Geophysical Research Abstracts
Vol. 18, EGU2016-1129-1, 2016
EGU General Assembly 2016

Evaluating the timing of late Quaternary geomorphodynamics and soil formation: a review of geochronological data from northeastern Germany

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A comprehensive review of late Quaternary terrestrial stratigraphical records from northeastern Germany requires the collection, evaluation and statistical processing of preferably all geochronological data from paleosols and corresponding sediments available so far. Therefore, a database has been established, comprising a multitude of published and unpublished age data. The database regionally covers the entire Weichselian glacial belt ('young morainic' area) and the immediately adjacent Saalian glacial belt ('old morainic' area) of northeastern Germany. The collected ages comprise a time interval of the last c. 50,000 years. More specifically we pursue the following aspects: (1) identification of the spatiotemporal pattern of dated records and their stratigraphical context; (2) dating of certain types of buried paleosols, corresponding sediments and reconstruction of the environmental conditions during soil formation; (3) timing and identification of specific geomorphic processes (triggered by e.g. climate change or land use) which led to burial of former surfaces. We have collected a total of c. 450 radiocarbon datings (AMS, conventional) and c. 400 luminescence datings (OSL, IRSL, TL) from a total of c. 200 sites. Each date is characterised by specific dating attributes (age with standard error, reliability, lab number, dated material) and by further information (e.g. coordinates, stratigraphy, references). Most of the radiocarbon and luminescence data were collected in the 1990s to 2010s. Among the radiocarbon dates charcoal (53 %) and peat (19 %) dominate the dated materials. Holocene ages prevail with a majority within the last 5000 years. Most dated paleosols are developed from peat (Histosols) as well as from glacial and aeolian sands (Arenosols, Podzols). Most luminescence dates come from aeolian (84 %) and colluvial sands (11 %), which are scattered over the whole Lateglacial-Holocene and the Holocene period, respectively. Furthermore, the collected ages were divided according to the facies (aeolian, fluvial, glacio-fluvial, colluvial, peat) and the sedimentary context (e.g. burial age of paleo-surfaces). The luminescence data suggest that in aeolian sequences the ages (n=322) cluster around 2 to 2.5 ka, c. 4 ka and between 11 to 14 ka. Ages from the basal part of sediment layers overlaying paleosols (n= 36) show major clusters around 0.3 ka, 0.6 ka, 4.5 to 6 ka and 11 to 14 ka. Colluvial layers (n=50) cluster between 0.3 ka to 4.7 ka and around 8.5 ka. By contrast among the radiocarbon dates no clear age cluster is recognisable. Radiocarbon data from colluvial (n=100) and aeolian (n=54) sediment sequences indicate a gap of ages in the period 7 to 8 ka cal BP.