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AR4 Climate models evaluation: Effect of topography in a sub-regional /local scale.

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A study was carried out to investigate the ability of present generation GCMs (IPCC AR4) to simulate the observed current seasonal temperature over a small domain of size 6o x 6o extending from 20-26oN and 83-89oE in east India. One way the model performance was addressed was by visual and graphical comparison between modelled and observed annual cycles. The majority of the AR4 models simulated the observed seasonal temperature cycles reasonably, and the deviation of model simulated annual cycles from those observed are within 2 standard deviations of observed interannual variability. The model performance in different seasons was assessed using a wide range of conventional statistical analyses, namely spatial correlation coefficients, mean bias, an agreement index (d-index) and various error indices. The model performance based on d-index and spatial correlation indicates slight variation across seasons. But the relative performances of models calculated using the different error estimators was not significantly varied across methods in the same season, indicating no method of model evaluation was superior to others. The best model in the recent generation (AR4) is MIROC whereas the multi-model ensemble using six models (MME6) consistently generated a slightly above average performance, ranking number 3 or 4 among the 7 data sets. The effect of observed and model topography on model performance was assessed by applying a mean lapse rate correction (0.65oC/100 meter) which revealed that all GCMs show quite similar spatial patterns with corrected observed patterns compared to uncorrected patterns of models and observation. Statistical measures recalculated using altitude corrected model and observed temperature shows stronger agreement compared to without correction but order of ranking of models based on performance was unaffected.