Hydrology and Earth System Sciences Discussions

Interactive comment on "Delineating riparian zones for entire river networks using geomorphological criteria" *by* D. Fernández et al.

F. Nardi

fernando.nardi@unistrapg.it

This manuscript, that presents original research work by authors for investigating on the use of DEM/GIS-based geomorphologic approaches for riparian buffers characterization, is of interest for HESS. The main results, represented in the submitted work, deal with the quantification of the performances of two different geomorphologic approaches as respect to standard flood maps (named in the paper as riparian areas identified using a "hydrologic" method) for given frequency (50 years return time) also evaluating a further method/analysis for adjusting the results of the automated preliminary geomorphologic approach to match at best the standard floodplain map.

This research framework, methods and results are an actual and interesting topic given

the need for preliminary (simplified) floodplain definition from the local scale (of the river basin tributaries and that portions of the network that, in general, has not been mapped using standard hydrologic & hydraulic modeling analyses yet.) to the global (large/country) scale. Large river basins in developing countries and ungauged basins in general need such simplified geomorphologic approaches, but an accurate and objective validation must be performed for investigating pros and cons, limits and accuracy/precision ranges.

Nevertheless, while confirming that this work is presenting interesting and novel results on the performances and validation of this kind of methods, I do suggest a MAJOR REVISION of the paper before publication on HESS. In particular, I inserted here below some general and specific comments that authors should take into account before resubmitting their work.

General comments (GC)

GC.1) Text:

The text is difficult to read and lacks of a concise language. Concepts and definitions are sometime repeated and there is no structured scientific language driving the reader from the beginning to the end. I'm not a native english mother tongue, but I feel that the language should be also reviewed more carefully from a native english proofreader. In particular the text should introduce more clearly the novelty of this work (see GC.2) starting from a review of recent works available in literature on geomorphologically-based flooplain DEM-based extraction methods (see GC.3).

GC.2) Novelty of this work:

I do believe this work does include novel insights for the topic with specific regard to the objective quantification of the performances of the two proposed geomorphic models for riparian areas identifications, but this is not clearly highlighted in the text starting from the title. I suggest a less general title like "Quantifying the performances of an

automated GIS-based geomorphologic approach for riparian zones delineation using DEMs".

GC.3) Review of literature, references:

A more carefully study of exiting papers on the topic would also support authors in highlighting what is really new here (see GC.2). In particular, the following works dealing with DEM-based preliminary (simplified) floodplain extraction methods and studies on the hydraulic geometry of flooplains provide valid reference works that should be carefully considered.

- McGlynn, B. L., and J. Seibert, Distributed assessment of contributing area and riparian buffering along stream networks, Water Resour. Res., 39(4), 1082, doi:10.1029/2002WR001521, 2003

- B. A. Dodov and E. Foufoula-Georgiou, Floodplain Morphometry Extraction From a High-Resolution Digital Elevation Model: A Simple Algorithm for Regional Analysis Studies, IEEE GEOSCIENCE AND REMOTE SENSING LETTERS, VOL. 3, NO. 3, JULY 2006

- Nardi, F., E. R. Vivoni, and S. Grimaldi (2006), Investigating a floodplain scaling relation using a hydrogeomorphic delineation method, Water Resour. Res., 42, W09409, doi:10.1029/2005WR004155

GC.4) Visual comparison of the two geomorphologic methods with standard hydrologic models: The visual and/or quantitative comparison of results is a central part of this work. I suggest to present in more detail the visual comparison of the different simulated floodplains. The standard hydrologic model is not well explained and submitted figures don't help the reader much in understanding the differences between the two different approaches. Please insert more detail in the text and review figures to provide more details.

Specific comments

Pag. 4045

row 1: please find synonymous for riparian that is repeated twice

row 10: add (DEM) after Digital Elevation Models

row 23: hydrological criteria is unclear. You want to say standard flood maps or reference flood maps or please define what you mean for hydrological criteria. If you refer to standard flood mapping you may also cite some reference papers like

- Noman, N. S., E. J. Nelson, and A. K. Zundel (2001), Review of automated floodplain delineation from digital terrain models, J. Water Resour. Plann. Manage., 127(6), 394–402

row 24: It is not clear what you mean with "...pointed out the same surfaces....".

row 27: remove "considered"

Pag. 4046

row 6: I'd substitute "vegetation" with "areas" and I'd remove "....provides many services to society"...-> "Riparian areas are involved in different geomorphological, hydrological and ecological processes () reducing flood risk or..."

row 15-16: add references to present the works that have been published on the topic. For example:

- McGlynn, B. L., and J. Seibert, Distributed assessment of contributing area and riparian buffering along stream networks, Water Resour. Res., 39(4), 1082, doi:10.1029/2002WR001521, 2003

- B. A. Dodov and E. Foufoula-Georgiou, Floodplain Morphometry Extraction From a High-Resolution Digital Elevation Model: A Simple Algorithm for Regional Analysis Studies, IEEE GEOSCIENCE AND REMOTE SENSING LETTERS, VOL. 3, NO. 3, JULY 2006

- Nardi, F., E. R. Vivoni, and S. Grimaldi (2006), Investigating a floodplain scaling relation using a hydrogeomorphic delineation method, Water Resour. Res., 42, W09409, doi:10.1029/2005WR004155

As a result, I'd remove "..and concensus is still far from being achieved" with "There are however, several different approaches to delineate riparian areas (McGlynn and Seiber, 2"3; Dodov and Foufoula-Georgiou, 2006; Nardi et al., 2006), but the developing of a standard methodology for a geomorphologic tool for preliminary floodplain mapping is still an open research topic."

Pag. 4047

row 5: There are several research works on the floodplain extents and associated parameters as a function of the contributing area, varying "...from source to mouth...". You may find some references in Nardi at al. (WRR, 2006) but you may also find papers on the hydraulic geometry and scaling laws for floodplains like

- Bhowmik, N. G. (1984), Hydraulic geometry of floodplains, J. Hydrol., 68, 369– 374.

- Dodov, B., and E. Foufoula-Georgiou (2004), Generalized hydraulic geometry: Derivation based on multiscaling formalism, Water Resour. Res., 40, W06302, doi:10.1029/2003WR002082.

Pag. 4048

row 26: please review "...there are not many published works...". I suggest to be more critical here expressing your personal view in what is lacking in available methodologies. I may agree that there are not many and they are different, but I'd point out which is still missing while introducing the motivation behind your work. Here you may more clearly the objectives and novelty of your work as respect to the other similar works.

Pag. 4049

row 4-11 These lines are the exact repetition of the abstract. Please review to avoid

C2011

text repetitions within the manuscript.

Pag. 4051

row 21: The DEM is a raster. Substitute "-....obtained from a DEM-derived raster" with "....obtained from the DEM."

pag. 4053

row 7: You define here the bankfull depth concept while the term was firstly inserted in pag. 4050 row 18. The definition should be inserted when the term is introduced for the first time.

Paragraph of row 6-22: I'd insert a schematic figure representing your definitions of bankfull depth, valley floor width, floodprone height including the different ranges as a function of Rosgen type streams. This would definitely help in figuring what you are doing by adjusting your simulated surfaces with the reference floodplain surfaces. I'd also add a schematic diagram (flow chart) for describing the BFDAC method

PAg. 4054

row 4: fig. 3 is here cited before citing fig.2 This is not a good practice for scientific publications.

I'd also insert a schematic diagram (flow chart) for describing the path distance method at the end of section 2.4

Section 2.5 title: Why "Data analyses". I'd rename this title for representing the adjustment of the surfaces. Something like "Geomorphologic floodplain surface adjustment methods" or a more concise title you may find

Pag. 4055

row7: Please define what you mean for cluster analysis when introducing

Fig. 2.

C2012

Fig.2 must be recreated for increasing the quality of graphics and texts. It is not possible to read the text in fig.3. Increase size and resolution of both the image and associated texts

Pag. 4057

row 3. "…was fully achieved…."I'd avoid the use of such conclusive remarks.