

SONDERDRUCK AUS:

Wolfgang Schirmer (Editor)

Dunes and fossil soils

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Definitions concerning coversand, fossil soil and paleosol

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The following definitions are proposals. They partly contrast to other definitions.

Eolian coversand

Eolian coversand is eolian sand spread in a blanket-like form or veneer over the bedrock. Its surface is flat or undulating, its inner fabric laminated or bedded or homogeneous. It differs from dunes by lack of typical dune forms and inner dune structures.

The additional adjective eolian is essential in contrast to other sandy coverbeds that prevalently occur in sandstone or sand areas as sand blankets of glacial, fluvial or colluvial (deluvial) origin. Therefore in the German earth science language the differentiation between Decksand = coversand (a lithological term only) and Flugdecksand = eolian coversand (lithological as well as genetical term) is a long and useful tradition (e. g. DÜCKER & MAARLEVELD 1957).

Eolian coversand is a morphological as well as lithological body and thus completely independent from any stratigraphical definition.

Contrast to different definitions:

The restriction of the term coversand to only Weichselian deposits — as recommended by KOSTER (1982: 122) — is considered not useful. Coversand as well as eolian coversand as a lithofacies should be free to occur through the whole earth history. The fact that we are aware of typical coversand deposition during the late Upper Weichselian before the Allerød period is an interesting result of investigation but no reason to restrict this lithological body to that period. In case this late Upper Weichselian coversand shows typical features to be identified, e. g. for mapping purposes, it is possible to add a local name like Veluwe coversand. This latter term could then be restricted within certain stratigraphic boundaries.

Fossil soil

A fossil or buried soil is covered by a deposit of any thickness that separates it visibly and by measurable soil properties from the present soil.

A fossil or buried soil is covered by a deposit thick enough that the recent soil formation does not essentially affect it or incorporate it into the recent surface soil (Fig. 1).

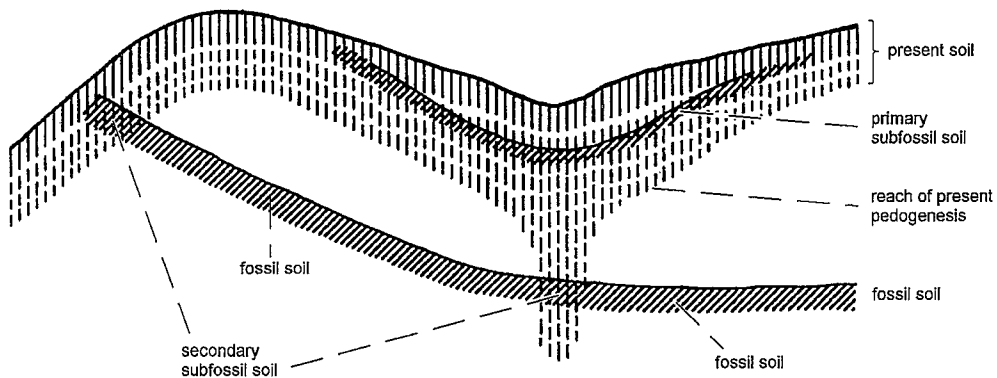


Fig. 1: Illustration demonstrating the terms fossil soil, primary subfossil and secondary subfossil soil.

Subunits:

Subfossil soil

A subfossil soil is a fossil soil covered by a deposit thin enough or with porosity high enough (e. g. dune sand, pumice tephra, coarse debris) that the recent soil formation affects the fossil soil, or the fossil soil is being incorporated into the present soil formation. The subfossil soil is a subunit of the polygenetic soil in which a fossil soil becomes amalgamated (welded) with the present soil.

Genetically the subfossil soil can be subdivided into two major groups:

Primary subfossil soil

A surface soil that has been covered by a deposit thin enough or with porosity high enough that the present soil formation affects it or is being incorporating it.

Secondary subfossil soil

A fossil soil the cover of which has been removed enough that it becomes encroached by the present soil formation.

Comment

The term „subfossil soil” is a term to designate the reach in which the present soil formation encroaches a buried soil, respectively the interfingering section of a buried and the present soil. In other words it may be only a question of time until this interfingering section is fully incorporated into the recent soil formation.

The difference between the primary and the secondary subfossil soil is: The primary subfossil soil, once covered, is affected by the new soil formation almost from the first day on, actually with the downward arrival of the first rain drop, earthworm or root end. The secondary subfossil soil has been fossil without being affected by later soil formation prior to its subfossil status.

The term subfossil soil may be used to point to the fact of welding between a fossil soil and the present soil. The terms primary and secondary subfossil soil may be used to point to the history and genesis of the fossil soil welded with the present soil. By ranging these terms as subunits — subfossil as subunit of fossil, primary and secondary as subunits of subfossil — it remains arbitrary whether the subunit terms are used or not. It should depend on the topic treated whether it is of interest to point out the fossil soil being a secondary subfossil soil or a mere fossil soil.

Other definitions handle the interfingering space by defining distinct depths to determine what has to be called present soil and fossil soil. The Soil Survey Staff (1992: 1) establishes more than 50 cm (under distinct conditions more than 30 cm) distance between the deeper lying soil and the recent soil to separate the deeper lying soil from the recent soil as buried soil.

The *Handbuch für Bodenkunde* (FELIX-HENNINGSSEN & BLEICH 1996) defines to designate a soil as fossil soil covered by deposits of 7 dm or more in thickness.

By using the definition of a subfossil soil given above, the delimitation of depth for designating a soil buried becomes superfluous. For it depends on the properties of the present soil and that of the substratum, whether the present soil regime encroaches more or less deeply downwards.

Paleosol

A paleosol is a soil formed prior to about 12,700 radiocarbon years BP. This age is the first onset of soil formation of most of the present surface soils. It is the beginning of the Late Glacial embracing the Meiendorf, Bølling and Allerød Interstadials. In the course of the decline of the last glaciation from the Meiendorf Interstadial on, continuous vegetational cover is proved for wide areas of the temperate northern hemisphere. Likewise this vegetational onset can be linked with the onset of the soil formation of the present soils (SCHIRMER 1996).

Other definitions use the Pleistocene/Holocene boundary (FELIX-HENNINGSSEN & BLEICH 1996: 5) respectively the mark 10,000 BP (WG Paleopedology 1994). These definitions include the Late Glacial period into the time of forming paleosols and they exclude the roots of formation of most of the present soils from the term present soil. Consequently most of the present soils would embrace a certain paleosol component. This does not hit the core of the matter.

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