

Interactive comment on “Reading the bed morphology of a mountain stream: a geomorphometric study on high-resolution topographic data” by S. Trevisani et al.

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The authors wish to thank the reviewer for his constructive observations. We report below our answers to the reviewer’s comments.

1) We agree that the manual filtering of LiDAR data performed in our study could lead to some misclassification errors, but the same could occur for an automatic filtering approach. For the case under study, field surveys show that big boulders are well represented. In the specific case of the three points mentioned by the referee, figure 4 shows that their elevation is approximately 1 m higher than the cloud of ground points.

This elevation could actually correspond to the top of large boulders. However, in that case, thanks to the high point density, more points at lower elevation, corresponding to the sides of boulders, would have probably been recorded. The check of their location on high resolution orthophotos confirms that they correspond to canopy-covered areas. Moreover, they are located near the margins of the domain, i.e. close to channel banks, where higher elevations should be expected. Finally, some smoothing of the elevation model has to be expected not only because of the possibility of missing some small to medium boulders, but also because of the interpolation procedure. We used a block kriging with block sizes of 0.5 m because the data density does not permit working at higher resolutions.

2) In the Rio Cordon the presence of LWD (large woody debris) is very limited and did not cause problems in LiDAR data analysis. Handling LiDAR data in streams where the presence of LWD is significant can prove to be challenging especially, as the referee points out, when trees in various states of collapse are involved. Filtering out LWD should obviously be avoided because assessing characteristics and spatial variability of LWD is of great importance for the morphological classification of streams (e.g. recognition of log steps) and for the analysis of related processes. Moreover, the removal of LWD from LiDAR datasets would cause a substantial decrease of ground point density, making it not possible to describe the underlying bed morphology at high resolution. The recognition of the topographic signature of LWD from LiDAR data can benefit from auxiliary information such as the intensity of returned pulse or other remote sensing data, such as radiation in the infrared spectrum.

3) We agree that the paper could benefit from some more details on the definition of the morphological units.

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