Geophysical Research Abstracts
Vol. 19, EGU2017-2343, 2017
EGU General Assembly 2017

Throughfall patterns of a Subtropical Atlantic Forest in Brazil

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The interception process is responsible for the spatial and temporal redistribution of the precipitation that reaches the ground. This process is important especially in forested areas since it influences recycling of moisture from the air and also the amount of water that effectively reaches the ground. The contact of the precipitation with the canopy influences on the water quality, increasing the concentration of various nutrients in the throughfall (Tf) and stemflow (Sf). Brazil, only about 8% of the original Atlantic Forest cover remains. That is an important biome and little is known about the characteristics of rainfall interception of this forest. The total interception loss in forested areas is usually formulated as the gross precipitation (P) minus the sum of the throughfall (Tf) and the stemflow (Sf). The stems characteristics influence on Sf, meanwhile, the value of Tf strongly depends on the canopy and leaf structures. Because of the complex structure of the canopy, these characteristics are usually expressed by the simpler Leaf Area Index (LAI) or the Canopy Cover Fraction (CCF). The Araponga river experimental catchment (ARA) with 5.3 ha is on the northern plateau of Santa Catarina State, southern Brazil. It is an area completely covered by secondary subtropical Atlantic Forest, the regional climate is the Köppen Cfb type, i.e. temperate climate without dry season and with warm summer (the mean temperature of the hottest month is always under 22°C). The objectives of the present study were (i) to evaluate the spatial and temporal variation of canopy cover; (ii) to influence of the interception process on the precipitation quality; and (iii) to explore the relation between canopy cover and throughfall. Inside the catchment, 9 Tf gauges were installed 40 cm above the soil surface in order to include the interception by shrub. 28 hand-made gauges were installed on a circular area of 3 m radius to analyze the spatial variability of throughfall. During 3 year in 2012 to 2014, digital images were taken every month with a camera installed horizontally 25 cm above the soil surface at each Tf gage. The total incident rainfall was 4624 mm, the throughfall volume was 3538 mm or 76% of incident rainfall. CCF and LAI ranged from 70 to 90% and from 3 to 5.5 m^2/m^2, respectively. We could not find any satisfactory relationship between Tf and canopy parameters (CCF and LAI). The analysis shows the significant difference in the water quality of the precipitation that reaches the ground after being intercepted. There was no significant relationship between the physicochemical parameters and the canopy cover fraction. The results indicate that the distribution of throughfall is not homogeneous, its spatial variation is not linked to any of the calculated parameters.