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Hydrology and Earth System Sciences Discussions

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

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The authors present a methodology for extracting channel networks from high resolution topography. The methodology consists of three main steps. First, the topographic attributes curvature and openness are computed. The window size for the computation of the attributes is defined based on the skewness. Then, the quantile-quantile plots of the computed attributes are used to construct a matrix of weights for the upslope area. The channels are then extracted based on the weighted area and then filtered based on entropy. The parts of the extracted network remaining after filtering are re-connected and the results compared to surveyed data through the total agreement probability.

I appreciate the work of the authors as they move in the direction of proposing a quantitative analysis of lidar data. It is definitely important to define objective methodologies

for the extraction of geomorphic features from high resolution topography. However, several points should be addressed in order to make the paper more clear and thus the procedure applicable by other users as well. The questions/comments to be addressed are listed below.

- It is not easy for the reader to get a sense of how much one gains from the application of both curvature and openness. As far as I can tell, they both measure convergence of the surface and it would be good to see maps extracted by using each of them and then the combination of the two to understand whether the information they carry is redundant or if some substantial improvement is obtained by using both. The curvature thresholding has been shown to be pretty powerful in the cited works of Lashermes et al. [2007] and Passalacqua et al. [2010a,b] and I don't have a sense of how much the openness adds.

- How was the range 3x3 to 33x33 for the window size defined? More indication on how to select these values would be useful for the reader interested in trying the same approach.

- Why filtering after the extraction? The operation of filtering is supposed to 'regularize' the data set before computing surface attributes (derivatives) in order to make the computation of derivatives well posed. Why extracting and then deleting at the end? Noise and small scale variability are included in the computations you initially performed.

- I think that the method used for re-connecting the channels is substantially different from the geodesic distance method proposed in the papers cited by the authors [Passalacqua et al., 2010a,b]. The geodesic distance is a global approach formulated in an integral form, which has the advantage of 'jumping' missing data or local irregularities on the surface, while the approach described here is local.

- The total agreement probability is a unique value for the whole network, since it is defined as a summation. I'm wondering how it varies across the network. For example, the same value could represent the case of an almost perfect extraction in which only one specific part of the network has been missed (maybe due to some local challenging characteristics of the surface), or could represent an overall mediocre extraction. Maybe showing the distribution of these probabilities would be more informative? It would be good to see it.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 9327, 2010.