



Projecting Changes in Tanzania Rainfall for the 21st century: Scenarios, Downscaling and Analysis”

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A Non-Homogeneous hidden Markov Models (NHMM) is developed using a 40-years record (1950-1990) of daily rainfall amount at eleven stations in Tanzania and re-analysis atmospheric fields of Temperature (T) at 1000 hPa, Geo Potential Height (GPH) at 1000 hPa, Meridional Winds (MW) and Zonal Winds (ZW) at 850 hPa, and Zonal Winds along the Equator, and from 10 to 1000 hPa along the vertical. The NHMM fitted is then used for predicting future rainfall patterns under global warming scenario (RCP8.5), using predictors from the CMCC-CMS simulations from 1950-2100. The model directly includes a consideration of seasonality through changes in the driving variables thus addressing the question of how future changes in seasonality of precipitation can also be modeled. The results of the simulations obtained by using the downscaling model NHMM, with predictors derived from the simulations of CMCC-CMS CGM, in the worst conditions of global warming as simulated by RCP8.5 scenario, seems to indicate that, as a consequence of increase of CO₂ concentration and temperature, Tanzania should be subjected to a reduction of total annual rainfall; this reduction is concentrated in the wet seasons, both MAM and OND, mainly as a consequence of decreasing of seasonal number of wet days. The tendency towards drier conditions is partially compensated by a slight increasing of precipitation in the dry season JJAS. Frequency and Intensity of extreme events don't show any evident trend during the 21 century. An investigation on the causes of such hydrologic changes, and specifically on the role of Intertropical Convergence Zone ITCZ and Indian Ocean dipole IOD is pursued.