The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2018-151-AC2, 2018

The Cryosphere Discussions

Interactive comment on "Seasonal sea ice prediction based on regional indices" *by* John E. Walsh et al.

John E. Walsh et al.

jewalsh@alaska.edu

Received and published: 30 November 2018

Anonymous Referee #2

Received and published: 1 November 2018

ÌĘ"Seasonal sea ice prediction based on regional indices" is an intriguing new look into the statistical predictability of sea ice conditions as defined by the Barnett Severity Index (BSI). The BSI is one of the longer duration sea ice metrics on record and I commend the authors for reaching back prior to the satellite era to paint a more thorough picture of sea ice conditions. We need more work in this area. As the authors note, this paper somewhat extends previous work by Drobot but it is not a precise analogue. The present paper has three main objectives: (1) to quantify predictability inherent in

antecedent spatial distributions of sea ice, (2) to distinguish predictability of pan-Arctic sea ice from that of regional predictability, and (3) to distinguish quantitatively the trend-derived predictability and predictability of departures from trend.

What is written in the paper is very well done. I have few critical issues with this aspect of the paper. Assessing the predictability of de-trended data is a key baseline contribution for further developing statistical sea ice forecasts. However, I am left wanting with just this analysis. In the Drobot paper, sea ice data was supplemented with atmospheric teleconnections and other data. This paper would be greatly strengthened by adding additional predictors so we can begin to better understand the predictability of de-trended sea ice data.

We acknowledge the reviewer's point, which is that the addition of other (atmospheric) predictors, the paper would provide a more comprehensive assessment of statistical predictability. However, previous work by Lindsey et al. (2008, JGR) and Drobot et al. (2006, GRL), has shown that atmospheric modes of variability such as the NAO, AO, and PDO "were found to have little value as predictors of the September Arctic SIE compared with ocean and ice predictors" (Guemas et al., 2014, QJRMS, p. 555). The recent paper by Goldstein et al. (2016, The Cryosphere Disc.), using Self-Organizing Maps (SOMs), also found that there was little evidence of a useful signal of the atmospheric circulation in seasonal prediction of open water season length. Summer wind patterns play a role in interannual variations of late-summer ice extent, but the summer wind patterns in years with similar September pan-Arctic can be quite different (Serreze et al., 2016, JGR) and wind pattern anomalies are largely unpredictable. Ocean anomalies do have some predictive value, especially for the North Atlantic winter ice extent (Bushuk et al., 2017, GRL), but the record of subsurface ocean variables is much shorter than the 60+ year record length of sea ice variations examined in our study. Given that (1) the aggregate of this evidence points to diminishing returns if the predictor suite is expanded beyond sea ice and (2) such an expansion of scope would, in our view, detract from the paper's intentional focus and main "punch lines", we be-

lieve that the paper's main messages would be diluted by the expansion to include other types of predictors.

Finally, we note that the paper's present focus on persistence generated a host of issues requiring further discussion and clarification, as is evident in the extensive comments of Reviewer 1. While a need for clarification is not a justification for a more limited scope, some of Reviewer 1's comments are fertile ground for further discussion (see Reviewer 1's comment on lines 342-345 and response), so we believe the paper's present content can generate reader interest.

For the above reason, I recommend this paper needs major revisions. To clarify, I find little fault with what is here – it's just that I don't think it's enough. By adding additional predictors, this will become a more complete package and one that will have high visibility moving forward.

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2018-151, 2018.