Hydrology and Earth System Sciences Discussions

Interactive comment on "Technical Note: Automatic river network generation for a physically-based river catchment model" *by* S. J. Birkinshaw

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The manuscript describes an approach to define the drainage network in particular situation useful for specific hydrological models (i.e. SHETRAN) where the blue line is defined on the edge of grid squares.

It is an interesting problem and the manuscript is well written and easily understandable.

Few comments and suggestions are listed in the following:

A) in the short introduction author mentions many contributions about DEM pre-processing. From these papers it could be possible to synthesize a procedure for a correct blue line extraction. So the first suggestion is to list in the introduction (or in the section 3) the steps for obtaining the contributing area map. Referring to [1], and also to other references cited in the manuscript by the author, a possible approach could be:

1) application of PEM4PIT [2],[3] (or other advanced procedures) for artificial depressions and flat areas removal;

2) estimation of the flow directions using the D8-LTD algorithm [4];

3) stream network automatic extraction using the curvature-based scheme [5], in conjunction with the automated constant drop analysis algorithm for the identification of the channel initiation threshold [6];

B) this first comment introduces the second one concerning the algorithm used by the author (point 1 -5 pag. 3241). Why do not use the previous approach to define the point 2 & 3? The proposed method to take in to account the "edge" problem starts from the contributed area map so it is possible to applied something more advanced than what author proposes in step 1 & 2.

Minor comments Figure 1 could be improved ...above all the 1(a) "Tarboton" instead of "Tarbotton" at page 3239 line 3 and at page 3240 line 26

References cited in this review:

[1] Grimaldi S., Petroselli A., Alonso G., Nardi F. (in press) "Flow time estimation with spatially variable hillslope velocity in ungauged basins" Advances in Water Resources , DOI: doi: 10.1016/j.advwatres.2010.06.003

[2] Grimaldi, S., Nardi,F., Di Benedetto, F., Istanbulluoglu, E., Bras, R. L., 2007. A physically based method for removing pits in digital elevation models. Advances in Water Resources 30, 2151-2158.

[3] Santini,M., Grimaldi, S., Nardi, F., Petroselli, A., Rulli, M.C., Preprocessing algorithms and landslide modelling on remotely sensed DEMs. Geomorphology 113 (1-2), pp. 110-125

[4] Orlandini, S., Moretti, G., Franchini, M., Aldighieri, B., Testa, B., 2003. Path-based methods for the determination of nondispersive drainage directions in grid-based digital elevation models. Water Resour. Res. 39(6), 1144, doi:10.1029/2002WR001639.

[5] Tarboton, D. G., Ames, D. P., 2001. Advances in the mapping of flow networks from digital elevation data. In: World Water and Environmental Resources Congress, Orlando, Florida, May 20-24, ASCE.

[6] Tarboton, D. G., Bras, R. L., Rodriguez-Iturbe, I., 1991. On the extraction of channel networks from digital elevation data. Hydrol. Processes 5(1), pp. 81– 100.

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