Title:

Treeline changes in the Kola Peninsula, Russia: natural and anthropogenic factors

Authors & affiliations:

Elena Golubeva[1], Olga Tutubalina[1], Valentina Kravtsova[1], Annika Hofgaard[2], Gareth Rees[3], Maria Golubeva[1], Anna Mikheeva[1], Ingrid Mathisen[2]
[1]Faculty of Geography, Moscow State University, Moscow, Russia; [2]Norwegian Institute for Nature Research, Trondheim, Norway; [3]Scott Polar Research Institute, the University of Cambridge, Cambridge, United Kingdom

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In this study, we analyse dominant factors of treeline change for three key areas within a limited region (150 x 80 km) in the Kola Peninsula, Russia. Two areas are situated in mountainous and comparatively continental setting: of these the first area in Khibiny Mountains is relatively unaffected by industrial pollution, while treeline changes in the second area in the Monchetundra Range are strongly controlled by sulphur dioxide and heavy metal emissions from the Severonikel smelter. In Khibiny, with fairly productive soils, the treeline has moved upslope by 20-30 m since 1950s, while in Monchetundra the treeline ascended by hundreds of meters due to forest disappearance as result of the industrial emissions. The third and northernmost area represents latitudinal, rather than altitudinal treeline, and is situated in rolling hills and plains near Lake Kanentiavr in northern Kola Peninsula, in a comparatively coastal setting (40 km south of the Barents Sea coast) with less productive soils. Treeline changes in the last 50 years are small, and both stagnation of the birch treeline ecotone and possible advance confined to topo-climatic favorable landscape segments are observed. This combination of case studies within a limited region demonstrates the significance of industrial emissions, as well as local climate and soil factors, that can significantly alter the expected picture of widespread climate-driven treeline advance at high latitudes.

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