

Interactive comment on “Identifying urban areas prone to flash floods using GIS – preliminary results” by Marzena Wicht and Katarzyna Osinska-Skotak

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This manuscript describes the modelling of areas prone to flash flooding in a district of Warsaw, Poland using GIS. The general concept of the research was interesting and could potentially be widely applicable and useful in various cities. A relatively strong case was built for modelling flood-prone areas, particularly with the advent of climate change. The idea of including open source data and/or open source GIS platforms is helpful as it allows a broader audience of GIS users to map the potential for flood risk or other environmental risks. These points notwithstanding, there were two major, interconnected issues with the article – weak connection between purpose, objectives and methods as well as the utility of results.

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a) Weak Connection between Purpose, Objectives and Methods The article does not clearly connect the purpose, objectives and methods because the purpose is unclear, the objectives appear unfulfilled and the methods do not align with the purpose or objectives. It must be clear to the reader whether the primary focus of the article is to capitalize on the use of open source GIS data and/or software or if this is merely a possibility. If the focus of the article is on open source GIS data or open source GIS platforms, or both, then it should be mentioned explicitly in the title and abstract. More information on the history and benefits of open source would be helpful to allow the reader to understand why open source is important for modelling potential risk. The difference between open source data and open source platforms should also be made explicit for readers unfamiliar with the realm of open source and GIS. The purpose appears to be an assessment of areas vulnerable to floods using open source GIS data and/or software, but the title, abstract and introduction do not make this clear. The purpose is not fully articulated and there is confusion throughout the article about what the purpose of the research is. Modelling flood-prone areas with open source data and proprietary GIS and modelling flood-prone areas with open source data and open source GIS are two very different purposes. The abstract mentions “commonly available data”, but the introduction refers to “open data”, which do not necessarily share the same definitions. Additionally, it is unclear whether the model used in this research is an open source or proprietary platform. The introduction referred to the use of an open-access GIS platform, but then the conclusion referred to the creation of an open-source platform to model flood risk. It is not relevant to mention the use of open-access GIS platforms in the introduction if the project does not use this type of GIS platform. The objectives of the research seem to confuse the research undertaken with the research that could be undertaken in the future. Steps b) through d) of the research (lines 28-30 on p. 2) do not appear to be addressed; however, there is reference to these steps in the conclusion section as research that will be conducted. For instance, step b) of the research section is to “test the thesis in different European urban areas”, but it states later in the paragraph that the paper tests the functionality

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of flood-prone area modelling in Warsaw. The objectives of the research should be attainable; testing the modelling in different European urban areas is not a realistic objective of this research. The methods appear to need more assessment for feasibility and there seems to be an overemphasis on methods that were not applicable to this research. Parts of the methods that did not work should be excluded from the paper (e.g. lines 12-16 on p. 12 and lines 1-3 on p. 13), unless they were appropriately adjusted and yielded meaningful results. Further, a large part of the introduction is dedicated to deriving the digital surface model from LiDAR data, though LiDAR data was unavailable in the study area at the time. Again, the focus of the paper should be on research that was conducted and not on research that could be conducted. It would be more suitable to acknowledge the current availability of LiDAR data in the conclusion as an aspect that could improve the accuracy of the model. There should be a coherent narrative in which the purpose feeds into the objectives (how purpose will be fulfilled), which feed into the methods (how objectives will be fulfilled). This will ultimately be the reader's guide to understanding what the research is, its importance and how it will be conducted. b) Utility of Results The results could have been more effective if better methods were chosen. A major issue with the results was that it only modeled one possible scenario when flooding events are highly dynamic. The highest maximum daily precipitation from the summers of 2007-2016 was chosen to assess flood-prone risk, but it would have been more valuable to model various scenarios with 25-, 50-, 100- and 200-year precipitation events to identify the areas at risk. This would provide insight into how flood waters rise across space and time since flood waters do not necessarily rise uniformly. The analysis of these four scenarios could also be conducted quickly. Moreover, the results were never validated with data, so it is difficult to assess the accuracy of the model. It would be useful to attempt reconciling the model data with the 2009 flash flood event data. Validating the model is an important step to understanding and addressing the model's shortfalls. Alternatively, it may be suitable to create a "risk index" using multi-criteria analysis where different layers of data can be used to assess cumulative risk.

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General Suggestions for Improvement c) Review correct use of citations (e.g. lines 4-5 on p. 2 do not need brackets around the years), quotations (e.g. lines 3-4 on p. 11) and figure references (e.g. do not use 'see' at line 32 on p. 11) d) Solicit the help of a few proofreaders as there were a few instances where the wrong word was used (e.g. p. 11 engendered vs. endangered) or where the word was spelled incorrectly (e.g. p. 9 topologic vs. topologic). e) Remove table of LiDAR data availability in selected European countries since it does not pertain to research. f) Ensure that sentences are directly relevant to the research. It is not important to include the types of houses or industrial nature of the city unless an explicit link is made to flood risk (e.g. p. 5). g) Use only aerial photograph from 2008 in figure 1 as the research is to model flood-prone areas during the time of the research, and not flood-prone areas in 1935 or 1945. h) Number steps for methods to make it easier to follow. i) Explain why the total amount of water accumulated in each basin was classified into 5 classes with the top 3 classes being the most risky. There should be a rationale behind this. j) Enlarge figure 10 so the reader can easily identify basin classification and flooded areas. k) Separate discussions from conclusion. The discussion should relate directly to the objectives and limitations while the conclusion should give an overview of the research, its importance, findings and implications.

I would recommend reflecting on the purpose, objectives and methods and narrowing these elements. In its current state, the paper is difficult to follow and the results leave a little to be desired. Once it is clear what the purpose of the article is, the appropriate objectives and methods can be chosen to support it. A key question is whether the focus of the research is on open source data and/or open source platforms and whether the data is available to support this research. There should also be a very critical review of whether every sentence in the paper is relevant to the research. I believe major revisions are necessary to strengthen the utility of this research.

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