

Operational Oceanography Centres and Marine Forecasting Centres for Operations at Sea



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A map to display Operational Oceanography and Marine Forecasting Centres

Mercator Ocean international is committed with international institutions and scientific working groups to set up international standards to monitor the ocean and develop operational oceanography. Making an inventory of the operational oceanography and ocean forecasting services is the first step to define where and how new capacities are needed.

Thus, Mercator Ocean has gathered in map different centres providing an operational oceanography and marine forecasting service.

Marine meteorology and forecast refers to many activities: “In the preparation of analyses, synopses, forecasts and warnings, knowledge is required of the present state of the atmosphere and the ocean surface, as well as the climate of the region. In addition, other types of forecasts that refer to special elements and phenomena, such as waves, storm surges, sea ice and ice accretion may be based on relevant observational data.” (*Guide to Marine Meteorological Services*, World Meteorological Organization, WMO-No. 471, 2018).

Operational Oceanography can be defined as “Operational oceanography provides estimates of ocean variables (temperature, currents, etc.) for the past, present, and future, global-to-coastal marine environments, and physical and biogeochemical properties. There is a systematic focus on operational observing systems, estimates of the current state, short-range predictions and ocean reanalyses. It provides routine and supported product and information at pre-determined and agreed upon service levels to enable marine policy implementation, support Blue Growth and scientific innovation”.

Operational Oceanography and Marine Forecasting Services for operations at sea are both working with the same architecture. A pre-processing phase where the data is collected, a processing phase where the models are elaborated and an integration phase allowing distributing the data to downstream users. The main difference between operational Oceanography Centres and marine forecasting Systems consist in the variable they analyse. Indeed, marine forecasting systems mainly analyses the interaction between the atmosphere and the surface of the ocean (waves, storm surges, wind etc.) while Operational Oceanography analyses both physical (temperature, salinity etc.) and biogeochemical variables.

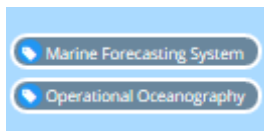
Operational Oceanography and Marine Forecasting Services for Operations at Sea criteria

To classify the different centres in the world, 3 classes of criteria have been elected.

- The structure type,
- Their spatial coverage,
- The different standards and techniques set up to fulfil the operational objectives.

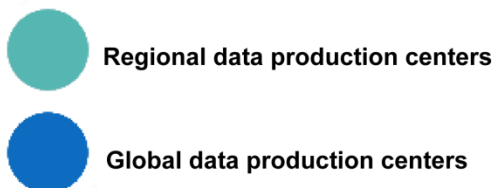
Structure criteria

A first filter has been set up to make a difference between the different ocean modeling centres. Indeed, Operational Oceanography Centres and Marine Forecasting Centres have been separated as the first one mainly focus in analysing physical and biogeochemical data, while the second ones mainly works on atmosphere-ocean interaction.



Spatial data set criterion

Another major criterion to understand to distinguish ocean modelling centres is the spatial coverage of their models/ Some centres provide global models which require important computing capacities while other provide regional models often with a more precise definition.



Technical criteria to fulfil operational objectives

	Operational Oceanography Centres	Marine Forecasting Services for Operations at sea
Pre-processing phase		
Capacity to produce information (models)	✘	✘
capacity to retrieve information (observations)	✘	✘
Modelise the ocean	✘	✘
Modelise biogeochemistry	✘	
Processing Phase		
Validation and verification	✘	✘
Data assimilation	✘	✘
Sufficient geographic and time coverage	✘	✘
Integration		
Product catalog available	✘	✘
Service catalog available	✘	✘
Human interaction with users	✘	✘
Quantified compliance with service commitments	✘	✘
Regular information updates	✘	✘
Adapt to a large number of user	✘	✘

This table provides the technical criteria that operational Oceanography and Marine Forecasting Centres should set up to be fully operational.

Worldwide, centres are at different steps of constructions and provide ocean data and models with different levels of operability.

3 categories have been selected depending on the level achieved by each services:

- Service under construction,
- Criteria partially met,
- Criteria fully met.



Services under construction



Criteria partially met



Criteria fully met