Dear Dr. Wernli,

We graciously thank the reviewers for their second round of feedback on this manuscript. We have incorporated the recommended changes and believe they have greatly improved the manuscript. In the attached pdf, newly revised text is shown in blue font. We have also included a clean, revised manuscript without markups.

Reviewer comments are shown in **bold**.
Author comments are in plain text.

Sincerely,
A Waling and Coauthors

Reviewer 1:

Thank you to the authors for considering my comments from the first review. I do not have many further comments. Please find them below and I hope they are useful to you.

Thank you for your further comments. Please see the following text for revisions that we have incorporated into our manuscript.

Lines 45-46: While I am not overly familiar with the methods used in climate models, the reduction of grid size towards the poles is considered through the use of "reduced grids", such as reduced gaussian grids, in weather forecasting circles (https://confluence.ecmwf.int/display/EMOS/Reduced+Gaussian+Grids). Perhaps some discussion of this, or overlap with climate models, would be good.

Thank you for this suggestion. We include a brief discussion of reduced gaussian grids and their usage in weather predictions at Lines 46-50:

"Another alternative to traditional latitude-longitude grids common in weather projections (Copernicus, 2019; ECMWF, 2023) is the reduced gaussian grid, which employs quasi-uniformly spaced latitude points and unevenly spaced longitude points to approximate uniform grid size throughout the globe, thus eliminating the need for a polar filter. Though perhaps more efficient than traditional latitude-longitude grids, unstructured grids provide higher computational efficiency and are thus preferred for high resolution global climate models."

Line 101: Why such an historic period (1 January 1979 to 31 December 1998)?

1 January 1979 to 31 December 1998 was used in this study because it was the available dataset created by co-author Herrington et al. in 2022. Rather than run new simulations for a two-year Master's thesis, we opted to leverage an existing dataset rather than simulate for a new dataset. Herrington et al. 2022 chose the 1979-1998 time period because that was the default time slice for the Atmospheric Model Intercomparison Project runs in CESM at the time. As 1979 is the beginning of the Satellite period, it is commonly used as a starting point for simulations.

Figure 4: I agree with you about keeping the boxes for the interquartile range. My suggestion for percentiles was for the whiskers.

Thank you for re-iterating this point. After further thought, we agree that changing the whiskers to reflect percentiles is the most informative way to show the seasonal data. Please see below for the new figure including 1/99 percentile whiskers.

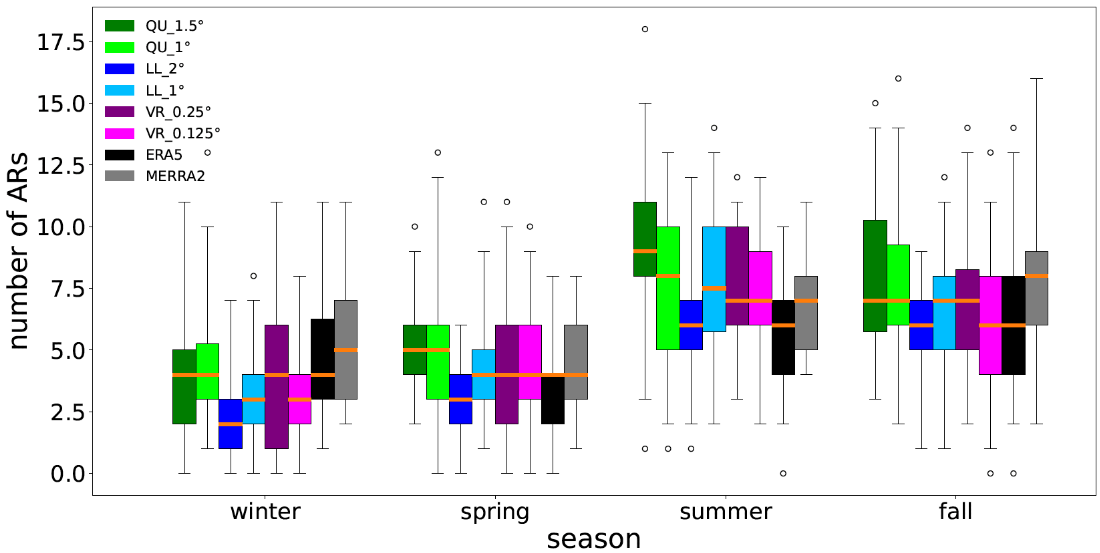


Figure 4. Number of ARs intersecting the Greenland ice sheet by season, with seasonal peaks in summer and fall. Winter was characterized as December through February, spring as March through May, summer as June through August, and fall as September through November. Seasonal distributions consider 20 years of data (1979-1998) using values from each of the four remapped ensemble members (N=80). Orange line in the center of each box signifies median value and box lower/upper boundaries describe the 25% and 75% quartiles, respectively. The whiskers extend from the box to the 1st and 99th percentiles. Outliers outside these percentiles indicated as open circles.

Reviewer 2:

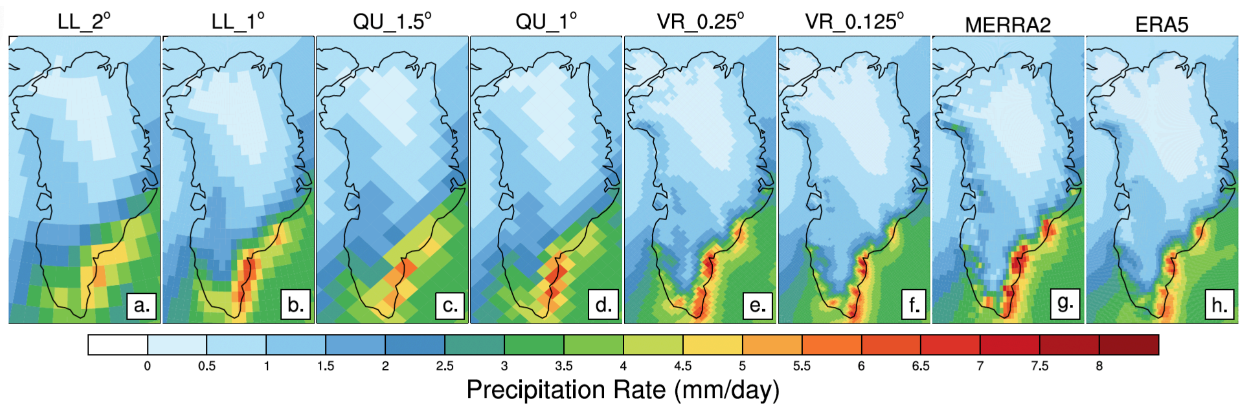
Thanks for this revised version which improves a lot the quality and interest of the paper. I understand that it is difficult to perform new sensitivity experiments (like using low resolution topography at high resolution) but showing similar figures as Fig2 for the mean precipitation and the 90th percentile precipitation rates simulated by the different configurations using different spatial resolutions will be useful to better highlight the impact of spatial resolution.

Thank you for this comment. We created plots showing the mean precipitation and 95th percentile precipitation rates without any remapping, please see below. We agree that this conveys useful information and have included the mean precipitation rate figure in our manuscript as Figure 8 with the following text:

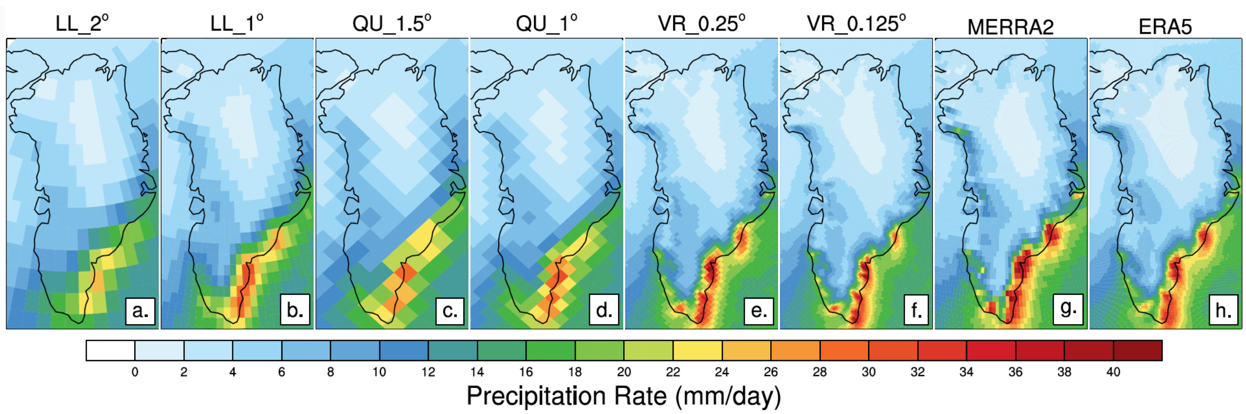
Line 261-264: "When we plot annual mean precipitation rate for all model grids and reanalyses on their native grids (Figure 8), the lower resolution grids tend to produce higher precipitation in the interior of the ice sheet, most notably over the southern dome of the GrIS. While the climatological mean precipitation rate is not exclusively from ARs, it exhibits a similar resolution sensitivity to our AR composite precipitation (Figure 7)."

We chose to only include the mean native precipitation rate figure rather than also the 95th percentile rate figure as the spatial trends are extremely similar in both, with the only real difference being the magnitude of precipitation rates; the 95th percentile rates are roughly 5x higher than the mean rates.

Mean native precipitation rates:



95th percentile native precipitation rates:



In coarser resolution grids, can mean precipitation travel further inland or only maximum (Per 90) can travel?

Both the mean and maximum precipitation can travel further inland in the coarser grids. As the both the mean (Figure 9a) and 95th percentile (Figure 9b) precipitation rates are similar for all grid configurations, we see the influence of ARs traveling further inland in more smoothed topography in the area-integrated precipitation for both mean and 95th percentile (Figures 9c-d). If this traveling further inland only occurred in 95th percentile ARs, we would not expect to see such a difference among the configurations in mean ARs (Figure 9c). Additionally, the two figures included above describing the mean and 95th percentile native precipitation show similar spatial trends, thus visually supporting this point.