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Potential climate-induced vegetation change in Siberia during the 21st century

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Climate change regional studies in Siberia have already registered climate warming by the end of the XX century. Our goal is to model potential vegetation change across Siberia caused by projected climatic anomalies for 2020, 2050, and 2080. Anomalies for these time slices were derived from two Hadley Center (HADCM3) SRES climate change scenarios, A1 and B1, which yeild the largest temperture range and the different effects on Siberian vegetation. Our Siberian bioclimatic model operates through three climatic indices (degree-days above 5oC and below 0oC, annual moisture index) and active layer depth (ALD) related to permafrost. Coupled with climatic indices and ALD for 2020, 2050 and 2080, the bioclimatic model predicts vegetation change for each 30-year period.

Our analyses demonstrate the far-reaching effects of a changing climate from both scenarios and their diverging effects on vegetation cover in Siberia in the 21st century. In a warmer 2020 climate, the taiga is predicted not to change in area (the HadCM3 B1 scenario) or to shrink slightly (HadCM3 A1FI). By the end of the century warming and drying climate (HadCM3A1FI) would cause the forests to retreat northwards and change in the forest structure. Both forest-tundra and tundra would be decreasing in area in the course of the century. Tundra would fully disappear, displaced by northern and even middle taiga, as a result of increased warming. The forests in turn would be replaced by forest-steppe and would decrease in area by as much as half. More moderate change should occur according to the HadCM3 B1 scenario. New habitats for some temperate vegetation types (like broadleaved forest, forest-steppe, and steppe)

should occur in the warmed climate of 2080.