

Interactive comment on “Record extension for short-gauged water quality parameters using a newly proposed robust version of the line of organic correlation technique” by B. Khalil and J. Adamowski

Anonymous Referee #1

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The paper deals with the extension technique of hydrological or water quality time series at short-gauged stations. A new method, the robust line of organic correlation technique (RLOC), is compared to the Ordinary least squares regression (OLS), the line of organic correlation (LOC) technique and the Kendall-Theil robust line (KTRL) method.

The proposed method is well analysed and the paper is well written. I support the publication of this paper in HESS. I have a couple of comments that should be addressed

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before publication, but since they mostly involve additional discussion, the resulting revision should be minor.

Page 4670, line 12-13: this sentence seems to be inconsistent with line 20-23 at page 4669 where it is said that "there are two main deficiencies in using the OLS as a record extension technique for water quality data. First, it is not robust for the presence of outliers. Presence of outliers significantly affects intercept and slope estimates in the OLS..." and in the abstract "On the other hand, the Kendall-Theil robust line (KTRL) method has been proposed as an analogue of OLS with the advantage of being robust in the presence of outliers."

Page 4671, second last line: "...period from $n_1 + 1$ to $n_1 + n_2$ years", not "...period from $n_1 + 1$ to n_2 years"

Page 4672: suggest to insert the assumptions of the OLS method

Page 4672, equation (1): "...for $i = 1, \dots, n_1$ ", not "...for $i = n_{1+1}, \dots, n_2$ "

Page 4677, line 9: how is the sample sizes?

Page 4682, second last line: "moments", not "momnets".

Subsection 4: I would suggest to shorten this subsection

Figure 1: Why are the $RMSE_{rloc}/RMSE_{ols}$ and $RMSE_{rloc}/RMSE_{ktrl}$ not also shown?

(this is just a suggestion) explain better the y-label, for instance " $RMSE_{ratio} = RMSE_{rloc}/RMSE_{loc}$ ". Caption: "Relative efficiency of ... LOC slope estimator. The population is composed by a mixture of two normal distributions ($N(10, 1)$ and $N(11, 3)$); the x axis tracks the percentage of the second distribution in the population."

Figure 2: (this is just a suggestion) Caption "...Electric Conductivity (EC) and Chloride (Cl)...". What the numbers in the box-plot means? Why there are circles and stars?

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Maybe they can be remove..

Figure 3, 4, 6 and 7: would it be useful to use mixed "points+lines" in the figures.

Figure 3-4:(this is just a suggestion) The figures could be merged into one figure showing BIAS (e.g. only for $\rho = 0.5$ and $\rho = 0.9$) and RMSE (e.g. only for $\rho = 0.5$ and $\rho = 0.9$)

Figure 6-7: (this is just a suggestion) The figures could be merged into one figure.

Figure 5, caption: (just a suggestion) "Box plots of the Inter-quartile Range (IQR) ratio, RLOC technique."

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