

Interactive comment on “Geo-hydrological hazard and urban development in the Mediterranean area: an example from Genoa City (Italy)” by F. Faccini et al.

Anonymous Referee #1

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General comments:

The paper presents a detailed analysis of the causes that may explain the high impact of intense Mediterranean rainfall events in the city of Genoa (Italy). The study presents a multi-disciplinary study addressing both the hazard (rainfall intensity) and vulnerability (evolution of urbanization and river courses other centuries) in the area. The topic is of interest for the readers of NHESS, but, the objectives and main results of the study are not explained deeply enough for the readers to really understand the interest of the study and also how this particular case study can be of broader interest for the scientific community. In addition, in its present state, the paper also presents several structural

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and weaknesses that should be addressed before possible publication.

First, the objectives of the study are not stated clearly enough. The authors say that they “examine the circumstances that led to an increased geo-hydrological risk in Genoa city and in its surroundings”. This statement is too vague: why are they doing this study? What are the hypotheses they want to examine, with which methodology?

In addition, the paper is not well structured. For instance in section 2 there are already some results discussed (Table 3). In section 3, the authors provide a review of previous work, but also apparently of their own work, which is not easy to distinguish from what has been done before. They also give the historical data sources they have used, but do not explain how those sources were used later and why. The purpose of section 4 is not very clear to me: it is quite descriptive providing details on some of the events and trying to compare them. But what the authors want to show is not explained. Why do they describe those events only and not all the events listed in the Table 1? I would suggest that the authors organize their paper (sections 2 to 5) in a more classical way, with a “materials and methods” section and a “results” section. The paper has two distinct parts, dealing with rainfall hazard and land use evolution. It could be interesting to cross the results of both parts to deepen the analysis.

Finally, I do not find that the conclusions are well supported by the results presented in the paper, in particular all the claims related to climate change impact and trends, which do not rely on solid statistical tests.

For all those reasons, I believe the paper should be restructured, the objectives clarified and the results strengthened before possible publication in NHESS. I therefore recommend major revision of the paper.

More detailed comments are provided below.

Specific comments:

1) P2452, lines 7-10: I don't believe that the increasing trend of high impact events

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is supported by the data presented in the paper. For such a claim, long time series should be analyzed and statistical tests should be used to assess if those trends are statistically significant or not.

2) P2452, line 24: how do you define an unacceptable risk? The definition is subjective and depends on the people's point of view that may change from one individual to the other.

3) P2453, lines 27-28: why are you interested in this question? For which purpose will your results be used? Urban planning? Flood prevention?

4) P2454, line 23: catchments more than 4 km² is somehow misleading. It gives the reader the feeling that catchments are very small in the area, whereas some are more than 150 km². I suggest adding the range of catchment sizes in this category in the presentation.

5) P2455, lines 1-9: here the authors give the names of the catchments, but it is difficult to locate them in the map: add the names in the map or use the letters you provide in Fig.1.

6) P2455, lines 15-17: these are already results, mixed with a general description of the study area. This is not very clear.

7) P2456: this section could be better organized with subsections describing for instance i) previous studies in the area; 2) meteorological data used in the study and the methods used to analyze them; 3) historical sources and how they were used in the study.

8) P2457, lines 10-16: here you provide information about your own work, mixed with a review of previous works. With this respect, it would be useful to better highlight (also in the objectives and introduction) what is the added value of your study as compared to existing ones.

9) P2457, lines 23-29: you speak about negative or positive trends, but you should

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analyze these trends using statistical tests to know if those trends are statistically significant or not.

10) P2458: here you provide the different sources of historical information you have used, but you do not explain how you used this information. For instance, did you georeferenced the old maps and overlay with present maps? Did you only perform qualitative analysis? Etc..

11) P2460, section 4: please clarify the objectives of this section which is very descriptive

12) P2460, line 13-15: repetition with some elements already in the introduction

13) P2461, lines 13-15: this sentence is very subjective and not supported by the data presented in the paper

14) P2461, lines 22-28: you speak about trends but this is not supported by statistical tests, providing information about whether the results are significant or not.

15) P2462, lines 5: "Figure 5 shows the trends..". I believe "trends" is probably not the right word to use. "Figure 5 provides the hyetograph and hydrograph.." would be sufficient.

16) P2466, line 9. I don't understand the use of the word "consequently". There is no relationship between the two sentences.

17) P2467, lines 1-6, 6-14. The results discussed here do not really appear in the paper. This is the same for the sentences in lines 20-25.

18) P2468, lines 10-15. It could be interesting to provide somewhere in the papers figures about the estimated concentration times in the various catchments. Would it be possible to also estimate those values for past conditions, for instance taking into account that water pathways were larger?

19) Tables 1 and 2 are interesting but they are not really exploited in the paper.

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20) Figure 1: is somehow too small. In addition, some information about catchments names is missing (see comment 5)

21) Figure 3: Provide the units of the y-axis.

22) Figure 4 (bottom graph). Here you have a time series of about 50 years. So it would be possible to apply statistical tests for trend analysis (for instance Mann-Kendall test).

23) Figure 12: Are you sure that you manage to identify all the events that occurred in the past?

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