

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2022-237

Anonymous Referee #1

Referee comment on "Power-Law between the Apparent Drainage Density and the Pruning Area" by Soohyun Yang et al., Hydrol. Earth Syst. Sci. Discuss.,
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The authors investigated a power functional relationship between the pruning area A_p and the associated apparent drainage density ρ_a identifying the scaling exponent of such relationship. Moreover, the exponent η is then linked to other scaling exponents representative of the fractal characteristics of the river basin. Topic may be of interest, but I have some doubt about the reliability of some of the outcomes of the research.

Major comments:

- The entire manuscript is based on the derivation of an analytical relationship for the derivation of the scaling exponent η . The authors propose three different relationships which leads to very different results. In particular, the first two expressions have analytical basis, but not very good results. The last equation seems to be an empirical one derived from data provides better results. In my experience, the analytical relationships should hold in all environments, and this represents a great advantage for their use. On the other hand, the empirical relationship is very case specific and limit significantly the impact of the research.
- Personally, this kind of analysis require a limited computational effort. Therefore, it would be much interesting to explore a larger number of case studies.
- The range of variability of the exponent η is relatively limited (0.42-0.47). The mean value is 0.445, which probably performs better than any of the relationship proposed. I have tested the error associate to the use of a mean value which is of the order of 5%. Therefore, I would like to know what is the added value of the proposed relationships.

