Comment on hess-2021-546
Anonymous Referee #1

Referee comment on "Performance-based comparison of regionalization methods to improve the at-site estimates of daily precipitation" by Abubakar Haruna et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-546-RC1, 2022

This paper presents an interesting comparison of regionalization methods for rainfall frequency analysis. It is based on a large sample of 1176 daily stations in Switzerland and its neighbouring countries. Five models have been compared, based on local data (local EGPD) or regional data (Omega EGPD with an average shape parameter; ROI EGPD Full or Semi with ROI approach; GAM EGPD with parameters depending on covariates). The paper gives confirmation on the interest of regional approach vs local approach, and concludes that the GAM model is better for the upper tail, and the ROI model for the bulk of the distribution.

The paper is clear and well written. I have one requirement on additional simulation and three minor recommendations.

The authors decided to use a EGPD distribution, with the advantage of representing both the bulk of the distribution and the upper tail. As the conclusion is that no model is the best on the whole part of the distribution, I would be interested to see whether a GP-ROI distribution-regional approach performs on the upper tail, compared with a GAM EGPD model.

Section 3.2

Line 152. The first time, explain PAM acronym (Partitioning around medoids)

Section 5.2
Figure 3 - Histogram. It could be interesting to add (for each class of radius) the mean number of stations belonging to the ROI

Section 5.4

Line 420. “The plot of the right of Figure 5”