DOCUMENT INFORMATION

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Guidelines for downloading Copernicus marine data from Earth observation satellites

Working draft 1.0 – November 2024

Preface

The "Guidelines for Downloading Copernicus Marine Data from Earth Observation Satellites" provide a step-by-step approach to accessing and utilizing critical data within GIS projects that support aquaculture animal health. Leveraging the Copernicus marine environment monitoring service is essential for two primary applications in these projects: first, as a dynamic background map, providing essential geographical and environmental context for the project area; and second, as a comprehensive source of bio-chemical and physical information. In this latter context, Copernicus Marine Data can be used to develop spatial analysis and mathematical models that describe aquaculture distribution, forecast disease spread or support other application where marine biochemical and physical parameters can influence the animal health.

Incorporating Copernicus data into aquaculture health GIS project contributes to understanding the “environmental” impacts on animal health. The guidelines in this document offer technical and practical insights, ensuring users can seamlessly integrate Copernicus Marine Data into their analytical workflows to support informed decision-making in aquaculture health management.

Copernicus Marine Data

In aquatic animal health GIS projects, Copernicus Marine Data provides a series of biochemical and physical datasets that represent marine conditions. Key types of data include:

Sea Surface Temperature (SST): SST data is essential for assessing optimal environmental conditions for aquaculture species, monitoring stress from temperature fluctuations, and identifying temperature-related disease risks.

Chlorophyll concentration: this data offers information about the phytoplankton, which is used to indicate algal bloom occurrences and primary productivity. High chlorophyll levels can impact water quality and may be linked to health issues in certain aquatic species.

Salinity: salinity levels affect species tolerance and distribution, and variations can influence disease spread. This data is crucial for spatial analysis in aquaculture health projects, especially for species sensitive to salinity changes.

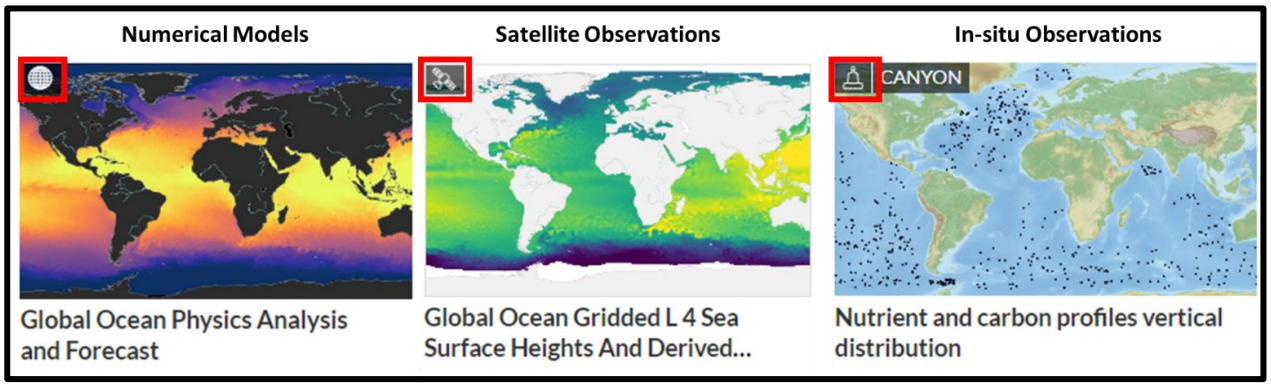
Currents and water circulation patterns: data on currents aids in tracking the potential spread of pathogens and pollutants, assisting models that predict the dispersion of diseases and environmental impacts.

Dissolved oxygen: oxygen level are critical for aquatic animal health because they influence species viability and susceptibility to diseases. Monitoring dissolved oxygen supports early warnings for low-oxygen events, which may increase stress and mortality risks.

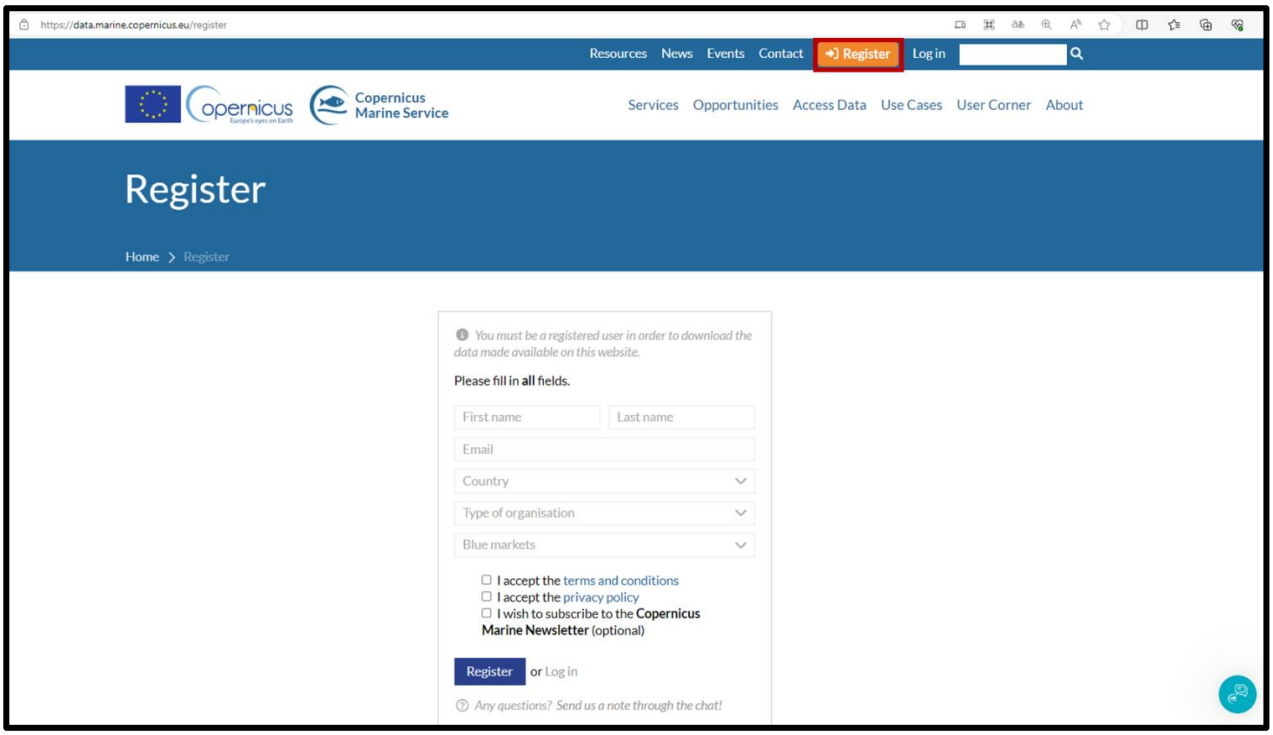
Nutrients: High nutrient concentrations (e.g., nitrates, phosphates) can lead to eutrophication, harmful algal blooms, and degraded water quality. Nutrient data helps assess the suitability of areas for aquaculture and identify potential environmental stressors.

Copernicus Marine Data Store

The Copernicus Marine Service is a component of the Copernicus Program, the European Union's Earth observation and monitoring initiative. Its goal is to provide readily accessible information to enhance maritime services and address issues related to the marine environment, maritime safety, and resources. The service delivers a variety of data and products related to seas and oceans, with datasets in the Copernicus Marine Data Store sourced from numerical models, satellite data, and in-situ observations.



To access and download data from the Copernicus Marine Data Store, you must be a registered user. Visit https://data.marine.copernicus.eu/register, complete the registration form and click the “Register” button to finalize your free profile registration.



After registering, you will receive a confirmation email and you must set your password before logging in to the Copernicus platform.

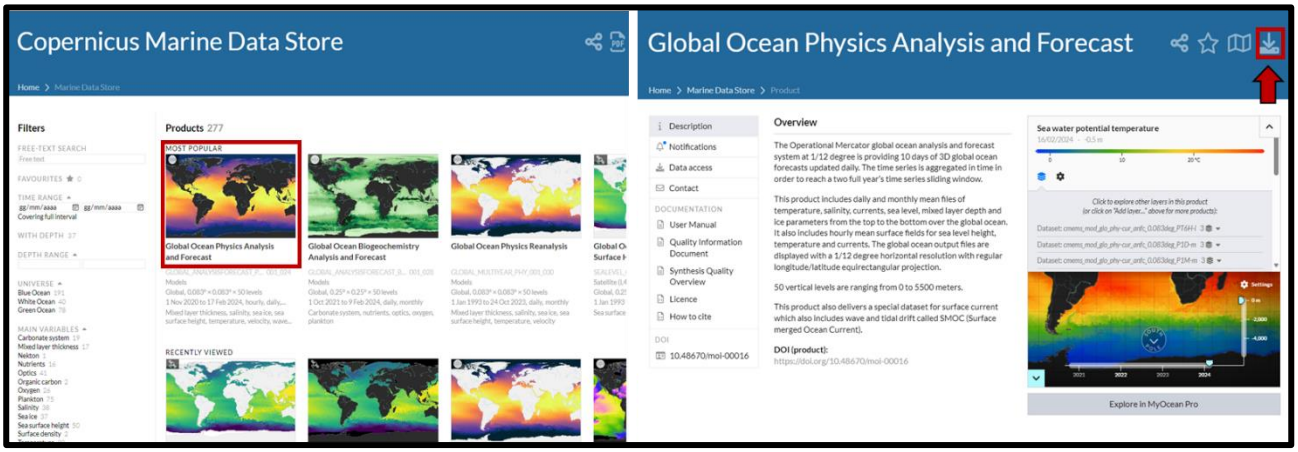
Data format:

The data format used by the platform is NetCDF (Network Common Data Form), the default format for Copernicus data. NetCDF facilitates the efficient creation, access, and dissemination of array-oriented scientific data and is widely recognized as a standard for the exchange of scientific information. More information on the NetCDF file format is available here.

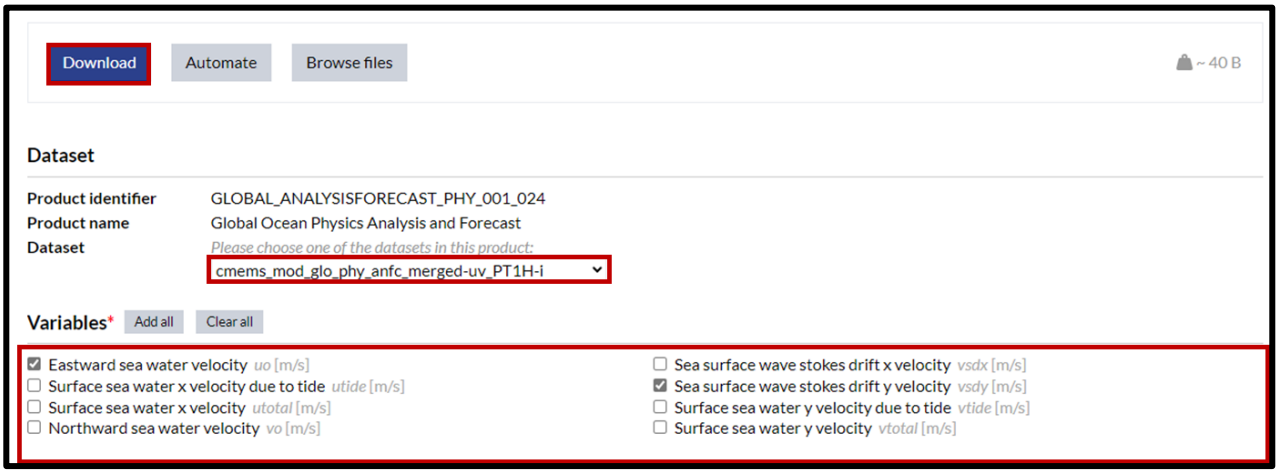
Downloading Copernicus Marine data

The initial step is to download the NetCDF file. Begin by selecting a Copernicus Marine data access endpoint that fits your needs. For example, to incorporate the **Global Ocean Physics Analysis and Forecast** into your QGIS project, visit the Copernicus Marine Data website at https://data.marine.copernicus.eu/products.

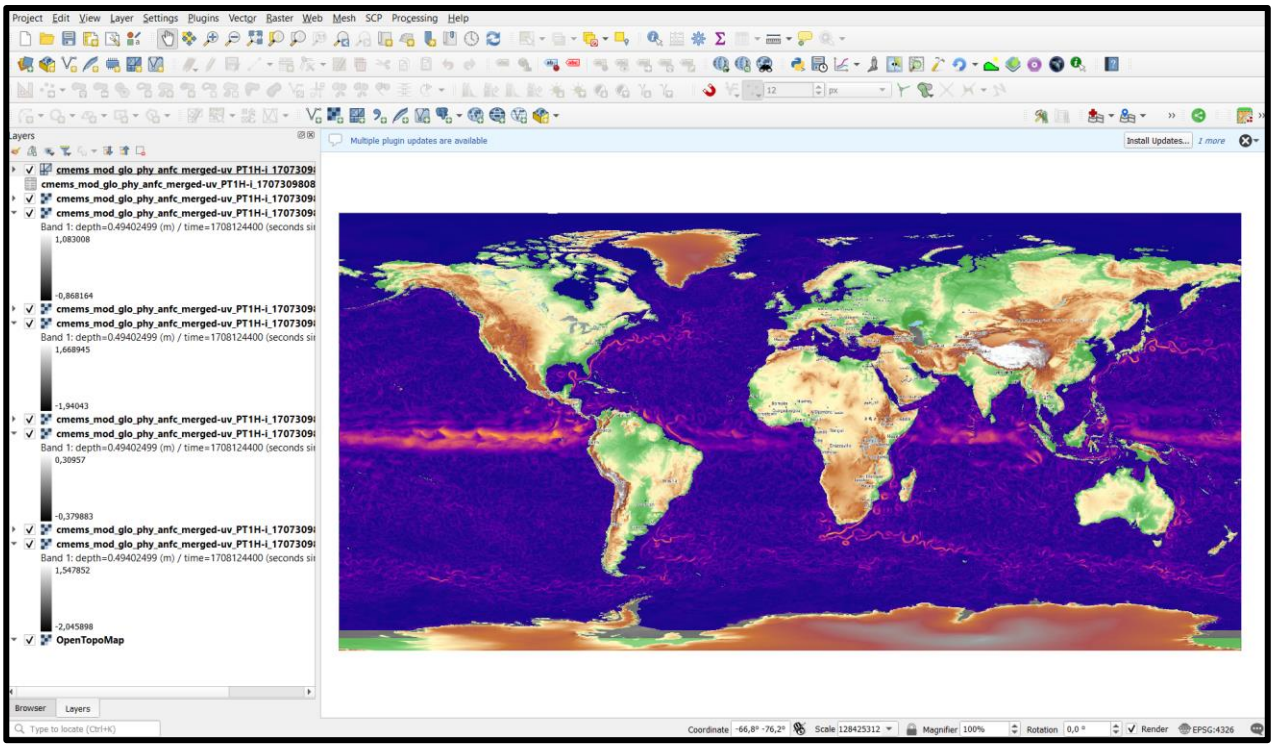
Browse the website to locate the specific dataset you are interested in. Click on the 'Download data' option to initiate the download of the NetCDF file, as illustrated in the images below.



At this stage, you can select the desired dataset and variables. Once chosen, click on the “Download” button, as shown in the images below.



Now, you can open your downloaded marine data in QGIS and utilize it for various GIS purposes, as illustrated in the image below.



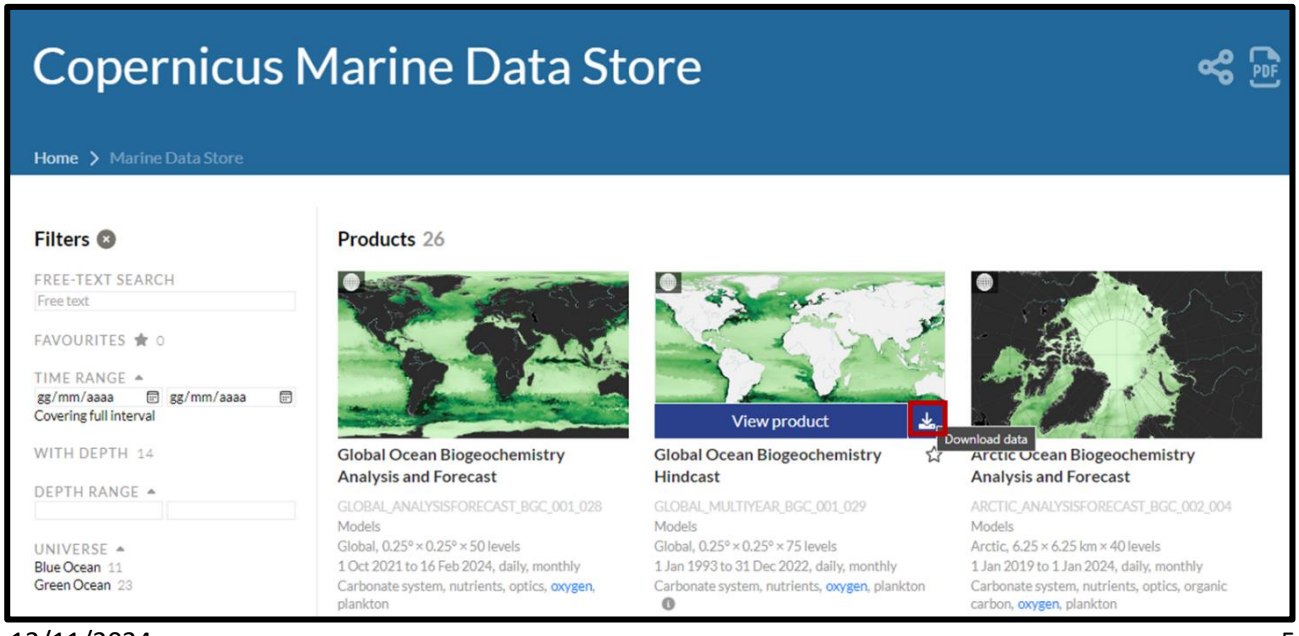
Example of Copernicus Marine data in a QGIS project.

Working with Copernicus Marine Data through Open Geospatial Consortium

Web services and web-based Application Programming Interfaces (APIs) enable users to execute standard functionality over the Web. Similar to how a browser accesses a website via its URL, a Web Service API uses its URL endpoint along with predefined parameters.

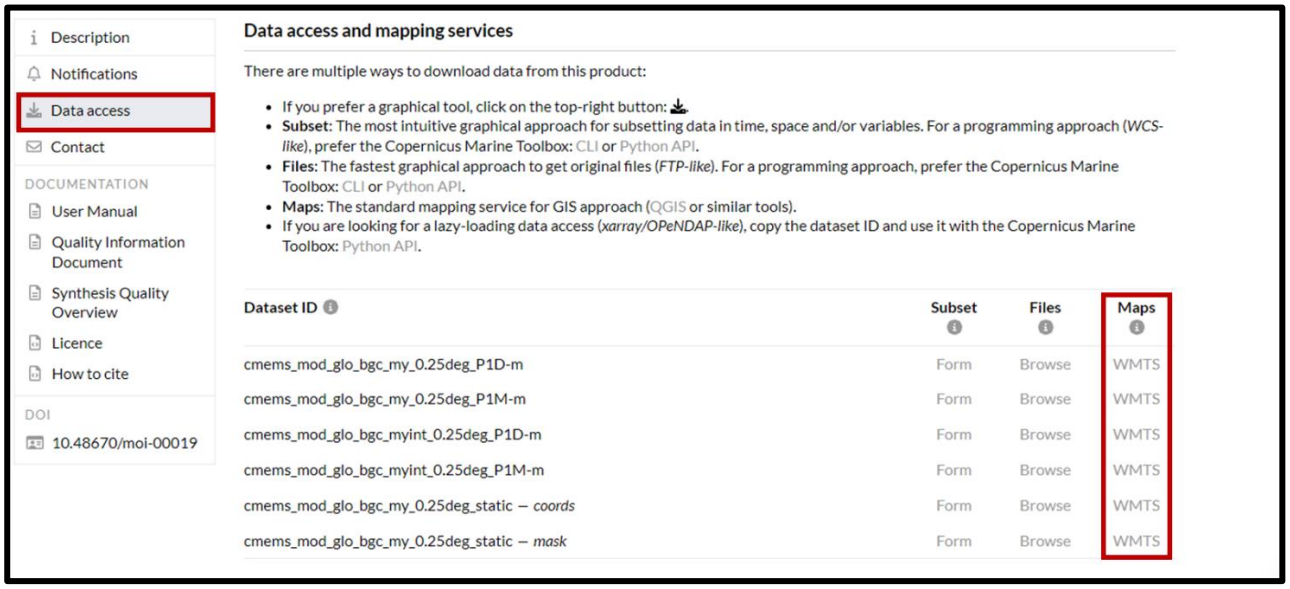
When a user makes an API call, the web server performs background calculations and sends the results back to the user via standard web (HTTP) response. Access to satellite data in GIS projects can be simplified using the Open Geospatial Consortium (OGC) APIs.

To begin, establish a WMTS connection. Visit the Copernicus Marine Data Store (CMDS) at https://data.marine.copernicus.eu/prod4ucts, select the desired product, and click the download button.

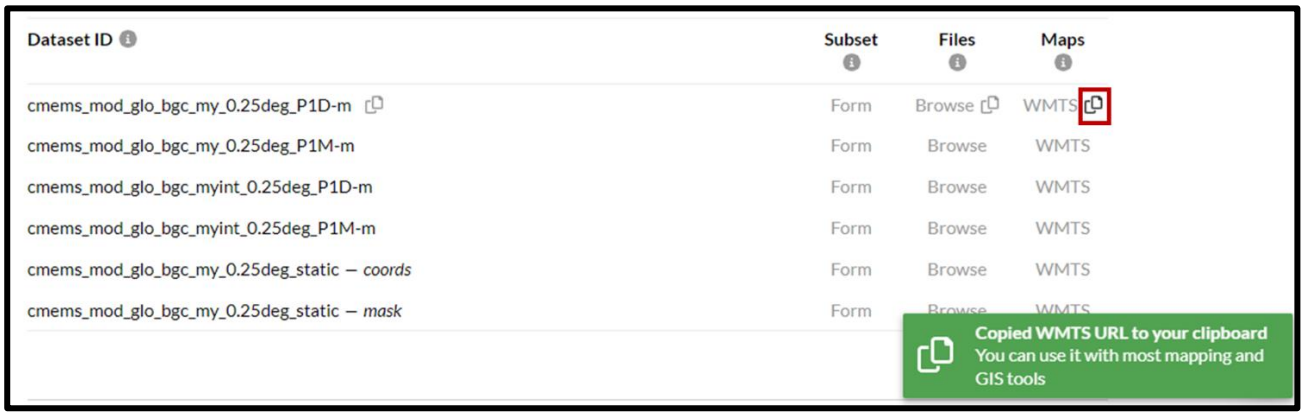


You will be redirected to the Data Access tab on the product information page.

Find the dataset of interest and locate the WMTS column.

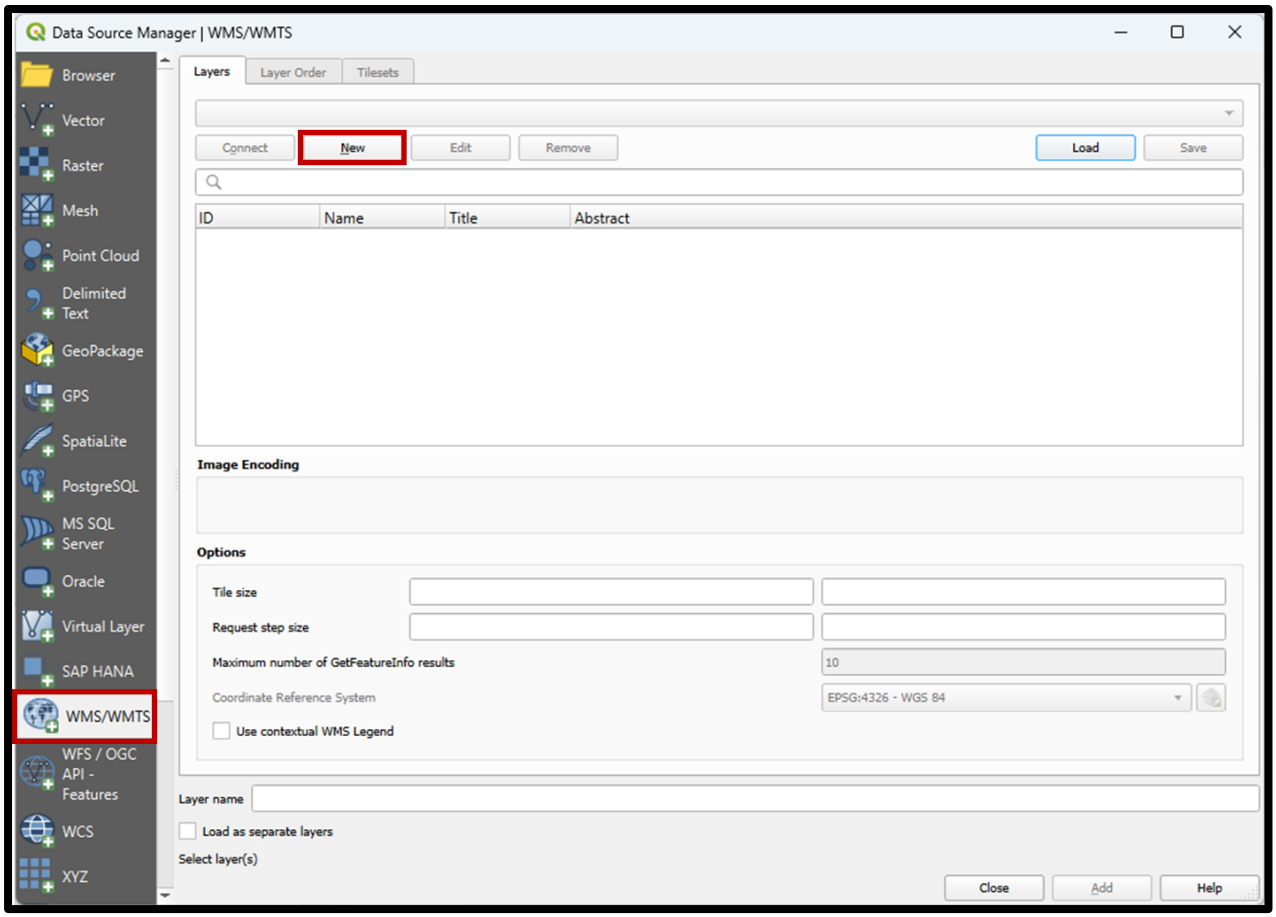


Hover over the WMTS link and copy the URL:

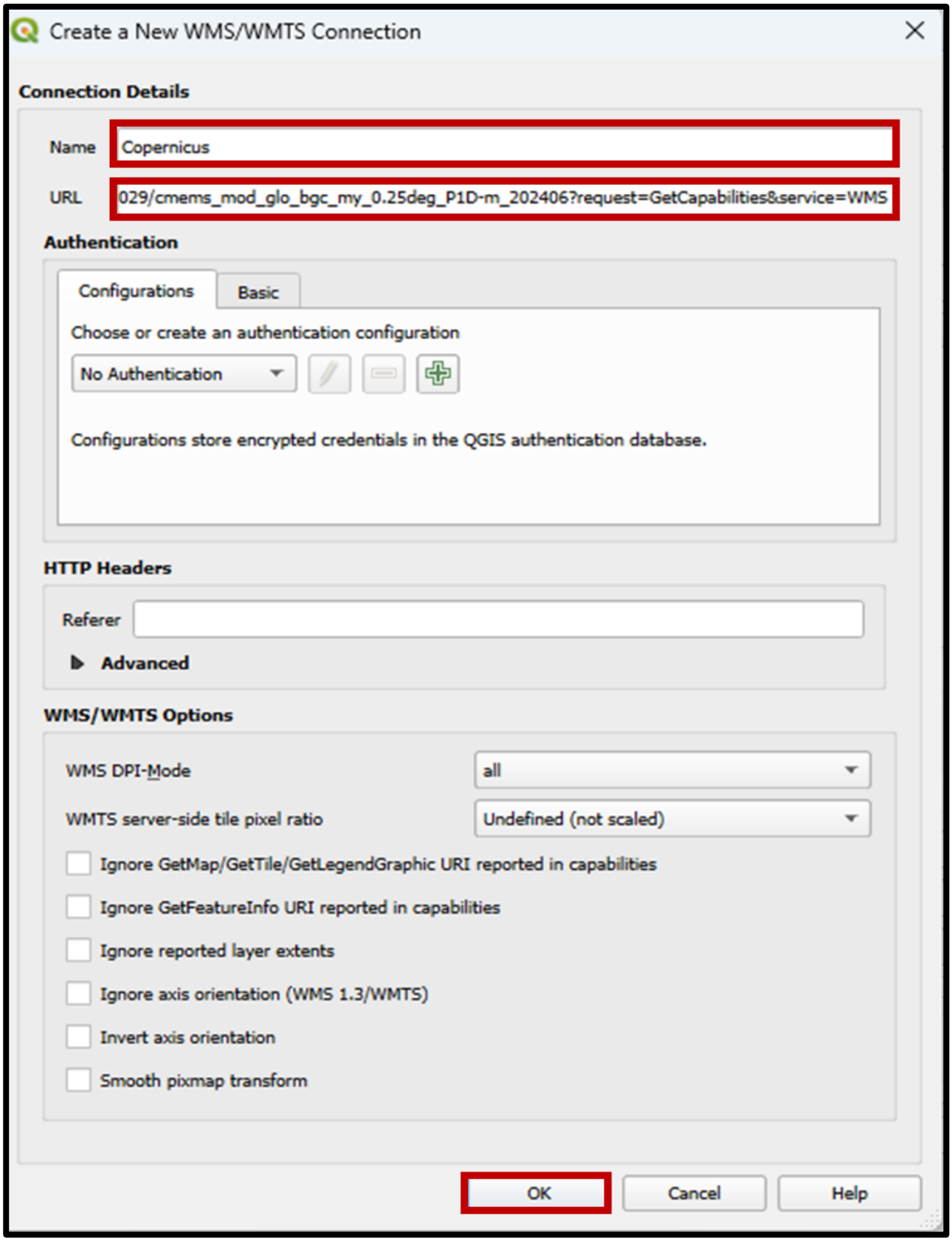


Next, paste the copied URL into your QGIS project. In the QGIS desktop application, open the Data Source Manager and go to the WMS/WMTS section.

Click on the “New” button to create a WMTS connection.

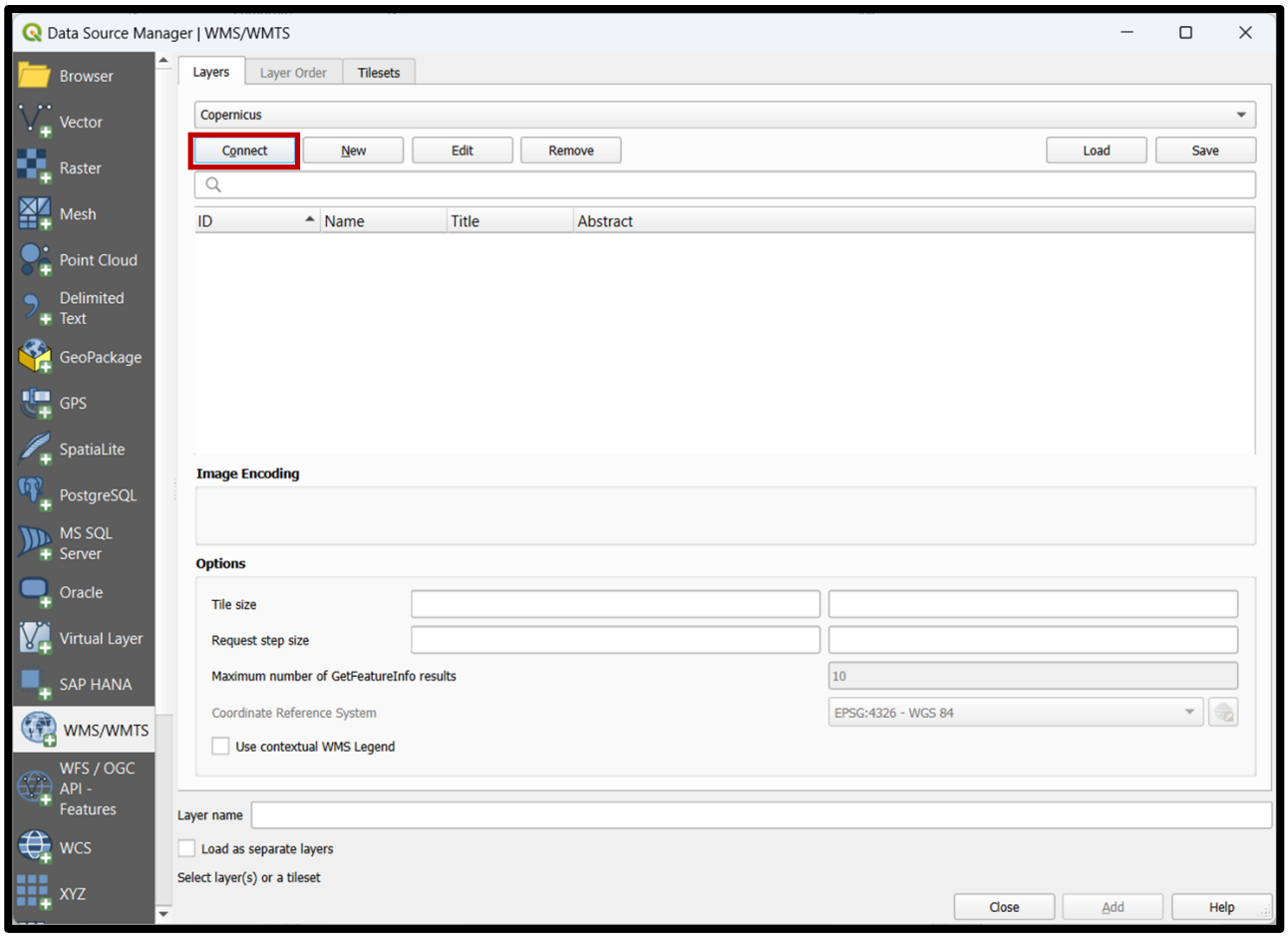


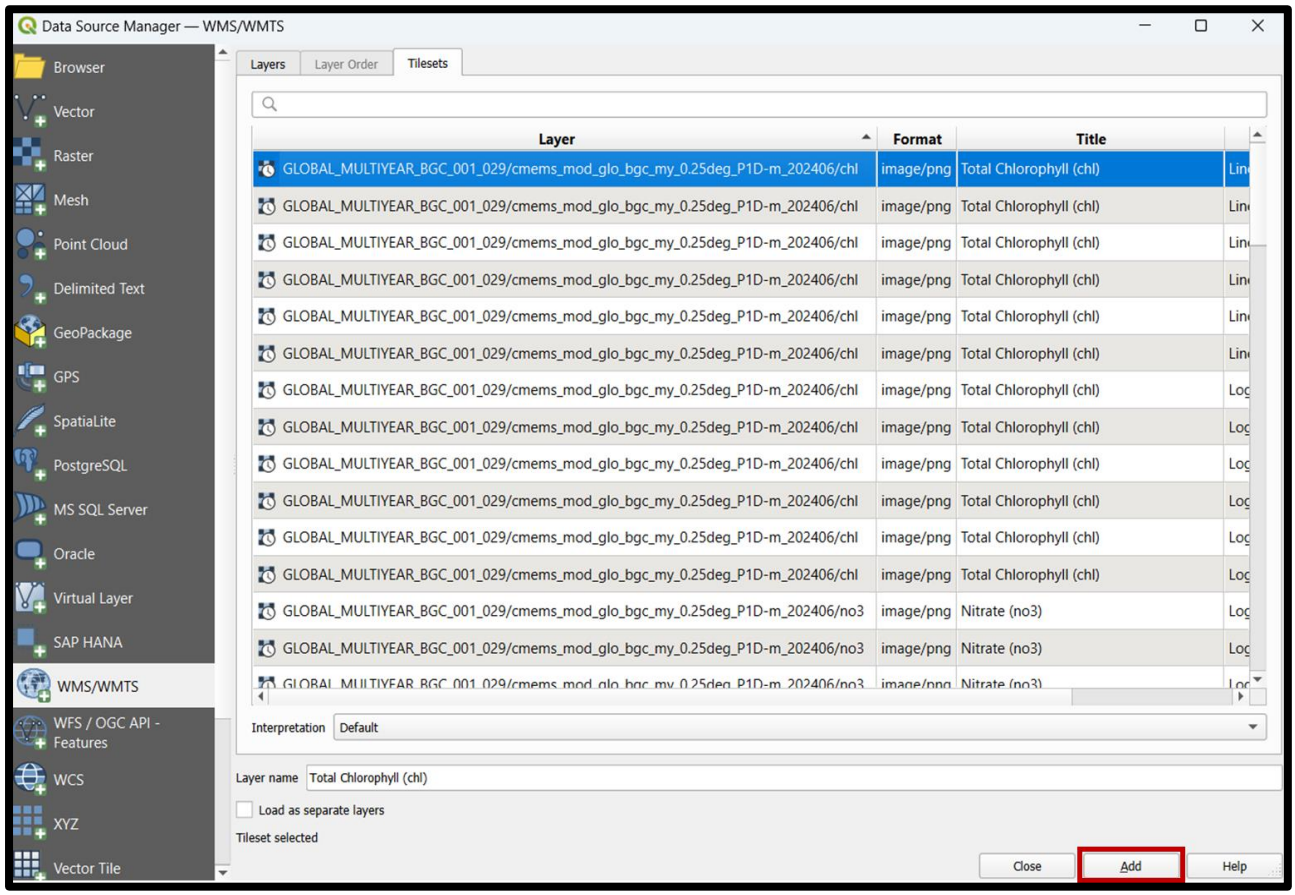
Enter a name for your connection and paste the copied URL into the appropriate field. Click “OK” to save your connection.



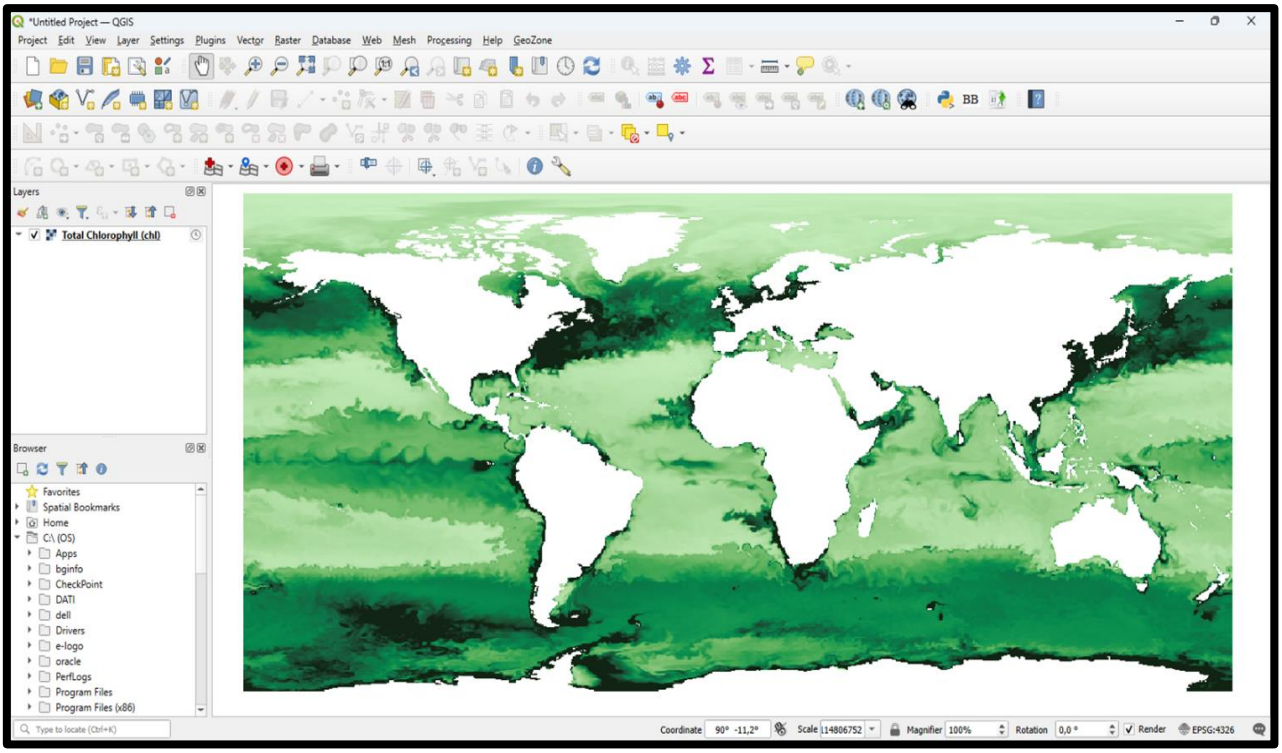
Then, click on the “Connect” button to establish the connection.

Select the desired layer by choosing it and then clicking on the “Add” button.


Data Source Manager | WMS/WMTS
Browser
Vector
Raster
Mesh
Point Cloud
Delimited Text
GeoPackage
GPS
SpatiaLite
PostgreSQL
MS SQL Server
Oracle
Virtual Layer
SAP HANA
WMS/WMTS
WFS / OGC API - Features
WCS
XYZ
Layers
Layer Order
Tilesets
Copernicus
Connect
New
Edit
Remove
Load
Save
ID
Name
Title
Abstract
Image Encoding
Options
Tile size
Request step size
Maximum number of GetFeatureInfo results
10
Coordinate Reference System
EPSG:4326 - WGS 84
Use contextual WMS Legend
Layer name
Load as separate layers
Select layer(s) or a tileset
Close
Add
Help


Data Source Manager — WMS/WMTS
Browser
Vector
Raster
Mesh
Point Cloud
Delimited Text
GeoPackage
GPS
SpatiaLite
PostgreSQL
MS SQL Server
Oracle
Virtual Layer
SAP HANA
WMS/WMTS
WFS / OGC API - Features
WCS
XYZ
Vector Tile
Layers
Layer Order
Tilesets
Layer
Format
Title
GLOBAL_MULTIYEAR_BGC_001_029/cmems_mod_glo_bgc_my_0.25deg_P1D-m_202406/chl
image/png
Total Chlorophyll (chl)
GLOBAL_MULTIYEAR_BGC_001_029/cmems_mod_glo_bgc_my_0.25deg_P1D-m_202406/no3
Nitrate (no3)
Interpretation
Default
Layer name
Total Chlorophyll (chl)
Load as separate layers
Tileset selected
Close
Add
Help

At this point, a pop-up window will appear, prompting you to select the appropriate elevation value. After making your choice, click "OK" to confirm. You have successfully imported a WMTS layer into your QGIS project, as shown in the image below:



Example of Copernicus Marine data in a QGIS project.