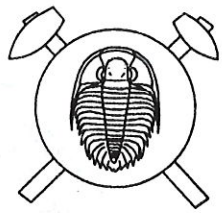
Magnetic fabric relationship between Palaeozoic volcanic and sedimentary rocks in the Nízký Jeseník Mts., NE Moravia



Vztahy magnetických vnitřních staveb paleozoických vulkanitů a sedimentárních hornin v Nízkém Jeseníku (Czech summary)

(*6 text*-figs.)

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Anisotropy of magnetic susceptibility (AMS) was used to investigate the fabric of magnetic minerals in Palaeozoic volcanic rocks of the Šternberk-Horní Benešov Belt in the Nízký Jeseník Mts. and in surrounding Lower Carboniferous sedimentary rocks (NE Bohemian Massif). The degree of AMS in the investigated volcanic rocks is relatively high in most specimens, clearly higher than that in recent undeformed volcanic rocks. The orientations of the magnetic fabric elements are near those in surrounding sedimentary rocks west of the Šternberk-Horní Benešov Belt, whose magnetic fabric is no doubt deformational in origin. Consequently, the magnetic fabric in the volcanic rocks investigated is deformational in origin and had at least a part of its deformational history the same as the magnetic fabric of surrounding sedimentary rocks. This conclusion is in agreement with the results of the geological research of the studied area.

Key words: magnetic fabric, volcanic rocks, NE Moravia

Introduction

The preferred orientation of magnetic minerals (the magnetic fabric) in young unmetamorphosed and undeformed volcanic rocks is usually controlled by the lava flow phenomena (for review see Tarling – Hrouda 1993). However, during even weak regional metamorphism the magnetic minerals can disintegrate and reorientate. Consequently, the magnetic fabric of a weakly metamorphosed volcanic rock can be complex, i.e. composed of both the primary (lava flow) and secondary (deformation) components. In general, there is a lack of the criteria how to recognize whether the magnetic fabric under consideration is primary or secondary in origin. The magnetics fabrics conformable to the shapes of volcanic bodies and, better, to the mesoscopic flow fabric elements, if observable, are believed to be primary. On the other hand, the magnetic fabrics conformable to the deformational fabric elements either in the volcanics or in the surrounding sedimentary rocks can be regarded as at least partially deformational (Henry 1977).

The Palaeozoic volcanic rocks investigated occur in the northeasternmost part of the Rhenohercynian Zone of the European Variscides, in the Bohemian Massif called the Sudeticum (Dvořák – Paproth 1969), in the Devonian antiformal Šternberk-Horní Benešov Belt, dividing the Lower Carboniferous sediments of the Nízký Jeseník Mts. into two parts differring structurally. The region west of the Šternberk-Horní Benešov Belt is characterized by well developed slaty cleavage, while the region east of the Belt displays only spaced cleavage or even no cleavage (Orel 1973).

As the magnetic fabric has been extensively investigated in the Nízký Jeseník Mts. by means of the anisotropy of magnetic susceptibility (AMS) in the seventies and early eighties (Hrouda 1976, 1978, 1979, 1979a, 1981; Dvořák – Hrouda 1972, 1975), there is a possibility to investigate the origin of the volcanic rocks in the NE Moravia from the point of view of the relationship of their magnetic fabric to that of the surrounding sedimentary rocks.

Geological setting

Devonian and Carboniferous rock sequences in the Moravo-Silesian region represent the easternmost so far known part of the European Variscides (Matte 1991). The Devonian rocks are divided in two facial developments:

a) the development of the Moravian Karst (prevalently shallow-water limestones with basal clastics on the Proterozoic basement of the Brno unit),