Hydrol. Earth Syst. Sci. Discuss., 8, C55–C57, 2011
www.hydrol-earth-syst-sci-discuss.net/8/C55/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Regional scale analysis of landform configuration with base-level maps" *by* C. H. Grohmann et al.

S. Grimaldi

salvatore.grimaldi@unitus.it

Received and published: 2 February 2011

The manuscript describes a base-level map definition method based on Strahler classification of stream network.

The manuscript is pleasant to read and the topic is interesting.

This comment is limited to the Digital Elevation Model pre-processing section, that, in my opinion, is not enough described and discussed by the authors.

Indeed, in section 3, authors spend only few lines to explain the used approach to extract the drainage network. Precisely they mention:

- the Ehlschlaeger's method for the drainage extraction

- the MFD as flowdirection method

Since the base level method applied in the paper is related to the DEM pre-processing procedure I would suggest to include more details on this point and to justify why some specific methods are preferred to other ones. For instance, the MFD, in my experience, is more appropriate for hillslope areas and not for channel identification.

In literature there are many contributions that investigate on flowdirection methods, flat areas issue and drainage network extraction, and it is clear that the choice of a combination of these methods could affect also the watershed Strahler classification.

As an example in:

Nardi F., Grimaldi S., Santini M., Petroselli A., Ubertini L., Hydrogeomorphic properties of simulated drainage patterns using digital elevation models: the flat area issue, Hydrological Science Journal, 53 (6), pp. 1176-1193, 2008,

the table 4 (page 11) shows a comparison among three approach combinations. The result is that using different combinations either the drainage network shape and the watershed maximum order could vary.

In our experience the best procedure for drainage network extraction is the following [1]:

1) application of PEM4PIT [2] for artificial depressions and flat areas removal;

2) estimation of the flow directions using the D8-LTD algorithm [3];

3) stream network automatic extraction using the curvature-based scheme [4], in conjunction with the automated constant drop analysis algorithm for the identification of the channel initiation threshold [5];

[1]Grimaldi S., Petroselli A., Alonso G., Nardi F., Flow time estimation with variable hillslope velocity in ungauged basins, Advances in Water Resources, 33 (10), 216-1223, 2010.

[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, 345 2151-2158.

[3] 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.

[4] 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.

[5] 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.

So, since the manuscript results could be affected by the applied pre-processing method, authors should mention that there is a well developed literature about this step and explain why they preferred the chosen approach.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 89, 2011.