

## **The effect of the swamp of South Sudan on the regional climate of North Africa**

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The Regional Climate Model Version 3 (RegCM3) which developed by International Center for Theoretical Physics (ICTP) is applied to study the effect of the swamps in southern Sudan at many regional metrological features. The model employs Normer projection, with number of grid points (jx, iy) = (320,160) centered at 15oE, 10oN, and a horizontal grid point spacing of 30 km. The simulation period is June-August 1990-1999, the initial and lateral boundary conditions are taken from ERA-interim reanalysis. The model was calibrated for the desired domain. The model manage to reproduce very well the precipitation, Temperature, African Easterly Jet (AEJ), Tropical Easterly Jet (TEJ), African Easterly Wave (AEW), the low level monsoon and relative humidity. The performance of the model in over North African domain is of sufficient quality for application to study landuse change. Although the model shows some bias, there is a clear improvement in these simulated model variables compared to the previous applications of this model over North Africa. An experiment was made for the Model with control case, swamp and without swamp to assess the impact on the regional climate. The difference between swamp and desert shows a change in temperature by around 2°C in the swamp area, and little change in the middle of Sudan (0.8°C). The precipitation changes up to 40% is the swamp area, and little change along the northern part of the ITCZ, and a remote negative dipole in the Atlantic Ocean (25%). The net solar absorbed increase by around 30 W/m<sup>2</sup> in some part of the swamp, and shows a negative dipole (10 W/m<sup>2</sup>) above the swamp. The sensible heat shows the same trend as the net solar absorbed but with a less degree. On the other hand, the latent heat doesn't show any dipole, but is shows an increase up to 17 W/m<sup>2</sup>. The solar incident in the swamp area is around -40 W/m<sup>2</sup>. In addition, the net longwave reaches in northern of swamp up to around 6 W/m<sup>2</sup>. The low level monsoon vectors at 925 mb show a convergence at the swamp region, and show a divergence at 850 mb. Moreover, the geopotential height at 850 mb in the swamp region become -0.6 m, the sea level pressure create a dipole in the middle of Sudan compare to the swamp area, in the swamp area it is up -8 pa and in the middle of Sudan it reaches 11 pa. The tropical Easterly Jet in the becomes in the belt of 5oS to 15oN around -35 cm/sec, whereas the African Easterly Jet becomes stronger in the swamp area (65 cm/sec), and becomes less stronger along the ITCZ (30 cm/sec). The African Easterly Wave shows a clear dipole between the south and center of Sudan compare to the Atlantic Ocean.