argo data management

Argo data management
ar-um-02-01

ARGO USER'S MANUAL

Version 2.4

March 29th 2012

Mis en forme : Exposant

ARGO
part of the integrated global observation strategy

Argo data management

User's manual

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Mis en forme ... [1]

History of the document

Version	Date	Comment
0.9	29/12/2001	Thierry Carval : creation of the document
0.9a	18/01/2002	Bob Keeley : general comments and updates
0.9a	24/01/2002	Valérie Harscoat : general comments and updates
0.9a	25/01/2002	Claudia Schmid : general comments and updates
0.9a	24/01/2002	Roger Goldsmith : general comments and updates
0.9b	05/03/2002	Roger Goldsmith, Yasushi Takatsuki and Claudia Schmid comments implemented.
0.9c	24/04/2002	Comments from version 0.9b are implemented
1.0	09/07/2002	Comments from version 0.9c are implemented
1.0a	31/12/2002	Missing values in trajectory and calibration
1.0a	17/01/2003	Description of directory file format
1.0a	24/01/2003	Update of reference tables
1.0a	24/01/2003	Update of “measurements of each profile” to handle corrected values
1.0a	24/01/2003	Increase the size of DC_REFERENCE from STRING16 to STRING32
1.0b	17/03/2003	Replace corrected values with adjusted values
1.0b	29/04/2003	DC_REFERENCE removed from trajectory format general information of the float section
1.0b	30/04/2003	Use blank fill values for character variables
1.0c	30/04/2003	Proposal submitted on 30/04/2003
1.0d	14/08/2003	Proposal submitted on 14/08/2003 (green font)
1.0e	23/10/2003	Proposal submitted on 12/11/2003 (green font)
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2.01	15/12/2003	History section updated.
2.01	01/10/2004	Meta-data section : WMO_INST_TYPE added to history section INSTRUMENT_TYPE renamed INST_REFERENCE
2.01	10/11/2004	Reference table 2 quality control flag scale updated by Annie Wong
2.01	10/11/2004	Updates in reference table 3, parameter codes table DOXY, TEMP_DOXY, TEMP (use ITS-90 scale)
2.01	23/11/2004	Reference table 14 : instrument failure mode added by Annie Wong
2.01	25/02/2005	Table 11 updated for frozen profile and deepest pressure tests from Rebecca Macreadie
2.01	28/02/2005	Table 4 updated : CSIO, China Second Institute of Oceanography
2.01	12/04/2005	Mathieu Belbeoch : table 5 updated : argos location classes
2.01	12/06/2005	Change lengths of all parameter name variables to accomodate longer parameter names. Affects: STATION_PARAMETERS (section 2.2.3), PARAMETER (section 2.2.5), and HISTORY_PARAMETER (section 2.2.6) in the profile format; TRAJECTORY_PARAMETERS (section 2.3.3) and HISTORY_PARAMETER (section 2.3.6) in the trajectory format; SENSOR (section 2.4.5) and PARAMETER (section 2.4.6) in the meta-data format
2.01	12/06/2005	Change “:conventions” attribute and description of PROFILE_<PARAM>_QC in section 2.2.3.
2.01	12/06/2005	Add reference table 2a for the redefined PROFILE_<PARAM>_QC variables
2.01	20/06/2005	New long name for TEMP_DOXY in section 3.3
2.01	22/06/2005	Claudia Schmid : general update of trajectory file history section (N_MEASUREMENT dimension removed)
2.01	07/11/2005	Claudia Schmid : create reference table 14 for technical parameter names. Minor typo corrections.
2.01	07/11/2005	Thierry Carval : add a GPS code for position accuracy in ref. Table 5.
2.01	08/11/2005	Ann Thresher : exemple of sensor type in meta-data
2.01	09/11/2005	Annie Wong : §3.2.2 usage of <PARAM_ADJUSTED_QC> and <PARAM_QC> Reference table 2 updated (qc 3 and 4)
2.01	11/11/2005	Thierry Carval : §2.2.4, §2.3.4 accept adjusted parameters in real time files
2.01	11/11/2005	Thierry Carval : §2.2.6 history section for multi-profile files is empty
2.01	11/11/2005	Thierry Carval : §1.3, §2.2.3, §2.3.4 real-time adjusted data
2.01	11/11/2005	Thierry Carval : §2.4.8 highly desirable meta-data description
2.1	30/11/2005	Annie Wong : §3.2.1 update on flag 4 real time comment
2.1	20/12/2005	Thierry Carval : remove erroneous blanks (ex : "Argo reference table 3")
2.1	01/03/2006	Mark Ignaszewski: §2.3.6 Change HISTORY_*_INDEX to “int”, Change HISTORY_REFERENCE to STRING64. Change to “dependent” in all sections. Remove PLATFORM_SERIAL_NO from desirable parameter table. Add “No QC performed” to Table 2a. Change FORMAT_VERSION to 2.2 in all sections.
2.1	26/09/2006	Thierry Carval §2.4.3 : TRANS_SYSTEM_ID : use N/A when not applicable (eg : Iridium or Orbcomm)
2.1	27/11/2006	Thierry Carval §2.4.8 : highly desirable metadata; PARKING_PRESSURE may be empty for floats drifting

		along a selected density level.
2.1	09/06/2008	Claudia Schmid §3.3: use DOXY2 for floats equipped with 2 oxygen sensors.
2.2	12/02/2009	Claudia Schmid §4.1 : file naming convention, multi-profiles cycle
2.2	03/03/2009	Thierry Carval §6.1 : greylist file collection §2.2.2 : move date_creation and date_update to "general information on profile file section".
2.2	21/08/2009	§1.2 : new graphic for float cycles description §2.2.3 : add a firmware version to general information for profile §2.3.4 : add a "CYCLE_STAGE" in trajectory file §2.3.5 : add "CYCLE_PHASE" and "cycle" in trajectory file §2.4.3 : general review of float characteristics §2.4.5 : configuration parameters §2.4.8. : metadata file version 2.3 §2.6 : technical data format 2.3 §2.8.2 : profile directory file format version 2.1 §3.3 : add BPHASE_DOXY §3.3 : remark on unit conversion of oxygen §6.2 : GDAC files removal add a RAFOS positioning system add a note on qc flag and qc manual add a description of greylist use for users trajectory format : move date_creation and date_update in the file information section
2.2	27/11/2009	§1.1: "Notice on file format change" chapter added §1.2: "User Obligations" chapter added §1.3: "Disclaimer" chapter added §1.4: "Further information sources and contact information" chapter added §2.3.1 and §2.3.6: remove N_HISTORY2 dimension from trajectory format §2.3.2: move DATE_CREATION and DATE_UPDATE to "General information on the trajectory file" chapter §2.3.4: revisit PARAM and PARAM_QC policy in real-time/delayed mode §2.5.4: CONFIGURATION_PHASE_REPETITION is removed from the configuration parameter chapter. §2.5.4: new example with a graphic §2.8.2: Profile directory file format statement transition added. §3.2.1: add a reference to quality control manual. §3.11: add a descripion of table11. Add a new column in the table to explain the link between QC test binary ID and test number. §3.14: table 14 "technical parameter names" revision, links to naming convention and list of technical parameters added. §6.1.1: "Greylist definition" chapter added §6.1.1: Who/when/how to add a float in the greylist §6.1.1: Who/when/how to remove floats from the greylist §6.1.1: How users should use the greylist
2.2	31/12/2009	§1.3: Disclaimer; argo data are continuously managed and updated §2.3.4: Trajectory locations and measurements Remove DC_REFERENCE Do not report DATA_MODE in this section report CYCLE_NUMBER in this section §2.3.5: Trajectory cycle information from the float Missing cycle management Report DATA_MODE in this section §3.2.1: Reference table 2: measurement flag scale For flag 2 comment is "Treat as good data" instead of "Probably good data" §3.3.2: Oxygen data management §3.14 Reference table 14: technical parameter names How to require new technical parameters
2.2	08/01/2010	Address the following messages listed and commented in argo-user-manual-comment-toulouse.doc : 04/01/2010 22:32 Annie Wong 31/12/2009 22:49 Claudia Schmid 31/12/2009 20:35 Claudia Schmid 31/12/2009 19:12 Annie Wong
2.31	08/09/2010	T. Carval : CONCENT_DOXY is renamed MOLAR_DOXY to be compliant with the document "Processing Argo OXYGEN data at the DAC level", version 1.0
2.31	14/06/2011	T. Carval : Add a NMDIS Chinese DAC
2.4	19/11/2011	Thierry Carval : general revision of the document presentation
2.4	19/11/2011	§2.3 Megan Scanderberg : update of trajectory format following Seoul trajectory & ADMT12 meeting
2.4	19/11/2011	§3.3 Thierry Carval : CNDC (conductivity) valid min is set to 8.5 instead of 60.0

2.4	10/02/2012	§2.2.3 Thierry Carval : vertical sampling scheme to manage profiles performed on different vertical axes
2.4	10/02/2012	§2.4 Esmee Vanwijk : meta-data format version 2.4
2.4	10/02/2012	§2.2.3 Thierry Carval : global attributes and parameter attributes for CF compatibility
2.4	13/02/0212	§2.5 Thierry Carval : remove chapter "technical information format version 2.2"; keep "technical information format version 2.3"
2.4	20/02/2012	Feedbacks from the draft "User's manual" sent on 13/02/2012. The changes are highlighted in green. The comments are available in argo-dm-user-manual-seoul-update-comment.docx
2.4	14/03/2012	Feedbacks from the draft "User's manual" sent on 14/03/2012. The changes are highlighted in grey. The comments are available in argo-dm-user-manual-seoul-update-comment.docx
2.4	30/03/2012	The version 2.4 of Argi user's manual is officially released.

1 Introduction

This document is the Argo data user's manual.

It contains the description of the formats and files produced by the Argo DACs.

1.1 Notice on file format change transition

This version of the "User's manual" is adjusting the file formats to the growing variety of floats and user needs. It introduces a complete revision of metadata and technical files. To cope with this radical change, during a transition period the version 2.2 and 2.3 of the technical and metadata file will be valid among Argo data system.

1.2 User Obligations

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

A user should acknowledge use of Argo 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 Argo project and the national programs that contribute to it."

1.3 Disclaimer

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

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

Argo 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 may 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.

Argo welcomes users to ask questions and report problems to the contact addresses listed on the Argo internet page.

Argo data are continuously managed; the user should be aware that after he downloaded data, those data may have been updated on Argo data server.

1.4 Further information sources and contact information

- Argo website: http://www.argo.net/
- If you detect any problem in the Argo data set, please give us your feedback via support@argo.net

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1.5 Argo program, data management context

The objective of Argo program is to operate and manage a set of 3000 floats distributed in all oceans, with the vision that the network will be a permanent and operational system.

The Argo data management group is creating a unique data format for internet distribution to users and for data exchange between national data centres (DACs) and global data centres (GDACs).

Profile data, metadata, trajectories and technical data are included in this standardization effort.

The Argo data formats are based on NetCDF because :

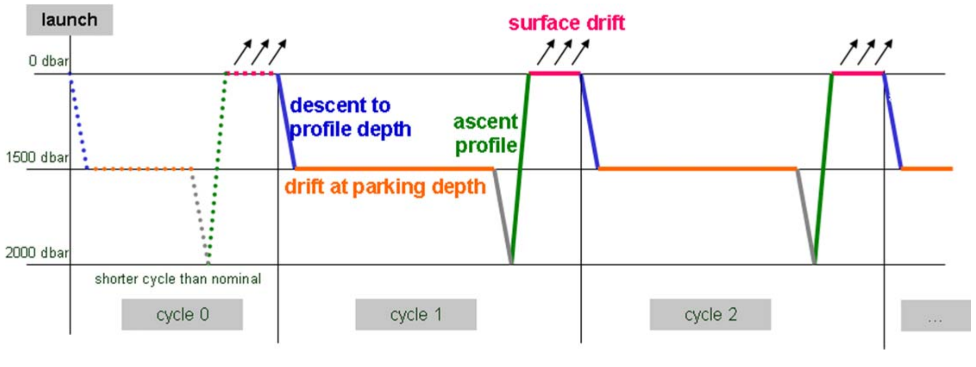
- It is a widely accepted data format by the user community,
- It is a self-describing format for which tools are widely available,
- It is a reliable and efficient format for data exchange.

1.6 Argo float cycles

A typical Argo float drifts for three years or more in the ocean. It continuously performs measurement cycles. Each cycle lasts about 10 days and can be divided into 4 stages:

- A descent from surface to a parking pressure (e.g. 1500 decibars),
- A subsurface drift at the parking pressure (e.g. 10 days),
- An ascent from a fixed pressure to surface (e.g. 2000 decibars),
- A surface drift with positioning and data transmission to a communication satellite (e.g. 8 hours).

Profile measurements (e.g. pressure, temperature, salinity) are performed during ascent, occasionally during descent. Subsurface measurements during parking are sometime performed (e.g. every 12 hours).



A typical Argo float performs continuously measurement cycle during 3 years or more in the ocean.

A more detailed cycle description is available in reference table 15, chapter 3.15.

Cycle naming convention

Float cycle numbers usually start at 1. The next cycles are increasing numbers (e.g. 2, 3,…N). If the float reports cycle number, this is what should be used in all Argo files.

Very conveniently some floats transmit their configuration during the transmissions before they descent for profile 1.

Cycle 0 contains the first surface drift with technical data transmission or configuration information. This data is reported in the technical data files.

Cycle 0 may contain subsurface measurements if a descending/ascending profile is performed before any data transmission. The time length of this cycle is usually shorter than the next nominal cycles. The cycle time is therefore regular only for later profiles and may be variable if the float is reprogrammed during its mission.

1.7 Real-time and Delayed mode data

Data from Argo floats are transmitted from the float, passed through processing and automatic quality control procedures as quickly as possible after the float begins reporting at the surface. The target is to issue the data to the GTS and Global Data servers within 24 hours of surfacing, or as quickly thereafter as possible. These are called real-time data.

The data are also issued to the Principle Investigators on the same schedule as they are sent to the Global servers. These scientists apply other procedures to check data quality and the target is for these data to be returned to the global data centres within 6 to 12 months. These constitute the delayed mode data.

The adjustments applied to delayed-data may also be applied to real-time data, to correct sensor drifts for real-time users. However, these real-time adjustments will be recalculated by the delayed mode quality control.

2 Formats description

2.1 Overview of the formats

Argo data formats are based on NetCDF from UNIDATA.

NetCDF (network Common Data Form) is an interface for array-oriented data access and a library that provides an implementation of the interface. The NetCDF library also defines a machine-independent format for representing scientific data. Together, the interface, library, and format support the creation, access, and sharing of scientific data. The NetCDF software was developed at the Unidata Program Centre in Boulder, Colorado. The freely available source can be obtained as a compressed tar file or a zip file from Unidata or from other mirror sites.

- Ucar web site address : http://www.ucar.edu/ucar
- NetCDF documentation : http://www.unidata.ucar.edu/packages/netcdf/index.html

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Argo formats are divided in 4 sections:

- Dimensions and definitions
- General information
- Data section
- History section

The Argo NetCDF formats do not contain any global attribute.

Argo date and time: all date and time have to be given in Universal Time coordinates.

2.2 Profile format version 2.3

An Argo single-cycle profile file contains a set of profiles from a single cycle. The minimum number is one profile per cycle. There is no defined maximum number of profiles per cycle.

A profile contains all parameters that are measured with the same vertical sampling scheme. For example, all Argo floats collect at least one profile per cycle that contains the CTD measurements.

Some speciality floats collect additional profiles per cycle. These speciality profiles contain parameters measured at pressure levels that are different from the CTD levels. Some examples of speciality profiles with different vertical sampling schemes are:

- Bouncing profiles: a series of shallow profiles performed during one cycle.
- High resolution near-surface observations: higher resolution vertical sampling near the surface from unpumped CTD.
- Oxygen profiles: dissolved oxygen measured on vertical levels that are not the CTD levels.
- Optical profiles: a series of optical profiles performed during one cycle.

Commentaire [TC1]: New introduction from Annie, vertical sampling scheme explanations.

For single-cycle profile file naming conventions, see §4.1.

2.2.1 Global attributes, dimensions and definitions

2.2.1.1 Global attributes

The global attributes section is used for data discovery. The following 9 global attributes should appear in the global section. The NetCDF Climate and Forecast (CF) Metadata Conventions (version 1.6, 5 December, 2011) are available from:

- http://cf-pcmdi.llnl.gov/documents/cf-conventions/1.6/cf-conventions.pdf

```
// global attributes:
        :title = "Argo float vertical profile";
        :institution = "CSIRO";
        :source = "Argo float";
        :history = "1977-04-22T06:00:00Z creation";
        :references = "http://www.argodatamgt.org/Documentation";
        :comment = "free text";
        :user_manual_version = "2.4" ;
        :Conventions = "Argo-2.4 CF-1.6" ;
        :featureType = "trajectoryProfile";
```

Global attribute name	Definition
title	A succinct description of what is in the dataset
institution	Specifies where the original data was produced.
source	The method of production of the original data. If it was model-generated, source should name the model and its version, as specifically as could be useful. If it is observational, source should characterize it (e.g., "surface observation" or "radiosonde").
history	Provides an audit trail for modifications to the original data. Well-behaved generic netCDF filters will automatically append their name and the parameters with which they were invoked to the global history attribute

	of an input netCDF file. We recommend that each line begin with a timestamp indicating the date and time of day that the program was executed.
references	Published or web-based references that describe the data or methods used to produce it.
comment	Miscellaneous information about the data or methods used to produce it.

2.2.1.2 Dimensions

Name	Value	Definition
DATE_TIME	DATE_TIME = 14;	This dimension is the length of an ASCII date and time value. Date_time convention is : YYYYMMDDHHMISS • YYYY : year • MM : month • DD : day • HH : hour of the day (as 0 to 23) • MI : minutes (as 0 to 59) • SS : seconds (as 0 to 59) Date and time values are always in universal time coordinates (UTC). Examples : 20010105172834 : January 5th 2001 17:28:34 19971217000000 : December 17th 1997 00:00:00
STRING256 STRING64 STRING32 STRING16 STRING8 STRING4 STRING2	STRING256 = 256; STRING64 = 64; STRING32 = 32; STRING16 = 16; STRING8 = 8; STRING4 = 4; STRING2 = 2;	String dimensions from 2 to 256.
N_PROF	N_PROF = <int value>;	Number of profiles contained in the file. This dimension depends on the data set. A file contains at least one profile. There is no defined limit on the maximum number of profiles in a file. Example : N_PROF = 100
N_PARAM	N_PARAM = <int value> ;	Maximum number of parameters measured or calculated for a pressure sample. This dimension depends on the data set. Examples : (pressure, temperature) : N_PARAM = 2 (pressure, temperature, salinity) : N_PARAM = 3 (pressure, temperature, conductivity, salinity) : N_PARAM = 4
N_LEVELS	N_LEVELS = <int value> ;	Maximum number of pressure levels contained in a profile. This dimension depends on the data set. Example : N_LEVELS = 100
N_CALIB	N_CALIB = <int value> ;	Maximum number of calibrations performed on a profile. This dimension depends on the data set. Example : N_CALIB = 10
N_HISTORY	N_HISTORY = UNLIMITED;	Number of history records.

2.2.2 General information on the profile file

This section contains information about the whole file.

Name	Definition	Comment
DATA_TYPE	char DATA_TYPE(STRING16); DATA_TYPE:long_name = "Data type"; DATA_TYPE:_FillValue = " ";	This field contains the type of data contained in the file. The list of acceptable data types is in the reference table 1. Example : Argo profile
FORMAT_VERSION	char FORMAT_VERSION(STRING4); FORMAT_VERSION:long_name = "File format version"; FORMAT_VERSION:_FillValue = " ";	File format version Example : «2.3»
HANDBOOK_VERSION	char HANDBOOK_VERSION(STRING4); HANDBOOK_VERSION:long_name = "Data handbook version"; HANDBOOK_VERSION:_FillValue = " ";	Version number of the data handbook. This field indicates that the data contained in this file are managed according to the policy described in the Argo data management handbook. Example : «1.0»
REFERENCE_DATE_TIME	char REFERENCE_DATE_TIME(DATE_TIME); REFERENCE_DATE_TIME: long_name = "Date of reference for Julian days"; REFERENCE_DATE_TIME:conventions = "YYYYMMDDHHMISS"; REFERENCE_DATE_TIME:_FillValue = " ";	Date of reference for julian days. The recommended reference date time is “19500101000000” : January 1st 1950 00:00:00
DATE_CREATION	char DATE_CREATION(DATE_TIME); DATE_CREATION: long_name = "Date of file creation "; DATE_CREATION:conventions = "YYYYMMDDHHMISS"; DATE_CREATION:_FillValue = " ";	Date and time (UTC) of creation of this file. Format : YYYYMMDDHHMISS Example : 20011229161700 : December 29th 2001 16 :17 :00
DATE_UPDATE	char DATE_UPDATE(DATE_TIME); DATE_UPDATE:long_name = "Date of update of this file"; DATE_UPDATE:conventions = "YYYYMMDDHHMISS"; DATE_UPDATE:_FillValue = " ";	Date and time (UTC) of update of this file. Format : YYYYMMDDHHMISS Example : 20011230090500 : December 30th 2001 09 :05 :00

2.2.3 General information for each profile

This section contains general information on each profile.

Each item of this section has a N_PROF (number of profiles) dimension.

Name	Definition	Comment
PLATFORM_NUMBER	char PLATFORM_NUMBER(N_PROF, STRING8); PLATFORM_NUMBER:long_name = "Float unique identifier"; PLATFORM_NUMBER:conventions = "WMO float identifier : A9IIIII"; PLATFORM_NUMBER:_FillValue = " ";	WMO float identifier. WMO is the World Meteorological Organization. This platform number is unique. Example : 6900045
PROJECT_NAME	char PROJECT_NAME(N_PROF, STRING64); PROJECT_NAME: long_name = "Name of the project"; PROJECT_NAME:_FillValue = " ";	Name of the project which operates the profiling float that performed the profile. Example : GYROSCOPE (EU project for ARGO program)
PI_NAME	char PI_NAME (N_PROF, STRING64); PI_NAME: long_name = "Name of the principal investigator"; PI_NAME:_FillValue = " ";	Name of the principal investigator in charge of the profiling float. Example : Yves Desaubies
STATION_PARAMETERS	char STATION_PARAMETERS(N_PROF, N_PARAM,STRING16); STATION_PARAMETERS:long_name = "List of available parameters for the station"; STATION_PARAMETERS:conventions = "Argo reference table 3"; STATION_PARAMETERS:_FillValue = " ";	List of parameters contained in this profile. The parameter names are listed in reference table 3. Examples : TEMP, PSAL, CNDC TEMP : temperature PSAL : practical salinity CNDC : conductvity

CYCLE_NUMBER	int CYCLE_NUMBER(N_PROF); CYCLE_NUMBER:long_name = "Float cycle number"; CYCLE_NUMBER:conventions = "0..N, 0 : launch cycle (if exists), 1 : first complete cycle"; CYCLE_NUMBER:_FillValue = 99999;	Float cycle number. A profiling float performs cycles. In each cycle, it performs an ascending vertical profile, a subsurface drift and a surface drift. In some cases, it also performs a descending vertical profile. 0 is the number of the launch cycle. The subsurface drift of the cycle 0 may not be complete. 1 is the number of the first complete cycle. Example : 10 : cycle number 10
DIRECTION	char DIRECTION(N_PROF); DIRECTION:long_name = "Direction of the station profiles"; DIRECTION:conventions = "A: ascending profiles, D: descending profiles "; DIRECTION:_FillValue = " ";	Type of profile on which measurement occurs. A : ascending profile D : descending profile
DATA_CENTRE	char DATA_CENTRE(N_PROF, STRING2); DATA_CENTRE:long_name = "Data centre in charge of float data processing"; DATA_CENTRE:conventions = "Argo reference table 4"; DATA_CENTRE:_FillValue = " ";	Code for the data centre in charge of the float data management. The data centre codes are described in the reference table 4. Example : ME for MEDS
DC_REFERENCE	char DC_REFERENCE(N_PROF, STRING32); DC_REFERENCE:long_name = "Station unique identifier in data centre"; DC_REFERENCE:conventions = "Data centre convention"; DC_REFERENCE:_FillValue = " ";	Unique identifier of the profile in the data centre. Data centres may have different identifier schemes. DC_REFERENCE is therefore not unique across data centres.
DATA_STATE_INDICATOR	char DATA_STATE_INDICATOR(N_PROF, STRING4); DATA_STATE_INDICATOR:long_name = "Degree of processing the data have passed through"; DATA_STATE_INDICATOR:conventions = "Argo reference table 6"; DATA_STATE_INDICATOR:_FillValue = " ";	Degree of processing the data has passed through. The data state indicator is described in the reference table 6.
DATA_MODE	char DATA_MODE(N_PROF); DATA_MODE:long_name = "Delayed mode or real time data"; DATA_MODE:conventions = "R : real time; D : delayed mode; A : real time with adjustment"; DATA_MODE:_FillValue = " ";	Indicates if the profile contains real time, delayed mode or adjusted data. R : real time data D : delayed mode data A : real time data with adjusted values
INST_REFERENCE	char INST_REFERENCE(N_PROF, STRING64); INST_REFERENCE:long_name = "Instrument type"; INST_REFERENCE:conventions = "Brand, type, serial number"; INST_REFERENCE:_FillValue = " ";	References of the instrument : brand, type, serial number Example : APEX-SBE 259
FIRMWARE_VERSION	char FIRMWARE_VERSION(N_PROF, STRING10); FIRMWARE_VERSION:long_name = "Instrument version"; FIRMWARE_VERSION:conventions = ""; FIRMWARE_VERSION:_FillValue = " ";	Firmware version of the float. Example : "013108"
WMO_INST_TYPE	char WMO_INST_TYPE(N_PROF, STRING4); WMO_INST_TYPE:long_name = "Coded instrument type"; WMO_INST_TYPE:conventions = "Argo reference table 8"; WMO_INST_TYPE:_FillValue = " ";	Instrument type from WMO code table 1770. A subset of WMO table 1770 is documented in the reference table 8. Example : 846 : Webb Research float, Seabird sensor
JULD	double JULD(N_PROF); JULD:long_name = "Julian day (UTC) of the station relative to REFERENCE_DATE_TIME"; JULD:standard_name = "time" ; JULD:units = "days since 1950-01-01 00:00:00 UTC"; JULD:conventions = "Relative julian days with decimal part (as parts of day)"; JULD:_FillValue = 999999.;	Julian day of the profile. The integer part represents the day, the decimal part represents the time of the profile. Date and time are in universal time coordinates. The julian day is relative to REFERENCE_DATE_TIME. Example : 18833.8013889885 : July 25 2001 19:14:00

	JULD:axis = "T" ;	
JULD_QC	char JULD_QC(N_PROF); JULD_QC:long_name = "Quality on Date and Time"; JULD_QC:conventions = "Argo reference table 2"; JULD_QC:_FillValue = " ";	Quality flag on JULD date and time. The flag scale is described in the reference table 2. Example : 1 : the date and time seems correct.
JULD_LOCATION	double JULD_LOCATION(N_PROF); JULD_LOCATION:long_name = "Julian day (UTC) of the location relative to REFERENCE_DATE_TIME "; JULD_LOCATION:units = "days since 1950-01-01 00:00:00 UTC"; JULD_LOCATION:conventions = "Relative julian days with decimal part (as parts of day)"; JULD_LOCATION:_FillValue = 999999.;	Julian day of the location of the profile (1). The integer part represents the day, the decimal part represents the time of the profile. Date and time are in universal time coordinates. The julian day is relative to REFERENCE_DATE_TIME. Example : 18833.8013889885 : July 25 2001 19:14:00
LATITUDE	double LATITUDE(N_PROF); LATITUDE:long_name = "Latitude of the station, best estimate"; LATITUDE:standard_name = "latitude" ; LATITUDE:units = "degree_north"; LATITUDE:_FillValue = 99999.; LATITUDE:valid_min = -90.; LATITUDE:valid_max = 90.; LATITUDE:axis = "Y" ;	Latitude of the profile. Unit : degree north This field contains the best estimated latitude. The latitude value may be improved in delayed mode. The measured locations of the float are located in the trajectory file. Example : 44.4991 : 44° 29' 56.76'' N
LONGITUDE	double LONGITUDE(N_PROF); LONGITUDE:long_name = "Longitude of the station, best estimate"; LONGITUDE:standard_name = "longitude" ; LONGITUDE:units = "degree_east"; LONGITUDE:_FillValue = 99999.; LONGITUDE:valid_min = -180.; LONGITUDE:valid_max = 180.; LONGITUDE:axis = "X" ;	Longitude of the profile. Unit : degree east This field contains the best estimated longitude. The longitude value may be improved in delayed mode. The measured locations of the float are located in the trajectory file. Example : 16.7222 : 16° 43' 19.92'' E
POSITION_QC	char POSITION_QC(N_PROF); POSITION_QC:long_name = "Quality on position (latitude and longitude)"; POSITION_QC:conventions = "Argo reference table 2"; POSITION_QC:_FillValue = " ";	Quality flag on position. The flag on position is set according to (LATITUDE, LONGITUDE) quality. The flag scale is described in the reference table 2. Example : 1 : position seems correct.
POSITIONING_SYSTEM	char POSITIONING_SYSTEM(N_PROF, STRING8); POSITIONING_SYSTEM:long_name = "Positioning system"; POSITIONING_SYSTEM:_FillValue = " ";	Name of the system in charge of positioning the float locations from reference table 9. Examples : ARGOS
PROFILE_<PARAM>_QC	char PROFILE_<PARAM>_QC(N_PROF); PROFILE_<PARAM>_QC:long_name = "Global quality flag of <PARAM> profile"; PROFILE_<PARAM>_QC:conventions = "Argo reference table 2a"; PROFILE_<PARAM>_QC:_FillValue = " ";	Global quality flag on the PARAM profile. PARAM is among the STATION_PARAMETERS. The overall flag is set to indicate the percentage of good data in the profile as described in reference table 2a. Example : PROFILE_TEMP_QC = A : the temperature profile contains only good values PROFILE_PSAL_QC = C : the salinity profile contains 50% to 75% good values
VERTICAL_SAMPLING_SCHEME	char VERTICAL_SAMPLING_SCHEME (N_PROF, STRING256); VERTICAL_SAMPLING_SCHEME:long_name = "Argo reference table 16" ; VERTICAL_SAMPLING_SCHEME:_FillValue = " " ;	This variable is mandatory. Use vertical sampling scheme to differentiate and identify profiles from a single-cycle with different vertical sampling schemes.

2.2.4 Measurements for each profile

This section contains information on each level of each profile.
Each variable in this section has a N_PROF (number of profiles), N_LEVELS (number of pressure levels) dimension.

<PARAM> contains the raw values telemetered from the floats.

The values in <PARAM> should never be altered. <PARAM_QC> contains qc flags that pertain to the values in <PARAM>. Values in <PARAM_QC> are set initially in 'R' and 'A' modes by the automatic real-time tests.

They are later modified in 'D' mode at levels where the qc flags are set incorrectly by the real-time procedures, and where erroneous data are not detected by the real-time procedures.

Each parameter can be adjusted (in delayed-mode, but also in real-time if appropriate). In that case, <PARAM>_ADJUSTED contains the adjusted values, <PARAM>_ADJUSTED_QC contains the QC flags set by the adjustment process, and <PARAM>_ADJUSTED_ERROR contains the adjustment uncertainties.

A real-time data file with no adjusted data has an adjusted section with fill values (<PARAM>_ADJUSTED, <PARAM>_ADJUSTED_QC and <PARAM>_ADJUSTED_ERROR).

The Argo profile delayed mode QC is described in "Argo quality control manual" by Annie Wong et Al.

Name	Definition	Comment
<PARAM>	float <PARAM>(N_PROF, N_LEVELS); <PARAM>:long_name = "<X>"; <PARAM>:standard_name = "<X>"; <PARAM>:_FillValue = <X>; <PARAM>:units = "<X>"; <PARAM>:valid_min = <X>; <PARAM>:valid_max = <X>; ~~<PARAM>:comment = "<X>";~~ <PARAM>:C_format = "<X>"; <PARAM>:FORTRAN_format = "<X>"; <PARAM>:resolution = <X>;	<PARAM> contains the original values of a parameter listed in reference table 3. <X> : this field is specified in the reference table 3.
<PARAM>_QC	char <PARAM>_QC(N_PROF, N_LEVELS); <PARAM>_QC:long_name = "quality flag"; <PARAM>_QC:conventions = "Argo reference table 2"; <PARAM>_QC:_FillValue = " ";	Quality flag applied on each <PARAM> values. The flag scale is specified in table 2.
<PARAM>_ADJUSTED	float <PARAM>_ADJUSTED(N_PROF, N_LEVELS); <PARAM>_ADJUSTED:long_name = "<X>"; <PARAM>:standard_name = "<X>"; <PARAM>_ADJUSTED:_FillValue = <X>; <PARAM>_ADJUSTED:units = "<X>"; <PARAM>_ADJUSTED:valid_min = <X>; <PARAM>_ADJUSTED:valid_max = <X>; ~~<PARAM>_ADJUSTED:comment = "<X>";~~ <PARAM>_ADJUSTED:C_format = "<X>"; <PARAM>_ADJUSTED:FORTRAN_format = "<X>"; <PARAM>_ADJUSTED:resolution= <X>;	<PARAM>_ADJUSTED contains the adjusted values derived from the original values of the parameter. <X> : this field is specified in the reference table 3. <PARAM>_ADJUSTED is mandatory. When no adjustment is performed, the FillValue is inserted.
<PARAM>_ADJUSTED_QC	char <PARAM>_ADJUSTED_QC(N_PROF, N_LEVELS); <PARAM>_ADJUSTED_QC:long_name = "quality flag"; <PARAM>_ADJUSTED_QC:conventions = "Argo reference table 2"; <PARAM>_ADJUSTED_QC:_FillValue = " ";	Quality flag applied on each <PARAM>_ADJUSTED values. The flag scale is specified in reference table 2. <PARAM>_ADJUSTED_QC is mandatory. When no adjustment is performed, the FillValue is inserted.
<PARAM>_ADJUSTED_ERROR	float <PARAM>_ADJUSTED_ERROR(N_PROF, N_LEVELS); <PARAM>_ADJUSTED_ERROR:long_name = "<X>"; <PARAM>_ADJUSTED_ERROR:_FillValue = <X>; <PARAM>_ADJUSTED_ERROR:units = "<X>"; ~~<PARAM>_ADJUSTED_ERROR:comment =~~	<PARAM>_ADJUSTED_ERROR contains the error on the adjusted values of the parameter. <X> : this field is specified in the reference table 3. <PARAM>_ADJUSTED_ERROR is

Mis en forme : Barré, Surlignage

	"Contains the error on the adjusted values as determined by the delayed mode QC process."; <PARAM>_ADJUSTED_ERROR:C_format = "<X>"; <PARAM>_ADJUSTED_ERROR:FORTRAN_format = "<X>"; <PARAM>_ADJUSTED_ERROR:resolution= <X>;	mandatory. When no adjustment is performed, the FillValue is inserted.

Mis en forme : Barré

Example of a profiling float performing temperature measurements with adjusted values of temperature

Parameter definition : PRES, TEMP, TEMP_ADJUSTED

```
float PRES(N_PROF, N_LEVELS);
PRES:long_name = "SEA PRESSURE (sea surface = 0)";
PRES:standard_name = "sea_water_pressure" ;
PRES:_FillValue = 99999.f;
PRES:units = "decibar";
PRES:valid_min = 0.f;
PRES:valid_max = 1200.f;
PRES:comment = "In situ measurement, sea surface = 0";
PRES:C_format = "7.1f" ;
PRES:FORTRAN_format= "F7.1";
PRES:resolution= 0.1f;
PRES:axis = "Z" ;

char PRES_QC(N_PROF, N_LEVELS);
PRES_QC:long_name = "quality flag";
PRES_QC:conventions = "Argo reference table 2";
PRES_QC:_FillValue = " ";

float TEMP(N_PROF, N_LEVELS);
TEMP:long_name = "SEA TEMPERATURE IN SITU ITS-90 SCALE";
TEMP:standard_name = "sea_water_temperature" ;
TEMP:_FillValue = 99999.f;
TEMP:units = "degree_Celsius";
TEMP:valid_min = -2.f;
TEMP:valid_max = 40.f;
TEMP:comment = "In situ measurement";
TEMP:C_format = "%9.3f";
TEMP:FORTRAN_format = "F9.3";
TEMP:resolution = 0.001f;

char TEMP_QC(N_PROF, N_LEVELS);
TEMP_QC:long_name = "quality flag";
TEMP_QC:conventions = "Argo reference table 2";
TEMP_QC:_FillValue = " ";

float TEMP_ADJUSTED(N_PROF, N_LEVELS);
TEMP_ADJUSTED:long_name = "ADJUSTED SEA TEMPERATURE IN SITU ITS-90 SCALE";
TEMP:standard_name = "sea_water_temperature" ;
TEMP_ADJUSTED:_FillValue = 99999.f;
TEMP_ADJUSTED:units = "degree_Celsius";
TEMP_ADJUSTED:valid_min = -2.f;
TEMP_ADJUSTED:valid_max = 40.f;
TEMP_ADJUSTED:comment = "Adjusted parameter";
TEMP_ADJUSTED:C_format = "%9.3f";
TEMP_ADJUSTED:FORTRAN_format= "F9.3";
TEMP_ADJUSTED:resolution= 0.001f;

char TEMP_ADJUSTED_QC(N_PROF, N_LEVELS);
TEMP_ADJUSTED QC:long_name = "quality flag";
TEMP_ADJUSTED QC:conventions = "Argo reference table 2";
TEMP_ADJUSTED_QC:_FillValue = " ";

float TEMP_ADJUSTED_ERROR(N_PROF, N_LEVELS);
TEMP_ADJUSTED_ERROR:long_name = "ERROR ON ADJUSTED SEA TEMPERATURE IN SITU ITS-90 SCALE";
TEMP_ADJUSTED_ERROR:_FillValue = 99999.f;
TEMP_ADJUSTED_ERROR:units = "degree_Celsius";
```

```
TEMP_ADJUSTED_ERROR:comment = "Contains the error on the adjusted values as determined by the delayed mode QC process.";
TEMP_ADJUSTED_ERROR :C_format = "%9.3f";
TEMP_ADJUSTED_ERROR :FORTRAN_format= "F9.3";
TEMP_ADJUSTED_ERROR:resolution= 0.001f;
```

2.2.5 Calibration information for each profile

Calibrations are applied to parameters to create adjusted parameters. Different calibration methods will be used by groups processing Argo data. When a method is applied, its description is stored in the following fields.

This section contains calibration information for each parameter of each profile.

Each item of this section has a N_PROF (number of profiles), N_CALIB (number of calibrations), N_PARAM (number of parameters) dimension.

If no calibration is available, N_CALIB is set to 1, all values of calibration section are set to fill values.

Name	Definition	Comment
PARAMETER	char PARAMETER(N_PROF, N_CALIB, N_PARAM,STRING16); PARAMETER:long_name = "List of parameters with calibration information"; PARAMETER:conventions = "Argo reference table 3"; PARAMETER:_FillValue = " ";	Name of the calibrated parameter. The list of parameters is in reference table 3. Example : PSAL
SCIENTIFIC_CALIB_EQUATION	Char SCIENTIFIC_CALIB_EQUATION(N_PROF, N_CALIB, N_PARAM,STRING256); SCIENTIFIC_CALIB_EQUATION:long_name = "Calibration equation for this parameter"; SCIENTIFIC_CALIB_EQUATION:_FillValue = " ";	Calibration equation applied to the parameter. Example : Tc = a1 * T + a0
SCIENTIFIC_CALIB_COEFFICIENT	Char SCIENTIFIC_CALIB_COEFFICIENT(N_PROF, N_CALIB, N_PARAM,STRING256); SCIENTIFIC_CALIB_COEFFICIENT:long_name = "Calibration coefficients for this equation"; SCIENTIFIC_CALIB_COEFFICIENT:_FillValue = " ";	Calibration coefficients for this equation. Example : a1=0.99997 , a0=0.0021
SCIENTIFIC_CALIB_COMMENT	Char SCIENTIFIC_CALIB_COMMENT(N_PROF, N_CALIB, N_PARAM,STRING256); SCIENTIFIC_CALIB_COMMENT:long_name = "Comment applying to this parameter calibration"; SCIENTIFIC_CALIB_COMMENT:_FillValue = " ";	Comment about this calibration Example : The sensor is not stable
SCIENTIFIC_CALIB_DATE	Char SCIENTIFIC_CALIB_DATE (N_PROF N_CALIB, N_PARAM, DATE_TIME) SCIENTIFIC_CALIB_DATE:_FillValue = " "; SCIENTIFIC_CALIB_DATE:long_name = "Date of calibration";	Date of the calibration. Example : 20011217161700

2.2.6 History information for each profile

This section contains history information for each action performed on each profile by a data centre.

Each item of this section has a N_HISTORY (number of history records), N_PROF (number of profiles) dimension.

A history record is created whenever an action is performed on a profile.

The recorded actions are coded and described in the history code table from the reference table 7.

On the GDAC, multi-profile history section is empty to reduce the size of the file. History section is available on mono-profile files, or in multi-profile files distributed from the web data selection.

Name	Definition	Comment
HISTORY_INSTITUTION	char HISTORY_INSTITUTION (N_HISTORY, N_PROF, STRING4); HISTORY_INSTITUTION:long_name = "Institution which performed action"; HISTORY_INSTITUTION:conventions = "Argo reference table 4"; HISTORY_INSTITUTION:_FillValue = " ";	Institution that performed the action. Institution codes are described in reference table 4. Example : ME for MEDS
HISTORY_STEP	char HISTORY_STEP (N_HISTORY, N_PROF, STRING4); HISTORY_STEP:long_name = "Step in data processing"; HISTORY_STEP:conventions = "Argo reference table 12"; HISTORY_STEP:_FillValue = " ";	Code of the step in data processing for this history record. The step codes are described in reference table 12. Example : ARGQ : Automatic QC of data reported in real-time has been performed
HISTORY_SOFTWARE	Char HISTORY_SOFTWARE (N_HISTORY, N_PROF, STRING4); HISTORY_SOFTWARE:long_name = "Name of software which performed action"; HISTORY_SOFTWARE:conventions = "Institution dependent"; HISTORY_SOFTWARE:_FillValue = " ";	Name of the software that performed the action. This code is institution dependent. Example : WJO
HISTORY_SOFTWARE_RELEASE	Char HISTORY_SOFTWARE_RELEASE (N_HISTORY, N_PROF, STRING4); HISTORY_SOFTWARE_RELEASE:long_name = "Version/release of software which performed action"; HISTORY_SOFTWARE_RELEASE:conventions = "Institution dependent"; HISTORY_SOFTWARE_RELEASE:_FillValue = " ";	Version of the software. This name is institution dependent. Example : «1.0»
HISTORY_REFERENCE	char HISTORY_REFERENCE (N_HISTORY, N_PROF, STRING64); HISTORY_REFERENCE:long_name = "Reference of database"; HISTORY_REFERENCE:conventions = "Institution dependent"; HISTORY_REFERENCE:_FillValue = " ";	Code of the reference database used for quality control in conjunction with the software. This code is institution dependent. Example : WOD2001
HISTORY_DATE	char HISTORY_DATE(N_HISTORY, N_PROF, DATE_TIME); HISTORY_DATE:long_name = "Date the history record was created"; HISTORY_DATE:conventions = "YYYYMMDDHHMISS"; HISTORY_DATE:_FillValue = " ";	Date of the action. Example : 20011217160057
HISTORY_ACTION	char HISTORY_ACTION(N_HISTORY, N_PROF, STRING4); HISTORY_ACTION:long_name =	Name of the action. The action codes are described in reference table 7. Example : QCF$ for QC failed

	"Action performed on data"; HISTORY_ACTION:conventions = "Argo reference table 7"; HISTORY_ACTION:_FillValue = " ";	
HISTORY_PARAMETER	char HISTORY_PARAMETER(N_HISTORY, N_PROF, STRING16); HISTORY_PARAMETER:long_name = "Station parameter action is performed on"; HISTORY_PARAMETER:conventions = "Argo reference table 3"; HISTORY_PARAMETER:_FillValue = " ";	Name of the parameter on which the action is performed. Example : PSAL
HISTORY_START_PRES	float HISTORY_START_PRES(N_HISTORY, N_PROF); HISTORY_START_PRES:long_name = "Start pressure action applied on"; HISTORY_START_PRES:_FillValue = 99999.f; HISTORY_START_PRES:units = "decibar";	Start pressure the action is applied to. Example : 1500.0
HISTORY_STOP_PRES	float HISTORY_STOP_PRES(N_HISTORY, N_PROF); HISTORY_STOP_PRES:long_name = "Stop pressure action applied on"; HISTORY_STOP_PRES:_FillValue = 99999.f; HISTORY_STOP_PRES:units = "decibar";	Stop pressure the action is applied to. This should be greater than START_PRES. Example : 1757.0
HISTORY_PREVIOUS_VALUE	float HISTORY_PREVIOUS_VALUE(N_HISTORY, N_PROF); HISTORY_PREVIOUS_VALUE:long_name = "Parameter/Flag previous value before action"; HISTORY_PREVIOUS_VALUE:_FillValue = 99999.f;	Parameter or flag of the previous value before action. Example : 2 (probably good) for a flag that was changed to 1 (good)
HISTORY_QCTEST	char HISTORY_QCTEST(N_HISTORY, N_PROF, STRING16); HISTORY_QCTEST:long_name = "Documentation of tests performed, tests failed (in hex form)"; HISTORY_QCTEST:conventions = "Write tests performed when ACTION=QCP$; tests failed when ACTION=QCF$"; HISTORY_QCTEST:_FillValue = " ";	This field records the tests performed when ACTION is set to QCP$ (qc performed), the test failed when ACTION is set to QCF$ (qc failed). The QCTEST codes are describe in reference table 11. Example : 0A (in hexadecimal form)

The usage of the History section is described in §5 "Using the History section of the Argo netCDF Structure".

2.3 Trajectory format version 2.3

An Argo trajectory file contains all received locations of an Argo float. There is one trajectory file per float. In addition to locations, a trajectory file may contain measurements such as temperature, salinity or conductivity performed at some or all locations.

For file naming conventions, see §4.1.

2.3.1 Global attributes, dimensions and definitions

2.3.1.1 Global attributes

The global attributes section is used for data discovery. The following 8 global attributes should appear in the global section. The NetCDF Climate and Forecast (CF) Metadata Conventions (version 1.6, 5 December, 2011) are available from:

- http://cf-pcmdi.llnl.gov/documents/cf-conventions/1.6/cf-conventions.pdf

```
// global attributes:
        :title = "Argo float trajectory file";
        :institution = "CSIRO";
        :source = "Argo float";
        :history = "1977-04-22T06:00:00Z creation";
        :references = "http://www.argodatamgt.org/Documentation";
        :comment = "free text";
        :user_manual_version = "2.4" ;
        :Conventions = "Argo-2.4 CF-1.6" ;
        :featureType = "trajectory";
```

2.3.1.2 Dimensions

Name	Definition	Comment
DATE_TIME	DATE_TIME = 14;	This dimension is the length of an ASCII date and time value. Date_time convention is : YYYYMMDDHHMISS • YYYY : year • MM : month • DD : day • HH : hour of the day • MI : minutes • SS : seconds Date and time values are always in universal time coordinates (UTC). Examples : 20010105172834 : January 5th 2001 17:28:34 19971217000000 : December 17th 1997 00:00:00
STRING256 STRING64 STRING32 STRING16 STRING8 STRING4 STRING2	STRING256 = 256; STRING64 = 64; STRING32 = 32; STRING16 = 16; STRING8 = 8; STRING4 = 4; STRING2 = 2;	String dimensions from 2 to 256.
N_PARAM	N_PARAM = <int value> ;	Maximum number of parameters measured or calculated for a pressure sample. Examples : (pressure, temperature) : N_PARAM = 2 (pressure, temperature, salinity) : N_PARAM = 3 (pressure, temperature, conductivity, salinity) : N_PARAM = 4
N_MEASUREMENT	N_MEASUREMENT = unlimited;	This dimension is the number of recorded locations and measurements of the file.
N_CYCLE	N_CYCLE = <int value> ;	Number of cycles performed by the float. Example : N_CYCLE = 100
N_HISTORY	N_HISTORY = <int	Maximum number of history records for a location. This dimension depends

	value> ;	on the data set Exemple : N_HISTORY = 10

2.3.2 General information on the trajectory file

This section contains information about the whole file.

Name	Definition	Comment
DATA_TYPE	char DATA_TYPE(STRING16); DATA_TYPE:long_name = "Data type"; DATA_TYPE:_FillValue = " ";	This field contains the type of data contained in the file. The list of acceptable data types is in the reference table 1. Example : Argo trajectory
FORMAT_VERSION	char FORMAT_VERSION(STRING4); FORMAT_VERSION:long_name "File format version "; FORMAT_VERSION:_FillValue = " ";	File format version Example : «2.3»
HANDBOOK_VERSION	char HANDBOOK_VERSION(STRING4); HANDBOOK_VERSION: long_name "Data handbook version"; HANDBOOK_VERSION:_FillValue = " ";	Version number of the data handbook. This field indicates that the data contained in this file are managed according to the policy described in the Argo data management handbook. Example : «1.0»
REFERENCE_DATE_TIME	char REFERENCE_DATE_TIME(DATE_TIME); REFERENCE_DATE_TIME: long_name "Date of reference for Julian days"; REFERENCE_DATE_TIME:conventions = "YYYYMMDDHHMISS"; REFERENCE_DATE_TIME:_FillValue = " ";	Date of reference for julian days. The recommended reference date time is «19500101000000» : January 1st 1950 00:00:00
DATE_CREATION	char DATE_CREATION(DATE_TIME); DATE_CREATION: long_name "Date of file creation "; DATE_CREATION:conventions = "YYYYMMDDHHMISS"; DATE_CREATION:_FillValue = " ";	Date and time (UTC) of creation of this file. Format : YYYYMMDDHHMISS Example : 20011229161700 : December 29th 2001 16 :17 :00
DATE_UPDATE	char DATE_UPDATE(DATE_TIME); DATE_UPDATE:long_name = "Date of update of this file"; DATE_UPDATE:conventions = "YYYYMMDDHHMISS"; DATE_UPDATE:_FillValue = " ";	Date and time (UTC) of update of this file. Format : YYYYMMDDHHMISS Example : 20011230090500 : December 30th 2001 09 :05 :00

2.3.3 General information on the float

This section contains general information on the float.

Name	Definition	Comment
PLATFORM_NUMBER	char PLATFORM_NUMBER(STRING8); PLATFORM_NUMBER:long_name = "Float unique identifier"; PLATFORM_NUMBER:conventions = "WMO float identifier : A9IIIII"; PLATFORM_NUMBER:_FillValue = " ";	WMO float identifier. WMO is the World Meteorological Organization. This platform number is unique. Example : 6900045
PROJECT_NAME	char PROJECT_NAME(STRING64); PROJECT_NAME: long_name = "Name of the project"; PROJECT_NAME:_FillValue = " ";	Name of the project which operates the float that performed the trajectory. Example : GYROSCOPE (EU project for ARGO program)
PI_NAME	char PI_NAME (STRING64); PI_NAME: long_name = "Name of the principal investigator"; PI_NAME:_FillValue = " ";	Name of the principal investigator in charge of the float. Example : Yves Desaubies
TRAJECTORY_PARAMETERS	char TRAJECTORY_PARAMETERS(N_PARAM,STRING16); TRAJECTORY_PARAMETERS:long_name = "List of available parameters for the station"; TRAJECTORY_PARAMETERS:conventions = "Argo reference table 3"; TRAJECTORY_PARAMETERS:_FillValue = " ";	List of parameters contained in this trajectory file. The parameter names are listed in reference table 3. Examples : TEMP, PSAL, CNDC TEMP : temperature PSAL : practical salinity CNDC : conductvity
DATA_CENTRE	char DATA_CENTRE(STRING2);	Code for the data centre in charge of the float data

	DATA_CENTRE:long_name = "Data centre in charge of float data processing"; DATA_CENTRE:conventions = "Argo reference table 4"; DATA_CENTRE:_FillValue = " ";	management. The data centre codes are described in the reference table 4. Example : ME for MEDS
DATA_STATE_INDICATOR	char DATA_STATE_INDICATOR(STRING4); DATA_STATE_INDICATOR:long_name = "Degree of processing the data have passed through"; DATA_STATE_INDICATOR:conventions = "Argo reference table 6"; DATA_STATE_INDICATOR:_FillValue = " ";	Degree of processing the data has passed through. The data state indicator is described in the reference table 6.
INST_REFERENCE	char INST_REFERENCE(STRING64); INST_REFERENCE:long_name = "Instrument type"; INST_REFERENCE:conventions = "Brand, type, serial number"; INST_REFERENCE:_FillValue = " ";	Information about instrument : brand, type, serial number Example : APEX-SBE 259
WMO_INST_TYPE	char WMO_INST_TYPE(STRING4); WMO_INST_TYPE:long_name = "Coded instrument type"; WMO_INST_TYPE:conventions = "Argo reference table 8"; WMO_INST_TYPE:_FillValue = " ";	Instrument type from WMO code table 1770. A subset of WMO table 1770 is documented in the reference table 8. Example : 831
POSITIONING_SYSTEM	char POSITIONING_SYSTEM(STRING8); POSITIONING_SYSTEM:long_name = "Positioning system"; POSITIONING_SYSTEM:_FillValue = " ";	Name of the system used to derive the float locations, see reference table 9. Examples : ARGOS

2.3.4 Locations and measurements from the float

This section contains locations for an individual Argo float. It may also contain measurements performed along the trajectory.

Each field in this section has a N_MEASUREMENT dimension.

N_MEASUREMENT is the number of locations (or measurement) received from the float.

When no parameter is measured along the trajectory, N_PARAM (number of parameters) and any field with a N_PARAM dimension are removed from the file: PARAM, PARAM_QC, PARAM_ADJUSTED, PARAM_ADJUSTED_QC, PARAM_ADJUSTED_ERROR and TRAJECTORY_PARAMETERS.

<PARAM> contains the raw values telemetered from the floats.

The values in <PARAM> should never be altered.

<PARAM_QC> contains qc flags that pertain to the values in <PARAM>. Values in <PARAM_QC> are set initially in 'R'[1] and 'A'[2] modes by the automatic real-time tests.

They are later modified in 'D'[3] mode at levels where the qc flags are set incorrectly by the real-time procedures, and where erroneous data are not detected by the real-time procedures.

Each parameter can be adjusted. In that case, <PARAM>_ADJUSTED contains the adjusted values, <PARAM>_ADJUSTED_QC contains the QC flags set by the delayed-mode process, and <PARAM>_ADJUSTED_ERROR contains the adjustment uncertainties.

A file with no adjusted data contains adjusted sections with fill values (<PARAM>_ADJUSTED, <PARAM>_ADJUSTED_QC and <PARAM>_ADJUSTED_ERROR).

Name	Definition	Comment
JULD	double JULD(N_MEASUREMENT); JULD:long_name = "Julian day (UTC) of each measurement relative to REFERENCE_DATE_TIME"; JULD:standard_name = "time" ; JULD:units = "days since 1950-01-01 00:00:00 UTC"; JULD:conventions = "Relative julian days with decimal part (as parts of the day)"; JULD:_FillValue = 999999.; JULD:axis = "T" ;	Julian day of the location (or measurement). The integer part represents the day, the decimal part represents the time of the measurement. Date and time are in universal time coordinates. The julian day is relative to REFERENCE_DATE_TIME. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_QC	char JULD_QC(N_MEASUREMENT); JULD_QC:long_name = "Quality on date and time"; JULD_QC:conventions = "Argo reference table 2"; JULD_QC:_FillValue = " ";	Quality flag on JULD date and time. The flag scale is described in the reference table 2. Example : 1 : the date and time seems correct.
LATITUDE	double LATITUDE(N_MEASUREMENT); LATITUDE:long_name = "Latitude of each location"; LATITUDE:standard_name = "latitude" ; LATITUDE:units = "degree_north";	Latitude of the location (or measurement). Unit : degree north Example : 44.4991 for 44° 29' 56.76'' N

[1] R : real-time data with no adjustment

[2] A : real-time data adjusted automatically in real-time.

[3] D : delayed-mode data

	LATITUDE:_FillValue = 99999.; LATITUDE:valid_min = -90.; LATITUDE:valid_max = 90.; LATITUDE:axis = "Y" ;	
LONGITUDE	double LONGITUDE(N_MEASUREMENT); LONGITUDE:long_name = "Longitude of each location"; LONGITUDE:standard_name = "longitude" ; LONGITUDE:units = "degree_east"; LONGITUDE:_FillValue = 99999.; LONGITUDE:valid_min = -180.; LONGITUDE:valid_max = 180.; LONGITUDE:axis = "X" ;	Longitude of the location (or measurement). Unit : degree east Example : 16.7222 for 16° 43' 19.92'' E
POSITION_ACCURACY	char POSITION_ACCURACY(N_MEASUREMENT); POSITION_ACCURACY:long_name = "Estimated accuracy in latitude and longitude"; POSITION_ACCURACY:conventions = "Argo reference table 5"; POSITION_ACCURACY:_FillValue = " ";	Position accuracy received from the positioning system. The location classes from ARGOS are described in the reference table 5. Example : 3 for a latitude and longitude accuracy < 150 m.
POSITION_QC	char POSITION_QC(N_MEASUREMENT); POSITION_QC:long_name = "Quality on position"; POSITION_QC:conventions = "Argo reference table 2"; POSITION_QC:_FillValue = " ";	Quality flag on position. The flag on position is set according to (LATITUDE, LONGITUDE, JULD) quality. The flag scale is described in the reference table 2. Example: 1 : position seems correct.
CYCLE_NUMBER	int CYCLE_NUMBER(N_MEASUREMENT); CYCLE_NUMBER:long_name = "Float cycle number of the measurement"; CYCLE_NUMBER:conventions = "0..N, 0 : launch cycle, 1 : first complete cycle"; CYCLE_NUMBER:_FillValue = 99999;	Cycle number of the float for this measurement. For one cycle number, there are usually several locations/measurement received. Example: 17 for measurements performed during the 17th cycle of the float.
MEASUREMENT_CODE	int MEASUREMENT_CODE (N_MEASUREMENT); MEASUREMENT_CODE:long_name = "Code referring to a measurement event in the cycle"; MEASUREMENT_CODE:conventions = "Argo reference table 15"; MEASUREMENT_CODE:_FillValue = 99999;	Code for each event in the cycle which corresponds to Argo reference table 15. Example: 1: All measurements made at start of descent to drift pressure . Could be time, location, surface pressure, etc.
<PARAM>	float <PARAM>(N_MEASUREMENT); <PARAM>:long_name = "<X>"; <PARAM>:standard_name = "<X>"; <PARAM>:_FillValue = <X>; <PARAM>:units = "<X>"; <PARAM>:valid_min = <X>; <PARAM>:valid_max = <X>; ~~<PARAM>:comment = "<X>";~~ <PARAM>:C_format = "<X>"; <PARAM>:FORTRAN_format = "<X>"; <PARAM>:resolution = <X>;	<PARAM> contains the original values of a parameter listed in reference table 3. <X>: this field is specified in the reference table 3.
<PARAM>_QC	char <PARAM>_QC(N_MEASUREMENT); <PARAM>_QC:long_name = "quality flag"; <PARAM>_QC:conventions = "Argo reference table 2"; <PARAM>_QC:_FillValue = " ";	Quality flag applied on each <PARAM> values. The flag scale is specified in table 2.
<PARAM>_ADJUSTED	float <PARAM>_ADJUSTED(N_MEASUREMENT); <PARAM>_ADJUSTED:long_name = "<X>"; <PARAM>:standard_name = "<X>"; <PARAM>_ADJUSTED:_FillValue = <X>; <PARAM>_ADJUSTED:units = "<X>"; <PARAM>_ADJUSTED:valid_min = <X>; <PARAM>_ADJUSTED:valid_max = <X>; ~~<PARAM>_ADJUSTED:comment = "<X>";~~ <PARAM>_ADJUSTED:C_format = "<X>"; <PARAM>_ADJUSTED:FORTRAN_format = "<X>"; <PARAM>_ADJUSTED:resolution= <X>;	<PARAM>_ADJUSTED contains the adjusted values derived from the original values of the parameter. <X> : this field is specified in the reference table 3. <PARAM>_ADJUSTED is mandatory. When no adjustment is performed, the FillValue is inserted.
<PARAM>_ADJUSTED_QC	char <PARAM>_ADJUSTED_QC(N_MEASUREMENT	Quality flag applied on each <PARAM>_ADJUSTED values. The flag scale is specified in reference table 2.

Commentaire [TC2]: Use « code » instead of « flag »

Commentaire [MS3]: MEASUREMENT_CODE replaces CYCLE_STAGE. This variable corresponds to events in the cycle rather than stages of the cycle, allowing more flexibility to add new events

	); <PARAM>_ADJUSTED_QC:long_name = "quality flag"; <PARAM>_ADJUSTED_QC:conventions = "Argo reference table 2"; <PARAM>_ADJUSTED_QC:_FillValue = " ";	<PARAM>_ADJUSTED_QC is mandatory. When no adjustment is performed, the FillValue is inserted.
<PARAM>_ADJUSTED_ERROR	float <PARAM>_ADJUSTED_ERROR(N_MEASUREMENT); <PARAM>_ADJUSTED_ERROR:long_name = "<X>"; <PARAM>_ADJUSTED_ERROR:_FillValue = <X>; <PARAM>_ADJUSTED_ERROR:units = "<X>"; ~~<PARAM>_ADJUSTED_ERROR:comment = "Contains the error on the adjusted values as determined by the delayed mode QC process.";~~ <PARAM>_ADJUSTED_ERROR:C_format = "<X>"; <PARAM>_ADJUSTED_ERROR:FORTRAN_format = "<X>"; <PARAM>_ADJUSTED_ERROR:resolution= <X>;	<PARAM>_ADJUSTED_ERROR contains the error on the adjusted values of the parameter. <X> : this field is specified in the reference table 3. <PARAM>_ADJUSTED_ERROR is mandatory. When no adjustment is performed, the FillValue is inserted.

2.3.5 Cycle information from the float

This section contains information on the cycles performed by the float.

Each field in this section has a N_CYCLE dimension.

N_CYCLE is the number of cycles performed by the float.

When a cycle is missing (e.g. no data received), all cycle information is reported as fill values.

Commentaire [MS4]: This is not a « new » requirement, but it has not been implemented yet, so it is still highlighted

Name	Definition	Comment
JULD_ASCENT_START	double JULD_ASCENT_START(N_CYCLE); JULD_ASCENT_START:long_name = "Start date of the ascending profile"; JULD_ASCENT_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_ASCENT_START:conventions = "Relative julian days with decimal part (as part of day)"; JULD_ASCENT_START:_FillValue=999999.;	Julian day (UTC) of the beginning of the ascending profile. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_ASCENT_START_STATUS	Char JULD_ASCENT_START_STATUS(N_CYCLE); JULD_ASCENT_START_STATUS:conventions = "0 : Nominal, 1 : Estimated, 2 :Transmitted"; JULD_ASCENT_START_STATUS:_FillValue = " ";	0 : date comes from the float meta data 1 : date is estimated 2 : date is transmitted by the float 3: date is determined by positioning system 9 : date is unknown
JULD_ASCENT_END	double JULD_ASCENT_END(N_CYCLE); JULD_ASCENT_END:long_name = "End date of the ascending profile"; JULD_ASCENT_END:units = "days since 1950-01-01 00:00:00 UTC"; JULD_ASCENT_END:conventions = "Relative julian days with decimal part (as part of day)"; JULD_ASCENT_END:_FillValue=999999.;	Julian day (UTC) of the end of the ascending profile. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_ASCENT_END_STATUS	Char JULD_ASCENT_END_STATUS(N_CYCLE); JULD_ASCENT_END_STATUS:conventions = "0 :	0 : date comes from the float

Commentaire [MS5]: On all the JULD_*_STATUS variables, the flag of 3: date is determined by positioning system has been added. I still have a flag of 0: date comes from float metadata to make the format backwards compatible, but it will no longer be recommended to fill in these cycle timing variables based on metadata times alone.

	Nominal, 1 : Estimated, 2 :Transmitted"; JULD_ASCENT_END_STATUS:_FillValue = " ";	meta data 1 : date is estimated 2 : date is transmitted by the float 3: date is determined by positioning system 9 : date is unknown
JULD_DESCENT_START	double JULD_DESCENT_START(N_CYCLE); JULD_DESCENT_START:long_name = "Descent start date of the cycle"; JULD_DESCENT_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_DESCENT_START:conventions = "Relative julian days with decimal part (as part of day)"; JULD_DESCENT_START:_FillValue=999999.;	Julian day (UTC) of the beginning of the descending profile. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_DESCENT_START_STATUS	Char JULD_DESCENT_START_STATUS(N_CYCLE); JULD_DESCENT_START_STATUS:conventions = "0 : Nominal, 1 : Estimated, 2 :Transmitted"; JULD_DESCENT_START_STATUS:_FillValue = " ";	0 : date comes from the float meta data 1 : date is estimated 2 : date is transmitted by the float 3: date is determined by positioning system 9 : date is unknown
JULD_DESCENT_END	double JULD_DESCENT_END(N_CYCLE); JULD_DESCENT_END:long_name = "Descent end date of the cycle"; JULD_DESCENT_END:units = "days since 1950-01-01 00:00:00 UTC"; JULD_DESCENT_END:conventions = "Relative julian days with decimal part (as part of day) "; JULD_DESCENT_END:_FillValue=999999.;	Julian day (UTC) of the end of the descending profile. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_DESCENT_END_STATUS	char JULD_DESCENT_END_STATUS(N_CYCLE); JULD_DESCENT_END_STATUS:conventions = "0 : Nominal, 1 : Estimated, 2 :Transmitted"; JULD_DESCENT_END_STATUS:_FillValue = " ";	0 : date comes from the float meta data 1 : date is estimated 2 : date is transmitted by the float 3: date is determined by positioning system 9 : date is unknown
JULD_TRANSMISSION_START	double JULD_TRANSMISSION_START(N_CYCLE); JULD_TRANSMISSION_START:long_name = "Start date of transmssion"; JULD_TRANSMISSION_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_TRANSMISSION_START:conventions = "Relative julian days with decimal part (as part of day)" JULD_TRANSMISSION_START:_FillValue=999999.;	Julian day (UTC) of the beginning of data transmission. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_TRANSMISSION_START_STATUS	char JULD_TRANSMISSION_START_STATUS(N_CYCLE); JULD_TRANSMISSION_START_STATUS:conventions = "0 : Nominal, 1 : Estimated, 2 :Transmitted"; JULD_TRANSMISSION_START_STATUS:_FillValue = " ";	0 : date comes from the float meta data 1 : date is estimated 2 : date is transmitted by the float 3: date is determined by

Commentaire [MS6]: Changed this variable name from JULD_START_TRANSMISSION to JULD_TRANSMISSION_START to match all the other cycle timing variable name conventions

		positioning system 9 : date is unknown
JULD_FIRST_STABILIZATION	Double JULD_FIRST_STABILIZATION(N_CYCLE); JULD_FIRST_STABILIZATION:long_name = "Time of float's first stabilization after leaving the surface"; JULD_FIRST_STABILIZATION:units = days since 1950-01-01 00:00:00 UTC"; JULD_FIRST STABILIZATION: Relative julian days with decimal part (as part of day) "; JULD_FIRST_STABILIZATION:_FillValue=999999	Julian day (UTC) of the first stabilization after the start of descent to the drift pressure. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_FIRST_STABILIZATION_STATUS	char JULD_FIRST_STABILIZATION_STATUS(N_CYCLE) ; JULD_FIRST_STABILIZATION_STATUS:conventions = "0 : Nominal, 1 : Estimated, 2 :Transmitted"; JULD_FIRST_STABILIZATION_STATUS:_FillValue = " ";	0 : date comes from the float meta data 1 : date is estimated 2 : date is transmited by the float 3: date is determined by positioning system 9 : date is unknown
JULD_DEEP_DESCENT_START	double JULD_DEEP_DESCENT_START(N_CYCLE); JULD_DEEP_DESCENT_START:long_name = "Deep Descent start date of the cycle"; JULD_DEEP_DESCENT_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_DEEP_DESCENT_START:conventions = "Relative julian days with decimal part (as part of day) "; JULD_DEEP_DESCENT_START:_FillValue=999999 .;	Julian day (UTC) of the start of the deep descent to profile pressure at the end of the drift phase. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_DEEP_DESCENT_START_STATUS	char JULD_DEEP_DESCENT_START_STATUS(N_CYCLE); JULD_DEEP_DESCENT_START_STATUS:conventions = "0 : Nominal, 1 : Estimated, 2 :Transmitted"; JULD_DEEP_DESCENT_START_STATUS:_FillValue = " ";	0 : date comes from the float meta data 1 : date is estimated 2 : date is transmited by the float 3: date is determined by positioning system 9 : date is unknown
JULD_DEEP_DESCENT_END	double JULD_DEEP_DESCENT_END(N_CYCLE); JULD_DEEP_DESCENT_END:long_name = "Deep Descent end date of the cycle"; JULD_DEEP_DESCENT_END:units = "days since 1950-01-01 00:00:00 UTC"; JULD_DEEP_DESCENT_END:conventions = "Relative julian days with decimal part (as part of day) "; JULD_DEEP_DESCENT_END:_FillValue=999999.;	Julian day (UTC) of the end of the deep descent to profile pressure. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_DEEP_DESCENT_END_STATUS	char JULD_DEEP_DESCENT_END_STATUS(N_CYCLE); JULD_DEEP_DESCENT_END_STATUS:conventions = "0 : Nominal, 1 : Estimated, 2 :Transmitted"; JULD_DEEP_DESCENT_END_STATUS:_FillValue = " ";	0 : date comes from the float meta data 1 : date is estimated 2 : date is transmited by the float 3: date is determined by positioning system 9 : date is unknown
JULD_TRANSMISSION_END	double JULD_TRANSMISSION_END (N_CYCLE); JULD_TRANSMISSION_END:long_name =	Julian day (UTC) of the end of

Commentaire [MS7]: This is start of the new cycle timing variables that were discussed at the Trajectory Workshop. Details on how to fill these will be in the DAC cookbook.

	"Transmssion end date"; JULD _TRANSMISSION_END:units = "days since 1950-01-01 00:00:00 UTC"; JULD _TRANSMISSION_END:conventions = "Relative julian days with decimal part (as part of day)"; JULD _TRANSMISSION_END:_FillValue=999999.;	transmission. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD _TRANSMISSION_END _STATUS	char JULD _TRANSMISSION_END _STATUS (N_CYCLE); JULD _TRANSMISSION_END _STATUS:conventions = "0 : Nominal, 1 : Estimated, 2 :Transmitted"; JULD _TRANSMISSION_END _STATUS:_FillValue = " ";	0 : date comes from the float meta data 1 : date is estimated 2 : date is transmitted by the float 3: date is determined by positioning system 9 : date is unknown
GROUNDED	char GROUNDED(N_CYCLE); GROUNDED:long_name = "Did the profiler touch the ground for that part of the cycle"; GROUNDED:conventions = "Y,P,N,U"; GROUNDED:_FillValue = " ";	GROUNDED indicates if the float touched the ground for that part of the cycle. Format : Y, N, U Examples : Y : yes the float touched the ground during drift P : yes the float touched the ground during descent to profile N : no U : unknown
CONFIG_MISSION_NUMBER	int CONFIG_MISSION_NUMBER (N_CYCLE); CONFIG_MISSION_NUMBER:long_name = " mission number of unique cycles performed by the float"; CONFIGU_MISSION_NUMBER:_FillValue = " ";	Mission number of the configuration parameter. Example : 1 See §2.4.5 "Configuration parameters".
CYCLE_NUMBER_ACTUAL	int CYCLE_NUMBER_ACTUAL(N_CYCLE); CYCLE_NUMBERc:long_name = "Float cycle number of the measurement"; CYCLE_NUMBER:conventions = "0...N, 0 : launch cycle, 1 : first complete cycle"; CYCLE_NUMBER:_FillValue = 99999;	Cycle number of the float. For one cycle number, there is a collection of useful information recorded (e.g. grounded or not). Example : 17 for measurements performed during the 17th cycle of the float.
DATA_MODE	char DATA_MODE(N_ CYCLE); DATA_MODE:long_name = "Delayed mode or real time data"; DATA_MODE:conventions = "R : real time; D : delayed mode; A : real time with adjustment"; DATA_MODE:_FillValue = " ";	Indicates if the profile contains real time or delayed mode data. R : real time data D : delayed mode data A : real time data with adjusted values

Commentaire [MS8]: Changed this from CONFIGURATION_PHASE_NUMBER to newly agreed upon CONFIG_MISSION_NUMBER

2.3.6 History information

This section contains history information for each action performed on each measurement.

Each item of this section has a N_MEASUREMENT (number of locations or measurements), N_HISTORY (number of history records) dimension.

Name	Definition	Comment
HISTORY_INSTITUTION	char HISTORY_INSTITUTION (N_HISTORY, STRING4); HISTORY_INSTITUTION:long_name = "Institution which performed action"; HISTORY_INSTITUTION:conventions = "Argo reference table 4"; HISTORY_INSTITUTION:_FillValue = " ";	Institution that performed the action. Institution codes are described in reference table 4. Example : ME for MEDS
HISTORY_STEP	char HISTORY_STEP (N_HISTORY, STRING4); HISTORY_STEP:long_name = "Step in data processing"; HISTORY_STEP:conventions = "Argo reference table 12"; HISTORY_STEP:_FillValue = " ";	Code of the step in data processing for this history record. The step codes are described in reference table 12. Example : ARGQ : Automatic QC of data reported in real-time has been performed
HISTORY_SOFTWARE	Char HISTORY_SOFTWARE (N_HISTORY, STRING4); HISTORY_SOFTWARE:long_name = "Name of software which performed action"; HISTORY_SOFTWARE:conventions = "Institution dependent"; HISTORY_SOFTWARE:_FillValue = " ";	Name of the software that performed the action. This code is institution dependent. Example : WJO
HISTORY_SOFTWARE_RELEASE	Char HISTORY_SOFTWARE_RELEASE (N_HISTORY, STRING4); HISTORY_SOFTWARE_RELEASE:long_name = "Version/release of software which performed action"; HISTORY_SOFTWARE_RELEASE:conventions = "Institution dependent"; HISTORY_SOFTWARE_RELEASE:_FillValue = " ";	Version of the software. This name is institution dependent. Example : «1.0»
HISTORY_REFERENCE	char HISTORY_REFERENCE (N_HISTORY, STRING64); HISTORY_REFERENCE:long_name = "Reference of database"; HISTORY_REFERENCE:conventions = "Institution dependent"; HISTORY_REFERENCE:_FillValue = " ";	Code of the reference database used for quality control in conjunction with the software. This code is institution dependent. Example : WOD2001
HISTORY_DATE	char HISTORY_DATE(N_HISTORY, DATE_TIME); HISTORY_DATE:long_name = "Date the history record was created"; HISTORY_DATE:conventions = "YYYYMMDDHHMISS"; HISTORY_DATE:_FillValue = " ";	Date of the action. Example : 20011217160057
HISTORY_ACTION	char HISTORY_ACTION (N_HISTORY, STRING64); HISTORY_ACTION:long_name = "Action performed on data"; HISTORY_ACTION:conventions = "Argo reference table 7"; HISTORY_ACTION:_FillValue = " ";	Name of the action. The action codes are described in reference table 7. Example : QCF$ for QC failed

HISTORY_PARAMETER	Char HISTORY_PARAMETER(N_HISTORY, STRING16); HISTORY_PARAMETER:long_name = "Station parameter action is performed on"; HISTORY_PARAMETER:conventions = "Argo reference table 3"; HISTORY_PARAMETER:_FillValue = " ";	Name of the parameter on which the action is performed. Example : PSAL
HISTORY_PREVIOUS_VALUE	Float HISTORY_PREVIOUS_VALUE(N_HISTORY); HISTORY_PREVIOUS_VALUE:long_name = "Parameter/Flag previous value before action"; HISTORY_PREVIOUS_VALUE:_FillValue = 99999.f;	Parameter or flag of the previous value before action. Example : 2 (probably good) for a flag that was changed to 1 (good)
HISTORY_INDEX_DIMENSION	char HISTORY_INDEX_DIMENSION(N_HISTORY);	Name of dimension to which HISTORY_START_INDEX and HISORY_STOP_INDEX Correspond. C: N_CYCLE M: N_MEASUREMENT
HISTORY_START_INDEX	int HISTORY_ START_INDEX (N_HISTORY); HISTORY_START_INDEX:long_name = "Start index action applied on"; HISTORY_START_INDEX:_FillValue = 99999;	Start index the action is applied to. This index corresponds to N_MEASUREMENT or N_CYCLE, depending on the corrected parameter Example : 100
HISTORY_STOP_INDEX	int HISTORY_ STOP_INDEX (N_HISTORY); HISTORY_STOP_INDEX:long_name = "Stop index action applied on"; HISTORY_STOP_INDEX:_FillValue = 99999;	Stopt index the action is applied to. This index corresponds to N_MEASUREMENT or N_CYCLE, depending on the corrected parameter Example : 150
HISTORY_QCTEST	char HISTORY_QCTEST(N_HISTORY, STRING16); HISTORY_QCTEST:long_name = "Documentation of tests performed, tests failed (in hex form)"; HISTORY_QCTEST:conventions = "Write tests performed when ACTION=QCP$; tests failed when ACTION=QCF$"; HISTORY_QCTEST:_FillValue = " ";	This field records the tests performed when ACTION is set to QCP$ (qc performed), the test failed when ACTION is set to QCF$ (qc failed). The QCTEST codes are describe in reference table 11. Example : 0A (in hexadecimal form)

The usage of history section is described in §5 "Using the History section of the Argo netCDF Structure".

2.4 Metadata format version 2.4

The format version 2.4 of Argo metadata will replace version 2.2 gradually. During the transition period, all formats will be valid. However, when a Data Assembly Center (DAC) produces metadata files with the new 2.4 format, all its metadata files must be provided in version 2.4.

An Argo meta-data file contains information about an Argo float.

For file naming conventions, see §4.1.

2.4.1 Global attributes, dimensions and definitions

2.4.1.1 Global attributes

The global attributes section is used for data discovery. The following 8 global attributes should appear in the global section. The NetCDF Climate and Forecast (CF) Metadata Conventions (version 1.6, 5 December, 2011) are available from:

- http://cf-pcmdi.llnl.gov/documents/cf-conventions/1.6/cf-conventions.pdf

```
// global attributes:
        :title = "Argo float metadata file";
        :institution = "CSIRO";
        :source = "Argo float";
        :history = "1977-04-22T06:00:00Z creation";
        :references = "http://www.argodatamgt.org/Documentation";
        :comment = "free text";
        :user_manual_version = "2.4" ;
        :Conventions = "Argo-2.4 CF-1.6" ;
```

2.4.1.2 Dimensions and definitions

Name	Definition	Comment
DATE_TIME	DATE_TIME = 14;	This dimension is the length of an ASCII date and time value. Date_time convention is : YYYYMMDDHHMISS YYYY : year MM : month DD : day HH : hour of the day MI : minutes SS : seconds Date and time values are always in universal time coordinates (UTC). Examples : 20010105172834 : January 5th 2001 17:28:34 19971217000000 : December 17th 1997 00:00:00
STRING1024 STRING256 STRING64 STRING32 STRING16 STRING8 STRING4 STRING2	STRING1024 = 1024; STRING256 = 256; STRING64 = 64; STRING32 = 32; STRING16 = 16; STRING8 = 8; STRING4 = 4; STRING2 = 2;	String dimensions from 2 to 1024.
N_PARAM	N_PARAM=<int value>;	Number of parameters measured or calculated for a pressure sample. Examples : (pressure, temperature) : N_PARAM = 2 (pressure, temperature, salinity) : N_PARAM = 3 (pressure, temperature, conductivity, salinity) : N_PARAM = 4
N_CONF_PARAM	N_CONF_PARAM=<int value>;	Number of configuration parameters.

Mis en forme : Police :(Par défaut) Tahoma, 8 pt, Couleur de police : Noir, Anglais (Australie), Surlignage

Commentaire [van385 9]: If in subsequent missions you need to add more config parameters then you will need to rewrite the file with a larger N_CONF_PARAM dimension

N_MISSIONS	N_MISSIONS=<unlimited>;	Number of missions.
N_POSITIONING_SYSTEM	N_POSITIONING_SYSTEM=<int value>;	Number of positioning systems.
N_TRANS_SYSTEM	N_TRANS_SYSTEM=<int value>;	Number of transmission systems.

Commentaire [TC10]: Esmee, 14/03/2012

2.4.2 General information on the meta-data file

This section contains information about the whole file.

Name	Definition	Comment
DATA_TYPE	char DATA_TYPE(STRING16); DATA_TYPE: long_name = "Data type"; DATA_TYPE:_FillValue = " ";	MANDATORY This field contains the type of data contained in the file. The list of acceptable data types is in the reference table 1. Example : Argo meta-data
FORMAT_VERSION	char FORMAT_VERSION(STRING4); FORMAT_VERSION: long_name = "File format version "; FORMAT_VERSION:_FillValue = " ";	File format version Example : «2.4»
HANDBOOK_VERSION	char HANDBOOK_VERSION(STRING4); HANDBOOK_VERSION: long_name = "Data handbook version"; HANDBOOK_VERSION:_FillValue = " ";	Version number of the data handbook. This field indicates that the data contained in this file are managed according to the policy described in the Argo data management handbook. Example : «1.0»
DATE_CREATION	char DATE_CREATION(DATE_TIME); DATE_CREATION: long_name = "Date of file creation"; DATE_CREATION:conventions = "YYYYMMDDHHMISS"; DATE_CREATION:_FillValue = " ";	Date and time (UTC) of creation of this file. Format : YYYYMMDDHHMISS Example : 20011229161700 : December 29th 2001 16:17:00
DATE_UPDATE	char DATE_UPDATE(DATE_TIME); DATE_UPDATE:long_name = "Date of update of this file"; DATE_UPDATE:conventions = "YYYYMMDDHHMISS"; DATE_UPDATE:_FillValue = " ";	Date and time (UTC) of update of this file. Format : YYYYMMDDHHMISS Example : 20011230090500 : December 30th 2001 09:05:00

2.4.3 Float characteristics

This section contains the main characteristics of the float.

Name	Definition	Comment
PLATFORM_NUMBER	char PLATFORM_NUMBER(STRING8); PLATFORM_NUMBER:long_name = "Float unique identifier"; PLATFORM_NUMBER:conventions = "WMO float identifier : A9IIIII"; PLATFORM_NUMBER:_FillValue = " ";	WMO float identifier. WMO is the World Meteorological Organization. This platform number is unique. Example : 6900045
PTT	char PTT (STRING256); PTT:long_name = "Transmission identifier (ARGOS, ORBCOMM, etc.)"; PTT:_FillValue = " ";	Transmission identifier of the float. Comma separated list for multi-beacon transmission. Example : 22507 : the float is equipped with one ARGOS beacon. 22598,22768 : the float is equipped with 2 ARGOS beacons.
IMEI	char IMEI (STRING256); IMEI:long_name = "Transmission identifier (ARGOS, ORBCOMM, etc.)"; IMEI:_FillValue = " ";	Optional: The IMEI number for the float. For security reasons recommend that only the last six digits (after removing the check sum) are reported. Example : 423978.
TRANS_SYSTEM	char TRANS_SYSTEM(N_TRANS_SYSTEM, STRING16); TRANS_SYSTEM:long_name = "The telecommunications system used"; TRANS_SYSTEM:_FillValue = " ";	Name of the telecommunication system from reference table 10. Example : ARGOS
TRANS_SYSTEM_ID	char TRANS_SYSTEM_ID(N_TRANS_SYSTEM, STRING32); TRANS_SYSTEM_ID:long_name = "The program identifier used by the transmission system"; TRANS_SYSTEM_ID:_FillValue = " ";	Program identifier of the telecommunication subscription. Use N/A when not applicable (eg : Iridium or Orbcomm) Example : 38511 is a program number for all the beacons of an ARGOS customer.
TRANS_FREQUENCY	char TRANS_FREQUENCY(STRING16); TRANS_FREQUENCY:long_name = "The frequency of transmission from the float"; TRANS_FREQUENCY:units = "hertz"; TRANS_FREQUENCY:_FillValue = " ";	Frequency of transmission from the float. Unit : hertz Example : 1/44
~~TRANS_REPETITION~~	~~float TRANS_REPETITION; TRANS_REPETITION:long_name = "The repetition rate of transmission from the float"; TRANS_REPETITION:units = "second"; TRANS_REPETITION:_FillValue = 99999.f;~~	~~Repetition rate of the transmission system. Unit : second Example : 40 for a repetition of messages every 40 seconds.~~
POSITIONING_SYSTEM	char POSITIONING_SYSTEM(N_POSITIONING_SYSTEM, STRING8); POSITIONING_SYSTEM:long_name = "Positioning system"; POSITIONING_SYSTEM:_FillValue = " ";	Position system from reference table 9. ARGOS or GPS are 2 positioning systems. Example : ARGOS
~~CLOCK_DRIFT~~	~~float CLOCK_DRIFT; CLOCK_DRIFT:long_name = "The rate of drift of the float clock"; CLOCK_DRIFT:units = "decisecond/day"; CLOCK_DRIFT:_FillValue = "99999.f";~~	~~Rate of drift of the float internal clock. Unit : decisecond/day Example : 1.57~~
PLATFORM_FAMILY	char PLATFORM_FAMILY (STRING256); PLATFORM_FAMILY:long_name = "Category of instrument "; PLATFORM_FAMILY:_FillValue = " ";	Category of instrument. Example: Float, POPS, ITP
PLATFORM_TYPE	char PLATFORM_TYPE (STRING32); PLATFORM_TYPE:long_name = "Type of float "; PLATFORM_TYPE:_FillValue = " ";	Type of float. Example: SOLO, APEX, PROVOR, ARVOR, NINJA
PLATFORM_MAKER	char PLATFORM_MAKER (STRING256); PLATFORM_MAKER:long_name = "The name of the manufacturer "; PLATFORM_MAKER:_FillValue = " ";	Name of the manufacturer. Example : Webb Research Corporation
FIRMWARE_VERSION	char FIRMWARE_VERSION (STRING16); FIRMWARE_VERSION:long_name = "The firmware version for the float."; FIRMWARE_VERSION:_FillValue = " ";	The firmware version. This is specified as per the format on the manufacturers manual. Example: 072804

Commentaire [van385 11]: Optional variable for those who wish to report this, recommend that only the last six digits (after the check sum has been removed) are reported.

Commentaire [van385 12]: Move this variable to the CONFIG section, this would become: CONFIG_ArgosTransmissionRepetitionPeriod_SECONDS, mandatory for Argos floats initially in mission 0, optional for others

Commentaire [van385 13]: Moved to technical file, becomes: TIME_ClockDrift_DeciSECONDSperDay

Commentaire [van385 14]: New variable, will have a standard reference table

Commentaire [van385 15]: New variable, will have a standard reference table

MANUAL_VERSION	char MANUAL_VERSION (STRING16); MANUAL_VERSION:long_name = "The manual version for the float."; MANUAL_VERSION:_FillValue = " ";	The version date or number for the manual for each float. Example 110610 or 004
FLOAT_SERIAL_NO	char FLOAT_SERIAL_NO(STRING16); long_name = "The serial number of the float"; FLOAT_SERIAL_NO:_FillValue = " ";	This field should contain only the serial number of the float. Example 1679
STANDARD_FORMAT_ID	char STANDARD_FORMAT_ID(STRING16); FORMAT_NUMBER:long_name = "A standard format number to describe the data format type for each float."; FORMAT_NUMBER:_FillValue = " ";	Standardised format number as described in the reference table online (host site yet to be determined, this table cross references to individual DAC format numbers. Example: 1
DAC_FORMAT_ID	char DAC_FORMAT_ID(STRING16); FORMAT_NUMBER:long_name = "The format number used by the DAC to describe the data format type for each float."; FORMAT_NUMBER:_FillValue = " ";	Format numbers used by individual DACs to describe each float type. This is cross-referenced to a standard format id by a reference table online, host site yet to be determined.
PLATFORM_MODEL	char PLATFORM_MODEL (STRING16); PLATFORM_MODEL:long_name = "Model of the float "; PLATFORM_MODEL:_FillValue = " ";	Model of the float. Example : APEX_SBE, SOLO_FSI, PROVOR_MARTEC_FSI
INST_REFERENCE	char INST_REFERENCE(STRING64); INST_REFERENCE:long_name = "Instrument type"; INST_REFERENCE:conventions = "Brand, type, serial number"; INST_REFERENCE:_FillValue = " ";	References of the instrument : PLATFORM_TYPE plus serial number of the float Example : APEX_SBE 259
WMO_INST_TYPE	char WMO_INST_TYPE(STRING4); WMO_INST_TYPE:long_name = "Coded instrument type"; WMO_INST_TYPE:conventions = "Argo reference table 8"; WMO_INST_TYPE:_FillValue = " ";	Instrument type from WMO code table 1770. A subset of WMO table 1770 is documented in the reference table 8. Example : 846 : Webb Research float, Seabird sensor
DIRECTION	char DIRECTION; DIRECTION:long_name = "Direction of the profiles"; DIRECTION:conventions = "A: ascending profiles, B: descending and ascending profiles"; DIRECTION:_FillValue = " ";	Direction of the profiles of the float. A : ascending profiles only B : descending and ascending profiles
PROJECT_NAME	char PROJECT_NAME(STRING64); PROJECT_NAME:long_name = "The program under which the float was deployed"; PROJECT_NAME:_FillValue = " ";	Name of the project which operates the profiling float that performed the profile. Example : GYROSCOPE (EU project for Argo program)
DATA_CENTRE	char DATA_CENTRE(STRING2); DATA_CENTRE:long_name = "Data centre in charge of float real-time processing"; DATA_CENTRE:conventions = "Argo reference table 4"; DATA_CENTRE:_FillValue = " ";	Code of the data centre in charge of the float data management. The data centre codes are described in the reference table 4. Example: ME for MEDS
PI_NAME	char PI_NAME (STRING64); PI_NAME:long_name = "Name of the principal investigator"; PI_NAME:_FillValue = " ";	Name of the principal investigator in charge of the profiling float. Example: Yves Desaubies
ANOMALY	char ANOMALY(STRING256); ANOMALY:long_name = "Describe any anomalies or problems the float may have had."; ANOMALY:_FillValue = " ";	This field describes any anomaly or problem the float may have had. Example: "the immersion drift is not stable."
BATTERY_TYPE	char BATTERY_TYPE(STRING64); BATTERY_TYPE: long_name = "The type of battery packs in the float."; BATTERY_TYPE:_FillValue = " ";	Describes the type of battery packs in the float. Example: Alkaline, Lithium or Alkaline and Lithium
BATTERY_PACKS	char BATTERY_PACKS(STRING64); BATTERY_PACKS: long_name = "The configuration of battery packs in the float."; BATTERY_PACKS:_FillValue = " ";	Describes the configuration of battery packs in the float, number and type. Example: 4DD Li + 1C Alk
CONTROLLER_BOARD_TYPE_PRIMARY	char CONTROLLER_BOARD_TYPE_PRIMARY(STRING32); CONTROLLER_BOARD_TYPE_PRIMARY: long_name = "The type of controller board."; CONTROLLER_BOARD_TYPE_PRIMARY: FillValue = " ";	Describes the type of controller board. Example: APF8, APF9i
CONTROLLER_BOARD_TYPE_SECONDARY	char CONTROLLER_BOARD_TYPE_SECONDARY(STRING32); CONTROLLER_BOARD_TYPE_SECONDARY:	Only applicable if there is more than one controller board in the float. Describes the second type of controller board. Example: APF8, APF9i

Commentaire [van385 16]: New variable that replaces INST_REFERENCE (which was populated with confused, non-standard input and was not well named).

Commentaire [van385 17]: New variable – important for trajectory processing and ability to decode raw data, input needs standardisation.

Commentaire [van385 18]: Will the input here always be numeric? If so, change.

Commentaire [van385 19]: New variable, the data format id given by the DAC.

Commentaire [van385 20]: Will the input here always be numeric? If so, change.

Commentaire [van385 21]: This variable is redundant. It has confused, non standard input and can be constructed by concatenating other metafile parameters

Commentaire [van385 22]: This variable is replaced with a new more specifically named and populated parameter: FLOAT_SERIAL_NO

Commentaire [van385 23]: This variable moves to the CONFIG section and becomes: CONFIG_Direction_STRING

Commentaire [van385 24]: New variable. This is important for tracking float performance

Commentaire [van385 25]: New variable, important for tracking float performance

Commentaire [van385 26]: New variable, the primary controller board of the float

Commentaire [van385 27]: New variable, only applicable; the secondary controller board of the float

	long_name = “The secondary type of controller board.”; CONTROLLER_BOARD_TYPE_SECONDARY: FillValue = " ";	
CONTROLLER_BOARD_SERIAL_NO_PRIMARY	char CONTROLLER_BOARD_SERIAL_NO_PRIMARY(STRING32); CONTROLLER_BOARD_SERIAL_NO_PRIMARY: long name = “The serial number of the primary controller board”; CONTROLLER_BOARD_SERIAL_NO_PRIMARY: FillValue = " ";	The serial number for the primary controller board. Example: 4567
CONTROLLER_BOARD_SERIAL_NO_SECONDARY	char CONTROLLER_BOARD_SERIAL_NO_SECONDARY(STRING32); CONTROLLER_BOARD_SERIAL_NO_SECONDARY: long name = “The serial number of the secondary controller board”; CONTROLLER_BOARD_SERIAL_NO_SECONDARY: FillValue = " ";	The serial number for the secondary controller board. Example: 4567
SPECIAL_FEATURES	char SPECIAL_FEATURES (STRING1024); SPECIAL_FEATURES:long_name = "Extra features of the float (algorithms, compressee etc.)"; SPECIAL_FEATURES:_FillValue = " ";	Additional float features can be specified here such as algorithms used by the float (Ice Sensing Algorithm, Interim Storage Algorithm, grounding avoidance) or additional hardware such as a compressee (buoyancy compensator). Example : ...
SAMPLING_MODE	char SAMPLING_MODE (STRING32); SAMPLING_MODE:long_name = "Float sampling mode"; SAMPLING_MODE:_FillValue = " ";	The float sampling mode. Example: Spot, Continuous or Mixed.
REDEPLOYED	char REDEPLOYED (STRING32); REDEPLOYED:long_name = "Indicates if the float has been previously deployed."; REDEPLOYED:_FillValue = " ";	Indicates if the float has been previously deployed, i.e. recovered after first mission and deployed with a new wmo id. In this case you would fill this field with the previous wmo id. Example: ...
FLOAT_OWNER	char FLOAT_OWNER (STRING64); FLOAT_OWNER:long_name = "The float owner"; FLOAT_OWNER:_FillValue = " ";	The owner of the float (may be different from the data centre and operating institution). Example:...
OPERATING_INSTITUTION	char OPERATING_INSTITUTION (STRING64); OPERATING_INSTITUTION:long_name = "The operating institution of the float"; OPERATING_INSTITUTION:_FillValue = " ";	The operating institution of the float (may be different from the float owner and data centre). Example:...
CUSTOMISATION	char CUSTOMISATION (STRING1024); CUSTOMISATION:long_name = "Float customisation, i.e. (institution and modifications)"; CUSTOMISATION:_FillValue = " ";	Free form field to record changes made to the float after manufacture and before deployment, i.e. this could be the customisation institution plus a list of modifications. Example:...
ARGO_GROUP	char ARGO_GROUP (STRING64); ARGO_GROUP:long_name = "The Argo group to which the float belongs"; ARGO_GROUP:_FillValue = " "; ARGO_GROUP:conventions = "Argo reference table 17";	The Argo group to which the float belongs. The valid Argo groups are listed in reference table 17. Example: Core Argo, Bio Argo, Argo Equivalent

Commentaire [van385 28]: New variable, the serial number for the primary controller board

Commentaire [van385 29]: New variable, only if applicable; the serial number for the secondary controller board

Commentaire [van385 30]: New variable to record special features of the float not recorded elsewhere, i.e. grounding avoidance, compressee etc.

Commentaire [van385 31]: New variable, float sampling mode

Commentaire [van385 32]: New variable, optional

Commentaire [van385 33]: New variable, optional

Commentaire [van385 34]: New variable, optional

Commentaire [van385 35]: New variable, optional

Commentaire [van385 36]: New variable, optional

2.4.4 Float deployment and mission information

Name	Definition	Comment
LAUNCH_DATE	char LAUNCH_DATE(DATE_TIME);	Date and time (UTC) of

	LAUNCH_DATE:long_name = "Date (UTC) of the deployment"; LAUNCH_DATE:conventions = "YYYYMMDDHHMISS"; LAUNCH_DATE:_FillValue = " ";	launch of the float. Format : YYYYMMDDHHMISS Example : 20011230090500 : December 30th 2001 03:05:00
LAUNCH_LATITUDE	double LAUNCH_LATITUDE; LAUNCH_LATITUDE:long_name = "Latitude of the float when deployed"; LAUNCH_LATITUDE:units = "degrees_north"; LAUNCH_LATITUDE:_FillValue = 99999.; LAUNCH_LATITUDE:valid_min = -90.; LAUNCH_LATITUDE:valid_max = 90.;	Latitude of the launch. Unit : degree north Example : 44.4991 : 44° 29' 56.76'' N
LAUNCH_LONGITUDE	double LAUNCH_LONGITUDE; LAUNCH_LONGITUDE:long_name = "Longitude of the float when deployed"; LAUNCH_LONGITUDE:units = "degrees_east"; LAUNCH_LONGITUDE:_FillValue = 99999.; LAUNCH_LONGITUDE:valid_min = -180.; LAUNCH_LONGITUDE:valid_max = 180.;	Longitude of the launch. Unit : degree east Example : 16.7222 : 16° 43' 19.92'' E
LAUNCH_QC	char LAUNCH_QC; LAUNCH_QC:long_name = "Quality on launch date, time and location"; LAUNCH_QC:conventions = "Argo reference table 2"; LAUNCH_QC:_FillValue = " ";	Quality flag on launch date, time and location. The flag scale is described in the reference table 2. Example : 1 : launch location seems correct.
START_DATE	char START_DATE(DATE_TIME); START_DATE:long_name = "Date (UTC) of the first descent of the float."; START_DATE:conventions = "YYYYMMDDHHMISS"; START_DATE:_FillValue = " ";	Date and time (UTC) of the first descent of the float. Format : YYYYMMDDHHMISS Example : 20011230090500 : December 30th 2001 06 :05 :00
START_DATE_QC	char START_DATE_QC; START_DATE_QC:long_name = "Quality on start date"; START_DATE_QC:conventions = "Argo reference table 2"; START_DATE_QC:_FillValue = " ";	Quality flag on start date. The flag scale is described in the reference table 2. Example : 1 : start date seems correct.
DEPLOYMENT_PLATFORM	char DEPLOY_PLATFORM(STRING32); DEPLOY_PLATFORM:long_name = "Identifier of the deployment platform"; DEPLOY_PLATFORM:_FillValue = " ";	Identifier of the deployment platform. Example : L'ATALANTE
~~DEPLOY_MISSION~~ DEPLOYMENT_CRUISE_ID	char DEPLOY_MISSION(STRING32); DEPLOY_MISSION:long_name = "Identifier of the mission used to deploy the float"; DEPLOY_MISSION:_FillValue = " ";	Identifier of the mission used to deploy the platform. Example : POMME2
~~DEPLOY_AVAILABLE_PRO FILE_ID~~ DEPLOYMENT_REFERENCE_STATION_ID	char DEPLOY_AVAILABLE_PROFILE_ID(STRING256); DEPLOY_AVALAIBLE_PROFILE_ID:long_name = "Identifier of stations used to verify the first profile"; DEPLOY_AVAILABLE_PROFILE_ID:_FillValue = " ";	Identifier of CTD or XBT stations used to verify the first profile. Example : 58776, 58777
END_MISSION_DATE	char END_MISSION_DATE (DATE_TIME); END_MISSION_DATE:long_name = "Date (UTC) of the end of mission of the float"; END_MISSION_DATE:conventions = "YYYYMMDDHHMISS"; END_MISSION_DATE:_FillValue = " ";	Date (UTC) of the end of mission of the float. Format : YYYYMMDDHHMISS Example : 20011230090500 : December 30th 2001 03:05:00
END_MISSION_STATUS	char END_MISSION_STATUS;	Status of the end of mission of the float.

Commentaire [van385 37]: Rename to be more specific

Commentaire [van385 38]: *Rename variable to be more specific*

Commentaire [van385 39]: Rename variable to be more specific

	END_MISSION_STATUS:long_name = "Status of the end of mission of the float"; END_MISSION_STATUS:conventions = "T:No more transmission received, R:Retrieved"; END_MISSION_STATUS:_FillValue = " ";	T:No more transmission received, R:Retrieved

2.4.5 Configuration parameters

This section describes the configuration parameters for a float. It is important to note that configuration parameters are float settings, not measurements reported by the float.

Configuration parameters may or may not be reported by a float.

Configuration parameters are identified by the "CONFIG" prefix.

For each configuration parameter, the name of the parameter and the value of the parameter are recorded.

Name	Definition	Comment
CONFIG_PARAMETER_NAME	char CONFIG_PARAMETER_N AME(N_CONF_PARAM, STRING128) CONFIG_PARAMETER_N AME:long_name="Name of configuration parameter"; CONFIG_PARAMETER_N AME:_FillValue = " ";	Name of the configuration parameter. Example : "CONFIG_ParkPressure_dBAR" See reference table 14b for standard configuraton parameter names.
CONFIG_PARAMETER_VALUE	int CONFIG_ PARAMETER_VALUE (N_MISSIONS, N_CONF_PARAM) CONFIG_ PARAMETER_VALUE :long_name="Value of configuraton parameter"; CONFIG_ PARAMETER_VALUE:_FillValue = " ";	Value of the configuration parameter. Example : "1500"
CONFIG_MISSION_NUMBER	int CONFIG_MISSION_NUMBE R(N_MISSIONS); CONFIG_MISSION_NUMBE R:long_name = "Unique number denoting the missions performed by the floatMission"; CONFIG_MISSION_NUMBE R:conventions = "0..N, 0 : launch mission (if exists), 1 : first complete mission"; CONFIG_MISSION_NUMBE R:_FillValue = 99999;	Unique number of the mission to which this parameter belongs. Example : 0 See note on floats with multiple configurations.
CONFIG_MISSION_COMMENT	char CONFIGURATION_MISSION_COMM ENT (N_MISSIONS, STRING256) CONFIGURATION_MISSION_COMMENT:long _name ="Comment on configuration"; CONFIGURATION_MISSION_COMMENT: FillValue=	Comment on this configuration mission. Example : "This mission follows a 1000 dbar meddie during parking"

Commentaire [van385 40]: This table reference will need to be changed.

The mission settings or parameter values are recorded as numbers. In this scheme, strings will need to be converted to numbers and will require measurement codes for the relevant parameters. The numeric codes for the affected parameters are defined in the "Explanation" section of the Configuration parameter names table (please see reference table 18). Only a few existing parameters are affected. If new floats with new configuration parameters (as strings) are introduced, then equivalent numeric flags must also be added to the table by the proposer of the new configuration parameter.

All parameter names are standardized and are available in reference table 18.

Commentaire [van385 41]:
1) The long term hosting of this table is yet to be decided. It is currently available at the ADMT website.
2) Someone will need to go through the whole manual and consecutively number all the tables so don't have "a" or "b" etc.

The mission is used to record information that changes from cycle to cycle, for instance when a float changes its mission from 3 shallow profiles to 1 deep profile. The shallow and deep profiles will have different mission numbers. The value of the mission number is recorded in CONFIG_MISSION_NUMBER.

Mission 0 parameters are pre-deployment or launch instructions. They are configuration parameters that are 'configured' but not changeable and are therefore designated mission 0 so that they are clearly differentiated from the other mission variables that may change during the float lifetime.

The parameter CONFIG_MISSION _COMMENT can be used to store information about the mission or whether the mission was set pre-deployment or transmitted by the float (free form field).

2.4.5.1 Note on floats with multiple configurations

Typically, an Argo float configuration is valid for the whole life of the float. Each cycle is repeated with the same behaviour (one configuration).

However, some floats may be configured to change their behaviour from cycle to cycle (multiple configurations).

When there is only one configuration, CONFIG_MISSION_NUMBER is set to 1: all the cycles are programmed to be the same. Note that in this case; floats will still have mission "0" that contains the pre-deployment or launch information. So for a float with one basic mission, it will have missions 0 and 1.

When there are multiple configurations, the configuration from the first cycle has CONFIG_MISSION_NUMBER set to 1. Each subsequent configuration change will be recorded as additional entries in CONFIG_MISSION_NUMBER, with the value increased sequentially by the integer one. All variables from mission 1 must be repeated in subsequent missions. Floats with multiple configurations still record pre-deployment or launch information in CONFIG_MISSION_NUMBER = 0.

If a float [with two-way communication capability] has many configuration parameters that change with every cycle, then a new mission number should be used for each cycle.

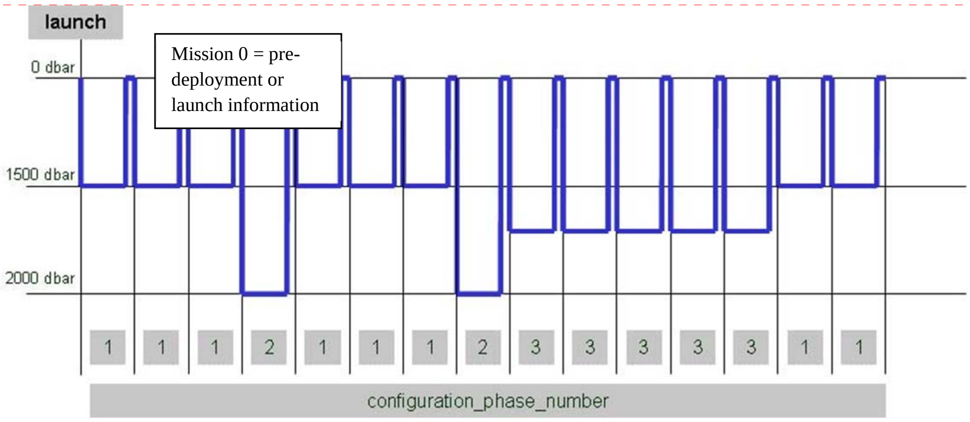
Argo best practice and our recommendation to users, is a minimum of configuration missions; i.e. if there is a change to configuration parameters that does not repeat a previous configuration then a new mission number should be used. If the configuration parameters change, but mirror a previous mission then that mission number should be re-used. In extremely complex cases where mission changes are unclear, then a new mission number can be used for each cycle. Users should be aware that the metafile will need to be rewritten each time a new mission number is added.

2.4.5.2 Determining which mission applies to a particular float cycle

Users are able to determine which mission applies to each cycle by looking at the CONFIG_MISSION_NUMBER(N_CYCLE) variable located in the trajectory file (see section "2.3.5 cycle information from the float" in the "Trajectory format version 2.3" section of this User's manual).

Mis en forme : Police :(Par défaut) Arial

Mis en forme : Default, Gauche, Interligne : simple



In the above example, there are 3 different float behaviours to record, (with park depth varying between 1500, 2000 and 1700 db). Each of these new behaviours requires a new mission number. This is in addition to the pre-deployment or launch info contained in mission 0:

CONFIG_PARAMETER_NAME = "CONFIG_ParkPressure_dBAR"
CONFIG_PARAMETER_VALUE = "1500"
CONFIG_MISSION_NUMBER = 1

CONFIG_PARAMETER_NAME = "CONFIG_ParkPressure_dBAR"
CONFIG_PARAMETER_VALUE = "2000"
CONFIG_MISSION_NUMBER = 2

CONFIG_PARAMETER_NAME = "CONFIG _ParkPressure_dBAR"
CONFIG_PARAMETER_VALUE = "1700"
CONFIG_MISSION_NUMBER = 3

A further example for a float with multiple missions is shown below. For this float the only change to the mission behaviour is the depth at which the float parks (with changes in two configuration parameters). However all configuration parameters from mission 1 must still be reported for each subsequent mission, even those that do not change. In this example there is one configuration mission 0 variable, which is set before launch, then there are another 6 variables that may change and control the float behaviour in subsequent missions (missions 1 to n). In this example, even though only CONFIG_ParkPressure_dBAR and CONFIG_ParkPistonPosition_COUNT are changing, the other mission variables are also repeated for each subsequent mission.

Configuration_parameter_name (N_Config_Param)	**Mission_Settings (N_Missions, N_Config_Param)**				
CONFIG_Mission_Number	0	1	2	…	…
CONFIG_PistonPositionPressureActivation_COUNT	100	100	100		

CONFIG_ParkPressure_dBAR		1000	1500		
CONFIG_ProfilePressure_dBAR		2000	2000		
CONFIG_Direction_LOGICAL		1*	1		
CONFIG_AscentToSurfaceTimeout_DecimalHour		3	3		
CONFIG_ParkPistonPosition_COUNT		113	75		
CONFIG_MeasureBattery_LOGICAL		0 ^	0		
…					
…					

* 1 = Ascending, 2 = Descending

^ 0 = No, 1 = Yes

2.4.6 Float sensor information

This section contains information about the sensors of the profiler.

Name	Definition	Comment
SENSOR	char SENSOR(N_PARAM,STRING16); SENSOR:long_name = "List of sensors on the float "; SENSOR:conventions = "Argo reference table 3"; SENSOR:_FillValue = " ";	Parameters measured by sensors of the float. The parameter names are listed in reference table 3. Examples : TEMP, PSAL, CNDC TEMP : temperature in celsius PSAL : practical salinity in psu CNDC : conductvity in mhos/m
SENSOR_MAKER	char SENSOR_MAKER(N_PARAM,STRING256); SENSOR_MAKER:long_name = "The name of the manufacturer "; SENSOR_MAKER:_FillValue = " ";	Name of the manufacturer of the sensor. Example : SEABIRD
SENSOR_MODEL	char SENSOR_MODEL (N_PARAM,STRING256); SENSOR_MODEL:long_name = "Type of sensor"; SENSOR_MODEL:_FillValue = " ";	Model of sensor. Example : SBE41
SENSOR_SERIAL_NO	char SENSOR_SERIAL_NO(N_PARAM,STRING16); SENSOR_SERIAL_NO:long_name = "The serial number of the sensor"; SENSOR_SERIAL_NO:_FillValue = " ";	Serial number of the sensor. Example : 2646 036 073
SENSOR_UNITS	char SENSOR_UNITS(N_PARAM, STRING16); SENSOR_UNITS:long_name = "The units of accuracy and resolution of the sensor"; SENSOR_UNITS:_FillValue = " ";	Units of accuracy of the sensor. Example : psu
SENSOR_ACCURACY	char SENSOR_ACCURACY(N_PARAM, STRING32); SENSOR_ACCURACY:long_name = "The accuracy of the sensor"; SENSOR_ACCURACY:_FillValue = " ";	Accuracy of the sensor. Example: "8 micromole/l or 5%"
SENSOR_RESOLUTION	char SENSOR_RESOLUTION(N_PARAM, STRING32); SENSOR_RESOLUTION:long_name = "The resolution of the sensor"; SENSOR_RESOLUTION:_FillValue =" ";	Resolution of the sensor. Example : 0.001 micromole/l

2.4.7 Float calibration information

This section contains information about the calibration of the profiler. The calibration described in this section is an instrumental calibration. The delayed mode calibration, based on a data analysis is described in the profile format.

Name	Definition	Comment
PARAMETER	char PARAMETER(N_PARAM,STRING16);	Parameters measured on this float.

	PARAMETER:long_name = "List of parameters with calibration information"; PARAMETER:conventions = "Argo reference table 3"; PARAMETER:_FillValue = " ";	The parameter names are listed inreference table 3. Examples : TEMP, PSAL, CNDC TEMP : temperature in celsius PSAL : practical salinity in psu CNDC : conductvity in mhos/m
PREDEPLOYMENT_CALIB_EQUATION	char PREDEPLOYMENT_CALIB_EQUATION(N_PARAM,STRING1024); PREDEPLOYMENT_CALIB_EQUATION:long_name = "Calibration equation for this parameter"; PREDEPLOYMENT_CALIB_EQUATION:_FillValue = " ";	Calibration equation for this parameter. Example : Tc = a1 * T + a0
PREDEPLOYMENT_CALIB _COEFFICIENT	char PREDEPLOYMENT_CALIB_COEFFICIENT(N_PARAM,STRING1024); PREDEPLOYMENT_CALIB_COEFFICIENT:long_name = "Calibration coefficients for this equation"; PREDEPLOYMENT_CALIB_COEFFICIENT:_FillValue = " ";	Calibration coefficients for this equation. Example : a1=0.99997 , a0=0.0021
PREDEPLOYMENT_CALIB_COMMENT	char PREDEPLOYMENT_CALIB_COMMENT(N_PARAM,STRING1024); PREDEPLOYMENT_CALIB_COMMENT:long_name = "Comment applying to this parameter calibration"; PREDEPLOYMENT_CALIB_COMMENT:_FillValue = " ";	Comments applying to this parameter calibration. Example : The sensor is not stable

2.4.8 Mandatory meta-data parameters

Mandatory (formerly known as highly desirable) meta-data parameters should be correctly filled according to the following table.

Mandatory meta-data	Mandatory format	Example
ARGO_GROUP	see reference table ?	ARGO_GROUP = “Core Argo” or “Argo Equivalent” or “Bio Argo”;
BATTERY_TYPE	not empty	BATTERY_TYPE = “Alkaline” or “Lithium” or “Alkaline and Lithium”;
BATTERY_PACKS	not empty	BATTERY_PACKS = “4DD Li + 1C Alk”;
CONTROLLER_BOARD_SERIAL_NO_PRIMARY	not empty	CONTROLLER_BOARD_SERIAL_NO_PRIMARY = 4567
CONTROLLER_BOARD_TYPE_PRIMARY	not empty	CONTROLLER_BOARD_TYPE_PRIMARY = “APF9”;
DAC_FORMAT_ID	not empty	DAC_FORMAT_ID = ‘11’;
DATA_CENTRE	see reference table 4	DATA_CENTRE = "AO ;
DATA_TYPE	"Argo meta-data";	DATA_TYPE = "Argo meta-data";
DATE_CREATION	YYYYMMDDHHMISS	DATE_CREATION = "20040210124422";
DATE_UPDATE	YYYYMMDDHHMISS	DATE_UPDATE = "20040210124422";
~~DEEPEST_PRESSURE~~	~~not empty~~	~~DEEPEST_PRESSURE = 1092;~~
~~DIRECTION~~	~~“A” or “D”~~	~~DIRECTION = “A”~~
FIRMWARE_VERSION	not empty	FIRMWARE_VERSION = “042606”;
FLOAT_SERIAL_NO	not empty	FLOAT_SERIAL_NO = “1679”
FORMAT_NUMBER	see reference table	FORMAT_NUMBER = “11”;
FORMAT_VERSION	"2.2 ";	FORMAT_VERSION = "2.2 ";
HANDBOOK_VERSION	"1.2 ";	HANDBOOK_VERSION = "1.2 ";
~~INST_REFERENCE~~	~~not empty~~	~~INST_REFERENCE = “APEX_SBE1679”;~~
LAUNCH_DATE	YYYYMMDDHHMISS	LAUNCH_DATE = "20010717000100";
LAUNCH_LATITUDE	not empty, -90 <= real <= 90	LAUNCH_LATITUDE = -7.91400003433228;
LAUNCH_LONGITUDE	not empty, -180 <= real <=	LAUNCH_LONGITUDE = -179.828338623047;

Commentaire [van385 42]: A reference table needs to be created

Commentaire [van385 43]: Move to CONFIG section becomes CONFIG_DeepestPressureAscendingProfile_dBAR

Commentaire [van385 44]: Move to CONFIG becomes CONFIG_Direction_STRING

Commentaire [van385 45]: Input needs to be standardised

Commentaire [van385 46]: This is deleted and replaced with a more specifically named and standardised variable: FLOAT_SERIAL_NO

	180	
LAUNCH_QC	see reference table 2	LAUNCH_QC = "1";
MANUAL_VERSION	not empty	MANUAL_VERSION = "004" or "041708"
PARAMETER	see reference table 3	PARAMETER ="PRES","TEMP","PSAL";
~~PARKING_PRESSURE~~	~~not empty~~	~~PARKING PRESSURE = 1000;~~
PI_NAME	not empty	PI_NAME = "Susan Wijffels";
PLATFORM_FAMILY	see reference table	PLATFORM_FAMILY = "subsurface profiling float", "ITP", "POPS";
PLATFORM_MAKER	see reference table	PLATFORM_MAKER = "Optimare";
~~PLATFORM_MODEL~~	~~not empty~~	~~PLATFORM_MODEL = "SOLO";~~
PLATFORM_NUMBER	XXXXX or XXXXXXX	PLATFORM_NUMBER = "5900077 ";
PLATFORM_TYPE	see reference table	PLATFORM_TYPE = "SOLO" or "APEX" or "PROVOR";
POSITIONING_SYSTEM	see reference table 9	POSITIONING_SYSTEM = "ARGOS";
PREDEPLOYMENT_CALIB_COEFFICIENT	not empty	PREDEPLOYMENT_CALIB_COEFFICIENT = "ser# = 3016 temperature coeffs: A0 = -0.0000 A1 = 0.0003 A2 = -0.0000 A3 = 0.0000";
PREDEPLOYMENT_CALIB_EQUATION	not empty	PREDEPLOYMENT_CALIB_EQUATION = "Temperature ITS-90 = 1/ { a0 + a1[lambda nu (n)] + a2 [lambda nu^2 (n)] + a3 [lambda nu^3 (n)]} - 273.15 (deg C)";
PTT	not empty	PTT = "23978 "; Default value : "n/a"
SENSOR	not empty	SENSOR = "TEMP", "PRES","CNDC";
SENSOR_MAKER	see reference table	SENSOR_MAKER = "SEABIRD";
SENSOR_MODEL	see reference table	SENSOR_MODEL = "SBE41"
SENSOR_SERIAL_NO	not empty	SENSOR_SERIAL_NO = "6785";
SENSOR_UNITS	not empty	SENSOR_UNITS = "deg C", "decibars";
~~START_DATE~~	~~YYYYMMDDHHMMSS~~	~~START_DATE = 20070618000100~~
~~START_DATE_QC~~	~~see reference table 2~~	~~START_DATE_QC = "2"~~
STANDARD_FORMAT_ID	reference table available at ADMT or CORIOLIS website	STANDARD_FORMAT_ID = "1";
TRANS_FREQUENCY	not empty	TRANS_FREQUENCY = "1/44";
TRANS_SYSTEM	see reference table 10	TRANS_SYSTEM = "ARGOS ";
TRANS_SYSTEM_ID	not empty	TRANS_SYSTEM_ID = "14281";
WMO_INST_TYPE	not empty	WMO_INST_TYPE = "846";

Commentaire [van385 47]: Move to CONFIG section becomes CONFIG_ParkPressure_dBAR

Commentaire [van385 48]: Input needs to be standardised

Commentaire [van385 49]: Input needs to be standardised

Commentaire [van385 50]: This field is redundant/not useful as it often contains confused input and can be constructed by combining other metadata parameters.

Commentaire [van385 51]: Input needs to be standardised

Commentaire [van385 52]: Input needs to be standardised

Commentaire [van385 53]: Input needs to be standardised

Commentaire [van385 54]: Delete from this table - propose this is not mandatory

Commentaire [van385 55]: Delete from this table - propose this is not mandatory

2.5 Technical information format version 2.4

Commentaire [TC56]: The change from 2.3 to 2.4 is minor. It is necessary for CF compliance (use long_name attribute instead of comment attribute).

The format version 2.4 of Argo technical data will replace versions 2.3 and 2.2 gradually. During the transition period, both formats will be valid. However, when a Data Assembly Center (DAC) produces technical files with the new 2.4 format, all its technical files must be provided in version 2.4.

An Argo technical file contains technical information from an Argo float. This information is registered for each cycle performed by the float.

The number and the type of technical information is different from one float model to an other. To be flexible, for each cycle, the name of the parameters and their values are recorded. The name of the parameters recorded may therefore change from one model of float to another.

For file naming conventions, see §4.1.

2.5.1 Global attributes, dimensions and definitions

2.5.1.1 Global attributes

The global attributes section is used for data discovery. The following 8 global attributes should appear in the global section. The NetCDF Climate and Forecast (CF) Metadata Conventions (version 1.6, 5 December, 2011) are available from:

- http://cf-pcmdi.llnl.gov/documents/cf-conventions/1.6/cf-conventions.pdf

```
// global attributes:
        :title = "Argo float technical data file";
        :institution = "CSIRO";
        :source = "Argo float";
        :history = "1977-04-22T06:00:00Z creation";
        :references = "http://www.argodatamgt.org/Documentation";
        :comment = "free text";
        :user_manual_version = "2.4" ;
        :Conventions = “Argo-2.4 CF-1.6" ;
```

2.5.1.2 Dimensions and definitions

Name	Definition	Comment
DATE_TIME	DATE_TIME = 14;	This dimension is the length of an ASCII date and time value. Date and time values are always in universal time coordinates (UTC). Date_time convention is : YYYYMMDDHHMISS • YYYY : year • MM : month • DD : day • HH : hour of the day • MI : minutes • SS : seconds Examples : 20010105172834 : January 5th 2001 17:28:34 19971217000000 : December 17th 1997 00:00:00
STRING128, STRING32 STRING8 STRING4 STRING2	STRING128 = 128; STRING32 = 32; STRING8 = 8; STRING4 = 4; STRING2 = 2;	String dimensions from 2 to 128.
N_TECH_PARAM	N_TECH_PARAM = UNLIMITED;	Number of technical parameters.

Mis en forme : Police :Surlignage

2.5.2 General information on the technical data file

This section contains information about the technical data file itself.

Name	Definition	Comment
PLATFORM_NUMBER	char PLATFORM_NUMBER(STRING8); PLATFORM_NUMBER:long_name = "Float unique identifier"; PLATFORM_NUMBER:conventions = "WMO float identifier : A9IIIII"; PLATFORM_NUMBER:_FillValue = " ";	WMO float identifier. WMO is the World Meteorological Organization. This platform number is unique. Example : 6900045
DATA_TYPE	char DATA_TYPE(STRING32); DATA_TYPE:long_name = "Data type"; DATA_TYPE:_FillValue = " ";	This field contains the type of data contained in the file. The list of acceptable data types is in the reference table 1. Example : "Argo technical data"
FORMAT_VERSION	char FORMAT_VERSION(STRING4); FORMAT_VERSION: long_name = "File format version "; FORMAT_VERSION:_FillValue = " ";	File format version Example : «2.4»
HANDBOOK_VERSION	char HANDBOOK_VERSION(STRING4); HANDBOOK_VERSION: long_name = "Data handbook version"; HANDBOOK_VERSION:_FillValue = " ";	Version number of the data handbook. This field indicates that the data contained in this file are managed according to the policy described in the Argo data management handbook. Example : «1.0»
DATA_CENTRE	char DATA_CENTRE(STRING2); DATA_CENTRE:long_name = "Data centre in charge of float data processing"; DATA_CENTRE:conventions = "Argo reference table 4"; DATA_CENTRE:_FillValue = " ";	Code of the data centre in charge of the float data management. The data centre codes are described in the reference table 4. Example : ME for MEDS
DATE_CREATION	char DATE_CREATION(DATE_TIME); DATE_CREATION:long_name = "Date of file creation "; DATE_CREATION:conventions = "YYYYMMDDHHMISS"; DATE_CREATION:_FillValue = " ";	Date and time (UTC) of creation of this file. Format : YYYYMMDDHHMISS Example : 20011229161700 : December 29th 2001 16 :17 :00
DATA_UPDATE	char DATE_UPDATE(DATE_TIME); DATE_UPDATE:long_name = "Date of update of this file"; DATE_UPDATE:conventions = "YYYYMMDDHHMISS"; DATE_UPDATE:_FillValue = " ";	Date and time (UTC) of update of this file. Format : YYYYMMDDHHMISS Example : 20011230090500 : December 30th 2001 09 :05 :00

2.5.3 Technical data

This section contains a set of technical data for each profile.

For each cycle, for each technical parameter, the name of the parameter and the value of the parameter are recorded.

The parameter name and its value are recorded as strings of 128 characters.

All parameter names are standardized and available in reference table 14.

Name	Definition	Comment
TECHNICAL_PARAMETER_NAME	char TECHNICAL_PARAMETER_NAME(N_TEC	Name of the technical parameter. Example :

	H_PARAM, STRING128) TECHNICAL_PARAMETER_NAME:long_name="Name of technical parameter"; TECHNICAL_PARAMETER_NAME:_FillValue = " ";	"CLOCK_FloatTime_HHMMSS" See reference table 14 for standard technical parameter names.
TECHNICAL_PARAMETER_VALUE	char TECHNICAL_PARAMETER_VALUE(N_TECH_PARAM, STRING128) TECHNICAL_PARAMETER_VALUE:long_name="Value of technical parameter"; TECHNICAL_PARAMETER_VALUE:_FillValue = " ";	Value of the technical parameter. Example : "125049"
CYCLE_NUMBER	int CYCLE_NUMBER(N_TECH_PARAM); CYCLE_NUMBER:long_name = "Float cycle number"; CYCLE_NUMBER:conventions = "0..N, 0 : launch cycle (if exists), 1 : first complete cycle"; CYCLE_NUMBER:_FillValue = 99999;	Cycle number of the technical parameter. Example : 157

2.6 GDAC FTP directory file format

2.6.1 Profile directory file format

The profile directory file describes all individual profile files of the GDAC ftp site. Its format is an autodescriptive Ascii with comma separated values.

The directory file contains:

- A header with a list of general informations : title, description, project name, format version, date of update, ftp root addresses, GDAC node
- A table with a description of each file of the GDAC ftp site. This table is a comma separated list.

Profile directory format definition

```
# Title : Profile directory file of the Argo Global Data Assembly Center
# Description : The directory file describes all individual  profile files of the argo GDAC ftp site.
# Project : ARGO
# Format version : 2.0
# Date of update : YYYYMMDDHHMISS
# FTP root number 1 :  ftp://ftp.ifremer.fr/ifremer/argo/dac
# FTP root number 2 :  ftp://usgodae.usgodae.org/pub/outgoing/argo/dac
# GDAC node : CORIOLIS
file,date,latitude,longitude,ocean,profiler_type,institution,date_update
```

- file : path and file name on the ftp site. The file name contain the float number and the cycle number.
  Fill value : none, this field is mandatory
- date : date of the profile, YYYYMMDDHHMISS
  Fill value : " " (blank)
- latitude, longitude : location of the profile
  Fill value : 99999.
- ocean : code of the ocean of the profile as described in reference table 13
  Fill value : " " (blank)
- profiler_type : type of profiling float as described in reference table 8
  Fill value : " " (blank)
- institution : institution of the profiling float described in reference table 4
  Fill value : " " (blank)
- date_update : : date of last update of the file, YYYYMMDDHHMISS
  Fill value : " " (blank)

Each line describes a file of the gdac ftp site.

Profile directory format example

```
# Title : Profile directory file of the Argo Global Data Assembly Center
# Description : The directory file describes all profile files of the argo GDAC ftp site.
# Project : ARGO
# Format version : 2.0
# Date of update : 20031028075500
# FTP root number 1 :  ftp://ftp.ifremer.fr/ifremer/argo/dac
# FTP root number 2 :  ftp://usgodae.usgodae.org/pub/outgoing/argo/dac
# GDAC node : CORIOLIS
file,date,latitude,longitude,ocean,profiler_type,institution,date_update
aoml/13857/profiles/R13857_001.nc,199707292003,0.267,-16.032,A,0845,AO,20030214155117
aoml/13857/profiles/R13857_002.nc,199708091921,0.072,-17.659,A,0845,AO,20030214155354
aoml/13857/profiles/R13857_003.nc,199708201845,0.543,-19.622,A,0845,AO,20030214155619
...
jma/29051/profiles/R29051_025.nc,200110250010,30.280,143.238,P,846,JA,20030212125117
jma/29051/profiles/R29051_026.nc,200111040004,30.057,143.206,P,846,JA,20030212125117
```

2.6.2 Profile directory file format version 2.1

The profile directory file describes all individual profile files of the GDAC ftp site. Its format is an auto descriptive ASCII with comma separated values.

This directory file format is more detailed than the previous version 2.0, it will eventually replace it.

The directory file contains:

- A header with a list of general information: title, description, project name, format version, date of update, ftp root addresses, GDAC node
- A table with a description of each file of the GDAC ftp site. This table is a comma-separated list.

The detailed index file is limited to core mission "Argo sampling scheme" : temperature, salinity and oxygen observations.

Compression of the profile directory file

The profile directory file is compressed with gzip.

MD5 signature

For each update of the directory file, an MD5 signature is produced. The MD5 signature file allows user to check that the file he collected through FTP is identical to the original file.

Index file naming convention

- etc/argo_profile_detailled_index.txt.gz
- etc/argo_profile_detailled_index.txt.gz.md5

Detailed profile directory format definition

```
# Title : Profile directory file of the Argo Global Data Assembly Center
# Description : The directory file describes all individual  profile files of the argo GDAC ftp site.
# Project : ARGO
# Format version : 2.1
# Date of update : YYYYMMDDHHMISS
# FTP root number 1 :  ftp://ftp.ifremer.fr/ifremer/argo/dac
# FTP root number 2 :  ftp://usgodae.usgodae.org/pub/outgoing/argo/dac
# GDAC node : CORIOLIS
file,date,latitude,longitude,ocean,profiler_type,institution,date_update,profile_temp_qc,profile_psal_qc,profile_doxy_qc,ad_psal
_adjustment_mean, ad_psal_adjustment_deviation,gdac_date_creation,gdac_date_update,n_levels
```

- file: path and file name on the ftp site. The file name contain the float number and the cycle number.
  Fill value : none, this field is mandatory
- date: date of the profile, YYYYMMDDHHMISS
  Fill value : " " (blank)
- latitude, longitude : location of the profile
  Fill value : 99999.
- ocean: code of the ocean of the profile as described in reference table 13
  Fill value : " " (blank)
- profiler_type : type of profiling float as described in reference table 8
  Fill value : " " (blank)
- institution: institution of the profiling float described in reference table 4
  Fill value : " " (blank)
- date_update: date of last update of the file, YYYYMMDDHHMISS
  Fill value: " " (blank)
- profile_temp_qc,profile_psal_qc,profile_doxy_qc : global quality flag on temperature, salinity and oxygene profile.

Fill value: " " (blank)

- ad_psal_adjustment_mean : for delayed mode or adjusted mode
  Mean of psal_adjusted – psal on the deepest 500 meters with good psal_adjusted_qc (equal to 1)
  Fill value: " " (blank)
- ad_psal_adjustment_deviation : for delayed mode or adjusted mode
  Standard deviation of psal_adjusted – psal on the deepest 500 meters with good psal_adjusted_qc (equal to 1)
  Fill value: " " (blank)
- gdac_date_creation : création date of the file on GDAC, YYYYMMDDHHMISS
- gdac_date_update : update date of the file on GDAC, YYYYMMDDHHMISS
- n_levels :maximum number of pressure levels contained in a profile
  Fill value: " " (blank)

Each line describes a file of the gdac ftp site.

Profile directory format example

```
# Title : Profile directory file of the Argo Global Data Assembly Center
# Description : The directory file describes all individual profile files of the argo GDAC ftp site.
# Project : ARGO
# Format version : 2.1
# Date of update : 20081025220004
# FTP root number 1 : ftp://ftp.ifremer.fr/ifremer/argo/dac
# FTP root number 2 : ftp://usgodae.usgodae.org/pub/outgoing/argo/dac
# GDAC node : CORIOLIS
file,date,latitude,longitude,ocean,profiler_type,institution,date_update,profile_temp_qc,profile_psal_qc,profile_doxy_qc,ad_psa
l_adjustment_mean,ad_psal_adjustment_deviation
aoml/13857/profiles/R13857_001.nc,19970729200300,0.267,-16.032,A,845,AO,20080918131927,A, , , ,
aoml/13857/profiles/R13857_002.nc,19970809192112,0.072,-17.659,A,845,AO,20080918131929,A, , , ,
aoml/13857/profiles/R13857_003.nc,19970820184545,0.543,-19.622,A,845,AO,20080918131931,A, , , ,
…
meds/3900084/profiles/D3900084_099.nc,20050830130800,-45.74,-58.67,A,846,ME,20060509152833,A,A, ,0.029,0.000
meds/3900084/profiles/D3900084_103.nc,20051009125300,-42.867,-56.903,A,846,ME,20060509152833,A,A, ,-0.003,0.000
…
```

2.6.3 Trajectory directory format

The trajectory directory file describes all trajectory files of the GDAC ftp site. Its format is an autodescriptive Ascii with comma separated values.

The directory file contains:

- A header with a list of general informations: title, description, project name, format version, date of update, ftp root addresses, GDAC node
- A table with a description of each file of the GDAC ftp site. This table is a comma separated list.

Trajectory directory format definition

```
# Title : Trajectory directory file of the Argo Global Data Assembly Center
# Description : The directory file describes all trajectory files of the argo GDAC ftp site.
# Project : ARGO
# Format version : 2.0
# Date of update : YYYYMMDDHHMISS
# FTP root number 1 :  ftp://ftp.ifremer.fr/ifremer/argo/dac
# FTP root number 2 :  ftp://usgodae.usgodae.org/pub/outgoing/argo/dac
# GDAC node : CORIOLIS
file, latitude_max, latitude_min, longitude_max, longitude_min, profiler_type, institution, date_update
```

- file : path and file name on the ftp site
  Fill value : none, this fiel is mandatory

- latitude_max, latitude_min, longitude_max, longitude_min : extreme locations of the float
  Fill values : 99999.

- profiler_type : type of profiling float as described in reference table 8
  Fill value : " " (blank)

- institution : institution of the profiling float described in reference table 4
  Fill value : " " (blank)

- date_update : date of last update of the file, YYYYMMDDHHMISS
  Fill value : " " (blank)

Trajectory directory format example

```
# Title : Trajectory directory file of the Argo Global Data Assembly Center
# Description : The directory file describes all trajectory files of the argo GDAC ftp site.
# Project : ARGO
# Format version : 2.0
# Date of update : 20031028075500
# FTP root number 1 :  ftp://ftp.ifremer.fr/ifremer/argo/dac
# FTP root number 2 :  ftp://usgodae.usgodae.org/pub/outgoing/argo/dac
# GDAC node : CORIOLIS
file, latitude_max, latitude_min, longitude_max, longitude_min, profiler_type, institution, date_update
aoml/13857/13857_traj.nc,1.25,0.267,-16.032,-18.5,0845,AO,20030214155117
aoml/13857/13857_traj.nc,0.072,-17.659,A,0845,AO,20030214155354
aoml/13857/13857_traj.nc,0.543,-19.622,A,0845,AO,20030214155619
...
jma/29051/29051_traj.nc,32.280,30.280,143.238,140.238,846,JA,20030212125117
jma/29051/29051_traj.nc,32.352,30.057,143.206,140.115,846,JA,20030212125117
```

2.6.4 Meta-data directory format

The metadata directory file describes all metadata files of the GDAC ftp site. Its format is an autodescriptive Ascii with comma separated values.

The directory file contains:

- A header with a list of general informations : title, description, project name, format version, date of update, ftp root addresses, GDAC node
- A table with a description of each file of the GDAC ftp site. This table is a comma separated list.

Metadata directory format definition

```
# Title : Metadata directory file of the Argo Global Data Assembly Center
# Description : The directory file describes all metadata files of the argo GDAC ftp site.
# Project : ARGO
# Format version : 2.0
# Date of update : YYYYMMDDHHMISS
# FTP root number 1 :  ftp://ftp.ifremer.fr/ifremer/argo/dac
# FTP root number 2 :  ftp://usgodae.usgodae.org/pub/outgoing/argo/dac
# GDAC node : CORIOLIS
file, profiler_type, institution, date_update
```

- file : path and file name on the ftp site
  Fill value : none, this field is mandatory

- profiler_type : type of profiling float as described in reference table 8
  Fill value : " " (blank)

- institution : institution of the profiling float described in reference table 4
  Fill value : " " (blank)

- date_update : date of last update of the file, YYYYMMDDHHMISS
  Fill value : " " (blank)

Metadata directory example
Title : Metadata directory file of the Argo Global Data Assembly Center # Description : The directory file describes all metadata files of the argo GDAC ftp site. # Project : ARGO # Format version : 2.0 # Date of update : 20031028075500 # FTP root number 1 : ftp://ftp.ifremer.fr/ifremer/argo/dac # FTP root number 2 : ftp://usgodae.usgodae.org/pub/outgoing/argo/dac # GDAC node : CORIOLIS file, profiler_type, institution, date_update aoml/13857/13857_meta.nc,0845,AO,20030214155117 aoml/13857/13857_meta.nc,0845,AO,20030214155354 aoml/13857/13857_meta.nc,0845,AO,20030214155619 ... jma/29051/29051_meta.nc,846,JA,20030212125117 jma/29051/29051_meta.nc,846,JA,20030212125117

3 Reference tables

3.1 Reference table 1: data type

This table contains the list of acceptable values for DATA_TYPE field.

Name
Argo profile
Argo trajectory
Argo meta-data
Argo technical data

3.2 Reference table 2: Argo quality control flag scale

3.2.1 Reference table 2: measurement flag scale

A quality flag indicates the quality of an observation.

The flags are assigned in real-time or delayed mode according to the Argo quality control manual available at:

- http://www.argodatamgt.org/Documentation

n	Meaning	Real-time comment	Delayed-mode comment
0	No QC was performed	No QC was performed.	No QC was performed.
1	Good data	All Argo real-time QC tests passed.	The adjusted value is statistically consistent and a statistical error estimate is supplied.
2	Probably good data	Not used in real-time.	Probably good data.
3	Bad data that are potentially correctable	Test 15 or Test 16 or Test 17 failed and all other real-time QC tests passed. These data are not to be used without scientific correction. A flag '3' may be assigned by an operator during additional visual QC for bad data that may be corrected in delayed mode.	An adjustment has been applied, but the value may still be bad.
4	Bad data	Data have failed one or more of the real-time QC tests, excluding Test 16. A flag '4' may be assigned by an operator during additional visual QC for bad data that are not correctable.	Bad data. Not adjustable.
5	Value changed	Value changed	Value changed
6	Not used	Not used	Not used
7	Not used	Not used	Not used
8	Interpolated value	Interpolated value	Interpolated value
9	Missing value	Missing value	Missing value

A list of real-time QC tests can be found in Table 11.

3.2.2 Reference table 2a: profile quality flag

N is defined as the percentage of levels with good data where:

- QC flag values of 1, 2, 5, or 8 are GOOD data
- QC flag values of 9 (missing) are NOT USED in the computation

All other QC flag values are BAD data

The computation should be taken from <PARAM_ADJUSTED_QC> if available and from <PARAM_QC> otherwise.

n	Meaning
" "	No QC performed
A	***N*** = 100%; All profile levels contain good data.
B	75% <= ***N*** < 100%
C	50% <= ***N*** < 75%
D	25% <= ***N*** < 50%
E	0% < ***N*** < 25%
F	***N*** = 0%; No profile levels have good data.

Example: a TEMP profile has 60 levels (3 levels contain missing values).

- 45 levels are flagged as 1
- levels are flagged as 2
- 7 levels are flagged as 4
- 3 levels are flagged as 9 (missing)

Percentage of good levels = ((45 + 5) / 57) * 100 = 87.7%

- PROFILE_TEMP_QC = "B";

3.3 Reference table 3: parameter code table

The following table describes the parameter codes used for Argo data management.

Code	long name	standard name	comment	unit	valid_min	valid_max	C_Format FORTRAN_Format resolution	Fill value
CNDC	ELECTRICAL CONDUCTIVITY	sea_water_electrical_conductivity	~~In situ measurement~~	mhos/m	0.f	8.5.f	%10.4f F10.4 0.0001f	99999.f
PRES	SEA PRESSURE	sea_water_pressure	~~In situ measurement, sea surface = 0~~	decibar	0.f	12000.f	%7.1f F7.1 0.1f	99999.f
PSAL	PRACTICAL SALINITY	sea_water_salinity	~~In situ measurement~~	psu	0.f	42.f	%9.3f F9.3 0.001f	99999.f
TEMP	SEA TEMPERATURE IN SITU ITS-90 SCALE	sea_water_temperature	~~In situ measurement~~	degree_Celsius	-2.f	40.f	%9.3f F9.3 0.001f	99999.f
DOXY	DISSOLVED OXYGEN	moles_of_oxygen_per_unit_mass_in_sea_water	~~In situ measurement~~	micromole/kg	0.f	650.f	%9.3f F9.3 0.001f	99999.f
TEMP_DOXY	SEA TEMPERATURE FROM DOXY SENSOR (ITS-90 SCALE)	temperature_of_sensor_for_oxygen_in_sea_water	~~In situ measurement~~	degree_Celsius	-2.f	40.f	%9.3f F9.3 0.001f	99999.f
PRES_DOXY	Sea water pressure at the depth of oxygen sampling	sea_water_pressure	~~In situ measurement, sea surface = 0~~	decibar	0.f	12000.f	%7.1f F7.1 0.1f	99999.f
VOLTAGE_DOXY	Voltage reported by oxygen sensor	-	~~Voltage reported by sensors such as SBE43~~	volt	0.f	100.f	%5.2f F5.2 0.01f	99999.f
FREQUENCY_DOXY	Frequency reported by oxygen sensor	-	~~Frequency reported by sensors such as SBE43~~	hertz	0.f	25000.f	%7.1f F7.1 0.1f	99999.f
COUNT_DOXY	Count reported by oxygen sensor	-	~~Raw counts reported by sensors such as SBE43~~		0.f	100.f	%5.2f F5.2 0.01f	99999.f
BPHASE_DOXY	Uncalibrated phase shift reported by oxygen sensor	-	~~Uncalibrated phase shift reported by sensors such as Aandera Optode~~	degree	10.f	70.f	%8.2f F8.2 0.01f	99999.f
DPHASE_DOXY	Calibrated phase shift reported by oxygen sensor	-	~~Calibrated phase shift reported by sensors such as Aandera Optode~~	degree	10.f	70.f	%8.2f F8.2 0.01f	99999.f
MOLAR_DOXY	Molar oxygen concentration reported by the oxygen sensor	mole_concentration_of_dissolved_molecular_oxygen_in_sea_water	~~Technical value reported by sensors such as Aanderaa Optode~~	micromole/litre	0.f	650.f	%9.3f F9.3 0.001f	99999.f

If new parameters are required, they have to be added to this table before they will be accepted.
A request for new parameters can be sent to argo-dm-chairman@jcommops.org for approval and inclusion.

3.3.1 Parameters from duplicate sensors

Some floats are equipped with 2 different sensors, measuring the same physical parameter. In that case, add the integer "2" at the end of the code of the duplicate parameter (e.g. DOXY2).

If more sensors that measure the same physical parameter are added, then the integer will simply increase by 1 (i.e. DOXY3, DOXY4, and so on).

Example

If a float has one Optode and one SBE oxygen sensor:

- Use DOXY and TEMP_DOXY for Optode
- Use DOXY2 for SBE

If a float has two Optode oxygen sensors:

- Use DOXY and TEMP_DOXY, and DOXY2 and TEMP_DOXY2

If a float has two SBE oxygen sensors:

- Use DOXY and DOXY2

3.3.2 Oxygen related parameters

Some Argo floats perform Oxygen observation from different types of sensors, such as the Aandera Optode or the Seabird SBE 43/IDO.

To provide homogeneous observations from heterogeneous sensors, oxygen measurement should be converted and reported as DOXY.

- DOXY is the dissolved oxygen concentration estimated from the telemetered, calibrations coefficients and CTD values: PRES, TEMP (or TEMP_DOXY) and PSAL.
  Pressure and salinity compensations (e.g. Optode) are taken into account.
- DOXY unit: micromole/kg
- DOXY_ADJUSTED is the dissolved oxygen concentration corrected for any sensor drift and offset. DOXY_ADJUSTED is calculated from the other “ADJUSTED” fields.

Calibration coefficients, equations and references used to convert the telemetered variables in DOXY must be carefully documented in the metadata.

The Argo oxygen data management is described at:

- http://www.argodatamgt.org/Documentation , "Oxygen data processing"

Code de champ modifié

~~Remark on unit conversion of oxygen~~

~~The unit of DOXY is micromole/kg in Argo data and the oxygen measurements are sent from Argo floats in another unit such as micromole/L for Optode and ml/L for SBE. Thus the unit conversion is carried out by DACs as follows:~~

- ~~O2 [micromole/kg] = O2 [micromole/L] / ρ~~
- ~~O2 [micromole/L] = 44.6596 × O2 [ml/L]~~

~~Here, ρ is the potential density of water [kg/L] at zero pressure and at the potential temperature (e.g., 1.0269 kg/L; e.g., UNESCO, 1983). The value of 44.6596 is derived from the molar volume of the oxygen gas, 22.3916 L/mole, at standard temperature and pressure (0°C, 1 atmosphere; e.g., García and Gordon, 1992).~~

García, H.E. and L.I. Gordon (1992): Oxygen solubility in sea water: better fitting equations. Limnol. Oceanogr., 37(6), 1307-1312.

UNESCO (1983): Algorithms for computation of fundamental properties of seawater. Unesco technical papers in marine science, 44, 53pp.

3.4 Reference table 4: data centres and institutions codes

Data centres and institutions	
AO	AOML, USA
BO	BODC, United Kingdom
CI	Institute of Ocean Sciences, Canada
CS	CSIRO, Australia
GE	BSH, Germany
GT	GTS : used for data coming from WMO GTS network
HZ	CSIO, China Second Institute of Oceanography
IF	Ifremer, France
IN	INCOIS, India
JA	JMA, Japan
JM	Jamstec, Japan
KM	KMA, Korea
KO	KORDI, Korea
ME	MEDS, Canada
NA	NAVO, USA
NM	NMDIS, China
PM	PMEL, USA
RU	Russia
SI	SIO, Scripps, USA
SP	Spain
UW	University of Washington, USA
VL	Far Eastern Regional Hydrometeorological Research Institute of Vladivostock, Russia
WH	Woods Hole Oceanographic Institution, USA

3.5 Reference table 5: location classes (ARGOS)

ARGOS location classes	
Value	Estimated accuracy in latitude and longitude
0	Argos accuracy estimation over 1500m radius
1	Argos accuracy estimation better than 1500m radius
2	Argos accuracy estimation better than 500 m radius
3	Argos accuracy estimation better than 250 m radius
G	GPS positioning accuracy
I	Iridium accuracy

3.6 Reference table 6: data state indicators

Level	Descriptor
0	Data are the raw output from instruments, without calibration, and not necessarily converted to engineering units. These data are rarely exchanged
1	Data have been converted to values independent of detailed instrument knowledge. Automated calibrations may have been done. Data may not have full geospatial and temporal referencing, but have sufficient information to uniquely reference the data to the point of measurement.
2	Data have complete geospatial and temporal references. Information may have been compressed (e.g. subsampled, averaged, etc.) but no assumptions of scales of variability or thermodynamic relationships have been used in the processing.
3	The data have been processed with assumptions about the scales of variability or hermodynamic relationships. The data are normally reduced to regular space, time intervals with enhanced signal to noise.

Class	Descriptor	Subclass
A	No scrutiny, value judgements or intercomparisons are performed on the data. The records are derived directly from the input with no filtering, or subsampling.	**-** Some reductions or subsampling has been performed, but the original record is available. **+** Geospatial and temporal properties are checked. Geophysical values are validated. If not validated, this is clearly indicated.
B	Data have been scrutinized and evaluated against a defined and documented set of measures. The process is often automated (i.e. has no human intervention) and the measures are published and widely available.	**-** Measures are completely automated, or documentation is not widely available. **+** The measures have been tested on independent data sets for completeness and robustness and are widely accepted.
C	Data have been scrutinized fully including intra-record and intra-dataset comparison and consistency checks. Scientists have been involved in the evaluation and brought latest knowledge to bear. The procedures are published, widely available and widely accepted.	**-** Procedures are not published or widely available. Procedures have not undergone full scrutiny and testing. **+** Data are fully quality controlled, peer reviewed and are widely accepted as valid. Documentation is complete and widely available.

Data state indicator recommended use

The following table describes the processing stage of data and the value to be assigned the data state indicator (DS Indicator). It is the concatenation of level and class described above.

Processing Stage	DS Indicator
1. Data pass through a communications system and arrive at a processing centre. The data resolution is the highest permitted by the technical constraints of the floats and communications system.	0A (note 1)
2. The national centre assembles all of the raw information into a complete profile located in space and time.	1A (note 2)
3. The national centre passes the data through automated QC procedures and prepares the data for distribution on the GTS, to global servers and to PIs.	2B
4. Real-time data are received at global data centres that apply QC including visual inspection of the data. These are then distributed to users in near real-time	2B+ (note 3)
5. Data are reviewed by PIs and returned to processing centres. The processing centres forward the data to the global Argo servers.	2C
6. Scientists accept data from various sources, combine them as they see fit with other data and generate a product. Results of the scientific analysis may be returned to regional centres or global servers. Incorporation of these results improves the quality of the data.	2C+
7. Scientists working as part of GODAE generate fields of gridded products delivered in near real-time for distribution from the global servers. Generally, these products mostly will be based on data having passed through automated QC procedures.	3B (note 4)
8. Scientists working as part of GODAE generate fields of gridded products delivered with some time delay for distribution from the global servers. Generally, these products mostly will be based on data having passed through manual or more sophisticated QC procedures than employed on the real-time data.	3C

Notes

1. We need to have a pragmatic approach to what constitutes "original" or "raw" data. Despite the fact that an instrument may be capable of high sampling rates, what is reported from the instrument defines what is considered "raw". For example, Argo floats can certainly sample at finer scales than every 10 db, but because of communications, all we see for now is data at that (or worse) vertical resolution. Therefore the data "coming from the instrument" is "raw" output at 10db resolution.
2. The conversion of the raw data stream from the communications system into profiles of variables causes the data state indicator to switch from level 0 to 1.
3. Even though the data at global data centres use manual or semi-automated QC procedures, there is often not the intercomparisons to larger data collections and fields that would qualify the data state indicator to be set to class C. This is generally only provided by scientific scrutiny of the data.
4. The transition from class 2 to 3 occurs when assumptions of scales of variability are applied. During the course of normal data processing it is common to carry out some averaging and subsampling. This is usually done to exploit oversampling by the instrument, and to ensure good measurements are achieved. These are considered to be part of the geospatial and temporal referencing process.

3.7 Reference table 7: history action codes

Code	Meaning
CF	Change a quality flag
CR	Create record
CV	Change value
DC	Station was checked by duplicate checking software
ED	Edit a parameter value
IP	This history group operates on the complete input record
NG	No good trace
PE	Position error. Profile position has been erroneously encoded. Corrected if possible.
QC	Quality Control
QCF$	Tests failed
QCP$	Test performed
SV	Set a value
TE	Time error. Profile date/time has been erroneously encoded. Corrected if possible.
UP	Station passed through the update program

3.8 Reference table 8: instrument types

The instrument type codes come from WMO table 1770. The WMO instrument types are available on the following web site:

http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/J-COMM/CODES/wmotable_e.htm#ct1770

Code de champ modifié

Code number	Instrument
831	P-Alace float
840	Provor, no conductivity
841	Provor, Seabird conductivity sensor
842	Provor, FSI conductivity sensor
843	*POPS ice Buoy/Float*
844	Arvor, Seabird conductivity sensor
845	Webb Research, no conductivity
846	Webb Research, Seabird sensor
847	Webb Research, FSI sensor
850	Solo, no conductivity
851	Solo, Seabird conductivity sensor
852	Solo, FSI conductivity sensor
853	Solo2, Seabird conductivity sensor
855	Ninja, no conductivity sensor
856	Ninja, SBE conductivity sensor
857	Ninja, FSI conductivity sensor
858	Ninja, TSK conductivity sensor
859	Profiling Float, NEMO, no conductivity
860	Profiling Float, NEMO, SBE conductivity sensor

3.9 Reference table 9: positioning system

Code	Description
ARGOS	ARGOS positioning system
GPS	GPS positioning system
RAFOS	RAFOS positioning system
IRIDIUM	Iridium positioning system

3.10 Reference table 10: transmission system

Code	Description
ARGOS	Argos transmission system
IRIDIUM	Iridium transmission system
ORBCOMM	Orbcomm transmission system

3.11 Reference table 11: QC test binary IDs

This table is used to record the result of the quality control tests in the history section.

The binary IDs of the QC tests are used to define the history variable HISTORY_QCTEST, whose value is computed by adding the binary ID together, then translating to a hexadecimal number. An example is given on §5.3.

The test numbers and the test names are listed in the Argo Quality Control Manual:

- §2.1 "Argo Real-Time Quality Control Test Procedures on Vertical Profiles", and
- §2.2 "Argo Real-Time Quality Control Test Procedures on Trajectories"

See http://www.argodatamgt.org/Documentation .

Code de champ modifié

Test number	QC test binary ID	Test name
1	2	Platform Identification test
2	4	Impossible Date test
3	8	Impossible Location test
4	16	Position on Land test
5	32	Impossible Speed test
6	64	Global Range test
7	128	Regional Global Parameter test
8	256	Pressure Increasing test
9	512	Spike test
10	*1024*	*Top and Bottom Spike test (obsolete)*
11	2048	Gradient test
12	4096	Digit Rollover test
13	8192	Stuck Value test
14	16384	Density Inversion test
15	32768	Grey List test
16	65536	Gross Salinity or Temperature Sensor Drift test
17	131072	Visual QC test
18	261144	Frozen profile test
19	524288	Deepest pressure test
20	1044576	Questionable Argos position test

3.12 Reference table 12: history steps codes

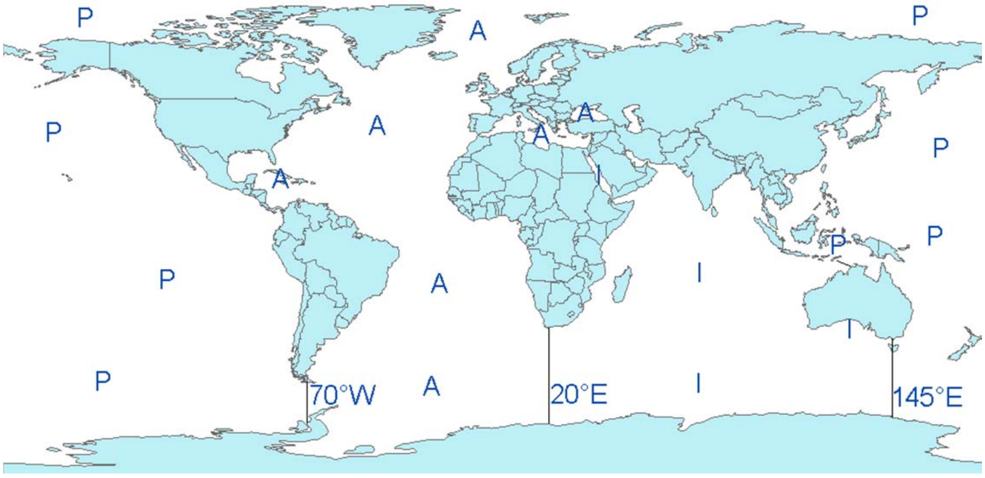
Code	Meaning
ARFM	Convert raw data from telecommunications system to a processing format
ARGQ	Automatic QC of data reported in real-time has been performed
IGO3	Checking for duplicates has been performed
ARSQ	Delayed mode QC has been performed
ARCA	Calibration has been performed
ARUP	Real-time data have been archived locally and sent to GDACs
ARDU	Delayed data have been archived locally and sent to GDACs
RFMT	Reformat software to convert hexadecimal format reported by the buoy to our standard format
COOA	Coriolis objective analysis performed

If individual centres wish to record other codes, they may add to this list as they feel is appropriate.

3.13 Reference table 13: ocean codes

The ocean codes are used in the GDAC ftp directory files. The ocean code is not used in Argo NetCDF files.

Code	Meaning
A	Atlantic ocean area
I	Indian ocean area
P	Pacific ocean area



- The Pacific/Atlantic boundary is 70°W.
- The Pacific/Indian boundary is 145°E.
- The Atlantic/Indian boundary is 20°E.

3.14 Reference table 14: technical parameter names

All technical parameter names are standardized.

The list of technical parameter names is available at:

- http://www.argodatamgt.org/Media/Argo-Data-Management/Argo-Documentation/General-documentation/Data-format/Argo-technical-parameter-names

Code de champ modifié

The naming convention for technical parameters is available at:

- http://www.argodatamgt.org/Media/Argo-Data-Management/Argo-Documentation/General-documentation/Data-format/Technical-parameter-naming-convention

Code de champ modifié

If new names are required as new variables are reported by a float, they must be added to this table before they will be accepted.

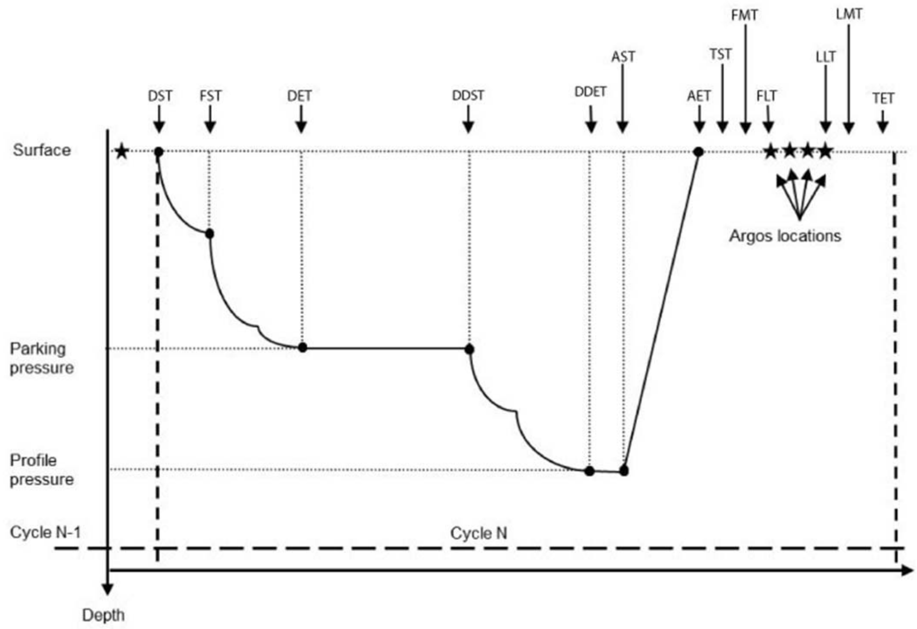
Request for new names can be sent to argo-dm-chairman@jcommops.org for approval and inclusion.

Older style files will be accepted for a short time and then all technical files must use approved names for standardized variables

3.15 Reference table 15: codes of trajectory measurements performed within a cycle

In the trajectory file, each measurement is associated with a code (measurement_code). The code allows matching the measurement with the part of the cycle. One or more measurements might be taken at the time of the action. The code allows matching the measurements with specific times and actions during each cycle.

Commentaire [TC57]: Is that wording clear enough?



Typical timings for a float cycle

DST	Descent Start Time	AST	Ascent Start Time	LLT	Last Location Time
FST	First Stabilization Time	AET	Ascent End Time	LMT	Last Message Time
DET	Descent End Time	TST	Transmission Start Time	TET	Transmission End Time
DDST	Deep Descent Start Time	FMT	First Message Time		
DDET	Deep Descent End Time	FLT	First Location Time		

Measurement codes table

Commentaire [TC58]: table updated by Claudia on 15/02/2012

Commentaire [MS59]: Here is the new measurement_code table providing flags to indicate what event took place in the cycle. The DAC cookbook will better define how to calculate the different times associated with the single digit events

Measure-ment code	Meaning	Definition	Transmitted by listed float type
0	Launch	Launch time and location of the float	All float types
1	Measurements at the start of descent from the surface to the drift pressure (DST)	All measurements made at the start of the descent of the float to drift pressure. Time (JULD_DESCENT_START) Location Surface pressure measurement (APEX) Surface temperature measurement (PROVOR)	Time: PROVOR, ARVOR, SOLO-II, WHOI SOLOIR, NEMO, NEMOIR, APEX APF9, APEXIR APF9
11	Stabilisations (more than one	Pressure and time of stabilisation of float near	PROVOR,

	time/pres/etc means more than one stabilisation)	surface [is this correct that they occur near the surface? I thought they (also) happen when the float reaches the target depth], soon after start of descent to drift pressure.	ARVOR, SIO SOLO, SOLO-II, POPS
12	Maximum pressure in descent to drift phase	Maximum pressure during the descent to drift pressure drift [how are 12 and 13 ordered time-wise? Maybe 12 comes after 13? If so: maybe reverse the order and the numbers.]	PROVOR
13	Measurements made during descent to drift pressure	Any measurements made during descent to drift pressure. Typically, Time and Pressure	PROVOR, SOLO-II
2	Measurements at the end of the descent from the surface to the drift pressure (DET)	All measurements made at the end of descent to drift pressure. (1) Time when the float first reaches within 5% of drifting pressure (JULD_DESCENT_END). (2) CTD at start of drift phase.	(1) Time: PROVOR, ARVOR, SOLO-II, NEMO, NEMOIR, APEX APF9 (2) CTD: WHOI SOLO NINJA
21	Pressure recorded at the end of descent time out	Pressure recorded at the end of the float's programmed time out during the descent to the drift pressure [somehow, this seems to be a 2, because the time-out seems to be needed to initiate the drift phase]	SIO SOLO
22	Measurements during drift phase	Pressure/temperature/salinity/etc taken during the drift phase. [If 21 becomes 2, then 22 becomes 21, and so on...]	APEX, SOLO, SOLO-II, PROVOR, ARVOR, NEMO
23	Minimum pressure during drift phase	Minimum pressure recorded by the float during the drift phase	APEX, PROVOR
24	Maximum pressure during drift phase	Maximum pressure recorded by the float during the drift phase	APEX, PROVOR
25	Mean of measurements done during drift phase	Mean of several measurements done during drift phase	
26	Median value of the measurements done during drift phase	Median value of the measurements done during drift phase [is a difference between 25 and 26 that 25 has the word 'several' or should both have the word 'several'?]	NEMO
3	Measurements at the start of descent from the drift level to the deep profile level (DDST)	All measurements made at the start of descent from the drift level to deep profile level. (1) Time (JULD_DEEP_DESCENT_START) (2) CTD at end of drift phase	(1) Time: PROVOR (excluding PROVOR MT), ARVOR, SOLO-II, NEMO, NEMOIR, POPS (2) CTD: WHOI SOLO
31	Maximum pressure during the descent to deep profile pressure	Maximum pressure during the descent to deep profile pressure	PROVOR
32	Maximum pressure during cycle	Maximum pressure during cycle	NINJA
33	Measurements made during descent to the deep profile pressure	Any measurements made during descent including pressures with corresponding times. [should this one come before 31 and thus shift the others down by 1?]	
4	Measurements at end of descent to deep profile pressure (DDET)	All measurements made when the float first reaches within 5% of deep profile pressure Time (JULD_DEEP_DESCENT_END)	PROVOR CTS3, ARVOR, SOLO-II, POPS
41	Time at the end of the Down-time	End date of the down-time parameter for APEX floats [is this significantly different from "4"?]	APEX
5	Measurements at the start of ascent (AST)	All measurements made at the time the ascent starts (1) Time (JULD_ASCENT_START) (2) CTD right before ascent start	(1) Time: APEX APF9, PROVOR, ARVOR, SOLO-II, NEMO, NEMOIR, POPS (2)????
51	Measurements taken during ascent (excluding the profile)	All measurements taken during ascent (excluding the profile) Times and pressures of CTD measurements	PROVOR, NINJA, SOLO-II
52	CTD taken near surface	CTD measurements taken near the surface [what is this? not the near-surface profile for SST and SSS, I assume.]	APEX

6	Measurements made at the end of the ascent (AET)	All measurements made at the end of the ascent. Time (JULD_ASCENT_END) , Location, Surface Pressure	PROVOR, ARVOR, SOLO-II, NEMO, NEMOIR, APEX, POPS
7	Measurements at start of transmission (TST)	Time and location of the start of transmission for the float.	APEX APF9, APEXIR APF9, PROVOR, ARVOR, SOLO-II, NEMO, NEMOIR, POPS
71	First message received (FMT)	First time message received by telecommunications system – may or may not have a location fix.	All ARGOS floats, [Orbcomm floats? Iridium floats? Some may have it and others don't.]
72	Surface fixes	Surface times and locations during surface drift. Should be listed in chronological order.	All floats
73	Last message received (LMT)	Last time message received by the telecommunications system – may or may not have a location fix.	All Argos floats. [Orbcomm floats? Iridium floats? Some may have it and others don't.]
81	Measurements made on the surface	Any measurements made during surface drift Surface pressure Surface temperature (some APEX)	APEX, PROVOR NEMO
8	Measurements at end of transmission (TET)	Time and location of the end of transmission for the float.	PROVOR, ARVOR, SOLO-II, APEXIR APF9

3.16 Reference table 16: vertical sampling schemes

This variable differentiates the various vertical sampling schemes for multiple profiles from a single cycle. This variable can vary between cycles to accommodate floats with two-way communication capabilities. The profile with N_PROF=1 is required to be the Primary sampling profile. Other profiles will have N_PROF > 1 in any order. There can be only one Primary sampling profile, while other vertical sampling schemes can have more than one profile.

Code (STRING256) FORMAT → name: nominal measurement type [full description] [ ] indicates optional	N_PROF	Code Description
Primary sampling: averaged [description] *or* Primary sampling: discrete [description] *or* Primary sampling: mixed [description]	1	Primary CTD measurements and measurements from auxiliary sensors that are taken at the same pressure levels and with the same sampling method as the Primary CTD profile. For auxiliary sensor measurements it is not required that all pressure levels contain data.
Secondary sampling: averaged [description] *or* Secondary sampling: discrete [description] *or* Secondary sampling: mixed [description]	>1	Excluding “Primary sampling”, this profile includes measurements that are taken at pressure levels different from the Primary CTD profile, or with sampling methods different from the Primary CTD profile. Measurements can be taken by the Primary CTD or by auxiliary sensors.
Near-surface sampling: averaged, pumped/unpumped [description] *or* Near-surface sampling: discrete, pumped/unpumped [description] *or* Near-surface sampling: mixed, pumped/unpumped [description]	>1	This profile includes near-surface measurements that are focused on the top 5dbar of the sea surface. (For the purpose of cross-calibration, this profile can extend deeper than the top 5dbar so as to overlap with the Primary sampling profile.) These measurements are taken at pressure levels different from the Primary CTD profile, or with sampling methods different from the Primary CTD profile. If the Primary sampling profile measures above 5dbar in the same manner as deeper data, there is no need to place the near-surface data here.
Bounce sampling: averaged [description] *or* Bounce sampling: discrete [description] *or* Bounce sampling: mixed [description]	>1	This scheme contains profiles that are collected on multiple rises/falls during a single cycle. The profiles are temporally offset from each other and/or the Primary sampling profile. They can be sampled with the Primary CTD or with auxiliary sensors.
Use the term 'averaged' if the data in the profile are pressure binned averages using multiple data measurements (pollings) from a sensor. Use the term 'discrete' if the data in the profile are from a single polling from a sensor. If both methods are used in the profile, use the term 'mixed'.		

Example for a SOLOII V1.2 float

N_PROF=1: "Primary sampling: averaged [nominal 2 dbar binned data sampled at 0.5 Hz from a SBE41CP]"
N_PROF=2: "Near-surface sampling: discrete, pumped [shallowest polling of a SBE41CP]"

Note: In this example, by adding a single data point in N_PROF=2, the size of the profile file will double.

Example for a Provor bio 5.0 float

This float is equipped with a Seabird CTD and a Wetlab Satrover optical sensor.
CTD sampling scheme:

- The threshold between deep sampling and upper sampling is 200 decibars.
- Upper sampling: 10 decibars slice thickness, 10 seconds sampling rate.
- Deep sampling: 25 decibars slice thickness, 10 seconds sampling rate.

Chlorophyll (optical) sampling scheme:

- The threshold between deep sampling and upper sampling is 300 decibars.
- Upper sampling: 1 decibar slice thickness, 1 seconds sampling rate.

Mis en forme : Retrait : Gauche : 0 cm, Suspendu : 1,02 cm, Hiérarchisation + Niveau : 2 + Style de numérotation : 1, 2, 3, ... + Commencer à : 1 + Alignement : Gauche + Alignement : 0 cm + Retrait : 1,02 cm

- Deep sampling: 10 decibars slice thickness, 10 seconds sampling rate.
- Deepest sampling: 1000 decibars.

Description of the 2 vertical sampling schemes:
N_PROF=1: "Primary sampling: averaged [10 seconds sampling, 25 decibars average from bottom to 200 decibars, 10 seconds sampling, 10 decibars average from 200 decibars to surface]"

N_PROF=2: "Secondary sampling: averaged [10 seconds sampling, 10 decibars average from 1000 decibars to 300 decibars, 1 second sampling, 1 decibar average from 300 decibars to surface]"

Example for an APEX Iridium float with an Optode oxygen sensor and an auxiliary CTD for near-surface measurements

N_PROF=1: "Primary sampling: averaged [2-dbar bin average]"
N_PROF=2: "Secondary sampling: discrete [1.1 Hz CTD data, discrete DOXY]"
N_PROF=3: "Near-surface sampling: discrete, unpumped [auxiliary CTD]"

Mis en forme ... [2]

3.17 Reference table 17: Argo group

The Argo group is a metadata to identify general groups-types of floats.

Argo group	Description
core	Argo float core mission (temperature and salinity, 10 days cycles, 2000decibar ascending profile, >=1500 decibar parking drift) , delayed mode data available within a few months
equivalent	Equivalent to a core Argo float with possible differences. Examples : special funding, no delayed mode activity
coastal	A profiling float deployed in coastal area
bio	A profiling float equipped with bio-geo-chemical sensors.

3.18 Reference table 18: metadata configuration parameter names

All metadata variable names and configuration parameter names are standardized.

The list of metadata variable names is available at:

- http://www.argodatamgt.org/Documentation under "Argo Metadata Files", "Metadata variable names"

The list of configuration parameter names is available at:

- http://www.argodatamgt.org/Documentation under "Argo Metadata Files", "Configuration parameter names"

If new names are required as new variables are reported by a float, they must be added to this table before they will be accepted.

Please note that in this scheme, configuration parameter values are stored as numerals and therefore any parameters with logical or string input will require an equivalent numeric code to be added to the "Explanation" section of the Configuration parameter names table.

Request for new names can be sent to argo-dm-chairman@jcommops.org for approval and inclusion.

4 Data access

The whole Argo data set is available in real time and delayed mode from the global data centres (GDACs).

The internet addresses are:

- http://www.usgodae.org/argo/argo.html
- http://www.argodatamgt.org

Code de champ modifié

The FTP addresses are:

- ftp://usgodae1.fnmoc.navy.mil/pub/outgoing/argo
- ftp://ftp.ifremer.fr/ifremer/argo

The 2 GDACs offer the same data set that is mirrored in real time.

More on GDACs organization:

- http://www.argodatamgt.org/Media/Argo-Data-Management/Argo-Documentation/General-documentation/GDAC-organisation

Code de champ modifié

4.1 File naming convention on GDACs

The GADC ftp sites comply with the following naming conventions:

Profile data

For floats that collect no more than 1 ascending and 1 descending profile per cycle the file names for individual profiles are <R/D><FloatID>_<XXX><D>.nc where the initial R indicates Real-Time data the initial D indicates Delayed-Mode data XXX is the cycle number the second D indicates a descending profile (profiles without this D are collected during ascent).

For floats that collect 2 or more ascending or descending profiles per cycle the file names for individual profiles are <R/D><FloatID>_<XXX><D><_YY>.nc where the initial R indicates Real-Time data the initial D indicates Delayed-Mode data XXX is the cycle number the second D indicates a descending profile (profiles without this D are collected during ascent).

YY counts multiple ascending/descending profiles separately

Since floats can alternate between the two modes, they may have file names following both conventions.

Examples:

a) R1900045_003.nc, R1900045_003D.nc

b) R1900046_007_01.nc, R1900067_007_02.nc, R1900067_007_03.nc

c) R1900046_007D_01.nc, R1900067_007D_02.nc, R1900067_007D_03.nc

d) R1900045_003.nc, R1900045_004_01.nc, R1900045_004_02.nc, R1900045_004_03.nc, R1900045_004_04.nc, R1900045_005.nc

Trajectory data

- <FloatID>_traj.nc
  Example : 1900045_traj.nc

Metadata

- <FloatID>_meta.nc
  Example : 1900045_meta.nc

Technical Data

- <FloatID>_tech.nc
  Example : 1900045_tech.nc

4.2 Other data sources

All Argo data are available from Argo GDACs (Global data centres).

Most Argo data are also available from GTS (Global Telecommunication System), a network operated by WMO (World Meteorological Organization).

On GTS there are 2 formats for Argo profiles:

- TESAC: an Ascii format
- BUFR: a binary format under development.

The description of these format is available from the WMO web site:

- http://www.wmo.ch
- http://www.wmo.ch/web/www/DPS/NewCodesTables/WMO306vol-I-1PartA.pdf

Code de champ modifié

5 Using the History section of the Argo netCDF Structure

Within the netCDF format are a number of fields that are used to track the progression of the data through the data system. This section records the processing stages, results of actions that may have altered the original values and information about QC tests performed and failed. The purpose of this document is to describe how to use this section of the format.

The creation of entries in the history section is the same for both profile and trajectory data. The next sections provide examples of what is expected. The information shown in the column labeled "Sample" is what would be written into the associated "Field" name in the netCDF format.

5.1 Recording information about the Delayed Mode QC process

The process of carrying out delayed mode QC may result in adjustments being made to observed variables. The table below shows how to record that the delayed mode QC has been done. Note that the fields HISTORY_SOFTWARE, HISTORY_SOFTWARE_RELEASE and HISTORY_REFERENCE are used together to document the name and version of software used to carry out the delayed QC, and the reference database used in the process. The contents of these three fields are defined locally by the person carrying out the QC.

Example: History entry to record that delayed mode QC has been carried out

Field	Sample	Explanation
HISTORY_INSTITUTION	CI	Selected from the list in reference table 4
HISTORY_STEP	ARSQ	Selected from the list in reference table 12.
HISTORY_SOFTWARE	WJO	This is a locally defined name for the delayed mode QC process employed.
HISTORY_SOFTWARE_RELEASE	1	This is a locally defined indicator that identifies what version of the QC software is being used.
HISTORY_REFERENCE	WOD2001	This is a locally defined name for the reference database used for the delayed mode QC process.
HISTORY_DATE	20030805000000	The year, month, day, hour, minute, second that the process ran
HISTORY_ACTION	IP	Selected from the list in reference table 7
HISTORY_PARAMETER	FillValue	This field does not apply (1)
HISTORY_START_PRES	FillValue	This field does not apply
HISTORY_STOP_PRES	FillValue	This field does not apply
HISTORY_PREVIOUS_VALUE	FillValue	This field does not apply
HISTORY_QCTEST	FillValue	This field does not apply

Note

(1) The present version of delayed mode QC only tests salinity and as such it is tempting to place “PSAL” in the _PARAMETER field. In future, delayed mode QC tests may include tests for temperature, pressure and perhaps other parameters. For this reason, simply addressing the software and version number will tell users what parameters have been tested.

5.2 Recording processing stages

Each entry to record the processing stages has a similar form. An example is provided to show how this is done. Note that reference table 12 contains the present list of processing stages and there should be at least one entry for each of these through which the data have passed. If data pass through one of these steps more than once, an entry for each passage should be written and the variable N_HISTORY updated appropriately.

Some institutions may wish to record more details of what they do. In this case, adding additional "local" entries to table 12 is permissible as long as the meaning is documented and is readily available. These individual additions can be recommended to the wider community for international adoption.

Example: History entry to record decoding of the data.

Field	Sample	Explanation
HISTORY_INSTITUTION	ME	Selected from the list in reference table 4
HISTORY_STEP	ARFM	Selected from the list in reference table 12.
HISTORY_SOFTWARE	FillValue	This field does not apply
HISTORY_SOFTWARE_RELEASE	FillValue	This field does not apply
HISTORY_REFERENCE	FillValue	This field does not apply
HISTORY_DATE	20030805000000	The year, month, day, hour, minute, second that the process ran
HISTORY_ACTION	IP	Selected from the list in reference table 7
HISTORY_PARAMETER	FillValue	This field does not apply
HISTORY_START_PRES	FillValue	This field does not apply
HISTORY_STOP_PRES	FillValue	This field does not apply
HISTORY_PREVIOUS_VALUE	FillValue	This field does not apply
HISTORY_QCTEST	FillValue	This field does not apply

5.3 Recording QC Tests Performed and Failed

The delayed mode QC process is recorded separately from the other QC tests that are performed because of the unique nature of the process and the requirement to record other information about the reference database used. When other tests are performed, such as the automated real-time QC, a group of tests are applied all at once. In this case, instead of recording that each individual test was performed and whether or not the test was failed, it is possible to document all of this in two history records.

The first documents what suite of tests was performed, and the second documents which tests in the suite were failed. A test is failed if the value is considered to be something other than good (i.e. the resulting QC flag is set to anything other than "1"). An example of each is provided. If data pass through QC more than once, an entry for each passage should be written and the variable N_HISTORY updated appropriately.

Example: QC tests performed and failed.

The example shown here records that the data have passed through real-time QC and that two tests failed. The encoding of tests performed is done by adding the ID numbers provided in reference table 11 for all tests performed, then translating this to a hexadecimal number and recording this result.

Record 1: Documenting the tests performed

Field	Sample	Explanation
HISTORY_INSTITUTION	ME	Selected from the list in reference table 4
HISTORY_STEP	ARGQ	Selected from the list in reference table 12.
HISTORY_SOFTWARE	FillValue	This field does not apply
HISTORY_SOFTWARE_RELEASE	FillValue	This field does not apply
HISTORY_REFERENCE	FillValue	This field does not apply
HISTORY_DATE	20030805000000	The year, month, day, hour, minute, second that the process ran
HISTORY_ACTION	QCP$	Selected from the list in reference table 7
HISTORY_PARAMETER	FillValue	This field does not apply
HISTORY_START_PRES	FillValue	This field does not apply
HISTORY_STOP_PRES	FillValue	This field does not apply
HISTORY_PREVIOUS_VALUE	FillValue	This field does not apply
HISTORY_QCTEST	1BE	This is the result of all tests with IDs from 2 to 256 having been applied (see reference table 11)

Record 2: Documenting the tests that failed

Field	Sample	Explanation
HISTORY_INSTITUTION	ME	Selected from the list in reference table 4
HISTORY_STEP	ARGQ	Selected from the list in reference table 12.
HISTORY_SOFTWARE	FillValue	This field does not apply
HISTORY_SOFTWARE_RELEASE	FillValue	This field does not apply
HISTORY_REFERENCE	FillValue	This field does not apply
HISTORY_DATE	20030805000000	The year, month, day, hour, minute, second that the process ran
HISTORY_ACTION	QCF$	Selected from the list in reference table 7
HISTORY_PARAMETER	FillValue	This field does not apply
HISTORY_START_PRES	FillValue	This field does not apply
HISTORY_STOP_PRES	FillValue	This field does not apply
HISTORY_PREVIOUS_VALUE	FillValue	This field does not apply

HISTORY_QCTEST	A0	This is the result when data fail tests with IDs of 32 and 128 (see reference table 11)

5.4 Recording changes in values

The PIs have the final word on the content of the data files in the Argo data system. In comparing their data to others there may arise occasions when changes may be required in the data.

We will use the example of recomputation of where the float first surfaced as an example. This computation process can be carried out once all of the messages from a float have been received. Not all real-time processing centres make this computation, but it can be made later on and added to the delayed mode data. If this is the case, we would insert the new position of the profile into the latitude and longitude fields in the profile and we would record the previous values in two history entries. Recording these allows us to return to the original value if we have made an error in the newly computed position. The two history entries would look as follows.

Example: Changed latitude

Field	Sample	Explanation
HISTORY_INSTITUTION	CI	Selected from the list in reference table 4
HISTORY_STEP	ARGQ	Selected from the list in reference table 12.
HISTORY_SOFTWARE	FillValue	This field does not apply
HISTORY_SOFTWARE_RELEASE	FillValue	This field does not apply
HISTORY_REFERENCE	FillValue	This field does not apply
HISTORY_DATE	20030805000000	The year, month, day, hour, minute, second that the process ran
HISTORY_ACTION	CV	Selected from the list in reference table 7
HISTORY_PARAMETER	LAT$	A new entry for reference table 3 created by institution CI to indicate changes have been made in the latitude.
HISTORY_START_PRES	FillValue	This field does not apply
HISTORY_STOP_PRES	FillValue	This field does not apply
HISTORY_PREVIOUS_VALUE	23.456	This is the value of the latitude before the change was made.
HISTORY_QCTEST	FillValue	This field does not apply

Notes

1. Be sure that the new value is recorded in the latitude and longitude of the profile section.
2. Be sure that the POSITION_QC flag is set to "5" to indicate to a user that the value now in the position has been changed from the original one that was there.
3. Be sure to record the previous value in history entries.

It is also sometimes desirable to record changes in quality flags that may arise from reprocessing data through some QC procedures. In this example, assume that whereas prior to the analysis, all temperature values from 75 to 105 dbars were considered correct, after the analysis, they are considered wrong. The history entry to record this would look as follows.

Example: Changed flags

Field	Sample	Explanation
HISTORY_INSTITUTION	CI	Selected from the list in reference table 4
HISTORY_STEP	ARGQ	Selected from the list in reference table 12.

HISTORY_SOFTWARE	FillValue	This field does not apply
HISTORY_SOFTWARE_RELEASE	FillValue	This field does not apply
HISTORY_REFERENCE	FillValue	This field does not apply
HISTORY_DATE	20030805000000	The year, month, day, hour, minute, second that the process ran
HISTORY_ACTION	CF	Selected from the list in reference table 7
HISTORY_PARAMETER	TEMP	Selected from the list in reference table 3
HISTORY_START_PRES	75	Shallowest pressure of action.
HISTORY_STOP_PRES	105	Deepest pressure of action.
HISTORY_PREVIOUS_VALUE	1	This is the value of the quality flag on temperature readings before the change was made.
HISTORY_QCTEST	FillValue	This field does not apply

Notes

1. The new QC flag of “4” (to indicate wrong values) would appear in the <param>_QC field.

6 DAC-GDAC data-management

This chapter describes the data management organization between Argo DACs and GDACS.

6.1 Greylist files operations

6.1.1 Greylist definition and management

The greylist is used for real-time operations, to detect a sensor malfunction. It is a list of suspicious or malfunctioning float sensors. It is managed by each DAC and available from both GDAC ftp site at:

- ftp://usgodae.org/pub/outgoing/argo/ar_greylist.txt
- ftp://ftp.ifremer.fr/ifremer/argo/ar_greylist.txt

The greylist is used in real-time QC test 15 to stop the real-time dissemination on the GTS of measurements from a sensor that is not working correctly.

The grey-list test is described in Argo quality control manual:

- http://www.argodatamgt.org/Media/Argo-Data-Management/Argo-Documentation/General-documentation/Argo-Quality-Control-manual-October-2009

Who/when/how to add a float in the greylist

Under the float's PI supervision, a DAC inserts a float in the greylist when a sensor is suspicious or malfunctioning.

For each affected parameter, the start/end date of malfunction is recorded and the value of the real-time QC flag to be applied to each observation of this parameter during that period.

The problem is reported in the ANOMALY field of the meta-data file.

Who/when/how to remove floats from the greylist

In collaboration with the PI of the float, a DAC removes a float from the greylist when delayed mode quality control was performed and the suspicious sensor's observations could be recovered after adjustment.

If the delayed mode quality control decided that the sensor observation cannot be recovered, the float remains in the greylist.

How users should use the greylist

The greylist provides an easy way to get information on suspicious floats.

However, the best information on a float's sensors bad behaviour is recorded in the ANOMALY field of the meta-data file.

6.1.2 Greylist files collection

Each DAC maintains a greylist that is submitted to the GDAC for updates. The DACs greylist are collected by the GDAC and merged into a global Argo greylist.

Greylist file collection from DAC to GDAC:

1. Query xxx_greylist.csv file in each DAC submit directory;
   xxx must be identical to the DAC (eg : aoml, coriolis); otherwise the file is rejected.
2. Check the format of xxx_greylist.csv . The whole file is rejected is the format check fails.
   - Floatid : valid Argo float id; the corresponding meta-data file must exist
   - Parameter : PSAL, TEMP, PRES or DOXY
   - Start date : YYYYMMDD valid, mandatory
   - End date : YYYYMMDD valid, fill value : ',,'
   - Flag : valid argo flag
   - Comment : free
   - DAC : valid DAC, mandatory

3. Remove all the floats of the DAC from the GDAC grey list and add the content of the submitted xxx_greylist.csv file

Note : after each submission, a copy of the Argo greylist is stored in etc/greylist/ar_greylist.txt_YYYYMMDD

The global Argo greylist is sorted by DAC, PLATFORM_CODE and START_DATE in alphabetical order.

6.2 GDAC files removal

A DAC can ask the GDAC to remove individual profile, trajectory, technical or meta-data files. A "removal file" is submitted to GDAC which will perform the removals.

The "removal file" contains one line per file to remove.

"Removal file" collection from DAC to GDAC :

- Query xxx_removal.txt file in each DAC submit directory;
  xxx must be identical to the DAC (eg : aoml, coriolis); otherwise the file is rejected.
- Check the format of xxx_removal.txt . The whole file is rejected is the format check fails.
  - File name : valid Argo file name; the corresponding meta-data file must exist for this DAC
- Move all the named files from GDAC into a etc/removed directory
- The removed files are kept for 3 months in the etc/removed directory and erased after that delay.

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