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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Landslides, floods and sinkholes in a karst environment: the 1–6 September 2014 Gargano event, southern Italy" *by* Maria Elena Martinotti et al.

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General comments The paper is well constructed, and describes an exceptional rainfall event and the natural hazards it created. It analyses rainfall data accurately and relates this event to the hazards that occurred in the territory using the E-NEP algorithm. It fails however to validate this new evaluation method (as early warning system) because of a scarce knowledge on the timing of hazardous events. This paper thus does not really give a great advance in what we know about natural hazards caused by heavy rainfall. It simply describes an exceptional rain event in detail, gives some general information on the hazards this event caused, and then explains that these happened because of heavy rainfall and high intensity. Nothing really new. The method looks promising

(E-NEP) but would need to be validated on a more detailed database of well-know hazards of which the timing is known in detail.

Detailed comments 1. you overuse many terms, and parts of sentences. Why geo-hydrological hazards? I would simply use hydrogeological hazards. The word (geo-hydrological) is used too often throughout the manuscript (6 times in the introduction only!). Avoid repeating too much terms like this, or the list of hazards (landslides, flash floods, inundations and sinkholes).

2. There is not much geological information on the landslides or other hazards. Of course they cannot be explained all in detail, but a table should be included giving some information on each landslide, sinkhole, flood... material involved, type of landslide, thickness of soil, inclination, dimensions, exposition, altitude, soil cover... Landslide are caused by many factors, not only rain. You simplify also a lot. E.g. Soils are thin or absent... looking at Figure 6 I see a lot of soil!

3. Figure 5: I would show the clusters (A, B, ...) on this map, and also use smaller symbols for the registered events (now I count 30 circles for landslides, while there should be 46!). I also suggest to distinguish the types with different symbols or colors. If needed the three most densely packed areas might be increased in size (use insets and detailed maps if needed). What are the difference between soils slips and soil slides? Did all these events REALLY occur during the rainfall events (in this period) or are some older or occurred after the considered period. How much fieldwork has been done here? It almost looks as if most of the work has been done on a computer without really studying the hazards in the field. Did you mostly work on a database given by different authorities (like civil protection, fire corps, forestry department, mairs,...).

4. Self-citation: Parise is cited 8 out of 28, Guzzetti 4 etc. Some citation are probably not really needed (Cannon et al. 2003, De Graff et al, 2013)

5. It is strange to put different hazards together. Sinkholes, floods and landslides do not have a lot of genetic mechanisms in common. Of course they form more easily under

heavy rainfall, but that is their only important common point. I would have focussed on landslides, trying to have more detail on those...

Minor adjustments (I used line numbers) Page 1 15 hydrogeological hazards (I suggest changing this throughout the text) 17 a karst area in Apulia 19 and temporal information 24 (E-NEP) Page 2 6 delete "by landslides.... inundations" 11 characteristics ... delete "Landslides.... sinkholes" and write "natural hazards" instead 20 Apulia (delete Puglia (...)) 26 In the area sedimentary rocks crop out... Page 3 2 have been reported (instead of exist)... delete "including....sinkholes" 11 metres 13 Description of events 26 stations (instead of rain gauges) 30 dry periods lasting between Page 4 8 in this period 25 delete "landslides and sinkholes" 35 translate water height (5.30 m) in flow rate. Page 5 1 and 3 flow rate instead of water height 2 from (not form) 6 Cagnano-Carpino was a landslide fatality, the flood fatality was at Peschici (see line 25 on page 4). Make up your mind! 12 mostly shallow landslides 13 write 4 and 2 instead of four and two 22 delete "of landslides" Page 6 17 of cumulated 18 of rainfall ..... exceeded... Page 7 1-3 you use 3 times geo-hydrological! use hydrogeological (possibly) and delete sometimes (just use hazards) 6 Probablity (E-NEP) algorithm ... record (delete s) 10 and d the time... 18 delete "landslides..... hazards" 28 delete else (first word) and write otherwise Page 8 2 possible hazard occurrence ... was calculated (delete using the approach.... (2012) Page 9 6 The analysis ..... DNEPmax is of interest 22 rise following 27 (E-NEP) 32 I, on their own, were not.... Page 10 15 et al., 2007 30 delete 2003 (not needed) and De Graff et al., 2013 These are difficult-to-find papers. 32 delete "that lays.... E-NEP." Page 11 2 delete (Brunetti..... 2012) 7 driven hazards 10 these hazards 30 Apulia Page 12 10 (E-NEP) 11 sinkholes). insert space For... 20 events they are abundant 21 as for the Page 14 9 Szonyi Page 17 5 sea level Page 18 I would have placed the rainfall station in a more logical sequence (from N to S? Or from E to W). Now they are placed rather randomly. Page 21 2 1-6 Page 23 2 scheme Page 25 The symbols of landslide are placed in ace rain time interval rather precisely, although you stated that only 9 were known to have occurred at precise intervals. Is this just a graphical representation? Or do you ONLY mention the 9 known ones. Explain please.

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