Dear Editor and the reviewer,

We do appreciate your constructive, thoughtful, careful, and helpful comments and suggestions. After careful discussions and analyses, we finished the preparation of responses to you. If there are any new comments or suggestions, please let us know.

Best Regards,

Paulo Victor N Araújo and the coauthors

Response to General comments:

1) [Anonymous Referee #2]: 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.

[Authors´s answer]: Large part of the city of Itaqui, it is in flood plain area of the Uruguay river, as many of the riverside cities of the study area (Saueressig, 2012). The floods in these regions are intimately linked to the rise of the river level. Therefore, in the case under study, the river-level altimetry is the main driver of the flood hazard [included in text, page 10, line 14].

Reference

Saueressig, S. R.: Zoneamento das áreas de risco a inundação da área urbana de Itaqui-RS, M.S. Dissertation, Federal University of Santa Maria, Santa Maria-RS, Brazil, 101 pp., http://repositorio.ufsm.br/handle/1/9362, 2012.

2) [Anonymous Referee #2]: 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?

[Authors´s answer]: Not is it realistic that all areas with the same elevation in the study zone are affected by the same hazard. “In a few areas there was topographic discontinuity. When these altimetric class discontinuities occurred, the sector in focus was considered in the upper elevation altimetric class” [included in text, page 7, line 21].

3) [Anonymous Referee #2]: 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?

[Authors´s answer]: To determine the classes of flood hazard mapping, a descriptive analysis of the orthometric heights time series (annual maximum fluvial levels records) of Uruguay River was performed (minimum, maximum, quartile and percentile).

The determination of the classes was closely linked to the probability of occurrence of height annual maximum fluvial of Uruguay river [included in text, page 7, line 12]. At this stage, 5 classes of flood hazard were determined as described in table 1.

Table 1: Classes of flood hazard for mapping.

Classes	Altimetric quota river used as indicator
Extremely high flood hazard	< Median
High flood hazard	≥ Median and < 3rd quartile
Moderate flood hazard	≥ 3rd quartile and < 95%
Low flood hazard	≥ 95% and < Maximum quota
Non-floodable	> Maximum quota

4) [Anonymous Referee #2]: 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?
[Authors´s answer]: [MODIFIED FOR]: "Finally, a visual comparison between a modelled flood versus a DIP from flood area satellite image was performed, which both were registered concomitantly on the same day in study region".

5) [Anonymous Referee #2]: 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.
[Authors´s answer]: [ACCEPTED and MODIFIED INTRODUCTION]

6) [Anonymous Referee #2]: The study area could be shortened a bit, neglecting information that are not very useful for the focus of the paper.
[Authors´s answer]: We find pertinent the permanence of the text of the study area, since, rarely, the articles found in the international literature reporting the aspects of the basin under study are rare.

7) [Anonymous Referee #2]: 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.
[Authors´s answer]: We apologize for the punctuation and correct it in the text. MODIFIED FOR "... and that this study area has a territorial area of 34,066.06 km^2 ...".

8) [Anonymous Referee #2]: 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.
[Authors´s answer]: We apologize for the mistake in writing the text, but in fact the independent variable was SRTM values and dependent variable was GCPs values. Common procedure found in the literature for DEM calibration (e.g., Gorokhovich and Voustianiouk, 2006; Du et al., 2012; Forkuor and Maathuis, 2012).
[TEXT MODIFIED FOR]: "This dataset was submitted to Linear Regression analysis, with ground control point values as dependent variable and SRTM data as independent variable. Common procedure found in the literature for DEM calibration (e.g., Gorokhovich and Voustianiouk, 2006; Forkuor and Maathuis, 2012)." [page 5, line 6].

Reference

Forkuor G. and Maathuis, B.: Comparison of SRTM and ASTER Derived Digital Elevation Models over Two Regions in Ghana – Implications for Hydrological and Environmental Modeling, in: Studies on Environmental and Applied Geomorphology, edited by: Piacentini, M. and Miccadei E., IntechOpen, https://doi.org/10.5772/28951, 2012.

Gorokhovich Y. and Voustianiouk A.: Accuracy assessment of the processed SRTM-based elevation data by CGIAR using field data from USA and Thailand and its relation to the terrain characteristics, Remote Sensing of Environment, 104, 409-415, https://doi.org/10.1016/j.rse.2006.05.012, 2006.

9) [Anonymous Referee #2]: 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.
[Authors´s answer]: A figure was drawn up and included in the new text (figure 7).

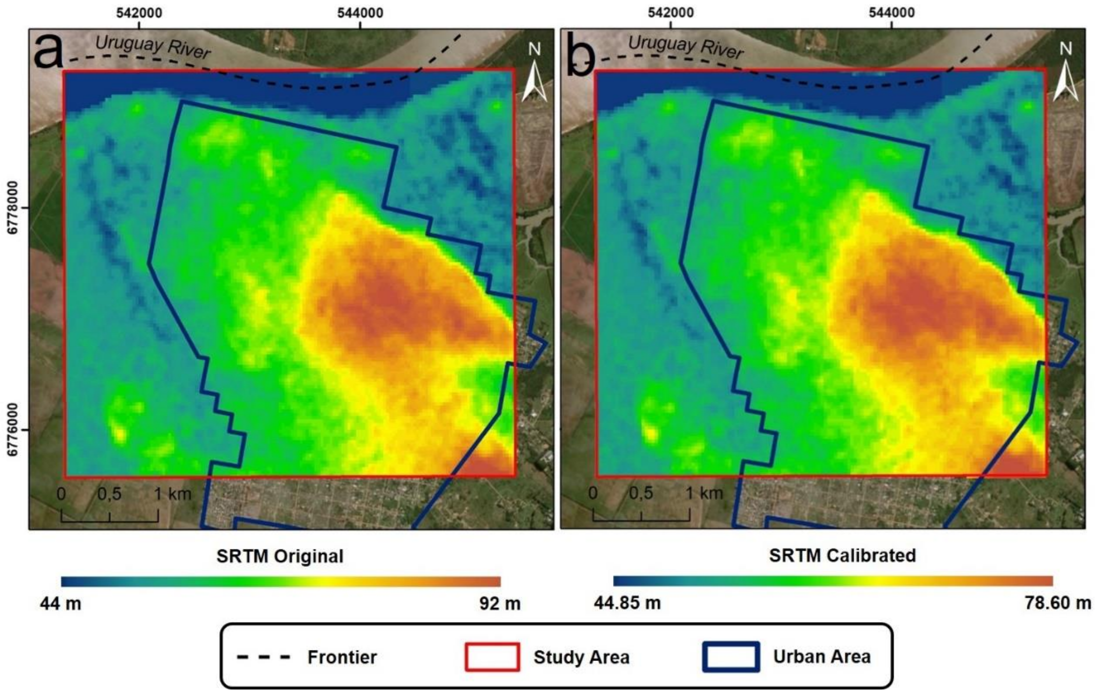

Figure 7: Digital Elevation Model (DEM): a) SRTM Original; b) SRTM Calibrated.

10) [Anonymous Referee #2]: 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.
[Authors´s answer]: It would be very interesting this strategy of validation, however to materialize it we faced the spectral limitation of the MUX sensor of CBERS-4 satellite. Due to the existence of trees with high crowns, in sectors affected by the flood, these would be masked in the PDI process. In our strategy, we opted to perform only comparative visual analysis. A future solution would be the use of other sensors, which are not currently available to authors.

Response to Minor comments:
11) [Anonymous Referee #2]: Abstract, p. 1 line 2: historical instead of historic.
[Authors´s answer]: [ACCEPTED AND CORRECTED].

12) [Anonymous Referee #2]: Abstract, p. 1 l. 16: what does "submitted the statistical analysis" mean?
[Authors´s answer]: [ACCEPTED and MODIFIED]: "submitted the descriptive statistical analysis and probability".

13) [Anonymous Referee #2]: Introduction, p. 2 line 13: what is the “sound judgements of the modeller”?
[Authors´s answer]: Several factors, such as: topographic discontinuity.

14) [Anonymous Referee #2]: Study area, p. 2 line 26 and others: pay attention to the units, please write the km2 with the superscript function.
[Authors´s answer]: [ACCEPTED AND CORRECTED].

15) [Anonymous Referee #2]: Study area, p. 3 line 11: I can see only ten sub-basins, although it is written that they are eleven.
[Authors´s answer]: Not, the text is correct. “In Brazil, the Uruguay hydrographic region is composed by eleven hydrographic sub-basins: (1) Apuae–Inhandava, (2) Passo Fundo, (3) Turvo–Santa Rosa–Santo Cristo, (4) Piratinim, (5) Ibicui, (6) Quarai, (7) Santa Maria, (8) Negro, (9) Ijui, (10) Varzea and (11) Butui–Icamaqua”. In new text, we add the number before the name, to guide the reader.

16) [Anonymous Referee #2]: Study area, p. 3 line 14: The study area comprises the urban area of Itaqui city AND is located.
[Authors´s answer]: [ACCEPTED AND CORRECTED].

17) [Anonymous Referee #2]: Study area, p. 3 line 16: official instead of official.
[Authors´s answer]: [ACCEPTED AND CORRECTED].

18) [Anonymous Referee #2]: Section 3, p. 4 l. 5: relevant problem to the local population, only. . . (without “and”).
[Authors´s answer]: [ACCEPTED AND CORRECTED].

19) [Anonymous Referee #2]: Section 3, p. 4 line 6: risks instead of riscks.
[Authors´s answer]: [ACCEPTED AND CORRECTED].

20) [Anonymous Referee #2]: Section 4.1: the reference to Fig 4 is missing.
[Authors´s answer]: All references to the figures were checked in the text. Everything is OK!

21) [Anonymous Referee #2]: Section 4.2.1, p. 6 line 5-6: what does “in good conservation” mean?
[Authors´s answer]: Existing still in the field and intact.