



OCEAN OBS'19



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Hawai'i Convention Center
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www.oceanobs19.net

Connecting Science and Society

As part of the decadal conference series, OceanObs'19 will galvanize the ocean observing community ranging from scientists to end users.

OceanObs'19 seeks to improve response to scientific and societal needs of a fit-for-purpose integrated ocean observing system, for better understanding the environment of the Earth, monitoring climate, and informing adaptation strategies as well as the sustainable use of ocean resources.

Web site <http://www.oceanobs19.net>

Added value of observing networks in the coastal ocean continuum: integration with model prediction and applications

Pierre De Mey-Frémaux, Villy Kourafalou and the GOV COSS-TT

Integration of observations of the coastal ocean continuum (from regional oceans to shelf seas and rivers) with models can substantially increase the value of observations and enable a wealth of applications. An internationally coordinated approach will be presented in support of proper integration of global and coastal continuum scales under a data-assimilative, multi-nested modeling framework. A crucial observational challenge for coastal continuum studies is addressing the variety of important spatial and temporal scales. Observations should sample the two-way interactions between nearshore, estuarine and shelf processes and open ocean processes, while accounting for the different pace of circulation drivers, such as the fast atmospheric and tidal processes and the slower general ocean circulation and climate scales. Because of these challenges, and as many coastal regions of the world oceans are not sufficiently observed, high-resolution models can serve as connectors and integrators of coastal continuum observations. In particular, multiscale nesting approaches are capable of integrating the global and local modeling scales, in synergy with the integration of multiscale, multidisciplinary remotely-sensed and in situ observations. Integrated systems of observations and models can be made part of a virtuous validation loop: data can be used for model validation, while models can be used to facilitate the understanding of observations and to design and optimize existing and future observational arrays, with implications on sampling technology and networks. In such integrated systems, data assimilation approaches can provide quantitative, validated estimates of Essential Ocean Variables in the coastal continuum, adding scientific and socioeconomic value to observations through applications (e.g. coastal management under a sustainable ecosystem approach, transport and fate of pollutants, maritime safety, hazards under natural variability and climate change).

“Coastal mini-review paper”

- OceanObs19 proposals 130 (led by Jason Holt), 41 (led by Xueming Wang) and 129 (led by Pierre for the COSS-TT) have been identified by the OceanObs19 science committee as being thematically close, and are given the opportunity to write a common OceanObs19 community "mini review" paper (= a short paper) on **challenges of coastal observations, data-model synergy and applications**.
- Following the agreement between Fraser Davidson (who leads the “parent” White Paper), Tony Lee (OceanObs19 science committee) and Pierre, the mini-review is to be built upon proposal 129 and to integrate proposals 41 and 130 (?).
- In practice: **3000 words, 2 figures or tables max**. Submission deadline: **Oct 31**. Paper will undergo peer review and will be *published in Frontiers in Marine Science*. *All actual contributors will be co-authors*.

Key target messages (1/3)

- 1) We place ourselves within the framework of an **internationally coordinated approach** (link with “parent” paper on **GOV** as well as to other programs and centers in support of proper **integration of global and coastal continuum scales** under a data-assimilative, multi-nested modeling framework.
- 2) Observing systems provide our most direct window on the oceans, but tend to be **spatiotemporally sparse, especially in coastal regions**. A crucial observational challenge is addressing the **variety of important spatial and temporal scales of the coastal continuum**. Observations should sample the two-way interactions of estuarine, nearshore, and shelf processes with open ocean processes, while accounting for the different pace of circulation drivers, such as the fast atmospheric and tidal processes and the slower general ocean circulation and climate scales
- 3) In coming decades, **autonomous observing systems, combined with advanced satellite remote sensing**, have the potential to revolutionize the spatiotemporal availability of marine observations, particularly in the coastal ocean, where a continuous 4D observing presence (e.g. Argo) is not currently available.

Key target messages (2/3)

- 4) To fully realize the benefits of these advances, **observations and models must be better integrated at all points in the information development chain**. These points include: analysis and interpretation, product development and validation, data assimilation for state and parameter estimation, and developing scientific understanding.
- 5) Integrated systems of observations and models can be made part of a **virtuous design validation loop**: data can be used for model validation, while models can be used to facilitate the understanding of observations and to design and optimize existing and future observational arrays, with implications on sampling technology and networks. Model derived information can greatly assist observing system design, for example by assessing the efficacy of observing systems and monitoring networks and providing operational information to support rapid environmental response and autonomous vehicle pilots.

Key target messages (3/3)

- 6) Because many coastal regions of the world oceans are not sufficiently observed, **models can serve as connectors and integrators of observations**. This has the potential to make a step-change in how models and observations are brought together to deliver societally relevant marine information. **Data assimilation approaches** can provide quantitative, validated estimates of Essential Ocean Variables in the coastal continuum.
- 7) Integration of observations with models can add value to coastal observations and enable a wealth of **applications**, e.g. decision-making support, marine search and rescue, coastal management under a sustainable ecosystem approach, transport and fate of pollutants, maritime safety, hazards under natural variability and climate change.
- 8) These connections can be facilitated by an **outcomes focused approach**: model and observing practitioners across the product delivery chain are brought together in targeted end-to-end development activities.

Mini-review authorship status

Author	Institute	Country
Pierre De Mey-Frémaux, LEAD	LEGOS/CNRS	France
Jason Holt, CO-LEAD	NOC	UK
Xueming Zhu, CO-LEAD	NMEFC	China
Nadia Ayoub	LEGOS/CNRS	France
Mauro Cirano	REMO/U.Rio	Brazil
Ivan Federico	CMCC	Italy
Shan Gao	NMEFC	China
Helene Hewitt	Met Office	UK
Lars Hole	Met.no	Norway
Rob King	Met Office	UK
Villy Kourafalou	U. Miami/RSMAS	USA
Ananda Pascual	IMEDEA	Spain
Joanna Staneva	HZG	Germany
Emil Stanev	HZG	Germany
Hui Wang	NMEFC	China

- Input submitted by 9 members of the Task Team (on a total of 33) = 27%, very disappointing!
- Do other members have nothing to say regarding the future of the coastal observing system?

Discussion

- OceanObs19 can help shape the future for coastal ocean models, forecasting systems and applications.
- Which messages does the coastal ocean forecasting community want to carry to the observational community and to agencies? (+ comments on target messages)
- Involvement of the Task Team in this mini-review paper:
 - Important messages
 - Examples illustrating those messages (achievements, needs, etc.) – preferably published since only 2 figures allowed
 - Who is not participating and wishes to participate?
- Involvement of the TT in the OO19 Conference.