



## **Atmospheric water budget over the West African monsoon region in a regional climate model: The sensitivity of different lateral boundary conditions**

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We investigate the spatio-temporal variation of the West African monsoon (WAM) water budget components by using three different RegCM4 regional climate model experiments. RegCM4 is driven by the ERA-Interim reanalysis and two CMIP5 Earth System Models (ESM), i.e. the MPI-ESM and the HadGEM2-ES. The analysis focuses, in particular on the main WAM rainy season which corresponds to the June-July-August-September (JJAS) and over the 1980-2005 periods. Moisture convergence computed from RegCM4 outputs are compared again that obtained from ERA-Interim while CRU and GPCP are used to evaluate RegCM4 ability to reproduce the observed precipitation. Our results show that there is a seasonality and interannual variability of the water balance that varies across the Sahel and Guinea region. However RegCM4 simulates faithfully the seasonal cycle and interannual variability of the hydrological variables with RegCM4 performing better when driven by ERA-Interim reanalysis. Over West Africa, precipitation exceeds evaporation and thus acts as a sink of moisture ( $P > E$ ), while over the Sahel and Guinean region evaporation exceeds precipitation ( $E > P$ ) over certain years. Overall here we show that the seasonal mean hydrological cycle and the precipitation interannual variations over sub-regions within the WAM domain are sensitive to the large scale lateral boundary conditions, even though the land surface scheme is a key element on the simulated hydrological cycle.