PRODUCT USER MANUAL

For all Ocean Colour Products

OCEANCOLOUR_ARC_CHL_L3_NRT_OBSERVATIONS_009_047
OCEANCOLOUR_ARC_CHL_L3_REP_OBSERVATIONS_009_069
OCEANCOLOUR_ARC_CHL_L4_NRT_OBSERVATIONS_009_087
OCEANCOLOUR_ARC_CHL_L4_REP_OBSERVATIONS_009_088
OCEANCOLOUR_ARC_OPTICS_L3_NRT_OBSERVATIONS_009_046
OCEANCOLOUR_ARC_OPTICS_L3_REP_OBSERVATIONS_009_068
OCEANCOLOUR_ARC_OPTICS_L4_NRT_OBSERVATIONS_009_089
OCEANCOLOUR_ATL_CHL_L3_NRT_OBSERVATIONS_009_036
OCEANCOLOUR_ATL_CHL_L3_REP_OBSERVATIONS_009_067
OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_037
OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_090
OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_091
OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_098
OCEANCOLOUR_ATL_OPTICS_L3_NRT_OBSERVATIONS_009_034
OCEANCOLOUR_ATL_OPTICS_L3_REP_OBSERVATIONS_009_066
OCEANCOLOUR_ATL_OPTICS_L4_NRT_OBSERVATIONS_009_092
OCEANCOLOUR_BAL_CHL_L3_NRT_OBSERVATIONS_009_049
OCEANCOLOUR_BAL_CHL_L3_REP_OBSERVATIONS_009_080
OCEANCOLOUR_BAL_OPTICS_L3_NRT_OBSERVATIONS_009_048
OCEANCOLOUR_BAL_OPTICS_L3_REP_OBSERVATIONS_009_097
OCEANCOLOUR_BS_CHL_L3_NRT_OBSERVATIONS_009_044
OCEANCOLOUR_BS_CHL_L3_REP_OBSERVATIONS_009_071
OCEANCOLOUR_BS_CHL_L4_NRT_OBSERVATIONS_009_045
OCEANCOLOUR_BS_CHL_L4_REP_OBSERVATIONS_009_079
OCEANCOLOUR_BS_OPTICS_L3_NRT_OBSERVATIONS_009_042
OCEANCOLOUR_BS_OPTICS_L4_NRT_OBSERVATIONS_009_043
OCEANCOLOUR_BS_OPTICS_L4_REP_OBSERVATIONS_009_096
OCEANCOLOUR_EUR_CHL_L3_NRT_OBSERVATIONS_009_050
OCEANCOLOUR_GLO_CHL_L3_NRT_OBSERVATIONS_009_032
OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_085
OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_065
OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_093
OCEANCOLOUR_GLO_CHL_L4_NRT_OBSERVATIONS_009_033
OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082
OCEANCOLOUR_GLO_OPTICS_L3_NRT_OBSERVATIONS_009_030
OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_086
OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_064
OCEANCOLOUR_GLO_OPTICS_L4_NRT_OBSERVATIONS_009_083
OCEANCOLOUR_GLO_OPTICS_L4_REP_OBSERVATIONS_009_081
OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040
OCEANCOLOUR_MED_CHL_L3_REP_OBSERVATIONS_009_073
OCEANCOLOUR_MED_CHL_L4_NRT_OBSERVATIONS_009_041
OCEANCOLOUR_MED_CHL_L4_REP_OBSERVATIONS_009_078
OCEANCOLOUR_MED_OPTICS_L3_NRT_OBSERVATIONS_009_038
OCEANCOLOUR_MED_OPTICS_L4_NRT_OBSERVATIONS_009_039
OCEANCOLOUR_MED_OPTICS_L4_REP_OBSERVATIONS_009_095

Issue: 1.9

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CHANGE RECORD

Issue	Date	§	Description of Change	Author	Checked By
1.0	01/05/2015	all	First version of document	G. Volpe, R. Santoleri, S. Colella, V. Forneris, P. Garnesson, M. Taberner , S. Pardo	Rosalia Santoleri
1.1	26/01/2016		ARV2 version	G. Volpe, R. Santoleri, S. Colella, V. Forneris, V.E. Brando, P. Garnesson, B. Taylor, M. Grant	Rosalia Santoleri
1.2	16/06/2016		Sections updated due to BAL prods switch from ACRI PU to CNR PU	M. Benincasa, V. Forneris	Rosalia Santoleri
1.3	28/7/2016		L4 optimal Interpolation product are now available for the period [1997-present]	P.Garnesson	
1.4	18/1/2017		ARV3 version	G. Volpe, R. Santoleri, S. Colella, V. Forneris, V.E. Brando, P. Garnesson, B. Taylor, M. Grant	Rosalia Santoleri
1.5	25/9/2107		V3.2: OLCI products are now available	G. Volpe, R. Santoleri, S. Colella, V. Forneris, V.E. Brando, P. Garnesson, B. Taylor, E. Böhm M. Grant	Rosalia Santoleri

1.6	20/11/2017		V3.3: REP extension to end of 2016 and a new climatology dataset.	G. Volpe, R. Santoleri, S. Colella, V. Forneris, V.E. Brando, P. Garnesson, B. Taylor, E. Böhm M. Grant	Rosalia Santoleri
1.7	18/01/2017		V4 version	G. Volpe, R. Santoleri, S. Colella, V. Forneris, V.E. Brando, P. Garnesson, B. Taylor, E. Böhm M. Grant	Rosalia Santoleri
1.8	18/6/2018		V4.3 release	G. Volpe, R. Santoleri, S. Colella, V. Forneris, V.E. Brando, P. Garnesson, B. Taylor, E. Böhm	Rosalia Santoleri
1.9	12/09/2018		November Service Release	G. Volpe, R. Santoleri, S. Colella, V. Forneris, V.E. Brando, P. Garnesson, B. Taylor, E. Böhm	Rosalia Santoleri

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GLOSSARY AND ABBREVIATIONS

PC	Production Centre
PU	Production Unit
OCTAC	Ocean Colour Thematic Assembly Centre
NetCDF	Network Common Data Form
CF	Climate Forecast (convention for NetCDF)
ARC	Arctic Sea
ATL	Atlantic Sea
BAL	Baltic Sea
BS	Black Sea
EUR	European Seas
GLO	Global Ocean
MED	Mediterranean Sea
NWS	North-West European continental Shelf
CNR	Italian National Research Council
ACRI	ACRI-ST
Ifremer	French Research Institute for Exploration of the Sea
PML	Plymouth Marine Laboratory
PUM	Product User Manual
ftp	File Transfer Protocol to download files
OPeNDAP	Open-Source Project for a Network Data Access Protocol. Protocol to download subset of data from a n-dimensional gridded dataset (i.e.: 4 dimensions: lon-lat, depth, time)
Subsetter	CMEMS service tool to download a NetCDF file of a selected geographical box using values of longitude an latitude, and time range
Directgetfile	CMEMS service tool (FTP like) to download a NetCDF file
Chl_a	mass concentration of chlorophyll_a in seawater
CDM	volume absorption coefficient of radiative flux in seawater due to dissolved organic matter and non algal particles
K490	volume attenuation coefficient of downwelling radiative flux in seawater
RRS	surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air
BBP443	volume backwards scattering coefficient of radiative flux in seawater due to particles
ZSD	ZSD Secchi depth of seawater

I INTRODUCTION

This guide describes the data product files from the CMEMS Ocean Colour Thematic Assembly Centre (OCTAC), which are the services available for data access, and how to use both files and services.

II OCTAC SYSTEM: GENERAL INFORMATION

The OC Production Center implemented a European Ocean Colour Service for Copernicus marine applications providing global, European and regional (Atlantic, Arctic, Baltic, Mediterranean, and Black Seas) high quality core OC products. OCTAC products are currently used by European, National and regional level intermediate/end users (intergovernmental bodies, National Environmental Agencies, ESA and European Projects etc.) to monitor marine conditions and are acquired by the CMEMS MFCs for ecosystem model assimilation/validation.
In the OC Production Centre (PC) there are 3 Production Units (PU) CNR, ACRI, PML.
Presently functions assigned amongst the institutions are:

- SS Service Desk for OCTAC and single point of contact for communication of incidents changes and service requests by users (CNR)
- Production Units :
    - ACRI: operating GLO and Atlantic (L4-interpolated) NRT production chains and providing corresponding REP (based on the Copernicus-GlobColour processor).
    - CNR: operating the MED, BS, BAL and EUR production chains
    - PML: operating the Arctic and Atlantic (L3 & L4-temporal-av) production chains and providing GLO REP products developed in the framework of ESA OC-CCI/C3S Project

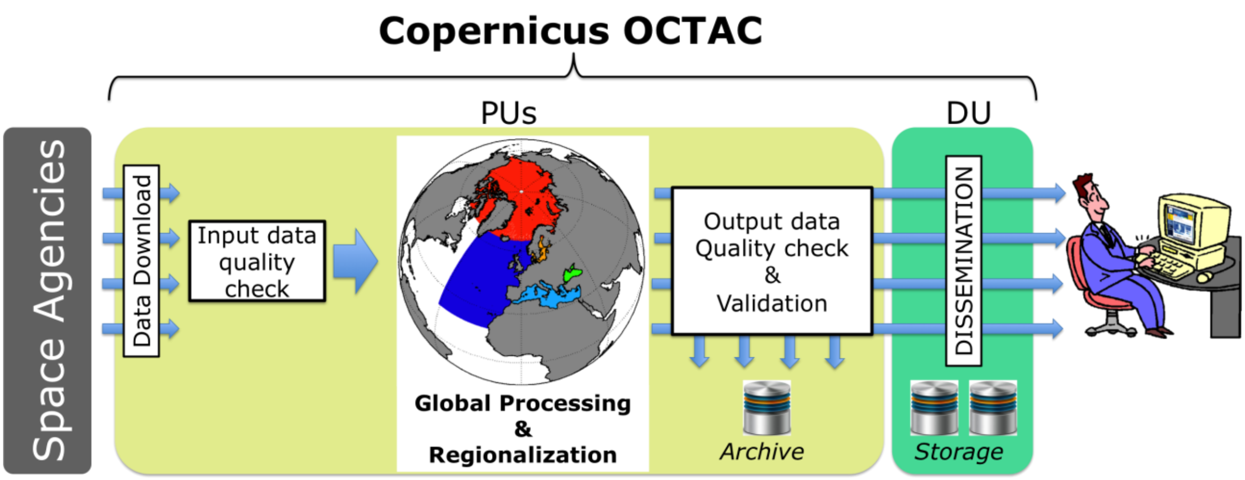


Figure 1: Overview of the OC TAC system

At each PU, the processing sequences can be divided into 5 main functions:

1. Data Ingestion
2. Products Generation
3. Products conversion and storage

4. Quality control
5. System Monitoring

The OCTAC Ocean regions can be therefore: GLO (global ocean), EUR (Pan-European seas), ARC (Arctic Ocean), BAL (Baltic Sea), ATL (Atlantic Ocean), MED (Mediterranean Sea), and BS (Black Sea). Table 1 below shows the geographical limits for each region.

Area Code	Ocean Region	Southernmost Latitude	Northernmost Latitude	Westernmost Longitude	Easternmost Longitude
GLO	Global Ocean	90.0°S	90.0°N	180.0°W	180.0°E
ARC	Arctic Ocean	65.0°N	90.0°N	180.0°W	180.0°E
BAL	Baltic Sea	53.25°N	65.85°N	9.25°E	30.25°E
ATL	Atlantic Ocean	20.0°N	66.0°N	46.0°W	13.0°E
MED	Mediterranean Sea	30.0°N	46.0°N	6.0°W	36.5°E
BS	Black Sea	40.0°N	48.0°N	26.5°E	42.0°E
EUR	European Seas	20.0°N	65.85°N	30.0°W	42.0°E

Table 1: Geographical limits for CMEMS OCTAC ocean regions.

For each region, OCTAC delivers only two types of products: CHL and OPTICS. CHL is the phytoplankton chlorophyll concentration evaluated either via standard processing or via region-specific algorithms. OPTICS refers to any other variable retrievable from ocean colour sensors, and includes: IOPs (Inherent Optical Properties, such as absorption and scattering), diffuse attenuation coefficient of light at 490 nm (Kd490), Secchi depth (transparency of water), spectral Remote Sensing Reflectance (Rrs), Coloured Dissolved Organic Matter (CDOM), and the non-organic Solid Particulate Matter (SPM).

The **product level** can be Level-3 (**L3**) or Level-4 (**L4**). L3 are the daily composite products as obtained by merging all the ocean satellite passages and they can be of any spatial resolution, typically 1, 4, 9, and 25 km. L4 are those products for which a temporal averaging method or an interpolation procedure is applied to fill in missing data values. Temporal averaging is performed on 8-days and monthly bases. The interpolation procedure currently used spans from Optimal Interpolation to DINEOF procedure. More details about product levels are provided in section IV.2.1.

Following the CMEMS convention, the OC products are further classified in **NRT (Near Real Time)** and **REP (reprocessed)**. More details about product processing mode and temporal coverage are provided in section IV.2.2.

The **NRT products** are operationally produced every day and provide the best estimate of the ocean colour variables at the time of processing. A first version of this product is generated soon after the satellite passage, by using climatological ancillary data (meteorological and ozone data for atmospheric correction, and attitude and ephemerides for data geolocation). These versions of NRT products are available within 24 hours from the satellite acquisition. The NRT products are then updated by reprocessing the OC data by using updated ancillary information. The new files (defined DT, in the product file names) supersede the previous NRT dataset as soon as available (up to 31 days from sensing, though typically around 15-20, depending from the input data and upstream providers). The

consistency of the OC NRT product time series is monitored by the OCTAC production units. Info about the product quality is detailed in relevant QUality Information Documents, QUIDs. The **REP** products, instead, are consistent multi-year time series produced by using a consolidated and consistent input dataset, with a unique processing software configuration. Therefore they represent a much more solid data set for long-term analyses. More details about product versions are provided in section IV.2.2. It should be noted that some daily products are missing during the period [1997-2002] due to the non-availability of the SeaWIFS input data, which was the only sensor operational in that period.
For NRT products, presently the entire OCTAC relies on the available OC sensors: MODIS-Aqua and NPP-VIIRS (from NASA) and Sentinel-3A OLCI (from EUMETSAT).,
It should be noted that these sensors are able to retrieve data by measuring the sun reflection over the sea. It means during the night or with cloudy conditions no data are available. As a consequence, at high latitude it is normal that products over Baltic or Arctic are not available or with a limited coverage during winter.
Products available from OCTAC are listed below:

- Arctic
  - ✓ OCEANCOLOUR_ARC_CHL_L3_NRT_OBSERVATIONS_009_047
  - ✓ OCEANCOLOUR_ARC_CHL_L3_REP_OBSERVATIONS_009_069
  - ✓ OCEANCOLOUR_ARC_CHL_L4_NRT_OBSERVATIONS_009_087
  - ✓ OCEANCOLOUR_ARC_CHL_L4_REP_OBSERVATIONS_009_088
  - ✓ OCEANCOLOUR_ARC_OPTICS_L3_NRT_OBSERVATIONS_009_046
  - ✓ OCEANCOLOUR_ARC_OPTICS_L3_REP_OBSERVATIONS_009_068
  - ✓ OCEANCOLOUR_ARC_OPTICS_L4_NRT_OBSERVATIONS_009_089
- Atlantic
  - ✓ OCEANCOLOUR_ATL_CHL_L3_NRT_OBSERVATIONS_009_036
  - ✓ OCEANCOLOUR_ATL_CHL_L3_REP_OBSERVATIONS_009_067
  - ✓ OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_037 (interpolation)
  - ✓ OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_098 (interpolation)
  - ✓ OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_090 (temporal av)
  - ✓ OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_091 (temporal av)
  - ✓ OCEANCOLOUR_ATL_OPTICS_L3_NRT_OBSERVATIONS_009_034
  - ✓ OCEANCOLOUR_ATL_OPTICS_L3_REP_OBSERVATIONS_009_066
  - ✓ OCEANCOLOUR_ATL_OPTICS_L4_NRT_OBSERVATIONS_009_092
- Baltic
  - ✓ OCEANCOLOUR_BAL_CHL_L3_NRT_OBSERVATIONS_009_049
  - ✓ OCEANCOLOUR_BAL_CHL_L3_REP_OBSERVATIONS_009_080
  - ✓ OCEANCOLOUR_BAL_OPTICS_L3_NRT_OBSERVATIONS_009_048
  - ✓ OCEANCOLOUR_BAL_OPTICS_L3_REP_OBSERVATIONS_009_097
- Black Sea
  - ✓ OCEANCOLOUR_BS_CHL_L3_NRT_OBSERVATIONS_009_044
  - ✓ OCEANCOLOUR_BS_CHL_L3_REP_OBSERVATIONS_009_071
  - ✓ OCEANCOLOUR_BS_CHL_L4_NRT_OBSERVATIONS_009_045
  - ✓ OCEANCOLOUR_BS_CHL_L4_REP_OBSERVATIONS_009_079
  - ✓ OCEANCOLOUR_BS_OPTICS_L3_NRT_OBSERVATIONS_009_042
  - ✓ OCEANCOLOUR_BS_OPTICS_L4_NRT_OBSERVATIONS_009_043
  - ✓ OCEANCOLOUR_BS_OPTICS_L3_REP_OBSERVATIONS_009_096

- Europe
  - ✓ OCEANCOLOUR_EUR_CHL_L3_NRT_OBSERVATIONS_009_050
- Global (Copernicus-GlobColour)
  - ✓ OCEANCOLOUR_GLO_OPTICS_L3_NRT_OBSERVATIONS_009_030
  - ✓ OCEANCOLOUR_GLO_CHL_L3_NRT_OBSERVATIONS_009_032
  - ✓ OCEANCOLOUR_GLO_CHL_L4_NRT_OBSERVATIONS_009_033
  - ✓ OCEANCOLOUR_GLO_OPTICS_L4_NRT_OBSERVATIONS_009_083
  - ✓ OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_085
  - ✓ OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_086
  - ✓ OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082
  - ✓ OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_081
- Global (OC-CCI)
  - ✓ OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_065
  - ✓ OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_093
  - ✓ OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_064
- Mediterranean Sea
  - ✓ OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040
  - ✓ OCEANCOLOUR_MED_CHL_L3_REP_OBSERVATIONS_009_073
  - ✓ OCEANCOLOUR_MED_CHL_L4_NRT_OBSERVATIONS_009_041
  - ✓ OCEANCOLOUR_MED_CHL_L4_REP_OBSERVATIONS_009_078
  - ✓ OCEANCOLOUR_MED_OPTICS_L3_NRT_OBSERVATIONS_009_038
  - ✓ OCEANCOLOUR_MED_OPTICS_L4_NRT_OBSERVATIONS_009_039
  - ✓ OCEANCOLOUR_MED_OPTICS_L3_REP_OBSERVATIONS_009_095

II.1 OCTAC Updates

This section describes the updates of the OCTAC system occurred since May 2015.

CMEMS V2.0 (April, 2016)

ACRI

- The Copernicus-GlobColour REP time-series [1997-2014] is now provided. Weaknesses and strengths of Copernicus-GlobColour compared to OC-CCI are provided in section VII.
- The NRT datasets start in 2015,
- 8-days and monthly products are now available,
- A non-mineral SPM product has been added.
- Global Optics products at 25 and 100 km have been retired
- BAL NRT production moved from ACRI PU to CNR PU
- Baltic GSM chlorophyll dataset [2012-2014] have been retired (superseded by a Neural Network approach, see CNR below)

CNR

- Only one chlorophyll product is now produced using different algorithm for open and coastal waters. This is labelled “CHL” instead of being labelled case 1, case 2.

- An L4 NRT product is now provided for the MED and BS areas (both optics and chlorophyll). This is provided as 8-day and monthly mean composite products from MODIS and VIIRS
- In addition to daily L4 CHL REP product, an L4 CHL REP product is now provided for the MED and BS areas. This is provided as 8-day and monthly mean composites based on the L3 REP.
- The BAL CHL L3 REP is now based on CCI reflectance and using a new regional algorithm.

PML

- Only one chlorophyll product is now produced (OC5CI). This is labelled "chl" instead of being labelled with the algorithm name.
- An L4 NRT product is now provided for the ARC and ATL areas (both optics and chlorophyll). This is provided as 8-day and monthly mean composite products from MODIS and VIIRS
- An L4 CHL REP product is now provided for the ARC and ATL areas. This is provided as 8-day and monthly mean composites based on the L3 REP.
- An L4 GLO REP CHL product is now provided based on OC-CCI data, provided as 8-day and monthly mean composites.
- Temporal coverage of the L3 GLO REP CHL (4km) product from OC-CCI has been extended to 31st December 2014 and rebased on the newer OC-CCI v2.0 release. The coverage of the regional L3 GLO REP (1km) is similarly extended.
- Chlorophyll products OC5 and OC488 have been superseded by OC5CI and retired

CMEMS V2.0.1 (June, 2016)

ACRI/CNR

- BAL NRT production moved from ACRI PU to CNR PU
- Baltic OPT NRT ACRI multi-sensor datasets have been retired.

- New BAL OPT NRT datasets single-sensor (modis_a) released.

II.1.1 *CMEMS V2.1 (July, 2016)*

ACRI

- **The daily L4 GLO OI (cloud free product) is now available as a REP [1997-2014]**
  OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082

II.1.2 *CMEMS V2.2 (September, 2016)*

ACRI

- **The daily L4 ATL OI (cloud free product) is now available as a REP [1997-2014]**
  OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_098

II.1.3 *CMEMS V3 (April, 2017)*

ACRI

- The Copernicus-GlobColour REP time-series have been extended to [1997-Aug-2016] using as inputs the last official level2 products from agencies.
- The NRT datasets start in Sep-2016

CNR

- Level-2 replaced Level-1 as upstream data for all the available sensors. This enables this production chain to more efficiently and promptly react and incorporate changes in space agencies' production chains;
- Updated destriping procedure
- Updated bowtie procedure
- Multi-sensor products replaced single-sensor products, which are no longer distributed;
- Updated of all chlorophyll algorithms
- Updated of Kd algorithm for Mediterranean Sea
- All REP product updated with new version of CCI processor (v3)
- BAL REP computed at 1 km of resolution
- Addition of new datasets within the Optics category: Inherent Optical Properties such as the phytoplankton absorption coefficient, the detritus absorption coefficient, and the particulate backscattering coefficient, all three at 443 nm
- REP Level-4 products only distributed at monthly or 8-day temporal resolution.

PML

- New multi-sensor merged Chlorophyll and RRS products for ATL and ARC areas in DT are now being produced, essentially identical to those provided as REP through OC-CCI
- Input data stream switched from L1 to L2, where possible (not all products can be provided from L2 inputs), for consistency across PUs
- Temporal coverage of the L3 GLO REP CHL (4km) product from OC-CCI has been extended to 31st December 2015 and rebased on the newer OC-CCI v3.0 release. The coverage of the regional L3 GLO REP (1km) is similarly extended.

II.1.4 *CMEMS V3.2 (October, 2017)*

ACRI

- The OLCI single-sensor products are now available for the period [6-July-2017, present]. The full mission (since April 2016) will be completed when it will have been reprocessed by ESA.

CNR

- The OLCI single-sensor products are now available for the period [6-July-2017, present]. The full mission (since April 2016) will be completed when it will have been reprocessed by ESA.

PML

- The OLCI single-sensor products are now available for the period [6-July-2017, present]. The full mission (since April 2016) will be completed when it will have been reprocessed by ESA.
- The multi-sensor CCI product has been brought up to full NRT status. Both NRT and DT versions of this product are now produced.

II.1.5 *CMEMS V3.3 (December, 2017)*

All Pus

- Temporal coverage of all multi-sensor REP products has been extended to the end of 2016

ACRI

- A GSM chlorophyll climatology is now provided at Global level.

II.1.6 *CMEMS V4.0 (April, 2018)*

All Pus

- the NRT MODIS and VIIRS datasets are using the R2018.0 NASA products since December 2017. It is planed to update all the CMEMS products using this new data in the coming months.

ACRI

- Temporal coverage of the Global NRT OLCI product has been extended to start the 25^{th} of April 2016 using the last baseline (2.23).

PML

- Single-sensor MODIS and VIIRS products have been withdrawn from the catalogue, with the exception of MODIS ADG, APH and ATOT and VIIRS SPM. The withdrawn products have been superseded by single-sensor OLCI products and by multi-sensor products based on OC-CCI, which are now available in NRT.
- Dimensions of the ATL and ARC areas have changed slightly. This reflects an upgrade of mapping software at PML PU, which now uses a common grid for all output products.

II.1.7 *CMEMS V4.1 & V4.2 (April, 2018)*

All Pus

. The Dissemination Unit relies now on a centralized CMEMS component shared by all TAC & MFC Pus.

II.1.8 *CMEMS V4.3 (June, 2018)*

ACRI

- The “cloud free” (interpolated) chlorophyll products (NRT & REP) have been updated to take benfit of the last R2018 NASA reprocessing and use of OLCI-S3A.

PML

- Temporal coverage of the Global NRT OLCI product has been extended to start the 25^{th} of April 2016 using the last baseline (2.23).

II.1.9 *CMEMS EIS Nov 2018*

ACRI

- Treatment of oligotrophic waters has been improved for both NRT and REP datasets

PML

- Change of chlorophyll algorithm from OC5C to OC5 for ATL and ARC

CNR

- Update of multi sensor processor for NRT time series for MED and BS

III HOW TO DOWNLOAD A PRODUCT

III.1 Download a product through the Copernicus Web Portal Subsetter Service

You first need to register. Please find below the registration steps
http://marine.copernicus.eu/web/34-products-and-services-faq.php#1

Once registered, the CMEMS FAQ http://marine.copernicus.eu/web/34-products-and-services-faq.php will guide you on How to download a product through the Copernicus Web Portal Subsetter Service.

III.2 Download a product through the Copernicus Web Portal MFTP Service

You first need to register. Please find below the registration steps:
http://marine.copernicus.eu/web/34-products-and-services-faq.php#1

Once registered, the CMEMS FAQ http://marine.copernicus.eu/web/34-products-and-services-faq.php will guide you on How to download a product through the Copernicus Web Portal MFTP Service.

IV DESCRIPTION OF THE PRODUCT SPECIFICATION

IV.1 General Information

The general information of the OC global and regional products is presented in the following subsections. Each subsection refers to different ocean regions.
Detailed information on the systems and products are available on Copernicus web site: http://marine.copernicus.eu/.

IV.1.1 *Mediterranean Sea*

Details about NRT products provided by CNR with daily, 8-days, and monthly temporal resolutions for the MED region are shown below.

Product	OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040 OCEANCOLOUR_MED_CHL_L4_NRT_OBSERVATIONS_009_041 OCEANCOLOUR_MED_OPTICS_L3_NRT_OBSERVATIONS_009_038 OCEANCOLOUR_MED_OPTICS_L4_NRT_OBSERVATIONS_009_039
Geographical coverage	6°W → 36.5°E; 30.0°N → 46.0°N
Xpoint	3308
Ypoint	1580
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater ([RD1], [RD2], [RD3]) **Kd490**: volume attenuation coefficient of downwelling radiative flux in seawater **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. Nominal central bands: 412, 443, 490, 510, 555, 670 nm
Observations	Yes
Analysis	No
Available time series	From 2017-01-01, (2016-04-25 OLCI) still on-going
Temporal resolution	Daily, 8-days, monthly
Target delivery time	Daily (L3), daily at day+1 for NRT and at day+31 for DT, at 13:00 UTC; 8-days means (L4), last day of the period +31 day, at 13:00 UTC; monthly means (L4), at last day of the month+31 days, at 13:00 UTC.
Delivery mechanism	SUBSETTER, WMS,MFTP
Horizontal resolution	1.1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

Details about the DINEOF-interpolated L4 DT product provided by CNR with daily resolution for the MED region are shown below.

Product	OCEANCOLOUR_MED_CHL_L4_NRT_OBSERVATIONS_009_041
Geographical coverage	6°W → 36.5°E; 30.0°N → 46.0°N
Xpoint	3308
Ypoint	1580
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater ([RD1],[RD2],[RD4])
Observations	Yes
Analysis	No
Available time series	From 2016-01-01, still on-going
Temporal resolution	Daily
Target delivery time	daily at day+1 for NRT and at day+36 for DT, at 13:00 UTC
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1.1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

Details about the REP product provided by CNR at daily resolution for the MED region are shown below.

Product	OCEANCOLOUR_MED_CHL_L3_REP_OBSERVATIONS_009_073 OCEANCOLOUR_MED_CHL_L4_REP_OBSERVATIONS_009_078 OCEANCOLOUR_MED_OPTICS_L3_REP_OBSERVATIONS_009_095
Geographical coverage	6°W → 36.5°E; 30.0°N → 46.0°N
Xpoint	3308
Ypoint	1580
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater ([RD1], [RD3], [RD2]) **Kd490**: volume attenuation coefficient of downwelling radiative flux in seawater **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. Nominal central bands: 412, 443, 490, 510, 555, 670 nm
Observations	Yes
Analysis	No
Available time series	From 1997-09-04 to 2016-12-19
Temporal resolution	Daily, 8-days, monthly
Target delivery time	As needed
Delivery mechanism	SUBSETTER, WMS,MFTP
Horizontal resolution	1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

IV.1.2 *Black Sea*

Details about NRT products provided by CNR with daily, weekly, and monthly temporal resolutions for the BS region are shown below.

Product	OCEANCOLOUR_BS_CHL_L3_NRT_OBSERVATIONS_009_044 OCEANCOLOUR_BS_CHL_L4_NRT_OBSERVATIONS_009_045 OCEANCOLOUR_BS_OPTICS_L3_NRT_OBSERVATIONS_009_042 OCEANCOLOUR_BS_OPTICS_L4_NRT_OBSERVATIONS_009_043
Geographical coverage	26.5°E → 42.0°E; 40.0°N → 48.0°N
Xpoint	1101
Ypoint	790
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater ([RD1], [RD5]) **Kd490**: volume attenuation coefficient of downwelling radiative flux in seawater **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. Nominal central bands: 412, 443, 490, 510, 555, 670
Observations	Yes
Analysis	No
Available time series	From 2017-01-01 (2016-04-25 OLCI), still on-going
Temporal resolution	Daily, 8-days, monthly
Target delivery time	Daily (L3), daily at day+1 for NRT and at day+31 for DT, at 13:00 UTC; 8-days means (L4), last day of the period +31 day, at 13:00 UTC; monthly means (L4), at last day of the month+31 days, at 13:00 UTC.
Delivery mechanism	SUBSETTER, WMS,MFTP
Horizontal resolution	1.1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

Details about the DINEOF-interpolated L4 DT product provided by CNR with daily resolution for the BS region are shown below.

Product	OCEANCOLOUR_BS_CHL_L4_NRT_OBSERVATIONS_009_045
Geographical coverage	26.5°E → 42.0°E; 40.0°N → 48.0°N
Xpoint	1101
Ypoint	790
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater ([RD1], [RD4], [RD5])
Observations	Yes
Analysis	No
Available time series	From 2017-01-01, still on-going
Temporal resolution	Daily
Target delivery time	daily at day+1 for NRT and at day+36 for DT, at 13:00 UTC

Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1.1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

Details about the REP product provided by CNR at daily resolution for the BS region are shown below.

Product	OCEANCOLOUR_BS_CHL_L3_REP_OBSERVATIONS_009_071 OCEANCOLOUR_BS_CHL_L4_REP_OBSERVATIONS_009_079 OCEANCOLOUR_BS_OPTICS_L3_REP_OBSERVATIONS_009_096
Geographical coverage	26.5°E → 42.0°E; 40.0°N → 48.0°N
Xpoint	1101
Ypoint	790
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater ([RD1], [RD5]) **Kd490**: volume attenuation coefficient of downwelling radiative flux in seawater **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. Nominal central bands for: 412, 443, 490, 510, 555, 670 nm
Observations	Yes
Analysis	No
Available time series	From 1997-09-04 to 2016-12-19
Temporal resolution	Daily, 8-days, monthly
Target delivery time	as needed
Delivery mechanism	SUBSETTER, WMS,MFTP
Horizontal resolution	1.1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

IV.1.3 *European Seas*

Details about NRT products provided by CNR with daily temporal resolutions for the EUR region are shown below.

Product	OCEANCOLOUR_EUR_CHL_L3_NRT_OBSERVATIONS_009_050
Geographical coverage	30.0°W → 42.0°E; 20.0°N → 65.85°N
Xpoint	5858
Ypoint	5095
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater
Observations	Yes
Analysis	No
Available time series	From 2016-01-01, still on-going
Temporal resolution	Daily

Target delivery time	daily at day+1 for NRT and at day+31 for DT, at 20:00 UTC
Delivery mechanism	SUBSETTER, WMS,MFTP
Horizontal resolution	1.1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

IV.1.4 *Global Ocean (Copernicus-GlobColour)*

These products are provided by ACRI-ST Company (Sophia Antipolis, France) and are based on the Copernicus-GlobColour [1] project. Products distributed in the frame of CMEMS are a subset of the larger Copernicus-GlobColour database (more than 40 variables available at 100, 25, 4 and 1km).

Details of CMEMS products provided by ACRI-ST are provided below. REP Products are based on merged SeaWIFs, MODIS-Aqua, MERIS and VIIRSN satellite data. NRT/DT products are based on merged MODIS-Aqua and VIIRSN satellite data. At present OLCI-S3A products are available only as a single sensor (not merged with other sensors).

Product	NRT/DT	OCEANCOLOUR_GLO_OPTICS_L3_NRT_OBSERVATIONS_009_030 OCEANCOLOUR_GLO_CHL_L3_NRT_OBSERVATIONS_009_032 OCEANCOLOUR_GLO_CHL_L4_NRT_OBSERVATIONS_009_033 OCEANCOLOUR_GLO_OPTICS_L4_NRT_OBSERVATIONS_009_083		
	REP	OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_085 OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_086 OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082 OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_081		
Geographical coverage	180°W - 180°E 90°S - 90°N			
Xpoint	8640 (1/24°)			
Ypoint	4320 (1/24°)			
Variables (for Merged products based on SeaWIFS, MERIS, MODIS-A, VIIRS-N)		Code	Description	Algorithm
		CHL-GSM	L3 Chlorophyll concentration (mg/m^3) : daily observations.	GSM [RD8]
		CHL-OI	L4 Chlorophyll concentration (mg/m^3): optimal interpolation to get a cloud free product.	Saulquin [RD1]
	Optics	**RRS**	Fully Normalized reflectance at 412, 443, 490, 555, 670 nm (sr^{-1})	AVW [RD9]
	Optics	**KD**	Diffuse attenuation coefficient at 490 nm (m^{-1}) of the downwelling irradiance at 490nm. It is one indicator of the turbidity of the water column.	Morel [RD10]
	Optics	**BBP**	Particulate backscattering coef. at 443 nm (m^{-1})	GSM [RD8]
	Optics	**CDM**	Absorption coef. due to cdom and non-	GSM[RD8]

			pigmented particles at 443 nm (m^{-1})	
		ZSD	Secchi disk depth Transparency (m)	Morel [RD10]
		SPM	Non Algal Suspended Particle Matter (g/m3)	Gohin [RD11]
Variables (for single OLCI products)	Code		Description	Algorithm
	CHL		L3 Chlorophyll concentration (mg/m^3) : daily observations.	OC4ME, Morel
	Optics	**RRS**	Fully Normalized reflectance at 400, 412, 443, 490, 510, 560, 620, 665, 674, 681, 709 nm (sr^{-1})	Baseline Correction
	Optics	**KD**	Diffuse attenuation coefficient at 490 nm (m^{-1}) of the downwelling irradiance at 490nm. It is one indicator of the turbidity of the water column.	OK2-560, Morel[RD10]
Observations	Yes			
Analysis	No			
Available time series	Merged NRT/DT: [Jan 2017 - present], OLCI [25 April 2016 – present]. Merged REP: [1997 - Dec-2016] (OLCI not used except for the L4 OI product). It should be noted that some daily products are missing during the period [1997-2002] due to the non-availability of the SeaWIFS input data.			
Temporal resolution	Daily, 8 days,monthly and daily-climatology			
Target delivery time	NRT - daily : 1 day after satellite acquisition at 18:00 UTC (except OI products at 20:00), DT - daily : for merged, 31 days after satellite acquisition at 18:00 UTC (except OI products at 20:00) for OLCI 10 days after satellite acquisition at 18:00 UTC NRT - 8-days/Monthly: 1 day after end of the period at 23:00 UTC DT - 8-days/Monthly: for merged, 31 day after end of the period at 23:00 UTC; for OLCI 10 days after satellite acquisition at 18:00 UTC REP: updated once per year.			
Delivery mechanism	SUBSETTER, WMS, MFTP			
Horizontal resolution	1/24° (about 4km) – For L3 CHL-GSM chlorophyll also available at 25km, 100km			
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)			
Format	NetCDF CF1.4			

The climatology is a daily climatology (366 daily products, including the 29th of February) created using all the data falling into a moving temporal window of ± 5 days (ie 11 days) extracted from a long time series of satellite observation. It means that for a 20 years series, a maximum of 20*11 days are used to characterise a daily climatology product at pixel level. The daily climatology provided for the 29th of February is based on 29th data for bissextile year, else based on the 28th of February.
The daily climatology product (on a pixel-by-pixel basis) is mainly characterized by the mean value, the standard deviation (STD) and the number of data used. Other statistics are provided: minimum, maximum, median, percentile 3, percentile 97, and standard deviation based on percentile 16 and 84.
The climatology is based on the period [1998-2014] to limit the quality issues of MODIS-Aqua and VIIRSN during the last years. At present, only the daily Global Chlorophyll climatology at 4km is disseminated (computed from OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_085/dataset-oc-glo-chl-multi-l3-gsm_4km_daily-rep-v01).
Please contact the service desk if you have other requirements. For instance it could be possible to provide climatology based on:

- other temporal resolutions: monthly, yearly,
- other spatial resolutions: 25km or 100km could be also provided or a 1km over European,
- other variables: RRS, KD, BBP, CDM, ZSD, SPM.

Important Note: for some pixels, only a few data are available along the time series. It means the statistics should be in this case carefully considered. It is recommended to use the variable "chl_count" to check the number of data used.

IV.1.5 *Global Ocean (OC-CCI)*

The Ocean Colour Climate Change Initiative is part of an ESA programme to produce "climate-grade" Essential Climate Variables based on satellite data; in OC-CCI v3.1's case, a merger of SeaWiFS, VIIRS, MERIS and MODIS-Aqua using the best-performing atmospheric correction and chlorophyll algorithms, with a temporally-weighted bias correction aiming to minimise differences between sensors. There is an annual update of algorithms and time series, which is incorporated by PML into the CMEMS distribution as GLO REP products. Further information and optional acknowledgement text can be found on the OC-CCI website (http://www.esa-oceancolour.org/).

Product Lines	OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_064 OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_065 OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_093
Geographical coverage	180°W ⍰ 180°E; 90°S ⍰ 90°N
Xpoint	8640
Ypoint	4320
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OC-CCI chlorophyll algorithm; in v3.1, a blend of OC3, OC4, OC5 and CI depending on the water types present in a pixel) **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. The merged dataset uses bands shifted to the SeaWiFS wavelengths, nominally centred at 412, 443, 490, 510, 555, and 670 nm
Observations	Yes
Analysis	No

Available time series	From 1997-09-04 to 2016-12-19
Temporal resolution	Daily, 8-day and monthly
Target delivery time	Updated once per year
Delivery mechanism	SUBSETTER, WMS,MFTP
Horizontal resolution	4 Km
Number of vertical levels	1
Format	NetCDF CF1.4

IV.1.6 *Atlantic*

Details about products provided by PML (L3) with daily temporal resolution for the Atlantic Ocean in NRT mode are provided below and are currently being produced from MODIS, VIIRS and OLCI sensors in single-sensor mode.

Product Lines	OCEANCOLOUR_ATL_CHL_L3_NRT_OBSERVATIONS_009_036 OCEANCOLOUR_ATL_OPTICS_L3_NRT_OBSERVATIONS_009_034
Geographical coverage	46°W ? 13°E; 20°N ? 66°N
Xpoint	5664
Ypoint	4416
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OLCI: OC4ME) **ADG**: volume absorption coefficient of radiative flux in seawater due to dissolved organic matter and non algal particles **(Currently MODIS-AQUA only).** **APH:** volume absorption coefficient of radiative flux in seawater due to phytoplankton (**Currently MODIS-AQUA only)** **ATOT:** volume absorption coefficient of radiative flux in seawater **(Currently MODIS-AQUA only)** **KD490**: volume attenuation coefficient of downwelling radiative flux in seawater **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. **Nominal central bands are listed below:** OLCI: 400, 412, 443, 490, 510, 560, 620, 665, 674, 681, 709 nm **SPM:** mass concentration of particulate (inorganic) matter in seawater (currently VIIRS only)
Observations	Yes
Analysis	No
Available time series	Starting 20 Dec 2017 (VIIRS ans MODIS) and 25 Apr 2016 (OLCI), ongoing
Temporal resolution	Daily
Target delivery time	NRT: The day after the satellite acquisition by 18:00 UTC DT: Up to 31 days (typically 15-20) after acquisition, by 18:00 UTC

Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1km
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)
Format	NetCDF CF1.4

PML additionally provides L3 multi-sensor merged products based on OC-CCI RRS algorithms and OC5CI in DT mode.

Product Lines	OCEANCOLOUR_ATL_CHL_L3_NRT_OBSERVATIONS_009_036 OCEANCOLOUR_ATL_OPTICS_L3_NRT_OBSERVATIONS_009_034
Geographical coverage	46°W ⍰ 13°E; 20°N ⍰ 66°N
Xpoint	5664
Ypoint	4416
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OC5CI) **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air at SeaWiFS wavelengths (412, 443, 490, 510, 555, 670)
Observations	Yes
Analysis	No
Available time series	1 Jan 2017, ongoing
Temporal resolution	Daily
Target delivery time	NRT: The day after the satellite acquisition by 18:00 UTC DT: Up to 31 days (typically 15-20) after acquisition, by 18:00 UTC
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1km
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)
Format	NetCDF CF1.4

PML provides L4 products with temporal averages of key L3 products described above.

Product Lines	OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_090 OCEANCOLOUR_ATL_OPTICS_L4_NRT_OBSERVATIONS_009_092
Geographical coverage	46°W ⍰ 13°E; 20°N ⍰ 66°N
Xpoint	5664
Ypoint	4416
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (MODIS/VIIRS: OC5CI, OLCI:OC4ME), for single sensor and multi-sensor products **KD490**: volume attenuation coefficient of downwelling radiative flux in seawater, for single sensor products only
Observations	Yes
Analysis	No
Available time series	2016-04-25 (OLCI) 2017-01-01 (multi), ongoing
Temporal resolution	8-day, monthly

Target delivery time	Up to 31 days (typically 15-20) after the end of the acquisition period, by 18:00 UTC
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1km
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)
Format	NetCDF CF1.4

The REP product provides Rrs data compatible with the OC-CCI 4km GLO REP, but reprocessed from scratch at 1km resolution for the regional areas. The CHL product provides the regional algorithm (OC5CI) created using these Rrs. This is fundamentally identical to the NRT multi-sensor product in terms of the algorithm used, but differs in that this product comes from the time period covered by OC-CCI and thus has a somewhat higher level of quality control.

Product	OCEANCOLOUR_ATL_CHL_L3_REP_OBSERVATIONS_009_067 OCEANCOLOUR_ATL_OPTICS_L3_REP_OBSERVATIONS_009_066
Geographical coverage	46°W ⍰ 13°E; 20°N ⍰ 66°N
Xpoint	5664
Ypoint	4416
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OC5CI) **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. The merged dataset uses bands shifted to the SeaWiFS wavelengths, nominally centred at 412, 443, 490, 510, 555, and 670 nm
Observations	Yes
Analysis	No
Available time series	From 1997-09-04 to 2017-12-19
Temporal resolution	Daily
Target delivery time	Updated annually
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

PML provides L4 products with temporal averages of key L3 products described above.

Product	OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_091
Geographical coverage	46°W ⍰ 13°E; 20°N ⍰ 66°N
Xpoint	5664
Ypoint	4416
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OC5CI)
Observations	Yes
Analysis	No

Available time series	From 1997-09-16 to 2016-12-19
Temporal resolution	8-day, monthly
Target delivery time	Updated annually
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

The Atlantic L4 “Cloud Free” Chlorophyll product is provided by ACRI-ST Company (Sophia Antipolis, France) and is based on the Copernicus-GlobColour [1] processor. Details of this product are provided below. Products are based on merged SeaWIFs, MODIS-Aqua, MERIS, VIIRSN and OLCI-S3A satellite data.

Product Lines	OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_037 (Copernicus-GlobColour) OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_098 (Copernicus-GlobColour)		
Geographical coverage	46°W - 13°E 20°N - 66°N		
Xpoint	5370		
Ypoint	4187		
Variables	Code	Description	Algorithm
	CHL-OI	daily L4 Chlorophyll concentration (mg/m^3): Optimal Interpolation to get a cloud free product.	Saulquin [RD7]
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater		
Observations	Yes		
Analysis	No		
Available time series	NRT/DT: [2017 – present] REP: [1997 -2016]		
Temporal resolution	Daily		
Target delivery time	NRT: the day after the satellite acquisition at 20:00 UTC DT: 31 days after the satellite acquisition at 20:00 UTC REP: updated once per year.		
Delivery mechanism	SUBSETTER, WMS, MFTP		
Horizontal resolution	1km		
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)		
Format	NetCDF CF1.4		

IV.1.7 *Baltic Sea*

Details about NRT products produced by CNR with daily temporal resolution for the Baltic Sea are provided below. Due to the interruption of SeaWiFS in late 2010 and the interruption of MERIS in April 2012 the production relies today on AQUA/MODIS as well as Sentinel3/OLCI data only.

Products	OCEANCOLOUR_BAL_OPTICS_L3_NRT_OBSERVATIONS_009_048 OCEANCOLOUR_BAL_CHL_L3_NRT_OBSERVATIONS_009_049
Geographical coverage	9.25°E → 30.25°E; 53.25°N → 65.85°N
Xpoint	1185
Ypoint	1147
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. RRS products are centred over 412, 443, 489, 531, 551, and 665 nm
Observations	Yes
Analysis	No
Available time series	From 2016-01-01, still on-going
Temporal resolution	Daily
Target delivery time	The day after the satellite acquisition: at 15:00 UTC
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1km
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)
Format	NetCDF CF1.4

Details about the REP product provided by CNR at daily resolution for the BAL region are shown below.

Product	OCEANCOLOUR_BAL_CHL_L3_REP_OBSERVATIONS_009_080 OCEANCOLOUR_BAL_OPTICS_L3_REP_OBSERVATIONS_009_097
Geographical coverage	9.25°E → 30.25°E; 53.25°N → 65.85°N
Xpoint	1185
Ypoint	1147
Variables	**Chl_a:** mass concentration of chlorophyll_a in seawater ([RD6]) **Kd490**: volume attenuation coefficient of downwelling radiative flux in seawater **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. Nominal central bands for: 412, 443, 490, 510, 555, 670 nm
Observations	Yes
Analysis	No
Available time series	From 1997-09-04 to 2017-12-19
Temporal resolution	Daily
Target delivery time	As needed
Delivery mechanism	SUBSETTER, WMS,MFTP
Horizontal resolution	1 Km

Number of vertical levels	1
Format	NetCDF CF1.4

IV.1.8 *Arctic Region*

Details about products provided by PML (L3) with daily temporal resolution for the Arctic region in NRT mode are provided below and are currently being produced from MODIS, VIIRS and OLCI in single-sensor mode.

Product Lines	OCEANCOLOUR_ARC_CHL_L3_NRT_OBSERVATIONS_009_047 OCEANCOLOUR_ARC_OPTICS_L3_NRT_OBSERVATIONS_009_046
Geographical coverage	180°W ? 180°E; 66°N ? 90°N
Xpoint	34560
Ypoint	2400
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OLCI: OC4ME) **ADG**: volume absorption coefficient of radiative flux in seawater due to dissolved organic matter and non-algal particles **(Currently MODIS-AQUA only).** **APH:** volume absorption coefficient of radiative flux in seawater due to phytoplankton **(Currently MODIS-AQUA only).** **ATOT:** volume absorption coefficient of radiative flux in seawater **(Currently MODIS-AQUA only).** **Kd490**: volume attenuation coefficient of downwelling radiative flux in seawater **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. **Nominal central bands are listed below:** OLCI: 400, 412, 443, 490, 510, 560, 620, 665, 674, 681, 709 nm **SPM:** mass concentration of particulate (inorganic) matter in seawater (Currently VIIRS only)
Observations	Yes
Analysis	No
Available time series	1 Jan 2017 (multi) 25 Apr 2016 (OLCI), ongoing
Temporal resolution	Daily
Target delivery time	NRT: The day after the satellite acquisition by 18:00 UTC DT: Up to 31 days (typically 15-20) after acquisition, by 18:00 UTC
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1km
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)
Format	NetCDF CF1.4

PML additionally provides L3 multi-sensor merged products based on OC-CCI RRS algorithms and OC5CI in DT mode.

Product Lines	OCEANCOLOUR_ARC_CHL_L3_NRT_OBSERVATIONS_009_047 OCEANCOLOUR_ARC_OPTICS_L3_NRT_OBSERVATIONS_009_046
Geographical coverage	180°W 180°E; 66°N 90°N
Xpoint	34560
Ypoint	2400
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OC5CI) **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air at SeaWiFS wavelengths (412, 443, 490, 510, 555, 670)
Observations	Yes
Analysis	No
Available time series	1 Jan 2017, ongoing
Temporal resolution	Daily
Target delivery time	NRT: The day after the satellite acquisition by 18:00 UTC DT: Up to 31 days (typically 15-20) after acquisition, by 18:00 UTC
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1km
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)
Format	NetCDF CF1.4

PML provides L4 products with temporal averages of key L3 products described above.

Product Lines	OCEANCOLOUR_ARC_CHL_L4_NRT_OBSERVATIONS_009_087 OCEANCOLOUR_ARC_OPTICS_L4_NRT_OBSERVATIONS_009_089
Geographical coverage	180°W 180°E; 66°N 90°N
Xpoint	34560
Ypoint	2400
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OLCI:OC4ME) **Kd490**: volume attenuation coefficient of downwelling radiative flux in seawater
Observations	Yes
Analysis	No
Available time series	1 Jan 2017 (multi), 25 Apr 2016 (OLCI) onwards
Temporal resolution	8-day, monthly
Target delivery time	Up to 31 days (typically 15-20) after the end of the acquisition period, by 18:00 UTC
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1km
Number of vertical levels	From 0.0m to 0.0m (CRS=EPSG: 5714)
Format	NetCDF CF1.4

The REP product provides Rrs data compatible with the OC-CCI 4km GLO REP, but reprocessed from scratch at 1km resolution for the regional areas. The CHL product provides the regional algorithm (OC5CI) created using these Rrs. This is fundamentally identical to the NRT multi-sensor product in terms of the algorithm used, but differs in that this product comes from the time period covered by OC-CCI and thus has a somewhat higher level of quality control.

Product	OCEANCOLOUR_ARC_CHL_L3_REP_OBSERVATIONS_009_069 OCEANCOLOUR_ARC_OPTICS_L3_REP_OBSERVATIONS_009_068
Geographical coverage	180°W ⍰ 180°E; 66°N ⍰ 90°N
Xpoint	34560
Ypoint	2400
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OC5CI) **RRS**: surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air. The merged dataset uses bands shifted to the SeaWiFS wavelengths, nominally centred at 412, 443, 490, 510, 555, and 670 nm.
Observations	Yes
Analysis	No
Available time series	From 1997-09-04 to 2016-12-19
Temporal resolution	Daily
Target delivery time	As needed
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

PML provides L4 products with temporal averages of key L3 products described above.

Product	OCEANCOLOUR_ARC_CHL_L4_REP_OBSERVATIONS_009_088
Geographical coverage	180°W ⍰ 180°E; 66°N ⍰ 90°N
Xpoint	36000
Ypoint	2400
Variables	**CHL:** mass concentration of chlorophyll_a in seawater (OC5CI)
Observations	Yes
Analysis	No
Available time series	From 1997-09-04 to 2016-12-19
Temporal resolution	8-day, monthly
Target delivery time	As needed
Delivery mechanism	SUBSETTER, WMS, MFTP
Horizontal resolution	1 Km
Number of vertical levels	1
Format	NetCDF CF1.4

IV.2 *Details of datasets*

The details of the OC global and regional datasets are presented in the following subsections. Each subsection refers to different ocean region. It is important to underline that the Ocean Colour datasets are classified also taking into account the satellite product level definition (L3 or L4) and the product temporal coverage as defined below. The definition is common for all regions.

IV.2.1 *Product Levels*

There are two product levels that are disseminated by CMEMS OCTAC: L3 and L4. Input data (Level-2 or Level-1) are the products downloaded by OCTAC PUs from upstream data providers.

Input data

- Level 1 (L1) are raw data formatted at full instrument resolution, time-referenced, and annotated with ancillary information, including radiometric and geometric calibration coefficients and georeferencing parameters (e.g., platform ephemeris) computed and appended but not applied to Level 0 data
- Level 2 data consist of derived geophysical variables at the same resolution as the source Level 1 data acquired by the ocean colour remote sensors.

L2 are the input data of all products derived by ACRI and CNR PUs, and most of the products from the PML PU. . L1 data are primarily used in OC-CCI related processing, which allows greater control and choice of algorithms. It may also be used in limited circumstances, such as working around any lengthy upstream L2 outage.

L3 Products

- L3 products are the daily composite and can be of any spatial resolution, typically 1, 4, 9, and 25 km

L4 Products

- Level 4 data result from analyses of L3 data (e.g., variables derived from multiple measurements). Either multi-day or daily L4 products are delivered to CMEMS delivers
- L4 are those products for which a temporal averaging method or an interpolation procedure is applied to fill in missing data values. Temporal averaging is performed on 8-days and monthly bases. The interpolation procedure currently used spans from Optimal Interpolation to DINEOF procedure.

IV.2.2 *Product processing mode and temporal coverage*

The OCTAC processes the L3 and L4 ocean colour products in two different processing modes:

- Operational mode
- Offline processing mode

These two processing modes are associated to the CMEMS catalogue products definition:

- The Near real Time (NRT) products
- The multi-year time series of reprocessed (REP) products

NRT and REP products could generated using different input data. As a consequence, the NRT and REP products could be characterized by different scientific quality. A more detailed description of these product versions is provided below.

Operational Near real Time (NRT) products

The **NRT products** are operationally produced every day and provide the best estimate of the ocean colour variables at the time of processing. These products are generated using the best auxiliary data available (meteorological data) at the time of the processing.

Two versions of NRT products are produced by OCTAC: 1) a first version is produced soon after the satellite passage; this version is meant for providing the user with products as soon as possible (defined NRT, in the product file name); 2) the NRT products are then updated by reprocessing the OC data by using updated ancillary information, The new files (defined DT, in the product file names) supersede the previous NRT files as soon as are available.

- First version of the NRT products (NRT files) may be affected by larger errors with respect to DT files (second version). Nevertheless, these NRT data are very useful for NRT coastal application, water quality monitoring, fishery application, and in situ data acquisition. This version of the product is delivered within one day from the satellite acquisition, compatible with the less-than-24 hours requirement.
- The first version of NRT products are understood to be of reduced quality due to unavailability of ancillary data (precision orbital data and meteorological fields used for atmospheric correction) used to produce L2 data. Therefore OC data are re-processed in delayed mode using consolidated L2 products to obtain consolidated products as soon as ancillary data are available (15-31 days after sensing). The errors associated to the DT files are in general lower than the NRT one.
- Since NRT product files are those first available to users but with lower scientific quality, DT product files supersede them as soon as they are available, generally 15-20 days after satellite sensing. It is important to note that the file name will reflect this file change to unequivocally let users know what they are actually downloading when accessing to the OC NRT products available in the catalogue.
- NRT products have a temporal window from approximately 2 years before now up to the present day

Reprocessed (REP) products

- Data are re-processed once for a long period (some years) using a consolidated and consistent input dataset with a unique processing software configuration. So, REP products should be used for climatic study or for analysis of the inter-annual variability of the ocean parameter under study.
- REP products provide a multi-year time series of the OC observations in the past time, the entire time series is available on line accessing the OCTAC DU from the Copernicus serving desk
- REP products are available at both regional and global scales.
- The Copernicus-GlobColour and OC-CCI are the main initiatives in the world providing a long term series of level 3 Observation Ocean Colour products at global level based on a multi sensor approach with a 4km resolution. While both datasets aim to provide high-quality merged datasets, Copernicus-GlobColour supports continuity with the NRT production (and thus the unavoidable risk of inconsistencies in the time series due to recalibrations or processing changes in its upstream data, until a full reprocessing is done on a yearly basis to restore consistency). On the other hand, OC-CCI targets “climate quality” consistency with minimal inter-sensor bias, with the unavoidable cost of being unable to provide this consistency up to the current date (e.g. with NRT). In V3, the CCI algorithms are applied to delayed-time NRT data for the regions, reducing the difference to around a month. These two datasets therefore provide different and complementary characteristics that are useful to different users – a service offering an NRT stream may opt for the GC REP in order to be able to identify anomalies in yesterday’s NRT or, while a study investigating delayed-time NRT, longer subtle changes over time or deriving a historical measure for later use may opt for OC-CCI or Copernicus-GlobColour. The differences between the two initiatives are detailed in the Section VII.
- The regional REP products are produced to improve the Chlorophyll retrieval accuracy and to provide a finer resolution (1Km) to address regional user needs. To this aim, OC-CCI reflectances at 1km are ingested and then the same regional bio-optical algorithms used in NRT production are applied.
- The users will be advised by CMEMS each time a new version of the REP products will be available

Each product may contain more than one dataset. Next sections provide details about datasets contained in each product.

IV.2.3 *Mediterranean Sea*

IV.2.3.1 PRODUCT: OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040

- **DATASET:** dataset-oc-med-chl-multi-l3-chl_1km_daily-rt-v02
  dataset-oc-med-chl-olci_a-l3-chl_1km_daily-rt-v02

- **VARIABLE:** Chl_a – Multi sensor mass concentration of chlorophyll_a in seawater. (daily) NRT and DT ([RD1][RD2][RD3])
  Note: The chlorophyll estimates are obtained using two different algorithms for open ocean (case 1) and coastal (case 2) water types.
- **UNITS:** mg m^{-3}
- **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.3.2 PRODUCT: OCEANCOLOUR_MED_CHL_L4_NRT_OBSERVATIONS_009_041

- **DATASET:** dataset-oc-med-chl-multi-l4-chl_1km_monthly-rt-v02
  dataset-oc-med-chl-olci_a-l4-chl_1km_monthly-rt-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (monthly) DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-med-chl-multi-l4-chl_1km_8days-rt-v02
  dataset-oc-med-chl-olci_a-l4-chl_1km_8days-rt-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (8-days) DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-med-chl-multi-l4-interp_1km_daily-rt-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (daily) NRT and DT. ([RD1][RD4])
  - **Note:** this is the DINEOF-interpolated product.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.3.3 PRODUCT: OCEANCOLOUR_MED_CHL_L3_REP_OBSERVATIONS_009_073

- **DATASET:** dataset-oc-med-chl-multi_cci-l3-chl_1km_daily-rep-v02
  - **VARIABLE:** Chl_a – Multi sensor mass concentration of chlorophyll_a in seawater - (daily) REP ([RD1][RD2][RD3])
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.3.4 PRODUCT: OCEANCOLOUR_MED_CHL_L4_REP_OBSERVATIONS_009_078

- **DATASET:** dataset-oc-med-chl-multi_cci-l4-chl_1km_monthly-rep-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (monthly) DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-med-chl-multi_cci-l4-chl_1km_8days-rep-v02

- **VARIABLE:** Chl_a – Multi sensor mass concentration of chlorophyll_a in seawater - (8-days) DT
- **UNITS:** mg m^{-3}
- **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.3.5 PRODUCT: OCEANCOLOUR_MED_OPTICS_L3_NRT_OBSERVATIONS_009_038

- **DATASET:** dataset-oc-med-opt-multi-l3-rrs412_1km_daily-rt-v02
  dataset-oc-med-opt-multi-l3-rrs443_1km_daily-rt-v02
  dataset-oc-med-opt-multi-l3-rrs490_1km_daily-rt-v02
  dataset-oc-med-opt-multi-l3-rrs510_1km_daily-rt-v02
  dataset-oc-med-opt-multi-l3-rrs555_1km_daily-rt-v02
  dataset-oc-med-opt-multi-l3-rrs670_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs400_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs412_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs443_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs490_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs510_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs560_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs620_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs665_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs674_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs681_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-rrs709_1km_daily-rt-v02
  - **VARIABLE:** RRS - Multi sensor surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) NRT and DT
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE: RRS400,** RRS412, RRS443, RRS490, RRS510, RRS555, RRS560, RRS620, RRS665, RRS670, RRS674, RRS681, RRS709
- **DATASET:** dataset-oc-med-opt-multi-l3-kd490_1km_daily-rt-v02
  dataset-oc-med-opt-olci_a-l3-kd490_1km_daily-rt-v02
  - **VARIABLE:** KD490 - Multi sensor volume attenuation coefficient of downwelling radiative flux in seawater - (daily) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490
- **DATASET:** dataset-oc-med-opt-multi-l3-bbp443_1km_daily-rt-v02
  - **VARIABLE:** BBP443 - Particulate back-scattering coefficient at 443 nm, QAA algorithm
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** BBP443
- **DATASET:** dataset-oc-med-opt-multi-l3-aph443_1km_daily-rt-v02
  - **VARIABLE:** APH443 - Absorption due to phytoplankton at 443 nm, QAA algorithm
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** APH443
- **DATASET:** dataset-oc-med-opt-multi-l3-aph443_1km_daily-rt-v02

- **VARIABLE:** ADG443 - Absorption due to gelbstoff and detrital material at 443 nm, QAA algorithm
- **UNITS:** m^{-1}
- **NAME OF VARIABLES IN THE NETCDF FILE:** APH443

IV.2.3.6 PRODUCT: OCEANCOLOUR_MED_OPTICS_L4_NRT_OBSERVATIONS_009_039

- **DATASET:** dataset-oc-med-opt-multi-l4-kd490_1km_monthly-rt-v02
  dataset-oc-med-opt-olci_a-l4-kd490_1km_monthly-rt-v02
  - **VARIABLE:** KD490 - Multi sensor volume attenuation coefficient of downwelling radiative flux in seawater - (monthly) DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490
- **DATASET:** dataset-oc-med-opt-multi-l4-kd490_1km_8days-rt-v02
  dataset-oc-med-opt-olci_a-l4-kd490_1km_8days-rt-v02
  - **VARIABLE:** KD490 - Multi sensor volume attenuation coefficient of downwelling radiative flux in seawater - (8-days) DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490

IV.2.3.7 PRODUCT: OCEANCOLOUR_MED_OPTICS_L3_REP_OBSERVATIONS_009_095

- **DATASET:** dataset-oc-med-opt-multi_cci-l3-rrs412_1km_daily-rep-v02
  dataset-oc-med-opt-multi_cci-l3-rrs443_1km_daily-rep-v02
  dataset-oc-med-opt-multi_cci-l3-rrs490_1km_daily-rep-v02
  dataset-oc-med-opt-multi_cci-l3-rrs510_1km_daily-rep-v02
  dataset-oc-med-opt-multi_cci-l3-rrs555_1km_daily-rep-v02
  dataset-oc-med-opt-multi_cci-l3-rrs670_1km_daily-rep-v02
  - **VARIABLE:** RRS – Multi sensor surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) REP
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS510, RRS555, RRS670

IV.2.4 *Black Sea*

IV.2.4.1 PRODUCT: OCEANCOLOUR_BS_CHL_L3_NRT_OBSERVATIONS_009_044

- **DATASET:** dataset-oc-bs-chl-multi-l3-chl_1km_daily-rt-v02
  dataset-oc-bs-chl-olci_a-l3-chl_1km_daily-rt-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater. (daily) NRT and DT. ([RD1][RD5])

Note: The chlorophyll estimates are obtained using two different algorithms for Open Ocean (case1) and coastal (case 2) water types.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.4.2 PRODUCT: OCEANCOLOUR_BS_CHL_L4_NRT_OBSERVATIONS_009_045

- **DATASET:** dataset-oc-bs-chl-multi-l4-chl_1km_monthly-rt-v02
  dataset-oc-bs-chl-olci_a-l4-chl_1km_monthly-rt-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (monthly) DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-bs-chl-multi-l4-chl_1km_8days-rt-v02
  dataset-oc-bs-chl-olci_a-l4-chl_1km_8days-rt-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (8-days) DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-bs-chl-multi-l4-interp_1km_daily-rt-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (daily) NRT and DT ([RD1][RD4][RD5]).
  - **Note:** this is the DINEOF-interpolated product.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.4.3 PRODUCT: OCEANCOLOUR_BS_CHL_L3_REP_OBSERVATIONS_009_071

- **DATASET:** dataset-oc-bs-chl-multi_cci-l3-chl_1km_daily-rep-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (daily) REP ([RD1][RD5])
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.4.4 PRODUCT: OCEANCOLOUR_BS_CHL_L4_REP_OBSERVATIONS_009_079

- **DATASET:** dataset-oc-bs-chl-multi_cci-l4-chl_1km_monthly-rep-v02
  - **VARIABLE:** Chl_a - Multi sensor mass concentration of chlorophyll_a in seawater - (monthly) DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-bs-chl-multi_cci-l4-chl_1km_8days-rep-v02
  - **VARIABLE:** Chl_a – Multi sensor mass concentration of chlorophyll_a in seawater - (8-days) DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.4.5 PRODUCT: OCEANCOLOUR_BS_OPTICS_L3_NRT_OBSERVATIONS_009_042

- **DATASET:** dataset-oc-bs-opt-multi-l3-rrs412_1km_daily-rt-v02
  dataset-oc-bs-opt-multi-l3-rrs443_1km_daily-rt-v02
  dataset-oc-bs-opt-multi-l3-rrs490_1km_daily-rt-v02
  dataset-oc-bs-opt-multi-l3-rrs510_1km_daily-rt-v02
  dataset-oc-bs-opt-multi-l3-rrs555_1km_daily-rt-v02
  dataset-oc-bs-opt-multi-l3-rrs670_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs400_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs412_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs443_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs490_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs510_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs560_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs620_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs665_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs674_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs681_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-rrs709_1km_daily-rt-v02
    - **VARIABLE:** RRS - Multi sensor surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) NRT and DT
    - **UNITS:** sr^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE: RRS400,** RRS412, RRS443, RRS490, RRS510, RRS555, RRS560, RRS620, RRS665, RRS670, RRS674, RRS681, RRS709
- **DATASET:** dataset-oc-bs-opt-multi-l3-kd490_1km_daily-rt-v02
  dataset-oc-bs-opt-olci_a-l3-kd490_1km_daily-rt-v02
    - **VARIABLE:** KD490 - Multi sensor volume attenuation coefficient of downwelling radiative flux in seawater - (daily) NRT and DT.
    - **UNITS:** m^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490

IV.2.4.6 PRODUCT: OCEANCOLOUR_BS_OPTICS_L4_NRT_OBSERVATIONS_009_043

- **DATASET:** dataset-oc-bs-opt-multi-l4-kd490_1km_monthly-rt-v02
  dataset-oc-bs-opt-olci_a-l4-kd490_1km_monthly-rt-v02
    - **VARIABLE:** KD490 - Multi sensor volume attenuation coefficient of downwelling radiative flux in seawater - (monthly) DT
    - **UNITS:** m^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490
- **DATASET:** dataset-oc-bs-opt-multi-l4-kd490_1km_8days-rt-v02
  dataset-oc-bs-opt-olci_a-l4-kd490_1km_8days-rt-v02
    - **VARIABLE:** KD490 - Multi sensor volume attenuation coefficient of downwelling radiative flux in seawater - (8-days) DT
    - **UNITS:** m^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490

IV.2.4.7 PRODUCT: OCEANCOLOUR_BS_OPTICS_L3_REP_OBSERVATIONS_009_096

- **DATASET:** dataset-oc-bs-opt-multi_cci-l3-rrs412_1km_daily-rep-v02
  dataset-oc-bs-opt-multi_cci-l3-rrs443_1km_daily-rep-v02
  dataset-oc-bs-opt-multi_cci-l3-rrs490_1km_daily-rep-v02
  dataset-oc-bs-opt-multi_cci-l3-rrs510_1km_daily-rep-v02
  dataset-oc-bs-opt-multi_cci-l3-rrs555_1km_daily-rep-v02
  dataset-oc-bs-opt-multi_cci-l3-rrs670_1km_daily-rep-v02
  - **VARIABLE:** RRS – Multi sensor surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) REP
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS510, RRS555, RRS670

IV.2.5 *European Seas*

IV.2.5.1 PRODUCT: OCEANCOLOUR_EUR_CHL_L3_NRT_OBSERVATIONS_009_050

- **DATASET:** dataset-oc-eur-chl-multi-l3-chl_1km_daily-rt-v02
  - **VARIABLE:** Chl_a - Multi sensor (MODIS-Aqua and VIIRS) mass concentration of chlorophyll_a in seawater. (daily) NRT and DT.
  - **Note:** The chlorophyll estimates are obtained using two different algorithms for Open Ocean (case1) and coastal (case 2) water types.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.6 *Global Ocean (Copernicus-GlobColour)*

IV.2.6.1 PRODUCT: OCEANCOLOUR_GLO_CHL_L3_NRT_OBSERVATIONS_009_032

- **DATASET:** dataset-oc-glo-chl-multi -l3-gsm_4km_daily-rt-v02
  dataset-oc-glo-chl-multi -l3-gsm_25km_daily-rt-v02
  dataset-oc-glo-chl-multi -l3-gsm_100km_daily-rt-v02
  dataset-oc-glo-chl-olci_a-l3-av_100km_daily-rt-v02
  dataset-oc-glo-chl-olci_a-l3-av_25km_daily-rt-v02
  dataset-oc-glo-chl-olci_a-l3-av_4km_daily-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from OLCI S3A, or MODIS and VIIRS data for multi - (daily) NRT and DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL and associated flags and errors

IV.2.6.2 PRODUCT: OCEANCOLOUR_GLO_CHL_L4_NRT_OBSERVATIONS_009_033

- **DATASET:** dataset-oc-glo-chl-multi-l4-oi_4km_daily-rt-v02
  dataset-oc-glo-chl-multi-l4-oi_4km_daily-rt-v02
  dataset-oc-glo-chl-multi-l4-gsm_4km_8days-rt-v02
  dataset-oc-glo-chl-multi-l4-gsm_4km_monthly-rt-v02

dataset-oc-glo-chl-multi-l4-gsm_25km_8days-rt-v02
dataset-oc-glo-chl-multi-l4-gsm_25km_monthly-rt-v02
dataset-oc-glo-chl-multi-l4-gsm_100km_8days-rt-v02
dataset-oc-glo-chl-multi-l4-gsm_100km_monthly-rt-v02
dataset-oc-glo-chl-olci_a-l4-av_4km_monthly-rt-v02
dataset-oc-glo-chl-olci_a-l4-av_100km_8days-rt-v02
dataset-oc-glo-chl-olci_a-l4-av_100km_monthly-rt-v02
dataset-oc-glo-chl-olci_a-l4-av_25km_8days-rt-v02
dataset-oc-glo-chl-olci_a-l4-av_25km_monthly-rt-v02
dataset-oc-glo-chl-olci_a-l4-av_4km_8days-rt-v02

- **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from MODIS and VIIRS data - (daily) NRT and DT. **Note:** “oi” this is the Optimally-interpolated product.
- **UNITS:** mg m^{-3}
- **NAME OF VARIABLES IN THE NETCDF FILE:** CHL and associated errors

IV.2.6.3 PRODUCT: OCEANCOLOUR_GLO_OPTICS_L3_NRT_OBSERVATIONS_009_030

- **DATASET:** dataset-oc-glo-opt-multi-l3-rrs412_4km_daily-rt-v02
dataset-oc-glo-opt-multi-l3-rrs443_4km_daily-rt-v02
dataset-oc-glo-opt-multi-l3-rrs490_4km_daily-rt-v02
dataset-oc-glo-opt-multi-l3-rrs555_4km_daily-rt-v02
dataset-oc-glo-opt-multi-l3-rrs670_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs400_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs412_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs443_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs490_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs510_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs560_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs620_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs665_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs674_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs681_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-rrs709_4km_daily-rt-v02
dataset-oc-glo-opt-olci_a-l3-kd490_4km_daily-rt-v02

  - **VARIABLE:** RRS - MODIS-derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) NRT and DT
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS555, RRS670 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-cdm443_4km_daily-rt-v02

- **VARIABLE:** CDM - volume absorption coefficient of radiative flux in seawater due to dissolved organic matter and non algal particles derived from MERIS and MODIS data - (daily) NRT and DT
- **UNITS:** m^{-1}
- **NAME OF VARIABLES IN THE NETCDF FILE:** CDM443 and associated flags and errors

- **DATASET:** dataset-oc-glo-opt-multi-l3-bbp443_4km_daily-rt-v02
  - **VARIABLE:** BBP - volume backwards scattering coefficient of radiative flux in seawater due to particles derived from MERIS and MODIS data - (daily) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** BBP443 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-kd490_4km_daily-rt-v02
  - **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from MERIS and MODIS data - (daily) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490
- **DATASET:** dataset-oc-glo-opt-multi-l3-zsd_4km_daily-rt-v02
  - **VARIABLE:** ZSD - Secchi depth of seawater derived from MERIS and MODIS data - (daily) NRT and DT
  - **UNITS:** m
  - **NAME OF VARIABLES IN THE NETCDF FILE:** ZSD and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-spm_4km_daily-rt-v02
  - **VARIABLE:** SPM – the non-organic Solid Particulate Matter (daily) NRT and DT
  - **UNITS:** g/m3
  - **NAME OF VARIABLES IN THE NETCDF FILE:** SPM and associated flags and errors

IV.2.6.4 PRODUCT: OCEANCOLOUR_GLO_OPTICS_L4_NRT_OBSERVATIONS_009_086

- **DATASET:** dataset-oc-glo-opt-multi-l3-rrs412_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs443_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs490_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs555_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs670_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs412_4km_monthly-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs443_4km_monthly-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs490_4km_monthly-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs555_4km_monthly-rt-v02
  dataset-oc-glo-opt-multi-l3-rrs670_4km_monthly-rt-v02
  dataset-oc-glo-opt-olci_a-l4-rrs400_4km_8days-rt-v02
  dataset-oc-glo-opt-olci_a-l4-rrs412_4km_8days-rt-v02
  dataset-oc-glo-opt-olci_a-l4-rrs443_4km_8days-rt-v02
  dataset-oc-glo-opt-olci_a-l4-rrs490_4km_8days-rt-v02
  dataset-oc-glo-opt-olci_a-l4-rrs510_4km_8days-rt-v02

dataset-oc-glo-opt-olci_a-l4-rrs560_4km_8days-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs620_4km_8days-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs665_4km_8days-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs674_4km_8days-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs681_4km_8days-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs709_4km_8days-rt-v02
dataset-oc-glo-opt-olci_a-l4-kd490_4km_8days-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs400_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs412_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs443_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs490_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs510_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs560_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs620_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs665_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs674_4km_monthly-rt-v02
dataset-oc-glo-opt-olci_a-l4-rrs681_4km_monthly-rt-v02

  - dataset-oc-glo-opt-olci_a-l4-rrs709_4km_monthly-rt-v02**VARIABLE:** RRS - derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (8-days and monthly) NRT and DT
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE: RRS400,** RRS412, RRS443, RRS490, RRS510, RRS555, RRS560, RRS620, RRS665, RRS670, RRS674, RRS681, RRS709 and associated flags and errors

- **DATASET:** dataset-oc-glo-opt-multi-l3-cdm443_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-cdm443_4km_monthly-rt-v02
  - **VARIABLE:** CDM - volume absorption coefficient of radiative flux in seawater due to dissolved organic matter and non algal particles derived from MERIS and MODIS data - (daily) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CDM443 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-bbp443_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-bbp443_4km_monthly-rt-v02
  - **VARIABLE:** BBP - volume backwards scattering coefficient of radiative flux in seawater due to particles derived from MERIS and MODIS data - (8-days and monthly) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** BBP443 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-kd490_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-kd490_4km_monthly-rt-v02
  dataset-oc-glo-opt-olci_a-l4-kd490_4km_monthly-rt-v02

- **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from MERIS and MODIS data - (8-days and monthly) NRT and DT
- **UNITS:** m^{-1}
- **NAME OF VARIABLES IN THE NETCDF FILE:** KD490

- **DATASET:** dataset-oc-glo-opt-multi-l3-zsd_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-zsd_4km_monthly-rt-v02
  - **VARIABLE:** ZSD - Secchi depth of seawater derived from MERIS and MODIS data - (8-days and monthly) NRT and DT
  - **UNITS:** m
  - **NAME OF VARIABLES IN THE NETCDF FILE:** ZSD and associated flags and errors

- **DATASET:** dataset-oc-glo-opt-multi-l3-spm_4km_8days-rt-v02
  dataset-oc-glo-opt-multi-l3-spm_4km_monthly-rt-v02
  - **VARIABLE:** SPM – the non-organic Solid Particulate Matter (8-days and monthly) NRT and DT
  - **UNITS:** g/m3
  - **NAME OF VARIABLES IN THE NETCDF FILE:** SPM and associated flags and errors

IV.2.6.5 PRODUCT: OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_032

- **DATASET:** dataset-oc-glo-chl-multi -l3-gsm_4km_daily-rep-v02
  dataset-oc-glo-chl-multi -l3-gsm_25km_daily-rep-v02
  dataset-oc-glo-chl-multi -l3-gsm_100km_daily-rep-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from MODIS and VIIRS data - (daily) REP
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL and associated flags and errors

IV.2.6.6 PRODUCT: OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082

- **DATASET:** dataset-oc-glo-chl-multi-l4-oi_4km_daily-rep-v02
  dataset-oc-glo-chl-multi-l4-oi_4km_daily-rep-v02
  dataset-oc-glo-chl-multi-l4-gsm_4km_8days-rep-v02
  dataset-oc-glo-chl-multi-l4-gsm_4km_monthly-rep-v02
  dataset-oc-glo-chl-multi-l4-gsm_25km_8days-rep-v02
  dataset-oc-glo-chl-multi-l4-gsm_25km_monthly-rep-v02
  dataset-oc-glo-chl-multi-l4-gsm_100km_8days-rep-v02
  dataset-oc-glo-chl-multi-l4-gsm_100km_monthly-rep-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from MODIS and VIIRS data - (daily) REP. **Note:** “oi” this is the Optimally-interpolated product.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL and associated errors

- **DATASET:** dataset-oc-glo-chl-multi-l4-gsm_4km_daily-climatology-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from MODIS and VIIRS data - (daily) REP. **Note:** "oi" this is the Optimally-interpolated product.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:**

Name of Variables	Description, Algorithm
CHL_mean	Arithmetic mean (mg/m3)
CHL_standard_deviation	Standard deviation (mg/m3)
CHL_count	Number of observation used to compute the statistics
CHL_minimum	Minimum value (mg/m3)
CHL_maximum	Maximum value (mg/m3)
CHL_median	Median (mg/m3)
CHL_percentile_standard_deviation	(p84 - p16)/2: standard deviation computed from percentile 16 and 84 with the hypothesis of a normal law. (mg/m3)
CHL_percentile_3	Percentile 3rd (mg/m3)
CHL_percentile_97	Percentile 97th (mg/m3)

IV.2.6.7 PRODUCT: OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_086

- **DATASET:** dataset-oc-glo-opt-multi-l3-rrs412_4km_daily-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs443_4km_daily-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs490_4km_daily-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs555_4km_daily-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs670_4km_daily-rep-v02
  - **VARIABLE:** RRS - MODIS-derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) REP
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS555, RRS670 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-cdm443_4km_daily-rep-v02
  - **VARIABLE:** CDM - volume absorption coefficient of radiative flux in seawater due to dissolved organic matter and non algal particles derived from MERIS and MODIS data - (daily) REP
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CDM443 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-bbp443_4km_daily-rep-v02
  - **VARIABLE:** BBP - volume backwards scattering coefficient of radiative flux in seawater due to particles derived from MERIS and MODIS data - (daily) REP
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** BBP443 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-kd490_4km_daily-rep-v02

  - **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from MERIS and MODIS data - (daily) REP
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490
- **DATASET:** dataset-oc-glo-opt-multi-l3-zsd_4km_daily-rep-v02
  - **VARIABLE:** ZSD - Secchi depth of seawater derived from MERIS and MODIS data - (daily) REP
  - **UNITS:** m
  - **NAME OF VARIABLES IN THE NETCDF FILE:** ZSD and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-spm_4km_daily-rep-v02
  - **VARIABLE:** SPM – the non-organic Solid Particulate Matter (daily) REP
  - **UNITS:** g/m3
  - **NAME OF VARIABLES IN THE NETCDF FILE:** SPM and associated flags and errors

IV.2.6.8 PRODUCT: OCEANCOLOUR_GLO_OPTICS_L4_REP_OBSERVATIONS_009_081

- **DATASET:** dataset-oc-glo-opt-multi-l3-rrs412_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs443_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs490_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs555_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs670_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs412_4km_monthly-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs443_4km_monthly-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs490_4km_monthly-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs555_4km_monthly-rep-v02
  dataset-oc-glo-opt-multi-l3-rrs670_4km_monthly-rep-v02
  - **VARIABLE:** RRS - MODIS-derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (8-days and monthly) REP
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS555, RRS670 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-cdm443_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-cdm443_4km_monthly-rep-v02
  - **VARIABLE:** CDM - volume absorption coefficient of radiative flux in seawater due to dissolved organic matter and non algal particles derived from MERIS and MODIS data - (daily) REP
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CDM443 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-bbp443_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-bbp443_4km_monthly-rep-v02

  - **VARIABLE:** BBP - volume backwards scattering coefficient of radiative flux in seawater due to particles derived from MERIS and MODIS data - (8-days and monthly) REP
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** BBP443 and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-kd490_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-kd490_4km_monthly-rep-v02
  - **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from MERIS and MODIS data - (8-days and monthly) REP
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490
- **DATASET:** dataset-oc-glo-opt-multi-l3-zsd_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-zsd_4km_monthly-rep-v02
  - **VARIABLE:** ZSD - Secchi depth of seawater derived from MERIS and MODIS data - (8-days and monthly) REP
  - **UNITS:** m
  - **NAME OF VARIABLES IN THE NETCDF FILE:** ZSD and associated flags and errors
- **DATASET:** dataset-oc-glo-opt-multi-l3-spm_4km_8days-rep-v02
  dataset-oc-glo-opt-multi-l3-spm_4km_monthly-rep-v02
  - **VARIABLE:** SPM – the non-organic Solid Particulate Matter (8-days and monthly) REP
  - **UNITS:** g/m3
  - **NAME OF VARIABLES IN THE NETCDF FILE:** SPM and associated flags and errors

IV.2.7 *Global Ocean (OC-CCI)*

IV.2.7.1 PRODUCT: OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_065

- **DATASET:** dataset-oc-glo-chl-multi_cci-l3_4km_daily-rep-v02
  - **VARIABLE:** Multi-sensor derived mass concentration of chlorophyll_a in seawater – (daily, OC-CCI chlorophyll) REP
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.7.2 PRODUCT: OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_064

- **DATASET:** dataset-oc-glo-opt-multi_cci-l3-rrs412_4km_daily-rep-v02
  dataset-oc-glo-opt-multi_cci-l3-rrs443_4km_daily-rep-v02
  dataset-oc-glo-opt-multi_cci-l3-rrs490_4km_daily-rep-v02
  dataset-oc-glo-opt-multi_cci-l3-rrs510_4km_daily-rep-v02
  dataset-oc-glo-opt-multi_cci-l3-rrs555_4km_daily-rep-v02
  dataset-oc-glo-opt-multi_cci-l3-rrs670_4km_daily-rep-v02

- **VARIABLE:** Multi-sensor derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) REP
- **UNITS:** sr^{-1}
- **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS510, RRS555, RRS670

IV.2.7.3 PRODUCT: OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_093

- **DATASET:** dataset-oc-glo-chl-multi_cci-l4_4km_8days-rep-v02
  - **VARIABLE:** Multi-sensor derived mass concentration of chlorophyll_a in seawater – (8-day composites, OC-CCI chlorophyll) REP
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-glo-chl-multi_cci-l4_4km_monthly-rep-v02
  - **VARIABLE:** Multi-sensor derived mass concentration of chlorophyll_a in seawater – (monthly composites, OC-CCI chlorophyll) REP
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.8 *Atlantic*

IV.2.8.1 PRODUCT: OCEANCOLOUR_ATL_OPTICS_L3_NRT_OBSERVATIONS_009_034

- **DATASET:** dataset-oc-atl-opt-modis_a-l3-atot443_1km_daily-rt-v02
  - **VARIABLE:** ATOT - volume absorption coefficient of radiative flux in seawater - (daily) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** ATOT
- **DATASET:** dataset-oc-atl-opt-modis_a-l3-aph443_1km_daily-rt-v02
  - **VARIABLE:** APH - volume absorption coefficient of radiative flux in seawater due to phytoplankton - (daily) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** APH
- **DATASET:** dataset-oc-atl-opt-modis_a-l3-adg443_1km_daily-rt-v02
  - **VARIABLE:** ADG - volume absorption coefficient of radiative flux in seawater due to phytoplankton due to dissolved organic matter and non algal particles - (daily) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** ADG
- **DATASET:** dataset-oc-atl-opt-viirs_s -l3-spm_1km_daily-rt-v02
  - **VARIABLE:** SPM - mass concentration of particulate (inorganic) matter in seawater derived from VIIRS data - (daily) NRT and DT
  - **UNITS:** mg m^{-3}

   - **NAME OF VARIABLES IN THE NETCDF FILE:** SPM

- **DATASET:**
   - dataset-oc-atl-opt-olci_a-l3-rrs400_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs412_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs443_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs490_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs510_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs560_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs620_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs665_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs674_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs681_1km_daily-rt-v01
   - dataset-oc-atl-opt-olci_a-l3-rrs709_1km_daily-rt-v01

   - **VARIABLE:** RRS - OLCI-derived or multi-sensor surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) NRT and DT
   - **UNITS:** sr^{-1}
   - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS400, RRS412, RRS443, RRS490, RRS510, RRS560, RRS620, RRS665, RRS674, RRS681, RRS709
- **DATASET:** dataset-oc-atl-opt-olci_a-l3-kd490_1km_daily-rt-v01
   - **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from OLCI data - (daily) NRT and DT
   - **UNITS:** m^{-1}
   - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490

- **DATASET:**
   - dataset-oc-atl-opt-multi_cci-l3-rrs412_1km_daily-rt-v02
   - dataset-oc-atl-opt-multi_cci-l3-rrs443_1km_daily-rt-v02
   - dataset-oc-atl-opt-multi_cci -l3-rrs490_1km_daily-rt-v02
   - dataset-oc-atl-opt-multi_cci -l3-rrs510_1km_daily-rt-v02
   - dataset-oc-atl-opt-multi_cci -l3-rrs555_1km_daily-rt-v02
   - dataset-oc-atl-opt-multi_cci -l3-rrs670_1km_daily-rt-v02

   - **VARIABLE:** RRS – **CCI**-approach multi-sensor product for the surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) NRT and DT.

   - **UNITS:** sr^{-1}
   - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS510, RRS555, RRS670

IV.2.8.2 PRODUCT: OCEANCOLOUR_ATL_OPTICS_L3_REP_OBSERVATIONS_009_066

- **DATASET:** dataset-oc-atl-opt-multi_cci-l3-rrs412_1km_daily-rep-v02
  dataset-oc-atl-opt-multi_cci-l3-rrs443_1km_daily-rep-v02
  dataset-oc-atl-opt-multi_cci-l3-rrs490_1km_daily-rep-v02
  dataset-oc-atl-opt-multi_cci-l3-rrs510_1km_daily-rep-v02
  dataset-oc-atl-opt-multi_cci-l3-rrs555_1km_daily-rep-v02
  dataset-oc-atl-opt-multi_cci-l3-rrs670_1km_daily-rep-v02
  - **VARIABLE:** Multi-sensor derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) REP
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS510, RRS555, RRS670

IV.2.8.3 PRODUCT: OCEANCOLOUR_ATL_OPTICS_L4_NRT_OBSERVATIONS_009_092

- **DATASET:** dataset-oc-atl-opt-olci_a-l4-kd490_1km_8days-rt-v01
  - **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from OLCI data - (8-day composites) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490
- **DATASET:** dataset-oc-atl-opt-olci_a-l4-kd490_1km_monthly-rt-v01
  - **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from OLCI data - (monthly composites) NRT and DT
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490

IV.2.8.4 PRODUCT: OCEANCOLOUR_ATL_CHL_L3_NRT_OBSERVATIONS_009_036

- **DATASET:** dataset-oc-atl-chl-olci_a-l3-chl_1km_daily-rt-v01
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from OLCI data (OC4ME) - (daily) NRT and DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-atl-opt-multi_cci -l3-chl_1km_daily-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from CCI-approach multi-sensor data (OC5CI) - (daily) NRT and DT.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.8.5 PRODUCT: OCEANCOLOUR_ATL_CHL_L3_REP_OBSERVATIONS_009_067

- **DATASET:** dataset-oc-atl-chl-multi_cci-l3-chl_1km_daily-rep-v02
  - **VARIABLE:** Multi-sensor derived mass concentration of chlorophyll_a in seawater – (daily, OC5CI) REP

- **UNITS:** mg m^{-3}
- **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.8.6 PRODUCT: OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_090

- **DATASET:** dataset-oc-atl-chl-olci_a-l4-chl_1km_8days-rt-v01
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from OLCI data (OC4ME) - (8-day composites) DT only.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-atl-chl-olci_a-l4-chl_1km_monthly-rt-v01
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from OLCI data (OC4ME) - (monthly composites) DT only.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-atl-chl-multi_cci-l4-chl_1km_8days-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from CCI-approach multi-sensor data (OC5CI) - (8-day composites) DT only.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-atl-chl-multi_cci-l4-chl_1km_monthly-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from VIIRS data - (monthly composites) DT only.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.8.7 PRODUCT: OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_091

- **DATASET:** dataset-oc-atl-chl-multi_cci-l4-chl_1km_8days-rep-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from optics data from the OC-CCI project – 8-day composites.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-atl-chl-multi_cci-l4-chl_1km_monthly-rep-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from optics data from the OC-CCI project – monthly composites.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.8.8 PRODUCT: OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_037 (Copernicus-GlobColour)

- **DATASET:** dataset-oc-atl-chl-multi -l4-oi_1km_daily-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from MODIS VIIRS and OLCI-S3A data - (daily) NRT and DT. **Note:** this is the Optimally-interpolated product.

- **UNITS:** mg m^{-3}
- **NAME OF VARIABLES IN THE NETCDF FILE:** CHL and associated errors

IV.2.8.9 PRODUCT: OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_098 (Copernicus-GlobColour)

- **DATASET:** dataset-oc-atl-chl-multi -l4-oi_1km_daily-rep-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from MODIS VIIRS and OLCI-S3A data - (daily) NRT and DT. **Note:** this is the Optimally-interpolated product.
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL and associated errors

IV.2.9 *Baltic Sea*

IV.2.9.1 PRODUCT: OCEANCOLOUR_BAL_CHL_L3_NRT_OBSERVATIONS_009_049

- **DATASET:** dataset-oc-bal-chl-modis-l3-nn_1km_daily-rt-v02
  dataset-oc-bal-chl-olci_a-l3-nn_1km_daily-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from MODIS and OLCI data - (daily) NRT and DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.9.2 PRODUCT: OCEANCOLOUR_BAL_CHL_L3_REP_OBSERVATIONS_009_080

- **DATASET:** dataset-oc-bal-chl-multi_cci-l3-chl_1km_daily-rep-v02
  - **VARIABLE:** Chl_a – Multi sensor mass concentration of chlorophyll_a in seawater - (daily) REP ([RD6])
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.9.3 PRODUCT: OCEANCOLOUR_BAL_OPTICS_L3_NRT_OBSERVATIONS_009_048

- **DATASET:** dataset-oc-bal-opt-modis_a-l3-rrs412_1km_daily-rt-v02
  dataset-oc-bal-opt-modis_a-l3-rrs443_1km_daily-rt-v02
  dataset-oc-bal-opt-modis_a-l3-rrs489_1km_daily-rt-v02
  dataset-oc-bal-opt-modis_a-l3-rrs531_1km_daily-rt-v02
  dataset-oc-bal-opt-modis_a-l3-rrs551_1km_daily-rt-v02
  dataset-oc-bal-opt-modis_a-l3-rrs665_1km_daily-rt-v02
  dataset-oc-bal-opt-olci_a-l3-rrs400_1km_daily-rt-v02
  dataset-oc-bal-opt-olci_a-l3-rrs412_1km_daily-rt-v02
  dataset-oc-bal-opt-olci_a-l3-rrs443_1km_daily-rt-v02
  dataset-oc-bal-opt-olci_a-l3-rrs490_1km_daily-rt-v02
  dataset-oc-bal-opt-olci_a-l3-rrs510_1km_daily-rt-v02
  dataset-oc-bal-opt-olci_a-l3-rrs560_1km_daily-rt-v02
  dataset-oc-bal-opt-olci_a-l3-rrs620_1km_daily-rt-v02
  dataset-oc-bal-opt-olci_a-l3-rrs665_1km_daily-rt-v02

dataset-oc-bal-opt-olci_a-l3-rrs674_1km_daily-rt-v02
dataset-oc-bal-opt-olci_a-l3-rrs681_1km_daily-rt-v02
dataset-oc-bal-opt-olci_a-l3-rrs709_1km_daily-rt-v02

  - **VARIABLE:** RRS - MODIS-and OLCI derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) NRT and DT
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE: RRS400,** RRS412, RRS443, RRS490, RRS510, RRS555, RRS560, RRS620, RRS665, RRS670, RRS674, RRS681, RRS709
  -

- **DATASET:** **dataset-oc-bal-opt-olci_a-l3-kd490_1km_daily-rt-v02**
  - **VARIABLE:** Kd490 – OLCI-derived volume attenuation coefficient of downwelling radiative flux in seawater - (daily)
  - **UNITS:** sr^{-1}

  NAME OF VARIABLES IN THE NETCDF FILE: KD490

IV.2.9.4 PRODUCT: OCEANCOLOUR_BAL_OPTICS_L3_REP_OBSERVATIONS_009_097

- **DATASET:** dataset-oc-bal-opt-multi_cci-l3-rrs412_1km_daily-rep-v02
  dataset-oc-bal-opt-multi_cci-l3-rrs443_1km_daily-rep-v02
  dataset-oc-bal-opt-multi_cci-l3-rrs490_1km_daily-rep-v02
  dataset-oc-bal-opt-multi_cci-l3-rrs510_1km_daily-rep-v02
  dataset-oc-bal-opt-multi_cci-l3-rrs555_1km_daily-rep-v02
  dataset-oc-bal-opt-multi_cci-l3-rrs670_1km_daily-rep-v02
  - **VARIABLE:** RRS - Multi sensor derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) REP
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS510, RRS555, RRS670
- **DATASET:** dataset-oc-bal-opt-multi_cci-l3-kd490_1km_daily-rep-v02
  - **VARIABLE:** Kd490 - Multi sensor derived volume attenuation coefficient of downwelling radiative flux in seawater - (daily) REP
  - **UNITS:** m^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490

IV.2.10 *Arctic region*

IV.2.10.1 PRODUCT: OCEANCOLOUR_ARC_CHL_L3_NRT_OBSERVATIONS_009_047

- **DATASET:** dataset-oc-arc-chl-olci_a-l3-chl_1km_daily-rt-v01
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from OLCI data - (daily) NRT and DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

- **DATASET:** dataset-oc-arc-opt-multi_cci-l3-chl_1km_daily-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from VIIRS data - (daily) NRT and DT
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.10.2 PRODUCT: OCEANCOLOUR_ARC_CHL_L4_NRT_OBSERVATIONS_009_087

- **DATASET:** dataset-oc-arc-chl-olci_a-l4-chl_1km_8days-rt-v01
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from OLCI data - (8-day composites) DT only
  - **UNITS:** mg m^{-3}

  NAME OF VARIABLES IN THE NETCDF FILE: CHL
- **DATASET:** dataset-oc-arc-chl-olci_a-l4-chl_1km_monthly-rt-v01
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from OLCI data - (monthly composites) DT only
  - **UNITS:** mg m^{-3}

  NAME OF VARIABLES IN THE NETCDF FILE: CHL
- **DATASET:** dataset-oc-arc-chl-multi_cci-l4-chl_1km_8days-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from VIIRS data - (8-day composites) DT only
  - **UNITS:** mg m^{-3}

  NAME OF VARIABLES IN THE NETCDF FILE: CHL
- **DATASET:** dataset-oc-arc-chl-multi_cci -l4-chl_1km_monthly-rt-v02
  - **VARIABLE:** Chl_a - mass concentration of chlorophyll_a in seawater derived from VIIRS data - (monthly composites) DT only
  - **UNITS:** mg m^{-3}

  NAME OF VARIABLES IN THE NETCDF FILE: CHL

IV.2.10.3 PRODUCT: OCEANCOLOUR_ARC_CHL_L3_REP_OBSERVATIONS_009_069

- **DATASET:** dataset-oc-arc-chl-multi_cci-l3-chl_1km_daily-rep-v02
  - **VARIABLE:** Multi-sensor derived mass concentration of chlorophyll_a in seawater – (daily, OC5CI) REP
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.10.4 PRODUCT: OCEANCOLOUR_ARC_CHL_L4_REP_OBSERVATIONS_009_088

- **DATASET:** dataset-oc-arc-chl-multi_cci-l4-chl_1km_8days-rep-v02
  - **VARIABLE:** Multi-sensor derived mass concentration of chlorophyll_a in seawater – (8-day composites, OC5CI) REP
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL
- **DATASET:** dataset-oc-arc-chl-multi_cci-l4-chl_1km_monthly-rep-v02
  - **VARIABLE:** Multi-sensor derived mass concentration of chlorophyll_a in seawater – (monthly composites, OC5CI) REP
  - **UNITS:** mg m^{-3}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** CHL

IV.2.10.5 PRODUCT: OCEANCOLOUR_ARC_OPTICS_L3_NRT_OBSERVATIONS_009_046

- **DATASET:** dataset-oc-arc-opt-olci_a-l3-rrs400_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs412_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs443_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs490_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs510_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs560_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs620_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs665_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs674_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs681_1km_daily-rt-v01
  dataset-oc-arc-opt-olci_a-l3-rrs709_1km_daily-rt-v01
  - **VARIABLE:** RRS - OLCI-derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) NRT and DT
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS400, RRS412, RRS443, RRS490, RRS510, RRS560, RRS620, RRS665, RRS674, RRS681, RRS709
- **DATASET:** dataset-oc-arc-opt-multi_cci -l3-rrs412_1km_daily-rt-v02
  dataset-oc-arc-opt-multi_cci -l3-rrs443_1km_daily-rt-v02
  dataset-oc-arc-opt-multi_cci -l3-rrs490_1km_daily-rt-v02
  dataset-oc-arc-opt-multi_cci -l3-rrs510_1km_daily-rt-v02
  dataset-oc-arc-opt-multi_cci -l3-rrs555_1km_daily-rt-v02
  dataset-oc-arc-opt-multi_cci-l3-rrs670_1km_daily-rt-v02
  - **VARIABLE:** RRS – **CCI**-approach derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) DT only
  - **UNITS:** sr^{-1}
  - **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS510, RRS555, RRS670

- **DATASET:** dataset-oc-arc-opt-modis_a-l3-atot443_1km_daily-rt-v02
    - **VARIABLE:** ATOT - volume absorption coefficient of radiative flux in seawater - (daily) NRT and DT
    - **UNITS:** m^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** ATOT
- **DATASET:** dataset-oc-arc-opt-modis_a-l3-aph443_1km_daily-rt-v02
    - **VARIABLE:** APH - volume absorption coefficient of radiative flux in seawater due to phytoplankton - (daily) NRT and DT
    - **UNITS:** m^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** APH
- **DATASET:** dataset-oc-arc-opt-modis_a-l3-adg443_1km_daily-rt-v02
    - **VARIABLE:** ADG - volume absorption coefficient of radiative flux in seawater due to phytoplankton due to dissolved organic matter and non algal particles - (daily) NRT and DT
    - **UNITS:** m^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** ADG
- **DATASET:** dataset-oc-arc-opt-viirs_s-l3-spm_1km_daily-rt-v02
    - **VARIABLE:** SPM - mass concentration of particulate (inorganic) matter in seawater derived from VIIRS data - (daily) NRT and DT
    - **UNITS:** mg m^{-3}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** SPM

IV.2.10.6 PRODUCT: OCEANCOLOUR_ARC_OPTICS_L4_NRT_OBSERVATIONS_009_089

- **DATASET:** dataset-oc-arc-opt-olci_a-l4-kd490_1km_8days-rt-v01
    - **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from OLCI data - (8-day composites) NRT and DT
    - **UNITS:** m^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490
- **DATASET:** dataset-oc-arc-opt-olci_a-l4-kd490_1km_monthly-rt-v01
    - **VARIABLE:** Kd490 - volume attenuation coefficient of downwelling radiative flux in seawater derived from OLCI data - (monthly composites) NRT and DT
    - **UNITS:** m^{-1}
    - **NAME OF VARIABLES IN THE NETCDF FILE:** KD490

IV.2.10.7 PRODUCT: OCEANCOLOUR_ARC_OPTICS_L3_REP_OBSERVATIONS_009_068

- **DATASET:** dataset-oc-arc-opt-multi_cci-l3-rrs412_1km_daily-rep-v02
  dataset-oc-arc-opt-multi_cci-l3-rrs443_1km_daily-rep-v02
  dataset-oc-arc-opt-multi_cci-l3-rrs490_1km_daily-rep-v02
  dataset-oc-arc-opt-multi_cci-l3-rrs510_1km_daily-rep-v02

dataset-oc-arc-opt-multi_cci-l3-rrs555_1km_daily-rep-v02
dataset-oc-arc-opt-multi_cci-l3-rrs670_1km_daily-rep-v02

- **VARIABLE:** Multi-sensor derived surface ratio of upwelling radiance emerging from seawater to downwelling radiative flux in air - (daily) REP
- **UNITS:** sr^{-1}
- **NAME OF VARIABLES IN THE NETCDF FILE:** RRS412, RRS443, RRS490, RRS510, RRS555, RRS670

V NOMENCLATURE OF FILES

The nomenclature of the downloaded files differs on the basis of the chosen download mechanism **Subsetter** or **FTP** (aka AFTP – "Authenticated-FTP", sometimes still referred as MFTP – "MyOcean FTP" for backwards compatibility, a FTP interface connected with the CMEMS Central Authentication System) service.

V.1 Nomenclature of files when downloaded through the Copernicus Web Portal Subsetter Service

The Subsetter Interface/Service is provided by MOTU, a Software/Interface that connects the Web Portal to the Dissemination Unit's catalogue. The details on how to access the data are provided by the Copernicus Service Desk.
The user will be asked to login using the supplied username and password. Then the user can access the data using the subsetter web interface or using a command line procedure (scripts) for automating the download (the CMEMS Service desk can provide information on how to build these scripts).
The OC files nomenclature has been harmonized in CMEMS: all Ocean Colour TAC PUs produce the files using the same nomenclature. This nomenclature is described in section V.2. However, the subsetter does not conserve the name of the OC original files (see below), therefore, the file nomenclature differs according to the mechanism used to download them: subsetter or mftp.
Ocean colour data are accessible via a unique interface. The dissemination Centre (CNR) delivers all OCTAC products (http://cmems.isac.cnr.it/mis-gateway-servlet/Motu; requires authentication).
The filename obtained downloading a product through the subsetter interface is given by:
{CMEMS_Dataset_ID}_{random_number}.nc
Where {CMEMS_Dataset_ID} has been harmonized following the same principles used for the filename convention:
dataset-{tac}-{region}-{type/parameter}-{sensor_satellite}-{level}-{config}-{type}-v{dataset version}
Where:
dataset is a fixed string;
tac represent the Thematic Assembly Center: **oc** in Ocean Color TAC;
region is a 3 letters code (see table 1);
type/parameter can be **chl** for Chlorophyll-a products or **opt** for all other optic parameters (config field below);
sensor can be modis, , viirs, multi (multi sensor merged) or multi_cci (ESA CCI multi sensor merged);
satellite is a 1 letter code: a=aqua s=seastar, e=envisat, n=npp (not present in case of multi satellite;
level can be either l3 or l4;

config is composed by: {algorithm/parameter}_{spatial resolution}_{temporal resolution}

I algorithm/parameter identifies the algorithm (such as "medoc3", "oc5", etc) used for CHL products or the parameter in analysis for optic parameters, which can be:

adg (or adg443)
aph (or aph443)
atot (or atot443)
bbp (or bbp443)
cdm443
kd490
rrsXXX (XXX varies accordingly to the wave length)
spm
zsd

II spatial resolution is expressed in Kilometres (1, 2, 9….100)

III temporal resolution (daily, weekly, monthly, 5days)

type could be **rt** ("Real Time" used for NRT and DT products), **rep** ("Reprocessing": consistent time series), **climatology** (climatology based on the "Reprocessing")
dataset version shows the version of the dataset, incrementing the number

A couple of examples of L3 MODIS(Aqua)-derived real time product covering the Mediterranean Sea (optical parameters) are:

dataset-oc-med-opt-multi-l3-rrs412_1km_daily-rt-v02.nc
dataset-oc-med-opt-multi-l3-kd490_1km_daily-rt-v02.nc

V.2 Nomenclature of files when downloaded through the Copernicus Web Portal MFTP Service

The use of CMEMS-FTP interface is typically recommended for users who:

1. want to download CMEMS data regularly and automatically,
2. want to download a large amount of data (e.g. Re-analysis).
3. want to download data provided exactly by the single file

Once logged (same user/password provided by CMEMS Service Desk), users will find the following folder structure:
/Core/{Product ID}/{Dataset ID}/{temporal split}
Where "temporal split" depends on the product and in general means "year/month".
Browsing the desired product, users will reach the final folder containing the files. File names follow the rule:
{valid date}[_{freq flag}_{end date}]-{producer}-{level/type}-{parameter}-{config}-{region}-[{bul date}_]{free field}-fv{file version}.nc

Where:

valid date yyyymmdd[ThhmmssZ] is the date which data refer to. This is a mandatory field.

freq flag is the frequency of data values in the file (h = hourly, d = daily, w = weekly, m = monthly, nd for an “n-day” product). Not mandatory
end date yyyymmdd is the final date which data refer to. Not mandatory
producer is a short version of the CMEMS production unit e.g. CNR, ACRI-ST, etc. This is a mandatory field.
level/type can either be L3 or L4. This is a mandatory field.
parameter is a code to identify the variable name (see Section V.3). This is a mandatory field.
config is a mandatory field, and identifies the producing system and configuration as follows:

config={Algorithm}_{Sensor}_{Spatial Resolution}

- Algorithm: e.g., MedOc3, oc5_modis, etc.
- Sensor: Use one or 2 characters to indicate the sensor/satellite. I:
  OLCI-a: Oa
  VIIRS: V
  MODIS/Aqua: A
  MERIS: M
  SeaWIFS: S
  Multi : SAMV merged sensors (SEAWIFS/MODIS-AQUA/MERIS/VIIRS)
  For merged products there will not be an underscore to separate each sensor contribution, e.g.: a merged product between SeaWiFS and MODIS AQUA will be: -SA-
- Spatial Resolution: is expressed in kilometres, using 1, 2, 4, 7, and 9, 25 and 100 Km for different resolutions

region is a mandatory and consists of a three letter code, (see table 1)
Bul date: bYYYYMMDD is the bulletin date in which the product was produced, could include ‘hhmm’ if required. Not mandatory
free field is a mandatory field code required for uniqueness of the filename, and can be NRT, DT or RAN (or REP).
file version is **vxx.y** where xx is the CMEMS version (00, 01 or 02) and y is an incremental version number if any. This is a mandatory field. The ”f” character may be omitted.

Mandatory fields are separated by "-" and subfields by "_".
Non-required fields can be omitted, consecutive dashes ‘-‘ should be retained to indicate the missing field except where it would be directly before the filename extension (‘.nc.bz2’).
Subfields can be indicated by adding an underscore ‘_‘ after any field.
This convention uses mandatory 7 fields:

valid_date-producer-level-parameter-config-region-free_field-file_version.nc

An example of a daily L3 MODIS-derived chlorophyll product (via the MedOC3 algorithm), produced by CNR in delayed-time mode covering the Mediterranean Sea at 1 km spatial resolution is:

20150518_d-OC_CNR-L3-CHL-MedOC4_AV_1KM-MED-DT-v02.nc

The daily climatology is a set of 366 files. An example of the resulting naming is given below for the Copernicus-GlobColour ACRI dataset dataset-oc-glo-chl-multi-l4-gsm_4km_daily-climato-v02 (for the first 2 days and last day file):

19980101_d_20140101-ACRI-L4-CHL-GSM_MULTI_4KM-GLO-CLIMATO-v02.nc
19980102_d_20140102-ACRI-L4-CHL-GSM_MULTI_4KM-GLO-CLIMATO-v02.nc
…
19981231_d_201401231-ACRI-L4-CHL-GSM_MULTI_4KM-GLO-CLIMATO-v02.nc

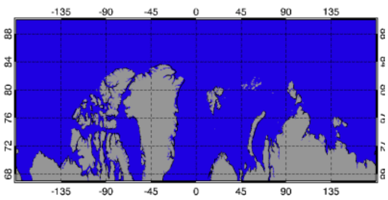
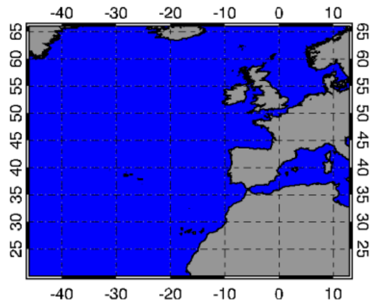
The years (1998, 2014) specify the period used to compute the climatology.

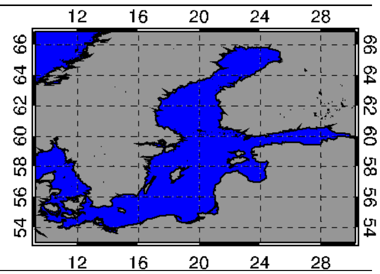
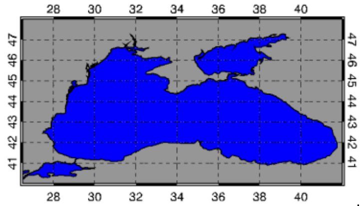
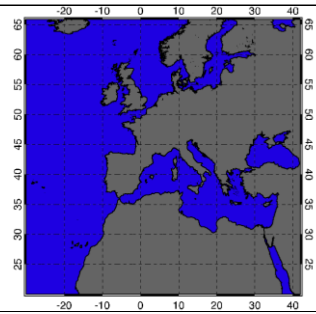
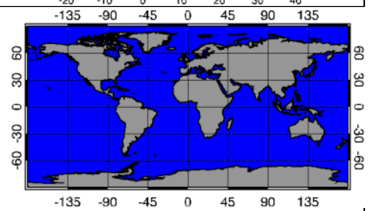
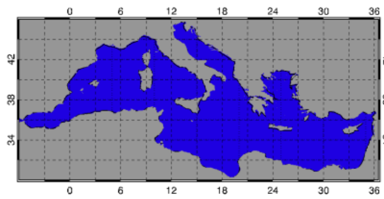
V.3 Grid

OCTAC delivers data with the regular Equirectangular projection in which longitude and latitude steps are constant.

V.4 Domain coverage

Table below provides a graphical overview of the domain coverage for each product.

Product	Domain
OCEANCOLOUR_ARC_CHL_L3_NRT_OBSERVATIONS_009_047 OCEANCOLOUR_ARC_OPTICS_L3_NRT_OBSERVATIONS_009_046 OCEANCOLOUR_ARC_CHL_L3_REP_OBSERVATIONS_009_069 OCEANCOLOUR_ARC_OPTICS_L3_REP_OBSERVATIONS_009_068 OCEANCOLOUR_ARC_CHL_L4_NRT_OBSERVATIONS_009_087 OCEANCOLOUR_ARC_CHL_L4_REP_OBSERVATIONS_009_088 OCEANCOLOUR_ARC_OPTICS_L4_NRT_OBSERVATIONS_009_089	
OCEANCOLOUR_ATL_CHL_L3_NRT_OBSERVATIONS_009_036 OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_037 OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_098 OCEANCOLOUR_ATL_OPTICS_L3_NRT_OBSERVATIONS_009_034 OCEANCOLOUR_ATL_OPTICS_L3_REP_OBSERVATIONS_009_066 OCEANCOLOUR_ATL_CHL_L3_REP_OBSERVATIONS_009_067 OCEANCOLOUR_ATL_CHL_L4_NRT_OBSERVATIONS_009_090 OCEANCOLOUR_ATL_CHL_L4_REP_OBSERVATIONS_009_091 OCEANCOLOUR_ATL_OPTICS_L4_NRT_OBSERVATIONS_009_092	

OCEANCOLOUR_BAL_CHL_L3_NRT_OBSERVATIONS_009_049 OCEANCOLOUR_BAL_CHL_L3_REP_OBSERVATIONS_009_080 OCEANCOLOUR_BAL_OPTICS_L3_NRT_OBSERVATIONS_009_048 OCEANCOLOUR_BAL_OPTICS_L3_REP_OBSERVATIONS_009_097	
OCEANCOLOUR_BS_CHL_L3_NRT_OBSERVATIONS_009_044 OCEANCOLOUR_BS_CHL_L3_REP_OBSERVATIONS_009_071 OCEANCOLOUR_BS_CHL_L4_NRT_OBSERVATIONS_009_045 OCEANCOLOUR_BS_CHL_L4_REP_OBSERVATIONS_009_079 OCEANCOLOUR_BS_OPTICS_L4_NRT_OBSERVATIONS_009_043 OCEANCOLOUR_BS_OPTICS_L3_NRT_OBSERVATIONS_009_042 OCEANCOLOUR_BS_OPTICS_L3_REP_OBSERVATIONS_009_096	
OCEANCOLOUR_EUR_CHL_L3_NRT_OBSERVATIONS_009_050	
Copernicus-GlobColour: OCEANCOLOUR_GLO_OPTICS_L3_NRT_OBSERVATIONS_009_030 OCEANCOLOUR_GLO_CHL_L3_NRT_OBSERVATIONS_009_032 OCEANCOLOUR_GLO_CHL_L4_NRT_OBSERVATIONS_009_033 OCEANCOLOUR_GLO_OPTICS_L4_NRT_OBSERVATIONS_009_033 OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_085 OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_086 OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082 OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_081 **OC-CCI:** OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_065 OCEANCOLOUR_GLO_OPTICS_L3_REP_OBSERVATIONS_009_064 OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_093	
OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040 OCEANCOLOUR_MED_CHL_L3_REP_OBSERVATIONS_009_073 OCEANCOLOUR_MED_CHL_L4_NRT_OBSERVATIONS_009_041 OCEANCOLOUR_MED_CHL_L4_REP_OBSERVATIONS_009_078 OCEANCOLOUR_MED_OPTICS_L3_NRT_OBSERVATIONS_009_038 OCEANCOLOUR_MED_OPTICS_L4_NRT_OBSERVATIONS_009_039 OCEANCOLOUR_MED_OPTICS_L4_REP_OBSERVATIONS_009_095	

VI FILE FORMAT

VI.1 NetCDF

The products are stored using the NetCDF 4 format.
NetCDF (network Common Data Form) is an interface for array-oriented data access and a library that provides an implementation of the interface. The netCDF library also defines a machine-independent format for representing scientific data. Together, the interface, library, and format support the creation, access, and sharing of scientific data. The netCDF software was developed at the Unidata Program Center in Boulder, Colorado. The netCDF libraries define a machine-independent format for representing scientific data.
Please see Unidata netCDF pages for more information, and to retrieve netCDF software package.

NetCDF data is:
* Self-Describing. A netCDF file includes information about the data it contains.
* Architecture-independent. A netCDF file is represented in a form that can be accessed by computers with different ways of storing integers, characters, and floating-point numbers.
* Direct-access. A small subset of a large dataset may be accessed efficiently, without first reading through all the preceding data.
* Appendable. Data can be appended to a netCDF dataset along one dimension without copying the dataset or redefining its structure. The structure of a netCDF dataset can be changed, though this sometimes causes the dataset to be copied.
* Sharable. One writer and multiple readers may simultaneously access the same netCDF file.

VI.2 Structure and semantics of NetCDF maps files

The NetCDF metadata fully describes the data structures. An example of the NetCDF metadata of the daily multi-sensor chlorophyll file is given below:

```
netcdf 20120401_d-OC_CNR-L3-CHL-MedOC4_AV_1KM-MED-DT-v02 {
dimensions:
	time = 1 ;
	lat = 1580 ;
	lon = 3308 ;
variables:
	int time(time) ;
		time:long_name = "reference time" ;
		time:standard_name = "time" ;
		time:axis = "T" ;
		time:calendar = "Gregorian" ;
```

```
        time:units = "seconds since 1981-01-01 00:00:00" ;
    float lat(lat) ;
        lat:long_name = "latitude" ;
        lat:standard_name = "latitude" ;
        lat:axis = "Y" ;
        lat:units = "degrees_north" ;
    float lon(lon) ;
        lon:long_name = "longitude" ;
        lon:standard_name = "longitude" ;
        lon:axis = "X" ;
        lon:units = "degrees_east" ;
    float CHL(time, lat, lon) ;
        CHL:long_name = " Multi-sensor and multi water-type Chlorophyll a concentration "
;
        CHL:standard_name = "mass_concentration_of_chlorophyll_a_in_sea_water" ;
        CHL:source = " MODIS AQUA; NPP VIIRS " ;
        CHL:type = "surface" ;
        CHL:units = "milligram m-3" ;
        CHL:missing_value = -999.f ;
        CHL:_FillValue = -999.f ;
        CHL:valid_min = 0.01f ;
        CHL:valid_max = 100.f ;
    float WTM(time, lat, lon) ;
        WTM:long_name = "Water Type Mask for Chlorophyll a concentration" ;
        WTM:standard_name = "MASK
mass_concentration_of_chlorophyll_a_in_sea_water" ;
        WTM:source = "MODIS AQUA; NPP VIIRS" ;
        WTM:comment = "WTM = [ 1(Case1) | 0(Case2) | between the two for mixture]" ;
        WTM:type = "surface" ;
        WTM:units = "" ;
        WTM:missing_value = -999.f ;
        WTM:_FillValue = -999.f ;
        WTM:valid_min = 0.f ;
        WTM:valid_max = 1.f ;
    float QI(time, lat, lon) ;
        QI:long_name = " Quality Index for Chlorophyll a concentration " ;
        QI:standard_name = " QI mass_concentration_of_chlorophyll_a_in_sea_water" ;
        QI:source = "MODIS AQUA; NPP VIIRS" ;
        QI:comment = "QI=(DailyData-
ClimatologyMedianData)/ClimatologyStandardDeviation" ;
        QI:type = "surface" ;
        QI:units = "milligram m^-3" ;
        QI:missing_value = -999.f ;
        QI:_FillValue = -999.f ;
```

```
        QI:valid_min = -5.f ;
        QI:valid_max = 5.f ;
// global attributes:
        :title = "dataset-oc-med-chl-multi-l3-chl_1km_daily-rt-v02" ;
        :references = "1) Volpe, G., Colella, S., Forneris, V., Tronconi, C., & Santoleri, R. (2012). The Mediterranean Ocean Colour Observing System - system development and product validation. Ocean Science, 8(5), 869-883. doi:10.5194/os-8-869-2012. - 2) Berthon, J. F., and G. Zibordi (2004), Bio-optical relationships for the northern Adriatic Sea, International Journal of Remote Sensing, 25, 7-8, 1527-1532. - 3) DAlimonte, D., Melin, F., Zibordi, G., & Berthon, J. F. (2003). Use of the Novelty Detection Technique to Identify the Range of Applicability of Empirical Ocean Color Algorithms. Ieee Transactions on Geoscience and Remote Sensing, 41(12), 2833-2843." ;
        :parameter_code = "CHL" ;
        :parameter = "chlorophyll-a concentration" ;
        :comment = "r=log10(max([rrs443,rrs490,rrs510])/rrs555) ; chlcase1=10^[0.0634-3.3477r+3.8502r^2-2.8322r^3+0.3917r^4] ; r=log10(rrs490/rrs555) ; chlcase2=10.^[0.091-2.620r-1.148r^2-4.949r^3]" ;
        :cmems_product_id = "OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040" ;
        :start_date = "2012-04-01" ;
        :stop_date = "2012-04-01" ;
        :creation_date = "Tue Jan 03 2017" ;
        :creation_time = "13:01:42 UTC" ;
        :westernmost_longitude = -6.f ;
        :easternmost_longitude = 36.5f ;
        :southernmost_latitude = 30.f ;
        :northernmost_latitude = 46.f ;
        :grid_resolution = " 1 Km" ;
        :product_version = "v02" ;
        :site_name = " " ;
        :CONVENTIONS_ = "CF-1.4" ;
        :INSTITUTION_ = "CNR-GOS" ;
        :CONTACT_ = "technical@gos.artov.isac.cnr.it" ;
        :NETCDF_VERSION_ = "v4" ;
        :GRID_MAPPING_ = "Equirectangular" ;
        :PRODUCT_LEVEL_ = "L3" ;
        :PLATFORM_ = "Aqua (EOS PM) ; NPP " ;
        :SENSOR_NAME_ = "MODIS; VIIRS" ;
        :SENSOR_ = "Moderate Resolution Imaging Spectroradiometer; Visible Infrared Imaging Radiometer Suite" ;
        :SOFTWARE_NAME_ = "GOS Processing chain" ;
        :SOFTWARE_VERSION_ = "v02" ;
        :HISTORY_ = " " ;
        :SOURCE_ = "surface observation" ;
```

```
        :START_TIME_ = "08:00:00 UTC" ;
        :STOP_TIME_ = "14:00:00 UTC" ;
        :FILE_QUALITY_INDEX_ = 0s ;
        :CITATION_ = " " ;
        :NAMING_AUTHORITY_ = "CMEMS" ;
        :DISTRIBUTION_STATEMENT_ = "See CMEMS Data License" ;
        :CMEMS_PRODUCTION_UNIT_ = "OC-CNR-ROMA-IT" ;
}
```

VI.3 Additional variables (Quality Index, Errors and Flags)

The NetCDF files of the products over the Mediterranean and Black Seas also contain an extra variable (the sensor mask), which gives each pixel a value as a function of the sensor. For the multi sensor product made by merging MODIS-AQUA and NPP-VIIRS, the sensor mask can be 1 if the pixel was sampled by MODIS only, 2 if the pixel was sampled by VIIRS only, or 3 when both sensors actually sampled the pixel. For the chlorophyll product over the Mediterranean Sea, the NetCDF files contain also the water-type mask, which has the same dimension as the chlorophyll data and varies between 0 (in case 2 waters) and 1 (in case 1 waters). An example of the two additional fields is given by the metadata reported in the previous section. Depending on provider and production mode (NRT or DT) the products can include additional information such as quality Index, errors (uncertainty) or flag quality in addition to the geophysical variable.

VI.4 Mediterranean Sea and Back Sea Quality Index

This section applies only to L3 MED, BS NRT datasets that are in the following products:

- OCEANCOLOUR_BS_CHL_L3_NRT_OBSERVATIONS_009_044
- OCEANCOLOUR_BS_OPTICS_L3_NRT_OBSERVATIONS_009_042
- OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040
- OCEANCOLOUR_MED_OPTICS_L3_NRT_OBSERVATIONS_009_038

For each geophysical variable (eg. Chl, Kd, rrs, aph, adg, bbp) included in the products listed above a data quality information is provided in the netCDF files as an additional variable. The daily 1 km resolution Quality Index is calculated on a pixel-by-pixel over valid observations as:

$$QI = (CurrentDataPixel - ClimatologyDataPixel)/STDDataPixel$$

with ClimatologyDataPixel and STDDataPixel being the 1km daily average and standard deviation climatology, respectively. The daily reference climatology maps have been created using independent SeaWiFS data falling into a moving temporal window of ±5 days. Single QI fields are available in the NetCDF files and can be viewed via WMS. For the current day data pixel to be considered good, QI is expected to be within ±2 STD's.

VI.5 Global Ocean Quality Flag and Uncertainties (Copernicus-GlobColour products)

This section applies only to GLO products (Copernicus-GlobColour products provided by ACRI-ST).
For each physical parameter (e.q. CHL, BBP…), 2 variables are attached (e.q CHL_error, CHL_flag):

1. A flag: a flags array (2 bytes), provides for each pixel different quality control information (variability of inputs required for radiance, source of instrument: all, MODIS only..., green reflectance threshold, mostly cloudy pixel, high aerosol optical thickness, etc...). The Table 2 contains the current flags definition. A flag is set if its bit is set to 1. The "Bit" column contains each flag bit number, from the least to the most significant bit of the 2 bytes.
2. An error estimate: this can be a theoretical computation using LUT, variable value and observation conditions (e.g. zenith angles) or the output of the merging model. The error bar is stored in % packed into a 2 bytes integers using a scale factor of 0.01 (this kind of data packing is standard in netCDF). The biggest error bar possible in this format is 327.67, so if a computed error bar is greater than 327.67 then it is set to 327.67. At present, no error estimate is provided for OLCI products.

Bit	Flag code	Description
0	NO_MEASUREMENT	Bin not covered by any L2 swaths pixel, valid or invalid (out of swaths)
1	INVALID	Bin covered, but only by invalid pixel(s) (invalid because L2 flags, clouds, land, …)
2	OLCI_A	OLCI(A) valid pixel(s) contribute to the bin value
3	LAND	Bin covered by more than 50% of land. If not set, bin is considered as water. (1) (4)
4	CLOUD1	Cloud fraction (2)
5	CLOUD2	
6	DEPTH1	Water depth (1) (3)
7	DEPTH2	
8	TURBID	Computed from EL555. TURBID flag is raised when EL555 is greater than 0
9	ICE	Bin covered by ice. Computed from and ice climatology.
10	TROPHIC1	Trophic classification (5)
11	TROPHIC2	
12	VIIRS_N	VIIRS(N) valid pixel(s) contribute to the bin value
13	SEAWIFS	SeaWiFS valid pixel(s) contribute to the bin value
14	MODIS	MODIS valid pixel(s) contribute to the bin value
15	MERIS	MERIS valid pixel(s) contribute to the bin value

Table 2 : Flags description

Note 1: computed using a common global land elevation and ocean bathymetry product (data from ESA). This product is computed at 4.63 km on the global ISIN and PC grids.
Note 2: for 8-days or longer periods, cloud fraction flags are not yet defined (flags are currently set to 0). For daily products they define a cloud coverage classification:

(CLOUD2=0) + (CLOUD1=0): CF < 5%
(CLOUD2=0) + (CLOUD1=1): 5% <= CF < 25%
(CLOUD2=1) + (CLOUD1=0): 25% <= CF < 50%
(CLOUD2=1) + (CLOUD1=1): CF >= 50%

Note 3: (DEPTH2=0) + (DEPTH1=0): depth < 30m
(DEPTH2=0) + (DEPTH1=1): 30m <= depth < 200m
(DEPTH2=1) + (DEPTH1=0): 200m <= depth < 1000m
(DEPTH2=1) + (DEPTH1=1): depth >= 1000m

Note 4: it is possible that a bin flagged LAND has a valid parameter value near the coastline.
Note 5: (TROPHIC2=0) + (TROPHIC1=1): Oligotrophic water
(TROPHIC2=1) + (TROPHIC1=0): Mesotrophic water
(TROPHIC2=1) + (TROPHIC1=1): Eutrophic water

VI.6 CCI multi-sensor number of observations

For CCI multi-sensor NRT and DT products provided by PML, an additional "nobs" variable is provided for each sensor that may have provided input to a product. This gives the number of data points from each sensor contributing to any given pixel in the data product. These variables are:

- MODISA_nobs: Count of the number of observations from the MODIS (Aqua) sensor contributing to this bin cell
- VIIRS_nobs: Count of the number of observations from the MODIS (Aqua) sensor contributing to this bin cell
- MERIS_nobs: Count of the number of observations from the MODIS (Aqua) sensor contributing to this bin cell
- SeaWiFS_nobs: Count of the number of observations from the MODIS (Aqua) sensor contributing to this bin cell

At the current time OLCI data do not contribute to OC-CCI multi-sensor products, as the OLCI products are too new to have been incorporated into the OC-CCI algorithms.

VI.7 Arctic Ocean and Atlantic Ocean Quality Index

This section applies only to ATL and ARC NRT products (provided by PML), i.e.:

OCEANCOLOUR_ATL_CHL_L3_NRT_OBSERVATIONS_009_036
OCEANCOLOUR_ATL_OPTICS_L3_NRT_OBSERVATIONS_009_034
OCEANCOLOUR_ARC_CHL_L3_NRT_OBSERVATIONS_009_047
OCEANCOLOUR_ARC_OPTICS_L3_NRT_OBSERVATIONS_009_046

For each geophysical variable included in the products listed above (with the exception of ADG, ATOT and APH) an additional variable containing quality information data is provided in the netCDF files. This daily 1 km resolution Quality Index variable (QI) is calculated on a pixel-by-pixel basis over valid observations as:

$$QI = (CurrentDataPixel - ClimatologyDataPixel)/\, STDDataPixel$$

where *ClimatologyDataPixel* and *STDDataPixel* are, respectively, the 1km daily average and standard deviation of the climatology. The reference climatology maps have been created using independent OC-CCI data falling into a moving temporal window of ±6 days.
A global QI attribute (*file_quality_index*) is also available in the netCDF files as a measurement overall quality of the file. Both this global attribute and the QI product data are defined to be within the range of ±5 STD's. High values imply high disparity between the observation and the climatology and they might be used as an indicator of low quality data. In particular for the current day data pixel to be considered good quality the QI is expected to be within ±2 STD's.

VI.8 Reading software

NetCDF data can be browsed and used through a number of software, like:

- ✓ ncBrowse: http://www.epic.noaa.gov/java/ncBrowse/,
- ✓ NetCDF Operator (NCO): http://nco.sourceforge.net/
- ✓ Panoply: http://www.giss.nasa.gov/tools/panoply/
- ✓ IDL, Matlab, GMT…

VII DIFFERENCES BETWEEN COPERNICUS-GLOBCOLOUR AND OC-CCI AT V4 (APRIL 2018) IN GLO REP PRODUCTS

The Copernicus-GlobColour and OC-CCI are the main initiatives in the world providing a long term series of level 3 Observation Ocean Colour products at global level based on a multi sensor approach with a 4km resolution. While both datasets aim to provide high-quality merged datasets, Copernicus-GlobColour supports continuity with the NRT production (and thus the unavoidable risk of inconsistencies in the time series due to recalibrations or processing changes in its upstream data, until a full reprocessing is done on a yearly basis to restore consistency). On the other hand, OC-CCI targets "climate quality" consistency with minimal inter-sensor bias, with the unavoidable cost of being unable to provide this consistency up to the current date (e.g. with NRT). In V3, the CCI algorithms are applied to delayed-time NRT data for the regions, reducing the difference to around a month, though these should not be considered climate grade. These two datasets therefore provide different and complementary characteristics that are useful to different users – a service offering an NRT stream may opt for the GC REP in order to be able to identify anomalies in yesterday's NRT or, while a study investigating delayed-time NRT, longer subtle changes over time or deriving a historical measure for later use may opt for OC-CCI or Copernicus-GlobColour. The differences between the two initiatives are detailed in the table below.

Copernicus-GlobColour	**OC-CCI**
Project / Objective	
The Copernicus-GlobColour project started in 2005 as an ESA Data User Element (DUE) project to provide a continuous data set of merged L3 Ocean Colour products. **Since 2008**, Copernicus-GlobColour has been continuously serving **more than 600 users worldwide** with the Copernicus-GlobColour data set made available through the Hermes website. Google scholar returns **more than 400 references** to GlobColour. In 2014, a major reprocessing widely extended to a new set of products was performed thanks to financial support from the European Union Framework Program 7 under grant n°282723 **(OSS2015)** and FEDER grant n°8 562 - 40 567 (MCGS). This effort has been continued with a new release in April 2016 and April 2017. Beginning of 2018 the NASA R2018.0 processing will be used to reprocess the time-series. The Copernicus-GlobColour primary data set is part of the core data set of the Group on Earth Observations System of Systems (GEOSS) under reference: urn:geoss:csr:resource:urn:uuid:4e33fd81-d5cc-dc40-b645-ab961447d9d8	The ESA Climate Change Initiative is a two stage programme aiming to produce a definitive set of multi-sensor merged datasets at "climate quality" (meaning, archival grade / suitable for long term climate trend monitoring, with a complete and fully internally consistent time series) for a number of Essential Climate Variables, one of which is Ocean Colour. With the first phase of the programme beginning in 2010, OC-CCI produced the first public release (v1.0) in Q1 2013, The second phase calls for annual releases (v2.0-v4.0), which include time series updates and significant targeted enhancements. All data are freely available from http://www.esa-oceancolour-cci.org/ . Code for the majority of the system is also available under free licenses (excluding some portions outside the legal authority of the project) and is due to be published to github. CCI is funded through to 2017. Follow-on programmes are in discussion, though incorporating the outputs of CCI projects into operational systems is one aim of the

	programme.
Upstreams	
The products are based on the official level 2 data provided by agencies (NASA, NOAA and ESA). The time series is from 1997 (and still on-going) and includes SeaWifs, MERIS, MODIS Aqua **and VIIRS-N** data**.** The NRT processing is at present based on MODIS and VIIRSN and OLCI-S3A. It will be extended to Sentinel S3B and NOOA20-VIIRS (JPSS) when available.	The products are based on the best available level 2 data, as determined by two round robin comparisons made before any release – one comparing available atmospheric correction algorithms (or precomputed datasets). The criteria, methodology and results for the round robins are quantitative in the main (with a few qualitative elements) and are openly published. The v3.0 dataset was based on the NASA level 2 processor for SeaWIFS and VIIRS, and an upgraded POLYMER for MERIS and MODIS. A partial reprocessing for v3.1 updated this to include NASA's r2014.0.1 release for MODIS, which affected data from 2014 onwards. The aim is to include Sentinel data in the v4.0 release.
Products overview	
GC products are available through two datasets: • one at Global Level (4km, 25 and 100km of resolution) and • the other one at European level [46W-42E 19N-72N] (1 km of resolution). More than 40 parameters are available for **single sensor** or for **merged sensors** and for different temporal resolution: daily, 8-days, monthly, climatology. Each parameter is provided with associated information **(flags and uncertainties)** at pixelwise**.** The uncertainties computation has been published and validated (Maritorena & al. 2011). **The CMEMS catalogue**, a subset of the Copernicus-GlobColour products are disseminated. It concerns mainly the merged Global products at 4km: • **CHL, KD, BBP, CDM, ZSD, SPM and RRS** (daily, 8-days and monthly)	As described in the previous section, a round robin comparison is made to select the best-in-class algorithms for a release, compared against an in-situ validation database ; in this case, the in-water algorithms (for chlorophyll, IOPs and Kd490). The merging process in OC-CCI uses a bandshifting approach and bias correction in order to derive Rrs that are compatible and comparable to a reference sensor (currently SeaWIFS) to ensure maximum consistency across the complete timeseries (i.e. without significant "steps" in the data due to individual sensors producing slightly different results). The OC-CCI v3.1 release contains Rrs and IOPs (aph, adg and bbp) at 6 wavelengths, chlorophyll and Kd490, all with per-pixel uncertainty (RMS and bias) fields directly linked to insitu data, plus supporting variables (number of observations per sensor and IOP atot) and a 14-class water

In addition, **a daily chlorophyll "cloud free" product** (optimal interpolation approach) is delivered at 4km at global Level and 1km over Atlantic**.** The full time-serie (OLCI single sensor) is also delivered for the period [25 April-2016 present[I**f requested by users, this subset could be extended.**	type classification, resulting in 90 data variables in total. The data are available in multiple temporal resolutions (daily, 5-day, 8-day, monthly), in two projections. All are global products at 4km spatial resolution. For CMEMS, a 1km version of the regional areas is produced. A subset of the above products are currently used (primarily RRS to support regional algorithms). The full global 4km product is available for CMEMS.
Reprocessing (REP) Time Series	
The REP time series available is covering the period [Sep-1997-Dec-2016]. In 2018, the next release will be extended of one year and will take into account the coming MERIS 4th reprocessing during and the coming Sentinel products.	The v3.0 release processes the full time series to the end of 2016. In light of the delays and issues with OLCI, the OC-CCI project has transitioned to a sustained production model for v3.1, maintaining it up to the current date, while developing v4.0 in parallel.
Near Real Time (NRT) products	
The NRT dataset provides the continuity with the REP. At date, it covers the period [Jan-2017-present]. **The products are disseminated in NRT mode** (one day after satellite acquisition) and refined 30 days after acquisition. The parameters/products delivered are the same one as the REP with the same resolution. The NRT products are based on the same algorithm than the REP and have the same format. **There is continuity between NRT/REP products** useful to detect anomalies.	Although OC-CCI is primarily aimed at climate-quality outputs, an NRT mode is now run operationally. The quality of NRT data is necessarily constrained by the use of imperfect calibration and ancillary data, and processing changes imposed by upstream suppliers, so it cannot be called climate quality.The delayed-time product was released as part of CMEMS v3.0 and is identical to the REP processing, though where upstream data have changed but not yet incorporated into the REP data stream (eg. NASA 2018.0 reprocesing), there will be differences between the two.
Algorithm / Method	
In the frame of CMEMS, the algorithms used are (other alternative algorithms are available in Copernicus-GlobColour): • The CHL, BBP443, CDM443 products are obtained by the merging of MERIS, MODIS/AQUA VIIRS and SeaWiFS based on a semi-analytic model called GSM (Maritorena & al.2011). The method uses an advanced retrieval based on fitting an in-water bio-optical model to the merged set of observed	The first parts of the OC-CCI chain produce best-in-class level 2 data per sensor, which are then binned to a global sinusoidal grid. In the second stage, these sensor data are bandshifted to the reference sensor wavelengths, then per-pixel corrected to remove bias versus this reference sensor (based on a temporally-smoothed and spatially-filled 60-day moving climatology that captures temporal and regional

normalised water-leaving radiances. • The KD490 and ZSD products are derived from the CHL product (Morel & al, 2007) • The SPM product is obtained using the Gohin algorithm (Gohin 2011, 2015 release). • The level-4 daily Optimal-Interpolation product is a combination of a water typed merge of chl-a products and an optimal interpolation (Saulquin & al, 2010) based on the kriging method with regional settings of the estimated covariance between the chl-a anomalies observation.	variation). The bias-corrected sensor data can then be simply merged. The third stage operates on the merged and bias-corrected Rrs data, computing the best-in-class in-water/derived products and a water-type classification (based on the methodology published in Moore et al (2009), but with a tuned set of water classes that best characterise the merged global data). In conjunction with an insitu database (submitted for publication) combining the majority of available validation data, per-variable and per-class uncertainty estimates can be computed, and are then applied per-pixel based on the water-type membership of each pixel (e.g. a pixel containing some percentage of coastal water types will reflect a higher uncertainty than one purely composed of pure open-ocean water). The output products are then provided additionally in a geographic projection, in a number of temporal variants and convenience subsets. For CMEMS, an additional processing at 1km is made for the regional areas, which use the corrected and merged RRS as a high-quality input to the regional-specific algorithms.

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