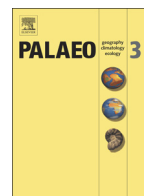




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Plio-Pleistocene floras of the Vildštejn Formation in the Cheb Basin, Czech Republic – A floristic and palaeoenvironmental review

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ABSTRACT

Plant fossil assemblages (foliage, fruits and seeds, pollen, wood) from the Pliocene and early Pleistocene deposits in W Bohemia (the Vildštejn Formation of the Cheb Basin, Tachov/Cheb–Domažlice/ Graben) are newly analysed using several palaeoenvironmental methods with the aim to reconstruct palaeovegetation and palaeoclimatic changes. Floras of four subsequent stratigraphic levels show a decrease of exotic elements in the Pliocene and a massive immigration of boreal elements in the early Pleistocene. Vegetation changes start with broad-leaved deciduous and mixed mesophytic forests and continue towards light forests of the mentioned types in areas of zonal to extrazonal habitats. This vegetational change is characterised by an immigration of dry herbaceous and sclerophyllous elements. Wetland communities from higher positions in the profiles stepwise loose exotic components and point to cool–temperate conditions similar to the present conditions. Palaeoclimatic signals show warmer and more humid conditions for the Pliocene levels (about 15 °C of mean annual temperature, 5 °C of mean temperature of the coldest month and 25 °C of mean temperature of the warmest month, more than 900 mm of mean annual precipitation). Early Pleistocene proxy data indicate the beginning of a cooler phase at the Plio-Pleistocene boundary (about 7 °C of mean annual temperature and decreasing trend of precipitation), but conditions not colder than those of the present day in the NW part of the Bohemian Massif.

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1. Introduction

Plant assemblages (foliage, fruits and seeds, pollen, wood) obtained from drill cores and outcrops of the Vildštejn Formation in the Cheb Basin and the Tachov (Cheb–Domažlice) Graben in western Bohemia were assigned by Bůžek et al. (1985) to the Pliocene–Pleistocene transition, according to the stratigraphic scheme of Gibbard et al. (2010). The fossils have been known since pioneer studies by Karl Rudolph in 1935 and were more systematically evaluated by Č. Bůžek, Z. Kvaček, F. Holý, M. Konzalová, and L. Stuchlik from 1982 to 1991 (Rudolph, 1935; Bůžek et al., 1982, 1985; Stuchlik, 1982, unpublished). In the present paper the plant material described so far (Stuchlik, 1982; Bůžek et al., 1985) is

re-evaluated in current taxonomical context and results of subsequently analysed new pollen material (Stuchlik, unpublished) are added. Several palaeoenvironmental techniques are applied on the complete fossil plant spectra from the Vildštejn Formation (Cheb Basin) and relicts of Neogene deposits of the Tachov (Cheb–Domažlice) Graben to reconstruct models of vegetation and climatic changes from the late Pliocene to early Pleistocene. The evaluation of the zonal vegetation at the studied sites was conducted using a semi-quantitative method of the Integrated Plant Record vegetation analysis. This technique was originally designed to reconstruct the character of zonal vegetation under subtropical to temperate climate. Here for the first time, the IPR-vegetation analysis is applied on Plio-Pleistocene floras originated partly under cool–temperate conditions. The obtained results are discussed in the context of those derived from other palaeovegetational techniques allowing to reconstruct complex qualitative and quantitative characteristics of the fossil vegetation, i.e., Phytosociological approach and Plant Community Scenario approach. Similarly, the multi-technique approach was used to detect climatic changes during the sedimentation of the Vildštejn Formation and the Tachov (Cheb–Domažlice) Graben. The method of the Coexistence Approach (CA) assesses palaeoclimatic estimates based on the analysis

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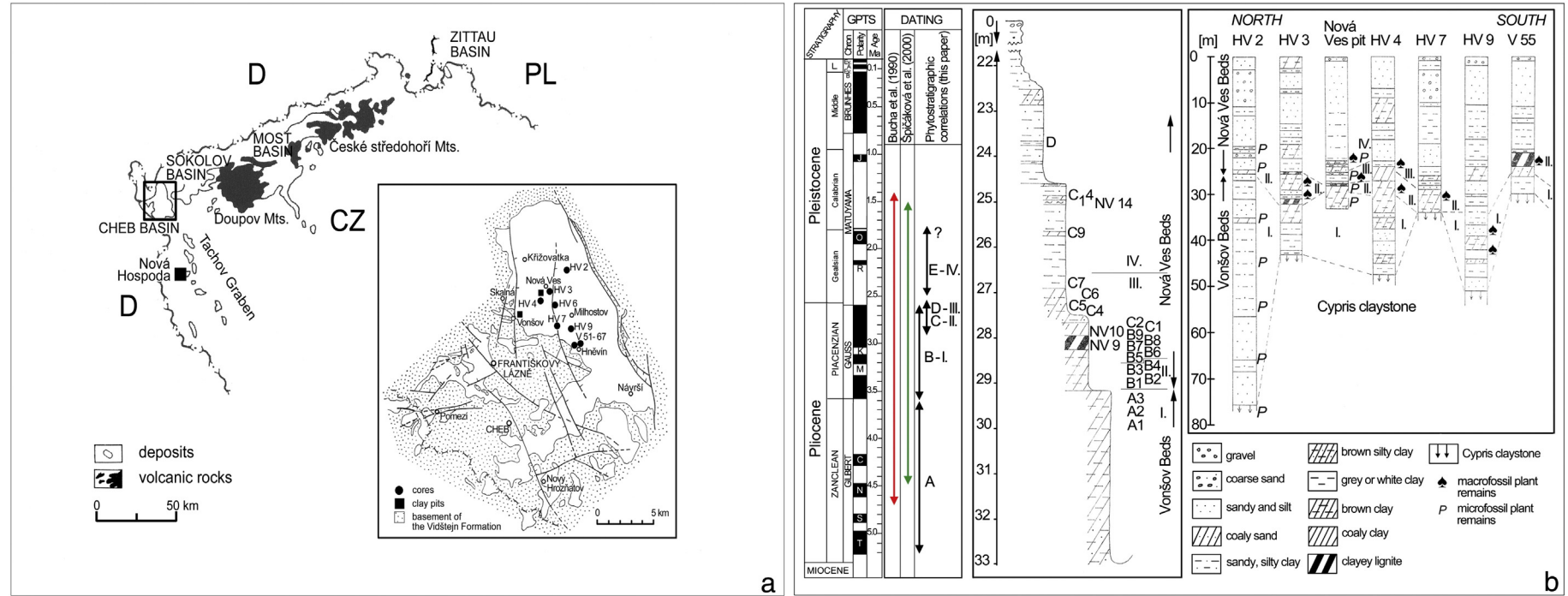


Fig. 1. a. Location of the studied floras of the Vildštejn Formation and Tachov (Cheb–Domažlice) Graben (modified after Bůžek et al. (1985)). b. Geological sections of selected drill cores and the Nová Ves clay pit. Symbols: A. Tachov (Cheb–Domažlice) Graben, B (I.) Vonšov Member (Pluto Clay), C (II.) Nová Ves Member (Nero Clay), D. (III.) Nová Ves Member (lignite beds), and E. (IV.) the Nová Ves Member (upper part), modified after Bůžek et al. (1985). Stratigraphic data after Bucha et al (1990) and Špičáková et al. (2000); GPTS dataset modified after Lourens et al. (1996) and Petronio et al. (2011).

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