

Interactive comment on “Improved quality check procedures of XBT profiles in MFS-VOS” by F. Reseghetti et al.

Anonymous Referee #1

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General comments

I think the paper is worth publishing, with revisions. The detailed evaluation of the quality of XBT profiles in this paper can be informative for many users and even manufacturers of this widely-used instruments. Analysis on acquisition time and that on the height of launching position would not be obtainable elsewhere. The whole results would be referred by the readers who are not specifically involved in the Mediterranean, too, when it is given in more generalized form.

However, I also have some criticism.

1) I recommend the authors not to include too much duplicate description which seems to be given already in PAPER-I (I have had no chance to read it, though). Make the

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article as concise as possible.

2) Do not present too many items from which the authors are not able to draw any conclusions or suggestions. They should state their points as clearly as possible.

3) I also recommend not to present interpretation of any figures and tables in their captions. Do it in the text. On the other hand, explanation of marks, lines, and symbols used in the figures should basically be given in the caption, not as legend.

4) The temperature error of XBT must be shown and discussed by $T(\text{XBT}) - T(\text{CTD})$, not by $T(\text{CTD}) - T(\text{XBT})$, everywhere in the article, if the authors consider CTD values as a truth.

5) It seems that terms like 'q.c. procedure' or 'analysis procedure' are used in too many ways or too generally. Be specific as much as possible.

6) Effect of LPH and that of probe-to-probe mass variation should be discussed or summarized more clearly in Sections 3.2.1 and 3.2.2, like in Section 5. I don't think that the detailed presentation of weight numbers of individual parts (M1 through M3 in Table 5) is meaningful, because the most important here should be the weight of probe rather than parts left on vessels. Why don't the authors measure the sum of M1 through M3 if they really want to estimate the weight of probes as residual?

7) I could not follow the logical flow of the analysis in Section 4. More clear description seems to be required.

8) Not a few parts of the manuscript are not understandable to me, perhaps because of poor English writing for one reason (see the following more specifically).

Specific comments (incl. wording/grammatical suggestions)

* The present title seems to me too general. Can be entitled more specifically.

* 'MFS' in the title should be spelled out.

- * 'DB' should be spelled out at its first appearance.
- * p.1443 l.21: The sentence following 'It is noteworthy ...' could be omitted.
- * p.1443 footnote: PAPER-I should be listed in reference.
- * p.1444 l.23: 'The data processing' sounds too general. Appendix A only describes the transient response of the equipment upon entry into the water.
- * p.1445 l.20(and elsewhere): I prefer AT, not ATI, because "Interval" reminds me of some duration between two pre-defined time instants.
- * p.1445 l.24: 'deeper depths' should be 'greater depth'.
- * p.1446 l.2: 'warmer temperature' should be 'higher temperature'.
- * p.1447 ll.10-11: I don't understand where 'an offset' term comes from, and what it stands for. Need more explanation.
- * p.1447 ll.18-21: What is the conclusion about the effect of LPH? Does it reasonably affect on the fall rate or other things?
- * p.1448 ll.10-11: The accuracy of the weight measurement should be noted, if it is available, in order to judge if the values of standard deviation are really from probe-to-probe difference.
- * p.1448 ll.10-13: What is the conclusion of the section? Do we need to pay more attention to the probe-to-probe mass variability?
- * p.1448 l.14: I would give the title of this section as 'Temperature bias of T4/DB probes'. This section does not describe any 'system'.
- * p.1448 l.26: Define 'the function' in the text, not in Figure 6.
- * p.1448 l.26 - p.1449 l.3: I don't understand what this part means. Does 'the constant' term mean B value in the figure? If it is related to the length of wire, how? Reasonable explanation is desired, if possible.

- * p.1449 l.3: 'compatible' should be 'comparable', shouldn't it?
- * p.1449 ll.6-8: I would agree if the authors state that the standardized method of Hanawa may not work in water of high vertical homogeneity. However, I don't understand how Fig.7 supports this?
- * p.1449 l.10: 'move' could be reworded as 'fall'.
- * p.1449 ll.12-14: I cannot understand this sentence. To me, it does not even look like a sentence.
- * p.1449 l.14: Cite 'Fig.8a' after 'In upper layer'. And put 'a' and 'b' labels on Figs.8-9. The same thing can be applied to the description of the results in Figures 11-12, and to those figures.
- * p.1449 ll.14-15: What is 'improved q.c. procedure'? Does it mean that the error of 'fall rate' is corrected profile by profile (i.e. probe by probe)? This is crucial to understand the flow of the authors' analysis and the following part of this section.
- * p.1449 l.15: 'strongly' may better be reworded by 'significantly'.
- * p.1449 l.16: 'stronger' might better be reworded by 'larger'.
- * p.1449 l.18: 'relative strong' might better be reworded by 'larger'.
- * p.1449 l.19: 'Fig 8' and 'Fig 9' should be replaced by 'Fig 8b' and 'Fig 9b', with adequate labeling on figures.
- * p.1449 l.23: A comma may be needed between 'analyzed' and 'a'.
- * p.1449 l.23: 'at deeper depths' should be replaced by 'at greater depth(s)' or 'at depth'.
- * p.1449 ll.23-24: 'B' (and 'A') of Figs.8-9 are not labeled in the figures. Lowercase ('a' and 'b' rather than 'A' and 'B') is preferred by custom.
- * p.1449 l.24 - p.1450 l.1: Does 'delta T' come primarily from systematic temperature

error of XBTs (rather than depth error)? If so, the correction of temperature using depth as a parameter is confusing because the authors showed that the error is temperature-dependent (not depth) by their bath calibration.

* p.1449 l.25: 'deriving' should be replaced by 'derived'.

* p.1450 l.1: What is 'm'? It must be a constant coefficient, but explain.

* p.1450 ll.5-6: Is 'delta T' dependent on temperature or depth(i.e. pressure)? The present description is just ambiguous. The authors should show their thought.

* p.1450 l.19: 'deeper' should be replaced by 'larger' or 'greater'.

* p.1450 ll.22-24: I don't understand the latter half of the sentence 'As a further result, ...'. How can the fact 'DB probes have a percent depth error smaller than T4' be read in Figure 10?

* p.1450 l.2: 'deeper depths' should be replaced by 'greater (or larger) depths'.

* p.1450 l.3: 'warmer' should be replaced by 'higher'.

* p.1450 l.10: 'deeper' should be replaced by 'greater'.

* p.1451 ll.12-13: 'on' following 'uncertainty' might better be reworded by 'in'.

* p.1451 l.18: The 'bias' is correlated with "systematic" WHAT of probe?

* p.1451 l.19-20: How can the DEPTH error be enhanced at thermocline? More careful description seems to be needed.

* p.1451 ll.21-22: I don't understand the sentence 'Such an ...'. Error can originate uncertainty?

* p.1452 l.18: I would entitle this section 'Concluding remarks'.

* p.1453 ll.15-16: Do Hanawa's FRCs work 'in reasonable way' or not? Can the authors tolerate 'non negligible' difference(bias) that frequently occurs? Which side are they

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on?

* p.1453 ll.23-24: I don't understand the sentence. What is 'a motion for a time longer than usual when the probes are lighter'?

* p.1454 l.2: 'warmer' should be 'higher'.

* p.1454 ll.6-10: I don't think the logic of interpretation of delta T (in Section 4) is so clear as written here. Why does the interception (the constant term) depend on temperature while the slope (the angular coef) on pressure?

* Appendix A: What is the difference between 'TC' and 'OTC'? Give their definitions.

* p.1455 l.11: 'depending' might better be reworded by 'dependent'.

* p.1455 ll.25-26: I don't understand the context 'by shifting ...'. Give definitions of the variables that appear in the equations.

* p.1456 l.17: What is '1m reduction procedures'?

* p.1457 l.18: 'that one on' should be 'that by'?

* References: Add Green (1984) and Seaver and Kuleshov (1982).

* Table 3: North and East should be written in showing Latitude and Longitude, respectively. Label 'U' and 'D' may better be replaced by 'H'(high) and 'L'(low), or more explicitly by LPH numbers (i.e. 8 and 2.5).

* Table 4: 'Speed max' should be 'Max speed'. Explain what $\langle \text{ATI} \rangle_{\text{th}}$ and $\langle \text{ATI} \rangle_{\text{exp}}$ mean. What is 'No XBT'?

* Table 5: I don't think numbers of M1 through M3 are meaningful in this context. Give the total weight of the three parts only, if needed.

* Table 6: Putting serial number of the probes can be preferred, when mentioning something about individual probes.

* Table 8: Relocate the second and third sentences of the caption (they are interpretation rather than explanation of the table!) in some adequate part of the text.

* Table 9: The third and the following sentences should be moved into the text. Two 'probes over' should be replaced by 'probes among'.

* Fig.1: I don't think this figure is needed in this context. How can we read the fact in the sentence 'No systematic effect due to ...' from this figure? And this sentence itself should be placed in the text.

* Fig.2: Eliminate the enclosed parameters, or describe them in the caption. Do not leave undefined variables. What is 'xc' and 'w'?

* Fig.3: Not cited in the text.

* Fig.4: Move the third and fourth sentences of the caption to somewhere in the text. 'Up' and 'down' should be better expressed by 'high' and 'low' as proposed elsewhere, and 'former' and 'latter' should be replaced by 'first' and 'second'.

* Fig.5: The second and the following sentences should be placed in the text. What does 'unpredictable' mean?

* Fig.6: Unit of the vertical ordinate should be presented. The enclosed coefficients and equations should be given in the caption, or eliminated. Show the range of s.d. by vertical bars.

* Fig.7: The second and the following sentences should be placed in the text. explanation of the lines should be given in the caption, not as legend.

* Fig.8: Put labels 'a' and 'b'. The types and colors of lines should be explained in the caption, not as legend. Are both maximum range and one standard deviation necessary?

* Fig.9: Put labels 'a' and 'b'. 'Fig.7' should be 'Fig.8'. Move the second sentence to the text.

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- * Fig.10: Give the explanation of the lines in the caption.
- * Fig.11: Put labels 'a' and 'b'. Move the last two sentences to the text.
- * Fig.12: Put labels 'a' and 'b'. Move the second and the third sentences to the text.

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