



## **Expert-guided hybrid dynamical-statistical seasonal prediction system: An application for the seasonal outlook in Korea**

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An Expert Seasonal Prediction System for operational Seasonal Outlook (ESPreSSO) is developed based on APEC Climate Center (APCC) Multi-Model Ensemble (MME) dynamical prediction and expert-guided statistical downscaling techniques. Dynamical models have improved to provide meaningful seasonal prediction, and their prediction skills are further improved by various ensemble and downscaling techniques. However, experienced scientists and forecasters make subjective correction for the operational seasonal outlook due to limited prediction skills and biases of dynamical models. Here, a hybrid seasonal prediction system that grafts experts' knowledge, experience, and understanding onto dynamical MME prediction is developed to guide operational seasonal outlook. The system will operate under the following assumptions: a) dynamical models have some prediction skills, whether they are systematically biased, b) target variables are dynamically homogeneous enough to be controlled by similar processes, but heterogeneous enough to generate diversity in potential predictors, and c) experts have keen knowledge on observed dynamics, model performance, and ESPreSSO per se. The basis dynamical prediction is based on the APCC MME, which are statistically mapped onto the station-based observations by experienced experts. Their subjective selection undergoes objective screening and quality control to generate final seasonal outlook products after physical ensemble averaging. The prediction system is constructed based on 23-year training period of 1983–2005, and its performance and stability is assessed for the independent 11-year prediction period of 2006–2016. The results show much improved and stable prediction skill compared to the draw MME prediction results.