



Loess and paleosols from Aschet, Austria – clay minerals as indicators of weathering intensity

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Loess/paleosol sequences of the Upper Pleistocene from Aschet in Upper Austria were studied by an interdisciplinary group of scientists. One part of the investigation focused on the clay mineralogical composition of the <2 µm clay fraction and on granulometric analyses.

The paleosols have been formed during interglacial paleoenvironmental conditions of different age as well as during interstadial conditions, characterised by variable pedogenic processes corresponding to the paleoclimatic change.

The Pleistocene environments of glacial and interglacial origin generally relate to alternation of more physically and more chemically altered clay assemblages, respectively. In cold periods sediments are enriched in well-crystallized illites, chlorites and feldspars, whereas warm periods correspond to enhanced amounts of kaolinite and expandable minerals such as smectites, vermiculites and mixed layer minerals.

The paleosols in the Aschet profile are characterized by the occurrence of vermiculites, mixed layered minerals like chlorite/vermiculite and illite/chlorite/vermiculite as products of clay transformation during pedogenesis. In the loess sequences illitic material and vermiculites are dominant.

The grade of weathering intensity of paleosols can be used as a record for the intensity of pedochemical processes and is therefore a helpful tool for reconstruction of paleoclimates. However, clay minerals basically express the intensity of weathering, and especially of hydrolysis, in the land masses adjacent to sedimentary basins. The information provided by pedogenic minerals fundamentally integrates the combined effects of temperature and precipitation, with sometimes additional data on the rainfall seasonality or drainage conditions. The climatic interpretation of pedogenetically formed clay minerals is based on the variations of illite and chlorite crystallinity and on the relative abundance of smectite and other expandable clay minerals.