

RC2 / AC

This study makes a valuable and timely contribution to disaster risk science by developing an algorithm that identifies multi-hazard events, utilising information on associated hazards as well as spatiotemporal relationships between disaster records in EM-DAT. The statistical analysis reveals that hazard pairs often lead to greater or at least equal impacts compared to isolated single hazards, although the patterns of impact vary depending on the hazard type and the impact metric. The study proposes developing generic archetypes of multi-hazard risk dynamics to enhance risk analysis and decision-making. While acknowledging the limitations of the EM-DAT database, it demonstrates the database's utility for identifying global patterns of multi-hazard impacts and recommends improvements in data reporting.

The manuscript is generally well-written and addresses an important topic, but several revisions could enhance its clarity, structure, and impact.

We appreciated the reviewer's time and effort in reading the article and providing helpful comments to strengthen the manuscript before publication.

I recommend the following adjustments to strengthen the manuscript before publication:

Methodology and Detail:

The methodology is sound, but providing more detail about the "statistical methods" previously used (Lines 94–95) would offer readers a clearer understanding of previous research. *Agreed, we will add a sentence on the methods used by Budimir, Atkinson and Lewis (2014).*

Additionally, the manuscript would benefit from justifying the focus on spatial overlap within a single country (Section 3.1.2). For instance, the author could explain why potential transboundary, spatially compounding events, such as those across northern Europe, were not considered (e.g., Fang et al., 2024; De Luca et al., 2017; Berghuijs et al., 2019). *Agreed. We will explain our considerations for making this simplifying assumption.*

The inclusion of Figure 1 is valuable, but expanding its caption to provide more context would help readers understand it without needing to refer back to the main text. *Agreed. RC1 pointed this out as well. We will develop an expanded flow diagram that provides more content.*

Structure:

The manuscript would benefit from a more cohesive structure.

For example, moving background information currently placed in the results section (e.g., Line 279) into the methods section would help maintain continuity and allow the

results section to focus more directly on presenting findings. *Does the reviewer mean lines 285 – 287 rather than line 279? We agree that these lines could better be placed in the method section.*

Additionally, keeping the discussion and results sections distinct would improve the paper's flow. Any interpretive content (e.g., Line 301) could be relocated to the discussion. *Agreed. We will move the discussions on sensitivity to the discussion section.*

Furthermore, separating recommendations from the conclusion would also allow the paper to finish on a stronger note, with a distinct conclusion leaving a lasting impression. *Agreed. We will make this change.*

Finally, introducing the archetypes (Line 427 onwards) in more detail in the methods section could help readers appreciate their relevance from the start, enhancing the manuscript's overall coherence. *Thanks for pointing this out. We will introduce the archetypes in the method section already.*

Writing Style:

The clarity of the manuscript can be improved by adopting a more concise and direct tone across all sections. For example, removing phrases like "not surprisingly" (e.g., Line 338) and simplifying explanations (e.g., Line 384 regarding spatiotemporal overlaps) would make the writing more focused. Writing all sections more concisely will help maintain a tighter narrative; for example, understanding Lines 480–484 currently requires multiple readings.

Here are three specific examples that would benefit from revision for clarity and conciseness, although consider making changes throughout the manuscript:

- Line 137 – Correct the typographical error "other the other."
- Line 141 – Consider rewriting this sentence to improve its flow.
- Line 488 – Ensure consistent tense usage throughout the text.

Thanks for pointing this out and providing some examples for clarification. We will re-read the entire manuscript with a focus on concise and direct language and make improvements including the examples mentioned here.