

***Interactive comment on* “Modeling the effects of sediment concentration on the propagation of flash floods in an Andean watershed” by M. T. Contreras and C. Escauriaza**

Anonymous Referee #1

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This review is of “Modeling the effects of sediment concentration on the propagation of flash floods in and Andean watershed” by Contreras and Escauriaza. Overall I recommend its publication after minor revisions to clarify a few things and answer some questions.

Abstract: I think it undersells the results, in particular the effects that flash flood sediment concentrations do have. When I read the abstract before reading the rest of the manuscript, my take-home understanding was that the authors found that sediment concentration doesn't really matter (lines 13-15). Sell the results better! An abstract should basically be advertising to get people to read the rest of the paper. The find-

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ings of how sediment concentration influence flow depth and the extent of flooding are pretty different from this. Emphasizing how sediment concentration DOES change flooding will get more people to read the manuscript, and is totally legitimate based on the results. Also, I think there should be more results in the abstract; if length is an issue, then shorten other parts of the abstract. For example, the introductory material in lines 1-6 is fine, but could be shortened to 1-2 lines if needed. Right now, really the only results are lines 12-15. Finally, I think add more numbers to the abstract, such as percent changes in flood depth or flood extent resulting from changes in sediment concentration.

Pg3 line 24 to pg4 line 4: shorten this; it feels repetitive. Its basically two outlines/roadmaps of the paper back to back.

I confess that I did not check the equations in great detail for errors; apologies.

Pg 5 line 23: suggest changing to “. . .we do not consider erosion or deposition of the bed.”

Pg 5 line 6: Unclear to me—Is the model validation what you show in Appendix A, or is it previous work that needs to be cited, like Guerra et al. 2014? I think the answer is Appendix A; I suggest rewording a bit to make it clear that you present the validation in Appendix A.

Pg 5 line 11: here and elsewhere, suggest cutting “for details” from citations. Its not needed.

Pg 7 line 26: this is my ignorance, but I don't know the difference between turbulent and dispersive stresses. It would be helpful to readers like me to work in a 1 or 2 sentence explanation. I see that you address this a bit on the next page (and cite Julien and Paris 2010), but I still suggest a little more.

Pg 8 line 20: suggest changing “sediment concentrations” to “volume sediment concentrations”

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Figure 1: I suggest somehow indicating which channel here is the mainstem and which is the Quillayes tributary. I can guess or probably figure it out from figure 3, but would be helpful to have more obvious on this figure. Also, in the caption its unclear to me which black line you're talking about—looks to me like there's a thin black line around the gridded part, and a thicker black line around the entire watershed.

Figure 2: while I believe the figure shows a confluence, I can't actually figure out where another stream comes in. Maybe annotate on the photo where the other channel is? Or use a different picture showing it more clearly? I do like the action shows with at least one of the authors for scale.

Figure 4: suggest changing y axis to Discharge rather than Flow

Pg 11 line 8-9: If CFL was defined earlier I missed it; make sure to define it.

Table 4.1: Some percentages are given in the text, but I suggest just adding columns of "% change from clear water" or similar to the table. I'm surprised at how much difference sed conc makes and think that showing percentages (and editing the abstract) would emphasize this more.

Pg 12 line 10: I'm hesitant to say its an exponential decrease unless there's a plot or other curve fitting showing that an exponential really does work well. Not everything that changes magnitude with time follows exponential decay.

Pg 13 line 3 (at least as the line #s show up on my pdf; its actually farther down the page): I disagree that figure 6 shows "similar dynamics" to figure 5. I'm confused by this. Figure 6 is practically inverted from Figure 5. In figure 6, the clear water case propagates slowest, 60% propagates fastest (if I'm not confused), which is opposite. There's a bit of possible explanation at the bottom of the page (it has something to do with different arrival times of flood waves on tributaries?), but I don't really understand. I think change "similar dynamics" and explain more what causes the differences between these figures.

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Pg 15 line 16 (I think line #s are messed up on the version I'm reading; it's a couple lines above figure 8): change "around of 7 h" to "around 7 h"

Pg 15 line 25: change "maximum increments of flow depth" to "maximum flow depth"? I may be misinterpreting, but I don't think you're talking about 3 m depth increments, I think you're talking about total flood depths at a given location of ~3m.

Figure 10 and 11: Change Q_U to $Q_{i,U}$, as is used elsewhere in manuscript.

Pg 20 line 26: change sensibility to sensitivity?

Pg 21 line 20: change extension to extent.

Figure B1 caption: change "used to the quiescent. . ." to "used for the quiescent. . ."

Figure B3: Unclear to me where the dam is located. I suggest adding more explanation to the caption, to explain that the "dams" are between ρ_1 and ρ_2 ? Also suggest in the caption saying that h is the flume width; I was confused a bit about h vs w .

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2019-168>, 2019.

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