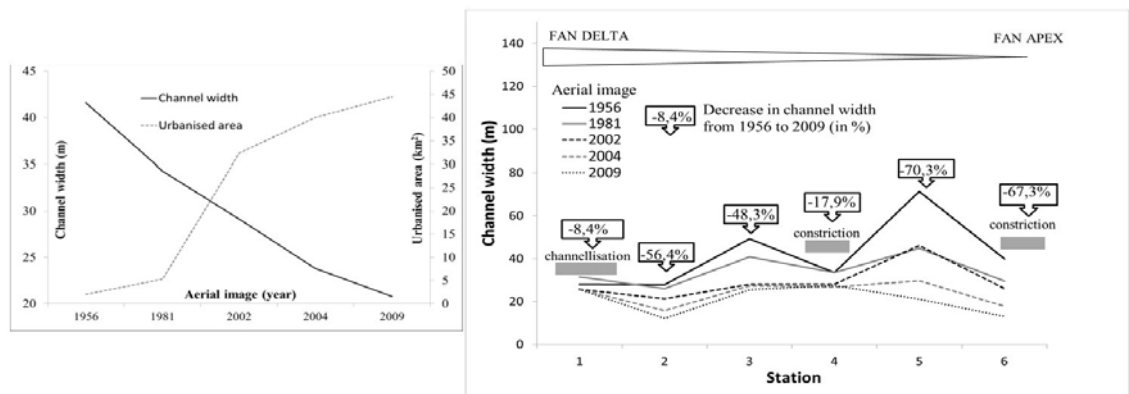


## Comments to Reviewer #1:

The topic of the paper (i.e. hazard in ephemeral streams) is of great interest and the comparison between two different streams is very helpful to better understand channel processes and making prediction on future channel dynamics. That said, I have several concerns about this work. My main points of concern are: (1) The overall quality of presentation is quite low; several parts are hard to follow and some parts could be more concise; (2) Overall the work is very descriptive, while several aspects could be presented and discussed by a quantitative approach. (3) What is the novelty of this work? I think that to conclude that “: : natural channels are much more adapted for floods than human modified sections: :” (page 23) is not new. The authors should be stressed more clearly the novelty of their work.

- 1) *The overall quality of the presentation has been improved by means of corrections of suggested changes and a qualified English grammar and style review made by an official translator. We expect new changes and additions will give better idea about our main goals in the manuscript.*
- 2) *About the quantitative approach. We improve the manuscript reworking former data ans also we include a new one. For example, the new figure about human-induced changes in Azohía’s channel:*



- 3) *We highlight here the main deductions derived from this paper and its novelty: Two case studies show how catchments load supply changes will dramatically alter flood dynamic and morphology on Mediterranean streams*
  - a. *Post – high magnitude flood analyses demonstrates that the load increase diminishes depth and sinuosity, reshaping a meandering pattern in a wider braided- trend system. Increased stream power induces outstanding erosion and depositional effects on the valley floor inducing hazards amplification.*
  - b. *Decreased load supply due to crops abandonment induces incipient channel incision on an alluvial fan. The increase in modeled channel parameters provide an indicator of system unsteadiness, which may be destabilized in case of a flood event, triggering dramatic effects on the alluvial fan.*
  - c. *Flood-prone areas maps based in hydraulic modeling shall take in consideration not only anomalous floodplain morphological features, but also load supply variability as well as incipient channel instability features, that might drive a dramatic system response under a large flood event*

English needs a significant improvement.

*As we said, English will be change in the new manuscript. An official translator is correcting accordingly to reviewers suggestions. NOTE: The translator review is still underway, due to lack of time. It might be that our present answers are not yet in perfect English, but this will be corrected at the final manuscript.*

#### SPECIFIC COMMENTS

Several specific comments were reported on the .pdf file.

Abstract. It should be more to the point. A better explanation of case studies, methods, and results is needed.

*This has been done, we enclose the new abstract*

*Ephemeral streams induce flash-flood events, which cause dramatic morphological changes and impacts on population, mainly due to their intermittent and less predictable activity. Human pressure on the basin modify load and discharge relationships inducing dormant instability on the fluvial system that will manifest abruptly during flood events. Flash-flood response of two ephemeral streams affected by load supply modification due to land use changes is discussed combining both geomorphic and hydraulic approaches. During the Rivillas flash flood, intensive clearing on the basin lead to high rates of sediment flowing into an artificially straightened and inefficient channel. The stream evolved from a sinuous single channel to a shallow braiding trend occupying the entire valley floor width. Misfit and unsteady channel conditions increased velocity, stream power and sediment entrainment capacity and magnified flood damages severely. Resulting morpho-sedimentary features offered a good relationship with valley floor post-flood hydraulic model. Prior to flood- event awareness would have allowed prediction of risk sensitive areas. In the second studied Azohia stream, modeling of current pre-flood channel conditions allows us to determine channel narrowing and entrenchment in the lower alluvial fan stretch. Intensive agriculture abandonment, basin reforestation and urbanization diminish load contribution and trigger channel incision. This fact induces an increase in slope and velocity at the channel, which renews energy for erosion activating backward incision and bank undermining. The absence of water spreading dynamics on the alluvial fan in favor of single channel confinement introduces an unsteady dynamics in the system, also offering a false stability feeling meanwhile a large magnitude flood does not occur. When analyzing flood-prone areas from hydraulic models, it is important to detect possible anthropic disturbance that may affect basin load budget in order to anticipate catastrophic consequences resulting from inappropriate fluvial management, before the occurrence of an extraordinary event.*

Page 14. The title of this section (4.2) could be “River response to flood events”. The present title is very similar to that of section 4.1.

*This has been done:*

*4.2 After impacts: river response to flood events*

#### 4.2.1 Post-flood analysis on the Rivillas River

Page 15-16. This part is a crucial one since it describes results in the Rivillas River. Description of erosion and sedimentation should be more accurate. I think that Figure 9 and Table 1 are not sufficient in such description. My main concern is that quantifying erosion and sedimentation in terms of area may imply significant limitation in understanding of channel processes. From such data (e.g. Table 1) it is not possible to assess if a specific reach underwent erosion or sedimentation: is it possible to make some estimates of volumes? Besides, it should be important to have more specific information about erosion and sedimentation: for instance, did erosion occur with similar or different intensity on the banks and on channel bed?

We agree that areal quantification might introduce inaccuracy, but a volumetric estimation in such a large area and diversified features is difficult to undertake. Our approach offers an idea of how the system reacts in response to load excess and how this burden is distributed along the long profile. As we explain in the new corrected manuscript a decrease in deposition areas downstream together with the significant anthropic effect could be deduced. Along the stream several constrictions also favor erosion that is followed by increased deposition. In respect to the last question as we have comment the former channel the former channel was obliterated and inefficient during the flood (with 12 m<sup>3</sup>/s capacity and during the flood, peak discharge varies from 300 to 800 m<sup>3</sup>/s depending of the reach) , and valley floor acted as floodway, either eroding or depositing.

Figure 1. Meaning of “s” and “v” needs to be explained in the figure caption.

*The figure 1 text (s= sinuosity and V= vegetation cover, has been removed. This is not relevant for a conceptual model*

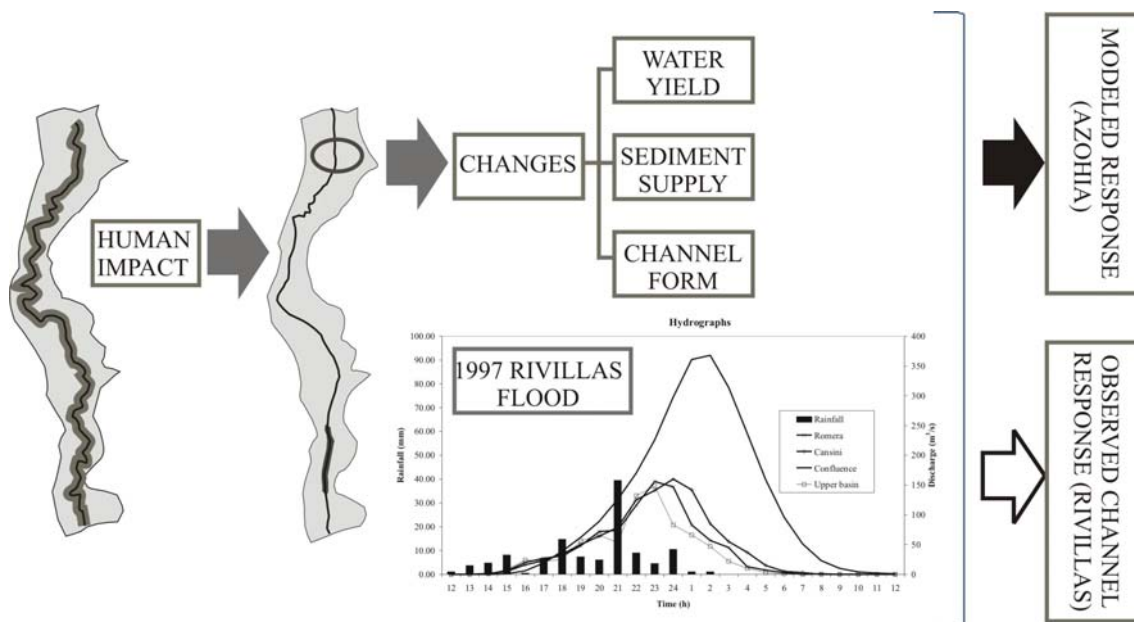


Figure 10. “Water flow disturbance” sounds as a strange term; could you find another term for this?

*We agree with the reviewer this term is confusing. We removed it and substitute with: “Local changes in water flow level”*

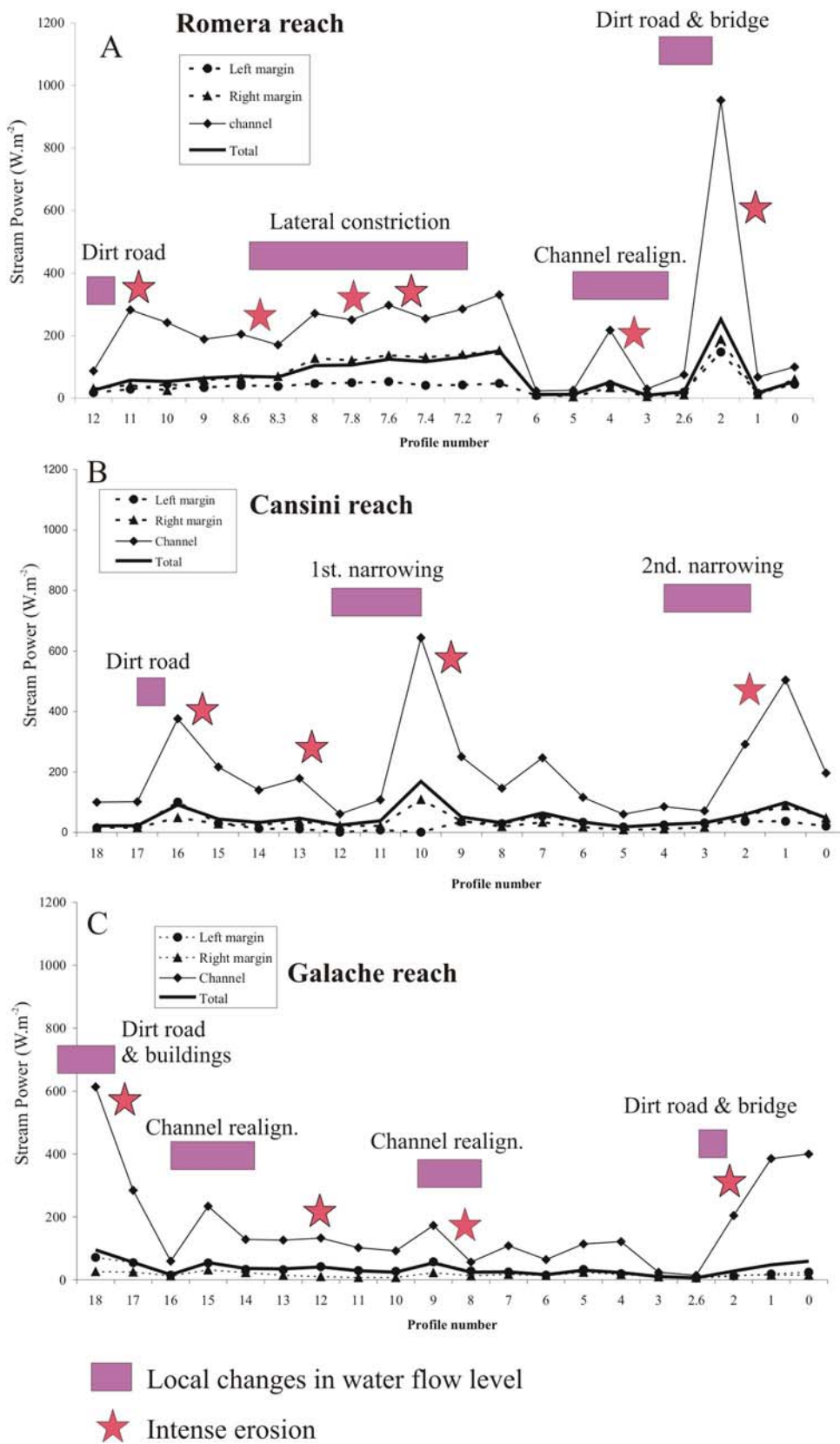


Figure 10. It should be explained the meaning of the different estimate of stream power (i.e. left margin, right margin, etc.).

*We obtain values of stream power from the model HEC-ras, which provides this information separately in channel, left and right margin. We think this information should be important to understand where the energy is located during a flood event.*

*We rephrased the sentence in the new manuscript as here we present: "Figure 10 shows the stream power separately in channel, left and right margin. This can point out where energy is concentrated during a flood. In the same figure the areas where erosion has been intense and major anthropic modifications capable of generating changes in river behavior during the flood are shown ..."*

Figure 10. Parameter used on "Y" axis should be "unit stream power"; in (a) and (c) should be "Wm-2 " instead of "Nm-2".

*This has been done (see figure above).*

Please also note the supplement to this comment:

ABOUT SUPPLEMENT. *We added or deleted all the references not cited in text or not included in references list.*

P3. L25: This phrase is very long and not so clear

*The sentence is rephrased as follows:*

*There are a variety of causes inducing changes in relation to the event nature, like storm size (Merrit and Wohl, 2003) or type of hydrological regime controlling peak flow, sediment transport and channel width (Osterkamp, 1980). There are many others, however, that might be more or less controlled by human activity such as presence or absence of riparian vegetation in channel (Tooth, 2000), effects of vegetation type and its special location (Sandercock and Hooke, 2010, 2011) and bedload, gradient, and channel geometries that lead to highly turbulent flow (Kochel, 1988).*

P4. L 13: discharge instead of water yield?

*This sentence has been eliminated*

P4. L28: I suggest: "...hydrology and hydraulics" instead of "...hydrological pattern"

*This sentence has been eliminated*

P5, L4: little information

*This has been done. Former text: "...we have littleinformation...", new one: " we have little information"*

P5, L21: This phrase is too vague.

*We have rephrased the sentence including more information as the reviewer 2 suggest to the same paragraph.*

*“...Some morphometric aspects like high elongation ratio, low drainage density or high ruggedness number in the Rivillas watershed suggest a predisposition to magnify the effects of storms increasing peak discharge and potential flash flooding character...”*

P5, L24: are

*Done: “The Azohia Rambla and alluvial fan are located...”*

P6, L14: delete a space

*Done: “At its mouth the Azohia has...”*

P8, L5: how these discahrged were measured/estimated?

*As we said in the previous sentence we obtain maximum discharge from paleostage indicators (PSI) and other water levels recorded after the 1997 flood. Modeled using Hec-ras. All of details about hydraulic calculations were published in Ortega and Garzón (2009) Geomorphology*

*We changed the former sentence as follows in order to clarify:*

*“...For both sites Hec-ras model (Hec, 1996) was used. It consist in a one-dimensional and step-backwater program which uses the Bernoulli equation to model selected discharges (1997 flood discharge in the Rivillas and different return period discharge scenarios in the Azohia Rambla) by means of surveyed channel topography. For the Rivilla’s river, the valley slope was used as a contour condition, on the assumption that it was the same as the energy line slope; and a subcritical flow type was considered. Energy losses were calculated from roughness using Chow’s tables (1959) for cultivated areas, which provided better results for the three studied reaches than the Cowan (1956) formula method. Contraction and expansion losses were estimated at 0.1 and 0.3 for sections with no geometrical changes and between 0.3 and 0.5 for sections with significant changes. There is no available gauging station to calibrate the final results, but flotsams were used as markers of the maximum flood level (Baker, 1977). For Azohía’s modeling we assume similar inputs and assumptions, except we obtain friction coefficient from Cowan’s equation due to the lack of cultivated areas. Hydraulic modeling has been shown to be useful to determine floodplain flow characteristics, distribution of flow velocities across the floodplain or to predict net floodplain deposition...”*

P9, L12: ...on the channel bed

*This has been done. “...This stress is similar to the force of friction on the channel bed acting in a flow per unit of longitude”*

P20, L9: this work is about French rivers!

*This is true. We rephrased the sentence accordingly:*

*“...This situation could be due to the overall trend presented in Mediterranean rivers by Garzon and Alonso (2002), Liebault and Piegay (2002), Uribelarrea et al. (2003) and Hooke (2006),*

P20, L23: This paragraph could be delete, it is almost identical to the previous one

Completely agree. We removed it

P23, L: This last phrase could be deleted (concepts already explained before)

We think this could be a good summary of the main points of our work.

A second reviewer also suggest for the same sentence: "The key points of the paper are summed up nicely in this last paragraph. The writing is very direct and clear. I would like to see more of this style used in other sections of the paper."

Figure 2:

All suggestions has been done (see figure)

Fig. 2. Map location of the two studied areas, (a) Rivillas watershed and geological map, (b) Azohia watershed and geological map.

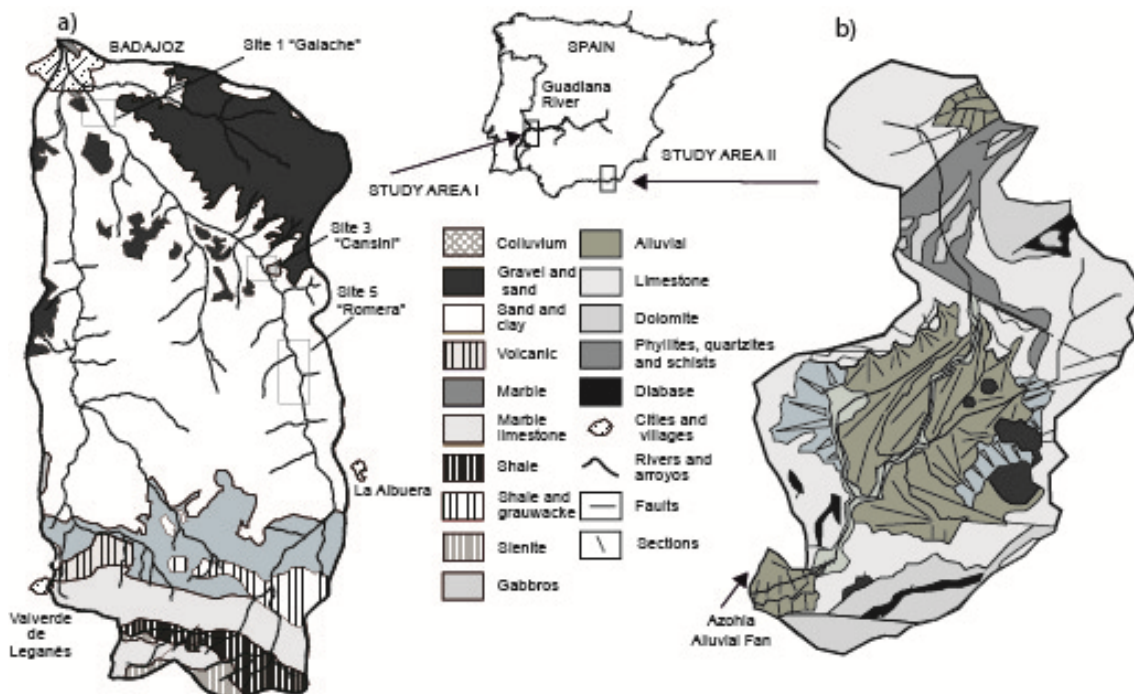


Figure 4:

Done:

Fig. 4. Situation of the studied reaches (stars) in Rivillas River: Galache (1), Acupark (2), Cansini (3), Romera (4) and Huerta Peña (5). Changes between 1956 and 1997 in channel sinuosity (v) and riparian vegetation (v) in three selected sites on the Rivillas watershed is shown.

Figure 5:

Done:

Fig. 5. Aerial photographs comparison in the Azohia alluvial fan between 1956, 1997 and 2004.