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Discussions

Interactive comment on "Technical Note: Improved mathematical representation of concentration-discharge relationships" *by* José Manuel Tunqui Neira et al.

Anonymous Referee #1

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The paper deals with the mathematical representation of the empirical relationships between discharge and ions concentration, presenting an application of the Box and Cox transformation of the data as an alternative to the commonly used log-log transformation. Although the topic is relevant to the current literature and well within the scope of the journal, I am struggling to understand what the exact nature of the problem is, and how and why the proposed work represents an improvement of the current knowledge about the research topic. The scientific significance and quality of the manuscript is quite poor. The literature review presented in the introduction section (rather rushed) does not at all bring the reader to the idea that a different data transformation, beyond the log-log transformation, is desirable by the scientific community for the representa-

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Discussion paper

tion of Q-C relationship and for what reason it should be. The motivation provided in the "About the excess of log-log transformation" section (the change of the shape of the Q-C relation) is quite weak. Authors probably reach an interesting point/motivation when they introduce (line 111) the problem of the representation of high flow discharge data concentration that arises for high frequency database but, surprisingly, when they come to the results, they mention the difficulties of the model to reproduce this type of data (line 151). But many more questions come about the scientific idea. Why authors choose the Box-Cox transformation? Aren't there alternative? If they do not compare the performance of the log-log transformation with the proposed two-sided power transformation, how can the reader guess it is an improved representation? How is the improvement demonstrated by the authors? The presentation quality is also quite poor. 1) The introduction section is quite rushed and presents a figure published elsewhere by other authors. Generally figures are not included in the introduction but if needed why do not use authors own data? 2) Figures frequently do not indicate neither the range of variability of the data not the unit of measurements 3) The dataset used for the analysis is not clearly presented 4) Figure 3: to which a and b parameters does it correspond? 5) Figure 4: how can I judge by visual inspection that black dots represent the best performing transformation if I do not know about the empirical relationship (figure 4 presents the model?)? 6) Table 1: for sulfate and EC (half of the database) the coefficient of determination for n = 5 (optimal) and n= ïĆě (log-log) is almost the same. What the improvement is? 7) Comparison between observation an model only appear at the very end (figure 6) but no comparison is provided with the log-log transformation (where the improvement is?).

Provided the previous motivation I very much regret to say that in my opinion the paper cannot be accepted for publication.

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