Urban growth and spatial segregation increase disaster risk: Lessons learned from the 2023 disaster on the North Coast of São Paulo, Brazil

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Response letter to reviewer #1 (Julio Cesar Pedrassoli)

Response 1: We would like to thank the reviewer Julio Cesar Pedrassoli for the interesting and positive comments regarding our paper. We are glad to hear about the scientific significance and potential of our results. We also thank you for the proposed suggestions and references regarding other layers of complexity in the 2023 event. They are of great contribution to our work. Please find below our point-by-point responses (in italics).

Global evidence indicates that ongoing climate change is already impacting, and will continue to impact in the future, urban populations and, furthermore, precarious urban occupations, especially in middle- and low-income countries in the global south, are likely to suffer the consequences of these impacts in a more direct and devastating way. In this way, this article, by analyzing the direct impacts of a recent extreme event in an extremely socially and spatially segregated Brazilian urban area, is of great scientific significance, especially as it demonstrates the disproportionality of the impacts on formal and informal urban areas.

As for the methods used and the general quality of the input data in the analytical model, the work follows the necessary rigor and presents the results clearly. As a caveat, the work would benefit from a better development of the concept of susceptibility. Vulnerability is developed in a substantial way, however, taking into account the idea that risk can be understood as the interface between susceptibility and vulnerability, characterizing the natural susceptibility of the São Sebastião region, especially due to its very steep topography, would be beneficial from a conceptual point of view.

Response 2: We will include a more detailed characterization of the natural susceptibility of the São Sebastião region in the revised version and will distinguish susceptibility and vulnerability clearer.

In addition, it would be interesting to deal in a little more detail with some of the other layers of complexity of the specific event on which the article is based: there was also a failure in the risk communication process, as the local government had received official warnings of a large amount of rain forecast some time in advance (https://agenciabrasil.ebc.com.br/geral/noticia/2023-02/centro-de-monitoramento-emitiu-alertas-tres-dias-antes-dos-temporais) but chose not to take any action. In addition, the risk areas were previously mapped, according to a report by the São Paulo State Institute for Technological Research (https://www.sidec.sp.gov.br/map_risco/uploads/doc1637073821.pdf).

Response 3: We agree that considering other layers of complexity is essential to better comprehend the conditions that led to such devastating impacts. As mentioned by the reviewer, we also identified failures and communication gaps in early warning before and during the event and were aware of existing maps indicating risk areas in the region. We recently addressed these in a technical paper submitted to the XXV Brazilian Symposium on Water Resources (November 2023). You can find the paper through the link: https://anais.abrhidro.org.br/job.php?Job=14954. In this context, we also agree that including these layers in our discussion could contribute to a more complete overview and understanding of the 2023 event. We will include these aspects in the discussion section of the revised version.

Overall, the paper is presented clearly with appropriate language, figures, and references, and its conclusions have great potential for applying better tools to public policies for monitoring and assessing risks related to extreme events in cities in the global south.

Response 4: Thank you very much again for your time to review the paper.