



# PRODUCT USER MANUAL

## For Mediterranean Sea Physical Analysis and Forecasting Product

MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013

Issue: 2.3

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**RECORD TABLE**

| Issue | Date       | §   | Description of Change                                                                             | Author                                                    | Validated By                         |
|-------|------------|-----|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------|
| 1.0   | 25/09/2017 | all | Initial version                                                                                   | R. Lecci, M. Drudi, A. Grandi, C. Fratianni, D. Padeletti |                                      |
| 1.1   | 25/01/2018 | all | Changes for product upgrade                                                                       | R. Lecci, A. Grandi, C. Fratianni, E. Clementi, M. Drudi  |                                      |
| 1.2   | 21/01/2019 | all | New template and new datasets                                                                     | R. Lecci, A. Grandi, E. Clementi, M. Drudi                |                                      |
| 1.3   | 06/12/2019 | all | Release of daily-mean products centred at 12:00Z instead of 00:00Z                                | R. Lecci, A. Grandi, M. Drudi, E. Clementi                |                                      |
| 1.4   | 10/09/2020 | all | Revision of timeseries temporal coverage and new atmospheric forcing                              | R. Lecci, A. Grandi, E. Clementi                          | C. Derval                            |
| 2.0   | 15/01/2021 | all | New product and new datasets                                                                      | R. Lecci, A. Grandi, E. Clementi                          | C. Derval                            |
| 2.1   | 10/09/2021 | all | Upgrade of forcing                                                                                | R. Lecci, A. Grandi                                       | C. Derval                            |
| 2.2   | 29/11/2022 | all | Addition of datasets, update of nomenclature and hourly time series forecast extension to 10 days | R. Lecci, A. Grandi, E. Clementi, M. Drudi                | Copernicus Marine Product Management |
| 2.3   | 30/11/2023 | all | Addition of datasets. Removal of hts datasets                                                     | R. Lecci, A. Grandi, E. Clementi, M. Drudi                |                                      |

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## GLOSSARY AND ABBREVIATIONS

|                      |                                                                                                                                                                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis (Numerical) | A representation of the state of the ocean based on numerical modeling ingesting available observations in Near Real Time. The operational production centre produces 4D time-space analysis data.                                            |
| CF                   | Climate Forecast (convention for NetCDF)                                                                                                                                                                                                      |
| CMCC                 | Centro Euro-Mediterraneo sui Cambiamenti Climatici                                                                                                                                                                                            |
| CMEMS                | Copernicus Marine Environment Monitoring Service                                                                                                                                                                                              |
| CMS                  | Copernicus Marine Service                                                                                                                                                                                                                     |
| CTD                  | Conductivity Temperature Depth                                                                                                                                                                                                                |
| DGF                  | DirectGetFile                                                                                                                                                                                                                                 |
| ECMWF                | European Centre for Medium-Range Weather Forecasts                                                                                                                                                                                            |
| FAQ                  | Frequently Asked Question                                                                                                                                                                                                                     |
| Forecast (Numerical) | A numerical forecast or prediction is based on equations governing the motions and the forces affecting motion of fluids. The equations are based, or initialized, on specified ocean conditions at a certain place and time (NOAA Glossary). |
| FTP                  | File Transfer Protocol                                                                                                                                                                                                                        |
| MDT                  | Mean Dynamic Topography                                                                                                                                                                                                                       |
| Med/MED              | Mediterranean                                                                                                                                                                                                                                 |
| Meridional Velocity  | South to North component of the horizontal velocity vector                                                                                                                                                                                    |
| MFC                  | Monitoring and Forecasting Centre                                                                                                                                                                                                             |
| MFS                  | Mediterranean Forecasting System                                                                                                                                                                                                              |
| NEMO                 | Nucleous for European Modelling of the Ocean                                                                                                                                                                                                  |
| NetCDF               | Network Common Data Form                                                                                                                                                                                                                      |
| NOAA                 | National Oceanic and Atmospheric Administration                                                                                                                                                                                               |
| OA                   | Objective Analyses                                                                                                                                                                                                                            |
| OCEANVAR             | Oceanographic variational data assimilation scheme developed at CMCC                                                                                                                                                                          |

|                |                                                                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OpenDAP        | Open-Source Project for a Network Data Access Protocol. Protocol to download subset of data from a n-dimensional gridded dataset (ie: 4 dimensions: lon-lat, depth, time) |
| PU             | Production Unit                                                                                                                                                           |
| SL             | Sea Level                                                                                                                                                                 |
| SLA            | Sea Level Anomaly                                                                                                                                                         |
| SSH            | Sea Surface Height                                                                                                                                                        |
| SST            | Sea Surface Temperature                                                                                                                                                   |
| Subsetter      | Copernicus Marine Service tool to download a NetCDF file of a selected geographical box using values of longitude, latitude and time range                                |
| XBT            | eXpandable BathyThermograph                                                                                                                                               |
| WW3            | WaveWatch-III                                                                                                                                                             |
| Zonal Velocity | West to East component of the horizontal velocity vector                                                                                                                  |
| 3DVAR          | Three-Dimensional Variational                                                                                                                                             |

## I INTRODUCTION

### I.1 Summary

This document is the user manual for the Copernicus Marine analysis and forecast product **MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013**. A rolling archive of analysis over the last two years up to real-time is available on the Marine Data Store.

It contains 3D, monthly mean fields, 24 hours mean fields and hourly mean fields of Potential Temperature, Salinity, Zonal and Meridional Velocity, and by 2D, monthly mean fields, 24 hours mean fields and hourly mean fields of Sea Surface Height, Mixed Layer Depth and Bottom Potential Temperature, 24 hours mean fields of Sea Surface Height assuming no tide and Sea Surface Zonal and Meridional Velocity assuming no tide. It contains also monthly mean fields and 24 hours mean fields of Vertical Velocity and instantaneous 15 minutes fields of Sea Surface Height and Sea Surface Zonal and Meridional Velocity.

MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013 product is organized in 25 datasets:

- 6 datasets contain monthly mean fields: 3D potential temperature, salinity, and currents information from top to bottom and 2D sea surface height, bottom potential temperature, mixed layer thickness information.
  - **cmems\_mod\_med\_phy-tem\_anfc\_4.2km\_P1M-m**
  - **cmems\_mod\_med\_phy-cur\_anfc\_4.2km\_P1M-m**
  - **cmems\_mod\_med\_phy-ssh\_anfc\_4.2km\_P1M-m**
  - **cmems\_mod\_med\_phy-mld\_anfc\_4.2km\_P1M-m**
  - **cmems\_mod\_med\_phy-sal\_anfc\_4.2km\_P1M-m**
  - **cmems\_mod\_med\_phy-wcur\_anfc\_4.2km\_P1M-m**
- 8 datasets contain daily mean fields: 3D potential temperature, salinity, and currents information from top to bottom and 2D sea surface height, bottom potential temperature, mixed layer thickness, sea surface height assuming no tide and sea surface currents assuming no tide information.
  - **cmems\_mod\_med\_phy-tem\_anfc\_4.2km\_P1D-m**
  - **cmems\_mod\_med\_phy-cur\_anfc\_4.2km\_P1D-m**
  - **cmems\_mod\_med\_phy-cur\_anfc\_detided\_4.2km\_P1D-m**
  - **cmems\_mod\_med\_phy-ssh\_anfc\_4.2km\_P1D-m**
  - **cmems\_mod\_med\_phy-ssh\_anfc\_detided\_4.2km\_P1D-m**
  - **cmems\_mod\_med\_phy-mld\_anfc\_4.2km\_P1D-m**
  - **cmems\_mod\_med\_phy-sal\_anfc\_4.2km\_P1D-m**
  - **cmems\_mod\_med\_phy-wcur\_anfc\_4.2km\_P1D-m**

- 3 datasets contain hourly mean fields: 3D potential temperature, salinity, and currents information from top to bottom and 2D bottom potential temperature.
  - **cmems\_mod\_med\_phy-tem\_anfc\_4.2km-3D\_PT1H-m**
  - **cmems\_mod\_med\_phy-sal\_anfc\_4.2km-3D\_PT1H-m**
  - **cmems\_mod\_med\_phy-cur\_anfc\_4.2km-3D\_PT1H-m**
- 5 datasets contain hourly mean fields: 2D sea surface potential temperature, sea surface salinity, sea surface currents, sea surface height, and mixed layer thickness information.
  - **cmems\_mod\_med\_phy-tem\_anfc\_4.2km-2D\_PT1H-m**
  - **cmems\_mod\_med\_phy-sal\_anfc\_4.2km-2D\_PT1H-m**
  - **cmems\_mod\_med\_phy-cur\_anfc\_4.2km-2D\_PT1H-m**
  - **cmems\_mod\_med\_phy-mld\_anfc\_4.2km-2D\_PT1H-m**
  - **cmems\_mod\_med\_phy-ssh\_anfc\_4.2km-2D\_PT1H-m**
- 2 datasets contain 15minutes instantaneous fields: 2D sea surface currents and sea surface height information.
  - **cmems\_mod\_med\_phy-cur\_anfc\_4.2km\_PT15M-i**
  - **cmems\_mod\_med\_phy-ssh\_anfc\_4.2km\_PT15M-i**
- 1 dataset contains the static fields for the system: coordinates, mean sea surface level, mask and bathymetry: **cmems\_mod\_med\_phy\_anfc\_4.2km\_static**

The product is published on the Copernicus Marine dissemination server after automatic and human quality controls. Files downloaded are in NetCDF format.

The analysis and forecasting system is described in the Quality Information Document (see in annex).

Disclaimer: The quality of the product may vary during the proposed time series depending on the possible update of the system.

Information on operational issues on products and services can be found on our [User Notification Service](#). If you have any questions, please [contact us](#).

## I.2 History of changes

| Date       | Description                                                                                                                                                                 |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21.01.2019 | New template and inclusion of new datasets                                                                                                                                  |
| 06.12.2019 | Release of daily-mean products centered at 12:00Z instead of 00:00Z                                                                                                         |
| 10.09.2020 | New timeseries temporal coverage and new atmospheric forcing                                                                                                                |
| 15.01.2021 | New product with the addition of 15 minutes frequency dataset for sea surface currents and sea level<br>Addition of the variable zos_detided in the datasets for sea level. |
| 10.09.2021 | Upgrade of forcing with Po daily observations                                                                                                                               |
| 29.11.2022 | New timeseries, addition of new datasets and hourly time series (15 levels) forecast extension to 10 days in the future                                                     |
| 30.11.2023 | Additional datasets and update of 2Y time series for all datasets. Removal of hts datasets.                                                                                 |

## II DESCRIPTION OF THE PRODUCT SPECIFICATION

### II.1 General Information

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Product Lines</b>         | MEDSEA_ANALYSISFORECAST_PHY_006_013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |
| <b>Geographical coverage</b> | 17.29°W → 36.30°E; 30.18°N → 45.98°N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |
| <b>Variables</b>             | Temperature<br>Salinity<br>Sea Surface Height<br>Sea Surface Height assuming no tide<br>Horizontal velocity (eastward and northward components)<br>Sea Surface Horizontal velocity assuming no tide (eastward and northward components)<br>Vertical velocity (upward component)<br>Ocean mixed layer thickness<br>Sea floor potential temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |
| <b>Product Type</b>          | <b>Analysis</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Forecast</b>    |
| <b>Update frequency</b>      | Weekly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Daily              |
| <b>Available time series</b> | last two years up to real-time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10-days forecast   |
| <b>Target delivery time</b>  | On Tuesday at 16:00 UTC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Daily at 16:00 UTC |
| <b>Temporal resolution</b>   | cmems_mod_med_phy-cur_anfc_4.2km_PT15M-i, cmems_mod_med_phy-ssh_anfc_4.2km_PT15M-i: 15 minutes instantaneous<br><br>cmems_mod_med_phy-ssh_anfc_4.2km-2D_PT1H-m, cmems_mod_med_phy-mld_anfc_4.2km-2D_PT1H-m, cmems_mod_med_phy-tem_anfc_4.2km-2D_PT1H-m, cmems_mod_med_phy-sal_anfc_4.2km-2D_PT1H-m, cmems_mod_med_phy-cur_anfc_4.2km-2D_PT1H-m, cmems_mod_med_phy-tem_anfc_4.2km-3D_PT1H-m, cmems_mod_med_phy-sal_anfc_4.2km-3D_PT1H-m, cmems_mod_med_phy-cur_anfc_4.2km-3D_PT1H-m: hourly mean<br><br>cmems_mod_med_phy-tem_anfc_4.2km_P1D-m, cmems_mod_med_phy-sal_anfc_4.2km_P1D-m, cmems_mod_med_phy-cur_anfc_4.2km_P1D-m, cmems_mod_med_phy-cur_anfc_detided_4.2km_P1D-m, cmems_mod_med_phy-wcur_anfc_4.2km_P1D-m, cmems_mod_med_phy-ssh_anfc_4.2km_P1D-m, cmems_mod_med_phy-ssh_anfc_detided_4.2km_P1D-m, cmems_mod_med_phy-mld_anfc_4.2km_P1D-m: daily mean<br><br>cmems_mod_med_phy-tem_anfc_4.2km_P1M-m, cmems_mod_med_phy-sal_anfc_4.2km_P1M-m, cmems_mod_med_phy-cur_anfc_4.2km_P1M-m, |                    |

|                           |                                                                                                                                       |     |     |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
|                           | cmems_mod_med_phy-wcur_anfc_4.2km_P1M-m, cmems_mod_med_phy-ssh_anfc_4.2km_P1M-m, cmems_mod_med_phy-mld_anfc_4.2km_P1M-m: monthly mean |     |     |
| Horizontal resolution     | 1/24 °                                                                                                                                |     |     |
| Number of vertical levels | 141                                                                                                                                   |     |     |
| Format                    | NetCDF CF1.0                                                                                                                          |     |     |
| Delivery mechanisms       | Subsetter                                                                                                                             | DGF | FTP |

*Table 1: MED-MFC Real Time products*

The runtime schedule:

MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013

The processing is based on two cycles: a daily cycle to produce forecast data, starting each day at 8:00UTC, and a weekly cycle to produce analysis data starting each Monday at 12:00UTC

## II.2 Details of datasets

| MEDSEA_ANALYSISFORECAST_PHY_006_013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Datasets:</p> <ul style="list-style-type: none"> <li>• cmems_mod_med_phy-tem_anfc_4.2km_P1M-m</li> <li>• cmems_mod_med_phy-cur_anfc_4.2km_P1M-m</li> <li>• cmems_mod_med_phy-ssh_anfc_4.2km_P1M-m</li> <li>• cmems_mod_med_phy-mld_anfc_4.2km_P1M-m</li> <li>• cmems_mod_med_phy-sal_anfc_4.2km_P1M-m</li> <li>• cmems_mod_med_phy-wcur_anfc_4.2km_P1M-m</li> </ul> <p>contain monthly mean fields: 3D potential temperature, salinity, and currents information from top to bottom and 2D sea surface height, bottom potential temperature, mixed layer thickness</p> <ul style="list-style-type: none"> <li>• cmems_mod_med_phy-tem_anfc_4.2km_P1D-m</li> <li>• cmems_mod_med_phy-cur_anfc_4.2km_P1D-m</li> <li>• cmems_mod_med_phy-cur_anfc_detided_4.2km_P1D-m</li> <li>• cmems_mod_med_phy-ssh_anfc_4.2km_P1D-m</li> <li>• cmems_mod_med_phy-ssh_anfc_detided_4.2km_P1D-m</li> <li>• cmems_mod_med_phy-mld_anfc_4.2km_P1D-m</li> <li>• cmems_mod_med_phy-sal_anfc_4.2km_P1D-m</li> <li>• cmems_mod_med_phy-wcur_anfc_4.2km_P1D-m</li> </ul> |

contain daily mean fields: 3D potential temperature, salinity, and currents information from top to bottom and 2D sea surface height, bottom potential temperature, mixed layer thickness, sea surface height assuming no tide, sea surface horizontal currents assuming no tide

- **cmems\_mod\_med\_phy-tem\_anfc\_4.2km-2D\_PT1H-m**
- **cmems\_mod\_med\_phy-sal\_anfc\_4.2km-2D\_PT1H-m**
- **cmems\_mod\_med\_phy-cur\_anfc\_4.2km-2D\_PT1H-m**
- **cmems\_mod\_med\_phy-ssh\_anfc\_4.2km-2D\_PT1H-m**
- **cmems\_mod\_med\_phy-mld\_anfc\_4.2km-2D\_PT1H-m**

contain hourly mean fields: 2D sea surface potential temperature, sea surface salinity, sea surface currents sea surface height and mixed layer thickness

- **cmems\_mod\_med\_phy-tem\_anfc\_4.2km-3D\_PT1H-m**
- **cmems\_mod\_med\_phy-sal\_anfc\_4.2km-3D\_PT1H-m**
- **cmems\_mod\_med\_phy-cur\_anfc\_4.2km-3D\_PT1H-m**

contain hourly mean fields: 3D potential temperature, salinity, and currents information from top to bottom and 2D bottom potential temperature

- **cmems\_mod\_med\_phy-cur\_anfc\_4.2km\_PT15M-i**
- **cmems\_mod\_med\_phy-ssh\_anfc\_4.2km\_PT15M-i**

contain 15minutes instantaneous fields: 2D sea surface currents and sea surface height

- **cmems\_mod\_med\_phy\_anfc\_4.2km\_static**

contains the static fields for the system: coordinates, mean sea surface level, mask and bathymetry

#### **Variables name in the NetCDF file and Unit: Long\_name & Standard\_name**

**zos** [m]

Sea surface height

sea\_surface\_height\_above\_geoid

**zos\_detided** [m]

Sea surface height assuming no tide

sea\_surface\_height\_above\_geoid\_assuming\_no\_tided

**uo** [m/s]

eastward ocean current velocity

eastward\_sea\_water\_velocity

**uo\_detided** [m/s]

eastward ocean current velocity assuming no tide

eastward\_sea\_water\_velocity\_assuming\_no\_tide

**vo** [m/s]

northward ocean current velocity

northward\_sea\_water\_velocity

**vo\_detided** [m/s]

northward ocean current velocity assuming no tide

northward\_sea\_water\_velocity\_assuming\_no\_tide

**wo** [m/s]

Quasi geostrophic vertical velocity

upward\_sea\_water\_velocity

**so** [psu]

Salinity

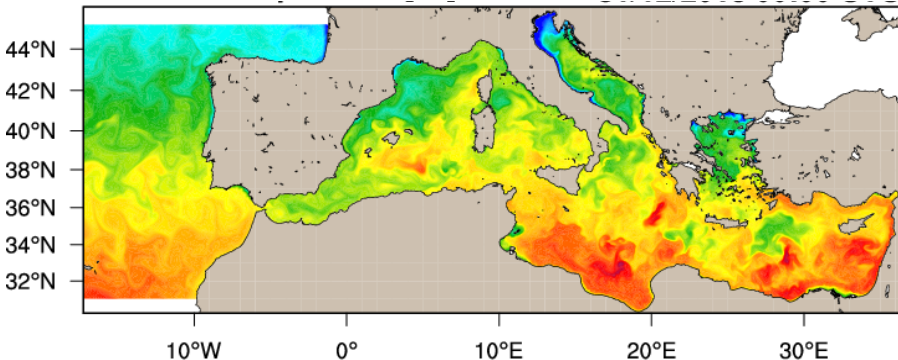
|                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| sea_water_salinity                                                                                                                                       |
| <b>thetao</b> [°C]<br>Sea Temperature<br>sea_water_potential_temperature                                                                                 |
| <b>bottomT</b> [°C]<br>Sea floor potential temperature<br>sea_water_potential_temperature_at_sea_floor                                                   |
| <b>m1otst</b> [m]<br>Ocean mixed layer thickness defined by density (as in de Boyer Montegut,2004)<br>ocean_mixed_layer_thickness_defined_by_sigma_theta |
| <b>e1t</b> [m]<br>Cell dimension along X axis                                                                                                            |
| <b>e2t</b> [m]<br>Cell dimension along Y axis                                                                                                            |
| <b>e3t</b> [m]<br>Cell dimension along Z axis<br>cell_thickness                                                                                          |
| <b>mask</b> [1]<br>Land-sea mask: 1 = sea ; 0 = land<br>sea_binary_mask                                                                                  |
| <b>deptho</b> [m]<br>Bathymetry<br>sea_floor_depth_below_geoid                                                                                           |
| <b>deptho_lev</b> [1]<br>Model level number at sea floor<br>model_level_number_at_sea_floor                                                              |
| <b>mdt</b> [m]<br>Mean dynamic topography<br>sea_surface_height_above_geoid                                                                              |

Table 2: list of the datasets and variable names and unit for the MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013 product

## II.3 Additional Information on parameters

|            |                                                                                                                                                  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| m1otst [m] | ocean_mixed_layer_thickness_defined_by_sigma_theta. It is the depth where the density increases of 0.01 kg.m-3 compared to density at 10 m depth |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------|

## II.4 Production System Description

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Domain</b><br><br><b>Resolution and grid</b><br><br><b>Geographic coverage</b> | <p>MEDSEA (17.29°W-36.29°E; 30.19°N – 45.98°N)</p> <p>1/24°; regular grid; 1287 x 380 x 141</p> <p>This is a regional product covering the Mediterranean Sea and a box in the adjacent Atlantic Ocean. It is defined on a regular grid at 1/24 degree (approx. 4km) and 141 vertical levels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Model Version</b><br><b>Production unit</b><br><b>Period of validation</b>     | <ul style="list-style-type: none"> <li>▪ NEMO v4.2 - WW3 v6.07</li> <li>▪ CMCC, Italy</li> <li>▪ 01.01.2020–31.12.2021</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Vertical grid</b>                                                              | <p>The product is delivered at the model's native grid, with up to 141 vertical levels:</p> <p><b>levels [m]:</b> 1.02 3.17 5.46 7.92 10.54 13.32 16.27 19.40 22.71 26.20 29.89 33.77 37.85 42.15 46.65 51.38 56.33 61.52 66.95 72.62 78.55 84.74 91.20 97.93 104.94 112.25 119.86 127.77 136 144.55 153.43 162.66 172.24 182.18 192.48 203.17 214.25 225.72 237.61 249.92 262.65 275.83 289.46 303.56 318.13 333.19 348.75 364.82 381.42 398.54 416.22 434.46 453.27 472.67 492.67 513.29 534.53 556.41 578.94 602.15 626.03 650.62 675.91 701.93 728.69 756.2 784.47 813.53 843.39 874.06 905.55 937.89 971.08 1005.14 1040.08 1075.91 1112.66 1150.34 1188.95 1228.52 1269.05 1310.56 1353.07 1396.58 1441.11 1486.67 1533.27 1580.93 1629.65 1679.45 1730.33 1782.31 1835.41 1889.61 1944.95 2001.42 2059.03 2117.79 2177.71 2238.8 2301.06 2364.49 2429.11 2494.91 2561.9 2630.09 2699.47 2770.06 2841.84 2914.83 2989.02 3064.41 3141 3218.8 3297.79 3377.98 3459.37 3541.94 3625.7 3710.65 3796.77 3884.06 3972.52 4062.13 4152.9 4244.8 4337.85 4432.02 4527.3 4623.7 4721.19 4819.77 4919.43 5020.15 5121.93 5224.75 5328.59 5433.46 5539.33 5646.2 5754</p> |
| <b>Tides</b>                                                                      | 8 components: M2, S2, N2, K2, K1, O1, P1, Q1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Atmospheric forcing</b>                                                        | ECMWF atmospheric forcing at 1/10 degrees: 6-hourly analysis; 1 hour for the first 3 days of forecast, 3 hours for the following 3 days of forecast and 6 hours for the last 4 days of forecast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                                             |                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Boundary forcing</b>                     | The Mediterranean modeling system is forced in the Atlantic side by the Global analysis and forecast product (GLOBAL_ANALYSISFORECAST_PHY_001_024), while in the Dardanelles Strait it is force by a combination of daily climatological fields from a Marmara Sea model and the Global analysis and forecast product (GLOBAL_ANALYSISFORECAST_PHY_001_024) |
| <b>Assimilation scheme</b>                  | OceanVar (3DVAR)                                                                                                                                                                                                                                                                                                                                            |
| <b>Assimilated observations</b>             | In-situ vertical profiles of Temperature and Salinity from ARGO, Glider and XBT; Sea Level Anomaly (SLA) from available satellites Jason 2 & 3, Saral-Altika, Cryosat, Sentinel-3A/3B, Sentinel6A and HY-2A/B.<br><br>Objective Analyses-Sea Surface Temperature (SST) fields are used to correct surface heat fluxes.                                      |
| <b>Initial conditions (spin-up process)</b> | World Ocean Atlas (WOA) 2013 V2, winter climatology at 01/01/2015                                                                                                                                                                                                                                                                                           |
| <b>Bathymetry</b>                           | GEBCO 30sec interpolated on the model grid                                                                                                                                                                                                                                                                                                                  |
| <b>River run-off</b>                        | Data from monthly climatologies and Po River observations                                                                                                                                                                                                                                                                                                   |

The physical component of the Mediterranean Forecasting System (Med-Physics) is a coupled hydrodynamic-wave modeling system implemented over the whole Mediterranean Basin including tides. The model horizontal grid resolution is  $1/24^\circ$  (ca. 4 km) and has 141 unevenly spaced vertical levels. The hydrodynamics are supplied by the Nucleus for European Modelling of the Ocean (NEMO v4.2) while the wave component is provided by WaveWatch-III; the model solutions are corrected by a variational data assimilation scheme (OceanVar) of temperature and salinity vertical profiles and along track satellite Sea Level Anomaly observations. Objective Analyses-Sea Surface Temperature fields are used for the correction of surface heat fluxes with the relaxation constant of  $110 \text{ W m}^{-2} \text{ K}^{-1}$  applied close to midnight.

#### II.4.1.1 [Production Cycle](#)

The processing is based on two cycles: a daily cycle to produce forecast data, and a weekly cycle to produce analysis data.

The daily cycle is delivered each day (J), for the next 9 days. The forecast is initialized by a hindcast every day. Every day the product is updated with a hindcast for day J-1 and 10-day forecast.

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## II.5 Grid

NEMO model is discretized on a staggered grid (Arakawa C grid) with masking of land areas. All variables are delivered at the centre of the tracer grid cell after interpolation.

## II.6 Vertical Levels

All MEDSEA ocean variables are computed on a  $z^*$  (time varying thickness) vertical coordinate system and delivered along a fixed  $z$ -level vertical grid. Moreover, the vertical grid is defined by means of partial cells, thus the last ocean level thickness varies to better represent the model topography.

## II.7 Processing information

### II.7.1 Update Time

The product is updated daily at 16:00 UTC for the daily and hourly datasets.

The monthly dataset is updated monthly on the 20th (addition of the monthly mean of the previous month).

### II.7.2 Temporal extent of analysis and forecast stored on delivery mechanism

A rolling archive of analysis over the last two years up to real-time is available on CMS portal. The table below shows the time coverage in detail for the time-series of each dataset.

| Dataset                                                                                                                                                                                                                                                                                | Time-series available from | Time-series available                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------|
| <b>monthly mean:</b><br>cmems_mod_med_phy-tem_anfc_4.2km_P1M-m,<br>cmems_mod_med_phy-sal_anfc_4.2km_P1M-m,<br>cmems_mod_med_phy-cur_anfc_4.2km_P1M-m,<br>cmems_mod_med_phy-wcur_anfc_4.2km_P1M-m,<br>cmems_mod_med_phy-ssh_anfc_4.2km_P1M-m,<br>cmems_mod_med_phy-mld_anfc_4.2km_P1M-m | last two years             | Previous Month                               |
|                                                                                                                                                                                                                                                                                        |                            | Update the 20 <sup>th</sup> of current month |
| <b>daily mean:</b><br>cmems_mod_med_phy-tem_anfc_4.2km_P1D-m,<br>cmems_mod_med_phy-sal_anfc_4.2km_P1D-m,<br>cmems_mod_med_phy-cur_anfc_4.2km_P1D-m,<br>cmems_mod_med_phy-wcur_anfc_4.2km_P1D-m,<br>cmems_mod_med_phy-ssh_anfc_4.2km_P1D-m,<br>cmems_mod_med_phy-mld_anfc_4.2km_P1D-m   |                            | J+9                                          |
|                                                                                                                                                                                                                                                                                        |                            | Updated by processing                        |

|                                                                                                                                                                                                                                                                           |                   |                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------|
| <b>hourly mean – 2D fields:</b><br>cmems_mod_med_phy-tem_anfc_4.2km-2D_PT1H-m,<br>cmems_mod_med_phy-sal_anfc_4.2km-2D_PT1H-m,<br>cmems_mod_med_phy-cur_anfc_4.2km-2D_PT1H-m,<br>cmems_mod_med_phy-ssh_anfc_4.2km-2D_PT1H-m,<br>cmems_mod_med_phy-mld_anfc_4.2km-2D_PT1H-m |                   |                                     |
| <b><u>15 minutes instantaneous – 2D fields:</u></b><br>cmems_mod_med_phy-cur_anfc_4.2km_PT15M-i,<br>cmems_mod_med_phy-ssh_anfc_4.2km_PT15M-i                                                                                                                              |                   | J+4<br><br>Updated by<br>processing |
| <b>hourly mean – 3D fields from top to bottom:</b><br>cmems_mod_med_phy-tem_anfc_4.2km-3D_PT1H-m,<br>cmems_mod_med_phy-sal_anfc_4.2km-3D_PT1H-m,<br>cmems_mod_med_phy-cur_anfc_4.2km-3D_PT1H-m                                                                            | 13/11/2023        |                                     |
| <b>daily mean:</b><br>cmems_mod_med_phy-cur_anfc_detided_4.2km_P1D-m,<br>cmems_mod_med_phy-ssh_anfc_detided_4.2km_P1D-m                                                                                                                                                   | last two<br>years | J+8<br><br>Updated by<br>processing |

### II.7.3 Time averaging

For the monthly dataset, the fields are monthly means over the calendar month (first to last day of the month). For the daily dataset, the fields are daily means over a day (midnight to midnight, centered at midday). For the hourly dataset, the fields are hourly means (centered every half-hour). For the 15 minutes frequency datasets, the fields are instantaneous at minutes 00, 15, 30 and 45 of every hour.

### III DOWNLOAD A PRODUCT

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After registration, you will be able to download our data. To assist you, our HelpCenter is available, and more specifically its [section about download](#).

Information on operational issues on products and services can be found on our [User Notification Service](#). If you have any questions, please [contact us](#).

## IV FILES NOMENCLATURE

### IV.1 Nomenclature of files when downloaded through the Web Portal Subsetter Service

Files nomenclature when downloaded through the Copernicus Marine Web Portal Subsetter is based on product dataset name and a numerical reference related to the request date on the MIS.

The scheme is: **datasetname\_nnnnnnnnnnnnn.nc**

where:

- **datasetname**: as described previously
- **nnnnnnnnnnnnnn**: 13-digit integer corresponding to the current time (download time) in milliseconds since January 1, 1970 midnight UTC.
- **.nc**: standard NetCDF filename extension.

Example: cmems\_mod\_med\_phy-sal\_anfc\_4.2km\_P1D-m\_1303461772348.nc

### IV.2 Nomenclature of files when downloaded through the CMS Web Portal DirectGetFile or CMS FTP Service

MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013 files nomenclature when downloaded through the Copernicus Marine FTP service is based as follows:

**{valid date}\_{freq flag}-{producer}-{parameter}-{config}-{region}-{bul date}\_{product type}-sv{file version}.nc**

where

- **valid date** YYYYMMDD is the validity day of the data in the file
- **freq flag** is the frequency of data values in the file (2dh = hourly 2D, 3dh = hourly 3D, qm = 15 minutes, d = daily, m=monthly)
- **producer** is a short version of the CMS production unit
- **config** identifies the producing system and configuration
- **region** is a six-letter code for the region
- **parameter** is a four-letter code for the parameter or parameter set from Standard BODC.
- **bul date** bYYYYMMDD is the bulletin date the product was produced
- **product type** is a two-letter code for the product type, for example fc for forecast, an for analysis and sm for hindcast.
- **file version** is xx.yy where xx is the CMS version (03, 04, 05, 06 or 07) and yy is an incremental version number

Table 1 shows the nomenclature for the MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013 products.

*Table 1 Description of the nomenclature for MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013*

|            |          |
|------------|----------|
| valid date | YYYYMMDD |
|------------|----------|

|                     |                                                                                   |
|---------------------|-----------------------------------------------------------------------------------|
| <b>freq flag</b>    | m (monthly)<br>d (daily)<br>2dh (hourly 2D)<br>3dh (hourly 3D)<br>qm (15 minutes) |
| <b>Producer</b>     | CMCC                                                                              |
| <b>Config</b>       | MFSeas8                                                                           |
| <b>Region</b>       | MEDATL                                                                            |
| <b>parameter</b>    | TEMP<br>PSAL<br>ASLV<br>RFVL<br>AMXL<br>HCNT<br>SHNT<br>LRZA                      |
| <b>bul date</b>     | bYYYYMMDD                                                                         |
| <b>product type</b> | fc (forecast)<br>an (analysis)<br>sm (hindcast)                                   |
| <b>file version</b> | 09.00                                                                             |

Example for a file of Salinity:

20220309\_d-CMCC--PSAL-MFSeas8-MEDATL-b20230607\_fc-sv09.00.nc

This is the mean field of salinity centered at 00:00 UTC of the 9<sup>th</sup> March 2022, and the time coverage is from midnight (00:00 UTC) of the 9<sup>th</sup> March 2022 to midnight (24:00 UTC) of the 9<sup>th</sup> March 2022 (see section IV.8).

20220309\_h-CMCC--PSAL-MFSeas8-MEDATL-b20230607\_fc-sv09.00.nc

This file contains the 24-hourly mean fields of salinity, each one centered at 30' of every hour from midnight (00:00 UTC) of the 9<sup>th</sup> March 2022 to midnight (24:00 UTC) of the 9<sup>th</sup> March 2022 (see section IV.9).

20220309\_hts-CMCC--PSAL-MFSeas8-MEDATL-b20230607\_fc-sv09.00.nc

This file contains the 24-hourly mean fields of salinity, each one centered at 30' of every hour from midnight (00:00 UTC) of the 9<sup>th</sup> March 2022 to midnight (24:00 UTC) of the 9<sup>th</sup> March 2022 (see section IV.9).

20220309\_qm-CMCC--RFVL-MFSeas8-MEDATL-b20230607\_fc-sv09.00.nc

This file contains the instantaneous fields of sea surface currents at minutes 00, 15, 30 and 45 of every hour from midnight (00:00 UTC) of the 9<sup>th</sup> March 2022 to midnight (24:00 UTC) of the 9<sup>th</sup> March 2022 (see section IV.9).

20220301\_m-CMCC--PSAL-MFSeas8-MEDATL-b20230607\_an-sv09.00.nc

This is the monthly mean field of salinity for the month of March 2022. The mean is computed from midnight (00:00 UTC) of the 1<sup>st</sup> March 2022 to midnight (24:00 UTC) of the 31<sup>th</sup> March 2022 (see section IV.9).

### IV.3 Other information: mean centre of Products, land mask value, missing value

The missing value for this product is: 1.e+20

Land mask is equal to “\_FillValue” (see variable attribute on NetCDF file).

Real\_Value = (Display\_Value X scale\_factor) + add\_offset

The PHY forecasts are using the NetCDF4 format without offset nor scale factors.

In the CMS online system data from the latest 2 years (running window) are available via these download interfaces: Subsetter and FTP download

## IV.4 File size

| DATASET NAME                                   | FILE NAME                                                                                                                                                                              | DIMENSION [MB] |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| cmems_mod_med_phy-ssh_anfc_4.2km_P1D-m         | {date1}_d-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_d-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_d-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 0.6            |
| cmems_mod_med_phy-ssh_anfc_detided_4.2km_P1D-m | {date1}_d-CMCC--SHNT-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_d-CMCC--SHNT-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_d-CMCC--SHNT-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 0.6            |
| cmems_mod_med_phy-sal_anfc_4.2km_P1D-m         | {date1}_d-CMCC--PSAL-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_d-CMCC--PSAL-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_d-CMCC--PSAL-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 39             |
| cmems_mod_med_phy-tem_anfc_4.2km_P1D-m         | {date1}_d-CMCC--TEMP-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_d-CMCC--TEMP-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_d-CMCC--TEMP-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 49             |
| cmems_mod_med_phy-cur_anfc_4.2km_P1D-m         | {date1}_d-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_d-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_d-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 132            |
| cmems_mod_med_phy-cur_anfc_detided_4.2km_P1D-m | {date1}_d-CMCC--HCNT-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_d-CMCC--HCNT-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_d-CMCC--HCNT-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 1.5            |

|                                            |                                                                                                                                                                                              |      |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| cmems_mod_med_phy-wcur_anfc_4.2km_P1D-m    | {date1}_d-CMCC--LRZA-MFSeas8-MEDATL-b{date2}_fc-sv09.nc<br>{date1}_d-CMCC--LRZA-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_d-CMCC--LRZA-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc          | 70   |
| cmems_mod_med_phy-mld_anfc_4.2km_P1D-m     | {date1}_d-CMCC--AMXL-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_d-CMCC--AMXL-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_d-CMCC--AMXL-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc       | 0.70 |
| cmems_mod_med_phy-sal_anfc_4.2km-2D_PT1H-m | {date1}_2dh-CMCC--PSAL-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_2dh-CMCC--PSAL-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_2dh-CMCC--PSAL-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 15   |
| cmems_mod_med_phy-tem_anfc_4.2km-2D_PT1H-m | {date1}_2dh-CMCC--TEMP-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_2dh-CMCC--TEMP-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_2dh-CMCC--TEMP-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 16   |
| cmems_mod_med_phy-cur_anfc_4.2km-2D_PT1H-m | {date1}_2dh-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_2dh-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_2dh-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 32   |
| cmems_mod_med_phy-ssh_anfc_4.2km-2D_PT1H-m | {date1}_2dh-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_fc-sv09.00.nc<br>{date1}_2dh-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_sm-sv09.00.nc<br>{date1}_2dh-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 14,5 |

|                                                |                                                                                                                                                                                                                  |      |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| cmems_mod_med_phy-<br>mld_anfc_4.2km-2D_PT1H-m | {date1}_2dh-CMCC--AMXL-MFSeas8-MEDATL-<br>b{date2}_fc-sv09.00.nc<br><br>{date1}_2dh-CMCC--AMXL-MFSeas8-MEDATL-<br>b{date2}_sm-sv09.00.nc<br><br>{date1}_2dh-CMCC--AMXL-MFSeas8-MEDATL-<br>b{date2}_an-sv09.00.nc | 14,5 |
| cmems_mod_med_phy-<br>sal_anfc_4.2km-3D_PT1H-m | {date1}_3dh-CMCC--PSAL-MFSeas8-MEDATL-b{date2}_fc-<br>sv09.00.nc<br><br>{date1}_3dh-CMCC--PSAL-MFSeas8-MEDATL-<br>b{date2}_sm-sv09.00.nc<br><br>{date1}_3dh-CMCC--PSAL-MFSeas8-MEDATL-<br>b{date2}_an-sv09.00.nc | 860  |
| cmems_mod_med_phy-<br>tem_anfc_4.2km-3D_PT1H-m | {date1}_3dh-CMCC--TEMP-MFSeas8-MEDATL-<br>b{date2}_fc-sv09.00.nc<br><br>{date1}_3dh-CMCC--TEMP-MFSeas8-MEDATL-<br>b{date2}_sm-sv09.00.nc<br><br>{date1}_3dh-CMCC--TEMP-MFSeas8-MEDATL-<br>b{date2}_an-sv09.00.nc | 1120 |
| cmems_mod_med_phy-<br>cur_anfc_4.2km-3D_PT1H-m | {date1}_3dh-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_fc-<br>sv09.00.nc<br><br>{date1}_3dh-CMCC--RFVL-MFSeas8-MEDATL-<br>b{date2}_sm-sv09.00.nc<br><br>{date1}_3dh-CMCC--RFVL-MFSeas8-MEDATL-<br>b{date2}_an-sv09.00.nc | 3130 |
| cmems_mod_med_phy-<br>cur_anfc_4.2km_PT15M-i   | {date1}_qm-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_fc-<br>sv09.00.nc<br><br>{date1}_qm-CMCC--RFVL-MFSeas8-MEDATL-<br>b{date2}_sm-sv09.00.nc<br><br>{date1}_qm-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_an-<br>sv09.00.nc    | 142  |
| cmems_mod_med_phy-<br>ssh_anfc_4.2km_PT15M-i   | {date1}_qm-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_fc-<br>sv09.00.nc<br><br>{date1}_qm-CMCC--ASLV-MFSeas8-MEDATL-<br>b{date2}_sm-sv09.00.nc<br><br>{date1}_qm-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_an-<br>sv09.00.nc    | 60   |

|                                         |                                                            |     |
|-----------------------------------------|------------------------------------------------------------|-----|
| cmems_mod_med_phy-ssh_anfc_4.2km_P1M-m  | {date1}_m-CMCC--ASLV-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 0.6 |
| cmems_mod_med_phy-sal_anfc_4.2km_P1M-m  | {date1}_m-CMCC--PSAL-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 39  |
| cmems_mod_med_phy-tem_anfc_4.2km_P1M-m  | {date1}_m-CMCC--TEMP-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 49  |
| cmems_mod_med_phy-cur_anfc_4.2km_P1M-m  | {date1}_m-CMCC--RFVL-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 132 |
| cmems_mod_med_phy-mld_anfc_4.2km_P1M-m  | {date1}_m-CMCC--AMXL-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 0.5 |
| cmems_mod_med_phy-wcur_anfc_4.2km_P1M-m | {date1}_m-CMCC--LRZA-MFSeas8-MEDATL-b{date2}_an-sv09.00.nc | 70  |
| cmems_mod_med_phy_anfc_4.2km_static     | MED-MFC_006_013_\${field}.nc                               | 5.7 |

## V FILE FORMAT

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### V.1 NetCDF

The products are compliant with the NetCDF Climate and Forecast Convention CF-1.4 (see <http://cf-pcmdi.llnl.gov/>).

The MEDSEA\_ANALYSISFORECAST\_PHY\_006\_013 product is distributed in netCDF4 format.

To know more about the NetCDF format, please follow this link: [What is the format of Copernicus Marine products ? NetCDF](#)

### V.2 Structure and semantic of netCDF maps files

The model output files contain some additional fields in addition to the variables mentioned earlier. An example output NetCDF file header for med-cmcc-tem-an-fc-d is inserted below, with the additional fields in italic fonts.

```
netcdf \20221205_d-CMCC--TEMP-MFSeas8-MEDATL-b20230607_an-sv09.00 {
```

dimensions:

```
depth = 141 ;
```

```
lat = 380 ;
```

```
lon = 1287 ;
```

```
time = UNLIMITED ; // (1 currently)
```

variables:

## VI REFERENCES

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Clementi, E., Drudi, M., Aydogdu, A., Moulin, A., Grandi, A., Mariani, A., Goglio, A. C., Pistoia, J., Miraglio, P., Lecci, R., Palermo, F., Coppini, G., Masina, S., & Pinardi, N. (2023). Mediterranean Sea Physical Analysis and Forecast (CMS MED-Physics, EAS8 system) (Version 1) [Data set]. Copernicus Marine Service (CMS). [https://doi.org/10.25423/CMCC/MEDSEA\\_ANALYSISFORECAST\\_PHY\\_006\\_013\\_EAS8](https://doi.org/10.25423/CMCC/MEDSEA_ANALYSISFORECAST_PHY_006_013_EAS8)

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