Conceptual and methodological frameworks for large scale and high resolution analysis of the physical flood susceptibility of buildings

The paper is an interesting and valuable contribution to the assessment of the physical vulnerability of building. In particular, the paper presents a methodology which aims to permit the assessment of susceptibility at a larger scale and thereby presenting a geographically referenced and remote methodology. The paper is structurally sound and takes the reader through the process of developing the approach, however at times it is lacking information from which to fully understand the process and the scientific relevance of the approach (see below). I suggest that it is accepted with minor revisions which address these omissions.

The authors introduce some of the existing approaches to flood damage assessment for buildings but it would be good to expand here to add additional comment about the different classifications of damage assessment (i.e. are they based on post-event analysis, pre-event physical basis) and how the approach presented here fits into these. In particular, it may be appropriate to draw on the paper by Jongman et al. (2012: NHESS) which compares and contracts different approaches. This may assist in evidencing the comment about the validity of the findings of existing approaches due to the variety of methodologies.

At times, however there is insufficient detail about some the technical elements and the methodological decisions to allow a more non-technical reader to understand some of the scientific assumptions made or assess the validity of the methodology:

This includes;

- There is little discussion about how the three elements of Susceptibility, function and coping capacity combine and contribute to physical vulnerability – are they all equally important to the susceptibility? I am also not convinced about using the term coping capacity as it implies a relation to the function and the ability of those using the buildings to switch activities elsewhere to minimise impact and disruption? Why have you selected to use this term rather than just building resilience?

- Are you here linking the function of the building to wider social and economic vulnerability? You mention that physical vulnerability is linked to social and economic vulnerability – but not how and if you are looking at this in your approach. For instance, are you considering the level redundancy or dependency within the system within the susceptibility assessment and how the availability of alternative production locations or accessing services may impact any systemic impacts?

- Is building collapse considered?

- Is it possible to still argue that spatial data are an objective data source once you have attempted to fit them into a classification?

- Figure 1 is very confusing and although presents many of the different elements of vulnerability. Please be much clearer about what your method is or is not considering? And what is wider context of vulnerability that is not being considered. Currently having many different types of vulnerability on the periphery of the diagram is not aiding understanding of how these are linked together with your approach nor how they link together. Perhaps this figure can be revised.

- With the building taxonomy it is not clear what different levels of information are used – maybe an example would assist the reader here. It is also difficult to understand how the building taxonomy is exactly constructed what the parameters are and how this leads to the different categories. You have mentioned the elements that you have selected by not really provided a scientific justification for doing so and suggested why other elements have not been used.

- From a methodological perspective – how have you used expert consensus to validate the classes – what was the process and how has this contributed to the validity of the method. E.g. how many experts were consulted and how important is the variation between regions in the type of properties and damages sustained? i.e. did the experts suggest that property damages were relatively homogenous based on the characteristics you are using or heterogenous?

- Section 3.1.3 - What approach has been used to assess the potential flood impacts on buildings – how has this been assessed – is it based upon post-event damage information? Or the datasets you mentioned in the introduction or starting from another type of assessment? Also what happens to the unrepresentative buildings?

- Section 4.1.1 – why are us using a segmentation process? And how important is it to overcome the inconsistencies in the process that you mention and that could be overcome with a higher spatial resolution? It is necessary to use this higher resolution?

- Is it possible to make greater comment about how the method might be used and under which circumstances it is a relevant approach and under which you might use a more precise approach? Also additional comment about how you might validate or ground test the approach is also appropriate.

- I am not sure figures 2 and 3 add much to the paper – perhaps these can be combined with figure 1 into an overall figure for the journal.

- Tables 1, 2 and 3 are good and clear. Although the explanation of how these have been generated is not very clear – perhaps some explanation can be added around these tables.