abstract

This doctoral thesis is focused on analysis of tectonic deformations associated with the Late Devonian subduction followed by the Early Carboniferous continental collision of the Saxothuringian and overriding upper-crustal Teplá–Barrandian units, which led to the growth of a large magmatic arc (the ~354–337 Ma Central Bohemian Plutonic Complex) in the central part of the Bohemian Massif. Far-field tectonic forces resulting from the collision produced ~WNW–ESE to ~NW–SE regional shortening across the forearc upper crust above the subduction zone; the shortening was accommodated by predominantly top-to-the-ESE tectonic transport along the southeastern flank of the Teplá–Barrandian unit. Approaching the magmatic arc margin, the regional structural pattern changes and exhibits significant acrossand along-strike variations interpreted as a result of strain partitioning, where the Saxothuringian/Teplá–Barrandian convergence interacted in different ways with the intruding magma pulses. Around the voluminous, northeasterly ~354 Ma Sázava pluton the principal shortening was at high angle to the forearc-facing intrusive contact and the host rocks were significantly thermally softened. The regional top-to-the-ESE tectonic transport converted here into arc-parallel ductile flow within the structural aureole around and above the pluton. In contrast, a narrow to nonexistent ductile strain aureole is preserved in the host rocks around discordant sheet-like plutons (the southwesterly pre-354 Ma Marginal granite and the Milín granodiorite of unknown radiometric age). Our AMS study of the Marginal granite and Milín granodiorite, and mapping of mesoscopic magmatic foliations and lineations in another neighboring sheet-like pluton (the ~346 Ma Kozárovice granodiorite), reveals sigmoidal mapscale fabric patterns consistent with dextral transpression. We thus suggest that the thin sheetlike plutons were oriented obliquely to the principal shortening and were rheologically weaker than the host rocks prior to final crystallization, producing dextral transpression recorded by the internal fabrics of these plutons. Our study shows that the the far-field plate kinematics during pluton emplacement is not the only factor that controls strain partitioning in continental magmatic arcs. The two contrasting styles of pluton emplacement documented here indicate that the pluton shape, orientation of intrusive contacts with respect to the background plate convergence vector, and heat budget of intrusions (magma volume, composition, and proportion of hot mantle component) may also govern strain partitioning.