

Real-time dynamic control of the Three Gorges Reservoir by coupling numerical weather rainfall prediction and flood forecasting

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Abstract Combining numerical weather rainfall prediction and flood forecasting to enhance forecast accuracy of inflow and extend the lead-time can effectively improve reservoir operation mode. In this study, the Regional Spectrum Model (RSM), which is developed by the Japan Meteorological Agency, was used to forecast rainfall with 5 days lead-time in the upper region of the Three Gorges Reservoir (TGR). The Xinanjiang Model was applied to forecast inflow to the TGR. In terms of relative error of inflow, relative error of flood peak and time difference of flood peak the performance of these combined forecasts was compared with that of a forecast based on using observed inflow and assuming that no further rain would fall. Taking the largest flood event in 2012 as an example, all inflow forecasting results were used to implement real-time dynamic control of the FLWL of the TGR. Compared with the designed operation rule, operation results showed that the dynamic control scheme significantly improved hydropower generation without increasing flood risk.

Key words numerical weather rainfall prediction; flood forecasting; flood limited water level; real-time dynamic control; Three Gorges Reservoir