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Mid-Holocene aeolian fluxes based on a multiproxy approach on two ombrogenous peat profiles from northern Romania

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

(1) Department of Geology, Babes-Bolyai University, 400084 Cluj-Napoca, Romania , (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

Aeolian particles play an important part in the global climatic system and influence both the environment and human health. Their formation, transport and deposition can vary over time, mainly due to climatic characteristics (e.g., precipitation, wind speed, the movement of air masses). These particles can settle in different catchment basins, but only few of them are particular good for analyzing aeolian particles. Ombrogenous bogs are formed above ground water and therefore all the mineral inputs come from the atmosphere, which makes them suitable for reconstructing past aeolian fluxes.
Here, we have used a multi-proxy approach including physical (loss-on-ignition and two methods of particle size analysis), geochemical (XRF elemental data), magnetics and dating measurements (AMS 14C, 210Pb) to two ombrotrophic peat profiles from the Carpathians Mts, northern Romania to: reconstruct past changes in atmospheric dust (particles <63μm) and sand deposition (particles 63-2000 μm) in the period between 7800 and 4500 cal. years BP and identify the drivers that have influenced the deposition of aeolian particles.
The results from the two sites show both similarities and differences in the aeolian fluxes suggesting a combination of regional and local controlling factors. Regarding the dust deposition, both records agree relatively well in suggesting a low dust flux input between 7600 to 6400 cal. years BP. The sharp increase in the dust fluxes between 6400 and 6200 cal. years BP is clearly visible in both records. This short event has been recorded in the region implying a wider scale enhancement of erosion, transport and deposition of dust. From 5700 to 4500 cal. years a slightly increase in the dust fluxes is recorded in both profiles.
Results from local sand fluxes at the two profiles suggest that the local erosion and transport of the sand particles was more intense between 7200 and 6000 cal. years BP. After 6000 cal. years BP the sand influx become generally low, suggesting low erosion rates in the region, with short periods of intensifications at 5850 - 5700, 5300 - 5200, 4900 - 4750 cal. years BP. In terms of particle mineralogy both sites show the dominance a quartz after 5800 cal. years suggesting a dominant erosion of quartz bearing rocks. Periods of high sand influxes were associated to a decline in tree pollen percentages and an increase in fire activity, suggesting an enhancement of erosion following disturbance by fire and deforestation. The sand fluxes show in general a negative correlation with the mean annual precipitation as reconstructed from pollen-based quantitative climate reconstruction while the dust fluxes show a positive correlation.
These findings provide new insights about the difference between local vs regional aeolian inputs in continental areas of CE Europe.