Palaeogeography of Prague Basin in Silurian times (Wenlock–Ludlow): data from palaeomagnetic and geochemical research

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Abstract: The Bohemian Massif in the light of palaeomagnetic results has been a tectonically stable block since the Early Permian as a part of the East European Plate. The Apparent Polar Wandering Path, with respect to the Trans-European Suture Zone (TESZ), was inferred for the geological period from the Quaternary to the Early Devonian. The TESZ is a prominent palaeolithospheric boundary zone separating the Precambrian lithosphere of the East European Craton (including Fennoscandia) – EEC – in the NE from the younger lithosphere underlying the Neoproterozoic–Palaeozoic mobile belts of western and central Europe in the SW. The effect of the TESZ on the dispersion of Variscan palaeomagnetic data is obvious if the distribution of pole positions is inferred from the regions NE of the TESZ, and indicates smoothly drifting of a compact lithospheric plate. The TESZ is a prominent boundary separating the stable EEC in the NE from mobile belts in the SW. Pre-Early Permian formations SW of the TESZ show marked horizontal palaeotectonic rotations whereas no such rotations were recorded NE of this zone. Palaeolatitudes inferred for the Devonian to Early Permian rocks of the Bohemian Massif are in agreement with the all-European data and can be considered definitive. A synoptic pattern of palaeolatitudes in Europe north of the Alpine tectonic belt clearly indicates a northerly drift for periods after the Early Permian with rotation of the whole plate until the Jurassic. In the Early Permian, the tectonically consolidated European Plate was formed as a part of the emerging Pangea supercontinent. Palaeogeographic and palaeotectonic reconstructions of pre-Variscan formations (e.g., the Barrandian, regarded as a peri-Gondwanan terrane) should respect palaeotectonic deformations caused by the Variscan Orogeny (Krs et al. 2001).

Two palaeogeographic concepts exist for the Silurian development of the Barrandian Unit (BU): (1) it may represent an isolated microplate called Perunica (Havlíček et al. 1994), whose palaeolatitudes changed from ca. 40°S to 25°S over the time period from 440 Ma to 420 Ma (Cocks & Torsvik 2006); or (2) there was no such an independent terrane with the BU which was never widely separated from adjacent Saxothuringian

and Moldanubian units, and remained at palaeolatitudes 45°S till 420 Ma (Stampfli et al. 2008).

Palaeomagnetic analyses deals with a complex study carried out in Gorstian deposits of the Suchomasty volcanic centre of Prague Basin. The characteristic primary component (ChRM) was determined by temperature range of 280–480°C (540°C) and by alternating field (AF) range of 40–80(100) mT. Major palaeomagnetic characteristics inferred from ChRM for Vinarice localities achieved values of: D = 191°, I = - 41°, α_{95} = 7° On the basis of mean palaeomagnetic direction calculated from two localities, palaeolatitudes of 24.4° on southern hemisphere were computed. Present data support that the Prague Basin was a continental rift basin, most likely situated on the Perunica microplate. The Perunica microplate drifted at southern subtropical palaeolatitudes of 24° in Gorstian time and experienced either 170° counter clockwise or 190° clockwise rotation during the Variscan orogeny.

Keywords: Prague Basin, Gorstian, Suchomasty volcanic centre, palaeolatitude

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