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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A GIS-based multivariate approach to identify flood damage affecting factors" *by* Barbara Blumenthal et al.

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'Paper is relevant to the scope of the journal, it describes the importance of TWI for urban flood risk analysis. The topic is certainly in interest of the international reader; However, I found several concerns that deserved to be addressed to improve the quality of the paper'

Thank you for the time you have invested and for valuable comments which will help us improve the manuscript. We have considered all comments. The changes are listed below the individual comments. If we for some reason have not been able to accommodate a suggestion an explanation has been provided.

Comment 1: 'Pg.4, line 25, Provide the details of DEM which used for derive the slope

map of the study area.'

Response: Thank you for this comment. DEM details were added to the section. The following was added: "The DEM has 2m horizontal and between 0.05 and 0.2m vertical resolutions and is based on the RH2000 elevation system. The DEM is the official Swedish elevation model (NNH) generated through airborne laserscanning."

Comment 2: 'Fig.1 North arrow is missing' Response: We refrain from using a north arrow because true north varies in the area due to meridian convergence. North is clearly indicated by the latitude/longitude gridnet.

Comment 3: 'Author(s) has classified the land cover in three classes, however the description of land use classification methods and source image is missing.'

Response: Land cover was not classified in the sense of deriving new classes based on spectral/textural information through image classification. Therefore, no confusion matrix is attached either. Official Swedish land cover data that is based on the CORINE classification scheme (Bossard et al. 2000 – CORINE land cover technical guide – Addendum 2000), and that the Swedish Environmental Protection Agency is responsible for, was aggregated from originally 25 classes into 3 classes, each representing a particular percentage of impervious surfaces (class 1 = 0%; class 2 =50% and class 3 = 100%). A clarification of land cover aggregation was provided under "Surface sealing"A class number was assigned to the table in Appendix 2 based on sealed surface percentages. The CORINE reference (Bossard et al. 2000) was added to the reference section. The introductory "Geodata" section was reformulated. The "Surface sealing" section was reformulated.

Comment 4: 'Author(s) have pertained the average rainfall in Table 2, however the method used for calculation of Average rainfall is missing. In addition, study is based on spatially located data bases although the location map of rain gauages are missing.'

Response: The average was calculated as the sum of the total rainfall amounts for

June, July and August from 2001 to 2013 divided with 13. A footnote was added in the manuscript. We added the location of the rain gauges in fig 2a and 2b.

Comment 5: 'Pg. 3, Line 21 temporal resolution is 15 minutes, however as per table 2 temporal resolution has been considered for 15 minutes and 60 minutes, it shows the wrong interpretation of data sets for statistics.'

Response: The finest resolution of the rainfall accumulation is 15 min. We do not understand this comment. If 15 min accumulations are known, even 60 min rainfall accumulations are known..? We have clarified in the manuscript that 15 min is the finest resolution.

Comment 6: 'Pg. 3, line 39 shows that Geographic positions for damages are not certain then how it is compare with TWI analysis?' Response: We calculated the mean TWI of the parishes and analyzed its correlation to the number and the total amount of flood insurance damage per parish.

Comment 7: 'What is PCA? What its significance flood damage analysis?'

Response: PCA (Principal component analyses) is a multivariate method, often used in exploratory data analysis. It is aimed to structure, simplify and visualize a dataset of possibly correlated variables. The original dataset (of correlated variables) converts by orthogonal transformation into a set of uncorrelated variables called principal components (PCs). In this study, PCA is used to analyze which of the investigated variables are correlated to flood damages and which are not. We will develop this issue in the manuscript in the section Statistical analysis.

Comment 8: 'Pg. 6, line 3, what is the r value of 0.7 to 0.9? Explain it significant in present study'

Response: Thank you for the comment. Here we mean the Pearson correlation coefficient r (ranges between -1 and 1). It is a measure for strength and direction of a linear relationship between two variables. R-values between 0.7 and 0.9 indicate a strong

positive relationship. We clarified this point in the manuscript.

Bossard, M., Feranec, J., Otahel, J., 2000. CORINE land cover technical guide: Addendum 2000. Technical report No 40. Copenhagen (EEA).

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