

Interactive comment on “300-years of hydrological records and societal responses to droughts and floods on the Pacific coast of Central America” by Alvaro Guevara-Murua et al.

Anonymous Referee #2

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General comments

This paper examines hydrological records, societal responses, and the relationships between the two in today's Antigua Guatemala and Guatemala City, over the period from 1640 to 1945. The basis for the presented semi-quantitative hydrological indices is derived from documentary data in the records of the city and municipal council meetings. These types of sources include descriptions of exceptional meteorological events such as heavy rain, flooding, dry weather conditions, and drought; as well as records of rogation ceremonies, crop shortages, etc. The indices derived for this paper cover the annual rainy season (May to October) and use a five-degree scale (very wet to very dry). There are exceptional periods that the authors present in their results, such as

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the dry period from 1640 to 1740, as well as those in the 1820s and 1840s. The period between 1760 and 1810 was wet. The authors bring these periods together with the Little Ice Age and the variability of the Intertropical Convergence Zone (ITCZ) and the El Niño Southern Oscillation (ENSO).

I agree with David Nash that this is a very nice and convincing paper. The topic is clearly in the focus of Climate of the Past. The authors very clearly describe the historical context of the outstanding documentary sources which they used for the paper. They also make clear which methods they applied in order to reconstruct precipitation. As a result, the authors have presented a remarkable continuous hydrological index encompassing more than 300 years, with almost no gaps. Nonetheless, I wish to make a few remarks:

Specific comments

In the abstract, the authors refer to the onset of the Little Ice Age as coinciding with the dry period from 1640 to 1740. Later in the paper, on p. 16, they define the Little Ice Age as the period between 1500 and 1800. Both definitions are in use, but I would recommend rephrasing one of the two sentences so that there is no inconsistency in that regard.

Also in the abstract, the authors mention the complexity of the relationship between hydrological extremes and societal responses. In the paper, they do not discuss this complexity any further; perhaps a short explanation could be added.

In the paper, the description of the state of the art is divided between several chapters. Perhaps a short paragraph in the introduction, instead of the short presentations of literature in each chapter, would be useful. So, for instance, on p. 2 the authors mention previous research reconstructing rainfall and extreme events based on ecclesiastical records in Latin America and Spain. At this point, Rodrigo and Barriendos, who published important results on this subject, are not mentioned. They only appear on page 6 when the topic is discussed a second time.

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The paper clearly describes why the records of the city and municipal council meetings are reliable and very useful for the reconstruction of hydrological variation. On p. 7 there are, in addition, three further reconstructions (Claxton 1986, 1998; Pardo 1944) mentioned as being based on "discontinuous primary sources and secondary sources". I recommend adding a short explanation of why these types of reconstructions and data collections are not so reliable as the results presented here.

The authors present very nice source examples on p. 7–9, but they do not give many comments on these examples. Perhaps fewer examples with more in-depth comments would be sufficient and more focussed.

The authors could also consider whether they want to gather all source-relevant information in one place. Currently, this information is distributed over several places. For instance, the reader gets the information that the Actas de Cabildo and the Actas Municipales are preserved in 190 volumes in the abstract, but in the main text this information only appears on p. 9, long after all the other source-relevant information. This information shows how much work was invested into this reconstruction. Therefore, it could be presented a bit earlier and more prominently in the introduction.

I congratulate the authors on these striking results and on a very informative and convincing paper, which I recommend publishing with a few minor revisions.

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