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LAKE SEDIMENT RESEARCH IN THE ESTIMATION OF THE ENVIRONMENTAL IMPACT OF PEAT PRODUCTION – DRAMATIC CHANGES IN SEDIMENTATION RATE IN FINNISH LAKES?

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SUMMARY

The environmental loading of peat production is nowadays widely discussed in Finland. In particular the impact on sedimentation rates in lakes and rivers has been given a lot of coverage in the media, and the lack of scientific information is evident. Palaeolimnological research has a long tradition in Finland, and suitable methods for studies needed in single loading cases are commonly used. The results obtained from well planned lake sedimentation research projects can provide critical information for the peat industry and environmental authorities.

KEY WORDS: Palaeolimnology, peat production, lake sediment, sedimentation rate

AIM AND METHODS

The Geological Survey of Finland (GTK) is launching a palaeolimnological research project in 2012, with a view to finding out exceptional changes in the sedimentation rate and patterns in lakes having peat production in their catchments. Lakes will be chosen in co-operation with the peat industry and environmental authorities in order to identify lakes possibly affected by peat production. A critical aspect is to find a comparator lake located in the same regional catchment area, but without peat production in the immediate catchment.

The total amount and areal distribution of sediment will be evaluated with echo soundings and reference coring (Fig. 1).

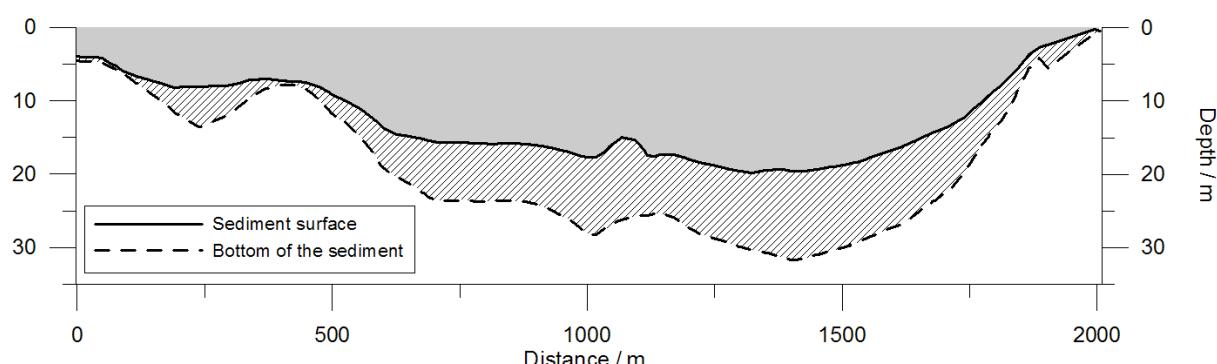


Fig. 1 Example of an echo sounding profile and its interpretation. Lake Puujärvi, southern Finland.



Fig. 2. A crust freeze core from Lake Mustialanlampi, southern Finland.

The thickness, quality and physical properties such as magnetic susceptibility, water content and the loss on ignition of recent sediments will be studied from short cores (Fig. 2), and the short-term sedimentation rate will be estimated using a proper dating method (e.g. ¹³⁷Cs, ²¹⁰Pb).

A wide variety of chemical analysis will be used to verify the changes in the quality of the sediments and lake sedimentation history. Analysis of P, C and N are used to demonstrate the possible eutrophication development. K, Ti and Cr can indicate changes in catchment land use whereas determinations of Pb, V and S are used in the evaluation of changes in airborne pollution.

The description of the long-term sedimentation rate and natural changes in the respective histories of the study lakes will be carried out from a log core sample using biostratigraphy and proper dating methods (e.g. ¹⁴C, palaeomagnetic dating). The sediment biostratigraphy is also an essential method in tracking the impact of human activities. Changes in populations of e.g. diatoms (*Bacillariophyceae*) or testate amoebas (*Testacea*, *Arcallacea*) reflect changes in lake and catchment history.

The main goal of the research program is to produce scientific information on the impact of peat production on the sedimentation and artificial loading of Finnish lakes. This kind of information is one of the key-issues in the policymaking relating to the sustainable use of peat in the future.