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Landscape and environmental changes along the Eastern Primorye coast during the middle to late Holocene and human effects

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Several stages are recognizable in landscape evolution along the Eastern Primorye coast, Kit Bay and its surrounding mountains in terms of climatic changes and related sea level fluctuations during the middle–late Holocene. The last 3.8–3.5 cal ka years were marked by a notable effect of the pyrogenic factor. The sea level rise at the maximum phase of the Holocene transgression led to the formation of lagoons at stream mouths, which underwent a complicated development. At that time, the coast's principal topographic elements came into being, and the modern landscape's pattern was laid on the coastal lowlands. The authors trace the changes in the vegetation in the process of short-term warmings and coolings. Korean pine appeared in the forests surrounding Kit Bay much earlier than in other regions of the Eastern Primorye. During the considered period, warmer phases were marked by increasing importance of broadleaf species, while at the cooler phases, a proportion of the Korean pine grew in the low mountains. In the last 2.3 cal ka, at greater elevations in the middle mountains, dark coniferous forests became more widespread, particularly spruce. At the same time, larch groves existed around the coastal sphagnum bog, probably due to seasonally frozen ground persisting for the greater part of a year. Extreme events with a considerable effect on the coastal landscape evolution include floods, whose frequency has been growing for the last 1.75 cal ka. Strong tsunamis are another factor influencing coastal evolution. Finally, changes in landscapes have been recorded related to human activities in the last few decades.

Keywords: Sea of Japan, coast, landscape, climatic changes, fire, flood, tsunami, middle–late Holocene

1. Introduction

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