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CHROMATOGRAPHIC ANALYSIS OF PORE WATER DISSOLVED ORGANIC MATTER FROM LAKE PEIPSI

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Lake sediments represent archives that reflect the history of environmental conditions, such as biological and geochemical processes in the aquatic ecosystem, climatic changes, and human impact. Sediments contain organic matter which consists of extremely heterogeneous mixture of various biomolecules including humic substances (HS), proteins, lipids, and carbohydrates.

In the present study, pore water dissolved organic matter (DOM) from Lake Peipsi sediments was investigated using high-pressure size-exclusion chromatography (HPSEC) with diode-array detection (DAD). HPSEC separates molecules by their size and, thus, allows evaluating molecular weight distribution of the components in a sample.

Sediment core was taken from the central part of the Lake Peipsi at a water depth of 9.7 m. The core was sliced into continuous 1-cm thick subsamples. The chronology of the sediments established by ¹⁴C dating was estimated to cover past 10,000 years. Pore water was extracted by centrifugation and filtered through 0.45 µm filter.

DOM content was evaluated as total area of the peaks separated by HPSEC. DOM from Lake Peipsi sediments was mostly represented by HS (>90% of the content) and HS aggregates with proteins. Molecular weights of HS were 1,400-1,900 Da for weight-average molecular weight M_w and 900-1,000 Da for number-average molecular weight M_n . The molecular weights of HS-protein aggregates reached several hundred thousands Da. It was possible to distinguish the temporal changes in DOM content into two periods (Fig.1). The obtained results revealed that the content of DOM was twice higher in the older samples (10,300-2,600 BP) than in the younger ones (2,400 BP to present).

HPSEC analysis of pore water DOM could be useful for palaeolimnological research. The advantages of this method are its simpleness and minimum sample pre-treatment.

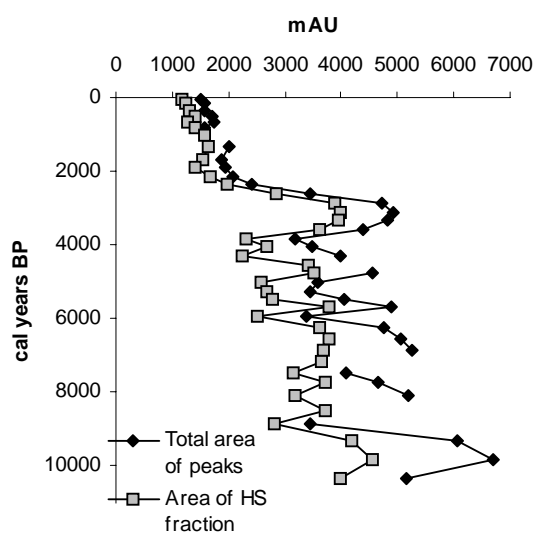


Fig. 1. Age-related profiles of total peak area and area of humic substances fraction.