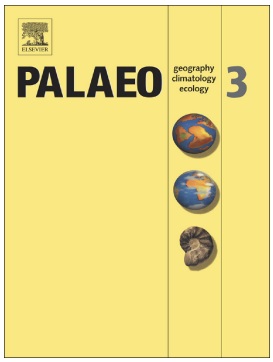

The disturbance regime of an Early Holocene swamp forest in the Czech Republic, as revealed by dendroecological, pollen and macrofossil data

Pavel Šamonil, Alice Moravcová, Petr Pokorný, Pavla Žáčková, Jakub Kašpar, Ivana Vašíčková, Pavel Daněk, Jan Novák, Petra Hájková, Dušan Adam, Hanns Hubert Leuschner

PII: S0031-0182(18)30254-2
DOI: doi:10.1016/j.palaeo.2018.07.001
Reference: PALAEO 8853

To appear in: *Palaeogeography, Palaeoclimatology, Palaeoecology*

Received date: 20 March 2018
Revised date: 28 June 2018
Accepted date: 4 July 2018

Please cite this article as: Pavel Šamonil, Alice Moravcová, Petr Pokorný, Pavla Žáčková, Jakub Kašpar, Ivana Vašíčková, Pavel Daněk, Jan Novák, Petra Hájková, Dušan Adam, Hanns Hubert Leuschner , The disturbance regime of an Early Holocene swamp forest in the Czech Republic, as revealed by dendroecological, pollen and macrofossil data. Palaeo (2018), doi:10.1016/j.palaeo.2018.07.001

The disturbance regime of an Early Holocene swamp forest in the Czech Republic, as revealed by dendroecological, pollen and macrofossil data

Pavel Šamonil[1*], Alice Moravcová[1,2], Petr Pokorný[3], Pavla Žáčková[2], Jakub Kašpar[1], Ivana Vašíčková[1], Pavel Daněk[1,4], Jan Novák[5], Petra Hájková[4,6], Dušan Adam[1], Hanns Hubert Leuschner[7]

[1] *Department of Forest Ecology, The Silva Tarouca Research Institute for Landscape and Ornamental Gardening, Lidická 25/27, 602 00 Brno, Czech Republic*

[2] *Department of Botany, Faculty of Science, Charles University in Prague, Benátská 2, 128 01 Praha 2, Czech Republic*

[3] *Center for Theoretical Study, Charles University, Husova 4, 110 00 Praha 1, Czech Republic*

[4] *Department of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská 267/2, 611 37 Brno, Czech Republic*

[5] *Laboratory of Archaeobotany and Palaeoecology, Department of Botany, Faculty of Sciences, University of South Bohemia, Na Zlaté stoce 3, 370 05 České Budějovice, Czech Republic*

[6] *Laboratory of paleoecology, Botanical Institute, Czech Academy of Science, Lidická 25/27, 602 00 Brno, Czech Republic*

[7] *Department of Palynology and Climate Dynamics, Georg-August-Universität Göttingen, Wilhelmsplatz 1, 37073 Göttingen, Germany*

Abstract

A unique remnant of forest dating back to the period 9733-7897 yr BC and consisting of hundreds of tree bases was discovered in the Czech Republic. We aimed to reveal the complex disturbance history of this (sub)fossil forest using dendrochronology, and to describe its detailed plant species composition changes using palaeobotanical techniques. Analysing such Early Holocene forest dynamics should help us understand the ability of the forest community to actively adapt to climate change and generally to understand the role of dynamic instability in ecosystem evolution.

We anatomically identified woody species in 488 samples, and determined the ages, growth suppressions, releases and fire scars in 116 well preserved tree ring series using a modern boundary line approach. This image of the forest structure and dynamics was supplemented with analyses of pollen spectra and plant macrofossils in excavated profiles. In order to achieve accurate dating, we dated 87 samples using ^{14}C and synchronized tree ring series, and compared them with an existing *Pinus sylvestris* chronology.

The developmental trajectory of the forest was unique, and did not match the general trend of postglacial pine growth in central Europe. Palaeobotanical proxies indicated that during the circa 2,000 years the forest persisted, this Early-Holocene ecosystem passed through several phases, reflected in the species composition of the vegetation as well as in habitat conditions. Nevertheless, the dominance of pine and the complex fine-scale disturbance regime were relatively robust and did not change fundamentally. Low-severity fires and short-term changes in soil moisture regime were crucial disturbance agents in the ecosystem. Stand-replacing disturbances were not found up to the gradual collapse of the forest around 8300 yr BC, replaced by a swamp community. The disturbance regime was relatively stable, suggesting a mitigating effect of changing climate due to the predominance of pine in the forest.

Abstract = 298 words

Key words

Dendrochronology; release; suppression; fire regime; growth chronology; *Pinus sylvestris* L.