



## **Decadal prediction of Near Surface Temperature in East Asian by Multimode Ensembles of IPCC AR5 Near-term Simulations**

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Based on near-term simulations from globe climate models for IPCC AR5, probability prediction of decadal changes of near-surface temperature over East Asian ( $20-50^{\circ}\text{N}$  [ $U+FF0C$ ]  $100-145^{\circ}\text{E}$ ) is conducted by the multivariate Gaussian ensemble kernel dressing. Before prediction, model performances are evaluated on the simulations of the present-day climate (1961-2010) with root-mean-square errors (RMSE) and ranked probability score (RPS). The results of evaluation show that except HadCM3 ( $\text{RMSE} > 2.8\text{K}$ ), all the other 8 globe climate models exhibit higher performance ( $1.2 < \text{RMSE} < 2.5\text{K}$ ) and multimode ensemble probability prediction by equal-weighted kernel dressing is skillful ( $\text{RPS} = 0.85$ ). Furthermore, the multimode ensemble probability prediction in the following decades over East Asian are interpreted in terms of the bivariate probability density of annual mean temperature and its trend within the period 2006–2035 with respect to 1961–1990. Results show that there is an average increase in the annual mean temperature of approximately  $+0.8\text{K}$  and a corresponding trend of  $+0.4\text{K}/30\text{a}$ . For both quantities there is a northwest-to-southeast pattern where the increase in the south-eastern part is less intense, especially near the ocean surface.