

Interactive comment on “Atmospheric influences on the anomalous 2016 Antarctic sea ice decay” by Elisabeth Schlosser et al.

Anonymous Referee #2

Received and published: 5 December 2017

Review on “Atmospheric influences on the anomalous 2016 Antarctic sea ice decay” by Elisabeth Schlosser, F. Alexander Haumann, and Marilyn N. Raphael.

General Comments The study is well written, well organized, and a joy to read. However, I do find the study to be a bit too much on the qualitative/descriptive side with many of the claims made on how the atmosphere “influenced” the sea ice being a bit speculative. Furthermore, I am not sure if we are learning anything new here. As stated by Referee 1, many of the descriptive details surrounding the sea ice, atmospheric circulation, and SAM pattern during 2016 are already discussed in the State of the Climate in 2016 Antarctica chapter. Without more quantification of mechanisms, such as quantifying advection, melt, and the role of the ocean, I don’t see what new information is being presented here. I also strongly encourage the authors to place their

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findings more in context with other work, particularly Turner et al. (2017). I recommend the authors perform a major revision and resubmit at a later time.

Specific Comments There is a lot of referencing to place names (particularly ocean basins and seas) throughout the study, and so I recommend the authors include a map to go along with Table 1. I also recommend giving new names to the regions (R1, R2, etc) so there is some connection to their respective geographic place names (e.g., western Ross Sea as wRS, etc). This will also reduce instances of referring to both the place name and the respective “region” name for clarification in the text (for example, lines 329-331), which is confusing and makes the R1, R2, etc. names seem unnecessary. If sensible region names are defined, they could be used throughout the manuscript without requiring further clarification.

Line 116: Please add citation Meehl et al. (2016) and their finding that tropical Pacific variability also influence meridional winds and associated sea ice extent.

Line 117-118: As you mention below in lines 125-127, Turner et al. (2017) already established northerly wind/warm air advection was a major contributor to the 2016 record sea ice loss. What are we learning here that we don't already know?

Line 245-246: How does adding two extra sub-areas compare/expand upon the results of Turner et al. (2017)? Please make these new insights clear by placing them into context of Turner et al. (2017).

Figure 3: Please specify in the caption what the green and grey lines are. I assume green is the average SIE and grey is the 2016 SIE, but it needs to be specified.

Line 255-256: The negative SIC anomalies in the Amundsen and Bellingshausen Seas actually appear quite similar in magnitude to those in the Indian Ocean. Without quantifying this, I don't think it can be said here.

Line 309-310 and 314-316: Although I appreciate the schematic arrows, without quantifying advection there is no way of determining that warm air advection explained any

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portion of the sea ice loss. Furthermore, actual surface air temperature over the sea ice would likely need to be analyzed to determine if, even in the presence of warm air advection, temperatures were actually warm enough to melt the ice as the authors claim.

Lines 332-334: This seems highly speculative.

Please add DOIs to bibliography

Technical Corrections Line 94: SIC has not been defined. Please define it here and use SIC for the remainder of the study

Line 124: remove “were”

Line 128: change to “December”

Line 130: remove “rather”

Line 137: ECMWF is never defined

Line 163: change “today” to “present”

Line 205: please clarify what “Mio.” Means

Line 210: no longer need to continue defining SIC, SIE, SIA as they are already defined

Line 259: Change “Figure 6” to “Figure 4”, and please clarify whether this is sea level pressure (as stated in caption) or surface pressure (as stated in text)

Line 269-270: Already defined as the Amundsen Sea Low / ASL, so just use ASL here

Line 275: Please remove the words “masses” and “right”

Line 288: Would say ASL instead of “Pacific low”

Line 305: Just put “periods” in parenthesis

Line 307: Please change to Figure 4e

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References Meehl, G. A., J. M. Arblaster, C. M. Bitz, C. T. Y. Chung, and H. Seng, 2016: Antarctic sea-ice expansion between 2000 and 2014 driven by tropical Pacific decadal climate variability. *Nature Geoscience* 9, 590–595, doi:10.1038/ngeo2751

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2017-192>, 2017.

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