

Review of “Geospatial modelling of large wood supply to rivers: a state-of-the-art model comparison in Swiss mountain river catchments”

1. Summary

This paper presents an overview of existing modelling approaches for estimating LW supply to rivers, and a more detailed comparison of two GIS-based approaches including catchment characteristics and estimated LW supply (Steeb et al., 2019a) for 40 Swiss catchments for 50 to 150-yr return period events. The empirical potential LW volume reduction factors used in one model (EGA) were obtained from the observational dataset, reducing the contribution as a model validation. In general, as the authors acknowledge, the uncertainty in both observed and modelled LW supply is large (Figure), and both modelling approaches perform similarly for LW supply estimation, with apparent overlap between the range of model results and the range of field data. The authors discuss aspects contributing to uncertainty in the modelled and observational results.

In general the paper seems caught between two directions, on the one hand a review paper examining the range of modelling approaches, and on the other a comparison of two GIS-based approaches through use of a detailed observational dataset. The authors state that “the approach presented here is a useful tool to give a comprehensive overview and direct attention to areas where a more precise assessment of the LW situation is probably useful.” I appreciate that the authors acknowledge the large degree of variation in both observational and modelled results, which is interesting and presents opportunities to strengthen the contribution of this manuscript. Do the main sources of observational uncertainty correspond to the main sources of uncertainty in both models? For each model, which steps have the highest contribution to final uncertainty? Is this broadly the same across all catchments, and could this be helped by future field observations? How does the present degree of uncertainty impact end use in hazard assessment—could this be improved if the models and observations were refined, or is the present degree of variation acceptable?

Line-by-Line comments:

Line 53: Please add references for this statement (“The main damage potential...”).

Line 64: To improve the flow of this sentence, please incorporate the parenthetical list in to a main sentence structure.

Lines 69-75: Here, additional context would be helpful to connect the model comparison and model review portions. Why the focus on these two GIS-based approaches?

Lines 112-141: To contextualise model development it would be helpful to incorporate a short overview of accompanying technological advances in GIS and LiDAR enabling current model development.

Line 163 (approx.): There is a broad range of models under comparison, making Table 1 difficult to follow. A schematic diagram illustrating different modelling approaches would be helpful, perhaps with key advantages and/or disadvantages of the scheme classes.

Table 1: it would be helpful if line numbers were included and used in the text to reference specific models to easily find entries in the table. If possible could a column specifying calibration datasets and/or model validation procedures would be helpful in understanding progression of model-data comparisons and highlight areas for future work later in the text.

Line 171: Here as above in the Introduction, additional context on why the two GIS-based approaches were chosen for comparison and relationship to the reviewed model development would be helpful in contextualising the comparison portion of the manuscript.

Figure 1: The quantitative definition of ‘medium, large, very large’ events is not presented until later in the text; please could this be defined earlier (or mentioned in the figure caption) so that the figure can be easily interpreted.

Lines 197-198: Here, more information on the calibration dataset would assist in interpreting the results. This information is currently largely presented in Section 5.3. However, the degree of variation in both the observational and modelled results is interesting and an examination of the reasons for variation and accompanying areas for future work in both approaches could be very helpful in motivating future work to fill identified research gaps.

Figure 2: This figure does not seem to add significant support to the text, especially in light of repeated reference to Supplemental Information figures. Could this figure be replaced by either Figure S1A

In this section more fully present the difference between the EGA buffer and FGA fuzzy-logic approaches would be helpful here. The difference in approach is a key focus of the Results, but equations are not included and the procedure details are not yet fully brought out in the text or figures.

Lines 283-286: More details of the choice of f are needed here. What range did the literature review yield? Can a more in-depth discussion of the five catchment mentioned be examined? Or, if these details are already in previous literature, please clarify.

Figure 5: From Lines 355-356 I believe that the observed data corresponded to the ‘large’ event scenario. This should be made clear in the figure and figure caption, and in Table 3.

Lines 404-405, and elsewhere: In general the Results would benefit from stronger quantitative comparison to contextualise results for the reader. Here, it would be helpful to discuss the variation in results in addition to mean values, and elsewhere (ex. Lines 421-424, 483, 486, and elsewhere) quantitative assessment of what constitutes “larger” and “much larger” is needed to interpret the Results.

Figure 9: Please label the lines of equality ($y=x$) in the subfigures.

Figure 10: Please explain the plotted gray lines.

Discussion: The Discussion and overall contribution of this manuscript would be strengthened through a more in-depth discussion of the observed variation in model and observational results presented in the Results (please see second paragraph of Summary). It is mentioned (ex. Lines 739-740) that the observational dataset enables comparison between catchments. Perhaps a catchment comparison case study be highlighted to help demonstrate differences in the models or variation in observational data?