

Interactive comment on “Atmospheric forcing of sea ice anomalies in the Ross Sea Polynya region” by Ethan R. Dale et al.

Anonymous Referee #1

Received and published: 14 June 2016

General Comments:

The authors examined the correlations between SIC, AWS winds/temp, ERA-Interim winds within a defined region in Ross Sea Polynya. They found persistent weak/strong winds near the edge of the Ross Ice Shelf are generally associated with positive/negative SIC anomalies in the Ross Sea Polynya (RSP). They also report rapid decreases in SIC during a strong wind event are followed by a more gradual recovery in SIC perhaps due to the slower responses of thermodynamic processes to changes. Comparison of AWS and ERA-I winds also suggests that ERA-I winds are weaker than observed.

There are a lot of details in the manuscript, some of which are interesting and some requires clarification (Please see comments and queries below) and justification based

C1

on the quality of the SIC retrievals. The quality of the SIC may be confounding in some cases and may affect (and therefore not support) the conclusions about the process behavior. Please address the concerns below.

My recommendation is for publication after revisions.

More specific comments:

Page.line

Abstract. This would be more effective if shortened in length. The first paragraph seems out of place in an abstract.

Fig. 1 Please define the red polygon/region in the caption, as you have described in text (or refer the reader to the text).

4.25 I have to ask: Even though different investigators have derived ice motion from the passive microwave data set using similar methodology, their quality varies. How have you assessed your derived ice motion estimates?

Fig. 3 caption: (b) red is the AWS and magenta is ERA-Interim.

5.25 I assume 2-meter winds are used in these analyses. Otherwise, there would be a scale factor. Also of interest is whether the ERA-I winds are directionally biased.

6.10 The Bootstrap algorithm is based on binned TBs over a day, so there is a blurring of events (polynya openings) over a 24-hour period. Please clarify the sentence re: varying time lag in 6.5.

6.15 Isn't this also dependent on the response of the Bootstrap retrievals to changes in observed brightness temperature?

6.18 There is lag between the changes in wind direction observed at Laurie and at the RSP?

6.28 Your arguments re: lag seem reasonable, but I'm still not quite comfortable as to

C2

whether the 24-hr sampling of the SIC fields would support your attribution statements. Perhaps I still don't quite clear about your remarks in 6.5.

6.29 You mean the wind speeds autocorrelation has e-folding time of 36 hours. If you included direction, it may be different.

7.10 You should also note that this also depends on the response of the bootstrap algorithm to thin ice growth. The algorithm designates thin ice as open water until the ice reaches a thickness of about 20 cm. So, that may explain some of the asymmetry in the responses.

8.0 At this point, I recommend that the results section should be broken into subsections. As is, there are five pages of text.

8.15 A general question: Are they larger differences between the AWS and ERA-I winds when the winds are strong (e.g., katabatics).

9.6 OK, these anomalies are interesting. I guess this is presented as just a remark on the results?

11.10 I thought Bootstrap accounted for the changing coastline.

Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2016-89, 2016.