

## ***Interactive comment on “Morphology of the Kosi megafan channels” by K. Gaurav et al.***

### **Anonymous Referee #2**

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This paper analyses field measurements from the Kosi megafan to determine the morphological characteristics of braided and isolated channels over the fan area, to elucidate whether commonalities can be found between these two types of channel. This paper provides a valuable set of field measurements in an area where these are scarce; however, the structure of the paper, number and type of measurements taken and the lack of depth in the interpretation and discussion of what is presented leads me to suggest that the paper would need to be substantially re-written and incorporate more data before it could be accepted for publication. Further details related to this are provided below.

Specific comments:

1. Field data: the chosen location of the transects is unclear and a more detailed explanation about sampling strategy used needs to be undertaken, as well as clearer

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indication of their location on the map provided. There is also a disparity between the number of measurements from the braided and isolated channel examples, and explanation needs to be given as to why this is. Detailed measurements of width, depth and discharge have been provided, but only a small number of locations had associated water surface slope and grain size, again it needs to be expanded on why this is the case. And little was made of the grain size measurements that were taken. A major problem with the data presented is the lack of any reference to the bedload data – this is an important consideration in the method that they have presented (as the authors themselves state in the conclusion) and I cannot see how they can draw any conclusions without these data included.

2. Little mention is made of the fact that the study area is located on a megafan – some consideration needs to be given to the fact that fans can react differently to other braided rivers systems and in particular slope and downfan grain size are important considerations, both of which have been overlooked in the data presented. In the field site overview it was mentioned that sediment composition was consistent over the fan area – more data or references need to be provided to support this as this is rarely the case in megafan environments.

3. The data interpretation and discussion section of the paper are weak, and a more robust explanation of the results needs to be made. In particular more emphasis needs to be given to relating the findings from this study to broader fluvial research and what these results will bring to braided river research and a more detailed understanding of the Kosi megafan. At the moment there are valid research questions set out in the introduction, but the data and conclusions do not adequately address these in the remainder of the paper.

4. The structure of the paper as it stands is confused. There are sections of the results that belong in the methods or even the introduction, the authors need to make sure that the theory is clearly presented at the outset, they then present and explain thoroughly the data that they are presenting and then discuss what this means in the latter stages

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of the paper – new theory that aren't related to their own data shouldn't be included in the results section. These have been highlighted in the list of detailed corrections below.

5. Terminology is used inconsistently and I have highlighted examples of word usage that is not appropriate. Particular care needs to be taken with the words 'thread' 'stream' 'channel' which all seemed to be used throughout the paper, better to select one of these and use it consistently. Also consider changing 'decomposition' when talking about the division of channels, this generally means to break down rather than divide and so is confusing in this context. The paper would benefit from a thorough edit to ensure consistent terminology.

Minor corrections:

Abstract Lines 2 and 3: consider changing terminology from 'streams' to channels Line 7: change "Their average slope. . ." to "The average slope. . ." Additional information to be added to the abstract to outline what the main results were and explain the importance of the main findings in the context of wider river research.

Section 1: Introduction The aim and research questions of the paper need to be clearly identified at the end of the introduction.

Section 2: The Kosi River megafan 1025 Line23: 'a series of avulsions' – need to expand on this – when did these occur and what was the magnitude? Some indication of the flow regime would be useful 1026 Line 9: Why 'seepage channels'? Not sure about the word usage, aren't these the isolated channels you are looking to compare? 1026 Line 11-12: Where is the evidence to support this statement? This is a large area, and it would not be uncommon to have variations in the sediment composition and granulometry, especially considering that this is on a fan you would expect a downfan change in the grain size, so you need to have either field evidence or a reference that will corroborate this sentence – you measured grain size and so this could possibly be used?

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Section 3: Field measurements 1026 Line 17: How was the location of the grain-size and slope measurements determined? Why weren't a greater number of samples created to allow for statistical analysis? 1026 Line 17: How was the sediment sample collected? Was this a single point sample from the bed? And at which position in the channel? 1027 Line 7: expand on the method used to calculate the relative error. What about measurements of suspended sediment and in particular bed load? These data are needed to answer the aims of the paper.

Section 4.1: Cross sections 1028 Line 14: You mention aerial images of the channel – have you used these in this study, if so expand on this and if not I don't see how it fits into this section 1028 Line 15: consider changing "decomposition" – word usage is not appropriate, 'division' would be better 1028 Line 17: again consider word usage "decompose" 1028 Line 18: the method of calculating the bar using water depth: channel depth is very dependent on the water level / discharge at the time of the measurement – to confirm that this was appropriate it would be good to demonstrate the annual average flow for the study period to show that this was a period of high flow and that the flows were comparable over the 2 study periods. 1028 Lines 16-21: this should be included in the method rather than the results

Section 4.2: Regime relations for the Kosi fan threads 1028 Line 23: again consider the word usage "decomposed" 1029: I do not see the relevance of this section. It is quite long and contains lots of elements that could be summarised in the methods and doesn't actually show any relationships. It could be condensed to only the salient points

Section 5: Conclusions The conclusions are not appropriate to the aim of the paper and are very vague. At the end of the section the authors state that they are undertaking further work and I feel that for the research to adequately answer what they are hoping to they will need to include these data. An in depth discussion of the results is needed, explaining what they show that is unique and of interest to wider fluvial research.

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Tables It would be better to label each of the sites with a unique identifier rather than relying solely on the coordinates – this makes it very difficult to compare which sites from Tables A1/A2 are associated with Table A3 or shown in Figures 3 and 4.

Figures Figure 1: An overview map of the area would be useful – most of the readers would not be familiar with the places named on the main map and so geographical context would better able readers to locate the field site Figure 2: Why are the long term trends shown for 2005-2007? Is it possible to show the annual discharge data for the study period as well? Figures 3 and 4: Would be easier to interpret if the sites on the figures were labelled rather than the coordinates. Figure 5: There are not enough measured points for the slope for any analysis to be done on it and so it would be better to remove the lines associated with this Figure 6: Same point as for Figure 5.

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Interactive comment on Earth Surf. Dynam. Discuss., 2, 1023, 2014.