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The Cryosphere Discussions

Interactive comment on "Future Arctic marine access: analysis and evaluation of observations, models, and projections of sea ice" *by* T. S. Rogers et al.

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Summary:

This paper presents an analysis of regional trends in observed extent and projections of Arctic sea ice from GCMs for different regions (quadrants of the Arctic). The observations indicate a correlation between sea ice and SST in the Atlantic sector with SST lagging extent. The models indicate differences in future regional projections, with the best models indicating reduced ice cover in key shipping routes. The Northwest and Northeast Passage may become navigable for periods during the summer.

General Comment:

This is a very nice and novel analysis of regional trends and projections of sea ice extent in the Arctic. It builds on earlier evaluations of pan-Arctic projections. As Arctic sea ice declines in the future and the prospects for access into and through the Arctic increase, it will be crucial to understand and predict the regional distribution of the ice cover. This paper is a good first start towards this understanding. I recommend publication after address a few minor comments, listed below.

Specific Comments:

Section 2.1: Why does the analysis start in 1980? The passive microwave record goes back to 1979 for continuous data. I don't think it will affect the analysis, but it seems odd to not use all of the data unless there is a specific reason.

Section 2.1: It is a reasonable proposition to use quadrants, especially since they've been employed previously in ACIA. However, they are somewhat arbitrary. Another approach would be to split the Arctic into more geographically coherent regions, as was done in Parkinson et al. (2008, JGR) and Meier et al., (2007, Ann. Glaciol.). Such regions are smaller and may be more difficult to analyze, particularly for models. Perhaps a sentence on the rationale/advantage of using quadrants would be useful?

Section 2.2: The correlation between SST and sea ice extent is interesting, particularly the fact that SST lags extent. It would seem more intuitive that it would be the reverse. This would seem to deserve a paper all its own, investigating potential explanations. As it is, while it's interesting, it seems a bit out of place. I understand that it is used to explain why the Atlantic sector has a different winter trend than the other three quadrants. The analysis sort of provides an answer, but really it just leads to more questions – i.e., why/how is the extent leading SST? I won't suggest that this should be cut, though I think it could be without detriment to the paper.

Section 4.2: I wonder why the cross-pole route isn't mentioned? I've heard much talk of the route over the pole recently and my understanding is that this route is likely to become more feasible sooner than the Northwest Passage. Even the Northeast

Passage can get blocked by wind-driven ice along the coast.

P3964, L8: typo, “loss”

Interactive comment on The Cryosphere Discuss., 6, 3963, 2012.