North-Atlantic Regional Data Center

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Overview

- Introduction: A North-Atlantic DAC
- Part I - Analysis of T and S at Coriolis: a contribution to the North-Atlantic DAC.
- Part II - Role of the RDAC in the Delayed Mode Quality Control of the ARGO data
- Part III – Other points
- Conclusion

A North-Atlantic RDAC

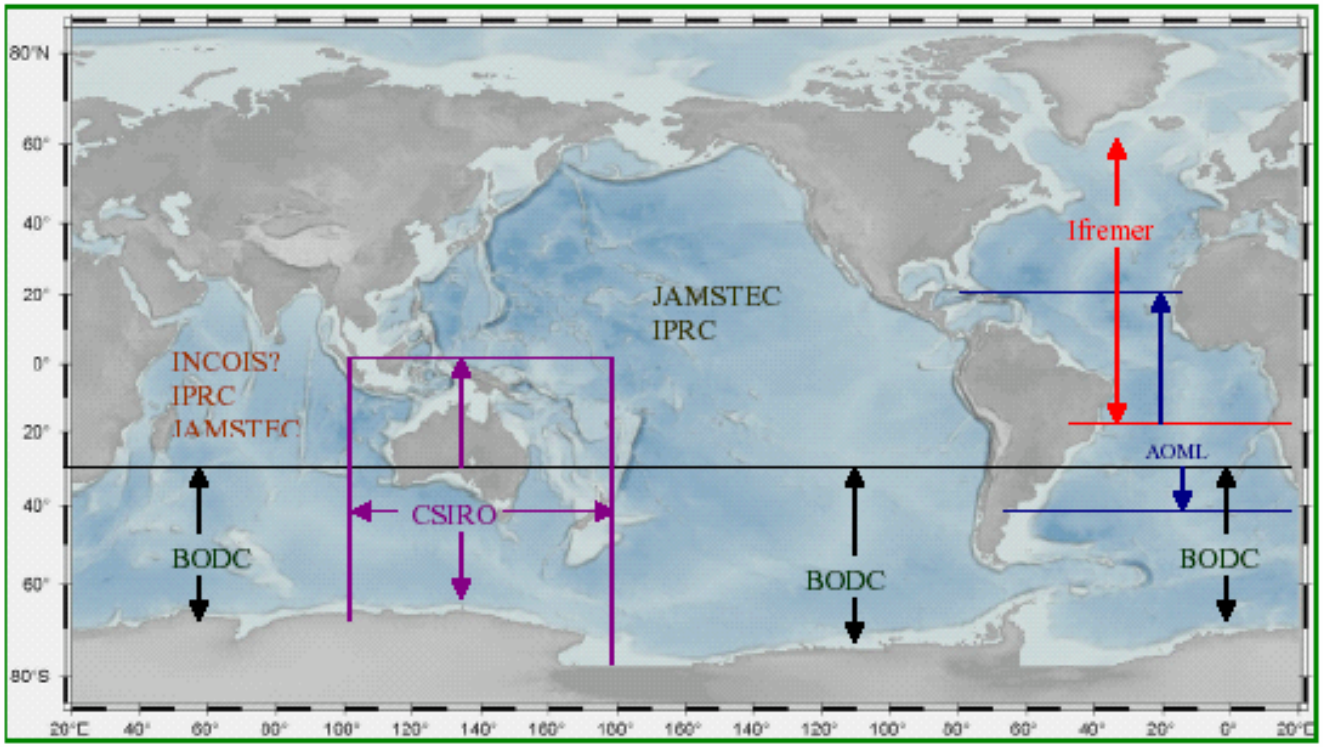


Figure 1 Area of interest of the institutes participating in Regional DACs implementation

Geographical extent: 60N-20S

Overlapping area with the SAARC

Should be setup end of 2005 or beginning of 2006

Part I
Analysis of Temperature and Salinity at the Coriolis data center

Contribution to the North-Atlantic RDAC and to other RDAC

Analysis of temperature and salinity at Coriolis: Methodology

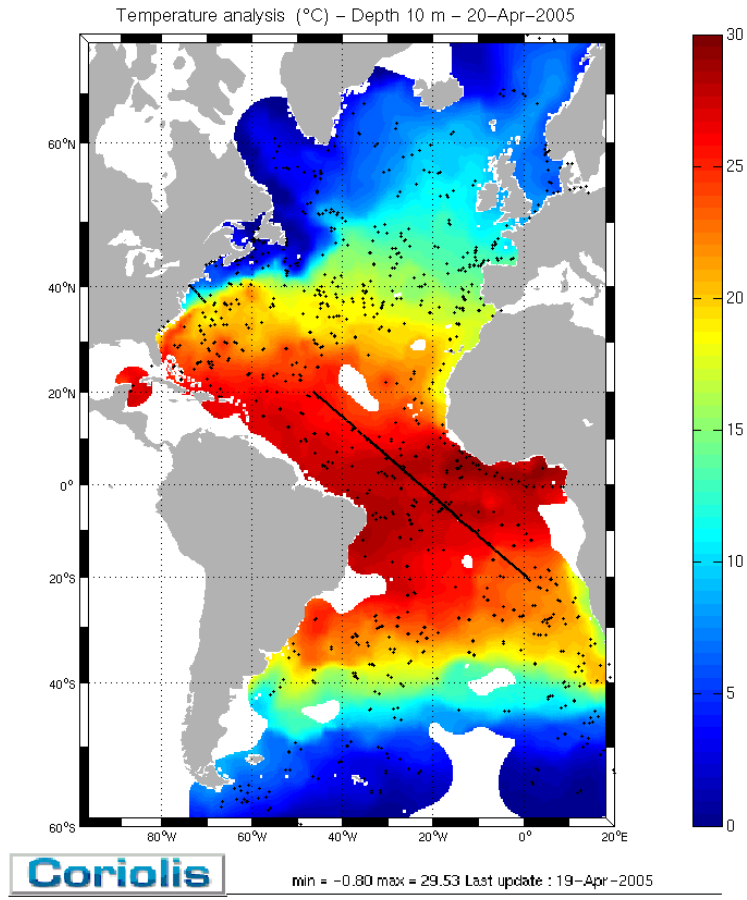
(in operational mode since December 2002)

Method: Objective analysis (Bretherton et al.,1975)

Data: Temperature and salinity profiles collected and controlled in real time by CORIOLIS from Argo profilers, GTS or oceanographic vessels (XBT, XCTD, CTD).

Analysis produced by the data center computes

- **T & S fields over the Atlantic**
  - on a 1/3° grid
  - at 59 levels down to 2000 m
- **Residuals for each observation**



Analysis of temperature and salinity at Coriolis : Applications

1. Residuals of daily analysis → improve real time QC flag

- Operational over the Atlantic at Coriolis
- Extension to the world ocean planned to become operational by June 2005 (prototype has been transferred to Coriolis data-center)

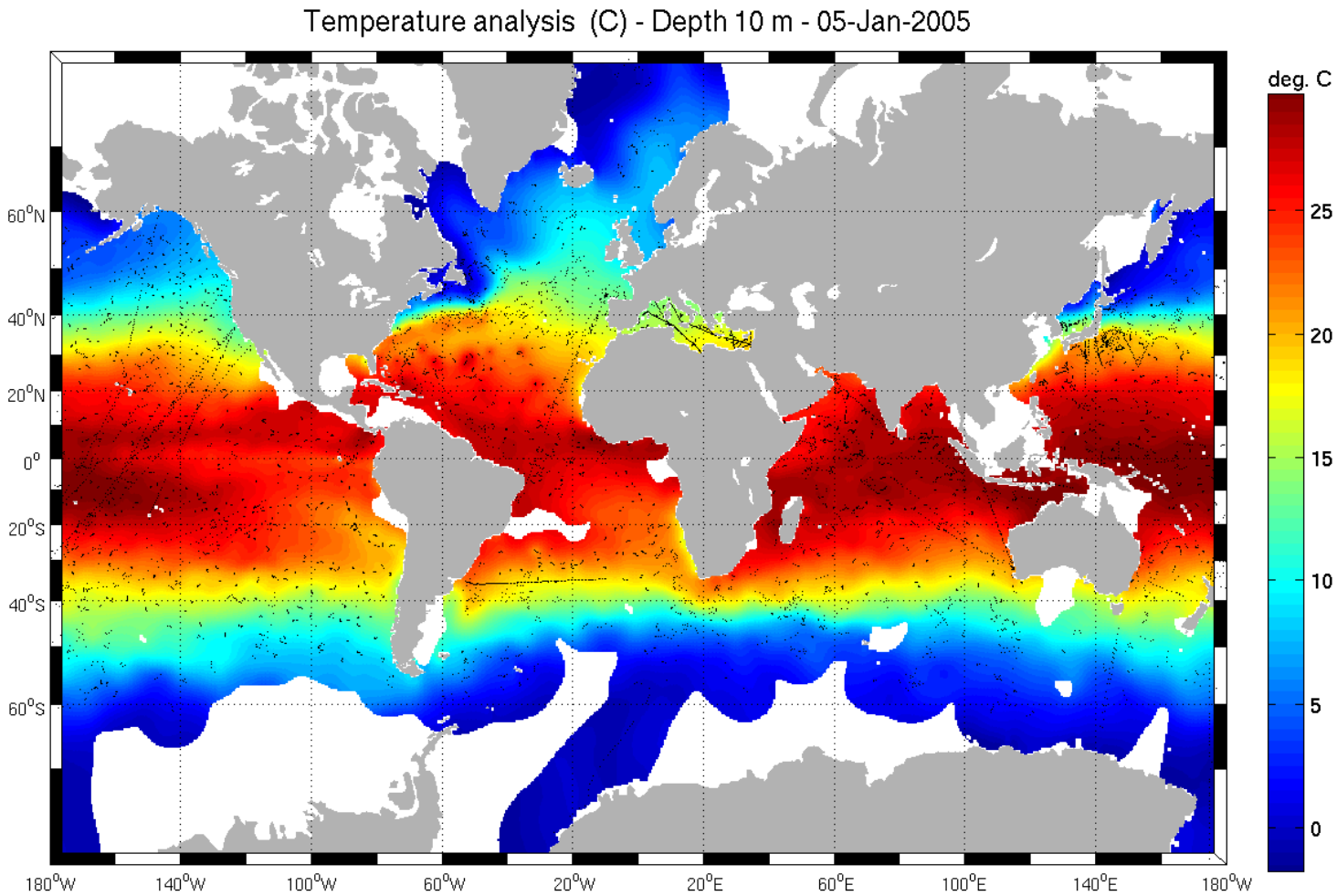
Analysis of temperature and salinity at Coriolis : Applications

2 . Weekly analysis → produce gridded fields of T and S

- Operational over the Atlantic at Coriolis (see Coriolis web site)
- The global prototype is available.
- Improvement planned (will be tested over a North-East Atlantic area end 2005):
  - Use Thermosalinometer data
  - Improve covariances – (continuous + depth dependance)
  - Introduce Kalman filter

Analysis of temperature and salinity at Coriolis : Applications

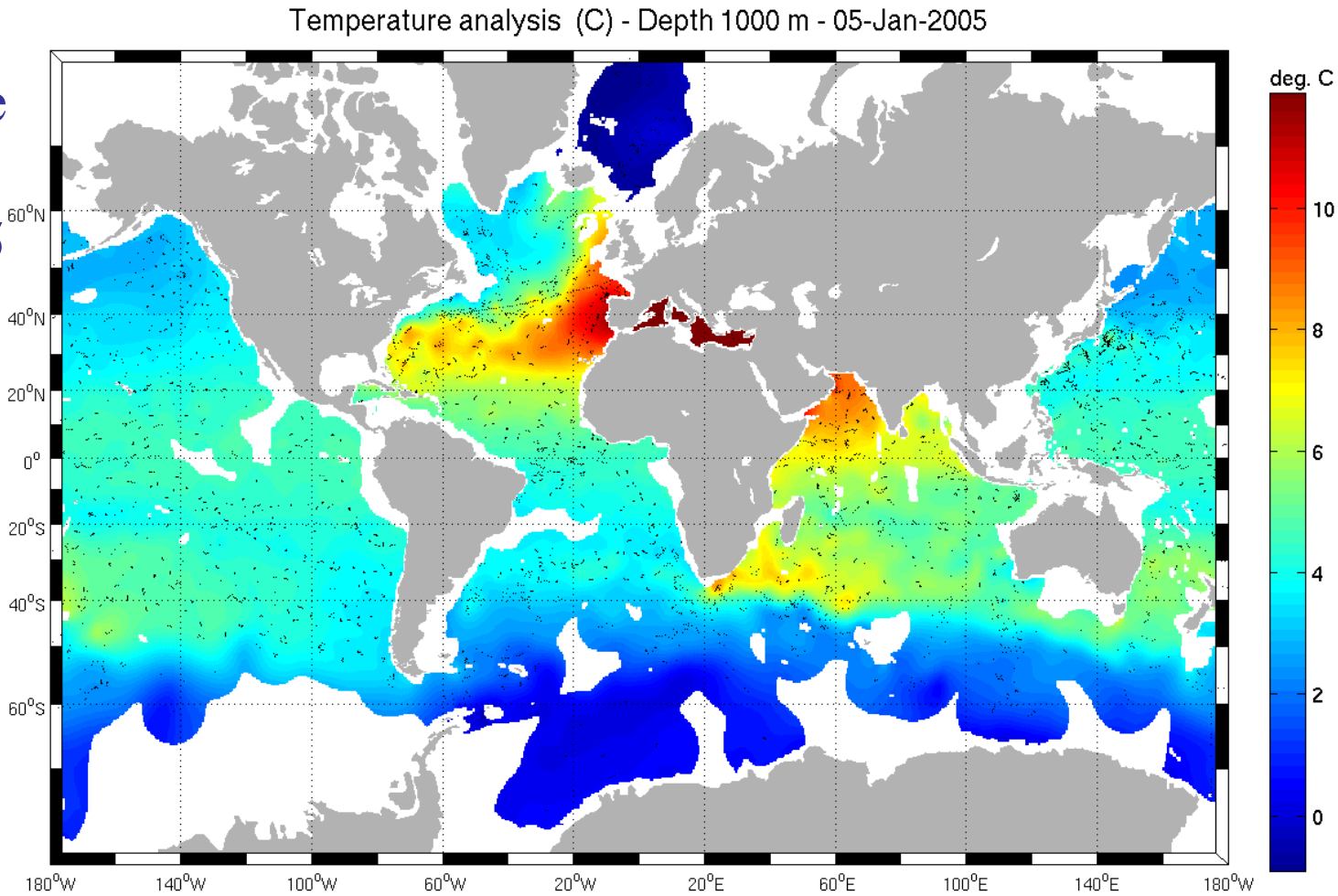
Temperature
at 10 m
05 Jan. 2005



min = -1.84 max = 30.68 Last update : 15-Mar-2005

Analysis of temperature and salinity at Coriolis : Applications

Temperature at 1000 m 05 Jan. 2005



min = -1.76 max = 14.22 Last update : 15-Mar-2005

Analysis of temperature and salinity at Coriolis : Applications

3 . Weekly Re-analysis → Climatology, variability, indicators

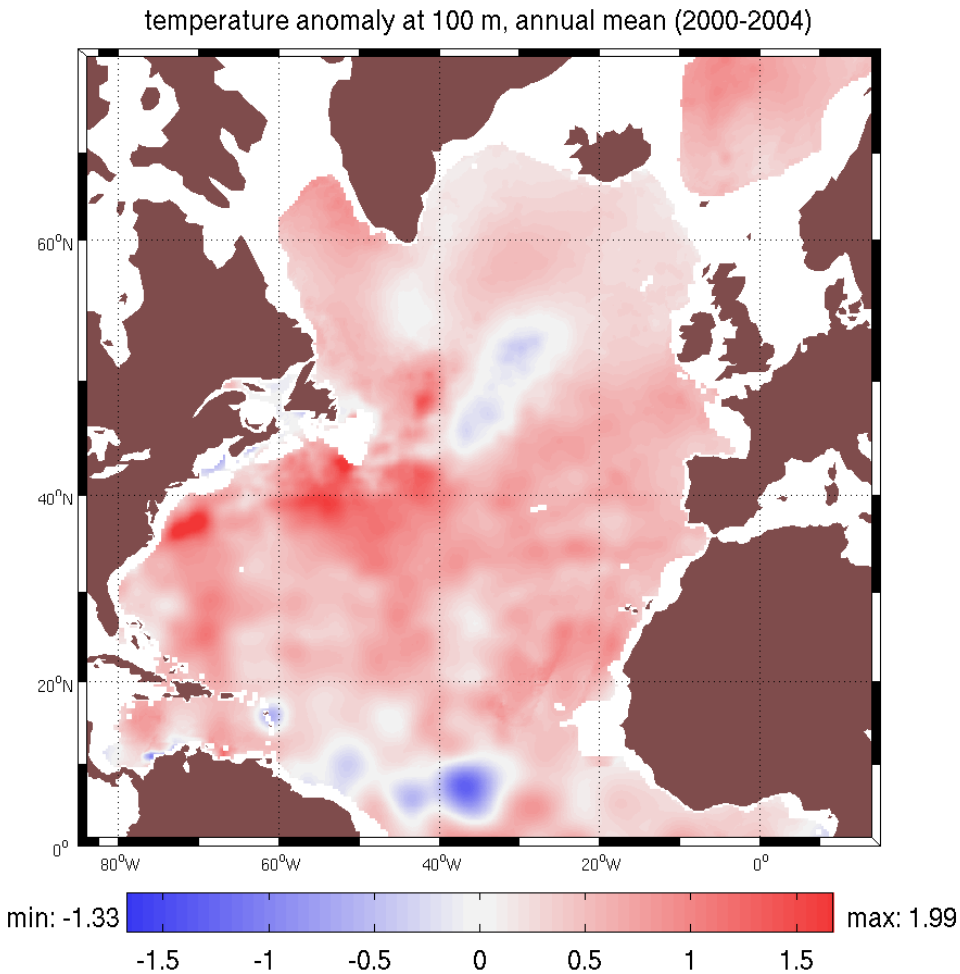
- A climatology of the North-Atlantic, representing the years 2000-2004 is in preparation (*Available june 2005*).
  - It will be available to improve real time QC (check against climatology)
  - It will be used as the background in future analysis

- We are presently analyzing the intra-seasonal to interannual variability
  - EOFs,
  - indicators (like time series of T and in key areas)
  - Mixed layer

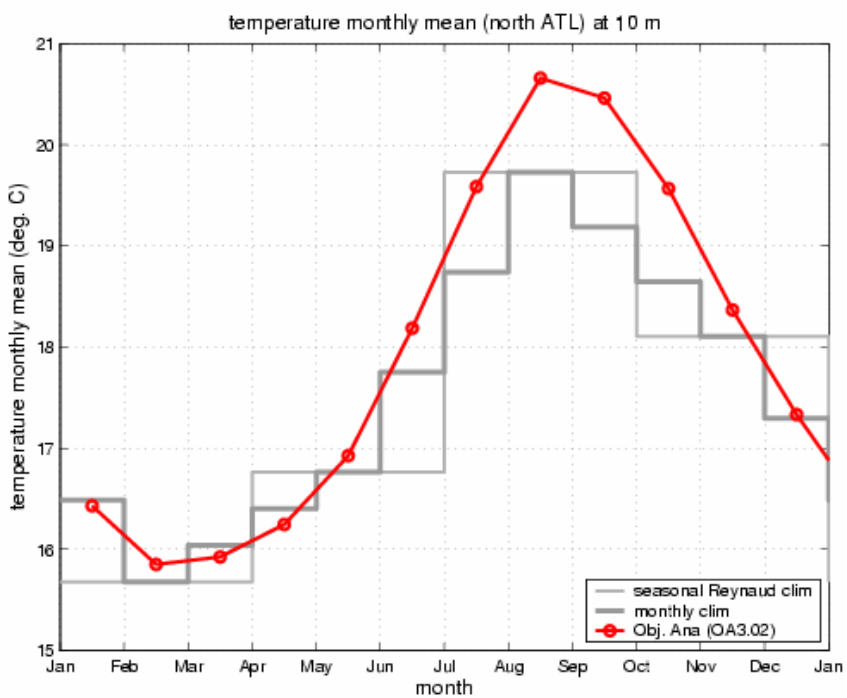
- First results: see next slides

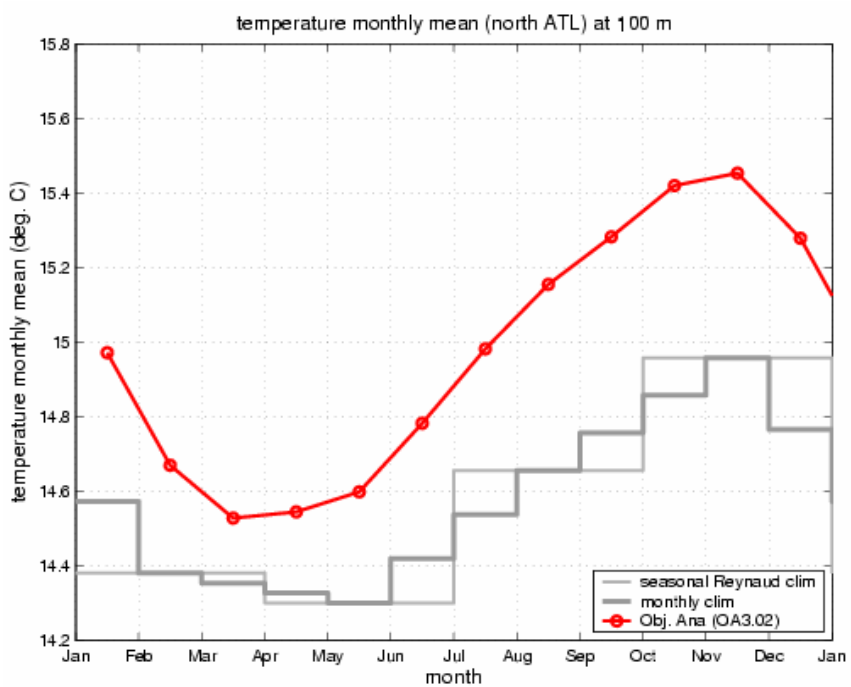
Analysis of temperature and salinity at Coriolis : Applications

- Mean temperature (2000-2004)
- Anomaly relative to Reynaud's 1998 climatology
- First results: **The upper ocean is warmer in 2000-2004 than in 1980-1990**, (predominantly in summer near surface)



Analysis of temperature and salinity at Coriolis : Applications





Mean temperature seasonal cycle

Analysis of temperature and salinity at Coriolis : Applications

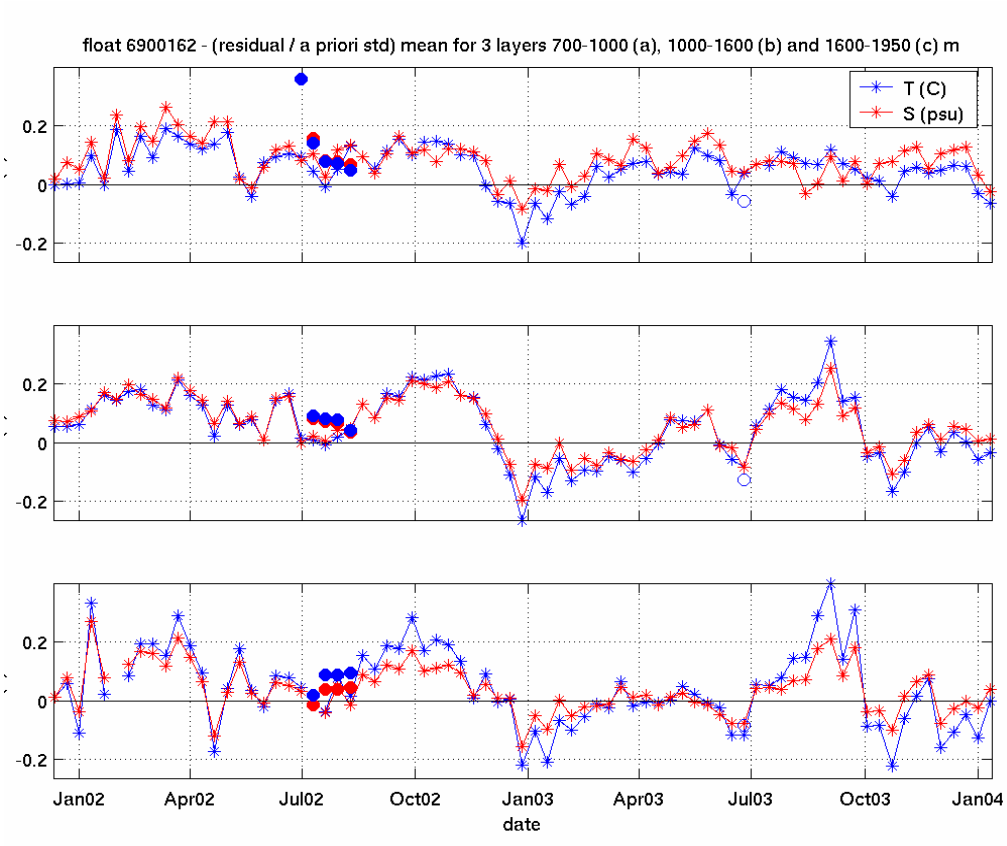
4 . Residuals of weekly analysis or re-analysis → Estimation of sensor long term drifts and offsets

➢ Residuals are due to instrument error (nominal accuracy + drift), sub-grid scales, or inconsistency between a priori statistics (climatology mean and variance)

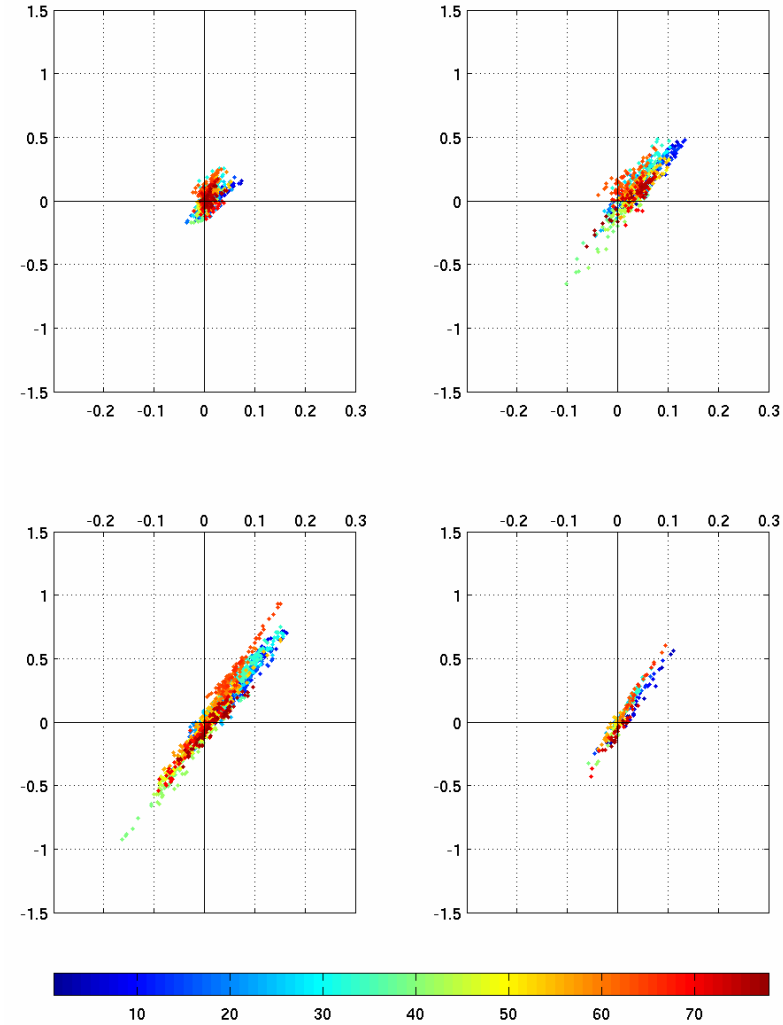
➢ Time and space structure of residuals
- help discriminate between these different components
- **complement to the statistical methods used at Coriolis for the delayed mode quality control of the ARGO data.**

➢ Statistical behavior of the residuals provide a mean for detecting sensor drifts or biases combining 3 methods usually applied separately:
- reference to a climatology
- colocation
- history of the sensor

Analysis of temperature and salinity at Coriolis : Applications



Time series of the adimensional residuals for 3 layers

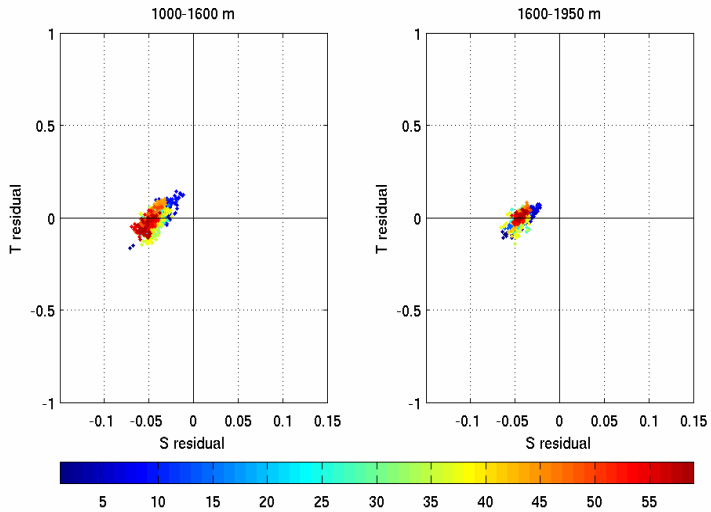


T residuals versus S residuals

Analysis of temperature and salinity at Coriolis : Applications

- Examples of temperature and salinity residuals
- Residual can reveal systematic drifts and offsets

Offset



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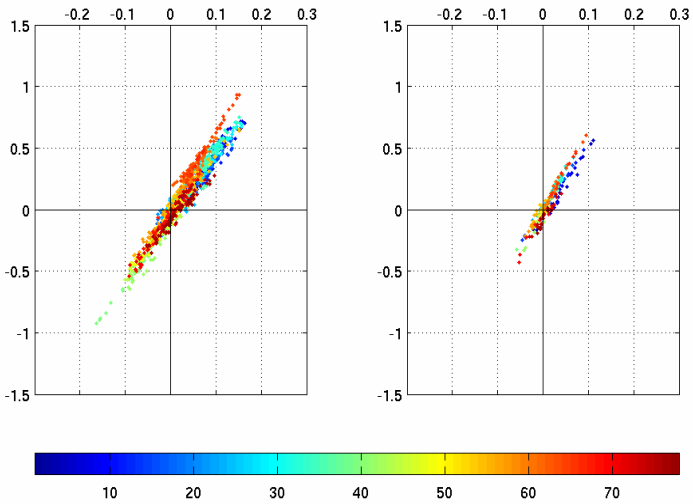
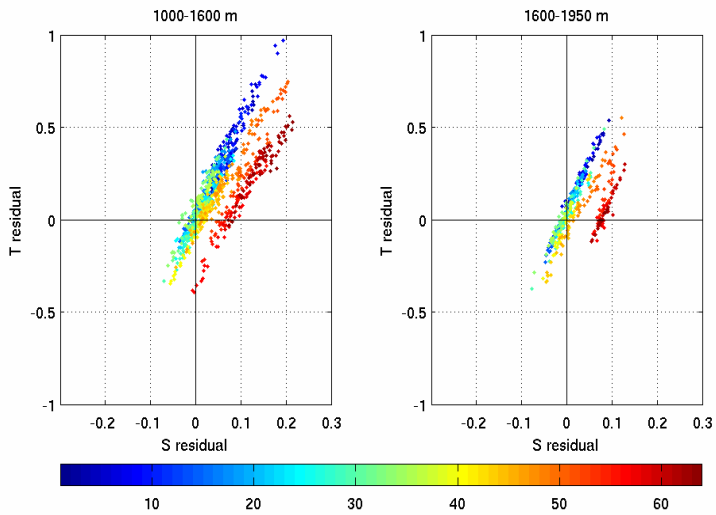
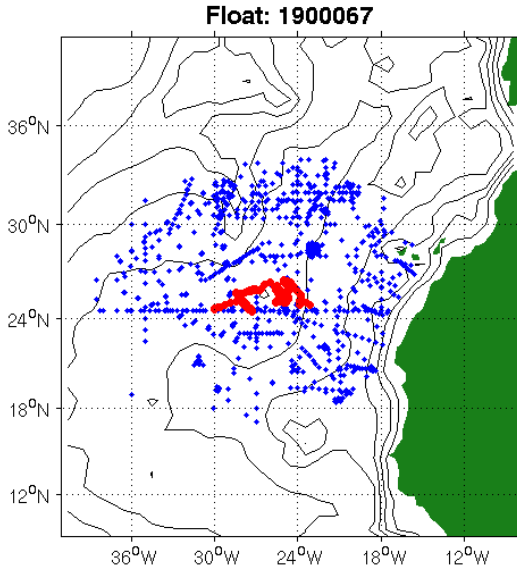


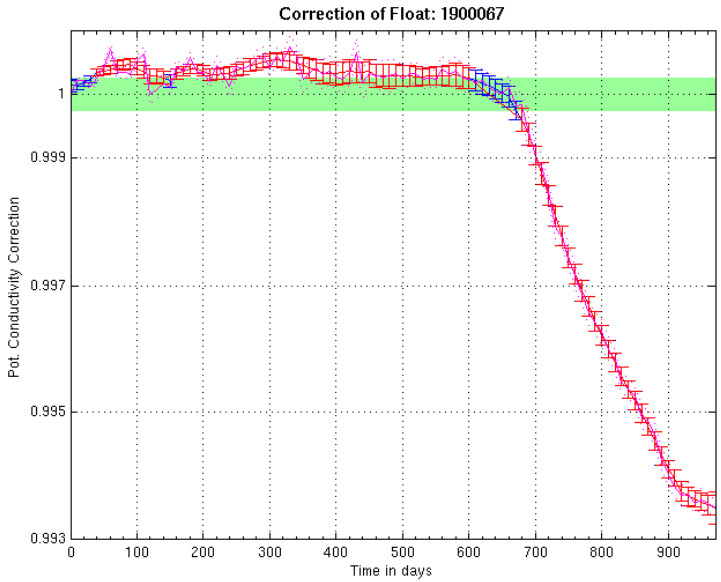
Drift

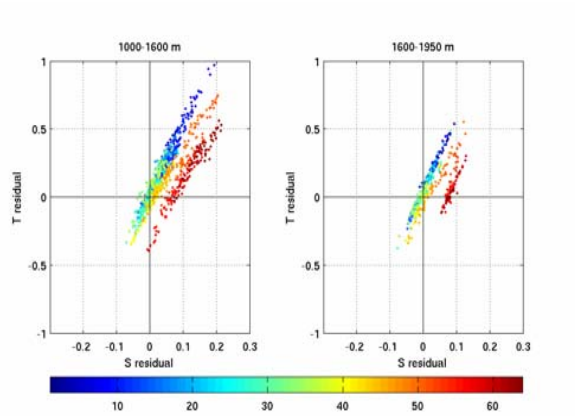


Part II
Role of the RDAC in the DMQC of the ARGO data

Role of the RDAC in the DMQC







The ARGO profile is compared to a climatological profile deduced from a reference database

The statistical method then proposed a mean conductivity correction (Wong et al 2003, Boehme and Send 2005)

Additional tools are available to help the DMQC operator and PI in their decision

- A DMQC operator proposes a correction
- A PI decides whether he accepts the proposed correction or not . He can also propose his own correction.

Role of the RDAC in the DMQC: Reference data set

1. There is no central guardian and exchange mechanism for reference datasets (1st DMQC meeting , San Diego, April 2005, a report will soon be available) → **RDAC should play this central role**

- For recent CTDs that have not been submitted to national data center, PIs should take the initiative to notify the relevant RDACs of data they have collected

- Historical data in data sparse regions should be added to reference datasets by RDACs

- For data already in WOD, RDACs are asked to keep track of data which are considered unsuitable for ARGO DMQC → unique ID for data in reference data set.

Role of the RDAC in the DMQC: Consistency of the ARGO data set

2. RDAC should ensure the consistency of the ARGO data set in a regional basin.

- RDAC should be the central guardian for the DMQC software and the parameters used by basin

- Corrections are done by the DAC and depends on a PI and on an operator:
  - RDAC cannot be responsible of the floats in its area and it cannot re-check each floats processed by another DAC
  - One way could be to use the objective analysis tools developed at the Coriolis data center and to check the consistency of the whole dataset.
  - Collaboration with other RDAC in overlapping areas

Part III

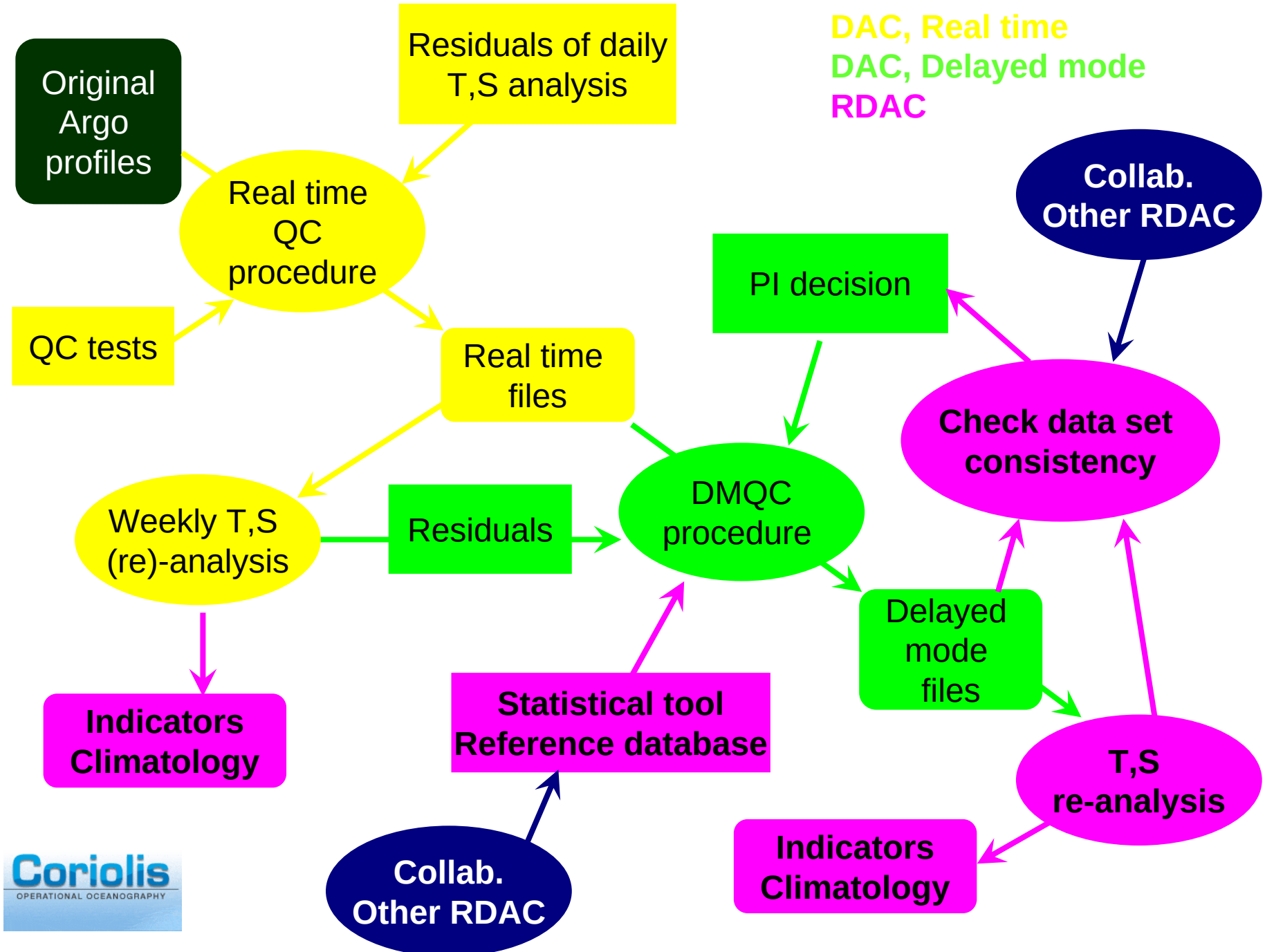
Additional roles of the RDAC

1. RDAC should provide elaborated products to the community

- weekly map of T, S data → currently produced at Coriolis
- map of "elaborated" fields: mixed layer depth
- "indicator": LSW properties, …

2. RDAC should provide an information system

- to share documents, reports, problems, etc..


DAC, Real time
DAC, Delayed mode
RDAC
Original Argo profiles
Residuals of daily T,S analysis
Real time QC procedure
QC tests
Real time files
Collab. Other RDAC
PI decision
Check data set consistency
Weekly T,S (re)-analysis
Residuals
DMQC procedure
Delayed mode files
Indicators Climatology
Statistical tool Reference database
T,S re-analysis
Indicators Climatology
Collab. Other RDAC
Coriolis
OPERATIONAL OCEANOGRAPHY