

Interactive comment on “Ice-shelf – ocean interactions at Fimbul Ice Shelf, Antarctica from oxygen isotope ratio measurements” by M. R. Price et al.

Anonymous Referee #1

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This manuscript estimates the contents of glacial meltwater and sea ice melt in the water masses near the Fimbul Ice Front based on temperature, salinity and oxygen isotope data from a cruise in 2005. Meltwater from the Fimbul Ice Shelf is thought to contribute to the water mass formation in the eastern Weddell Sea and also to influence the deep convection in the Weddell Sea. The work that is presented in this manuscript is therefore important, it contains new and unique data and should be published. However, before publication the paper needs some revision. My main concern about the scientific content is about the choice of source water masses. I think the authors must justify this better. I also think the manuscript is hard to read, and I am sure the authors could express themselves more clearly. I have marked the –accepted subject to minor

revisions– box, but this depends somewhat on the authors answer to my question of source water masses. If they can not justify their source water masses well enough, they should redo their estimates with other source waters. I guess this would be more like a major revision.

I dont think the authors have justified well enough the choice of source water masses. Glacial melt and WDW are both obvious. But the third one is sea ice. What about precipitation into the water. Is this negligible or is it somehow included in the sea ice? I guess that precipitation may also be due to snow drifting off the ice shelf edge. I can not find any discussion of this, although precipitation is mentioned a few places as a process that may be important for water mass formation. The sentence starting on page 715 and ending on 716 reads: –Salinity is similarly affected by mixing—direct local precipitation and melting of winter snow –. Still precipitation is not included as a source to the oxygen isotope ratios. I would like to know why this is not important. I think the authors should do more in convincing the readers of the paper that their three-end-member mass balance is capturing the processes going on. If precipitation is not included they should show that it is negligible.

Figure 1: The regions of grounded ice should be included in the figure.

Second paragraph in section 4: WSDW, is that Weddell Sea Deep Water? What is then WDSW? Maybe it should be WSDW? However, it is probably not a spelling error either as WDSW is formed near Amery and WSDW in the southern Weddell Sea. Please spell out what WSDW and WDSW means.

First paragraph in section 5: It is not so easy to understand what the authors want to say with this section. For instance the sentence: –the figure shows the temperature minimum into which the ISW will mix–. What does this really mean? What I understand by the section is that the shelf break stations west of the ice tongue contains a water mass that is a mix between the shelf break stations east of the ice tongue and the ISW. If this is what they want to say with this section, I think they should write using a clearer

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language, more to the point. Why start with the conclusion of Nicholls et al that the source to the ISW is found in section F, if what they want to say is simply that west of the ice tongue water masses are influenced by ISW, while east of the ice tongue they are not. —Actually, after reading the abstract I finally think I understand what the authors want to tell with this paragraph. The sentence in the abstract reads: –Just downstream of the FIS we observe locally created ISW mixing out across the continental slope–. This sentence is quite clear and it should be included in the paragraph in section 5. The paragraph should also start by going right to the point. Only in the last sentence of the paragraph they say what they want to tell the reader, but it drowns in all the words early in the paragraph. I suggestion is to start the paragraph by saying something like: –The data also shows clearly that locally formed ISW mixes out across the continental slope–. Then they can start with telling how we can see this. Writing it this way would make it a lot easier to read, as the reader know what the authors want to show, before going into the details of the different stations and data.

Interactive comment on Ocean Sci. Discuss., 4, 709, 2007.

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