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Interactive comment on "Geomorphometric delineation of floodplains and terraces from objectively defined topographic thresholds" *by* Fiona J. Clubb et al.

Anonymous Referee #1

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The paper by Clubb et al. is an interesting and valid contribution to the journal. The authors propose a digital approach to mapping floodplains and terraces in different landscapes and compare their results with field measurements or flood maps derived from other sources. The paper is very well written and I enjoy reading it. Overall I think the authors provide a clear and detailed example of the validity of their procedure. However, I have few comments that I think might help to improve the paper.

1. First of all, I do appreciate the effort of creating an entirely automated procedure: this is the ultimate goal of many research, providing tools to avoid time consuming field surveys over large areas, in addition to allow understanding earth surface processes at the landscape scale. The paper states that prior approaches required manual editing

by the users, and they suggest their work is a step forward from these issues. They underline this fact many times in the manuscript, describing how their method is 'fully automated'. However, I think the authors should note that indeed, the procedure is still not fully automated. At page 7 - line 203: there is a suggested threshold, but such threshold can be changed by the user after visually inspecting the landscape - line 207: the user must provide the latitude and longitude do focus on a specific channel of interest (of course, in the case the user wants to focus on a specific channel on the whole landscape, which is understandable) - line 212: the user must specify the width of the swath, and this value can be estimated by a visual inspection of the DEMs. So it appears there is still some user-related parameters. I think, actually, what the authors propose is a procedure based on a fully automatic threshold (based on statistic) for the extraction (as the paper title correctly indicates). And statistic itself has been proven very useful in this task in many other research papers also in other fields, in addition to those mentioned by the authors in the introduction e.g. (Molly and Stepinski, 2007; Thommeret et al., 2010; Pelletier, 2013).

2. Table 3 reports the accuracy of the floodplain extraction. I tried to do the math myself but I do not get the value of 8m for the Mid Bailey Run. Maybe I am missing something? Also, the mean distance is not a reliable information, the authors errors arrive to values of ~90 m. This measurement might not be that influent for landscape-scale processes, but for flood inundation maps, especially near human settlements, it might make a difference, so I think it is worth discussing it, unless the authors believe that this error is an outlier due to specific reasons (but it still might be worth mentioning it). Maybe they could evaluate reliability and sensitivity for the FIP (and not just for the overall floodplain extraction) as (Orlandini et al., 2011) did to assess the goodness of its point identification. This would also make the floodplain initiation point analysis consistent with the floodplain identification and terraces extraction analysis.

3. Lines from 285 to 335 should be in the method section. This is not a result, but rather the metrics the authors choose to evaluate the quality of their results. Concerning this

approach (also for the previous point), I think the use of an overall Quality measure would be appropriate, rather than just using reliability and sensitivity. Overall quality can be evaluated according to (Heipke et al., 1997), which is the first one proposing the sensitivity and reliability formulation. This would allow the authors also to compare their quality with other works about feature extraction in literature. I would also argue that reliability and sensitivity in their broad sense do not report an overall 'spatial correlation' between the datasets, as stated by the authors (line 365), but only a specific relation between either false negatives or true positives. Hence why I would suggest to use an overall measure as well.

4. Line 383: Floodplain inundation and alluviation changes through time. However I am not sure these changes would affect the geomorphological floodplain in the timeframe expressed by the authors (2-5 years' differences) unless significant events happened in that timeframe.

5. Results discussion. Can the author explain why their method performs better for floodplain delineations rather than for terraces? Is there a reason related to the method itself, or to the topography under analysis?is it related to the method they use to extract the channels? I think this is worth discussing more. Also, can the authors provide information about what influences the rate of TP or FN (so reliability and sensitivity, and eventually overall quality if they decide to evaluate it)? I think this is an important information to give, so users willingly to apply the proposed method in other areas can understand where to expect better or worse results.

6. Line 418- on. The authors state their method is relatively insensitive to grid resolution. However, their optimum value of reliability is obtained with a 5m DEM rather than for a 1 m DEM, and there are variations in reliability and sensitivity when changing the resolution: in some cases, the r and s are higher for the 10m DEM. I wonder if the authors have an idea on why this happens (maybe less noise on the 10m DEM that can influence their evaluations? Maybe too much noise on the 1m?). I think this part is also worth discussing a bit, since the procedure is available to the public, and users

might have different datasets (not necessarily Lidar at 1m). I understand the shifts in the two indices are low in magnitude, but I think discussing them makes sense.

7. Figures The figures are clear and well described. Just a curiosity: figure 8c and d: the predicted terrace is quite different from the digitised one in the central part of the river. From a visual inspection, this appears as a quite well define terrace, what is this difference's cause? Also, is it possible to have a map of an area showing both the identified terrace and floodplain?

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