
ARGO USER'S MANUAL

Version 3.01
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ARGO

part of the integrated global observation strategy



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Argo data management

User's manual

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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)
2.0	12/11/2003	All comments from "Argo user's manual comments" ref ar-dm-02-02 implemented. General agreement from Argo data management meeting in Monterey (Nov. 5-7, 2003)
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 description 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	13/02/2012	§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 Argo user's manual is officially released.
2.41	19/06/2012	§2.4.6 : CONFIGURATION_MISSION_COMMENT: FillValue is equal to " ";
2.41	07/11/2012	§2.4 : metadata format, additions from Esmee
2.41	10/11/2012	§6.4 : compressed files distribution
2.41	10/11/2012	§6.5 : compressed files data submission
2.41	07/01/2013	§2.2 §2.3 §2.4 §2.5 all format versions renamed as 3.0
3.0	03/05/2013	§2.3 : trajectory format entirely revisited by Megan Scanderbeg, Jean-Philippe Rannou and John Gilson
3.01	06/05/2013	§3.15 : move reference table 15 from §2.3 to §3.15 and replace the previous version.
3.01	06/05/2013	§3.20 : reference table 20 "grounded flags" updated
3.01	06/05/2013	§3.21 : reference table 21 added, "representative park pressure status"
3.01	06/05/2013	§4.1 : file naming convention, update on trajectory file names
3.01	06/05/2013	§2.3.6 : table n_cycle revisited, 2 variables added
3.01	19/06/2013	§2.2 : more information to describe the relations between profiles – vertical sampling scheme – cycle
3.01	19/06/2013	§2.2.4 : Replace INST_REFERENCE with FLOAT_SERIAL_NO
3.01	19/06/2013	§2.2.4 : FIRMWARE_VERSION : dimension set to STRING16, remove attribute "conventions"
3.01	19/06/2013	§2.2.4 : add a CONFIG_MISSION_NUMBER variable in the profile file
3.01	19/06/2013	§2.4.4 : remove IMEI number
3.01	19/06/2013	§2.4.4 : TRANS_FREQUENCY dimension set to (N_TRANS_SYSTEM, STRING16)
3.01	19/06/2013	§2.4.4 : PLATFORM_TYPE, STANDARD_FORMAT_ID, DAC_FORMAT_ID : add a link to the draft reference table (an Internet spread sheet)
3.01	19/06/2013	§2.4.4 : remove variable SAMPLING_MODE
3.01	19/06/2013	§2.4.4 : remove variable ARGO_GROUP
3.01	19/06/2013	§2.4.4 : BATTERY_PACKS moved from mandatory metadata to highly desirable metadata
3.01	19/06/2013	§3.3 : reference table 3: parameter code table, oxygen related parameters . Remove pres_doxy . Update long names . Add TPHASE_DOXY, C1PHASE_DOXY, C2PHASE_DOXY, MLPL_DOXY Resolution is mandatory but its content is sensor dependent.
3.01	19/06/2013	§3.8 : reference table 8: instrument types Add 10 new instruments types
3.01	19/06/2013	§3.17 : reference table 17: obsolete Remove reference table 17.
3.01	19/06/2013	§4.1 : trajectory : new file naming convention
3.01	20/06/2013	§2.2.4 : Add the PLATFORM_TYPE variable Add an N_PROF dimension in FLOAT_SERIAL_NO.
3.01	20/06/2013	§2.3.4 : add the PLATFORM_TYPE variable
3.01	26/06/2013	§2.2.4 : CONFIG_MISSION_NUMBER long name updated
3.01	26/06/2013	Remarks from Megan Scanderbeg §2.3.1 : add a global attribute in the profile file : :comment_on_resolution = "PRES variable resolution depends on measurement code"; §2.3.4 : remove the STRING2 dimension from SATELLITE_NAME char SATELLITE_NAME(N_MEASUREMENT, STRING2); §3.15 : remove the old reference table 15 (but keep the new one)
3.01	27/06/2013	§2.4.6.2 : configuration_mission_number graphic updated
3.01	28/06/2013	§2.3.2 : add a STRING32 dimension

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 3.0 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

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 :

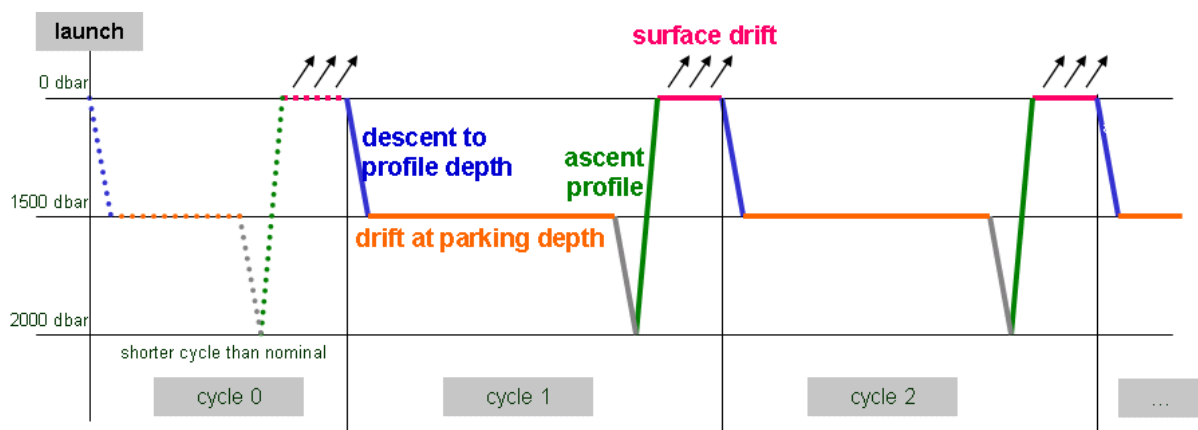
- It is a widely accepted data format by the user community,
- It is a self-describing format for which tools are widely available,
- It is a reliable and efficient format for data exchange.

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>

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 3.0

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 and at the same location and time. 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, and can be at locations and time that are different from the primary profile. When multiple profiles exist in a single cycle, users are urged to check the information associated with each profile in order to determine their spatial and temporal relations. 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.

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

2.2.1 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 = "2011-04-22T06:00:00Z creation";
:references = "http://www.argodatamgt.org/Documentation";
:comment = "free text";
:user_manual_version = "3.0";
:Conventions = "Argo-3.0 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.

2.2.2 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 5 th 2001 17:28:34 19971217000000 : December 17 th 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.

2.2.3 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";	This field contains the type of data contained in the file.

	DATA_TYPE:_FillValue = " ";	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 : «3.0»
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 1 st 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 29 th 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 30 th 2001 09 :05 :00

2.2.4 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 : conductivity
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
PLATFORM_TYPE	char PLATFORM_TYPE(N_PROF, STRING32); PLATFORM_TYPE:long_name = "Type of float"; PLATFORM_TYPE:_FillValue = " ";	Type of float. Example: SOLO, APEX, PROVOR, ARVOR, NINJA The draft list of platform_type is available on https://docs.google.com/spreadsheet/ccc?key=0AitL8e3zpeffdEtyVmN3a0hvUC1NMDJMchILN2FMStE#gid=2
FLOAT_SERIAL_NO	char FLOAT_SERIAL_NO(N_PROF, STRING16); FLOAT_SERIAL_NO: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
FIRMWARE_VERSION	char FIRMWARE_VERSION(N_PROF, STRING16); 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.; JULD:axis = "T";	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_QC	char JULD_QC(N_PROF); JULD_QC:long_name = "Quality on Date and	Quality flag on JULD date and time. The flag scale is described in the reference table

	Time"; JULD_QC:conventions = "Argo reference table 2"; JULD_QC:_FillValue = " ";	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 = 99999.9; LATITUDE:valid_min = -90.0; LATITUDE:valid_max = 90.0; 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 = 99999.9; LONGITUDE:valid_min = -180.0; LONGITUDE:valid_max = 180.0; 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 = "Vertical sampling scheme"; VERTICAL_SAMPLING_SCHEME:conventions = "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.
CONFIG_MISSION_NUMBER	int CONFIG_MISSION_NUMBER(N_PROF); CONFIG_MISSION_NUMBER:long_name = "Float's mission number for each profile"; CONFIG_MISSION_NUMBER:conventions = "0..N, 0 : launch mission (if exists), 1 : first complete mission"; CONFIG_MISSION_NUMBER:_FillValue = 99999.;	Unique number of the mission to which this profile belongs. Example : 1 See §2.4.6 "Configuration parameters" and note on floats with multiple configurations.

2.2.5 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>: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>_ADJUSTED:standard_name = "<X>"; <PARAM>_ADJUSTED:_FillValue = <X>; <PARAM>_ADJUSTED:units = "<X>"; <PARAM>_ADJUSTED:valid_min = <X>; <PARAM>_ADJUSTED:valid_max = <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:C_format = "<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

	<PARAM>_ADJUSTED_ERROR:FORTTRAN_format = "<X>"; <PARAM>_ADJUSTED_ERROR:resolution= <X>;	mandatory. When no adjustment is performed, the FillValue is inserted.
--	--	--

Note on vertical axis associated to PRES

The variable PRES (pressure) is the vertical axis. The PRES declaration contains the variable attribute

```
PRES:axis = "Z";
```

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

Parameter definition : PRES, TEMP, TEMP_ADJUSTED

```
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:C_format = "%9.3f";
TEMP:FORTTRAN_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_ADJUSTED: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:C_format = "%9.3f";
TEMP_ADJUSTED:FORTTRAN_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:C_format = "%9.3f";
TEMP_ADJUSTED_ERROR:FORTTRAN_format = "F9.3";
TEMP_ADJUSTED_ERROR:resolution = 0.001f;
```

2.2.6 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 : $T_c = a_1 * T + a_0$
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 : $a_1=0.99997$, $a_0=0.0021$
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

2.2.7 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 = "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, N_PROF, STRING16); HISTORY_PARAMETER:long_name = "Station parameter action is performed on"; HISTORY_PARAMETER:conventions	Name of the parameter on which the action is performed. Example : PSAL

	= "Argo reference table 3"; HISTORY_PARAMETER:_FillValue = " ";	
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_HIS TORY, N_PROF); HISTORY_PREVIOUS_VALUE:long_n ame = "Parameter/Flag previous value before action"; HISTORY_PREVIOUS_VALUE:_FillVal ue = 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 3.0

Argo trajectory files contain all received locations of Argo floats. The trajectory file also contains cycle timing information important for making velocity calculations. These times may come directly from the float in real time, from calculations based on float information in real time, from the satellite system in real time, or from estimations done in delayed mode.

In addition to locations and cycle timing information, a trajectory file often contains measurements such as pressure, temperature, salinity or conductivity performed at various times during the cycle. The full pressure, temperature and salinity profile collected upon ascent is not included in the trajectory file. This is stored in the profile file.

There will be up to two possible trajectory files at one time for a float - a real time trajectory file ("R") and a delayed mode trajectory file ("D"). For naming conventions, see 4.1. The real time trajectory file will contain all the data obtained in real time for all the cycles the float has performed. The "R" file will exist until the float dies and a delayed mode trajectory file exists for the entire float lifetime.

The delayed mode trajectory file will contain both real time and delayed mode data. The delayed mode data will be the highest quality data available for each cycle that has been delayed mode quality controlled. However, delayed mode quality control may not be performed on all the float's cycles. In this case, the "D" file will contain both the real time and delayed mode data only for the cycles for which delayed mode quality control has been performed. Therefore, if both an "R" and "D" trajectory file exist, to obtain the best quality data for the entire float record, one must look at the "D" file for the cycles that have been delayed mode quality controlled and then in the "R" file for the rest of the cycles which have not yet been delayed mode quality controlled. Once a float dies and the entire float record has been quality controlled, the "D" file will be the only file available on the GDAC and will contain both adjusted and not adjusted data.

The trajectory file contains two groups of data variables. In this document the groups are differentiated by their dimension.

The variable group described in 1.1.5 which includes the locations, cycle timing information, and measurements from the float is `N_MEASUREMENT` long. It includes all the raw data from the float and there is no complimentary variable in the `N_CYCLE` variable group. If filled, the best timing information is kept in the `JULD_ADJUSTED` variable. If this is filled in real time, that means either clock drift has been determined and adjustment has been applied (inclusive of adjustment of zero) or another timing estimate has been done based on typical float behavior. Simultaneously, the `DATA_MODE` should be marked as "A" indicating an adjusted float, and the `CLOCK_OFFSET` variable should be appropriately filled.

The variable group described in 1.1.6 which includes the cycle timing information is `N_CYCLE` long. This array includes the best timing information which matches, if filled, the `JULD_ADJUSTED` times in the `N_MEASUREMENT` array, else it matches the `JULD` (`N_MEASUREMENT`) variable. The times can be corrected for float clock drift or estimated. The `JULD*STATUS` variables provide information on the state of the timing information. The `N_CYCLE` array also includes several variables that pertain only to the entire cycle such as `GROUNDED`, `CONFIG_MISSION_NUMBER`, etc.

In the `N_MEASUREMENT` group, the `MEASUREMENT_CODE` variable must be correctly understood. This variable is designed to indicate where in the cycle the location, times and measurements occur. The Measurement Code Table (Reference Table 15) contains all the flags and their meanings for the `MEASUREMENT_CODE` variable. This table is comprised of two parts - a) Absolute codes: measurement code (MC) values can be primary (mandatory) or secondary (highly desirable), and b) Relative codes: measurement code values are relative to an absolute code and are

further divided into two parts: generic codes that can be used by a wide variety of floats and specific codes that are directly important to a specific float/measurement.

All Primary and Secondary MC events that **are experienced by the float** are required to be present in the N_MEASUREMENT array and redundantly in the N_CYCLE variables. Secondary codes are codes that not as crucial as the primary codes, but it is still recommended they be filled. All other codes are voluntary.

If the float experiences an event but the time is not able to be determined, then most variables are set to fill value and a *_STATUS = '9' is used in both the N_MEASUREMENT and N_CYCLE arrays. This indicates that it might be possible to estimate in the future and acts as a placeholder.

If a float does not experience an event, then the fill values are used for all N_CYCLE variables. These non-events do not get a placeholder in the N_MEASUREMENT arrays.

For file naming conventions, see §4.1.

2.3.1 Global attributes

The global attributes section is used for data discovery. The following 11 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 = "CORIOLIS";
:source = "Argo float";
:history = "2011-04-22T06:00:00Z creation";
:references = "http://www.argodatamgt.org/Documentation";
:comment = "free text";
:user_manual_version = "3.0";
:Conventions = "Argo-3.0 CF-1.6";
:featureType = "trajectory";
:dac_decoder_version = "Argo Coriolis Matlab decoder v3.0";
:dac_format_id = "4.21";
:comment_on_resolution = "PRES variable resolution depends on measurement code";
```

2.3.2 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 5 th 2001 17:28:34 19971217000000 : December 17 th 1997 00:00:00
STRING64 STRING32 STRING16 STRING10	STRING64 = 64; STRING32 = 32; STRING16 = 16; STRING10 = 10;	String dimensions from 2 to 64.

STRING8 STRING4 STRING2	STRING8 = 8; STRING4 = 4; STRING2 = 2;	
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, cycle timings and measurements of the file.
N_CYCLE	N_CYCLE = <int value>;	Number of collected float cycles. If all the cycles have been collected (i.e. if there are no missing cycles), it is the number of cycles performed by the float. In this particular case, as some floats begin cycle numbering at 0, others at 1, in the former, N_CYCLE = max(CYCLE_NUMBER) + 1. In the latter, N_CYCLE = max(CYCLE_NUMBER) Example : N_CYCLE = 100
N_HISTORY	N_HISTORY = <int value>;	Maximum number of history records for a location. This dimension depends on the data set Example : N_HISTORY = 10

2.3.3 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 : "3.0"
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 : "3.0"
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 1 st 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 29 th 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 30 th 2001 09 :05 :00

2.3.4 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 : "PRES"," TEMP", "PSAL", "CNDC", "DOXY", etc "PRES": pressure "TEMP" : temperature "PSAL" : practical salinity "CNDC" :electrical conductivity "DOXY" : dissolved oxygen
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 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
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.
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 The draft list of platform_type is available on https://docs.google.com/spreadsheets/ccc?key=0AitL8e3zpeffdTtyVmN3a0hvUC1NMDJMcHILN2FMSIE#gid=2
FLOAT_SERIAL_NO	char FLOAT_SERIAL_NO(STRING16); FLOAT_SERIAL_NO:long_name = "Serial number of the float"; FLOAT_SERIAL_NO:_FillValue = " ";	This field should contain only the serial number of the float. Example : 1679
FIRMWARE_VERSION	char FIRMWARE_VERSION(STRING16); FIRMWARE_VERSION:long_name = "Instrument firmware version"; FIRMWARE_VERSION:_FillValue = " ";	Firmware version of the float. Example : "013108"
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. Example : ARGOS

2.3.5 N_MEASUREMENT dimension variable group

This section describes the variables found in the N_MEASUREMENT dimension variable group. In this variable group you find the unadjusted data as reported by the float, adjusted timing, the reported locations, as well as measurements performed along the surface and subsurface trajectory.

N_MEASUREMENT is the number of locations, cycle timings, and measurements received or estimated from information sent by the float. If a cycle is missed, nothing is entered into the N_MEASUREMENT array - e.g. **no fill values are allowed to indicate a missing cycle**.

JULD contains the raw timing values either from the satellite system or from the float. The values in JULD cannot be estimated, nor altered such as for clock drift.

JULD_ADJUSTED contains the best estimate of float timing available for this float. If necessary, it contains adjusted timing variables due to clock drift. The times can be adjusted either in real time or in delayed mode due to clock drift or estimation of times based on float behaviour by a float expert. The JULD_ADJUSTED_STATUS variable indicates how the JULD_ADJUSTED value was filled and indicates whether the time is estimated or measured. The JULD_ADJUSTED_QC contain the QC flags for the adjusted times. This may lead to times where JULD_ADJUSTED is filled, but JULD contains 'FillValue'. That is because the time is estimated rather than measured.

In R-mode, no times are adjusted and JULD is filled while JULD_ADJUSTED is contains 'FillValue'.

In A-mode, JULD_ADJUSTED contains real-time correction of clock drift and real-time estimates, if applicable.

In D-mode, JULD_ADJUSTED is filled with the best estimate of float timing after expert review. If no clock drift is determined to have occurred and no other adjustments to event times are needed, then all values found in JULD should be replicated in JULD_ADJUSTED.

CYCLE_NUMBER contains the cycle number of the cycle that is assigned in real time. This cycle number must match the profile cycle number, which is the number recorded in the CYCLE_NUMBER(N_PROF) variable in profile files.

CYCLE_NUMBER_INDEX indicates which cycle number information is contained in that index of the N_CYCLE array. For example, CYCLE_NUMBER_INDEX(4)=3 means the 4th element of all N_CYCLE variables is associated with the WMO_003.nc profile file. This might happen if the float's first cycle has a cycle number of zero rather than one. Additionally, all the elements of the N_MEASUREMENT variables for which CYCLE_NUMBER = 3 are likewise associated with the 4th N_CYCLE elements and with the WMO_003.nc profile file. This clearly links the index in the N_CYCLE array to the cycle number in the N_MEASUREMENT array.

Additionally, CYCLE_NUMBER = -1 indicates the float's launch and the JULD and LATITUDE and LONGITUDE variables should contain the float's launch time and location.

CYCLE_NUMBER_ADJUSTED contains a cycle numbering which has been assessed and adjusted to be correct, especially for the purposes of trajectory calculations. If a cycle is recovered during delayed mode and no profile file is created, the cycle must be added into the CYCLE_NUMBER_ADJUSTED and CYCLE_NUMBER_ADJUSTED_INDEX variables. Two examples recovered cycles are below.

The first example is where cycle number 5 is recovered in delayed mode. The cycle number variables must be rewritten as follows:

CYCLE_NUMBER	1, 2, 3, 4, _, 6, 7, 8, 9, 10, 11, ...,
CYCLE_NUMBER_INDEX	1, 2, 3, 4, _, 6, 7, 8, 9, 10, 11, ...,
CYCLE_NUMBER_ADJUSTED	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, _
CYCLE_NUMBER_ADJUSTED_INDEX	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, _

CYCLE_NUMBER	1, 2, 3, 4, _, 6, 7, 8, 9, 10, 11, ...,
CYCLE_NUMBER_INDEX	1, 2, 3, 4, _, 6, 7, 8, 9, 10, 11, ...,
CYCLE_NUMBER_ADJUSTED	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, _
CYCLE_NUMBER_ADJUSTED_INDEX	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, _

Here, FillValue is added to CYCLE_NUMBER and CYCLE_NUMBER_INDEX to indicate that no profile file exists with cycle number 5.

A second example of an error that might be discovered in cycle number in delayed mode involves floats that do not send cycle number and for which cycle number must be calculated. Here, cycle number 5 was incorrectly skipped in real time and is introduced in delayed mode:

CYCLE_NUMBER	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, ...
CYCLE_NUMBER_INDEX	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, ...
CYCLE_NUMBER_ADJUSTED	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, _, _
CYCLE_NUMBER_ADJUSTED_INDEX	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, _, _

Here, CYCLE_NUMBER = 6 which was assigned in real time, should actually be assigned cycle number = 5 as reflected by the CYCLE_NUMBER_ADJUSTED variable.

CYCLE_NUMBER always corresponds to the profile cycle number. To look for the cycle that matches the profile cycle number, users must look in the CYCLE_NUMBER variable for the cycle number they are interested in. If the CYCLE_NUMBER_ADJUSTED variable is 'FillValue', then this cycle is in real time mode and no corrected cycle number exists. If the CYCLE_NUMBER_ADJUSTED variable is filled, this is the correct cycle number as determined during delayed mode. For the previous example, profile cycle number 6 corresponds to CYCLE_NUMBER = 6 and CYCLE_NUMBER_ADJUSTED = 5.

<PARAM> contains the uncorrected real-time data transmitted by 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 real time 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 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 A-mode processing contains adjusted sections with fill values (<PARAM>_ADJUSTED, <PARAM>_ADJUSTED_QC and <PARAM>_ADJUSTED_ERROR). This is the same for all other ADJUSTED files (e.g. JULD_ADJUSTED).

When no parameter is measured along the trajectory, N_PARAM (number of parameters) and any fields relative to parameter are not in the file : <PARAM>, <PARAM>_QC,

<PARAM>_ADJUSTED, <PARAM>_ADJUSTED_QC, <PARAM>_ADJUSTED_ERROR and TRAJECTORY_PARAMETERS.

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_STATUS	char JULD_STATUS(N_MEASUREMENT); JULD_STATUS:long_name="Status of the date and time" JULD_STATUS:conventions = "Argo reference table 19"; JULD_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: 2 : Value is transmitted by the float
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.
JULD_ADJUSTED	double JULD_ADJUSTED(N_MEASUREMENT); JULD_ADJUSTED:long_name = "Adjusted julian day (UTC) of each measurement relative to REFERENCE_DATE_TIME"; JULD_ADJUSTED:standard_name = "time"; JULD_ADJUSTED:units = "days since 1950-01-01 00:00:00 UTC"; JULD_ADJUSTED:conventions = "Relative julian days with decimal part (as parts of the day)"; JULD_ADJUSTED:_FillValue = 999999.; JULD:axis = "T";	Adjusted 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. The date may be adjusted due to float clock drift or expert review. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_ADJUSTED_STATUS	char JULD_ADJUSTED_STATUS(N_MEASUREMENT) ; JULD_ADJUSTED_STATUS:long_name="Status of the JULD_ADJUSTED date" JULD_ADJUSTED_STATUS:conventions = "Argo reference table 19"; JULD_ADJUSTED_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: 2 : Value is transmitted by the float
JULD_ADJUSTED_QC	char JULD_ADJUSTED_QC(N_MEASUREMENT); JULD_ADJUSTED_QC:long_name = "Quality on adjusted date and time"; JULD_ADJUSTED_QC:conventions = "Argo reference table 2"; JULD_ADJUSTED_QC:_FillValue = " ";	Quality flag on JULD_ADJUSTED 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:_FillValue = 99999.; LATITUDE:valid_min = -90.; LATITUDE:valid_max = 90.; LATITUDE:axis="Y";	Latitude of the location (or measurement). Unit : degree north Example : 44.4991 for 44° 29' 56.76" N
LONGITUDE	double LONGITUDE(N_MEASUREMENT); LONGITUDE:long_name = "Longitude of each location"; LONGITUDE:standard_name = "longitude"; LONGITUDE:units = "degree_east";	Longitude of the location (or measurement). Unit : degree east Example : 16.7222 for 16° 43' 19.92" E

	LONGITUDE:_FillValue = 99999. ; LONGITUDE:valid_min = -180. ; LONGITUDE:valid_max = 180. ; LONGITUDE:axis = "X";	
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. A "G" indicates the GPS positioning system. Examples : 3 for a latitude and longitude accuracy < 250 m. G for GPS accuracy
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 series of measurements, locations and timings. Some floats begin with a cycle 0 and some begin at cycle number 1. Cycle number is -1 for the float's launch and includes the time and location. For one cycle number, there are usually several locations/measurement received. This cycle number must match the profile cycle number. Example : 17 for measurements performed during the 17 th cycle of the float.
CYCLE_NUMBER_ADJUSTED	int CYCLE_NUMBER_ADJUSTED (N_MEASUREMENT); CYCLE_NUMBER_ADJUSTED:long_name = "Adjusted float cycle number of the measurement"; CYCLE_NUMBER_ADJUSTED:conventions = "0..N, 0 : launch cycle, 1 : first complete cycle"; CYCLE_NUMBER_ADJUSTED:_FillValue = 99999;	Adjusted cycle number of the float for this series of measurements, locations and timings. Some floats begin with a cycle 0 and some begin at cycle number 1. For one cycle number, there are usually several locations/measurement received. Sometimes cycle numbers are assigned erroneously and need to be corrected. This variable contains the corrected cycle numbers. Example : 17 for measurements performed during the 17 th cycle of the float.
MEASUREMENT_CODE	int MEASUREMENT_CODE (N_MEASUREMENT); MEASUREMENT_CODE:long_name = "Flag referring to a measurement event in the cycle"; MEASUREMENT_CODE:conventions = "Argo reference table 15"; MEASUREMENT_CODE:_FillValue = 99999;	Flag for each event in the cycle which corresponds to Argo reference table 15. Example: 100 : 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>:C_format = "<X>"; <PARAM>:FORTRAN_format = "<X>";	<PARAM> contains the original values of a parameter listed in the "code" column of reference table 3. <X> : these fields are specified in the columns of 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>_ADJUSTED: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 =	<PARAM>_ADJUSTED contains the adjusted values derived from the original values of the parameter. <X> : these fields are specified in the columns of the reference table 3. <PARAM>_ADJUSTED is mandatory. When no adjustment is performed, the FillValue is inserted.

	<pre>"<X>"; <PARAM>_ADJUSTED:resolution= <X>;</pre>	
<PARAM>_ADJUSTED_QC	<pre>char <PARAM>_ADJUSTED_QC(N_MEASUREMENT); <PARAM>_ADJUSTED_QC:long_name = "quality flag"; <PARAM>_ADJUSTED_QC:conventions = "Argo reference table 2"; <PARAM>_ADJUSTED_QC:_FillValue = " ";</pre>	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	<pre>float <PARAM>_ADJUSTED_ERROR(N_MEASUREMENT); <PARAM>_ADJUSTED_ERROR:long_name = "Contains the error on the adjusted values as determined by the delayed mode QC process."; <PARAM>_ADJUSTED_ERROR:_FillValue = <X>; <PARAM>_ADJUSTED_ERROR:units = "<X>"; <PARAM>_ADJUSTED_ERROR:C_format = "<X>"; <PARAM>_ADJUSTED_ERROR:FORTTRAN_format = "<X>"; <PARAM>_ADJUSTED_ERROR:resolution= <X>;</pre>	<PARAM>_ADJUSTED_ERROR contains the error on the adjusted values of the parameter. <X> : these fields are specified in the columns of the reference table 3. <PARAM>_ADJUSTED_ERROR is mandatory. When no adjustment is performed, the FillValue is inserted.
AXES_ERROR_ELLIPSE_MAJOR	<pre>float AXES_ERROR_ELLIPSE_MAJOR(N_MEASUREMENT); AXES_ERROR_ELLIPSE_MAJOR.long_name = "Major axis of error ellipse from positioning system"; AXES_ERROR_ELLIPSE_MAJOR:units = "meters"; AXES_ERROR_ELLIPSE_MAJOR:_FillValue = 99999.;</pre>	Major axis of error ellipse reported by the positioning system.
AXES_ERROR_ELLIPSE_MINOR	<pre>float AXES_ERROR_ELLIPSE_MINOR(N_MEASUREMENT); AXES_ERROR_ELLIPSE_MINOR.long_name = "Minor axis of error ellipse from positioning system"; AXES_ERROR_ELLIPSE_MINOR:units = "meters"; AXES_ERROR_ELLIPSE_MINOR:_FillValue = 99999.;</pre>	Minor axis of error ellipse reported by the positioning system.
AXES_ERROR_ELLIPSE_ANGLE	<pre>float AXES_ERROR_ELLIPSE_ANGLE(N_MEASUREMENT); AXES_ERROR_ELLIPSE_ANGLE.long_name = "Angle of error ellipse from positioning system"; AXES_ERROR_ELLIPSE_ANGLE:units = "Degrees (from North when heading East)"; AXES_ERROR_ELLIPSE_ANGLE:_FillValue = 99999.;</pre>	Angle of error ellipse reported by the positioning system.
SATELLITE_NAME	<pre>char SATELLITE_NAME(N_MEASUREMENT); SATELLITE_NAME.long_name = "Satellite name from positioning system"; SATELLITE_NAME.FillValue=" ";</pre>	Satellite name from positioning system.

2.3.6 N_CYCLE dimension variable group

This section contains information on the variables with dimension N_CYCLE. They include variables that contain the best estimate of float timing.

Each field in this section has a N_CYCLE dimension.

N_CYCLE is the number of collected cycles performed by the float. A cycle is defined as a series of actions, including collection of data, made by a float that ends with transmission of data. If the float fails to collect or transmit data, a cycle has not occurred and CYCLE_NUMBER_INDEX should not be incremented.

Floats begin with different cycle numbers depending on float type. To understand how the N_CYCLE dimension variable group relates to the N_MEASUREMENT variable group, the user must consult the CYCLE_NUMBER_INDEX variable. This variable indicates the cycle number of the float information that is contained in that particular N_CYCLE index. For example, to find the N_CYCLE information that corresponds to CYCLE_NUMBER = 1, look for CYCLE_NUMBER_INDEX = 1.

Additionally, CYCLE_NUMBER_INDEX is the number of the profile cycle associated with the trajectory cycle in that index of the N_CYCLE array.

If any errors are discovered in how the cycle numbers were assigned, or if additional cycles are recovered in delayed mode, the CYCLE_NUMBER_INDEX_ADJUSTED variable is adjusted accordingly.

CYCLE_NUMBER_INDEX always corresponds to the profile cycle number. To look for the cycle that matches the profile cycle number, users must look in the CYCLE_NUMBER_INDEX variable for the cycle number they are interested in. If the CYCLE_NUMBER_INDEX_ADJUSTED variable contains 'FillValue', then this cycle is in real time mode and no corrected cycle number exists. If the CYCLE_NUMBER_INDEX_ADJUSTED variable is filled, this is the correct cycle number as determined during delayed mode.

When a cycle is missing (e.g. no data received), no fill values are used to indicate a missing cycle.

Name	Definition	Comment
JULD_DESCENT_START	double JULD_DESCENT_START(N_CYCLE); JULD_DESCENT_START:long_name = "Descent start date of the cycle"; JULD_DESCENT_START:standard_name = "time"; 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) when float leaves the surface and begins descent 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 = "Argo reference table 19"; JULD_DESCENT_START_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_FIRST_STABILIZATION	double JULD_FIRST_STABILIZATION(N_CYCLE); JULD_FIRST_STABILIZATION:long_name = "Time when a float first becomes water-neutral. ."; JULD_FIRST_STABILIZATION:standard_name = "time"; JULD_FIRST_STABILIZATION:units = "days since 1950-01-01 00:00:00 UTC"; JULD_FIRST_STABILIZATION:conventions = "Relative julian days	Julian day (UTC) of time when a float first becomes water-neutral. Example : 18833.8013889885 : July 25 2001 19:14:00

	with decimal part (as part of day) "; JULD_FIRST_STABILIZATION:_FillValue =999999.	
JULD_FIRST_STABILIZATION_STATUS	char JULD_FIRST_STABILIZATION_STATUS(N_CYCLE); JULD_FIRST_STABILIZATION_STATUS:conventions = "Argo reference table 19"; JULD_STABILIZATION_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_DESCENT_END	double JULD_DESCENT_END(N_CYCLE); JULD_DESCENT_END:long_name = "Descent end date of the cycle"; JULD_DESCENT_END:standard_name = "time"; 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) when float first approaches within 3% of the eventual drift pressure. Float may be transitioning from the surface or from a deep 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 = "Argo reference table 19"; JULD_DESCENT_END_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_PARK_START	double JULD_PARK_START(N_CYCLE); JULD_PARK_START:long_name = "Drift start date of the cycle"; JULD_PARK_START:standard_name = "time"; JULD_PARK_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_PARK_START:conventions = "Relative julian days with decimal part (as part of day) "; JULD_PARK_START:_FillValue=999999.;	Julian day (UTC) when float transitions to its Park or Drift mission. This variable is based on float logic based on a descent timer (i.e. SOLO), or be based on measurements of pressure (i.e. Provor).Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_PARK_START_STATUS	char JULD_PARK_START_STATUS(N_CYCLE); JULD_PARK_START_STATUS:conventions = "Argo reference table 19"; JULD_PARK_START_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_PARK_END	double JULD_PARK_END(N_CYCLE); JULD_PARK_END:long_name = "Drift end date of the cycle"; JULD_PARK_END:standard_name = "time"; JULD_PARK_END:units = "days since 1950-01-01 00:00:00 UTC"; JULD_PARK_END:conventions = "Relative julian days with decimal part (as part of day) "; JULD_PARK_END:_FillValue=999999.;	Julian day (UTC) when float exits from its Park or Drift mission. It may next rise to the surface (AST) or sink to profile depth (DEET)Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_PARK_END_STATUS	char JULD_PARK_END_STATUS(N_CYCLE); JULD_PARK_END_STATUS:conventions = "Argo reference table 19"; JULD_PARK_END_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float

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:standard_name = "time"; 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) when float first approaches within 3% of the eventual deep drift/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 = "Argo reference table 19"; JULD_DEEP_DESCENT_END_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_DEEP_PARK_START	double JULD_DEEP_PARK_START(N_CYCLE); JULD_DEEP_PARK_START:long_name = "Deep Descent end date of the cycle"; JULD_DEEP_PARK_START:standard_name = "time"; JULD_DEEP_PARK_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_DEEP_PARK_START:conventions = "Relative julian days with decimal part (as part of day)"; JULD_DEEP_PARK_START:_FillValue=999999.;	Julian day (UTC) when float transitions to its Deep Park or Deep Drift mission. This variable is based on float logic based on a descent timer (i.e. SOLO), or be based on measurements of pressure (i.e. Provor). Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_DEEP_PARK_START_STATUS	char JULD_DEEP_PARK_START_STATUS(N_CYCLE); JULD_DEEP_PARK_START_STATUS:conventions = "Argo reference table 19"; JULD_DEEP_PARK_START_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_ASCENT_START	double JULD_ASCENT_START(N_CYCLE); JULD_ASCENT_START:long_name = "Start date of the ascent to the surface"; JULD_ASCENT_START:standard_name = "time"; 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 float's ascent to the surface 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 = "Argo reference table 19"; JULD_ASCENT_START_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_DEEP_ASCENT_START	double JULD_DEEP_ASCENT_START(N_CYCLE); JULD_DEEP_ASCENT_START:long_name = "Start date of the ascent to the surface"; JULD_DEEP_ASCENT_START:standard_name = "time"; JULD_DEEP_ASCENT_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_DEEP_ASCENT_START:conventions = "Relative julian days with decimal part (as part of day)"; JULD_DEEP_ASCENT_START:_FillValue=999999.;	Julian day (UTC) when float begins its rise to drift pressure. Typical for profile-on-descent floats.. Example : 18833.8013889885 : July 25 2001 19:14:00

	<pre>e = "Deep ascent start date of the cycle"; JULD_DEEP_ASCENT_START:standard_ name = "time"; JULD_DEEP_ASCENT_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_DEEP_ASCENT_START:conventio ns = "Relative julian days with decimal part (as part of day) "; JULD_DEEP_ASCENT_START:_FillValue =999999.;</pre>	
JULD_DEEP_ASCENT_S TART_STATUS	<pre>char JULD_DEEP_ASCENT_START_STATUS(N_ CYCLE); JULD_DEEP_ASCENT_START_STATUS:c onventions = "Argo reference table 19 "; JULD_DEEP_ASCENT_START_STATUS: _FillValue = " ";</pre>	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_ASCENT_END	<pre>double JULD_ASCENT_END(N_CYCLE); JULD_ASCENT_END:long_name = "End date of the float's ascent to the surface "; JULD_ASCENT_END:standard_name = "time"; 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. ;</pre>	Julian day (UTC) of the end of the ascent to the surface . Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_ASCENT_END_ST ATUS	<pre>char JULD_ASCENT_END_STATUS(N_CYCLE); JULD_ASCENT_END_STATUS:conventio ns = "Argo reference table 19 "; JULD_ASCENT_END_STATUS:_FillValue = " ";</pre>	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_TRANSMISSION_ START	<pre>double JULD_TRANSMISSION_START(N_CYCL E); JULD_TRANSMISSION_START:long_na me = "Start date of transmssion"; JULD_TRANSMISSION_START:standard _name = "time"; JULD_TRANSMISSION_START:units = "days since 1950-01-01 00:00:00 UTC"; JULD_TRANSMISSION_START:conventi ons = "Relative julian days with decimal part (as part of day)" JULD_TRANSMISSION_START:_FillValu e=999999.;</pre>	Julian day (UTC) of the beginning of data transmission. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_TRANSMISSION_ START_STATUS	<pre>char JULD_TRANSMISSION_START_STATUS (N_CYCLE); JULD_TRANSMISSION_START_STATU S:conventions = "Argo reference table 19 "; JULD_TRANSMISSION_START_STATU S:_FillValue = " ";</pre>	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_FIRST_MESSAGE	<pre>double JULD_FIRST_MESSAGE(N_CYCLE); JULD_FIRST_MESSAGE:long_name = "Date of earliest float message received"; JULD_FIRST_MESSAGE:standard_name = "time"; JULD_FIRST_MESSAGE:units = "days since 1950-01-01 00:00:00 UTC";</pre>	Julian day (UTC) of the earliest float message received. May or may not have a position associated with it. Example : 18833.8013889885 : July 25 2001 19:14:00

	JULD_FIRST_MESSAGE:conventions = "Relative julian days with decimal part (as part of day)"; JULD_FIRST_MESSAGE:_FillValue=999999.;	
JULD_FIRST_MESSAGE_STATUS	char JULD_FIRST_MESSAGE_STATUS(N_CYCLE); JULD_FIRST_MESSAGE_STATUS:conventions = "Argo reference table 19 "; JULD_FIRST_MESSAGE_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_FIRST_LOCATION	double JULD_FIRST_LOCATION(N_CYCLE); JULD_FIRST_LOCATION:long_name = "Date of earliest location"; JULD_FIRST_LOCATION:standard_name = "time"; JULD_FIRST_LOCATION:units = "days since 1950-01-01 00:00:00 UTC"; JULD_FIRST_LOCATION:conventions = "Relative julian days with decimal part (as part of day)"; JULD_FIRST_LOCATION:_FillValue=999999.;	Julian day (UTC) of the earliest position Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_FIRST_LOCATION_STATUS	char JULD_FIRST_LOCATION_STATUS(N_CYCLE); JULD_FIRST_LOCATION_STATUS:conventions = "Argo reference table 19 "; JULD_FIRST_LOCATION_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_LAST_LOCATION	double JULD_LAST_LOCATION(N_CYCLE); JULD_LAST_LOCATION:long_name = "Date of latest location"; JULD_LAST_LOCATION:standard_name = "time"; JULD_LAST_LOCATION:units = "days since 1950-01-01 00:00:00 UTC"; JULD_LAST_LOCATION:conventions = "Relative julian days with decimal part (as part of day)"; JULD_LAST_LOCATION:_FillValue=999999.;	Julian day (UTC) of the latest position Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_LAST_LOCATION_STATUS	char JULD_LAST_LOCATION_STATUS(N_CYCLE); JULD_LAST_LOCATION_STATUS:conventions = "Argo reference table 19 "; JULD_LAST_LOCATION_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
JULD_LAST_MESSAGE	double JULD_LAST_MESSAGE(N_CYCLE); JULD_LAST_MESSAGE:long_name = "Date of latest float message received"; JULD_LAST_MESSAGE:standard_name = "time"; JULD_LAST_MESSAGE:units = "days since 1950-01-01 00:00:00 UTC"; JULD_LAST_MESSAGE:conventions = "Relative julian days with decimal part (as part of day)"; JULD_LAST_MESSAGE:_FillValue=999999.;	Julian day (UTC) of the latest float message received. May or may not have a position associated with it. Example : 18833.8013889885 : July 25 2001 19:14:00
JULD_LAST_MESSAGE_STATUS	char JULD_LAST_MESSAGE_STATUS(N_CYCLE); JULD_LAST_MESSAGE_STATUS:conventions = "Argo reference table 19 "; JULD_LAST_MESSAGE_STATUS:_FillValue	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float

	ue = " ";	
JULD_TRANSMISSION_END	double JULD_TRANSMISSION_END(N_CYCLE); JULD_TRANSMISSION_END:long_name = "Transmssion end date"; JULD_TRANSMISSION_END:standard_name = "time"; 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.;	Julian day (UTC) of the end of 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 = "Argo reference table 19"; JULD_TRANSMISSION_END_STATUS:_FillValue = " ";	Status flag on JULD date and time. The flag scale is described in reference table 19. Example: '2' : Value is transmitted by the float
CLOCK_OFFSET	double CLOCK_OFFSET(N_CYCLE); CLOCK_OFFSET:long_name = "Time of float clock drift"; CLOCK_OFFSET:units = "days"; CLOCK_OFFSET:conventions = "Days with decimal part (as part of day)"; CLOCK_OFFSET:_FillValue=999999.;	Decimal part of day that float clock has drifted. Float clock drift is defined as Float time (provided by the inboard Real Time Clock (RTC) of the float) – UTC time. This makes the clock drift is < 0 if float RTC is before UTC time. Float clock drift can be corrected in real time or in delayed mode. Real time corrections correspond to a data mode of "A". For "A" mode files, JULD_ADJUSTED = JULD - CLOCK_OFFSET "D" mode files may have corrections for clock drift only or additional time corrections based on expert review. Example : -1.08546: the clock drift is estimated to be equal to – 1 day 2 hours 3 minutes and 4 seconds at the time of the corresponding cycle surfacing
GROUNDED	char GROUNDED(N_CYCLE); GROUNDED:long_name = "Did the profiler touch the ground for that cycle?"; GROUNDED:conventions = "Argo reference table 20"; GROUNDED:_FillValue = " ";	GROUNDED indicates the best estimate of whether the float touched the ground for that cycle. The conventions are described in Argo reference table 20. Examples : Y : yes, the float touched the ground B : yes, the float touched the ground after a bathymetry check
REPRESENTATIVE_PARK_PRESSURE	float REPRESENTATIVE_PARK_PRESSURE(N_CYCLE); REPRESENTATIVE_PARK_PRESSURE:long_name = "Best pressure value during drift phase"; REPRESENTATIVE_PARK_PRESSURE:units = "<X>"; REPRESENTATIVE_PARK_PRESSURE:_FillValue="<X>";	The Representative Park Pressure (RPP) is the best pressure value assigned to the drift phase. See the REPRESENTATIVE_PARK_PRESSURE_STATUS variable to understand how this pressure was evaluated. It should match the PRES(N_MEASUREMENT) values with MC = 301. <X> : these fields are specified in the columns of the reference table 3. Example: 1025
REPRESENTATIVE_PARK_PRESSURE_STATUS	char REPRESENTATIVE_PARK_PRESSURE_STATUS(N_CYCLE); REPRESENTATIVE_PARK_PRESSURE_STATUS:conventions = "Argo reference table 21"; REPRESENTATIVE_PARK_PRESSURE_STATUS:_FillValue="<X>";	Status flag on the Representative Park Pressure (RPP). The flag scale is described in reference table 21. Example: '2' : mean value, directly provided by the float, of pressure measurements regularly sampled during the drift phase
CONFIG_MISSION_NUMBER	int CONFIG_MISSION_NUMBER(N_CYCLE); CONFIG_MISSION_NUMBER:long_name = "Unique number denoting the missions performed by the float"; CONFIG_MISSION_NUMBER:conventions = "0..N, 0 : launch mission (if exists), 1 : first complete mission"; CONFIG_MISSION_NUMBER:_FillValue	Unique number of the mission to which this parameter belongs. Example : 1 See §2.4.5 "Configuration parameters" and note on floats with multiple configurations.

	= 99999;	
CYCLE_NUMBER_INDEX	int CYCLE_NUMBER_INDEX(N_CYCLE); CYCLE_NUMBER_INDEX:long_name = "Cycle number that corresponds to the current index"; CYCLE_NUMBER_INDEX:conventions = "0...N, 0 : launch cycle, 1 : first complete cycle"; CYCLE_NUMBER_INDEX:FillValue = 99999;	Cycle number of the float that corresponds to the information contained in the current index. This cycle number must match the profile cycle number, ensuring that the trajectory and profile with the same cycle number contain data from the same cycle. Example : 17 means information for the 17 th cycle of the float is contained in this index.
CYCLE_NUMBER_INDEX_ADJUSTED	int CYCLE_NUMBER_INDEX_ADJUSTED(N_CYCLE); CYCLE_NUMBER_INDEX_ADJUSTED:long_name = "Cycle number that corresponds to the current index"; CYCLE_NUMBER_INDEX_ADJUSTED:conventions = "0...N, 0 : launch cycle, 1 : first complete cycle"; CYCLE_NUMBER_INDEX_ADJUSTED:FillValue = 99999;	Corrected cycle number of the float that corresponds to the information contained in the current index. Errors may be found in CYCLE_NUMBER_INDEX variable which are corrected and contained in this variable. Example : 17 means information for the 17 th cycle of the float is contained in this index.
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 trajectory cycle contains real time, adjusted or delayed mode data. A delayed mode cycle means the positions, times, cycle number, pressure, temperature, and salinity (if measured) have been quality controlled. Additional parameters like oxygen may not be quality controlled. Floats often have delayed mode data only after they die, but can have both delayed mode and real time data. When this occurs, two trajectory files exist - a real time file ("R") with only real time data for all the cycles in the float record and a delayed mode file ("D") with both real time and delayed mode data for all the cycles that have been delayed mode quality controlled. Floats can be adjusted in real time with adjusted time values only in the JULD_ADJUSTED variable and its associated _STATUS and _QC variables. This occurs when floats are corrected in real time for clock drift. Examples : 'R' : real time data 'D' : delayed mode data 'A' : real time data with JULD_ADJUSTED values

2.3.7 History information

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

Each item of this section has a 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 : "OW"
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, STRING4); 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 : "OCF\$" 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.;	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); HISTORY_INDEX_DIMENSION:long_name = "Name of dimension to which HISTORY_START_INDEX and HISTORY_STOP_INDEX correspond"; HISTORY_INDEX_DIMENSION:conventions = "C: N_CYCLE, M: N_MEASUREMENT"; HISTORY_INDEX_DIMENSION:_FillValue = " ";	Name of dimension to which HISTORY_START_INDEX and HISTORY_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;	Stop 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 3.0

The format version 3.0 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 3.0 format, all its metadata files must be provided in version 3.0.

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

For file naming conventions, see §4.1.

2.4.1 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 = "2011-04-22T06:00:00Z creation";
:references = "http://www.argodatamgt.org/Documentation";
:comment = "free text";
:user_manual_version = "3.0";
:Conventions = "Argo-3.0 CF-1.6";
```

2.4.2 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 STRING128 STRING32 STRING16 STRING8 STRING4 STRING2	STRING1024 = 1024; STRING256 = 256; STRING128 = 128; 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.

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.

2.4.3 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 : «3.0»
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 29 th 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 30 th 2001 09:05:00

2.4.4 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 : A911111"; 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. DACS can use N/A or alternative of their choice 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(N_TRANS_SYSTEM, 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
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
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 The draft list of platform_type is available on https://docs.google.com/spreadsheets/ccc?key=0AitL8e3zpeffdEtyVmN3a0hvUC1NMDJMchILN2FMSIE#gid=2
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
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); STANDARD_FORMAT_ID:long_name = "A standard format number to describe the data format type for each float."; STANDARD_FORMAT_ID:_FillValue = " ";	Standardised format number as described in the draft reference table online (https://docs.google.com/spreadsheets/ccc?key=0AitL8e3zpeffdENUQmszRIY3djYweGZhbBZSU1fTFE#gid=9). This table cross references to individual DAC format numbers. Example: 1010151
DAC_FORMAT_ID	char DAC_FORMAT_ID(STRING16); DAC_FORMAT_ID:long_name = "The format number used by the DAC to describe the data format type for each float."; DAC_FORMAT_ID:_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, draft table is available at: https://docs.google.com/spreadsheets/ccc?key=0AitL8e3zpeffdENUQmszRIY3djYweGZhbBZSU1fTFE#gid=9

		Example: A9.
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
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:long_name = "The secondary type of controller board."; CONTROLLER_BOARD_TYPE_SECONDARY:_FillValue = " ";	Only applicable if there is more than one controller board in the float. Describes the second type of controller board.
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 = " ";	Only applicable if there is more than one controller board in the float. 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, compresses 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 compresses (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: Joe Blogg
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: ACE CRC
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

2.4.5 Float deployment and mission information

Name	Definition	Comment
LAUNCH_DATE	char LAUNCH_DATE(DATE_TIME); LAUNCH_DATE:long_name = "Date (UTC) of the deployment"; LAUNCH_DATE:conventions = "YYYYMMDDHHMISS"; LAUNCH_DATE:_FillValue = " ";	Date and time (UTC) of 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 DEPLOYMENT_PLATFORM(String32); DEPLOYMENT_PLATFORM:long_name = "Identifier of the deployment platform"; DEPLOYMENT_PLATFORM:_FillValue = " ";	Identifier of the deployment platform, i.e. vessel or ship name. Example : L'ATALANTE
DEPLOY_MISSION DEPLOYMENT_CRUISE_ID	char DEPLOYMENT_CRUISE_ID(String32); DEPLOYMENT_CRUISE_ID:long_name = "Identification number or reference number of the cruise used to deploy the float"; DEPLOYMENT_CRUISE_ID:_FillValue = " ";	Identification number or reference number of the cruise used to deploy the platform. Example : POMME2
DEPLOY_AVAILABLE_PROFILE_ID DEPLOYMENT_REFERENCE_STATION_ID	char DEPLOYMENT_REFERENCE_STATION_ID(String256); DEPLOYMENT_REFERENCE_STATION_ID:long_name = "Identifier or reference number of co-located stations used to verify the first profile"; DEPLOYMENT_REFERENCE_STATION_ID:_FillValue = " ";	Identifier or reference number of co-located 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; 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 = " ";	Status of the end of mission of the float. T:No more transmission received, R:Retrieved

2.4.6 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_NAME(N_CONF_PARAM, STRING128) CONFIG_PARAMETER_NAME:long_name="Name of configuration parameter"; CONFIG_PARAMETER_NAME:_FillValue = " ";	Name of the configuration parameter. Example : "CONFIG_ParkPressure_dBAR" See reference table 14b for standard configuration parameter names.

CONFIG_PARAMETER_VALUE	<code>double CONFIG_PARAMETER_VALUE(N_MISSIONS, N_CONF_PARAM) CONFIG_PARAMETER_VALUE:long_name="Value of configuration parameter"; CONFIG_PARAMETER_VALUE:_FillValue = 99999.;</code>	Value of the configuration parameter. Example : 1500
CONFIG_MISSION_NUMBER	<code>int CONFIG_MISSION_NUMBER(N_MISSIONS); CONFIG_MISSION_NUMBER:long_name = "Unique number denoting the missions performed by the floatMission"; CONFIG_MISSION_NUMBER:conventions = "0..N, 0 : launch mission (if exists), 1 : first complete mission"; CONFIG_MISSION_NUMBER:_FillValue = 99999;</code>	Unique number of the mission to which this parameter belongs. Example : 0 See note on floats with multiple configurations.
CONFIG_MISSION_COMMENT	<code>char CONFIG_MISSION_COMMENT(N_MISSIONS, STRING256) CONFIG_MISSION_COMMENT:long_name="Comment on configuration"; CONFIG_MISSION_COMMENT:_FillValue= " ";</code>	Comment on this configuration mission. Example : "This mission follows a 1000 dbar meddie during parking"

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.

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).

2.4.6.1 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).

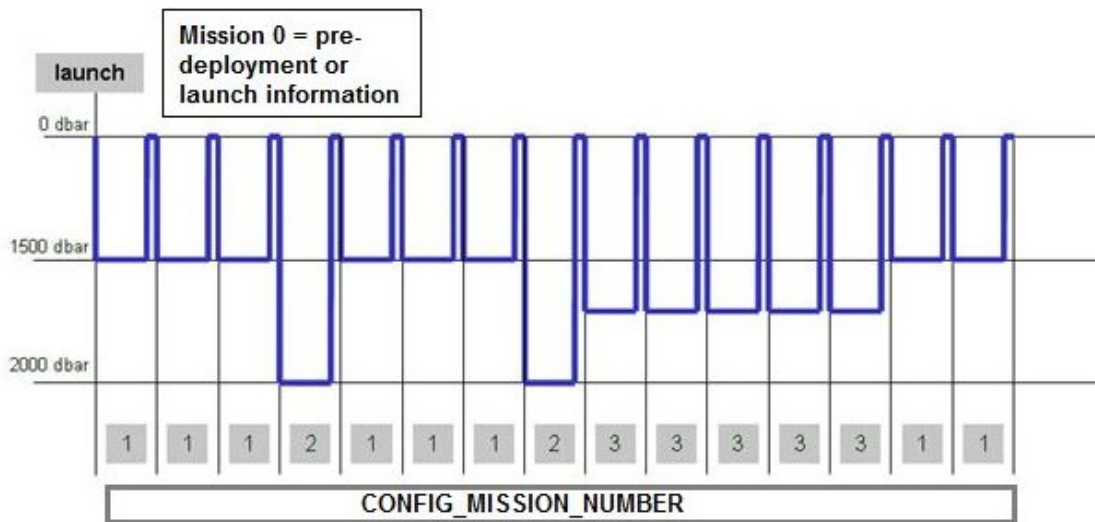
When there is only one configuration, CONFIG_MISSION_NUMBER is set to 1: all the cycles are programmed to be the same. Note that in this case; floats will still have mission "0" that contains the pre-deployment or launch information. So for a float with one basic mission, it will have missions 0 and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

2.4.6.2 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 3.0” section of this User’s manual).



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

Mission 0 =
pre-deployment
or launch

```
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.

CONFIG_PARAMETER_NAME (N_CONF_PARAM)	Mission Settings (N_MISSIONS, N_CONF_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

2.4.7 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 : conductivity 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 The draft list of sensor makers is available at : https://docs.google.com/spreadsheet/ccc?key=0AtL8e3zpeffdEtyVmN3a0hvUC1NMDJMchILN2FMSIE&pli=1#gid=3
SENSOR_MODEL	char SENSOR_MODEL(N_PARAM,STRING256); SENSOR_MODEL:long_name = "Type of sensor"; SENSOR_MODEL:_FillValue = " ";	Model of sensor. Example : SBE41 The draft list of sensor models is available at : https://docs.google.com/spreadsheet/ccc?key=0AtL8e3zpeffdEtyVmN3a0hvUC1NMDJMchILN2FMSIE&pli=1#gid=6

SENSOR_SERIAL_NO	char SENSOR_SERIAL_NO(N_PARAM,STRING16); SENSOR_SERIAL_NO:long_name = "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

2.4.8 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); PARAMETER:long_name = "List of parameters with calibration information"; PARAMETER:conventions = "Argo reference table 3"; PARAMETER:_FillValue = " ";	Parameters measured on this float. The parameter names are listed in reference table 3. Examples : TEMP, PSAL, CNDC TEMP : temperature in celsius PSAL : practical salinity in psu CNDC : conductivity 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 : $T_c = a_1 * T + a_0$
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 : $a_1=0.99997$, $a_0=0.0021$
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

2.4.9 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 2	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";
FIRMWARE_VERSION	not empty	FIRMWARE_VERSION = "042606";
FLOAT_SERIAL_NO	not empty	FLOAT_SERIAL_NO = "1679"
FORMAT_VERSION	"2.2";	FORMAT_VERSION = "2.2";
HANDBOOK_VERSION	"1.2";	HANDBOOK_VERSION = "1.2";
LAUNCH_DATE	YYYYMMDDHHMISS	LAUNCH_DATE = "20010717000100";
LAUNCH_LATITUDE	not empty, -90 <= real <= 90	LAUNCH_LATITUDE = -7.91400003433228;
LAUNCH_LONGITUDE	not empty, -180 <= real <= 180	LAUNCH_LONGITUDE = -179.828338623047;
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";
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_NUMBER	XXXXX or XXXXXXX	PLATFORM_NUMBER = "5900077";
PLATFORM_TYPE	not empty	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	not empty	SENSOR_MAKER = "SEABIRD";
SENSOR_MODEL	not empty	SENSOR_MODEL = "SBE41"
SENSOR_SERIAL_NO	not empty	SENSOR_SERIAL_NO = "6785";
SENSOR_UNITS	not empty	SENSOR_UNITS = "deg C", "decibars";
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";

2.4.10 Highly desirable metadata parameters

Highly desirable metadata parameters should be correctly filled according to the following table.

Highly desirable meta-data	Format	Example
BATTERY_PACKS	Please populate this field according to the standard abbreviations and notations if at all possible in reference table ? . If unknown, fill with FillValue = " ";	BATTERY_PACKS = "4DD Li + 1C Alk";

2.5 Technical information format version 3.0

The format version 3.0 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 3.0 format, all its technical files must be provided in version 3.0.

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 another. 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

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 = "2011-04-22T06:00:00Z creation";
:references = "http://www.argodatamgt.org/Documentation";
:comment = "free text";
:user_manual_version = "3.0";
:Conventions = "Argo-3.0 CF-1.6";
```

2.5.2 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 5 th 2001 17:28:34 19971217000000 : December 17 th 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.

2.5.3 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 : «3.0»
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 29 th 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 30 th 2001 09 :05 :00
-------------	--	---

2.5.4 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_TECH_PARAM, STRING128) TECHNICAL_PARAMETER_NAME:long_name="Name of technical parameter"; TECHNICAL_PARAMETER_NAME:_FillValue = " ";	Name of the technical parameter. Example : "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 autodescription 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_detailed_index.txt.gz
- etc/argo_profile_detailed_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
l_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_psal_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 autodescription 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 field 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 autodestructive 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	$75\% \leq N < 100\%$
C	$50\% \leq N < 75\%$
D	$25\% \leq N < 50\%$
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	unit	valid_min	valid_max	C_Form at FORTRAN Format resolution	Fill value
CNDC	ELECTRICAL CONDUCTIVITY	sea_water_electrical_conductivity	mhos/m	0.f	8.5.f	%10.4f F10.4 0.0001f	99999.f
PRES	SEA PRESSURE	sea_water_pressure	decibar	0.f	12000.f	%7.1f F7.1 0.1f	99999.f
PSAL	PRACTICAL SALINITY	sea_water_salinity	psu	0.f	42.f	%9.3f F9.3 0.001f	99999.f
TEMP	SEA TEMPERATURE IN SITU ITS-90 SCALE	sea_water_temperature	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	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	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	decibar	0.f	12000.f	%7.1f F7.1 0.1f	99999.f
VOLTAGE_DOXY	Voltage reported by oxygen sensor (SBE43)	-	volt	0.f	100.f	%5.2f F5.2 0.01f	99999.f
FREQUENCY_DOXY	Frequency reported by oxygen sensor (SBE43)	-	hertz	0.f	25000.f	%7.1f F7.1 0.1f	99999.f
COUNT_DOXY	Count reported by oxygen sensor (SBE43)	-		0.f	100.f	%5.2f F5.2 0.01f	99999.f
BPHASE_DOXY	Uncalibrated phase shift reported by oxygen sensor (optode Aanderaa 3830)	-	degree	10.f	70.f	%8.2f F8.2 0.01f	99999.f
DPHASE_DOXY	Calibrated phase shift reported by oxygen sensor (optode Aanderaa 3830)	-	degree	10.f	70.f	%8.2f F8.2 0.01f	99999.f
TPHASE_DOXY	Uncalibrated phase shift reported by oxygen sensor (optode Aanderaa 4330)	-	degree	10.f	70.f	%8.2f F8.2 0.01f	99999.f
C1PHASE_DOXY	Uncalibrated phase shift reported by oxygen sensor (optode Aanderaa 4330)	-	degree	10.f	70.f	%8.2f F8.2 0.01f	99999.f
C2PHASE_DOXY	Uncalibrated phase shift reported by oxygen sensor (optode Aanderaa 4330)	-	degree	10.f	70.f	%8.2f F8.2 0.01f	99999.f
MOLAR_DOXY	Uncompensated (pressure and salinity) oxygen concentration reported by the oxygen sensor (optode Aanderaa 3830 or 4330)	mole_concentration_of_dissolved_molecular_oxygen_in_sea_water	micromole/litre	0.f	650.f	%9.3f F9.3 0.001f	99999.f
PHASE_DOXY	Phase shift reported by oxygen sensor (SBE63)	-	degree	10.f	70.f	%8.2f F8.2 0.01f	99999.f
MLPL_DOXY	Oxygen concentration	-	ml/l	0.f	650.f	%9.3f	99999.f

	reported by the oxygen sensor (SBE63)					F9.3 0.001f	
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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.

Note on resolution

For each parameter, the resolution attribute is mandatory. However, the resolution value is sensor dependant.

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> , Cookbook documents, "Processing Argo oxygen data at the DAC level"

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 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 thermodynamic 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 number	Instrument
831	P-Alace float
837	Arvor-C float
838	Arvor-D float
839	Provor-II 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
848	Apex-EM float
849	Apex-D deep float
850	Solo, no conductivity
851	Solo, Seabird conductivity sensor
852	Solo, FSI conductivity sensor
853	Solo2, Seabird conductivity sensor
854	S2A float
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
861	Profiling Float, NEMO, FSI conductivity sensor

862	Solo-D deep float
863	Navis-A Float
864	Ninja-D deep float
865	Nova float

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> .

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

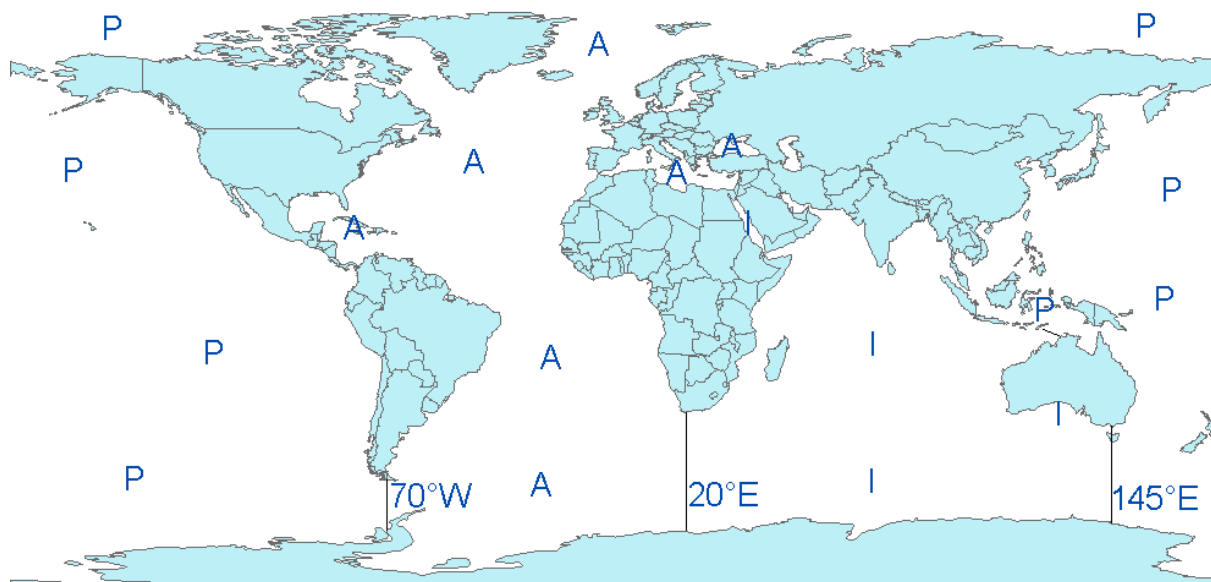
Code	Meaning
ARFM	Convert raw data from telecommunications system to a processing format
ARGO	Automatic QC of data reported in real-time has been performed
IGO3	Checking for duplicates has been performed
ARSQ	Delayed mode QC has been performed
ARCA	Calibration has been performed
ARUP	Real-time data have 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>

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>

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

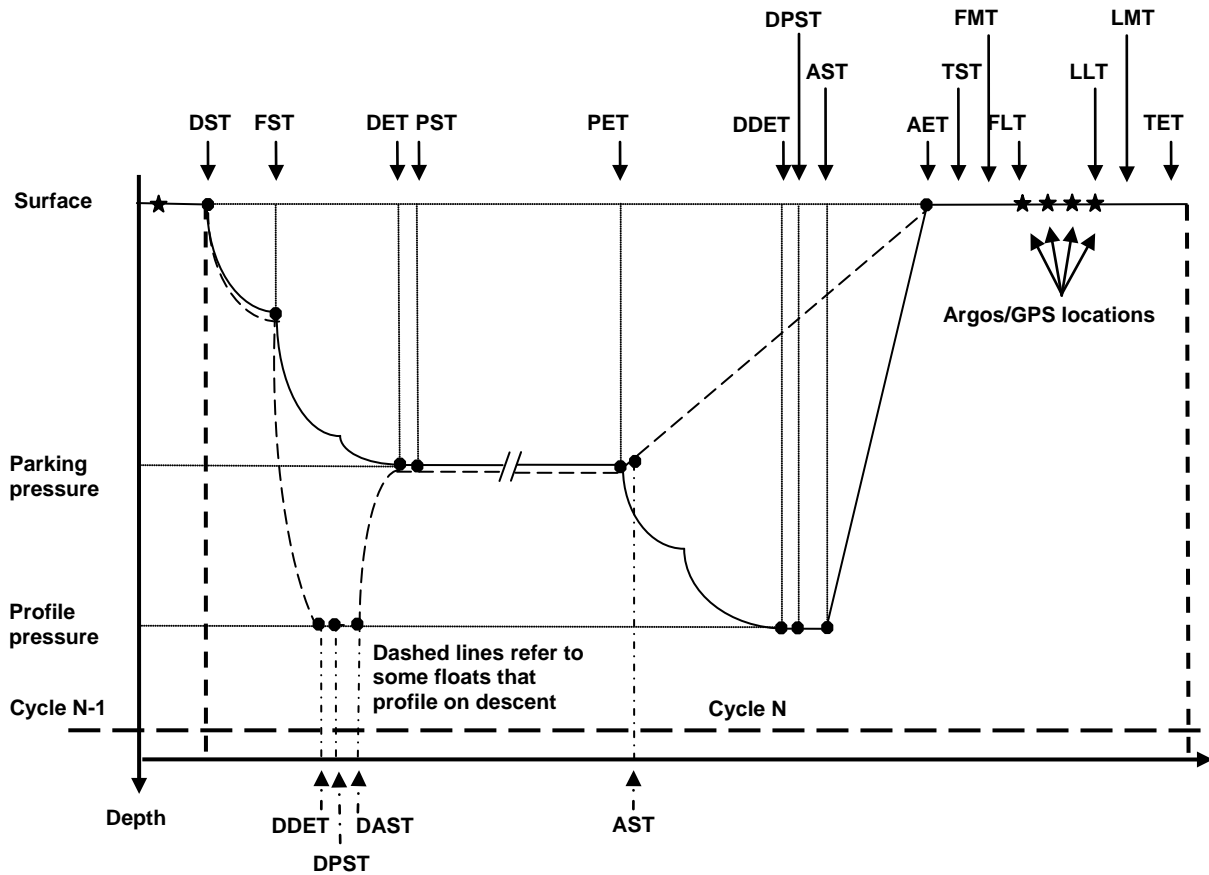


Figure 1: Figure showing float cycle and the cycle timing variables. Floats can profile either on descent or ascent. Most floats profile on ascent. Their float path is shown with a solid black line. Some floats profile on descent. One such float, the new SOLO-II Deep float, has a cycle as shown by the dashed line.

Floats that profile on ascent would have the following mandatory cycle timings:

- DST, DET, PET, DDET, AST, AET and all surface times

Floats that profile on descent might have the following cycle timings:

- DST, DDET, DAST, DET, PET, AST, AET, and all surface times

Time	Long name	Traj data name	Description
DST	Descent Start	JULD_DESCENT_START	Time when float leaves the surface, beginning

	Time	JULD_DESCENT_START_STATUS	descent.
FST	First Stabilization Time	JULD_FIRST_STABILIZATION JULD_FIRST_STABILIZATION_STATUS	Time when a float first becomes water-neutral.
DET	Descent End Time	JULD_DESCENT_END JULD_DESCENT_END_STATUS Note: Float may approach drift pressure from above or below.	Time when float first approaches within 3% of the eventual drift pressure. Float may be transitioning from the surface or from a deep profile. This variable is based on pressure only and can be measured or estimated by fall-rate. In the case of a float that overshoots the drift pressure on descent, DET is the time of the overshoot.
PST	Park Start Time	JULD_PARK_START JULD_PARK_START_STATUS	Time when float transitions to its Park or Drift mission. This variable is based on float logic based on a descent timer (i.e. SOLO), or be based on measurements of pressure (i.e. Provor).
Note on DET and PST: DET and PST might be near in time or hours apart depending on float model and cycle-to-cycle variability. PI has judgment call whether DET ~ = PST.			
PET	Park End Time	JULD_PARK_END JULD_PARK_END_STATUS	Time when float exits from its Park or Drift mission. It may next rise to the surface (AST) or sink to profile depth.
DDET	Deep Descent End Time	JULD_DEEP_DESCENT_END JULD_DEEP_DESCENT_END_STATUS	Time when float first approaches within 3% of the eventual deep drift/profile pressure. This variable is based on pressure only and can be measured or estimated by fall-rate.
DPST	Deep Park Start Time	JULD_DEEP_PARK_START JULD_DEEP_PARK_START_STATUS	Time when float transitions to a deep park drift mission. This variable is only defined if the float enters a deep drift phase (i.e. DPST not defined in cases of constant deep pressure due to bottom hits, or buoyancy issues)
DAST	Deep Ascent Start Time	JULD_DEEP_ASCENT_START JULD_DEEP_ASCENT_START_STATUS	Time when float begins its rise to drift pressure. Typical for profile-on-descent floats.
AST	Ascent Start Time	JULD_ASCENT_START JULD_ASCENT_START_STATUS	Time when float begins to return to the surface.
AET	Ascent End Time	JULD_ASCENT_END JULD_ASCENT_END_STATUS	Time when float reaches the surface.
TST	Transmission Start Time	JULD_TRANSMISSION_START JULD_TRANSMISSION_START_STATUS	Time when float begins transmitting.
FMT	First Message Time	JULD_FIRST_MESSAGE JULD_FIRST_MESSAGE_STATUS	Earliest time of all received float messages.
FLT	First Location Time	JULD_FIRST_LOCATION JULD_FIRST_LOCATION_STATUS	Earliest location of all float locations.
LLT	Last Location Time	JULD_LAST_LOCATION JULD_LAST_LOCATION_STATUS	Latest location of all float locations.
LMT	Last Message Time	JULD_LAST_MESSAGE JULD_LAST_MESSAGE_STATUS	Latest time of all received float messages.
TET	Transmission End Time	JULD_TRANSMISSION_END JULD_TRANSMISSION_END_STATUS	Time when floats stops transmitting.

General Measurement Code Table Key

Measurement code type	Definition
Any code evenly divisible by 100 (e.g. 100, 200, 300, etc)	Primary Measurement Codes (MC) . Each marks a mandatory-to-fill cycle timing variable. These are very important for determining trajectory estimates. All are found in both the N_MEASUREMENT and N_CYCLE data arrays.

Any code evenly divisible by 50 but not evenly divisible by 100 (e.g. 150, 250, 450, etc)	Secondary Measurement Codes (MC) . Each marks a suggested-to-fill cycle timing variable. Secondary MC are not always applicable to all floats, but are very useful in determining trajectory estimates.
<p>Any code that falls in between any Primary or Secondary Measurement Code (span of 50 values). These codes describe data that are important cycle timing information but are not as important as the primary or secondary timing variables.</p> <p>The value span is subdivided into two halves. Measurement codes in this section will be described relative to the values of the Primary and Secondary codes.</p>	<p>Relative Generic Codes. Values spanning from MC minus 24 to MC minus 1: Measurement codes that have lower value and within 24 of a Primary or Secondary Measurement Code. These code definitions are phrased generally, so can be attached to data from many different floats. These code values (MC minus 24 to MC minus 1) are assigned when a float records a measurement while transitioning TOWARDS the MC. The definitions of the MC from MC minus 24 to MC minus 1 are repeated for all Primary and Secondary MC. An example, most floats record pressure/temperature/salinity during drift. The float is transitioning towards PET (MC=300) during this period. Thus the pressure/temperature/salinity measurements will have an MC between MC minus 24 and MC minus 1 where MC=300 (thus between MC=276 and MC=299). Which value is chosen is determined by the measurement itself (See table below).</p> <p>Relative Specific Codes. Values spanning from MC plus 1 to MC plus 25: These are specific measurements that are generally NOT recorded by multiple float types. They are believed to be valuable enough in trajectory estimation that they are defined here, and not within the generically defined MC minus 24 to MC minus 1 span. MC codes in this span will be specific to the MC code, and will NOT be repeated for other Primary and Secondary MCs. An example, APEX floats report the "Down-time end date", which is important in determining the start of ascent (MC=500). The MC for "Down-time end date" is recorded with MC plus 1 (MC=501).</p>

Relative Generic Code Table Key (from MC minus 24 to MC minus 1)

This table pertains to any measurement code that has lower value and within 24 of a Primary or Secondary Measurement Code (see below). These definitions apply relative to every Primary and Secondary code. For example, AST (time of ascent start, MC=500) and AET (time of ascent end, MC=600) are both Primary MCs. There exists a measurement code MC minus 4 for both AST and AET which is assigned to any averaged measurement that is taken while transitioning towards the MC. If an averaged measurement is recorded while transitioning towards AST, the correct MC=496. If an averaged measurement is recorded while transitioning towards AET, the correct MC=596.

Relative Measure-ment code	Meaning
MC minus 1	Any single measurement transitioning towards MC (see MC-10 for a 'series' of measurements)
MC minus 2	Maximum value while float is transitioning towards an MC (e.g. pressure)
MC minus 3	Minimum value while float is transitioning towards an MC (e.g. pressure)
MC minus 4	Any averaged measurements made during transition to MC
MC minus 5	Median value while float is transitioning towards an MC
MC minus 6 to MC minus 9	currently unassigned
MC minus 10	Any "series" of measurements recorded while transitioning towards MC. (e.g. Provor 'spy' measurements, SOLOII pressure-time pairs, etc).

MC minus 11	Active adjustment to buoyancy made at this time
MC minus 12 to MC minus 24	currently unassigned

Measurement Code Table

Measurement code	Variable	Meaning	Transmitted by listed float type. Value can be estimated in other floats
0		Launch time and location of the float	All float types
76-99	see above table	Any measurement recorded during transition towards DST	
100	DST	All measurements made when float leaves the surface, beginning descent. Time (JULD_DESCENT_START)	Time: PROVOR, ARVOR, SOLO-II, WHOI SOLOIR, NEMO, NEMOIR, APEX APF9, APEXIR APF9
101-125	unassigned	Reserved for specific timing events around DST.	
126-149	see above table	Any measurement recorded during transition towards FST	
150	FST	All measurements made at time when a float first becomes water-neutral. Time (JULD_FIRST_STABILIZATION)	PROVOR, ARVOR
151-175	unassigned	Reserved for specific timing events around FST.	
176-199	see above table	Any measurement recorded during transition towards DET	
200	DET	All measurements made at time when float first approaches within 3% of the eventual drift pressure. Float may be transitioning from the surface or from a deep profile. This variable is based on measured or estimated pressure only. In the case of a float that overshoots the drift pressure on descent, DET is the time of the overshoot. Time (JULD_DESCENT_END)	Time: PROVOR, ARVOR, SOLO-II, NEMO, NEMOIR, NAVISAPEX APF9i?
201-202 & 204-225	unassigned	Reserved for specific timing events around DET.	
203		Deepest bin reached during descending profile	
226-249	see above table	Any measurement recorded during transition towards PST	
250	PST	All measurements made at time when float transitions to its Park or Drift mission. This variable is based on float logic based on a descent timer (i.e. SOLO), or be based on measurements of pressure	APEX non APF9, APEX APF9, APEX APF9i, SIO SOLO, SOLO-II, NEMO, NEMOIR CTD: WHOI SOLO

		(i.e. Provor). Time(JULD_PARK_START)	NINJA
251-275	unassigned	Reserved for specific timing events around PST.	
276-299	see above table	Any measurement recorded during transition towards PET	
300	PET	All measurements made at time when float exits from its Park or Drift mission. It may next rise to the surface (AST) or sink to profile depth Time (JULD_PARK_END)	Time: PROVOR (excluding PROVOR MT), ARVOR, SOLO-II, NEMO, NEMOIR, POPS CTD: WHOI SOLO
301		Representative Park <PARAM> found either from measurements taken during drift or from metafile information	
302-325	unassigned	Reserved for specific timing events around PET.	
376-399	see above table	Any measurement recorded during transition towards DDET	
400	DDET	All measurements made at time when float first approaches within 3% of the eventual deep drift/profile pressure. This variable is based on pressure only and can be measured or estimated. Time (JULD_DEEP_DESCENT_END)	Time: PROVOR CTS3, ARVOR, SOLO-II, POPS
401-425	unassigned	Reserved for specific timing events around DDET.	
426-449	see above table	Any measurement recorded during transition towards DPST	
450	DPST	All measurements made at time when float transitions to a deep park drift mission. This variable is only defined if the float enters a deep drift phase (i.e. DPST not defined in cases of constant deep pressure due to bottom hits, or buoyancy issues).	
451-475	unassigned	Reserved for specific timing events around DPST.	
476-499	see above table	Any measurement recorded during transition towards AST	
500	AST	All measurements made at the start of the float's ascent to the surface Time (JULD_ASCENT_START)	Time: APEX APF9, PROVOR, ARVOR, SOLO-II, NEMO, NEMOIR, POPS
501		Down-time end time: end date of the down-time parameter reported by APEX floats	APEX
502		Ascent start time directly transmitted by APEX floats	APEX
503		Deepest bin reached during ascending	

		profile	
504-525	unassigned	Reserved for specific timing events around AST.	
526-549	see above table	Any measurement recorded during transition towards DAST	
550	DAST	All measurements made at the start of the float's ascent from profile pressure to drift pressure. Used for floats that profile on descent and then move back up to drift pressure. Time (JULD_DEEP_ASCENT_START)	Time: Deep SOLO-II
551-575	unassigned	Reserved for specific timing events around DAST.	
576-599	see above table	Any measurement recorded during transition towards AET	
600	AET	All measurements made at the end of ascent. Time (JULD_ASCENT_END)	PROVOR, ARVOR, SOLO-II, NEMO, NEMOIR, APEX, POPS
601-625	unassigned	Reserved for specific timing events around AET.	
676-699	see above table	Any measurement recorded during transition towards TST	
700	TST	Time and location of the start of transmission for the float. Time (JULD_TRANSMISSION_START)	APEX APF9, APEXIR APF9, PROVOR, ARVOR, SOLO-II, NEMO, NEMOIR, POPS
701		Transmission start time directly transmitted by APEX float	APEX
702	FMT	Earliest time of all messages received by telecommunications system – may or may not have a location fix. Time (JULD_FIRST_MESSAGE)	All floats
703		Surface times and locations during surface drift. Should be listed in chronological order.	All floats
704	LMT	Latest time of all messages received by telecommunications system – may or may not have a location fix. Time (JULD_LAST_MESSAGE)	All floats
705-725	unassigned	Reserved for specific timing events around TST	
776-799	see above table	Any measurement recorded during transition towards TET	
800	TET	Time and location of the end of transmission for the float. Time (JULD_TRANSMISSION_END)	PROVOR, ARVOR, SOLO-II, APEXIR APF9
801-825	unassigned	Reserved for specific timing events around TET	
901		Grounded flag	

		Configuration phase	
902		Last time before float recovery. For floats that have been recovered, it is important to know when this occurred. This time in the JULD array will be the last time before the float was recovered. Determined by inspection of data	
903		Pressure offset used to correct APEX pressure measurements	APEX

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] <i>or</i> Primary sampling: discrete [description] <i>or</i> 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] <i>or</i> Secondary sampling: discrete [description] <i>or</i> 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] <i>or</i> Near-surface sampling: discrete, pumped/unpumped [description] <i>or</i> 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] <i>or</i> Bounce sampling: discrete [description] <i>or</i> 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.
- 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]"

3.17 Reference table 17: **obsolete**

This table has been removed.

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.

3.19 Reference table 19: STATUS flags

flag	Meaning
0	Value is estimated from pre-deployment information found in the metadata
1	Value is estimated using information not transmitted by the float or by procedures that rely on typical float behavior
2	Value is transmitted by the float
3	Value is directly computed from relevant, transmitted float information
4	Value is determined by satellite
9	Value is not immediately known, but believe it can be estimated later

3.20 Reference table 20: GROUNDED flags

flag	Meaning
Y	Yes, the float touched the ground
B	Yes, the float touched the ground after bathymetry check with an outside database
N	No, the float did not touch the ground
S	Float is known to be drifting at a shallower depth than originally programmed
U	Unknown

3.21 Reference table 21: REPRESENTATIVE_PARK_PRESSURE_STATUS

flag	Meaning
1	Value is the weighted average of pressure measurements regularly sampled during the drift phase and provided by the float
2	Value is the mean value, directly provided by the float, of the pressure measurements regularly sampled during the drift phase
3	Value is the median value, directly provided by the float, of the pressure measurements regularly sampled during the drift phase
4	Value is the pressure measurement sampled at DDST
5	Value is the average of the min and max pressure measurements sampled during the drift phase (the precision is 1 bar)
6	Value is the PARKING_PRESSURE meta-data but the float is programmed to sample measurements during the drift phase (i.e. drift measurement is missing)
7	Value is the PARKING_PRESSURE meta-data for this float which does not achieve any measurement during the drift phase

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>

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>

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:

- R1900045_003.nc, R1900045_003D.nc
- R1900046_007_01.nc, R1900067_007_02.nc, R1900067_007_03.nc
- R1900046_007D_01.nc, R1900067_007D_02.nc, R1900067_007D_03.nc
- 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>_<R/D>traj.nc

- R: real-time data
- D: delayed-mode data

Examples

1900045_Rtraj.nc : real-time trajectory from float 1900045

1900045_Dtraj.nc : delayed-mode trajectory from float 1900045

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>

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	2003080500000 0	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	2003080500000 0	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	2003080500000 0	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	2003080500000 0	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_OCTEST	AO	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	2003080500000 0	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_OCTEST	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	C1	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	2003080500000 0	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 File submission from DAC to GDACS

Each DAC submits regularly all its new files to both USGODAE and Coriolis GDACS.

On both GDACS, each DAC has an ftp account with:

- a submit directory to submit files;
- a reject directory that contains the submitted file that were rejected by GDACS files format checker.

Seven types of files are accepted on GDAC:

- A float metadata file
- A float trajectory file
- A float technical data file
- An float's cycle file
- The DAC's geylist
- A removal file
- A compressed file containing a series of above files

Each GDAC checks the file format. If agreed, the file is pushed on the GDAC ftp server or processed. Otherwise, the file is moved in the reject directory, an error message is sent to the DAC contact point. Rejected files are kept in the reject directory for one month at least.

6.2 Greylist files operations

6.2.1 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.

6.2.2 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.

Greylis file collection from DAC to GDAC:

1. Query xxx_greylis.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_greylis.csv . The whole file is rejected if 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_greylis.csv file

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

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

6.3 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 if 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.

6.4 Compressed files data distribution

Once a month, a compressed version of dac, geo and latest data directories is distributed on:

- <ftp://ftp.ifremer.fr/ifremer/argo/etc/argo-zip/>

DAC directory

- One compressed file for each DAC
Example : <ftp://ftp.ifremer.fr/ifremer/argo/etc/argo-zip/dac/aoml.tar.gz>
- The compressed index of profile files : ftp://ftp.ifremer.fr/ifremer/argo/etc/argo-zip/dac/ar_index_global_prof.txt.gz

Geo directory

- One compressed file for each ocean
Example : ftp://ftp.ifremer.fr/ifremer/argo/etc/argo-zip/geo/atlantic_ocean.tar.gz

Latest data directory

- The compressed latest data directory
ftp://ftp.ifremer.fr/ifremer/argo/etc/argo-zip/latest_data/latest_data.tar.gz

6.5 Compressed files data submission

A DAC can push to GDAC a compressed file containing a series of files. The GDAC will process all its content. This is useful to submit an important batch of files (example : delayed mode data).

The compressed file is a tar-ed file or directory compressed with gzip.

Compressed file naming convention

XXX.tar.gz

- XXX : the compressed file name, with no specific requirement
- tar : tar suffix
- gz : gzip suffix

Example: coriolis-201210-DelayedMode.tar.gz