

PRODUCT USER MANUAL

Global Ocean Surface Carbon Product MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008

Issue 5.0

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RECORD TABLE

Issue	Date	§	Description of Change	Author	Checked by	Validated by
0.0	January 2019	all	Initial version of the document	Marion Gehlen, Thi- Tuyet-Trang Chau	Stéphanie Guinehut	Mercator
1.0	December 2019	all	Update of documents: method improvement, temporal extension, uncertainty quantification	Thi-Tuyet-Trang Chau, Marion Gehlen, Frédéric Chevallier	Stéphanie Guinehut	C. Derval
2.0	September 2020	Tabl e II.3.2 IV	Update of the input fields Temporal extension	Thi-Tuyet-Trang Chau, Marion Gehlen, Frédéric Chevallier	Stéphanie Guinehut	C. Derval
3.0	September 2021	all	Update of the input fields Spatial and temporal extension	Thi-Tuyet-Trang Chau, Marion Gehlen, Frédéric Chevallier	Stéphanie Guinehut	C. Derval
4.0	September 2022	all	Update of the input fields Addition of new variables New template	Thi-Tuyet-Trang Chau, Marion Gehlen, Frédéric Chevallier	Sandrine Mulet	Copernicus Marine product management
5.0	September 2023	all	Update of the input fields Increase of spatial resolution (1° to 0.25°) Temporal extension for the year 2022	Thi-Tuyet-Trang Chau, Marion Gehlen, Frédéric Chevallier	Hélène Etienne	Copernicus Marine product management











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GLOSSARY AND ABBREVIATIONS

CMEMS	Copernicus Marine Environment Monitoring Service
NetCDF	Network Common Data Form
ОМІ	Ocean Monitoring Indicator
PUM	Product User Manual
QUID	Quality Information Document











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INTRODUCTION

I.1 Summary

This document is the user manual for the Copernicus Marine Global Ocean Surface Carbon Product MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008. The product provides a reconstruction of global properties from 1985 (yearly updated) at a monthly resolution and 0.25°×0.25° spatial resolution.

This product is global (see II.3). It is defined on a standard grid at 0.25° degree.

The product is organised in 1 dataset (dataset-carbon-rep-monthly) containing 7 variables and their associated uncertainties (under the form of standard deviations):

- spco2: surface ocean carbon dioxide partial pressure,
- spco2_uncertainty: uncertainty of surface ocean carbon dioxide partial pressure,
- fgco2: surface ocean downward mass flux of carbon dioxide expressed as carbon,
- **fgco2_uncertainty**: uncertainty of surface ocean downward mass flux of carbon dioxide expressed as carbon,
- ph: surface ocean pH on total scale,
- ph_uncertainty: uncertainty of surface ocean pH on total scale,
- talk: total alkalinity in surface seawater,
- talk_uncertainty: uncertainty of total alkalinity in surface seawater,
- tco2: surface ocean dissolved inorganic carbon,
- tco2_uncertainty: uncertainty of surface ocean dissolved inorganic carbon,
- omega_ca: saturation state for surface seawater with respect to calcite,
- omega_ca_uncertainty: uncertainty of saturation state for surface seawater with respect to calcite,
- omega_ar: saturation state for surface seawater with respect to aragonite,
- omega_ar_uncertainty: uncertainty of saturation state for surface seawater with respect to aragonite,

It is updated with a yearly frequency.

The product is published on the Copernicus Marine dissemination server after automatic and human quality controls. Files downloaded are in NetCDF format and follow CF-1.6 convention.

The processing system is described in the Quality Information Document (QUID).









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I.2 History of changes

January 2019 April 2019	1st publication of MULTIOBS_GLO_BIO_REP_015_005 product over the period 2001-2016 Extension of the product for the year 2017
December 2019	2 nd publication of MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 product MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 is the new name of MULTIOBS_GLO_BIO_REP_015_005 The method has been improved, uncertainty is now provided with each variable and the time series has been extended to cover the period from 1985 with yearly update
September 2020	3 rd publication of MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 product. The product has been upgraded: updates of the formulation of surface ocean downward mass flux of carbon dioxide, and of uncertainty quantification of surface ocean pH Extension of the product for the year 2019
September 2021	4 th publication of MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 product. The product has been upgraded with extensions of data coverage over the coasts and partly high latitudes (above 60°N) for the years 1985-2020
September 2022	5th publication of MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 product. The product includes datasets for new variables (total alkalinity, dissolved inorganic carbon, saturation state with respect to calcite and aragonite) Extension of the product for the year 2021.
September 2023	6 th publication of MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 product. Product upgrade in increasing spatial resolution (1° to 0.25°) for all the datasets of 7 surface carbonate system variables Extension of the product for the year 2022.

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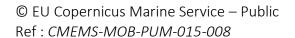


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DESCRIPTION OF THE PRODUCT SPECIFICATION

II.1 General Information

Product(s) name	MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008
Geographical coverage	Global
Variables	Surface ocean carbon dioxide partial pressure, spco2 (micro atm)
	Uncertainty (standard deviation) of surface ocean carbon dioxide partial pressure, spco2_uncertainty (micro atm)
	Surface ocean downward mass flux of carbon dioxide expressed as carbon, fgco2 (mol C m-2 yr-1)
	Uncertainty (standard deviation) of surface ocean downward mass flux of carbon dioxide expressed as carbon, fgco2_uncertainty (mol C m-2 yr-1)
	Surface ocean pH on total scale, ph (pH units)
	Uncertainty (standard deviation) of surface ocean pH on total scale, ph_uncertainty (pH units)
	Total alkalinity in surface seawater, talk (micro mol kg-1)
	Uncertainty (standard deviation) of total alkalinity in surface seawater, talk_uncertainty (micro mol kg-1)
	Surface ocean dissolved inorganic carbon, tco2 (micro mol kg-1)
	Uncertainty (standard deviation) of surface ocean dissolved inorganic carbon, tco2_uncertainty (micro mol kg-1)
	Saturation state for surface seawater with respect to calcite, omega_ca (-)
	Uncertainty (standard deviation) of saturation state for surface seawater with respect to calcite, omega_ca_uncertainty (-)
	Saturation state for surface seawater with respect to aragonite, omega_ar (-)
	Uncertainty (standard deviation) of saturation state for surface seawater with respect to aragonite, omega_ar_uncertainty (-)
	Reprocessing













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Update frequency	Yearly
Available time series	From January 1985
Temporal resolution	Monthly
Spatial resolution	0.25°×0.25°
Delivery mechanisms	Subsetter FTP
Format	NetCDF CF1.7

II.2 Details of datasets

MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008

dataset-carbon-rep-monthly contains all the variables

spco2 [micro atm]

Surface aqueous partial pressure of CO2

surface_partial_pressure_of_carbon_dioxide_in_sea_water

spco2_uncertainty [micro atm]

Uncertainty (standard deviation) of surface aqueous partial pressure of CO2 uncertainty_surface_partial_pressure_of_carbon_dioxide_in_sea_water

fgco2 [mol C m-2 yr-1]

Surface downward flux of total CO2

surface_downward_mass_flux_of_carbon_dioxide_expressed_as_carbon

fgco2_uncertainty [mol C m-2 yr-1]

Uncertainty (standard deviation) of surface downward flux of total CO2 uncertainty_surface_downward_mass_flux_of_carbon_dioxide_expressed_as_carbon











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ph [1]

pH on total scale

sea_water_ph_reported_on_total_scale

ph_uncertainty [1]

Uncertainty (standard deviation) of pH on total scale uncertainty_sea_water_ph_reported_on_total_scale

talk [micro mol kg-1]

Total alkalinity in surface seawater total_alkalinity_in sea_water

talk_uncertainty [micro mol kg-1]

Uncertainty (standard deviation) of total alkalinity in surface seawater uncertainty_total_alkalinity_in sea_water

tco2 [micro mol kg-1]

Surface ocean dissolved inorganic carbon dissolved_inorganic_carbon_in_sea_water

tco2_uncertainty [micro mol kg-1]

Uncertainty (standard deviation) of surface ocean dissolved inorganic carbon uncertainty_dissolved_inorganic_carbon_in_sea_water

omega_ca [-]

Saturation state for surface seawater with respect to calcite calcite_saturation_state_in_sea_water

omega_ca_uncertainty [-]

Uncertainty (standard deviation) of saturation state for surface seawater with respect to calcite uncertainty_calcite_saturation_state_in_sea_water











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omega_ar [-]

Saturation state for surface seawater with respect to aragonite aragonite_saturation_state_in_sea_water

omega_ar_uncertainty [-]

Uncertainty (standard deviation) of saturation state for surface seawater with respect to aragonite uncertainty_aragonite_saturation_state_in_sea_water

II.3 Production System Description

Detailed information on the systems and products MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 is on the Copernicus Marine website and in the Quality Information Document (QUID)







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III DOWNLOAD A PRODUCT

After registration, you will be able to download our data. To assist you, our <u>HelpCenter</u> is available, and more specifically its <u>section about download</u>.

Information on operational issues on products and services can be found on our <u>User Notification Service</u>. If you have any questions, please <u>contact us</u>.











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IV FILES NOMENCLATURE

IV.1 Nomenclature of files when downloaded through the Copernicus Marine Service Web Portal <u>Subsetter</u> Service

MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 files nomenclature when downloaded through the Web Portal Subsetter is based on product dataset name and a numerical reference related to the request date on the portal.

The scheme is: dataset-carbon-rep-monthly_nnnnnnnnnnnn.nc

where:

- dataset-carbon-rep-monthly is the dataset reference.
- nnnnnnnnnnn: 13 digit integer corresponding to the current time (download time) in milliseconds since January 1, 1970 midnight UTC. is the first time step contained in the file.
- .nc is the standard NetCDF filename extension.

Example: dataset-carbon-rep-monthly 1318943720287.nc

IV.2 Nomenclature of files when downloaded through the Copernicus Marine Service FTP Service

MULTIOBS_GLO_BIO_CARBON_SURFACE_REP_015_008 files nomenclature when downloaded through the FTP service is based on the model name, production date, and field date.

The scheme is: dataset-carbon-rep-monthly_\$date1\$T0000Z_P\$date2\$T1545Z.nc,

where:

- date1: integer (format YYYYMMDD) corresponding to the field date.
- date2: integer (format YYYYMMDD) corresponding to the production date when the file was generated.
- .nc: standard NetCDF filename extension.

Example: dataset-carbon-rep-monthly 20010115T0000Z P20210930T1545Z.nc











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V FILE FORMAT AND READING SOFTWARE

The products are stored using the NetCDF format.

To know more about the NetCDF format, please follow this link:

What is the format of Copernicus Marine products? NetCDF









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VI REFERENCES

See the Quality Information Document (QUID):

https://catalogue.marine.copernicus.eu/documents/QUID/CMEMS-MOB-QUID-015-008.pdf).









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