

Interactive comment on “A rainfall design method for spatial flood risk assessment: considering multiple flood sources” by X. Jiang and H. Tatano

Anonymous Referee #2

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This paper deals with the problem of flood risk assessment in urban area, by combining a classical design approach based on rainfall IDF curves and a copula method enabling to combine different durations. By doing that, author indicates that this new method makes it possible to combine risks from multi-sources, ie : from “coastal flooding, flooding from river channels and inundation caused by insufficient drainage capacity”.

The subject of the paper is of great interest, and the article is well structured and presented. However I would require a major revision. My main concerns are:

1. The objective of combining different risk sources is very (too) ambitious. But the proposed method is in my opinion too simple: it only generalizes a flood design method

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widely used in engineering and its principal limitation lies in the choice of the different characteristic durations. This choice is very difficult and is finally made using empirical formulas. To properly deal with the multi source risk issue, I would try to use a rainfall runoff model coupled with a stochastic rainfall generator, in order to analyze all the different scenarios (see ref [1] applying this idea in another context).

2. The presented copula method is very interesting and copulas are more and more used in hydrology (and also for rainfall generator see ref [2]). Its interest lies in the possibility to combine different statistical laws. However, I don't see the interest in the presented case study using IDF curves. Why the statistical law should change with the duration? (by the way, page 8017 line 3 : why 3 parameters for a log-normal law?). Furthermore, some choices are not enough discussed (ie choice of the copula)

In order to improve the paper, I would recommend: - to better explain the objective (here it is too ambitious) - to compare the proposed method to another which doesn't use copulas, in order to show the gain of using copulas. - to study the impacts of all the underlying choices, in order to give guidelines on how to use copulas in this type of issue.

[1] Carvajal, C.; Peyras L. and Arnaud, P.; Boissier, D. & Royet, P. Probabilistic Modeling of Floodwater Level for Dam Reservoirs Journal of Hydrologic Engineering, 2009, 14(3), 223-232

[2] Cantet, P. & Arnaud, P. Extreme rainfall analysis by a stochastic model: impact of the copula choice on the sub-daily rainfall generation Stochastic Environmental Research and Risk Assessment, Springer Berlin Heidelberg, 2014, 28(6), 1479-1492

If the authors want to compare their approach with outputs given by a rainfall stochastic generator, some tools are available in R : Kossieris, P.; Koutsoyiannis, D.; Onof, C.; Tyralis, H. & Efstratiadis, A. HyetosR: An R package for temporal stochastic simulation of rainfall at fine time scales European Geosciences Union General Assembly, 2012

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