

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

**Anonymous Referee #2**

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### GENERAL COMMENTS

First of all, I must say the topic of this paper is of high interest for Statistical Hydrology of Extremes: I agree completely with the word “essential” in the first sentence of the abstract. In fact, in all Extreme Frequency Analysis the classical graphical comparison between plotting positions and the fitted function in probabilistic scale (usually Gumbel scale) is done. By the way, the reason for the Gumbel scale is to enhance the right tail, which is of our interest. However, this graphical comparison is subjective and better objective method should be used, as the proposed in this work. Therefore, my first comment is it would be needed some critical (or not!) comments in the Introduction to this classical method.

C2342

Last sentence in conclusion is on one hand pessimistic, because (following the Parsimonious Principle) it is never recommended to use the GEV (3 parameters) and with more reasons the TCEV (4 parameters) with a sample of less than 20 data. On the other hand, this type of test can be very useful with the TCEV in a regional framework (large sample) to detect locally (short sample) the extraordinary events and to proceed with the regionalization, fitting a Gumbel to the local ordinary events, as it was done at least by Frances (1998). In this case, author used the the skewness test, originally for outliers elimination, described by Kottegoda (1984). In this way, last general question of referee#1 can be partially answered.

Because the skewness test is centered in the right tail of the sample, in any case, it needs to be cited and criticized within the paper introduction. Or better (if possible) compared with the MV test in the application.

Finally, I have found the text perfectly understandable, but I must say English is not my mother tongue, so I can not rigorously review the English grammar and style. Question to the scientific community: it is really needed to write in Oxford English?

### MINOR CORRECTIONS/COMMENTS

In the introduction, a critical short abstract (pros and cons) of the D’Agostino and Stephens book, should be added.

It seems the term MV test is used sometimes referring to the modified MV test (or MV test with censored parameters). Also in Fig 1 “MV without correction” is used. Unify terminology for the two tests. For example, in P65L14 MV, Do it refer to both tests or to which one?

P58L19 The “of course” for this fact is not as obvious for me as authors claim. Would you mind to give more explanations to affirm this significant increase of bias?

P58L20 As referee#1, I think authors need to justify strongly the selection of the median as an estimator.

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P62L18 The first time terms “systematic” and “non-systematic” data were used in the proper context of different sources of information was in Frances (1998).

P62 To be clearer, I will add at the end of section 2 how to apply the modified MV test using eq (8) and the parameters estimated with eqs 13, 14 and 16.

P63L6 To improve the impression of applicability, justify the use of GEV and TCEV, here or better in the introduction. For example, making a short review of the use of these distributions in literature. In the case of the TCEV, specifically show it not only works with Italian extreme precipitation and flood data.

P66L2. I would not say “usually”. Better use “can be”.

P67L5. I would say “some modellers”.

P67L10 Explain (again) which cases.

It is not usual to add dots and commas at the end of equations. Consider their elimination.

Use systematically one term: Gumbel or EV1.

#### REFERENCES:

Frances, F. (1998). Using the TCEV distribution function with systematic and non-systematic data in a regional flood frequency analysis. *Stochastic Hydrology and Hydraulics*, v 12 (4), 267-283.

Kottegoda, N.T., 1984. Investigation of Outliers in Annual Maximun Flow Series. *Journal of Hydrology*, 72, 105-137.

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