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Interactive comment on "Statistical model for economic damage from pluvial flood in Japan using rainfall data and socio-economic parameters" *by* R. Bhattarai et al.

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We used slope as one of a dependent variable in damage occurrence probability function. For this, GTOPO30 datasets (about 1 km spatial resolution) were used which were further processed to prepare 0.1 deg. datasets (about 10 km) resolution [Page: 6086, LN:9-13]. The model was based on the 0.1 deg. resolution for pluvial flood damage calculation in national scale and its distribution over Japan. The slope coefficient was optimized in the slope which we have used. The model was tested in different spatial resolution [10 km, 20 km and 60 km] for precipitation input and found negligible impact on results however the sensitivity of spatial resolution of DEM were not judged yet. Since the model development and the results were based on even coarser scale than the DEM itself and also the slope coefficient was optimized in the slope, there would be negligible impact in the results by using finer resolution DEM, however it could be examined in revised version of the paper. Only the general property damage data which imply housing, household appliances, depreciable business properties, business inventory properties, depreciable agricultural/fisheries and agriculture/fisheries inventory property [Page: 6078, LN: 5-12] were used in this study. We excluded the infrastructure and public buildings damage and the model was designed to assess pluvial flood damage on general property only, hence we believe that the distribution of assets based on population are reasonable. We defined vulnerability by damage per GDP as given by damage cost function. The vulnerability were evaluated in three different population density classes and given by a power law. Actually the parameter "p" and "q" implicitly show the vulnerability variables (pluvial flood defense capacity of a location) for all three population density classes which were described in the section 2.2.4. It is true that all depended factors of vulnerability (p and q) were not analyzed in this study and we hope further study will be in the direction of assigning vulnerability variables rather than lumped vulnerability parameter values. We agree with the reviewer that very short term precipitation, particularly lasts for a few minutes to hours be responsible for pluvial flooding. However the damage data for these temporal resolution are not realized to date. Moreover, damage values are available as integral values of flood events which lasts several days and further disaggregation of these data into both temporal and spatial scale are a very difficult task at this moment. Hence the daily damage data associated with daily precipitation with its exceedance probability were used to establish the formulation as given in Eq (9) and Eq (10). Since hourly precipitation dataset over Japan are available, a sensitivity test for precipitation of different temporal resolution could be presented in revised version of the paper. The population density classes were defined in three different classes after many trials. Obviously the present population density class classified as (Low: 0-250 persons/km2, Medium: 250-2000 persons/km2 and high: >2000 persons/km2) gave best output and hence adopted in this study. The explanation of damage data were given in Page: 6078, LN:5-11 and section 2.13 Page: 6084, LN:9-15). Since the Gumbel distribution theory is very well known, its brief description was presented under section 2.2.2 with its two equations (Eq. 5 and Eq. 6). However, more explanation could be incorporated in revised version of the manuscript. We acknowledge the reviewer for pointing out the correction in Eq. 5. It was only a typing or printing error. The equation is corrected as: a=($\sqrt{6}\ \pi$)/6σ. Since all the data used were in Japanese currency, the results with this paper were presented in JPY. However the reviewer concern could be addressed in the revised version. Other minor corrections will be addressed in the revised version.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 6075, 2015.