

## ***Interactive comment on “Technical Note: Testing an improved index for analysing storm nutrient hysteresis” by C. E. M. Lloyd et al.***

### **Anonymous Referee #1**

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This technical note compares different methods to quantify hysteresis patterns and introduces a new, more robust way to do so. The manuscript is well-organized, clearly written and potentially of interest to quite some of the readers. From my point of view, it can be considered for publication after addressing a few minor comments:

(1) although being widely used in hydrology, the term "hysteresis" used here is formally incorrect. Hysteresis is defined as the dependence of a system output on its history of inputs (and thus on its internal state). Although discharge is a manifestation of the system state, the discharge-concentration relationships are technically no hysteresis loops but rather closed loops of a functional relationship. In addition, actual hysteresis is characterized by unique input-output relationships below and above given threshold values (e.g. Schmitt-triggers from electronic circuits as examples for sharp hysteresis).

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I would therefore suggest to qualify the terminology here, for example by stating:"[...] closed loops, thereafter referred to as hysteresis loops".

(2) p.7883, l.9ff: I could not quite follow this explanation. In other words, I am not sure if the new method is capable of a more robust representation of figure-of-eight shapes. Even if using the normalized ranges, wouldn't a regular 8-shape (for the sake of the argument say for example horizontally aligned at an angle of 0 degrees) result in a HI of 0 in spite of exhibiting "hysteresis"? It would be great if the authors elaborated a bit on that and clarified this question.

(3) is there a particular reason not to show the box plots in figure two with equal y-axis scales (at least for panel ii and iv of each storm). this could more clearly illustrate that HI<sub>new</sub> is somewhat more robust.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7875, 2015.

**HESD**

12, C3148–C3149, 2015

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