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Effects of evaporation in the ephemeral streamflow diurnal pattern: Case of Tambarga, Southeastern Burkina Faso.

Theophile Mande (1,2), Natalie C Ceperley (1), Steven V Weijs (1), and Marc B Parlange (1)

(1) ENAC EFLUM, EPFL, Lausanne, Switzerland (theophile.mande@epfl.ch), (2) International Institute for Water and Environmental Engineering (2iE), Ouagadougou,Burkina Faso

Diurnal patterns of streamflow and evaporation are relatively well explained in the literature. Several factors, such as rainfall events, change of riverbed conductivity, water uptake by plants and crops and direct evaporation are known to drive to groundwater and streamflow diurnal pattern. The drainage area (topographic bounds) and the evaporation footprint are roughly used as area that controlling respectively streamflow and evaporation. Nonetheless, delineating precisely the area controlling or influencing these daily patterns remains a key issue in hydrology. This study investigates the groundwater recharge, streamflow and evaporation generation processes and aims to identify the area controlling these daily patterns. The groundwater appears to be the primary source of continuous streamflow for Tambarga's ephemeral stream. The base flow is controlled by the groundwater and starts when the water table level reaches the riverbed. During the dry days, the baseflow and the evaporation follow a diurnal cycle with their respective minimum and maximum values coinciding in time.
A symmetrical daytime relationship was highlighted between evaporation measured using eddy covariance techniques and streamflow gauged using a weir at the basin outlet (3.5 km2).Comparing water lost in the stream and actual evaporation in half-hour periods, a contributing area was defined during dry days. The riparian zone could reasonably represent this area and seems corresponding to the primary source of evaporation. The daily partitioning of evaporation over the basin was highlighted using a clockwise hysteresis relationship found between actual evaporation and water lost in the stream. The importance of this contributing area for modeling stream-aquifer-atmosphere interactions is discussed in detail in this presentation.