Natural Hazards
and Earth System
Sciences
Discussions

Interactive comment on "Building Asset Value Mapping in Support of Flood Risk Assessment: A Case Study of Shanghai, China" *by* Jidong Wu et al.

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We thank the referee 1 for his/her careful reading of the paper, and we have found the comments extremely useful while working on a new draft of the paper with substantial changes. We have adopted the recommendations from referee 1.

Response to anonymous Referee #1

The discussion paper entitled 'Building Asset Value Mapping in Support of Flood Risk Assessment: A Case Study of Shanghai, China' effectively developed a methodology to map the building asset value using Shanghai as a case study and further applied the results in a flood damage estimation under a flood scenario of Shanghai to testify

the flexibility of the BFA map. But some problems however may affect the accurate evaluation. In specific:

1): LandScan population (2010) was used as ancillary data together with building footprint map and the township-level BFA estimation (2014) to represent the floor area density within a township. However, the population of the city of Shanghai increased by 1 million during 2010 to 2014. The time inconsistency should be fixed or at least discussed (P5, Table1);

Response: Thanks for indicating the data limitation problem in this study. Because we did not acquire LandScan 2014, we have to resort to LandScan 2010 that we had. We totally agree with your suggestion, and will add a discussion for this issue in the Discussion section.

2): While the floor area and population are generally closely related and high correlation between them in district level has been presented, to use population data as proxy to estimate the building density can still bring major errors in some areas of Chinese city, such as villa residential and 'village in the city'. For these areas, the building density for the same number of population should be totally different. For these part, a correlation analysis with validation with random point instead of district level should be necessary, especially taking account for the high-resolution results in this research (P5, L15_20);

Response: Thanks for your constructive comments. As you referred, the population density is not perfectly correlated with building area, such as villa residential and 'village in the city', the spatial heterogeneity for this correlation should be even bigger in finer spatial scale. We totally agree with your suggestion, and did a finer spatial scale validation: firstly, we acquired a real building distribution vector layer for downtown area of Shanghai, which including the building height information, according to the relationship between number of storeys and building height sampling, we transformed building height to building storeys, then we can calculate building floor area in each regular grid

cell; b) after that, we can compare the modeled building floor area with the real building floor area as you suggested and as a necessary supplement of validation except for district level correlation analysis.

Detailed revisions are as follows: 1) we add a new figure in the main text (Section 3) to show the validation of modeled building floor area in the downtown area of Shanghai. 2) we add a paragraph to describe the validation process and results in the new Section 3.2. "As population density is not fully correlated with BFA, such as villa residential and 'village in the city' in some city of China, for further validating the accuracy of modeled BFA in sub-district level, we compared the modeled BFA with real BFA. As Figure 6 shows, ..."

Figure 6: Building floor area validation by different grid cell size in part of the downtown area of Shanghai. a) Real building height in the downtown area of Shanghai (i.e., the sampling area for validation). b) Relationship between building height and number of storeys in Shanghai acquired by random building surveys. c) Real building floor area calculated by number of storeys via a) and b) multiplied with occupied area of the building footprint. d) Modeled building floor area as described above in this article. e) Distribution of relative error between modeled BFA and Real BFA by five different grid cell size. f) Relationship between modeled BFA and Real BFA for regular grid cell size of 1600 m. g) Spatial relative error distribution between modeled BFA and Real BFA for regular grid cell size of 1600 m.

3): The explanation of the estimation of construction costs is not clear. The basis of 3230 CNY for medium story and 6750 CNY for high story is not convincing enough. Besides, spatial differences are neglected with the mean value (P8, L24_27);

Response: Thanks for your comments. From the perspective of reconstruction cost needed post-disaster, we use replacement cost to estimate the building asset value according to building types by reference to "Construction cost standard of Shanghai". We did not consider the spatial differences of replacement cost across Shanghai (with

a total area of 6340 square kilometers in size) because of data issues even though this differences are actually exist. According to your comments, we consider to revise this part as follows: a) explain the replacement cost parameter more clearly in the main text; 2) add a discussion for this limitation in the Discussion section.

4): Minor problem: The sentence 'both the high- and low-rise BFA was underestimated' should be 'both the high-rise and low-rise BFA was underestimated' (P13, L14).

Response: Thanks for your reminding. We have adopted your suggestion. We will check the English language issues in the revised manuscript.

Thank you again for your comments. These comments are extremely helpful for us.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2017-17/nhess-2017-17-AC1-supplement.pdf

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., doi:10.5194/nhess-2017-17, 2017.