

Interactive comment on “Using geomorphometry for hydro-geomorphological analysis in a Mediterranean research catchment” by D. Guida et al.

D. Guida et al.

dguida@unisa.it

Received and published: 20 April 2016

Dear referee, First of all, thank you for your useful suggestions!

Following your statement: “Without clarification of marked problems is not possible fully evaluate the paper”, we wrote this reply in order to give you some explication which could be useful to continue the revision process:

1. “The process of used land surface segmentation is not sufficiently explained and justified.as well as specifications of the multisegmentation alghoritm. ...”

- We kindly explain that we used different parameters for the segmentation and for the classification, but may be we didn't well explained in the text and in the figure 3. - For

[Printer-friendly version](#)

[Discussion paper](#)



multiresolution segmentation algorithm it was used: A) the sine and cosine of aspect and B) the “weighted” plan and profile curvature.

- For classification was used only plan curvature (as it is mentioned on p. 7 lines 27-28).
- Parameters used for multiresolution segmentation are: scale 7, shape 0.0002, compactness 0.0002.

2. “Production of flow accumulation maps is unclear too”

- The flow accumulation map was obtained using “Catchment area” algorithm available in the SAGA module implemented in QGIS; - in the text we used alternatively “flow accumulation” and “contributing area” map (see pag. 5 lines 10-11).

3. Criterion of accordance between expert based mapping and multiresolution segmentation

- With the term “Expert based geomorphological map” we mean a traditional “geomorphological map” performed by geomorphologist, who drawn polygonal features on a topographic map (CTR 1:5.000 vector data map). - Thus, the criterion of accordance between the geomorphological map and multiresolution segmentation is the training-target procedure proposed in the section “Methodology” of Guida et al.2015 (see reference).

4. “Majority variable are not explained in the table 3”.

- the specific discharge “q” is calculated from the area of each hydro-geomorphotype, that will be added into the final revised text
- The AREA 1 and AREA 2 haven’t any relation with the areas of fig.8
- The AREA 1 and AREA 2 are used for comparison with others studies and to explain the saturation state both for each hydro-geomorphotype and the catchment
- AREA 1: is the ratio (it is not in %) between the contributing area and the area of each

hydro- geomorphotype. This ratio is used in the fig. 15b pag. 15 (there is an error in the figure 15 b the area is A1 and not A2)

- AREA 2: is the ratio (it is not in %) between the contributing area and the area of the basin. This ratio is used in the text pag. 15 line 15

5. “Systematic shift of extreme value in fig 14 could point to systematic underestimation of contributing area in the 5th scenario”.

- We tried different curves according to Fig. 15 a in order to compare our results to the others cited studies. - In particular, the curve adopted is comparable with that of Dunne et al., 1975 and Dunne, 1978.

6. Quality of geomorphometric procedure: - The quality of the geomorphometric procedure will be improve using a DEM with a higher resolution than that used in this study.

Answers to some marked questions in the pdf:

Pag. 5 line 9: Please, define / quote this algorithm

- The statement “hydrologically-corrected DEM was obtained by means of the D_{∞} algorithm” is not corrected - We must replace the above sentence in “ hydrologically-corrected DEM was obtained by means of the “Fill sink” tool of ArcHydro geospatial data model designed to operate within ESRI’s ArcInfo software.

Pag. 7 lines 22-23: Please explain choice of this variables. Why you consider aspect as more important as e.g. slope gradient?

- We didn’t consider slope gradient because, a part for the valley bottom and hilltop, it is quite constant and didn’t give additional information to the segmentation procedure.

Pag. 7 lines 23-24: Why only curvatures were used in following analysis? Why not aspect?

- The aspect was not processed in the Landserf free Gis because we just obtained a good accordance between the training and the target segments by using the sine and cosine aspect parameters in addition to the curvatures analyses.

Pag. 7, line 25: Is it Expert-based contributing area map from Fig 3? Please, be terminologically consistent

- in the text we used alternatively “expert based geomorphological map” and “expert based contributing area map”.

Pag. 7, line 25-26-27: How was the multisegmentation algorithm used, what variants were tested and what was a criterion of agreement of expert based mapping and multiresolution segmentation?

- We have tested the algorithm trying different incremental weight (1, 2, and so on) for the plane and profile curvatures (i.e for incremental weight of 1 of plane/profile curvature with cell window 5 – weight 1; cell window 7- weight 2 . . . Cell window 21- weight 10). - In the final revision procedure we will insert a table with the weight

Pag. 8 Line 5-6-7: Not clear. Please, describe in more detail

- In order to obtain the five different scenarios showed in fig 9-13, the log of contributing area map (flow accumulation map) has been reclassified according to the real condition of water flow observed in field.

Pag. 8 line 28: How was the sum of plane curvature classes computed? Why only plane and not profile curvature was used - We used E-Cognition to sum, for each segment derived from the segmentation, the plane curvature computed with different windows. - Was used only the plane curvature in the classification because was enough to classify the hydro-geomorphotype

Pag.14 line 9: Used exponential relation evidently systematically overestimate extreme values. Because extremely low number of values high R2 cannot be substantive. Were tested another types of relationships? If the exponential relationships result from the

[Printer-friendly version](#)

[Discussion paper](#)



hydrological theory assesment of contributing area could be questionable.

- We tried different curves according to Fig. 15 a in order to compare our results to the others cited studies. - The exponential law was used because described better than the linear and others curves the five scenarios.

Pag. 16 line 29: No info about weighted profile and plan curvature sum computation. Moreover on p. 8 only plan curvature is mentioned as used for segmentation!!

- The corrected statement is: “a weighted plane curvature sum”.

Pag. 16 Line: Where is it documented?

- See Pag. 8 Line 5-6-7 - We used the logarithm of flow accumulation to scale it to a more condensed and linear range. An example is the “Topographic Index” (Quinn et al., 1991, 1995).

Pag. 16 line 33: Not documented

- The sentence “this parameter provided better statistical fit with the observed contribution areas detected during the event by means of direct surveys and discharge/groundwater measurements” is modify in “ spatial distribution of this parameters offered a good accordance with the observed contribution areas detected during the event by means of direct surveys and ischarge/groundwater measurements”

We hope that the above clarifications are useful to continue the revision process. Write us for any others informations you need!

Best regards

The Authors

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-68, 2016.