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LONG-TERM VARIATION OF ANOMALY IN ABOVEGROUND BIOMASS IN CIRCUMPOLAR BOREAL FORESTS

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High latitude of the northern hemisphere is an area which may be affected most by the warming climate. This effect is likely to have been apparent in the circumpolar boreal forests; however, due to lack of repeated forest measurements in the less-populated regions, it has generally been difficult to substantiate such effects with data. We apply a method of quantitative stand reconstruction which allows us to estimate structure of forest stands in the past with only samples and data that could be obtained at present, and examined history of responses of boreal forests to climate variations in terms of reconstructed anomaly in aboveground forest biomass.

Measurement of stem diameter at breast height (dbh) and tree height of all living trees was conducted in forest plots containing about 100 living trees or more in western part of Northwest Territories, Canada at latitudes ranging from 68^{o} to 60^{o}. Samples of stem disks were also taken at various heights of stems to estimate their stem volume in the past through stem analysis. These information were used to estimate aboveground biomass of stands in the past based on the stand reconstruction technique. Anomaly in aboveground biomass was further calculated after fitting a von Bertalanffy growth equation to the estimated aboveground biomass data with a use of Hozumi's *U-W* diagrammatic analysis. Then, correlations between the estimated anomaly in aboveground biomass and annual air temperature, annual precipitation, and other environmental variables were examined.

We found that effect of warming air temperature is species specific in northwestern Canada. Black spruce (*Picea mariana*) stands showed significant negative correlation between aboveground biomass anomaly and air temperature, suggesting that stands grew worse when air temperature was higher. On the other hand, jack pine (*Pinus banksiana*) indicated significant positive correlation between these variables, suggesting that it showed better growth when warm. Implication of these findings in the context of the effect of climate warming in the circumpolar boreal forest is discussed.