Analysis on the recurrence period of the Autumn flood during 2021 in the Zhanghe River Basin

Hui Fan,Yu Chen,Lin Wei, Shipan Fan

Objectives

In order to deeply understand the flood characteristics, the study analyzes the effect of joint flood regulation and accumulate experience for future flood regulation of Zhanghe River. The paper restores the flood process of the main control stations , and determines the recurrence period of the Autumn flood during 2021 in combination with the flood hydrological frequency calculation results.

Methods

By analyzing the scheduling and application of the reservoir and the measured flood process of the main control stations in the upper reaches of the Zhanghe River Basin(Figure 2), the natural flood process of the main control stations is restored using the three-source Xin'anjiang model and the Muskingum routing model. Also, the maximum flood peak discharge and volume in different periods are simulated. The flood recurrence period of the main control stations is calculated according to the hydrological frequency calculation results.

Results

The joint operation of reservoirs in the upper reaches of the Zhanghe River Basin has shown an positive role. The maximum flood peak discharge, the maximum 5-day and 15-day flood volume reduction rates of Yuecheng Reservoir are 21%, 13% and 9%, respectively(Figure 4).

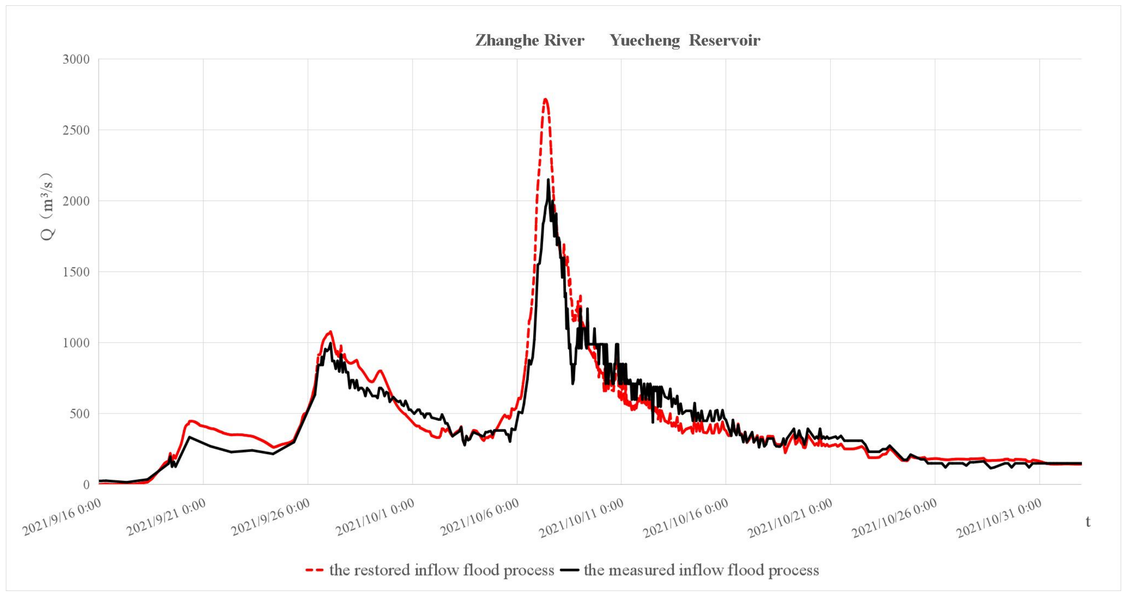

Figure 4 Comparison between the measured and restored inflow flood processes of Yuecheng Reservoir

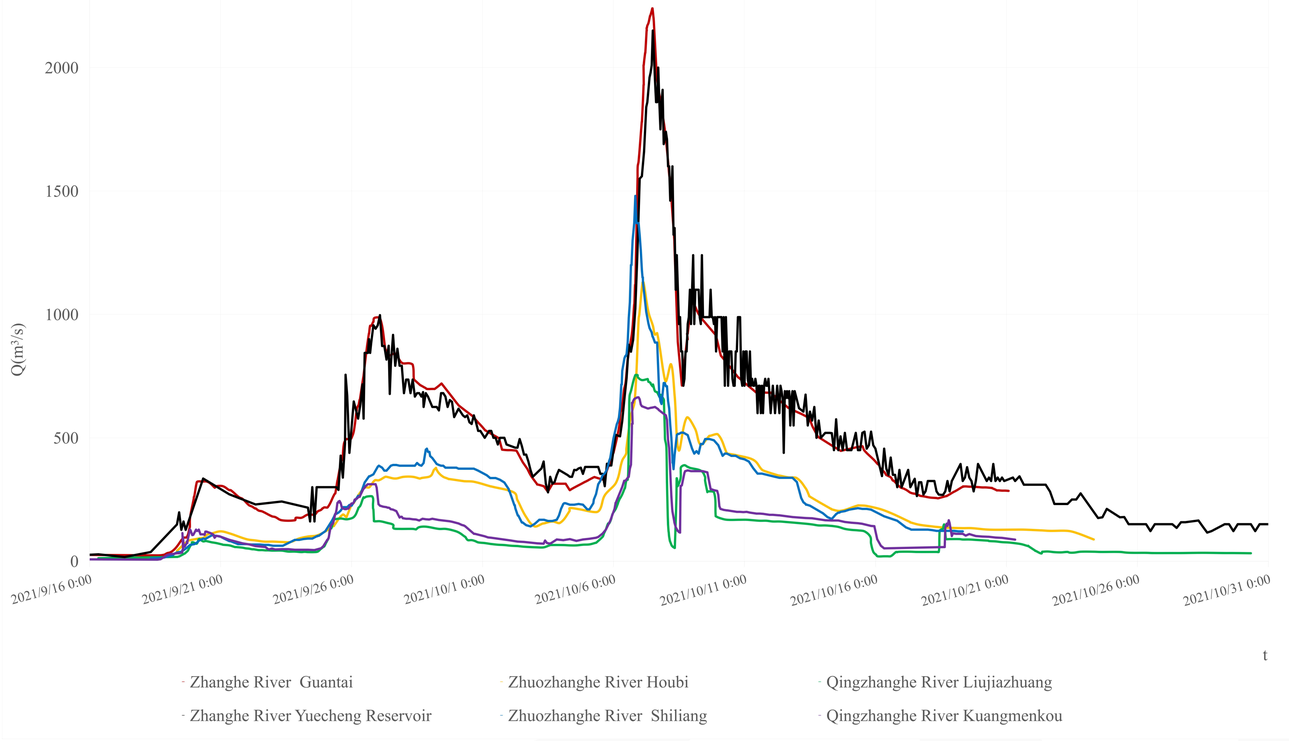

Figure 2 The measured flood process of the main control stations in the Zhanghe River

Conclusions

Based on the hydrological frequency calculation results in main-flood season, the recurrence period of the maximum flood peak discharge of the maximum 5-day and 15-day flood volume in Shiliang of Zhuozhang River Basin, Kuangmenkou of the Qingzhang River Basin and Yuecheng Reservoir of Zhanghe River Basin are about 5 years, 10 years and 10 years, correspondingly(Table 3).

However, in post-flood season, the recurrence period of the maximum flood peak discharge for the maximum 5-day and 15-day flood volume in Yuecheng Reservoir are 10~20 years, 20~30 years and 30~50 years, respectively.

Table 3 The recurrence period of the Restored Autumn flood during 2021 in the Zhanghe River

River	Hydrological Station	the Restored Flood Process			the Recurrence Period		
		Q_m	W_5	W_{15}	Q_m	W_5	W_{15}
Zhuozhanghe	Shiliang	1771	3.01	5.62	<5	10~20	10~20
Qingzhanghe	Kuangmenkou	1070	1.95	3.24	5~10	10~20	5~10
Zhanghe	Yuecheng Reservoir	2717	5.64	10.64	<5	5~10	10~20