

Transport and distribution of terrestrial plant biomarkers in modern lake sediments: implications for paleoenvironmental reconstructions

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Terrestrial plant biomarkers preserved in lake sediments are commonly used in paleoenvironmental reconstructions. Basin-specific transport pathways and distribution controls of plant biomarkers, however, are poorly understood. This study mapped the distribution of sedimentary *n*-alkanes sourced from vascular plant waxes to delineate possible transport pathways and quantified the contribution of terrestrial and aquatic input. We combine these data with existing leaf and pollen taphonomy literature and sediment focusing models to develop a better understanding of the controls on plant biomarker transport within lake basins.

Here, we report the spatial distribution of sedimentary *n*-alkanes, the carbon isotope values and C:N ratios of bulk sediment, and percent organic matter from three lakes in the Adirondack Mountains, NY. Preliminary carbon isotope data and *n*-alkane concentrations within each lake suggests a large terrestrial input. Bulk sediment carbon isotope values ranged from -26‰ to -32‰ consistent with carbon isotope values of modern terrestrial vegetation. The concentrations of long-chain *n*-alkanes (indicative of higher land plants), moreover, are much higher than short-chain *n*-alkanes (indicative of aquatic and microbial activity) by almost two times. By contrast, C:N ratios range from 11-14 indicating a mix of aquatic and terrestrial contribution to the lake's total organic matter.

We combined high-resolution sonar data with the sediment analyses to identify basin-specific controls on the distributions of *n*-alkanes and bulk sediment carbon isotopes. The statistical categorization of sediment zones based on relative hardness and roughness along the lake bottom delineates where organic material is concentrated. For the terrestrially sourced plant waxes, we measured low *n*-alkane concentrations in sandy littoral sediments relative to deeper sediments towards the main depo-center. Together, this information validates sediment focusing models and suggests that terrestrial carbon and *n*-alkanes are preferentially transported to the main depo-center of the lake. These observations highlight important relationships between basin-specific sediment properties and processes controlling the transport and deposition of *n*-alkanes.