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Diurnal cycle of the West African Monsoon water cycle: regional and seasonal variability.

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The ground-based Global Positioning System (GPS) receivers deployed in the framework of AMMA provide an unprecedented insight into diurnal variations of precipitable water vapour over West Africa. They display a strong seasonal dynamics and distinct features along latitude. Overall, GPS data point to the significance of an afternoon maximum of PWV during the monsoon season. These data are used together with surface evapo-transpiration from the ALMIP land surface model simulations forced with TRMM 3B42v6 three-hourly precipitation data. The combination of the three datasets yields a comprehensive description of the atmospheric water cycle at a sub-daily timescale. A description of the monthly mean diurnal cycle in the water budget terms is discussed as a function of location and time. A focus is made on the pre- and post-onset periods. The diurnal cycle of the atmospheric processes involved are investigated with the help of high-resolution radiosonde data and the ECMWF model analysis and forecasts.