

Interactive comment on “Determining flow directions in river channel networks using planform morphology and topology” by Jon Schwenk et al.

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Schwenk et al. presents a method to assign steady-state flow directions to channel links of delta and braided rivers with complex river morphologies. This information is useful for a range of biogeochemical and hydrological flux processes. The manuscript is generally well written and I find the manuscript easy to understand. I think it was a high-quality study and I appreciate that the code and datasets were made freely available. The one major problem I found with this study is that, it might be submitted to the wrong journal. It is a methods study, essentially explaining the RivGraph Python package (<https://github.com/jonschwenk/RivGraph>), which may not be suitable for ESD, at

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least according to the aims and scope of the journal. In my opinion this study is probably most appropriate for a journal like IEEE Geoscience and Remote Sensing Letters. However, that being said, if the Editor wishes to continue with the review process, I think Schwenk et al. is a nice contribution.

Major comments:

1. I think the manuscript would benefit from a paragraph in the introduction discussing other channel vectorization algorithms to provide additional context and motivation (e.g. RivaMap, RivWidth, RivWidthCloud, MERIT Hydro, etc.).
2. Include in the intro and/or abstract that RivGraph determines the steady-state, or mean long-term flow direction. Deltaic systems are often bidirectional flow and this point was only acknowledged in pass in the Conclusions.
3. I think a very large potential improvement of this approach would be automatic identification of inlets and outlets and this should either be implemented into the code or acknowledged in the “Improvements and Speed” section.
4. It appears that lakes and other non-channelized water bodies are not included in the Delta river masks. Were these removed? These features can be some of the most difficult to skeletonize and I am curious how the authors handled these features.
5. While the authors may have captured all the major sources of errors for their sample data set, applying these algorithms worldwide will likely cause a number of currently unidentified errors to be identified. I recommend noting this point somewhere in the manuscript main text (e.g. end of section 4.2).

Minor comments:

1. Add how the authors identified inlets and outlets. Was this done manually? Could it be automated?
2. Figures:

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- a. Panels should be in the same order as they are referred to in the main text.
 - b. Figures would benefit from having labeled panels (e.g. “a”, “b”, “c”, etc..).
 - c. Figures are sometimes mislabeled (e.g. Figure 5 is referred to as Figure 6 several times).
 - d. Figures with maps: Add North arrow(s) to maps that are not oriented North as up.
3. If the authors wish to add an additional end-member sample, the braided section of the Congo River has a very distinct planform geomorphology and could be an additional case to test RivGraph. This idea is just a gentle suggestion, not a demand.
- L76: Islands of size 20 pixels or less were removed (filled) from all channel networks. Please justify this action.
- L87: Replace “GISs” with “GIS software packages”
- L269: “the shortest link is selected as the one to be fixed (flipped), as DPAs are generally more certain about longer links.” I probably don’t completely understand but why not just flip the link with the lowest direction certainty?
- L283: change “informations” to “information”
- L421: “one second” Is this on one core or is this code parallelized?

Interactive comment on Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2019-19>, 2019.

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