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The annual and diurnal cycles of precipitation over an Equatorial Andean valley and its transition to the Amazon Basin: A case at the Antizana region

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The spatiotemporal variability of precipitation over the complex topography of the Andean equatorial regions has recently caught the attention of researchers thanks to improvements in monitoring networks, including high temporal resolution data. Using a set of 38 rain gauges at hourly time step spanning the 2014-2015 period, this work aims to characterize the annual and diurnal cycles over the upper parts of the Guayllabamba (Andean valley) and Napo (transition zone) basins (78.65°W-77.75°W and -0.8S-0°, land area of ~10000 km^2). This region drains respectively to Pacific and Amazonian rivers and is of particular interest because the region provides over 30% of the domestic water demand of the city of Quito, and presents a high glacierized volcano, the Antizana.

The annual cycle is characterized through cluster analysis of monthly rainfall showing two groups of stations that respond to bimodal and unimodal seasonal regimes and corresponds to the local boundary between the Pacific and the Amazon basins. The bimodality presents higher rainfall occurring during March-April and October-November, on the other hand, the unimodality presents its maxima in June.

A careful analysis of the evolution of the diurnal cycle during the year is done and results show that stations with bimodal annual regime peaks around 13:00-17:00 LT and in some months a second peak appears around 22:00-06:00 LT. Regarding stations with unimodal annual regime, the diurnal cycle peaks around 10:00 LT-18:00 LT and in addition shifts to 00:00-06:00 LT during June-August.

In general, the annual and diurnal cycles are useful for water management in the study zone, especially with regards to Quito's water supply. Furthermore, the annual cycle and its relationship

with altitude provides new information related to strong and weak precipitation gradients that are useful for hydro-glaciological modelling exercises. And the information on the diurnal cycle can improve some water management practices.