



EGUsphere, referee comment RC1
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Comment on egusphere-2022-657

Anonymous Referee #1

Referee comment on "Hydrologic implications of projected changes in rain-on-snow melt for Great Lakes Basin watersheds" by Daniel T. Myers et al., EGU sphere,
<https://doi.org/10.5194/egusphere-2022-657-RC1>, 2022

General comments:

This study is a novel investigation that is of interest to the professional community and in-line with the aims and scope of the journal. The topic is appropriately introduced with justification provided for the specific objectives. While some additional details on the statistical testing could be added (see below), the methodological approach appears logical and reproducible. The results are organized around specific themes with figures that enhance understanding and are aligned with the final conclusions. Prior to supporting acceptance and publication, there are a small number of outstanding concerns with the manuscript that are addressed below as specific comments.

Specific comments:

- The proportions of historical ROS melt [to total melt] is larger here than a variety of previous findings for the region. For instance, Welty and Zeng (2021) find extreme ROS occurrence is approximately 24% for the Great Lakes basin, similar to the value the authors give on line 34 at over 25% of extreme ablation events being ROS. Looking at all ROS events, not just extreme, the maximum value to date I am aware of for this region is found in Suriano (2022). This notes between 30-50% of ablation is ROS in the eastern lakes, compared to less than 20% in the extreme northern/western regions. While the results here have a similar spatial pattern to Suriano (2022), with more ROS in the eastern lakes and less to the north and west, the magnitudes are rather different. Given one of the primary results of this study is the detection of large decreases in ROS events under the RCP4.5 scenario relative to historical period, it is warranted to provide further discussion on the robustness of the

historical model values relative to observations. This appears absent from the manuscript currently and should be incorporated into the discussion section of the revision.

- The authors acknowledge on line 126 the threshold used for statistical significance for their correlation tests. However, it is unclear if any significance testing was conducted for the rest of the study. Was any sort of t-test or difference of means testing conducted for the results comparing the historical period to the mid-century period? If not, this should be considered by the authors to aid in differentiating meaningful changes from ones still within the noise.