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Soil moisture variation along a toposequence in the northeast Brazilian caatinga

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Soil moisture variations and soil water potentials are crucial to understand the plant behavior under water stress conditions. Such kind of data are also valuable for modeling efforts in hydrology, ecophysiology, soil-plant-atmosphere interactions and earth system models. Here we present soil moisture variation along the hydrological year of 2015 for 4 different soil profiles along a topographic gradient in the Brazilian caatinga, Sao Joao site, northeast Brazil, Pernambuco state. The data were collected using Sentek probes, Enviroscan type, in sandy soil profiles of 0.4 m (P1), 0.5 m (P2), 0.9 m (P3) and 1.10 m (P4), from the bottom to the top of an instrumented hill-slope of around 1 km length. Along this topographic gradient, the maximum depth of probes installation occurred due to the existence of an impenetrable layer, commonly found in some areas of the Caatinga biome. Our results show that, during the rainy season, in the deepest soil profile (P4) from the upper part of the slope, soil moisture reached the maximum of 16% at the top layer (0.1-0.4 m soil depths), while below 0.4 m depth, the maximum soil moisture registered during rainy season were 6%. However, during the dry period, soil moisture at the top (0.1-0.4 m soil depths) decreased to values below 1 %, while the deeper soil layers (below 0.70 m) maintained moisture content at values around 4% for the whole dry period. In the shallower soil profile (P4), soil moisture also reached the maximum of 16% in the wet season along the whole soil profile. In the dry period, however, the top layer presented maximum soil content of 1% while the bottom (0.4 m) maintain moisture content of around 4%, similar to the deepest layer of the P4 profile. Similar behavior was found for the intermediate soil profiles (P2 and P3), suggesting that, independently of the depth of the soil profile, soil moisture at the interface soil/atmosphere present values below 1% in the dry season while at the interface sandy soil/impenetrable layer, moisture is maintained at around 3-5%. For the next steps, these results will be analyzed in terms of rainfall rates, soil physical properties and water storage in order to understand the water balance dynamic for different soil depths above the impenetrable soil layer.