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Discussion of "Reservoir Flood Season Segmentation and Optimal Operation of Flood-Limiting Water Levels" by Haiyan Jiang, Zhongbo Yu, and Chongxun Mo

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The discussers wish to thank the authors of the original paper for their efforts in investigating a solution to maximize the efficiency of flood control storage in flood seasons.

Many studies have been performed in several fields of water resources systems. Yet, a combination of the clustering method, the probability change point analysis, and statistical graphical technique had not been previously applied, as done in the original paper.

The authors of the original paper calculated the optimal operation of the flood-limiting water levels (FLWL) by segmentation of the flood seasons into an early flood season, a main flood season, and a late flood season using an ensemble approach that consists of a fuzzy clustering method, a probability change-point analysis, and a statistical graphical technique (each having the same weights). Afterwards a method of acceptance/rejection was used to generate abundant P-III seasonal peak inflow. Then, the results were transformed into continuous inflow hydrographs by multiplying the typical flood hydrographs by a scaling coefficient in each time interval of the hydrograph. Lastly, a Monte Carlo technique was used to calculate the failure probabilities of reservoir operation for different FLWLs. When the flood control standard equaled the failure probability of flood regulation (defined as the frequency of the highest regulated water level at the dam that exceeded the flood control level), the optimal operation of the FLWL was determined.

Although the original paper is well-defined, well written, and well organized, the discussers would like to make a few suggestions that may help the authors of the original paper and other researchers in the future while conducting similar flood control studies.

Uniform random numbers were generated in the original paper to produce stochastic inflow hydrographs. Subsequently a Wilson-Hilferty (W-H) transformation and an acceptance/rejection method were applied to generate a stochastic Pearson Type-III (P-III) series that was transformed into continuous inflow hydrographs. However, we believe that the generation of hydrographs is more accurately done by using historical data than by generating random numbers. For instance, Liu et al. (2010) used an autoregressive (AR) model to generate hydrological series. Then the normalized series were calculated. Subsequently the W-H transformation was applied to generate hydrological series following the P-III distribution.

Moreover, the calculation of the highest water at a dam's location based on different generated FLWL can be more accurately achieved by considering the effects of other hydrological parameters, such as precipitation on a reservoir's water surface, which does not appear to have been considered in the original paper.

References

Liu, P., Guo, S., Xiong, L., and Chen, L. (2010). "Flood season segmentation based on the probability change-point analysis technique." *Hydrol. Sci. J.*, 55(4), 540–554.