Hydrology and Earth System Sciences

Open Access

Discussions

Interactive comment on **"Higher statistical moments and an outlier detection technique as two alternative methods that capture long-term changes in continuous environmental data"** *by* **I. Arismendi et al.**

Anonymous Referee #1

Received and published: 15 July 2014

In general, the paper is well referenced, logically presented, and the figures support the results. The methods suggested are potentially useful for many and are described in a manner that makes it easy to see the application. Improvements can be made with more careful wording related to the statistical methods, some additional references, and some simple changes to the figures and tables.

The formula used for skewness is not simply the third standardized moment. It is the adjusted Fisher-Pearson standardized moment coefficient. The authors should state

this, reference it, and perhaps tell potential users of the methods they are proposing why this version of skewness is desirable.

Likewise, different statistical packages compute somewhat different versions of kurtosis. This appears to be closest to that of Sheskin, D.J. (2000) Handbook of Parametric and Nonparametric Statistical Procedures, Second Edition. Boca Raton, Florida: Chapman & Hall/CRC. The authors should verify this, state the version of kurtosis used, and reference it.

Regarding the description of the Cramer test of whether or not the skewness coefficient is different from 0, the null hypothesis is misstated. The authors say "... we could not reject the null hypothesis that the distribution was skewed ("non-significant"). The null hypothesis is that the skew is equal to 0 (symmetric; Cramer, 1998).

For parallel construction, the null hypothesis for the excess kurtosis should also be stated, that excess kurtosis is 0, or the distribution is mesokurtic (Cramer, 1998).

The manuscript is generally well reference, however, there should be a reference for non-metric multidimensional scaling (N-MDS) unconstrained ordination when it is first discussed in section 2.3.

I could not find a reference to figure 4 in the manuscript but did find a reference to figure 4 of the supplement. Because the supplemental figure is what was discussed, fig. 4 manuscript and fig. 4 supplement should be switched.

Results are discussed in terms of unregulated and regulated streams. To better highlight these important differences, all figures and tables (where relevant) should distinguish between regulated and unregulated sites. This would be very helpful for the reader. For example, in table 2, a line could be added between sites 5 and 6 with spanners indicating sites 1-5 are unregulated and sites 6-10 are regulated. Figure 1 for example, should have the term unregulated placed in 1b and the term regulated in 1d. That way at a glance, the reader could see the difference without reading the

extensive caption.

For figure 1, the plot in position c is discussed first, and then the plot in position a – this happens on both pages 6 and 7. It flows better for the reader if the plot positions in figure 1 were switched so that the one in position c now becomes the one in position a, then the text can refer to a first. Also, currently a and c are paired and b and d are paired. Pairing a and b, then c and d is a more natural way of presentation, as is reading left to right. Organizing and labeling the figure as a in the upper left (higher kurtosis, positively skewed), b in the upper right (lower kurtosis, negatively skewed), c in the lower left (unregulated cluster), and d the lower right (regulated cluster), would be easier for the reader to follow.

The authors are careful to document the stress in figures 4, S3, and S4. However, they do not provide enough information for readers to be able to interpret that value. For example, looking at the HDR boxplots with stress values of 0.17 and 0.16, they can have rather different shapes. Therefore, a sentence or two describing how stress was calculated would help.

There are a few grammatical corrections that need to be made: line 3, page 7, change "may indicates" to "may indicate"; line 4, page 7, change "extremes" to "extreme", or change sentence to something like ". . . both extremes (cold and warm values);" line 12, page 10, change "this" to "these".

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 4729, 2014.