



## **Feedbacks between treeline shift and nutrient availability in Northern Russian mountains**

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Treelines are distinct vegetation boundaries from tundra to forests which have shifted upward during the last decades in various mountain regions around the globe. These shifts have mainly be attributed to climate warming. In our study, we examined the influence of nutrient availability on treeline shifts. We hypothesized that a more favorable microclimate in the forest enhances nutrient mineralization which fosters the forest expansion. In remote areas of the Ural and Khibiny mountains of Northern Russia, we have sampled plants and soils along six elevational transects reaching from the tundra to subalpine forests, representing treeline shifts in a space for time approach.

Results show that available nitrogen and phosphorus in the soil increases with decreasing elevation, i.e. from the tundra to the subalpine forest . Concentration of N and P in needles showed the same pattern. The increase in soil and plant nutrients was most pronounced from the tundra to the species line, while plant nutrient contents even decreased from the species line towards the subalpine forest. We interpret that these findings indicate a positive feedback between treeline advance and nutrient availability, very likely due to an accelerated organic matter turnover under the more favorable microclimatic conditions under tree canopies. However, with ongoing forest development nutrient cycling is becoming increasingly tighter due to the binding of nutrients in biomass.