

## Reply to the comments of Referee #2

### Anonymous Referee #2

*This paper improves our ability for parameter optimization in the physically-based distributed hydrological modelling efforts. Therefore, to me, the paper worth publishing in the journal. However, there are a number of comments to be responded before it is published. Also a revision will be needed for the style and structure of the paper; e.g., a precisely written English and text without typographical errors. There are a lot of mistyped words that should be corrected. There is a problem with using abbreviations.*

*The authors should avoid using abbreviations unnecessarily. However, once decided, they must be used properly and continuously. Also avoid using active voices such as 'We assume (Page 10610 Line 6), use 'It is assumed' instead. There are long sentences separated by commas; better these sentences are divided.*

Thank the reviewer for his/her comments, the problems related to the mistyped words will be corrected in the revision, and the unnecessarily abbreviations will be eliminated also.

*'We assume (Page 10610 Line 6), use 'It is assumed' instead.*

Will be down in the revision.

*There are long sentences separated by commas; better these sentences are divided.*

Will be down in the revision, and some will be separated into short sentences.

*Although the comments are high in number they are all doable, thus the revision can be considered minor. Such revision will be helpful in bringing the paper to the publishable level. My comments are listed as follows:*

Thanks again, following are responses to the reviewer's comments, and revisions will be down accordingly.

1. Abstract: Abbreviate 'Physically-based distributed hydrological models' as PBDHMs here.

Will be down in the revision.

2. Abstract: Extend PSO

Will not be changed as this not suggested in the references.

3. Page 10606 Line 5: Give reference to WEHY model of Kavvas et al. (2004, 2006).

References are as follows: Kavvas, M., Chen, Z., Dogrul, C., Yoon, J., Ohara, N.,

Liang, L., Aksoy, H., Anderson, M., Yoshitani, J., Fukami, K., and Matsuura, T.

(2004). "Watershed Environmental Hydrology (WEHY) Model Based on Upscaled Conservation Equations: Hydrologic Module." *J. Hydrol. Eng.*,

10.1061/(ASCE)1084-0699(2004)9:6(450), 450-464.

Kavvas, M., Yoon, J., Chen, Z., Liang, L., Dogrul, E., Ohara, N., Aksoy, H., Anderson,

*M., Reuter, J., and Hackley, S. (2006). "Watershed Environmental Hydrology Model: Environmental Module and Its Application to a California Watershed." J. Hydrol. Eng., 10.1061/(ASCE)1084-0699(2006)11:3(261), 261-272.*

These two references will be added to the revision.

4. *Page 10608 Line 3: What does SCE stand for?*

SCE means Shuffled Complex Evolution, a full term will be added to the revision, and the abbreviation SCE will be followed.

5. *Page 10608 Lines 8-9: WET Spa or WET Sps?*

It should be WetSpa, this is a typo, will be corrected.

6. *From Page 10613 Lines 16 to Page 10614 Line 4: Section 2.5.1 PSO: Give references properly; also no need to mention that much detail. Long sentences are there.*

The authors think the references are appropriate, and the references review is needed to make sure that the PSO has not been employed yet for PBDHMs parameter optimization, so no revision will be done for this comment.

7. *Page 10616 Lines 14-17: The sentence needs revision.*

Will be revised as "Choose the independent parameters to be optimized. In the case that the computation load is a great challenge, only highly sensitive parameters will be optimized, otherwise, all parameters could be optimized

8. *From Page 10618 Line 22 to Page 10619 Line 12: Better to present all these values in a table / tables.*

Considering there are already many tables, so the authors will not add a table, and prefer to keep the text explanation, so no revision to this comment.

9. *From Page 10618 Line 25 to Page 10619: 10 soil types are mentioned here. As a hydrologist, I am not familiar with the soil type and I do not understand how each will affect on the model.*

Soil types will affect the parameter's values of the PBDHMs, this is shown in the later part of this paper, so the authors think there is no need to explain here, and no revision to this comments.

10. *Page 10627 Lines 16-19: Bullets 4 and 5 are results not Conclusions. Simply delete.*

These results are very important, though it may not be conclusions to other PBDHMs, but the authors think these are conclusions to the Liuxihe Model that is used in this paper, so there will be no revision to this comments.

11. *Tables 3 and 4 can be combined as both are almost the same.*

The authors prefer to have two separate tables to make it easier for the readers to read,

so there will be no revision to this comments.

*12. In Fig 6, it is expected to have a figure corresponding to the upper panel as in Fig 5a.*

As there are already many figures, and the one has the similar pattern with that in Fig. 5a, so there is no need to add one, and this is already stated in the paper, so there will be no revision to this comments.