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Impacts of calibration strategies and ensemble methods on ensemble flood forecasting over Lanjiang basin, Southeast China

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Ensemble flood forecasting driven by numerical weather prediction products is becoming more commonly used in operational flood forecasting applications.In this study, a hydrological ensemble flood forecasting system based on Variable Infiltration Capacity (VIC) model and quantitative precipitation forecasts from TIGGE dataset is constructed for Lanjiang Basin, Southeast China. The impacts of calibration strategies and ensemble methods on the performance of the system are then evaluated.The hydrological model is optimized by parallel programmed ε-NSGAII multi-objective algorithm and two respectively parameterized models are determined to simulate daily flows and peak flows coupled with a modular approach.The results indicatethat the ε-NSGAII algorithm permits more efficient optimization and rational determination on parameter setting.It is demonstrated that the multimodel ensemble streamflow mean have better skills than the best singlemodel ensemble mean (ECMWF) and the multimodel ensembles weighted on members and skill scores outperform other multimodel ensembles. For typical flood event, it is proved that the flood can be predicted 3-4 days in advance, but the flows in rising limb can be captured with only 1-2 days ahead due to the flash feature. With respect to peak flows selected by Peaks Over Threshold approach, the ensemble means from either singlemodel or multimodels are generally underestimated as the extreme values are smoothed out by ensemble process.