Hydrology and Earth System Sciences Discussions

Interactive comment on "Exploiting the information content of hydrological "outliers" for goodness-of-fit testing" *by* F. Laio et al.

Anonymous Referee #1

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General comments

All research into rigorous evaluation of the goodness of fit of distributions in hydrology is to be highly commended. This is a matter of great scientific as well as practical interest. The paper seems well researched and considers a method of testing goodness of fit not yet present in the literature. However, I feel that the problem pointed out in my comment below concerning page 4859, lines 5-7 must be dealt with in some way before the paper can be considered for publication in HESS.

Specific comments

Page 4859, line 5-7. This statement as it stands needs to be supported by a reference.

It is not trivial that the distribution of $x_{(n)}$ is independent of that of $x_{(1)}$ to $x_{(n-1)}$ as can be seen in Falk and Reiss (1988). Falk, M. and Reiss, R.-D.: Independence of Order Statistics, The Annals of Probability, Vol. 16, No. 2 (Apr., 1988), pp. 854-862, URL: http://www.jstor.org/stable/2243843

Equation 8 is central to the paper, however it is not clear whether the choice to directly link the value of the maximum distribution to the significance level is one made by the authors of the present paper or that it was taken from the references quoted earlier (Grubbs, Rossi) or perhaps from the references quoted for the maximum value distribution immediately after the equation. The following sentence states that "The usual applications of this test . . . " where in fact it is very hard to find any application of this test, at least under the name "maximum value test" in the literature. The literature does show that it can be very difficult to properly account for the effect of sampling in full generality for most goodness of fit tests. Perhaps this is what the authors intended to say? If not, then some references to illustrate the problem would be most welcome.

Page 4858, lines 19,20: Why is this particular estimate used for $x_{(n)}$?

General questions that I would like to see answered in the paper: when would the author recommend the use of this method and does the author feel that further research into the method, for example to see if its power can be improved, would be worthwhile.

Technical corrections

Page 4852, line 12: is this really numerically versus analytically or rather Monte Carlo versus deterministic? In both cases a reference where the method is applied in such a way would be appreciated.

Page 4852, line 4: "... is mainly determined by the the ..." should be "... is mainly determined by the ..."

Page 4869, line 19: "... Asymptotic bias estimation ..." should be "... Asymptotic bias of estimation ..."

Page 4852, line 26, should perhaps be: Gumbel, E., Discussion of the Papers of Messrs. Anscombe and Daniel, Technometrics 2, 165-166, 1960.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 4851, 2010.