



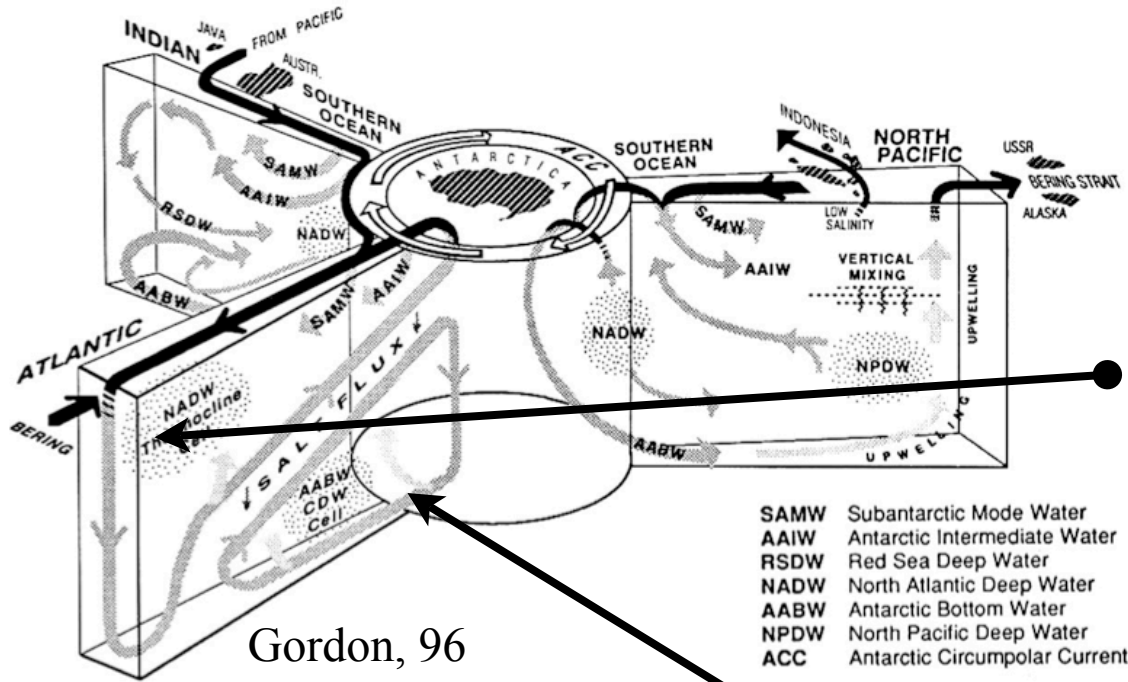
International strategy Argo - deep

G. Maze (Ifremer/LPO, SO Argo, France AST)

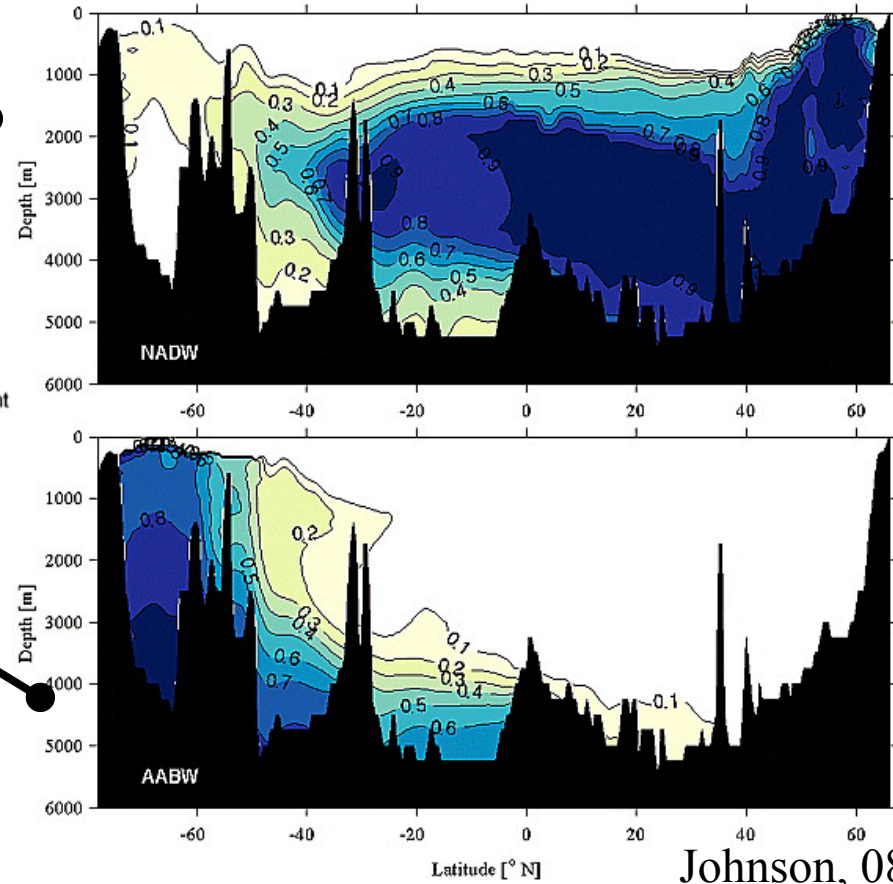
V. Thierry (Ifremer/LPO)

**LPO: Laboratoire de Physique des Océans
UMR 6523 CNRS / IFREMER / IRD / UBO-IUEM**

Scientific target ?



North Atlantic Deep Water (NADW) and Antarctic Bottom Water (AABW) distribution in the Atlantic:



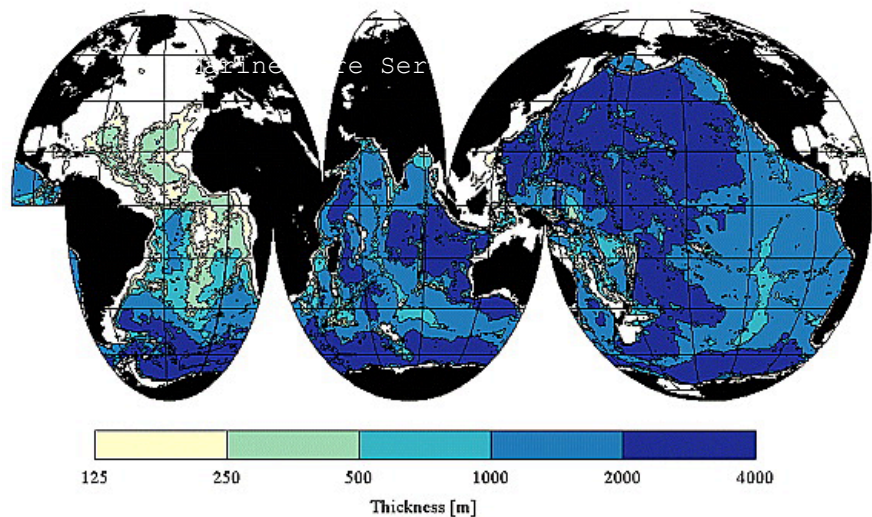
Deep water masses and circulation carry climatic signals (heat, fresh water, carbon)... increasingly relevant to understand global budgets and surface signals

Johnson, 08



Scientific target: long term ocean monitoring

AABW distribution

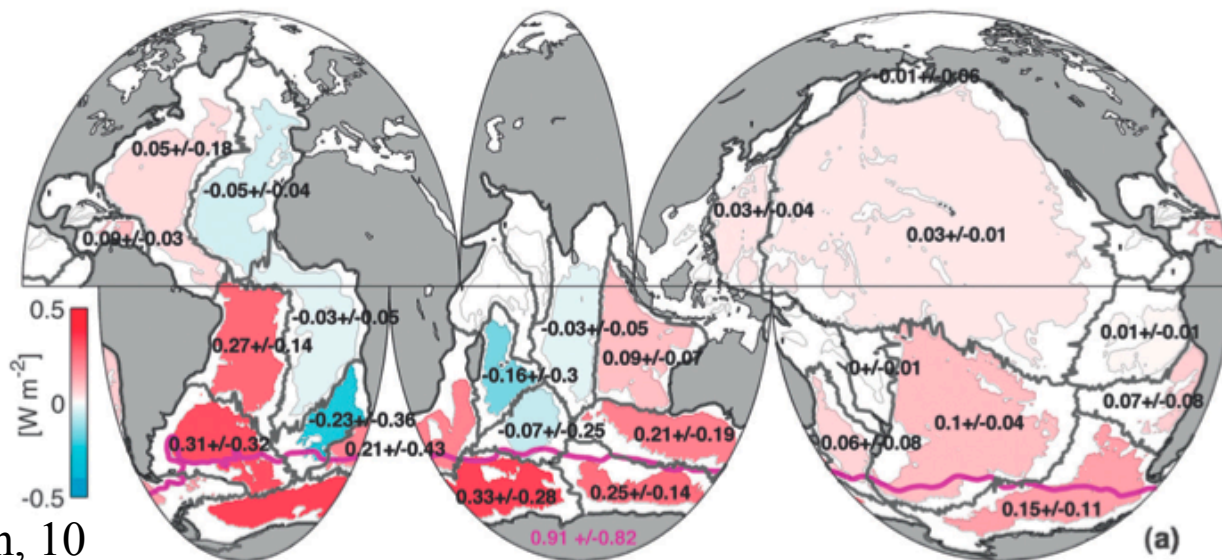


AABW warms

How much ?

Variability not in sparse hydrography ?

Heat flux through 4000m: 2000s vs 1990s



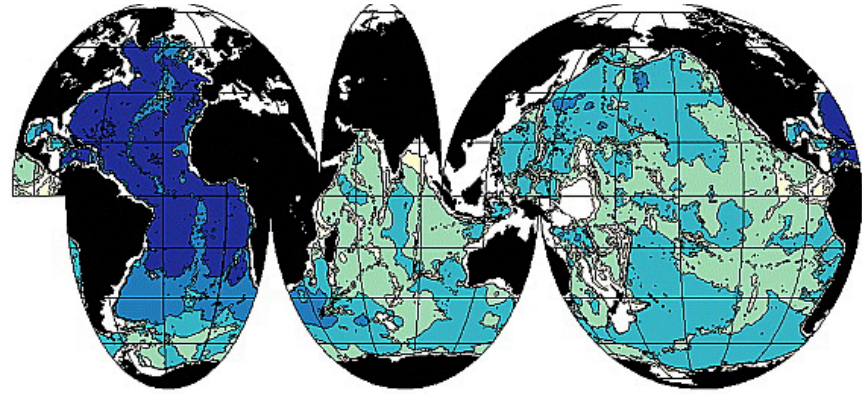
Purkey & Johnson, 10

Johnson, 08



Scientific target: long term ocean monitoring

NADW (LSW+DSOW) distribution



Johnson, 08

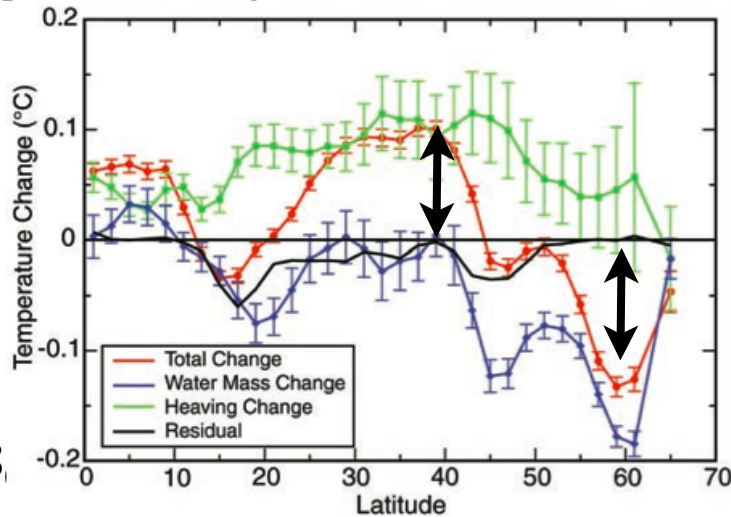
NADW

Strong variability

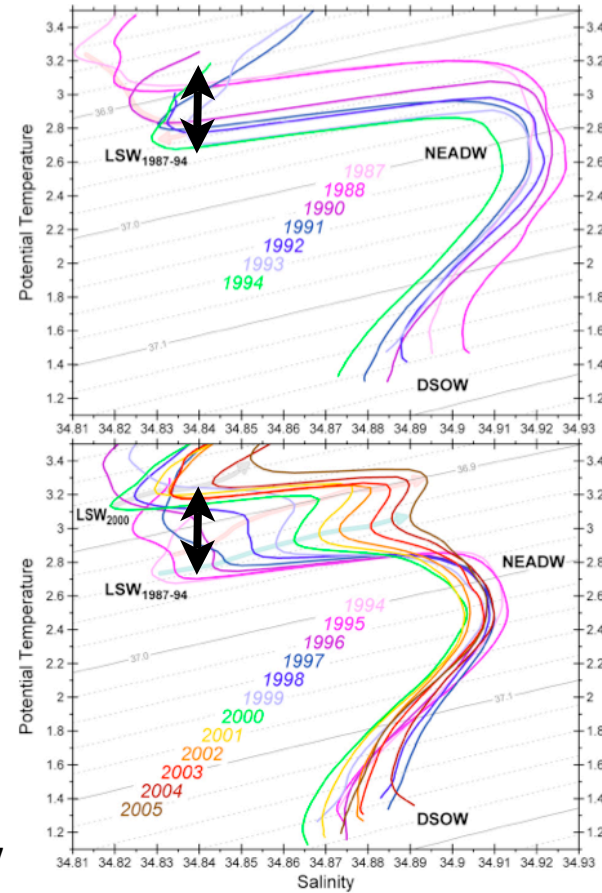
Disentangle decadal from interannual signals

Downstream variability ?

Temperature change at -2000m: 1980-2000 vs 1950-1970



Lozier, 08

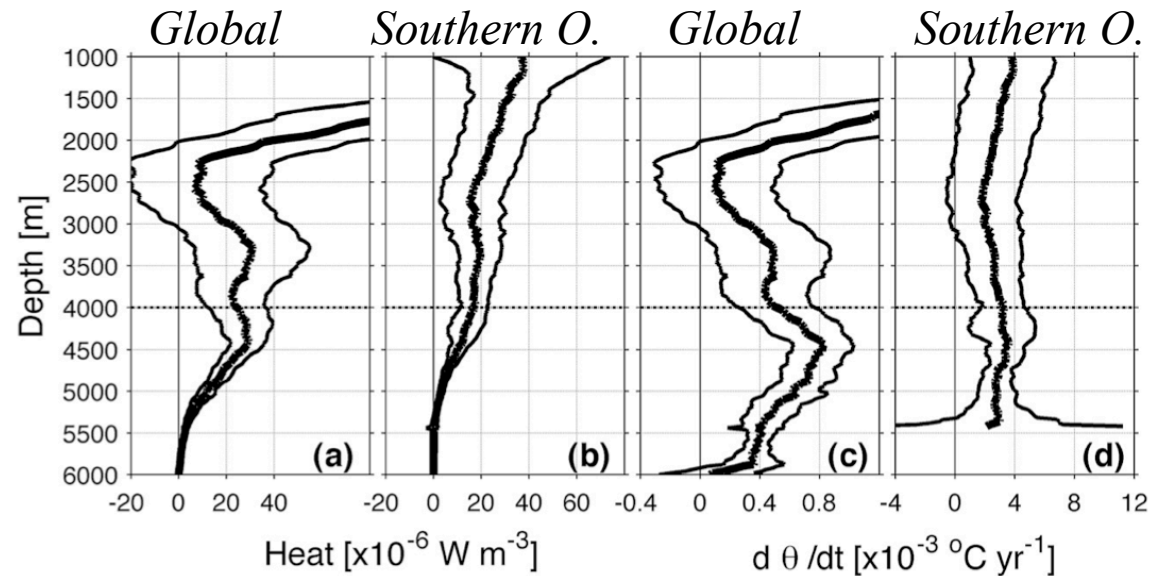
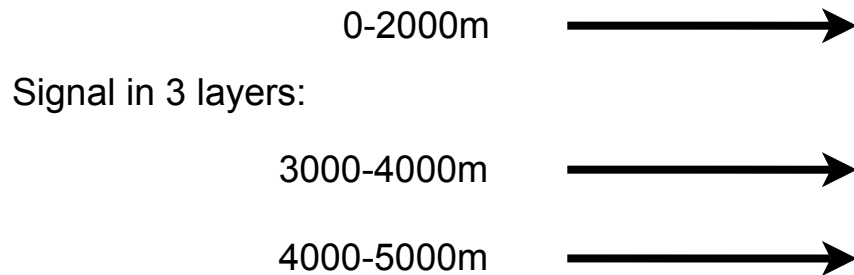


Yashayaev, 07

Scientific target: long term ocean monitoring

Argo sampling to the ocean bottom is needed to close regional and global heat and sea level budgets

- > Budgets are sum of large opposite regional-scale signals:
 - east/west, STP/SPG gyres
 - spatial coverage ?*
- > Disentangle frequency components of signals:
 - NADW (0-4000m): interannual [0.1degC/1yr] variability vs decadal [0.025 to 0.1 degC/10yr]
 - AABW (0-6000m): interannual variability ?, decadal variability: o[0.04degC/10yr]
 - sensors accuracy, temporal coverage ?*



2000s vs 1990s
 Purkey & Johnson, 10

FIG. 9. Profiles of heat gain per meter (thick lines) with 95% confidence intervals (thin lines) estimated as described in (3) for the (a) global ocean and (b) Southern Ocean south of the SAF. Area-weighted mean profiles of $d\theta/dt$ for (c) the global ocean and (d) the Southern Ocean south of the SAF.



Strategy

We need to deploy deep floats where the signal is localized

The signal is localized where deep water masses are formed: the North Atlantic subpolar gyre and around Antarctica

We will then “follow” the signal along propagation pathways (NADW:0-4000m and AABW: 0-6000m)

> SO Argo (G. Maze, V. Thierry) to write an internal report for NAOS in 2014 and contribute to Euro-Argo roadmap.

Difficult loop between technology and science

A deep ocean trial is being held in June 2014 aboard New Zealand's RV Tangaroa in order to test sensor accuracy in the SBE-61. Several SBE-61 CTDs will be integrated with the shipboard SBE-911 CTD system, and multiple casts carried out on the abyssal plain of the Southwest Pacific Basin, in water depth of about 5600 m (36-degrees S, 177-degrees W). Two Deep SOLO floats will be deployed at the same location, and cycled to the ocean bottom every 3 days for about a year.

Argo Steering Team Strategy

No global recommendations exist, nor deployments target.

At last AST meeting (March, 2015), an action item was created:

“Investigate utility of task teams for Argo enhancements and what the AST would ask these task teams to do and how they would interact with the AST. Create a Terms of Reference/expectations for these task teams.”

Argo-deep by S. Riser (US) and G. Maze (FR)

Work in progress ! draft in redaction.

A global design of coverage and sampling in Deep Argo, coordinated by the Argo Steering Team, will be completed once the capabilities and costs of Deep Argo profiling are demonstrated.

