

MICROCLIMATE, TREE WATER POTENTIAL, TREE TRANSPIRATION, AND BOLE DIELECTRIC CONSTANT
OF CONIFERS AND DECIDUOUS TREE SPECIES
IN THE CONTINENTAL BOREAL ECOTONE IN CENTRAL ALASKA

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The occurrence of temporal and spatial water stress in major tree species in the boreal environment is still in dispute. Under limited water supply conditions from the rooted soil zone, trees show a declining water potential. Coincidental change in tree water potential, tree transpiration and tree dielectric constant has been observed in previous studies performed in Mediterranean ecotones. If radar is sensitive to changes in tree water states as reflected through changes in dielectric constant, then radar remote sensing could be used to monitor the water status of forests. The goal of this study is to detect and quantify the temporal occurrence of declining tree water potential in relation to microclimate, tree transpiration and bole dielectric constant and subsequently model its effect on radar backscatter and to verify its detectability with radar.

In early summer 1993 four tree species in a mixed floodplain forest along the Tanana River, Central Alaska have been equipped with sensors to continuously monitor *in situ* microclimate in the canopy and soil as well as xylem water flux and dielectric constant of these trees over the course of the year. General meteorological data and canopy structural information are available through the Institute of Northern Forestry in Fairbanks. Pre-dawn and noon AIRSAR imagery of this site was obtained during July 1993. Water potential measurements were taken during summer solstice at continuous ambient light and later during July for a full diurnal cycle.

All trees in the floodplain site with generally moist soil conditions showed substantial diurnal variation in transpiration and tree water potential values. This indicates the occurrence of diurnal changes in water availability to trees during the boreal summer. Results from the dielectric constant measurements and the AIRSAR data will be presented.

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