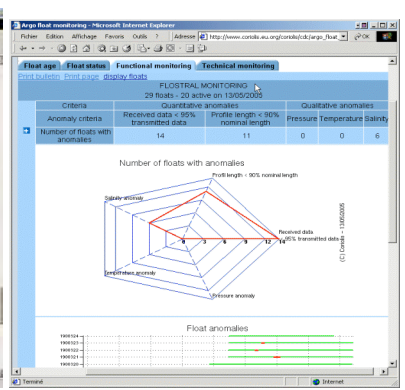
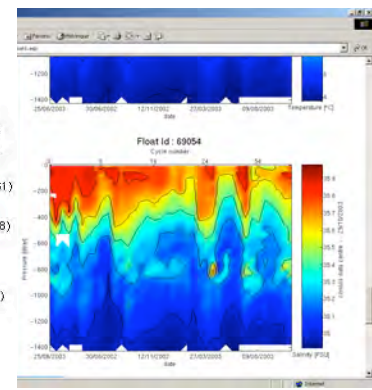
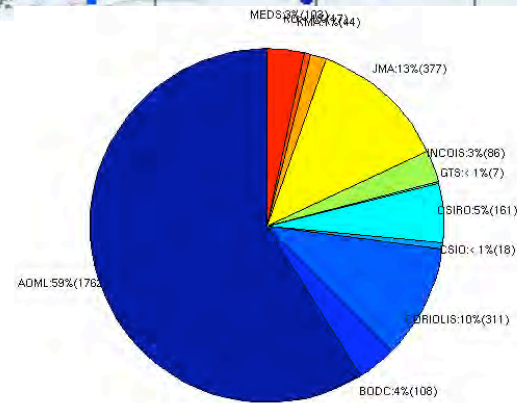
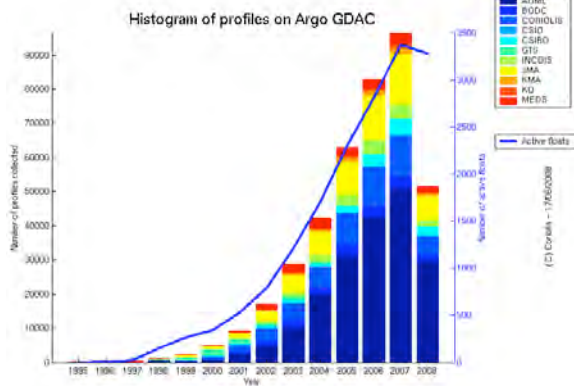
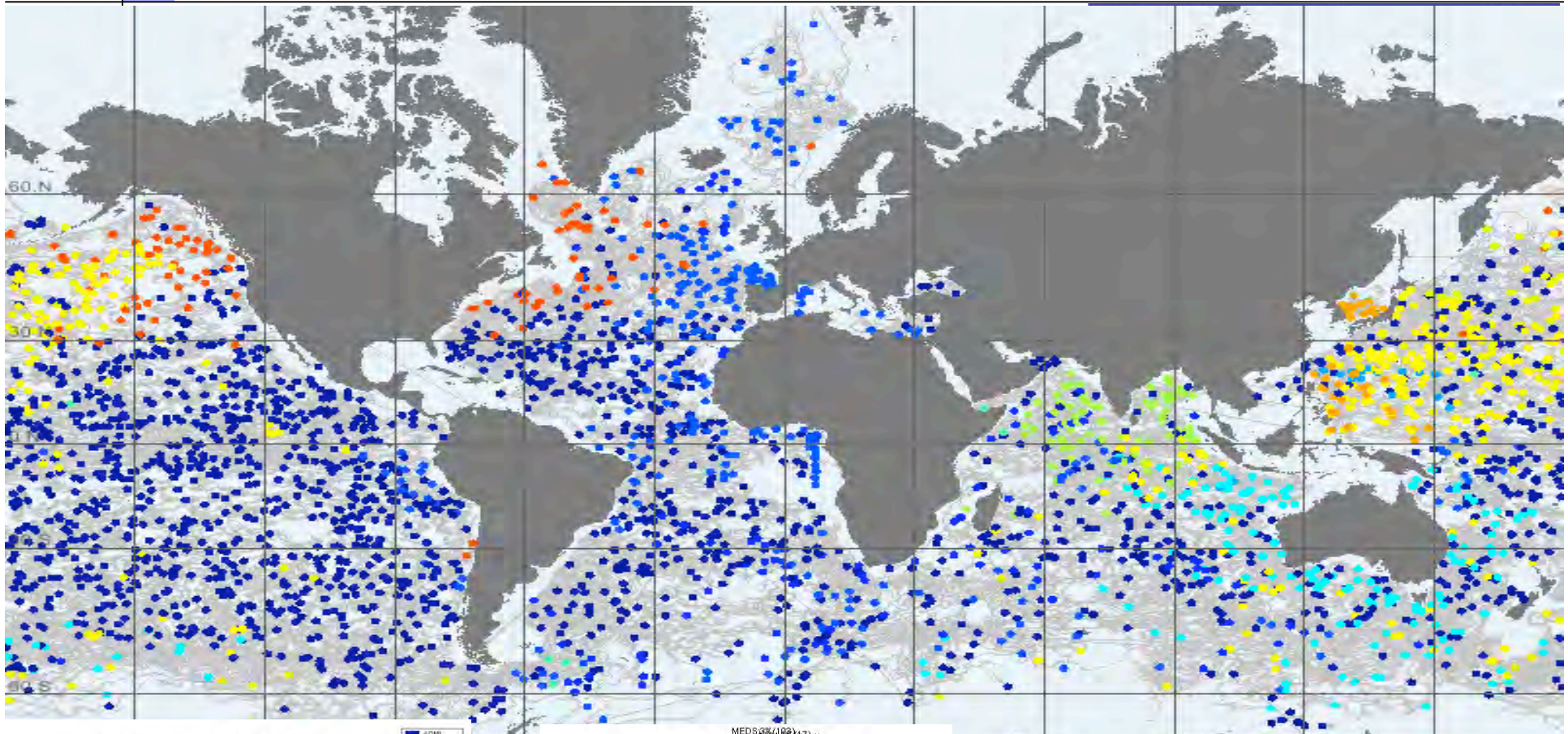


# Argo data management

ARGO

part of the integrated global observation strategy



## The missions

- 
- Collect the data and process them
- Quality control the data within 24h using agreed procedures
- Distribute the Argo data on GTS and on Internet from a unique access point
- Correct in delayed mode the profiles using agreed procedures
- Inform Users on the Argo network
- Archive the data on the longer term



## Argo data management actors

### ■ PI : Principal Investigators

The scientists who deploy the floats, then carry out delayed mode QC and return data to DAC Centres within a few months of observations. **Delayed mode operators** may help PIs for Delayed mode QC

### ■ DAC: Data Assembly Centres

The DACs are facilities set up by many of the nations deploying floats. Their role is crucial in acquiring the raw data from the floats and standardizing the handling. Their functions include :

- collecting data
- converting to standard exchange formats
- applying standardized real-time quality control
- delivering data to the GTS and GDACs within 24 hours of the surfacing and to PIs on a more relaxed schedule
- coordinating Argo data handling for the floats under their control

### ■ GDAC : Global Data Centres

The GDACs are the data servers where the master copies of the data reside. The Argo global dataset is available from GDACs; central points for data distribution on Internet for all floats.

Located in Monterrey (US GODAE/FNMOC/USA) and Brest (Coriolis/Ifremer/France). A synchronization between the 2 GDACs centres occurs daily.



## Argo data management actors

- **RDAC : Regional Data Centres**

The Regional Centres look at data from ocean basins to verify float data consistency and generate products.

They provide basin-wide synthesis of all floats data with other available data. They provide a feedback to Pis on delayed mode quality control.

- **AIC : Argo Information Centre**

Centre located in Toulouse/France, in charge of informing on the Argo program status and to provide all necessary information to users.

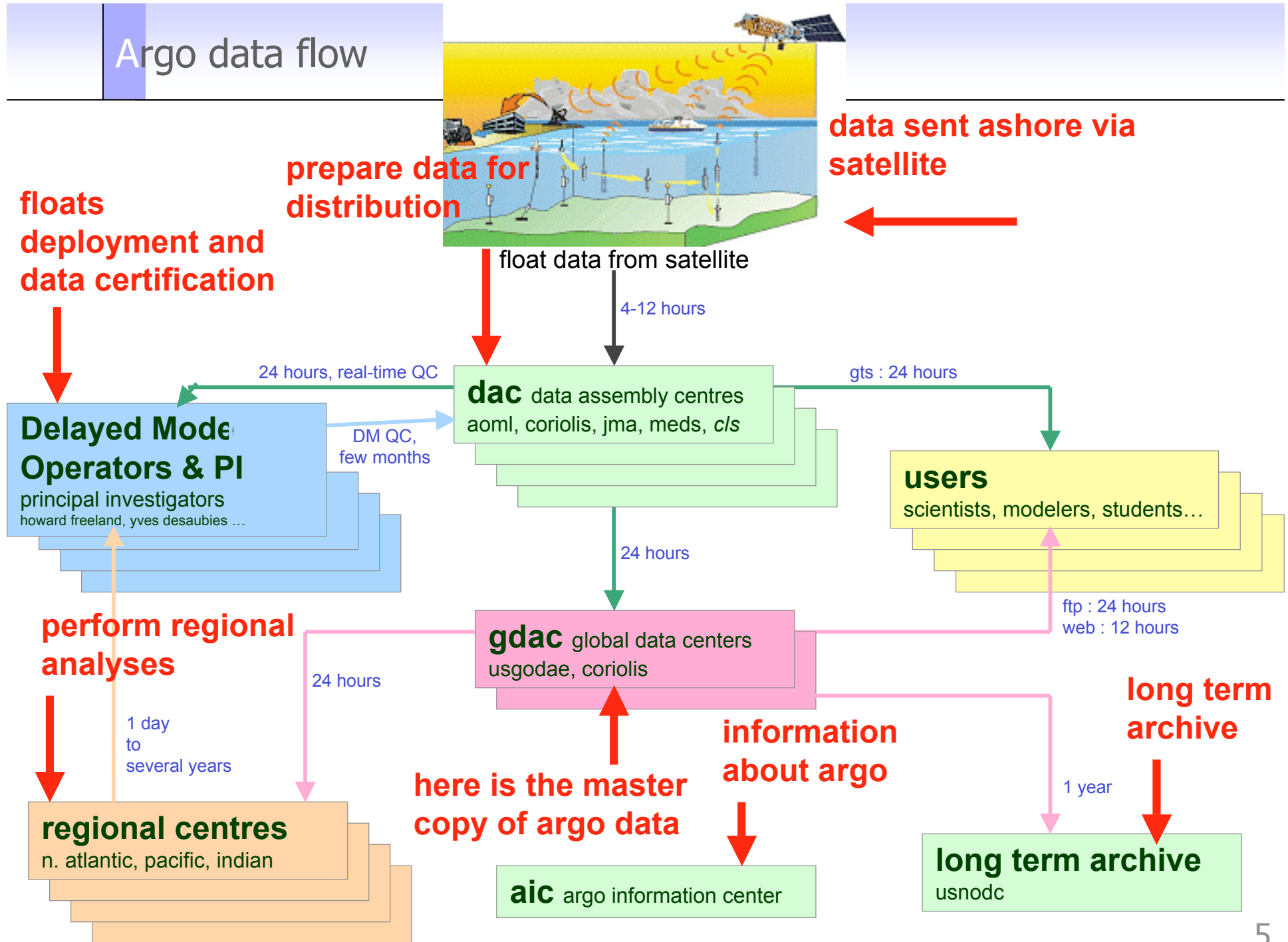
- **Argo long term archive**

Data centre located in NODC/USA in charge of the long term archive of all Argo data.





# Argo data flow



## In Real Time

One EU GDAC: Coriolis

Two National Data Centers  
NERC - Coriolis

# European Contribution to the Argo Data System

Two RDACs  
coordinated by  
Coriolis and NERC

User works  
June 2008

In Delayed  
mode



Four Delayed Mode  
Operators

NERC – BSH- Coriolis- OGS

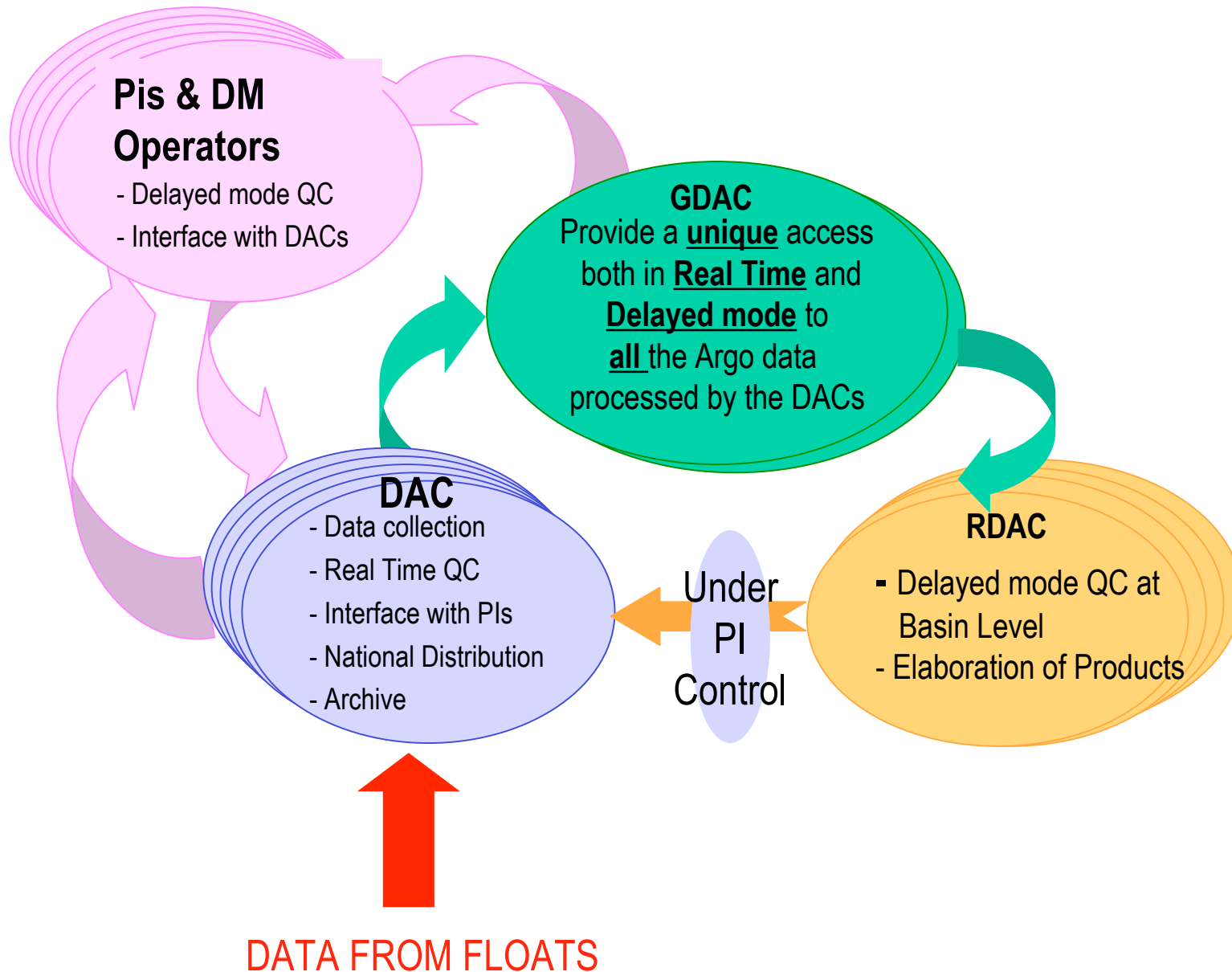


# Who does What

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# Argo quality control process

**Data from floats**



**Real-time (RT) data stream**

**Function:** Apply agreed RT QC tests to float data. Assign quality flags.

**Users:** Operational centres, data assimilation, researchers needing timely data.

**Timeframe:** 24-48 hrs after transmission.

**Who/Where:** Performed by National Data Assembly Centres.

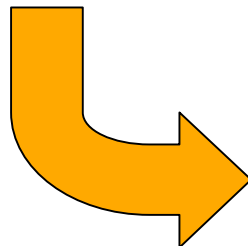
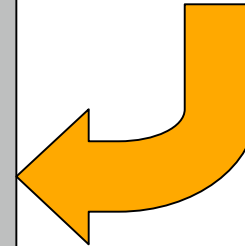
**Delayed-mode (DM) data stream**

**Function:** Apply accepted DM procedures to float data. Provide statistically justified corrections using accepted methods. Provide feedback to RT system.

**Users:** All needing adjusted data with error estimates.

**Timeframe:** 6-12 months after transmission.

**Who/Where:** Perform by PIs with DM Agencies or Regional Centres.



**Regional Analysis**

**Function:** Provide basin-wide synthesis of all float data with other available data.

**Users:** Researchers of climate change and model validation.

**Timeframe:** Lifespan of float.

**Who/Where:** Perform by Regional Centres.

**All data are available from the two Argo Global Data Assembly Centres: Coriolis at IFREMER, and USGODAE at Monterey.**



# Argo real-time quality control



## ■ Profiles : 17 automatic QC tests performed before gdac and gts distribution

- 1 Platform Identification
- 2 Impossible Date
- 3 Impossible Location
- 4 Position on Land
- 5 Impossible Speed
- 6 Global Range
- 7 Regional Range
- 8 Pressure Increasing
- 9 Spike
- 10 *Top and Bottom Spike : removed*
- 11 Gradient
- 12 Digit Rollover
- 13 Stuck Value
- 14 Density Inversion
- 15 Grey List
- 16 Gross salinity or temperature sensor drift
- 17 *Visual QC (not mandatory)*
- 18 Frozen profile
- 19 Deepest pressure

## ■ Trajectories : 7 automatic QC tests performed before gdac and gts distribution

- 1 Platform Identification
- 2 Impossible Date
- 3 Impossible Location
- 4 Position on Land
- 5 Impossible Speed
- 6 Global Range
- 7 Regional Global Parameter

## ■ QC flag scale

- 0 No QC was performed
- 1 Good data
- 2 Probably good data
- 3 Bad data that are potentially correctable
- 4 Bad data
- 5 Value changed
- 6 Not used
- 7 Not used
- 8 Interpolated value
- 9 Missing value

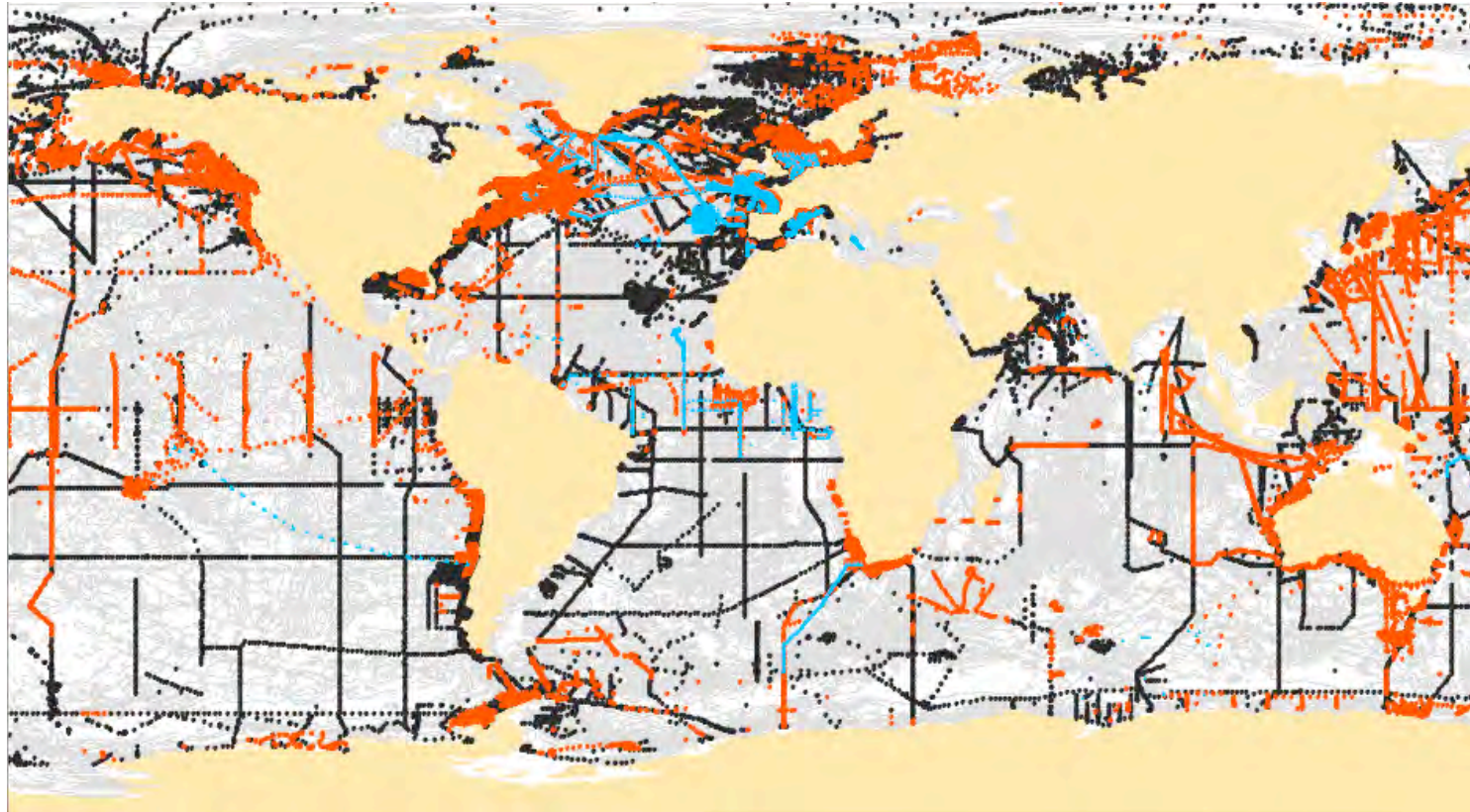
Reference data base for delayed mode QC :  
A need for more recent CTD

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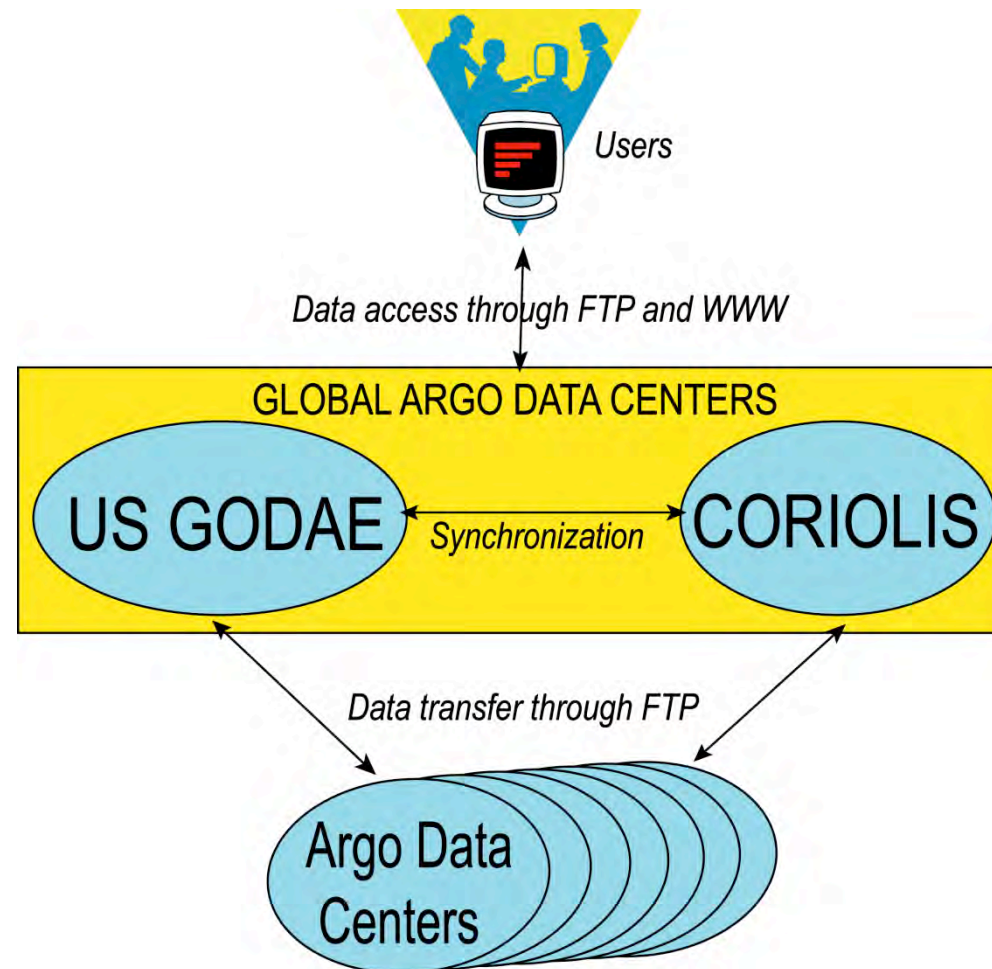


Black (WOD2001) – Orange (WOD2005) – Blue : new CTD

Coordinated by Coriolis (C Coatanoan)

Collaboration with Clivar/CCHDO NODC/USA and PIs

- The GDAC FTP sites provide the master copy of Argo data set (meta-data, profiles, trajectories and technical informations).
- The GDAC keeps the highest processing level of floats data. It is not in charge of archiving the different versions of float data.



# Argo data transfer from DACs to GDACs FTP sites

## Principles

- Each national center has an FTP account on the global data servers
- When a new cycle is available, the National DAC :
  - Applies real-time quality controls to the new profile(s) and trajectory
  - Distributes simultaneously to both GDACs in NetCDF format :
    - ✓ The new profile(s)
    - ✓ The trajectory file
    - ✓ The technical file
  - Distributes the profile(s) to GTS  
(GTS distribution may be performed by CLS-Argos)
- For new floats Metadata must be transferred first





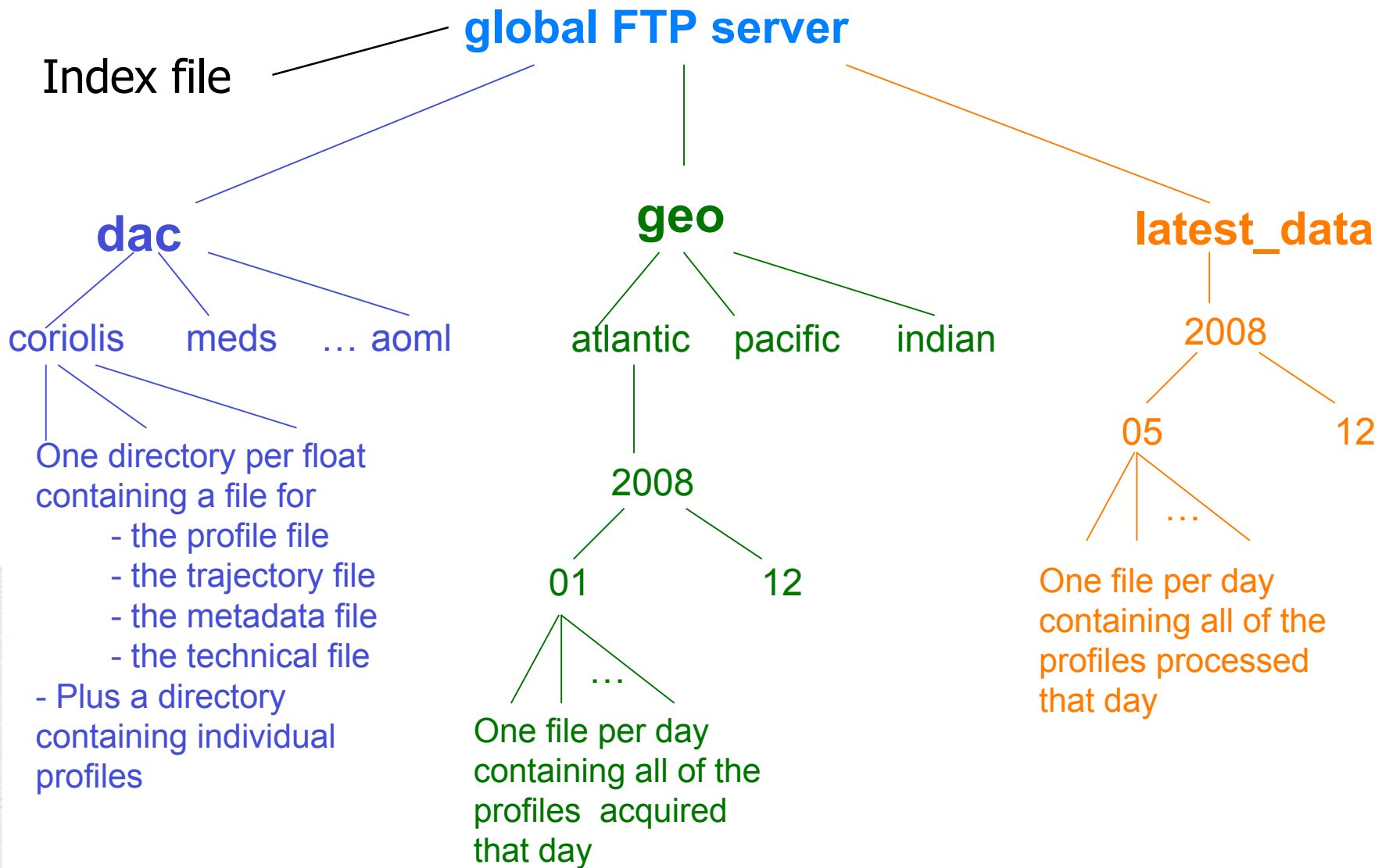
## Argo GDAC : content and data formats

- On GDAC FTP site, for each float, 4 types of informations are handled.
  - Metadata file : general informations on the float life.
  - Profile file : one file per profile.  
It contains both original data acquired by the float and the best available profile together with quality flags.  
Note : for users convenience, some aggregated profile files are generated by GDAC.
  - Trajectory file : one file containing the complete trajectory of the float as well as the measurements collected while drifting.
  - Technical file : one file containing the technical information provided by the float.
- Argo NetCDF format is used for metadata, profile, trajectory and technical files.  
Argo NetCDF data format is described in « Argo users's manual »  
<http://www.coriolis.eu.org/cdc/argo/argo-dm-user-manual.pdf>





# Argo GDAC FTP structure



# Monitoring the network at GDAC

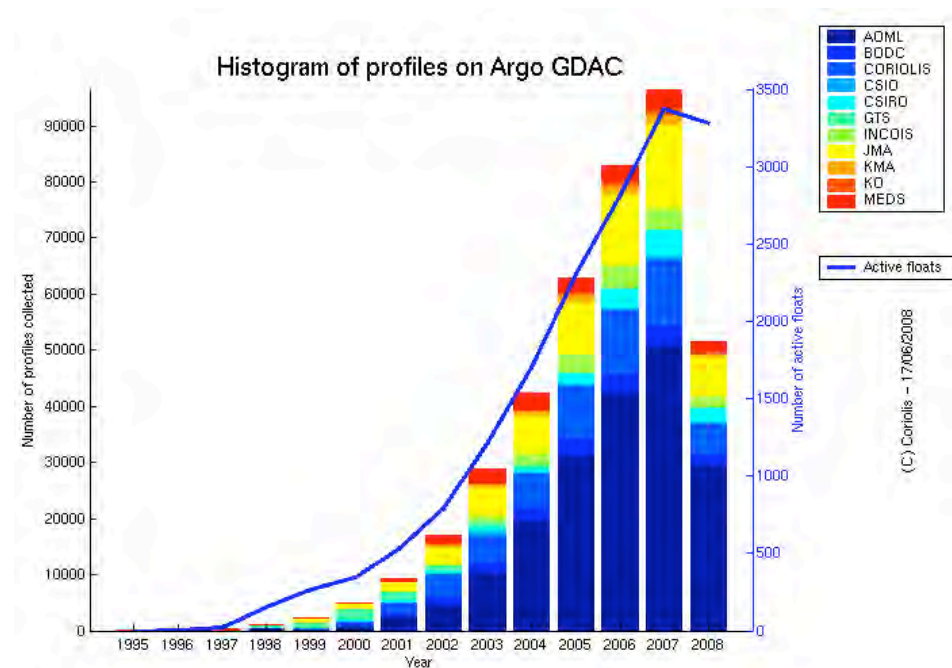
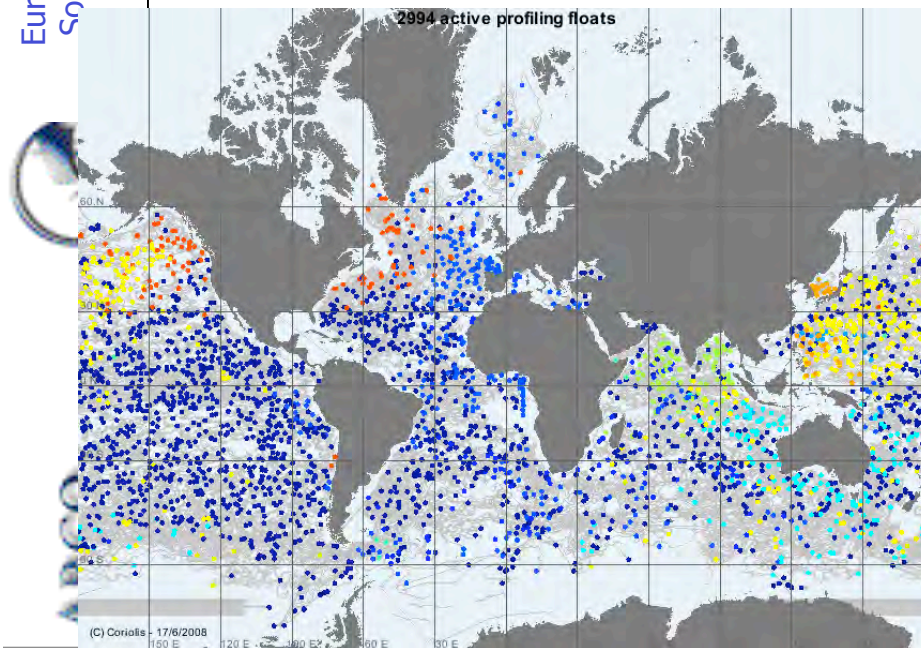
## ■ Done at Two levels

- At AIC that covers all Argo aspects
- At GDACs on the data stream only

## ■ At GDAC [http://www.coriolis.eu.org/cdc/argo\\_gdac\\_monitoring.htm](http://www.coriolis.eu.org/cdc/argo_gdac_monitoring.htm)

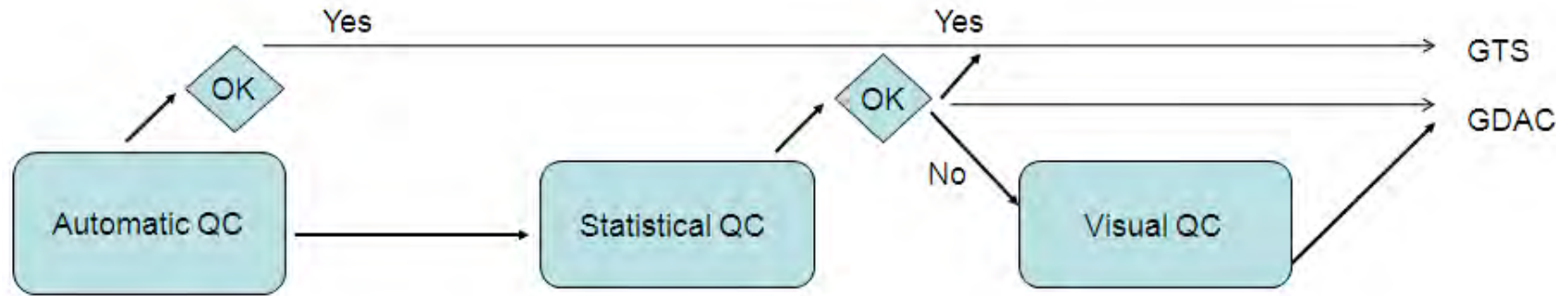
- Format checker to verify that the Netcdf format is correct and that mandatory fields are filled
- Provide statistics on data coverage, country repartition, Real-time and delayed mode data available at GDAC

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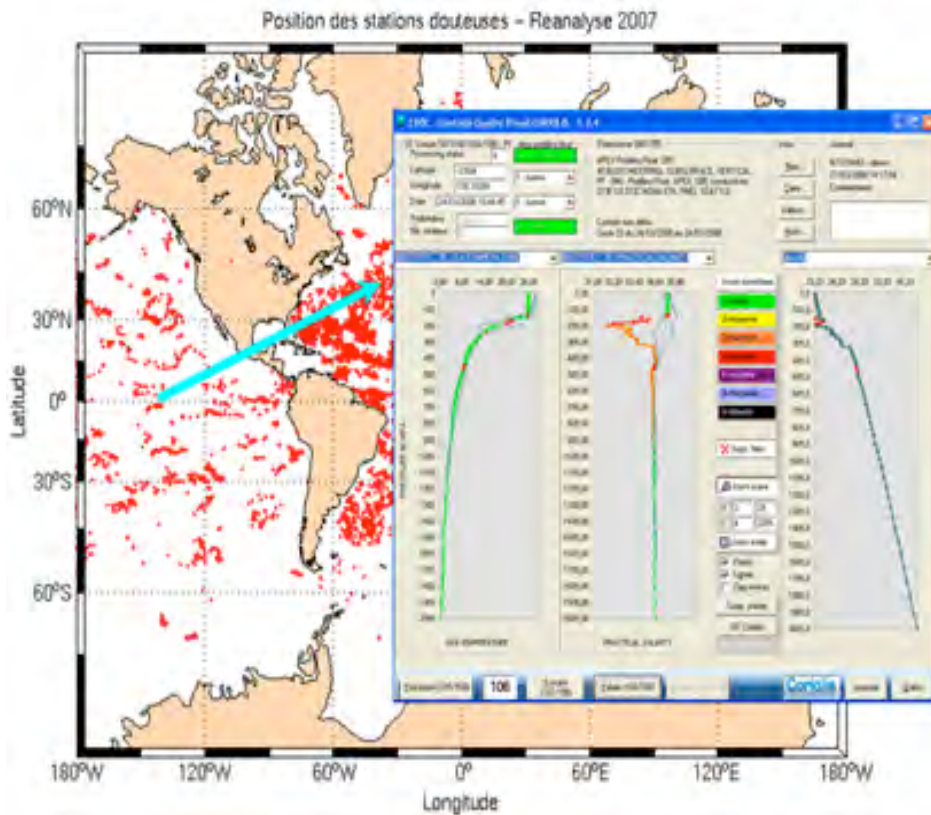


# Data Consistency an Argo Regional Center activity

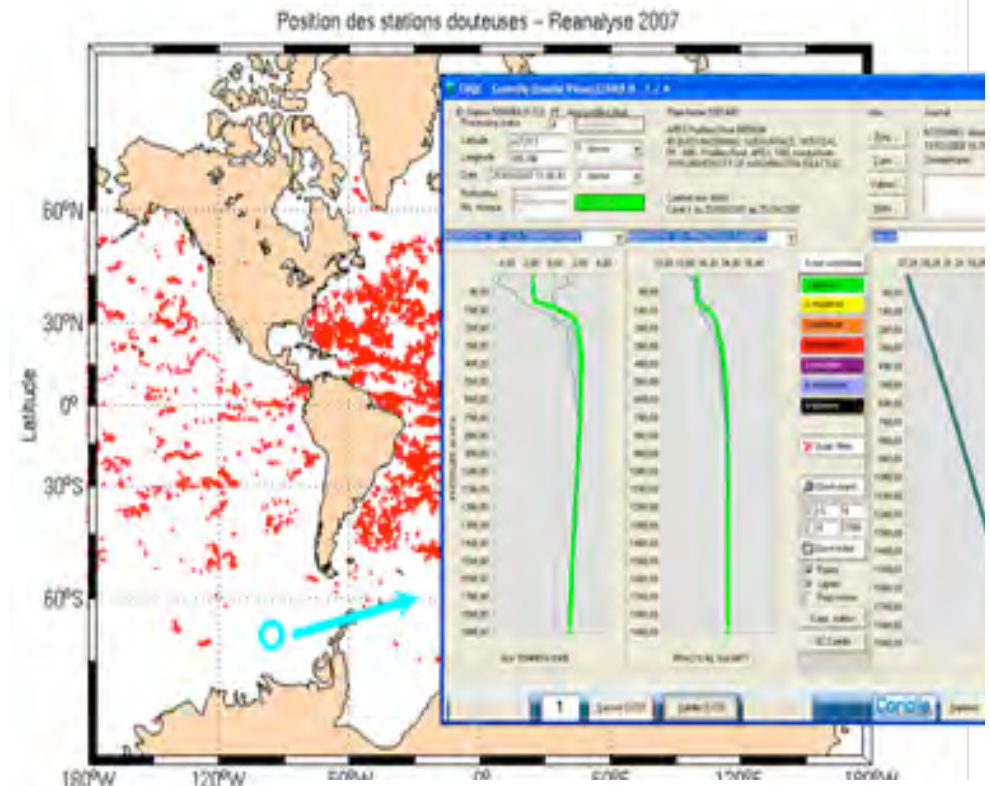
shop  
3



Emilie Brion Coriolis France



Spike small to be detected automatically

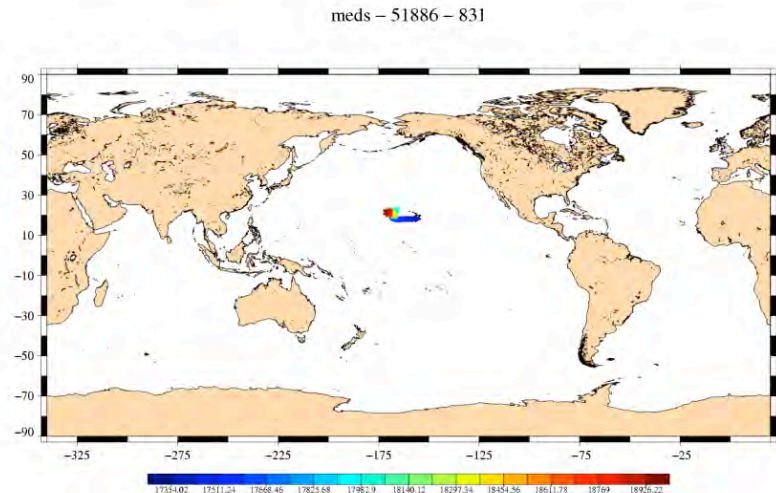
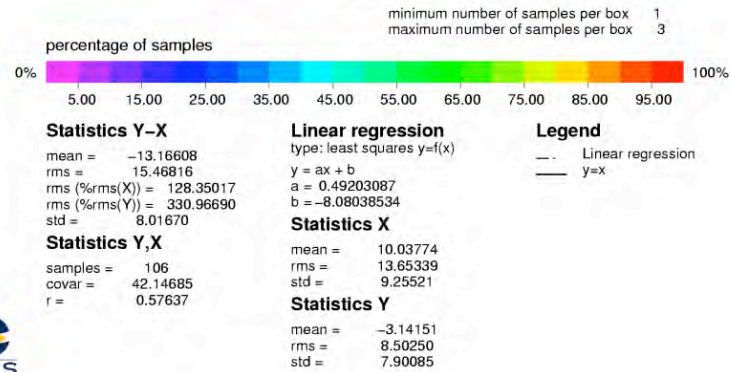
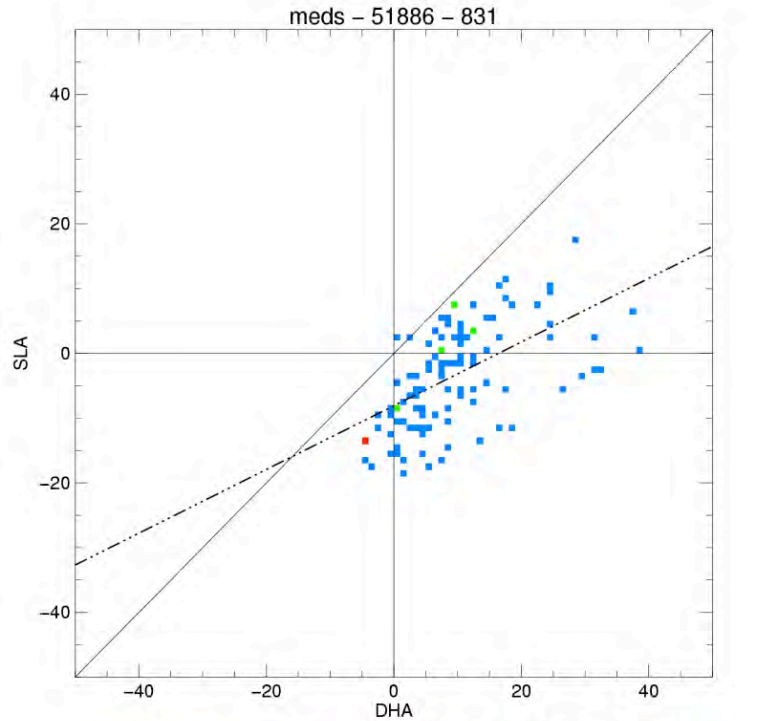


Poor climatology and strong current area

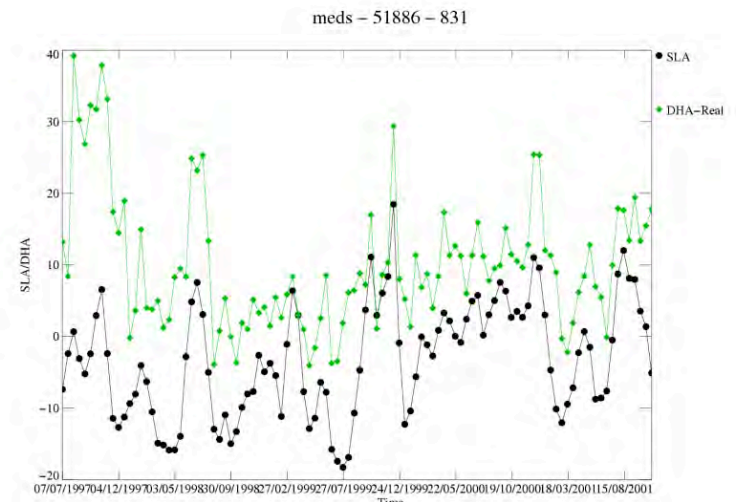


# Validate the consistency by comparing to altimetry

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Green : real time DHA from Argo  
Black : SLA from Altimetry



➔ Good correlation but offset of 13 cm

# Argo data management reference documents

## ■ Reference documents

- Data management web page : [http://www.coriolis.eu.org/cdc/argo/argo\\_data\\_management.htm](http://www.coriolis.eu.org/cdc/argo/argo_data_management.htm)
- Beginner's guide to Argo data : [http://www.coriolis.eu.org/cdc/argo/Argo\\_data\\_guide.pdf](http://www.coriolis.eu.org/cdc/argo/Argo_data_guide.pdf)
- Data management policy : [http://www.coriolis.eu.org/cdc/argo/argo\\_data\\_management\\_handbook.pdf](http://www.coriolis.eu.org/cdc/argo/argo_data_management_handbook.pdf)
- GDACs organization : [http://www.coriolis.eu.org/cdc/argo/gdac\\_argo\\_servers-2.4.pdf](http://www.coriolis.eu.org/cdc/argo/gdac_argo_servers-2.4.pdf)
- User's manual; data formats : <http://www.coriolis.eu.org/cdc/argo/argo-dm-user-manual.pdf>
- Quality control manual : <http://www.coriolis.eu.org/cdc/argo/argo-quality-control-manual.pdf>

## ■ 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.coriolis.eu.org/cdc/argo.htm>
- The FTP addresses are :
  - <ftp://usgodae1.fnmoc.navy.mil/pub/outgoing/argo>
  - <ftp://ftp.ifremer.fr/ifremer/argo>
- Data discovery : Live Access Server
  - <http://usgodae2.usgodae.org/las/servlets/dataset>
  - <http://www.usgodae.org/docs/lasget.html>
  - <http://www.ifremer.fr/las/servlets/dataset>
- Data discovery : web interface
  - [http://www.usgodae.org/cgi-bin/argo\\_select.pl](http://www.usgodae.org/cgi-bin/argo_select.pl)
  - <http://www.coriolis.eu.org/cdc/ArgoZonalDataSelection/cdcArgoZonalDataSelections.asp>
  - <http://www.coriolis.eu.org/cdc/dataSelection/cdcDataSelections.asp>
- Data access : OpenDAP
  - <http://www.usgodae.org/cgi-dods/nph-dods/ftp/outgoing/argo>
  - <http://www.ifremer.fr/cgi-bin/nph-dods/data/in-situ/argo>

