Natural Hazards
and Earth System
Sciences

Discussions

Interactive comment on "Dynamics of large wood during a flash flood in two mountain catchments" by A. Lucía et al.

A. Lucía et al.

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We wish to thank the reviewer for her/his valuable comments and suggestions. Below are the answers to her/his comments, which are reported before our response.

1) I found this paper interesting to read as it provides a novel approach to evaluating fluxes of wood in stream channels following an extreme event. I believe the paper merits publication with some revision. The paper would benefit from some substantial editing and organization. In many cases the paragraphs could be cut in half without losing any content. I recommend that a native English speaker help in the editing and revision. My detailed technical comments are included in the attached word document, and are mostly suggestions to improve the analysis and paper.

Thank you. The detailed technical comments will be all addressed in the revised ms, which will be also reorganized and edited by a native English speaker colleague.

2) Due in part to the more erosive terrain and underlying geology?

Yes, the following phrase "due in part to the presence of more erosive lithologies." will be added to the text.

3) Flood hazards to human development on floodplains (?)

Yes, this explanation will be included in the text

4) Yes, these are summary papers, but wood has been studied in North America since the 1970s, and you should really cite the early excellent and ground breaking wood papers, for example, one example among many: Swanson, F.J., Lienkaemper, G.W., 1978. Physical consequences of large organic debris in Pacific Northwest streams. USDA For. Serv. Gen. Tech. Rep. PNW-69. 12 pp.

The text will be changed as "In-channel LW storage and its morphological effects have been studied since the 1970s (e.g. Swanson and Lienkaemper, 1978), and quite extensively in the recent decades (see for a summary Gurnell, 2014; Wohl, 2014)."

5) Marwan Hassan has a paper on modeling stochastic wood supply to mountain streams, you might contact him to see if it is in press and check it out for citing here.

Thank you for pointing us to this reference. It will be included in the revised ms.

6) Consider using the term "hillslope processes" rather than colluvial, here and throughout the paper.

The term "hillslope processes" will be adopted in the ms.

7) Also check out this paper: Kaczka, R.J., 2009. Dynamic of large woody debris and wood dams in mountain Kamienica Stream, Polish Carpathians. Tree Rings in Archaeology, Climatology and Ecology 7, 133–137. An amazing dendrochronology

study that found most wood jams were formed during a handful of extreme events.

Thank you for this reference. It will be briefly mentioned in the revised ms.

8) Here and throughout the paper, try to be clear when you are calling out hillslope gradients/slopes versus channel gradients/slopes. Here you mean hillslopes.

In this case we referred to the hillslope gradient. It will be clarified here and throughout the paper.

9) Probably should describe your statistical methods in the methods section rather than the results, it will be cleaner.

This was also pointed out by Reviewer 1. We will follow your suggestion and restructure the paper to better differentiate the methods and the results.

10) Please briefly describe this method in one sentence

A sentence will be been included to describe the methodoloy described in Gaume and Borga (2008)

11) Please give the TOTAL channel length surveyed too.

This sentence will be added in the text "The total surveyed channel length was 11.2 km in the Gravegnola and 19.3 km in the Pogliaschina."

12) Consider adding to one of your maps the debris flows, landslides, and floodplains, perhaps on Figure 7, so we can see the visual relation between wood in the channel. floodplain sources, and hillslope sources – you may need to just focus on a sub basin to show the detail needed.

We will add to the former fig 7 a detail of the Veppo Creek, where it is possible to see areas with different slope processes providing LW to the channel, and also where the presence of islands and bridges reduce LW export.

13) Just say "GIS", no need to plug a particular company, when you can do it in with

any GIS software.

OK, the company name will be deleted in the revised ms

14) This is unclear, not sure what this means.

The log length was assigned to the "projected line length". This means that in the case the log visible in the orthophotos were inclined, the actual total length would be longer than what measured in GIS. In order to be clearer, in the text we will be report "horizontally projected line length".

15) Please add a simple conceptual figure showing how your wood budget works and how it is calculated – with simple equations as needed – it will make it much easier for the reader to understand and visualize what your budget entails.

Thanks for the suggestion. A conceptual figure will be included (new figure 6)

16) You can condense this down to one sentence.

Following the suggestion by reviewer 1, we will remove this text from the methods and put it in the discussion, where it actually fits better.

17) Consider combining your results and discussion together, it will make it easier to follow, where after you describe a particular result, give the discussion of that result. It will make it easier to follow your discussion, rather than going back to a separate results section.

We understand the reviewer's rationale, but we would prefer to keep the two sections separated.

18) Source/Citation?

As also asked by Reviewer 1, we will include the following explanation "The return period of the flood of October 25, 2011, was estimated by comparing peak discharges assessed by means of post-flood surveys with the application of regional equations

relating peak discharge (corresponding to various return periods) to drainage area"

19) Do you ever just evaluate total wood in the channel, as a parameter? i.e. total wood in the channel after the flood? Is this what LWrT defines? This is where a schematic and definitions of your wood budget in the methods section would be useful.

The total wood surveyed in the channel after the flood is described by the variable LWd. We will add the conceptual figure (new figure 6) to clarify

20) Consider breaking out this as section 4.2.1 Sub basin scale variation of wood or similar

We will move to section 4.1 the section 4.2.2 proposed here, to combine the two reviewers' suggestions on this part of the ms. We will change also the title of the section.

21) Consider breaking out this section as 4.2.2 Reach scale variation of wood or similar

See answer to comment 19.

22) So why bother with the long results, Table 1, and Figure 8? Just summarize the non correlation in a sentence and remove the rest.

As studies analyzing LW dynamics during very large floods are quite few, we believe that presenting most of the analysis, although statistically non-significant, can be valuable, so we'd like to keep both Table 1 and Figure 8.

23) Is there anything informative about these results? Are they really needed?

We think so. Please see the first part of the response to comment 21

24) A 10 meter DEM seems pretty good for figuring out valley width, and then you have your channel width from your orthophotos. Contact Lee Benda to see if you can use their DEM programs that will extract floodplain and valley widths at a given height above the channel. leebenda@terrainworks.com I think this will help you discern much more about your spatial wood patterns, where you can make correlations between total

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wood volumes and channel confinement (ratio of valley width to channel width)

The suggestion is surely valuable, but the DEM resolution is actually – and unfortunately – not adequate for such an automatic analysis, as many of the studied channels and floodplains are quite narrow, comparable to DEM resolution (10 m). Nonetheless, we have analyzed in detail the widening processes in these basins in a recently submitted ms (Surian et al, submitted to Geomorphology), and we have determined valley width through the use of all the available information: DEM, orthophotos, geological and technical maps. Consequently, it was possible to calculate the channel confinement index (which mostly ranges from 1 to 20). Both LW recruited from the fluvial corridor and LW deposited in the channel are found to increase with higher confinement index (i.e. in less confined reaches) due its effect on channel widening. However, Gravegnola reaches still feature high LW recruitment rates than those in the Pogliaschina. This information will be briefly added in the revised ms, but the detailed analysis and discussion on the controlling factors for channel widening will be presented in the Surian et al. paper.

25) As mentioned earlier, consider adding a figure similar to Figure 8, but focus on a sub basin, and include the locations of floodplains, debris flows, landslides, bridges, and standing trees that trap wood. Also consider including an associated longitudinal plot with wood volume on the Y axis and channel distance on the X axis, with arrows and bars pointing out the controlling factors for large wood volumes (bridges, standing trees, channel widening, debris flows etc)

Nice suggestion. We will include both images, the former in the figure 7 and the latter (the longitudinal variation of LW export) in a new figure.

26) Is there no concern for the ecological role of wood in Italian rivers for aquatic habitat?

Still very little, but it's slowly increasing. The priority for the river basin authorities is still to decrease flood risks (potentially enhanced by LW clogging) given the highly

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populated mountain valleys.

27) Please define all the symbols below the table, it's too much work for the reader to flip back and forth to a separate table A1 with the definitions.

OK, the reviewer is right. We will define symbols in the table.

28) Also , is this table even needed? There's only one significant result, just describe in one sentence and leave out the table.

Please see answer to comment 21

29) Please define all the symbols below the table, it's too much work for the reader to flip back and forth to a separate table A1 with the definitions.

We will define symbols in the table.

30) Please define all the symbols below the table, it's too much work for the reader to flip back and forth to a separate table A1 with the definitions.

We will define symbols in the table.

31) Consider reporting all your wood metrics in volume per channel area, as you can then compare volumes between channels of different sizes.

We acknowledge the value of expressing LW per unit of channel area, but in this study the channel area increased dramatically after the event, and thus two different sets of LW metrics would be derived. We think that expressing LW by unit of channel length is more suitable in LW-flood studies in highly dynamic river systems.

32) Missing a T for total here?

Yes, thanks you

33) Channel slope

Yes, it will be specified in the revised ms

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34) This elevation map is not very informative – it would be more informative and visually descriptive to provide a shaded relief map instead.

We would like to keep the elevation map in this figure and to include the shaded relief map in the figures 5 and 6.

35) Consider including a shaded relief base map

Thanks, we will include it (see previous comment)

36) Summarized at the sub basin scale.

Thanks, it will be included in the caption

37) Consider including a shaded relief

Thanks, we will include it (see previous comment)

38) (=LW export)

Yes, it will be modified this way, thanks.

39) Is this figure needed?

Please see answer to comment 21. We would like to keep it to better illustrate the results.

40) Is this figure needed?

Please see answer to comment 21 We would like to keep it to better illustrate the results.