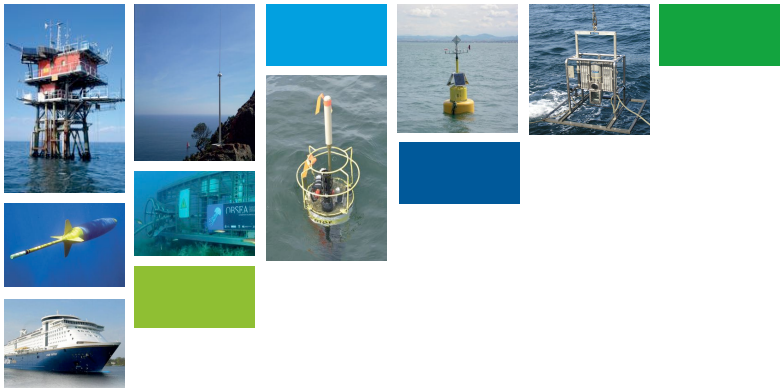


JERICO-NEXT Malta Summer School 2018

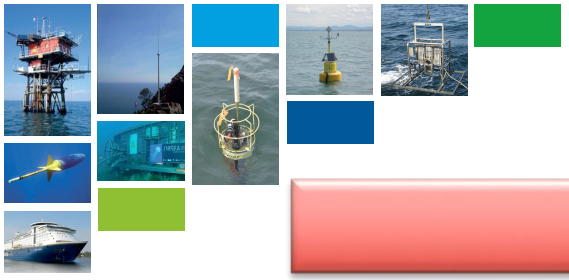
Operational Oceanography for Blue Growth

11th July 2018

CMEMS

Satellite and Model products

R. Lecci – F. Palermo

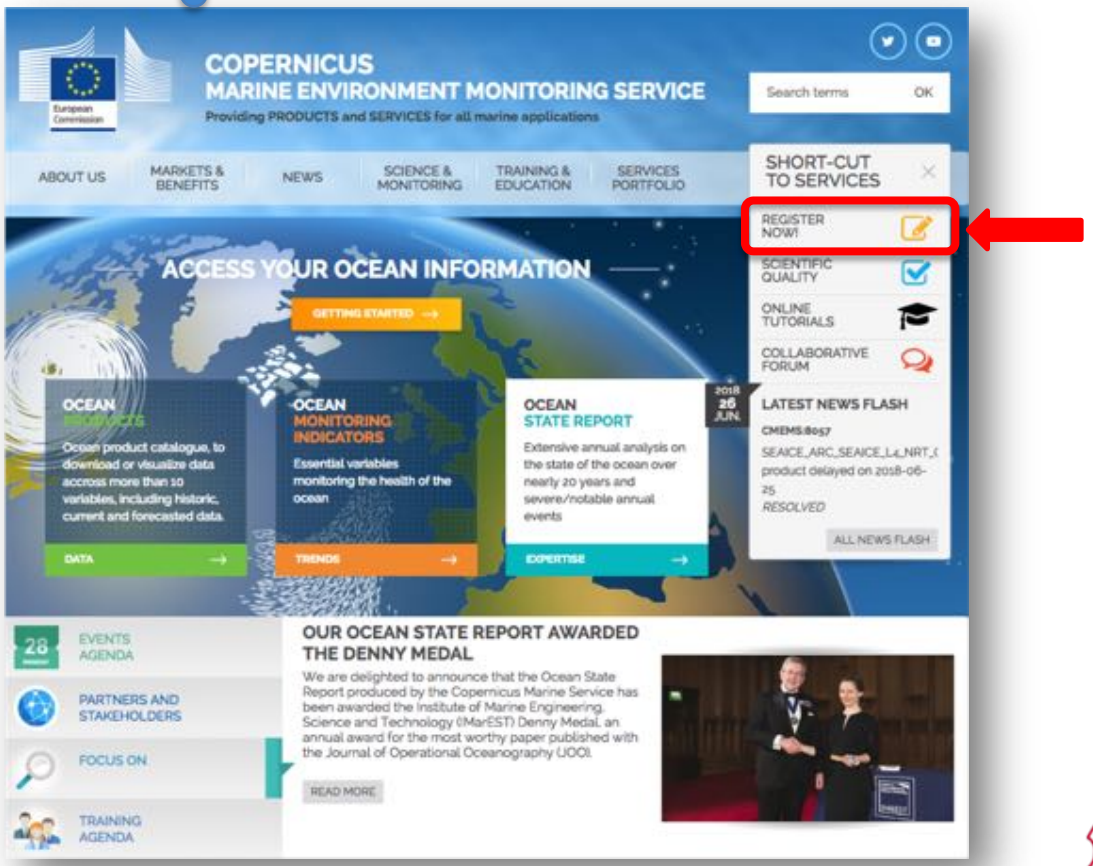


Outline

- Download of CMEMS products
- CMEMS products:
  - Satellite
  - Models
- Practical Applications:
  - Environmental Monitoring
    - Means
    - Anomalies
    - STD
    - Correlations
  - Time series:
    - SOI
    - SSTA
    - Detrending
    - Filtering
  - Interpolation

Download of CMEMS products

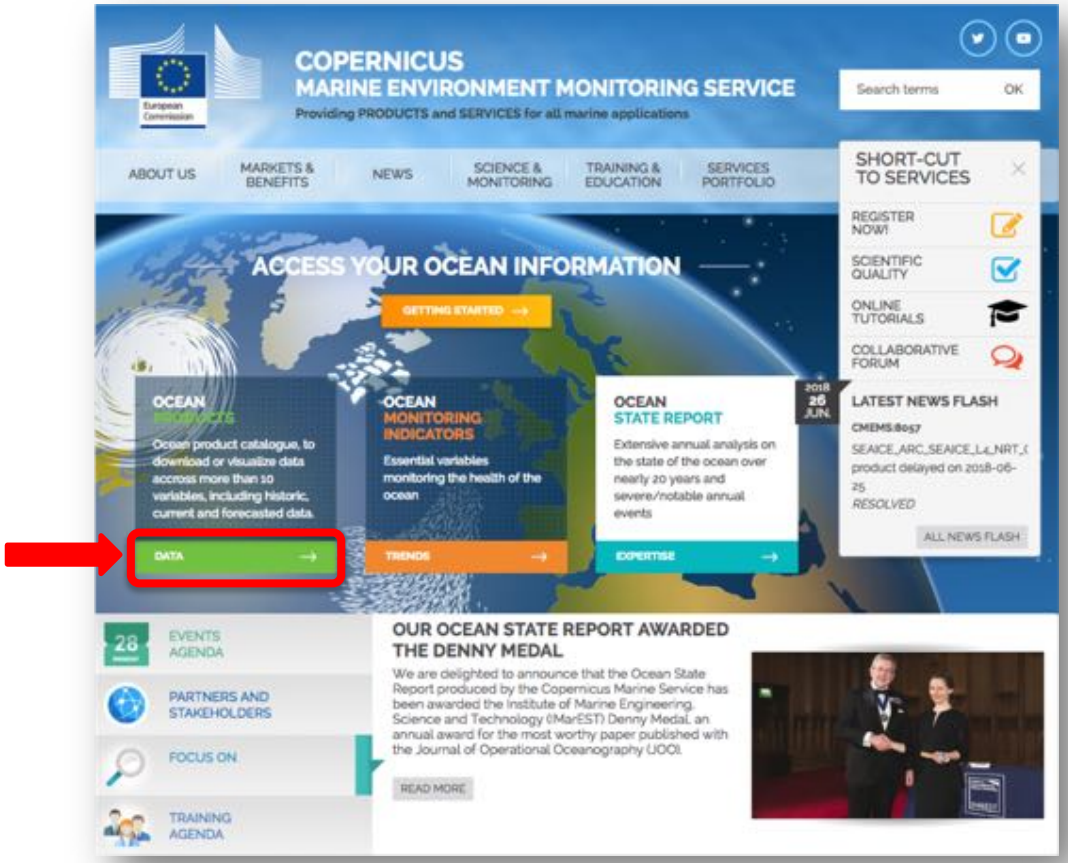
Register, for free,
on
http://marine.copernicus.eu



Services available without registration

- To discover the catalogue of products
- To get in-depth information on products
- To view products
- To access information on products quality
- To get news about products & services
- To use technical FAQs
- To learn latest improvements on products
- To exchange and share on an interactive web-based forum meant for current or future CMEMS users, for scientists implied in ocean knowledge, for CMEMS partners and more generally for the whole CMEMS community.

Download of CMEMS products

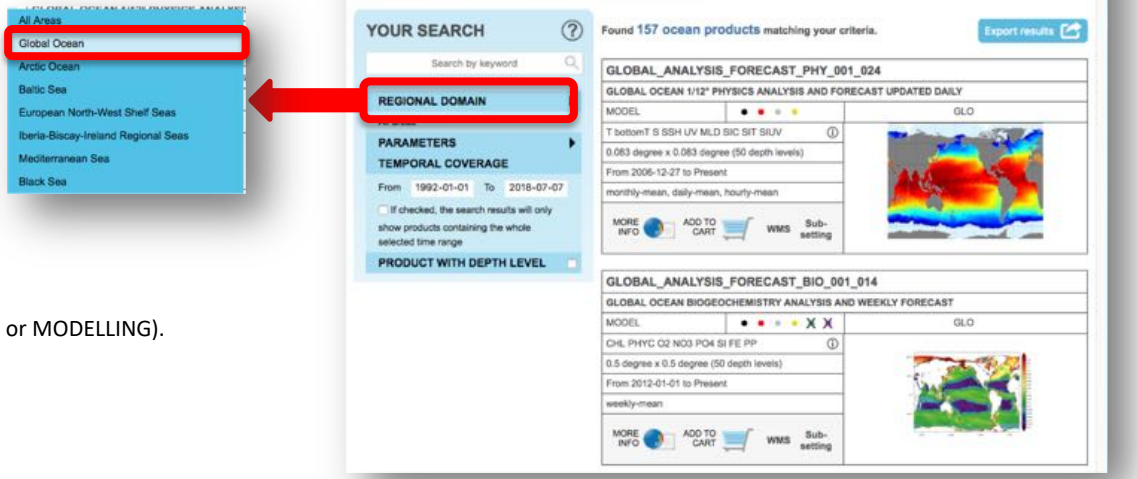


Download of CMEMS products

Download of CMEMS products

The interactive catalogue allows users to select products according to:

- **7 geographical areas** :
  - GLOBAL Ocean,
  - ARCTIC Ocean,
  - BALTIC Sea,
  - Atlantic-European North West Shelf-Ocean,
  - Atlantic-European South West Shelf-Ocean,
  - MEDITERRANEAN Sea,
  - BLACK Sea.
- **Parameters**:
  - Temperature,
  - Salinity,
  - Currents,
  - Sea Ice,
  - Sea Level,
  - Wind,
  - Ocean Optics,
  - Ocean Chemistry,
  - Ocean Biology,
  - Ocean Chlorophyll.
- **Time Coverage**:
  - FORECAST,
  - NEAR REAL TIME,
  - MULTI-YEAR,
  - TIME INVARIANT products (either from OBSERVATIONS or MODELLING).
- **Models or Observations** (Satellite or InSitu)
- **Grid type**
- **Time span**
- **Vertical coverage**
- **Processing Level**
- **Temporal resolution**



Download of CMEMS products

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- **7 geographical areas** :
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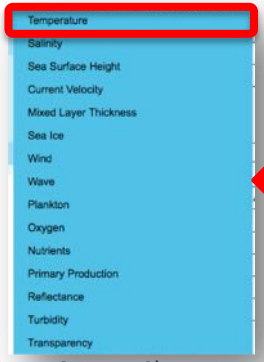
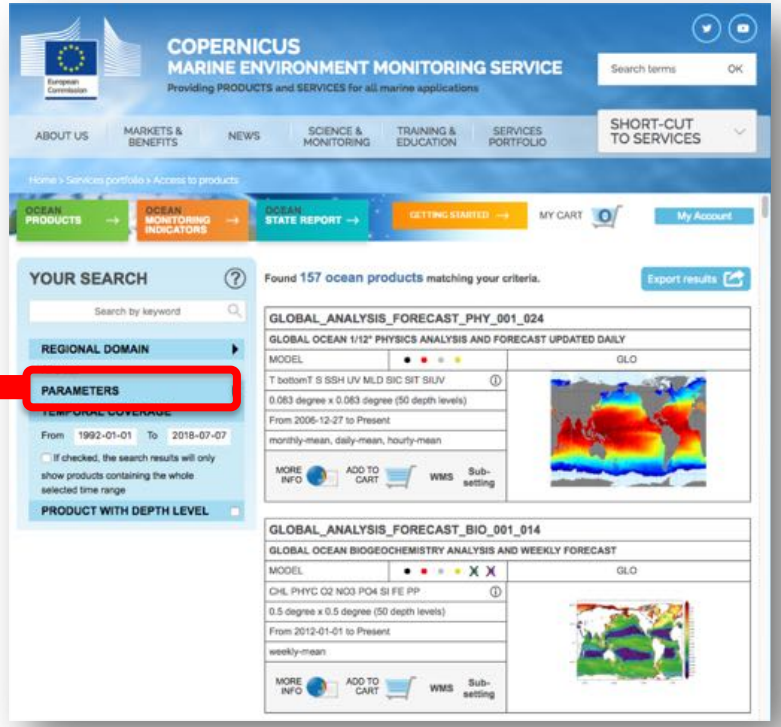
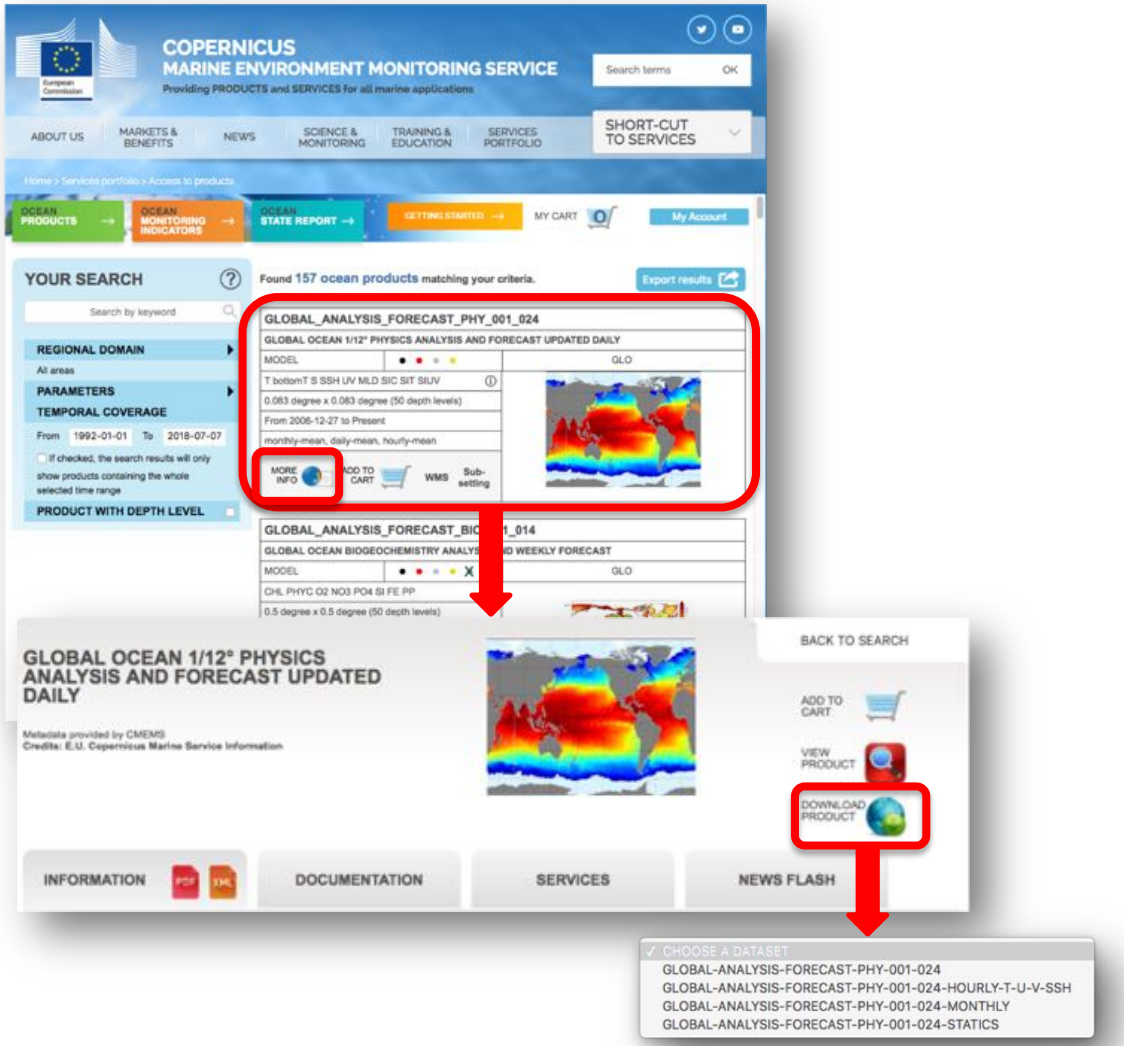




Download of CMEMS products



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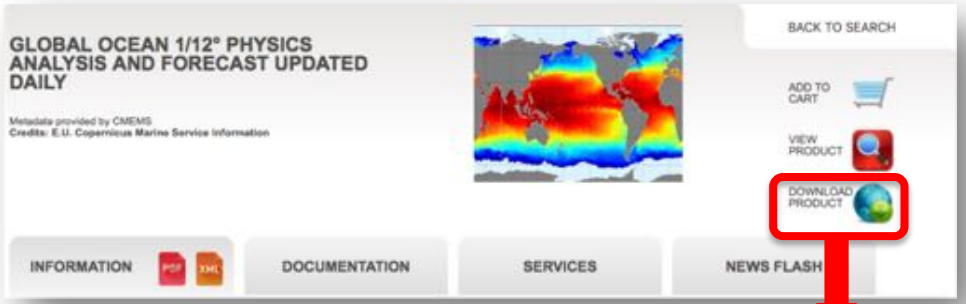
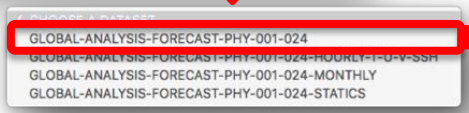
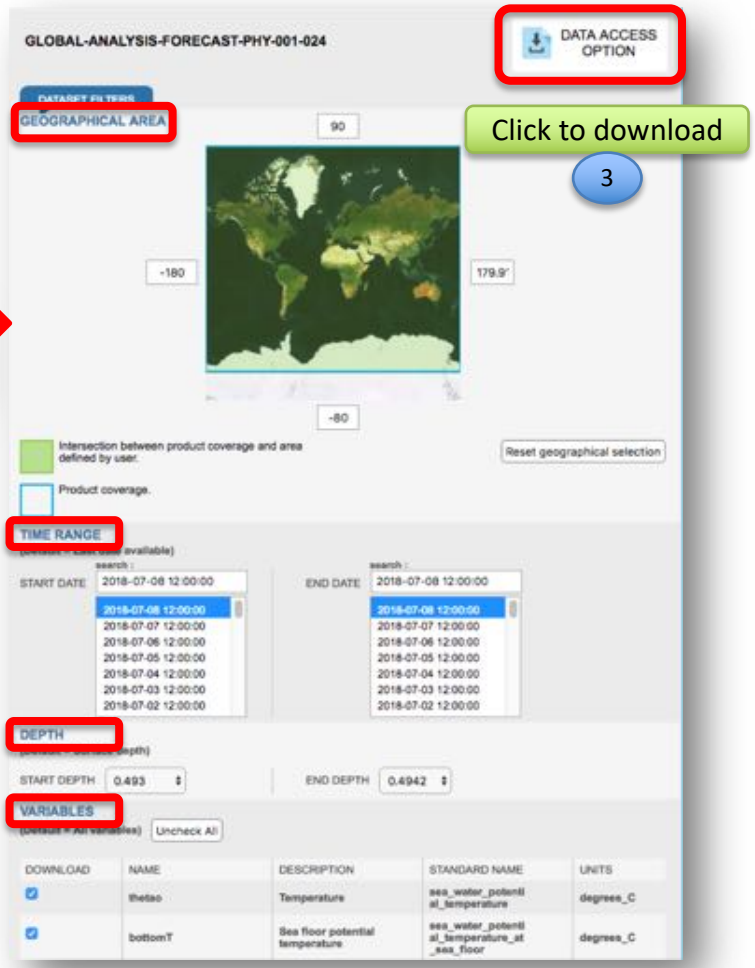
Download of CMEMS products



1 Select your dataset



2 Select and apply your filters



Download of CMEMS products

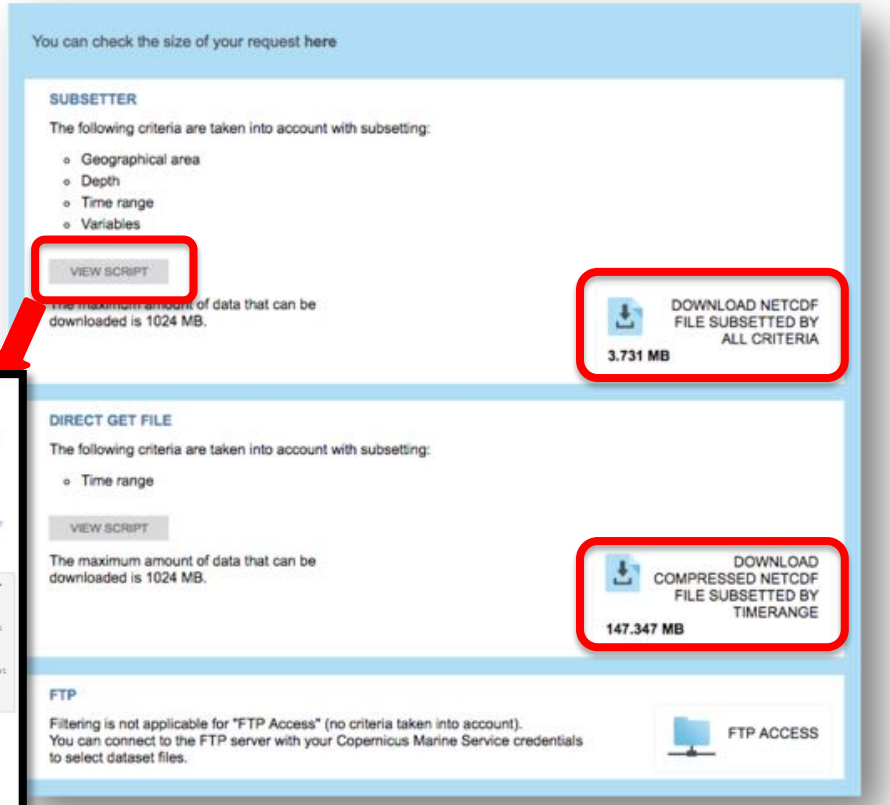
Users are offered different on-line downloading options:

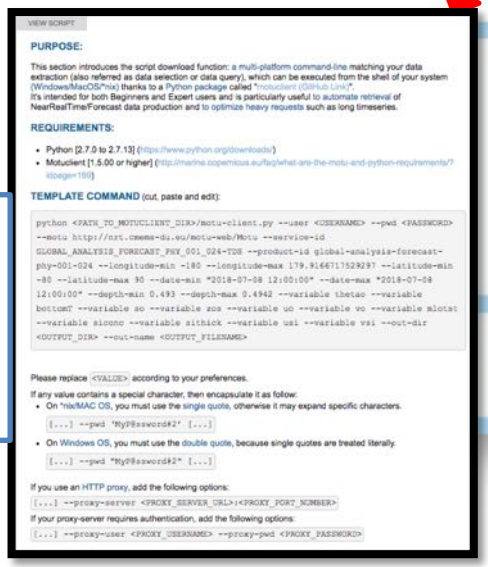
- To download the whole product.
- To extract and download only a part of a product (per area, per variable, for a period of time, some depths).
- To download automatically by using scripts (python) for a regular use.

According to chosen product, various download mechanisms are available:

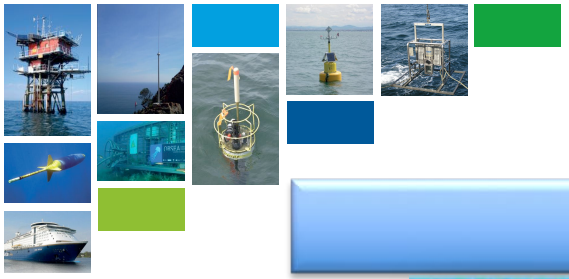
- **SUBSETTER**: HTTPS protocol, allow to subset on (areas/ depth/ time/ variable), available for 75% of the products
- **DIRECTGETFILE**: HTTPS protocol, download the whole file with a time selection, available for 40% of the products
- **FTP**: FTP protocol, download the whole file, available for 85% of the products

The requested data is downloaded in Netcdf format



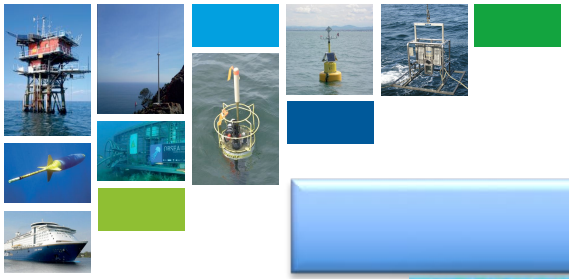


Python command line and **Motu Client** to launch a download request



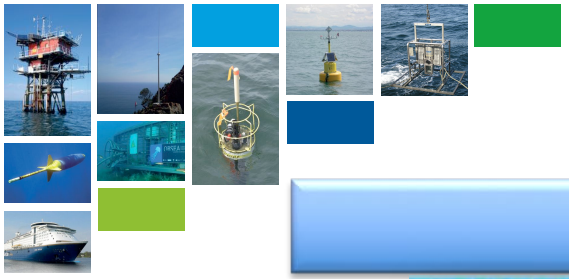
CMEMS products

PARAMETER	MODEL			SATELLITE	
	20years in the past (surface to bottom of the ocean)	Today (surface to bottom of the ocean)	10-day forecast (surface to bottom of the ocean)	20years in the past (surface of the ocean only)	Today (surface of the ocean only)
Sea Surface Height	x	x	x	x	x
Temperature	X	X	X	X	X
Salinity	X	X	X		
Waves	X	X	X		
Currents/velocity	X	X	X		
Mixed Layer Depth	x	x	x		
Sea ice	X	X	X	X	X
Turbidity/Transparency				X	X
Reflectance				X	X
Nutrients	x	x	x		
Primary Production	X	X	X		
Oxygen	X	X	X		
Plankton	x	x	x		
Wind				X	X



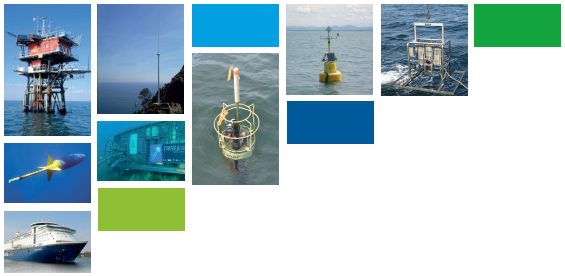
Practical applications: satellite products

PARAMETER	MODEL			SATELLITE	
	20years in the past (surface to bottom of the ocean)	Today (surface to bottom of the ocean)	10-day forecast (surface to bottom of the ocean)	20years in the past (surface of the ocean only)	Today (surface of the ocean only)
Sea Surface Height	x	x	x	x	x
Temperature	X	X	X	X	X
Salinity	X	X	X		
Waves	X	X	X		
Currents/velocity	X	X	X		
Mixed Layer Depth	x	x	x		
Sea ice	X	X	X	X	X
Turbidity/Transparency				X	X
Reflectance				X	X
Nutrients	x	x	x		
Primary Production	X	X	X		
Oxygen	X	X	X		
Plankton	x	x	x		
Wind				X	X



Practical applications: model products

PARAMETER	MODEL			SATELLITE	
	20years in the past (surface to bottom of the ocean)	Today (surface to bottom of the ocean)	10-day forecast (surface to bottom of the ocean)	20years in the past (surface of the ocean only)	Today (surface of the ocean only)
Sea Surface Height	x	x	x	x	x
Temperature	X	X	X	X	X
Salinity	X	X	X		
Waves	X	X	X		
Currents/velocity	X	X	X		
Mixed Layer Depth	x	x	x		
Sea ice	X	X	X	X	X
Turbidity/Transparency				X	X
Reflectance				X	X
Nutrients	x	x	x		
Primary Production	X	X	X		
Oxygen	X	X	X		
Plankton	x	x	x		
Wind				X	X



MATLAB
Practical Applications