

Author's Response (Revision Round 3)

2024-11-07 - Daniel Kovacek & Steven Weijs

Authors' thanks: We are grateful to the editors for their time dedicated to reviewing and providing feedback on our manuscript. The persistence in seeking a higher standard is appreciated.

The response information below is organized in the following order: i) editor comment, ii) author response, and iii) line numbers and/or sections identifying related manuscript revisions with description of changes. Please note that page and line numbers referring to manuscript edits correspond to the **revised manuscript**.

A note regarding the track-changes file: we removed text-wrapping on figures to prevent these figures and their captions from being cut off.

Responses to Editor's comments

Editor's Comment: *I think the BCUB you present belongs to large sample hydrology (LSH) datasets, even though it does not include hydrological, climatic, and physical characteristics. In the revised manuscript, you defined BCUB as "hydrographic datasets," which makes the concepts complex and not easy to follow. I suggest it may be better to illustrate the contribution of BCUB within the concept framework of LSH.*

Author's Response: The the revisions in question were partially in response to a comment from one of the reviewers ("RC3: *Why are streamflow not served here?*"), which suggested it was not clear enough that the dataset is not an LSH dataset due to its lack of streamflow data. Revising the introduction was also done to clarify the gap statement, and we use the examples of LSH and hydrography to establish the points between which the BCUB is positioned. We feel including a description of hydrographic datasets is an important point of contrast, though we also see the editor's point regarding positioning the BCUB dataset more in the concept framework of LSH.

Corresponding Manuscript Edits (related edits from last revision):

- Section 1.1 was revised to emphasize the BCUB as a complement to LSH.

Editor's Comment: *For Figure 1, the green color is used to show both catchments and the active monitoring network, making the figure difficult to follow.*

Author's Response: Agreed, the contrast can be improved.

Corresponding Manuscript Edits

- Figure 1 has been updated as follows: BCUB region changed from green to grey, symbol sizes in inset map and legend increased for better visibility.

***Editor's Comment:** Figure 2 is not completely displayed, and the figure caption is missing.*

Author's Response: The automatic formatting in the version with tracked changes "Latex diff" shifted Figure 2 out of frame and unfortunately there was not an obvious fix. For the current tracked changes file we removed text wrapping to avoid this issue. Neither the figure nor the caption changed since the previous revision, and they are rendered "correctly" in the revised manuscript.

Corresponding Manuscript Edits

- No changes were made. Latexdiff rendering was edited to prevent images and captions from being shifted off the page.

***Editor's Comment:**In Figure 3, explain "NA" in the figure caption. Add (a) and (b) for the two subplots, and include a scale bar for Figure 3a. The red color is used to show both NA Level 5 basins and the BC border, making the figure difficult to follow.*

Author's Response: The N.A. stands for North America and we agree it should be defined in the manuscript. Same comment regarding the tracked changes file.

Corresponding Manuscript Edits

- Figure 3 has been updated to combine the components of the previous revision into a single figure. This way the figure can be rendered much larger for clarity without losing the intent of the figure to demonstrate how the sub-regions were derived. The legend has been changed to N.Am. and the full expansion "North America" has been added in the caption. We verified that BC is defined as British Columbia earlier in the manuscript (introduction).

***Editor's Comment:** Regarding Figure 4, is there a lake outflow point? Streams in the lakes are not clear.*

Author's Response: The "Lake Inflows" label for the outflow point is indeed misleading. Since lake outlets are not distinguished from inlets explicitly in the dataset, we did not add a unique layer to the figure. We considered several more general terms and decided on the more general labels "Lake Inflow/Outflow" in figure legend and also refer to river-lake connections in the caption.

Corresponding Manuscript Edits

- The yellow triangle symbol has been renamed to “Lake Inflow/Outflow”. The transparency of the lake layer is increased slightly to make the underlying vestigial stream lines more visible without adding too much visual clutter.

Editor’s Comment: *For Figure 5, different datasets generate slightly variable basin boundaries. This is a straightforward point. Is there any additional information we can gather from this figure? If not, I suggest deleting this figure. The differences in basin boundaries can be demonstrated in Figure 10.*

Author’s Response: We agree, the same information is clearly illustrated in Figure 10..

Corresponding Manuscript Edits

- Figure 5 has been removed along with the paragraph explaining it.

Editor’s Comment: *In Figure 6, briefly explain in the figure caption what information we can gather from the figure. The font in axis labels and the legend is too small.*

Author’s Response: While some boundary uncertainty remains, the revised method reduces the median uncertainty for the smallest catchments from over 10% to about 2.5%, addressing the initial concern raised by the reviewer.

Corresponding Manuscript Edits

- The caption of Figure 6 (now Figure 5) has been revised as follows: “Boundary uncertainties are significantly reduced relative to the smallest catchments in the dataset (1 km²) when region bounds are generated from the same DEM source as the catchments (blue, median uncertainty 0.025 km²), compared to HydroBASINS-derived regions (red, median uncertainty 0.13 km²). Axes and legend labels have been reformatted to use larger fonts.

Editor’s Comment: *Figures 7 and 8 should be combined.*

- **Author’s Response / Manuscript edits:** We agree, Figures 7 and 8 and their captions have been combined into one figure (now Figure 6). Please note that in order to make the tracked-changes file not get cut off from the page, we had to insert a page break, and the deletion of old text makes the images not display side-by-side. The final rendering can be seen clearly in the revised manuscript, and we trust this is a fair compromise to ensure that all figures and the corresponding changes are rendered on the page and not cut off.

Editor's Comment: *The caption for Figure 9 is incomplete, and this figure is difficult to follow. More explanation should be added to the figure caption. For example, what information can we learn from area and perimeter deviations?*

Author's Response / Manuscript Edit: We have removed the figure as it is perhaps unnecessarily overcomplicating a simple result. The description of the result has been reviewed for clarity in Section 2.2.3.

Editor's Comment: *Figures 11 and 12 should be combined. Add scale bars.*

Author's Response: Please see the next comment response.

Editor's Comment: *Currently, there are no figures showing the overall pattern of the BCUB dataset. I suggest Figures 11 and 12 be plotted much larger to more clearly show at least a part of the BCUB dataset map. Otherwise, Figure 10 should be modified, or a new figure should be added for this purpose. At present, most figures are about technical details of producing the dataset rather than the dataset itself. Particularly, the rivers and lakes that you mentioned are not shown throughout the paper. Readers need to see how the BCUB dataset map looks beyond some technical detail figures.*

Author's Response: We agree, the figures can be given more space to better illustrate examples of what the dataset can be used for. We have plotted Figures 11 and 12 each to full page width per your suggestion. We modified the second example figure to represent a question asked of the full dataset. This is a dataset representing catchment-level attributes, so queries, and visualizations thereof, will be catchment-based.

Corresponding Manuscript Edits

- Figures 11 and 12 (now 8 and 9) have been modified to full page width.

References:

1. Mandelbrot, B.: How long is the coast of Britain? Statistical self-similarity and fractional dimension, *science*, 156, 636–638, 1967.