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Postglacial zonation of soil organic matter in clayey till sediments

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Studies of the distribution of soil organic matter (SOM) below intensively cultivated fields on clayey sediments of Quaternary age in Denmark show three markedly different zones from the surface and down to about 10 meters below surface. Each zone reflects the balance between input and losses of since the last glaciation.

The upper zone makes up the uppermost few meters below the soil surface. Here, the inherited bioavailable pool of SOM has mineralized and only small amounts of not-bioavailable SOM are present. The largest pool of SOM is renewable and derives from crops grown in the field.

In the underlying middle zone, the content of inherited SOM is very low and seems well protected against biological decomposition (not-bioavailable). No renewable source of SOM from the crops seems to reach down to this middle zone.

In the third and deepest zone, only inherited SOM is present. The SOM origins from the sediments deposited during the last glaciation, about 12,000 years ago.

Typically, the lowest contents of SOM is in the middle zone.

Zonation by content, composition, and bioavailability of the organic matter in soils and deeper sediments is important for the fate of many environmentally substances and for the quality of soil water as well of the quality of other parts of the aquatic environment. In addition, the SOM- pools of different composition in the three zones will most likely behave different to future changes in atmospheric CO_2 and climate change adoption.