Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2016-496-RC3, 2016
© Author(s) 2016. CC-BY 3.0 License.

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Reproducing an extreme flood with uncertain post-event information" *by* Diana Fuentes-Andino et al.

Anonymous Referee #3

Received and published: 5 December 2016

"Reproducing an extreme flood with uncertain post-event information" by Diana Fuentes-Andino et al. deals with the possibility of modeling floods when there is a lack in data. The case considered is based on the flood event which occured in Tegucigalpa (Honduras) due to hurricane Mitch. The purpose is to generate a probabilistic inundation map generated thanks to several modeling tools (TOPMODEL, LISFLOOD-FP) and considering uncertainty in parameters. The article is interesting and perfectly in the scope of the journal.

However, I think that this article might be fully improved.

The authors should highlight the novelties with their work and the difficulties. They should do a deeper analysis of the post-event data (quality and quantity), of the method used and of the results obtained.

This article is not self contained, it has to be read with other references. This is not very convenient, I recommend to give some information. For example, even if they are well-known some little details should be given about the different modeling tools which are used in this article (TOPMODEL, LISFLOOD-FP, GLUE, ...): equations, parameters, ...

The authors should mention some works which deal with Mitch event and its impacts in Honduras : - Westerberg, I., Walther, A., Guerrero, J.-L., Coello, Z., Halldin, S., Xu, C.-Y., Chen, D. & Lundin (2010). Precipitation data in a mountainous catchment in Honduras: quality assessment and spatiotemporal characteristics. Theor Appl Climatol, 101. 381-396. - Mastin, M.C. and Olsen, T.D. (2002). Fifty-Year Flood-Inundation Maps for Tegucigalpa, Honduras. U.S. Geological Survey Open-File Report 02-261. - Haile, A.T. (2005). Integrating Hydrodynamic Models and High Resolution DEM (LIDAR) For Flood Modelling. International Institute for geo-information science and earth observation Enschede, the Netherlands.

All the hydraulic parameters do not have the same impact and the same influence on the results of the modeling. There are some good references on this topic in litterature, they have to be mentioned and some words have to be said. Because all parameters cannot be considered of equivalent value. This remark is also valid for the data. A more in depth discussion should be done on this topic which one of the main points of the article. For example discharge and roughness coefficient are strongly connected, so uncertainties on discharges should impact strongly the roughness coefficient ...

In both the introduction and the section 3. "Method", for the uncertainty analysis aspects, the focus is given exclusively on the GLUE method which is used here applied in the field for a couple of years already. However it would be very welcome to contextualize the interest of using the GLUE method within the framework of more recent methods applied in the field of uncertainty analysis in recent years : e.g. in hydraulic modeling in 1D see (Bozzi et al., 2015) and in 2D see (Willis, 2014) which applies a screening method in 2D and lastly (Abily et al., 2015 & 2016) for global sensitivity analysis applications in 2D and spatialisation of uncertainty aspects. I recommend the

authors to provide a short subsection/paragraph which makes the synthesis of this type of approaches explaining what is the place of GLUE. Obviously above mentioned approaches are computationnally costly, but a stte of the art is clearly lacking in this article to enhance added value and limits of what is done by the authors on the uncertainty aspect compare to what is existing in literature and to put it in perspective for the readers especially for those who are not familiar with uncertainty analysis. I recommand in this topic : - Abily, M., Bertrand, N., Delestre, O., Gourbesville, P., & Duluc, C.-M. (2016). Spatial Global Sensitivity Analysis of High Resolution classified topographic data use in 2D urban flood modelling. Environmental Modelling & Software, 77. 183-195. - Abily, M., Delestre, O., Amossé, L., Bertrand, N., Richet, Y., Duluc, C.-M., Gourbesville, P. & Navaro, P. (2015). Uncertainty related to high resolution topographic data use for flood event modelling over urban areas: toward sensitivity analysis approach. ESAIM: Proceedings and Surveys, 48, 385-399. - Bozzi, S., Passoni, G., Bernadara, P., Goutal, N. & Arnaud, A. (2015). Roghness and Discharge Uncertainty in 1D Water Level Calculations. Environmental Modeling & Assesment, 1-11. - Willis, T.D. (2014). Systematic analysis of uncertainty in flood inundation modelling. Doctoral dissertation, University of Leeds. - Iooss, B. & Lemaître, P. (2015). A review on global sensitivity analysis methods. Uncertainty management in Simulation-Optimization of Complex Systems: Algorithms and Applications, Ed. C. Meloni and G. Dellino, Springer.

Here are some comments/questions on details : - p.7 l.19 "combining the rainfall-runoff TOPMODEL", as mentioned before, some details should be given on the modeling tools especially TOPMODEL, in order to show that it is also a model. Because some modeling tools such as HEC-RAS, MIKE11, ... are based on different physically based models/equations and the word model cannot be used for these tools. So it should be clarified if TOPMODELis based on one model and might considered as a model. If not, the sentence should be changed into "combining the rainfall-runoff results generated by TOPMODEL". - p.8 l.15 "with channel roughness coefficient (nCU) assumed uniform along all the reaches." it should be told if it is a reasonnable asumption. - p.8 from line 17 to 25, I found this paragraph well written. - p.9 line 5-6 Are a and b percentages

or hours? It has to be clarified here p.10 l.26-27. - p.9 l.28 "a downstream boundary condition" it should be told which kind of boundary condition is used. I guess it is water level/height. - p.10 from line 5 to 12, are the choices given reasonable, it should be discussed a little to justify these choices. - p.10 l.21 I think that "Two degree of belief values" should be changed into "Two degrees of belief values". - p.10 l.23 the same remark for "Ninety-nine degree of belief values". - p.10 l.28 "metres" should be changed into "meters". - p.10 l.31 "... degrees of belief." should be changed into "...degrees of belief:". - p.10 l.32 after formula (1) a comma should be added. - p.11 l.1 "Where ..." should be changed into "where ...". - p.11 l.4 "to all the observed maximum water level" into "to all the observed maximum water levels". - p.11 l.23 "... 47 894 out of 130 000" something is missing: "130 000 behavioural simulations"? - p.12 line 3 to 10 are the behaviors due to the change of parameters described in this paragraph expected? It should be justified a little. - p.12 l.16 "4619mˆ3 sˆ-1" a space should be added between the value and the unit. - p.13 l.4 "an RRM" should be changed into "a RRM". - p.13 l.5 "was proven" should be changed into "was proved". - p.13 l.8 "... be used for forecasting ...", it should be told what is forecasted. - p.14 l.21 "The LISFLOOD-FP model ..." same remark as previously, it should be told why LISFLOOD might be considered as a model, if not it should be changed into "The LISFLOOD-FP modeling tool" or "The LISFLOOD-FP software". - p.14 l.30 "DEM" the meaning of DEM has not be given. - p.15-16 conclusion, as told before the challenges/difficulties and the novelties have to be highlighted.

Figures/graphics should be improved.

As a conclusion, I would say that this article is interesting and is in the scope of the journal. It needs major revision. Once all points would be fixed, it should be a very interesting article for the community.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-496, 2016.