

Lake sediment cores as a DNA archive to track historical treeline changes

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Due to rising global temperatures, the effects of climate-induced terrestrial vegetation changes, such as shifts of the circum-arctic boreal treeline, are of current concern, but the timing and mode of these processes are not well understood. The most commonly used method to study vegetation history and vegetation change is pollen analysis, but in recent years, the analyses of ancient DNA from sedimentary archives has gained importance as an additional proxy. This DNA can be used for species identification and reconstruction of biotic assemblages, and in contrast to pollen, it is putatively of local origin. Genetic information can also reveal differentiation below the level of species, and can thus be used to analyze population dynamics within single species, which is possible only to a very limited degree using traditional morphological approaches.

We are analyzing lake sediment core records from the arctic-boreal treeline ecotone in northern Siberia, which is formed by *Larix* (larch). The position of the Siberian treeline has changed in latitude several times throughout the Holocene, with important implications for terrestrial and lacustrine ecosystems. Understanding these past changes has immediate bearing on projections of future biodiversity changes due to current global warming. Using DNA extracted from lake sediment cores we track the occurrence of different species and assemblages, and, with highly variable genetic markers, we are also analyzing subspecific genotypes of *Larix*. Lake sediment cores can thus serve as an archive for subspecific plant population history.