

This paper aims to provide a technique for retrieving sea ice thickness in the Weddell Sea by upward looking sonars. Any viable technique that provides ice thickness information in the polar regions, particularly in Antarctica, would be most desirable because of the requirement of such data for mass balance, modeling studies and for testing remote sensed information. In this regard, the scientific merit of the objectives of this mission is very high. The ULS dataset is well described as well as the physics involved in the sonar systems. The sensitivity and error analysis are really a good point.

Generally, the manuscript is carefully written and sections are appropriate.

I recommend publication after the authors have addressed the few points under Specific Comments below and have gone through the text again to improve some confusing sentences.

Specific comments:

Page 806 – line 15-16: This information is not appropriate in the abstract. References are well located in “DATA COVERAGE AND PARAMETER MEASURED”. Anyway, the word “under” is not proper.

Page 806 – line 18: How much more than 18 millions of squared km? Maybe, it would be better to define an interval with the related references. (Between 18 and 19 million of squared kilometers could give an idea for example).

Page 806 – line 23: Antarctic sea ice formation and melting influences the whole Southern Ocean! Why just stressing the relevance for the Atlantic sector?

Page 807 – line 8: References about the Arctic could be useful.

Page 808 – line 20/21: Is this a separate section with a title in bold style? So, this is section **3 Data coverage and parameter measured**. If so, please check and change the following numeration.

Page 809 – line 10: Why the measurements were concentrated on the prime meridian? Because of the 0° longitude or for a geophysical reason? And what about the previous locations' strategy? They were placed following any latitude concept? Please let the reader know about.

Page 810 – line 3: Which kind of ECMWF reanalysis product. More information are needed.

Page 810 – line 23: It would be better to begin the sentence with In step two.

Page 815 – line 16: It should be a rate of four ‘per’ minutes. Please check.

Page 818 - line17: Please, if possible rewrite the sentence avoiding the use of “equal to” something followed by “the equal symbol”.

Page 818 - line18: From the sentence I guess you mean the temperature profile is constant, not linear. It is correct?

Page 823 – line 3: It's the ‘statistical mode’.

Page 825 – line 22-23: It is preferable to rewrite the sentence avoiding the use of colloquial expression such as ‘one find’.

Page 825 – line 25: How much significant? Please add more detailed information about this statistical significance.

Page 826 – line 2: What about sea ice thickness results in the other locations? If possible, please comment some about the other diagrams, even if not detailed as for the selected results.

Page 828 – line 3: Conclusions are synthetic and comprehensive. It could be interesting to remind also some of the results you get from the selected diagrams.

Fig. 2 – Text in the vertical and horizontal axis are not readable.

Fig. 14 – Where is the connection to Fig. 7?