

Long-term reservoir operation optimized by DP models with one-month ensemble forecast of precipitation

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Abstract Optimizing processes of three (dynamic programming) DP-based models are analysed through the application of the models to optimization of long-term reservoir operation. One-month ensemble forecast of precipitation provided by the Japan Meteorological Agency is introduced to long-term reservoir operation focusing on water utilization. Ensemble inflow scenarios are then predicted from estimated precipitation scenarios by use of a regression model. Optimization of long-term reservoir operation which only focuses on water utilization is conducted by use of the predicted inflow scenario. Deterministic DP used with ensemble mean prediction and stochastic DP and sampling stochastic DP with all members of the ensemble forecast were employed for the optimization. By the application to Sameura Reservoir in the Yoshino River basin, Japan, it was shown that distribution characteristics of predicted streamflow, such as the relationship between the normal and median value, can be an index for decision of a DP-model employed, combining with prediction error tendency.

Key words ensemble forecast of precipitation; dynamic programming; reservoir operation; drought management; optimization; real-time operation