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Are dew measurements relevant for forest litter interception on a Cerrado woodland forest?

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Determining the water partitioning in the critical zone, and how the biotic and abiotic factors affect these processes, is crucial to improve the comprehension of hydrological processes. Adequate field measurements of water partitioning in forested areas are challenging. Especially, continuous forest litter interception measurements are difficult to obtain. Therefore, we developed an equipment (named Litter Interception Device - LID), composed of a weighting system that contains a load cell with a resolution of 1 g, for continuous measurements of forest litter interception. The study was carried out in a Cerrado woodland forest (Cerrado sensu stricto) since 2017 in the State of São Paulo, Brazil. Following the continuous monitoring, we observed eventual weight gain during the nights. We analyzed the measurements for possible accumulation of dew in two LIDs between August 2018 and August 2019. We first carried out laboratory tests to check the possibility of measurement errors due to temperature shifts on the load cell. A maximum of 3 g error measurement after 10 °C temperature reduction was observed. We also estimated the dew point temperature for the study area during the monitoring period, based on temperature, relative humidity and rainfall data of sensors installed outside the Cerrado's forest. In the forest, we monitored the temperature using a thermocouple installed in the forest litter sample. All sensors' data were stored in a datalogger every 10 min. The dataset was analyzed in daily periods between the 9:00 pm and 7:00 am of the subsequent day. To check for dew accumulation on the forest litter, we defined the following minimum criteria to be considered dew, for each interval of our analysis: (a) the total mass gained could not be less than 2 g (equivalent to 0.0125 mm moisture accumulation); (b) the maximum temperature variation on forest litter 7 °C (considering that daily temperature variations close or above 10 ºC could introduce more errors); (c) there was no rainfall from 9:00 pm to 7:00 am of the subsequent day. On 204 days dew point temperature was reached, from which 76 days at least one of the LIDs registered a weight gain. During the study period, the temperature on the forest litter presented a maximum and mean variation of 6.7 °C and 2.5 (±1.2) °C, respectively. The data analysis indicated on average 4.59 mm of dew in one year. This average corresponded to 0.35% of the total rainfall for the study period (1206 mm) and 3.74% of the total average forest litter interception (133 mm). In tropical forests like the wooded Cerrado presented here, rainfall is the major input of water; otherwise to arid regions, were studies have shown that dew is the major input (i.e. Negev Desert). In our case, despite the low

percentage related to the total rainfall, dew should not be neglected. As the LID measures all the mass inputs, including forest litter's deposition, dew must be considered to correctly determine the hydrological processes at different time-space scales.