OceanSITES User's Manual

NetCDF Conventions and Reference Tables

Version 1.2

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Updated

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History

Version	Date	Comment
0.1	20/03/2003	TC: creation of the document
0.3	20/02/2004	TC: updates on locations, mooring name, data state indicator, parameters table, epic codes, history information
0.3.2	26/05/2004	NG: make more flexible, add dataset (metadata) file
0.4	01/06/2004	TC: separate data set description and data file, merge with Steve Hankins's straw man
0.6	28/06/2004	TC: updates from Nan Galbraith, Steve Hankins, Jonathan Gregory, Brian Eaton
0.7	23/05/2005	Maureen Edwards: NOCS data centre, new GF3 parameters
0.7	24/05/2005	Roy Lowry: physical parameters from BODC Data Markup Vocabulary
1.0	18/02/2006	TC: updates following OceanSITES data management meeting 2006, Hawai'i §2.1: LEVEL dimension replaces DEPTH to accomadate depth or pressure §2.2: QC_MANUAL field created §2.2: CONVENTION field removed §2.2: PLATFORM_CODE added §2.2: SITE_CODE added §2.2: WMO_PLATFORM_CODE added §2.3: DEPTH renamed DEPH to comply to GF3 §2.3: DATA_MODE set at measurement level §3: metadata file description transferred to "OceanSITES metadata proposal" until approval §5: file naming convention updated
1.0	19/02/2006	NG: data codes in chapter 4.1.2
1.0	28/04/2006	PF & NG: data mode optional
1.0	28/04/2006	TC & JG: §2.2 global attributes
1.1	April-May-June 2008	NG, MM, TC, ML: general revision based on OceanSITES 2008 meeting Epic codes removed Use ISO8601 for string dates Remove general attributes Update global attribute section for CF-1.1 compatibility New dimensions for DEPTH, LATITUDE, LONGITUDE Add an uncertainty attribute New presentation of the document
1.2 draft	September 2009	§1.3 : GDAC distribute the "best data" statement §1.4 : add a "User obligations" paragraph §1.5 : add a "Disclaimer" paragraph §2 : note on format version §2.2.1 : no fill value allowed for TIME, LATITUDE, LONGITUDE, DEPTH §2.2.1 : use WGS84 datum for latitude and longitude §2.2.1 : DEPTH "reference" optional attribute §2.2.3 and §4.7 : use "sensor_mount" optional attribute §2.2.3 and §4.8 : use "sensor_orientation" optional attribute §2.2.3 : use sensor_name and sensor_orientation attributes §4.3 : revisit parameter names §4.4 : update DAC codes §4.6 : add a sentence on OceanSITES site naming policy §5.1 : new data file naming convention §5.2: add GDAC_CREATION_DATE, GDAC_UPDATE_DATE, PARAMETERS in the index file.
1.2 draft	December 7th 2009	§5.1: revisit file naming convention. §5.2: add a data_mode in the index file. §6: add a "Glossary, definition" chapter.

1.2 draft	March 2010	§5.2: add geospatial_vertical_min and geospatial_vertical_min in the index file. §1.7 : useful links chapter created
1.2 draft	April 2010	Last comments received from Matthias Lankhorst, Nan Galbraith, Derrick Snowden, Hester Viola, Andrew Dickson, John Graybeal.§1.6: information and contact on project office §2.2.1: update of Z axis §2.2.1: latitude-longitude reference and EPSG coordinate reference §2.2.1: depth EPSG coordinate reference §2.2.1: note on latitude and longitude WGS84 datum §2.2.1: note on DEPTH reference §2.2.3: all attributes listed in the example §2.2.4: metadata variables: sensors information, calibrations §3: simplify metadata introduction §4.2: QC flag scale, 6 not used (comment) §4.3.1: use DOXY_TEMP instead of TEMP_DOXY §4.4: 4 new centres §4.6: update of OceanSITES catalogue
1.2 draft	June 2010	Updates from 29/06/2010 webex meeting. §2.1: remove “For a mooring with a GPS receiver, use LATITUDE of the same dimension as TIME and provide the actual location.” §2.2: add an optional “array” and “network” optional global attribute Allow multiple axes in a file • §2: remove “Coordinate variables, which describe the dimensions of a data set, are limited to a single set of longitude, latitude, depth and time (X,Y,Z, and T) dimensions in any single file. If data from a reference station cannot all be put on to a single set of axes, then separate files are created for these data.” • §2.3.1: remove “Data with different coordinate variables must be recorded in separate files.“ §2.3.1: empty values are not allowed for coordinate variables.
1.2	Feb 1 2013	Clarify requirements for dimensions and coordinates; explain use of (and requirements for use of) ‘coordinates’ attribute in some circumstances. Clarify the statement that QC flag meanings and values are required.

1 OceanSITES data-management principles

1.1 About OceanSITES

The OceanSITES program is the global network of open-ocean sustained time series sites, called ocean reference stations, being implemented by an international partnership of researchers. OceanSITES provides fixed-point time series of various physical, biogeochemical, and atmospheric variables at different locations around the globe, from the atmosphere and sea surface to the seafloor. The program's objective is to build and maintain a multidisciplinary global network for a broad range of research and operational applications including climate, carbon, and ecosystem variability and forecasting and ocean state validation.

All OceanSITES data are publicly available. More information about the project is available at: http://www.oceansites.org.

1.2 About this document

The main purpose of this document is to specify the format of the files that are used to distribute OceanSITES data, and to document the standards used therein. This includes naming conventions, or taxonomy, as well as metadata content.

1.3 OceanSITES data management structure and data access

The data flow within OceanSITES is carried out through three organizational units: PIs, DACs, GDACs.

The **Principal Investigator (PI)**, typically a scientist at a research institution, maintains the observing platform and the sensors that deliver the data. He or she is responsible for providing the data and all auxiliary information to a **Data Assembly Center (DAC)**.

The **DAC** assembles OceanSITES-compliant files from this information and delivers these to the two **Global Data Assembly Centers (GDACs)**, where they are made publicly available.

The **GDAC** distributes the best copy of the data files. When a higher quality data file (e.g. calibrated data) is available, it replaces the previous version of the data file.
The user can access the data at either GDAC, cf. section "GDAC organization".

Archive of preliminary or real-time data is beyond the scope of the OceanSITES GDACs; this issue should be addressed by the long term archive policy for OceanSITES (under study).

1.4 User Obligations

A user of OceanSITES data is expected to read and understand this manual and the documentation about the data as contained in the "attributes" of the NetCDF data files, as these contain essential information about data quality and accuracy.

A user of OceanSITES data must comply with the requirements set forth in the attributes "distribution_statement" and "citation" of the NetCDF data files.

Unless stated otherwise, a user must acknowledge use of OceanSITES data in all

publications and products where such data are used, preferably with the following standard sentence:

"These data were collected and made freely available by the international OceanSITES project and the national programs that contribute to it."

1.5 Disclaimer

OceanSITES data are published without any warranty, express or implied.

The user assumes all risk arising from his/her use of OceanSITES data.

OceanSITES data are intended to be research-quality and include estimates of data quality and accuracy, but it is possible that these estimates or the data themselves contain errors.

It is the sole responsibility of the user to assess if the data are appropriate for his/her use, and to interpret the data, data quality, and data accuracy accordingly.

OceanSITES welcomes users to ask questions and report problems to the contact addresses listed in the data files or on the OceanSITES internet page.

1.6 Further Information Sources and Contact Information

- OceanSITES website: http://www.oceansites.org
- For further information about the benefits and distributing data onto the GTS, please refer to: http://www.jcommops.org/dbcp/gts or contact the OceanSITES Project Office on projectoffice@oceansites.org.
- For information about unique numbering of OceanSITES Moorings and Gliders on the GTS see: http://www.wmo.int/pages/prog/amp/mmop/wmo-number-rules.html

1.7 Useful links, tools

1.7.1 OceanSITES file format checker

The OceansSITES file format checker is a java software freely available at:

http://projets.ifremer.fr/coriolis/Observing-the-ocean/Observing-system-networks/OceanSITES/Access-to-data

1.7.2 OceanSITES file format converters

Medatlas format to OceanSITES NetCDF converter is available at:
http://projets.ifremer.fr/coriolis/Observing-the-ocean/Observing-system-networks/OceanSITES/Access-to-data

ODV format to OceanSITES NetCDF converter is also available at:
http://projets.ifremer.fr/coriolis/Observing-the-ocean/Observing-system-networks/OceanSITES/Access-to-data

2 OceanSITES NetCDF data format version 1.2

OceanSITES uses the NetCDF (network Common Data Form) system, a set of software libraries and machine-independent data formats. Our implementation of NetCDF is based on the community-supported Climate and Forecast (CF) specification, which supplies a standard vocabulary and some metadata conventions.

OceanSITES layers several more conventions above the CF standard.. These are intended to make it easier to share in-situ data, to make it simpler for the GDACs to aggregate data from multiple sites, and to ensure that the data can be created and understood by the basic NetCDF utilities.

- OceanSITES includes standard terms for the short name of both coordinate and data variables (measurements).
- File names are created using a standard, described in section 6.2.

An OceanSITES data file contains measurements such as temperature and salinity, continuously performed at different levels on a platform (e.g. mooring), as well as meteorological or other parameters recorded at the site, derived variables associated with the site, and complete location, time, and provenance information.

The requirements are drawn almost exclusively from the NetCDF Style Guide:

- Units are compliant with CF/COARDS/Udunits ;
- The time parameter is encoded as recommended by COARDS and CF.
- Parameters are given standard names from the CF table
- Where time is specified as an attribute, the ISO8601 standard is used.

For more information on CF, COARDS, NetCDF, Udunits, and ISO8601 see:

- NetCDF: http://www.unidata.ucar.edu/software/netcdf/docs/BestPractices.html
- Udunits: http://www.unidata.ucar.edu/software/udunits/
- CF: http://cf-pcmdi.llnl.gov/
- COARDS: http://www.ferret.noaa.gov/noaa_coop/coop_cdf_profile.html
- ISO8601: http://en.wikipedia.org/wiki/ISO_8601

Note on format version

Since July 2010, the OceanSITES valid data format version is **1.2**.
The User's manual may be updated with clarifications, recommendations, additional optional attributes without changing the data format version.

2.1 Data file dimensions

NetCDF dimensions provide information on the size of the data variables, and additionally may tie spatial and temporal coordinates to data. OceanSITES time series are limited to a single variable for three of the data dimensions, time, latitude and longitude; multiple depth dimensions are permitted. Requirements are described further in the section on coordinate

variables.

Short names for OceanSITES dimension variables should be in upper case.

Name	Example	Comment
TIME	TIME=unlimited	Number of time steps. Example: for a mooring with one value per day and a mission length of one year, TIME contains 365 time steps.
DEPTH	DEPTH=5	Number of depth levels. Example: for a mooring with measurements at 0.25, 10, 50, 100 and 200 meters, DEPTH=5.
LATITUDE	LATITUDE=1	Dimension of the LATITUDE coordinate variable.
LONGITUDE	LONGITUDE=1	Dimension of the LONGITUDE coordinate variable.
POSITION	POSITION=1	Dimension of the POSITION_QC variable.

2.2 Global attributes

The global attribute section of a NetCDF file contains metadata that describes the contents of the file overall, and allows for data discovery. All fields should be human-readable, and should be of character type, not numeric, even if the information content is a number. OceanSITES recommends that all of these attributes be used and contain meaningful information unless there are technical reasons rendering this impossible. However, files that do not at least contain the attributes listed as "mandatory" will not be considered OceanSITES-compliant. In OceanSITES, global attribute names are in lower-case letters.

Global attributes can be thought of as conveying five kinds of information:

- What: what are the data in this dataset;
- Where: the spatial coverage of the data;
- When: the temporal coverage of the data;
- Who: who produced the data;
- How: how were the data produced and made available.

The global attributes specification follows the recommendations of Unidata NetCDF Attribute Convention for Dataset Discovery, at :

http://www.unidata.ucar.edu/software/netcdf-java/formats/DataDiscoveryAttConvention.html

Name	Example	Definition
WHAT		
data_type	data_type="OceanSITES time-series data"	This field contains the type of data contained in the file. The list of acceptable data types is in reference table 1. Example: "OceanSITES time-series data". **This attribute is mandatory.**
format_version	format_version="1.1"	OceanSITES format version Example: "1.1". **This attribute is mandatory.**

platform_code	platform_code=”CIS-1”	Platform unique code within OceanSITES project. Example: “CIS-1” mooring on CIS site (Central Irminger Sea). **This attribute is mandatory.**
date_update	date_update=”2006-04-11T08:35:00Z”	File update or creation date (UTC). See note on time format below. **This attribute is mandatory.**
institution	institution=”National Oceanographic Centre”	Specifies institution where the original data was produced.
site_code	site_code=”CIS”	Name of the site within OceanSITES project. Example: “CIS” for Central Irminger Sea. The site codes are available on GDAC ftp servers. **This attribute is mandatory.**
array	array=”TAO”	An OceanSITES array is a grouping of sites based on a common and identified scientific question, or on a common geographic location. See the definition in the glossary chapter.
network	network=”EuroSITES”	An OceansSITES network is a grouping of sites based on common shore-based logistics or infrastructure. See the definition in the glossary chapter.
wmo_platform_code	wmo_platform_code=”48409”	WMO (World Meteorological Organization) identifier. This platform number is unique within the OceanSITES project. Example: “48409” for CIS-1 mooring.
source	source=”Mooring observation”	The method of production of the original data. For OceanSITES data, use one of the following: “Shipborne observation”, “Mooring observation”
history	history= “2005-04-11T08:35:00Z data collected, A. Meyer. 2005-04-12T10:11:00Z OceanSITES file with provisional data compiled and sent to DAC, A. Meyer.”	Provides an audit trail for modifications to the original data. It should contain a separate line for each modification, with each line beginning with a timestamp, and including user name, modification name, and modification arguments. The time stamp should follow the format outlined in the note on time formats below.
data_mode	data_mode=”R”	Indicates if the file contains real-time, provisional or delayed-mode data. The list of valid data modes is in reference table 5. **This attribute is mandatory.**
quality_control_indicator	Quality_control=”6”	Level of quality control applied to data. The values are listed in reference table 2.1.
quality_index	quality_index=”A”	A code value valid for the whole dataset: 0 unknown quality A excellent (no known problems, regular quality checking) B probably good (occasional problems, validation phase) C extremely suspect, frequent problems
references	references=”http:// www.oceansites.org, http://www.noc.soton.ac.uk/animate/index.php”	Published or web-based references that describe the data or methods used to produce it. Include a reference to OceanSITES and a project-specific reference if appropriate.

comment	comment="…"	Miscellaneous information about the data or methods used to produce it. Any free-format text is appropriate.
Conventions	Conventions="CF-1.4, OceanSITES 1.1"	Name of the conventions followed by the dataset. "convention" starting in lower case 'c' is still valid but will become obsolete.
Netcdf_version	netcdf_version="3.5"	Netcdf version used for the data set
title summary	title="CIS Mooring Data" summary="Oceanographic mooring data from CIS observatory in the Central Irminger Sea, North Atlantic, in 2005. Measured properties: temperature and salinity at ten depth levels."	Free-format text describing the dataset. The display of these two attributes together should allow data discovery for a human reader. "title": title of the dataset. Use the file name if in doubt. "summary": a longer description of the dataset. A paragraph of up to 100 words is appropriate.
naming_authority id	Naming_authority="OceanSITES" id="OS_CIS-1_200502_TS"	The "id" and "naming_authority" attributes are intended to provide a globally unique identification for each dataset. For OceanSITES data, use: naming_authority="OceanSITES" and id=file name (without .nc suffix), which is designed to be unique.
cdm_data_type	cdm_data_type="Station"	The "cdm_data_type" attribute gives the Unidata CDM (common data model) data type used by THREDDS. E.g. "Point", "Trajectory", "Station", "Radial", "Grid", "Swath". Use "Station" for OceanSITES mooring data. More: http://www.unidata.ucar.edu/projects/THREDDS/CDM/CDM-TDS.htm
WHERE		
area	area="North Atlantic Ocean"	Geographical coverage. Try to compose of the following: North/Tropical/South Atlantic/Pacific/Indian Ocean, Southern Ocean, Arctic Ocean. For specific sea area, use the International Hydrographic Bureau sea areas available at : http://vocab.ndg.nerc.ac.uk/client/vocabServer.jsp.
geospatial_lat_min	geospatial_lat_min="59.8"	The southernmost latitude, a value between -90 and 90 degrees. **This attribute is mandatory.**
geospatial_lat_max	geospatial_lat_max="59.8"	The northernmost latitude, a value between -90 and 90 degrees. **This attribute is mandatory.**
geospatial_lon_min	geospatial_lon_min="-41.2"	The westernmost longitude, a value between -180 and 180 degrees. **This attribute is mandatory.**
geospatial_lon_max	geospatial_lon_max="-41.2"	The easternmost longitude, a value between -180 and 180 degrees. **This attribute is mandatory.**
geospatial_vertical_min	geospatial_vertical_min="10.0"	Minimum depth for measurements.
geospatial_vertical_max	geospatial_vertical_max="2000"	Maximum depth for measurements
WHEN		

time_coverage_start	time_coverage_start=”2006-03-01T00:00:00Z”	Start date of the data in UTC. See note on time format below.
time_coverage_end	time_coverage_end=”2006-03-05T23:59:29Z”	Final date of the data in UTC. See note on time format below.
WHO		
institution_references	institution_references=”http://www.nocs.uk”	References to data provider institution, the place to find all information on the dataset (web-based, i.e. give URLs).
contact	contact=”codac@nocs.uk”	Contact person’s e-mail.
author	author=”John Smith”	Name of the person responsible for the creation of the dataset.
data_assembly_center	data_assembly_center=”EUROSITES”	Data Assembly Center (DAC) in charge of this data file. The data_assembly_center are listed in reference table 4.
pi_name	pi_name=”Alice Juarez”	Name of the principal investigator in charge of the platform.
HOW		
distribution_statement	distribution_statement=”Follows CLIVAR (Climate Varibility and Predictability) standards, cf. http://www.clivar.org/data/data_policy.php. Data available free of charge. User assumes all risk for use of data. User must display citation in any publication or product using data. User must contact PI prior to any commercial use of data.”	Statement describing data distribution policy. OceanSITES has adopted the CLIVAR data policy, which explicitly calls for free and unrestricted data exchange. Details at: http://www.clivar.org/data/data_policy.php
citation	citation=”These data were collected and made freely available by the OceanSITES project and the national programs that contribute to it.”	The citation to be used in publications using the dataset.
update_interval	update_interval=”daily”	Update interval for the file, one of the following: “hourly”, “daily”, “yearly”, “void”. Use “void” for delayed-mode or archive data that do not need continuous updating.
qc_manual	qc_manual=”http://www.ocensites.org/data/quality_control_manual.pdf”	This field contains the name of the manual that describes the quality control procedure. As of now, there is no separate QC manual, so the user’s manual is the appropriate reference.

Note on time formats

Whenever time information is given in the global attributes, it ought to be a string of the format:

`"YYYY-MM-DDThh:mm:ssZ"` (i.e. year - month - day T hour : minute : second Z)

If higher resolution than seconds is needed, any number of decimal digits (“.s”) for the seconds is acceptable:

"YYYY-MM-DDThh:mm:ss.sZ"

In any case, the time must be in UTC. A capital “T” separates the date and the hour information. The string must end with a capital “Z”, an old indication of UTC. These formats are two (of many) described by ISO8601.

Examples:

- 2005-10-24T08:00:00Z
- 2008-01-01T22:50:02.031Z

2.3 Variables

NetCDF variables include data measured by instruments, parameters derived from the primary measurements, and coordinate variables, which may be nominal values, such as values for depth for instruments that do not directly record depth. The variable names are written in CAPITALIZED letters. Each variable has a specific set of attributes, some of which are mandatory.

2.3.1 Coordinate variables

The coordinate variables orient the data in time and space. For this purpose, they have an "axis" attribute defining that they point in X, Y, Z, and T dimensions. The DEPTH variable may be positive in either upward or downward direction, which is defined in its "positive" attribute.

Default values are not allowed in coordinate variables.

All attributes in this section except the "comment" are mandatory; however "QC_indicator" may be omitted for any parameter if there is a separate QC variable for that parameter.

The Z axis may be represented as pressure, if, for example pressure is recorded directly by an instrument and the calculation of depth from pressure would cause a loss of information. Depth is strongly preferred, since it allows data to be used more directly.

Type, name, dimension, attributes	Comment
Double **TIME**(TIME); TIME:long_name = "time"; TIME:standard_name = "time"; TIME:units = "days since 1950-01-01T00:00:00Z"; TIME:valid_min = 0.0; TIME:valid_max = 90000.0; TIME:QC_indicator = <X>; TIME:QC_procedure = <Y>; TIME:uncertainty = <Z>; TIME:comment = "Optional comment..." TIME:axis = "T";	Date and time (UTC) of the measurement in days since midnight, 1950-01-01. Example: Noon, Jan 2, 1950 is stored as 1.5. July 25, 2001, 19:14:00 is stored as 18833.8013889885. <X>: Replaces TIME_QC if constant. Cf. note on quality control in data variable section, value from reference table 2. <Y>: Cf. note on quality control in data variable section, value from reference table 2.1. <Z>: Choose appropriate value.
Float **LATITUDE**(LATITUDE); LATITUDE:long_name = "Latitude of each location"; LATITUDE:standard_name = "latitude"; LATITUDE:units = "degrees_north"; LATITUDE:valid_min = -90.0; LATITUDE:valid_max = 90.0; LATITUDE:QC_indicator = <X>; LATITUDE:QC_procedure= <Y>; LATITUDE:uncertainty = <Z>; LATITUDE:comment = "Optional comment..." LATITUDE:axis="Y"; LATITUDE:reference="WGS84"; LATITUDE:coordinate_reference_frame="urn:ogc:crs:EPSG::4326";	Latitude of the measurements. Units: degrees north; southern latitudes are negative. Example: 44.4991 for 44° 29' 56.76'' N <X>: Replaces POSITION_QC if constant. Cf. note on quality control in data variable section, value from reference table 2. <Y>: Cf. note on quality control in data variable section, value from reference table 2.1. <Z>: Choose appropriate value.

Float **LONGITUDE**(LONGITUDE); LONGITUDE:long_name = “Longitude of each location”; LONGITUDE:standard_name = “longitude”; LONGITUDE:units = “degrees_east”; LONGITUDE:valid_min = -180.0; LONGITUDE:valid_max = 180.0; LONGITUDE:QC_indicator = <X>; LONGITUDE:QC_procedure = <Y>; LONGITUDE:uncertainty = <Z>; LONGITUDE:comment = “Optional comment...” LONGITUDE:axis=”X”; LONGITUDE:reference="WGS84"; LONGITUDE:coordinate_reference_frame="urn:ogc:crs:EPSG::4326";	Longitude of the measurements. Unit: degrees east; western latitudes are negative. Example: 16.7222 for 16° 43’ 19.92’’ E <X>: Replaces POSITION_QC if constant. Cf. note on quality control in data variable section, value from reference table 2. <Y>: Cf. note on quality control in data variable section, value from reference table 2.1. <Z>: Choose appropriate value.
Float **DEPTH**(DEPTH); DEPTH:long_name = “Depth of each measurement”; DEPTH:standard_name = “depth”; DEPTH:units = “meters”; DEPTH:positive = “down”; DEPTH:_FillValue = -99999.0; DEPTH:valid_min = 0.0; DEPTH:valid_max = 12000.0; DEPTH:QC_indicator = <X>; DEPTH:QC_procedure = <Y>; DEPTH:uncertainty = <Z>; DEPTH:comment = “Optional comment...” DEPTH:axis=”Z”; DEPTH:reference=<R>; DEPTH:coordinate_reference_frame="urn:ogc:crs:EPSG::5113"	Depth of each measurement. Example: 513 for a measurement 513 meters below sea surface. Z axes may be positive=”up” (atmospheric) or positive=”down” (oceanic). <X>: Replaces DEPTH_QC if constant. Cf. note on quality control in data variable section, value from reference table 2. <Y>: Cf. note on quality control in data variable section, value from reference table 2.1. <Z>: Choose appropriate value. <R> : The depth reference default value is “sea_level”. Other possible values are : “mean_sea_level”, “mean_lower_low_water”, “wgs84_geoid” For instruments that do not have fixed depths such as Profiling floats, CTD, gliders, DEPTH is not required; PRES is the vertical axis.

Note on latitude and longitude WGS84 datum

The latitude and longitude datum is WGS84. This is the default output of GPS systems.

OceanSITES uses the EPSG coordinate reference system to describe geographical positions; the coordinate reference frame corresponding to WGS84 is : "urn:ogc:crs:EPSG::5113".

More on EPSG : http://www.epsg.org/

Note on DEPTH reference

The default depth reference is "sea_level" (free sea surface).

In EPSG coordinate reference system, this default reference is: "urn:ogc:crs:EPSG::5113"

Note on handling observations in multiple locations

An OceanSITES files may contain observations performed in different locations. In that case, the TIME, LATITUDE and LONGITUDE dimensions have the same size.

For example: two CTD casts performed in different locations.

- TIME, LATITUDE and LONGITUDE dimensions are set to 2
- TIME(1) is the time of the first CTD cast, TIME(2) is the time of the second CTD cast
- LATITUDE(1) is the latitude of the first CTD cast, LATITUDE(2) is the latitude of the second CTD cast
- LONGITUDE(1) is the longitude of the first CTD cast, LONGITUDE(2) is the longitude of the second CTD cast

Note on TIME

By default, the time word represents the center of the data sample or averaging period.

2.3.2 Coordinate quality control variables

The coordinate variables have the same quality control variables as the data variables. If the quality control values are constant, the information is given in attributes of the coordinate variables. For details, see <PARAM>_QC in the section on data variables, and the note on quality control therein.

Type, name, dimension, attributes	Comment
Byte TIME_QC(TIME);	Quality flag for each TIME value.
Byte POSITION_QC(POSITION);	Quality flag for each LATITUDE and LONGITUDE value.
Byte DEPTH_QC(DEPTH);	Quality flag for each DEPTH value.

2.3.3 Data variables

Data variables contain the actual measurements and indicators about their quality, uncertainty, and mode through which they were obtained. There are different options as to how the indicators are specified, whether in attributes or separate variables, which are outlined in the notes below the table. The variable names are standardized in reference table 3; replace <PARAM> with any of the names indicated there. Mandatory attributes are marked as such, however, OceanSITES requests that all other attributes be used and contain meaningful information unless technical reasons make this impossible.

Type, name, dimension, attributes	Comment
Float <**PARAM**>(TIME, DEPTH,LATITUDE,LONGITUDE); or Float <**PARAM**>(TIME, DEPTH); <PARAM>:**standard_name** = “<X>”; <PARAM>:**units** = “<Y>”; <PARAM>:_**FillValue** = <Y>; <PARAM>:**coordinates** = <’x’>; <PARAM>:long_name = “Y”; <PARAM>:QC_indicator = <X>; <PARAM>:QC_procedure = <X>; <PARAM>:valid_min = <Y>; <PARAM>:valid_max = <Y>; <PARAM>:comment = “<Y>”; <PARAM>:sensor_depth = <Y>; <PARAM>:sensor_mount = <X>; <PARAM>:sensor_orientation = <X>; <PARAM>:sensor_name = <Y>; <PARAM>:sensor_serial_number = <Y>; <PARAM>:ancillary_variables = “<Y>” ; <PARAM>:uncertainty = <Y>; <PARAM>:accuracy = <Y>; <PARAM>:precision = <Y>; <PARAM>:resolution = <Y>; <PARAM>: cell_methods = “<X>”; <PARAM>:DM_indicator = “<X>” <PARAM>:reference_scale = “<Y>”	<PARAM> names are defined in reference table 3. Examples: TEMP, PSAL, DOXY. These 3 attributes are mandatory: standard_name, units and _FillValue. The ‘coordinates’ attribute is REQUIRED when a data variable does not have 4 dimensional coordinate variables in its definition. These 11 attributes are highly desirables : QC_indicator, QC_procedure, valid_min, valid_max, sensor_name, uncertainty sensor_serial_number accuracy, precision, resolution, DM_indicator. The other attributes are optional. <X> : standardized attributes listed in reference tables <Y> : attributes whose value is set by the PI (Principal Investigator) **standard_name**: type char, see reference. table 3 **units**: type char, see reference table 3 **_FillValue**: type float, see reference table 3 **long_name**: type char, free text **QC_indicator**: type byte, see reference table 2 and note on quality control below **QC_procedure** type byte, see reference table 2.1 and note on quality control below **valid_min**: type float. Minimum value for valid data **valid_max**: type float. Maximum value for valid data **comment**. type char. Any free-format text with comments as appropriate. **sensor_depth**. type float. Nominal sensor depth(s) in meters, counting positive as per DEPTH:positive. **sensor_mount** type char. See reference table 7 for sensor mounting characteristics. **sensor_orientation** type char. See reference table 8 for sensor orientation characteristics. **sensor_name** type char (if the data all come from a single sensor). **sensor_serial_number** type char (if the data all come from a single sensor).

	ancillary_variables. type char. Other variables associated with <PARAM>, e.g. <PARAM>_QC. List as space-separated string. Example: TEMP:ancillary_variables=”TEMP_QC TEMP_DM TEMP_UNCERTAINTY” NOTE: no term may appear in the list of ancillary variables that is not the name of a variable in the file. **uncertainty**: type float. Overall measurement uncertainty, if constant. Cf. note on uncertainty below. **accuracy**: type float. Nominal sensor accuracy. Cf. note on uncertainty below. **precision**: type float. Nominal sensor precision. Cf. note on uncertainty below. **resolution**: type float. Nominal resolution of this data parameter. **cell_methods**: type char. Specifies cell method as per CF convention. Example: TEMP:cell_methods=”TIME: point DEPTH: point LATITUDE: point LONGITUDE: point” Values are listed in table 2.2 **DM_indicator**: Type char. Data mode, if constant, as per reference table 5. Cf. note on data modes below. **reference_scale**: type char. For some measurements that are provided according to a standard reference scale specify the the reference scale with this optional attribute. Example: ITS-90, PSS-78
Byte **<PARAM>_QC**(TIME, DEPTH); <PARAM>_QC:flag_values = 0, 1, 2, 3, 4, 5, 7, 8, 9; <PARAM>_QC:flag_meanings = “no_qc_performed good_data probably_good_data bad_data_that_are_potentially_correctable bad_data value_changed nominal_value interpolated_value missing_value” <PARAM>_QC:long_name = “quality flag”; <PARAM>_QC:conventions = “OceanSITES reference table 2”; <PARAM>_QC:_FillValue = -128; <PARAM>_QC:valid_min = 0; <PARAM>_QC:valid_max= 9;	Quality flags for values of associated <PARAM>. **flag_values**: type byte. Required; fixed value **flag_meanings**: type char. Required; fixed value The flag scale is specified in reference table 2, and is included in the flag_meanings attribute. **long_name**: type char. fixed value **conventions**. type char. Required; fixed value **_FillValue**. type byte. Required; fixed value **valid_min**. type byte. Required; fixed value **valid_max**: type byte. Required; fixed value
Char **<PARAM>_DM**(TIME, DEPTH); <PARAM>_DM:long_name = “method of data processing “; <PARAM>_DM:conventions = “ OceanSITES reference table 5”; <PARAM>_DM:flag_values = “R”, “P”, “D”, “M”; <PARAM>_DM:flag_meanings = “real-time provisional delayed-mode mixed”; <PARAM>_DM:_FillValue = “ “;	This is the data mode. Indicates if the data point is real-time, delayed-mode or provisional mode. It is included when the dataset mixes modes for a single variable. See note on data modes below, and reference table 5. **long_name**: type char. Required; fixed value **conventions**: type char. Required; fixed value **flag_values**: type char. Required; fixed value **flag_meanings**: type char. Required; fixed value **_FillValue**: type char. Required; fixed value
Float **<PARAM>_UNCERTAINTY**(TIME, DEPTH): <PARAM>_UNCERTAINTY:long_name = “uncertainty” <PARAM>_UNCERTAINTY:_FillValue=<Y> <PARAM>:units = “<Y>”;	Overall uncertainty of the data given in <PARAM>. See note on uncertainty below. **long_name**: type char. Required; fixed value **_FillValue**: type float. Required. **units**: type char. Required. Must be the same as <PARAM>:units.

Note on ‘coordinates’ attribute:

All of a variable's spatiotemporal coordinates (latitude, longitude, vertical, and time) that are not dimensions of the variable (e.g. Float <PARAM>(TIME, DEPTH); as opposed to Float <PARAM>(TIME, DEPTH, LATITUDE, LONGITUDE); are required to be associated with the data variable via the 'coordinates' attribute of the variable. The value of the coordinates attribute is a blank separated list of the names of auxiliary coordinate variables.

Note on quality control (QC)

The quality of the data in a variable <PARAM> is described by the attribute <PARAM>:QC_procedure, and one of the following: the attribute <PARAM>:QC_indicator or the variable <PARAM_QC>.

<PARAM>:QC_procedure is mandatory and contains values from reference table 2.1, which describe what kind of quality control procedure has been applied.

It is mandatory to define one of <PARAM>:QC_indicator or <PARAM_QC>, both of which would contain values describing the data quality as per reference table 2. If the quality is the same for all <PARAM>, use <PARAM>:QC_indicator. Else, use <PARAM_QC>.

Note on uncertainty

If the overall measurement uncertainty for a variable <PARAM> is reasonably well-known, it must be provided in the attribute <PARAM>:uncertainty if it is constant, or in a variable of its own, <PARAM>_UNCERTAINTY, if it is not constant. If uncertainty is given in either way, the attribute <PARAM>:accuracy is optional.
If it is impossible to estimate the overall measurement uncertainty, it is required to define at least the attribute <PARAM>:accuracy with the nominal sensor accuracy.
The attributes <PARAM>:precision and <PARAM>:resolution are optional; they contain the sensor precision and resolution if defined.

Note on data modes (DM)

Data mode may be represented as a global attribute "data_mode" if all data is a single mode, or as an attribute to a variable <PARAM>:DM_indicator if all data for <PARAM> is in a single mode. If a parameter contains a mixture of modes, these attributes should be set to "M" and the actual data modes should be represented by an extra variable, <PARAM>_DM. The values for the data modes are explained in reference table 5.

Example for sea temperature measurements and associated quality flags

Float TEMP(TIME, DEPTH);
TEMP:standard_name = "sea_water_temperature";
TEMP:units = "degree_Celsius";
TEMP:_FillValue = 99999.f;
TEMP:long_name = "sea water temperature in-situ ITS-90 scale";
TEMP:QC_indicator = 1;
TEMP:QC_procedure = 5;
TEMP:valid_min = -2.0f;
TEMP:valid_max = 40.f;
TEMP:comment = "";
TEMP:sensor_depth = 1;
TEMP:sensor_mount = "mounted_on_surface_buoy";
TEMP:sensor_name = "SBE41";
TEMP:sensor_serial_number = "3263";
TEMP:ancillary_variables = "TEMP_QC" ;
TEMP:uncertainty = 0.01f;

TEMP:accuracy = 0.01f;
TEMP:precision = 0.01f;
TEMP:resolution = 0.001f;
TEMP:cell_methods=”median”;
TEMP:DM_indicator=”P”;
TEMP:reference_scale = “ITS-90”;

TEMP_QC:long_name = “quality flag”;
TEMP_QC:conventions = “OceanSITES reference table 2”;
TEMP_QC:_FillValue = -128;
TEMP_QC:flag_values = 0, 1, 2, 3, 4, 5, 7, 8, 9;
TEMP_QC:flag_meanings = “no_qc_performed good_data probably_good_data bad_data_that_are_potentially_correctable bad_data value_changed nominal_value interpolated_value missing_value”

3 OceanSITES metadata format

OceanSITES is developing an OGC SensorML metadata file format. Meanwhile, this information is available in a Microsoft Word file, a text file, or a modified CDL (NetCDF output) file.

3.1 OceanSITES platform information

Name	Value	Required/ Optional
platform_category	Air-Sea Flux Site, Transport Site, Physical, Meteorological, Biogeochemical, Geophysical	**Required**
wmo_message_format	WMO standard formats: FM13, FM18, FM64, or FM65. PIs may request desired WMO formats and GDAC will determine the final formats to be used	**Optional**
wind_direction_conventions	WMO standard uses wind-from-direction, indicate if the real-time wind direction received by GDAC/DAC is a wind-to-direction before GTS dissemination.	**Optional**
platform_message_reporting_frequency	**The frequency of message reporting from buoy to DAC, such as daily, hourly, or every 10min etc.)**	**Required**

3.2 OceanSITES Parameter and Sensor Information

This section is to be used by PI to provide parameter and associated sensor information for each of the platform dataset files specified in section 2. If real-time GPS tracking data are available, use LATITUDE and LONGITUDE as the position parameters. Please use one form for each parameter.

Name	Value	Required Optional
parameter_name	OS 1.1 parameter - valid parameter name in OceanSITES parameter dictionary as netCDF variable name Example : TEMP	**Required**
sensor_vendor	Name of the sensor vendor Example : PMEL	**Desired**
sensor_sampling_period	Period(s) in minutes when sampling occurs in one message report from buoys, typically in one hour Example : Instantaneous	**Desired**
sensor_sampling_frequency	Instantaneous or frequency in HZ or every 15 second etc Example : 1 per 10 min	**Desired**
sensor_reporting_time	**UTC time represents middle, beginning, or end of sampling periods, indicate if sensor reporting time differs from the corresponding platform message reporting time Example: Sensor reports at the top of the hour and every ten minutes after. Data is transmitted once daily as a mean.**	**Optional**

4 Reference tables

4.1 Reference tables 1: data type and data code

4.1.1 Reference table 1: Data type

The data_type global attribute should have one of the valid values listed here.

Data type
OceanSITES metadata
OceanSITES profile data
OceanSITES time-series data
OceanSITES trajectory data

4.2 Reference table 2: Variable quality control flag scale

The quality control flags indicate the data quality of the data values in a file, and are normally assigned after quality control procedures have been performed. These codes are used in the <PARAM>_QC variables to describe the quality of each measurement, or in the attribute <PARAM>:QC_indicator to describe the overall quality of the parameter.

Code	Meaning	Comment
0	No QC was performed	-
1	Good data	All QC tests passed.
2	Probably good data	-
3	Bad data that are potentially correctable	These data are not to be used without scientific correction or re-calibration.
4	Bad data	Data have failed one or more tests.
5	Value changed	Data may be recovered after transmission error.
6	-	Not used.
7	Nominal value	Data were not observed but reported. Example: an instrument target depth.
8	Interpolated value	Missing data may be interpolated from neighboring data in space or time.
9	Missing value	-

4.2.1 Reference table 2.1: Overall quality control procedure indicator

This table describes the quality procedures applied to all the measurement of a parameter. These values are used as an overall quality indicator (i.e. one summarizing all measurements) in the attributes of each variable <PARAM>.

Cf. <PARAM>:QC_procedure attribute description in section 3.2.3.

Code	Meaning
0	No QC performed

1	Ranges applied, bad data flagged
2	Data interpolated
3	Sensor malfunctioning (data possibly useful)
4	Data missing
5	Data manually reviewed
6	Data verified against model or other contextual information
7	Other QC process applied

4.2.2 Reference table 2.2: cell methods

From NetCDF Climate and Forecast (CF) Metadata Conventions, Version 1.2, 4 May, 2008. In the Units column, *u* indicates the units of the physical quantity before the method is applied.

Cell Method	Units	Description
point	u	The data values are representative of points in space or time (instantaneous).
sum	u	The data values are representative of a sum or accumulation over the cell.
maximum	u	Maximum
median	u	Median
mid_range	u	Average of maximum and minimum
minimum	u	Minimum
mean	u	Mean (average value)
mode	u	Mode (most common value)
standard_deviation	u	Standard deviation
variance	u2	Variance

4.3 Reference table 3: OceanSITES parameter dictionary

4.3.1 Convention for parameter names, standard names and units

The parameter dictionary is is available on GDACs ftp servers.

- Parameter names should start with a code based on SeaDataNet-BODC parameter discovery vocabulary.
  They are not strictly standardized, however.
  When necessary, a parameter name has a suffix that designates secondary parameters[1]. The suffix starts with the character "_".

u

- The NetCDF “standard_name” attribute contains the standardized parameter name from CF conventions.
- The NetCDF “units” attribute are compliant with Udunits as implemented in the CF/COARDS standards.

As the parameter names are not strictly standardized, one should use the standard_name attribute to query a particular measurement from different data files.

Example
On a mooring, sea temperature measured by a series of Microcat CTD is reported as TEMP, with a standard name of SEA_WATER_TEMPERATURE.
Secondary temperature measurement performed by an oxygen sensor is reported as DOXY_TEMP with a standard name of temperature_of_sensor_for_oxygen_in_sea_water.
For both measurements, the unit attribute is “degree_Celsius”.

4.3.2 References

The OceanSITES standard names are taken from the CF standard names, available at:

- http://cf-pcmdi.llnl.gov/documents/cf-standard-names/
- The parameter names are based on SeaDataNet-BODC parameter discovery vocabulary available at:
- http://seadatanet.maris2.nl/v_bodc_vocab/welcome.aspx
  Select P021, “ BODC Parameter Discovery Vocabulary”

The units are compliant with Udunits, as implemented by the CF standard; definitions are available at:

- http://www.unidata.ucar.edu/software/udunits

The valid parameter names, standard names are available on GDACs ftp servers.

The following list an extract of the OceanSITES parameter dictionary for parameter name and standard name.

Parameter	Standard name
AIRT	air_temperature
ATMP	air_pressure
ATMS	air_pressure_at_sea_level
CDIR	direction_of_sea_water_velocity was sea_water_direction
CNDC	sea_water_electrical_conductivity
CSPD	sea_water_speed
DEPTH	depth
DEWT	dew_point_temperature
DOX2	moles_of_oxygen_per_unit_mass_in_sea_water was dissolved_oxygen
DOXY	mass_concentration_of_oxygen_in_sea_water was dissolved_oxygen
DOXY_TEMP	temperature_of_sensor_for_oxygen_in_sea_water
DRYT	dry_bulb_temperature
DYNHT	dynamic_height
EWCT	eastward_sea_water_velocity
FLU2	fluorescence
HCSP	sea_water_speed
HEAT	heat_content
ISO17	isotherm_depth
LW	surface_downwelling_longwave_flux_in_air
NSCT	northward_sea_water_velocity
OPBS	optical_backscattering_coefficient
PCO2	surface_partial_pressure_of_carbon_dioxide_in_air was CO2_partial_pressure_in_dry/wet_gas
PRES	sea_water_pressure
PSAL	sea_water_salinity
RAIN	rainfall_rate
RAIT	thickness_of_rainfall_amount
RELH	relative_humidity
SDFA	surface_downwelling_shortwave_flux_in_air
SRAD	isotropic_shortwave_radiance_in_air
SW	surface_downwelling_shortwave_flux_in_air
TEMP	sea_water_temperature
UCUR	eastward_sea_water_velocity
UWND	eastward_wind

VAVH	sea_surface_wave_significant_height
VAVT	sea_surface_wave_zero_upcrossing_period
VCUR	northward_sea_water_velocity
VDEN	sea_surface_wave_variance_spectral_density
VDIR	sea_surface_wave_from_direction
VWND	northward_wind
WDIR	wind_to_direction
WSPD	wind_speed

4.4 Reference table 4: Data Assembly Center Codes

Data Assembly Centers and institutions	
BERGEN	UNIVERSITY OF BERGEN GEOPHYSICAL INSTITUTE
CCHDO	CLIVAR and Carbon Hydographic Office
CDIAC	CARBON DIOXIDE INFORMATION ANALYSIS CENTER
EUROSITES	EuroSites EU project
IMOS	AUSTRALIAN INTEGRATED MARINE OBSERVING SYSTEM
INCOIS	Indian National Centre for Ocean Information Services
JAMSTEC	Jamstec, Japan
MBARI	Monterey Bay Aquarium Research Institute
MEDS	MEDS, Canada
NDBC	National Data Buoy Center, USA
NIOZ	ROYAL NETHERLANDS INSTITUTE FOR SEA RESEARCH
NOCS	National Oceanography Centre, Southampton
PMEL	PMEL, USA
SIO	SIO, Scripps, USA
WHOI	Woods Hole Oceanographic Institution, USA

4.5 Reference table 5: data mode

The values for the variables "<PARAM>_DM", the global attribute "data_mode", and variable attributes "<PARAM>:DM_indicator" are defined as follows:

Value	Meaning
R	Real-time data. Data coming from the (typically remote) platform through a communication channel without physical access to the instruments, disassembly or recovery of the platform. Example: for a mooring with a radio communication, this would be data obtained through the radio.
P	Provisional data. Data obtained after the instruments or the platform have been recovered or serviced. Example: for instruments on a mooring, this would be data downloaded directly from the instruments after the mooring has been recovered on a ship.
D	Delayed-mode data. Data published after all calibrations and quality control procedures have been applied on the internally recorded or best available original data. This is the best possible version of processed data.

M	Mixed. This value is only allowed in the global attribute “data_mode” or in attributes to variables in the form “<PARAM>:DM_indicator”. It indicates that the file contains data in more than one of the above states. In this case, the variable(s) <PARAM>_DM specify which data is in which data mode.

4.6 Reference table 6: OceanSITES sites catalog

The OceanSITES catalogue is managed by the Project Office (email: projectoffice@oceansites.org).

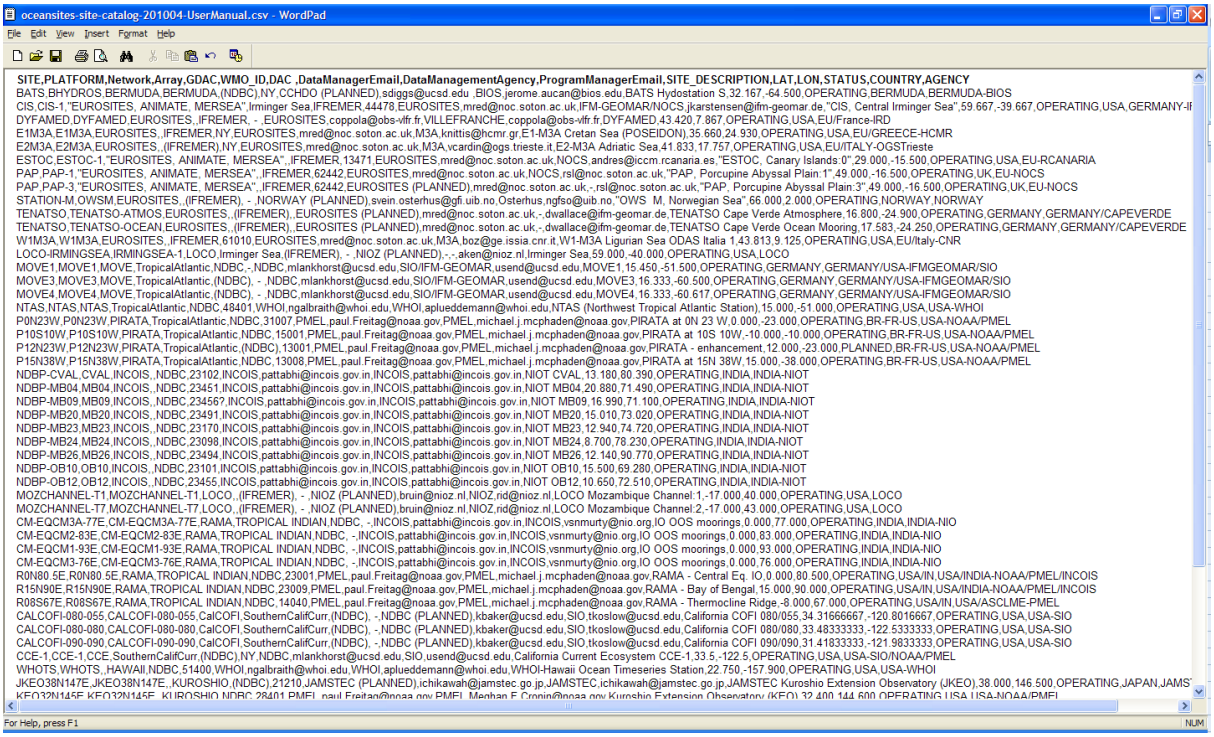
An OceanSITES site and platforms have unique names provided by OceanSITES Project Office after agreement from the Principal Investigator and the OceanSITES Steering Team

The Project Office ensures that platform_codes are unique among OceanSITES.

The WMO codes are requested to WMO by the DAC or the national contact with WMO.

The OceanSITES sites catalogue will be made available on GDACs ftp servers.

The following list is an extract from the catalogue.



4.7 Reference table 7: sensor mount characteristics

The <PARAM>:”sensor_mount” attribute indicates the way a sensor is mounted on a mooring.

The following table lists the valid sensor_mount attribute values.

sensor_mount
mounted_on_fixed_structure
mounted_on_surface_buoy

mounted_on_mooring_line
mounted_on_bottom_lander
mounted_on_moored_profiler
mounted_on_glider
mounted_on_shipborne_fixed
mounted_on_shipborne_profiler
mounted_on_seafloor_structure
mounted_on_benthic_node
mounted_on_benthic_crawler
mounted_on_surface_buoy_tether
mounted_on_seafloor_structure_riser
mounted_on_fixed_subsurface_vertical_profiler

4.8 Reference table 8: sensor orientation characteristics

When appropriate, the <PARAM>:"sensor_orientation" attribute indicates the way a sensor is oriented on a mooring.

The following table lists the valid sensor_orientation attribute values.

sensor_orientation	comment
downward	Example : ADCP measuring from surface to bottom currents.
upward	Example : In-line ADCP measuring currents towards the surface
vertical	-
horizontal	-

5 GDAC organization

There are two GDACs (global data assembly centers) for redundancy, which are the users' access points for OceanSITES data. One GDAC is located in France (Coriolis, http://www.coriolis.eu.org), the other one in the USA (NDBC, National Data Buoy Center, http://www.ndbc.noaa.gov). The GDACs handle OceanSITES data, metadata, and index files on ftp servers. The servers at both GDACs are synchronized at least daily to provide the same OceanSITES data.

The user can access the data at either GDAC's ftp site:

- ftp://data.ndbc.noaa.gov/data/oceansites
- ftp://ftp.ifremer.fr/ifremer/oceansites

From these root directories of the GDACs downward, the organization of the directories and files is:

- DATA/site/FileName.nc
  site: OceanSITES site code

The sites codes will be listed in the "OceanSITES catalogue" document at either GDAC's root directory.

5.1 File naming convention

The OceanSITES file names use the following naming convention for data and metadata files.

5.1.1 Data file naming convention

OS_XXX_YYY_T_PARTX.nc

- OS - OceanSITES prefix
- XXX - Platform code from the OceanSITES catalogue
- YYY - Deployment code (unique code for deployment - date or number)
- T - Data Mode
  - R: real-time data
  - P : provisional data
  - D: delayed mode
  - M: mixed delayed mode and real-time.
- <_PARTX> - An optional user defined field for identification of data

Example

- OS_CIS-1_200905_R_CTD.nc

This file contains temperature and salinity data from the CIS-1 mooring, from the EuroSITES project, for the deployment performed in May 2009.

5.1.2 Metadata file naming convention

OS_XXX_YYY_META.zzz

- OS: OceanSITES prefix
- XXX: platform code
- YYY: deployment code
- zzz: metadata file suffix (.txt, .doc, .xml)

These metadata are for the corresponding data file(s) OS_XXX_YYY_T_ZZZ_PARTX.nc

Example

- OS_CIS-1_200905_META.xml

This file contains the metadata of CIS-1 mooring, for the deployment performed in May 2009.

5.2 Index file for data files

To allow for data discovery without downloading the data files themselves, an index file is created at the GDAC level, which lists all available data files and the location and time ranges of their data contents:

- The data index file is located at the root directory of the GDAC.
- The index file contains the list and a description of all data files available on the GDAC.
- There is a header section, lines of which start with # characters.
- The information sections are comma-separated values.
- Each line contains the following information:
- file: the file name, beginning from the GDAC root directory
- date_update: the update date of the file, YYYY-MM-DDTHH:MI:SSZ
- start_date: first date for observations, YYYY-MM-DDTHH:MI:SSZ
- end_date: last date for observations, YYYY-MM-DDTHH:MI:SSZ
- southern_most_latitude
- northern_most_latitude
- western_most_longitude
- eastern_most_longitude
- geospatial_vertical_min
- geospatial_vertical_min
- update_interval: M monthly, D daily, Y yearly, V void
- size: the size of the file in megabytes
- gdac_creation_date: date of creation of the file on the GDAC
- gdac_update_date: date of update of the file on the GDAC.
- data_mode: R, P, D, M (real-time, provisional, delayed mode, mixed; see reference table 5)
- parameters: list of parameters (standard_name) available in the file separated with

blank

The fill value is empty: ",,".

GDAC data files index: oceansites_files_index.txt

OceanSites FTP GLOBAL INDEX
FTP://FTP.IFREMER.FR/IFREMER/OCEANSITES
Contact: HTTP://WWW.OCEANSITES.ORG
Index update date YYYY-MM-DDTHH:MI:SSZ: 2008-03-30T18:37:46Z
#
#file,date_update,start_date,end_date,
southern_most_latitude,northern_most_latitude,western_most_longitude,eastern_most_longitude,
geospatial_vertical_min,geospatial_vertical_min,update_interval,size,gdac_creation_date,gdac_update_date,d
ata_mode,parameters
TAO/0n170w/OS_0n170w_SW_LW_2m.nc,2008-04-12T08:05:00Z,2007-03-17T18:07:00Z,2008-04-
12T08:05:00Z,0,0,-170,-170,M,16.7,0,550,2008-04-12T08:05:00Z,2008-04-
12T08:05:00Z,R,sea_water_pressure sea_water_temperature sea_water_salinity

6 Glossary, definitions

This chapter gives a definition for the OceanSITES items described in this manual.

6.1 Site

An OceanSITES site is a defined geographic location where sustained oceanographic, meteorological or other observations are made.

Example: CIS is a site in the Central Irminger Sea.

Note: A site should be thought of as a point in space, i.e. a nominal position, with a small area extent around it, such that successive observations from anywhere within this area reasonably represent conditions at the nominal position for the major scientific questions that the observations address.

6.2 Array

An OceanSITES array is a grouping of sites based on a common and identified scientific question, or on a common geographic location.

Example: An IRMINGERSEA array would identify the sites CIS, LOCO-IRMINGERSEA, and OOI-IRMINGERSEA as sharing a common scientific interest and/or geographic location.

Notes: It is valid for a single site to belong to no, one, or multiple arrays.

Documenting the array is recommended only if it identifies commonalities beyond a single project or a single operating institution.

6.3 Network

An OceansSITES network is a grouping of sites based on common shore-based logistics or infrastructure.

Example: EuroSITES, although technically a single project, bundles multiple institutional efforts and connects otherwise remote sites to a degree that warrants calling it a network.

Notes: It is valid for a single site to belong to no, one, or multiple networks. Documenting the network is recommended only if it identifies structures beyond a single project or a single operating institution.

6.4 Platform

An OceanSITES platform is an independently deployable package of instruments and sensors forming part of site. It may be fixed to the ocean floor, may float or may be self-propelled.

Examples:

- CIS-1: a mooring in Central Irminger Sea
- THETYS II: a vessel that performs regular CTDs at DYFAMED site.

6.5 Deployment

An OceanSITES deployment is an instrumented platform performing observations for a period of time. Changes to the instrumentation or to the spatial characteristics of the platform or its instruments constitute the end of the deployment.

Examples: The CTD data for CIS-1 deployment performed in May 2009 (200905) and are distributed as OS_CIS-1_200905_R_CTD.nc file.

6.6 Instrument

An OceanSITES instrument is device that provides digital data output.

Examples: CTD, ADCP, Meteorological Package.

6.7 Sensor

A device that measures environmental parameter but does not digitize data for transmission, it needs to be connected to an instrument to produce a data stream that a computer can read.
Examples: Transmissiometer, Fluorometer, Oxygen sensor.