

# ***Interactive comment on “Large-scale hydrological modelling by using modified PUB recommendations: the India-HYPE case” by I. G. Pechlivanidis and B. Arheimer***

## **Anonymous Referee #1**

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Large-scale hydrological modelling by using modified PUB recommendations: the India-HYPE case by I. G. Pechlivanidis and B. Arheimer

This paper represents the first formal application of the general recommendations from the final chapter of the PUB Book (Takeuchi et al., 2013; Bloeschl et al., 2013), and that too so soon after the book was published and even more importantly in the Indian subcontinent. More than anything it demonstrates that these recommendations and the PUB Book itself are indeed practically relevant, and the effort that went into them has been worthwhile.

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In order to accommodate application to over 6000 catchments around India, they made one modification or compromise: they chose to apply one common model to all the catchments. From then on, they claim that the implementation of the recommendations helped to improve NSE (model performance) improved from 0.14 to 0.64.

This is impressive. Those are the positives, and I do want the paper to be eventually published in HESS. Having said this, I must also point to areas of potential improvement.

### Highlighting Hydrological Insights Gained

First of all, in spite of the value and relevance of the Takeuchi et al. recommendations, the presentation, especially in relation to the implementation of these recommendations came across as rather pedantic (or abstract). I would have gained more from the paper if these had been illustrated by substantive illustrations that have provided hydrologic insight.

Indian hydrology must exhibit enormous heterogeneity, and hence process complexity: dominant processes must vary substantially across the country, and when one applies the same model everywhere, model performance must vary also tremendously. The authors missed an opportunity to highlight many of these issues through their modeling (PUB) experience. Absence of this gives me an empty feeling, of not learning much hydrological from this extensive application of the model across the whole subcontinent. I have to believe that when one improves performance from 0.16 to 0.64, one must have learned a lot from that experience.

### Large Sample Application

The authors claimed that they modified the PUB recommendations to tackle simultaneous prediction in over 6000 catchments. However, their statement that they applied one common model in all catchments, I missed anything else they did to deal with multiple basins.

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When you apply the same model to many catchments, it provides an opportunity to compare the functioning of many catchments across gradients of climate and landscape properties, to pool catchments together in terms of similar behavior, make connections between catchment classes and regional climatic and landscape patterns etc. One also could have discovered that model is deficient in certain respects in different parts of the country, which calls for improvements in model conceptualization (not just model parameterization). Bringing these out would have been also interesting and insightful.

### Recommendations

Overall, while I am really impressed with the effort that went into the paper, much more could have been brought out. The paper is already long enough and I can imagine the authors might resist adding more material of the sort I have called for. However, if the authors want the readers to take interest in their paper, they must make at least some effort to present some hydrological details and insights along the lines of my remarks. I will leave it to the discretion of the authors and the editor as to how much of this needs to/can be done in this paper.

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