Correction of the paper for the second reviewer: RC C2204. Anonymous Referee #2 provided on 04 Jan 2014.
"Conceptual and methodological frameworks for large scale and high resolution analysis of the physical flood susceptibility of buildings".
New proposed tittle: **"Assessment of the physical flood susceptibility of buildings on large scale − Conceptual and methodological frameworks"**
Version of the 13. February 2014

	Question of the reviewer	**Answer**	**Answer included in page and line**
1	is a different exercise from assessing flood damage a posteriori. However, the paper focuses on the latter approaches almost from the start (ln. 15). Can this issue be clarified? If the former analyses are scarce but nevertheless existing (ln. 13), can these be referenced?	We thank the reviewer very much for this comment. In response to that, we have included respective amendments as follows: "There are various approaches available for assessing the flood vulnerability of and damage to buildings and critical infrastructure. They cover pre- and post-event methods for different scales. However, there can hardly be found any method that allows for large scale pre-event assessment of the built structures with a high resolution. To make advancements in this respect, the paper presents, first, a conceptual framework for understanding physical flood susceptibility of buildings; and second, a methodological framework for its assessment. The latter ranges from semi-automatic extraction of buildings mainly from remote sensing with their subsequent classification and systematic characterisation to the assessment of the physical flood susceptibility on the basis of depth-impact functions." "There are various approaches available for assessing flood damage to buildings and critical infrastructure based on field data collected after an event such as FLEMO (Kreibich et al., 2010) as well as synthetic approaches for assessing the damage prior to a future event as e.g. HAZUS (Scawthorn et al., 2006) and HOWAD (Neubert et al., 2009). Differences between the assessment models for flood damage to and flood vulnerability of buildings in terms of scale, input data, damage calculation and outputs with their uncertainties are shown by Merz et al. (2004) and Jongman et al. (2012)."	Page 5696, line 1 Page 5701, line 16

2	As justification for need of a new approach, the authors list the extensive time and resources required by field work among the difficulties of adapting existing susceptibility (or damage?) assessment methods to large scales (ln. 18). However, doesn't this problem still apply also to this method, since it relies on rather expensive data (VHR imagery and DSM) AND field work to collect values of susceptibility for buildings? The case-study further puts in evidence the difficulties of relying on automatic methods based on RS and the need for costly and time-consuming manual editing…	We appreciate the reviewer's comment. Of course, field work is not completely represented by remote sensing and GIS techniques. However, there is a significant reduction of effort due to the focus on a few representatives for each building type. To make this more clear, we have modified the manuscript as follows: "Against this background, a novel approach is proposed that particularly enables the classification and characterisation of buildings on large scale as well as systematic physical flood susceptibility assessment. High resolution images and digital surface models are used as data source for the building analysis because they are supposed to capture huge multidimensional information on settlement features in an instant of time and allow for high efficiency through principal global availability and relatively low-costs compared to surveying the parameters on the ground (Navulur, 2006; Vu and Ban, 2010)." "It proved as a systematic procedure with reduced efforts compared to extensive ex-post damage surveys or ex-ante synthetic damage simulation modelling." "The approaches of selecting the representative buildings via the building taxonomic code can help to reduce costs and time required for surveying of information in urban areas."	Page 5697, line 3 Page 5710, line 17 Page 5712, line 10
3	It is said that HR images (…) allow for high efficiency through global availability and relatively lowcosts (p. 5697, ln. 8). "Global availability" of HR optical imagery is mostly theoretical, given practical limitations such as cost (aerial imagery) and limited coverage of high latitudes, cloud cover, etc. (satellite imagery). The mentioned "Low-costs" are compared to which alternatives?	We agree with the reviewer that this aspect should be phrased a bit more carefully. Therefore, we have improved the explanation about global availability of data as follows: "High resolution images and digital surface models are used as data source for the building analysis because they are supposed to capture huge multidimensional information on settlement features in an instant of time and allow for high efficiency through principal global availability and relatively low costs compared to surveying the parameters on the ground (Navulur, 2006; Vu and Ban, 2010)."	Page 5697, line 5

		"Transferability of the approach to other study regions seems mainly to depend on the accessibility of very high resolution data. Although there are currently certain limitations in many regions of the world, improvements may be expected from new sensors. There is a rapidly increasing trend towards the availability and accessibility of spatial data and improvements of their properties in terms of resolution. For instance, unmanned aerial vehicles may be supposed to provide support for the collection of very high resolution images and the improved accuracy of the extracted features. Additionally, new free algorithms for features extraction play a role such, as SpaceEye (ICIS 2009) which allows processing of the global data of Google Earth with simple functions on the imagery such as segmentation and edge extraction. These technological advances will contribute in the near future to the collecting of a huge amount of data which require to be classified for the analysis of settlements."	Page 5710, line 25
4	It is said that "…identification of individual buildings (…) can be done by automatic-or semi-automatic extraction from remote sensing data." (p. 5701, ln. 15). Not always, as the test demonstrates…	This comment is particularly appreciated. There has been a surprisingly large number of specialised literature for building extraction from different remote sensing sources. Most of them are supposed to be automatic. These methods require the input of parameters or threshold and depend on the level of expected results and of accuracy. Therefore, they are not automatic. Thus, we have removed the word "automatic" on page 5701 line 18 and revised the text as follows: "This can be done by predominately done semi-automatic" and including the word "semi-automatic". Moreover, we have included an additional condition for the building extraction as follows: "This can be done by predominately done semi-automatic extraction from remote sensing data, depending on "the resolution of data, especially of the high data, on the selected method, on the scene complexity and incomplete cue extraction" (Sohn and Dowman, 2007)."	Page 5701, line 17 Page 5707 line 17 ff. Page 5707, line17

5	Regarding the case-study, why was this study area selected (p. 5707)? What are the main features of this area? Can a map be included, with the extent and location?	We thank the reviewer for this valuable comment. An according explanation has been added as follows: "Testing of the methodology was carried out in a study site of a developing country selected randomly according to the availability of data."	Page 5697, line19
6	It is mentioned that "inconsistencies could be overcome with higher spatial resolution of the DSM" (p. 5708). However, so far studies show that these can only be reduced and not completely eliminated, as 100% accuracy in building extraction is not yet attainable. Also it is said that "buildings that did not fit the criteria of accuracy were manually edited" (p. 5708, ln. 2). What are these accuracy criteria?	This comment of the reviewer is very much appreciated. We responded to it with the following revision: "Using reference polygons of the building outline, the accuracy of the building extraction is calculated using the indexes proposed by Song and Haithcoat (2005) and Aguilar and Mills (2008); for a more general discussion of factors influencing accuracy see Sohn and Dowman, 2007)."	Page 5707, line 26
7	In Table 3, what is the role of the parameter 'Susceptible volume'? It does not seem to be taken in consideration for computation of the building's volume degradation in Table 4, as one would expect.	We thank the reviewer for this comment. Indeed, it was a mistake in this table. We have corrected it. 'Susceptible volume' results multiplying 'volume material in m^3' with the suscetabiliy value. The name of Table 4 has been changed to "Derivation of the building's susceptible volume for water depth related to the material of Table 3".	Page 5719
8	In Figs. 6 and 7, the potential deterioration is shown in in m3. Wouldn't it be more useful, including for comparison of impact functions among individual buildings as well as taxonomies in same area to have this scale standardized between 0-1, with 1 being the total volume of the building?	We appreciate this comment of the reviewer. Yes, this is an interesting discussion which we already had during the development of the methodology. At the end, we concluded that normalisation is neither required from the field data nor improves the usability of the results. Since flooding normally just effects the basement and ground floor, normalisation related to the entire building would lead to an underestimation of damage to large buildings such as multi-storey houses. As consequence, e.g. prioritising of detailed risk assessments or risk reduction measures would underestimate this damage which of course would a undesirable result.	