Geophysical Research Abstracts
Vol. 18, EGU2016-258-1, 2016
EGU General Assembly 2016

Mid to late Holocene aeolian activity revealed by a multiproxy peat record in continental CE Europe (Northern Romania)

Andrei Marian Panait (1), Angelica Feurdean (1,2), Simon Mark Hutchinson (3), and Ioan Tanţău (1)

(1) Department of Geology, Babes-Bolyai University, 400084 Cluj-Napoca, Romania (pnt_andrei@yahoo.com), (2) Senckenberg Biodiversity and Climate Research Centre, Senckenberganlange 25, D-60325 Frankfurt am Main, Germany, (3) School of Environment and Life Sciences, University of Salford,Salford M5 4WT, UK

Peat bogs, and especially ombrogenous mire, are increasingly used as continental archives of aeolian dust and sand deposition. Since ombrogenous peat is formed above ground water level all the inputs are atmospheric. Dust is more influenced by regional climatic patterns due to its small size, whereas sand tends to record local patterns in storm frequency and intensity reflecting its larger particle size. However, both size fractions are significantly underused proxies of past climate variability.

Here, an ombrogenous peat profile from Tăul Muced in the Rodnei Mountains (Northern Romanian Carpathians), located in a temperate continental climate, with Atlantic and Baltic influences, provides the very first record of mid to late Holocene aeolian activity from Romania highlighting the interplay between local and regional controls in a continental area of CE Europe. We use a multiproxy approach combining radiocarbon dating, the physical properties of the peat (loss-on-ignition, bulk density), mineral magnetic measurements (ARM, SIRM), geochemical (Ti and Zr) and particle size analysis (via both laser diffraction and the manual counting of sand particles under a steromicroscope) to determine changes in: i) atmospheric dust deposition and ii) wind velocities during the last 7800 years.

We found that the aeolian particles are mainly silt (3.9-63 μm) (dust) and sand (63-1200 μm). The mineralogical composition of the aeolian sediment in peat is mainly quartz, more rarely calcite and very rarely other minerals such as feldspar, sulphur, mica (biotite and muscovite), magnetite and other melanocrate minerals. The roundness of the sand particles varies from well-rounded to sub-angular and angular, and suggests that the sand particles have different source areas.

Results from this study show that over the last 7600 years the pattern of wind frequency changed several times: there are periods characterised by a low aeolian input around 6950-6550, 5000-3900, 3500-2900, 1650-1250 and 600-200 cal. yr. BP. On the contrary, periods of relatively high aeolian input were noted around 7800-6900, 6550-5000, 3900-3500, 2900-2300, 1250-600 and the last 200 cal. yr. BP. Generally, intervals of enhanced aeolian input appears to coincide to well-known periods of high climate variability such as the Middle Bronze Age Cold Period, the Iron Age Cold Period and the Medieval Warm Period as well as a period of accentuated deforestation the last 120 years. Low aeolian activity appears to characterise the Bronze Age Climatic Optimum, the Dark Ages Climatic Optimum and the Little Ice Age.

Based on the maximum grain size we also identified several short time intervals of high wind speeds: 7000-6800, 4300-3900, 3450-3350, 3100-2800, 1000-800 and the last 150 cal. yr. BP. These periods are characterised by a maximum grain size > 700 μm. Results indicate that wind speeds and frequencies have changed over time and are mainly associated with known climate change.

These findings provide new insights into our understanding of changes in wind characteristics in continental areas of CE Europe and also demonstrate that that aeolian dust and sand dust are highly promising proxy of past climate variability in this region.