

## ***Interactive comment on “Estimating the extent of Antarctic summer sea ice during the Heroic Age of Exploration” by T. Edinburgh et al.***

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(or Please see attached PDF.)

Review of Estimating the extent of Antarctic summer sea ice during the Heroic Age of Exploration, by Tom Edinburgh and Jonathan J. Day (doi:10.5194/tc-2016-90, 2016)

General comments:

The paper summarizes a carefully executed analysis comparing Antarctic ice extent from old data in the form of ship logbook entries with ice extent from today's satellite data. The authors acknowledge the obstacles inherent in comparing such different data types, and address them. Numerous references point to wide and deep research before the work with actual numbers began, and this adds weight to the results captured

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in the paper.

The authors find that with the exception of extent in the Weddell Sea, ice extent now is not much different than it was in the Heroic Age (1897-1917). Between then and now, however, it may have been much more extensive, based on whaling records and the earliest Nimbus satellite imagery. This is an important finding because it suggests significant decadal and inter-decadal variability in southern hemisphere ice extent.

Publishing research results that come from old data like ship logbooks is important because it broadens recognition of international projects like ICOADS and Old Weather that are working to ensure that the observations are not lost.

Specific comments:

Page 4 lines 21-36: Fortunately, the Worby and Comiso study quantifies average differences in where a human observer would note the ice pack beginning on a voyage south, and where satellite data would put it. The Heroic Age did not have the “trained observers” of the Worby and Comiso study, and the study was only for one sector of the Antarctic, but given the other sources of error and imprecision when comparing satellite extent with that from logbooks, these are minor issues.

This section includes “They argue that during this time of year, saturated bands of ice and floes, particularly at the edges of the pack ice, may be very localised, resulting in ice concentration below the 15% threshold when averaged over the 25km footprint of the PM instrument. “ The use of “footprint” is incorrect here. The algorithm uses brightness temperature from 37GHz, 22Gz, and 19GHz channels, and for these the field of view is larger. For the 19GHz frequency, it is about 70x45km. Simply replacing “footprint” with “grid cell size” works here though. (Substituting “grid cell” for “pixel” throughout would be more correct.) Page 5 lines 3 and 4: The actual data set the authors used needs to be cited properly. This is probably the right one to use: Comiso, J. C. 2000, updated 2015. Bootstrap Sea Ice Concentrations from Nimbus-7 SMMR and DMSP SSM/I-SSMIS, Version 2. [Indicate subset used]. Boulder, Colorado

USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. doi: <http://dx.doi.org/10.5067/J6JQLS9EJ5HU>. [Date Accessed]. Page 5 lines 5 and 6: I'll just note that this way of constructing a mean ice edge for one day may not be optimal, because if the ice edge in some sector occupied a low latitude just a few times, and a high latitude most of the time, say, then the average concentration field from that day's 26 instances might easily have values >15% and place the average edge for that day in a place north of where it is likely to be seen. There are other ways to do it (e.g. the median edge used by the Sea Ice Index, described in [https://nsidc.org/data/docs/noaa/g02135\\_seaice\\_index/#processing\\_overview](https://nsidc.org/data/docs/noaa/g02135_seaice_index/#processing_overview)), but for the purposes of this paper I don't think it makes much difference. Page 6 line 24: missing a "by" Supplementary material: The animations in the supplement do a great job of conveying information that the text covers but can't convey as well. Figure S2, Scatter Max is not the same as figure S2 within Supplementary Material (later lacks a trend line)

Please also note the supplement to this comment:

<http://www.the-cryosphere-discuss.net/tc-2016-90/tc-2016-90-RC2-supplement.pdf>

Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2016-90, 2016.

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