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A Comment on 'Two Distinctive Granite Suites in the SW Bohemian Massif and their Record of Emplacement: Constraints from Geochemistry and Zircon ^{207}Pb/^{206}Pb Chronology' by Siebel *et al.* *Journal of Petrology* **49**, 1853–1872

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The recent paper of Siebel *et al.* (2008) provides useful geochemical and geochronological data for Variscan granites from the large and previously little studied Bavarian Forest sector of the South Bohemian Batholith (SW Bohemian Massif). We agree with several of the geological conclusions reached in this paper, but would like to comment here on one specific point, where we hold a significantly different opinion. This concerns the conclusion of Siebel *et al.* (2008) that the Pfahl fault (see Siebel *et al.*, 2008, fig. 1) represents an important plate-tectonic boundary within the SW Bohemian Massif and separates basement terranes of different composition. A terrane map of that kind has been published by Fiala *et al.* (1995), who introduced the term 'Bavarian terrane' for the region south of the Pfahl fault, and correlated the region north of the Pfahl fault with the so-called 'Ostrong terrane' of the central and southeastern Bohemian Massif. Siebel *et al.* (2008) support this terrane model of Fiala *et al.* (1995), using arguments derived from the typology of the Variscan granites.

Siebel *et al.* (2008) state that the Variscan granites of the Bavarian Forest represent two distinctive S-type granite suites (a high Ca–Sr–Y and a low Ca–Sr–Y suite), considered to be derived from different crustal sources. Although we would classify their high Ca–Sr–Y granite suite as an I-type rather than an S-type suite (the A/CNK values are between 0·95 and 1·1 for most samples; see Siebel *et al.*, 2008, fig. 7b), we consider this two-suites model of Siebel *et al.* (2008) basically useful and reasonable. It is in line with similar observations in adjacent Austria (Liew *et al.*, 1989; Frasl & Finger, 1991; Finger & Clemens, 1995) and the Czech Republic (Holub *et al.*, 1995). There, the classic terms I-type and S-type granite (Chappell & White 1974, 2001) were used to highlight a bimodality of magma sources within the Variscan South Bohemian Batholith. Comparing the data, it would appear that the I-type (and I–S transitional) granite units recognized in Austria and the Czech Republic correspond widely to the high Ca–Sr–Y granites defined by Siebel *et al.* (2008) in the Bavarian Forest, whereas the S-type units are broadly equivalent to their low Ca–Sr–Y granites. In this respect the new data of Siebel *et al.* (2008) are entirely consistent with previous granite studies in the South Bohemian Batholith.

However, we would like to challenge the statement of Siebel *et al.* (2008) that the Pfahl fault separates a northern low Ca–Sr–Y granite province from a southern high Ca–Sr–Y granite province. The fairly clear geochemical

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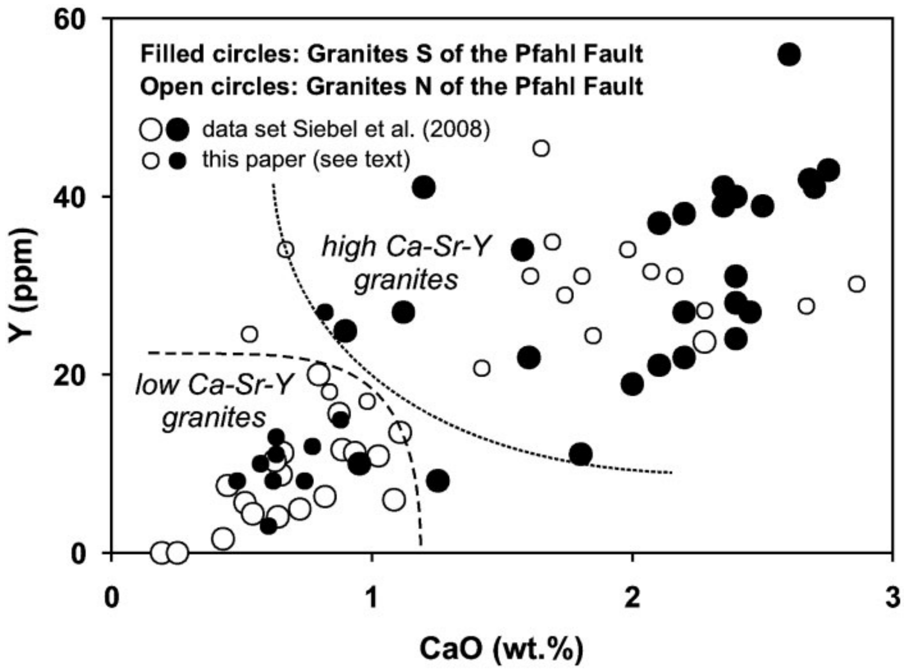

Fig. 1. CaO vs Y diagram after Siebel *et al.* (2008) showing data for Variscan granites from the SW Bohemian Massif. •, granites situated south of the Pfahl fault; ○, granites from north of the Pfahl fault. Large symbols are the data from Siebel *et al.* (2008). These data would imply that the type of granitic plutonism changes dramatically at the Pfahl fault. Small symbols are additional data for the Weinsberg granite from north of the Pfahl fault (small ○) and for the Altenberg, Haibach and Regen granites from south of the Pfahl fault (small •). These data do not support the model of Siebel *et al.* (2008), according to which the Pfahl fault separates two regions of chemically distinct plutons.

separation presented by Siebel *et al.* (2008) for the plutons north and south of the Pfahl fault is an artefact that results from a database that is too small. For instance, the Variscan granitic intrusions situated north of the Pfahl fault are traditionally subdivided into the S-type granites of the Eisgarn group and the I-type (I–S transitional type) granites of the Weinsberg group (Holub *et al.*, 1995). Siebel *et al.* (2008) used almost exclusively data from the Eisgarn type, although the Weinsberg type granites are equally abundant (compare the Czech 1:500 000 map of 1967). In Fig. 1 we have added our own data for the Weinsberg granite bodies from north of the Pfahl fault to the Y vs CaO diagram of Siebel *et al.* (2008). Most of these data correlate with the high Ca–Sr–Y granite suite of Siebel *et al.* (2008), demonstrating that high Ca–Sr–Y (I-type) granites do play a significant role to the north of the Pfahl fault. Likewise, appreciable amounts of low Ca–Sr–Y (S-type) granites from south of the Pfahl fault have not been considered by Siebel *et al.* (2008). In Figure 1 we have added our own analyses from the large two-mica granite body south of Regen [mapped as Flasergranite by Teipel *et al.* (2008)], and from the Haibach and Altenberg S-type granites from Austria (Frasl & Finger, 1991). Although situated to the south of the Pfahl fault, these granitic rocks correlate with the low Ca–Sr–Y suite of Siebel *et al.* (2008).

In conclusion, we appreciate the statement of Siebel *et al.* (2008) that the Variscan granites of the Bavarian Forest (and the South Bohemian Batholith in general) cannot be derived from a single source. We also would agree that there exists some kind of source-related chemical zonation within the western half of the South Bohemian Batholith, with low Ca–Sr–Y granites (S-type granites) being relatively more abundant in the north, whereas high Ca–Sr–Y granites (I-type granites) dominate in the region between the Pfahl and the Danube fault, a situation similar to that reported from the adjacent Austrian sector of the South Bohemian Batholith (Frasl & Finger, 1991). However, it is important to note that there is no significant regional switch between the two magmatic suites along the Pfahl fault, as the dataset of Siebel *et al.* (2008) would imply. This is an essential observation that needs to be considered when models for magma petrogenesis in the South Bohemian Batholith are developed (see below).

Fiala *et al.* (1995) argued that the tectonic fabrics are significantly different in the Bavarian and the Ostrong terranes. However, more recent research (Kalt *et al.*, 2000; Finger *et al.*, 2007) has shown that the crust north of the Pfahl fault (Hinterer Bayerischer Wald) exhibits the same NW–SE-striking (Hercynian) tectonic architecture and the same LP–HT regional metamorphic–anatectic overprint at *c.* 322–325 Ma as the crust south of the Pfahl fault

(Vorderer Bayerischer Wald). Furthermore, Finger *et al.* (2007) have pointed out that prominent pre-Variscan lithologies from north of the Pfahl fault continue into the area south of the fault. This clearly refutes the idea that the Pfahl fault represents a terrane boundary in the plate-tectonic sense.

Regarding the somewhat greater abundance of I-type (high Ca–Sr–Y) granites in the area south of the Pfahl fault, we see no compelling evidence for linking this feature to a different compositional nature of the crust, as Siebel *et al.* (2008) suggest. An alternative explanation could be that high-T melting of deep infracrustal I-type sources (or melting of enriched mantle in combination with AFC or magma mixing) played a relatively greater role in the region south of the Pfahl fault. The crustal block south of the Pfahl fault was uplifted for several kilometers relative to the northern block at the time when I-type granite production was most intensive. These vertical crustal movements may hint at a (partial) delamination of the mantle lithosphere (Henk *et al.*, 2000). Therefore, we tend to believe that the main petrological causes for the enhanced production of I-type granite melts south of the Pfahl fault were a locally higher thermal gradient and decompression melting effects.

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