

Interactive comment on “Development of reliable future climatic projections to assess hydro-meteorological implications in the Western Lake Erie Basin” by Sushant Mehan et al.

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Comment 1a: The overall structure of the manuscript is clear. However, particular sections and paragraphs require restructuring. The introduction contains many sentences that are not placed in context. For example, pollution mitigation strategies are (suddenly and abruptly) introduced, and not referred back to – what was the motivation to discuss this specific topic? Also Western Lake Erie Basin is not introduced, but is – apparently – a hotspot that requires special attention (see p.3, l. 3, ‘.. specific to the WLEB’). Another example is that ‘climate projections at regional scales are unclear’ (p.1, l.31), what is meant by “unclear”? The introduction is the foundation of the paper,

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but right now the motivation and the problem statement are not clear.

Response: We appreciate this comment and will revise the manuscript accordingly.

Comment 1b: Also in the study itself, many choices were not rationalized. For example, why were three out of eight stations used (p. 3, l. 19) and not all, and how does this influence the results? Same concerning the GCMs, I understand that using all might be a lot, but why nine, and why these nine, and how does this influence the results?

Response: The selection of three out of eight stations was based on analysis of similarities or differences among the stations in terms of climatic patterns and statistical properties of precipitation and temperatures, and also considering their spatial locations so as to provide suitable representation of climate across the basin, as detailed in (Mehan et al., 2017a). We have added the aforementioned text to the manuscript for clarification. The three stations were used to develop the methodology and framework for this study, which was then applied to all 16 ground-based climate stations in the WLEB. Because of the care taken in identifying the three stations, we believe that the selection did not adversely affect the results but, rather, made the process more efficient.

Concerning the GCMs, these were selected because they were common to both climate databases, thus, allowing a comparison between the databases. While we did not evaluate how this choice influenced the result, we believe that we were able to capture range and variability in climate and thus provide suitable representation with these nine GCMs (with corrections).

(Mehan, S., Guo, T., Gitau, M. W., and Flanagan, D. C.: Comparative study of different stochastic weather generators for long-term climate data simulation, *Climate*, 5, 26, 2017a.)

Comment 1c: This relates to another point; the discussion is currently not well embedded in scientific literature, and therefore does not lead to deeper understanding of

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the results. For example; only 9 GCMs were used, are they from different ‘families’ as discussed in the model genealogy of Knutti et al.? and if not, your ensemble is probably too narrow; how would this influence the results and the conclusions of the study? Another example: written on p. 21: ‘biases in climate projections occur mainly because of flawed or faulty ideational boundary assumptions and can lead to deleterious outcomes’. The first question from a skeptic could be if these projections have any value at all; can you correct for faulty assumptions simply with using a bias correction or is this just a Band-Aid? or could that be a motivation to opt for SWGs? As uncertainty is one of the topics dealt with in this paper, a more comprehensive discussion of the approaches and assumptions in this study is well in place, or even needed.

Response: We would like to thank the reviewer for this comment. We will expand our discussion to provide a better understanding of the results.

Comment 2a: Some of the methods of the study are presented as conclusions, such as the points at page 22 starting at line 17 and starting at line 20, while these points are actually motivations or methodologies, and not the result or conclusion of this study per se.

Response: The conclusions section has been revised based on this and other comments.

Comments 2b: Concerning the text; currently the text contains many numbers, which does not necessarily makes it attractive to read (e.g. p. 12, line 14/15). On the other hand, the figures are sometimes not comprehensively discussed (sometimes referred to only once). Consider removing too many individual values from the text, and sketch a more general picture, refer to figures / tables for detailed numbers.

Response: We appreciate this comment and will revise the manuscript accordingly

Comments 2c: Overall, I recognize that the study has been done carefully, but scientifically, discussion and depth are missing and (maybe because of that) few new lessons

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are learned.

Response: We would like to thank the reviewer for this comment. We will revise the manuscript to expand our discussion based on this and other comments provided.

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