

## ***Interactive comment on “Accurate stream extraction from large, radar-based elevation models” by M. Metz et al.***

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Thank you for your comments and suggestions. We propose to do the following modifications to the manuscript:

1) We can reduce the description of computational improvements, but we would like to not remove this part completely because the computational speed improvements are responsible for a much more widespread use of this procedure. What took previously hours or days is now done in minutes, making the procedure much more attractive for users, whereas the slow speed of the previous version kept many people from using it. The coupling of A\* Search and MFD flow accumulation is a subject on its own because it implies a comparison of SFD (e.g. D8) and MFD (e.g. of Holmgren (1994)). We

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feel that such a comparison would exceed the scope of this manuscript and we would prefer to keep this for a separate manuscript where several flow distribution methods are compared, e.g. D8, D-Inf, Freeman (1991), Holmgren (1994), keeping all other processing steps (sink treatment and stream extraction) identical.

2) The main reason why breaching is mentioned in the introduction is that the impact reduction approach of Lindsay & Creed (2005) uses both sink filling and breaching. We excluded breaching because it is also a conceptually simple sink treatment method like sink filling. One problem of breaching is e.g. carving channels into flat areas like lakes and oceans, introducing artifacts. For our comparisons, we chose sink filling because it is still widespread and IRA as a more sophisticated approach.

3) This seems to be partially related to 1). We can describe in more detail which features of the A\* Search give better results than other methods, but since we used MFD throughout, we can not make conclusions about benefits of MFD over other flow distribution methods. As above, evaluating MFD of Holmgren (1994) and comparing it to other methods might be a topic for a separate manuscript. In general, differences between a MFD method and a SFD method are probably most prominent with regard to the location of stream heads. Channel tracing might differ if a stream cell has several downstream neighbours with identical slope relative to the current cell. SFD will more or less randomly choose one downstream cell to continue whereas MFD distributes flow equally to all downstream cells with identical slope. Other accuracy metrics for comparing flow distribution methods could also be based on erosion modeling.

4) Right, TAUDEM and SAGA should be mentioned, although SAGA does not offer unusual methods with regard to sink treatment. Even the Wang & Liu (2006) method is based on sink filling and thus not conceptually new. It introduces a slope during filling, something done also by Garbrecht & Martz (1997). Wang and Liu (2006) introduce a slope based on the traditional search order as described by Jenson & Domingue (1988), whereas Garbrecht & Martz (1997) take terrain morphology into account, nicely centering streams in flat areas. Something like this could be added to the discussion.

We have not tested TAUDEM and can therefore only speculate about its accuracy with regard to extracted stream networks.

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