

9. Appendixes

Appendix A : The FOCCUS Survey on CMEMS dependencies, as published through Typeforms and distributed on 1 st Jan 2025

<https://marinecopernicus.typeform.com/to/Bew6WtKe>

FOCCUS Survey

Copernicus products in coastal forecasting centers

The Horizon Europe FOCCUS project aims for a coastal extension of the Copernicus Marine Environment Monitoring Service.

This survey aims to document the current use of Copernicus products by coastal forecasting centers, and is thus addressed to the developers and maintainers of such forecasting systems. Thanks to your contributions, we aim to guide the roadmap towards a future enhanced integration of the open ocean and coastal operational oceanography systems.

For efficiency, we will complement your contribution by collecting information on your forecasting system from the Ocean Decade OceanPrediction Atlas. Although not mandatory, please consider registering to this Atlas before addressing the present survey.

This survey addresses different topics : physical oceanography, biogeochemistry, waves and sea ice. Feel free to send this survey to anyone in your organisation who may be able to answer one or more parts of it.

For any inquiries, please contact acapet@naturalsciences.be.

Q1a : Is your OOFS reported in the OceanPrediction DCC Atlas?

- Yes
- No

Q1b*[if Q1a==Yes]* : Please indicate the corresponding reference: Please copy the exact name used for your system in the DCC Atlas entry

Q2a*[if Q1a==No]* : Registering your OOFS* in the DCC Atlas enables us to directly utilize the information stored there to better contextualize your responses to this survey. Therefore, we strongly encourage you to register.

If you are not yet registered, we will require some additional information from you.

Q2b*[if Q1a==No]* : What is the name of your organization/institution ?

Q2c*[if Q1a==No]* : Where are you based? [-> list of European countries]

Q2d*[if Q1a==No]* : What is (are) your regional basin(s) of interest ?[-> list of European marine basins ?]

Q2e*[if Q1a==No]* : At what scale do you work ? [-> List of spatial scales]

Q3a : Do your OOFS produces/provides products related to physical oceanography (excluding waves)?

- Yes
- No [-> skips all the following Q3 questions.]

Q3b *[only if Q3a==YES]* :Do your OOFS* relies on operational Copernicus Marine Service **physical oceanography model data** products for initial and/or open boundary conditions?

- Yes, we only use Copernicus Marine Service products.
- Yes, but not only.
- No.

Q3c *[only if Q3b==Yes (only or not only)]* : What specific variable(s) from model data do you use, and do you need to apply any specific processing to those products before their consideration in your operational pipeline? [-> Matrix of checkboxes]

	I don't use it	I use it and apply a spatial downscaling procedure	I use it and adapt the temporal variability	I use it and apply systematic bias correction	I use it, with another type of pre-processing	I use it as it is
Temperature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salinity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Velocity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sea surface height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q3d: Can you identify potential improvements of physical oceanography products that would enhance the interface between the Copernicus Marine Service system and your OOFS? *If relevant, please start by indicating the related variable, eg. "[Temperature] : should be provided in Fahrenheit"*

Q3e [*only if Q3b==Not only*] : For what variable(s) are you relying on another data provider for initial and open boundary conditions?

Q3f [*only if Q3b==No*] Which data provider are you relying on for initial and open boundary conditions?

- World Ocean Atlas or other climatology products.
- Large-scale ocean models maintained in our own institution
- Large scale ocean models provided by external institutions other than Copernicus Marine Service (-> *this opens a free text option: What other institution?*)
- We don't need such inputs.
- Other

Q3g [*only if Q3b==No, or not only*] : Would using Copernicus Marine Service products be an option within the next 3 years?

- Yes, we're working on it.
- No, it would require more than 3 years to be implemented.
- No, because of current technical limitations with those products (-> *this opens a free text option: What limitation?*)
- No because of other reasons (-> *this opens a free text option: What reasons?*).

Q3h [*only if Q3g==No because of "other reasons" or "technical limitations"*] :
For what reasons or limitations ?

Q3i : What type of scheme/methods are you using for boundary conditions? [*Multiple selections allowed*]

- Radiation/Orlanski or similar conditions to allow outgoing wave propagation and avoid artificial reflection of outgoing waves into the domain.
- Flather or similar conditions to ensure a balance between sea level and current interactions, and enhance dynamic consistency.
- Flow Relaxation or similar scheme to reduce discontinuity and ensure smooth transitions at boundaries.
- None of the above.
- Other (-> *this opens a free text option*)

Q3j [*only if Q3i != "None of the above"*] : Would you consider it relevant/helpful if common guidelines for the application of such methods would be provided/supported in the frame of Copernicus Marine Services.

Q3k : Do your OOFs rely on Copernicus Marine Service **observation** products for **validation**?

- Yes

- No

Q3l: [only if Q3k==Yes] From which platform?

	Remote Sensing	Argo and other moving autonomous platform	Moorings, tide gauges, and other fixed platforms	Cruises, and ship-cast datasets
Temperature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salinity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Velocity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sea surface height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q3m : Can you identify an improvement in the **observation** product that would help improve its usage in the **validation** procedure?

Q3n : Do your Oofs rely on Copernicus Marine Service **observation** products for **assimilation**?

- Yes
- No

Q3o [only if Q3n==Yes] : From which platform?

	Remote Sensing	Argo and other moving autonomous platform	Moorings, tide gauges, and other fixed platforms	Cruises, and ship-cast datasets
Temperature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salinity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Velocity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sea surface height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q3p: Can you identify an improvement in the observation product that would help improve its usage in the assimilation procedure?

Q4a. Do your OOFS produces/provides products related to biogeochemical oceanography?

- Yes
- No [-> Skips all following Q4 questions]

Q4b [only if Q4a==YES] Do your OOFS relies on operational Copernicus Marine Service biogeochemical oceanography **model** data products for initial and/or open boundary conditions?

- Yes, we only use Copernicus Marine Service products.
- Yes, but not only.
- No.

Q4c [only if Q4b==YES (only or not only)] What specific product(s)?

	I don't use it	I use it and implement a specific remapping of state variables	I use it and adapt the temporal variability	I use it and apply systematic bias correction	I use it, with another type of pre-processing	I use it as it is
Chlorophyll-A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Light attenuation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zooplankton	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nutrients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pH	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Particulate Organic Matter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q4d Can you identify potential improvements of biogeochemical oceanography products that would enhance the interface between the Copernicus Marine Service system and your OOFs?

Q4e [only if Q4b==Not only] : For what variable(s) are you relying on another data provider for initial and open boundary conditions?

Q4f [only if Q4b==No, or not only] Which data provider are you relying on for initial and open boundary conditions?

- World Ocean Atlas or other climatology products.
- Large-scale BGC models maintained in our own institution
- Large scale BGC models provided by external institutions other than Copernicus Marine Service.
- We don't need such inputs.

Q4g [only if Q4b==No, or not only] Would using Copernicus Marine Service products be an option within the next 3 years?

- Yes, we're working on it.
- No, it would require more than 3 years to be implemented.
- No, because of current technical limitations with those products.
- No, because of other reasons.

Q4h [only if Q4g==No because of "other reasons" or "technical limitations"]: For what reasons or limitations ?

Q4i For **validation** of your biogeochemical products, do your OOFs rely on Copernicus Marine Service observation products ?

- Yes
- No

Q4j [only if Q4i==Yes] From which platform?

	Remote Sensing	Argo and other moving autonomous platform	Moorings, tide gauges, and other fixed platforms	Cruises, and ship-cast datasets
Chlorophyll-A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Light attenuation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zooplankton	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nutrients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pH	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Particulate Organic Matter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q4i Can you identify an improvement in the observation product that would help improve its usage in the **validation** procedure?

Q4j For **assimilation** of your biogeochemical products, do your OOFS rely on Copernicus Marine Service observation products ?

- Yes
- No

Q4h [only if Q4j==Yes] From which platform?

	Remote Sensing	Argo and other moving autonomous platform	Moorings, tide gauges, and other fixed platforms	Cruises, and ship-cast datasets
Chlorophyll-A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Light attenuation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Turbidity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zooplankton	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nutrients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pH	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q4i Can you identify an improvement in the observation product that would help improve its usage in the **assimilation** procedure?

Q5a. Do your OOFS produces/provides products related to waves?

- Yes
- No [-> Skips all following Q5 questions]

Q5b Do your OOFS relies on operational Copernicus Marine Service wave model data products for initial and/or open boundary conditions?

- Yes, we only use Copernicus Marine Service products.
- Yes, but not only.
- No.

Q5c [only if Q3.1==YES (only or not only)] What specific product(s)?

	I don't use it	retrieve spectral properties from the products	I use it and adapt the temporal variability	I use it and apply systematic bias correction	with another type of pre-processing	I use it as it is
Sea surface wave stokes drift velocity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
wave significant height (SWH)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
wave mean period (MWT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sea surface wave from direction (VMDR)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sea surface wind wave significant height or period (WW)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sea surface swell wave height or period (SW1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q5d Can you identify potential improvements of wave products that would enhance the interface between the Copernicus Marine Service system and your OOFs?

Q5e [only if Q5b==Not only] : For what variable(s) are you relying on another data provider for initial and open boundary conditions?

Q5f [only if Q5b==No, or not only] Which data provider are you relying on for initial and open boundary conditions?

- World Ocean Atlas or other climatology products.
- Large-scale wave models maintained in our own institution
- Large scale wave models provided by external institutions other than Copernicus Marine Service.
- We don't need such inputs.

Q5g [only if Q5b==No, or not only] Would using Copernicus Marine Service products be an option within the next 3 years?

- Yes, we're working on it.
- No, it would require more than 3 years to be implemented.
- No, because of current technical limitations with those products
- No because of other reasons

Q5h [only if Q5g==No because of "other reasons" or "technical limitations"]: For what reasons or limitations ?

Q5i For **validation** of your wave products, do your OOFS rely on Copernicus Marine Service observation products ?

- Yes
- No

Q5j Can you identify an improvement in the observation product that would help improve its usage in the **validation** procedure?

Q5k For **assimilation** of your wave products, do your OOFS rely on Copernicus Marine Service observation products ?

- Yes
- No

Q5i Can you identify an improvement in the observation product that would help improve its usage in the **assimilation** procedure?

Q6a. Do your OOFS produces/provides products related to sea-ice?

- Yes
- No [-> Skips all following Q6 questions]

Q6b Do your OOFS relies on operational Copernicus Marine Service sea ic model data products for initial and/or open boundary conditions?

- Yes, we only use Copernicus Marine Service products.
- Yes, but not only.
- No.

Q6c [only if Q6b==Yes (only or not only)]What specific variable(s) from model data do you use, and do you need to apply any specific processing to those products before their consideration in your operational pipeline?

	I don't use it	I use it and implement a specific remapping of state variables	I use it and adapt the temporal variability	I use it and apply systematic bias correction	I use it, with another type of pre-processing	I use it as it is
Sea ice velocity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Snow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Albedo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Iceberg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sea ice thickness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
sea ice concentration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q6d Can you identify potential improvements of sea ice products that would enhance the interface between the Copernicus Marine Service system and your OOFs?

Q6e [only if Q6b==Not only] : For what variable(s) are you relying on another data provider for initial and open boundary conditions?

Q6f [only if Q6b==No, or not only] Which data provider are you relying on for initial and open boundary conditions?

- World Ocean Atlas or other climatology products.
- Large-scale models maintained in our own institution
- Large scale models provided by external institutions other than Copernicus Marine Service.
- We don't need such inputs.

Q6g [only if Q6b==No, or not only] Would using Copernicus Marine Service products be an option within the next 3 years?

- Yes, we're working on it.

- No, it would require more than 3 years to be implemented.
- No, because of current technical limitations with those products
- No because of other reasons

Q6h [only if Q6g==No because of “other reasons” or “technical limitations”]:

For what reasons or limitations ?

Q6i For **validation** of your sea ice products, do your OOFS rely on Copernicus Marine Service observation products ?

- Yes
- No

Q6j Can you identify an improvement in the observation product that would help improve its usage in the **validation** procedure?

Q6k For **assimilation** of your sea ice products, do your OOFS rely on Copernicus Marine Service observation products ?

- Yes
- No

Q6l Can you identify an improvement in the observation product that would help improve its usage in the **assimilation** procedure?

Q7 If you would allow us to contact you for questions on your contributions, please fill your email below
