



Comment on acp-2021-609

Anonymous Referee #3

Referee comment on "Atmospheric rivers and associated precipitation patterns during the ALOUD/PASCAL campaigns near Svalbard (May–June 2017): case studies using observations, reanalyses, and a regional climate model" by Carolina Viceto et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-609-RC3>, 2021

The paper by Viceto et al. 2021 analyses three atmospheric river events which took place during the ALOUD/PASCAL campaigns near Svalbard. They compare model simulations, with a wide variety of reanalysis datasets and observations. In addition, they use two different detection methods for Atmospheric rivers, besides looking at the synoptic situation and vertical profiles. This paper provides an in-depth analysis of those events and provides extra insights of moisture intrusions to this specific region of the Arctic. I found the analysis well done and results well described. In my opinion, the paper could improve in readability by reducing the length of the abstract and summary/conclusions, and by stating more clearly the research questions and uniqueness of the study. By doing so the paper will be easier to read and the main message will appear more clearly. I explain those comments below, together with some minor comments on the paper.

Abstract

Is it needed to mention the dates of the field campaign in sentence 17, for me it would be enough to indicate the dates of the events which fall within the field campaign.

Can you indicate the research question/objective more clearly in the abstract? And as well in the introduction?

Line 21-25; is all this information needed in the abstract or can you reduce the text here?

Line 33: there was an increase **of values** with height. This 'of values' is not really clear. Can you improve this sentence?

Line 35: ..during spring **and** beginning of summer ..

Minor comments

Line 53: reasons

Line 55: Here it's indicated that a typical duration of an AR is 2 to 4 days, but in your

study you have two separate ARS within 3 days (6 and 9 of June). Can you comment on this? It shows up as different AR events from the figures but it would be good to emphasize that these are separate events

Line 73-75: The majority of ... --> this sentence feels unlogic here as you have been talking about ARs before but in that particular section you discuss the influence on the Arctic. I would move the sentence to line 65 or remove it from the text

Line 84-89: The information provided here is already very specific and would better suit in the method or discussion section

Line 90: Shields et al. (2018) study aimed to understand

Line 146: from 1000 hPa to 300 hPa. What are the vertical steps?

Section 3.3 Air mass trajectories: For the air mass trajectories the NCEP dataset is used, which is not used for the rest of the analysis of detections of ARs, which is a bit inconsistent. Can you motivate your choice in the text, and did you analyse the performance of simulating the ARs in the NCEP dataset?

Line 180: where g is the acceleration due to the gravity

Line 225: here you explicitly mention ERA-Interim, but why don't you compare with ERA5?

Line 297: First and second line of this section have a lot of overlap, combine them?

Line 304: ..used to study the atmospheric blocking

Line 354: After the landfall.. --> I believe here you mean the timing after the landfall while it could be interpret as location. This could be stated more clearly.

Line 378: Are you talking about the RMSE for IWV?

Line 520: Add interpretation to the sentence on low precip in ERA5

Line 660: In this study we focused **on** understanding

Figures & Tables

Figure 2: It would be nice to see the direction in which the AR is moving for extra insights in the event. You do show the orange arrows above 300, but could you lower it to get the direction for every plot? For the 6 June case you do not know the direction from the plot, which would give extra insights.

Figure 3: Is there a better way to visualize this data? I found the figure not very attractive.

Table 2: I wonder if Table 2 is needed in the main manuscript, as you only refer to it twice in the text and most information can be also found in Figure 5

Figure 6: end of caption --> (reference) --> still edits are needed?

Figure 9: In figure itself it should be accumulated instead of acumulated