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Title: Horton Laws for Hydraulic Geometric Variables and their Scaling Exponents in Self-Similar River Networks

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Special Issue: Complex network approaches to analyzing and modeling nonlinear systems in geosciences

Editor's comments:

1. Abstract, ll.1-2 (and later: ll.36-37): You write that you consider five H-G variables but then list six properties (Q, W, D, U, S, n').
2. l.363: "Bryandywine" should probably read "Brandywine"
3. ll.458-461: I don't see how you can achieve the given factorization of $f_l(Q_1+Q_2)$ by considering $f_l=Q^m$ - I think this can only apply to $f_l(Q_1*Q_2)$. Please check.
4. The use of field data at different parts of the manuscript should be reorganized. Specifically, in ll.538-543 (Sec. 6) you make use of one of the data sets without explaining it before. In turn, the data are introduced in Sec. 7.3. It would be better to include a brief description of all data sets before their first use, eventually even as a separate section (e.g., before Sec. 6).
5. From the considerations in Sec. 7.1, can you provide a brief discussion on the relationship between SS-2 and fractality?
6. l.626: "As mentioned in Sect. 7.1" - I don't find this mentioned in the given subsection.
7. Results of field studies (from l.636 on): Could you provide upper/lower bounds on α and β (i.e., when using $D_T=1.7$ or 1.8)? In general, for the empirical data, it would be good to give confidence bounds for all parameters. Can the deviations of some of the empirical results from theoretical predictions be (at least partly) explained by error propagation during the estimation?
8. Fig. 6 is referenced in the text before Figs. 3-5 (i.e., in l.674). Changing the order of figures is recommended.
9. ll.749-750: "probability distributions that are called generalized Horton laws" - this statement might benefit from some reformulation
10. ll.755-767: Some information on the Whitewater basin would be helpful, probably in relation with the above comment 4.
11. Fig. 1, caption: The sentence "Numbers beside points..." probably relates to Fig. 2, not Fig. 1.

Authors' Response:

We appreciate the important comments and suggestions of the editor. We incorporated all of them as explained below. Our paper greatly benefited from both the previous referees' and the editor comments. A detailed explanation of how we responded to the editor's comments is given below (line numbers refer to previous version):

1. Abstract, ll.1-2 (and later: ll.36-37): we made the corresponding correction, indeed, we considered six instead of five variables.
2. l.363: We fixed the typo in "Brandywine".
3. ll.458-461: There was a typo in $f_l(Q_1+Q_2)$. We changed it to $f_l(Q_1*Q_2)$.
4. We reorganized the presentation of the field data in a new section (Sect. 3) and moved the corresponding material there. We feel that this key suggestion helped us clarify many issues regarding tests of our theoretical predictions in sections 6 and 8.3.

5. The relationship between SS-2 and fractality is discussed briefly in Sect. 2.2, where an example is given. In view of our answer to comment 7 below, we felt that further discussion of this important comment was not warranted here. Probably future work can address it in greater detail.

6. l.626: The sentence was corrected.

7. We showed in the revised version that the prediction of the exponent “ y ” depends on D_T through the exponents “ f ” and “ z ”. The new eq. (54) and the texts right above and below it make this point clear. Therefore, there was no need to analyze the effect of observed D_T on theoretical prediction of “ y ”.

We have listed the observed errors in the exponents published in the two NZ basins in Table-1. Using this data, we included a complete analysis of errors in the predicted exponents. We appreciate this comment because it helped us to reorganize some text and clarify the comparison between theoretical predictions and observations in sections 6 and 8.3.

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8. Figures were organized according to order of reference.

9. ll.749-750: The sentence was corrected.

10. ll.755-767 We included a description of the Whitewater basin in the new Sect. 3. 11. Captions of the Figures were revised.

Vijay Gupta and Oscar Mesa
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Ps. In the archive.zip file all the figures, the tex and bib files are included