

The warm temperate deciduous forests in Asia have a relatively dense understory, hence, it is imperative that we understand the dynamics of transpiration in both the overstory (E_O) and understory (E_U) of forest stands under the influence of the Asian monsoon in order to improve the accuracy of forest water use budgeting and to identify key factors controlling forest water use under climate change. In this study, E_O and E_U of a temperate deciduous forest stand located in South Korea were measured during the growing season of 2008 using sap flow methods. The objectives of this study were (1) to quantify the total transpiration of the forest stand, i.e., overstory and understory, (2) to determine their relative contribution to ecosystem evapotranspiration (E_{eco}), and (3) to identify factors controlling the transpiration of each layer. E_O and E_U were 174 and 22 mm, respectively. Total transpiration accounted for 55 % of the total E_{eco} , revealing the importance of unaccounted contributions to E_{eco} (i.e., soil evaporation and wet canopy evaporation). During the monsoon period, there was a strong reduction in the total transpiration, likely because of reductions in photosynthetic active radiation, vapor pressure deficit and plant area index. The ratio of E_U to E_O declined during the same period, indicating an effect of monsoon on the partitioning of E_{eco} in its two components. The seasonal pattern of E_O was synchronized with the overstory canopy development, which equally had a strong regulatory influence on E_U .