



PRODUCT USER MANUAL

For SEA LEVEL Reprocessed In Situ Product
INSITU_GLO_PHY_SSH_DISCRETE_MY_013_053

Issue: 1.1

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Approval Date : November 2023



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RECORD TABLE

Issue	Date	§	Description of Change	Author	Validated By
1.0	2022/06/06	All	Creation of the document	Begoña Pérez Gómez, Jue Lin Ye, Alejandro Gallardo and In Situ TAC Partners	Stéphane Tarot
1.1	2023/06/01	All	Addition of new dataset including tide and surge for the IBI region	Begoña Pérez Gómez, Jue Lin Ye, Alejandro Gallardo and In Situ TAC Partners	Stéphane Tarot

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GLOSSARY AND ABBREVIATIONS

CF	Climate Forecast (convention for NetCDF)
EMODNet	European Marine Observation and Data Network (EMODnet)(http://www.emodnet.eu/) and the Physical component http://www.emodnet-physics.eu/Portal
EUROGOOS, ROOS	The European Global Ocean Observing System (http://eurogoos.eu/) and its Regional Operational Oceanographic System
Arctic ROOS	Arctic ocean
BOOS	Baltic sea
NOOS	North West Shelf region
IBI-ROOS	Iberia-Biscay-Ireland Seas
MOON	Mediterranean Sea
Black Sea GOOS	Black Sea
EuroGOOS TGTT	EuroGOOS Tide Gauge Task Team
EuroGOOS DATAMEQ	EuroGOOS Data Management, Exchange and Quality Working Group
GLOSS	Global Sea Level Observing System https://gloss-sealevel.org/
In Situ TAC	In Situ Thematic Assembly Centre
NetCDF	Network Common Data Form
NRT	Near Real Time
QuID	Quality Information Document

I INTRODUCTION

I.1 Summary

This document is the user manual of the Sea Level REProcessed In Situ product, INSITU_GLO_PHY_SSH_DISCRETE_MY_013_053, distributed by the Copernicus Marine Service In Situ Thematic Assembly Centre (In Situ TAC). It contains a description of the product, including how it is built, datasets, available data access services, and instructions for use of files and services.

The Sea Level REP product is a global product that provides the best available version of in-situ historical sea level observations, reprocessed and validated in delayed mode at centralized level by the Production Centre. This is required for assessment of operational models and reanalysis, and for use by the research community. It integrates the in-situ sea level observations, mainly from tide gauges providing coastal sea level, aggregated from the Regional EuroGOOS consortium (Arctic-ROOS, BOOS, NOOS, IBIROOS, MONGOOS and Black Sea GOOS), National Data Centers (NODC's), Hydrographic Offices or Metoffices, the Global Sea Level Observing System (GLOSS) and EMODnet Physics. The Copernicus Marine Service is not contributing to the maintenance and setting up of the observing systems it uses. The complete list of variables distributed by the In Situ TAC can be found in the Copernicus Marine In Situ TAC physical parameters list (<https://doi.org/10.13155/53381>).

The product is updated twice a year after a delayed mode quality control and processing which includes visualization, computation of non-tidal residuals and hourly data, and check of datum stability by means of neighbour test or buddy-checking. Details are provided in the Quality Information Document (QuID) CMEMS-INS-QUID-013_053.

Sea level data are available at the dedicated directory for sea level INSITU_GLO_PHY_SSH_DISCRETE_MY_013_053 of Copernicus Marine Service Dissemination System. It includes three different datasets: the first one contains the diverse original time sampling data available at the In Situ TAC NRT, which vary from 1-min to 1 hour, with updated quality control flags; a second one contains the homogeneous hourly data timeseries, validated and filtered from higher frequency observations, when available; and the third one contains an hourly dataset including astronomical tide and surge/non-tidal residuals for the IBI region. More detailed information can be obtained from the Copernicus Marine Service Copernicus Marine Service web page (<https://marine.copernicus.eu/>), and the In Situ TAC web page (<http://www.marineinsitu.eu/>).

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

1.2 History of changes

Date	Description of changes and impacted product
<u>EIS (11/2022)</u>	<u>FIRST RELEASE OF THE PRODUCT.</u>
<u>EIS (11/2023)</u>	<u>TEMPORAL EXTENSION UNTIL DECEMBER 2022</u> <u>NEW DATASET FOR THE IBI REGION, INCLUDING ASTRONOMICAL TIDE AND NON-TIDAL RESIDUALS</u>

II DESCRIPTION OF THE PRODUCT SPECIFICATION

II.1 General Information

The following table summarizes the main characteristics of the product.

Product Lines	INSITU_GLO_PHY_SSH_DISCRETE_MY_013_053
Geographical coverage	Global
Variables	<ul style="list-style-type: none"> • Water surface height above a specific datum (SLEV) • Non tidal elevation of sea surface height (SLVR) • Tidal sea surface height above a specific datum (TIDE)
Product Type	Observations Multi Year
Available time series	Since 1886 (longest time series in the Baltic), regularly updated
Temporal resolution	Variable (e.g. 1, 5, 10, 15 min, 1 h, depending on the tide gauge)
Target delivery time	Twice a year
Delivery mechanism	FTP
Horizontal resolution	N/A
Number of vertical levels	N/A
Format	NetCDF-4 classic model

Table 1: In Situ TAC Multi-year SEA LEVEL product

II.2 Details of datasets

INSITU_GLO_PHY_SSH_DISCRETE_MY_013_053
Datasets: cmems_obs-ins_glo_phy-ssh_my_na_irr: values with original time sampling in In Situ TAC NRT, updated flags cmems_obs-ins_glo_phy-ssh_my_na_PT1H: validated time series of hourly values (filtered or instantaneous) cmems_obs-ins_ibi_phy-ssh_my_tide-surge_PT1H: validated time series of hourly values (filtered or instantaneous) including corresponding values of tide and surge, for the IBI region Variables name in the NetCDF file and Unit: Long_name & Standard_name
SLEV [m] Water surface height above a specific datum water_surface_height_above_reference_datum
SLVR [m] Non tidal elevation of sea surface height non_tidal_elevation_of_sea_surface_height
TIDE [m] Tidal sea surface height above a specific datum tidal_sea_surface_height_above_reference_datum

Table 2: list of the datasets and variable names and unit for the INSITU_GLO_PHY_SSH_DISCRETE_MY_013_053 product

II.3 Production System Description

The In Situ Sea Level REProcessed product starts with a frozen copy of history files from the Global multiparameter Near Real Time (NRT) product (INSITU_GLO_PHYBGCWAV_DISCRETE_MYNRT_013_030).

The production consists of:

- i) extraction of sea level data and metadata in the mentioned product (mainly from tide gauges);
- ii) validation with procedures detailed in the Quality Information Document (QuID), following best practices at global and European level (GLOSS, EuroGOOS DATAMEQ and EuroGOOS TGTT);
- iii) NetCDF files generation and check with a format and content checker;
- iv) assessment of the product with the metrics described in the QuID;
- v) preparation of documentation and distribution.

The Production Unit performs the sea level validation in a centralized way twice a year: around June for temporal extension of six months and at the end of the year (November-December)

for temporal extension of six months and also several possible modifications or improvements of the product including full reprocessing.

II.4 Processing information

II.4.1 Update Time

This product is updated twice a year.

II.4.2 Time averaging

One of the product datasets contains the original time sampling data available in In Situ TAC NRT. Despite most of the stations provide hourly values, some of them provide data at diverse sampling intervals, e.g.: 1, 5, 10 and 15 min, typically averaged/filtered values of sea level observations over the mentioned time intervals.

Whenever these lower sampling data are available, hourly values are then obtained by the Production Centre in a homogeneous way by means of a standard filter (Pugh filter), after resampling and interpolation, as described in IOC(2020). This is also the filter applied to obtain NRT hourly values for some of the In Situ TAC regions.

II.4.3 Detiding for the IBI region

The dataset including hourly values with tide and surge derived by-products for the IBI region is generated in the following way: annual harmonic constants and tide predictions are obtained by means of uTide python package (Codiga, 2011). The non-tidal residuals are then computed as the difference between hourly observed and predicted values and a filter is applied to deal with the tidal remnant from harmonic analysis based on hourly values (Horsburgh and Wilson, 2007; Bernier and Thompson, 2015; Pérez González et al., 2017).

III DOWNLOAD A PRODUCT

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

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

IV FILES NOMENCLATURE

IV.1 Nomenclature of files when downloaded through the Copernicus Marine Service FTP Service

Files can be downloaded through the Copernicus Marine Service FTP Service, organized in one product directory, three datasets directories and the corresponding index files. In each dataset directory there is a history folder with one directory per platform type (TG: tide gauges for now), including one file per platform/station in each dataset.

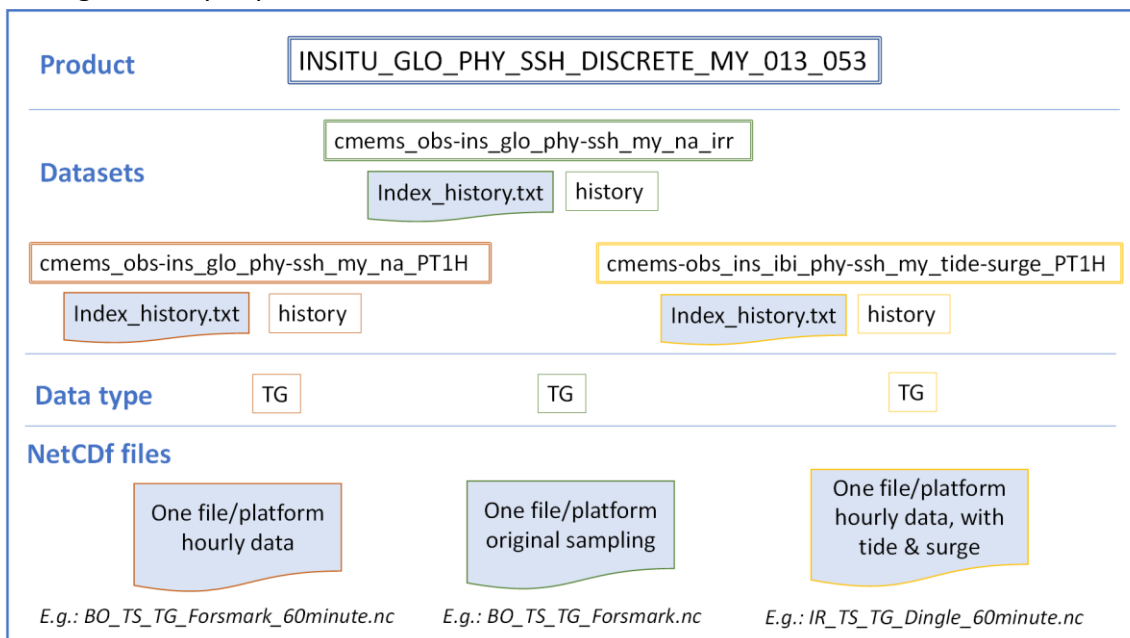


Figure 1: FTP structure organization of the In Situ TAC Sea Level REP product

File naming convention:

Dataset/history/data_type/RR_XX_YY_CODE<_ZZZ>.nc where:

- RR: region bigram, which corresponds to one of the following:
 - GL: Global
 - AR: Arctic
 - BO: Baltic Sea
 - NO: NorthWestShelf
 - IR: Iberia-Biscay-Ireland
 - MO: Mediterranean Sea
 - BS: Black Sea
- XX: file type, in this case:
 - TS: timeseries

- YY: data type (platform dependent), in this case:
 - TG: Tide gauge station
- CODE: platform code in In Situ TAC
- <_ZZZ>: optional parameter for platforms or tide gauges with multiple sampling data, that can be:
 - 01minute
 - 02minute
 - 05minute
 - 10minute
 - 60minute (applied to all files in the hourly reprocessed dataset)
- .nc: standard NetCDF filename extension.

Examples:

- Forsmark tide gauge, in the Baltic Sea, original time sampling:
BO_TS_TG_Forsmark.nc
- Forsmark tide gauge, in the Baltic Sea, reprocessed hourly data:
BO_TS_TG_Forsmark_60minute.nc

IV.2 Index file

An index file describes the content of each dataset directory. It is useful for regular synchronization between the Distribution Unit and operational users, and for data discovery. The index file contains one line per file with the following elements:

- product_id
COP-XX-YY
 - COP: Copernicus trigram
 - XX: region bigram
 - YY: product version

Example: COP-NO-01

- file_name
- geospatial_lat_min
- geospatial_lat_max
- geospatial_lon_min
- geospatial_lon_max
- time_coverage_start
- time_coverage_end
- institution
- date_update
- data_mode
 - R: real-time data

- D: delayed-mode data
- M: mixed real-time and delayed mode data
- parameters (separator: blank)

The field separator character is "," (comma). Within each field, the commas found in the content are replaced by "-". Some fields contain a list of values. They are separated by blank (example: the list of parameters) or separated by semicolon (if blank is a valid character in the values).

The index lines are sorted by file name and time coverage start.

The "parameters" field contains the physical parameters as listed in the "physical parameters list" (<https://doi.org/10.13155/53381>) and candidate parameters (not yet approved in the official list).

Coordinates, pseudo-coordinates and metadata variables are ignored.

From the "physical parameters list" the following variables are thus ignored: TIME, LATITUDE, LONGITUDE, _QC, POSITION_QC, _ADJUSTED_QC, _ADJUSTED_ERROR, _DM, _UNCERTAINTY, DC_REFERENCE, DIRECTION, POSITIONING_SYSTEM, VERTICAL_SAMPLING_SCHEME

Date is ISO8601 format: YYYY-MM-DDThh:mm:ssZ.

The header is composed of several lines starting with '#' character. It contains metadata about the content of the index file.

```
# Title: in-situ files catalog
# Description: catalog of available in-situ files
# Project: Copernicus Marine In Situ TAC
# Format version: 1.4
# Date of update: 2020-04-20T12:34:20Z
#product_id,file_name,geospatial_lat_min,geospatial_lat_max,geospatial_lon_min,
geospatial_lon_max,time_coverage_start,time_coverage_end,institution,date_update,
data_mode, parameters
```

IV.3 File generation rules

A data file is not distributed in case of:

- Bad parameters: the file contains only bad data (qc flag 4)

IV.4 Other information: mean centre of Products, land mask value, missing value

The product files use scale factor and offset as shown below:

$Real_Value = (Display_Value \times scale_factor) + add_offset$

V FILE FORMAT

V.1 Format and Reading software

The products are stored using the NetCDF format.

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

<https://help.marine.copernicus.eu/en/articles/4427604-what-is-the-format-of-copernicus-marine-products-netcdf>

V.2 File format checker

Every Copernicus In Situ TAC data file submitted by a PU (Production Unit) for distribution has its format and data consistency checked by the Copernicus file format checker. It ensures the file formats match the Copernicus In Situ TAC standards precisely, as specified in the SRD.

Files with format or consistency errors are rejected by the PU and are not distributed. Less serious problems may generate warnings and the file will still be distributed on the PU.

The file format checker is publicly available on:

- *Copernicus, EGO, OceanSITES, Argo data management (2021). NetCDF file format checker for Argo floats, Copernicus In Situ TAC, EGO gliders, OceanSITES. SEANOE.*
<https://doi.org/10.17882/45538>

The reference document for file format checks is available on:

- *Copernicus Marine In Situ Tac Data Management Team (2021). Copernicus Marine in situ TAC - System Requirements Document (SRD). CMEMS-INS-SRD.*
<https://doi.org/10.13155/40846>

V.3 Structure and semantic of netCDF maps files

In the following tables we show an example of the NetCDF files header from a file with original time sampling interval, a file with hourly reprocessed sea level data, and one with hourly reprocessed data including tide and surge components for the IBI region.

NetCDF file with original time sampling interval

```
netcdf BO_TS_TG_GoteborgGotaalvbron {
dimensions:
    TIME = 155790 ;
    DEPTH = 1 ;
    LATITUDE = 155790 ;
    LONGITUDE = 155790 ;
    POSITION = 155790 ;
variables:
    double TIME(TIME) ;
        TIME:long_name = "Time" ;
        TIME:standard_name = "time" ;
        TIME:units = "days since 1950-01-01T00:00:00Z" ;
        TIME:valid_min = -90000.f ;
        TIME:valid_max = 90000.f ;
        TIME:QC_indicator = 1 ;
        TIME:comment = " " ;
        TIME:axis = "T" ;
        TIME:ancillary_variables = "TIME_QC" ;
        TIME:calendar = "standard" ;
    byte TIME_QC(TIME) ;
        TIME_QC:long_name = "Time quality flag" ;
        TIME_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
        TIME_QC:FillValue = -127b ;
        TIME_QC:valid_min = 0b ;
        TIME_QC:valid_max = 9b ;
        TIME_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
        TIME_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
    float LATITUDE(LATITUDE) ;
        LATITUDE:long_name = "Latitude of each location" ;
        LATITUDE:standard_name = "latitude" ;
        LATITUDE:units = "degree_north" ;
        LATITUDE:valid_min = -90.f ;
        LATITUDE:valid_max = 90.f ;
        LATITUDE:QC_indicator = 1 ;
        LATITUDE:comment = " " ;
        LATITUDE:axis = "Y" ;
        LATITUDE:ancillary_variables = "POSITION_QC" ;
    float LONGITUDE(LONGITUDE) ;
        LONGITUDE:long_name = "Longitude of each location" ;
```



```

LONGITUDE:standard_name = "longitude" ;
LONGITUDE:units = "degree_east" ;
LONGITUDE:valid_min = -180.f ;
LONGITUDE:valid_max = 180.f ;
LONGITUDE:QC_indicator = 1 ;
LONGITUDE:comment = " " ;
LONGITUDE:axis = "X" ;
LONGITUDE:ancillary_variables = "POSITION_QC" ;
byte POSITION_QC(POSITION) ;
  POSITION_QC:long_name = "Position quality flag" ;
  POSITION_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
  POSITION_QC:_FillValue = -127b ;
  POSITION_QC:valid_min = 0b ;
  POSITION_QC:valid_max = 9b ;
  POSITION_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
  POSITION_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
float DEPH(TIME, DEPTH) ;
  DEPH:long_name = "Depth" ;
  DEPH:standard_name = "depth" ;
  DEPH:_FillValue = 9.96921e+36f ;
  DEPH:units = "m" ;
  DEPH:positive = "down" ;
  DEPH:valid_min = -12000.f ;
  DEPH:valid_max = 12000.f ;
  DEPH:comment = " " ;
  DEPH:axis = "Z" ;
  DEPH:reference = "sea_level" ;
  DEPH:data_mode = "D" ;
  DEPH:ancillary_variables = "DEPH_QC" ;
byte DEPH_QC(TIME, DEPTH) ;
  DEPH_QC:long_name = "Depth quality flag" ;
  DEPH_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
  DEPH_QC:_FillValue = -127b ;
  DEPH_QC:valid_min = 0b ;
  DEPH_QC:valid_max = 9b ;
  DEPH_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
  DEPH_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
int SLEV(TIME, DEPTH) ;
  SLEV:standard_name = "water_surface_height_above_reference_datum" ;
  SLEV:units = "m" ;
  SLEV:_FillValue = -2147483647 ;
  SLEV:add_offset = 0.f ;
  SLEV:scale_factor = 0.001f ;
  SLEV:long_name = "Water surface height above a specific datum" ;
  SLEV:valid_min = -2000 ;
  SLEV:valid_max = 40000 ;
  SLEV:comment = " " ;

```

```

SLEV:coordinates = "TIME LATITUDE LONGITUDE DEPTH" ;
SLEV:sensor_depth = 0.f ;
SLEV:sensor_mount = " " ;
SLEV:sensor_orientation = " " ;
SLEV:data_mode = "D" ;
SLEV:processing_method = "instantaneous values" ;
SLEV:sea_level_datum = "BSCD2000" ;
SLEV:time_sampling = 5.f ;
SLEV:ancillary_variables = "SLEV_QC" ;
byte SLEV_QC(TIME, DEPTH) ;
  SLEV_QC:long_name = "Water surface height above a specific datum quality flag" ;
  SLEV_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
  SLEV_QC:_FillValue = -127b ;
  SLEV_QC:valid_min = 0b ;
  SLEV_QC:valid_max = 9b ;
  SLEV_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
  SLEV_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;

// global attributes:
  :platform_code = "GoteborgGotaalvbron" ;
  :platform_name = "Göteborg-Götaälvb" ;
  :data_mode = "D" ;
  :title = "Global Ocean - In Situ Sea Level Observation Re-Analysis" ;
  :summary = "Sea level data from Göteborg-Götaälvb tide gauge in the Baltic Sea. Delayed-mode
quality control and assessment of original time sampling data in INS TAC NRT.Oceanographic data from the Baltic
Sea. Measured properties: the hydrographic conditions as currents, temperature and salinity." ;
  :naming_authority = "Copernicus Marine In Situ" ;
  :id = "BO_TS_TG_GoteborgGotaalvbron" ;
  :wmo_platform_code = "" ;
  :ices_platform_code = "" ;
  :source = "coastal structure" ;
  :source_platform_category_code = "17" ;
  :institution_edmo_code = "545" ;
  :institution = "Swedish Meteorological and Hydrological Institute (SMHI)" ;
  :institution_country = "Sweden" ;
  :institution_references = "https://www.smhi.se/ http://www.puertos.es" ;
  :site_code = "GoteborgGotaalvbron" ;
  :comment = "" ;
  :contact = "cmems-service@puertos.es cmems-service@smhi.se" ;
  :area = "Baltic Sea" ;
  :geospatial_vertical_min = "0.0" ;
  :geospatial_vertical_max = "0.0" ;
  :time_coverage_start = "2010-10-20T08:10:00Z" ;
  :time_coverage_end = "2013-05-15T12:35:00Z" ;
  :cdm_data_type = "timeSeries" ;
  :data_type = "OceanSITES time-series data" ;
  :bottom_depth = "" ;
  :format_version = "1.4" ;

```

```

:Conventions = "CF-1.6 Copernicus-InSituTAC-FormatManual-1.42 Copernicus-InSituTAC-SRD-
1.5 Copernicus-InSituTAC-ParametersList-3.2.0" ;
:netcdf_version = "netCDF-4 classic model" ;
:references = "http://marine.copernicus.eu http://www.marineinsitu.eu" ;
:data_assembly_center = "Puertos del Estado" ;
:update_interval = "P6M" ;
:citation = "These data were collected and made freely available by the Copernicus project and
the programs that contribute to it." ;
:distribution_statement = "These data follow Copernicus standards; they are public and free of
charge. User assumes all risk for use of data. User must display citation in any publication or product using data.
User must contact PI prior to any commercial use of data." ;
:doi = "https://doi.org/10.13155/59938 https://doi.org/10.13155/40846
https://doi.org/10.13155/53381 https://doi.org/10.13155/36230 https://doi.org/10.13155/43494null" ;
:pi_name = "GBG" ;
:qc_manual = "Quality control of in situ sea level observations: a review and progress towards
automated quality control, volume 1 - UNESCO Biblioteca Digital
https://unesdoc.unesco.org/ark:/48223/pf0000373566" ;
:date_update = "2022-06-01T17:10:21Z" ;
:history = "2022-06-01T17:10:21ZCreation" ;
:wmo_inst_type = "" ;
:last_date_observation = "2013-05-15T12:35:00Z" ;
:last_latitude_observation = "57.7147" ;
:last_longitude_observation = "11.9669" ;
:geospatial_lat_min = "57.7147" ;
:geospatial_lat_max = "57.7147" ;
:geospatial_lon_min = "11.9669" ;
:geospatial_lon_max = "11.9669" ;
:_NCProperties = "version=2,netcdf=4.7.3,hdf5=1.10.4" ;
}

```

NetCDF file with hourly reprocessed sea level data

```

netcdf BO_TS_TG_GoteborgGotaalvbron_60minute {
dimensions:
    TIME = 22191 ;
    DEPTH = 1 ;
    LATITUDE = 22191 ;
    LONGITUDE = 22191 ;
    POSITION = 22191 ;
variables:
    double TIME(TIME) ;
        TIME:long_name = "Time" ;
        TIME:standard_name = "time" ;
        TIME:units = "days since 1950-01-01T00:00:00Z" ;
        TIME:valid_min = -90000.f ;
        TIME:valid_max = 90000.f ;
        TIME:QC_indicator = 1 ;
        TIME:comment = " " ;
        TIME:axis = "T" ;

```

```

        TIME:ancillary_variables = "TIME_QC" ;
        TIME:calendar = "standard" ;
    byte TIME_QC(TIME) ;
        TIME_QC:long_name = "Time quality flag" ;
        TIME_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
        TIME_QC:_FillValue = -127b ;
        TIME_QC:valid_min = 0b ;
        TIME_QC:valid_max = 9b ;
        TIME_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
        TIME_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
    float LATITUDE(LATITUDE) ;
        LATITUDE:long_name = "Latitude of each location" ;
        LATITUDE:standard_name = "latitude" ;
        LATITUDE:units = "degree_north" ;
        LATITUDE:valid_min = -90.f ;
        LATITUDE:valid_max = 90.f ;
        LATITUDE:QC_indicator = 1 ;
        LATITUDE:comment = " " ;
        LATITUDE:axis = "Y" ;
        LATITUDE:ancillary_variables = "POSITION_QC" ;
    float LONGITUDE(LONGITUDE) ;
        LONGITUDE:long_name = "Longitude of each location" ;
        LONGITUDE:standard_name = "longitude" ;
        LONGITUDE:units = "degree_east" ;
        LONGITUDE:valid_min = -180.f ;
        LONGITUDE:valid_max = 180.f ;
        LONGITUDE:QC_indicator = 1 ;
        LONGITUDE:comment = " " ;
        LONGITUDE:axis = "X" ;
        LONGITUDE:ancillary_variables = "POSITION_QC" ;
    byte POSITION_QC(POSITION) ;
        POSITION_QC:long_name = "Position quality flag" ;
        POSITION_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
        POSITION_QC:_FillValue = -127b ;
        POSITION_QC:valid_min = 0b ;
        POSITION_QC:valid_max = 9b ;
        POSITION_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
        POSITION_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
    float DEPH(TIME, DEPTH) ;
        DEPH:long_name = "Depth" ;
        DEPH:standard_name = "depth" ;
        DEPH:_FillValue = 9.96921e+36f ;
        DEPH:units = "m" ;
        DEPH:positive = "down" ;
        DEPH:valid_min = -12000.f ;
        DEPH:valid_max = 12000.f ;
        DEPH:comment = " " ;

```

```

    DEPH:axis = "Z" ;
    DEPH:reference = "sea_level" ;
    DEPH:data_mode = "D" ;
    DEPH:ancillary_variables = "DEPH_QC" ;
byte DEPH_QC(TIME, DEPTH) ;
    DEPH_QC:long_name = "Depth quality flag" ;
    DEPH_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
    DEPH_QC:_FillValue = -127b ;
    DEPH_QC:valid_min = 0b ;
    DEPH_QC:valid_max = 9b ;
    DEPH_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
    DEPH_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
int SLEV(TIME, DEPTH) ;
    SLEV:standard_name = "water_surface_height_above_reference_datum" ;
    SLEV:units = "m" ;
    SLEV:_FillValue = -2147483647 ;
    SLEV:add_offset = 0.f ;
    SLEV:scale_factor = 0.001f ;
    SLEV:long_name = "Water surface height above a specific datum" ;
    SLEV:valid_min = -2000 ;
    SLEV:valid_max = 40000 ;
    SLEV:comment = " " ;
    SLEV:coordinates = "TIME LATITUDE LONGITUDE DEPH" ;
    SLEV:sensor_depth = 0.f ;
    SLEV:sensor_mount = " " ;
    SLEV:sensor_orientation = " " ;
    SLEV:data_mode = "D" ;
    SLEV:processing_method = "filtered values" ;
    SLEV:sea_level_datum = "BSCD2000" ;
    SLEV:time_sampling = 60.f ;
    SLEV:ancillary_variables = "SLEV_QC" ;
byte SLEV_QC(TIME, DEPTH) ;
    SLEV_QC:long_name = "Water surface height above a specific datum quality flag" ;
    SLEV_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
    SLEV_QC:_FillValue = -127b ;
    SLEV_QC:valid_min = 0b ;
    SLEV_QC:valid_max = 9b ;
    SLEV_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
    SLEV_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;

// global attributes:
    :platform_code = "GoteborgGotaalvbron" ;
    :platform_name = "Göteborg-Götaälvb" ;
    :data_mode = "D" ;
    :title = "Global Ocean - In Situ Sea Level Observation Re-Analysis" ;

```

```

:summary = "Hourly sea level data from Göteborg-Götaälvb tide gauge in the Baltic Sea.
Obtained and/or assessed in delayed mode by Copernicus Marine Service.Oceanographic data from the Baltic
Sea. Measured properties: the hydrographic conditions as currents, temperature and salinity." ;
:naming_authority = "Copernicus Marine In Situ" ;
:id = "BO_TS_TG_GoteborgGotaalvbron_60minute" ;
:wmo_platform_code = "" ;
:ices_platform_code = "" ;
:source = "coastal structure" ;
:source_platform_category_code = "17" ;
:institution_edmo_code = "545" ;
:institution = "Swedish Meteorological and Hydrological Institute (SMHI)" ;
:institution_country = "Sweden" ;
:institution_references = "https://www.smhi.se/ http://www.puertos.es" ;
:site_code = "GoteborgGotaalvbron" ;
:comment = "" ;
:contact = "cmems-service@puertos.es cmems-service@smhi.se" ;
:area = "Baltic Sea" ;
:geospatial_vertical_min = "0.0" ;
:geospatial_vertical_max = "0.0" ;
:time_coverage_start = "2010-10-20T23:00:00Z" ;
:time_coverage_end = "2013-05-14T22:00:00Z" ;
:cdm_data_type = "timeSeries" ;
:data_type = "OceanSITES time-series data" ;
:bottom_depth = "" ;
:format_version = "1.4" ;
:Conventions = "CF-1.6 Copernicus-InSituTAC-FormatManual-1.42 Copernicus-InSituTAC-SRD-
1.5 Copernicus-InSituTAC-ParametersList-3.2.0" ;
:netcdf_version = "netCDF-4 classic model" ;
:references = "http://marine.copernicus.eu http://www.marineinsitu.eu" ;
:data_assembly_center = "Puertos del Estado" ;
:update_interval = "P6M" ;
:citation = "These data were collected and made freely available by the Copernicus project and
the programs that contribute to it." ;
:distribution_statement = "These data follow Copernicus standards; they are public and free of
charge. User assumes all risk for use of data. User must display citation in any publication or product using data.
User must contact PI prior to any commercial use of data." ;
:doi = "https://doi.org/10.13155/59938 https://doi.org/10.13155/40846
https://doi.org/10.13155/53381 https://doi.org/10.13155/36230 https://doi.org/10.13155/43494null" ;
:pi_name = "GBG" ;
:qc_manual = "Quality control of in situ sea level observations: a review and progress towards
automated quality control, volume 1 - UNESCO Biblioteca Digital
https://unesdoc.unesco.org/ark:/48223/pf0000373566" ;
:date_update = "2022-06-01T17:13:22Z" ;
:history = "2022-06-01T17:13:22ZCreation" ;
:wmo_inst_type = "" ;
:last_date_observation = "2013-05-14T22:00:00Z" ;
:last_latitude_observation = "57.7147" ;
:last_longitude_observation = "11.9669" ;
:geospatial_lat_min = "57.7147" ;
:geospatial_lat_max = "57.7147" ;
:geospatial_lon_min = "11.9669" ;

```

```

:geospatial_lon_max = "11.9669" ;
:_NCProperties = "version=2,netcdf=4.7.3,hdf5=1.10.4" ;
}

```

NetCDF file with hourly reprocessed sea level data including tide and surge components (IBI)

```

netcdf IR_TS_TG_Dingle_60minute {
dimensions:
    TIME = 24786 ;
    DEPTH = 1 ;
    LATITUDE = 24786 ;
    LONGITUDE = 24786 ;
    POSITION = 24786 ;
variables:
    double TIME(TIME) ;
        TIME:long_name = "Time" ;
        TIME:standard_name = "time" ;
        TIME:units = "days since 1950-01-01T00:00:00Z" ;
        TIME:valid_min = -90000.f ;
        TIME:valid_max = 90000.f ;
        TIME:QC_indicator = 1 ;
        TIME:comment = " " ;
        TIME:axis = "T" ;
        TIME:ancillary_variables = "TIME_QC" ;
        TIME:calendar = "standard" ;
    byte TIME_QC(TIME) ;
        TIME_QC:long_name = "Time quality flag" ;
        TIME_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
        TIME_QC:_FillValue = -127b ;
        TIME_QC:valid_min = 0b ;
        TIME_QC:valid_max = 9b ;
        TIME_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
        TIME_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
    float LATITUDE(LATITUDE) ;
        LATITUDE:long_name = "Latitude of each location" ;
        LATITUDE:standard_name = "latitude" ;
        LATITUDE:units = "degree_north" ;
        LATITUDE:valid_min = -90.f ;
        LATITUDE:valid_max = 90.f ;
        LATITUDE:QC_indicator = 1 ;
        LATITUDE:comment = " " ;
        LATITUDE:axis = "Y" ;
        LATITUDE:ancillary_variables = "POSITION_QC" ;
    float LONGITUDE(LONGITUDE) ;
        LONGITUDE:long_name = "Longitude of each location" ;
        LONGITUDE:standard_name = "longitude" ;
        LONGITUDE:units = "degree_east" ;

```

```

LONGITUDE:valid_min = -180.f ;
LONGITUDE:valid_max = 180.f ;
LONGITUDE:QC_indicator = 1 ;
LONGITUDE:comment = " " ;
LONGITUDE:axis = "X" ;
LONGITUDE:ancillary_variables = "POSITION_QC" ;
byte POSITION_QC(POSITION) ;
  POSITION_QC:long_name = "Position quality flag" ;
  POSITION_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
  POSITION_QC:_FillValue = -127b ;
  POSITION_QC:valid_min = 0b ;
  POSITION_QC:valid_max = 9b ;
  POSITION_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
  POSITION_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
float DEPH(TIME, DEPTH) ;
  DEPH:long_name = "Depth" ;
  DEPH:standard_name = "depth" ;
  DEPH:_FillValue = 9.96921e+36f ;
  DEPH:units = "m" ;
  DEPH:positive = "down" ;
  DEPH:valid_min = -12000.f ;
  DEPH:valid_max = 12000.f ;
  DEPH:comment = " " ;
  DEPH:axis = "Z" ;
  DEPH:reference = "sea_level" ;
  DEPH:data_mode = "D" ;
  DEPH:ancillary_variables = "DEPH_QC" ;
byte DEPH_QC(TIME, DEPTH) ;
  DEPH_QC:long_name = "Depth quality flag" ;
  DEPH_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
  DEPH_QC:_FillValue = -127b ;
  DEPH_QC:valid_min = 0b ;
  DEPH_QC:valid_max = 9b ;
  DEPH_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
  DEPH_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;
int SLEV(TIME, DEPTH) ;
  SLEV:standard_name = "water_surface_height_above_reference_datum" ;
  SLEV:units = "m" ;
  SLEV:_FillValue = -2147483647 ;
  SLEV:add_offset = 0.f ;
  SLEV:scale_factor = 0.001f ;
  SLEV:long_name = "Water surface height above a specific datum" ;
  SLEV:valid_min = -2000 ;
  SLEV:valid_max = 40000 ;
  SLEV:comment = " " ;
  SLEV:coordinates = "TIME LATITUDE LONGITUDE DEPH" ;
  SLEV:sensor_depth = 0.f ;

```



```

    SLEV:sensor_mount = " ";
    SLEV:sensor_orientation = " ";
    SLEV:data_mode = "D";
    SLEV:time_sampling = 60.f;
    SLEV:sea_level_datum = "Ordnance Datum Malin Head";
    SLEV:processing_method = "filtered values";
    SLEV:ancillary_variables = "SLEV_QC";
byte SLEV_QC(TIME, DEPTH);
    SLEV_QC:long_name = "Water surface height above a specific datum quality flag";
    SLEV_QC:conventions = "Copernicus Marine In Situ reference table 2";
    SLEV_QC:_FillValue = -127b;
    SLEV_QC:valid_min = 0b;
    SLEV_QC:valid_max = 9b;
    SLEV_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b;
    SLEV_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value";
int SLVR(TIME, DEPTH);
    SLVR:standard_name = "non_tidal_elevation_of_sea_surface_height";
    SLVR:units = "m";
    SLVR:_FillValue = -2147483647;
    SLVR:add_offset = 0.f;
    SLVR:scale_factor = 0.001f;
    SLVR:long_name = "Non tidal elevation of sea surface height";
    SLVR:valid_min = -2000;
    SLVR:valid_max = 40000;
    SLVR:comment = " ";
    SLVR:coordinates = "TIME LATITUDE LONGITUDE DEPTH";
    SLVR:sensor_depth = 0.f;
    SLVR:sensor_mount = " ";
    SLVR:sensor_orientation = " ";
    SLVR:data_mode = "D";
    SLVR:processing_method = "filtered values";
    SLVR:sea_level_datum = "Ordnance Datum Malin Head";
    SLVR:time_sampling = 60.f;
    SLVR:ancillary_variables = "SLVR_QC";
byte SLVR_QC(TIME, DEPTH);
    SLVR_QC:long_name = "Non tidal elevation of sea surface height quality flag";
    SLVR_QC:conventions = "Copernicus Marine In Situ reference table 2";
    SLVR_QC:_FillValue = -127b;
    SLVR_QC:valid_min = 0b;
    SLVR_QC:valid_max = 9b;
    SLVR_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b;
    SLVR_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value";
int TIDE(TIME, DEPTH);
    TIDE:standard_name = "tidal_sea_surface_height_above_reference_datum";
    TIDE:units = "m";
    TIDE:_FillValue = -2147483647;
    TIDE:add_offset = 0.f;
  
```

```

TIDE:scale_factor = 0.001f ;
TIDE:long_name = "Tidal sea surface height above a specific datum" ;
TIDE:valid_min = -2000 ;
TIDE:valid_max = 40000 ;
TIDE:comment = " " ;
TIDE:coordinates = "TIME LATITUDE LONGITUDE DEPTH" ;
TIDE:sensor_depth = 0.f ;
TIDE:sensor_mount = " " ;
TIDE:sensor_orientation = " " ;
TIDE:data_mode = "D" ;
TIDE:processing_method = "filtered values" ;
TIDE:sea_level_datum = "Ordnance Datum Malin Head" ;
TIDE:time_sampling = 60.f ;
TIDE:ancillary_variables = "TIDE_QC" ;
byte TIDE_QC(TIME, DEPTH) ;
  TIDE_QC:long_name = "Tidal sea surface height above a specific datum quality flag" ;
  TIDE_QC:conventions = "Copernicus Marine In Situ reference table 2" ;
  TIDE_QC:_FillValue = -127b ;
  TIDE_QC:valid_min = 0b ;
  TIDE_QC:valid_max = 9b ;
  TIDE_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
  TIDE_QC:flag_meanings = "no_qc_performed good_data probably_good_data
bad_data_that_are_potentially_correctable bad_data value_changed value_below_detection nominal_value
interpolated_value missing_value" ;

// global attributes:
  :platform_code = "Dingle" ;
  :platform_name = "Dingle Harbour" ;
  :data_mode = "D" ;
  :title = "Global Ocean - In Situ Sea Level Observation Re-Analysis" ;
  :summary = "Hourly sea level data from Dingle Harbour tide gauge in the North Atlantic Ocean.
Obtained and/or assessed in delayed mode by Copernicus Marine Service, including tide and surge components."
;

  :naming_authority = "Copernicus Marine In Situ" ;
  :id = "IR_TS_TG_Dingle_60minute" ;
  :wmo_platform_code = "" ;
  :ices_platform_code = "" ;
  :source = "coastal structure" ;
  :source_platform_category_code = "17" ;
  :institution_edmo_code = "396" ;
  :institution = "Marine Institute (MI)" ;
  :institution_country = "Ireland" ;
  :institution_references = "http://www.marine.ie/ http://www.puertos.es" ;
  :site_code = "" ;
  :comment = "The dataset including hourly values with tide and surge derived by-products for
the IBI region is generated in the following way: annual harmonic constants and tide predictions are obtained by
means of uTide python package (Codiga, 2011). The non-tidal residuals are then computed as the difference
between hourly observed and predicted values and a filter is applied to deal with the tidal remnant from
harmonic analysis based on hourly values.DM Reprocessed by MI + Sea Level REP" ;
  :contact = "kieran.lyons@marine.ie cmems-service@puertos.es cmems-service@puertos.es" ;
  :area = "North Atlantic Ocean" ;

```

```

:geospatial_vertical_min = "0.0" ;
:geospatial_vertical_max = "0.0" ;
:time_coverage_start = "2019-01-07T18:00:00Z" ;
:time_coverage_end = "2022-12-31T23:00:00Z" ;
:cdm_data_type = "timeSeries" ;
:data_type = "OceanSITES time-series data" ;
:bottom_depth = "" ;
:format_version = "1.4" ;
:Conventions = "CF-1.6 Copernicus-InSituTAC-FormatManual-1.43 Copernicus-InSituTAC-SRD-
1.6 Copernicus-InSituTAC-ParametersList-3.2.1" ;
:netcdf_version = "netCDF-4 classic model" ;
:references = "http://marine.copernicus.eu http://www.marineinsitu.eu" ;
:data_assembly_center = "Puertos del Estado" ;
:update_interval = "P6M" ;
:citation = "These data were collated within the Copernicus Marine Service (In Situ) and
EMODnet collaboration framework. Data is made freely available by the Copernicus Marine Service and the
programs that contribute to it." ;
:distribution_statement = "These data follow Copernicus standards; they are public and free of
charge. User assumes all risk for use of data. User must display citation in any publication or product using data."
;
:license = "https://marine.copernicus.eu/user-corner/service-commitments-and-licence" ;
:doi = "https://doi.org/10.13155/59938 https://doi.org/10.13155/40846
https://doi.org/10.13155/53381 https://doi.org/10.13155/36230 https://doi.org/10.13155/43494null" ;
:pi_name = "PdE" ;
:qc_manual = "Quality control of in situ sea level observations: a review and progress towards
automated quality control, volume 1 - UNESCO Biblioteca Digital
https://unesdoc.unesco.org/ark:/48223/pf0000373566" ;
:date_update = "2023-06-02T13:27:40Z" ;
:history = "2023-06-02T13:27:40ZCreation" ;
:wmo_inst_type = "" ;
:last_date_observation = "2022-12-31T23:00:00Z" ;
:last_latitude_observation = "52.1392" ;
:last_longitude_observation = "-10.2773" ;
:geospatial_lat_min = "52.1392" ;
:geospatial_lat_max = "52.1392" ;
:geospatial_lon_min = "-10.2773" ;
:geospatial_lon_max = "-10.2773" ;
}

```

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