



EGUsphere, author comment AC2
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Reply on RC1

Annette Sophie Bösmeier et al.

Author comment on "Reliability of flood marks and practical relevance for flood hazard assessment in southwestern Germany" by Annette Sophie Bösmeier et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-223-AC2>, 2022

Dear Neil Macdonald,

we appreciate your helpful comments and your thorough proofreading of our article. We are also happy about your positive feedback particularly regarding the design and implementation of our study.

We thank you also for your notes provided in the supplement. We included the corrections and took your comments into account.

Regarding your main question on the influence of urban surface change on our study, we did not have a possibility of quantifying such change rates at the three study sites. We are going to include a statement in the methods section and take the issue up again in the discussion section at appropriate places. It is likely that level changes took place to a certain extent between the flood mark survey in the early 20th century and the survey which has been part of this study. These changes may be reflected in the small differences between historically documented and current flood mark heights, as mentioned e.g. in line 425. However, base changes can have happened also prior to the historical mark survey. We are going to point out this uncertainty in the discussion section.

We also want to answer your questions provided by the supplement:

- Line 199: *"It would be interesting to note here, or later possibly, whether any of the flood marks were informal compared to formal records."*

See the comment after the next one.

- Line 210: *"how many do you estimate had been lost?"*

This is illustrated in Sec. 4.1.3.

- Line 277: *"I think this is an important point, can you discern the proportion that are informal (painted) rather than formal (engraved). The characterization is itself assumptive, but is useful in thinking about the quality and accuracy of the mark. I have been looking at this, as part of the tools used in communicating risk and how knowledge can fade with time."*

In our study area, it is difficult to distinguish between 'formal' and 'informal' flood marks. We do not have any information on the installation of the marks (compare lines 448–454). We assume that a large part of the marks were installed according to official stipulations since many of them show similar appearances, however we are not aware of sources verifying this assumption. Actually, we doubt that the type of a flood mark (painted or engraved) could be a reliable decisive criterion to show the formal or informal character of marks in our study: nearly all collected marks are engraved but most of them are painted as well. Moreover, some older marks have been repainted and, due to weathering, it is not always clear whether or not they initially also had been engraved. In lines 275–277, we mentioned type and appearance of the collected marks. We could add a few sentences in the discussion, referring to the question, whether the appearance of a flood mark can provide information on its accuracy and quality (we believe, in our study this is rather difficult, also compare line 353–355).

- Figure 4: *"A good figure, but consider how it may be viewed by those that are colour blind."*

Thank you for the link. We have tested the figure and it appears to be fine.

- Line 324: *"I think this is really interesting, anecdotally from a UK perspective I believe that it is the other way round, with most of the flood marks removed/lost as people want to sell properties [...]"*

This is indeed an interesting point. Observations similar to yours in the UK also have been reported from France, and we also know of places in the Elz catchment, which is directly south of our study catchment, where flood marks at houses have been removed even though it is forbidden by law. Fortunately, in the Kinzig valley, a different kind of mindset appears to prevail – at least locally. Possibly, it might be related to the long history of recurring floods and the strong dependence on the river with regards to timber rafting, which is a particularity of the Kinzig area. Finally, the reason for flood marks disappearing from bridges may be the comparably small size of (historical) bridges and their repeated complete destruction during large floods of the past.

- Line 342: *"Could you add a sentence explaining how you came to this sum, is it just a pragmatic estimate of likely difference, or generated from some specific example or reasoning?"*

This range of tolerance was derived from the (maximum positive or negative) height deviations between historically recorded and still preserved flood marks, excluding preserved marks that had been noticeably relocated or significantly modified compared to their original status (compare Fig. 3), as described in lines 342–352. Also excluded were four historically documented marks at a house corner in Schiltach (S24–27), which were found to be at similar lower heights (-0.25 to -0.325 m) nowadays. Yet these data have not been included in the range of tolerance: despite being in a good condition, the marks might have been reattached incorrectly as for three marks, either inconsistencies in mark inscription or mark position relative to the notch or relative to the side of the building (where the mark was positioned) were detected. In contrast to that, Figure 5 c) shows two marks (W28 and S15) with a very small height difference between the historical and the current survey. These marks did not appear modified or relocated and were included in the estimation of a range of tolerance. To clarify this issue, we are going to add a suitable statement to the manuscript. We also would like to change the legend entry 'Lost mark' in Fig. 5c) to 'Documented mark' realizing that 'lost' does not apply to the marks W28 and S15.

- Line 343: *"also potential for ground level to change if the street has been reflagged/resurfaced?"*

See comment to line 354.

- Line 354: *"Could this be a change in footpath/road/ground surface height rather than flood mark height. I have flood marks in York in the Merchant Adventurers Hall that are now below street level from the 1830s."*

Kerbs in Germany are normally between 5 and 12 cm high, high kerbs can amount to 15 cm. Thus, the construction or renewal of a footpath during the 20th century (after the historical flood marks survey) could easily have led to a small increase or decrease of the absolute flood mark height relative to the ground level. We therefore assume that a change in footpath height could be a possible explanation for the small height differences that we have found for a couple of preserved marks, as explained in the previous comment to line 342. The significant height change of the marks mentioned in line 354 might have been caused by relocation, as explained above, but also a significant change of the base level cannot be excluded.

- Line 358: *"You could consider adding a figure here with all of the flood marks presented and the relative difference based on current surveys. Is there a consistent reduction in level, or are some higher than previous recorded? If the difference is consistently a reduction in height then this might suggest that the relative height change is derived from an increase in street/surface level rather than a reduction in flood mark height. So far you have not discussed this - it might also help explain why the difference is greatest for older marks."*

We totally agree with you. It would be helpful to discuss this issue in an additional short paragraph. We could also add an additional figure to be attached to Fig. 5 (Fig. 5 d)) displaying all mark heights of historically documented and still preserved marks together with the local flooding depths of the current flood hazard maps. Regarding your question on the directionality of the relative differences, such a pattern is not visible. Marks that have not been altered significantly may be a little higher or a little lower today, regardless of whether they refer to e.g. the 1824 or the 1882 flood event. The few marks that have been subject to significant height changes and relocation (lines 347–350) are at lower positions nowadays but this may be a coincidence as the marks rather appear to have been relocated (compare Fig. 3, and the comment above).

We hope that we could adequately clarify the issues that you have brought forward. We would be happy to receive a short reply indicating which of our suggestions you would support. Thank you again for investing your time in our manuscript.

Best regards,

A.S. Bösmeier, I. Himmerlsbach, and S. Seeger