PALAEOMAGNETISM AND PALAEOGEOGRAPHY OF VARISCAN FORMATIONS OF THE BOHEMIAN MASSIF, COMPARISON WITH OTHER REGIONS IN EUROPE

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Palaeomagnetic research into Lower Permian and Carboniferous rocks indicated the palaeogeographic affinity of the Bohemian Massif to the North–European Platform, continual drift from the equatorial zone and partial horizontal rotation deformations of some blocks during pre–Lower Permian period. Palaeomagnetic results were originally derived on samples of prevailing red beds, of some tuffs and volcanics occurring both in flat basins and furrows. Recently, with a newly developed high–purity thermal demagnetization apparatus MAVACS (Magnetic Vacuum Control System) and with application of multi–component analysis of remanence, some previously derived data were either checked or new regions with rocks of different genesis (oil–shale, roof slate, black shale, microgranodiorite) were investigated. The tight grouping of Lower Permian pole positions from the Bohemian Massif is in contrast to a larger scatter and a specific distribution of Permian pole positions derived on rocks from the nearby Alpo–Carpathian mobile belt. The distribution of poles is due to palaeotectonic rotation effects of rock blocks or nappes found in the collision zone between the African Plate and the North–European Platform. A model was proposed for the collision zone explaining the effects of horizontal tectonic rotation on the distribution of palaeomagnetic pole positions for blocks of different ages and of different palaeogeographic latitudes.

In the Bohemian Massif, the difference in Upper Carboniferous palaeomagnetic declinations (17°±4°) was found between the blocks comprising the Inner Sudetic and Sub–Krkonoše basins on one hand, and the Plzeň and Kladno–Rakovník basins on the other hand. The Upper–Silesian black coal basin is situated in the proximity of the lithospheric boundary separating the North–European Platform from the collision zone of the Alpo–Carpathian system. The palaeomagnetic results lead to the conclusion that the region of the Upper–Silesian basin was not palaeotectonically much influenced by the nearby lithospheric boundary in the period after the Lower–Permian. Homogeneity of Lower Permian palaeomeridians shows on consolidation of the Bohemian Massif blocks during the Lower Permian. This is also evidenced by a small scatter of Lower Permian palaeomagnetic pole positions: by means of R. Fisher's statistics, for seven so far derived Lower Permian pole positions $\alpha_{95} = 2.9°$ and for seven Carboniferous pole positions $\alpha_{95} = 6.8°$, where α_{95} means the semi–vertical angle of the cone of confidence at the 95% probability level.

The amount of Triassic, Permian and Carboniferous palaeomagnetic data published so far for Europe warranted their statistical processing. Previous analysis showed unequivocally that statistical sets must be arranged according to areas of distinct palaeotectonic development. The planar depiction of Triassic and Permian palaeomeridians shows the high tectonic stability for regions west of the Ural Mts. to Great Britain and north of the Alpine belt to the northernmost part of Europe.

To interpret tectonic deformations, plate and microplate movements during Variscan orogeny it was useful to employ statistically evaluted palaeomagnetic pole positions. In the regions of the Ural Mts. and Western Europe Hercynides a large increase in palaeomagnetic declinations has been revealed with the age of the Upper–Devonian and Carboniferous rocks. According to J.D. Edel, parts of the Variscan belt (Armorican Massif, Vosges) underwent a large cklockwise rotation during Visean–Namurian by about 40° to its position in Permian. Palaeotectonic rotations in the Ural Mts. and especially in the Western Europe Hercynides reach extreme values comparable with those observed for nappes in the Alpo–Carpathian belt. The distribution of pole positions fits the model originally elaborated for the Alpine collision zone. Tectonic rotations and numerous findings of remagnetization during later phases of the Variscan orogeny have to be respected during studies of palaeomagnetism and hence derived palaeogeographical latitudes of the pre–Variscan formations.