

## ***Interactive comment on “Assessing Chinese flood protection and its social divergence” by Dan Wang et al.***

### **Anonymous Referee #2**

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This paper develops a county-level flood protection level (FPL) dataset for China on the basis of the prescriptions of the 2014 Chinese policy document Standard for flood control. It then analyses this against the amount of children and elders in the country, also by county. The paper is generally well written, and even though I do not think it can be considered particularly substantial as a research article (as the bulk of the work consists in essentially overlapping GIS datasets following a policy document), I believe the results are nevertheless interesting and useful to the community. Thus, in my opinion the article may be considered for publication in NHESD, although several improvements are necessary.

### General comments

1. The paper defines floodplain as the maximum extent of the 100-year flood map, and

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the exposed elements are then defined as the elements within that area. Should this refer to a defended or an undefended 100-year flood extent? Is there a reference to this aspect in the policy document, i.e. a guideline on how the actual quantification of exposed elements should be performed? This point needs to be clearly addressed in the article, as it will necessarily affect the estimation of FPLs. Moreover, taking into account that the 100-year hazard map used in this study (Rudari et al., 2015) already implicitly considers the existence of flood defences based on GDP, does its application impact the estimation of FPLs? Please discuss.

2. The validation of FPLs is carried out not against a sample of actual flood protection infrastructure, but rather against local flood protection plans. Therefore, this exercise can be viewed more as a check on whether county-level flood protection policies are aligned with the national one from 2014, rather than an actual validation of computed FPLs. Although the authors acknowledge this limitation in the article, I am not convinced with statements such as "validating the policy-based FPLs as a reliable proxy for actual FPLs", which I find partly unsupported. I think the article would benefit significantly from a more robust validation with ground-truth data for a number of counties. Is this information for some counties not available or obtainable at all, e.g. with river basement management authorities?

3. Still related to the comparison of county level plans and the national policy regarding protection level, can you please provide some additional information on how these counties were selected? It would be relevant to understand if these counties are representative of the different realities in China, particularly in terms of the variables defined in the policy (rural/urban, exposed population, arable land). You found an agreement in FPLs in 66.7% of the counties – can this be attributed in some way to specific properties of these counties, for example? Additional information on the validation counties and additional discussion on this would be useful.

Specific comments

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Title: I feel that the use of "social divergence" raises a reader's expectations above what is actually presented in the article, which is limited to age groups. Please adjust the title to reflect this, or otherwise expand the analysis to include other factors that influence social vulnerability – the latter would certainly be more insightful and make the article more interesting.

L37: Remove 'Each year' (I assume these are aggregate numbers for 1990-2017)

L58: I do not fully understand what the second research question means, in the sense that the policy document does not make reference to demographics in the definition of FPLs, and so the answer to this is already known. Please clarify.

L65: My interpretation of Jonkman, 2013 is that it states the actual opposite of what you are saying in this sentence. For example, Jonkman, 2013 says that "... the actual protection levels could differ by more than a factor of 10 from the protection standard, and the effect on risk will be similar." Please discuss and revise.

Eq. 1: I find "GDP-weighted PopE" a poor name for a variable, as it is a bit long and at first sight it appears to be GDP minus... Please improve.

L119: Section 2.5 is unexpected and feels disconnected from what comes before in the article, because up to this point you have not yet stated that this is an analysis you will be doing. Is this cluster analysis meant to address a research question? Please contextualize beforehand, and when doing so provide an explanation on why this analysis is useful.

L163: Unclear which previous studies this sentence refers to. Is it only Scussolini et al., 2016? Please clarify.

L197: Because FPLs also change over time but only current FPLs are considered in this section, I am unsure about the usefulness of the analysis carried out here. For the same reason, I also find this section title a bit misleading. Please improve and clarify.

L235: This could also simply be the result of FPLs being calculated on the basis of

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present-time exposed population, couldn't it? We do not have information about FPLs in 1990; therefore, stating that a faster increase in exposed population may have occurred in these counties because in the past their FPL was already high seems speculative. Please discuss.

Table 1: Note at the bottom is unclear.

Figure 2: Remove "the" in y-axis label.

Figure 5: In the y-axis label, replace "Exposure" with "Exposed population".

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