

**Review of the paper Quantitative historical hydrology in Europe by
G. Benito, R. Brázdil, J. Herget, and M. J. Machado, submitted to be published in HESS**

The paper is an interesting review of the state the art and methodology to estimate flood discharge and flood frequency by using paleoflood and historical data. The paper also discuss the improvement supposed in flood frequency estimation by merging this kind of data with instrumental data. The authors are recognized experts in the matter and it is undoubtedly a good and useful paper for experts and non-experts on the matter. Having in mind its future application as reference paper on estimation of quantitative historical hydrology, from paleofloods to recent data, the only changes required before its publication are referred to the argument followed in the text (mainly a reorganization) and some references that should be included to update the discussion.

Please find these comments in the attached supplement:

1. Introduction

P.4416, 1.1: Please add a comment about the China reports: are they continuous and homogeneous for any long period?

P. 4416, 1.11: Introduce a full stop before starting the paragraph about the early stages of hydrology.

P. 4416, 1.18-25: It would be better to follow a chronological argument, starting from the longest series (paleofloods), following by historical floods and ending with early instrumental period

P. 4416, 1.14: It would be better to cite Fig.1 in another place, because it shows a general framework of different sources of information and in its present position in the text, it only does reference to gauge stations and data-loggers.

2. Quantitative historical hydrology

The section does not correspond to this title. It is a mix of different things that are already included and developed in other parts of the paper, and some general aspects with other more detailed ones. In order to better contribute to the learning of the reader, the better would be: a) to maintain the introductory style and removing it to the introduction doing the necessary changes; or b) to develop more the different aspects commented in the section, merging with other parts of the text. For instance, when you speak about the quantification (numerical or categorical), you should introduce here the classifications that you present in other parts of the paper in basis to return period, peak of discharge or types like catastrophic or extraordinary floods.

3. History of....

P.4420: It would be better to numerate the equations

P.4421, 1.26: For the non expert it would be better to say the meaning of "ca."

4.1. Documentary data....

P. 4424, 1.5: Databases are not usually printed sources

P. 4424, 1.11: Remove from the bracket the reference of Barriendos and Coeur (2004), it is cited explicitly in the following sentence. On the other hand, in the paper of Barriendos et al, 2003, the qualitative classification showed is better than in Barriendos and Coeur, 2004, because it synthesizes both classifications, this one used in the papers from Coeur and Lang for French rivers and this other one commonly used by Barriendos and other authors for Spanish rivers. Please, displace here the classification that you show in the first paragraph of page 4436.

P. 4425, 1.4. The River Ter series has been updated until 2002 in Llasat et al (2005) and until 2012 in Barrera-Escoda and Llasat (2015). Please, update the references.

5.2. Multiproxy analysis....

p. 4435, l.8. As before, the River Llobregat series has been updated in the papers cited previously. Particularly, Llasat et al (2005) was published into the SPHERE project and Barrera-Escoda and Llasat (2015) updates the SPHERE series and introduces new analysis and results.

5.3 Flood magnitude sensitivity...

P.4435, l.18: Why do you consider rare floods when $T > 50$ years? Any reference to justify it?

For this part, and having in mind that this is a review paper, I would recommend you to consider in your paper the recent papers published by Mediero et al (2014) about flood frequency in Spain, Barrera-Escoda and Llasat (2015) and Peña et al (2015) where the influence of climatic aspects in flood frequency and magnitude are widely discussed.

On the other hand, the impact of climatic features is not the same for catastrophic or largest floods than for extraordinary ones that can be more affected by non climatic factors like changes in the use of soil, increasing vulnerability and so on. I would recommend you to read and include in the references, the paper from Hall et al (2014), where a deep analysis on the different factors that can affect flood frequency changes is presented.

Finally, this section is a little confusing, because there are a lot of quantitative data that are mixed (in some occasions is difficult to know to which river they refer). Please, try to organize better all this information.

References

Barrera-Escoda, A. And M.C. Llasat, 2015. Evolving flood patterns in a Mediterranean region (1301–2012) and climatic factors – the case of Catalonia. *Hydrol. Earth Syst. Sci.*, 19, 465–483, www.hydrol-earth-syst-sci.net/19/465/2015/ doi:10.5194/hess-19-465-2015.

Hall, J., B. Arheimer, M. Borga, R. Brázdil, P. Claps, A. Kiss, T. R. Kjeldsen, J. Kriaučiūnienė, Z. W. Kundzewicz, M. Lang, M. C. Llasat, N. Macdonald, N. McIntyre, L. Mediero, B. Merz, R. Merz, P. Molnar, A. Montanari, C. Neuhold, J. Parajka, R. A. P. Perdigão, L. Plavcová, M. Rogger, J. L. Salinas, E. Sauquet, C. Schär, J. Szolgay, A. Viglione and G. Blöschl, 2014: Understanding Flood Regime Changes in Europe: A state of the art assessment. *Hydrol. Earth Syst. Sci.*, 18, 2735-2772, 2013, www.hydrol-earth-syst-sci.net/18/2735/2014/ doi:10.5194/hess-18-2735-2014.

Llasat, M.C., M. Barriendos, Barrera, A., and Rigo, T., 2005. Floods in Catalonia (NE Spain) since the 14th century. Climatological and meteorological aspects from historical documentary sources and old instrumental records. *Journal of Hydrology. Applications of palaeoflood hydrology and historical data in flood risk analysis*, 313, 32-47.

Mediero, L., Santillán, D, Garrote, L. and Granados, A., 2014. Detection and attribution of trends in magnitude, frequency and timing of floods in Spain, *J. Hydrol.*, 517, 1072-1088, 2014.

Peña, J. C., Schulte, L., Badoux, A., Barriendos, M., and Barrera-Escoda, A., 2014. Influence of solar forcing, climate variability and atmospheric circulation patterns on summer floods in Switzerland, *Hydrol. Earth Syst. Sci. Discuss.*, 11, 13843-13890, doi:10.5194/hessd-11-13843-2014.