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The regional climate model RegCM3 performances over several regions and climate regimes

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Regional Climate models are more and more needed to provide high resolution regional climate information in climate impact studies. Water availability in a future scenario is the main request of policy makers for adaptation and mitigation purposes. However precipitation changes are unlikely to be as spatially coherent as temperature changes and they are closely related to the regional model itself. In addition model skill varies regionally. An example of several ICTP regional climate model (RegCM3) simulations is reported over China, Korea, Africa, Central and Southern America, Europe and Australia.

Over China, Australia, and Korea the regional model improves the simulation compared to the driving GCM when compared with CRU observations. In China, for example, the higher resolution of the regional model inhibits the penetration of the monsoon precipitation front from the southern slope of the Himalaya onto the Tibetan Plateau. In Korea the nested domain simulation (20 km) shows an encouraging performance with regard to capturing extreme precipitation episodes and the finer spatial distribution reflects the detailed geography of the Korean Peninsula.

Over South America, RegCM captures the annual cycle of precipitation over Northeast Brazil and the South American Monsoon region, although the monsoon onset occurs too early in the model. Precipitation over the Amazon is not well captured, with too little precipitation associated with weak easterlies and reduced moisture transport into the interior of the continent.

RegCM simulates the annual cycle of precipitation over Central America and the Caribbean fairly well; in particular, the complex spatial distribution of the Mid-Summer Drought, a decrease in precipitation that occurs during the middle of the rainy season in July and August, is better captured by RegCM than by the GCM. In addition, RegCM simulates the strength and position of the Caribbean low level jet, a mesoscale feature related to precipitation anomalies in the region.

Over Africa our analysis shows that RegCM3 is able to reproduce fairly well the spatial variability of seasonal mean temperature, precipitation and the associated low-level circulation. However, monsoon flow is over predicted while African Easterly Jet (AEJ) core underestimated and shifted a bit northward.

Finally, over Europe the regional model shows a cold bias for most part of the year and a wet bias in winter and spring. Rain frequency is too high especially over the mountainous regions. The spatial patter of the precipitation extreme is well represented in the model although a slight overestimation of the 95, 98 99 percentile is evident.