General Comments:

The paper ***"Simulating Multi-Hazard Event Sets for Life Cycle Consequence Analysis"*** by Iannacone et al. is a notable contribution to the field of natural hazard risk quantification and modeling. It innovatively addresses a significant gap in existing literature by proposing a computational framework for simulating sequences of hazard events, considering both Level I (occurrence interactions) and Level II (consequence interactions). The methodological approach, which utilizes competing Poisson processes and a sequential Monte Carlo sampling method, is both rigorous and novel. The paper is well-structured, and the authors provide a comprehensive and clear explanation of their methodology, supported by a numerical example that effectively demonstrates the application and potential of their proposed method. I suggest that the paper be approved for publication after incorporating the modifications and recommendations noted below.

Specific Comments:

- The development of a simulation-based method for generating multi-hazard event sets is commendable. The use of competing Poisson processes and a sequential Monte Carlo sampling method to incorporate different types of Level I interactions seems reasonable. However, more clarification on the method choosing and naming other alternative methods to conduct such simulations might be insightful.

- The paper is well-organized, with a logical flow that systematically introduces the problem, the methodology, and a numerical example. Each section builds upon the previous one, making the complex concepts more accessible.

- The inclusion of a detailed numerical example is particularly effective. It not only demonstrates the practical application of the method but also aids in understanding the complexities involved in simulating multi-hazard events. The example is well-chosen and supports the theoretical framework effectively.

- The paper effectively situates the research within the existing scholarly context, highlighting the deficiencies in current methods and the ways in which this study addresses them. Nonetheless, it falls short in providing a thorough literature review, particularly in the introduction, where some cited references are notably outdated. To enhance this aspect, consider including the following recent papers that also explore similar issues among others:

    - Dehghani, N. L., E. Fereshtehnejad, and A. Shafieezadeh. 2021. “A Markovian approach to infrastructure life-cycle analysis: Modeling the interplay of hazard effects and recovery.” Earthquake Engng Struct Dyn., 50 (3): 736–755. https://doi.org/10.1002/eqe.3359.
    - Di Baldassarre, G., D. Nohrstedt, J. Mård, S. Burchardt, C. Albin, S. Bondesson, K. Breinl, F. M. Deegan, D. Fuentes, M. G. Lopez, M. Granberg, L. Nyberg, M. R. Nyman, E. Rhodes,

V. Troll, S. Young, C. Walch, and C. F. Parker. 2018. “An Integrative Research Framework to Unravel the Interplay of Natural Hazards and Vulnerabilities.” Earth’s Future, 6 (3): 305–310. https://doi.org/10.1002/2017EF000764.

- Nofal, O. M., K. Amini, J. E. Padgett, J. W. Van De Lindt, N. Rosenheim, Y. M. Darestani, A. Enderami, E. J. Sutley, S. Hamideh, and L. Duenas-Osorio. 2023. “Multi-hazard socio-physical resilience assessment of hurricane-induced hazards on coastal communities.” Resilient Cities and Structures, 2 (2): 67–81. https://doi.org/10.1016/j.rcns.2023.07.003.
- de Ruiter, M. C., A. Couasnon, M. J. C. van den Homberg, J. E. Daniell, J. C. Gill, and P. J. Ward. 2020. “Why We Can No Longer Ignore Consecutive Disasters.” Earth’s Future, 8 (3): e2019EF001425. https://doi.org/10.1029/2019EF001425.

- The approach has significant implications for risk assessment and disaster management planning. It provides a more realistic assessment of risk by considering the interactions between different hazard types, which is crucial for effective planning and mitigation strategies.

- The combined findings are presented as both mean and median values, as seen in Figure 10, for instance. It would be beneficial to include an explanation of how each value is utilized, as well as clarification of the insights that can be derived from comparing these two measures within the same scenario.

- Enhancing the paper's conclusion with deeper insights into the innovative aspects of the proposed framework, along with more detailed interpretations of potential outcomes and applications, would add value. Additionally, a thorough discussion of the limitations and future research prospects is currently absent and would be a beneficial inclusion.

Technical Corrections:

- Figure 2: It would be beneficial to add a label for independent hazards with no interactions in part (a) of the figure, within the legend. Furthermore, the use of arrows in this figure does not effectively aid in understanding the concepts, especially given their inconsistent application. Consider simplifying the representation of interactions in this figure.
- Lines 190-208: The examples of interactions are repetitive, given that definitions and examples have been provided earlier. Please consider eliminating redundant information throughout the paper.
- Figure 5: The parameter 't_{-1}' in the figure is unclear, and it lacks a direct mention in the accompanying explanations.
- Line 320: Integrate the sentence about the Appendix into the body of the paragraph, rather than having it as a separate line.
- Equation 13: A parenthesis is missing after 't_{II}' in the equation.

- Table 1: The caption is not aligned with the table's position. Instead of a single line mentioning the table, it would be more logical to refer to it before detailing each input in lines 333-334, or even consider placing it in the appendix since all the references are already explained clearly.
- Figure 9: The amount of information in this figure is minimal and could be more effectively presented in a simple table, thereby reducing unnecessary complexity.
- Figure 10: Using the same scale for both parts of the figure would enhance its insightfulness, as it allows for a better visual comparison of the mean and median across the same scenarios. Aim to use a single scale bar for both parts of the figure.