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Multiproxy investigation of climatic changes and human activities in a Baltic bog (N. Poland) during the last millennium.

François De Vleeschouwer (1), Nathalie Fagel (2), Natalia Piotrowska (3), Jarek Sikorski (3), Jacek Pawlyta (3), Andriy Cheburkin (4), Mariusz Lamentowicz (5), Anna Pazdur (3), Nadine Mattielli (6), Virginie Renson (7), and the BOG Team

(1) Department of Ecology and Environmental Science, Umeå University, SE-901 87 Umeå, Sweden (fdevleeschouwer@gmail.com), (2) Unité de Recherche Argiles, Géochimie et Environnements sédimentaires, Université de Liège, Allée du 6 août, B18, 4000 Liège, Belgium, (3) Department of Radioisotopes, GADAM Centre of Excellence, Institute of Physics, Silesian University of Technology, Krzywoustego 2, 44-100 Gliwice, Poland, (4) Institute of Environmental Geochemistry, University of Heidelberg, Im Neuenheimer Feld 236, B- 69120 Heidelberg, Germany , (5) Department of Biogeography and Palaeoecology, Institute of Palaeogeography and Geo-ecology, Adam Mickiewicz University, Dziegielowa 27, 61-680 Poznan, Poland, (6) Unité de recherche: "Isotopes: Pétrologie et Environnement", Département des Sciences de la Terre et de l'Environnement, CP 160/02, Université Libre de Bruxelles, Avenue FD. Roosevelt 50, 1050 Bruxelles, Belgium, (7) Earth System Science, Department of Geology, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussel, Belgium

We present a multiproxy study carried out on a peat core retrieved from Słowińskie Błota bog (Pomerania, N-Poland). Several organic (palynology, plant macrofossils, testate amoebae, d13C) and inorganic (elemental geochemistry, lead isotopes) proxies were coupled to 210Pb-14C age-modelling in order to discriminate climatic and anthropogenic signals.

Reconstruction of dust fluxes through time has remained a challenge, especially for tracing the nature of climatic changes. Although the idea of enhanced erosion conditions and storminess is commonly discussed, the conditions for dust deposition in peatlands over Europe during, for example, the 'Little Ice Age' (LIA), are rarely favourable. Indeed the natural forest cover over Europe was much more important than nowadays, preventing dust deposition. Northern Poland, near the Baltic shore, was deforested just before the LIA (around AD 1100), and therefore constitutes a key area for the reconstruction of LIA climatic change. Our study of organic proxies evidences the LIA and is combined to our inorganic geochemical approach to validate our dust record. Overall, both organic and inorganic proxies show that LIA climatic changes are in good agreement with other records from Poland and NE Europe within a ca. 50yrs uncertainty.

The severity of the LIA does however not affect the dynamism of mining activities over the last millennium. Indeed, during the LIA, Poland is experiencing its economical and cultural apogee, which can be seen by an increase in lead enrichment factors interpreted as an increase in mining activities. Lead, Zn, Cu, Ni concentrations and Pb isotopic ratios show that Polish Pb–Zn ores and coal were the main sources of Pb, as well as other heavy metals and S over Northern Poland until the industrial revolution. During the last century, leaded gasoline also contributed to anthropogenic Pb input over Poland. Coal and Pb–Zn ores, however, remained important sources of pollution in Eastern European countries during the last 50 years, as demonstrated by a high 206Pb/207Pb ratio (1.15) relative to the Pb isotopic signature of Western Europe (c. 1.10).

The multiproxy record of Słowińskie Błota enhance the advantage of coupling geochemistry and biological proxies together with high-resolution age-modelling to better constrain the causes and consequences of both natural and anthropogenic changes during the last millennium.