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Ensemble projection of seasonal mean temperature and precipitation over South Korea using simulation results of five RCMs over CORDEX-East Asia based on IPCC RCP scenarios

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The seasonal mean temperature and precipitation over South Korea are projected with three ensemble methods using simulations from five regional climate models (RCMs) over the CORDEX East Asia domain with a 50 km horizontal resolution for 25-year (1981–2005) present and 45-year (2006–2050) future climate. All the simulations for present and future climate were performed using the results of HadGEM2-AO based on the representative concentration pathway (RCP: 4.5/8.5) scenarios. All five RCMs capture the spatial distribution of seasonal mean temperature and precipitation well over South Korea, but they show a systematic cold bias and their performances are clearly dependent on season, model, and geographic location. Equal weighted averaging (EWA), performance-based ensemble averaging (PEA_RAC), and multivariate linear regression (Mul_Reg) are used to project the seasonal mean temperature and precipitation. For the 25-year present climate simulation data, PEA_RAC significantly improves the projection skills for both the training and projection period. However, the EWA shows the least projection skill because the number of ensembles is small (5) and they have systematic biases. PEA_RAC shows that the seasonal mean temperature of 2026–2050 can be increased by +1.48–2.47 °C (1.95–2.50 °C) compared to the present climate (1981–2005) under RCP 4.5 (8.5). However, the magnitude of the increase should be recognized as being exaggerated, because all the RCMs overestimated the trend of the present temperature irrespective of the season. Also, projection results of seasonal mean precipitation by 3 ensemble methods will be presented.