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Interactive comment on "Assessment of the structure and variability of Weddell Sea water masses in distinct ocean reanalysis products" *by* T. S. Dotto et al.

Anonymous Referee #1

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General comments:

This manuscript evaluates the structure and variability of intermediate and deep Weddell Sea waters in five reanalysis products. The authors have thoroughly compared hydrographic properties in these products with those of observed data. I think that the material is useful for readers who analyze the reanalysis products. However, I feel that the manuscript should be improved mainly in the following two points. First, the final rating of the products should be included in Section 5 corresponding to the aim of this research stated as "to identify which reanalysis product best reproduces the main regional oceanographic features" (P. 501, L. 8-9). Although many strong and weak aspects of all the products are thoroughly described and discussed in Sections 4 and 5,

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the best product is not clearly stated based on all the aspects considered here. I think that it is useful for many readers to know which is the best product regarding Weddell Sea deep water masses. Second, some of the general comments in Section 4 should be carefully checked since they are not exactly correct for all the products as pointed out in the specific comments below.

Specific comments:

1. P. 498, L. 11-13: The MyOcean product has the same problem as the CFSR and ECCO2 products as shown in Fig. 12.

2. P. 498, L. 15-16: This is not true for SODA as shown in Table 4.

3. P. 504, L. 24-25: The authors should add a brief explanation of the normalized centered root-mean-square error. I think that some readers are not familiar with this quantity.

4. P. 506, L. 24-26: In some results, colder and fresher difference from observations does not extend till ∼1500 m.

5. P. 507, L. 6: It seems that "If the opposite occurred" means saline and warm biases. However, it is not the case for the MyOcean and ECCO2.

6. P. 507, L. 23-24: The statement of "as shown by the underestimation of S in almost all products and sections evaluated" is not quite true for section SR4 with distinct fresh bias in 1000-2000 m only seen in the CFSR.

7. P. 509, L. 2-6: Figs. 7 and 8 show that most (not all) reanalysis products have warmer and saltier values than those in observations along A12, but this is not the case along SR4. I do not think that the first sentence here correctly states these facts. Furthermore, it is not clear to me how the second sentence explains the facts in the first sentence.

8. P. 510, L. 26-27: Anomalous periods in ECMWF along section A12 are shown in

Fig. 9, but not described in the text.

9. Section 5 Discussion and conclusions: It is easier to follow discussions if relevant table or figure is sited more often.

10. P. 515, L. 5-8: I do not understand what is meant by the final phrase of this sentence.

11. P. 516, L. 28 - P. 517, L. 2: Are there any possible reasons for this discrepancy?

12. P. 517, L. 20-26: It seems that the discussion here is limited for section A12. However, we cannot tell whether this is the case from the phrase "In the Weddell Sea" alone.

13. Table 4: It is better to write down periods for all the products used to evaluate trends in the caption. The footnotes only describe exceptions. Why are trends for WSBW in ECCO2 not listed?

14. Figs. 7-12: The authors do not clearly state what the gray curves represent. It is not clear what is meant by "The grey shading indicates the variation...".

Technical corrections:

1. P. 501, L. 9, 12-13: Sect. -> Section

2. P. 501, L. 17: in represent -> in terms of

3. P. 502, L. 1-2: The ocean model is derived from ... -> The ocean model is driven by ...

4. P. 507, L. 25-26: S lower differences -> lower S differences

5. P. 516, L. 9: variabilities of -> variability

6. P. 516, L. 13 and 16, and P. 517, L. 5: degCyr^{-1} -> degC yr^{-1}

7. P. 518, L. 16: and to -> to

8. Table 1: The degree symbols are missing in the ocean model resolution for SODA.

9. Table 2: Footnote b: Only used until 2010. -> Only data in 2010 are used.

10. Fig. 4 caption: expanded to allow for more detail → expanded to show more detail

11. Figs. 4 and 5: I am afraid that the panels in these figures are too small when they are printed.

12. Fig. 6: The normalized centered root-mean-square error abbreviated as CRMSE is indicated as "CRMSD" in the figure. It may be better to label two panels as (a) and (b) and refer to them as such in P. 509.

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