



Variations in temperature and precipitation during Indian summer monsoon simulated by RegCM3

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Variations in temperature and precipitation due to global changes have large societal impact in sectors such as agriculture and health. It is therefore very important to examine their temporal and spatial variations at the regional level in order to assess the impact of climate change. In India, the most important quasi-periodic system to affect the weather and climate is the Indian summer monsoon. The local changes in the temperature and precipitation can be well examined by a regional model. RegCM3 is one such model best suited for the Indian region. This model has been integrated in the ensemble mode at 55km resolution over India for the summer monsoon season during the years 1982-2009. The model simulations are compared with observed values in detail. Comparison with observations shows that RegCM3 has slightly underestimated summer monsoon precipitation over the Central and Northeast India. Nevertheless, over these regions, RegCM3 simulated rainfall is closer to the observations when compared to other regions where rainfall is highly overestimated. The model simulated mid-tropospheric temperature shows a warm bias over the Himalayan and Tibetan regions that gives rise to the low pressure in the region. Thus the position of the monsoon trough as simulated by the model lies to the north of its original position. This is similar to the usual monsoon break condition leading to less rainfall over Central India. RegCM3 simulated surface maximum temperature shows large negative bias over the country while the surface minimum temperature is close to the observation. Nevertheless, there is a strong correlation between the all India weighted average surface temperature simulated by RegCM3 and IMD observations. At the regional level, in the Central India, both rainfall and temperature show the best correlation with the respective observed values. While examining the extreme condition in Central India, it is found that RegCM3 simulated frequencies of very wet and extremely wet days and warm days and nights are more as compared to those in IMD observed values, but with some systematic biases. However, the inter-annual characteristics of both the rainfall and temperature extremes simulated by RegCM3 are well in phase with those observed.