Ocean Sci. Discuss., 8, C61–C64, 2011
www.ocean-sci-discuss.net/8/C61/2011/

Ocean Science
Discussions

Interactive comment on "Empirical correction of XBT fall rate and its impact on heat content analysis" *by* M. Hamon et al.

Anonymous Referee #2

Received and published: 28 March 2011

The paper is devoted to an important issue of the XBT data correction, which has been often discussed in the oceanographic literature during the last years. The authors chose a so-called collocation method to validate the XBT data against the reference CTD and bottle data. This method was used in several previous studies of the XBT biases.

This study provides almost no new facts on the XBT biases: it rather confirms several important results obtained in the earlier studies which I summarize below:

1) The total XBT temperature bias changes with time (Gouretski&Koltermann (2007) 2) The depth bias changes with time (Wijffels et al.(2008) , Gouretski and Reseghetti (2010)). 3) Using time-varying but constant with depth multiplicative depth correction factor (Wijffels et al. 2008) reduces but does not eliminate the total temperature

bias (Gouretski and Reseghetti (2010)) 4) To further reduce the residual bias a depth-varying correction is needed. The correction is not-linear with depth (Gouretski and Reseghetti (2010)) 5) Pure thermal bias is not-negligible during 1968-80, but is close to zero later on (Gouretski&Reseghetti 2010) 6) Japanese made TSK XBT probes may have a different fall rate equation, so that the regional XBT bias for the Western North Pacific is different (Wijffels et al (2008)) 7) A warm "event" during the 1970s is the result of the positive total temperature bias in the XBT data (Gouretski&Koltermann (2007), Wijffels et al. (2008), Gouretski&Reseghetti (2010)).

The authors introduce parabolic corrections for XBT depths. A would like to see a plot showing how well the parabolic function approximate the (calculated) depth bias. The authors mention, that "this parabolic character is more or less pronounced according to year, geographical area and the type of XBT" – I would like to see a graphical illustration for this statement: "more or less" is not enough.

Specific comments

The English (both a proper wording and a style) should be considerably improved. At several places the text is difficult to understand. Please ask British or american colleagues for help.

Abstract: the term "collocation method" is introduced without providing any explanation on what it is.

P. 298, Line 7: ". . . proposed a linear correction" . I suggest to change to "a yearly multiplicative correction factor. P.298, Line 9: ". . . bias compared on a CTD climatology". Obviously, " bias obtained by comparing with the CTD climatology" was meant.

P.298 Line 27: "distant from less than 15 days" – please, reformulate: "distant" is rather used for separations in space.

P-295, Line 5: Why profiles shallow than 200 m were removed from the study?

P.294, Line 24: "The vertical median bias" : bad English, please, rewrite.

Page 295, after line 2: Please, insert the reference to Gouretski&Reseghetti (2010), as they noted (and provided plots) inability of the depth-uniform correction factor to effectively reduce the bias throughout the water column.

Page.295, Line 8: This observation agrees.. Change to "This agrees.."

P.295, Line 14 "Our calculations. . .to several observations". The word "observations" is not a proper one here. Please, rewrite the sentence.

P.296, Line 19-20. I do not understand the sentence.

P.297, lines 13-14: "As we did not find significant differences between profiles. . ." I guess, the difference in terms of biases is meant?

P-297, line 22: "The parabolic character . . . is certainly due to a too simple approximation..".

No! The parabolic character is simply YOUR choice of the approximation – nothing more.

Page 298, L.9-18: I can not see why two temperature classes were selected? Do the probes have a different fall rate in different regions? – There are no further details. I also do not understand the last sentence about the application of depth corrections three times. Please, rewrite the section in a more understandable way, or remove it from the text.

P.298, lines 20. There is no sense to speak about the correlation between the bias and its correction.

P.298, line 27: "The calculation of the drop height in board is very rough . . ." Bad English, please, rewrite. Moreover, the launch height is not calculated! It is known or (in most cases) unknown.

Section on heat content: I appreciate the effort to demonstrate the impact of the new corrections on the heat content calculations. However, in its current form the section is

unacceptable. If the authors would like to retain the section it must be re-worked completely, with comparisons with other heat content estimates from the literature being included.

Interactive comment on Ocean Sci. Discuss., 8, 291, 2011.