

***Interactive comment on* “New estimates of Arctic and Antarctic sea ice extent during September 1964 from recovered Nimbus I satellite imagery” by W. N. Meier et al.**

Anonymous Referee #1

Received and published: 5 February 2013

General Comments

This paper is well summarized by its title. The result is that Arctic sea ice extent from September 1964 is consistent with September 1979–2000 estimates from passive microwave data, but Antarctic sea ice extent from September 1964 is much higher than September 1979–2000 estimates.

The recovered Nimbus I data is new and thus provides a valuable point of comparison of sea ice extent from before the passive microwave era. The analysis and conclusions are valid and proper. This paper is suitable for publication after minor revisions noted below.

Specific Comments

The Abstract should state that the Nimbus I data is VISIBLE or OPTICAL imagery.

Regarding Arctic sea ice extent, a statement in the Abstract is inconsistent with statements in the Introduction. Referring to Arctic sea ice extent since 1979, the Abstract says: "relatively stable summer extents until the recent large decrease", with the implication being that the stable period was 1979-2000 and the recent large decrease was since 2000. But the first line of the Introduction says: "The decline of Arctic sea ice extent over the past 3+ decades...". Page 37 lines 11-12 also says "a downward trend is evident... almost from the beginning of the passive microwave record" which was 1979. So which is it, a stable period followed by a large decrease, or a 3+ decade downward trend?

What is the horizontal resolution (in meters) and the size (in kilometers) of each Nimbus image? Find a suitable place to include this information.

Page 41 line 19. The "average ice edge" is discussed in reference to Figure 3, but the figure caption refers to the median ice edge, not the average. This is a problem throughout the paper – an apparent confusion between average and median. On Page 43 line 17, the average ice extent for 1979-2000 is used for filling a region. The total ice extent is then calculated and compared (line 20) to the median ice extent for 1979-2000. Why fill with the average and then compare to the median? See also the caption for Figure 6.

Page 42 line 1. What is meant by summing the area "within the contours"? What contours? Do you mean "south of the ice edge"?

Page 42 line 6. The paper by Predoehl (1966) is titled: "Antarctic pack ice: boundaries established from Nimbus I pictures". Why, then, do you refer to Predoehl (1966) as "a 1960s era estimate"? It would seem to be an exact point of comparison, based on the same satellite you are using, which only operated for 3 weeks.

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Technical Corrections

Abstract line 10. "The Arctic 1964 extent IS" (not was), for consistency with the previous sentence about the Antarctic 1964 extent, which uses the present tense (is).

Abstract line 13. "the recently observed *RECORD* into a longer-term context"

Page 36 line 17. "The primary source *OF* these sea ice extent estimates *IS* a series..."

Page 36 line 19. Missing parenthesis "(" before SMMR

Page 36 lines 23-26. This is a badly written sentence. I would suggest: "For sensor transitions, algorithm coefficients are adjusted to provide intercalibration (e.g. Cavalieri et al, 2012) and thus a consistent time series through the ... "

In my opinion, "time series" should be 2 words, not "timeseries". What is The Cryosphere's opinion on that? Similarly, in my opinion "data set" should be 2 words, not "dataset".

Page 37 line 23. "satellite imagery and reconnaissance *FLIGHTS*", right?

Page 38 line 20. After "Nimbus I", give the dates of operation, to be consistent with the text for Nimbus II and Nimbus III in the same sentence. Then, delete the dates from Page 39 lines 8-9.

Page 38 line 25. "but rather due *TO* limitations of *COMPUTATIONAL* power..."

Page 39 line 7. "Arctic and Antarctic basins". Is the Antarctic really a basin?

Page 39 line 14. "September is a period *WHEN* ..."

Page 39 line 15. Delete the word "feature". Not necessary.

Page 40 line 8. Change "imagery" to "images" (because it's followed by "they")

Page 40 line 13. After "contrast", delete the word "and".

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Page 40 lines 14-15. "delineate" is the wrong word. It should be "distinguish".

Page 40 line 19. "criteria" should be "criterion" (singular)

Page 41 line 12. The text is discussing the Antarctic, but it refers to Figure 2, which is in the Arctic.

Page 41 line 22. After the word "discrepancy", change "and" to "in"

Page 42 line 4. "ship and aircraft" should be "ship or aircraft"

Page 43 line 18. Delete "obtain a total Arctic sea ice extent"

Page 44 line 7. Delete "to present"

Page 44 line 17. "archived *AND* distributed"

Acknowledgements. "This research was *FUNDED* by Alex Calder for *THEIR* diligence ..."

Fig 1 caption. Line 1 - "region" should be "regions". Line 2 - "criteria" should be "criterion". What are the red and green lines?

Fig 2 caption. I don't see any blue # marks in the figure. Oh, maybe there are 2 purple # marks at the very top of the figure. The caption should note the location of the blue (or purple) # marks because they're not obvious.

Fig 3. Label the Weddell Sea since it is discussed on Page 41, and label the lines of latitude that are drawn in the figure.

Fig 4 caption. Line 2 - put a comma after "whisker plot". Line 3 - after "1979-2011" add "in blue". Line 4 - change "which" to "while".

Fig 5 caption. I think this should be Nimbus I imagery, not Nimbus II. Is the left panel actually "imagery" (plural) or is it an image (singular)? The right panel is described as "passive microwave imagery". Is it really imagery, or is it a derived sea ice concentration product? In the caption, give the size (in kilometers) of the Nimbus image in the

left panel.

Fig 6. It is difficult to distinguish the black dots from the blue dots. Maybe try green instead of blue.

Fig 7 caption. Line 2 - put a comma after "to the left". Line 3 - after "1979-2011" add "in blue".

Interactive comment on The Cryosphere Discuss., 7, 35, 2013.

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