

Interactive comment on “The “Prediflood” database of historical floods in Catalonia (NE Iberian Peninsula) AD 1035–2013, and its potential applications in flood analysis” by M. Barriendos et al.

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General evaluation: This paper presents a sophisticated system for gathering and archiving data and information on historical floods in Catalonia. It includes techniques for verification and assessment of the data. Such an elaborate system, according to my opinion, has currently no parallel in Europe and it represents a complex tool for a reliable and high-quality processing and evaluation of historical data in hydrology. An effort to catalogue floods since the 10th century until now is undoubtedly appreciable. A

C4298

remarkable feature of this system is its division into three types of flood reconstruction: hydraulic, hydrological, and meteorological. Particularly, for remarkable I consider, that the hydrological reconstruction aims to obtain a hyethograph of the rainfall. This conception somewhat differs from an approach to reconstruction of historical flood events in Central Europe and perhaps elsewhere as well. The Prediflood is a new tool. It would be beneficial if the authors clarified when this system started to be formed, what organization or institute runs it, and if it is opened for professionals from elsewhere, like for example a British database (www.trp.dundee.ac.uk/cbheelcome.htm).

Thanks a lot by your general comments. We agree with your comment about describing what has been process to integrate the different methods, databases, ideas and capabilities, into framework of PREDIFLOOD Project.

We can also indicate to referee that PREDIFLOOD Database is an initiative nested into a research project. We don't have institutions or research centers supporting us to consolidate and prolongue this effort. When we exploit these data, producing scientific literature, we put our data and results in open access to scientific community.

Specific comments and points to be addressed:

The authors should explain the acronym “Prediflood”. The authors should specify in more detail in what sense they use the term database. I wonder to what extent the Prediflood database can be considered a database in its narrow meaning– is that the data are stored by some kind of software application such as Oracle, Dbase, Paradox, Access, etc.? After reading the manuscript I believe it is rather a project or system for archiving all information on historical floods, its digitization and storage in database, and original methods and approaches using software such as HEC RAS, HEC HMS. The authors should consider if the term Prediflood System or Catalogue or Archive should not better entitle their tool.

We agree with your comment. We will introduce specific explanations about origin and characteristics of this database. We enlarge Introduction section and we clarify any

C4299

aspects in sections 3.1. and 3.2.

To advance you an explanation, we introduce into the text that our expression "database" is not related to usual database file from any software application. Considering our stage of research, collecting and organizing informations, we need a flexible storage of original materials. We decide to have, by the moment, one Excel file as a catalogue of all records, and different folders with graphic and textual materials. Really, it's more similar to a conventional historical archive. We decide to mention "database" to avoid problems of confusing terminology because in spanish terms "archive", "file", are synonymous for historical materials but also for software materials.

Page 7946, l. 10–15. Flood event is determined by Event Code – YYYY-MM. Regarding the example used in text – the flood event on the Ebro river in October 8–9. The Flood event code is identified by year and month. Does such a system enable us to enlist several floods if they occurred during one month? Please clarify this.

We have clarified this point in the new version of the manuscript, section 3.2.

To one Flood case more documentary sources (more information in chronicle, newspapers, etc.) are likely to relate. For example more primary sources are likely to be related to the Flood case in the town of XERTA 1787 October 8. I assume that the database enables to attach more documentary sources related to one Flood case. Am I correct?

Yes, you are. We work with open formats because in any moment we can find more primary sources for the same flood case. Then, information can be repeated (one data from different references), we can find different complementary information (different data from different references) or we can find contradictory data (opposed data from different sources, opening a process of critical analysis of sources, if proceed). This open structure makes easy introduction and re-organization of new critical information about flood case. We can confirm reliability of sources or we can arrive to correct/remove data and sources if proceed. Our final objective of Flood Archive is to

C4300

contain all possible details, right or wrong, identifying quality of all of them, to make the best possible analysis. When more information and sources are considered, more consistent results can be used in the meteorological and hydraulic reconstruction stages. We have emphasized with one example in the new version the open aspects of the database.

Does hydraulic or hydrological reconstruction deal with travel-times of the flood discharges (peaks)? If it is the case, the authors should indicate this in the manuscript.

Changes of bed river characteristics and land use along time may be very important. This is one of critical aspects to be considered in hydraulic and hydrologic reconstruction. Flood discharges are reconstructed after a detailed characterization of the dimensions and structural elements present during the event under study. This work is made with present data, but introducing into the model all possible information available on documentary sources but also other epigraphic or sedimentary. When study area is a bed-rock, usually we apply the same topographical data as in present, considering not important changes are recorded. Specific areas with high interest for flood reconstruction are being analyzed under this procedure, when enough data is available. Summarizing this methodological experience, figures 4, 5 and 6 contain different "inputs" of information for respective periods of flood reconstructions.

Concerning travel-times of the flood discharges, we consider but we only apply for best documented events (i.e. "Santa Tecla" event, September 1874), where detailed appointments of time of maximum discharges are available. Then, we can define travel-times of overflow wave, etc. Under our experience, when more effort is applied to information gathering, results improve capacity of data analysis on this aspect.

Flow Routing along rivers is taken into account in our method. It is explained in the text: 1. Page 7957 line 17 "and river flow routing" 2. Page 7957 line 19 "and the Muskingum–Cunge methods" 3. Page 7975 figure 6 "Muskingum–Cunge routing method"

I wonder how many flood events out of the total number of 1103 were reconstructed

C4301

hydraulically or hydrologically and if the results of these reconstructions are included in the database.

We have 45 hydraulic reconstructions and 5 hydrologic reconstructions, and this activity is in progress. According to publication of results and data gathering be finishing, we want put in open access these data.

I am missing any information on available systematic hydrological measurements and data (short information on beginning, length of the data series, etc.) in Catalonia. Is there a relation or link between the Prediflood database and a database of instrumental hydrological data (if such a database exists in Catalonia, which I assume).

We don't mention instrumental data availability in detail but, of course, we know and we work with instrumental data. Water Agency and Meteorological Office of Catalan Government are in charge of generating and preserving instrumental systematic data series (gauging stations and meteorological observatories). We have a close relation with both agencies and others.

Data availability has a general characteristic of precarious conditions. They started during first two decades of 20th century. Then, we have very short data series (hydrological and meteorological systematic measurements). For 1880-1900 a good pluviometric network is also available for Catalonia. Main problems of this series is Civil War (1936-1939) and subsequent critical period. Most of data series are stopped with a prolonged period of inactivity. But also a lot of series were completely destroyed by war in different archives. Correct data availability can be dated on 1970s-1980s.

Table 1 – the information presented by the table should not be presented randomly – rather it should be arranged according to a certain criteria, I am missing this point here.

This table applies one objective criteria for a quantitative qualification of flood catalogues. Main reference is Gaume et al., 2009. The most important is definition of coverage and density. Coverage put in relation surface of basin and length of data se-

C4302

ries. Density combines previous indices of coverage with amount of flood events. The main objective of this table is showing the level of density available into catalogues of historical floods of Spanish Civil Protection, organized by basins, in comparison with first results of PREDIFLOOD Project. Density of our catalogue/archive (35.1) is more than 5 times higher than density of whole Spanish series (6.2).

Does the database use the hydrological coding?

No. At this moment we are in a first organizative stage and we don't consider use of pre-existing coding systems because flood events are not definitive and introduction of new data are changing frequently its contents. When a more definitive flood data series will be defined, we will consider to use the hydrological coding.

Minor corrections Page 7973 Fig. 4 Hydrological reconstruction

Thanks!! We have changed this typo mistake.

Page 7971 Fig. 2, clarification of descriptions is needed

These two figures show temporal distribution of flood cases and flood events. We think it could be more illustrative for readers not only a final amount of flood cases and events (2711 and 1103, respectively) but also their internal temporal distribution, organized by decades. Figure independent of text is not so easy to be understood. It would be better if it be into text (pages 7948-7949). If manuscript is accepted for publication, we can put figures in the most appropriate location into the text.

In all the case, we have modified the caption of this figure.

Thanks for your useful comments.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 7935, 2014.

C4303