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Reconstruction of Holocene environmental changes in Southern Kurils (North-Western Pacific) based on palaeolake sediment proxies from Shikotan Island



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ABSTRACT

We investigated a well-dated sediment section of a palaeolake situated in the coastal zone of Shikotan Island (Lesser Kurils) for organic sediment-geochemistry and biotic components (diatoms, chironomids, pollen) in order to provide a reconstruction of the palaeoenvironmental changes and palaeo-events (tsunamis, sea-level fluctuations and landslides) in Holocene. During the *ca* 8000 years of sedimentation the changes in organic sediment-geochemistry and in composition of the diatoms and chironomids as well as the shifts in composition of terrestrial vegetation suggest that the period until *ca* 5800 cal yr BP was characterized by a warm and humid climate (corresponds to middle Holocene optimum) with climate cooling thereafter. A warm period reconstructed from *ca* 900 to at least *ca* 580 cal yr BP corresponds to a transition to a Nara-Heian-Kamakura warm stage and can be correlated to a Medieval Warm Period. After 580 cal yr BP, the lake gradually dried out and climatic signals could not be obtained from the declining lacustrine biological communities, but the increasing role of spruce and disappearance of the oak from the vegetation give evidences of the climate cooling that can be correlated with the LIA. The marine regression stages at the investigated site are identified for *ca* 6200–5900 (at the end of the middle Holocene transgression), *ca* 5500–5100 (Middle Jomon regression or Kemigawa regression), and *ca* 1070–360 cal yr BP (at the end of Heian transgression). The lithological structure of sediments and the diatom compositions give evidences for the multiple tsunami events of different strengths in the Island. Most remarkable of them can be dated at around *ca* 7000, 6460, 5750, 4800, 950 cal yr BP. The new results help to understand the Holocene environmental history of the Southern Kurils as a part of the Kuril-Kamchatka and Aleutian Marginal Sea-Island Arc Systems in the North-Western Pacific region.

1. Introduction

Studies of Holocene environments of the coasts of the North-Western (NW) Pacific marginal seas are of interest for understanding the evolution of geosystems within the background of global climate

warming (Korotky et al., 2000; Razjigaeva et al., 2002, 2004, 2013; Lozhkin et al., 2017). The one of the most important drivers of Holocene environmental change along the coastal Far East mainland and NW Pacific Islands, has been implied to be a series of transgressions and regressions that are linked to variations in global ice volume as climate

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