

Interactive comment on “Alluvial plain dynamics in the southern Amazonian foreland basin” by U. Lombardo

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I enjoyed reading this paper, which documents remarkably dynamic channels of relatively small streams in the Amazon foreland basin. Using aerial imagery available for recent decades, the author documents frequent crevassing, avulsions, meander migration, and floodplain modifications. The results have important implications for our understanding of depositional processes in foreland basins, as well as for management decisions regarding infrastructure, landuse, and biodiversity.

The manuscript could benefit from some additional documentation on some of the figures, and greater clarity in the text to better present the author's logic and thinking.

The paper might benefit from some reorganization. The basic data simply consists of

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observations from aerial images. The authors, however, include inferences regarding spatial and temporal changes in sediment load, bed elevation, stream discharges, and floodplain deposition (specifically changes in floodplain elevation) that are not directly observed, but are rather interpretations based on indirect evidence. It might be best to remove most of these from the results section of the paper, and rather present this more interpretative aspect of their work in the discussion, where a conceptual model for the occurrence and progression of these changes (i.e., the crevassing and avulsions and their consequences) can be outlined clearly, and the data supporting them can be clearly outlined.

I don't think that the revisions suggested here are particularly onerous, difficult, or extensive. I have indicated them as “major”, but I think that the author should have little difficulty completing them prior to eventual publication.

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Additional suggestions are outlined in the detail comments below.

1. Page 2064, line 11. “the” is unnecessary.
2. Page 2064, lines 13-15. This sentence is awkward, and should be rewritten. Also, the author should clarify the nature of this conclusion, as this type of thinking is prevalent throughout the manuscript. No date on sediment loads or sedimentation rates is available; the basic data simply consists of aerial imagery. Conclusions regarding sediment loads such as this are inferences, and are not supported by direct observations. There is nothing wrong with making these inferences, but it should be clearly noted that the data do not directly demonstrate this. “I found”, as written here, is a mis-statement of the nature of the data. “The data suggests “ is a clearer way to present this (other options also might be considered). But please revise to remove “I found” here and elsewhere to clearly indicate to the reader that conclusions like these are indirect inferences, and are not supported by gaging or other direct measurements.
3. Page 2064, line 24. Please explain what RAMSAR is.
4. Page 2065, line 15. “depend”, not “dependent”.
5. Page 2065, line 19. “couple

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of” is rather informal, how about “few”? 6. Page 2068, line 7. “All the tributaries...”. Please provide a number. 7. Page 2068, lines 12-13. Please indicate how many rivers and the time periods for which high resolution data are available. This general statement is not very useful. Perhaps a table indicating the locations and years of data availability should be added. 8. Page 2070, line 22. “Alluvium”, rather than “alluvia”, is the more common term. I actually had to look the latter up, as I was not familiar with it. 9. Page 2072, lines 17-18. Since gaging station data are not available, what specifically is the evidence for the interpretation of “decreasing discharge down-flow”? Please present the observational evidence that supports this conclusion, and explain your interpretation, so the reader can understand who this inference is supported (or not supported) by data. 10. Page 2073, lines 17-18. “sharp drop in river discharge...”. See comment 9. 11. Page 2073, lines 19-21. “seasonally perched”. Please explain this term – it is not commonly used in fluvial geomorphology, and its meaning will not be obvious to most readers. Also, make it clear that the infilling of the channel and its consequences is an interpretation not supported by observation here – it is really just inferred as a necessary step leading to crevassing and avulsion, but there is really no direct evidence that this is happening. 12. Page 2073, line 20. “upwards”? Does this really refer to “upstream”? Please clarify. 13. Page 2074, line 1. “from the point...”. Can this location be more clearly specified? Does this mean “downstream of” this “point”? 14. Page 2074, lines 24-25. Clause stating the annual TSS load is repeated below, and it is therefore not needed here. 15. Page 2075, lines 5-30. More this highly interpretive material to the discussion. It is inappropriate for the results section, which should be limited to presentation of data. 16. Page 2076, lines 1-6. Is the “water table” the correct term here? Should the reference be to the water depth? I don’t understand this at all. Please clarify, and also move this rather speculative text to the Discussion, where it really belongs. 17. Page 2076, line 22. “water table...”. See comment #16. 18. Page 2076, line 23. “hydraulic head”. Please explain in greater detail. Where is the “head” high, and where is it low, and what then is the direction of the driving force? How is hydraulic head defined here? Is this term used as it is

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typically defined in hydrogeology (water surface elevation in a well in an aquifer?), or is the term used in a context borrowed from hydraulics (water surface elevation of a free surface + velocity head, etc.). The reader needs a better explanation of this to understand the idea that the author is trying to convey. 19. Page 2077, lines 6-7. “play a dominant role...”. This is an overstatement. No comparative data for large rivers are provided. Please explain more clearly, and/or express more carefully. 20. Page 2077, lines 10-13. “Most of the sediments...”. No direct evidence for sediment loads etc. are provided, so this is inferred. Please explain the nature of the evidence for this, and present as the inference that it is (unsupported by direct observation). I don’t argue with the conclusion, but please don’t confuse the reader by claiming that your DATA demonstrate this. It is INFERRED from other data. 21. Page 2077, line 19. Is the figure given the annual average discharge? Please specify. 22. Page 2077, line 29, page 2078, line 1. “annual to decadal” is better. 23. Page 2077, line 2. “siltation”. What does this term mean here? Is the sediment silt? No grain size data are given in this paper? Does the author mean to refer to “bed aggradation”? Please clarify the meaning of this, and explain the evidence for it (if the author is referring to bed aggradation, it must be inferred as a necessary precursor to crevassing and avulsion, but there is no direct evidence available to suggest that it is occurring). 24. Page 2078, line 3. “perched river bed”. See previous comment about this term. 25. Page 2079, line 12. “WILL change their courses...”. 26. Page 2079, line 25. “works” is unnecessary. 27. Page 2080, lines 25-26. Delete “it is advisable that”, replace “is” with “should be”. 28. Table 2. Please give the units of Mr. 29. Figure 6. I don’t understand the term “annexed” in the caption, or where this channel is on the figure. Please clarify. Perhaps the channel “annexed in 2000” can be specifically labeled as such in the figure, and the “crevasse initiated in 2002” can also be specifically labeled. 30. Figure 7, caption. “new course lasted only until...”. I don’t understand this. Is the large channel to the right in “d” temporary? Can this be explained and labeled more clearly? 31. Where is the location illustrated in Figure 8? Please specify by including a “box” on another figure that illustrates this area in a larger context. 32. Figure 9. The labels “a”, “b”,

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and “c”, and some of the avulsion years are not clear. Put these in white boxes or something to improve readability?

Interactive comment on Earth Syst. Dynam. Discuss., 6, 2063, 2015.

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