The Cryosphere Discuss., 2, S260–S262, 2008
www.the-cryosphere-discuss.net/2/S260/2008/

The Cryosphere Discussions

Interactive comment on "The emergence of surface-based Arctic amplification" *by* M. C. Serreze et al.

Anonymous Referee #2

Received and published: 28 August 2008

I recommend publication of this excellent paper that makes a compelling case for open water in the late summer and early autumn being a positive feedback to surface air temperature (SAT)in the Arctic, which in turn reduces the following year sea ice development. The Arctic amplification is a key mechanism that is an expected outcome of GHG driven warming, and its appearance may explain the more rapid sea ice reductions in the last 5 years than models have forecast. The key recommendations are merely to more clearly delineate the competing explanations, and why via differential diagnosis Arctic amplification is the key factor in autumn sea ice extent reduction. The paper must also more specifically demonstrate why NCEP is better than ERA40 at the task of identifying air temperature changes with altitude.

Key Issues:

1.604-17-25 Delineating the specific explanations for declining autumn sea ice, numbering each.

2. 605-1-15: Graverson (2008) arrive at a very different conclusion because of the height in the atmosphere of the observed cooling in the ERA40 reanalysis is different from NCEP. It is important to explain why the difference exists and why the NCEP is more valid for this specific application. A Figure may be useful that would compare NCEP, JRA-25 and ERA40. I agree with the following paragraph that NCEP fits other observations better, but this statement will be strengthened by the aforementioned discussion.

3. 608-21 The conclusion of this sentence that most of the increase in SAT over the Arctic is due to sea ice change needs better defense. Why does the differential analysis lead to this conclusion and what is the principal difference in the results?

4. 610-12-15 Explain why these observations are then incompatible with particular explanations offered in Point 1 for sea ice loss?

Specific comments 602-7 surface air temperature should be added between Arctic and amplification.

602-9 Same issue, can be simplified from here forward.

602-18 atmosphere,

603-13 Identify the reference This

606-25 What are the size of the cells. And are the problems a result of differential coastline position?

607-7 How many cells are impacted?

608-8 Explain why the NCEP sea ice concentration product is used instead of NSIDC, when they are so well correlated. I recognize it does not change the outcome.

TCD

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609-3 Can the anomalies be illustrated in a table, more concisely expressing the change?

610-7 Correlation coefficients?

611-23 Why is NCEP better than ERA40 here?

613-15 What does the NCEP say about the comparative importance of the Northern Annular Modes role in SAT and sea ice loss?

613-17-29 Why is this paragraph even necessary?

Interactive comment on The Cryosphere Discuss., 2, 601, 2008.