Session: C25 Poster: W10A

Multi-model ensemble seasonal hindcast (1983-2003) and Real-time prediction (2007-2011) at APCC

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Asia-Pacific Economic Cooperation (APEC) Climate Center (APCC) has devoted, since its inception in 2005, to meeting the growing societal and economic interests in monitoring and prediction of seasonal climate variability in an endeavor to reduce damages due to natural disasters. Since 2007, the APCC has produced deterministic and probabilistic multi-model ensemble (MME) seasonal climate predictions 1-month ahead and disseminated it to APEC member economies. Currently, 17 research institutes and operational centers from 9 APEC member economies are participating in the APCC operational rolling monthly 3-month MME prediction, by routinely providing their predictions in the form of ensembles of global forecast fields. APCC produces real-time seasonal forecast of precipitation and 850-hPa temperature over the globe using four deterministic MME methods and one probabilistic multi-model prediction (PMMP) method. It has been demonstrated that MME prediction with the step-wise pattern projection method (SPM) and simple composite method (SCM) are effective ways on reducing errors and quantifying forecast uncertainty due to model formulation. The SPM MME has better skills for seasonal precipitation and temperature than any individual model and other three MME methods during both the hindcast (1983-2004) and real-time forecast (2007-2011) period. The APCC MME skills for the real-time forecast period are generally lower than those for the hindcast due to overfitting and stability problem of statistical approach. The APCC PMMP system has been recently improved with correction of predicted seasonal mean anomalies using the upgraded SPM and the optimal estimation of forecast uncertainty taking into account the inflation of the predicted variance to match for the corresponding observed. The new version of the PMMP system has better skill than the old one for temperature and precipitation in June-July-August (JJA) in terms of reliability and resolution during both cross-validated hindcast and independent real-time forecast periods.