

***Interactive comment on* “Empirical reconstruction of salinity from temperature profiles with phenomenological constraints” by F. Reseghetti**

Anonymous Referee #3

Received and published: 23 January 2007

Review of “Empirical reconstruction of salinity from temperature profiles with phenomenological constraints” by F. Reseghetti (osd-2006-0084)

In the context of the ocean data assimilation, the author presents an approach to derive salinity profiles from observed temperature profiles. The areas of interest regard the Tyrrhenian Sea and the Ligurian Sea. The method is based on the assumption that the potential density of such regions does not change but, at the same time, it claims that interannual variations are reproduced in some ways by such an approach. Another source of confusion concerns the temperature trends that characterize these regions. Considered altogether, these different elements underline the lack of a specific presentation on the nature of the signals that are under interested in this study. It results a very difficult paper to follow where the proposed “new” method is by itself not easy to

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analyze. Different tests are then presented but no firm conclusions on the reliability of the present approach could be drawn. The same applies for the precision of the reconstructed salinity profiles. The examples presented as independent tests as well as the applications based on XCTD data are terrible in that sense, at least for the salinity field. As no physical arguments are discussed or presented to explain such failures of the method it is impossible to recognize the benefit of using the present approach. Moreover, nobody could claim to present a new method without setting strong arguments that other methods presently designed to do the same work need some improvements. In that regard the present approach seems very close to the arguments presented by Troccoli and Haines in 1999. Only the consideration of long-term trends represents an element not presented elsewhere and, if it is really the case, it must be stated and discussed more clearly. As it states it is difficult to recommend the publication of this manuscript.

Specific points

- As stated in the introduction, consideration of salinity within ODAS is not only required by multi-parametric approach; Ji et al. (JCLim, 2000) and Troccoli et al. (MWR, 2002) show that assimilation of temperature without attempting to correct salinity may generate some spurious responses in the model dynamics and, potentially, some deteriorations of the temperature field itself. Both these studies are highly relevant for the present manuscript.
- Does the second part is really useful, with the exception of the last paragraph?
- In the available dataset part a description of the precision for the different sources of data is presented but it generates some confusion to my point of view. These numbers represent the technical precisions that are reached by present sensors and they are quite different from the uncertainty that result in combining different profiles due to inadequate sampling in time and in space (including the vertical). It joins the aforementioned problem of setting what is the range of the variability that is under investigation

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by the present study.

- In order to illustrate how the method works a presentation of “typical” profiles in temperature, density and salinity, as observed and reconstructed, along the vertical would probably help.

- Most of the figures contain too much things to be really attractive.

- Finally, please update your referencing procedure as I note that some co-authors are missing, some papers are listed but not cited within the text, some journal names change throughout the list, some dates are not identical between the list and the text, some errors in titles, etc...

Interactive comment on Ocean Sci. Discuss., 4, 1, 2007.

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