



Terms of Reference

Ad Hoc Team on Coastal Observations, Applications, Services & Tools (COAST)

The 34th CEOS Plenary established a CEOS Ad Hoc Team on Coastal Observations, Applications, Services & Tools (CEOS-COAST).

Rationale and Priorities for a CEOS-COAST Ad-Hoc Team

Coastal zones are extraordinarily important from a societal and economic perspective. They are home to much of the global population, amongst the most productive ecosystems on Earth, and crucial to the emerging Blue Economy as essential sites of commerce, transportation, food security, and recreation. Within both developed and developing nations, coastal zones continue to grow and diversify. In this regard, there is a compelling need to better observe, understand, manage, and predict changes in these regions in support of sustainable development.

Our ability and more so capacity to address changes in these regions is still relatively limited, particularly in the developing world. Coastal zones are characterized by complex processes, with rapidly changing and evolving conditions that can be challenging to effectively observe in both time and space, particularly given their inherent transboundary and transdisciplinary nature. Within coastal zones there is dynamic coupling of terrestrial, aquatic and atmospheric domains; complex, episodic and often ephemeral physical and biological/biogeochemical processes; and finally, the overarching challenge of integrating environmental sciences with social sciences.

There are also significant risks and threats to human health and safety, as well as the abundant ecosystem resources from these regions. Coastal hazards such as flooding and inundation, as well as water quality and associated impacts (e.g., eutrophication, hypoxia, harmful algal blooms, sediment loadings and coral reef et al. habitat degradation) to ecosystem health and productivity, represent particularly great challenges for society to address.

The Committee on Earth Observation Satellites (CEOS) formed the COAST (Coastal Observations, Applications, Services and Tools) team in 2019 (<http://ceos.org/ourwork/ad-hoc-teams/ceos-coast/>) in response to addressing these and other challenges and risks in the coastal zone, toward providing new and improved scientific/technical capabilities and building capacity for a more robust end-to-end value chain (observations to data to products to information to actionable knowledge) in support of coastal stakeholders and global sustainable development (additional background is found in Appendix A).

Focusing on this user-driven value chain, the CEOS-COAST Ad Hoc Team (AHT) will facilitate targeted work and engagement on priority coastal observations and applications within CEOS, addressing the identification, extension/expansion, integration and transformation of multi-sensor observations into fit-for-purpose information supporting existing and emerging stakeholder requirements.

This dedicated coastal-focused activity helps bridge land and aquatic observations within CEOS, and given its cross-cutting nature, will integrate across multiple CEOS entities and domains, both thematic (e.g., Disasters, Climate, Sustainable Development Goals [SDGs], and

Capacity Development) and technical (e.g., Virtual Constellations (VCs): Ocean, Land and Atmosphere; calibration and validation; systems, tools and services - Working Group on Information Systems and Services [WGISS], CEOS Ocean Variables Enabling Research and Applications for GEO [COVERAGE et al.]. COAST will formulate and implement high impact pilot projects that leverage the CEOS Analysis Ready Data (ARD) framework already demonstrated for terrestrial applications, as well as leverage the emerging WGISS/Systems Engineering Office CEOS Earth Analytics Interoperability Lab (EAIL).

The COAST Ad Hoc Team will encourage broader utilization of Earth observations and other CEOS capabilities for societal benefits within coastal zones (e.g., Blue Economy; SDG-14), and demonstrate specific opportunities and mechanisms for CEOS to engage, particularly through the linkage of the Group on Earth Observations Blue Planet and AquaWatch Initiatives, likewise engaging with external stakeholders such as Intergovernmental Oceanographic Commission/Global Ocean Observing System, United Nations (UN) Environment, World Meteorological Organization, and the UN Decade of Ocean Science for Sustainable Development (2021-2030).

In this broader context, there is significant opportunity for the COAST AHT to facilitate technology transfer from developed to developing nations and building capabilities and capacity, with an eye toward scaling up from individual demonstration activities at national and regional levels to full global implementation.

The strategic approach and priorities of the COAST AHT will be to:

- Maintain a CEOS perspective and ensure a clear focus on the “upstream” end of the value-chain, i.e., observations to data to products, addressing issues such as fit-for-purpose/analysis ready data; new/improved, higher resolution, integrated products et al.
- Co-design and co-develop specific, tractable high priority pilot projects and related activities in geographical areas that resonate with stakeholders/users in GEO, UN et al., particularly technology transitions toward broader global implementation
- Identify, leverage and integrate appropriate CEOS capabilities and capacities across agencies, VCs, and Working Groups (WGs)
- Identify and articulate exactly what the novel contribution is from CEOS relative to other existing and planned community activities, ensuring complementarity and avoiding redundancy
- Collaboratively work with stakeholders to ensure pilot products meet existing and emerging user needs and to identify a path forward for longer term implementation
- Develop a viable strategy to identify and acquire the necessary resources (human, Internet Technology et al.) from CEOS members to successfully execute the Phase 2 implementation plan.

Scope and Objectives

There is a broad spectrum of coastal needs, issues and challenges, with a diverse ecosystem of stakeholders that can potentially be engaged. The CEOS-COAST Phase 1 deliverables (<http://ceos.org/ourwork/ad-hoc-teams/ceos-coast/>) identified the specific scope and priorities of the COAST effort moving forward, focusing on the transboundary and transdisciplinary nature of the coastal zone. Specifically, this includes sea impacts on land – including coastal hazards such as flooding and inundation, at continental as well as for small island states – as well as land impacts on the sea, including water quality issues such as coastal eutrophication and sediment loading, affecting the ability of the coastal ecosystem to deliver valuable goods and services.

Within this framework, specific objectives of the CEOS-COAST AHT are to:

- Identify and analyse opportunities for new and emerging satellite-based observations and derived capabilities to support coastal needs, challenges and opportunities (e.g., new methods, new data, new products)
- Implement COAST priority pilots & supporting infrastructure identified in Phase 1
- Engage with GEO, UN entities and other relevant authoritative stakeholders on coastal needs and issues, working together on pilot project implementation, and building partnerships to transfer and sustain COAST deliverables after Phase 2
- Provide a forum for sharing/communicating best practices and approaches across CEOS and the broader international community in support of COAST activities and priorities, providing easy access to methodological development, tools and platforms, and ready discovery and accessibility to high priority global/regional data sets
- Strategically utilize CEOS assets and bodies to engage with users and advance capabilities for COAST pilot project implementation, and also generally for future COAST planning and activities.

Leadership

The CEOS-COAST AHT will have two or more Co-Chairs, from CEOS Agencies representing different geographical regions and with complementary interests and areas of expertise. Each Co-Chair will serve for an initial term of one year. The CEOS COAST AHT reports to the CEOS Chair.

Membership

Participation is open to all CEOS Agencies who are willing to support and contribute to activities that are in scope with the COAST AHT mission and objectives. Agencies that are not already part of COAST, but are interested in participating are encouraged to directly contact the Co-Chairs for inclusion and integration into the COAST AHT and its activities.

End of Terms of Reference

Appendix A: Background on COAST History and Formulation

One of the outcomes identified from the 2018 CEOS Strategic Implementation Team (SIT) Technical Workshop, as part of the VC/WG Day, was the suggestion for CEOS to consider potential pilot projects in the coastal zone targeting high priority user needs (e.g., flooding, water quality) – an imperative noting that a majority of the world’s population lives within close proximity of a coastal zone. This also traces back to extensive previous CEOS engagement with the Integrated Global Observing System (IGOS) Coastal Theme, GOOS and its Panel for Integrated Coastal Observations (PICO), and more recently actively working with and facilitating the GEO Blue Planet Initiative.

At SIT-34, ongoing CEOS agency interest in analysis ready satellite data provision for the coastal domain was discussed, as was the potential for a future workshop on coastal observation coordination and user engagement. An action was given to the CEOS Blue Planet Expert (P. DiGiacomo) to bring forward to the 2019 CEOS SIT Technical Workshop ideas for an *ad hoc* coastal observing and applications team.

Dr. DiGiacomo presented on the coastal strategy topic during the VC/WG/*ad hoc* (AHT) Day and again at the 2019 SIT Technical Workshop. He recommended that the SIT establish a Coastal Study Team that would define the objective, scope, priorities and value chain approach for a CEOS coastal engagement strategy, including identification of potential pilot project(s) and the engagement strategy with internal and external stakeholders. The following action was captured at the meeting pursuant to this recommendation:

SIT-TW-2019 -14	Paul DiGiacomo, SIT Chair Team, and SIT Vice Chair Team	Develop a Coastal Study Team proposal for consideration as a cross-cutting CEOS activity, and present the proposal for discussion and decision at the CEOS Plenary.	30 September 2019
	<i>Rationale: Follow-up on discussions around coordination on coastal observations between several CEOS VCs, including as a demonstration of how Oceans VCs could work together on a focused topic.</i>		

In response to this action, a *CEOS Coastal Observations and Applications Study Team* (CEOS-COAST) was proposed and approved at the 33rd CEOS Plenary in October 2019. Agencies were requested to express their interest in participating on CEOS-COAST and to identify participants with appropriate expertise and interest. In January 2020, the CEOS-COAST kickoff meeting was held virtually, with extensive CEOS Agency, Working Group and Virtual Constellation participants, as well as experts from GEO Secretariat and the GEO Blue Planet and AquaWatch Initiatives. Regular monthly meetings, coupled with more frequent special topic meetings, were held throughout 2020 to coordinate and prepare COAST Phase 1 deliverables for the 2020 SIT Technical Workshop. These included three scoping whitepapers for COAST Phase 2 pilot activities in 2021, a compilation of relevant international projects, and an annotated bibliography (see <http://ceos.org/ourwork/ad-hoc-teams/ceos-coast/>).

In response to these COAST Phase 1 activities and deliverables, the following outcome was specified following the 2020 SIT Technical Workshop:

Outcome 04	CEOS Coastal Observations and Applications Study Team (COAST) will ask Plenary for approval to be recognized/proceed as a <i>CEOS Ad Hoc Team</i> for 2 years. Next steps will include a call for Agency expressions of interest/support for Phase 2 (2021) activities (including a co-Chair for the AHT).
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Furthermore, the following actions were specified:

SIT-TW-2020-03	CEOS COAST to seek a co-Lead for the Ad Hoc Team to be proposed at Plenary.	CEOS Plenary
	<i>Rationale: A COAST Co-Lead will help share the workload and bring new capabilities. (ISRO has agreed in principle to Co-Lead.)</i>	
SIT-TW-2020-04	Paul di Giacomo (NOAA) to develop a high level draft Terms of Reference for a CEOS COAST Ad Hoc Team ahead of Plenary	CEOS Plenary
	<i>Rationale: While not required before the October 2020 CEOS Plenary, draft TORs can be helpful information for review by CEOS Agencies preparing for this year’s Plenary discussions. The requirement in the CEOS Governance and Processes Document (page 7) is, “Within two months of creation, the Ad Hoc Team will prepare defined objectives and appropriate path forward for meeting those objectives to include identifying needed resources.”</i>	

SIT-TW-2020-03 was successfully completed in October 2020, with Indian Space Research Organisation (ISRO) formally confirming that they would serve as Co-lead for a CEOS-COAST AHT, complementing NOAA in this capacity. This document represents the formal response to action SIT-TW-2020-04.