Sensitivity of Mt. Kenya lakes to climate warming: comparison of historical and modern-day communities of chironomid larvae

Recent studies forecast that anthropogenic climate change poses serious threats to the biodiversity and ecosystem functioning of high-elevation mountain lakes worldwide, either through the direct effects of atmospheric warming and the melting of glaciers, or through indirect effects on lake hydrology, nutrient cycling and productivity. This study aims to evaluate the ecological sensitivity of high-elevation lakes on Mt. Kenya to climate change, by comparing the species assemblages of larval Chironomidae (non-biting midges) deposited today in the bottom sediments of 19 lakes, with those at the base of short cores collected from these same lakes and dated to the Little Ice Age or shortly thereafter (ca. 200-150 years ago). The difference in species composition between the modern-day and historical samples is then translated into a reconstructed change in mean annual temperature (MAT), using chironomid-based temperature-inference models based on weighted-averaging transfer functions calibrated with modern-day data from ca.50 East African mountain lakes. The practical work for this thesis involves the identification and counting of sub-fossil remains of chironomid larvae in the 19 core-base samples, and the application of quantitative temperature-inference models. The results are then compared with environmental data on each of the study lakes to discern differences in ecological sensitivity between deep and shallow mountain lakes, and between lakes with or without glaciers in their catchments.

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