

# ***Interactive comment on “An index concentration method for suspended load monitoring in large rivers of the Amazonian foreland” by William Santini et al.***

## **Anonymous Referee #1**

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### **\*General comments\***

This manuscript by Santini et al. reports a novel method to link suspended sediment concentration averaged over a whole river channel depth (which is necessary for accurate sediment flux computation), to those (“index”) that could be measured at a single point - most commonly at the surface. This is an especially relevant issue for accurately estimating sediment fluxes in larger rivers - which usually display strong vertical gradients in suspended sediment concentration - especially in remote locations where sediment sampling throughout the whole cross-section is not always possible. The manuscript provides a method for a semi-empirical calibration (i.e. the estimate of the

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depth-integrated sediment concentration relies on fits of hydraulic-based laws to observed concentrations, while the relationship between depth-averaged and index concentration is empirical) of such relationships, which is shown to be location-dependent, and potentially variable with time across the hydrological year (based on a network of gauging stations located on the largest Amazon tributaries in Peru).

The manuscript is well-written, properly organised, and clearly of great interest to those interested in sedimentary dynamics in large systems or in estimating river suspended sediment fluxes, be it for basic research or for operational reasons. I just think that some readers might be lost - as I was - at some places in the current manuscript, and that it would benefit from further clarification. Comments in this direction are appended below.

\*Specific comments\*

- p. 3 - l. 4: “thalweg” or simply “bottom”?
- p. 9 - l. 9: Is it “Hypothesis” or “Assumptions”?
- p. 11 - l. 24: “regression slope” should be defined or specified, or better at least better linked to what is said elsewhere (I think it is “alpha”?).
- p. 11 - l. 25: What is meant by “measured alpha”?
- p. 12 - l. 2: Is there a reference for this statement about the delivery of “coarser elements” by the lowland tributaries?
- p. 12 - l. 5: Isn’t BOR right at the Andean outlet, and therefore not influenced by lowland inputs?
- p. 12 - l. 7: This is not what I see in Fig. 3... Aren’t the axes swapped? And is the color-coding right? The figure and the text sound contradictory, but I might be wrong.
- p. 12 - l. 14: “increases” with what? Downstream?

- p. 12 - l. 28 to - p. 10 - l. 21: That is already a whole lot of interpretation, not only results.
- p. 12 - l. 27: “mixed-load” should be defined.
- p. 12 - l. 28: “random factor” is not clear? Is it meant that this feature appears sort of stochastically?
- p. 12 - l. 29-30: Is this link clearly established, actually?
- p. 13 - l. 25-26: Which “result” exactly are we talking about here? The P-values themselves or their low variability. or the fact that they were averaged per site?
- p. 14 - l. 22: Which “zone”?
- p. 16 - l. 29: Where are the numerical values in the equation from?
- p. 19 - l. 9: Where does this relationship between “<u>” and “h” come from?
- Figure 2: It took me a while to understand what the blue and purple lines are in the upper-left panel - it would be better to clearly indicate what they are within the panel.
- What the x-axis represents is a bit mysterious, as I did not see any explanation in the text. I guess this is because this is a non-dimensional number that is expected to be the same at all locations and in all hydrological conditions?
- Figure 7, caption: What is meant by “observed” and “measured” values here?
- Figure 10: What about the other stations than those shown in panel (b), why aren't they represented? And it would make more sense to me to plot simply “predicted” vs. “measured” (i.e. without the 1.1-factor) and then to plot the 1:1, and/or 1.1:1 line - at least because in this case the caption is wrong, strictly speaking.

\*Technical corrections\*

- p. 12 - l. 21 (also p. 15 - l. 3): “valid” -> “validate”.

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- p. 14 - l. 17: “is” -> “are”.
- p. 17 - l. 5: “in” -> “at”.
- p. 20 - l. 5: Something is missing between “can” and “more”.
- p. 20 - l. 7: “the ratio of” -> “the ratio between”?
- p. 20 - l. 11: “ad” -> “and”.
- Figure 2, caption: “staked” -> “stacked”.

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Interactive comment on Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2018-93>, 2019.

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