



A paleosol from an area centrally beneath the former Weichselian ice sheet

Rolf Zale

Dept. of Ecology and Environmental Science, University of Umeå, Sweden (rolf.zale@emg.umu.se)

A previously un-discovered area with frequently occurring paleosols has been discovered in the interior of northern Sweden, i.e. centrally under the former Weichselian ice sheet. The paleosols are in some locations formed in till, in others in aeolian silt overlying glaciofluvial material. In all places there is a well-developed recent soil profile at the ground surface. The paleosol consists in many places of one or two horizons, generally including the E horizon which is up to 10 cm thick. Some of the buried soil horizons are warped and deformed, suggesting that they have been exposed to significant shear stress in the past. The best preserved sequence of paleosol consists of c. 2 cm of A horizon (interpreted to originate from a buried O-horizon), c. 2 cm of E horizon and c. 5 cm of B horizon, and is interpreted to be in situ. The paleosols are interpreted as spodosols, similar in thickness and general appearance to the recent spodosols in the area. The B-horizon of the paleosol contains more carbon and weathering products (indicated by higher Fe/Zr and Al/Zr ratios) than the above lying E horizon, which suggests that the weathering and downward transport of elements (the podzolization processes) has not substantially reworked the geochemical stratigraphy. Despite this apparent insignificant effect of current weathering processes at the soil surface, the B-horizon of the paleosol contains more weathering products, such as Fe and Al, than the B horizon of recently formed spodosols. This finding suggests that the paleosol has formed either over a longer time-period in the past or during other bioclimatic conditions.

These findings support the following hypotheses:

The paleosol predates Weichsel 3.

Weichsel 3 had virtually no erosional power in the area.

Weichsel 3 deposited only a very thin ablation till layer in this area.

The paleosol was formed during a period of several thousand years of active podzolization.

The main eskers and other major glaciofluvial deposits in the general area that are covered with c. 50 cm of till are not from the deglaciation of Weichsel (Weichsel 3) but from an earlier deglaciation.

The potential for finding pre-Weichsel 3 geomorphology is enormous, and a lot of the theories about Weichsel in general and Weichsel 3 in particular in northern Sweden are likely to need revision.