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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Indicators of Necessary Storages for Flood and Drought Management: Towards Global Maps" *by* Kuniyoshi Takeuchi and Muhammad Masood

Anonymous Referee #5

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This study presents the use of Flood Duration Curve (FDC) and Drought Duration Curve (DDC) as indicators of necessary storages for water management. The presented materials are generally very stimulating by revisiting the creative method developed in 1980s. The application of the traditional method to the latest spatially distributed model results with climate change projections can provide new insights into the interpretations of simulation results. I believe this paper is relevant also to the special issue in honor of Prof. Eric F. Wood.

My major review comment on the current manuscript, however, is that the central theme of this manuscript is ambiguous. In the manuscript, I see at least the following five topics are presented in a mixed manner.

1) Authors promote the application of various traditional analysis approaches, in particular FDC and DDC here, with a large dataset in modern days to obtain practical implications.

2) FDC and DDC curves have been used previously for a dam operation at a single site, while the authors in this manuscript extend the method to spatially distributed data.

3) Authors claim the use of FDC and DDC enabled to characterize necessary storages in the Ganges-Brahmaputra-Meghna (GBM) basin.

4) Authors claim most of recent climate change impact assessment studies simply evaluate the increase or decrease of hydrologic variables. On the other hand, the presented approach with FDC-DDC can provides different perspective to interpret climate change projections suitable for practical water resource management.

5) Finally the authors attempt to present the projected climate change impact in the GBM basin.

I believe all the above issues are equally important. Meanwhile with such a many topics, I found difficulty in understanding the main message by the authors. For example, the introduction mainly reviews the original concept of FDC-DDC with some other similar approaches but not necessary arguing the point of 1). The method section solely reviews the FDC and DDC methods with some extensions to the spatially application i.e. point 2). The result sections including the conclusions focus mostly on 3) - 5), whose issues are not well explained in the introduction.

Personally I believe this paper can improve the readability if the authors express their own points on the 1) and 2) in result, discussion and conclusion sections. Just revisiting traditional approach cannot be accepted in a scientific paper, but this is not the case with demonstrating further extensions.

In addition to the above major comments, I have the following minor review comments.

Please add some more explanations on the practical use of the quantified necessary

storages for river basin managers. Especially for such a large river basins, the meaning of smoothing discharge at a particular river section should be carefully discussed. For example, smoothing river discharge at an upstream point with smaller storage and at a downstream point with large storage have different impacts for both flood (at the downstream of the reservoirs) and drought. Hence I wonder for the effective use of the information, it requires some additional information such as the impact of smoothing to the downstream areas etc. for practical applications. This comment does not request for additional analysis but requesting for how the spatially distributed necessary storage inforamtion can be used in practices.

P2 L24-26 The part of "its scale is different from that of elementary hydrological processes in a small catchment" is unclear. The similar sentences appear also in 4.2.2 describing Representative Elementary Area (REA), but the current manuscript is still unclear how the scale issue dealt in this study is related to REA.

P5 L2 AOEB -> ADEB

P9 L1 What is the relationship between "WATCH Forcing Data set (WFD)" and previously described datasets including CRU and APHRODITE in 3.2.2.1 in the presented simulation.

P12 4.2.1 Please explain the motivation of this discussion at the beginning of this subsection or in the introduction, otherwise this part sounds a bit too sudden and not well connected to the other part.

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