Geophysical Research Abstracts
Vol. 15, EGU2013-11317, 2013
EGU General Assembly 2013

Stemflow amount, intensity and timing in a mature forest in coastal British Columbia, Canada

Ilja van Meerveld (1) and Sheena Spencer (2,3)

(1) Critical Zone Hydrology Group, Faculty of Earth and Life Sciences, VU University Amsterdam, The Netherlands (ilja.van.meerveld@vu.nl), (2) Department of Geography, Simon Fraser University, Burnaby, BC, Canada (saspence@sfu.ca), (3) Foothills Research Institute, Hinton, AB, Canada

Stemflow is the portion of precipitation that falls on the forest canopy and flows along tree branches and stems to the soil at the base of the tree. Previous studies have shown the importance of stemflow for nutrient cycling, groundwater recharge, plant water uptake and soil moisture dynamics; however little is known about stemflow in mature coastal British Columbia forests. Furthermore, most studies focus on the amount of stemflow; few studies have looked at the timing or intensity of stemflow relative to precipitation intensity. We therefore measured stemflow from 18 trees of four different species within a ∼1 ha mature western hemlock-western redcedar stand within the Malcolm Knapp Research Forest in British Columbia, Canada, using water collecting containers and tipping bucket rain gauges. Measurements between February and November 2010 showed that stemflow amount was highly variable between the different trees. It did not vary much between species but instead varied mainly with tree size. Trees smaller than 35 cm in diameter contributed relatively more stemflow than larger trees; they represented 24% of the total basal area but contributed ∼72% of total stemflow at this site. Funneling ratios were larger than one for the trees smaller than 35 cm in diameter and increased with event size up to 50 mm. Funneling ratios for larger trees were less than one and did not vary much with event size. Stemflow started on average after 3 mm of precipitation. Peak stemflow intensities were much larger than peak precipitation intensity for some events and did not always occur at the same time as peak precipitation intensity; peak stemflow intensities tended to increase for consecutive precipitation bursts and occurred approximately 15 minutes after the corresponding peak precipitation intensity. Peak stemflow intensities were not related to tree species or tree size. Even though stemflow accounted for only ∼1% of precipitation, high peak stemflow intensities could contribute to fast groundwater recharge and influence soil moisture dynamics around the trees. Dye tracer experiments showed that stemflow infiltrated primarily along roots and was more frequently found at depth than at the soil surface.