Response to Referee #1

We wish to thank the Reviewer for his/her thorough review of our manuscript and for the useful comments that helped us improve the quality of the paper. The specific issues raised by this Referee are addressed in detail below:

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 findings 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.

Response:

Thank you for your kind assessment of our work. We have modified the abstract by reducing the introduction, clarifying the objective of our research, and summarizing all the main results of our work. We incorporated both, more numerical results, and their meaning in the context of understanding the interaction of geomorphic features and the effect of the 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.

Response:

We simplified this paragraph by briefly describing the content of each section of the manuscript.

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

Response:

We have incorporated the sediment deposition on this statement.

Pg 5 line 6: Unclear to me if it 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.
Response:

Appendix A details the derivation of the equations for the numerical scheme used in our model. We have modified the text to explain the content of the validation in Appendix A.

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

We have deleted them.

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.
Response:

We would like to sincerely thank the Reviewer for this comment, since we agree this will make the manuscript more understandable to a wider range of readers.
Turbulent stresses, as its name indicates, are the momentum losses produced by the irregular velocity fluctuations and vorticity that mix the flow and mobilize sediment particles. This is the component mainly associated with the characteristics of the flow that are often described by the Reynolds number.
On the other hand, dispersive stresses are the momentum losses due to collisions of sediment particles. While they both are related, at highly turbulent flows and low sediment concentrations, many particles would remain in suspension, but the dispersive effects would not be significant, since they require large concentrations or large particles that would collide continuously with each other due to the turbulent fluctuations.
Since the references we cite in the manuscript have a clear explanation of each case, we did not include additional ones. However, we have added an explanation in the text to describe the differences.

Pg 8 line 20: suggest changing "sediment concentrations" to "volume sediment concentrations"
Response:

We have made this change and now we specify that we mean by volume sediment concentration.

Figure 1: I suggest somehow indicating which channel here is the mainsteam 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 it's unclear to me which

black line you're talking about. It looks to me like there's a thin black line around the gridded part, and a thicker black line around the entire watershed.
Response:

We changed the color of the line showing Los Quillayes as turquoise, to distinguish the blue line representing the Quebrada de Ramon. We have added a comment in the caption of the Figure. We have also modified the figure by deleting the black line around the entire watershed and thickening the line surrounding the Lidar covered area.

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.
Response:
We have modified the picture by including two arrows representing the directions of the tributaries.

Figure 4: suggest changing y axis to Discharge rather than Flow
Response:
We have modified the figure according to this suggestion.

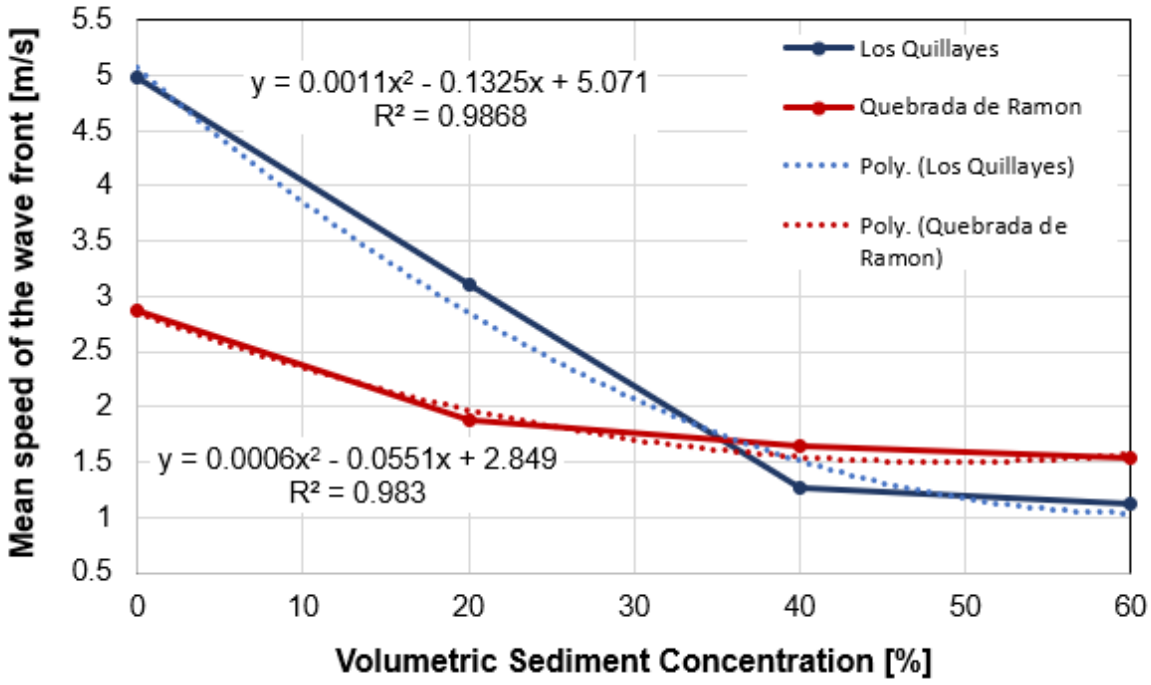
Pg 11 line 8-9: If CFL was defined earlier I missed it; make sure to define it.
Response:

We have incorporated the definition of the CFL and the value employed in the simulations

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.
Response:
We have incorporated this values for both streams in Table 1.

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.
Response:

We sincerely thank the Reviewer for this comment, since our original sentence was not scientifically rigorous. After plotting the variation of the mean velocity of the wave speed against the sediment concentration, we observe that a quadratic function fits better for both rivers. We have corrected the sentence in the manuscript including the R2 of the fitting curve.



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.

Response:

We have modified the two paragraphs that describe Figure 6. We have explained that we observe the effects of sediment concentrations and topography in both, upstream and downstream the confluence. We also describe that there is a third factor affecting the dynamics of the flood downstream of the confluence, which is the difference on the arrival times of the flows coming from the two streams.

Since the differences of sediment concentration change the flow velocity upstream from the confluence in different proportions for both streams, we observe that flows with 60% of sediment concentration arrive at the confluence with a difference of only one hour. However, this difference increases up to three hours for clear water conditions. As a consequence, the main channel is flooded due to the volume coming from both, QR and Qui, when the sediment concentration is 60%. For clear water, however, there is a long section of the river that is initially flooded with water coming only from QR. After the flow advances 4 km downstream from the confluence, it is reached by the flow coming from Qui, increasing the total flow velocity as shown in Figure 6.

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"
Response:

Corrected.

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.
Response:

Your assumption is correct, and we apologize for this mistake. We have corrected this error on the new version of the manuscript.

Figure 10 and 11: Change Q_U to Qui_U, as is used elsewhere in manuscript.
Response:

We updated Figure 7, 8, 10, and 11 to keep a consistent notation.

Pg 20 line 26: change sensibility to sensitivity?
Response:

Corrected.

Pg 21 line 20: change extension to extent.
Response:

Corrected.

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

Corrected.

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 rho1 and rho2? Also suggest in the caption saying that h is the flume width; I was confused a bit about h vs w.
Response:

We have incorporated an explanation of the numerical experiment, and the meaning of h and W as well.