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Holocene climate and vegetation changes in Eastern Kamchatka based on pollen, macrofossil and tephra records

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A better knowledge of the Quaternary climate and vegetation in Kamchatka, one of the Northern Pacific key regions, is undoubtedly important. Only a few previous studies have provided paleoenvironmental information for this area, but these studies have poor age control and are inconsistent. To reconstruct paleoclimate and both regional and local vegetation history we are analyzing continuous, high-resolution pollen and macrofossil records from peats on Kamchatka. Thin, well-dated ash layers in these peats provide their spatial correlation and excellent age control. Herein we report preliminary results of two peat sections from the Pacific coast of Kamchatka Peninsula, the Uka peat (57 49'N, 162 10'E, about 10 m a.s.l.), which started to rise over a moraine lake since the latest Pleistocene and the Stolbovaya peat (56 47'N, 162 46'E, 7 m a.s.l.), which overlaid the ancient lagoon deposits at ca. 5380 BP. Pollen and macrofossil records from both coastal peats represent similar changes in regional vegetation reflecting the main paleoclimatic variations. The wet and warm mid-Holocene (8-5 ka) is represented well at the Uka record. This period is characterized by the highest value of tree alder (Alnus hirsuta) and shrub alder (A. fruticosa) pollen. The first appearance of tree birch (both Betula ermanii and B. platyphylla) at the Pacific coast corresponds to the minor dry event around ca. 6900 BP followed by the distinct humid pulse at ca. 5670-5000 BP. The last one is characterized by the low pollen concentration indicating high deposition rate, and the remarkable tree alder peak, that correlates well with the basal part of the Stolbovaya record. A 5-4,3 ka drier period is suggested by the second appearance of tree birch in surrounding vegetation, while alder strongly decreases. In local vegetation of both mires the dominant eutrophic species such as Sphagnum teres and Carex rhynchophysa are replaced by the more oligotrophic Sh.

russovii and C. cryptocarpa respectively. The Late Holocene wet interval is represented at 4,3-3,5 ka in both peats. Higher-resolution Stolbovaya record allows us to define the period of humidity maximum more clearly at 4,3-4 ka, when the eutrophic fen (Sphagnum, Equisetum) was inundated and a shallow lake (Menyanthes trifoliata, Comarum palustre) appeared. The local vegetation change correlates well with the maximum of tree alder and shrubs (Myrica tomentosa, Betula exilis) suggesting the establishment of wet and probably cold climate. The most pronounced change in both regional and local vegetation are found soon after 3500 BP, when tree birch pollen suddenly increases and tree alder almost disappeared. Such local components as heath, dwarf-shrub birch and willow become more important, and total pollen concentration sharply increases denoting significant change in trophic conditions. All these features suggest a sudden onset of drier climate after 3500 BP followed by relatively rapid vegetation changes. The upper parts of both records show a progressive development of the oligotrophic peat bogs (Ericaceae, Rubus chamaemorus) under dry and probably warmer conditions up to present except for a short amelioration ca. 2700-2400 BP. In spite of the negligible thickness, two ashes of Shiveluch volcano, SH 2400 BP and SH 3600, obviously influenced the vegetation. Thus, grasses and Myrica tomentosa pollen sharply increases just above these ashes, while other components show a temporal degradation. This effect could be explained by the specific chemical composition of these ahses, which is different from the most of Shiveluch tephras.