Geophysical Research Abstracts
Vol. 14, EGU2012-9393, 2012
EGU General Assembly 2012

Albedo of a hybrid poplar plantation in central Alberta, Canada

D.T. Price (1), P.Y. Bernier (2), A. Orchansky (3), and B. Thomas (4)

(1) Natural Resources Canada, Canadian Forest Service, Edmonton (AB), Canada (david.price@rncan.gc.ca), (2) Natural Resources Canada, Canadian Forest Service, Québec (QC), Canada (pbernier@rncan.gc.ca), (3) Micrometeorological Consultant, Edmonton (AB), Canada, (4) Alberta-Pacific Forest Industries Inc., Boyle (AB) and University of Alberta, Edmonton (AB), Canada

Canada's boreal forest resources are coming under increasing pressure from competing land-uses, including establishment of protected areas, and losses of harvestable forest to mining and oil and gas exploration. In the prairie region, concerns about lack of wood supply for pulpmills and potential opportunities for bioenergy production and carbon sequestration for climate change mitigation, have spurred interest in afforestation of marginal agricultural land, notably with fast-growing hybrid poplars (HP). However, global modelling studies suggest that a shift from grassland or crops to forest cover in temperate and boreal regions could result in reduced surface albedo, particularly in winter, causing an increase in radiative forcing and reducing any climate mitigation benefits due to net GHG removal.

We report on seven growing seasons of measurements of short-wave canopy albedo using tower-mounted instruments, along with eddy covariance measurements of carbon, water and energy balance, at a site in central Alberta planted with HP cuttings in spring 2005. The data show little systematic change in average albedo as vegetation has changed from bare ground to a plantation of 6 m trees. Reasons for this include very wide (3 m) spacing between the trees, and snow cover which often persists for 4–5 months and is highly visible below the bare canopies during winter. While measurements should continue as the trees grow larger, we postulate that extensive afforestation with HP is unlikely to have major effects on regional-scale surface albedo compared to the agricultural systems they replace. Normal rotation lengths are 15–20 years, hence even if older plantations have significantly lower winter albedo, their contribution to the regional average would be relatively small because they will cover only a small fraction of the landscape (e.g., compared to forests of boreal conifers or temperate broadleaved species).