



EGUsphere, author comment AC2  
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## Reply on RC2

Daniel T. Myers et al.

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Author 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,  
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Dear Reviewer 2,

Thank you for pointing out that the model performance is lower than often reported in hydrologic studies. We are currently experimenting with different ways to adjust and recalibrate our model to achieve better performance, such as modifying potential parameter ranges within reason. Our goal is to have our best model ready for the revision.

Our study simultaneously evaluates 99 streamflow and 50 snowpack stations at the daily time step spread over a large hydrologically diverse region. This has the benefit of allowing us to verify that our model is performing as well as possible for simulating many watersheds and hydrological processes. However, it has created an extra challenge to achieve the error metrics associated with a more geographically limited system, which could fit well to one watershed or process but perform less well with other watersheds or processes (e.g. snowpack). We currently include several hydrologically diverse stations where our model performs well ( $NSE > 0.5$ ) and where our model performs not-so-well, so that the model can be as representative as possible of the entire basin.

Also, we want to use the same model parameter set across the Great Lakes Basin so we can know that any spatial differences in ROS represent actual differences due to spatial variation of climate forcings, rather than artifacts of regionally calibrated parameter sets simulating processes differently. Thus, with this single global parameter set, some stations perform well while others perform not-so-well, but we believe that the benefits of this approach in providing confidence in our interpretations of spatial ROS variation outweigh the sacrifice of model performance for some stations.

We apologize that the Myers et al. 2021 paper that the ROS model is based on is not open access. We are happy to share this paper (through the editor if you prefer) to provide the best background for our study. We will also incorporate substantially more information about the ROS model into our current paper so that other readers who encounter the same problem can access the information.

With regards to the comparison of different time periods (mid-21st century and late-21st century), we decided to focus on the mid-21st century because that is the period that the models and RCP's generally agree about climate changes, and because we expect that it will be the most meaningful focus for water resource managers in the Great Lakes Basin. By late-21st century, the climate projections also have much larger uncertainty. Thus, we

prefer to stick with the mid-21st century for most of our analyses. We will certainly incorporate more relative rather than absolute changes into the manuscript to best evaluate the climate change impacts.

Thank you again for the thorough review and helpful comments that are improving the quality and reliability of our paper. We will submit a full response with revisions after the public comment period closes.

Best,

Dan, Darren, and Scott