

Interactive comment on “Channel network identification from high-resolution DTM: a statistical approach” by G. Sofia et al.

Anonymous Referee #2

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General comments:

The authors present a methodology to extract channel networks from high resolution DTMs. This method uses the combination of two topographic indices (openness and minimum curvature) to label concave areas. The labeled areas are then integrated in the upslope areas calculation as done in previous works. As the author say, other papers refer to the advantage of combining topographic index and drainage algorithm to delineate channel networks. According to me, the interest of this work relies on 1) the research of optimal kernel size considering the terrain feature size compared to DTM spatial resolution; 2) the research of objective thresholds to compute the network; and 3) the incorporation of topographic indices.

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This manuscript should be resubmitted taking into account the following major remarks:

- 1) The manuscript presents serious problems in the use of English language. I suggest to the author to get help to rewrite the manuscript.
- 2) The paper is poorly structured. According to me, the methodology is not well exposed and should be clarified. The rational for the imbrications between each methodological step is poorly justified and I found that the progression was hard to follow. I don't think that the description of experiments and calculations are sufficiently complete and precise to allow their reproduction by fellow scientists. A global scheme that summarizes the method should help clarifying the text.
- 3) The objective of the work should be more clearly exposed and related to the scientific context and the contribution of this paper should be more clearly addressed. It is especially necessary to explicit the difference of this work comparing to others: as for example, Tarboton and Ames, 2001; Molloy and Stepinski, 2007; Thommeret et al., 2010; and Tarolli and Dalla Fontana, 2008. Moreover, the authors should explain clearly the main heuristic differences of this work with the paper published in Natural Hazards in 2010, Tarolli, Sofia and Dalla Fontana, Geomorphic features extraction from high-resolution topography: landslide crowns and bank erosion.
- 4) Some technical parts of the manuscript regarding statistics are too long and useless and could be drastically resumed.
- 5) Since no comparison is made with other methods of channel network delineation, it is hard to identify the benefit of this method compared to existing ones. Maybe a comparative work could be done to clarify the advantage (and eventually the inconvenient) of their method. In particular, show the contribution of the openness index and its complementarity with minimum curvature.

Specific comments:

- 9329: 14-17 I think that this paragraph concerning the DTM filling procedures does

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not contribute to a better understanding of the problems the paper is dealing with. It should be removed.

- 9330 The authors refer to a lot of other works that have provided interesting results in channel network extraction. However, the author should explain what is new in this work compared to the others.
- For easier reading, I suggest to merge section 3.1 and section 5. In section 3.1, the upslope areas calculation should be more clearly explain. Moreover, the choice of the MFD could be justified.
- Section 3.2. The surface approximation is quite known. I recommend the authors to shorten this section by referring to other works that deals with topographic indices computation as Evan, 1992 and Woods, 1996.
- 9337: 15 Justify this affirmation: "Differently, in the presence of noises and terrain roughness, such a histogram tend to be more or less skewed to one side". It does not seem so obvious in mountainous areas
- 9338: 10-14 Use X (random variable) instead of x in eq. 10. And latter un the text, keep X not t .
- 9339: 5-end of the section I wonder if these paragraphs should not be with the results.
- 9340:4-10 Refer to other works that used the upslope area weighting procedure.
- 9340: 19-end of the section Justify the use of QQplots instead of a distribution comparison test as the chi2 test, for instance.
- 9341 Concerning the z-score: I'm not sure it is the appropriate name (standard score) while population parameters are estimated. If it means normalized variable, or stundentized variable, just refer to it and synthesize this section in one sentence.
- About the section 7: Is it possible to quantify the noise before the filtering step?

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- Section 9. It could be interesting to summarize the number of parameters and thresholds used to obtain the channel network.

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