Organic geochemistry of lacustrine sediments: a record of the changing trophic status of Rostherne Mere, U.K.

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Abstract

The elemental, molecular (lipid) and isotopic ($^{13}C/^{12}C$) composition of organic matter in samples from the eutrophic lake, Rostherne Mere, U.K. were examined at high resolution in a single sediment core from a deep part of the lake. The distributions of lipids indicate an important contribution of allochthonous organic matter to the Rostherne sediments. However, increases in concentrations of unsaturated and branched chain fatty acids, phytol and C_{27} and C_{28} sterols toward the surficial sediments, and changing carbon isotope composition and C/N ratios, suggest that the autochthonous contribution to sedimentary OM has increased as a result of recent eutrophication. The elevated supply of labile OM to the sediments has influenced some key diagenetic processes, notably those of phytol degradation and higher plant triterpenoid degradation and aromatisation.

Author Keywords: lipids; biological markers; lake sediments; eutrophication; diagenesis; Rostherne Mere

Index Terms: Analytical geochemistry; Sediments; Molecular structure; Composition; Organic compounds; Lakes; Eutrophication; Sedimentary rocks; Degradation; Aromatization; Environmental impact; Biomarkers; Diagenesis; Lacustrine sediments; Trophic status