

Interactive comment on “Technical Note: Improved Sampling of Behavioral Subsurface Flow Model Parameters Using Active Subspaces” by Daniel Erdal and Olaf A. Cirpka

Anonymous Referee #1

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Content Comments:

1. Page 5, Figure 2 - Consider labeling the red line “Behavioral Limit Line” for clarity. Can one assume the point has to be above the limit line to be considered acceptable behavior? Could Figure 2 be moved so that it is after Line 115?
2. Page 5, Line 105 – Where does the active subspace come from that the initial candidate parameter sets (say, the first 1-99) are projected onto? Line 113 states that the active subspace is recalculated after adding 100 state-1 accepted parameter sets – but, how do you start?
3. Page 5, Line 106 – Can you provide any insight about how the values/criteria (e.g., 5

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closest neighbors plus 1% radius) were selected for this work that would be beneficial for another researcher trying to implement this method?

4. Page 6, Line 121 – Is the “acceptance ratio” the ratio of candidates that are stage-1 accepted to the total number of candidate parameter sets (stage-1 accepted + rejected)? Or, is the “acceptance ratio” the ratio of candidates that are stage-1 accepted to those that are stage-2 accepted (i.e., the amount of pre-accepted candidates that become accepted). This clarification would also help interpret Figure 3.
5. Page 6, Line 121 and 136 – Intuitively, I am struggling to understand why $P=0.75$ is the fastest when it should, in my mind, be the most difficult to achieve. And, along those lines, why $P=0.75$ sampling results in a significantly different distribution from the unbiased pure Monte-Carlo scheme. Do you have any insight into why this is occurring?
 - a. Furthermore, do you think the P value selected is dependent on the model/application? Based on your experience, is the exercise of comparing different P values and selecting one necessary for another researcher trying to implement this method, or do you think the $P=0.55$ scheme is broadly applicable?

Grammar Comments:

1. Page 4, Line 67 – Line states that the model considers 6 observations, but there are only 5 listed below this sentence. Should 6 be changed to 5?
2. Page 4, Line 67 – Consider revising the sentence to state “...observations that define acceptable behavioral performance...”
3. Page 4, Lines 69-73 – Make the list style consistent in regard to the period placement at the end of each list item (or remove them all).
4. Page 4-5, Lines 87-93 – Add period after list item number 4.
5. Page 6, Lines 109 and 111 – Remove hyphen between “parameter-set”.

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6. Page 6, Line 125 – Present the acceptance ratio at 0.005 (not a percent) since the acceptance ratios are shown as decimal values on the y-axis of Figure 3.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-629>, 2020.