

Reply to reviewer comments on Egusphere-2025-1009

We express our sincere thanks to the reviewer RC1 for his time, insights and constructive engagement with our manuscript. Below, we provide detailed responses to the reviewer comments. We believe that the suggested changes from the reviewer have improved the quality and argument of the manuscript and thank the reviewer again for his contribution.

(RC1-00): “The paper examines public-sector compensation in disaster recovery, focusing on the 2020 Gloria storm in Catalonia. It highlights the importance of public compensation for uninsured assets and provides insights into financial aid distribution for disaster recovery. The study reveals that fluvial and coastal hazards caused over 80% of recorded damages, with infrastructure sustaining the highest losses. Public funding prioritized community assets and critical infrastructure.

The paper details the data used and the methodology with great precision and presents clear and concise results. The case study seems very appropriate to me. In addition to good conclusions. For all these reasons, I recommend its publication. I simply add some personal recommendations that the authors may or may not consider:”

(Reply to RC1-00): We thank RC1 for the thorough and positive feedback. We are pleased to hear that the case study and methodology were well-received and that the conclusions were clear and valuable. We appreciate his recommendations and will carefully consider them in the revision process. Below we respond to each comment.

(RC1-01): “In line 226, Gumbel is mentioned but its use is not justified as it is done with GEV previously.”

(Reply to RC1-01): Thank you for this comment. Indeed, the sentence in the original manuscript lacked sufficient detail. Based on the available data, different types of Generalized Extreme Value (GEV) distributions were used to calculate the return periods for each hazard. Since the IDF curves for rainfall data from Llabrés Brustenga (2020) were derived using a Gumbel distribution (Type I of the GEV family), we also employed a Gumbel distribution to calculate the return period of rainfall accumulation during the Gloria Storm event. We adapted the revised manuscript at the following points:

- We will amend the following sentence: “Since the IDF rainfall maps were derived using a Gumbel distribution fit (Llabrés Brustenga, 2020), we used the corresponding formula to calculate the return period of the rainfall accumulation”.
- Additionally, to provide clarification, we will add the following sentence to the revised manuscript to clarify that the Gumbel is a type of GEV distribution: “This distribution includes the Gumbel (Type I) distribution, the Fréchet (Type II) distribution and the Weibull (Type III) distribution, respectively, when the shape parameter is equal to 0, greater than 0, and lower than 0”.
- We will modify the sentence to clarify that different types of distributions will be fitted according to the data available: “Hence, depending on the data available, we apply different types of GEV distributions to characterize the Gloria storm, considering three main hazards: meteorological, fluvial, and coastal”.

(RC1-02): “In figure 6, it would be advisable to add the letter labels to know what the caption refers to (a, b, c...).”

(Reply to RC1-02): We appreciate the reviewer’s suggestion. As recommended, letter labels will be included to improve the clarity of Figure 3.

(RC1-03): “In the conclusions, add future contributions following the line of research.”

(Reply to RC1-03): We agree that outlining future steps in relation to this research provides valuable context for the work completed until now. Therefore, we will include the following sentences in Section 5:

“In recent years, Machine Learning (ML) algorithms have emerged as a valuable tool for assessing the multiplicity of impacts that may affect a region. These methods effectively process large volumes of heterogenous data and model complex non-linear relationships among multiple factors. Due to the complexity of multi-risk systems, ML techniques are increasingly being used to investigate the connections between natural and human-driven pressures, helping to better understand the consequences of these interactions. Future research could build on this work by applying ML algorithms to the dataset developed here, aiming to uncover new insights into how public compensation mechanisms function in the context of multi-hazard events.”

(RC1-04): “If possible, a graphical diagram of the methodology used in the paper.”

(Reply to RC1-04): Thank you for the suggestion. We agree that including a figure would provide clearer guidance for readers. We will include in the manuscript the following Figure 3.

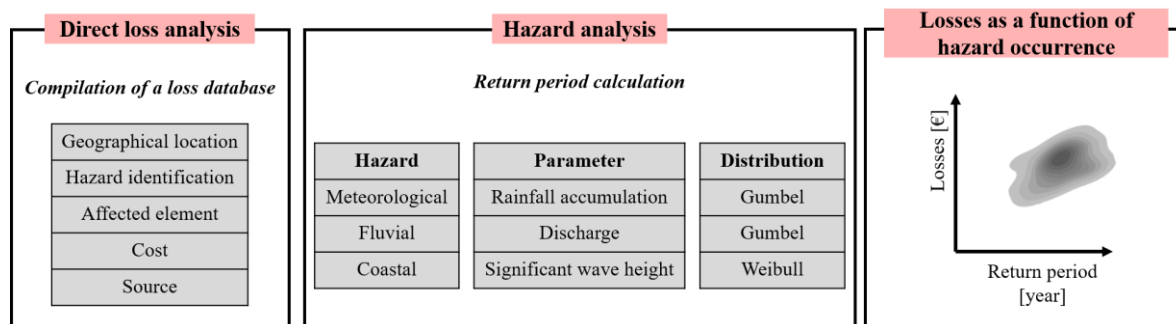


Figure 3. Graphical diagram of the methodology.

Additionally, we will add a brief subsection “3.3 Losses as function of hazard occurrence” to the “Methods and Data” section to provide further detail on the third component of the methodology. This will enhance the manuscript by incorporating the following paragraph:

“3.3 Losses as function of hazard occurrence

A general assessment of losses as a function of hazard occurrence probability was determined. Losses were calculated by aggregating recorded costs at the municipal level for each asset and hazard type (“Hazard identification” and “Affected element”). For each municipality, losses were then aligned with a standardized return period. Return periods were determined using the median return period of 48-hour accumulated rainfall within each municipality for meteorological hazard, the closest upstream gauge station for fluvial hazard, and the nearest SIMAR point for coastal hazard. The

standardization was performed by normalizing return periods relative to their maximum values. To visualize the relationship between losses and hazard frequency, we generated separate density plots for each hazard and asset type.”

References

Llabrés Brustenga, A.: Intensity - duration - frequency of rainfall in catalunya: maximum expected precipitation and idf relationship at high temporal and spatial resolution, https://diposit.ub.edu/dspace/bitstream/2445/151942/1/ALB_PhD_THESIS.pdf, Universitat de Barcelona, 2020.