

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

Anonymous Referee #1

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This article proposes a new method to determine salinity values from measurements of in situ temperature. The method aims to construct a “synthetic” salinity value to be used in place of the climatological salinity when collocated temperature and salinity values are required, as in multivariate data assimilation for example. I agree with the author that an improved method for generating synthetic salinities is required, and that use of the theta-S relationship should allow greater recovery of water mass information from the available observations. However, I find the quality of the article to be very poor and difficult to understand. Description of the method, as well as the main findings and their relevance, is vague and poorly developed. As such, I cannot recommend this paper for publication without major revisions. Specific comments and suggestions are outlined below.

As this paper is concerning with the introduction of a new method, further details should be provided on the method as well as showing the constructed synthetic salinities. As the method proposed is based on exploiting the theta-S relationship, this should also be shown. All figures would benefit greatly by increasing font sizes and reducing the amount of information shown. More detailed descriptions of the legends are also required. In addition, labels are missing from all figures (a, b, c, etc.). Although it is helpful it present the observed bias with respect to climatology (e.g. Fig. 1), I fail to see the usefulness of the fit (left column). It would be much more helpful to see actual profiles instead. The proposed method performs quite poorly for the Tyrrhenian 1996-2001 dataset. A more detailed discussion of why it fails here, and how such failures could be circumvented is required

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