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Are phases of increased Holocene aeolian dynamics in the North European Plain indicating past human induced soil erosion?

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Aeolian sands originating primarily from the Pleni- and Late glacial are widespread in parts of the North European Plain. Together with the large-scale occurrence of sandy (glacio-) fluvial deposits they form the zone which is often referred to as the 'European sand-belt'. According to historical records, the reactivation of aeolian sands through human impact has been a severe problem at least since the Medieval period but it probably took place already during earlier phases of the Holocene. While studies on aeolian dynamics during the Late glacial have made fast progress during the last two decades, regionally differentiated knowledge on the Holocene dynamics is still sketchy. Compiling a geochronological dataset of 189 luminescence ages (indicating the time of aeolian deposition) and 301 14C-ages from palaeo-surfaces (palaeosols, buried peats and archaeological features indicating surface stability) from Great Britain to the Baltic States, our study aims to reveal phases of increased aeolian dynamics and of surface stabilisation, respectively. The dataset was statistically analysed and compared with land-use data from archaeological records as well as with climatic data. We are thereby able to show that local human impact triggered aeolian erosion already in the Mesolithic (∼9600 to 6200 cal BP), abating during the Early and Middle Neolithic (∼6200 to 5000 cal BP). However, during the Late Neolithic (∼4000 cal BP) intensified land-use triggered aeolian dynamics again. Younger phases of aeolian sedimentation were identified at around 1800 cal BP, 900 cal BP and around 680 cal BP. Data indicatin geomorphic stability cluster around 2700 cal BP, 1300 cal BP and 900 cal BP as well as around 690 cal BP in the western part (The Netherlands) and 610 cal BP in the eastern part of the sand-belt (NE Germany and Poland). In general these phases seem independent of climatic trends or changes in forest composition. Instead they can predominately be ascribed to changing patterns of the intensity of human impact, namely to phases of increasing and decreasing human-induced soil erosion.