PRODUCT USER MANUAL

For In Situ Products

INSITU_GLO_PHYBGCWAV_DISCRETE_MYNRT_013_030

INSITU_ARC_PHYBGCWAV_DISCRETE_MYNRT_013_031

INSITU_BAL_PHYBGCWAV_DISCRETE_MYNRT_013_032

INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033

INSITU_BLK_PHYBGCWAV_DISCRETE_MYNRT_013_034

INSITU_MED_PHYBGCWAV_DISCRETE_MYNRT_013_035

INSITU_NWS_PHYBGCWAV_DISCRETE_MYNRT_013_036

Issue: 2.2

Contributors : In Situ TAC partners

Approval Date :NOVEMBER 2024

MERCATOR OCEAN
INTERNATIONAL
2 avenue de l'Aérodrome de Montaudran, 31400 Toulouse, FRANCE
Tél : +33 5 61 39 38 02 - Fax : +33 5 61 39 38 99
Société civile de droit français au capital de 2 000 000 € - 522 911 577 RCS Toulouse - SIRET 522 911 577 00016

marine.copernicus.eu
mercator-ocean.eu

RECORD TABLE

Issue	Date	§	Description of Change	Author	Validated By
1.0	2011/10/30	All	Creation of the document	S Pouliquen and In Situ TAC Partners	
1.1	2012/10/30	9	Merging NRT products	S Pouliquen	
1.2	2013/02/07		Adding History Directory	S Pouliquen	
1.3	2015/05/01	All	Change format to fit Copernicus Marine Service graphical rules		
1.4	Dec 2015	All	Update from MyOcean to Copernicus Marine Service	S Pouliquen	
1.5	January 2016		Updates from SRC	Thierry Carval	
1.6	May 27 2016	All	All Typos corrections after C. Derval comments. IV.1 Add temporal coverage	L.Petit de la Villéon	
1.6.1	May 31 2016	5.1	The monthly directory contains 5 years of data	L.Petit de la Villéon	
1.7	Jan 18 2017	1	Add wave parameters in description	L.Petit de la Villéon	

1.71	23/01/2019	5.2	New chapter for file types (was in §5.1) Add file types for HF radars	S. Tarot	
1.71	23/01/2019	5.3	Add data types for HF radars	S. Tarot	
1.71	23/01/2019	6.2.4	Add data types for HF radars	S. Tarot	
1.8	09/04/2019	-	General revision for NetCDF4 transition	T. Carval	
1.9	29/11/2019	All	March 2020 Release - Remove regional TS REP products - Add data type for wave spectra, saildrone and vessel ADCP - Wave REP was missing in §4	S. Tarot	
1.10	01/09/2020		Use the new PUM manual template Include changes from the new version of SRD http://dx.doi.org/10.13155/40846	F. Manzano, T. Carval	
1.10	01/09/2020		Add CARBON-NRT product	R. Castano Primo	
1.11	08/01/2021		Add information about EMODnet chemistry integration	T. Carval, D. Leroy, V. Racapé	

1.12	19/04/2021		Update flag 6 from “not used” to “value below detection” (EMODnet chemistry) Add "MBT profiles" to XB data type Add CO and TX data types	L. Drouineau	
1.13	06/09/2021		Remove reference to Carbon	L. Drouineau	
1.14	16/06/2022	All	Use new template Use new product name	In Situ TAC Partners	
2.0	15/11/2022	All	Reorganisation of content Included relevant information for users extracted from previous System Requirements Document Reference tables moved to reference document RD[1] Copernicus Marine In Situ NetCDF Format Manual	F. Manzano, I. Pérez and In Situ TAC Partners	S. Tarot
2.1	30/01/2024		Remove reference directory	L. Drouineau	S. Tarot
2.2	30/05/2024		Update index format Update file access	L. Drouineau	S. Tarot

Table of Contents

RECORD TABLE

GLOSSARY AND ABBREVIATIONS

API	Application Programming Interface
ARCO	Analysis-Ready Cloud Optimized
Arctic ROOS	Arctic Regional Operational Oceanographic System
Argo, Euro-Argo	International profiling float network (www.argo.net) and its European component (http://www.euro-argo.eu)
Black Sea GOOS	Black Sea Global Ocean Observing System
BGC	Biogeochemical
BOOS	Baltic Operational Oceanographic System
CCHDO	CLIVAR and Carbon Hydrographic Data Office
CF	Climate and Forecast convention for NetCDF formats
CIS	Copernicus Marine Service Central Information System
CMT	Copernicus Marine Toolbox
DBCP, ESURFMAR	Data Buoy Collaboration Panel (https://www.ocean-ops.org/dbcp/) and its European component (http://www.eumetnet.eu/e-surfmar)
EC	European Commission
EGO, GROOM	International Glider network (http://www.ego-network.org) and its European coordination (http://www.groom-fp7.eu)

EMODnet	European Marine Observation and Data Network – EMODnet (http://www.emodnet.eu/) and the Physical component http://www.emodnet-physics.eu/Portal as well as the biogeochemical component (https://www.emodnet-chemistry.eu/)
ERDDAP	Environmental Research Division's Data Access Program
EuroGOOS, ROOS	The European Global Ocean Observing System (https://eurogoos.eu/) and its Regional Operational Oceanographic System
GDAC	Global Data Assembly Centre
GOSUD	International Global Ocean Surface Underway Data (https://www.gosud.org/)
GTSPP	Global Temperature and Salinity Profile Program
IBI-ROOS	Iberia-Biscay-Ireland Regional Operational Oceanographic System
ICES	International Council for the Exploration of the Sea (https://www.ices.dk/)
IMOS	Integrated Marine Observing System https://imos.org.au/
JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology
KPI	Key Performance Indicator
MERSEA	Marine Environment and Security for the European Area
MFSTEP	Mediterranean Forecasting System Towards Environmental Predictions
MonGOOS	Mediterranean Operational Network for the Global Ocean Observing System
NCEI	National Centers for Environmental Information
NDBC	National Data Buoy Centre https://www.ndbc.noaa.gov/

NetCDF	Network Common Data Form
NODC	National Oceanographic Data Centre
NOOS	North West European Shelf Operational Oceanographic System
NRT	Near Real Time
MDL	Marine Data Lake
MDS	Marine Data Store
MFC	Monitoring and Forecasting Centre
MY	Multi-Year
MYNRT	Multi-Year + Near Real Time
OceanSITES, EMSO	OceanSITES is a worldwide system of long-term, open-ocean reference stations (http://www.oceansites.org/) and its European component (https://emso.eu/)
OGC	Open Geospatial Consortium
SeaDataNet	European Network of National Oceanographic Data Centres (NODCs) (https://www.seadatanet.org/)
SEPRISE	Sustained, Efficient Production of Required Information and Services within Europe
SP	Synthetic Profile
TAC	Thematic Assembly Centre

WOD	World Ocean Database https://www.ncei.noaa.gov/products/world-ocean-database

DATA ACCESS

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.

In Situ TAC Dashboard

The In Situ TAC Dashboard is a tool that provides an user-friendly interface for users to discover, subset, share and download files containing in-situ observations from In Situ TAC multiparameter NRT products. Files can be interactively selected via the In Situ TAC Dashboard viewer interface, available at: https://marineinsitu.eu/dashboard/.

Nevertheless it is better encouraged to use the CMT (Copernicus Marine Toolbox) services when possible. To know more about the CMT, please follow this link:

https://help.marine.copernicus.eu/en/articles/7949409-copernicus-marine-toolbox-introduction

I INTRODUCTION

I.1 Summary

The Copernicus Marine Service In Situ Thematic Assembly Centre (In Situ TAC) is a distributed system built on the existing activities and services developed previously within the EC supported projects (MERSEA, MyOcean, MFSTEP, FerryBox, SEPRISE…) and EuroGOOS Regional alliances (ROOSes). It provides a research and operational framework to deliver in situ observations and develop derived products based on such observations, to address progressively global but also regional needs either for monitoring, modelling, or downstream service development.

The In Situ TAC provides the interface between centres, distributing in situ measurements from national and international observing systems. The MERSEA project established the global component of the In Situ TAC for the physical parameters needed by the Monitoring and Forecasting Centres (MFC) that use the data for assimilation and validation of the forecasting systems. These efforts resulted in a strong enhancement of the French Coriolis data centre. The goal within Copernicus Marine Service is to consolidate and integrate the regional components, based on expertise developed within the ROOSes, and to initiate the setup of the biogeochemical part of the In Situ TAC. In addition, considerable benefits to the Global Monitoring for Environment and Security (COPERNICUS) In Situ users will be gained in terms of In Situ product choice, service, timeliness, quality, robustness, and accuracy. As an operational infrastructure, the In Situ TAC sets the necessary production capacities and quality control procedures to answer Europe's request for service level agreements with the external users as defined in Copernicus Marine Service.

The first In Situ TAC, version 0, was a heritage of all the work performed in previous projects. The operational products proposed for that initial version were near real time and re-processed data for the global ocean via the Coriolis data centre. Next version 1 complemented these products by delivering suitable products for all European regions, introducing new lines of products (real time, biogeochemistry) and applying improved validation procedures for both products and services. The current In Situ TAC, version 2, will additionally deliver, in collaboration with SeaDataNet, Temperature and Salinity re-analysed datasets for the global ocean and regional seas that can feed reanalysis activities performed by the Copernicus Marine Service MFCs and external users.

There are two main production streams in the In Situ TAC:

- The near real time stream delivers the 7 regional Multi-Year Near Real Time products (MYNRT). MYNRT products are constantly updated with real time and historical data from the data providers. They also feed on the validation activities carried out in the delayed mode stream.
- The delayed mode stream delivers the Multi-Year reprocessed products (MY) and feeds on the data available in the MYNRT products. The MY products are organised in parametric families. MY products span the global oceans.

In Situ TAC products provide observed and validated data for the below parametric families:

	MYNRT	MY
Temperature and salinity	x	x
Currents	x	x
Sea level	x	x
Biogeochemical	x	x
Waves	x	x
Carbon		x

Table 1 Parametric families of distributed and validated observations

This document describes the 7 regional MYNRT in situ not-gridded data products from the In Situ TAC, the data services that are available to access them, and how to use the files and services. Specifically, it:

- Describes the distributed architecture of the In Situ TAC.
- Describes the generic functions implemented by each In Situ TAC component: data collation, quality control, validation and distribution on the In Situ TAC portal and Copernicus Marine, monitoring of the In Situ TAC production.

- Describes the organization of product data accessible through the Marine Data Store (MDS).
- Provides references to the documents describing the product format and the agreed quality control procedures

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

I.2 History of changes

Date	Description of changes and impacted product
2019/07/15	Transition from netcdf3 to netcdf4
2022/11/29	New names for all the products
2023/11/15	Use DSG (Discrete Sampling Geometries) from CF convention
2024/04/04	Use MDS (Marine Data Store) and CMT to download files

II DESCRIPTION OF THE PRODUCT SPECIFICATION

II.1 General Information

Product Lines	INSITU_GLO_PHYBGCWAV_DISCRETE_MYNRT_013_030 INSITU_ARC_PHYBGCWAV_DISCRETE_MYNRT_013_031 INSITU_BAL_PHYBGCWAV_DISCRETE_MYNRT_013_032 INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033 INSITU_BLK_PHYBGCWAV_DISCRETE_MYNRT_013_034 INSITU_MED_PHYBGCWAV_DISCRETE_MYNRT_013_035 INSITU_NWS_PHYBGCWAV_DISCRETE_MYNRT_013_036
Geographical coverage	See: RD [4] Copernicus in situ TAC - CMEMS regions definition
Variables	See: RD [2] Copernicus Marine in situ TAC - Physical Parameters List
Product Type	In Situ observation
Available time series	1990-present *
Temporal resolution	N/A
Target delivery time	From hourly to daily
Delivery mechanism	Copernicus Marine Service Information Service
Horizontal resolution	N/A
Number of vertical levels	N/A
Format	NetCDF 4.0

Table 2 In Situ TAC Multi Year – Near Real Time products

** Data from before 1990 are available, although they are rather scarce:*

- *INSITU_GLO_PHYBGCWAV_DISCRETE_MYNRT_013_030: 1846-present*
- *INSITU_ARC_PHYBGCWAV_DISCRETE_MYNRT_013_031: 1899-present*
- *INSITU_BAL_PHYBGCWAV_DISCRETE_MYNRT_013_032: 1860-present*
- *INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033: 1846-present*
- *INSITU_BLK_PHYBGCWAV_DISCRETE_MYNRT_013_034: 1884-present*

- *INSITU_MED_PHYBGCWAV_DISCRETE_MYNRT_013_035: 1892-present*
- *INSITU_NWS_PHYBGCWAV_DISCRETE_MYNRT_013_036: 1860-present*

II.2 Details of datasets

INSITU_GLO_PHYBGCWAV_DISCRETE_MYNRT_013_030 **INSITU_ARC_PHYBGCWAV_DISCRETE_MYNRT_013_031** **INSITU_BAL_PHYBGCWAV_DISCRETE_MYNRT_013_032** **INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033** **INSITU_BLK_PHYBGCWAV_DISCRETE_MYNRT_013_034** **INSITU_MED_PHYBGCWAV_DISCRETE_MYNRT_013_035** **INSITU_NWS_PHYBGCWAV_DISCRETE_MYNRT_013_036**
Dataset: cmems_obs-ins_glo_phybgcwav_mynrt_na_irr cmems_obs-ins_arc_phybgcwav_mynrt_na_irr cmems_obs-ins_bal_phybgcwav_mynrt_na_irr cmems_obs-ins_nws_phybgcwav_mynrt_na_irr cmems_obs-ins_ibi_phybgcwav_mynrt_na_irr cmems_obs-ins_med_phybgcwav_mynrt_na_irr cmems_obs-ins_blk_phybgcwav_mynrt_na_irr
Variables name in the NetCDF file and Unit: Long_name & Standard_name
See: RD [2] Copernicus Marine in situ TAC - Physical Parameters List

Table 3 list of the datasets and variable names and unit for the INSITU_{region}_PHYBGCWAV_DISCRETE_MYNRT_013_030-036 product

II.3 Production System Description

II.3.1 Regions, partners, and responsibilities

For efficiency reasons the In Situ TAC is a distributed centre organised around 7 oceanographic regions: the global ocean and the 6 EuroGOOS regional alliances (see Figure 1). It involves many partners from different countries in Europe that can be consulted at https://marineinsitu.eu/partners/ . It does not deploy any observing system and relies on data exclusively funded by other sources than Copernicus Marine Service.

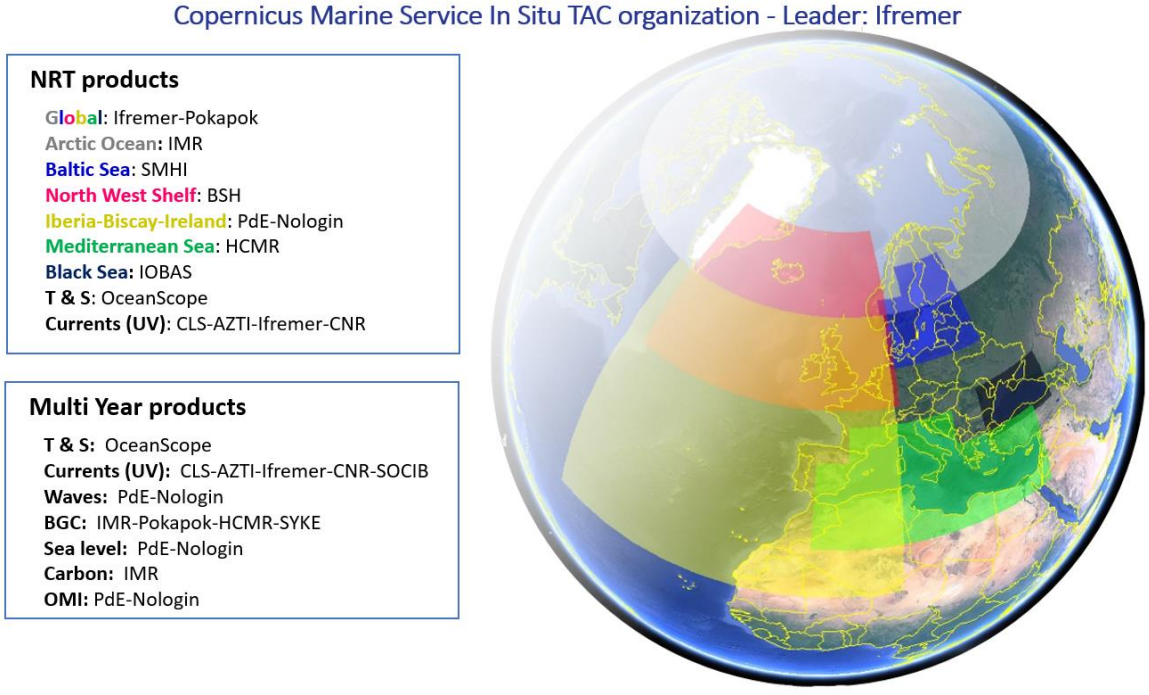

Figure 1 The In Situ TAC organization

Each of the 7 regional MYNRT products contains data from observing systems deployed at or passing through the corresponding **In Situ TAC region**. The spatial domain of the In Situ TAC regions is represented Figure 1. There is an area overlap between the regions to provide for continuity at the boundaries: data files from the same observing system can be expected in more than one regional product in the overlapping areas. The Global region includes all the data files from the 6 European regions, plus those of the global oceans.

In Situ TAC regions' boundaries are given in Table 4, which has been extracted from RD [4] Copernicus in situ TAC - CMEMS regions definition.

In Situ TAC region	East	West	North	South
Arctic	180	-180	90	60
Baltic (1)	15	8	62	53
Baltic (2)	31	15	66	53
Black sea	42	26	47.5	40
Global	180	-180	90	-90
IBI - Iberia Biscay Ireland	5	-40	60	20
Mediterranean (1)	37	-5.61	41	28
Mediterranean (2)	20	0	45.8	41
North West Shelf	13	-45	71.5	48

Table 4 Regions' boundaries

II.3.2 Production Unit (PU)

There are 7 regional Production Units (PU) responsible for each of the 7 regional MYNRT products. PUs assemble data provided by national or international data centres into an integrated dataset. As detailed further in II.3.4 Data flow a Production Unit collates data, controls it according to In Situ TAC agreed rules and validates the dataset consistency in its area of responsibility. Each PU then pushes its dataset on the Copernicus Marine Service II.3.3 Marine Data Store (MDS), from where they are finally available to users.

The regional Global PU is a backup for the other regional PUs and also assembles data from the international networks (JCOMM) observation for the global ocean.

II.3.3 Marine Data Store (MDS)

The Marine Data Store is unique and global. It is the user interface as PUs do not directly serve end users. All In Situ TAC products are available in the MDS in both native format, that is the

original files as generated by the PU (NetCDF) and ARCO format. The Copernicus Marine Toolbox (CMT) is the official tool to download data, and can be used from CLI (Command Line Interface) or API (integrated as a Python library).More information about product distribution in II.6 Data distribution.

II.3.4 Data flow

The In Situ TAC is a decentralised architecture. However, the quality of the product delivered must be equivalent wherever the data are processed. Therefore, the different functions involved in the data flow are implemented in a common manner among the global and regional PUs of the In Situ TAC. The functions performed along the operative chain are summarised in Figure 2:

- **Acquire data:** gather data available on international networks or through collaboration with regional and national partners.
- **Quality control:** apply automatic quality controls that have been agreed at the In Situ TAC level. These procedures are defined by parameter, elaborated in coherence with international agreements, in particular SeaDataNet, and documented in Copernicus In Situ Catalogue.
- **Validation/Assessment:** assess periodically the consistency of the data over a period and area to detect data that are not coherent with their neighbours but could not be detected by automatic QC.
- **Data Harmonization:** harmonise the collected data and metadata to follow specific naming conventions and metadata standards and format them into platform oriented NetCDF files as described in RD [1] Copernicus Marine In Situ NetCDF Format Manual.
- **Product aggregation:** aggregate NetCDF files from all the platforms in the PU's region of responsibility into the final regional product. This includes synchronising files generated at other PUs that fall in the region managed by the PU.
- **Distribution:** make the data available within Copernicus In Situ and to the external users by way of Copernicus Marine Data Store.

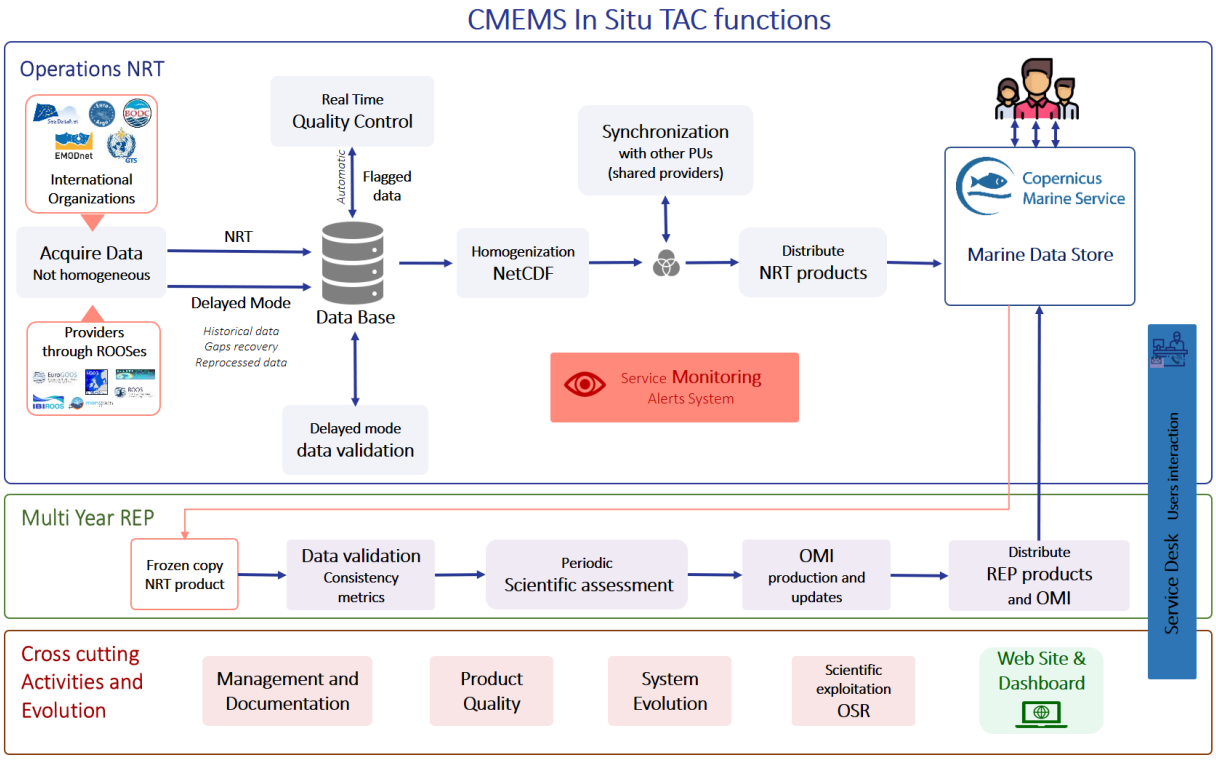

Figure 2 Functions implemented by an In Situ TAC component

In any case, the Global component of the In Situ TAC collects the data from the regional components and integrates them into the global product acting as a backup of the regional centres. The Global PU applies quality control for all the data that are handled directly by the Global (as a regional PU) and are then synchronised into any other concerned regional products. The data that are initially distributed by a regional PU and then synchronised into the Global, are not processed with any further quality control apart from the one that has already been applied by the responsible regional PU.

II.3.5 Data sources

The In Situ TAC is a distributed system built on the existing activities and services developed previously within the EC supported MyOcean FP7 project and EuroGOOS Regional alliances (ROOSes). The In Situ TAC provides the interface between centres, distributing In Situ measurements from national and international observing systems.

As shown in Figure 3, In Situ TAC is integrated into a larger framework at European and International levels and developed requirements to support efficient interoperability with:

- JCOMM networks (Argo, OceanSITES, GOSUD, GTSPP, DBCP, EGO) and EuroGOOS ROOSes who operate the respective networks and provide access to the observations to be distributed in Copernicus Marine Environment Monitoring Services
- Thematic centres which aggregate In Situ observation data for specific purposes. The main one for Copernicus In Situ TAC is SeaDataNet who integrates the networks of NODCs that manage historical scientific European data
- The European Marine Observation and Data Network (EMODnet), which is a network of organisations supported by the EU's integrated maritime policy.

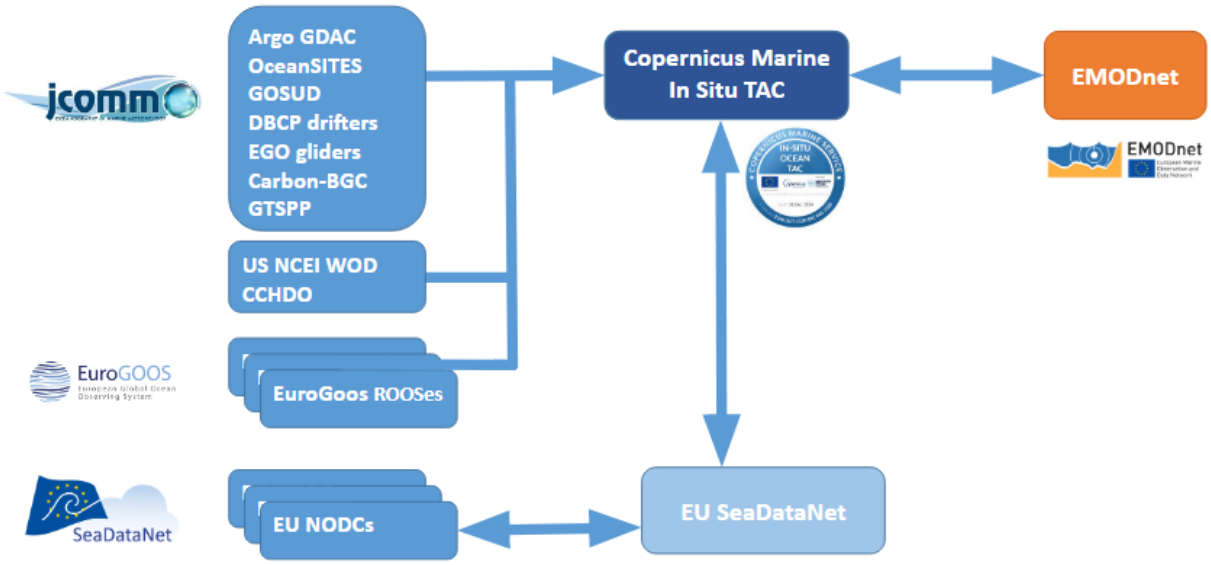

Figure 3 Global networks data flow

The table below lists the major data sources together with its DOIs (Digital Object Identifiers) or web references:

Argo GDAC	http://doi.org/10.17882/42182
DBCP	https://doi.org/10.17882/57247
EMODnet chemistry	https://www.emodnet-chemistry.eu/
GOSUD	https://doi.org/10.17882/47403

GTSPP	https://www.ncei.noaa.gov/products/global-temperature-and-salinity-profile-programme
ICES	https://www.ices.dk
IMOS	https://imos.org.au/
NDBC	https://www.ndbc.noaa.gov/
Fisheries and Ocean Canada	https://www.dfo-mpo.gc.ca/
OceanGliders	https://doi.org/10.17882/56509
Pangaea	https://www.pangaea.de/
SeaDataNet	https://www.seadatanet.org/
WOD	https://www.ncei.noaa.gov/products/world-ocean-database

Table 5 DOIs (Digital Object Identifiers) of the major data sources

One advantage to set up a connection to these data aggregators is also that this service built within Copernicus can be easily extended to integrate other types of data for the needs of the ROOSes. The In Situ TAC has been developed in partnership with EuroGOOS ROOSes and additional parameters (outside the parametric families listed in Table 1 of the summary section) have been included in the MYNRT products to fulfil the need of the EuroGOOS ROOSes. In that case the In Situ TAC has only implemented the “Acquire” and “Distribute” functions and does not perform any additional quality checks. Therefore, there are presently additional parameters included in the MYNRT regional products aggregated of a best effort mode from the ROOS partners with no commitment on the data provision and quality. This had been a way to start a winner-winner relation with the regional data providers from ROOSes. The full list of distributed parameters is available in RD [2] Copernicus Marine in situ TAC - Physical Parameters List, which is updated when additional parameters are considered and well defined.

II.4 Processing information

II.4.1 Update Time

In Situ TAC MYNRT products are internally organised in directories spanning different time periods (see II.6.1 Data organisation). Each directory has its own production schedule:

- The “latest” directory is updated at least twice a day, usually hourly.
- The “monthly” directory is updated at least once a month.
- The “history” directory is updated at least quarterly, usually monthly.

II.4.2 Time averaging

Not applicable

II.5 Data files

II.5.1 File format

The file format is described in section Erreur ! Source du renvoi introuvable. Erreur ! Source du renvoi introuvable.

II.5.2 Metadata

Platform and variable metadata are contained in the global and variable attributes of the files. The full list is available in RD [3] Copernicus Marine in situ TAC - Attributes list. This section gives further details on some of the metadata provided.

II.5.2.1 Platform identification

II.5.2.1.1 Convention

Each platform within Copernicus In Situ TAC has a unique code. This code is mandatory; it appears in the **platform_code** global attribute of the NetCDF data files.

The characters underscore (“_”) and blank (“ “) are not allowed within a platform code.

II.5.2.1.2 Platform identifiers

An individual platform can have different identification codes. The NetCDF global attributes provide this information.

Global attribute **platform_code**: It is unique within all Copernicus Distribution Units. This attribute is used in the naming of the platform and the respective files naming. When available, the platform code should be the global attribute wmo_platform_code.

Global attribute **platform_name**: The human readable name of the platform. This attribute may have an empty fill value.

Global attribute **wmo_platform_code**: This is the identifier for the platform given by WMO (from World Meteorological Organisation). More information in RD [3] Copernicus Marine in situ TAC - Attributes list.

Global attribute **ices_platform_code:** It contains the platform code assigned by ICES (International Council for the Exploration of the Sea). More information in RD [3] Copernicus Marine in situ TAC - Attributes list.

II.5.2.2 Institution code

The global attribute institution_edmo_code is strongly recommended because no edmo_code implies the provider is an unknown provider and, consequently, it is not considered in numbers and KPIs computation. In addition, it must be valid.
Label used in the global attributes are extracted from https://edmo.seadatanet.org/. More details for institution_* attributes can be found in RD [3] Copernicus Marine in situ TAC - Attributes list

II.5.2.3 Geographic and temporal bounding box

II.5.2.3.1 Metadata geographic bounding box

The geospatial_lat_min, geospatial_lat_max, geospatial_lon_min, geospatial_lon_max attributes only consider values with valid position. Otherwise, it is not useful for spatial filtering.

II.5.2.3.2 Metadata temporal bounding box (last observation)

The last_latitude_observation / last_longitude_observation / last_date_observation global attributes:

- These attributes are associated with the last observation with valid date and position.
- last_latitude_observation / last_longitude_observation must remain empty for HF radars as their data is a grid. The value for last_date_observation will be taken from time_coverage_end.

II.5.2.4 Data mode

This chapter explains how to discriminate real-time and delayed-mode data in a Copernicus In Situ file. Data mode is given in attributes and/or ancillary data variables using the codes available at RD [1] Copernicus Marine In Situ NetCDF Format Manual - Reference table 5: data mode.

II.5.2.4.1 File level: global attribute 'data_mode'

The global attribute 'data_mode' is used to discriminate files containing real-time data, delayed-mode data or both. **It refers to the whole file**.

This global attribute is mandatory.

II.5.2.4.2 Variable level: variable attribute 'data_mode'

This variable attribute indicates that the variable contains real-time data, delayed-mode data or both. It refers to the whole variable.

This variable attribute is mandatory.

II.5.2.4.3 Value level: <PARAM>_DM variable

The variable <PARAM>_DM is used to discriminate between real-time and delayed-mode data within a variable. **It refers to each individual measure in a parameter variable**.

This variable is only delivered if there is a mixture of data modes in the variable.

The dimensions of <PARAM>_DM are the same as for the related <PARAM>.

II.5.3 Management of vertical axis

There is a unique vertical axis within each file, either DEPH (ex. drifting buoys), or PRES (ex: floats). The vertical axis variable has the attribute axis="Z" and positive="down".

DEPH provides the distance from sea level in metres either provided by sensors or as nominal values, while PRES contains values measured by a sensor in dBar, both corresponding to the levels where measurements were recorded by the platform.

Vertical axis is provided as follows:

- **Time series data**

  Only DEPH can be used as the vertical axis. DEPH will contain a list of all possible levels (nominal or not) where the sensors are recording within the file. DEPTH dimension is equal to the maximum number of levels (total). The PRES variable if present is just another variable providing measurements wherever a sensor is recording pressure to the respective DEPH level. DEPH is strictly monotonic.

- **Profiles data**

  PRES or DEPH can be used as the vertical axis (one or the other, but not neither nor both). The vertical axis contains at each time step the list of the levels, which provide measurements at the specific time step. This list may vary for each time step. Due to this variation, the maximum length of a profile is used as DEPTH dimension. Thus, the

vertical axis variable may contain fill values at the end of each profile. If PRES is the vertical axis, DEPH may be available too as any other variable and vice versa. The vertical axis variable should not contain empty profiles - thus fill values only. The vertical axis is strictly monotonic.

When no direct pressure or depth observation is performed, the depth estimation can be a nominal value or a convention. The estimated depth is stored in the DEPH variable, its associated QC flag is set to 7 (nominal value).

Examples of estimated depths:

- The depth of a thermosalinograph fitted at 5 metres deep on a vessel: DEPH = 5 DEPH_QC=7
- The depth of a thermistor fitted at 50 metres deep on a mooring cable: DEPH=50 DEPH_QC=7
- The depth of a sea level station set to 0 metre deep by convention: DEPH = 0 DEPH_QC=7

Note: When an atmospheric sensor elevation (altitude) is not known, the rule is to report DEPH with _FillValue and QC 9.

II.5.4 Synthetic profiles for profiling floats (PF)

To solve the issue of TIME duplicate for a same profiling float due to observations from multiple sensors, a unique synthetic profile (SP) is now introduced to contain all the information with the addition of the variable PRES_CORE(TIME,DEPTH) to identify the core levels with a value of 1, and a value of 0 at the levels of secondary T&S profiles or at the BGC interpolated levels.

Example of duplicates in TIME:

```
6901472, Cycle 1 Asc : 6 profiles on 24/10/2012 at 14:45:00
   1.  PRES, TEMP, PSAL (+ADJUSTEDs)
   2.  PRES, TEMP, PSAL near surface
   3.  PRES, DOXY (+ADJUSTEDs)
   4.  PRES, PAR, IRRADIANCE380/412/490 (+ADJUSTEDs)
   5.  PRES, CHLA, CDOM, BBP700 (+ADJUSTEDs)
   6.  PRES, NTAW (+ADJUSTEDs)
```

The processing of synthetic profiles is based on the ARGO community (Bittig Henry, Wong Annie, Plant Josh (2022) BGC-Argo synthetic profile file processing and format on Coriolis GDAC. https://doi.org/10.13155/55637).

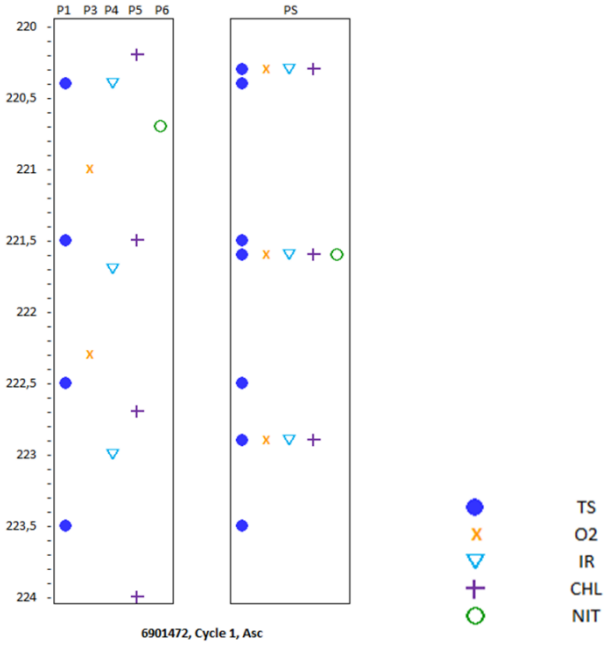

Figure 4 Example of synthetic profile (SP)

To retrieve the Core profile from the SP profile, just extract the data at depth where the new parameter: PRES_CORE(TIME,DEPTH)=1.

Several cases can occur:

- When there's only a Core Profile all the PRES_CORE values of the PS profile will be at 1.
- When there is a Core Profile and secondary T&S profile, the PRES_CORE = 1 at the core levels and PRES_CORE = 0 at the secondary levels.
- When there is a Core profile and BGC profile, the PS profile will be the ARGO synthetic profile (with interpolated level for BGC) and PRES_CORE = 1 will identify the level of the Core profile.
- Without a Core profile : PRES_CORE = 0

II.5.5 File size

Copernicus In Situ TAC files have a nominal maximum size of 4GB.

II.6 Data distribution

As summarised in Figure 4, product distribution is based on the 7 regional Production Units (PUs) portals that provide data to the Copernicus Marine Data Store (MDS), according to the production schedule specified in Processing information.

The MDS provides access to the real-time and historical data collected and validated for the specific regions. The MYNRT products contain the **best available version of the data at that time** in terms of quality and time coverage. The MY products include only data that has undergone a further level of scientific validation by the In Situ TAC thematic MY teams. Data distributed in the 7 regional In Situ TAC products share:

- Same format: NetCDF CF Copernicus implementation format has been chosen because it is CF compliant, it relies on SeaDataNet vocabularies, it is able to handle profiles and time series data coming from floats, drifters, moorings, gliders, vessels... See **Erreur ! Source du renvoi introuvable.**
- Same organisation (folder structure): See II.6.1 Data organisation.

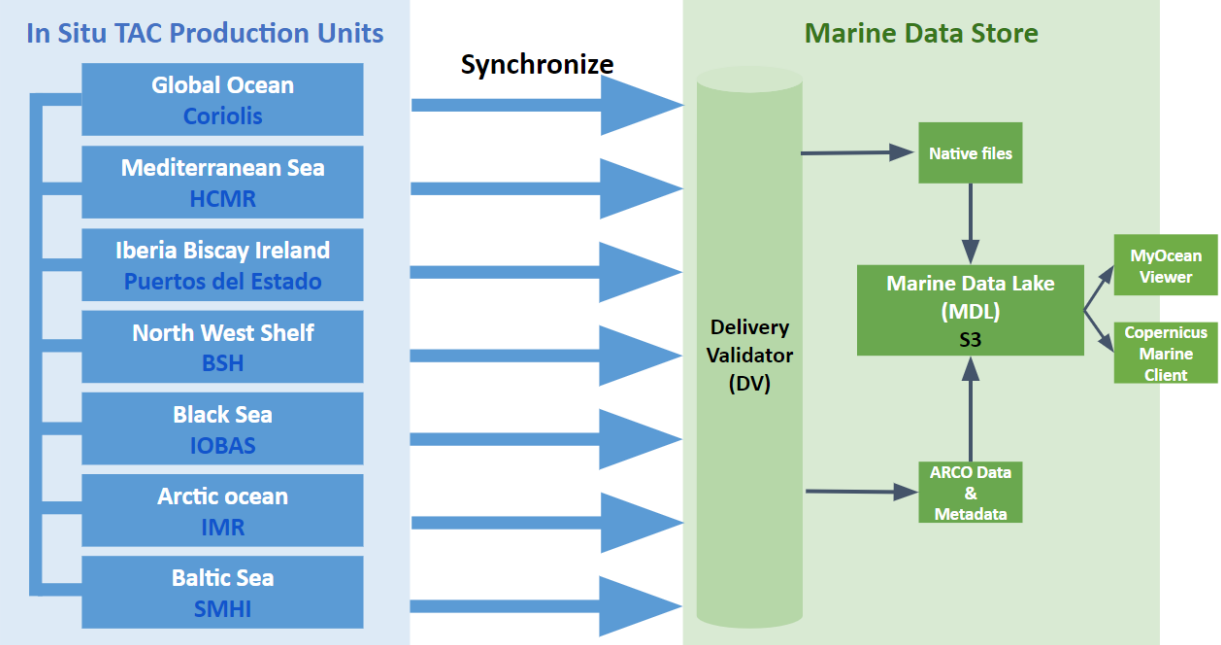

Figure 4 PUs synchronisation and Marine Data Store scheme

The In Situ TAC also provides additional tools for data discovery, visualisation and monitoring:

- In Situ TAC Dashboard: adhoc In Situ TAC viewer See **Erreur ! Source du renvoi introuvable.** **Erreur ! Source du renvoi introuvable.**
- Monitoring / Key Performance Indicators (KPIs): quantifiable performance indicators used to define success factors and measure progress toward the achievement of the defined goals. Some metrics provided are the number of platforms, data delay of distribution, number of providers… https://marineinsitu.eu/monitoring/ More information in https://docs.google.com/document/d/1CNS578LnNTR0ZYj3_QMizkk_xve7Uz98/edit#heading=h.2nusc19 VI.1 Production Units monitoring.

II.6.1 Data organisation

Every regional MYNRT product has a dedicated product in the Marine Data Store.

As shown in the Figure 5, the product directory has a unique dataset directory with the following contents:

- 3 data directories (called “parts” in the Marine Data Store): latest, monthly, history
- 3 index files describe the files of the 3 directories + 1 index file for platforms.

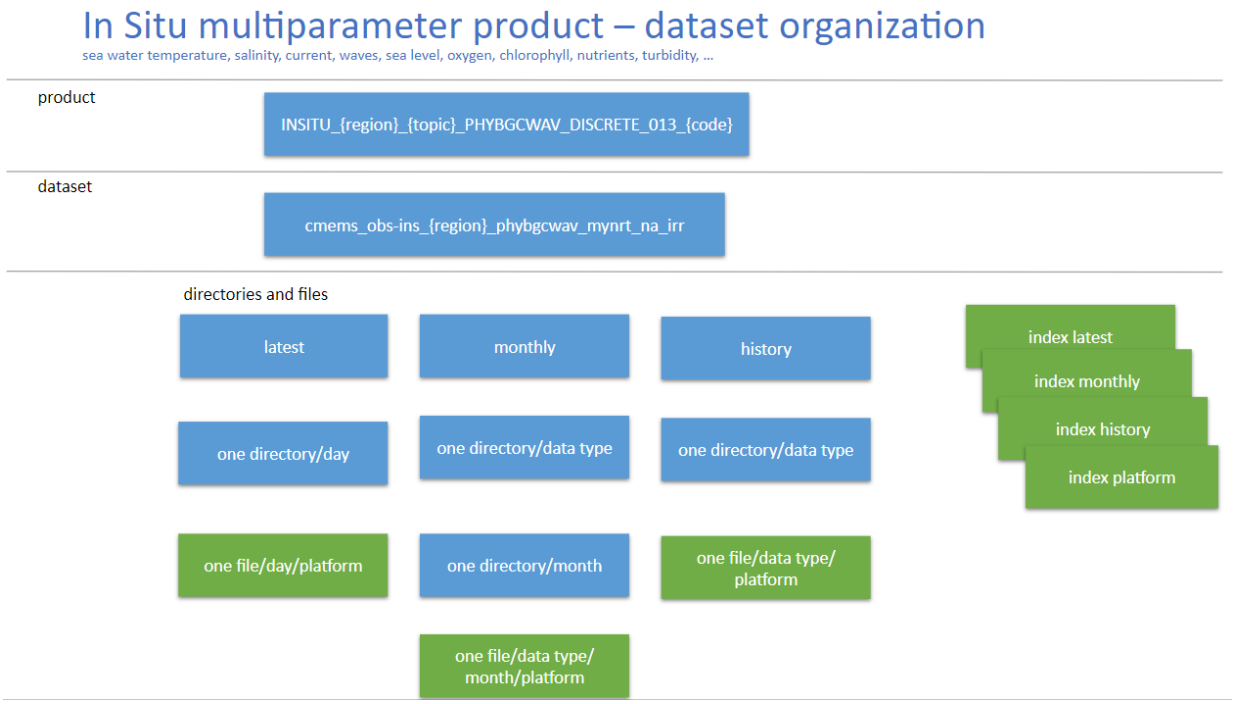

Figure 5 MYNRT regional product organisation

II.6.1.1 Latest directory

Daily files per platform containing the 31 previous days including the current day of data (organised per day of observation).

One directory per day (named YYYYMMDD)

II.6.1.2 Monthly directory

This directory contains monthly files per platform. It contains data (organised per month of observations) from the whole five previous years plus the current year (current month excluded).

The data of the current month are available in the latest directory and the older data are available in the history directory.

One directory per data type (RD [1] Copernicus Marine In Situ NetCDF Format Manual - Reference table 4: data type bigrams) and month (named YYYYMM).

II.6.1.3 History directory

One file per platform containing its complete series of observations up to the end of the past month.

When observations are delivered in the history directory, they may remain in the monthly directory; however, a user is advised to use the history directory.

One directory per data type (RD [1] Copernicus Marine In Situ NetCDF Format Manual - Reference table 4: data type bigrams).

II.6.2 Index files

It is important to help users find the platforms and the files that provide such observations in the dataset. A data discovery mechanism is provided by means of index files, which are located at the top level of the dataset directory and provide information on each platform and file located on the server.

These index files allow users to know what is in the files without having to download them. They contain a list of all available data files by providing the relative path to the file (such path can be directly used by Copernicus Marine Toolbox), together with a selection of relevant metadata (temporal and spatial ranges, parameters…) that describes the data file contents.

Three index files describe the content of latest, monthly and history directories: index_latest.txt, index_monthly.txt and index_history.txt.

In addition, another index file (index_platform.txt) is provided. It registers the list of all the individual platforms that are available in the product directory and is updated daily.

These index files are also useful for automatic data download by operational users.

II.6.2.1 Index files update and consistency

There is consistency between the index files and the file system. When a file must be deleted, its reference is removed from the index before the file deletion. When a file is added or updated, it is indexed after its addition or update.

II.6.2.2 Index of latest/monthly/history directories

The index files are updated to describe all the files available in the latest, the monthly and the history directories.

Each index file contains one line per data file, with the following fields:

- product_id
  COP-XX-YY (e.g., COP-NO-01)

    - COP: Copernicus trigram
    - XX: production unit bigram (RD [1] Copernicus Marine In Situ NetCDF Format Manual - Reference table 2: production unit bigrams)
    - YY: product version
- file_name
- geospatial_lat_min
- geospatial_lat_max
- geospatial_lon_min
- geospatial_lon_max
- time_coverage_start
- time_coverage_end
- institution (separator: semicolon)
- date_update
- data_mode
- parameters (separator: blank)

The information in both index files and NetCDF files must be the same when the index element is a global attribute in the NetCDF file. These fields in the index file are directly extracted from the NetCDF files, not calculated upon index generation.

The **fields are sorted** in the order mentioned in this definition.

The **index files are named** according to the directory they describe.

- index_latest.txt
- index_monthly.txt
- index_history.txt

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

The **field separator** character is "," (comma).
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). Commas are not allowed in the values of these fields and therefore they are replaced with hyphens (-).

The **parameters** field contains the physical parameters as listed in the RD [2] Copernicus Marine in situ TAC - Physical Parameters List and candidate parameters (not yet approved in the official list). Coordinates, pseudo-coordinates, metadata and ancillary variables are ignored. The following variables are thus ignored: TIME, LATITUDE, LONGITUDE, <PARAM>_QC, POSITION_QC, <PARAM>_ADJUSTED_QC, <PARAM>_ADJUSTED_ERROR, <PARAM>_DM,

<PARAM>_UNCERTAINTY, DC_REFERENCE, DIRECTION, POSITIONING_SYSTEM, VERTICAL_SAMPLING_SCHEME.

ISO8601 format is used in date-time fields: 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 : 3.0

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

Copernicus In Situ data file index example
Title : in-situ files catalog # Description : catalog of available in-situ files compliant with Marine Data Store # Project : Copernicus Marine In Situ TAC # Format version : 3.0 # 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 INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033/cmems_obs-ins_ibi_phybgcwav_mynrt_na_irr_202311/latest/20200408/IR_TS_MO_1300131_20200408.nc,27.9951,27.9995,-16.6089,-16.6052,2020-04-08T00:00:00Z,2020-04-08T23:00:00Z,Puertos del Estado (Spain),2020-04-10T23:24:37Z,R,DEPH VHM0 VZMX VTPK VTM02 VMDR VPED ATMS DRYT WSPD WDIR HCSP HCDT TEMP PSAL CNDC COP-IR-01,INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033/cmems_obs-ins_ibi_phybgcwav_mynrt_na_irr_202311/latest/20200409/IR_TS_MO_1300131_20200409.nc,27.9937,28.001,-16.6107,-16.6052,2020-04-09T00:00:00Z,2020-04-09T23:00:00Z,Puertos del Estado (Spain),2020-04-11T23:25:53Z,R,DEPH VHM0 VZMX VTPK VTM02 VMDR VPED ATMS DRYT WSPD WDIR HCSP HCDT TEMP PSAL CNDC

COP-IR-01,INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033/cmems_obs-ins_ibi_phybgcwav_mynrt_na_irr_202311/latest/20200410/IR_TS_MO_1300131_20200410.nc,27.9937,27.9981,-16.6107,-16.6034,2020-04-10T00:00:00Z,2020-04-10T23:00:00Z,Puertos del Estado (Spain),2020-04-12T23:25:18Z,R,DEPH VHM0 VZMX VTPK VTM02 VMDR VPED ATMS DRYT WSPD WDIR HCSP HCDT TEMP PSAL CNDC
COP-IR-01,INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033/cmems_obs-ins_ibi_phybgcwav_mynrt_na_irr_202311/latest/20200411/IR_TS_MO_1300131_20200411.nc,27.9922,27.9995,-16.6107,-16.6071,2020-04-11T00:00:00Z,2020-04-11T23:00:00Z,Puertos del Estado (Spain),2020-04-13T23:26:11Z,R,DEPH VHM0 VZMX VTPK VTM02 VMDR VPED ATMS DRYT WSPD WDIR HCSP HCDT TEMP PSAL CNDC
COP-IR-01,INSITU_IBI_PHYBGCWAV_DISCRETE_MYNRT_013_033/cmems_obs-ins_ibi_phybgcwav_mynrt_na_irr_202311/latest/20200412/IR_TS_MO_1300131_20200412.nc,27.9937,28.0024,-16.6107,-16.6052,2020-04-12T00:00:00Z,2020-04-12T23:00:00Z,Puertos del Estado (Spain),2020-04-14T23:26:45Z,R,DEPH VHM0 VZMX VTPK VTM02 VMDR VPED ATMS DRYT WSPD WDIR HCSP HCDT TEMP PSAL CNDC

II.6.2.3 Index of platforms

The platforms index file is updated, at least, daily and registers the list of individual platforms that are available on the server.

Each platform index contains a line per platform with the following information:

- platform_code
- date_creation: date of the first file related to the platform appearing in the product
- date_update: the latest update date of any file associated with the platform
- wmo_platform_code: It can be empty.
- data_source: list of different data streams of the platform = all possible combinations of data types, file type and sources (latest, monthly, history) of this platform (see the example of a line content below)
- institution
- institution_edmo_code: list of the different edmo codes of the platform. It can be empty.
- parameters
- last_latitude_observation
- last_longitude_observation
- last_date_observation

The information in both index files and NetCDF files must be the same when the index element is a global attribute in the NetCDF file. It implies that the computation of these global attributes is performed in the generation process of the NetCDF files.

A platform will appear in the platforms index only if there is at least one file in the files' indexes.

It must be cross-checked that platform_code used in files indexes matches one of the platfom_code listed in the index_platform.txt.

The **fields** are provided **in the order** mentioned in this definition.

The **index lines are sorted** by platform_code.

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 separated by blank (example: the list of parameters) or separated by semicolon (if blank is a valid character in the values).

Data streams are identified thanks to the different filenames without date/period value. **Data source** lists the distinct PUs and data types for each individual platform:

- Latest files: RR_XX_YY_CODE_YYYYMMDD
- Monthly files: RR_XX_YY_CODE_YYYYMM
- History files: RR_XX_YY_CODE

See IV.1 Nomenclature of files

The **parameters** field contains the physical parameters as listed in the RD [2] Copernicus Marine in situ TAC - Physical Parameters List and candidate parameters (not yet approved in the official list). Coordinates, pseudo-coordinates and metadata and ancillary variables are ignored. The following variables are thus ignored: TIME, LATITUDE, LONGITUDE, <PARAM>_QC, POSITION_QC, <PARAM>_ADJUSTED_QC, <PARAM>_ADJUSTED_ERROR, <PARAM>_DM, <PARAM>_UNCERTAINTY, DC_REFERENCE, DIRECTION, POSITIONING_SYSTEM, VERTICAL_SAMPLING_SCHEME.

ISO8601 format used in date-time fields: 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 platforms catalog

Description : catalog of available in-situ platforms

Project : Copernicus Marine In Situ TAC

Format version : 2.0

Date of update : 2020-04-20T12:36:44Z

platform_code,date_creation,date_update,wmo_platform_code,data_source,institution, institution_edmo_code,parameters,last_latitude_observation,last_longitude_observation, last_date_observation

Copernicus In Situ data platform index example
Title : in-situ platforms catalog # Description : catalog of available in-situ platforms # Project : Copernicus Marine In Situ TAC # Format version : 2.0 # Date of update : 2020-04-20T12:36:44Z # platform_code,date_creation,date_update,wmo_platform_code,data_source,institution, institution_edmo_code,parameters,last_latitude_observation,last_longitude_observation, last_date_observation 6100196,2020-05-08T13:24:29Z,2020-05-08T13:20:58Z,6100196,IR_TS_MO_6100196_YYYYMMDD IR_TS_MO_6100196_YYYYMM IR_TS_MO_6100196 IR_WS_MO_6100196_YYYYMMDD IR_WS_MO_6100196_YYYYMM IR_WS_MO_6100196,Puertos del Estado (Spain),2751,ATMS DEPH DRYT FREQUENCY FREQUENCY_BOUNDS STHETA1 THETA1 VHM0 VMDR VPED VSPEC1D VTM02 VTPK VZMX WDIR WSPD,41.9111,3.6371,2020-05-08T13:00:00Z 6100198,2020-05-08T13:24:29Z,2020-05-08T13:20:58Z,6100198,IR_TS_MO_6100198_YYYYMMDD IR_TS_MO_6100198_YYYYMM IR_TS_MO_6100198 IR_WS_MO_6100198_YYYYMMDD IR_WS_MO_6100198_YYYYMM IR_WS_MO_6100198,Puertos del Estado (Spain),2751,ATMS CNDC DEPH DRYT FREQUENCY FREQUENCY_BOUNDS HCDT HCSP PSAL STHETA1 TEMP THETA1 VHM0 VMDR VPED VSPEC1D VTM02 VTPK WDIR WSPD,36.57,-2.32,2020-05-08T13:00:00Z 6100280,2020-05-08T13:24:29Z,2020-05-08T13:20:58Z,6100280,IR_TS_MO_6100280_YYYYMMDD IR_TS_MO_6100280_YYYYMM IR_TS_MO_6100280 IR_WS_MO_6100280_YYYYMMDD IR_WS_MO_6100280_YYYYMM IR_WS_MO_6100280,Puertos del Estado (Spain),2751,ATMS CNDC DEPH DRYT FREQUENCY FREQUENCY_BOUNDS HCDT HCSP PSAL STHETA1 TEMP THETA1 VHM0 VMDR VPED VSPEC1D VTM02 VTPK VZMX WDIR,40.68,1.47,2020-05-08T13:00:00Z 6100281,2020-05-08T13:24:29Z,2020-05-08T13:20:58Z,6100281,IR_TS_MO_6100281_YYYYMMDD IR_TS_MO_6100281_YYYYMM IR_TS_MO_6100281 IR_WS_MO_6100281_YYYYMMDD IR_WS_MO_6100281_YYYYMM IR_WS_MO_6100281,Puertos del Estado (Spain),2751,ATMS CNDC DEPH DRYT FREQUENCY FREQUENCY_BOUNDS HCDT HCSP PSAL STHETA1 TEMP THETA1 VHM0 VMDR VPED VSPEC1D VTM02 VTPK WDIR,39.52,0.2,2020-05-08T13:00:00Z 6100284,2020-05-08T13:24:29Z,2020-05-08T10:02:23Z,6100284,GL_TS_MO_6100284_YYYYMMDD GL_TS_MO_6100284_YYYYMM

GL_TS_MO_6100284,IFREMER Institut Francais de Recherche pour l'Exploitation de la Mer,1054,ATMS DC_REFERENCE DEPH DRYT GSPD LGH4 POSITIONING_SYSTEM PRRD RELH WDIR WSPD,43.3189,4.8662,2020-05-08T07:33:20Z

II.6.2.4 How to download index files

To assist you, this article gives information about how to download In Situ TAC index files.

II.6.3 File distribution rules

A data file is not distributed if:

- The file does not convey with In Situ TAC file format and content rules (See **Erreur ! Source du renvoi introuvable. Erreur ! Source du renvoi introuvable.**)
- The file contains bad coordinates only: a file with no valid (or missing) time coordinate or no valid spatial coordinates is not distributed on Copernicus In Situ TAC. Valid coordinate variables have a <coordinate>_QC variable set to 1, 2, 5, 7 or 8 (see RD [1] Copernicus Marine In Situ NetCDF Format Manual - Reference table 1: variable quality control flag scale)
- Bad parameters: the file contains only bad observed data (qc flag 4) *

  ** Within a file, a parameter having only bad data is distributed.*

II.6.3.1 Duplication

Duplication of platforms is avoided within Copernicus Marine In Situ TAC. Every platform is managed and produced by one single Production Unit.

Data from a unique observing platform may be available from distinct regional products because there is overlap between regions. In that case, a single PU creates the file and shares it with the PUs responsible for its neighbouring regions.

III FILE FORMAT

III.1 NetCDF

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

To understand the differences between netCDF and Zarr, please consult this article:

how-to-choose-between-netcdf-and-zarr-format-using-the-toolbox

III.2 In Situ TAC NetCDF Format Implementation

Copernicus In Situ TAC distributes data and metadata following the NetCDF CF convention implementation specified in RD [1] Copernicus Marine In Situ NetCDF Format Manual

III.2.1 Content and format rules

III.2.1.1 File format and content checkers

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 and content checkers. Their application ensures the file format matches the Copernicus In Situ TAC standards.

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 RD [5] NetCDF file format checker for Argo floats, Copernicus In Situ TAC, EGO gliders, OceanSITES. The file content checker is publicly available on RD [6] Copernicus Marine in situ NetCDF file content checker.

IV FILES NOMENCLATURE

Information about nomenclature of files when downloaded can be found in this article: " How is defined the nomenclature of Copernicus Marine data? | Copernicus Marine Help Center "

IV.1 Nomenclature of files

Files nomenclature is consistent along the different directories within the datasets:

- latest: RR_XX_YY_CODE_YYYYMMDD.nc (e.g., GL_TS_TS_FKJB_20180702.nc)
- monthly: RR_XX_YY_CODE_YYYYMM.nc (e.g., GL_TS_TS_FKJB_201806.nc)
- history: RR_XX_YY_CODE<_ZZZ>.nc (e.g., GL_TS_TS_FKJB.nc)

  - RR: production unit bigram RD [1] Copernicus Marine In Situ NetCDF Format Manual - Reference table 2: production unit bigrams
  - XX: file type RD [1] Copernicus Marine In Situ NetCDF Format Manual - Reference table 3: file type bigrams
  - YY: data type RD [1] Copernicus Marine In Situ NetCDF Format Manual - Reference table 4: data type bigrams
  - CODE: platform code
  - timestamp (YYYYMMDD or YYYYMM for daily and monthly files respectively)
  - <_ZZZ>: optional information. is generally absent; it is used in specific cases such as a platform having data with multiple time-sampling.
  - .nc: NetCDF file name suffix

IV.1.1 File naming convention for tide gauges

Tide gauge data in the history directory may be distributed with distinct time sampling on the same period.

For a given platform, to discriminate the distinct time samplings, one file per sampling is generated.

The time sampling is reported in the file name's optional information.

When only one time sampling is available, the file name's optional information is not used.

Examples

Tarifa tide gauge has a unique time sampling

- IR_TS_TG_TarifaTG.nc

Brest tide gauge has 5 distinct time samplings

- GL_TS_TG_BrestTG_01minute.nc
- GL_TS_TG_BrestTG_02minute.nc
- GL_TS_TG_BrestTG_05minute.nc
- GL_TS_TG_BrestTG_10minute.nc
- GL_TS_TG_BrestTG_60minute.nc

IV.1.2 File naming convention for drifting buoys

Drifting buoys files in the history directory are named using the WMO code which can be 5 or 7 digits. This WMO code can be reused for different platforms. In order to separate each platform using the same WMO, a letter is added at the end:

Example for WMO code 4100559:

- GL_TS_DB_4100559**A**.nc
- GL_TS_DB_4100559**B**.nc
- GL_TS_DB_4100559**C**.nc
- GL_TS_DB_4100559**D**.nc
- GL_TS_DB_4100559**E**.nc
- GL_TS_DB_4100559.nc

V QUALITY CONTROLS

V.1 Quality control manual

The most important document related with the quality for the products described is RD [7] Copernicus Marine In Situ TAC quality information document for Near Real Time In Situ products (QUID and SQO).

The Copernicus Marine Service real-time and delayed-mode quality controls are described in the quality control manuals: https://marineinsitu.eu/documentation/ "Quality control procedures" section.

VI OPERATIONS AND MONITORING

VI.1 Production Units monitoring

VI.1.1 Availability of data: Key Performance Indicators - KPI

The content of the Production Unit is monitored daily with 5 Key Performance Indicators (KPI).

The KPIs are quantifiable performance indicators used to define success factors and measure progress toward the achievement of the organisation/system goals.

The KPI are specified in the document RD [8] Copernicus Marine In Situ TAC, Key Performance Indicators (KPI): Synthetic information to users on the quality of the product and of the service.

The KPIs are publicly available on https://marineinsitu.eu/monitoring/ .

VII REFERENCES

[1] Copernicus Marine In Situ NetCDF Format Manual https://doi.org/10.13155/59938

[2] Copernicus Marine in situ TAC - Physical Parameters List https://doi.org/10.13155/53381

[3] Copernicus Marine in situ NetCDF Attributes list https://doi.org/10.13155/95044

[4] Copernicus in situ TAC - CMEMS regions definition https://doi.org/10.17882/44395

[5] NetCDF file format checker for Argo floats, Copernicus In Situ TAC, EGO gliders, OceanSITES https://doi.org/10.17882/45538

[6] Copernicus Marine in situ NetCDF file content checker https://doi.org/10.17882/95058

[7] Copernicus Marine In Situ TAC quality information document for Near Real Time In Situ products (QUID and SQO) https://doi.org/10.13155/75807

[8] Copernicus Marine In Situ TAC, Key Performance Indicators (KPI): Synthetic information to users on the quality of the product and of the service https://doi.org/10.13155/76297

VIII ANNEX

timeSeries mooring

```
netcdf IR_TS_MO_6200082 {
dimensions:
       TIME = 201860 ;
       DEPTH = 3 ;
       STRLEN = 64 ;
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. ;
              TIME:valid_max = 90000. ;
              TIME:uncertainty = " " ;
              TIME:comment = " " ;
              TIME:axis = "T" ;
              TIME:ancillary_variables = "TIME_QC" ;
              TIME:calendar = "standard" ;
       byte TIME_QC(TIME) ;
              TIME_QC:_FillValue = -127b ;
              TIME_QC:long_name = "Time quality flag" ;
              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 DEPH(DEPTH) ;
              DEPH:_FillValue = 9.96921e+36f ;
              DEPH:long_name = "Depth" ;
              DEPH:standard_name = "depth" ;
              DEPH:units = "m" ;
              DEPH:valid_min = -12000.f ;
              DEPH:valid_max = 12000.f ;
              DEPH:uncertainty = " " ;
              DEPH:comment = " " ;
              DEPH:positive = "down" ;
              DEPH:axis = "Z" ;
              DEPH:reference = "sea_level" ;
              DEPH:data_mode = "D" ;
       char STATION(STRLEN) ;
              STATION:long_name = "station" ;
              STATION:cf_role = "timeseries_id" ;
       float 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:uncertainty = " " ;
            LATITUDE:comment = " " ;
            LATITUDE:axis = "Y" ;
      float 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:uncertainty = " " ;
            LONGITUDE:comment = " " ;
            LONGITUDE:axis = "X" ;
      float PRECISE_LATITUDE(TIME) ;
            PRECISE_LATITUDE:_FillValue = 9.96921e+36f ;
            PRECISE_LATITUDE:long_name = "Latitude of each location" ;
            PRECISE_LATITUDE:standard_name = "latitude" ;
            PRECISE_LATITUDE:units = "degree_north" ;
            PRECISE_LATITUDE:valid_min = -90.f ;
            PRECISE_LATITUDE:valid_max = 90.f ;
            PRECISE_LATITUDE:uncertainty = " " ;
            PRECISE_LATITUDE:comment = " " ;
            PRECISE_LATITUDE:ancillary_variables = "POSITION_QC" ;
      float PRECISE_LONGITUDE(TIME) ;
            PRECISE_LONGITUDE:_FillValue = 9.96921e+36f ;
            PRECISE_LONGITUDE:long_name = "Longitude of each location" ;
            PRECISE_LONGITUDE:standard_name = "longitude" ;
            PRECISE_LONGITUDE:units = "degree_east" ;
            PRECISE_LONGITUDE:valid_min = -180.f ;
            PRECISE_LONGITUDE:valid_max = 180.f ;
            PRECISE_LONGITUDE:uncertainty = " " ;
            PRECISE_LONGITUDE:comment = " " ;
            PRECISE_LONGITUDE:ancillary_variables = "POSITION_QC" ;
      byte POSITION_QC(TIME) ;
            POSITION_QC:_FillValue = -127b ;
            POSITION_QC:long_name = "Position quality flag" ;
            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 VZMX(TIME, DEPTH) ;
            VZMX:_FillValue = 9.96921e+36f ;
            VZMX:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            VZMX:data_mode = "M" ;
            VZMX:long_name = "Maximum zero crossing wave height (Hmax)" ;
            VZMX:standard_name = "sea_surface_wave_maximum_height" ;
            VZMX:type_of_analysis = "zero crossing" ;
            VZMX:units = "m" ;
            VZMX:valid_max = 40.f ;
            VZMX:valid_min = 0.001f ;
            VZMX:ancillary_variables = "VZMX_QC VZMX_DM" ;
```

```
        byte VZMX_QC(TIME, DEPTH) ;
                VZMX_QC:_FillValue = -127b ;
                VZMX_QC:long_name = "Maximum zero crossing wave height (Hmax) quality
flag" ;
                VZMX_QC:valid_min = 0b ;
                VZMX_QC:valid_max = 9b ;
                VZMX_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
                VZMX_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" ;
                VZMX_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
        char VZMX_DM(TIME, DEPTH) ;
                VZMX_DM:_FillValue = " " ;
                VZMX_DM:long_name = "Maximum zero crossing wave height (Hmax) method of
data processing" ;
                VZMX_DM:flag_values = "R, A, D" ;
                VZMX_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
                VZMX_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
        float VHM0(TIME, DEPTH) ;
                VHM0:_FillValue = 9.96921e+36f ;
                VHM0:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
                VHM0:data_mode = "M" ;
                VHM0:long_name = "Spectral significant wave height (Hm0)" ;
                VHM0:standard_name = "sea_surface_wave_significant_height" ;
                VHM0:type_of_analysis = "spectral analysis" ;
                VHM0:units = "m" ;
                VHM0:valid_max = 25.f ;
                VHM0:valid_min = 0.f ;
                VHM0:ancillary_variables = "VHM0_QC VHM0_DM" ;
        byte VHM0_QC(TIME, DEPTH) ;
                VHM0_QC:_FillValue = -127b ;
                VHM0_QC:long_name = "Spectral significant wave height (Hm0) quality
flag" ;
                VHM0_QC:valid_min = 0b ;
                VHM0_QC:valid_max = 9b ;
                VHM0_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
                VHM0_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" ;
                VHM0_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
        char VHM0_DM(TIME, DEPTH) ;
                VHM0_DM:_FillValue = " " ;
                VHM0_DM:long_name = "Spectral significant wave height (Hm0) method of
data processing" ;
                VHM0_DM:flag_values = "R, A, D" ;
                VHM0_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
                VHM0_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
        float VTM02(TIME, DEPTH) ;
                VTM02:_FillValue = 9.96921e+36f ;
```

```
            VTM02:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            VTM02:data_mode = "M" ;
            VTM02:long_name = "Spectral moments (0,2) wave period (Tm02)" ;
            VTM02:standard_name =
"sea_surface_wave_mean_period_from_variance_spectral_density_second_frequency_moment"
;
            VTM02:type_of_analysis = "spectral analysis" ;
            VTM02:units = "s" ;
            VTM02:valid_max = 25.f ;
            VTM02:valid_min = 1.f ;
            VTM02:ancillary_variables = "VTM02_QC VTM02_DM" ;
      byte VTM02_QC(TIME, DEPTH) ;
            VTM02_QC:_FillValue = -127b ;
            VTM02_QC:long_name = "Spectral moments (0,2) wave period (Tm02) quality
flag" ;
            VTM02_QC:valid_min = 0b ;
            VTM02_QC:valid_max = 9b ;
            VTM02_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            VTM02_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" ;
            VTM02_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char VTM02_DM(TIME, DEPTH) ;
            VTM02_DM:_FillValue = " " ;
            VTM02_DM:long_name = "Spectral moments (0,2) wave period (Tm02) method
of data processing" ;
            VTM02_DM:flag_values = "R, A, D" ;
            VTM02_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode"
;
            VTM02_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float VTZM(TIME, DEPTH) ;
            VTZM:_FillValue = 9.96921e+36f ;
            VTZM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            VTZM:data_mode = "M" ;
            VTZM:long_name = "Period of the highest wave (Thmax)" ;
            VTZM:standard_name = "sea_surface_wave_period_of_highest_wave" ;
            VTZM:type_of_analysis = "zero crossing" ;
            VTZM:units = "s" ;
            VTZM:valid_max = 30.f ;
            VTZM:valid_min = 1.f ;
            VTZM:ancillary_variables = "VTZM_QC VTZM_DM" ;
      byte VTZM_QC(TIME, DEPTH) ;
            VTZM_QC:_FillValue = -127b ;
            VTZM_QC:long_name = "Period of the highest wave (Thmax) quality flag" ;
            VTZM_QC:valid_min = 0b ;
            VTZM_QC:valid_max = 9b ;
            VTZM_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            VTZM_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" ;
```

```
            VTZM_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char VTZM_DM(TIME, DEPTH) ;
            VTZM_DM:_FillValue = " " ;
            VTZM_DM:long_name = "Period of the highest wave (Thmax) method of data
processing" ;
            VTZM_DM:flag_values = "R, A, D" ;
            VTZM_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            VTZM_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float VAVT(TIME, DEPTH) ;
            VAVT:_FillValue = 9.96921e+36f ;
            VAVT:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            VAVT:data_mode = "M" ;
            VAVT:long_name = "Average period highest 1/3 wave (T1/3)" ;
            VAVT:standard_name = "sea_surface_wave_significant_period" ;
            VAVT:type_of_analysis = "zero crossing" ;
            VAVT:units = "s" ;
            VAVT:valid_max = 25.f ;
            VAVT:valid_min = 1.f ;
            VAVT:ancillary_variables = "VAVT_QC VAVT_DM" ;
      byte VAVT_QC(TIME, DEPTH) ;
            VAVT_QC:_FillValue = -127b ;
            VAVT_QC:long_name = "Average period highest 1/3 wave (T1/3) quality
flag" ;
            VAVT_QC:valid_min = 0b ;
            VAVT_QC:valid_max = 9b ;
            VAVT_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            VAVT_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" ;
            VAVT_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char VAVT_DM(TIME, DEPTH) ;
            VAVT_DM:_FillValue = " " ;
            VAVT_DM:long_name = "Average period highest 1/3 wave (T1/3) method of
data processing" ;
            VAVT_DM:flag_values = "R, A, D" ;
            VAVT_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            VAVT_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float VTPK(TIME, DEPTH) ;
            VTPK:_FillValue = 9.96921e+36f ;
            VTPK:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            VTPK:data_mode = "M" ;
            VTPK:long_name = "Wave period at spectral peak / peak period (Tp)" ;
            VTPK:standard_name =
"sea_surface_wave_period_at_variance_spectral_density_maximum" ;
            VTPK:type_of_analysis = "spectral analysis" ;
            VTPK:units = "s" ;
            VTPK:valid_max = 30.f ;
            VTPK:valid_min = 1.f ;
            VTPK:ancillary_variables = "VTPK_QC VTPK_DM" ;
```

```
      byte VTPK_QC(TIME, DEPTH) ;
            VTPK_QC:_FillValue = -127b ;
            VTPK_QC:long_name = "Wave period at spectral peak / peak period (Tp)
quality flag" ;
            VTPK_QC:valid_min = 0b ;
            VTPK_QC:valid_max = 9b ;
            VTPK_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            VTPK_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" ;
            VTPK_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char VTPK_DM(TIME, DEPTH) ;
            VTPK_DM:_FillValue = " " ;
            VTPK_DM:long_name = "Wave period at spectral peak / peak period (Tp)
method of data processing" ;
            VTPK_DM:flag_values = "R, A, D" ;
            VTPK_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            VTPK_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float HCSP(TIME, DEPTH) ;
            HCSP:_FillValue = 9.96921e+36f ;
            HCSP:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            HCSP:data_mode = "M" ;
            HCSP:long_name = "Horizontal current speed" ;
            HCSP:standard_name = "sea_water_speed" ;
            HCSP:units = "m s-1" ;
            HCSP:valid_max = 5.f ;
            HCSP:valid_min = 0.f ;
            HCSP:ancillary_variables = "HCSP_QC HCSP_DM" ;
      byte HCSP_QC(TIME, DEPTH) ;
            HCSP_QC:_FillValue = -127b ;
            HCSP_QC:long_name = "Horizontal current speed quality flag" ;
            HCSP_QC:valid_min = 0b ;
            HCSP_QC:valid_max = 9b ;
            HCSP_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            HCSP_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" ;
            HCSP_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char HCSP_DM(TIME, DEPTH) ;
            HCSP_DM:_FillValue = " " ;
            HCSP_DM:long_name = "Horizontal current speed method of data processing"
;
            HCSP_DM:flag_values = "R, A, D" ;
            HCSP_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            HCSP_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float ATMS(TIME, DEPTH) ;
            ATMS:_FillValue = 9.96921e+36f ;
            ATMS:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            ATMS:data_mode = "M" ;
```

```
            ATMS:long_name = "Atmospheric pressure at sea level" ;
            ATMS:standard_name = "air_pressure_at_sea_level" ;
            ATMS:units = "hPa" ;
            ATMS:valid_max = 1050.f ;
            ATMS:valid_min = 880.f ;
            ATMS:ancillary_variables = "ATMS_QC ATMS_DM" ;
      byte ATMS_QC(TIME, DEPTH) ;
            ATMS_QC:_FillValue = -127b ;
            ATMS_QC:long_name = "Atmospheric pressure at sea level quality flag" ;
            ATMS_QC:valid_min = 0b ;
            ATMS_QC:valid_max = 9b ;
            ATMS_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            ATMS_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" ;
            ATMS_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char ATMS_DM(TIME, DEPTH) ;
            ATMS_DM:_FillValue = " " ;
            ATMS_DM:long_name = "Atmospheric pressure at sea level method of data
processing" ;
            ATMS_DM:flag_values = "R, A, D" ;
            ATMS_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            ATMS_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float HCDT(TIME, DEPTH) ;
            HCDT:_FillValue = 9.96921e+36f ;
            HCDT:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            HCDT:data_mode = "M" ;
            HCDT:long_name = "Current to direction relative true north" ;
            HCDT:standard_name = "direction_of_sea_water_velocity" ;
            HCDT:units = "degree" ;
            HCDT:valid_max = 360.f ;
            HCDT:valid_min = 0.f ;
            HCDT:ancillary_variables = "HCDT_QC HCDT_DM" ;
      byte HCDT_QC(TIME, DEPTH) ;
            HCDT_QC:_FillValue = -127b ;
            HCDT_QC:long_name = "Current to direction relative true north quality
flag" ;
            HCDT_QC:valid_min = 0b ;
            HCDT_QC:valid_max = 9b ;
            HCDT_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            HCDT_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" ;
            HCDT_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char HCDT_DM(TIME, DEPTH) ;
            HCDT_DM:_FillValue = " " ;
            HCDT_DM:long_name = "Current to direction relative true north method of
data processing" ;
            HCDT_DM:flag_values = "R, A, D" ;
            HCDT_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
```

```
            HCDT_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float WDIR(TIME, DEPTH) ;
            WDIR:_FillValue = 9.96921e+36f ;
            WDIR:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            WDIR:data_mode = "M" ;
            WDIR:long_name = "Wind from direction relative true north" ;
            WDIR:standard_name = "wind_from_direction" ;
            WDIR:units = "degree" ;
            WDIR:valid_max = 360.f ;
            WDIR:valid_min = 0.f ;
            WDIR:ancillary_variables = "WDIR_QC WDIR_DM" ;
      byte WDIR_QC(TIME, DEPTH) ;
            WDIR_QC:_FillValue = -127b ;
            WDIR_QC:long_name = "Wind from direction relative true north quality
flag" ;
            WDIR_QC:valid_min = 0b ;
            WDIR_QC:valid_max = 9b ;
            WDIR_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            WDIR_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" ;
            WDIR_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char WDIR_DM(TIME, DEPTH) ;
            WDIR_DM:_FillValue = " " ;
            WDIR_DM:long_name = "Wind from direction relative true north method of
data processing" ;
            WDIR_DM:flag_values = "R, A, D" ;
            WDIR_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            WDIR_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float DRYT(TIME, DEPTH) ;
            DRYT:_FillValue = 9.96921e+36f ;
            DRYT:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            DRYT:data_mode = "M" ;
            DRYT:long_name = "Air temperature in dry bulb" ;
            DRYT:standard_name = "air_temperature" ;
            DRYT:units = "degrees_C" ;
            DRYT:valid_max = 39.9f ;
            DRYT:valid_min = -1.f ;
            DRYT:ancillary_variables = "DRYT_QC DRYT_DM" ;
      byte DRYT_QC(TIME, DEPTH) ;
            DRYT_QC:_FillValue = -127b ;
            DRYT_QC:long_name = "Air temperature in dry bulb quality flag" ;
            DRYT_QC:valid_min = 0b ;
            DRYT_QC:valid_max = 9b ;
            DRYT_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            DRYT_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" ;
            DRYT_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
```

```
      char DRYT_DM(TIME, DEPTH) ;
            DRYT_DM:_FillValue = " " ;
            DRYT_DM:long_name = "Air temperature in dry bulb method of data
processing" ;
            DRYT_DM:flag_values = "R, A, D" ;
            DRYT_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            DRYT_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float WSPD(TIME, DEPTH) ;
            WSPD:_FillValue = 9.96921e+36f ;
            WSPD:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            WSPD:data_mode = "M" ;
            WSPD:long_name = "Horizontal wind speed" ;
            WSPD:standard_name = "wind_speed" ;
            WSPD:units = "m s-1" ;
            WSPD:valid_max = 45.f ;
            WSPD:valid_min = 0.f ;
            WSPD:ancillary_variables = "WSPD_QC WSPD_DM" ;
      byte WSPD_QC(TIME, DEPTH) ;
            WSPD_QC:_FillValue = -127b ;
            WSPD_QC:long_name = "Horizontal wind speed quality flag" ;
            WSPD_QC:valid_min = 0b ;
            WSPD_QC:valid_max = 9b ;
            WSPD_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            WSPD_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" ;
            WSPD_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char WSPD_DM(TIME, DEPTH) ;
            WSPD_DM:_FillValue = " " ;
            WSPD_DM:long_name = "Horizontal wind speed method of data processing" ;
            WSPD_DM:flag_values = "R, A, D" ;
            WSPD_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            WSPD_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float GSPD(TIME, DEPTH) ;
            GSPD:_FillValue = 9.96921e+36f ;
            GSPD:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            GSPD:data_mode = "M" ;
            GSPD:long_name = "Gust wind speed" ;
            GSPD:standard_name = "wind_speed_of_gust" ;
            GSPD:units = "m s-1" ;
            GSPD:valid_max = 70.f ;
            GSPD:valid_min = 0.f ;
            GSPD:ancillary_variables = "GSPD_QC GSPD_DM" ;
      byte GSPD_QC(TIME, DEPTH) ;
            GSPD_QC:_FillValue = -127b ;
            GSPD_QC:long_name = "Gust wind speed quality flag" ;
            GSPD_QC:valid_min = 0b ;
            GSPD_QC:valid_max = 9b ;
            GSPD_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
```

```
            GSPD_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" ;
            GSPD_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char GSPD_DM(TIME, DEPTH) ;
            GSPD_DM:_FillValue = " " ;
            GSPD_DM:long_name = "Gust wind speed method of data processing" ;
            GSPD_DM:flag_values = "R, A, D" ;
            GSPD_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            GSPD_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float TEMP(TIME, DEPTH) ;
            TEMP:_FillValue = 9.96921e+36f ;
            TEMP:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            TEMP:data_mode = "M" ;
            TEMP:long_name = "Sea temperature" ;
            TEMP:standard_name = "sea_water_temperature" ;
            TEMP:units = "degrees_C" ;
            TEMP:valid_max = 32.f ;
            TEMP:valid_min = -2.f ;
            TEMP:ancillary_variables = "TEMP_QC TEMP_DM" ;
      byte TEMP_QC(TIME, DEPTH) ;
            TEMP_QC:_FillValue = -127b ;
            TEMP_QC:long_name = "Sea temperature quality flag" ;
            TEMP_QC:valid_min = 0b ;
            TEMP_QC:valid_max = 9b ;
            TEMP_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            TEMP_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" ;
            TEMP_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char TEMP_DM(TIME, DEPTH) ;
            TEMP_DM:_FillValue = " " ;
            TEMP_DM:long_name = "Sea temperature method of data processing" ;
            TEMP_DM:flag_values = "R, A, D" ;
            TEMP_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            TEMP_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float PSAL(TIME, DEPTH) ;
            PSAL:_FillValue = 9.96921e+36f ;
            PSAL:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            PSAL:data_mode = "M" ;
            PSAL:long_name = "Practical salinity" ;
            PSAL:standard_name = "sea_water_practical_salinity" ;
            PSAL:units = "0.001" ;
            PSAL:valid_max = 40.f ;
            PSAL:valid_min = 0.f ;
            PSAL:ancillary_variables = "PSAL_QC PSAL_DM" ;
      byte PSAL_QC(TIME, DEPTH) ;
            PSAL_QC:_FillValue = -127b ;
            PSAL_QC:long_name = "Practical salinity quality flag" ;
```

```
                PSAL_QC:valid_min = 0b ;
                PSAL_QC:valid_max = 9b ;
                PSAL_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
                PSAL_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" ;
                PSAL_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
        char PSAL_DM(TIME, DEPTH) ;
                PSAL_DM:_FillValue = " " ;
                PSAL_DM:long_name = "Practical salinity method of data processing" ;
                PSAL_DM:flag_values = "R, A, D" ;
                PSAL_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
                PSAL_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
        float CNDC(TIME, DEPTH) ;
                CNDC:_FillValue = 9.96921e+36f ;
                CNDC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
                CNDC:data_mode = "M" ;
                CNDC:long_name = "Electrical conductivity" ;
                CNDC:standard_name = "sea_water_electrical_conductivity" ;
                CNDC:units = "S m-1" ;
                CNDC:valid_max = 70.f ;
                CNDC:valid_min = 0.f ;
                CNDC:ancillary_variables = "CNDC_QC CNDC_DM" ;
        byte CNDC_QC(TIME, DEPTH) ;
                CNDC_QC:_FillValue = -127b ;
                CNDC_QC:long_name = "Electrical conductivity quality flag" ;
                CNDC_QC:valid_min = 0b ;
                CNDC_QC:valid_max = 9b ;
                CNDC_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
                CNDC_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" ;
                CNDC_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
        char CNDC_DM(TIME, DEPTH) ;
                CNDC_DM:_FillValue = " " ;
                CNDC_DM:long_name = "Electrical conductivity method of data processing"
;
                CNDC_DM:flag_values = "R, A, D" ;
                CNDC_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
                CNDC_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
        float VPED(TIME, DEPTH) ;
                VPED:_FillValue = 9.96921e+36f ;
                VPED:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
                VPED:data_mode = "M" ;
                VPED:long_name = "Wave principal direction at spectral peak" ;
                VPED:standard_name =
"sea_surface_wave_from_direction_at_variance_spectral_density_maximum" ;
                VPED:type_of_analysis = "spectral analysis" ;
                VPED:units = "degree" ;
```

```
            VPED:valid_max = 360.f ;
            VPED:valid_min = 0.f ;
            VPED:ancillary_variables = "VPED_QC VPED_DM" ;
            VPED:direction_convention = "clockwise from North" ;
            VPED:direction_reference = "True North" ;
      byte VPED_QC(TIME, DEPTH) ;
            VPED_QC:_FillValue = -127b ;
            VPED_QC:long_name = "Wave principal direction at spectral peak quality
flag" ;
            VPED_QC:valid_min = 0b ;
            VPED_QC:valid_max = 9b ;
            VPED_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            VPED_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" ;
            VPED_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char VPED_DM(TIME, DEPTH) ;
            VPED_DM:_FillValue = " " ;
            VPED_DM:long_name = "Wave principal direction at spectral peak method of
data processing" ;
            VPED_DM:flag_values = "R, A, D" ;
            VPED_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            VPED_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      float VMDR(TIME, DEPTH) ;
            VMDR:_FillValue = 9.96921e+36f ;
            VMDR:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
            VMDR:data_mode = "M" ;
            VMDR:long_name = "Mean wave direction from (Mdir)" ;
            VMDR:standard_name = "sea_surface_wave_from_direction" ;
            VMDR:type_of_analysis = "spectral analysis" ;
            VMDR:units = "degree" ;
            VMDR:valid_max = 360.f ;
            VMDR:valid_min = 0.f ;
            VMDR:ancillary_variables = "VMDR_QC VMDR_DM" ;
            VMDR:direction_convention = "clockwise from North" ;
            VMDR:direction_reference = "True North" ;
      byte VMDR_QC(TIME, DEPTH) ;
            VMDR_QC:_FillValue = -127b ;
            VMDR_QC:long_name = "Mean wave direction from (Mdir) quality flag" ;
            VMDR_QC:valid_min = 0b ;
            VMDR_QC:valid_max = 9b ;
            VMDR_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            VMDR_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" ;
            VMDR_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;
      char VMDR_DM(TIME, DEPTH) ;
            VMDR_DM:_FillValue = " " ;
            VMDR_DM:long_name = "Mean wave direction from (Mdir) method of data
processing" ;
            VMDR_DM:flag_values = "R, A, D" ;
```

```
            VMDR_DM:flag_meanings = "real-time adjusted-in-real-time delayed-mode" ;
            VMDR_DM:coordinates = "TIME LATITUDE LONGITUDE DEPH PRECISE_LATITUDE
PRECISE_LONGITUDE STATION" ;

// global attributes:
            :last_date_observation = "2023-12-31T23:00:00Z" ;
            :last_latitude_observation = "44.1245" ;
            :last_longitude_observation = "-7.6697" ;
            :geospatial_lat_min = "44.05" ;
            :geospatial_lat_max = "44.17" ;
            :geospatial_lon_min = "-7.7264" ;
            :geospatial_lon_max = "-7.595" ;
            :geospatial_vertical_min = "-3.0" ;
            :geospatial_vertical_max = "3.0" ;
            :time_coverage_start = "1996-07-19T15:00:00Z" ;
            :time_coverage_end = "2023-12-31T23:00:00Z" ;
            :data_mode = "M" ;
            :id = "IR_TS_MO_6200082" ;
            :institution = "Puertos del Estado" ;
            :institution_abbreviated = "PdE" ;
            :institution_country = "Spain" ;
            :institution_edmo_code = "2751" ;
            :institution_references = "http://www.puertos.es/" ;
            :naming_authority = "Copernicus Marine In Situ" ;
            :network = "EuroSITES" ;
            :platform_code = "6200082" ;
            :platform_name = "Estaca de Bares buoy" ;
            :site_code = " " ;
            :source = "mooring" ;
            :source_platform_category_code = "48" ;
            :title = "IBI - NRT in situ Observations" ;
            :wmo_platform_code = "6200082" ;
            :area = "North Atlantic Ocean" ;
            :bottom_depth = "1800" ;
            :cdm_data_type = "timeSeries" ;
            :featureType = "timeSeries" ;
            :geospatial_lat_units = "degree_north" ;
            :geospatial_lon_units = "degree_east" ;
            :geospatial_vertical_positive = "down" ;
            :geospatial_vertical_units = "EPSG:4979" ;
            :time_coverage_duration = "P10027D" ;
            :time_coverage_resolution = "PT60M" ;
            :Conventions = "CF-1.11 Copernicus-InSituTAC-FormatManual-2.0.0
Copernicus-InSituTAC-ParametersList-3.3.0 Copernicus-InSituTAC-AttributesList-1.0.0"
;
            :format_version = "2.0" ;
            :netcdf_version = "netCDF-4 classic model" ;
            :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." ;
            :creator_name = "Marta de Alfonso" ;
            :creator_email = "mar@puertos.es cmems-service@puertos.es" ;
            :creator_url = "https://orcid.org/my-orcid?orcid=0000-0002-9297-8342" ;
            :creator_type = "person" ;
```

```
            :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/10.13155/43494" ;
            :license = "https://marine.copernicus.eu/user-corner/service-
commitments-and-licence" ;
            :publisher_email = "cmems-service@puertos.es" ;
            :publisher_name = "Copernicus Marine Service" ;
            :publisher_url = "https://marine.copernicus.eu/
http://www.marineinsitu.eu/" ;
            :publisher_institution = "Puertos del Estado" ;
            :references = "http://marine.copernicus.eu http://www.marineinsitu.eu" ;
            :update_interval = "P1M" ;
            :date_modified = "2024-01-29T15:35:29Z" ;
            :history = "2024-01-29T15:35:29Z Creation" ;
            :processing_level = "3B" ;
}
```

trajectory

```
netcdf GL_TS_TS_FMNB {
dimensions:
        TIME = 11618 ;
        DEPTH = 1;
        STRING32 = 32 ;
        STRLEN = 4 ;
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. ;
                TIME:valid_max = 90000. ;
                TIME:uncertainty = " " ;
                TIME:axis = "T" ;
                TIME:ancillary_variables = "TIME_QC" ;
                TIME:calendar = "standard" ;
        byte TIME_QC(TIME) ;
                TIME_QC:_FillValue = -127b ;
                TIME_QC:long_name = "Time quality flag" ;
                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(TIME) ;
                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:uncertainty = " " ;
                LATITUDE:axis = "Y" ;
                LATITUDE:ancillary_variables = "POSITION_QC" ;
        float LONGITUDE(TIME) ;
                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:uncertainty = " " ;
                LONGITUDE:axis = "X" ;
                LONGITUDE:ancillary_variables = "POSITION_QC" ;
        byte POSITION_QC(TIME) ;
                POSITION_QC:_FillValue = -127b ;
                POSITION_QC:long_name = "Position quality flag" ;
                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" ;
        char DC_REFERENCE(TIME, STRING32) ;
                DC_REFERENCE:_FillValue = " " ;
                DC_REFERENCE:long_name = "Station/Location unique identifier in data centre" ;
        char TRAJECTORY(STRLEN) ;
                TRAJECTORY:long_name = "trajectory" ;
```

```
                TRAJECTORY:cf_role = "trajectory_id" ;
        float DEPH(DEPTH) ;
                DEPH:_FillValue = 9.96921e+36f ;
                DEPH:long_name = "Depth" ;
                DEPH:standard_name = "depth" ;
                DEPH:units = "m" ;
                DEPH:valid_min = -12000.f ;
                DEPH:valid_max = 12000.f ;
                DEPH:uncertainty = " " ;
                DEPH:axis = "Z" ;
                DEPH:positive = "down" ;
                DEPH:reference = "sea_level" ;
                DEPH:data_mode = "R" ;
        float PSAL(TIME, DEPTH) ;
                PSAL:_FillValue = 9.96921e+36f ;
                PSAL:long_name = "Practical salinity" ;
                PSAL:standard_name = "sea_water_practical_salinity" ;
                PSAL:units = "0.001" ;
                PSAL:coordinates = "TIME LATITUDE LONGITUDE DEPH TRAJECTORY" ;
                PSAL:data_mode = "R" ;
                PSAL:ancillary_variables = "PSAL_QC" ;
        byte PSAL_QC(TIME, DEPTH) ;
                PSAL_QC:_FillValue = -127b ;
                PSAL_QC:long_name = "Practical salinity quality flag" ;
                PSAL_QC:valid_min = 0b ;
                PSAL_QC:valid_max = 9b ;
                PSAL_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
                PSAL_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" ;
                PSAL_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH TRAJECTORY" ;
        float SSJT(TIME, DEPTH) ;
                SSJT:_FillValue = 9.96921e+36f ;
                SSJT:long_name = "Sea temperature from TSG" ;
                SSJT:units = "degree_Celsius" ;
                SSJT:coordinates = "TIME LATITUDE LONGITUDE DEPH TRAJECTORY" ;
                SSJT:data_mode = "R" ;
                SSJT:ancillary_variables = "SSJT_QC" ;
        byte SSJT_QC(TIME, DEPTH) ;
                SSJT_QC:_FillValue = -127b ;
                SSJT_QC:long_name = "Sea temperature from TSG quality flag" ;
                SSJT_QC:valid_min = 0b ;
                SSJT_QC:valid_max = 9b ;
                SSJT_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
                SSJT_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" ;
                SSJT_QC:coordinates = "TIME LATITUDE LONGITUDE DEPH TRAJECTORY" ;

// global attributes:
                :platform_code = "FMNB" ;
                :platform_name = "Commandant Charcot" ;
                :wmo_platform_code = "FMNB" ;
                :ices_platform_code = " " ;
                :coriolis_platform_code = "FMNB" ;
                :site_code = " " ;
                :comment = " " ;
                :source = "research vessel" ;
                :source_platform_category_code = "31" ;
                :institution = "IRD Centre de Bretagne" ;
                :institution_edmo_code = "440" ;
                :institution_country = "France" ;
```

```
                :institution_references = " " ;
                :naming_authority = "Copernicus Marine In Situ" ;
                :title = "Global Ocean - In Situ Observation Copernicus" ;
                :summary = " " ;
                :data_mode = "R" ;
                :wmo_instrument_type = " " ;
                :area = "Global Ocean" ;
                :geospatial_lat_min = "-78.73330" ;
                :geospatial_lat_max = "90.00000" ;
                :geospatial_lon_min = "0.03330" ;
                :geospatial_lon_max = "-0.73330" ;
                :geospatial_vertical_min = "10.00" ;
                :geospatial_vertical_max = "10.00" ;
                :time_coverage_start = "2021-10-28T18:55:00Z" ;
                :time_coverage_end = "2023-12-26T14:55:00Z" ;
                :cdm_data_type = "trajectory" ;
                :featureType = "trajectory" ;
                :bottom_depth = " " ;
                :last_date_observation = "2023-12-26T14:55:00Z" ;
                :last_latitude_observation = "-55.98330" ;
                :last_longitude_observation = "-65.76670" ;
                :references = "http://marine.copernicus.eu http://www.marineinsitu.eu" ;
                :license = "https://marine.copernicus.eu/user-corner/service-commitments-and-
licence" ;
                :update_interval = "PT1H" ;
                :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." ;
                :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/10.13155/43494" ;
                :creator_name = " " ;
                :id = "GL_TS_TS_FMNB" ;
                :netcdf_version = "netCDF-4 classic model" ;
                :format_version = "2.0" ;
                :Conventions = "CF-1.11 Copernicus-InSituTAC-FormatManual-2.0.0 Copernicus-
InSituTAC-ParametersList-3.3.0 Copernicus-InSituTAC-AttributesList-1.0.0" ;
                :date_modified = "2024-01-19T07:03:26Z" ;
                :history = "2024-01-19T07:03:26Z : Creation" ;
                :publisher_email = "cmems-service@ifremer.fr" ;
                :publisher_name = "Copernicus Marine Service" ;
                :publisher_url = "https://marine.copernicus.eu/ http://www.marineinsitu.eu/" ;
                :publisher_institution = "Ifremer" ;
}
```

trajectoryProfile

```
netcdf GL_PR_PF_3901661 {
dimensions:
       TIME = 126 ;
       DEPTH = 102 ;
       STRING32 = 32 ;
       STRLEN = 7 ;
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. ;
              TIME:valid_max = 90000. ;
              TIME:uncertainty = " " ;
              TIME:axis = "T" ;
              TIME:ancillary_variables = "TIME_QC" ;
              TIME:calendar = "standard" ;
       byte TIME_QC(TIME) ;
              TIME_QC:_FillValue = -127b ;
              TIME_QC:long_name = "Time quality flag" ;
              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(TIME) ;
              LATITUDE:long_name = "Latitude of each location" ;
              LATITUDE:standard_name = "latitude" ;
              LATITUDE:units = "degree_north" ;
              LATITUDE:valid_min = -90. ;
              LATITUDE:valid_max = 90. ;
              LATITUDE:uncertainty = " " ;
              LATITUDE:axis = "Y" ;
              LATITUDE:ancillary_variables = "POSITION_QC" ;
       float LONGITUDE(TIME) ;
              LONGITUDE:long_name = "Longitude of each location" ;
              LONGITUDE:standard_name = "longitude" ;
              LONGITUDE:units = "degree_east" ;
              LONGITUDE:valid_min = -180. ;
              LONGITUDE:valid_max = 180. ;
              LONGITUDE:uncertainty = " " ;
              LONGITUDE:axis = "X" ;
              LONGITUDE:ancillary_variables = "POSITION_QC" ;
       byte POSITION_QC(TIME) ;
              POSITION_QC:_FillValue = -127b ;
              POSITION_QC:long_name = "Position quality flag" ;
              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" ;
```

```
        char DC_REFERENCE(TIME, STRING32) ;
                DC_REFERENCE:_FillValue = " " ;
                DC_REFERENCE:long_name = "Station/Location unique identifier in data
centre" ;
        char DIRECTION(TIME) ;
                DIRECTION:long_name = "Direction of the profiles" ;
                DIRECTION:_FillValue = " " ;
                DIRECTION:flag_values = "A, D, U" ;
                DIRECTION:flag_meanings = "ascending_profile descending_profile unknown"
;
        char TRAJECTORY(STRLEN) ;
                TRAJECTORY:long_name = "trajectory" ;
                TRAJECTORY:cf_role = "trajectory_id" ;
        float PRES(TIME, DEPTH) ;
                PRES:_FillValue = 9.96921e+36f ;
                PRES:long_name = "Sea pressure" ;
                PRES:standard_name = "sea_water_pressure" ;
                PRES:units = "dbar" ;
                PRES:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
                PRES:axis = "Z" ;
                PRES:positive = "down" ;
                PRES:data_mode = "R" ;
                PRES:ancillary_variables = "PRES_QC" ;
        byte PRES_QC(TIME, DEPTH) ;
                PRES_QC:_FillValue = -127b ;
                PRES_QC:long_name = "Sea pressure quality flag" ;
                PRES_QC:valid_min = 0b ;
                PRES_QC:valid_max = 9b ;
                PRES_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
                PRES_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" ;
                PRES_QC:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
        float PRES_ADJUSTED(TIME, DEPTH) ;
                PRES_ADJUSTED:_FillValue = 9.96921e+36f ;
                PRES_ADJUSTED:long_name = "Sea pressure adjusted" ;
                PRES_ADJUSTED:standard_name = "sea_water_pressure" ;
                PRES_ADJUSTED:units = "dbar" ;
                PRES_ADJUSTED:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
                PRES_ADJUSTED:data_mode = "D" ;
                PRES_ADJUSTED:ancillary_variables = "PRES_ADJUSTED_QC
PRES_ADJUSTED_ERROR" ;
        byte PRES_ADJUSTED_QC(TIME, DEPTH) ;
                PRES_ADJUSTED_QC:_FillValue = -127b ;
                PRES_ADJUSTED_QC:long_name = "Sea pressure adjusted quality flag" ;
                PRES_ADJUSTED_QC:valid_min = 0b ;
                PRES_ADJUSTED_QC:valid_max = 9b ;
                PRES_ADJUSTED_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
                PRES_ADJUSTED_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" ;
                PRES_ADJUSTED_QC:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY"
;
        float PRES_ADJUSTED_ERROR(TIME, DEPTH) ;
                PRES_ADJUSTED_ERROR:_FillValue = 9.96921e+36f ;
```

```
            PRES_ADJUSTED_ERROR:long_name = "Sea pressure adjusted error" ;
            PRES_ADJUSTED_ERROR:units = "dbar" ;
            PRES_ADJUSTED_ERROR:coordinates = "TIME LATITUDE LONGITUDE PRES
TRAJECTORY" ;
      byte PRES_CORE(TIME, DEPTH) ;
            PRES_CORE:valid_min = 0b ;
            PRES_CORE:valid_max = 1b ;
            PRES_CORE:flag_values = 0b, 1b ;
            PRES_CORE:flag_meanings = "not_pressure_from_core_profile
pressure_from_core_profile" ;
            PRES_CORE:_FillValue = -127b ;
            PRES_CORE:long_name = "Indicator of pressure level from core profile" ;
            PRES_CORE:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
      float TEMP(TIME, DEPTH) ;
            TEMP:_FillValue = 9.96921e+36f ;
            TEMP:long_name = "Sea temperature" ;
            TEMP:standard_name = "sea_water_temperature" ;
            TEMP:units = "degrees_C" ;
            TEMP:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
            TEMP:data_mode = "R" ;
            TEMP:ancillary_variables = "TEMP_QC" ;
      byte TEMP_QC(TIME, DEPTH) ;
            TEMP_QC:_FillValue = -127b ;
            TEMP_QC:long_name = "Sea temperature quality flag" ;
            TEMP_QC:valid_min = 0b ;
            TEMP_QC:valid_max = 9b ;
            TEMP_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            TEMP_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" ;
            TEMP_QC:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
      float TEMP_ADJUSTED(TIME, DEPTH) ;
            TEMP_ADJUSTED:_FillValue = 9.96921e+36f ;
            TEMP_ADJUSTED:long_name = "Sea temperature adjusted" ;
            TEMP_ADJUSTED:standard_name = "sea_water_temperature" ;
            TEMP_ADJUSTED:units = "degrees_C" ;
            TEMP_ADJUSTED:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
            TEMP_ADJUSTED:data_mode = "D" ;
            TEMP_ADJUSTED:ancillary_variables = "TEMP_ADJUSTED_QC
TEMP_ADJUSTED_ERROR" ;
      byte TEMP_ADJUSTED_QC(TIME, DEPTH) ;
            TEMP_ADJUSTED_QC:_FillValue = -127b ;
            TEMP_ADJUSTED_QC:long_name = "Sea temperature adjusted quality flag" ;
            TEMP_ADJUSTED_QC:valid_min = 0b ;
            TEMP_ADJUSTED_QC:valid_max = 9b ;
            TEMP_ADJUSTED_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            TEMP_ADJUSTED_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" ;
            TEMP_ADJUSTED_QC:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY"
;
      float TEMP_ADJUSTED_ERROR(TIME, DEPTH) ;
            TEMP_ADJUSTED_ERROR:_FillValue = 9.96921e+36f ;
            TEMP_ADJUSTED_ERROR:long_name = "Sea temperature adjusted error" ;
            TEMP_ADJUSTED_ERROR:units = "degrees_C" ;
```

```
            TEMP_ADJUSTED_ERROR:coordinates = "TIME LATITUDE LONGITUDE PRES
TRAJECTORY" ;
      float PSAL(TIME, DEPTH) ;
            PSAL:_FillValue = 9.96921e+36f ;
            PSAL:long_name = "Practical salinity" ;
            PSAL:standard_name = "sea_water_practical_salinity" ;
            PSAL:units = "0.001" ;
            PSAL:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
            PSAL:data_mode = "R" ;
            PSAL:ancillary_variables = "PSAL_QC" ;
      byte PSAL_QC(TIME, DEPTH) ;
            PSAL_QC:_FillValue = -127b ;
            PSAL_QC:long_name = "Practical salinity quality flag" ;
            PSAL_QC:valid_min = 0b ;
            PSAL_QC:valid_max = 9b ;
            PSAL_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            PSAL_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" ;
            PSAL_QC:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
      float PSAL_ADJUSTED(TIME, DEPTH) ;
            PSAL_ADJUSTED:_FillValue = 9.96921e+36f ;
            PSAL_ADJUSTED:long_name = "Practical salinity adjusted" ;
            PSAL_ADJUSTED:standard_name = "sea_water_practical_salinity" ;
            PSAL_ADJUSTED:units = "0.001" ;
            PSAL_ADJUSTED:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY" ;
            PSAL_ADJUSTED:data_mode = "D" ;
            PSAL_ADJUSTED:ancillary_variables = "PSAL_ADJUSTED_QC
PSAL_ADJUSTED_ERROR" ;
      byte PSAL_ADJUSTED_QC(TIME, DEPTH) ;
            PSAL_ADJUSTED_QC:_FillValue = -127b ;
            PSAL_ADJUSTED_QC:long_name = "Practical salinity adjusted quality flag"
;
            PSAL_ADJUSTED_QC:valid_min = 0b ;
            PSAL_ADJUSTED_QC:valid_max = 9b ;
            PSAL_ADJUSTED_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            PSAL_ADJUSTED_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" ;
            PSAL_ADJUSTED_QC:coordinates = "TIME LATITUDE LONGITUDE PRES TRAJECTORY"
;
      float PSAL_ADJUSTED_ERROR(TIME, DEPTH) ;
            PSAL_ADJUSTED_ERROR:_FillValue = 9.96921e+36f ;
            PSAL_ADJUSTED_ERROR:long_name = "Practical salinity adjusted error" ;
            PSAL_ADJUSTED_ERROR:units = "0.001" ;
            PSAL_ADJUSTED_ERROR:coordinates = "TIME LATITUDE LONGITUDE PRES
TRAJECTORY" ;

// global attributes:
            :platform_code = "3901661" ;
            :platform_name = "APEX Profiling Float" ;
            :wmo_platform_code = "3901661" ;
            :ices_platform_code = " " ;
            :coriolis_platform_code = "3901661" ;
            :site_code = " " ;
```

```
                :comment = " " ;
                :source = "drifting subsurface profiling float" ;
                :source_platform_category_code = "46" ;
                :institution = "Federal Maritime and Hydrographic Agency (BSH)" ;
                :institution_edmo_code = "1850" ;
                :institution_country = "Germany" ;
                :institution_references = " " ;
                :naming_authority = "Copernicus Marine In Situ" ;
                :title = "Global Ocean - In Situ Observation Copernicus" ;
                :summary = " " ;
                :data_mode = "M" ;
                :wmo_instrument_type = "846" ;
                :area = "Global Ocean" ;
                :geospatial_lat_min = "47.50400" ;
                :geospatial_lat_max = "56.54600" ;
                :geospatial_lon_min = "-45.61000" ;
                :geospatial_lon_max = "-14.86000" ;
                :geospatial_vertical_min = "5.70" ;
                :geospatial_vertical_max = "1999.43" ;
                :time_coverage_start = "2018-05-04T16:36:20Z" ;
                :time_coverage_end = "2021-09-20T08:43:07Z" ;
                :cdm_data_type = "profile" ;
                :featureType = "trajectoryProfile" ;
                :bottom_depth = " " ;
                :last_date_observation = "2021-09-20T08:43:07Z" ;
                :last_latitude_observation = "56.12900" ;
                :last_longitude_observation = "-20.49600" ;
                :references = "http://marine.copernicus.eu http://www.marineinsitu.eu" ;
                :license = "https://marine.copernicus.eu/user-corner/service-
commitments-and-licence" ;
                :update_interval = "P1D" ;
                :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." ;
                :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/10.13155/43494" ;
                :creator_name = "Birgit Klein" ;
                :id = "GL_PR_PF_3901661" ;
                :netcdf_version = "netCDF-4 classic model" ;
                :format_version = "2.0" ;
                :Conventions = "CF-1.11 Copernicus-InSituTAC-FormatManual-2.0.0
Copernicus-InSituTAC-ParametersList-3.3.0 Copernicus-InSituTAC-AttributesList-1.0.0";
                :date_modified = "2023-11-13T09:28:26Z" ;
                :history = "2023-11-13T09:28:26Z : Creation" ;
                :publisher_email = "cmems-service@ifremer.fr" ;
                :publisher_name = "Copernicus Marine Service" ;
                :publisher_url = "https://marine.copernicus.eu/
http://www.marineinsitu.eu/" ;
                :publisher_institution = "Ifremer" ;
}
```

timeSeries spectral

```
netcdf GL_WS_MO_1400012 {
dimensions:
       TIME = 1793 ;
       STRLEN = 7 ;
       FREQUENCY = 64 ;
       nv = 2 ;
variables:
       double TIME(TIME) ;
              TIME:long_name = "Time" ;
              TIME:standard_name = "time" ;
              TIME:axis = "T" ;
              TIME:units = "days since 1950-01-01T00:00:00Z" ;
              TIME:valid_min = -90000. ;
              TIME:valid_max = 90000. ;
              TIME:uncertainty = " " ;
              TIME:ancillary_variables = "TIME_QC" ;
              TIME:calendar = "standard" ;
       byte TIME_QC(TIME) ;
              TIME_QC:long_name = "Time quality flag" ;
              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:long_name = "Latitude of each location" ;
              LATITUDE:standard_name = "latitude" ;
              LATITUDE:axis = "Y" ;
              LATITUDE:units = "degree_north" ;
              LATITUDE:valid_min = -90.f ;
              LATITUDE:valid_max = 90.f ;
              LATITUDE:uncertainty = " " ;
       float LONGITUDE ;
              LONGITUDE:long_name = "Longitude of each location" ;
              LONGITUDE:standard_name = "longitude" ;
              LONGITUDE:axis = "X" ;
              LONGITUDE:units = "degree_east" ;
              LONGITUDE:valid_min = -180.f ;
              LONGITUDE:valid_max = 180.f ;
              LONGITUDE:uncertainty = " " ;
       char STATION(STRLEN) ;
              STATION:long_name = "station" ;
              STATION:cf_role = "timeseries_id" ;
       float FREQ(TIME, FREQUENCY) ;
              FREQ:long_name = "Central frequency of the band" ;
              FREQ:standard_name = "wave_frequency" ;
              FREQ:units = "s-1" ;
              FREQ:_FillValue = 9.96921e+36f ;
              FREQ:bounds = "FREQ_BOUNDS" ;
```

```
            FREQ:uncertainty = " " ;
            FREQ:ancillary_variables = "FREQ_QC" ;
      byte FREQ_QC(TIME, FREQUENCY) ;
            FREQ_QC:long_name = "Central frequency of the band quality flag" ;
            FREQ_QC:_FillValue = -127b ;
            FREQ_QC:valid_min = 0b ;
            FREQ_QC:valid_max = 9b ;
            FREQ_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            FREQ_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 FREQ_BOUNDS(TIME, FREQUENCY, nv) ;
      float STHETA2(TIME, FREQUENCY) ;
            STHETA2:long_name = "Directional spread around THETA2" ;
            STHETA2:standard_name = "sea_surface_wave_directional_spread" ;
            STHETA2:units = "degree" ;
            STHETA2:_FillValue = 9.96921e+36f ;
            STHETA2:type_of_analysis = "2nd order spectral analysis" ;
            STHETA2:ancillary_variables = "STHETA2_QC" ;
            STHETA2:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
            STHETA2:data_mode = "D" ;
      byte STHETA2_QC(TIME, FREQUENCY) ;
            STHETA2_QC:long_name = "Directional spread around THETA2 quality flag" ;
            STHETA2_QC:_FillValue = -127b ;
            STHETA2_QC:valid_min = 0b ;
            STHETA2_QC:valid_max = 9b ;
            STHETA2_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            STHETA2_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" ;
            STHETA2_QC:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
      float VSPEC1D(TIME, FREQUENCY) ;
            VSPEC1D:long_name = "Wave scalar spectral density" ;
            VSPEC1D:standard_name = "sea_surface_wave_variance_spectral_density" ;
            VSPEC1D:units = "m2 s" ;
            VSPEC1D:_FillValue = 9.96921e+36f ;
            VSPEC1D:type_of_analysis = "1st order spectral analysis" ;
            VSPEC1D:ancillary_variables = "VSPEC1D_QC" ;
            VSPEC1D:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
            VSPEC1D:data_mode = "D" ;
      byte VSPEC1D_QC(TIME, FREQUENCY) ;
            VSPEC1D_QC:long_name = "Wave scalar spectral density quality flag" ;
            VSPEC1D_QC:_FillValue = -127b ;
            VSPEC1D_QC:valid_min = 0b ;
            VSPEC1D_QC:valid_max = 9b ;
            VSPEC1D_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            VSPEC1D_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" ;
            VSPEC1D_QC:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
      float STHETA1(TIME, FREQUENCY) ;
            STHETA1:long_name = "Directional spread around THETA1" ;
            STHETA1:standard_name = "sea_surface_wave_directional_spread" ;
            STHETA1:units = "degree" ;
            STHETA1:_FillValue = 9.96921e+36f ;
```

```
            STHETA1:type_of_analysis = "1st order spectral analysis" ;
            STHETA1:ancillary_variables = "STHETA1_QC" ;
            STHETA1:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
            STHETA1:data_mode = "D" ;
      byte STHETA1_QC(TIME, FREQUENCY) ;
            STHETA1_QC:long_name = "Directional spread around THETA1 quality flag" ;
            STHETA1_QC:_FillValue = -127b ;
            STHETA1_QC:valid_min = 0b ;
            STHETA1_QC:valid_max = 9b ;
            STHETA1_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            STHETA1_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" ;
            STHETA1_QC:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
      float THETA2(TIME, FREQUENCY) ;
            THETA2:long_name = "Principal wave from direction" ;
            THETA2:standard_name = "sea_surface_wave_from_direction" ;
            THETA2:units = "degree" ;
            THETA2:_FillValue = 9.96921e+36f ;
            THETA2:type_of_analysis = "2nd order spectral analysis" ;
            THETA2:direction_reference = "True North" ;
            THETA2:direction_convention = "clockwise from North" ;
            THETA2:ancillary_variables = "THETA2_QC" ;
            THETA2:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
            THETA2:data_mode = "D" ;
      byte THETA2_QC(TIME, FREQUENCY) ;
            THETA2_QC:long_name = "Principal wave from direction quality flag" ;
            THETA2_QC:_FillValue = -127b ;
            THETA2_QC:valid_min = 0b ;
            THETA2_QC:valid_max = 9b ;
            THETA2_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            THETA2_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" ;
            THETA2_QC:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
      float THETA1(TIME, FREQUENCY) ;
            THETA1:long_name = "Mean wave from direction" ;
            THETA1:standard_name = "sea_surface_wave_from_direction" ;
            THETA1:units = "degree" ;
            THETA1:_FillValue = 9.96921e+36f ;
            THETA1:type_of_analysis = "1st order spectral analysis" ;
            THETA1:direction_reference = "True North" ;
            THETA1:direction_convention = "clockwise from North" ;
            THETA1:ancillary_variables = "THETA1_QC" ;
            THETA1:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;
            THETA1:data_mode = "D" ;
      byte THETA1_QC(TIME, FREQUENCY) ;
            THETA1_QC:long_name = "Mean wave from direction quality flag" ;
            THETA1_QC:_FillValue = -127b ;
            THETA1_QC:valid_min = 0b ;
            THETA1_QC:valid_max = 9b ;
            THETA1_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            THETA1_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" ;
```

```
            THETA1_QC:coordinates = "TIME LATITUDE LONGITUDE FREQ STATION" ;

// global attributes:
            :platform_code = "1400012" ;
            :format_version = "2.0" ;
            :date_modified = "2023-11-07T18:53:28Z" ;
            :history = "2023-11-07T18:53:28Z : Creation" ;
            :institution = "CEREMA Centre Etudes et Expertise sur les Risques
Environnement Mobilité et Aménagement" ;
            :institution_edmo_code = "4533" ;
            :institution_references = "" ;
            :institution_country = "FRANCE" ;
            :site_code = " " ;
            :wmo_platform_code = "1400012" ;
            :ices_platform_code = " " ;
            :platform_name = "Port Reunion Est" ;
            :source = "moored surface buoy" ;
            :source_platform_category_code = "41" ;
            :wmo_instrument_type = " " ;
            :references = "http://marine.copernicus.eu http://www.marineinsitu.eu" ;
            :comment = " " ;
            :Conventions = "CF-1.11 Copernicus-InSituTAC-FormatManual-2.0.0
Copernicus-InSituTAC-ParametersList-3.3.0 Copernicus-InSituTAC-AttributesList-1.0.0"
;
            :netcdf_version = "netCDF-4 classic model" ;
            :title = "Global Ocean - In Situ Observation Copernicus" ;
            :summary = " " ;
            :naming_authority = "Copernicus Marine In Situ" ;
            :id = "GL_WS_MO_1400012" ;
            :cdm_data_type = "timeSeries" ;
            :featureType = "timeSeries" ;
            :area = "Global Ocean" ;
            :geospatial_lat_min = "-20.92452" ;
            :geospatial_lat_max = "-20.92452" ;
            :geospatial_lon_min = "55.3242" ;
            :geospatial_lon_max = "55.3242" ;
            :geospatial_vertical_min = "0.00" ;
            :geospatial_vertical_max = "0.00" ;
            :geospatial_vertical_positive = "down" ;
            :time_coverage_start = "2023-03-01T00:00:00Z" ;
            :time_coverage_end = "2023-04-18T05:00:00Z" ;
            :bottom_depth = " " ;
            :last_date_observation = "2023-04-18T05:00:00Z" ;
            :publisher_email = "cmems-service@ifremer.fr" ;
            :publisher_url = "https://marine.copernicus.eu/
http://www.marineinsitu.eu/" ;
            :publisher_name = "Copernicus Marine Service" ;
            :publisher_institution = "Ifremer" ;
            :creator_name = "Coriolis for Copernicus Marine service" ;
            :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/10.13155/43494" ;
            :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." ;
```

```
            :update_interval = "P1M" ;
            :license = "https://marine.copernicus.eu/user-corner/service-
commitments-and-licence" ;
            :last_latitude_observation = "-20.92452" ;
            :last_longitude_observation = "55.3242" ;
            :data_mode = "D" ;
}
```

grid radarTotal

```
netcdf GL_TV_HF_HFR-Ibiza-Total_20240115 {
dimensions:
        LATITUDE = 30 ;
        LONGITUDE = 27 ;
        TIME = 24 ;
        DEPTH = 1 ;
        MAXSITE = 150 ;
        STRING4 = 4 ;
        STRING9 = 9 ;
        STRING15 = 15 ;
        STRING36 = 36 ;
        MAXINST = 50 ;
        STRING98 = 98 ;
        REFMAX = 1 ;
        STRING159 = 159 ;
variables:
        float LATITUDE(LATITUDE) ;
                LATITUDE:axis = "Y" ;
                LATITUDE:standard_name = "latitude" ;
                LATITUDE:long_name = "Latitude of each location" ;
                LATITUDE:units = "degree_north" ;
                LATITUDE:valid_min = -90.f ;
                LATITUDE:valid_max = 90.f ;
                LATITUDE:uncertainty = "" ;
                LATITUDE:sdn_parameter_name = "Latitude north" ;
                LATITUDE:sdn_parameter_urn = "SDN:P01::ALATZZ01" ;
                LATITUDE:sdn_uom_name = "Degrees north" ;
                LATITUDE:sdn_uom_urn = "SDN:P06::DEGN" ;
                LATITUDE:grid_mapping = "crs" ;
                LATITUDE:ancillary_variables = "POSITION_QC" ;
        float LONGITUDE(LONGITUDE) ;
                LONGITUDE:axis = "X" ;
                LONGITUDE:standard_name = "longitude" ;
                LONGITUDE:long_name = "Longitude of each location" ;
                LONGITUDE:units = "degree_east" ;
                LONGITUDE:valid_min = -180.f ;
                LONGITUDE:valid_max = 180.f ;
                LONGITUDE:uncertainty = "" ;
                LONGITUDE:sdn_parameter_name = "Longitude east" ;
                LONGITUDE:sdn_parameter_urn = "SDN:P01::ALONZZ01" ;
                LONGITUDE:sdn_uom_name = "Degrees east" ;
                LONGITUDE:sdn_uom_urn = "SDN:P06::DEGE" ;
                LONGITUDE:grid_mapping = "crs" ;
                LONGITUDE:ancillary_variables = "POSITION_QC" ;
        short GDOP(TIME, DEPTH, LATITUDE, LONGITUDE) ;
                GDOP:_FillValue = -32767s ;
                GDOP:long_name = "Geometrical dilution of precision" ;
                GDOP:standard_name = " " ;
                GDOP:units = "1" ;
                GDOP:valid_min = -20000s ;
                GDOP:valid_max = 20000s ;
```

```
            GDOP:comment = "The Geometric Dilution of Precision (GDOP) is the
coefficient of the uncertainty, which relates the uncertainties in radial and
velocity vectors. The GDOP is a unit-less coefficient, which characterizes the effect
that radar station geometry has on the measurement and position determination errors.
A low GDOP corresponds to an optimal geometric configuration of radar stations, and
results in accurate surface current data. Essentially, GDOP is a quantitative way to
relate the radial and velocity vector uncertainties. Setting a threshold on GDOP for
total combination avoids the combination of radials with an intersection angle below
a certain value. GDOP is a useful metric for filtering errant velocities due to poor
geometry." ;
            GDOP:sdn_parameter_name = "Dilution of precision " ;
            GDOP:sdn_parameter_urn = "SDN:S06::S0600236" ;
            GDOP:sdn_uom_name = "Dimensionless" ;
            GDOP:sdn_uom_urn = "SDN:P06::UUUU" ;
            GDOP:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            GDOP:ancillary_variables = "QCflag GDOP_QC" ;
            GDOP:data_mode = "R" ;
            GDOP:add_offset = 0. ;
            GDOP:scale_factor = 0.001 ;
      byte DDNS_QC(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            DDNS_QC:_FillValue = -127b ;
            DDNS_QC:long_name = "Data density threshold quality flag" ;
            DDNS_QC:valid_min = 0b ;
            DDNS_QC:valid_max = 9b ;
            DDNS_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            DDNS_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" ;
            DDNS_QC:comment = "OceanSITES quality flagging for Data density
threshold QC test.  Data Density Threshold QC Test - Test applies to each vector.
Threshold=[minimum number of contributing radial velocities=3]" ;
            DDNS_QC:units = "1" ;
            DDNS_QC:add_offset = 0 ;
            DDNS_QC:scale_factor = 1 ;
      byte CSPD_QC(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            CSPD_QC:_FillValue = -127b ;
            CSPD_QC:long_name = "Velocity threshold quality flag" ;
            CSPD_QC:valid_min = 0b ;
            CSPD_QC:valid_max = 9b ;
            CSPD_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            CSPD_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" ;
            CSPD_QC:comment = "OceanSITES quality flagging for Velocity threshold QC
test.  Velocity Threshold QC Test - Test applies to each vector. Threshold=[maximum
velocity=0.7 (m/s)]" ;
            CSPD_QC:units = "1" ;
            CSPD_QC:add_offset = 0 ;
            CSPD_QC:scale_factor = 1 ;
      byte VART_QC(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            VART_QC:_FillValue = -127b ;
            VART_QC:long_name = "Variance threshold quality flag" ;
            VART_QC:valid_min = 0b ;
            VART_QC:valid_max = 9b ;
            VART_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
```

```
            VART_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" ;
            VART_QC:comment = "OceanSITES quality flagging for variance threshold QC
test.  Variance Threshold QC Test not applicable to Direction Finding systems.
Temporal Derivative QC Test - Test applies to each vector. Threshold=[velocity
difference threshold=1.0 (m/s)]" ;
            VART_QC:units = "1" ;
            VART_QC:add_offset = 0 ;
            VART_QC:scale_factor = 1 ;
      byte GDOP_QC(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            GDOP_QC:_FillValue = -127b ;
            GDOP_QC:long_name = "GDOP threshold quality flag" ;
            GDOP_QC:valid_min = 0b ;
            GDOP_QC:valid_max = 9b ;
            GDOP_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            GDOP_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" ;
            GDOP_QC:comment = "OceanSITES quality flagging for GDOP threshold QC
test.  GDOP Threshold QC Test - Test applies to each vector. Threshold=[GDOP
threshold=2.83]" ;
            GDOP_QC:units = "1" ;
            GDOP_QC:add_offset = 0 ;
            GDOP_QC:scale_factor = 1 ;
      byte QCflag(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            QCflag:_FillValue = -127b ;
            QCflag:long_name = "Overall quality flag" ;
            QCflag:valid_min = 0b ;
            QCflag:valid_max = 9b ;
            QCflag:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            QCflag: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" ;
            QCflag:comment = "OceanSITES quality flagging for all QC tests  Overall
QC Flag - Test applies to each vector. Test checks if all QC tests are passed." ;
            QCflag:units = "1" ;
            QCflag:add_offset = 0 ;
            QCflag:scale_factor = 1 ;
      short EWCT(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            EWCT:_FillValue = -32767s ;
            EWCT:valid_min = -10000s ;
            EWCT:valid_max = 10000s ;
            EWCT:standard_name = "eastward_sea_water_velocity" ;
            EWCT:long_name = "West-east current component" ;
            EWCT:units = "m s-1" ;
            EWCT:sdn_parameter_name = "Eastward current velocity in the water body"
;
            EWCT:sdn_parameter_urn = "SDN:P01::LCEWZZ01" ;
            EWCT:sdn_uom_name = "Metres per second" ;
            EWCT:sdn_uom_urn = "SDN:P06::UVAA" ;
            EWCT:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            EWCT:ancillary_variables = "QCflag VART_QC CSPD_QC DDNS_QC GDOP_QC" ;
            EWCT:data_mode = "R" ;
            EWCT:add_offset = 0. ;
```

```
            EWCT:scale_factor = 0.001 ;
      short NSCT(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            NSCT:_FillValue = -32767s ;
            NSCT:valid_min = -10000s ;
            NSCT:valid_max = 10000s ;
            NSCT:standard_name = "northward_sea_water_velocity" ;
            NSCT:long_name = "South-north current component" ;
            NSCT:units = "m s-1" ;
            NSCT:sdn_parameter_name = "Northward current velocity in the water body"
;
            NSCT:sdn_parameter_urn = "SDN:P01::LCNSZZ01" ;
            NSCT:sdn_uom_name = "Metres per second" ;
            NSCT:sdn_uom_urn = "SDN:P06::UVAA" ;
            NSCT:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            NSCT:ancillary_variables = "QCflag VART_QC CSPD_QC DDNS_QC GDOP_QC" ;
            NSCT:data_mode = "R" ;
            NSCT:add_offset = 0. ;
            NSCT:scale_factor = 0.001 ;
      short EWCS(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            EWCS:_FillValue = -32767s ;
            EWCS:valid_min = -10000s ;
            EWCS:valid_max = 10000s ;
            EWCS:long_name = "Standard deviation of surface eastward sea water
velocity" ;
            EWCS:standard_name = " " ;
            EWCS:units = "m s-1" ;
            EWCS:sdn_parameter_name = "Eastward current velocity standard deviation
in the water body" ;
            EWCS:sdn_parameter_urn = "SDN:P01::SDEWZZZZ" ;
            EWCS:sdn_uom_name = "Metres per second" ;
            EWCS:sdn_uom_urn = "SDN:P06::UVAA" ;
            EWCS:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            EWCS:ancillary_variables = "QCflag VART_QC" ;
            EWCS:data_mode = "R" ;
            EWCS:add_offset = 0. ;
            EWCS:scale_factor = 0.001 ;
      short NSCS(TIME, DEPTH, LATITUDE, LONGITUDE) ;
            NSCS:_FillValue = -32767s ;
            NSCS:valid_min = -10000s ;
            NSCS:valid_max = 10000s ;
            NSCS:long_name = "Standard deviation of surface northward sea water
velocity" ;
            NSCS:standard_name = " " ;
            NSCS:units = "m s-1" ;
            NSCS:sdn_parameter_name = "Northward current velocity standard deviation
in the water body" ;
            NSCS:sdn_parameter_urn = "SDN:P01::SDNSZZZZ" ;
            NSCS:sdn_uom_name = "Metres per second" ;
            NSCS:sdn_uom_urn = "SDN:P06::UVAA" ;
            NSCS:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            NSCS:ancillary_variables = "QCflag VART_QC" ;
            NSCS:data_mode = "R" ;
            NSCS:add_offset = 0. ;
            NSCS:scale_factor = 0.001 ;
      int CCOV(TIME, DEPTH, LATITUDE, LONGITUDE) ;
```

```
        CCOV:_FillValue = -2147483647 ;
        CCOV:long_name = "Covariance of surface sea water velocity" ;
        CCOV:standard_name = " " ;
        CCOV:units = "m2 s-2" ;
        CCOV:valid_min = -10000000 ;
        CCOV:valid_max = 10000000 ;
        CCOV:sdn_parameter_name = " " ;
        CCOV:sdn_parameter_urn = " " ;
        CCOV:sdn_uom_name = "Square metres per second squared" ;
        CCOV:sdn_uom_urn = "SDN:P06::SQM2" ;
        CCOV:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
        CCOV:ancillary_variables = "QCflag" ;
        CCOV:data_mode = "R" ;
        CCOV:add_offset = 0. ;
        CCOV:scale_factor = 1.e-06 ;
byte NARX(TIME, MAXSITE) ;
        NARX:_FillValue = -127b ;
        NARX:long_name = "Number of receive antennas" ;
        NARX:standard_name = " " ;
        NARX:valid_min = 0b ;
        NARX:valid_max = 127b ;
        NARX:units = "1" ;
        NARX:sdn_parameter_name = "" ;
        NARX:sdn_parameter_urn = "" ;
        NARX:sdn_uom_name = "Dimensionless" ;
        NARX:sdn_uom_urn = "SDN:P06::UUUU" ;
        NARX:data_mode = "R" ;
        NARX:add_offset = 0 ;
        NARX:scale_factor = 1 ;
byte NATX(TIME, MAXSITE) ;
        NATX:_FillValue = -127b ;
        NATX:long_name = "Number of transmit antennas" ;
        NATX:standard_name = " " ;
        NATX:valid_min = 0b ;
        NATX:valid_max = 127b ;
        NATX:units = "1" ;
        NATX:sdn_parameter_name = "" ;
        NATX:sdn_parameter_urn = "" ;
        NATX:sdn_uom_name = "Dimensionless" ;
        NATX:sdn_uom_urn = "SDN:P06::UUUU" ;
        NATX:data_mode = "R" ;
        NATX:add_offset = 0 ;
        NATX:scale_factor = 1 ;
int SLTR(TIME, MAXSITE) ;
        SLTR:_FillValue = -2147483647 ;
        SLTR:long_name = "Receive antenna latitudes" ;
        SLTR:standard_name = "latitude" ;
        SLTR:valid_min = -90000 ;
        SLTR:valid_max = 90000 ;
        SLTR:units = "degree_north" ;
        SLTR:sdn_parameter_name = "Latitude north" ;
        SLTR:sdn_parameter_urn = "SDN:P01::ALATZZ01" ;
        SLTR:sdn_uom_name = "Degrees north" ;
        SLTR:sdn_uom_urn = "SDN:P06::DEGN" ;
        SLTR:coordinates = "TIME MAXSITE" ;
```

```
        SLTR:data_mode = "R" ;
        SLTR:add_offset = 0. ;
        SLTR:scale_factor = 0.001 ;
int SLNR(TIME, MAXSITE) ;
        SLNR:_FillValue = -2147483647 ;
        SLNR:long_name = "Receive antenna longitudes" ;
        SLNR:standard_name = "longitude" ;
        SLNR:valid_min = -180000 ;
        SLNR:valid_max = 180000 ;
        SLNR:units = "degree_east" ;
        SLNR:sdn_parameter_name = "Longitude east" ;
        SLNR:sdn_parameter_urn = "SDN:P01::ALONZZ01" ;
        SLNR:sdn_uom_name = "Degrees east" ;
        SLNR:sdn_uom_urn = "SDN:P06::DEGE" ;
        SLNR:coordinates = "TIME MAXSITE" ;
        SLNR:data_mode = "R" ;
        SLNR:add_offset = 0. ;
        SLNR:scale_factor = 0.001 ;
int SLTT(TIME, MAXSITE) ;
        SLTT:_FillValue = -2147483647 ;
        SLTT:long_name = "Transmit antenna latitudes" ;
        SLTT:standard_name = "latitude" ;
        SLTT:valid_min = -90000 ;
        SLTT:valid_max = 90000 ;
        SLTT:units = "degree_north" ;
        SLTT:sdn_parameter_name = "Latitude north" ;
        SLTT:sdn_parameter_urn = "SDN:P01::ALATZZ01" ;
        SLTT:sdn_uom_name = "Degrees north" ;
        SLTT:sdn_uom_urn = "SDN:P06::DEGN" ;
        SLTT:coordinates = "TIME MAXSITE" ;
        SLTT:data_mode = "R" ;
        SLTT:add_offset = 0. ;
        SLTT:scale_factor = 0.001 ;
int SLNT(TIME, MAXSITE) ;
        SLNT:_FillValue = -2147483647 ;
        SLNT:long_name = "Transmit antenna longitudes" ;
        SLNT:standard_name = "longitude" ;
        SLNT:valid_min = -180000 ;
        SLNT:valid_max = 180000 ;
        SLNT:units = "degree_east" ;
        SLNT:sdn_parameter_name = "Longitude east" ;
        SLNT:sdn_parameter_urn = "SDN:P01::ALONZZ01" ;
        SLNT:sdn_uom_name = "Degrees east" ;
        SLNT:sdn_uom_urn = "SDN:P06::DEGE" ;
        SLNT:coordinates = "TIME MAXSITE" ;
        SLNT:data_mode = "R" ;
        SLNT:add_offset = 0. ;
        SLNT:scale_factor = 0.001 ;
char SCDR(TIME, MAXSITE, STRING4) ;
        SCDR:_FillValue = " " ;
        SCDR:long_name = "Receive antenna codes" ;
        SCDR:standard_name = " " ;
        SCDR:units = 1 ;
        SCDR:sdn_parameter_name = " " ;
        SCDR:sdn_parameter_urn = " " ;
```

```
                SCDR:sdn_uom_name = "Dimensionless" ;
                SCDR:sdn_uom_urn = "SDN:P06::UUUU" ;
                SCDR:data_mode = "R" ;
        char SCDT(TIME, MAXSITE, STRING4) ;
                SCDT:_FillValue = " " ;
                SCDT:long_name = "Transmit antenna codes" ;
                SCDT:standard_name = " " ;
                SCDT:units = 1 ;
                SCDT:sdn_parameter_name = " " ;
                SCDT:sdn_parameter_urn = " " ;
                SCDT:sdn_uom_name = "Dimensionless" ;
                SCDT:sdn_uom_urn = "SDN:P06::UUUU" ;
                SCDT:data_mode = "R" ;
        char SDN_CRUISE(TIME, STRING9) ;
                SDN_CRUISE:long_name = "Grid grouping label" ;
        char SDN_STATION(TIME, STRING15) ;
                SDN_STATION:long_name = "Grid label" ;
        char SDN_LOCAL_CDI_ID(TIME, STRING36) ;
                SDN_LOCAL_CDI_ID:long_name = "SeaDataNet CDI identifier" ;
                SDN_LOCAL_CDI_ID:cf_role = "grid_id" ;
        short SDN_EDMO_CODE(TIME, MAXINST) ;
                SDN_EDMO_CODE:_FillValue = -32767s ;
                SDN_EDMO_CODE:long_name = "European Directory of Marine Organisations
code for the CDI partner" ;
                SDN_EDMO_CODE:units = "1" ;
        char SDN_REFERENCES(TIME, STRING98) ;
                SDN_REFERENCES:long_name = "Usage metadata reference" ;
        char SDN_XLINK(TIME, REFMAX, STRING159) ;
                SDN_XLINK:long_name = "External resource linkages" ;
        byte TIME_QC(TIME) ;
                TIME_QC:_FillValue = -127b ;
                TIME_QC:long_name = "Time quality flag" ;
                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" ;
                TIME_QC:comment = "OceanSITES quality flagging for temporal coordinate"
;
                TIME_QC:units = "1" ;
                TIME_QC:add_offset = 0 ;
                TIME_QC:scale_factor = 1 ;
        byte POSITION_QC(TIME, DEPTH, LATITUDE, LONGITUDE) ;
                POSITION_QC:_FillValue = -127b ;
                POSITION_QC:long_name = "Position quality flag" ;
                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" ;
                POSITION_QC:comment = "OceanSITES quality flagging for position
coordinates" ;
                POSITION_QC:units = "1" ;
```

```
            POSITION_QC:add_offset = 0 ;
            POSITION_QC:scale_factor = 1 ;
      byte DEPH_QC(TIME) ;
            DEPH_QC:_FillValue = -127b ;
            DEPH_QC:long_name = "Depth quality flag" ;
            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" ;
            DEPH_QC:comment = "OceanSITES quality flagging for depth coordinate" ;
            DEPH_QC:units = "1" ;
            DEPH_QC:add_offset = 0 ;
            DEPH_QC:scale_factor = 1 ;
      double TIME(TIME) ;
            TIME:axis = "T" ;
            TIME:long_name = "Time" ;
            TIME:standard_name = "time" ;
            TIME:valid_min = -90000. ;
            TIME:valid_max = 90000. ;
            TIME:uncertainty = "" ;
            TIME:sdn_parameter_name = "Elapsed time (since 1950-01-01T00:00:00Z)" ;
            TIME:sdn_parameter_urn = "SDN:P01::ELTJLD01" ;
            TIME:sdn_uom_name = "Days" ;
            TIME:sdn_uom_urn = "SDN:P06::UTAA" ;
            TIME:ancillary_variables = "TIME_QC" ;
            TIME:units = "days since 1950-01-01T00:00:00Z" ;
            TIME:calendar = "standard" ;
      float DEPH(DEPTH) ;
            DEPH:_FillValue = 9.96921e+36f ;
            DEPH:axis = "Z" ;
            DEPH:long_name = "Depth" ;
            DEPH:standard_name = "depth" ;
            DEPH:units = "m" ;
            DEPH:positive = "down" ;
            DEPH:reference = "sea_level" ;
            DEPH:valid_min = -12000.f ;
            DEPH:valid_max = 12000.f ;
            DEPH:uncertainty = "" ;
            DEPH:sdn_parameter_name = "Depth below surface of the water body" ;
            DEPH:sdn_parameter_urn = "SDN:P01::ADEPZZ01" ;
            DEPH:sdn_uom_name = "Metres" ;
            DEPH:sdn_uom_urn = "SDN:P06::ULAA" ;
            DEPH:ancillary_variables = "DEPH_QC" ;
            DEPH:data_mode = "R" ;
      short crs ;
            crs:grid_mapping_name = "latitude_longitude" ;
            crs:epsg_code = "EPSG:4326" ;
            crs:semi_major_axis = 6378137. ;
            crs:inverse_flattening = 298.257223563 ;

// global attributes:
            :site_code = "HFR-Ibiza" ;
            :platform_code = "HFR-Ibiza-Total" ;
```

```
            :platform_name = "HFR-Ibiza-Total" ;
            :ices_platform_code = "" ;
            :wmo_platform_code = "" ;
            :data_mode = "R" ;
            :doa_estimation_method = "FORM: Direction Finding; GALF: Direction
Finding" ;
            :calibration_type = "FORM: APM; GALF: APM" ;
            :last_calibration_date = "FORM: 2020-03-03T00:00:00Z; GALF: 2017-01-
26T00:00:00Z" ;
            :calibration_link = "FORM: ereyes@socib.es; GALF: ereyes@socib.es" ;
            :title = "Global Ocean - In Situ Observation Copernicus" ;
            :summary = "The data set consists of real-time continuous coastal ocean
surface current maps in the Ibiza Channel (Western Mediterranean) averaged over a
time interval of 1 hour around the cardinal hour, measured by the coastal High-
Frequency Radars installed. Surface ocean velocities estimated by HF Radar are
representative of the upper 0.9 meters of the ocean for a central frequency of 13.5
MHz. " ;
            :source = "coastal structure" ;
            :source_platform_category_code = "17" ;
            :wmo_instrument_type = "" ;
            :institution = "SOCIB - Balearic Islands Coastal Observing and
forecasting System" ;
            :institution_abbreviated = "" ;
            :institution_country = "" ;
            :institution_edmo_code = "3410" ;
            :institution_references = "https://www.socib.es/ https://www.socib.es" ;
            :id = "GL_TV_HF_HFR-Ibiza-Total_20240115" ;
            :project = "Jerico-Next; INCREASE; CMEMS-INSTAC phase2" ;
            :project_edmerp_code = "" ;
            :naming_authority = "Copernicus Marine In Situ" ;
            :keywords = "OCEAN CURRENTS, SURFACE WATER, RADAR, SCR-HF" ;
            :keywords_vocabulary = "GCMD Science Keywords" ;
            :comment = "HFR is nowadays the unique land-based remote sensing
technology providing continuous maps of near-real surface currents (0.9m) over wide
areas (out of about 85 km from near shore) whit high-spatial (3 km) and temporal
resolution (hourly). Two or mode HFR sites are needed for computing the map of total
surface current vectors in the overlapping coverage area. Total velocities are
derived using least square fit that maps radial velocities measured from individual
sites onto a cartesian grid. The final product is a map of the horizontal components
of the ocean currents on a regular grid in the area of overlap of two or more radar
stations." ;
            :network = "HFR_Ibiza" ;
            :geospatial_lat_min = "38.3095" ;
            :geospatial_lat_max = "39.12019" ;
            :geospatial_lat_resolution = "3.0" ;
            :geospatial_lat_units = "degree_north" ;
            :geospatial_lon_min = "0.48664" ;
            :geospatial_lon_max = "1.4179" ;
            :geospatial_lon_resolution = "3.0" ;
            :geospatial_lon_units = "degree_east" ;
            :geospatial_vertical_min = "0" ;
            :geospatial_vertical_max = "0.8841941282883076" ;
            :geospatial_vertical_positive = "down" ;
            :geospatial_vertical_resolution = "0.8841941282883076" ;
            :geospatial_vertical_units = "EPSG:4326" ;
```

:spatial_resolution = "3.0" ;
:time_coverage_start = "2024-01-14T23:30:00Z" ;
:time_coverage_end = "2024-01-15T23:30:00Z" ;
:time_coverage_resolution = "PT1H" ;
:time_coverage_duration = "P1DT0H0M0S" ;
:area = "Ibiza Channel" ;
:bottom_depth = "" ;
:cdm_data_type = "grid" ;
:format_version = "2.0" ;
:Conventions = "CF-1.11 Copernicus-InSituTAC-FormatManual-2.0.0 Copernicus-InSituTAC-ParametersList-3.3.0 Copernicus-InSituTAC-AttributesList-1.0.0" ;
:netcdf_version = "netCDF-4 classic model" ;
:update_interval = "void" ;
: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. These data are collected and processed by SOCIB (Balearic Island Coastal and Observing Forecasting System) with the support of different projects: Jerico-Next, INCREASE, CMEMS-INSTAC phase II and IBISAR" ;
:publisher_name = "Copernicus Marine Service" ;
:publisher_url = "https://marine.copernicus.eu/ http://www.marineinsitu.eu/" ;
:publisher_email = "cmems-service@ifremer.fr" ;
:publisher_institution = "European HFR Node" ;
:license = "https://marine.copernicus.eu/user-corner/service-commitments-and-licence" ;
:date_created = "2024-01-15T23:47:28Z" ;
:history = "Data measured from 2024-01-14T23:30:00Z to 2024-01-15T23:30:00Z. netCDF file created at 2024-01-15T23:47:28Z by the European HFR Node." ;
:date_modified = "2024-01-15T23:47:28Z" ;
:processing_level = "3B" ;
:creator_name = "Lorenzo Corgnati" ;
:creator_email = "lorenzo.corgnati@sp.ismar.cnr.it" ;
:creator_url = "https://www.hfrnode.eu/" ;
:creator_type = "person" ;
:manufacturer = "FORM: CODAR SeaSonde, GALF: CODAR SeaSonde" ;
:sensor_model = "FORM: CODAR SeaSonde, GALF: CODAR SeaSonde" ;
:doi = "" ;
:references = "http://marine.copernicus.eu http://www.marineinsitu.eu http://www.marineinsitu.eu/wp-content/uploads/2018/02/HFR_Data_Model_Reference_Card_v1.pdf" ;
}

grid radarRadial

```
netcdf GL_RV_HF_HFR-Ibiza-FORM_20240115 {
dimensions:
	RNGE = 79 ;
	BEAR = 72 ;
	TIME = 24 ;
	DEPTH = 1 ;
	MAXSITE = 1 ;
	STRING4 = 4 ;
	STRING9 = 9 ;
	STRING14 = 14 ;
	STRING35 = 35 ;
	MAXINST = 1 ;
	STRING98 = 98 ;
	REFMAX = 1 ;
	STRING159 = 159 ;
variables:
	float RNGE(RNGE) ;
		RNGE:axis = "Y" ;
		RNGE:valid_min = 0.f ;
		RNGE:valid_max = 90000.f ;
		RNGE:uncertainty = " " ;
		RNGE:long_name = "Range away from instrument" ;
		RNGE:standard_name = " " ;
		RNGE:units = "km" ;
		RNGE:sdn_parameter_name = "Range (from fixed reference point) by
unspecified GPS system" ;
		RNGE:sdn_parameter_urn = "SDN:P01::RIFNAX01" ;
		RNGE:sdn_uom_name = "Kilometres" ;
		RNGE:sdn_uom_urn = "SDN:P06::ULKM" ;
		RNGE:ancillary_variables = "POSITION_QC" ;
	float BEAR(BEAR) ;
		BEAR:axis = "X" ;
		BEAR:valid_min = 0.f ;
		BEAR:valid_max = 360.f ;
		BEAR:uncertainty = "" ;
		BEAR:long_name = "Bearing away from instrument" ;
		BEAR:standard_name = " " ;
		BEAR:units = "degree_true" ;
		BEAR:sdn_parameter_name = "Bearing" ;
		BEAR:sdn_parameter_urn = "SDN:P01::BEARRFTR" ;
		BEAR:sdn_uom_name = "Degrees true" ;
		BEAR:sdn_uom_urn = "SDN:P06::UABB" ;
		BEAR:ancillary_variables = "POSITION_QC" ;
	short ESPC(TIME, DEPTH, RNGE, BEAR) ;
		ESPC:_FillValue = -32767s ;
		ESPC:long_name = "Radial standard deviation of current velocity over the
scatter patch" ;
		ESPC:standard_name = " " ;
		ESPC:valid_min = -32000s ;
		ESPC:valid_max = 32000s ;
		ESPC:units = "m s-1" ;
```

```
                ESPC:sdn_parameter_name = "" ;
                ESPC:sdn_parameter_urn = "" ;
                ESPC:sdn_uom_name = "Metres per second" ;
                ESPC:sdn_uom_urn = "SDN:P06::UVAA" ;
                ESPC:ancillary_variables = "QCflag VART_QC" ;
                ESPC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
                ESPC:data_mode = "R" ;
                ESPC:add_offset = 0. ;
                ESPC:scale_factor = 0.001 ;
        short ETMP(TIME, DEPTH, RNGE, BEAR) ;
                ETMP:_FillValue = -32767s ;
                ETMP:long_name = "Radial standard deviation of current velocity over
coverage period" ;
                ETMP:standard_name = " " ;
                ETMP:valid_min = -32000s ;
                ETMP:valid_max = 32000s ;
                ETMP:units = "m s-1" ;
                ETMP:sdn_parameter_name = "" ;
                ETMP:sdn_parameter_urn = "" ;
                ETMP:sdn_uom_name = "Metres per second" ;
                ETMP:sdn_uom_urn = "SDN:P06::UVAA" ;
                ETMP:ancillary_variables = "QCflag VART_QC" ;
                ETMP:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
                ETMP:data_mode = "R" ;
                ETMP:add_offset = 0. ;
                ETMP:scale_factor = 0.001 ;
        short MAXV(TIME, DEPTH, RNGE, BEAR) ;
                MAXV:_FillValue = -32767s ;
                MAXV:long_name = "Radial sea water velocity away from instrument
maximum" ;
                MAXV:standard_name = " " ;
                MAXV:valid_min = -10000s ;
                MAXV:valid_max = 10000s ;
                MAXV:units = "m s-1" ;
                MAXV:sdn_parameter_name = "Current speed (Eulerian) in the water body by
directional range-gated radar" ;
                MAXV:sdn_parameter_urn = "SDN:P01::LCSAWVRD" ;
                MAXV:sdn_uom_name = "Metres per second" ;
                MAXV:sdn_uom_urn = "SDN:P06::UVAA" ;
                MAXV:ancillary_variables = "QCflag MDFL_QC CSPD_QC VART_QC" ;
                MAXV:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
                MAXV:data_mode = "R" ;
                MAXV:add_offset = 0. ;
                MAXV:scale_factor = 0.001 ;
        short MINV(TIME, DEPTH, RNGE, BEAR) ;
                MINV:_FillValue = -32767s ;
                MINV:long_name = "Radial sea water velocity away from instrument
minimum" ;
                MINV:standard_name = " " ;
                MINV:valid_min = -10000s ;
                MINV:valid_max = 10000s ;
                MINV:units = "m s-1" ;
                MINV:sdn_parameter_name = "Current speed (Eulerian) in the water body by
directional range-gated radar" ;
                MINV:sdn_parameter_urn = "SDN:P01::LCSAWVRD" ;
```

```
        MINV:sdn_uom_name = "Metres per second" ;
        MINV:sdn_uom_urn = "SDN:P06::UVAA" ;
        MINV:ancillary_variables = "QCflag MDFL_QC CSPD_QC VART_QC" ;
        MINV:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
        MINV:data_mode = "R" ;
        MINV:add_offset = 0. ;
        MINV:scale_factor = 0.001 ;
short ERSC(TIME, DEPTH, RNGE, BEAR) ;
        ERSC:_FillValue = -32767s ;
        ERSC:long_name = "Radial sea water velocity spatial quality count" ;
        ERSC:standard_name = " " ;
        ERSC:valid_min = 0s ;
        ERSC:valid_max = 127s ;
        ERSC:units = "1" ;
        ERSC:sdn_parameter_name = "" ;
        ERSC:sdn_parameter_urn = "" ;
        ERSC:sdn_uom_name = "Dimensionless" ;
        ERSC:sdn_uom_urn = "SDN:P06::UUUU" ;
        ERSC:ancillary_variables = "QCflag" ;
        ERSC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
        ERSC:data_mode = "R" ;
        ERSC:add_offset = 0 ;
        ERSC:scale_factor = 1 ;
short ERTC(TIME, DEPTH, RNGE, BEAR) ;
        ERTC:_FillValue = -32767s ;
        ERTC:long_name = "Radial sea water velocity temporal quality count" ;
        ERTC:standard_name = " " ;
        ERTC:valid_min = 0s ;
        ERTC:valid_max = 127s ;
        ERTC:units = "1" ;
        ERTC:sdn_parameter_name = "" ;
        ERTC:sdn_parameter_urn = "" ;
        ERTC:sdn_uom_name = "Dimensionless" ;
        ERTC:sdn_uom_urn = "SDN:P06::UUUU" ;
        ERTC:ancillary_variables = "QCflag" ;
        ERTC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
        ERTC:data_mode = "R" ;
        ERTC:add_offset = 0 ;
        ERTC:scale_factor = 1 ;
int XDST(TIME, DEPTH, RNGE, BEAR) ;
        XDST:_FillValue = -2147483647 ;
        XDST:long_name = "Eastward distance from instrument" ;
        XDST:standard_name = " " ;
        XDST:valid_min = 0 ;
        XDST:valid_max = 1000000 ;
        XDST:units = "km" ;
        XDST:sdn_parameter_name = "" ;
        XDST:sdn_parameter_urn = "" ;
        XDST:sdn_uom_name = "Kilometres" ;
        XDST:sdn_uom_urn = "SDN:P06::ULKM" ;
        XDST:ancillary_variables = "QCflag OWTR_QC MDFL_QC CSPD_QC VART_QC" ;
        XDST:coordinates = "LATITUDE LONGITUDE" ;
        XDST:data_mode = "R" ;
        XDST:add_offset = 0. ;
        XDST:scale_factor = 0.001 ;
```

```
        int YDST(TIME, DEPTH, RNGE, BEAR) ;
               YDST:_FillValue = -2147483647 ;
               YDST:long_name = "Northward distance from instrument" ;
               YDST:standard_name = " " ;
               YDST:valid_min = 0 ;
               YDST:valid_max = 1000000 ;
               YDST:units = "km" ;
               YDST:sdn_parameter_name = "" ;
               YDST:sdn_parameter_urn = "" ;
               YDST:sdn_uom_name = "Kilometres" ;
               YDST:sdn_uom_urn = "SDN:P06::ULKM" ;
               YDST:ancillary_variables = "QCflag OWTR_QC MDFL_QC CSPD_QC VART_QC" ;
               YDST:coordinates = "LATITUDE LONGITUDE" ;
               YDST:data_mode = "R" ;
               YDST:add_offset = 0. ;
               YDST:scale_factor = 0.001 ;
        short SPRC(TIME, DEPTH, RNGE, BEAR) ;
               SPRC:_FillValue = -32767s ;
               SPRC:long_name = "Radial sea water velocity cross spectra range cell" ;
               SPRC:standard_name = " " ;
               SPRC:valid_min = 0s ;
               SPRC:valid_max = 127s ;
               SPRC:units = "1" ;
               SPRC:sdn_parameter_name = "" ;
               SPRC:sdn_parameter_urn = "" ;
               SPRC:sdn_uom_name = "Dimensionless" ;
               SPRC:sdn_uom_urn = "SDN:P06::UUUU" ;
               SPRC:ancillary_variables = "QCflag OWTR_QC MDFL_QC CSPD_QC VART_QC" ;
               SPRC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
               SPRC:data_mode = "R" ;
               SPRC:add_offset = 0 ;
               SPRC:scale_factor = 1 ;
        byte OWTR_QC(TIME, DEPTH, RNGE, BEAR) ;
               OWTR_QC:_FillValue = -127b ;
               OWTR_QC:long_name = "Over-water quality flag" ;
               OWTR_QC:valid_min = 0b ;
               OWTR_QC:valid_max = 9b ;
               OWTR_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
               OWTR_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" ;
               OWTR_QC:comment = "OceanSITES quality flagging for Over-water QC test.
Over Water QC Test - Test applies to each vector. Thresholds=[GeoPandas
\"naturalearth_lowres\"]" ;
               OWTR_QC:units = "1" ;
               OWTR_QC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
               OWTR_QC:add_offset = 0 ;
               OWTR_QC:scale_factor = 1 ;
        byte CSPD_QC(TIME, DEPTH, RNGE, BEAR) ;
               CSPD_QC:_FillValue = -127b ;
               CSPD_QC:long_name = "Velocity threshold quality flag" ;
               CSPD_QC:valid_min = 0b ;
               CSPD_QC:valid_max = 9b ;
               CSPD_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
```

```
            CSPD_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" ;
            CSPD_QC:comment = "OceanSITES quality flagging for Velocity Threshold QC
test.  Velocity Threshold QC Test - Test applies to each vector. Threshold=[maximum
velocity=0.8 (m/s)]" ;
            CSPD_QC:units = "1" ;
            CSPD_QC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            CSPD_QC:add_offset = 0 ;
            CSPD_QC:scale_factor = 1 ;
      byte VART_QC(TIME, DEPTH, RNGE, BEAR) ;
            VART_QC:_FillValue = -127b ;
            VART_QC:long_name = "Variance threshold quality flag" ;
            VART_QC:valid_min = 0b ;
            VART_QC:valid_max = 9b ;
            VART_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            VART_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" ;
            VART_QC:comment = "OceanSITES quality flagging for Variance Threshold QC
test.  Variance Threshold QC Test not applicable to Direction Finding systems.
Temporal Derivative QC Test - Test applies to each vector. Threshold=[velocity
difference threshold=1.0 (m/s)]" ;
            VART_QC:units = "1" ;
            VART_QC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            VART_QC:add_offset = 0 ;
            VART_QC:scale_factor = 1 ;
      byte MDFL_QC(TIME, DEPTH, RNGE, BEAR) ;
            MDFL_QC:_FillValue = -127b ;
            MDFL_QC:long_name = "Median filter quality flag" ;
            MDFL_QC:valid_min = 0b ;
            MDFL_QC:valid_max = 9b ;
            MDFL_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            MDFL_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" ;
            MDFL_QC:comment = "OceanSITES quality flagging for Median Filter QC
test.  Median Filter QC Test - Test applies to each vector. Thresholds=[distance
limit=6.0 (km) velocity-median difference threshold=0.7 (m/s)]" ;
            MDFL_QC:units = "1" ;
            MDFL_QC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            MDFL_QC:add_offset = 0 ;
            MDFL_QC:scale_factor = 1 ;
      byte AVRB_QC(TIME, DEPTH, RNGE, BEAR) ;
            AVRB_QC:_FillValue = -127b ;
            AVRB_QC:long_name = "Average radial bearing quality flag" ;
            AVRB_QC:valid_min = 0b ;
            AVRB_QC:valid_max = 9b ;
            AVRB_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            AVRB_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" ;
            AVRB_QC:comment = "OceanSITES quality flagging for Average Radial
Bearing QC test.  Average Radial Bearing QC Test - Test applies to entire file.
Thresholds=[minimum bearing=190.0 (degrees) - maximum bearing=345.0 (degrees)]" ;
```

```
            AVRB_QC:units = "1" ;
            AVRB_QC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            AVRB_QC:add_offset = 0 ;
            AVRB_QC:scale_factor = 1 ;
      byte RDCT_QC(TIME, DEPTH, RNGE, BEAR) ;
            RDCT_QC:_FillValue = -127b ;
            RDCT_QC:long_name = "Radial count quality flag" ;
            RDCT_QC:valid_min = 0b ;
            RDCT_QC:valid_max = 9b ;
            RDCT_QC:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            RDCT_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" ;
            RDCT_QC:comment = "OceanSITES quality flagging for Radial Count QC test.
Radial Count QC Test - Test applies to entire file. Threshold=[minimum number of
radial vectors=500]" ;
            RDCT_QC:units = "1" ;
            RDCT_QC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            RDCT_QC:add_offset = 0 ;
            RDCT_QC:scale_factor = 1 ;
      byte QCflag(TIME, DEPTH, RNGE, BEAR) ;
            QCflag:_FillValue = -127b ;
            QCflag:long_name = "Overall quality flag" ;
            QCflag:valid_min = 0b ;
            QCflag:valid_max = 9b ;
            QCflag:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
            QCflag: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" ;
            QCflag:comment = "OceanSITES quality flagging for all QC tests  Overall
QC Flag - Test applies to each vector. Test checks if all QC tests are passed." ;
            QCflag:units = "1" ;
            QCflag:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            QCflag:add_offset = 0 ;
            QCflag:scale_factor = 1 ;
      float LONGITUDE(RNGE, BEAR) ;
            LONGITUDE:_FillValue = 9.96921e+36f ;
            LONGITUDE:standard_name = "longitude" ;
            LONGITUDE:long_name = "Longitude of each location" ;
            LONGITUDE:units = "degree_east" ;
            LONGITUDE:valid_min = -180.f ;
            LONGITUDE:valid_max = 180.f ;
            LONGITUDE:uncertainty = "" ;
            LONGITUDE:sdn_parameter_name = "Longitude east" ;
            LONGITUDE:sdn_parameter_urn = "SDN:P01::ALONZZ01" ;
            LONGITUDE:sdn_uom_name = "Degrees east" ;
            LONGITUDE:sdn_uom_urn = "SDN:P06::DEGE" ;
            LONGITUDE:grid_mapping = "crs" ;
            LONGITUDE:ancillary_variables = "POSITION_QC" ;
      float LATITUDE(RNGE, BEAR) ;
            LATITUDE:_FillValue = 9.96921e+36f ;
            LATITUDE:standard_name = "latitude" ;
            LATITUDE:long_name = "Latitude of each location" ;
            LATITUDE:units = "degree_north" ;
            LATITUDE:valid_min = -90.f ;
```

```
                LATITUDE:valid_max = 90.f ;
                LATITUDE:uncertainty = "" ;
                LATITUDE:sdn_parameter_name = "Latitude north" ;
                LATITUDE:sdn_parameter_urn = "SDN:P01::ALATZZ01" ;
                LATITUDE:sdn_uom_name = "Degrees north" ;
                LATITUDE:sdn_uom_urn = "SDN:P06::DEGN" ;
                LATITUDE:grid_mapping = "crs" ;
                LATITUDE:ancillary_variables = "POSITION_QC" ;
        int DRVA(TIME, DEPTH, RNGE, BEAR) ;
                DRVA:_FillValue = -2147483647 ;
                DRVA:valid_min = 0 ;
                DRVA:valid_max = 360000 ;
                DRVA:standard_name = "direction_of_radial_vector_away_from_instrument" ;
                DRVA:long_name = "Direction of radial vector away from instrument" ;
                DRVA:units = "degree_true" ;
                DRVA:sdn_parameter_name = "Direction (towards) of water current
(Eulerian measurement) in the water body by directional range-gated radar" ;
                DRVA:sdn_parameter_urn = "SDN:P01::LCDAWVRD" ;
                DRVA:sdn_uom_name = "Degrees True" ;
                DRVA:sdn_uom_urn = "SDN:P06::UABB" ;
                DRVA:ancillary_variables = "QCflag OWTR_QC MDFL_QC AVRB_QC RDCT_QC" ;
                DRVA:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
                DRVA:data_mode = "R" ;
                DRVA:add_offset = 0. ;
                DRVA:scale_factor = 0.001 ;
        short RDVA(TIME, DEPTH, RNGE, BEAR) ;
                RDVA:_FillValue = -32767s ;
                RDVA:valid_min = -10000s ;
                RDVA:valid_max = 10000s ;
                RDVA:standard_name = "radial_sea_water_velocity_away_from_instrument" ;
                RDVA:units = "m s-1" ;
                RDVA:long_name = "Radial sea water velocity away from instrument" ;
                RDVA:sdn_parameter_name = "Speed of water current (Eulerian measurement)
in the water body by directional range-gated radar" ;
                RDVA:sdn_parameter_urn = "SDN:P01::LCSAWVRD" ;
                RDVA:sdn_uom_name = "Metres per second" ;
                RDVA:sdn_uom_urn = "SDN:P06::UVAA" ;
                RDVA:ancillary_variables = "QCflag OWTR_QC MDFL_QC CSPD_QC VART_QC
RDCT_QC" ;
                RDVA:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
                RDVA:data_mode = "R" ;
                RDVA:add_offset = 0. ;
                RDVA:scale_factor = 0.001 ;
        short EWCT(TIME, DEPTH, RNGE, BEAR) ;
                EWCT:_FillValue = -32767s ;
                EWCT:valid_min = -10000s ;
                EWCT:valid_max = 10000s ;
                EWCT:standard_name = "eastward_sea_water_velocity" ;
                EWCT:long_name = "West-east current component" ;
                EWCT:units = "m s-1" ;
                EWCT:sdn_parameter_name = "Eastward current velocity in the water body"
;
                EWCT:sdn_parameter_urn = "SDN:P01::LCEWZZ01" ;
                EWCT:sdn_uom_name = "Metres per second" ;
                EWCT:sdn_uom_urn = "SDN:P06::UVAA" ;
```

```
              EWCT:ancillary_variables = "QCflag OWTR_QC MDFL_QC CSPD_QC VART_QC
AVRB_QC RDCT_QC" ;
              EWCT:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
              EWCT:data_mode = "R" ;
              EWCT:add_offset = 0. ;
              EWCT:scale_factor = 0.001 ;
       short NSCT(TIME, DEPTH, RNGE, BEAR) ;
              NSCT:_FillValue = -32767s ;
              NSCT:valid_min = -10000s ;
              NSCT:valid_max = 10000s ;
              NSCT:standard_name = "northward_sea_water_velocity" ;
              NSCT:long_name = "South-north current component" ;
              NSCT:units = "m s-1" ;
              NSCT:sdn_parameter_name = "Northward current velocity in the water body"
;
              NSCT:sdn_parameter_urn = "SDN:P01::LCNSZZ01" ;
              NSCT:sdn_uom_name = "Metres per second" ;
              NSCT:sdn_uom_urn = "SDN:P06::UVAA" ;
              NSCT:ancillary_variables = "QCflag OWTR_QC MDFL_QC CSPD_QC VART_QC
AVRB_QC RDCT_QC" ;
              NSCT:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
              NSCT:data_mode = "R" ;
              NSCT:add_offset = 0. ;
              NSCT:scale_factor = 0.001 ;
       byte NARX(TIME, MAXSITE) ;
              NARX:_FillValue = -127b ;
              NARX:long_name = "Number of receive antennas" ;
              NARX:standard_name = " " ;
              NARX:valid_min = 0b ;
              NARX:valid_max = 127b ;
              NARX:units = "1" ;
              NARX:sdn_parameter_name = "" ;
              NARX:sdn_parameter_urn = "" ;
              NARX:sdn_uom_name = "Dimensionless" ;
              NARX:sdn_uom_urn = "SDN:P06::UUUU" ;
              NARX:data_mode = "R" ;
              NARX:add_offset = 0 ;
              NARX:scale_factor = 1 ;
       byte NATX(TIME, MAXSITE) ;
              NATX:_FillValue = -127b ;
              NATX:long_name = "Number of transmit antennas" ;
              NATX:standard_name = " " ;
              NATX:valid_min = 0b ;
              NATX:valid_max = 127b ;
              NATX:units = "1" ;
              NATX:sdn_parameter_name = "" ;
              NATX:sdn_parameter_urn = "" ;
              NATX:sdn_uom_name = "Dimensionless" ;
              NATX:sdn_uom_urn = "SDN:P06::UUUU" ;
              NATX:data_mode = "R" ;
              NATX:add_offset = 0 ;
              NATX:scale_factor = 1 ;
       int SLTR(TIME, MAXSITE) ;
              SLTR:_FillValue = -2147483647 ;
              SLTR:long_name = "Receive antenna latitudes" ;
```

```
        SLTR:standard_name = "latitude" ;
        SLTR:valid_min = -90000 ;
        SLTR:valid_max = 90000 ;
        SLTR:units = "degree_north" ;
        SLTR:sdn_parameter_name = "Latitude north" ;
        SLTR:sdn_parameter_urn = "SDN:P01::ALATZZ01" ;
        SLTR:sdn_uom_name = "Degrees north" ;
        SLTR:sdn_uom_urn = "SDN:P06::DEGN" ;
        SLTR:coordinates = "TIME MAXSITE" ;
        SLTR:data_mode = "R" ;
        SLTR:add_offset = 0. ;
        SLTR:scale_factor = 0.001 ;
int SLNR(TIME, MAXSITE) ;
        SLNR:_FillValue = -2147483647 ;
        SLNR:long_name = "Receive antenna longitudes" ;
        SLNR:standard_name = "longitude" ;
        SLNR:valid_min = -180000 ;
        SLNR:valid_max = 180000 ;
        SLNR:units = "degree_east" ;
        SLNR:sdn_parameter_name = "Longitude east" ;
        SLNR:sdn_parameter_urn = "SDN:P01::ALONZZ01" ;
        SLNR:sdn_uom_name = "Degrees east" ;
        SLNR:sdn_uom_urn = "SDN:P06::DEGE" ;
        SLNR:coordinates = "TIME MAXSITE" ;
        SLNR:data_mode = "R" ;
        SLNR:add_offset = 0. ;
        SLNR:scale_factor = 0.001 ;
int SLTT(TIME, MAXSITE) ;
        SLTT:_FillValue = -2147483647 ;
        SLTT:long_name = "Transmit antenna latitudes" ;
        SLTT:standard_name = "latitude" ;
        SLTT:valid_min = -90000 ;
        SLTT:valid_max = 90000 ;
        SLTT:units = "degree_north" ;
        SLTT:sdn_parameter_name = "Latitude north" ;
        SLTT:sdn_parameter_urn = "SDN:P01::ALATZZ01" ;
        SLTT:sdn_uom_name = "Degrees north" ;
        SLTT:sdn_uom_urn = "SDN:P06::DEGN" ;
        SLTT:coordinates = "TIME MAXSITE" ;
        SLTT:data_mode = "R" ;
        SLTT:add_offset = 0. ;
        SLTT:scale_factor = 0.001 ;
int SLNT(TIME, MAXSITE) ;
        SLNT:_FillValue = -2147483647 ;
        SLNT:long_name = "Transmit antenna longitudes" ;
        SLNT:standard_name = "longitude" ;
        SLNT:valid_min = -180000 ;
        SLNT:valid_max = 180000 ;
        SLNT:units = "degree_east" ;
        SLNT:sdn_parameter_name = "Longitude east" ;
        SLNT:sdn_parameter_urn = "SDN:P01::ALONZZ01" ;
        SLNT:sdn_uom_name = "Degrees east" ;
        SLNT:sdn_uom_urn = "SDN:P06::DEGE" ;
        SLNT:coordinates = "TIME MAXSITE" ;
        SLNT:data_mode = "R" ;
```

```
            SLNT:add_offset = 0. ;
            SLNT:scale_factor = 0.001 ;
      char SCDR(TIME, MAXSITE, STRING4) ;
            SCDR:_FillValue = " " ;
            SCDR:long_name = "Receive antenna codes" ;
            SCDR:standard_name = " " ;
            SCDR:units = 1 ;
            SCDR:sdn_parameter_name = "" ;
            SCDR:sdn_parameter_urn = "" ;
            SCDR:sdn_uom_name = "Dimensionless" ;
            SCDR:sdn_uom_urn = "SDN:P06::UUUU" ;
            SCDR:data_mode = "R" ;
      char SCDT(TIME, MAXSITE, STRING4) ;
            SCDT:_FillValue = " " ;
            SCDT:long_name = "Transmit antenna codes" ;
            SCDT:standard_name = " " ;
            SCDT:units = 1 ;
            SCDT:sdn_parameter_name = "" ;
            SCDT:sdn_parameter_urn = "" ;
            SCDT:sdn_uom_name = "Dimensionless" ;
            SCDT:sdn_uom_urn = "SDN:P06::UUUU" ;
            SCDT:data_mode = "R" ;
      char SDN_CRUISE(TIME, STRING9) ;
            SDN_CRUISE:long_name = "Grid grouping label" ;
      char SDN_STATION(TIME, STRING14) ;
            SDN_STATION:long_name = "Grid label" ;
      char SDN_LOCAL_CDI_ID(TIME, STRING35) ;
            SDN_LOCAL_CDI_ID:long_name = "SeaDataNet CDI identifier" ;
            SDN_LOCAL_CDI_ID:cf_role = "grid_id" ;
      short SDN_EDMO_CODE(TIME, MAXINST) ;
            SDN_EDMO_CODE:long_name = "European Directory of Marine Organisations
code for the CDI partner" ;
            SDN_EDMO_CODE:units = "1" ;
      char SDN_REFERENCES(TIME, STRING98) ;
            SDN_REFERENCES:long_name = "Usage metadata reference" ;
      char SDN_XLINK(TIME, REFMAX, STRING159) ;
            SDN_XLINK:long_name = "External resource linkages" ;
      byte TIME_QC(TIME) ;
            TIME_QC:_FillValue = -127b ;
            TIME_QC:long_name = "Time quality flag" ;
            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" ;
            TIME_QC:comment = "OceanSITES quality flagging for temporal coordinate"
;
            TIME_QC:units = "1" ;
            TIME_QC:add_offset = 0 ;
            TIME_QC:scale_factor = 1 ;
      byte POSITION_QC(TIME, DEPTH, RNGE, BEAR) ;
            POSITION_QC:_FillValue = -127b ;
            POSITION_QC:long_name = "Position quality flag" ;
            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" ;
            POSITION_QC:comment = "OceanSITES quality flagging for position
coordinates" ;
            POSITION_QC:units = "1" ;
            POSITION_QC:coordinates = "TIME DEPH LATITUDE LONGITUDE" ;
            POSITION_QC:add_offset = 0 ;
            POSITION_QC:scale_factor = 1 ;
      byte DEPH_QC(TIME) ;
            DEPH_QC:_FillValue = -127b ;
            DEPH_QC:long_name = "Depth quality flag" ;
            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" ;
            DEPH_QC:comment = "OceanSITES quality flagging for depth coordinate" ;
            DEPH_QC:units = "1" ;
            DEPH_QC:add_offset = 0 ;
            DEPH_QC:scale_factor = 1 ;
      double TIME(TIME) ;
            TIME:axis = "T" ;
            TIME:long_name = "Time" ;
            TIME:standard_name = "time" ;
            TIME:valid_min = -90000. ;
            TIME:valid_max = 90000. ;
            TIME:uncertainty = "" ;
            TIME:sdn_parameter_name = "Elapsed time (since 1950-01-01T00:00:00Z)" ;
            TIME:sdn_parameter_urn = "SDN:P01::ELTJLD01" ;
            TIME:sdn_uom_name = "Days" ;
            TIME:sdn_uom_urn = "SDN:P06::UTAA" ;
            TIME:ancillary_variables = "TIME_QC" ;
            TIME:units = "days since 1950-01-01T00:00:00Z" ;
            TIME:calendar = "standard" ;
      float DEPH(DEPTH) ;
            DEPH:_FillValue = 9.96921e+36f ;
            DEPH:axis = "Z" ;
            DEPH:long_name = "Depth" ;
            DEPH:standard_name = "depth" ;
            DEPH:units = "m" ;
            DEPH:positive = "down" ;
            DEPH:reference = "sea_level" ;
            DEPH:valid_min = -12000.f ;
            DEPH:valid_max = 12000.f ;
            DEPH:uncertainty = "" ;
            DEPH:sdn_parameter_name = "Depth below surface of the water body" ;
            DEPH:sdn_parameter_urn = "SDN:P01::ADEPZZ01" ;
            DEPH:sdn_uom_name = "Metres" ;
            DEPH:sdn_uom_urn = "SDN:P06::ULAA" ;
            DEPH:ancillary_variables = "DEPH_QC" ;
            DEPH:data_mode = "R" ;
```

```
       short crs ;
              crs:grid_mapping_name = "latitude_longitude" ;
              crs:epsg_code = "EPSG:4326" ;
              crs:semi_major_axis = 6378137. ;
              crs:inverse_flattening = 298.257223563 ;

// global attributes:
              :site_code = "HFR-Ibiza" ;
              :platform_code = "HFR-Ibiza-FORM" ;
              :platform_name = "HFR-Ibiza-FORM" ;
              :ices_platform_code = "" ;
              :wmo_platform_code = "" ;
              :data_mode = "R" ;
              :doa_estimation_method = "Direction Finding" ;
              :calibration_type = "APM" ;
              :last_calibration_date = "2020-03-03T00:00:00Z" ;
              :calibration_link = "ereyes@socib.es" ;
              :title = "Global Ocean - In Situ Observation Copernicus" ;
              :summary = "The data set consists of maps of radial velocity of the sea
water surface current collected at Formentera (FORM) site in the Ibiza Channel
(Mediterranean Sea). Data are averaged over a time interval of 1 hour around the
cardinal hour. HF-RADAR measurements of ocean velocity are radial in direction
relative to the radar location and representative of the upper 0.9 meters of the
ocean." ;
              :source = "coastal structure" ;
              :source_platform_category_code = "17" ;
              :wmo_instrument_type = "" ;
              :institution = "SOCIB - Balearic Islands Coastal Observing and
forecasting System" ;
              :institution_abbreviated = "" ;
              :institution_country = "" ;
              :institution_edmo_code = "3410" ;
              :institution_references = "https://www.socib.es" ;
              :id = "GL_RV_HF_HFR-Ibiza-FORM_20240115" ;
              :project = "Jerico-Next; INCREASE; CMEMS-INSTAC phase2" ;
              :project_edmerp_code = "" ;
              :naming_authority = "Copernicus Marine In Situ" ;
              :keywords = "OCEAN CURRENTS, SURFACE WATER, RADAR, SCR-HF" ;
              :keywords_vocabulary = "GCMD Science Keywords" ;
              :comment = "HFR is nowadays the unique land-based remote sensing
technology providing continuous maps of near-real surface currents (0.9m) over wide
areas (out of about 85 km from near shore) whit high-spatial (3 km) and temporal
resolution (hourly). Two or mode HFR sites are needed for computing the map of total
surface current vectors in the overlapping coverage area. Total velocities are
derived using least square fit that maps radial velocities measured from individual
sites onto a cartesian grid. The final product is a map of the horizontal components
of the ocean currents on a regular grid in the area of overlap of two or more radar
stations." ;
              :network = "HFR_Ibiza" ;
              :geospatial_lat_min = "38.3095" ;
              :geospatial_lat_max = "39.12019" ;
              :geospatial_lat_resolution = "0.01499044" ;
              :geospatial_lat_units = "degree_north" ;
              :geospatial_lon_min = "0.48664" ;
              :geospatial_lon_max = "1.4179" ;
```

```
            :geospatial_lon_resolution = "0.0" ;
            :geospatial_lon_units = "degree_east" ;
            :geospatial_vertical_min = "0" ;
            :geospatial_vertical_max = "0.8841941282883076" ;
            :geospatial_vertical_positive = "down" ;
            :geospatial_vertical_resolution = "0.8841941282883076" ;
            :geospatial_vertical_units = "EPSG:4326" ;
            :time_coverage_start = "2024-01-14T23:30:00Z" ;
            :time_coverage_end = "2024-01-15T23:30:00Z" ;
            :time_coverage_resolution = "PT1H" ;
            :time_coverage_duration = "P1DT0H0M0S" ;
            :area = "Ibiza Channel" ;
            :bottom_depth = "" ;
            :cdm_data_type = "grid" ;
            :format_version = "2.0" ;
            :Conventions = "CF-1.11 Copernicus-InSituTAC-FormatManual-2.0.0
Copernicus-InSituTAC-ParametersList-3.3.0 Copernicus-InSituTAC-AttributesList-1.0.0"
;
            :netcdf_version = "netCDF-4 classic model" ;
            :update_interval = "void" ;
            :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. These data
are collected and processed by SOCIB (Balearic Island Coastal and Observing
Forecasting System) with the support of different projects: Jerico-Next, INCREASE,
CMEMS-INSTAC phase II and IBISAR" ;
            :publisher_name = "Copernicus Marine Service" ;
            :publisher_url = "https://marine.copernicus.eu/
http://www.marineinsitu.eu/" ;
            :publisher_email = "cmems-service@ifremer.fr" ;
            :publisher_institution = "European HFR Node" ;
            :license = "https://marine.copernicus.eu/user-corner/service-
commitments-and-licence" ;
            :date_created = "2024-01-15T23:47:07Z" ;
            :history = "Data measured from 2024-01-14T23:30:00Z to 2024-01-
15T23:30:00Z. netCDF file created at 2024-01-15T23:47:07Z by the European HFR Node."
;
            :date_modified = "2024-01-15T23:47:07Z" ;
            :processing_level = "2B" ;
            :creator_name = "Lorenzo Corgnati" ;
            :creator_email = "lorenzo.corgnati@sp.ismar.cnr.it" ;
            :creator_url = "https://www.hfrnode.eu/" ;
            :creator_type = "person" ;
            :manufacturer = "CODAR SeaSonde" ;
            :sensor_model = "CODAR SeaSonde" ;
            :doi = "" ;
            :references = "http://marine.copernicus.eu http://www.marineinsitu.eu
http://www.marineinsitu.eu/wp-
content/uploads/2018/02/HFR_Data_Model_Reference_Card_v1.pdf" ;
}
```