

## ***Interactive comment on “Robust extraction of thalwegs network from DTM: application on badlands” by N. Thommeret et al.***

**T. Stepinski (Referee)**

tom@lpi.usra.edu

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General remarks: This paper proposes a particular variant of morphologically-based delineation of stream networks from DTMs. The authors correctly observe that a robust delineation of stream networks cannot be achieved by means of the popular steepest descent algorithm, but instead, must be based on direct detection of channel morphology in the DTM. The authors are not the first to point it out (they give appropriate credits), but their approach – using convergence index to flag channel morphology – is novel and represents an original contribution that is very much relevant to the scope of the HESS. The study area is well-chosen inasmuch as it is covered by the high resolution DTM and the ground truth map of the streams is available for comparison. Therefore I support the ultimate publication of this paper in the HESS, but the present

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manuscript has problems that should be addressed by the authors in the revised version. I have identified three broad areas of problems:

- 1) The paper is written in poor English. There are just too many problems for me to correct as a part of the review process. There are many incorrectly use words, phrases, and sentences. This has been a nuisance for this reviewer, but it could be a major barrier to the understanding of the paper by a reader less familiar with the topic. I strongly urge the authors to seek help in rewriting the manuscript.
- 2) The major contribution of the paper – usage of convergence index for stream delineation does not come across as the main point of the paper. The phrase “Robust extraction” appears in the title of the paper, but robustness is not really shown in the paper as only a single site of particular resolution is studied.
- 3) There are multiple references in the paper to “studying networks using topological indices”, but such study is not the part of the paper, nor is it clear what those indices suppose to be. Are there fractal indices? There is a mention on page 881 line 9 about the 3-D network geometry, but the study is planar so 3-D seems out of place. The authors mention several times that those indices are very sensitive to noise etc, but I am not aware of network indices that are indeed sensitive to details. In fact, fractal indices are famously insensitive to peculiarities in network geometry. The authors need to be clearer in their statements.

Specific remarks:

Page 884: Tarboton and Ames (2001) did not use plan curvature to delineate streams. They used Peucker and Douglas (1975) algorithm to calculate a proxy of curvature.

Page 887 section 3.2: The way the text is written right now the reader may get the impression that the authors invented the method for reconnecting the segments of streams. However, the very same method was already used by Tarboton and Ames (2001) and Molloy and Stepinski 2007). What is different is the use of kinematic routing

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algorithm instead of D8; this should be clarified.

Page 888: The authors choose to first reconnect stream segments and then to thin them. This is different than approaches by Tarboton and Ames and Molloy and Stepinski who first thin and then reconnect. Is there a specific reason for switching this order?

Citations: Citation to Wiedermann et al. 1998 does not appear in the list of citations. The authors are not aware of the work by Yokoyama et al. (Photogrammetric Engineering and Remote sensing 68, 257-265, 2002) on openness – a terrain parameter that can also be used for delineation of streams and constitute a more direct competition to convergence index than planar curvature. It should be mentioned in the introduction on page 882.

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