

## ***Interactive comment on “River logjams cause frequent large-scale forest die-off events in Southwestern Amazonia” by Umberto Lombardo***

**S. Dixon**

s.j.dixon@bham.ac.uk

Received and published: 31 March 2017

Having read through the paper I wouldn't hesitate to recommend it is published, pending a few amendments. It is a much neglected area of large wood/logjam impacts/dynamics in tropical rivers and would be a hugely important contribution to the literature and of great interest to the readers of ESD. I have identified 3 areas where I suggest some additional attention could improve the manuscript. 1. Literature – there are a few papers which I think could improve the discussion around the mechanics of river meandering, forest growth and logjam formation, I have highlighted these below 2. Methods – I think these are a little light and could use some more detailed description of exactly what was done. I think at the end of the introduction a specific statement of the aims of the paper could help this as well, as then it may be more obvious how the more generally stated methods fit into the objectives. 3. The figures

C1

are well drawn, but there are a couple of minor details that I suggest could enhance them (flow direction arrows, coordinates and colour ramps).

Specific suggestions: Abstract line 15 (and elsewhere in discussion). I'm not sure about the terminology of logjams “migrating” upstream. I think what the author is referring to is that the formation of logjams “propagate” upstream, i.e. that logjams form in the downstream sections and that over time they are identified further and further upstream. Descriptions need to be refined here, as I was not 100% sure if this was referring to “propagation”, or to individual logjams moving upstream (migrating) or to a single logjam growing larger and larger and effectively turning into a huge log raft whose extent effectively migrates upstream through growth of its upstream edge. Line 25 – I felt that: Collins BD, Montgomery DR, Fetherston KL, Abbe TB. 2012. The floodplain large-wood cycle hypothesis: A mechanism for the physical and biotic structuring of temperate forested alluvial valleys in the North Pacific coastal ecoregion. *Geomorphology*, 139-140: 460-470. DOI: 10.1016/j.geomorph.2011.11.011. Is missing from the discussion here. Certainly the information in this paper somewhat runs counter to parts of this hypothesis and so it is really important to address this. And highlights how tropical forests may be very different. Paragraph ending line 36 – I think it would be good here to really spell out that therefore logjam mediated flood disturbances are really important in this context. (It's only really inferred at the moment). Line 68 – I recommend ending the intro with a specific statement of aims. Line 70 – methods. As stated above I think this needs a bit more info. Specifically it is not stated what the fieldwork was for or what it was trying to do (I guess some element of ground truthing to remote sensing?) I also think more specifics are needed for the analysis of remote sensed data to make it clear it was systematic. I think there were two parts 1) identification in GEE, 2) detailed analysis. There isn't anything about how landsat was processed etc, which composite bands were used (if any), what programs (ARC?). I couldn't see anywhere how logjams were identified? Is this just from the presence of the flood event aftermath in the images? This needs to be stated. Also given the results of distance for logjams, more info about exactly how this was measured – assume

C2

in ARC using route events? Or was it a straight line distance? Given avulsions was a base line year use for measurement along the river, or was a new distance calculated along the river for each year? Not sure about how this was measured. One key thing I think is missing is the timing of the images, it is implied that there is continuous coverage from 1987-2016, but knowing Landsat this seems unlikely! I think specifically identifying gaps in annual coverage for each river is important, perhaps this could be a table in supplemental info? Line 89 – I think this first line could be reworded. Something like “The spatial characteristics of forest die off triggered by logjam-induced floods are shown in Figure 2.” Line 91 – Not sure about use of “total collapse” of the river. I think this is referring to an avulsion? Line 95-105 – a lot of this paragraph feels more like a site settings part of a methods section? Maybe consider moving it to methods and making it part of an explicit site section? Line 116 – I wasn’t sure about the use of the word “killed”, as it implies a direct effect, rather than just causality. I’m not sure we can say the flood “killed” the forests, as opposed to the effects of the flood led to the death of (specific species?) within the forest. Maybe reword. Line 117 – I think a bit more info about the characteristic V-shape would help. It can be inferred at the moment, but better to spell it out to avoid potential confusion – I.E. where the point of the V is, etc? Line 138 – An example of the migrating terminology I’m not sure about. Also maybe worth looking at our 2014 paper – at the end we make some interesting observations about how logjams can retain position and ostensibly the same architecture, but in fact are exchanging individual logs – i.e. even in apparently stable jams the logs are changing. Given this it seems unlikely individual jams are migrating, strictly speaking. Dixon SJ, Sear DA. 2014. The influence of geomorphology on large wood dynamics in a low-gradient headwater stream. *Water Resources Research*, 50: 9194-9210. DOI: 10.1002/2014wr015947. Line 152 – The pre-columbian info seems to come out of nowhere here! It is not immediately obvious what the relevance is at this point - but once I’ve read the whole thing the importance/relevance comes out, but here it seems out of place. I suggest perhaps signposting it earlier in the intro/methods/aims section. Or alternatively remove from the results and just introduce as an incidental

C3

observation in the discussion where you introduce the main point/implications of these observations. I don’t think it has to be in results strictly speaking. Line 181 – I think the discussion of river morphodynamics could be given a bit more general context by reference to general geomorph literature. The following springs to mind Constantine JA, Dunne T, Ahmed J, Legleiter C, Lazarus ED. 2014. Sediment supply as a driver of river meandering and floodplain evolution in the Amazon Basin. *Nature Geoscience*, 7: 899-903. But think there is a fair bit out there to provide a bit more context/reference support to the geomorph context. Could potentially introduce these themes in the intro as well? I don’t think it needs a lot, but a bit of context would enhance it. FIGURES A lot of my comments on the figures are suggesting improvements, rather than something I might strictly insist on if I were a reviewer/editor, so take in that context Figure 1 – This really needs an elevation scale bar, especially given that a different scale is used for the topography in the two panels. Could also use a map georeferenced/coordinates, either on the edge of the panels, or a spot reference. Figure 2 – On the inset panels, I know they are all flowing in the same broad direction, but flow direction arrows on the rivers would improve instant clarity. Figure 3 – again, flow direction arrow might help Figure 4 – I’m not sure about the colour ramp here! Seems a bit vivid! It’s also not quite clear what is going on with the rivers in these images, as the rivers seem discontinuous in places? They appear to be headwaters, but I’m not sure this is actually the case? Figure 5 – The meaning of the arrows is not immediately clear. Some of the arrows are short and some long, (and some angled) does this refer to the length of the avulsion relative to the X-axis? If so I’d explicitly state this and also make sure that the arrows are neutral in the Y-axis, as at the moment some are angled and it is not clear if this therefore refers to multi-year avulsions. Figure 6 – flow direction arrows would be useful here, as would coordinates. In panel F it is hard to see how the individual points for the logjams correspond to the area(s) Figure 7 – flow direction here I think would be mandatory, as it is not clear. I would recommend changing the red text to yellow to make it more colour blind/black & white friendly. It’s pretty hard to read at the moment even with colour vision! I’m not sure about the colour ramp used for the inset meander

C4

history, at the moment the colours don't have any meaning as the colour ramp doesn't have a clear evolution. So I can look at it and see there has been lots of change, but I can't easily see if there are temporal patterns. Not sure if that is an objective of the figure, so if purpose is just to show its changed a lot then it's probably OK as is, but if it needs to show change at particularly times, or evolution of change then a graduated colour ramp (dark red to yellow for example) would be needed to show this. Figure 8 again flow direction and coordinates would help. Figure 9 – hard to see the river flow arrow, maybe move it over the vegetation area and make it yellow or white?

---

Interactive comment on Earth Syst. Dynam. Discuss., doi:10.5194/esd-2017-19, 2017.