

Probabilistic Drought Forecasts Based on Ensemble Technique

Using the Improved Surface Water Supply Index in Korea

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Recently a drought continues to occur and its damages deepen further in Korea as well as worldwide. A dry season droughts also impact irrigation and stress the small agricultural reservoirs in middle regions of Korea. For mitigating drought impact, an accurate drought outlook as well as a drought monitoring is preceded. This paper proposes techniques for improving the previous hydrological index and developing a monthly probabilistic drought forecast. First, the previous hydrological drought index (SWSI, Surface Water Supply Index) used in Korea has some limitations: used only a few components and assumed the all components were fitted to the normal distribution. This study investigated available hydrometeorological components appropriate to each study basin for a drought index (Surface Water Supply Index) and estimated the proper probabilistic distributions for each component. This study also improved drought index that reflected the time-lag (2-month ago, 1-month ago, and this month) of each component. It is proved that the improved drought index simulates actual drought more accurate than the previous. Second, this study used a water balance model (“*abcd*”) which was successfully calibrated using a regional regression including monthly components and was used to convert meteorology to hydrology. Third, for the monthly drought forecast, this study performed an ensemble technique which included the various combinations using historical observations. This

procedure were applied to the Geum River basin which consists of 14 sub-basins in Korea and a simulation run for each of the monthly drought forecast was carried out. Last, this study considered and quantified the drought forecast uncertainty based on ensemble technique. The methodologies were applied to the Geum River basin in Korea. The accuracy of the monthly drought forecasts is better than the forecasts with the previous drought index. These results also are very worth to the drought management for the dry season.

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