

The paper presents an important and original contribution to the sampling problem in estimation of Area-Depth-Duration curves. These models are important in hazard assessments among other applications. Overall, I enjoy reading the paper, it's clear, easy to follow and contains very relevant discussions. I have some minor comments that I believe need some clarifications, after which I recommend the paper for acceptance.

- In the methodology, the authors fitted the IDF of Koustoyiaannis et. al. (1998) for each area separately. However, there are IDAF formulations that links all the data for different durations and different area together and fit one IDAF formulation. An advantage of this is that a constrain is already implemented in the formulation to ensure that the intensities decrease with area. Example is the IDAF formulation of De Michelle. Did the authors consider this option?
- In the multiple location sampling, a random sampling is done. I expect that each time the sampling is repeated, a different set of locations will be selected. Would this affect the result? Have you considered using a moving window in space to capture all possibilities?
- I find it surprising that the spatial crossing does not show any pattern as a function of the topography. For instance, Melese et al. (2019) and Haruna et al. (2024) observed this behavior to depend on orography, for instance the location of the study pixel on the windward or leeward side. Could you comment on this? Would it be possible to apply the different sampling strategies to a pixel on the leeside or wind side of the mountain and to see the effect on the curves?

Melese, V., Blanchet, J., and Creutin, J.-D.: A Regional Scale-Invariant Extreme Value Model of Rainfall Intensity-Duration-Area-Frequency Relationships, *Water Resources Research*, 55, 5539–5558, <https://doi.org/10.1029/2018WR024368>, 2019.

Haruna, Abubakar, Juliette Blanchet, and Anne-Catherine Favre. "Estimation of Intensity-Duration-Area-Frequency Relationships Based on the Full Range of Non-Zero Precipitation From Radar-Reanalysis Data." *Water Resources Research* 60.2 (2024): e2023WR035902.

Rosin, T., Marra, F., and Morin, E.: Exploring patterns in precipitation intensity-duration-area-frequency relationships using weather radar data, *Hydrol. Earth Syst. Sci.*, 28, 3549–3566, <https://doi.org/10.5194/hess-28-3549-2024>, 2024.

- I was expecting “Summer” to have more locations with crossing, compared to winter. Since summer events are convective and tends to be isolated, while winter are stratiform and tends to cover a larger area. Could you comment? Furthermore (in Line 375), I expected frontal systems to exhibit less spatial variability compared to convective events. Since frontal storms are driven by large-scale interactions between air masses rather than localized convective processes, the intensity of precipitation and weather conditions tends to be more uniform compared to convective storms. Could you comment?
- The authors compare the quantiles from the various sampling strategies to those from KOSTRA. Due to the inherent differences between the two, I don't understand how KOSTRA values could serve as benchmark for preferring one method over the other. Should the best method agree with KOSTRA values? Why?
- Is there any motivation for the choice of the different areas and durations, and more precisely the upper bounds?
- Do you observe the same “crossing” based on simple exploratory analysis of the annual maxima series (without fitting GEV).
- Line 93: I don't understand the sentence “The region has been observed for the time period of 2000 to 2019,...” Could you rephrase.
- Line 101. Do you mean “final merged radar data”?
- Line 155: Eq 7 instead of 6

- Line 194: “...actual intensities”. Do you mean “intensities with durations d ”?
- Line 207. The largest area ($R=36$ km), any justification for this choice? Would it affect the result?
- Line 415: “.....smaller values than KOSTRA all durations.” - > “.. for all durations”
- Figures
 - In Figure 1, it is difficult to contextualize the location of the study area with respect to the map of Germany, Would it be possible to add a locator map?
 - What are the grey colored points that are randomly located in Figure 4b. They seem to be independent of the circles.
 - Figure 4: Add that the circles are colored according to the radius(area)
 - Caption of Figure 4, the phrase “In both schemes the outer most circles are to the center of the study location.” Seems not complete.
 - Figure 5 and 9. The choice of the color palette (seems to be discrete/qualitative) makes it difficult to track the changes of the quantiles as functions of the area. Since the area are increasing, a “sequential” or “diverging” palette would be better (Eg. Melese et al. (2019)).
 - Figure 6 B is mentioned earlier (Line 284) than 6 A (Line 300). Consider switching the two?? (Moving 6 B to the right)
- Equations
 - Check equation 11 carefully, a power is missing
 - The transition from Eq 8 to 9 is not very clear. For example, the index a is suddenly dropped. I suggest rewriting it for clarity.
 - In Eq 14, since dependent events are removed, then $n_{am}^{MLS} \leq n_t \times n_{sp}$. Am I correct?