

EGU2020-3391

<https://doi.org/10.5194/egusphere-egu2020-3391>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Ensemble learning for dynamic modeling in flood control operation of multi-reservoir systems

Jieyu Li^{1,2,3}, Ping-an Zhong¹, Minzhi Yang¹, and Qingwen Lu¹

¹Collage of Hydrology and Water Resources, Hohai University, Nanjing, China (lijyhhu@hhu.edu.cn)

²Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands

³IHE Delft Institute for Water Education, Delft, The Netherlands

Real-time joint operation of multi-reservoirs is significant to flood control and management of river basin. The high dimension of joint operation model and complex decision-making environment are still the main problems. This paper develops a general framework for reducing the complexity of flood control operation by identifying effective reservoirs. First, considering the factors which influence the reservoir flood control effect, a criteria system for identifying effective reservoirs is proposed. Then, different classification models based on ensemble learning are established. In real-time operation, the intelligent identification of effective reservoirs is carried out by sensing real-time information of the temporal and spatial distribution of storm floods and the variation of reservoir flood control capacity. On this basis, a hybrid equivalent operation model is established adaptively, which consists of a joint operation model of effective reservoirs and separate operation models of noneffective reservoirs. A case study of the flood control system located in the Huaihe River basin in China indicates that: (1) the ensemble learning classification models can identify effective reservoirs according to real-time information of flood and reservoirs dynamically. (2) the flood control effect of the hybrid equivalent operation model is similar to that of the joint operation model of all reservoirs. Obviously, in real-time flood control operation, the proposed method can realize the dynamic combination of two operation modes under different flood control situations, make the best use of reservoir storage capacity and reduce the complexity of flood control operation.

Key words: multi-reservoir system; real-time flood control operation; effective reservoir; ensemble learning; hybrid equivalent operation model