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Earth System Dynamics
Discussions

Interactive comment on "Moisture transport and Antarctic sea ice: Austral spring 2016 event" *by* Monica Ionita et al.

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Summary and overall comments
The manuscript describes the dramatic retreat of AA sea ice in Oct-Dec 2016 in detail, and relates it to anomalies in the atmospheric circulation, in particular surface temperature, total column water vapour and total column water vapour flux. The methodology was previously unknown to me, and the results are interesting, warranting publication in ESD. However, the writing in the manuscript needs improvement. I therefore recommend publication after minor revisions.

Specific comments
Fig. 2: Please indicate in the caption what is shown. What are the arrows in left

column plots? In right column, are colours IMV (integrated water vapour) and arrows the IMVT (integrated water vapour transport)? Also, please insert reference arrow.

Fig 3: For comparison with Fig 2, please swap center and right columns so that temperature is in middle and IMV to the right.

Fig 4: This figure is referenced on lines 26, 29 on page 3, but I think you mean Fig 5 or 6? In that case, Fig 4 is only referenced to once in the paper, and is somewhat unnecessary. The relation between high temperatures and low sea ice is already made in Fig 3. I strongly suggest to remove it or add it to Supp. material.

Fig. 6: From Fig 6a,c, my guess is that there is an SLP anomaly somewhere over the Antarctic Peninsula driving the changes in advection. Hence, the 2nd box is correlated to WS sea ice, but is likely not causing the anomalies in WS sea ice? Also, the caption describes Fig 6c three times, but never Fig 6e or 6f.

Page 1, Line 11,12: Throughout the paper, the authors use the unusual abbreviations "IWV" for integrated water vapour and "TT" for 2m temperature. For the former, "VIWV" (vertically integrated water vapour) would be a better name so that the direction of integrations is explicit, or the authors could use "TCWV" (total column water vapour) or "IWVC" (integrated water vapour column) which are more common. Rather than "TT", perhaps "T2m" or "Ts" would be better?

Page 1, Line 32: The sentence "Antarctica experienced..." could be changed to "Between September 2016 and April 2017, Antarctica experienced a dramatic shift featuring strong negative SIE anomalies".

Line 2, Line 2: "could be caused either by a potential change..". What is meant by "potential change"? Perhaps re-phrase to "could potentially have been caused by a change in the long-term trend or by natural climate variability"?

Page 2, Line 20: Skip the comma between "utilize" and "the".

Page 3, Line 20: "does not change on time"? Do you mean "is time-independent"?

Section 2.2: The method is interesting, but the description may need some clarification. If there are 37 years of data and you use a 21-year moving window, then you only have 37-21=16 data points in time? Does this mean that the maps in Fig. 5,6 are made from 16 time levels? And 80% of 16 is about 13, so you require significant correlations for 13 of 16 time levels?

Page 3, Line 26, 29: Should be Figure 5,6 instead of 4,5?

Page 4, Line 22: Suggest "striking" instead of "very particular"

Page 4, Line 29, 30: Perhaps use "SIE anomaly below -2.2 mil. km^2" instead of "more than 2.2" so that it is clear that the anomalies are negative. Same at Line 30.

Page 5, Line 2: "1980's"

Page 5, Line 12: At several places in the paper (e.g. Page 6, Line 32 and Page 7, Line 12), the authors use "positive temperature anomalies and enhanced water vapour". Why not use "positive anomalies in surface temperature and total column water vapour"?

Page 6, Lines 9, 15, 19, 20, 23: "wet" often refers to high precipitation. Use "most humid" instead? Also, do we know if these events are linked to high values of precipitation?

Page 6, Line 32: Suggest change from "extreme warm temperatures and enhanced moisture" to "large positive anomalies in surface temperature and total column water vapour".

Page 8, Lines 1-5: I found these sentences unclear. I would suggest "For October and November each year, we calculate daily IWVT (or TCWV or IWVC, see above comment) over three areas in the ABS, IO, RS respectively. The areas are those which rank as the warmest and most humid on record in 2016, and are marked in Figures 3e

and 3h. The time series of IWVT for these areas are shown in Figures 7a, c, e. "

Page 8, Line 8: "reaching the" rather than "penetrating until".

Page 8, Line 13: "ABS" instead of "BAS"?

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