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Interactive comment on "Computing water flow through complex landscapes, Part 2: Finding hierarchies in depressions and morphological segmentations" *by* Richard Barnes et al.

Richard Barnes et al.

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> A minor issue is that I found the algorithms easier to understand when reading the captions of the figures. Perhaps, the extensive captions might be better placed in the main text.

We have tried to provide multiple ways to understand the algorithms, including the description in the text, pictures via the figures, figure captions, and extensively-commented source code. Our hope is that at least one of these methods will prove effective for each reader. It might be that in your case the figure captions worked best. In the revised paper, we'll try to duplicate or move material from the captions to the

Printer-friendly version

Discussion paper

main text where appropriate.

> My concern is that the paper may be too technical for the readership of ESURF. While I see that the authors are planning a third part that will highlight how the developed soft-ware can be used to accelerate hydrological models, I think that the paper would benefit from more illustrations/examples/interpretations of the output of these algorithms. How do sink networks differ between different regions (glacially sculpted low-land regions vs. dryland regions) or different DEMs? Illustrating potential geomorphological applications would be a nice addition to the paper and would considerably widen its readership.

This is a good comment, and indeed one that we wrestled with before deciding to focus on a more abstract approach. From both this comment and some from Reviewer 1, it seems that at least one specific example would be valuable to demonstrate more tangibly the application of the depression hierarchy to real landscapes. We are considering two candidates for this example: the Illinois landscape used by Callaghan and Wickert (2019, a companion paper), and Madagascar, which has diverse topography but is small enough to allow us to describe its exemplary features without diluting the technical focus of this paper. Our choice on which to include in the ultimate analysis in the resubmitted draft will be based on which provides a more useful and intuitive visual description of the depression hierarchy.

> The empirical tests are done on an high-performance computer. Why? As far as I understand, the code is not (yet) fully optimized for using parallel infrastructure. I wonder how timings of the algorithm would scale on “normal" desktop computer.

The largest dataset we test requires approximately 15GB of RAM, which is larger than our laptops (8GB). Since we are located at different institutions, HPC environments

are a convenient way to collaborate. The scaling of the algorithm is unaffected by the compute environment, since this is an instrinsic property of the algorithm.

We thank Dr. Schwanghart for his thoughtful review.

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