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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.

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General comments This is an interesting paper on the use of citizen science to create flood maps (extent, depth) using the memory of leaders and people in the community in an area of Dakar, Senegal. The extent is compared with remote sensing and the idea is innovative but lacking in details in places.

We thank the reviewer for having taken the time to review our paper and providing thoughtful comments that will help us improve our paper. Specific comments Line 45 – what is meant by citizens from the community? Sometimes citizens are located around the world so I think this is too narrow a definition of citizen science We agree with the comment. Consequently, we remove "from the community". The sentence would

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be “Citizen science is a form of collaborative research involving citizens into scientific projects (Wiggins and Crowston, 2011)”.

Line 48 – “. . .social media, mobile, smartphones. . .” – what do you mean by mobile here? Do you mean mobile devices? Mobile phones? You mean phones that are not smartphones? We mean mobile devices. To avoid redundancies, we remove smartphones as they are part of mobile devices.

Line 49 – Open Street Map should be OpenStreetMap Thanks. Done

Line 49 – the references of Goodchild 2007 and Silvertown 2009 seem strange for OpenStreetMap, Google Earth and Geo-Wiki – there are much better references for these three applications. If you reference Goodchild (2007), then you should really mention Volunteered Geographic Information. You need better alignment between your references and your text. It was an error in referencing. We propose: Mooney, P and Minghini, M. 2017. A Review of OpenStreetMap Data. In: Foody, G, See, L, Fritz, S, Mooney, P, Olteanu-Raimond, A-M, Fonte, C C and Antoniou, V. (eds.) Mapping and the Citizen Sensor. Pp. 37–59. London: Ubiquity Press. DOI: https://doi.org/10.5334/bbf.c. License: CC-BY 4.0 for OSM

Fritz, S., McCallum, I., Schill, C., Perger, C., Grillmayer, R., Achard, F., Kraxner, F.,Obersteiner, M., 2009. Geo-Wiki.Org: the use of crowd-sourcing to improve global land cover. Remote Sensing 1 (3), 345e354. For Geo-Wiki

Le Yu & Peng Gong (2012) Google Earth as a virtual globe tool for Earth science applications at the global scale: progress and perspectives, International Journal of Remote Sensing, 33:12, 3966-3986, DOI: 10.1080/01431161.2011.636081 for Google Earth

Line 50-54 – the literature review on flooding/hydrology and citizen science is a bit brief. There is quite a bit of work in this area and should be described in more detail. Indeed, there is some literature in that respect and we did a literature review compiling

the studies already done in the field of flood hazard assessment using citizen science in Sy et al, 2019. So we didn't want to repeat ourselves. Nevertheless, we agree we could still say more. We propose to develop it as follows, replacing the part from "The use of . . . to interpret increases significantly":

The use of citizen science has also emerged in the field of flood analysis in recent years. The existing works could be classified by looking at which phase of flood risk management they are dealing with and considering the timing, i.e. before, during and after the flood event. For example, Sy et al (2019) did a review on the use of citizen science in flood hazard assessment, discussing its potential to gather information needed to develop realistic scenarios and provide flood hazard parameters, such as the extent and water depth, that could help in understanding the hazard level at the site. Assumpção et al, (2018) focused on the role citizen science could play in flood modelling and demonstrated its value to provide information for nourishing, calibrating and validating flood modelling in particular where data are scarce. It is worth mentioning that most of the existing studies dealt with fluvial flooding, fewer studies concern pluvial or groundwater flooding (See, 2019).

Line 54 – this paper used memory and citizen science in the context of wildlife conservation so it is worth citing as one example: https://onlinelibrary.wiley.com/doi/full/10.1111/tgis.12300 Thank you for having brought this interesting article to our attention. We could integrate it as follows. Moreover, none of those citizen science projects studied the reconstruction of past events using the citizen memory, in contrary to the field of wildlife conservation, where Zhang et al, (2017) demonstrated the value of citizen data for mapping past phenomena that were not otherwise recorded.

Section 2 – I am missing details about the type of flooding that occurs in this area, i.e. pluvial, fluvial, surface, etc.? Thank you for raising this question. We are pleased to provide more details on the type of flooding occurring in our area of study. Flooding in this area is due to runoff of rainwater, which is not absorbed by surfaces made im-

permeable due to the rapid urbanization and to ineffective drainage network, combined with the rise of groundwater at some locations. Therefore, our area is characterized by floods from multiple types.

Line 78 – I do not see how Figure 2 shows 'novel methods in citizen science' – why are these novel in the context of citizen science? Based on what evidence? Perhaps it is better to say that you are combining different participatory approaches together. Otherwise, I think the figure is good for showing the approach taken. You are right. Figure 2 does not show where the novelty is. We propose to modify the sentence as follows: "We developed a framework combining different participatory approaches together (Fig. 2).

Line 96 – what does "In some cases, it was possible to register the narrative" mean? Record it digitally? Yes, the narrative was digitally recorded with a smartphone. We propose to modify the sentence as "In some cases, it was possible to digitally record the narrative using a smartphone.

Line 102 – what does "fixing pins" mean – putting pins on the map? What does "handled GPS" mean? Yes, fixing pins mean pins that can be put on the map. Handled GPS should have been written as "handheld GPS" as it was a pocket navigation device

Line 106 – ". . .were put into a mental condition" does not make sense in English – you probably mean put into a relaxed state or something else? It is Line 107 in our version. We replace Âńmental condition" with "a relaxed state"

Line 119 – what does "using scale mapping" mean? The map that was used was drawn at the scale of the neighbourhood, so we propose to modify this part as "using maps at the scale of the neighbourhood"

Line 127 – (and in other places with the similar use of confronting) – "confronting the story"- this need to be rewritten to something clearer in English as we would not express it this way. It will be changed accordingly, depending on the meaning of the

concerned sentence. For line 127, we propose “cross-checking the story . . .”

Line 129 – 130 – this appears to be an assumption. Do you have a reference or evidence to back this up? We will add the reference of Rubin, 2005 at the end of the sentence. Rubin, D. C., 2005, A Basic-Systems Approach to Autobiographical Memory, Current Directions in Psychological Science, https://doi.org/10.1111/j.0963-7214.2005.00339.x

Line 154 – you do not need to mention Bland and Altman the second time or the third time on line 156. Thanks. We corrected the sentence as follows: We used the Bland-Altman method (1986) which allows determining the level of agreement between data acquired with two different techniques, even if there is no information about the “true” values (Bland and Altman, 1986).

Section 3.1.3 – there are few details on the remote sensing, e.g. where did you obtain the training data? Where did you obtain the validation data? What was the accuracy? Perhaps add this to your supplementary material. It was an error in the type of classification instead of a supervised, it was unsupervised classification. Details were provided in the second reviewer’s answer to point 4/p.6 Line 184 – use the word “aggravating”-replace this with another, more appropriate English word such as worsen, exacerbate, etc. or you can remove it, e.g. “regarding the processes that worsen the flood. . .” Thanks. It is replaced by “Regarding the processes that worsen the flood”

Figure 5 – Can you provide R-square values or correlation with each image? We did an analysis on the level of agreement between the two approaches to obtain the same information and not a correlation analysis. We could provide the R-square values or correlation, but it would not be meaningless on two datasets providing the same information. A correlation analysis could be done if we were to determine the correlation between the height of the person and the level of the water provided.

Line 229 – What is a “graphic semiology”? It refers to a standardized set of rules

and practices in map representation. In order to improve the clarity of the sentence, we propose to rewrite it as: “Moreover, maps are usually constructed applying standard rules of graphic semiology (Thomas, 2001) that does not necessarily take into account the cultural background or the knowledge of the citizen (Fuchs et al., 2009) And we also propose to add the following reference: Isabelle Thomas, Âń Cartographie d’aujourd’hui et de demain: rappels et perspectives. Âż, Cybergeo: European Journal of Geography [En ligne], Cartographie, Imagerie, SIG, document 189, mis en ligne le 27 mars 2001, consulté le 31 juillet 2019. URL: http://journals.openedition.org/cybergeo/3812; DOI: 10.4000/cybergeo.3812

Line 250 – in deep should be in-depth Thanks. It is replaced by in-depth

Line 269 – What does “to ensure people implication in our project. . ..” Mean? We wanted to express the fact that by creating a Facebook page dedicated to this project, people would feel like being part of a group sharing the same interest and therefore willing to share information and feeling more involved, but at this stage, it was more motivation than implication. We propose to modify the sentence as: As Facebook is one of the most used social media in Yeumbeul North (Sy, 2019 doctoral thesis), we created a page to interact with the local citizens and motivate them to be part of the project.

Figure 6 – You need to label a), b) and c) in your figure caption Indeed, the labels were missing in the figure caption. It will be corrected as Figure 6. Bland-Altman plots for different flooding events (a) 2005, (b) 2009 and (c) 2012. These graphs show differences between water depth provided by neighbourhood chiefs (NC) and local representatives (LR) in meters against averaged values of NC and LR. The blue line is the mean difference value and the red dotted lines show the +/- 1.96 standard deviation (SD) water depth differences for all observations.

Technical correction There are numerous English errors in the text as well as awkward phrasing and incorrect use of verb tenses. I suggest that you ask a native English

speaker to edit your paper or you use a professional editing service. This will also help to improve the readability of the paper. Here is an example of awkward phrasing: We will ask a native English speaker to edit the paper one more time after having implemented all corrections.

Line 97 – the narrative allowed identifying which neighbourhoods were flooded" would be rewritten as ".the narrative allowed the neighbourhoods that were flooded to be identified" OR ".the narrative allowed for the identification of which neighbourhoods were flooded. Thank you. It will be rephrased as "the narrative allowed the neighbourhoods that were flooded to be identified"

Line 180 – "identify rainfall" should be "identified rainfall" Thanks. It will be rewritten as "identified rainfall"

Line 171 – "results from both images treatment were compare"-not entirely sure what you mean The comparison was between the image before and the one after the flood, once they were treated. To make it clearer, we modified the sentence as: Finally, both images were compared to extract the flooded areas. Areas were considered as flooded if they were existing only on the 2005 image after the flood.

Line 183 – "removal of the wall painting" - I think you mean removal of the wall paint or removal of the paint on the walls Indeed. So, it has been rewritten as "removal of the paint on the walls"

Line 275 (and other places): – Do not use contractions in scientific writing, e.g., don't Contractions in line 275 and other places have been changed

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