

Interactive comment on “Towards closure of regional heat budgets in the North Atlantic using Argo floats and surface flux datasets” by N. C. Wells et al.

Anonymous Referee #1

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General :

The paper presents an estimation of the upper ocean heat budget of the North Atlantic using data from the Argo floats and NCEP/NCAR and NOC surface flux datasets. The Argo data volume allows estimating heat and fresh water storage in the ocean by its uniform geographical and seasonal distribution, and depth penetration. The year-to-year changes in the properties and circulation of the water masses in the North Atlantic are a sensitive indicator of the interaction between the atmosphere and the ocean. The combination with both datasets (Argo/NOC) allows having good estimates of the upper ocean heat budget. The paper is well written, with some details to understand the

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different steps for estimating the budget. Before being accepted, it should be nevertheless subject for revision according to the caveats outlined below.

Specific comments:

1. Although the Argo array is not yet complete, its impact on the global-scale studies can already be seen such as on regional area like the North Atlantic Ocean. The choice of 1999-2005 periods in this study is strongly constrained by the Argo availability. The area of the Argo distribution for the longitude is 0° - 100° W. Could you precise why you did not take into account Argo data from 0 to 10° E to get data in the Norway Sea (some data are available for the studied period).

2. I would also suggest to precise what type of parameter has been chosen. Since we have processed delayed mode data from 2006 for the first floats, it would be interesting to know that the estimates have been done from temp and not temp_adjusted. In the same way, I think that it would be interesting to perform, in the future, this kind of study with the most complete Argo dataset, specially for the North Atlantic Ocean, taking into account when available the temp_adjusted and pres_adjusted (specially for some Apex, the correction can be significant). From 2005, the distribution of the Argo profiling floats has increased in the North Atlantic Ocean with a more confined distribution in some areas.

3. Compare results on the MLD with results in Carton, J.A., S.A. Grodsky, and H. Liu, 2008: Variability of the Oceanic Mixed Layer, 1960-2004. *Journal of Climate*, 5, 1029-1047, using also Argo profiling floats for the most recent years.

4. I would appreciate to have figures more explicit to understand the variation of the seasonal cycle, introducing colour and geographical maps.

5. Since Argo data are made freely available, where Argo data are used in a publication or product, the following acknowledgement has to be given: "These data were collected and made freely available by the International Argo Project and the national programs

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that contribute to it. (<http://www.argo.ucsd.edu>, <http://argo.jcommops.org>). Argo is a pilot program of the Global Ocean Observing System."

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