Age structure of mountain birch at and beyond the treeline, and potential for future change, Northern Norway and North-Western Russia

Master project within PPS Arctic Norway founded by Research Council of Norway
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Aim

To analyse the age structure of the current birch treeline and the birch recruitment beyond the treeline along climatic gradients in Arctic Scandinavia and Kola Peninsula.

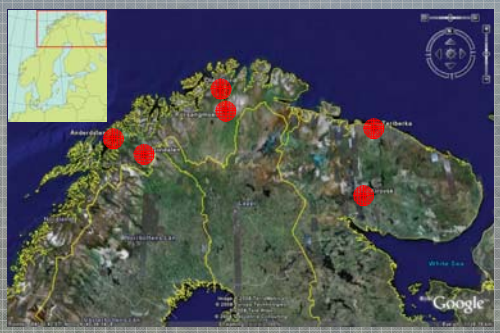
Why?

The treeline and the transition from forest and tundra form an important ecological ecotone, and its position and structure is influenced by climate, topography and anthropogenic impact. The location of the zone is expected to change in response to the climate warming, because of anticipated increase in growth and recruitment at the treeline and in the current alpine zone.

This study analyses the both the history of the current treeline location and the potential for changes along coast-inland gradients and along the regional west-east gradient of decreasing impact of Atlantic air masses.

Where and when?

The study uses oceanic and continental areas in two regions in Northern Norway (Troms and Finnmark), and one in North-Western Russia (Kola Peninsula). The Norwegian areas were sampled in the summer 2007, and Russian areas will be sampled in 2008.



How?

In each area, one north facing mountain slope is selected, along which 20 mountain birch (*Betula pubescens* spp. *tortuosa*) treeline trees are cored at ground level, and cored/cut at 2 m for determination of age, recruitment year, and time required to reach tree size. Further, all saplings within a 20 m wide sampling band stretching from the treeline and 100 altitudinal meters into the alpine tundra towards the summit of the mountain, are cored or cut for age determination. In addition to age the following variables are recorded for all sampled individuals: height, stem diameter at ground level and breast height (1,3 m), crown diameter, vitality, ground moisture conditions, plant community and GPS position. Additionally, the altitudinal distance between the treeline and forest line, and the most advanced altitudinal location of birch sapling/seedling per area is recorded.

After age determination in the lab the samples are grouped into classes, giving area-specific age structures for treeline trees and recruitment. Differences in age, growth characteristics and environmental characteristics between study areas are tested for by the use of ANOVA and Tukey's HSD; and correlation between different variables is tested for by Spearman's/Pearson's analysis. Further, by using PCA and correlation analysis the pattern and importance of variables corresponding to tree and sapling positions along the gradient is analysed.

Preliminary results

Data collected in 2007 is not yet fully analysed, but one age structure example from Olderfjord (Finnmark) is presented: This age structure consists of the 20 treeline trees and 110 saplings from the sampled altitudinal section beyond the treeline. There was a slight overlap in age between the two groups. The age of the treeline trees ranged from 37 to 86 years, while the saplings ranged from 3 to 38 years.