

## ***Interactive comment on “Distributions of mixed layer properties in North Pacific water mass formation areas: comparison of Argo floats and World Ocean Atlas 2001” by F. M. Bingham and T. Suga***

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We thank the reviewer for his/her careful reading and thoughtful comments. The paper is much improved as a result.

Paragraph starting with “The most questionable part” We agree somewhat with the reviewer here. We have deleted Figure 6 and some associated discussion. We felt there was some need to contextualize the results, so we left Figure 5, using 2006 data instead of 2005 and 2004 and contracting the area. We also deleted the 2004 and 2005 histograms from Figs. 4 and 5.

Paragraph starting with “Another concern for me” In the original manuscript, we did not show results for 2004 and we now have additional results for 2006. The volumetric censuses for these years are very similar to those presented for 2005, so we are fairly confident in our results. For additional discussion on this point, see our response to reviewer 3.

p. 2, l. 11. This statement is based on the comparison between Fig. 2a (WOA01) and Fig. 2b (Argo). So we left it as it was.

p. 3, l. 22-23. This text has been modified to include better worded text and a more appropriate reference.

p. 3, l. 27. We have added some text describing briefly the Ladd and Thompson results here.

p. 4 l. 8. Some further discussion of this was added in association with the discussion of Figure 1a in the next section.

p. 4, l. 9. Text deleted.

p. 4, l. 12-14. Done.

p. 4, l. 24-27. This is a good suggestion. We have added some text stating this.

p. 4, l. 5-6. “Oka (personal communication)” refers to a manuscript then in preparation by Oka, Talley and Suga. (This information was given to the editorial staff at the time of the previous submission, but apparently did not get passed on to the reviewers.) That manuscript has since been submitted and the reference has been changed. The reviewers are welcome to examine a preprint of this manuscript at [www.fredbingham.com/okaetal/OTS06.pdf](http://www.fredbingham.com/okaetal/OTS06.pdf).

p. 5, l. 7-9. We have added some text explaining what criteria Kara et al and de Boyer Montegut et al used. The relative advantages and disadvantages of different criteria are thoroughly delved into in these two papers and are beyond the scope of this paper.

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These references are provided so that the interested reader can learn more.

p. 5, l. 25. The 10 degree maximum search radius was rarely used. Most one degree squares had profiles within 4 degrees of the grid point. Some explanation of this has been added to the text.

p. 6, l. 12. done.

p. 6, l. 13. done.

p. 6-7. This is a great suggestion. The problematic paragraph has been moved to the end of section 2. The second paragraph mentioned was deleted.

p. 7, l. 12. done.

p. 7, l. 13. The 2006 data are described in the new version instead of 2005. The large NPTW peak is not so apparent in the 2006 data.

p. 7, l. 14-16. The wording has been changed as requested.

p. 7-8 7th paragraph. Done.

p. 8, l. 9-10. This refers to Fig. 3e. The wording has been changed to reflect this.

p. 8, l. 11-12. Wording changed.

p. 8, l. 17. Wording changed.

p. 8, l. 18-20. Wording changed.

p. 9, 11th paragraph of Sec. 3. This paragraph discusses the discrepancies between outcrops measured by floats and those measured by the WOA. The subject matter is similar to that presented in previous paragraphs, but distinct. We have left this paragraph as is.

p. 9, 12th paragraph of Sec. 3. What the reviewer is noting is not strictly true. What we have done is compare the T-S relation of floats surfacing in a given area with the WOA.

It is true that a large percentage of those floats match, except for the central mode water areas. However, since we are aggregating all of the floats in that area, not just the “blue” ones, the overlap is not obvious. Even if there is some redundancy between the calculated percentages and the outcrop area matches, they are two different and unique ways of looking at the same problem. We have added some words to the last sentence to make it clearer.

p. 12-13. This paragraph (beginning with “Suga et al. (2005)”) compares our results with those of Suga et al. who calculated subducted volumes using a completely different methodology. It is useful to compare the pool of water available at the surface in wintertime with the total volume subducted. If they are very different from each other, one or the other of the calculations may be problematic.

p. 17, Table 1 footnote. This division seems reasonable from looking at Oka et al (2006). A reference has been added to clarify.

p. 21, Fig. 3, caption, l. 3. 10 m. Words added.

p. 21, Fig. 3b and 3c. Done.

p. 4 l. 12. Done.

p. 5, l. 5. Done.

p. 6, l. 3. Done.

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