Modern pollen data from pristine taiga forest of Pechora-Ilych state nature biosphere reserve (Komi republic, Russia): first results

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Summary

The first results of modern pollen investigations from western slop of Ural Mountains presented. 33 modern pollen samples have been collected in June 2016 from four dominant forest types (*Sphagnum*, true moss, tall fern and tall herbs sections) in Pechora-Ilych state nature biosphere reserve (Komi republic, Russia). The detail record of surrounding vegetation was performed at every sampling point. Pollen assemblages are mostly dominated by tree pollen (*Betula* type, *Pinus haploxylon* type and Picea). The pollen assemblages and vegetation records will be statistically analyzed (clustering and correspondence analysis) to investigate how vegetation is reflected in pollen assemblages and for producing new series of PPEs.

Key words: modern pollen samples, pristine conifer forest, Ural Mountains

1. Introduction

Investigation of modern pollen-vegetation relationships is crucial for correct reconstruction of past vegetation from pollen profiles (Overpeck et al. 1985, Sugita et al. 2010). Pollen productivity is one of the key parameters in those relationships (Gaillard et al., 2008). This study is an attempt to evaluate modern pollen–vegetation relationships in the pristine dark

coniferous forest and to produce reliable pollen productivity estimates (PPEs) as a contribution to palaeoecological research. Modern pollen spectra from western slope of Northern Ural have been poorly studied. Most of already published modern pollen data were collected in Southern (Lapteva, 2005, 2007) and Polar (Jankovska, 2007) Ural. This research has been made with aims to 1) investigate how modern pollen assemblages from western slope of Ural Mountains reflect surrounding landscapes and to 2) produce the new set of PPEs reliable for that particular area.

2. Study area

The study area is located in the piedmont of Pechora-Ilych Nature Reserve (south-eastern part of Komi republic, Russia), on the western side of Northern Ural Mountains. The region is dominated by forests of shade-loving species: Siberian spruce (*Picea abovata* Ledeb.), Siberian pine (*Pinus sibirica* Du Tour), and Siberian fir (*Abies sibirica* Ledeb.). Birch (*Betula pubescence* Ehrh.) is growing in stands as an admixture. Singular rowan trees (*Sorbus aucuparia* L.) sprout in rich forest types (Korchagin, 1940). Old-growth and uneven-aged dark coniferous forests occur all over the area except small patches of bogs and meadows in the floodplain of the Bolshaya Porozhnaya river. The Pechora-Ilych Biosphere Nature Reserve in the Ural Mountains is considered to be the most undisturbed taiga in European Russia. The vegetation and forest structure show no visible traces of human impact for at least two full tree life cycles (ca. 500 years, (Aleynikov et al., 2015)).

The study site located in a couple of kilometers to the north of the influx of the Bolshaya Porozhnyaya river to the Pechora river.

3. Method

33 modern surface samples (*Sphagnum* mosses, green mosses, litter) were collected by random sampling in all vegetation formations (several types of dark coniferous forests, mires, meadows in the river floodplain) in June 2016. The samples were collected with aim to accumulate several years of pollen loading: depth and the surface size of the sample were recorded in the field (Lisitsyna & Hicks, 2014). Most of samples are collected under the forest canopy with opening of less than 1 ha. At all points, detail vegetation descriptions within 1 m radius, as well as within 400 m² were performed along with samples collection. Vegetation mapping was conducted in the whole investigated area. Laboratory preparation of the surface samples followed standard procedures. The pollen was counted at 400x magnification until a sum of 500 arboreal pollen grains (AP) was reached. Pollen and spore identification was based on Moore et al. (1991).

4. Results and discussion

Forest vegetation of that area mainly belongs to four sections: *Sphagnum*, true moss, tall fern and tall herbs sections (Smirnov, 2013). All modern pollen spectra are rich by tree pollen with dominance of *Betula* (40 – 50%), *Pinus haploxylon* (30 %), *Picea* (17 – 22 %). Small proportion of *Abies* (3 – 4 %) and *Alnus* (0,1 – 2 %) pollen was detected in surface samples. Microcharcoal particles were found in amount 4 – 8 % from total pollen sum. They are clearly detect local forest fire of 2004 located within 3,5 km from sampling points (Tinner, 2006). The pollen grains of ferns (*Dryopteris* type, *Gymnocarpium* type), herb plants (Poaceae, *Ranunculus* type, Cyperaceae, Acteraceae, Rosaceae) and dwarf shrubs (Ericaceae) are also present in modern spectra.

The pollen assemblages and vegetation data will be analyzed by numerical methods (clustering and correspondence analysis) to investigate how vegetation is reflected in pollen assemblages. The PPEs for the most common species in that area will be produced using that set

of modern samples with help of Prentice-Sugita model (Prentice & Parsons, 1983; Sugita, 2007a, b). The PPEs for major western and central European species form different natural zones has been already produced (Broström et al. 2008; Poska et al. 2011; Abraham & Kozakova 2012). Those PPEs are now in use for reconstructions of vegetation, landscapes and climate of the past of the origin area. However the application of PPE value for different vegetation and climatic zones questionable (Abraham & Kozakova 2012). Therefore the investigation of modern pollen-vegetation relationships in parental vegetation zone is crucial for correct reconstruction of past vegetation from pollen profiles. The dataset presented will be also used for the interpretation of the fossil pollen profile from the Banan-bog (located in the middle of study area) taken in 2011.

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