



Marine Data 4 Arctic Ocean

Training Workshop
6-7 November 2024



PROGRAMME OF
THE EUROPEAN UNION



Implemented by
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Introduction

Here you will find the unanswered questions of the training workshop “Marine Data 4 Arctic Ocean” held the 6th and 7th of November 2024. 690 people took part of the event, hence this post-event report.

Please keep in mind that some questions asked were very similar, as a result we've summarized the different topics you covered in the Q&A 😊

We thank you again for your presence and hope to see you again!

1) Session #1 – Products & Use Cases

General questions

- How will a possible discharge of cold water from the Beaufort Gyre impact other marine currents of the Atlantic Ocean?

We invite you to look for research papers that will provide you with a full description of their working methods and the calculations/models/data they use. You can look on [ResearchGate](#), [Connected Papers](#), [Google Scholar](#) and many others.

General questions about the Copernicus Marine Service

Some useful links :

- [Home | CMEMS](#)
- Products catalogue : [Copernicus Marine Data Store | Copernicus Marine Service](#)
- Past use cases : [Use Cases | CMEMS](#)
- Everything you need as a user : [User Corner | CMEMS](#)
- Tutorials from past events : [E-learning materials | CMEMS](#)
- Is the data freely available or do we need to pay?

The visualization, the access and the download of data are totally free: [Access data | CMEMS](#)

- Is it planned to extend the FSLE data to global ocean in a future CMEMS product?

A ticket has been made by the user support to answer this question. The report will be updated once the answer is available.

- Is there a complete online training session (with details) that help beginners to start using these data with machine learning?

There isn't yet but it is a nice idea! We will probably try to organize this during 2025 😊

- Is it possible to use a format other than netcdf ?

Yes, it is possible to use a data format other than .nc for Copernicus Marine products. You can specify the format of the downloaded data to be either NetCDF or Zarr. To do this, you can use the following options:

- For the Command Line Interface (CLI), use `--file-format <format>` where `<format>` can be `[netcdf | zarr]`.
- For the Python Library (API), use `file_format=<format>` where `<format>` can also be `[netcdf | zarr]`.

By default, the data is delivered in NetCDF format, but if you specify Zarr format, you can download the data in that format as well. Additionally, the majority of Copernicus Marine products are produced in NetCDF format, but they can also be downloaded in Zarr format via the Copernicus Marine Toolbox, and some datasets provide GeoTIFF and Shapefile data.

Here is a link to an article to look into it in detail:

[What are the formats of Copernicus Marine products? | Copernicus Marine Help Center](#)

MyOceanPro Viewer Demonstration : [MyOcean Viewer | CMEMS](#)

- Can we save our progress or history to continue our work later or to make some corrections or edits?

Yes, in MyOcean Pro Viewer, you can save your work progress. The tool allows you to save graphs in your session, which means you can continue your work later or make corrections and edits as needed. Additionally, you can minimize and expand graph windows, which can be useful for managing your workspace and focusing on specific data or analyses.

User testimony #1 – Jiping Xie (Nansen Environmental and Remote Sensing Center)

Link to Jiping's paper: <https://os.copernicus.org/articles/15/1191/2019/>

We answered all of the questions during his Q&A session, you can have a look at the replay if you wish.

User testimony #2 – Ana Maria Mancho (Spanish National Research Council)

Link to Ana Maria's paper: <https://digital.csic.es/handle/10261/200923>

- If Lagrangian descriptors are considered for path planning, how effective are they for guiding submarine navigation?

Here is the link of the publication Ana mentioned: [Lagrangian coherent structure assisted path planning for transoceanic autonomous underwater vehicle missions | Scientific Reports](#)

User testimony #3 – Keguang Wang (Norwegian Meteorological Institute)

Link to Keguang's paper: <https://tc.copernicus.org/articles/17/4487/2023/>

We answered all of the questions during his Q&A session, you can have a look at the replay if you wish.

User testimony #4 – Susanna Winkelbauer (University of Vienna)

Links to Susanna's papers:

- <https://hess.copernicus.org/articles/26/279/2022/>
- <https://doi.org/10.5194/gmd-17-4603-2024>
- <https://doi.org/10.5194/sp-1-osr7-14-2023>
- <https://doi.org/10.1007/s00382-024-07105-5>

- Do you plan to use occupancy grid maps in your research, and if so, how do you envision incorporating AI techniques to enhance their effectiveness?

No, as of now we do not plan to use occupancy grid maps.

- What was the type of chart in which Susanna represented the currents?

It was a Hovmöller diagram, often used for studies on a vertical profil.

- Have you tried volume flow also for Agulhas Current? Is it biased?

We have not (yet). However, we plan to assess many additional currents in the upcoming Reanalyses Intercomparison Project (MER-EP), which is planned to start next year. Whether we'll include Agulhas Current really depends on the availability of observational data for validation (I don't know what's available in this region from the top of my head).

2) Session #2 – Practical session

General questions

- How do I download CMEMS data directly using R?

As I mentioned in the presentation, it is possible to download CMEMS data using the toolbox. You can refer to this article to look into this in detail! <https://help.marine.copernicus.eu/en/articles/8638253-how-to-download-data-via-the-copernicus-marine-toolbox-in-r>

The Copernicus Marine Toolbox

Some useful links :

- [Copernicus Marine Toolbox - Introduction | Copernicus Marine Help Center](#)
- [Copernicus Marine Toolbox - Installation | Copernicus Marine Help Center](#)
- Why dates have to be different between original files and subset?

The difference in time units between data downloaded via the graphical user interface (GUI) and the original files is a result of the data homogenization process used by the GUI. When you subset data via the portal, it provides the time units as seconds since 1970 for all datasets, which is a standardized format to facilitate data visualization. However, when you use the Copernicus Marine Toolbox or access the original data directly, you will receive the original time units as they were in the original files. This homogenization does not occur when using the Copernicus Marine Toolbox for subsetting, hence the difference in time units between the two methods.

- Open_dataframe and open_dataset do not require prior download? 2. can you also quickly summarize the subset function as well?

The subset function in the Copernicus Marine Toolbox is designed to allow users to download extracts of data from a dataset by selecting specific variables, geographical areas, time ranges, or depth ranges. This function is part of a free tool that facilitates the exploration of product metadata, subsetting of datasets, and downloading of original files from producers without quotas. It is available both as a Command Line Interface (CLI) and a Python Library (API), making it a versatile tool for accessing and manipulating large datasets and retrieving only the relevant information needed for a particular analysis or project.

- Is there difference between copernicusmarine open_dataset and xarray open_dataset?

The `copernicusmarine.open_dataset` function is a specialized tool for loading xarray datasets that provides a single interface for remote retrieval of data from different Copernicus Marine services. It allows users to specify various parameters to customize the returned object, such as geographical bounds, temporal and depth ranges, and more. This function is part of the Copernicus Marine Toolbox API, which is designed to facilitate access to and manipulation of

marine data sets. On the other hand, the standard `xarray.open_dataset` function is a more general-purpose tool that is part of the `xarray` library. It is used to load datasets into `xarray` data structures without the specific customizations and services provided by the Copernicus Marine Toolbox API. While both functions serve to open datasets, the `copernicusmarine.open_dataset` function is tailored to interact with Copernicus Marine data services and may offer additional functionalities or conveniences for users working with Copernicus Marine data.

- Is there a way to find the dataset id straight from the toolbox without going to the homepage?

No, it's not possible. To get the `dataset_id`, you will have to retrieve it from the datastore when selecting your product. You can also obtain it by using the 'Add a Layer' option in the MyOceanPro tool, which will take you to the datastore where you can select your `dataset_id` from your product page.

- Not sure if it's relevant but is it possible to make a sea ice loss map directly on the command line?

No, it's not possible to plot a map variable on the command line; however, you can do that using the Python API. As for browsing and downloading the data, as I mentioned in the presentation, all the functions are executable in both the command line interface and the Python API!

- Open_dataframe function works too when you have data in EASE Grid ?

In the context of working with EASE Grid data, the `read_dataframe` function can indeed be useful for reading data, provided the grid data is in a format that can be structured into a dataframe. However, some preprocessing might be required if the EASE Grid format differs significantly from typical dataframe-compatible formats (e.g., CSV, Parquet).

If the data is in EASE Grid format, you might need a compatible library or conversion step (such as using GDAL or another geospatial library) to correctly interpret the grid structure before loading it into a dataframe. Once converted or adapted, you can use `read_dataframe` to handle it within your workflow, especially for data analysis or transformation tasks.

- Will there be information about displaying rotated coordinates? Arctic data is often in those rotated coordinates that are a bit tricky to display with cartopy

To get more information about displaying rotated coordinates using Cartopy, you can refer to this section on our e-learning materials webpage. You can proceed to download the related notebook, which contains examples on how to display Arctic data! <https://marine.copernicus.eu/services/user-learning-services/visualizing-sea-ice-products-arctic-ocean>

Jupyter Notebooks – Alexandre Homerin (Noveltis)

All of the questions were answered during the event. You can watch the replay if you wish or download the tutorial if you didn't yet 😊 : [Jupyter Notebook tutorials](#)

QGIS – Alexandre Homerin (Noveltis)

All of the questions were answered during the event. You can watch the replay if you wish or download the tutorial if you didn't yet 😊 : [QGIS](#)

R Studio – Simon Millet (Noveltis)

All of the questions were answered during the event. You can watch the replay if you wish or download the tutorial if you didn't yet 😊 : [R](#)

Thanks again for your participation 😊