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Interactive comment on "Delimitation of Flood Areas Based on Calibrated DEM and Geoprocessing: Case Study on Uruguay River, Itaqui City, Southern Brazil" *by* Paulo Victor N. Araújo et al.

Anonymous Referee #2

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Title: Delimitation of Flood Areas Based on Calibrated DEM and Geoprocessing: Case Study on Uruguay River, Itaqui City, Southern Brazil

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OVERALL EVALUATION The manuscript focuses on the mapping of flood prone areas by means of calibrated DEM, historical series of streamflow records and geoprocess-

ing techniques in Southern Brazil, in particular close to the city of Itaqui in the Uruguay River basin. After having calibrated the DEM using Ground Control Points, the floodable areas are mapped in relation to the results of a statistic analysis on the annual maximum level records of the Uruguay River, that identify 5 hazard classes. Maps resulting from of this procedure are then compared with the extent of the flooded area in two historical floods, showing a good similarity. Looking in a comprehensive way at the whole study, I would say that the core idea of the study is interesting for research purposes and fit perfectly in the context of the journal. Although this consideration, in my opinion the manuscript needs to be deeply revised in some points, in order to be published in NHESS. Authors can find my comments below, I hope the authors will find them useful.

General comments: I would give much more importance to the core of the manuscript, i.e. the mapping of floodable areas. Calibration and geoprocessing procedures are also important, but I would deepen and detail the description of the methods used to map the hazard of the study area, for the sake of reproducibility of the study, going into the details in a clear way and neglecting information, which are not connected with the analysis. For example, the current version of the manuscript does not allow readers to understand why authors relate levels in the river with water depth in the floodable areas: has the river no embankments at all? This might be clarified. Is it realistic that all areas with the same elevation in the study zone are affected by the same hazard, even if their distance from the river is some kilometres greater? Are there no obstacles or topographic discontinuities that can influence flooding dynamics? In my opinion, these are aspects that might be discussed in the paper, in order to improve the robustness of the methodology. In addition, I would better clarify the reason behind the choice of the relationship between the river level statistics and the hazard classes: for example, are there other literature studies that justify this selection? Furthermore, it is not clear to me what the "simulated flood altimetric quota" mentioned at the beginning of Section 4 is: probably, the word "simulated" is misleading, and it only identifies areas, which are below a certain terrain elevation? Considering the introduction, I would suggest

to detail the aim of the study and why authors use the methodology they describe, giving an overview of the literature background of the topic: other procedure used for mapping flood hazard (1D-2D hydrodynamic models, other DEM-based method, just to cite some of them), their advantages and disadvantages also focusing on the specific case study, in order to justify the developed procedure. The study area could be shortened a bit, neglecting information that are not very useful for the focus of the paper. I think the extension of the study area is wrong, because it seems to be much greater than the total area of the Uruguay River basin and it doesn't match with figure 1. According to the description of the procedure in Section 4.2.1, I would expect the independent variable (GCPs) on the x-axis and SRTM data on the y-axis, both axes ranging from the same minimum to the same maximum. In my opinion, a figure showing a comparison between original and calibrated DEM (with the same colour scale range) would be useful to better understand the improvements coming from the DEM's calibration. As last comment, I find the validation part of the paper, i.e. the comparison of the study results with the historical flood area extensions, too short and superficial, while it should represent one of the most important part of the manuscript. A "visual comparison" (see also the abstract) without numeric and statistics results is, in my opinion, not suitable for a scientific research paper and cannot be used to draw reliable conclusions about the good performance of the methodology.

Minor comments: I would recommend revising the language: there are a lot of misspellings and grammatical errors, and together with the complexity and the ambiguity of some sentences, they make the manuscript sometimes difficult to understand. As general correction, make sure that every sentence has a subject and put the verb in the correct position, not at the beginning. Furthermore, make sure of the temporal coherence of verbs, because now some sentences have the present, some other have the past. Abstract, p. 1 line 2: historical instead of historic Abstract, p. 1 l. 16: what does "submitted the statistical analysis" mean? Introduction, p. 2 line 13: what is the "sound judgements of the modeller"? Study area, p. 2 line 26 and others: pay attention to the units, please write the km2 with the superscript function. Study area, p. 3 line 11: I can

see only ten sub-basins, although it is written that they are eleven. Study area, p. 3 line 14: The study area comprises the urban area of Itaqui city AND is located. . . Study area, p. 3 line 16: official instead of oficial Section 3, p. 4 l. 5: relevant problem to the local population, only. . . (without "and") Section 3, p. 4 line 6: risks instead of riscks Section 4.1: the reference to Fig 4 is missing Section 4.2.1, p. 6 line 5-6: what does "in good conservation" mean?