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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Reconstituting past flood events: the contribution of citizen science" *by* Bocar Sy et al.

Bocar Sy et al.

bocar.sy@unige.ch

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General comments The paper presents a project of citizen science aiming at documenting past flood events in Dakar, Sénégal, for which no information about the extent, water levels of past events were available. The paper presents a methodology that is of interest for other countries, in particular developing countries for which this kind of information is rarely available. The method allows gathering information that is relevant for flood prevention and preparedness. However, the method requires knowledge of the local culture and social conventions to be put in practice and is relatively time-consuming as it is based on participatory approaches and mapping. A comparison with flooding extend estimated using remote sensing data is also provided. The paper is well presented and written and clearly illustrates the added value of the approach,

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in particular in providing information about water level that cannot be obtained using remote sensing data. Additionally, the participatory approach allows the local communities to be better informed about flood prevention. The paper is of interest for the readers of Hydrology and Earth System Sciences, in particular in the context of socio-hydrology. We thank the reviewer for his positive feedback and for the comments he provided which allows us to provide more information on our work.

2/ p.5, stage 2: using their methodology, the authors obtain two information about water levels: the first one from the mapping after the training, the second one after the field survey. How did they resolve possible conflicting results? Which source of information did they consider as the most reliable? In cases of conflicting results, the field value is considered the most reliable. As in the field, the chief used also sense organs for example view to better remember the events.

3/ p.5 line 145. Would it be possible that local representative could be reluctant to contradict the neighbourhood chiefs by giving information that could differ from the one provided by the neighbourhood chiefs? Or did the authors only informed local representatives of the location where they had to provide a water level value? We only indicated the site location to the local representatives. They did not know in advance the value given by the chief for the same site.

4/ p.6; the section about remote sensing is quite vague about the methods really put in practice. It could be useful to provide more detailed information on the methods. The section on remote sensing will be developed to clarify the methods used. We take this opportunity to answer section 3.1.3 of the reviewer 1. The following paragraph provides our proposal. The flooded areas for the 2005 event were determined using available Spot 5 images i.e. one acquired during the 2005 flood event and one acquired in 2006 in the absence of flooding. Various image improvement and correction techniques have been applied based on appropriate geo-referencing. The multispectral Spot images of 10 m resolution were merged with a Spot panchromatic image with a spatial resolution of 2.5 m to increase their spatial accuracy. In order to detect water-covered areas,

we applied the normalized difference water index (NDWI) (Khajuria et al., 2017) is used to separate the water signature from other land-use types was applied with Erdas Imagine 2014. This NDWI index is based on the fact that water absorbed energy in the near-infrared (NIR) and short-wavelength infrared (SWIR). There are two methods for calculating the NDWI. The first method uses the infrared band (NIR) to (SWIR) and is proposed by Gao (1996). The second method uses the green band and the NIR, it is defined by McFeeter (1996). Since both methods are equal, the second method is used. The NDWI is obtained by the following equation:

NDWI = (Green-NIR)/(Green+NIR)

The unsupervised classification methods have been applied on both sharpened images using ISODATA algorithm (Anusha and Bharathi et al 2019) by using a convergence threshold of 0.95 and maximum iterations of 12. The classes are then recoded to highlight only the water layer. Finally, results from both images treatment were compared to extract the flooded areas. The pixel is considered as flooded if it is classified as no water during the dry period and water during the wet period. For the events of 2009 and 2012, flooded areas have been obtained by comparing and photo-interpreting high-resolution true colour composite images from Google Earth historical imagery, about 0.5 m resolution, before and up to 3 weeks after the flood events (supplementary material). The Google Earth high-resolution imagery archive remains a largely unexploited resource for the analysis and description of the Earth's land surface (Potere 2008). These high resolution used in this analysis come from Digital Globe's (Worldwide, Quick Bird) satellites.

5/ p.8 line 232. How did the authors verify that the way to use and produce maps had been properly understood? To check how to use and produce the maps was well understood we did: -Training (familiar the contributor with the map in order to make a difference for example between symbols); -Test of localisation (ask the contributor to locate himself in the map).

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