Forest evapotranspiration during periods of mild winter weather.

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Abstract. Until recently there has been virtually no precipitation/throughfall and micrometeorologic studies carried out in the wet season in the humid temperate forests of the Pacific Northwest. Nevertheless, it is widely believed that evapotranspiration in these forests is limited mainly to the seasonal drought period. Rothacher's (1963) precipitation/throughfall study is frequently cited as evidence in support of this hypothesis, yet that study was very limited in scope and rigor. Beginning in winter 1998, year-round micrometeorological and precipitation/throughfall data has been collected at the Wind River Canopy Crane Facility in southwestern Washington. The crane stands within 500-year old coniferous forest reserve. I will report on empirical and theoretical evapotranspiration results for this site, specifically for intervals of mild weather in the wet season, i.e,. for periods when the ground and canopy is snow-free, and precipitation occurs as rain. An empirical estimate of interception loss for these intervals is obtained as precipitation measured below the canopy subtracted from precipitation measured in a nearby clearing. The theoretical results are obtained by applying the Penman-Monteith equation with the micrometeorological data as forcing data, and using parameters estimated a priori from the literature. This research is motivated by an earlier study carried out by the author, in which Penman-Monteith predicted that winter evaporation is a substantial component of the water budget at a forested site in the Puget Sound Lowland. For that project, meteorological forcings were inferred from daily precipitation and mininmum and maximum air temperatures, using algorithms that had not been validated for application in winter. At the time that study was completed (1997), there was no data available to validate the model predictions. Despite these shortcomings, the results provided at least a theoretical basis for questioning the long held assumption that evapotranspiration is minimal in winter.

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