDI		apen	2019	2022 Q1	The existing GFOI R&D programme and corresponding data supply activity	
CARD 19-00	Early Warring Medule for GFDI	g Messue for GPDI		2018	2021 Q1	Scoring discussions continue amongst the GPOI Leads for the definition of a .	
CARD-19-04	Forest Boruss measurements for GFDI sources		aper.	2019	3223 (21	The new generation of Above Ground Biomass resourcement missions offers great	
CUE 19-05	Forwar applications in support of the CEOS ARD strategy		0.041	2019	2021 (34	The LS Forests and Biomass sam will support the CSOS ARD strategy plint	
CANE-20-01	Devery a CEDEATORIA matching		open	2019	3021 (34	The AFOLD coalmap is part of the broader convention engagement	
CARD-20-02	Integrated Carton Cycle Interface between CEOS and the UNESCE		0967.	2019	2021 Q4	Building on the important connections established by WGCImatechts task will	
CARE 20 64	Space base support to GPDI Capacity Building component.		apar	2025	2021 (34	Support to GPOI Capacity Building Component through the USGS EpiChain to	
CARE 20 65	Support and encourage space size uptake in GFO countries		aper.	2020	2021 04	Answering education coverage information and facilitation of	dacoveryspeaks_
Ecure 21 et	6311 Prototype Products and Guidance		oper	2021	2021 Q4	Develop prototype CEOS data products and associated user p	pullance material in
ECA88-21-62	National Inventory Jean Tale Group		0,041	2021	2221 02	Establish a test group of national inventory users to provide Needback on the	
CANE 21-03	Forest Stamues Reference Newers		0241	2021	2022 04	Further development and support for the concept of the Ponest Biomass	
0015-016-0	CROS-UNFCCC 657 Soundy		4941	2021	3031 02	Prepare an outline strategy paper proposing the GEOS approach to support for _	
BCB-16-05	Advanced Multi-Angual NODC on Rader Sackscatter		0.001	2018	2021 02	Provide a multi-legual MODC (Serman, English, French, Spanish, Portuguese	
E CB-18-09	Land Cover and Land Use Charge MDDC		4941	2018	3121 (0)	Provide a MODC (Massive Online Open Course) on Land Cover and Land Use Changes	
BC8-19-08	Provide CB august to Hyperspectral Renote Sensing		0,001	2019	2022 01	Provide free & open learning material for hyperspectral remo	as serving
E C8-20-01	Earth Observations TeoRic for Sustainable COes and Human Settlements Training Webinar		aper	2009	2021.04	Training locused on the Earth Observations Toolkit for Sustail	noble Offes and
E CB-20-04	Juggier Nedelausie Awarenese Referan		4941	2020	2021 (34	Work with WG255 to provide a jupyter relationits assertings	mbise
CB-20-05	Essential the Earth Observation Training, Education, and Capacity Devergement Network (2)	OTEC Devents	0.041	2020	2021 02	Establish the Earth Observation Training, Education, and Cap	acity Development
E) CB-20-05	Metalata Sometimen Tiger Team		open	2020	2021 (34	Selection and definition of metadata standards for the excha-	rgs and processing
E CB-20-87	Real tractice dualo to E-Learning		aper	2029	2021 02:	Best practice guide to e Learning	

http://deliverables.ceos.org/

CEOS Work Plan: Expected Outcomes



The expected outcomes of the CEOS Work Plan reflect ongoing and emerging priorities as characterised by internal decision making and external commitments (focusing on improved EO systems coordination and enhanced data access for key global programmes and initiatives) in these areas:

- CEOS and the 'New Space' agenda
- Climate Monitoring, Research, and Services
- Carbon Observations in support of Climate Science and Policy, plus UNFCCC Global Stocktake
- Data Quality, Data Discovery, Access, Preservation, Usability & Exploitation
- Capacity Building and Data Democracy
- Observations for Disasters, Land, Water, and Oceans
- Observations in support of the UN Sustainable Development Goals
- Advancement of the CEOS Virtual Constellations



COAST-VC helps to integrate across multiple CEOS entities and domains, both thematic, e.g., disasters, SDGs, and capacity development, and technical, e.g., ocean, land and atmosphere, biodiversity, information systems and services, and calibration/validation.

COAST-VC is well-positioned to highlight the broader use of Earth observations for greater societal benefit within coastal zones (e.g., Blue Economy; SDG-14), and demonstrates a specific mechanism for CEOS to engage with external stakeholders, such as GOOS.

CNES agreed to become the third co-lead for COAST, joining ISRO and NOAA who have committed to serve through 2025.

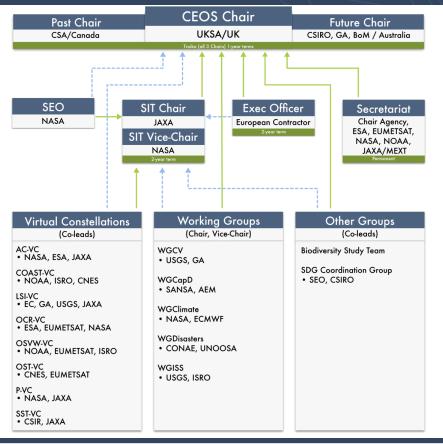
New Products in the Blue Carbon thematic area and Arctic Pilot regions are expected (contingent on funding availability).

Collaboration with CEOS virtual constellations working on ocean topics.

CEOS Organisational Structure



This organogram depicts the CEOS organisational structure, including the paths by which each CEOS entity reports to leadership.



CEOS Plenaries



Plenary	Year	Venue	Host	Plenary	Year	Venue	Host
1 st	1984	Washington DC, USA	NOAA	20 th	2006	Buenos Aires, Argentina	CONAE
2 nd	1986	Frascati, Italy	ESA	21 st	2007	Kona, Hawaii, USA	USGS
3 rd	1988	Ottawa, Canada	CSA	22 nd	2008	George, South Africa	CSIR
4 th	1990	Sao Jose dos Campos, Brazil	INPE	23 rd	2009	Phuket, Thailand	GISTDA
5 th	1991	Washington DC, USA	NASA/NOAA	24 th	2010	Rio de Janeiro, Brazil	INPE
6 th	1992	London, UK	BNSC	25 th	2011	Lucca, Italy	ASI
7 th	1993	Tsukuba, Japan	MEXT/NASDA	26 th	2012	Bangalore, India	ISRO
8 th	1994	Berlin, Germany	DARA	27 th	2013	Montreal, Canada	CSA
9 th	1995	Montreal, Canada	CSA	28th	2014	Trömso, Norway	EUMETSAT
10 th	1996	Canberra, Australia	CSIRO	29th	2015	Kyoto, Japan	JAXA
11 th	1997	Toulouse, France	CNES	30th	2016	Brisbane, Australia	CSIRO
12 th	1998	Bangalore, India	ISRO	31st	2017	Rapid City, USA	USGS
13 th	1999	Stockholm, Sweden	EUMETSAT	32nd	2018	Brussels, Belgium	EC
14 th	2000	Rio de Janeiro, Brazil	INPE	33rd	2019	Hanoi, Vietnam	VAST/VNSC
15th	2001	Kyoto, Japan	MEXT/NASDA	34th	2020	Virtual	ISRO
16 th	2002	Frascati, Italy	ESA	35th	2021	Virtual	NASA
17 th	2003	Colorado Springs, USA	NOAA	36th	2022	Biarritz, France	CNES
18 th	2004	Beijing, China	NRSCC	37th	2023	Chiang Rai, Thailand	GISTDA
19 th	2005	London, UK	BNSC	38th	2024	Montreal, Canada	CSA

Introduction to COAST: Coastal Observations, Applications, Services, and Tools

> Merrie Beth Neely Paul Di Giacomo

Committee on Earth Observation Satellites

What is CEOS? Committee on Earth Observation Satellites

What is CEOS COAST-Virtual Constellation? A Coastal Focused Team

- Use Earth observation data (satellite + in situ) to tackle coastal problems affecting society - coverage | frequency | resolution
- Engage with regional coastal stakeholders
 - Endorsed as a Contribution to the UN Ocean Decade

How might CEOS COAST help you?

- Leverage global satellite data for high impact issues affecting YOUR community.
- Co-design coastal information products to solve YOUR information needs.
- Advance products and features YOU want and will be easy for you to use



Partnerships



Satellite data / imaging

Satellite data/imaging processing capabilities

Expertise in satellite algorithm development

Analytical tools/capabilities



Local knowledge/ groundtruthing ability

In situ data, existing models

Understanding of local needs/applications

Analytical tools/capabilities

Pilot Projects



Identified two projects to develop coastal products, services and tools

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Coastal



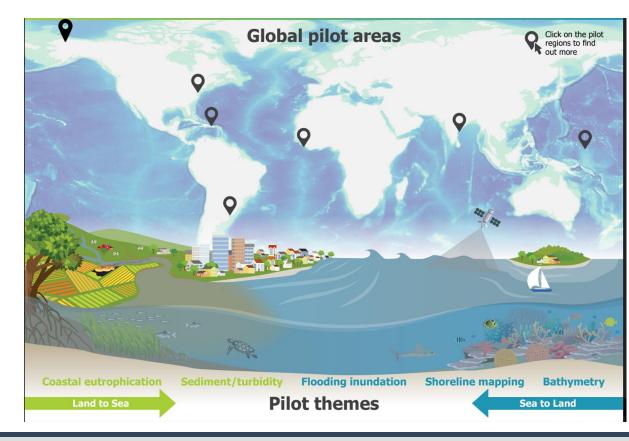
Pilot Project Locations

Continental:

Chesapeake Bay (USA) Odisha/Bay of Bengal West Coast of Africa Rio de la Plata region (Latin America)

Small Island Nations: Caribbean & Pacific

Arctic Regions: Bering Sea & Alaska/Canada



Why Satellite Data?

- With information <u>equity</u> as our lens:
 - How to fill the temporal/spatial gaps of in situ data and leverage models?
 - How do we grow understanding of satellite-based applications?
 - How do we scale up projects and methods that put satellite data & information into the hands of more people?

Why CoDesign?

- Build something useful and user-friendly
- Unique coastal satellite data products, **low barrier of entry** skillwise
- One-stop access to various data types, including in situ data (cal/val) YOU can supply!
- Enhanced access to trusted data sources
- Free and open source products enables customization by anyone
- Regional Pilots enable product testing for scalability

TRAINING? OOSC and Living Planet Symposium June 2025

CEOS COAST DATA NEEDS



Shoreline mapping/coastal elevation island elevations Shore line validation data Flood maps/Flood extent data Bathymetry data Coastal elevation & Intertidal Mapping -Optical EO data, validation (GPS, LiDAR, in-situ) Precipitation temporal & spatial antecedent moisture conditions (soil moisture) **Digital Elevation Models** River Discharge/Dam location & specs Land Use /Cover datasets Water Temperature Salinity - river discharge/mixing models/Density gradients - plume dispersal (i.e. settling velocity)

Tidal Data - altimetry, winds Wave Data - statistics from Altimeters & buoys significant wave height/direction/periodicity wave spectra data Wave refraction nearshore **Ecosystem Status/Change** Habitat maps coral health data SAV classification mangrove classification & health coastal sediment maps - deposition & rate of accumulation Eutrophication Indicators (in situ data) Turbidity/Sediment data & loadings datasets Point source discharges (volume & conc.) Nutrient loadings datasets water quality maps Water color maps (airborne or in situ)



NOAA Flood / Coastal Inundation Mapping Development Products



- NWS NRT; NWS daily composite; NWS 5-day composite
- VIIRS Flood Detection Global (3 products)
 - Global NRT; Global Daily composite; Global 5-day composite
- Synthetic Aperture Radar (SAR) (1 product)
 - (Sentinel 1, RadarSat Constellation Mission (RCM), RadarSat 2, ALOS 4 (2023), and NISAR (2023)
- ABI US Flood Detection Products (2 products)
 - Hourly Composite; Daily Composite
- Blended Flood Detection VIIRS/ABI and VIIRS/SAR (2 products)
- **Downscaled VIIRS and Blended VIIRS/SAR** (2 Products)

Shoreline Mapping







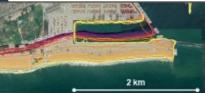
Point of Sangomar, Senegal

Digital Earth Africa Coastlines Launched at the GEO Blue Planet Symposium October 2022

Project commenced as a CEOS COAST initiative to take the learnings from the Digital Earth Australia Coastlines project across to DE Africa







maps.digitalearth.africa

https://www.digitalearthafrica.org/platform-resources/services/coastlines

Intertidal Elevation





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Derived data product DEA Intertidal

- Time series data provides insights into dynamic coastal regions
- Integrate with ecological and migratory species modelling
- Incorporates Landsat and Sentinei-2 data

Our first product to incorporate Landsat (USGS) and Sentinel-2 (ESA) data into the same derived product

Annual elevation maps of the Intertidal zone at 10m resolution

Annual exposure maps to underpin ecological and migratory species applications

Uncertainty metrics to enable the data to be integrated into other elevation and bathymetry products with confidence

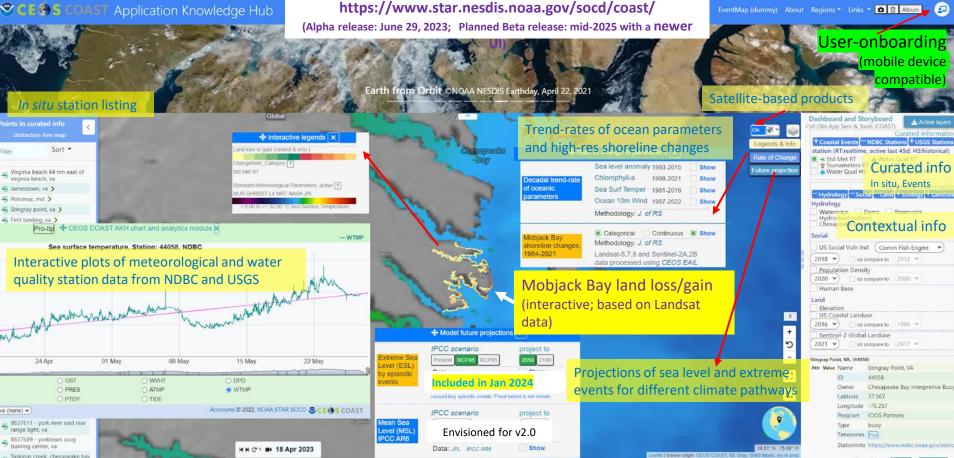
https://knowledge.dea.ga.gov.au/data/product/dea-intertidal/





Data Information

CESS



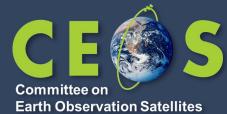
Knowledge



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The Global Ocean Observing System

Thank you

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