Geophysical Research Abstracts
Vol. 21, EGU2019-12979, 2019
EGU General Assembly 2019

The ecohydrology of a Pinus brutia forest during four hydrologic years

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The Mediterranean climate is characterized by low amounts of rainfall and by high variability and unpredictability. Mediterranean pines developed adaptive strategies to survive and grow under such conditions. This study aims to analyse of the long-term impact of the rainfall regime on the water balance components of *Pinus brutia* trees, synthesizing new and previously published results.

The study site is a homogenous *Pinus brutia* stand located on the northern foothills of the Troodos mountains in Cyprus, at 620 m elevation. The area has a sloping topography with very shallow soils and fractured bedrock. On top of the soil there is a thick layer of litter (pine needles) that reduces soil evaporation. The average daily minimum temperature is 5 ˚C in January and the average daily maximum temperature is 35 ˚C in August. Mean annual rainfall is 425 mm. Monitoring started on 17 November 2014 and is ongoing. We installed 31 soil moisture sensors at 12-cm depth and one at 30-cm depth, where the soil was deeper than 24 cm. Two soil water potential sensors were installed at 12-cm depth. We used sap flow heat ratio method (HRM) instruments to determine sap flow rates of *Pinus brutia* trees and to examine azimuthal variations. Hourly meteorological conditions were observed by an on-site meteorological station. For our analysis, we computed the potential evaporation and the vapour pressure deficit.

Total rainfall was 507 mm in 2015, 359 mm in 2016, 220 mm in 2017 and 576 mm in 2018. The total reference evapotranspiration was 1277 mm in 2015, 1480 mm in 2016, 1413 mm in 2017 and 1533 mm in 2018. Tree transpitation was 266 mm in 2015, 107 mm in 2016 and 166 mm in 2017. The preliminary results show the highest transpiration rates in 2018. This year was characterized by extreme rainfall events in late spring and summer, during high evaporative demand. The results show a seasonal pattern of transpiration, due to the temporal distribution of rainfall and soil moisture during the year and the rain in the preceding months, which recharges the fractured bedrock.