

Interactive comment on “High Resolution 3-D temperature and salinity fields derived from in situ and satellite observations” by S. Guinehut et al.

Anonymous Referee #2

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1 General comments

The paper is focused on a method that combines sparse in situ measurements with high-resolution satellite measurements to generate 3 dimensional temperature and salinity fields. Synthetic T and S fields obtained with a multiple linear regression are combined with in situ observations. The method described is an improvement of what is described in a previous paper by Guinehut et al. (2004).

Overall, the manuscript is well structured, concise and self-consistent. The method is well described.

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2 Specific comments

My main concern is about the choice of the various data sets used in the article. There are many data bases and climatologies publicly available, then I would like to know more about the reasons to select one or another data base.

- Page 1317, line 14: what is the EN3 dataset? I could not find any information about it in the Ingleby and Huddleston paper. Why not use data provided in the World Ocean Database? Can you indicate how many profiles satisfy the mentioned conditions (1500 depth, T and S both measured)?
- P 1317, l 21: concerning the CORA3.1: is there a duplicate detection in order to avoid common data in CORA3.1 and EN3?
- For the statistics between subsurface and surface fields, it is stated that only the profiles valid up to 1500 m depth are selected. Hence I would expect the maps showing the correlations (Fig1, Fig4) to be limited to the regions where the bottom is deeper than 1500m.
- P 1318: ARIVO climatology: there are numerous global climatologies available. Is your choice of ARIVO driven by its time coverage (2002-2007)?
- P 1322: l 18: it would be relevant to have a explanation or a hypothesis for the existence of this tongue of negative values.
- Figure 10: instead of plotting the temperature fields, why not directly represent the anomalies with respect to OVIDE 2008 cruise? This would make the improvements provided by the combined estimate easier to identify.
- P 1332: the authors mention the possibility to use Sea Surface Salinity. Do the actual accuracy of the measurements by SMOS or Aquarius will allow you to significantly improve the quality of the reconstructions?

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3 Technical corrections

I have a few comments on the figures, followed by some typos.

3.1 Figures

Figure 1: the values of the correlation coefficients are supposed to be between -1 and 1, so should do the scale.

Figure 2:

- the horizontal and vertical labels are not easy to read. Of course I could zoom in the pdf, but even doing that it's still hard.
- as the vertical axis are the same for all the subfigures, maybe it is sufficient to have the labels only on the left-hand subfigures. Same for the horizontal axis. Also, to increase the
- Colors cale: same comment as figure 1: why does it go beyond -1 and 1?

Figure 3:

- same comments as for Fig.2.
- Fig. 3 does not appear in the text.

Figure 11: labels not easy to read

3.2 Typos

P 1318; L 20: for the 2002 to 2008 periods → period
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P 1325; L 1: showed is correct but very rare compared to 'shown'

P 1326; L 8: the 'm' for meters is missing

P 1327; L 13: the in situ T and S sectionS

P 1327; L 14: only in situ observationS

P 1327; L 20: this number increaseS

P 1329; L2: 1500 meterS. Also, for consistence within the text, use 'm' instead of meters.

P 1329; L2: 500 mr → m

P 1329; L7: previous Argo: do you mean before Argo?

P 1329; L8: 17-years: the - is not necessary

P 1329; L10: the observed signalS

P 1330; L8: T/S profiles observations → T/S profile observations

P 1330; L13: showed rare compared to 'shown'

P 1330; L20: Hemisphere: here with upper case, while lower case on the previous page

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