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# Interactive comment on "Patterns and comparisons of human-induced changes on river flood impacts in cities" *by* Stephanie Clark et al.

**Anonymous Referee #1**

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The paper explores the global dataset on fluvial flood risk prepared and discussed by Philip Ward and co-authors on city level. This is potentially a good idea; although the data has been explored in a series of papers by these authors there are still room for further studies. In its scope the current paper is rather close to Winsemius et al (2016); the current paper focuses on cities while the original paper focuses on river catchments.

There are however a number of important shortcommings that should be addressed before I potentially can recommend publication.

First of all I would like to see a discussion of what new knowledge the authors think they can gain by considering cities rather than river catchments. At least the findings of the current paper should be compared to Winsemius et al (2016).

Next, the introduction is rather long and gives a thorough introduction to flooding. Unfortunately the authors does not distinguish between the different types of flooding that can occur, i.e. sea surges, groundwater induced flooding, pluvial flooding and, fluvial flooding. The paper is based on a specific data set that only considers fluvial flooding. Hence references to authors that specifically refer to pluvial flooding should be removed, e.g. Willems et al (2012). Perhaps differences in fluvial flood risk between cities can be explained by different exposures to other types of flood risk? If the authors do not wish to enter such discussions they should stick to considering only one type of flooding. Next, the literature on whether flood risk is stationary or has an increasing trend is quite abundant. The findings differ, primarily as a function of the framing, i.e. if the models include corrections for changes in socio-economic development, vulnerability, etc. The author uses the terms 'impacts', 'risks' and 'material damage' more or less inter-changeably throughout the paper. When referring to IDSR and other recognized frameworks I would expect more stringent use of the terminology and more transparent explanations and assumptions. This includes a description of what the scenario for development is between 2010 and 2030 and the rationale for choosing the approximately 100 cities in Table 1, that are then later reduced to 80 cities (without mentioning which of the cities are excluded).

However, my most important concern is that I cannot see what the authors are doing with the data. The closest to an explanation is that the authors state that the calculations are carried out in Matlab using a modified version of the package SOM. Modified in which way? Why are the data transformed the way they are if the SOM approach is particularly good in dealing with non-linear relationships, how do you treat taking logarithm of the value of zero, what are the definitions of QE, TE, DRR, and the Davies-Bouldin Index, and how is a U-matrix visually verified? Without this information the reader will have to do a complete reanalysis to (perhaps) get the same results as the authors.

Since I expect a thorough revision of the method section before perhaps resubmitting

the paper I have not read the results and discussions sections in detail.

More detailed comments: I disagree with the use of the term 'spatio-temporal'. It usually denotes something where there is explicit reference to a spatial dimension, in the current example perhaps the physical distance between the cities. I think the authors should find another term to describe the characteristics of their data.

The data on the figures cannot be read in the pdf-version of the paper.

I cannot follow the discussion on the cluster. Perhaps it is just me not being able to see the same patterns as the authors.

The list of references should be improved. Just from browsing it I can see dubious referencing to e.g. IPCC (2014) (Use author names) and Willems (2012) (several authors), and Kohonen (2001) (incomplete reference). There are more errors than the ones I have pointed out.

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