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Discussions

Interactive comment on "Long-term river trajectories to enhance restoration efficiency and sustainability on the Upper Rhine: an interdisciplinary study (Rohrschollen Island, France)" *by* David Eschbach et al.

Anonymous Referee #1

GENERAL COMMENTS The study deals with the long-term evolution of a reach of the Rhine River which underwent some restoration activities. Overall, I think it is a very good work: the novelty is combining reconstruction of morphological evolution with other aspects, specifically with geochemical characteristics of sediments. Some revisions are needed to make some parts more effective, especially the last section (see "specific comments"), and to put the work in a wider context (it could be useful to summarize one or two key points that comes out from this study and this restoration project).

C1

SPECIFIC COMMENTS "Study area" section (pages 4 and 5). The part dealing with the restoration project could be improved. I think it could be useful to describe a little bit more in detail the restoration project and, in particular, the aims of the project. This would be very helpful for improving the last section of the manuscript (4.4) (see one of the following comments).

Page 8, L. 2. A brief explanation of the CM diagram method would be useful.

IRSL dating. I have some concerns about using this dating method within this study: is this method appropriate to the temporal scale considered in this study? How much reliable are the results? I am specifically referring to Figure 7, which shows that dates have significant errors and reverse ages can be obtained (see pit 2, where there is a reverse relation between sediment depth and age). Overall the contribution of IRSL may be considered useful for this study, since it constrains the age of fine sediment deposition, but it would be useful if authors would add some comments on such data. For instance, could alternative dating method be used in a similar context?

Section 4.4. This is part could be improved: considering the amount and quality of data, I think that the authors could make some efforts to make this part more effective. I think that they should try to go more in detail about the effects of the restoration project. For instance: were the project aims appropriate for this river reach? To what extent are (or will be) those aims achieved? Which are the main limitations of a restoration project carried out at reach scale, such as the one described in this study? Other examples to improve this section: "in part, this functioning has been targeted by recent restoration efforts" (Page 21, L. 11-12), this could be illustrated more in detail; "this highlight the impact...works are irreversible" (Page 21, L. 20-21), this statement requires further explanations. I am wondering if it could be useful to add a final section (e.g. "Conclusions" or "Final remarks") where major outcomes of this study (both specific and general) could be summarized.

Page 22, L. 30. This sentence is not clear: I think it would be useful to explain bet-

ter what could be likely the future evolution of this reach, and I would avoid a direct reference to Lane balance (it is a concept well known among geomorphologists but, probably, not for readers with different backgrounds).

Figure 9. I have some concerns about this figure. Is it really meaningful to calculate sinuosity if channel configuration was multi-thread from 1743 to 1838? Sinuosity is a key characteristic in single-thread channel, while less relevant in multi-thread channel. I think that it is not correct to assume that sinuosity in 1872 was 1 (it does not look like a straight channel!). I am wondering if this figure could be removed.

Some suggests concerning terminology: "channelization" or "channelization work" instead of "correction"; Page 14, L. 7. "Central bar" instead of "median bar".

TECHNICAL CORRECTIONS Page 1 – L. 21. "IRSL" instead of "IRLS" Page 2 – L. 1. It could be better to use a chronological order where several works are cited. Please consider this comment throughout the manuscript. Page 4 – L. 15. Figure 3 (as well as Figure 4, page 5 L. 7) is cited within the main text before Figure 2. Page 20, L. 2. What is the meaning of "NN"? Above sea level? Page 21, L. 5. "Different spatio-temporal scales"? Page 21, L. 32. Eschbach et al., submitted is missing in the reference list. Page 22, L. 33. "Short" instead of "medium"? Figure 4c. A legend should be add to explain the two symbols of this figure (i.e. anchor points and RMSE errors).