Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-248-RC3, 2017

Hydrology and Earth System Sciences
Open Access
Discussions

Interactive comment on "Human-water interface in hydrological modeling: Current status and future directions" *by* Yoshihide Wada et al.

Pat YEH (Referee)

ceeyehj@nus.edu.sg

Received and published: 7 June 2017

This is a very excellent review paper, written in a very comprehensive and also clear manner. No typos can be found. Also this paper has nicely included various branches of the research on the "Human-water interface in hydrological modelling", and comprehensively acknowledged almost all relevant literature published recently. The scope and width as a review paper are very good. If some potential improvements can be suggested to the authors, it would be that this paper has a slight shortcoming on its structure and hence clarity. I recommend the publication of this paper after minor re-structuring in addition to some minor editorial revisions. (See detailed review comments below) Another concern is that the impact and modeling of human-induced land use/land cover change was not mentioned in the entire paper, but that related urban-

ization was indeed included in Section 3.5. The authors may mention the rationale why this topic is not categorized as one of the "human-water interface".

Major Comments:

Regarding the structure of the main contents of this paper, Section 3, currently it has the following 9 subsections:

3.1 Modelling human impacts on extremes 3.2 Human impact modelling and indicators 3.3 Modelling human impacts on groundwater resources 3.4 Incorporating regional water management 3.5 Representing rapid urbanization 3.6 Global models for regional use 3.7 Need for model intercomparison 3.8 Observing and sharing human water management information 3.9 Modelling human activities at multiple spatial scales

Which can be categorized as two groups – Modelling purposes: 3.1, 3.2, 3.3, 3.4, 3.5 Modelling Issues: 3.5, 3.6, 3.7, 3.8, 3.9

In reviewing the relevant modelling issues, the contributions made in this paper are not as well-organized as in reviewing modelling purposes in the first 5 sub-sections. Indeed, some excellent discussions on modelling issues are given together with modelling purposes; one such example is on the bottom of page 11 (section 3.5). For those "common" modelling issues (irrespective of any particular modelling purpose), perhaps it is better to move to a new Section 4 to summarize common key modelling issues, also including the use of remote sensing data and global vs. regional modelling strategy. In this new section, some of the following significant modelling issues, which have not been systematically categorised and reviewed yet, can be summarized with more depths to add the completeness of this paper:

1. Uncertainties in data – this can be largely divided into the uncertainties in (1) climatic forcing data, and (2) calibration/validation data (and data for parameter estimation/specification)

2. Model-scale issue - Given the fact that most (if not all) LHMs and LSMs reviewed

in this paper are global models, the issue arises whether these global-scale models suitable to be applied to study regional problems? Or instead, there is urgent need to develop regional model in order to resolve the sensitivities?

3. Sub-grid variability and the scaling effect: What are the optimal grid resolution for one specific modelling purpose? The algorithms used in current LHMs and LSMs are largely based on small-scale understanding. However, If the large-scale models are commonly applied, how can these generally nonlinear small-scale effects be parametrized and scaled-up to be meaningful for large-scale model applications?

4. Understanding and evidence on the mechanisms and pathways of interactions from observations. For example, it is still not clear how the urbanization (as well as other land use / land cover changes) change has caused changes in water and energy budget partitioning. Related to studies are too scarce to gain solid understanding. Therefore, it is difficult to judge whether the parametrization and parameters used and specified in the modelling tasks are realistic, and there is a lack of data to prove the models indeed capture the impacts of human activities on the water cycle.

One more comment is on the Figure 1. The explanations in the end of Section 3.1 for this figure, and also in the figure caption, are not enough for any readers to understand the entire figure, since the authors only presented the implications of some part of this figure without explaining what and how it was calculated plotted. I suggest to provide more clear explanations on different parts of this figure.

Editorial Comments:

For the spelling check of MS Word, suggest change all "modelling" into "modelling".

P2L9: "on the hydrological cycle"

P4L7: "and runoff was routed down the simulated river systems".

P4L15-19: The differentiation between the "Conceptual" and "Physically based" models have not been mentioned, so it reads pretty vague here regarding the discussion in

this paragraph. It is nicer to explain how recently LHMs are becoming more "physically based" by giving some explanations or relevant examples.

P7L5: "important water use dominated by groundwater pumping led to a. . ..“

P7L10: Both references Falkenmark (1989) and Falkenmark et al (1997) are missing in the reference section.

P8L10: "be addressed within the hydrological community"

P10L28: "Another example is the long-distance and cross-basin water diversions that provides additional water supplies. . ."

Also here the recently Chinese North-Water-South-Transfer Project starting from the end of 2014 can be another well-known important example in addition to that already mentioned Periyar Project and Kurnool Cudappah Canal in India and the Irtysh-Karaganda Canal in Central Asia.

P11L3: "but also for comprehensive data collection"

P12L30-31: These two ways read very similar to each other. Suggest to explain the difference more clearly.

P13L13: "Masaki et al. (2016) was the first to compare the simulation. . ."

P14L5: "has benefited considerably from such coordinated 5 data collection and distribution efforts in the past, but it is. . ."

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-248, 2017.