Contrasting Styles of Magmatic Zoning in the Central Moldanubian Pluton

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Within the Central Moldanubian Pluton, three strongly peraluminous granite intrusion events were recognized (Breiter et al. 1997, Breiter and Koller 1999) (Fig.1). The oldest one, the Lásenice granite, was produced by minimum melting of metasedimentary material during the thermal peak of the Variscan metamorphism. The main stage of intrusion history is represented by the suite of the Èímìø, Eisgarn s.s., and muscovite granites. The original high-K peraluminous melt, which was rich in Zr, Th and REE, underwent an intensive fractionation process towards the enrichment in Na, P, F, Li, Rb, Sn, Nb, U and Ta. The last melting episode produced deep-seated stocks of Zvùle type. This melt was evolved as concerns major elements, but, in contrast to the previous melt, not able to produce LILE and Sn, Nb, U, Ta-enrichment.

Two of the studied granite bodies show remarkable primary magmatic zoning.

Eisgarn granite s.s. forms an elliptical, petrographically and chemically well zoned body between the towns of Gmünd and Nová Bystøice. Its rim facies petrographically resembles the Èímìø granite containing large perthitized orthoclase phenocrysts, smaller sub-automorph sericitized oligoclase, biotite rich in accessory apatite, zircon and monazite, and muscovite with relics of andalusite. The core-facies contains, besides relatively scarce and often partly resorbed perthite phenocrysts, also small automorphic columns of not-perthitized Kfs, and nearly automorph, only slightly perthitized albite. Muscovite prevails over strongly chloritized accessory-poor biotite. Andalusite is rare or absent. Besides old isometric Mn-poor apatite, also young Mn-rich interstitial apatite is present.

The Eisgarn body (Fig. 2) shows distinct zoning patterns of nearly all analysed elements: an increase in elements such as Rb, Na, P, and F and a decrease in K, Ca, Fe, Mg, Th, Zr, Sr etc. from the contact to the centre. The isolines conform with the contacts with the older granites and crystalline rocks on the NW, N, E, and SE margins. In the SW, the continuation of the intrusion is covered by Tertiary and Quaternary sediments of Tøeboò Basin. This zoning can be explained as a product of intensive inward oriented fractional crystallisation after the intrusion. This model is in good agreement with the position of small bodies of P, F, Na, Rb, Sn, Nb-rich muscovite granites in the intrusion centre.

The Zvùle granite builds a ring-shaped body between the villages of Kun•ak and Landštejn. Mineralogically, it is characterized by the presence of sericitized perthitized orthoclase phenocrysts, nearly automorph albite with sericitized cores, and by muscovite predominating over biotite. Muscovite contains rather common relicts of andalusite. Biotite contains only scarce accessories and is, mainly in outer parts of the body, frequently chloritized. Apatite is the most abundant accessory phase.

The Zvùle body is nearly homogeneous as regards concentrations of major elements, but we found distinct ring-shaped zoning of Rb and Sr hosted by feldspar (Fig. 2). The relatively scarce type of "reversed" zoning is expressed here by the increase in Rb and decrease in Sr from the centre towards the rims. The most fractioned part of this body is situated along its southern contact. This can be explained by upwards fluid migration in magma reservoir producing Rb-enrichment of the uppermost part of magma chamber. During the following intrusion, the top-portion of the crystal mush was emplaced along contact, while the lower, Sr-richer part of the magma, was emplaced later within the body centre.

References

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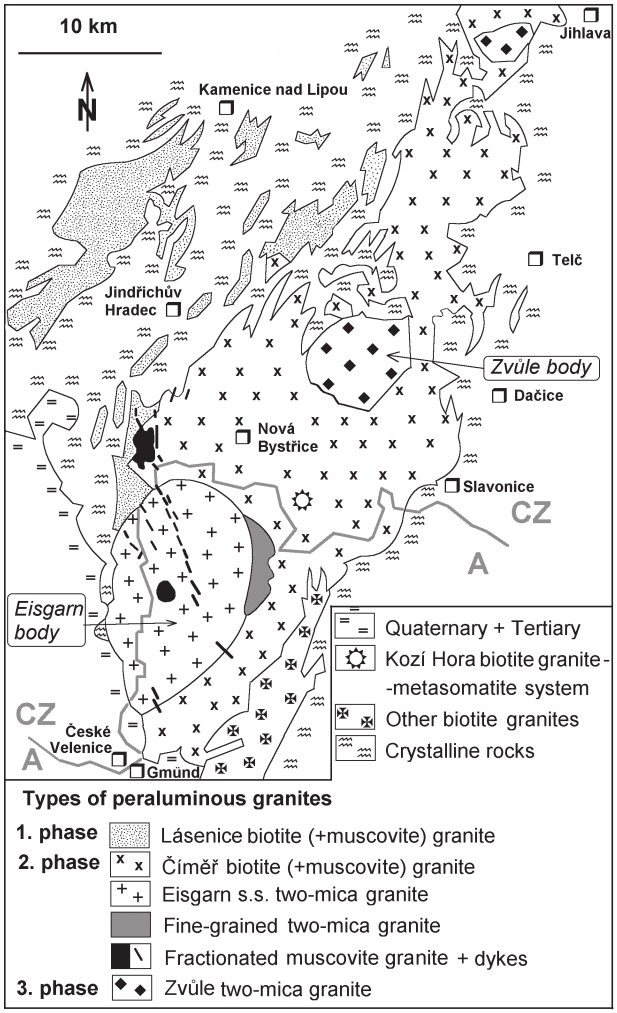

Fig.1. Geological sketch map of the Central Moldanubian Pluton.

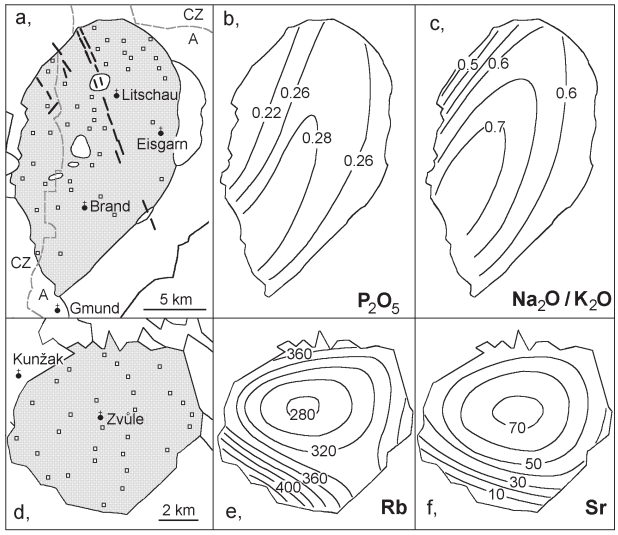

Fig.2. Idealised areal distribution of selected elements within the Eisgarn and Zvùle bodies. On geological sketches, the interpreted areas are dotted, location of used samples is expressed by small squares. Concentrations of major elements are given in wt.%, concentrations of trace elements in ppm.