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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical note: Diagnostic efficiency – specific evaluation of model performance" *by* Robin Schwemmle et al.

Anonymous Referee #1

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General comments

The technical note presents an intriguing new metric fusing together aspects of traditional efficiency and hydrologic signature metrics. The research is highly relevant to HESS, and the technical methodology is well described. The results used to demonstrate the utility of the new method of evaluating model performance are sufficient to support the conclusions of the manuscript. Overall, the material is well structured but there are some aspects which are unclear or insufficiently explained.

Specific comments

31: I do not see how traditional efficiency metrics only allow a binary choice between 'good' and 'poor'. They provide a gradation of relative performance. This should be

rephrased.

61: The justification is missing or misplaced. Why these three and not the other two?

62: The three types of model error are a key point in the manuscript, but this 'definition' is inadequate. Why these three types? What distinguishes the types? Listing potential sources of each type does not define anything. What is the difference between constant error from model parameters and dynamic error from model parameters?

71: Superficially, the DE metric looks like KGE (three component terms, covering bias, variability and correlation). The manuscript could be improved with an explicit contrast between the two, to highlight the novel aspects of the DE metric. Section 2.3 would be a good place, as it currently does not include a comparison, only formula regurgitation.

151: 'Mimicking' may not be the best term to describe the artificial errors generated for this demonstration. To mimic is to imitate, and the synthetic errors introduced to the observed time series are not intended to imitate anything in particular.

180: The summary table is very useful, but grid lines would improve the readability.

240: This paragraph has glossed over one key limitation of the new error metric. The 'negative dynamic error' lumps together high flow underestimation and low flow overestimation. The results presented in Figure 4 are a perfect example of why this is a limitation: all three time series have only low flow overestimation as a prominent error. How is the diagnostic polar plot (Fig 5) more informative than the FDC presented in Figure 4?

253: You have stated that the metric formulation is based on hydrological rather than purely statistical understanding, but this has not come out clearly earlier in the text. After all, one of your three component terms is identical to one used in the KGE. A more explicit justification for the hydrological basis would better support the novelty of your metric.

273: If the use of polar plots is limiting the information content, why not use some other

type of plot? For example, could a radar chart be used instead?

Technical corrections:

7: Should be ‘part of’ not ‘part for’.

10: Unsatisfactory rather than unsatisfying.

10: Originate not origin.

15: Should be ‘these three’ not ‘the three’ as other error types are possible but not account for here.

21: Extra comma after ‘suggests’.

31: Should this be “model performance using only a single numerical value”?

44: You do not need two qualifiers in this sentence, use either ‘usually’ or ‘may only be’ but not both.

52: This is not the best way to introduce the topic of model error or the stated topic of diagnostic efficiency.

55: ‘Sources’ may be more appropriate than ‘origins’ in this context.

96: The word ‘does’ is extraneous.

Figure 1: The figure could use a y-axis title, and I’m not sure that ‘years’ is an appropriate unit for dates.

149: Are the underscores appropriate for a caption?

152: In the following what? List, table or section?

285-287: Sentence contains grammatical errors, please correct.

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