



The Role of Groundwater in the Amazon Water Cycle

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Using an integrated soil-vegetation-groundwater-surface water model (LEAFHYDRO), we simulate the Amazon water cycle over 2000-2009 (10yrs) forced by the ERA-Interim products at the time step of 1 minute and grid spacing of 1 arc-minute (~2km) over the Amazon basin. We present the simulation results of groundwater level, river flow, floodplain dynamics, soil moisture, evapotranspiration (ET) and the associated energy fluxes. Our findings suggest that, first, the groundwater level lags behind the rainfall by weeks to months and is the main water source for dry-season streamflow and wetlands, second, the presence of shallow groundwater reduces wet-season drainage and hence increases soil water storage, and third, in the late dry season the normally downward water flux through the soil reverses and there is a small but critical upward flux driven by capillarity from the water table to the root zone that supports dry-season ET. Together, these results suggest that the groundwater reservoir is an important player in the Amazon water cycle by buffering the dry-season land surface water stores and fluxes. Our findings may have implications to the future of the Amazon forest under the projected climate change with a longer dry season (IPCC). Understanding how the Amazon survives the dry season today may help us understand how it may fair in the future.