

## Glacial legacies on interglacial vegetation at the Pliocene-Pleistocene transition in NE Asia

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### Abstract

Broad-scale climate control of vegetation is widely assumed. Vegetation-climate lags are generally thought to have lasted no more than a few centuries. Here our palaeoecological study challenges this concept over glacial-interglacial timescales. Through multivariate analyses of pollen assemblages from Lake El'gygytgyn, Russian Far East and other data we show that interglacial vegetation during the Plio-Pleistocene transition mainly reflects conditions of the preceding glacial instead of contemporary interglacial climate. Vegetation-climate disequilibrium may persist for several millennia, related to the combined effects of permafrost persistence, distant glacial refugia and fire. In contrast, no effects from the preceding interglacial on glacial vegetation are detected. We propose that disequilibrium was stronger during the Plio-Pleistocene transition than during the Mid-Pliocene Warm Period when, in addition to climate, herbivory was important. By analogy to the past, we suggest today's widespread larch ecosystem on permafrost is not in climate equilibrium. Vegetation-based reconstructions of interglacial climates used to assess atmospheric CO<sub>2</sub>-Temperature relationships may thus yield misleading simulations of past global climate sensitivity.

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