Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2016-247-RC1, 2016

Hydrology and Earth System Sciences
Discussions
Open Access
EGU

Interactive comment on "Comparison of six different soft computing methods in modeling evaporation in different climates" *by* L. Wang et al.

N. Haughton (Referee)

ned@nedhaughton.com

Received and published: 1 June 2016

To the Editor,

Thank you for the opportunity to review this paper.

The paper implements 8 different empirical model structures over for predicting pan evaporation at a variety of sites in China, and then evaluates the performances of these models against each other. The paper is not revolutionary, but does provide useful information about the performance of a number of advanced empirical models in a hydrological setting.

Over all, the paper is well written, and the intent and methods are very clear. However, the paper suffers from trying to show too much detail in the results section, and the

Printer-friendly version

Discussion paper

actual intercomparison results are not very clear. I think that these problems could be resolved but summarising the results in a neater fashion. Some specific suggestions are given below.

Cheers

ned haughton

Major comments

There is no mention of local optima problems associated with many soft computing methods. This should at least be acknowledged, any methods for avoiding these problems should be explained in the methods sections for each of the models.

The results section is long and repetitive. It would be good to try to summarise the data as much as possible, and draw a bit of a narrative through the results. What is the key message you're trying to communicate here? Some specific suggestions are given below in the Tables and Figures sections.

There is no discussion section. It would be good to have some general discussion of the generalisability of these results, and the implications for others working in the field.

Minor comments

l112-5: There is no justification given for the choice of these 8 models. Many more models are mentioned in the introduction. Why choose these 8 specifically?

l226: This sentence mentions a dataset, but this isn't actually described above.

l280-303: The important thing is that the sites are diverse. You are not trying to describe the sites, just use them to evaluate modes, yet lot of these statistics are just descriptive stats repeated from the table. Better would be to quote ranges (of means, variance, and extremes), and maybe try to relate those to global- or china-wide ranges, to show that the sites are representative.

Section 2.3: No rationale is given for the choice of metrics. All three metrics are highly correlated (all r»0.9), from what I can see, and therefore two metrics don't provide much more information after the first. Consider using alternate metrics, such as the Nash-Sutcliffe model efficiency coefficient, normalised mean error, correlation, or some of the metrics mentioned in Pachepsky et al. (2016)

l314-323: This section should be split up and moved into the relevant Methods subsections.

l331 (and below): How are these "accuracy ranks" calculated? They are not mentioned in the methods section at all. Perhaps they should be included in the tables?

l333-4: It is not clear that Ta and Rg are better at modelling Ep than RH or Ws, because RH and Ws are only included as fourth and fifth variables. If the inputs are highly correlated, then RH and Ws may also perform reasonably by themselves.

l413: the Rˆ2 is not the same things as Pearson's Correlation Coefficient, except in the simple case of univariate linear regression. Also, the some of the correlations between Ws and Ep (I assume the R column in Table 1) are reasonably high, so it would be reasonable to assume some predictive power.

l445: The description of the generalised model should be moved to the methods section and expanded.

l477-480: Performance is not additive, especially when the predictor variables have significant covariance, so it is almost inevitable that RH and Ws will appear to be worse predictors relative to Rg and Ta, when they have only been included in models with multiple other variables.

l479: Ws doesn't decrease *all* simulation metric results, and again, it is not clear how this variable would perform as a predictor in the absence of other inputs, which are likely correlated.

Tables

Tables 1, 3-10, and 12: There is a *LOT* of data in all of the tables. It is very difficult to read information laid out like this. Consider using summary plots (possibly small multiples of parallel coordinate plots) instead and moving the tables to supplemental material, or colouring the table cells to give a clearer indication of performance (normalise colours per column).

Tables 3-10: There is no explanation given anywhere as to why there are two columns in tables 3-10 for each of the three metrics. Explain in-text, and in the table captions.

Figures

Figure 3: Colour the stars in the same colours as in Figure 4.

Figure 4: Put the legend outside above the graphs, make it larger.

Figures 6-13:

- The paper is about comparison between models, not sites. But I have to scroll between 8 pages to compare all of the models. It would be better to have a grid for each site, that included all 8 models.

- If you remove the x- and y-axis tags from all but the first row and column, you can save significant space, and probably fit all models on 2x4 grid, allowing more plots per page.

- The bubble effect only adds unnecessary visual detail. Remove the 3d effect, and use smaller circles, so the detail in the scatter plot can be seen properly.

- I guess that the scatter plots include the seasonal cycle. It may be useful to have corresponding residuals plots, to show under which conditions the modes are performing poorly.

- Units should be mm/day, I think.

Technical notes

l48: remove "and air".

l49-50: Pan evaporation is a measurement, it doesn't play a role in the ecosystem. Remove clause, or move to previous sentence.

l56: "..less _well_ understood.."

l65: remove "the"

l70: Full stop before "For example.."

l95: ".. in case of without local inputs and outputs" doesn't make sense. Re-word.

l97: remove first "the"

l98: "On the contrary" probably should be "In contrast"

l102: "at a few number of stations" makes no sense, re-write sentence, split at "for example".

l128: "_The_ MLP is _a_ well-known ..."

l129-30: "_hierarchical_ networks _consisting of_ several layers.."

l132: The neurons are the nodes. The connections are the synapses. Re-word sentence.

l149: "two types of neurons, S-summation and D-summation, which...".

l188: "MF" - abbreviation undefined.

l190: "RMSE" - abbreviation undefined.

l220: "variables are"

l225: "analyse"

l280: remove "It is clear that"

l296: "has lower skewness", I think.

l397: "indicate"

l475: "..MLP _performance was_ superior to.."

l476: Full stop after "stations".

l479: "_Decreased_" (past tense)

Table 1: Headers misaligned. R metric needs to be explained in footer. Also, it is probably better to sort by variable first, and then by station, so that stations can be compared. If you do this, add minor grid lines between variables.

References

Best, Martin J., Gab Abramowitz, H Johnson, et al. 2015The Plumbing of Land Surface Models: Benchmarking Model Performance. Journal of Hydrometeorology 16(3): 1425–1442. http://journals.ametsoc.org/doi/abs/10.1175/JHM-D-14-0158.1.

Pachepsky, Y. A., G. Martinez, F. Pan, T. Wagener, and T. Nicholson. "Evaluating Hydrological Model Performance Using Information Theory-Based Metrics." Hydrol. Earth Syst. Sci. Discuss. 2016 (February 15, 2016): 1–24. doi:10.5194/hess-2016-46.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-247, 2016.