**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Spatial variability in floodplain sedimentation: the use of generalized linear mixed-effects models" *by* A. Cabezas et al.

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The article discusses a potentially interesting and marginally covered subject (spatial variability in floodplain sedimentation) and aims to use GMLE models to elucidate this variability. Yet, the article should focus more on discussing the variability, the benefits of the GLME models on elucidating this variability, and put it into context of other (rare) spatial variability literature. Much of the text could also benefit from rephrasing, since the current phrases often stand in the way of a good understanding of the text. I advise considering this article after major revisions have been made.

My suggestions and remarks:

Page 1590 Line 6: 'consisting on' should be 'consisting of' Line 13: 'another' should

be 'other' Line 14: 'vegetation morphology'? I suggest changing this into 'vegetation pattern' or 'vegetation characteristics'. Line 14: hyphenate 'small scale' (should be 'small-scale') Line 18: erase 'solid'.

Page 1591 Line 1-4: I 'd like to see some references to Australian work, such as by Martin Thoms Line 13: erase 'to' Line 17: Piegay misses an accent: Piégay. Line 20: 'Middlekoop' should be 'Middelkoop' Line 26: 'Middlekoop' should be 'Middelkoop' Line 29: 'on'should be 'of'

1592 Line 8: 'Middlekoop' should be 'Middelkoop'; I'd also suggest citing Thonon et al. (2007) in Hydrological Processes, who developed a model that combines finite elements with the Method of Characteristics. Line 13: please elaborate further on the need for empirical measurements and the link with GLME models, this is a very large jump. Please make clear why GLME models are so useful for studying spatial variability. I agree with the fact that sedimentation is heterogeneous, and that it is important to elucidate it, but the added value of GLME models should be made clear at this point. In line 29, you use 'therefore, the objectives of such analysis were (...)'. Yet, I think you first should state your objectives and then underline why GLME models are such a great tool to achieve those. Line 15-17: sentence doesn't make sense Line 17: erase 'provide a framework' Line 25: 'on' should be 'in' Line 27: 'to' should be 'from'

1593 Line 1: again, first state objectives and then tell us how the model helps to achieve them. Line 8: please use a different symbol for Hm3, may not be clear to everbody. 2.1: I like the very detailed data on the river reach, which is important given the objectives of your research 2.2: please use 'channel-floodplain connectivity' instead of 'superficial connectivity'

1594 Line 6: replace 'digging' by 'burying' Line 10: explain how you ascertained that the mats did not fold during inundation, since I understand from your text that you only fixed them in three positions. Line 22: please enlighten the reader why you used a brush to get only a very select sediment sample from the mats and did not get all the

sediment of, mix it well and then take a sample of that. Given the high spatial variability (even within the mat area), this may give a better result. Line 28: replace 'grounded' by 'ground'

1599 Line 13-26: generally very unclear paragraph, please rewrite or elucidate with graphs (bar graphs, pie charts, trend lines etc.).

1600 3.2: Unclear paragraph. Line 10-11: Do you mean there is a positive relation between the scale of measurement (plot, row/transect, whole subarea) and the TN and TOC variability? An do you mean that variability within subareas differs widely, e.g. one row can have a low variability whereas a row a bit further away from the channel has a higher variability? This is how I at least understand your text. Line 26: use 'independent' instead of 'independently' 3.3 I would like to see at least a basic introduction to GLME models earlier in the text, perhaps best in 'Materials and Methods'. Please also use 'relationship' instead of 'effect' for describing statistical relations between parameters

1601 Line 13-15: do you mean 'smaller' instead of 'narrower'?

1602 4.1: in general, I would have expected a discussion on spatial variability and not on sedimentation rates and their statistical relationships with sediment variables. I think you have an excellent and large dataset to discuss spatial variability in sedimentation, yet do not see this reflected in this discussion. Also please use 'current site' or 'current study' instead of 'this site' and 'this study' as the latter may lead to confusion (e.g., "do you mean your own study or the study you just cited?") Line 1: erase 'than' Line 9-10: sentence is unclear to me. What would you like to convey? That there is a relationship between channel-floodplain connectivity and spatial variability? Text further on suggests you would like to say this, but this remains unclear when you use 'morphology' (which cannot be quantified) instead of 'connectivity' (which can be (semi-)quantified). Line 14: 'was intensively shorter'? What do you mean by this? Line 20: replace 'on' with 'of'

1603 Line 9-10: please rephrase your sentence 'however ... (Table 3) to 'However, when analyzing the data at site scale, we noted that this negative relationship at reach scale was only found to exist at the RF site'. Line 20: replace 'what increased also sediment quantities' with 'which led to higher sedimentation rates close to the river channel'. Line 21-22: explain what you mean with 'it'. I think it is the lack of relationship between particle size and sedimentation rate?

1604 Line 1-11: please also discuss work by Ian Droppo and fellow flocculation experts on the relationship between aggregation and organic matter concentrations (although I still think the main focus of the article should be discussing spatial variability in sedimentation, since there is a lack of literature doing so). Line 12-17: I don't think spatial differences depend on where water enters the floodplain, I think spatial differences are related to the distance to where water enters the floodplain. Please rephrase. Please replace 'this results' with 'Depletion of suspended sediment by sedimentation along preferential flow paths results'. Line 28 ff: excellent result, yet I am very interested in why there is such a difference in spatial variability between TOC/TN deposition and sedimentation. Please elaborate on that. Line 28: erase 'at the'.

1605 4.2 The discussion lacks a clear conclusion (preferably a bulleted list of conclusions) and the discussion in this section could focus much more on the merits of the GLME models and how they could enlighten our knowledge on spatial variability of floodplain sedimentation. Line 17-20: Rather unclear phrasing. Please rephrase as 'the inverse relationship between elevation and sedimentation rate, as found by Walling (numerous studies) could not be confirmed by this study. As Middelkoop & Asselman (1998) and Thonon et al. (2007) found, this might be attributed to levees and other topographic attributes. Line 28: please erase 'therefore'.

1606 Line 1-30: suddenly the article discusses the influence of vegetation, vegetation density and its distribution on sedimentation. This should either be left out as to not blur the discussion, or introduce this properly in the introduction. Line 19-22: please also cite other work that relates flood magnitude to sedimentation. Line 29: the article

ends rather abruptly. Please add a short bulleted list of concise conclusions.

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