High-resolution peat-based reconstruction of Holocene atmospheric dust fluxes and sources in NW Russia

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We present a reconstruction of atmospheric dust fluxes and sources in the European part of Russia over 5400 years, using a dated ombrotrophic peat profile and geochemical proxies such as concentrations of Ti, Sc, Rare Earth Elements (REE), REE spectra, and Eu- and Ce anomalies.

Sampling site and methods

Samples from the peat bog Staroselsky Mokh located in the Central Forest State Natural Biosphere Reserve, Valdai Hills, Russia were analysed using Q-ICP-MS. Peat dating was based on ^{14}C (AMS) and ^{210}Pb (Bchron age-depth model). A potential source of anthropogenic pollution is brown coal mining (1948-1996) and dust resuspension from coal waste heaps located 40 km away near Nelidovo.

Results

In the pre-anthropogenic period, dust fluxes varied widely being lowest during Holocene climatic optima. The maxima coincided with the mid-Holocene cooling period and the Little Ice Age. Good agreement was found between our data on dust deposition and a Holocene temperature reconstruction in Fennoscandia [1]. Over the industrial period, maximal dust deposition took place in the 1950s - 70s (about 40 times higher than the pre-anthropogenic average), corresponding to the period of coal mining. Current (in the year 2011±1) dust fallout is about three times higher than the average pre-anthropogenic level. The REE spectra showed their identity with early Holocene lake deposits (gyttja), underlying peat, both in the pre- and in the industrial periods, including times of coal mining. So dust source is probably a local geological background. The exception is the top layers, corresponding to the hottest and dryest years (2010-2011) in the region, where, according to REE spectra, the source of dust may be different.

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[1] Korhola et al. (2000) *Quaternary Research* **54**, 284-294.