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Ocean Science Discussions

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 #2

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General comments:

This paper describes melt water input from the Fimbul ice shelf in the Weddell Sea using data from Autosub and ship-based hydrography. The measurements reveal two significant sources of Ice Shelf Water (ISW). By using delta 18 O measurements, an extra, - and very useful, variable is added, so that one can compare the different sources of fresh water input to the water column in the southeast Weddell Sea. The paper is clear, and concise, and add new unique data to a region that has been rarely sampled. The interpretations are plausable, and increases our understanding of this quite unique ice-shelf. The suggestions/corrections are found below.

Specific comments:

1. Introduction: line 22, page 711, the term 'Jutul Basin' I have not found on maps from the Norwegian Polar Institute of the glacial upstream of Jutulstraumen (the ice stream). It was used by Smedsrud et al (2006) to cover the sub ice shelf cavity basin south of the sill that they also termed the 'Jutul Sill'. If 'Jutul Basin' has been used before 2006 to cover the upstream glacial basin a possibility would be to call the subice shelf basin 'Fimbul Basin'. But one should indeed try to keep the names concise. This also should apply to the ice tonuge that pretrudes north from the Fimbul, it's name is 'Troll tunga' and it last had a major break off in 1967. No proper citation on that one tough.

3. Hydrographic properties. Generally fine, but one aspect not included is that one would expect the "normally" westard flow in the area to follow constant f/H contours, contours of constant watercolumn depth (Figure 12 in Nøst 2004). This should make it somewhat difficult for the coastal current to flow directly below the ice toungue. But if this takes place, which it probably will do to some degree, one would also expect the current below the ice shelf front to make iot directly into the cavity on the eastern slope of the sill.

4. Oxygen isotope ratios. Here I agree with the other reviewer in that one should seek better estimates for the sea ice values, both in d18O and salinity. Eicken 1998 is a good place to start. As the area outside the Fimbul is often ice-free in summer, one would indeed expect higher sea ice salinity of the first year ice than 3 psu. 5. Discussion and Conclusion. Here a discussion of the hydrography of 2005 compared with earlier results is clearly missing. For exapmple is a CTD cast from Foldvik et al 1985 (taken in January 1979) today located below 'Trolltunga'. At this location the 0 degree isotherm was at 589 m depth, only located 20 km north of the sill. Some of the stations occupied by the AWI Greenwich meridian section also come very close to the shelf, and should be of relevance to the Discussion about the chance for having WDW in the cavity below Fimbul.

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Page 723, line 14. This is not correct in my understanding. The outflow of ISW from the Fimbul cavity should not be guided by the sill. The ISW water must form a plume like feature and be guided by the sub-ice-shelf draft (Figure 13 in Nøst 2004). This would tend to guide outflow along the draft of jutlustraumen along the Greenwich meridian, or along the western edge of the cavity along 2 deg W. This should indicate that station 9 would get a signal both from the eastern area of the entire Fimbul ice shelf, as well as from the ice tonuge (Trolltunga).

References are OK, but these, and others, should likely be added;

Eicken, H. Deriving Modes and Rates of Ice Growth in the Weddell Sea From Microstructural, Salinity and Stable-Isotope Data, 89-122. Ed: Jeffries, M. O., Antarctic Sea Ice: Physical Processes, Interactions and Variability, AGU, 1998, Antarctic Research Series

Foldvik, A. and Gammelsrød, T. and Tørresen, T.,"Physical oceanography studies in the Weddell Sea during the Norwegian Antarctic Research Expedition 1978/79", Polar Research, 1985, vol 3, 195-207.

Figures :

Figure 2 is too small, it is hard to see both numbers, depths, and iso-lines. The rest of the Figures and captions are fine.

Figure 5: Very difficult to see the difference between red and magenta in my printed version. It should be better to also use different symbols. Figure 6: The color does really not add much of value here. A gray scale would have done the same job, but maybe this is not of much concern in an on-line journal these days. Just remember there are a good number of colorblind persons out there.

Also I think it is a good rule that papers should be OK to read also printed on a black and white printer, or copied on a B/W copy machine. The cost of printing in color is a a lot higher, and now-days this is mostly covered by our own institutes, not the journals.

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