

## ***Interactive comment on “Developments in large-scale coastal flood hazard mapping” by M. I. Vousdoukas et al.***

**M. I. Vousdoukas et al.**

michalis.vousdoukas@jrc.ec.europa.eu

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The manuscript represents the very first approach to the problem of coastal flooding at an European scale. The paper is very well written and is based on a rigorous approach. It is notable the fact that four different methodologies are compared, spacing from a simple bath-tub approach to more sophisticated numerical modeling. Regarding the literature review a little bit extra can be done. The author on page 2-lines 52-58 presents basically two approaches with different potential of application but also variable computing requirements, e.g. bath-tub in a GIS environment against numerical modeling. A third intermediate solution, a dynamic reduced model like LISFLOOD is finally considered. In reality a fourth approach can be considered, the use of sophisticated GIS methodologies, e.g. the Cost-Distance Approach, thus introducing a "proxy" for inundated surface characteristics, like the presence of obstacles or passageways.

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This new approach has been recently compared to more detailed hydrological estimations using wave run-up calculations and the results are promising. Likewise other approaches, it has been used for the application of the flood directory, the method and reference case study can be found in the recent paper on NHES by Perini et al., 2016 (DOI:10.5194/nhess-16-181-2016). Another interesting application is the one by Sekovski et al., 2015 (DOI: 10.5194/nhess-15-2331-2015), to predict increased vulnerability to urban growth.

Authors: We are thankful to the reviewer for the positive comments on our work. We agree that the introduction could be improved and in the revised version we are discussing the proposed methodologies, as well as others proposed by the second referee.

Regarding the approximation that the authors used for the introduction of coastal structures in the DTM, described at page 5, lines 170-172, I think it is a clever solution. However, can they clarify why they use a 5 year return period level? Is not a little bit low? My experience is that defense structures are built with an elevation which corresponds to much higher safety levels, if not, low-lying areas behind dykes would be flooded too regularly. Personally I would have chosen at least a 10 return period level.

Authors: The accuracy, detail, and spatial resolution/density of the available information about coastal protection varies substantially among countries; i.e. for some countries detailed GIS layers are available, while for others little information can be found. This is a known shortcoming, which has been acknowledged also by both reviewers. As a result collecting and improving the information on coastal protection has been a constant task during the last years. Along most urban centers it was possible to have at least a rough estimate, i.e. from personal communication with national authorities or the coastal engineering community. The same applies for some countries (e.g. Belgium) for which data were not officially available. Therefore most urban centers have been considered to be protected by more rare events and the 5-year event standard has been applied mainly along areas for which we had no information. Those were

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mostly locations with low population density. There, a protection standard even lower than for the 5-year event is often in place and for that reason we expect that our results could be even conservative.

At page 6 the authors say that Xynthia is the best documented flood in Europe. This is not true, the 1953 flood in the Netherlands, Belgium and the UK is very well documented. If they mean that Xynthia is more documented regarding the flood extent using for example satellite-based methods I agree. But I believe the statement should be rephrased.

Authors: The comment is fair and the statement has been rephrased. Xynthia is not the only documented event, but most likely the only recent well documented event.

On the same page, at line 190 they say that the flood extent was obtained by field measurements. Who did these measurements? Are they publicly available?

Authors: The flood extent information was obtained by digitizing reports and papers, and references have been added in the revised manuscript (Breilh et al. 2013 and DDTM-17, 2011). Similar information could be also found in the following website: <http://www.storm-surge.info/data-access>, even though they were not used in the present work.

Also, the sentence at line 191 is a broken one.

Authors: The sentence has been rephrased.

Some reviewing is needed for the reference list. 1) The reference by Breilh et al. should come before Boetle et al. 2) Is the paper by Dottori already published? Add page numbers. 3) The paper by Vousdoukas et al. at line 483 is now published. Please upgrade.

Authors: The reference list has been corrected. Vousdoukas et al and Dottori et al are still online as corrected proofs. The order of the references is made by the Endnote reference manager software using the journal template and should be correct. It will

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be further checked and corrected in case of a problem before final publication.

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