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Discussions

Interactive comment on "Assessing changes on urban flood vulnerability through mapping land use from historical information" *by* M. Boudou et al.

Anonymous Referee #3

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GENERAL COMMENT :

The topic of Boudou et al.'s article is perfectly suited to the thematic issue of HESS entitled "Floods and their changes in historical times - a European perspective". It combines in an interesting way data from historical archives, an original cartographic analysis together with flood management issues in urban areas and research policy from different perspectives. I think, it can be published in this issue. However, several paragraphs require modifications, supplementary informations and important clarifications.

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Interactive Discussion
Discussion Paper

First, with regards to the poor English level of the paper, I agree with the first anonymous reviewer's comment. The full manuscript (text, figures and legends) should be proofread carefully and corrected for spelling, grammar, and content by a native English speaker because the standard of English does not reach the required scientific level of a journal like HESS. In some cases authors need to choose more appropriate expressions and to avoid invented words (see the following proposals for text and figures). You frequently use inappropriate terms in many of your sentences. Some expressions don't exist in English... or you use them in wrong place sometimes (awkward turns of phrase)! Authors should use more accurately the existing English vocabulary especially about hydrological and geomorphological questions. Punctuation should also be checked and adjusted. For now, the result is sloppy and quite unpleasant to read. And, from this point of view, it should be redone neatly. I agree with the other reviewer about the lack of a paragraph in which the authors analyze similar papers published worldwide. A brief panorama dealing about main floods for both cities throughout their respective histories is also lacking, it's the leading subject of this thematic issue of HESS... (between 4 and 5 lignes for each city). Such addendum seems needful in paragraphs 2.3 and 2.2. (quoting, for example, Champion (1858-1864) and Alexandre (1987) but also local existing bibliography referring to historical floods). About this aspect, authors have to complete their bibliography which is too sketchy.

Much more detailed explanations are needed about these rainfall events (January 1910 flood and March 1930 flood): intensity, duration, quantity, etc. The maximum flood peak discharges reached during these two events are also required (more the annual mean discharges and the 10/100/1000-year flood peak discharges, if available). Does it exist recent explanations about origin of these phenomena? How were they related to known specific critical meteorological mechanisms? For example, the St. Mary Magdalene's flood, the largest recorded flood in central Europe in July 1342, was attributed to the well-known Genoa Cyclogenesis, Ligurian Depression (or V(5)-track cyclone). Maybe, is this the case for these two unusual climate events? Have you considered the evolution/variation of the floor elevation in each city over time and riverbeds' ele-

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vation (aggradation or incision)? You must also add informations about physical and geographical characteristics of both studied catchments (local floodplain topography) but also dimensions of the runoff area upstream from Besançon and Moissac (including the number of tributaries). All these informations should be summarized in a large table then set in a file for the additional material. Moreover, a detailed checklist of each document from archives (reference numbers, databases) together with their exact locations (Municipal, District or National archives) must be given. This is a minimum requirement in a work mainly based on historical written/cartographic archives! In the paragraph named “Census of the exposed population within the flood extent” (3.4) it would be interesting to describe at length data involved in analysis (equation) that you mention in your article (additional material) but also to present numerical results used to draw various maps shown in figures. A graph showing evolution of the population for both cities since the early XXth century would also be very welcome. What kind of solutions/measures was found by both cities (or by local societies) to cope with floods throughout the twentieth century?

At last, the conclusion paragraph is too short, especially the "perspectives" part, it should be improved by highlighting more clearly implications of obtained results in (urban) river flood risk management policies (local, national or transnational). So, the Xynthia storm was not a good example because dramatic floods and their resulting damages which have occurred didn’t originate in a flooded river. . ., it exist many other relevant examples in France and Europe.

Instead, unlike what is stated in the report of the first anonymous reviewer, the term "diachronic" don’t bother me. Indeed, it is frequently used in environmental history, in landscape ecology or in paleoecology. But conversely, the notion of “transdisciplinarity” appears more problematic. “Transdisciplinary" generally refers to "a paradigm or vision that transcends narrow disciplinary worldviews through overarching synthesis”, it’s the last level - the ultimate degree of coordination - in integrative research approaches. You surely use data from various academic disciplines (e.g. “interdisciplinarity”) but do you

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combine this interdisciplinarity with a participatory approach? I'm not sure that your work (Ph.D) was really a participatory research! "Transdisciplinary research is projects that involve academic researchers from different unrelated disciplines as well as non-academic participants, such as land managers, user groups and the general public, to create new knowledge and theory and research a common question (Tress et al., 2005)". This junction between various academic disciplines/scholarly research and non-academic participants, towards a common goal to overcome the split between science and society, is specific to transdisciplinarity but unfortunately its implementation is uncommon In research practice (disputes between academic scholars, supremacy of the hard sciences over the Humanities and Social Sciences or trouble of communication between paradigms because of a problem of translation -> the famous "Thomas Kuhn theory", etc.). I suggest you read specific and relevant articles of Tress & Tress (2001) and Tress et al. (2005) summarizing pluridisciplinarity, interdisciplinarity and transdisciplinarity research concepts. After having read these articles you could redefine your view of "transdisciplinarity".

PROPOSALS OF CORRECTIONS TO THE ORIGINAL TEXT:

- PAGE 6152: ligne 2 "two ancient floods" -> "TWO PAST FLOODS"

- PAGE 6155 : ligne 11 "There were a relatively small number of fatalities (4 direct + 11 indirect deaths), but the impact within the Paris region was extremely high, with 150 000 affected people and about 1.5 billion of euros of damages" -> (A REFERENCE PLEASE ?)

- PAGE 6157: ligne 7 "vulnerable to water crushing forces"-> "VULNERABLE TO FLOOD-INDUCED FORCES (SUCH AS FLOTATION, LATERAL PRESSURES, OR MOVING WATER)"

- PAGE 6157: ligne 8 "damaging process"-> "DESTRUCTION PROCESS"

- PAGE 6159: ligne 27 "for ancient time" -> "EARLIER HISTORICAL PERIODS" or

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“EARLIER TIMES”

- PAGE 6161: ligne 16 “(reduction of inhabitants per building)” -> “(A DECLINE IN THE NUMBER OF INHABITANTS PER BUILDING)”

- PAGE 6161 : ligne 20 “surface areas spread by” -> “INCREASE” or “EXPANDE”

- PAGE 6163: ligne 2 “especially due to progress in flood warning and population evacuation by the civil protection services” -> “DUE TO PROGRESS IN BOTH FLOOD WARNING DECISION-MAKING AND EMERGENCY POPULATION-EVACUATION SCHEME BY THE CIVIL PROTECTION SERVICES”

- PAGE 6163: ligne 5 “is considered as the reference flood hazard in the local regulatory document of flood risk” -> “IS CONSIDERED AS THE REFERENCE FLOOD HAZARD BOTH FOR THE LOCAL FLOOD RISK MANAGEMENT STRATEGY AND PLANNING AND DEVELOPMENT DOCUMENTS”.

- PAGE 6163: ligne 9 “ancient floods” -> “PAST FLOOD EVENTS”

- PAGE 6163: ligne 17 “as well from ancient censuses” -> “AS WELL FROM OLD CENSUSES”

- PAGE 6164: ligne 5 “taking into account modifications of the river and flood topography and hydraulic works (dikes, weir, dams . . .)” -> “TAKING INTO ACCOUNT CHANGES IN RIVERBED ELEVATIONS AND FLOODPLAIN TOPOGRAPHY BUT ALSO IMPACTS OF HYDRAULIC INFRASTRUCTURES (LIKE DIKES, WEIR, DAMS, ETC...)”

PROPOSALS OF CORRECTIONS TO THE ORIGINAL FIGURES AND LEGENDS:

Presentation and layout of maps and figures must be exactly the same (e.g. shape and color of symbols, north arrows, please select always the same location for copyrights and authors, kilomEters in English not KilomÈtres in French, etc.).

- FIGURE 1 : “Hydrographic districts” -> “HYDROGAPHIC BASINS” or "DRAINAGE

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BASINS"

- FIGURE 2: “catchement area studied”-> "CATCHEMENT STUDIED"

- FIGURE 3: “longitudinal profile” -> “LONG PROFILE OF THE DOUBS RIVER” “Longitudinal profile of the Doubs River and flood inter-comparison” -> LONG PROFILE OF THE DOUBS RIVER AND WHAT IS THE PRINTING DATE OF THE ORIGINAL PROFIL (ARCHIVE NUMBER) ? FROM THE SERVICE HYDRAULIQUE OF THE DOUBS DISTRICT? IN WHICH PART OF THE RIVER BASIN THIS LONG PROFILE IS LOCATED? AND, HOW FAR FROM THE CITY OF BEANÇON ? IN MY OPINION THIS FIGURE IS NOT RELEVANT FOR THIS ARTICLE. ITS REMOVAL MUST BE DISCUSSED.

- FIGURE 4 : “water entries” -> “WATER INLETS”

- FIGURE 5: “City center” or “city centRE” ?

- FIGURE 7 : “Land use classification” -> “LAND-USE TYPE CLASSIFICATION” “Land use and occupation within the 1910 flood extent in Besançon: (a) in 1910; (b) in 2013” -> “LAND-USE TYPES AND SOIL OCCUPATION WITHIN THE 1910 FLOOD EXTENT IN BESANÇON: (A) IN 1910; (B) IN 2013”

Continous urban fabric -> “HIGH DENSITY URBAN AREA” Discontinuous urban fabric -> “MEDIUM DENSITY RESIDENTIAL” parking -> “PARKING LOT” Economic activity building -> “INDUSTRIAL, BUSINESS PARK, RETAIL CENTER” Garrison/barrack -> “MILITARY LAND” Education -> “EDUCATIONAL” Administrative, cultural, religious or health building -> “INSTITUTIONAL, PUBLIC FACILITY, OFFICE,...”

- FIGURE 8 : “Estimated population per building within 1910 flood extent in Besançon: (a) in 1910; (b) in 2013” -> “ESTIMATED NUMBER OF INHABITANTS PER BUILDING WITHIN THE 1910 FLOOD EXTENT AREA IN BESANÇON (A) IN 1910; (B) IN 2013” THERE IS A PROBLEM IN THIS FIGURE: 1910 OR 1911?

“Estimation of the population living in the building” -> “ESTIMATED NUMBER OF IN-

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HABITANTS PER BUILDING”

- FIGURE 9 : Land use classification -> “LAND-USE TYPE CLASSIFICATION” Residential discontinuous sparse building -> “SMALL LOT RESIDENTIAL” Residential discontinous building -> “MEDIUM DENSITY RESIDENTIAL” Residential continous building -> “HIGH DENSITY RESIDENTIAL” Economic activity building -> “INDUSTRIAL, BUSINESS PARK, RETAIL CENTER” Education -> “EDUCATIONAL” Parking -> “PARKING LOT” Administrative, cultural, religious,... -> “INSTITUTIONAL, PUBLIC FACILITY, OFFICE,...”

FOR THE “BUILT-UP AREA” MAYBE YOU COULD USE THE SAME CLASSIFICATION AS FOR THE WHOLE CITY?

- Figure 10: “Estimation of the population in the building” -> “ESTIMATED NUMBER OF INHABITANTS PER BUILDING” “Estimated population per building within 1930 flood extent in Moissac: (a) in 1910; (b) in 2013” -> “ESTIMATED NUMBER OF INHABITANTS PER BUILDING WITHIN THE 1930 FLOOD EXTENT AREA IN MOISSAC (A) IN 1910; (B) IN 2013.” THERE IS A PROBLEM IN THIS FIGURE : 1910 OR 1930?

References:

Alexandre P. 1987. Le climat en Europe au Moyen Age, contribution à l’histoire des variations climatiques de 1000 à 1425, d’après les sources narratives de l’Europe occidentale. Paris, Éditions de l’École des hautes études en sciences sociales 828 p.

Champion M. 1858-1864. Les inondations en France depuis le VIe siècle jusqu’à nos jours. Dalmont, Paris, 6 volumes.

Tress B. & Tress G. 2001. Capitalising on multiplicity: a transdisciplinary systems approach to landscape research. Landscape and Urban Planning, 57 (3-4): 143-157.

Tress, G., Tress B. & Fry G. 2005. Clarifying integrative research concepts in landscape ecology. Landscape Ecology, 20 (4): 479-493.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 6151, 2015.