

Interactive comment on “The role of different factors related to social impact of heavy rain events: considerations about the intensity thresholds in densely populated areas” by L. Barbería et al.

L. Barbería et al.

lbarberia@meteo.cat

Received and published: 22 April 2014

First of all, we would like to thank the anonymous referee #2 for their comments which will improve the quality of the paper. The first questions are commented below:

1. I suggest to state how many events have been considered in this phase and to introduce a simple table in Section 2, containing all descriptive elements used in the discussion: date of the event, length of the event, coincidence with strong wind events (yes-no), number of requests, rain in 24 h, rain in 1 h, rain in half an hour, population

C460

density of the most affected sectors.

(Answer): It is true that it would be interesting to give more information in the events' revision section. Because of this, the number of events considered will be added. Thus, the first paragraph will be rewritten as it follows: 'Out of the 49 heavy rain events obtained from the MEDEX database for the period 2000-2002 in Catalonia, 11 of them presented an unexpected CI adjustment. Consequently, an analysis of these events has been carried out in order to determine which modifications should be applied to the index.'

In section 'Conclusions of the revision' information about the number of events affected by each adjustment will be added on page 8, line 19: 'After applying these adjustments, 7 events were modified by the improvement of the population factor, 27 events by the length of the event factor and 8 events by the strong wind factor.'

In figure 2 all the events are shown and their factors are represented by different colours (rain in 24 h, population, length of the event and coincidence with a strong wind event). The lack of hail information and hourly and sub-hourly data for all the measurement points prevents us from including them in this part of the study. Therefore we do not consider necessary to introduce a new table as its content would be redundant.

2. Pg. 7. Line 15: "The more elements at risk and the more valuable and susceptible that those elements are, the higher vulnerability to flooding". I think that the concept expressed by this sentence is reductive and should be enlarged. I think the paper deals with the whole of damage recorded during heavy rainfall events, not only by river flooding. (Answer): We agree that with this sentence readers may assume that we are only considering river flooding events. The aim of our study is the analysis of all rain events that have impact on society. Therefore, another damaging agent as urban flooding will be introduced to avoid a restrictive idea. Thus, the following sentence will be added: 'Moreover, heavy rain can cause urban flooding when the city sewage system does not have enough capacity to drain away the rain during events of very

C461

intense precipitation (Petrucchi and Pasqua, 2012).’ Also, the following reference will be included: Petrucci, O. and Pasqua, A. A.: Damaging events along roads during bad weather periods: a case study in Calabria (Italy), *Nat. Hazards Earth Syst. Sci.*, 12, 365-378, 2012

About the other suggested modifications, a brief answer to all the points is given below.

1. Abstract. Line 15: “A period without significant population changes has been selected for the study to minimize the effects linked to vulnerability and exposure” change as “... and exposure modifications”. (Answer): We will add it to make it clearer.
2. Introduction, line 2, maybe actors instead of sectors? (Answer): Maybe ‘actors’ is more suitable, so we will change it.
3. Pg. 3 row 25: this sentence is not clear “An index is a valuable tool to foresee approximately the effects that an event can have in which variables of different nature interact”. (Answer): In order to make it clearer, on page 3 row 25 this sentence will be changed: ‘Indices are indirect numerical surrogates of real phenomena (Fekete, 2009). In our case, the CI could be a valuable tool to foresee the social impact.’ Also, the following reference will be included: Fekete, A.: Validation of a social vulnerability index in context to river-floods in Germany, *Nat. Hazards Earth Syst. Sci.*, 9, 393-403, 2009
4. Pg. 5 line 12: “14th and 15th of July 2001 event” can be changed in: “the event which occurred on 14th and 15th of July 2001”. (Answer): We will change it.
5. Pg. 5 line 17: maximum rainfall was around 40 mm/24 h (Answer): We will change it in order to make it clearer.
6. Pg. 5 line 18: correct this “inhabitants km⁻²”. The same occur on pg. 8 line 2 (Answer): We agree that we have to change it. The abbreviation ‘inh km⁻²’ will be used in all cases.
7. Maybe the Authors should clearly state that on Pg. 6 line 4 (The studied cases also

C462

indicate that rainfall intensity cannot be ignored) they mean hourly or sub-hourly rain intensity. (Answer): We will add that rainfall intensity is calculated on the basis of 30-minutes rainfall data. The reason is that during the period 2000-2002, only 30-minute rainfall data were available for SMC automatic stations, accordingly to the warning levels defined in the SMC.

8. Tables 2, 3 and 6: I suggest to use a different format for the date of the events YYYY-MM-day/days (Answer): We agree that this format for the date of the events could be useful, especially if the events were ordered by date. However, in these tables the events are ordered by number of requests, and because of this we consider that this change is not necessary.

9. Table 3: avoid to repeat max rainfall for all columns (Answer): Thank you for your suggestion, but in this case, in order to avoid misunderstandings, we prefer to keep the term ‘max rainfall’ in all columns.

Interactive comment on *Nat. Hazards Earth Syst. Sci. Discuss.*, 2, 459, 2014.