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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Evaluation of coastal vulnerability to flooding: comparison of two different methodologies adopted by the Emilia-Romagna Region (Italy)" *by* L. Perini et al.

L. Perini et al.

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The answers to the reviewer's comments are presented below, after each comment posted by the reviewer, numbered from 1 to 11.

1. Although English is not my mother tongue, I found several inconsistencies in the use of English. I strongly suggest a revision of the English by a native speaker.

Answer to comment 1: The English was reviewed

2. I suggest improving the quality of the figures. Sometimes the texts/colours are difficult to read (figures 4 and 5)

Answer to comment 2: Figure 4 and 5 were completely reworked to make the legend larger and clearer, the symbols well visible and distinguishable and the colours brighter. The new figures named Fig4_rev.jpg and Fig5_rev.jpg are attached to this answer.

3. From my point of view the abstract is not the place to mention the particular use of software. Instead of mentioning the tool “Cost-Distance of ARGIS” it would be better to describe what was done with this tool.

Answer to comment 3: The reference to the Cost-Distance tool was removed from the abstract and replaced by the statement “a least-path cost analysis."

4. In the Introduction section it would be convenient to include a general comparison with previous works, together with a discussion of the limitations and applicability of the methodologies presented in this paper. It can be used as the base for the discussion of the work presented by Escudero et al. (2012).

Answer to comment 4: The work by Escudero et al. (2012) is very interesting but we believe that it is not relevant to the present paper. The present work is not related to risk assessment and how risk is defined at regional level, although some results on this topic are presented. On page 4319 it is stated: “The current paper aims at presenting in detail the methodology adopted at regional level in Emilia-Romagna to satisfy the requests of the Floods Directive. The Directive was implemented into the Italian legislation through the Legislative Decree 49/2010. The hazard maps are presented here in comparison with another approach which produced vulnerability maps along profile lines (hereafter referred to as “VaPL”), that was adopted locally before the Directive had been issued”. Therefore an overview of the available methodologies to define coastal risk is out of the scope of the paper that, in fact, focuses on the available literature on flood maps creation. The paper by Escudero et al. (2012) makes an extensive summary of the available definitions and methods to evaluate coastal risk. The present work provides an overview of the available methods to create flood hazard maps, which can or cannot be related to a risk analysis. The risk maps are presented

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for completeness sake in the context of the Flood Directive, but the main focus is on the EU-Directive method (Cost-Distance tool and the model in ArcGIS) applied at regional level and how it compares with another method adopted by the regional authorities before the EU-Directive. The comparison is made on the results of both methodologies and if they are able to properly describe flood hazards and the impact of storms. In theory, the risk assessment could be removed from the paper, but we believe that it is interesting to present how the end-users defined the matrix that combines events with different return periods and the exposure of land use typologies, classified according to the Flood Directive.

5. As the journal has a broad readership many of whom are not experts in ARGIS, more details of the calculation procedures done with the module "Cost-Distance" should be included in the explanations

Answer to comment 5: The Cost-Distance tool of ArcGIS is a common and standard tool that is broadly explained in the on-line help of ArcGIS (available at: http://resources.arcgis.com/en/help/main/10.1/index.html#//009z00000018000000). We believe that, every time ArcGIS is used to carry out an analysis, the software itself is cited and only a brief description of its functionalities is outlined in the text. Otherwise the paper would result repetitive, while it does not have to be a software guideline for readers.

6. The authors make a review of flood hydrodynamic models, which do not contribute to work, given that they did not use any of them. These parts of the paper can be summarized.

Answer to comment 6: The review is presented to outline other works and methods related to the creation of flood maps, according to the reviewer 2 comments. In fact, the literature cited in the introduction is then discussed in the discussion section to provide a comparison between different methods and results, and the limitations/strengths of the presented method. See also the answer to comment 4.

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7. It is not clear in the paper how the authors transferred to the flooding maps the zone identified by experts. Surely there are flood water marks recorded in some buildings.

Answer to comment 7: The information from peripheral offices are collected by SGSS and then "translated" into maps. More recently (i.e. 2013) peripheral offices are encouraged to collect quantitative information on storm impacts, but till then only qualitative descriptions of what occurred along the coast are available. Therefore, there is no information on flood water levels, but only general comments on, e.g., up to where the water flowed landward (road xxx, at the crossroad with road xxx, etc) and a rough estimation of the water levels. Also damages are reported as qualitative narrative information.

8. The authors employed the formulations presented by Holman (1986) and improved by Komar (1998) in order to evaluate the runup. In my experience the formulation presented by Stockdon et al. (2006) is more reliable, any reason for choosing the former?

Answer to comment 8: The Holman (1986) formula was used for the analysis because the VaPL method was set-up before the Stockdon et al. (2006) formula had been published.

9. An explanation or reference is needed on how the wave period was chosen.

Answer to comment 9: The wave period associated to a specific return period was chosen according to the available information in the literature (Idroser, 1996), where the analysis of different return periods is presented. See point 2 on page 4322 and Table 1.

10. A comparison between the calculated and measured flooding of the March 2010 storm should be presented. In fact satellite photos can be used.

Answer to comment 10: Thank you for this comment. It is not possible to include the suggested analysis in the present work. We will, however, consider to map on satellite images, if available, the coastal flooding extension after the 2010 storm and to publish

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the outcomes of the analysis in a future paper.

11. The effect of sea level rise is not considered in the analysis, why?

Answer to comment 11: The following sentence was added in the paper, page 4334, line 8: “The Sea Level Rise (SLR) component was not taken into account in this study. A careful estimation of SLR projections for the Adriatic Sea is not yet available and global/Mediterranean projections probably are not representative of what might occur in the enclosed basin of the northern Adriatic area”

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 4315, 2015.

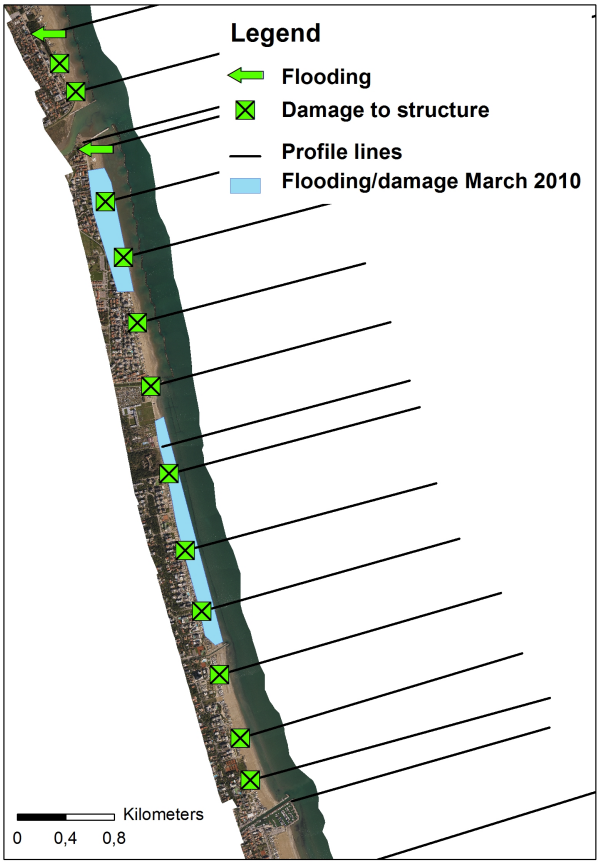

Fig. 1.

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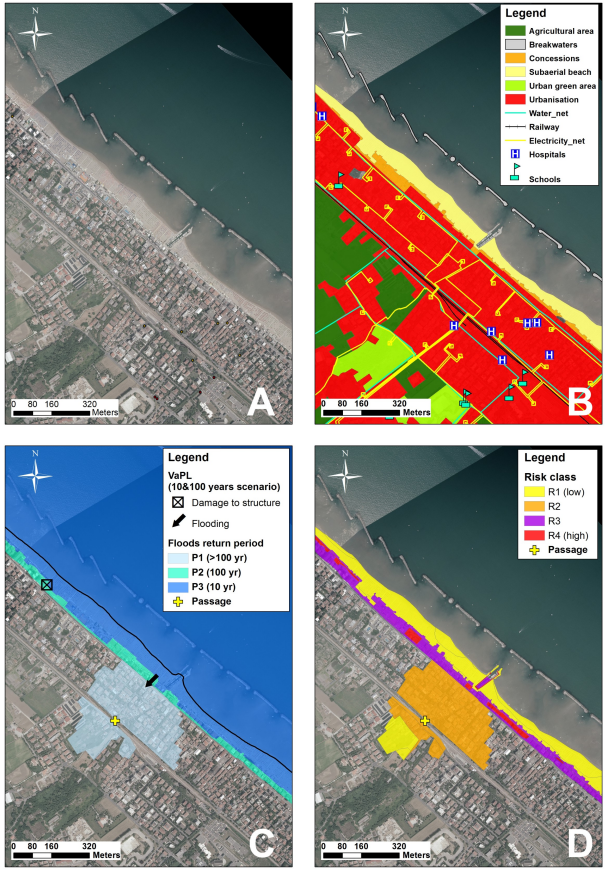

Fig. 2.

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