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Late Glacial to Holocene environments in the present-day coldest region of the Northern Hemisphere inferred from a pollen record of Lake Billyakh, Verkhoyansk Mts, NE Siberia

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Abstract. In this study, a radiocarbon-dated pollen record from Lake Billyakh (65°17' N, 126°47' E; 340 m a.s.l.) in the Verkhoyansk Mountains was used to reconstruct vegetation and climate change since about 15 kyr BP. The pollen record and pollen-based biome reconstruction suggest that open cool steppe (STEP) and grass and sedge tundra (TUND) communities with Poaceae, Cyperaceae, *Artemisia*, Chenopodiaceae, Caryophyllaceae and *Selaginella rupestris* dominated the area from 15 to 13.5 kyr BP. On the other hand, the constant presence of *Larix* pollen in quantities comparable to today's values points to the constant presence of boreal deciduous conifer (CLDE) trees in the regional vegetation during the Late Glacial. A major spread of shrub tundra communities, including birch (*Betula* sect. *Nanae*), alder (*Duschekia fruticosa*) and willow (*Salix*) species, is dated to 13.5–12.7 kyr BP, indicating a noticeable increase in precipitation toward the end of the Last Glaciation, particularly during the Bølling-Allerød Interstadial. Between 12.7 and 11.4 kyr BP pollen percentages of herbaceous taxa rapidly increased, whereas shrub taxa percentages decreased, suggesting strengthening of the steppe communities associated with the relatively cold and dry Younger Dryas Stadial. However, the pollen data in hand indicate that Younger Dryas climate was less severe than the climate during the earlier interval from 15 to 13.5 kyr BP. The onset of the Holocene is marked in the pollen record by the highest values of shrub and lowest values of herbaceous taxa, suggesting a return of warmer and wetter conditions after 11.4 kyr BP. Percentages of tree taxa increase gradually and reach maximum values after 7 kyr BP, reflecting the spread of boreal cold deciduous and taiga forests in the region. An interval between 7 and 2 kyr BP is noticeable for the highest percentages of Scots pine (*Pinus* subgen. *Diploxylon*), spruce (*Picea*) and fir (*Abies*) pollen, indicating mid-Holocene spread of boreal forest communities in response to climate amelioration and degradation of the permafrost layer.

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