U-Pb dating of South Bohemian granites: constraints for the longevity of melting Cadomian crust

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Information on the precise timing of magma emplacement and regional metamorphism is crucial for understanding the process of, and evaluating models for, granite generation in South Bohemia. Chronological data are controversial: For the Weinsberg granite for instance, which represents c. 50 % of the South Bohemian Batholith (around 10,000 km^2 of granite), Finger & Von Quadt (1991), Friedl et al. (1996) and Gerdes (2001) have suggested an intrusion age of c. 328 Ma, based on U-Pb monazite and Rb-Sr isochrone dating. However, in a recent study (Klötzli et al. 2001), mainly based on zircon evaporation ages, it is suggested that the Weinsberg granite formed much earlier around 345-355 Ma. This would imply that major parts of the batholith formed prior to regional metamorphism in the surrounding Moldanubian country rocks (c. 345-330 Ma), which is in contradiction to field evidence (Fuchs & Thiele, 1968, Büttner & Kruhl, 1997).

We present several new U-Pb single zircon ID-TIMS ages from different types of the Weinsberg granite, which are in the range of 322 ± 1 Ma and 332 ± 1 Ma and thus clearly at variance with the results of Klötzli et al. (2001). The two-mica Eisgarn granites, which occur in the northern part of the batholith, intruded at roughly the same time. U-Pb ID-TIMS zircon and monazite ages from the type locality of the Eisgarn granite in Lower Austria are 327-328 Ma, a fine-grained Eisgarn-type granite from northern Upper Austria (Sulzberg granite) yielded the same monazite crystallisation age of 327 Ma.

Fine-grained two-mica granites of the Altenberg pluton north of Linz belong to a younger magmatic event; U-Pb monazite analyses give an age of 316 ± 1 Ma. The fine-grained, I-type, Mauthausen granite, which intrudes the Weinsberg granite, shows a similar monazite crystallisation age of 317.5 ± 1 Ma. However, the Freistadt granodiorite pluton, previously considered as closely related to the Mauthausen granite, contains monazite that crystallized at c. 300 Ma and, in addition, some inherited 331 Myr old monazites. Monazites from the Peuerbach and Schärding granites of the Sauwald in the southwest of the South Bohemian Batholith also give ages around 316-319 Ma.

All together our U-Pb data indicate that the formation of the South Bohemian Batholith occurred not in one short-lived magmatic pulse, but over c. 30 Ma time span. For characterising the magma sources of the South Bohemian granites we analysed inherited zircon cores by means of ID-TIMS, SHRIMP and LA-MC-ICPMS technique. Our results so far indicate a multiple inherited zircon age spectrum with maxima at around 500-530, 560-580, 650-670 and 2000-2400 Ma. A similar zircon age pattern is known from the exposed Cadomian crust in the Tepla-Barrandian and Saxothuringian units in the northern Bohemian Massif. Together with the similar Nd-isotope composition this implies that the South Bohemian Batholith formed mainly from the melting of an Armorican-type Cadomian basement.

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Neogene Beckenmodellierung mit Lotstörungen und Nivellement

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Neuerdings werden Geodäten öfters mit dem Problem der Gesteinsdichten konfrontiert. Was bei Geländemodellen noch abschätzbar ist, erfordert beim Untergrund neue Denkweisen (geologische Karte, Profile, Seismik...) und auch manchmal Mut zu Neuland. So zog die Messmethode unseres Geoidprojekts eine eigene Lotstörungsmodellierung nach sich, die später auf neogene Tiefen- oder Dichtemodelle erweitert wurde.