Comment on nhess-2021-102

Anonymous Referee #2

Referee comment on "Global flood exposure from different sized rivers" by Mark V. Bernhofen et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-102-RC2, 2021

The manuscript describes a scientifically-sound and relatively-easy-to-implement geomorphological approach to assess global flood exposure (over time) to different sized rivers. Global and national flood exposures are estimated using three different gridded population distribution products - differing in terms of their spatial resolution, the underlying assumptions made, and the methodology used to produce them. Results are compared and used to inform on (1) how the use of different river network sizes impacts both global and national flood exposure estimates, and (2) the appropriate application of the considered population distribution datasets.

I am very supportive of the Author's effort and would like to highlight that more comparative studies like this one should be conducted, especially at the intersection between population mapping and natural hazards and risks. The manuscript is timely, appropriate for the journal, and potentially of interest for its readers. It is well written, articulated and presented, and offer an original contribution in the field of flood exposure, as well as valuable insights into the advantages and challenges of using gridded population datasets to assess exposure to hazards.

In my opinion, the manuscript should be published after minor revisions aimed at addressing the detailed comments below. I have really enjoyed reading the manuscript and want to congratulate the Authors for their work.

60: "Recent advances in population data, providing more detail and employing new modelling techniques" – I would suggest to rephrase this as "Recent advances in population mapping, providing a better and more detailed representation of the spatial distribution of the population, have been shown to drastically reduce flood exposure estimates in developing countries (Smith et al., 2019).

84: "https://dataforgood.fb.com/docs/high-resolution-population-density-maps-85demographic-estimates-documentation/" – The provide link is not working.

298: "these methods" – Should be "the corresponding outputs".

298: "the settlement distribution of the three population datasets along the Likuala-aux-Herbes river in the Republic of Congo." – I would suggest to rephrase as follow: "the population distribution of the three outputs with respect to the settlement distribution,

manually identified from high-resolution satellite imagery , along the Likuala-aux-Herbes river in the Republic of Congo"

300: "algorithm spreads some residual population across the grid in areas where no settlements have been identified" – please rephrase as follow: "algorithm dasymetrically redistribute the whole population across the grid, also in areas where no settlements have been identified"

302: "this residual population spread" – please rephrase as follow: "such modeling approach"

336: "there is still significant uncertainty in the underlying census data" – This represent a common feature shared by all three population datasets considered in this study (which are all using exactly the same input census data).

354: "WorldPop's residual population spread leads" – please rephrase as follow: WorldPop's modeling approach and assumptions leads"

Figure 6: "(b) HRSL settlement distribution. (c) WorldPop settlement distribution (resampled to 1 arc second for comparison). (d) GHS-POP settlement distribution (resampled to 1 arc second for comparions)." – Should be ""(b) HRSL population distribution. (c) WorldPop population distribution (resampled to 1 arc second for comparison). (d) GHS-POP population distribution (resampled to 1 arc second for comparions)."