Geophysical Research Abstracts,
Vol. 11, EGU2009-1731, 2009
EGU General Assembly 2009

Variability of East African rainfall based on multi-year RegCM3 simulations

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The International Center for Theoretical Physics(ICTP) regional climate model version 3(ICTP-RegCM3) multi-year simulations of East Africa rainfall during the October-December, short rains season are evaluated. Two parallel runs; based on NCEP reanalysis and NASA FvGCM lateral boundary conditions are performed. The simulated monthly and seasonal rainfall climatology as well as the inter-annual variability are found to be fairly consistent with observations. The model climatology over specific homogeneous climate sub-regions, except central Kenya highlands, also reasonably agree with the observed. The latitude-time evolution(intra-seasonal variability) of the simulated seasonal rainfall exhibits two distinct modes of behavior. The first is a quasi-stationary mode associated with high rainfall throughout the season within the equatorial belt between; 1oS and 2oN. The second mode is associated with the ITCZ-driven southward migration of regions of rainfall maxima as the season progresses, which is also consistent with the observed. Furthermore, observed rainfall variability over distinct homogeneous climate sub-regions is also fairly reproduced by the model, except over central Kenya Highlands and northeastern parts of Kenya. The spatial correlation between simulated seasonal rainfall and some of the global teleconnections(DMI and Nino3.4 indices) show that the regional model conserves some of the observed regional 'hot spots' where rainfall-ENSO/DMI association are strong. At the same, unlike observations, the model reveals that along the East Africa Rift Valley and over western parts of Lake Victoria Basin, the association is weak, perhaps an indication that non-linear interactions between local forcing (captured by the model) and large scale systems either suppresses or obscures the dominant influence of the teleconnections on rainfall over certain parts.