

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.

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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).

The area chosen was determined by the number of Argo floats, the depth of water, the bottom topography and presence of sea-ice. Most ARGO floats were constrained

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by the 1000m isobath and therefore this became a limitation for this study. The $2^\circ \times 2^\circ$ grid refers to the locations to which individual variables are interpolated. This grid extends from 9.5°N to 69.5°N and from 84.5°W to 0.5°W . The $10^\circ \times 10^\circ$ grid extends from 20 to 60°N , 75 to 5°W . The region north of 60°N and south of 20°N is not considered in this study because of the large amount of land and ice at higher latitudes and the more irregular seasonal cycle in heat storage at low latitudes. A sentence has been added to Section 3

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.

We refer to the data quality controls discussed in the thesis by Hadfield et. al. 2007 and the subsequent removal of some floats following a pressure problem. There were 49,599 temperature profiles prior to quality control and 43,127 of the temperature profiles after quality control or 86% of the original temperature profiles. A sentence has been added to Section 3.

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.

Carton et.al. (2008) provide a gridded mixed layer climatology 1960-2002 based on historical observations. They demonstrate significant interannual variability in the winter-spring transition, when the deep winter mixed layer is being replaced by a shallow

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spring thermocline. Our analysis using Argo is based on monthly values of the mixed layer depth and therefore is unable to capture this high frequency variability in this winter-spring period. However, the focus of the paper is on heat content 0-300m heat content, and this is only influenced by the value of the wintertime maximum mixed layer depth as discussed in Section 3.

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

We have focused on the annual mean because the components of the heat budget have all been estimated with their associated errors (Figure 11) for the 7 year period. We do show many quantities and their seasonal variation, and some specific examples for 2 ten degree boxes. We believe this shows sufficient information for this paper.

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

We have added this acknowledgement.

Interactive comment on Ocean Sci. Discuss., 6, 95, 2009.

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