The main dataset is ARGO that we complement with data from fixed platforms (mainly
The analyzed field $x^a$ is the linear least square estimator deduced from the set of
noise in $R$. $P$ is the covariance matrix of the estimated field.
variables and extreme values are later derived. Global indices (heat content, dynamical height) and corresponding error bars are also computed.
Sensitivity tests and careful examination of the analysis results have been performed to detect biases and inconsistencies. A strategy is proposed to reduce these errors and produce a coherent statistical representation of the first decade of the third millennium.

Method and dataset

**ARIVO Analysis**

A methodology has been defined to process the global in-situ datasets in order to produce monthly gridded fields. The methodology applies both to the Near-Real Time
(hereafter NRT) processing (monthly) and to the processing of long time series for the purpose of climatological studies.

**Coriolis global monthly datasets**

These global datasets are assembled by date and quality controlled by Coriolis, they are the basic – or starting point data set of our analysis.

i) CORA : has been prepared for the MERCATOR re-analysis. We use CORA2 version for the period 2002-2008

ii) NRT : This Near-Real Time dataset is made available one week after the end of each month. We use this dataset since 2009. It allows the production of Near-Real Time monthly analysis.

**Delayed mode platform datasets**

Delayed mode data have been validated and calibrated by PIs. We progressively build up a list of validated DM-platforms.

**Analysis method**

The analyzed field $x^a$ is the linear least square estimator deduced from the set of observations $y^a$. $x^f$ is a reference field or first guess. The statistical information on
the period 2002-2008

**Post-analysis QC**

Coriolis global monthly datasets - CORA, TAO, ARGO, CTD

Delayed mode platform datasets - ARGO - TAO, MM, ARGO, CTD

- Spatial structure
- variances
- mean

**New climatology**

- mean field
- variances
- spatial structure

The process exposed in the flow chart includes a post-
analysis quality control step in which data that produce strong field anomaly and high residuals are visually checked and discarded if the anomaly is confirmed. This process has been applied in the D2 dataset for the 2002-2011 period and led to the D3 dataset. Moreover, a list of uncalibrated platforms known to show strong biases have been removed. The final dataset D4 will be the starting point for the combination with the Delayed Mode data from selected platforms.

**Switching from D2 to D4 produces little changes in the global indices.**

**Error estimate**

The optimal interpolation method produces the error field estimate. Integrating the error lead to put error bars on the global indices. In 2004, estimates of the global quantities are not compatible within error bars. Errors on data and/or a priori variance in some areas have been underestimated.

**Perspectives**

1) adding selected Delayed Mode datasets (DS analysis)

+ OVIDE: 44 ARGO floats in the North Atlantic (PI: V. Thierry)
+ GoodHope: 94 GoodHope ARGO floats in the southern Ocean (PI: S. Speich) plus selected floats found in the area that have been validated by the GH project
+ Elephant-Seals: 26 elephant seals in the southern ocean equipped with T-S sensors (PI: Roquet, F. Roquet et al. 2011).

2) Improve a-priori statistics

- DS will be used as a basis for the new mean field.
- A priori variance on the field will be recomputed from the new dataset and a strategy has to be defined to improve the estimate in undersampled areas
- Measurement error : increase measurement error on NRT data to take into account biases and give priority to DM well qualified

**Run the analysis on the 2002-2012 period**

**Post-Analysis Quality Control**

The optimal interpolation method produces the error field estimate. Integrating the
error lead to put error bars on the global indices. In 2004, estimates of the global quantities are not compatible within error bars. Errors on data and/or a priori variance in some areas have been underestimated.

**References**

