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U-Pb ages and morphology of zircons from different granites within the Saxonian Granulite Massif

U-Pb-Alter und Morphologie von Zirkonen aus verschiedenen Graniten innerhalb des Sächsischen Granulitmassivs

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Abstract

The Saxonian Granulite Massif comprises various granitoid intrusions with different stages of deformation but of similar ages. However, there is only little knowledge about the magmatic source of these rocks. Combining the external and internal morphology of zircons and taking into consideration their Th-U values allows the differentiation of the granitoids into at least two groups of distinct evolution.

Kurzfassung

Innerhalb des Sächsischen Granulitgebirges treten verschiedene Granitoidintrusionen auf, welche sich zwar im Grad der Deformation unterscheiden, jedoch alle ähnliche Alter aufweisen. Über die magmatische Quelle dieser Gesteine ist bisher wenig bekannt. Durch die Kombination von Methoden, welche sowohl Merkmale der externen als auch internen Zirkonmorphologie verwenden, sowie durch die Berücksichtigung der Th/U-Verhältnisse dieser Zirkone, ist eine Unterteilung in mindestens zwei Gruppen granitoider Gesteine mit unterschiedlicher Genese möglich.

1. Introduction

The Saxonian Granulite Massif (SGM) was subject of numerous studies during the last 25 years (e.g. Gottesmann 1987, von Quadt 1993, Reinhardt & Kleemann 1994, Kroner 1995, Baumann et al. 1997, Romer & Rötzler 2001, Rötzler et al. 2004, Rötzler & Romer 2010). Throughout this time, rocks of the SGM, mostly granulites, were predominantly investigated with focus on P-T-t evolution and geochronology.

Zircon is known to vary broadly in its crystal habitus in response to the growing conditions of their environmental setting (Pupin 1980, Vavra 1994). Hence, the present study deals with the morphology of granitic zircons to gain knowledge about their formation and to differentiate several granitoid intrusions of almost the same age in the SGM (Nasdala et al. 1998, Gehmlich 2003).

Due to its characteristics like the resistance to weathering (Mange & Maurer 1991) and crustal processes as well as the nature of its crystal lattice (Finch & Hancher 2003, Hoskin & Schaltegger 2003), zircon is one of the best studied igneous minerals. Numerous empirical in-

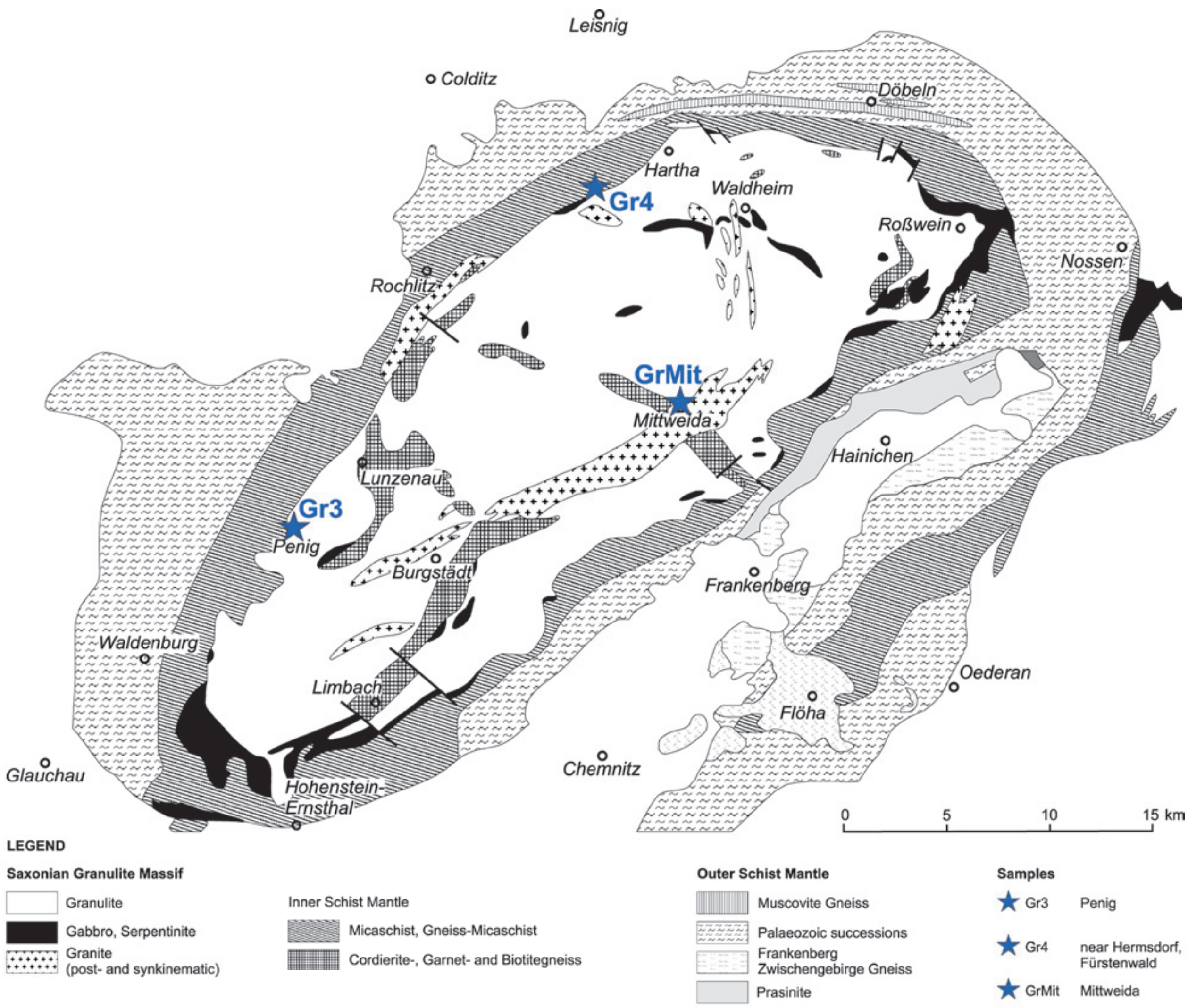

Fig. 1. Simplified geological map of the SGM based on Pietzsch (1962) with indicated sample localities.

Abb. 1. Vereinfachte geologische Karte des SGM basierend auf Pietzsch (1962) mit eingetragenen Fundorten.

vestigations revealed a systematic variation of zircon morphology for the main types of granitoids (Pupin & Turco 1972, 1975, Pupin 1976, 1980, 1990). It has to be remarked that a classification *sensu* Pupin (1980) considers only external zircon morphology. An extension of this method was established by Vavra (1994), who additionally used cathodoluminescence-imaging (CL) of internal zircon structures to identify former morphotypes.

2. Geological setting

The SGM is one part of the allochthonous domain of the Saxo-Thuringian Zone, situated at the north-western margin of the Bohemian Massif. The massif has an elliptic dome-like structure with a core predominantly consisting of felsic, very fine-grained granulites with inclusions of mafic granulites, garnet-pyroxenites and garnet-serpentinites. High-temperature shear zones separate the granulites in the core from deformed and partly transformed granulites at its margin and from a Palaeozoic schist cover of metasedimentary rocks in the roof as well (Fig. 1; Reinhardt & Kleemann 1994, Kroner 1995). Peak of metamorphism for the granulites is defined at 340 – 341 Ma, with U/Pb- and Pb/Pb-zircon ages ranging between 320 Ma and 485 Ma (von Quadt 1993, Vavra & Reinhardt 1997, Baumann et al. 1997, Vavra et al. 1998, Kröner et al. 1998, Romer & Rötzler 2001, Rötzler et al. 2004).

Apart from the granulites and meta-sedimentary rocks, several granites occur within the SGM. In general, four main types of granites can be distinguished according to their degree of deformation: i) Mittweida granite body, ii) Berbersdorf granite body, iii) granite gneisses (the so-called Lagergranite) and iv) smaller granitic dykes (Gottesmann 1987). Whereas the Mittweida granite is undeformed, the Berbersdorf granite is moderately to strongly deformed and the granite gneisses are very strongly deformed. Granites of the smaller dykes can show every degree of deformation (Gottesmann 1987). Previous studies report apparent ages of 333 ± 5 Ma (Nasdala et al. 1998) and 337 ± 5 Ma (Gehmlich 2003) for the Mittweida granite.

3. Samples and methods

In this case study, we compare zircons from i) the large granitic intrusion of Mittweida [GrMit], from ii) a small dyke from Penig [Gr3] and from iii) a granite to granite gneiss from a sill, collected near Hermsdorf in the Fürstenwald [Gr4] (Fig. 1; for coordinates of each sample, see results below). The main objective was the differentiation of these three granitic samples using other characteristics than U-Pb dating due to their almost identical intrusion ages (Early Carboniferous, Viséan).

After crushing 1 – 2 kg of the unweathered sample material in a jaw crusher, material was sieved for the fraction from 45 – 400 µm. Heavy mineral separation was achieved from this fraction using LST (lithium heteropolytungstate in water) prior to magnetic separation in the Frantz isomagnetic separator. Final selection of zircon grains was achieved by hand-picking under a binocular microscope (ZEISS Stemi 2000-C). Subsequently, zircons of all sizes and morphological types were selected and put on a tape. The grains were coated with carbon followed by the sputtering with an alloy of gold and palladium. Afterwards, back scattered electron-imaging (BSE) was performed via scanning electron microscope SEM (ZEISS Evo 50). Last steps included mounting and polishing prior to CL-imaging. For statistical reasons, at least 200 grains per sample were investigated with respect to their morphology *sensu* Pupin (1980) and Vavra 1994. Due to roundness or fracturing not every grain could be exactly classified.

Zones showing monophase growth patterns were preferentially selected for placement of laser ablation spots for isotope analyses in order to avoid mixed U-Pb ages resulting from different late- to postmagmatic or metamorphic influences. Measurements for U, Th and Pb took place at the Senckenberg Naturhistorische Sammlungen Dresden, Museum für Mineralogie und Geologie, Sektion Geochronologie, and were carried out via LA-ICP-MS (Laser Ablation with Inductively Coupled Plasma Mass Spectrometry) techniques. A Thermo-Scientific Element 2 XR instrument coupled to a New Wave UP-193 Excimer Laser System was used (for data, see Tab. 1). For ablation, the mounts were put into a teardrop-shaped, low volume laser cell produced by Ben Jähne (Dresden, Germany), which enables sequential sampling of heterogeneous grains (e.g. growth zones) during time-resolved data acquisition. Single measurement of one spot contained approximately 15 s background acquisition followed by 30 s data acquisition. Depending on grain size and structure, spot sizes ranged between 15 µm and 35 µm. Further specifications on the settings of the instrument are available in Tab. 1. If necessary, correction of common-Pb was carried out, based on the interference- and background-corrected ^{204}Pb signal and a model Pb composition (Stacey & Kramers 1975). Judgement of necessity for correction depended on whether the corrected ^{207}Pb/^{206}Pb value lay outside the internal errors of the measured ratios. Interpretation with respect to the obtained ages was done for all grains within a range of 90 – 110% of concordance (e.g. Meinhold et al. 2011). Discordant analyses were generally interpreted with caution, even if they define a discordia. Finally, raw data were corrected for background signal, common-Pb, laser induced elemental fractionation, instrumental mass discrimination, depth- and time-dependant elemental fractionation of Pb/Th and Pb/U by use of an Excel® spreadsheet program developed by Axel Gerdes (Frankfurt am Main, Germany). Measurement of

Table 1. Settings for the instruments used in the laboratory of the Senckenberg Naturhistorische Sammlungen Dresden, Museum für Mineralogie und Geologie, Sektion Geochronologie – Excimer Laser, New Wave, UP 193 and ICP-MS, Thermo Fisher, Element 2 XR.

Tabelle 1. Einstellungen der Instrumente im Labor der Senckenberg Naturhistorischen Sammlungen Dresden, Museum für Mineralogie und Geologie, Sektion Geochronologie – Excimer Laser, New Wave, UP 193 und ICP-MS, Thermo Fisher, Element 2 XR.

ICP-MS	Finnigan Element 2 XR
Forward Power	1390 W
Gas flow rate	15.0 l min^{-1} (plasma) 1.07 l min^{-1} (aux)
Scan mode	E-scan
Scanned masses	202, 204, 206, 207, 208, 232, 235, 238
Mass resolution	300
Dead time	18 ns
Oxide UO^+/U^+	< 1%
Dwell time	4 ms
Settling time	≤ 1 ms/amu
Number of scans	1500
Background	15 s
Ablation time	30 s
Integration time	1.4 s (= 25 scans)
Laser system	UP193 New Wave 193 nm, excimer
Nominal spot diameter	25 – 35 µm (unknowns) 35 µm (standard)
Carrier gas	0.25 l min^{-1} He 1.1 l min^{-1} Ar
Laser settings	10 Hz, 55% LP
Drill speed (DS) / Raster scan speed (RSS)	~ 0.5 µm/s (DS)
Cell volume	c. 3 cm^3
Sensitivity	6 × 10^6 counts/pg U

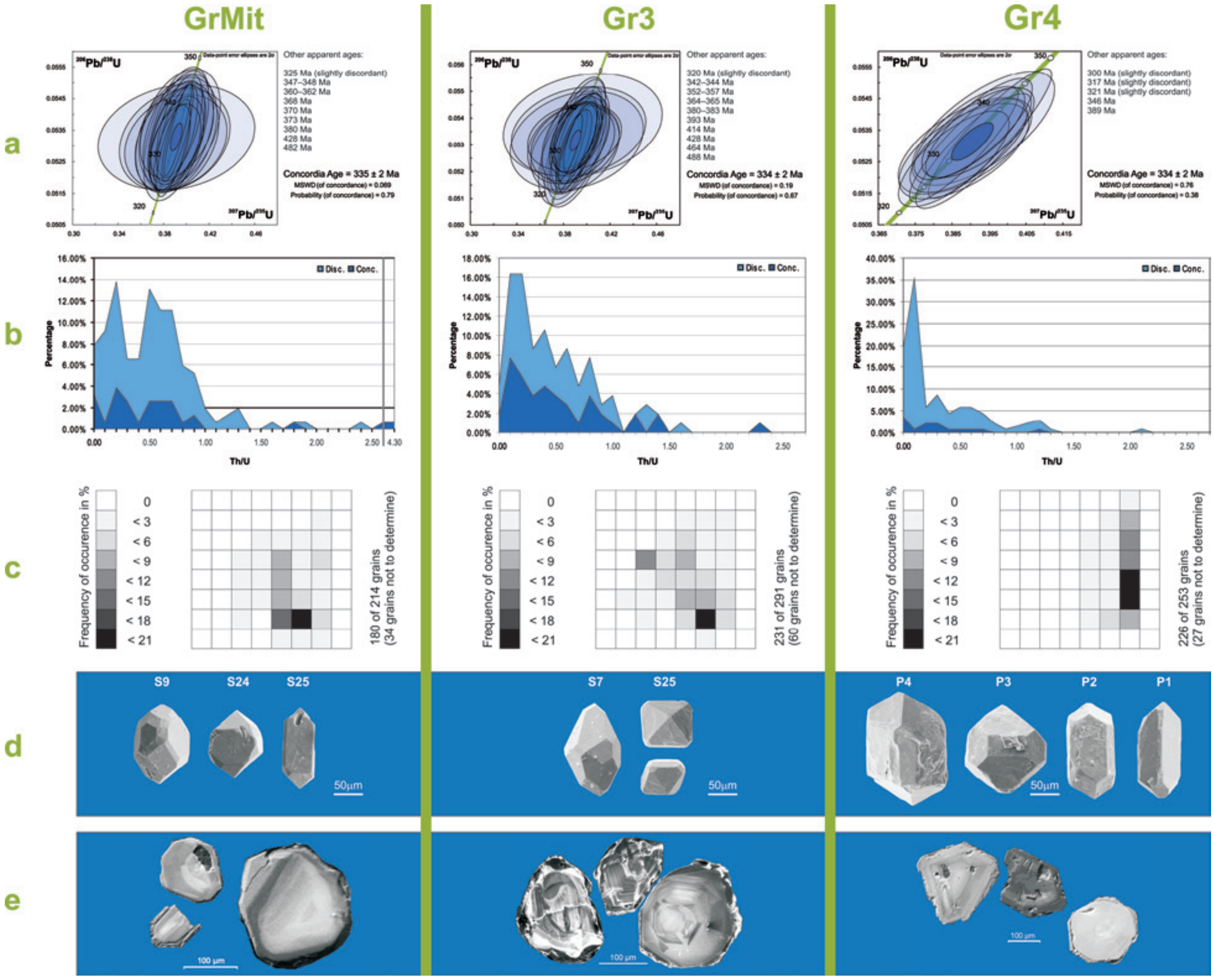

Fig. 2. Summarised results of all analyses conducted on zircons from samples GrMit, Gr3 and Gr4: **a**, Calculated concordia ages of each sample, which are interpreted to date the intrusion; **b**, Th/U ratios of all concordant and discordant zircons of each sample; **c**, Frequency distribution pattern of morphotypes of each sample according to Pupin (1980); **d**, BSE-images of typical zircon grains of each sample; **e**, CL-images of typical zircon grains of each sample.

Abb. 2. Zusammenfassung der Ergebnisse aller Analysen an Zirkonen der Proben GrMit, Gr3 und Gr4: **a**, Berechnete Konkordia-Alter für jede Probe, welche als Intrusionsalter interpretiert werden; **b**, Th/U Verhältnisse aller konkordanten und diskordanten Zirkone der jeweiligen Probe; **c**, Häufigkeitsverteilung der Morphotypen innerhalb einer jeden Probe nach Pupin (1980); **d**, BSE-Bilder von für die jeweilige Probe typischen Morphotypen; **e**, CL-Bilder von typischen Zirkonen einer jeden Probe.

Th/U ratios was carried out parallel to U-Pb determination with the same combination of instruments. Reported uncertainties were propagated by quadratic addition of the external reproducibility obtained from the standard zircon GJ-1 (~ 0.6% and 0.5 – 1.0% for the $^{207}Pb/^{206}Pb$ and $^{206}Pb/^{238}U$, respectively) during individual analytical sessions and the within-run precision of each analysis. Visualisation of concordia diagrams (2 σ error ellipses) and concordia ages (95% confidence level) was achieved using Isoplot/Ex 2.49 (Ludwig 2001). Frequency as well as relative probability plots were generated via AgeDisplay (Sircombe 2004). For zircons with ages older than 1 Ga, $^{207}Pb/^{206}Pb$ ages were taken for interpretation, for younger grains, the $^{206}Pb/^{238}U$ ages were used for interpretation. For further details on analytical protocol and data processing, see Gerdes & Zeh (2006).

Calculating the Th/U ratio helps to characterise the different granitoides. Due to stability of the Th-U system it is possible to use the ratios of both, concordant as well as discordant grains, to reveal differences between the granitoid samples (Hoskin & Schaltegger 2003).

4. Results

4.1. GrMit, monzo- to syenogranite, large intrusive body:

50°59′14.63″ N; 13°00′00.89″ E

A total of 214 zircons of sample GrMit were studied. Of all grains, 180 can be classified according to the diagram of Pupin (1980). The majority of zircons show S24 and S25 morphology, subpopulations form a path including S9, S14 and S19 morphotypes (Fig. 2c, d). Only few grains display typical features of magmatic zircon, such as well-developed and undisturbed growth zoning (Corfu et al. 2003). Most of the zircon grains exhibit either local recrystallisation or convolute zoning, pointing to late- to post-magmatic influences (Corfu et al. 2003), or they show features indicating metamorphic overprint like sector and fir-tree zoning or total homogenisation. A number of 35 of the 148 zircon grains (152 spots) analysed for age determination display concordant ages ranging between 325 ± 8 Ma and 482 ± 11 Ma (Tab. 2). The vast majority of ages cluster around 335 Ma, with a calculated concordia age of 335 ± 2 Ma (Fig. 2a). Older grains are rare and display ages between 347 Ma and 482 Ma. Obtained Th/U values of all measured zircons as well as concordant grains are between 0.03 and 4.33, while roughly 90% of them have values smaller than 1 (Fig. 2b).

4.2. Gr3, microgranite, small dyke:
50°55′51.23″ N; E12°41′24.69″ E

Sample Gr3 contained 291 zircons of which 231 are definable according to Pupin (1980), mostly clustering around S25 morphotype. A minor concentration is characterised by the S7 type (Fig. 2c, d). Additionally, a notable amount of grains displays a broad variation of morphotypes. The zircons of this sample largely show internal textures related to magmatic growth (Corfu et al. 2003), but more than half of them display some late- to post magmatic growth characteristics. The remaining zircon grains indicate metamorphic overprint of different stages (Fig. 2e). U-Pb measurements of 108 zircons (119 spots) yield 45 concordant ages between 320 ± 8 Ma and 488 ± 12 Ma (Tab. 3). Most of the concordant zircons are grouped around 334 Ma with a resulting calculated concordia age of 334 ± 2 Ma (Fig. 2a). Few older grains have ages between 342 Ma and 488 Ma. The Th/U values vary from 0.03 – 2.31 for all grains, while almost 90% of them are below 1, which is the same for concordant zircons (Fig. 2b).

4.3. Gr4, granite to granite gneiss, large intrusive body:
51°04′41.38″ N; 12°53′05.19″ E

This sample contained 253 zircon grains, of which 226 can be classified according to Pupin (1980). They predominantly plot around P2 – P5 morphotypes (Fig. 2c, d). The internal textures of zircons from this sample are mostly represented by undisturbed concentric growth zones, suggested to be related to magmatic crystal growth (Corfu et al. 2003). Nevertheless, there are several grains showing characteristics of metamorphic overprint (Fig. 2e). 17 of 127 zircon grains (138 spots) yield concordant ages. The youngest concordant grain is dated at 300 ± 6 Ma, the oldest grain analysed reveals an age of 389 ± 9 Ma. Most of the concordant grains lie between 330 Ma and 336 Ma, resulting in a concordia age of 334 ± 2 Ma (Fig. 2a, Tab. 4). The Th/U ratio range stands at between 0.05 and 2.06 for all analysed grains and between 0.08 and 1.29 for concordant grains, while the vast majority of them yield values smaller than 0.5 with a distinctive peak at ca. 0.1 (Fig. 2b).

5. Discussion

The calculated U-Pb zircon ages for the three analysed granitoid rocks range between 334 ± 2 Ma and 335 ± 2 Ma, which is equal within the errors. All zircon grains younger than 330 Ma are interpreted as slightly discordant, and thus are possibly affected by post-intrusive events. Older inherited grains are rare and yield ages between 342 Ma and 488 Ma, while the age distribution pattern of them is nearly the same in samples Gr3 and GrMit. In contrast, sample Gr4 does not contain zircons older than 400 Ma. As neither intrusion age, nor inheritance of older grains differs significantly between the analysed samples, other characteristics of zircons have to be investigated to reveal possible variations concerning the origin of the intrusions.

Due to this, 758 zircon grains of the three samples were investigated with respect to their morphology *sensu* Pupin (1980). The percentage of definable grains with respect to their morphotypes varies between 79% in Gr3 and 89% in Gr4. Samples GrMit and Gr3 show quite similar distribution patterns with comparable percentages and a broad diversity of morphotypes. These obtained variations are typical for S-type granitoids (Pupin 1980, Belousova et al. 2005). Nevertheless, both samples have different maxima within the fields of S24/S25 (GrMit) and S25/S7 (Gr3). A specific feature of sample Gr3 is a noteworthy amount of extremely shortened zircon crystals. Gr4 has a completely different pattern (Fig. 2c), forming a characteristic path according to Pupin (1980). In this sample, the majority of the grains plots within the fields P3 and P4. The adjacent fields P2 and P5 also comprise a high percentage of zircons. Typically, alkaline and hyperalkaline I-type granitoids are represented by such a distribution pattern (Pupin 1980, Belousova et al. 2005). Taking into consideration the mentioned differences within the distribution pattern of morphotypes, we can clearly distinguish between samples Gr3 and GrMit on the one hand and Gr4 on the other.

The analysis of the internal morphology according to Vavra (1994) and Corfu et al. (2003) is a second characteristic studied in addition to the U-Pb zircon ages. Within samples Gr3 and GrMit, there are only few grains showing typical features of magmatic zircons like well-developed and undisturbed growth zoning (Corfu et al. 2003). Zircon grains with characteristics pointing to late- to post-magmatic phenomena, such as local recrystallisation or convolute zoning (Corfu et al. 2003), dominate in these samples. A third group of zircon grains in Gr3 and GrMit is characterised by larger areas of recrystallisation and overgrowth, as well as features typical for zircons of high-grade metamorphic rocks like fir-tree sector zoning or overgrowths with radial sector zoning (Vavra et al. 1998, Corfu et al. 2003). This mixture of undisturbed magmatic and however influenced grains is interpreted to result from different melt sources. Thus, both of the granitoids Gr3 and GrMit probably contain zircons from the surrounding high-grade metamorphic granulites and possibly further (meta-) sedimentary sources. Sample Gr4 shows a completely different distribution pattern with a majority of undisturbed magmatic grains and few zircons characterised by late- or post-magmatic influences. The magmatic grains do not give hints to any evidence for a former external morphology according to Vavra (1994) or Köksal et al. (2008). Crystals with attributes of metamorphism are rare. This is in accordance to the hypothesised I-type character of this sample, which is deduced from morphotype analysis. Although it is described as the most deformed rock (granite gneiss) of the investigated samples (Gottesmann 1987), the deformation did not seem to have a major effect on the internal morphology of the zircon grains. Additionally, the small amount of grains with inclusions of xenocrysts or xenocrystic cores occuring in sample Gr4 is not a peculiarity. These are observed in an equating quantity also within the other two samples.

The last studied characteristic of the zircons, the Th/U ratio, corroborates the already supposed classification of the samples. While Gr3 and GrMit show a scattered distribution of Th/U values, interpreted as a potential sign of several magmatic sources, Gr4 is dominated by zircons with very low Th/U ratios (Fig. 2b), most likely indicating an origin from only one magmatic source. Very low Th/U ratios seem to be characteristically for altered and newly grown zircons as well (e.g. Vavra et al. 1996, Zeh et al. 2010).

With reference to the results, we can distinguish between two potential groups of granitoids. The first group is represented by the samples Gr3 and GrMit. They contain zircons with broad variation of external morphologies and an internal morphology dominated by late- to post-magmatic or metamorphic phenomena, accompanied by a wide range of Th/U values. This group is interpreted to originate from melts, which at least partially contain significant amounts of zircons from sedimentary and metamorphic sources, and thus can be classified as S-type granitoids (Clemens 2003, Köksal et al. 2008). Caused by the high grade of metamorphism of the rocks adjacent to the granitoids, there is no constraint about the maximum depositional age of the potential protoliths (Clemens 2003). The second group is characterised by sample Gr4. The predominance of magmatic grains, which do not show different earlier external morphologies *sensu* Vavra (1994), as well as the strictness of the path formed by the morphotypes point to a mantle source (Pupin 1980) of the magma and do not give any evidence for rapid changes in chemical conditions (Vavra 1994, Köksal et al. 2008).

In contrast to the investigations of Gehmlich (2003), within this study, the granite of Mittweida (sample GrMit) does not show an alkaline path peculiar to alkaline granitoids. This is probably due to different sample localities within this large granitic body. Consequently, the granitic intrusion of Mittweida probably did not only melt sedimentary rocks, but also magmatites.

6. Conclusions

We suppose that morphotypological investigations according to Pupin (1980) in combination with studies of the internal morphology introduced by Vavra (e.g. 1990, 1994) and measurements of the Th/U ratios in zircons can help to distinguish between the nearly synchronous intruded granitoid bodies of the SGM. As suggested by this case study, the analysed rocks units are most likely derived from melts of different origin and thus can be subdivided into S- and I-type granitoids.

7. References

Baumann, N.; Pilot, J.; Werner, C.-D.; Todt, W. (1997): Zur Geochronologie und Isotopengeochemie des Sächsischen Granulitgebirges. – Terra Nostra, **97**: 19 – 22, Berlin.

Belousova, E.A.; Griffin, W.L.; O'Reilly, S.Y. (2005): Zircon Crystal Morphology, Trace Element Signatures and Hf Isotope Composition as a Tool for Petrogenetic Modelling: Examples From Eastern Australian Granitoids. – Journal of Petrology, **47**: 329 – 353, Oxford.

Clemens, J.D. (2003): S-type granitic magmas – petrogenetic issues, models and evidence. – Earth Science Reviews, **61**: 1 – 18, Amsterdam.

Finch, R.J.; Hanchar, J.M. (2003): Structure and chemistry of zircon and zircon-group minerals. – In: Hanchar, J.M.; Hoskin, W.O. (Eds., 2003): Zircon: Reviews in Mineralogy & Geochemistry, **53**: 1 – 25, Washington.

Gehmlich, M. (2003): Die Cadomiden und Varisziden des Saxothuringischen Terranes – Geochronologie magmatischer Ereignisse. – Freiberger Forschungshefte, **C 500**: 1 – 129, Leipzig.

Gerdes, A.; Zeh, A. (2006): Combined U-Pb and Hf isotope LA-(MC-)ICP-MS analyses of detrital zircons: Comparison with SHRIMP and new constraints for the provenance and age of an Armorican metasediment in Central Germany. – Earth and Planetary Science Letters, **249**: 47–61, Amsterdam.

Gottesmann, B. (1987): Petrographic studies of Granite Gneisses and Granites from the Saechsisches Granulitgebirge. – Zentralinstituts für Isotopen- und Strahlenforschung, Mitteilungen, **133**: 309–336, Leipzig.

Hoskin, P.W.O.; Schaltegger, U. (2003): The Composition of Zircon and Igneous and Metamorphic Petrogenesis. – In: Hanchar, J.M.; Hoskin, P.W.O. (Eds., 2003): Zircon: Reviews in Mineralogy & Geochemistry, **53**: 1–25, Washington.

Köksal, S.; Cemal Göncüoglu, M.; Toksoy-Köksal, F.; Möller, A.; Kemnitz, H. (2008): Zircon typologies and internal structures as petrogenetic indicators in contrasting granitoid types from central Anatolia, Turkey. – Mineralogy and Petrology, **93**: 185–211, Berlin, Heidelberg.

Kröner, A.; Jaeckel, P.; Reischmann, T.; Kroner, U. (1998): Further evidence for an early Carboniferous (~340 Ma) age of high-grade metamorphism in the Saxon granulite complex. – Geologische Rundschau, **86**: 751–766, Berlin.

Kroner, U. (1995): Postkollisionale Extension am Nordrand der Böhmischen Masse – Die Exhumierung des Sächsischen Granulitgebirges. Freiberger Forschungshefte, **C 457**: 1–114, Leipzig.

Ludwig, K.R. (2001): User's manual for Isoplot/Ex rev. 2.49. – Berkeley Geochronology Center Special Publication, **1a**: 1–56, Berkeley.

Mange, M.A.; Maurer, H.F.W. (1991): Schwerminerale in Farbe. – 1–148, Stuttgart (Enke).

Meinhold, G.; Morton, A.C.; Fanning, C.M.; Frei, D.; Howard, J.P.; Phillips, R.J.; Strogen, D.; Whitham, A.G. (2011): Evidence from detrital zircons for recycling of Mesoproterozoic and Neoproterozoic crust recorded in Paleozoic and Mesozoic sandstones of southern Lybia. – Earth and Planetary Science Letters, **312**: 164–175, Amsterdam.

Nasdala, L.; Pidgeon, R.T.; Wofl, D.; Irmer, G. (1998): Metamictization and U-Pb isotopic discordance in single zircons: a combined Raman microprobe and SHRIMP ion probe study. – Mineralogy and Petrology, **62**: 1–27, Vienna.

Pietzsch, K. (1962): Geologie von Sachsen. – 1–870, Berlin (Deutscher Verlag der Wissenschaften).

Pupin, J.-P. (1976): Signification des caractéres morphologiques du zircon commun des roches en pétrologie. Base de la méthode typologique. – 1–394, Nice (upublished doctoral thesis, Nice University).

Pupin, J.-P. (1980): Zircon and Granite Petrology. – Contributions to Mineralogy and Petrology, **73**: 207–220, Berlin, Heidelberg.

Pupin, J.-P. (1992): Les zircons des granites océaniques et continentaux: couplage typologie - géochimie des éléments en traces. – Bulletin de la Société Géologique de France, **163**: 495–507, Paris.

Pupin, J.-P.; Turco, G. (1972): Une typologie originale du zircon accessoire. – Bulletin de la Société Française de Minéralogie et de Cristallographie, **95**: 348–359, Paris.

Pupin, J.-P.; Turco, G. (1975): Typologie du zircon accessoire dans les roches plutoniques dioritiques, granitiques et syenitiques: Facteurs essentials determinant les variations typologiques. – Pétrologie, **1**: 139–156, Paris.

Reinhardt, J.; Kleemann, U. (1994): Extensional unroofing of granulitic lower crust and related low-pressure, high-temperature metamorphism in the Saxonian Granulite Massif, Germany. – Tectonophysics, **238**: 71–94, Amsterdam.

Rötzler, J.; Romer, R.L.; Budzinski, H.; Oberhänsli, R. (2004): Ultrahigh-temperature high-pressure granulites from Tirschheim, Saxon Granulite Massif, Germany: P-T-t path and geotectonic implications. – European Journal of Mineralogy, **16**: 917–937, Stuttgart.

Rötzler, J.; Romer, R.L. (2010): The Saxon Granulite Massif: a key area fort the geodynamic evolution of Variscan central Europe. – In: Linnemann, U.; Romer, R.L. (Eds.) (2010): Pre-Mesozoic Geology of Saxo-Thuringia. – 233–252, Stuttgart (Schweizerbart).

Romer, R.L.; Rötzler, J. (2001): P-T-t Evolution of Ultrahigh-Temperature Granulites from the Saxon Granulite Massif, Germany. Part II: Geochronology. – Journal of Petrology, **42**: 2015–2032, Oxford.

Sircombe, K.N. (2004): AGEDISPLAY: an EXCEL workbook to evaluate and display univariate geochronological data using binned frequency histograms and probability density distributions. – Computers & Geosciences, **30**: 21–31, Amsterdam.

Stacey, J.S.; Kramers, J.D. (1975): Approximation of terrestrial lead isotope evolution by a two-stage model. – Earth and Planetary Science Letters, **26**: 207–221, Amsterdam.

Vavra, G. (1990): On the kinematics of zircon growth and its petrogenetic significance: a cathodoluminescence study. – Contributions to Mineralogy and Petrology, **106**: 90–99, Berlin, Heidelberg.

Vavra, G. (1994): Systematics of internal zircon morphology in major Variscan granitoid types. – Contributions to Mineralogy and Petrology, **117**: 331–344, Berlin, Heidelberg.

Vavra, G.; Gebauer, D.; Schmid, R. (1996): Multiple zircon growth and recrystallization during polyphase Late Carboniferous to Triassic metamorphism in granulites of the Ivrea Zone (Southern Alps): an ion microprobe (SHRIMP) study. – Contributions to Mineralogy and Petrology, **122**: 337–358, Berlin, Heidelberg.

Vavra, G.; Reinhardt, J. (1997): Which processes are dated by U/Pb zircon ages of high-grade metamorphic rocks? Zircon genesis in various lithologies and structural levels of the Saxonian Granulite Massif. – Terra Nostra, **97**: 190–192, Berlin.

Vavra, G.; Reinhardt, J.; Todt, W.; Pidgeon, R.T. (1998): Dating the exhumation of a hot core complex (Saxonian Granulite Massif) – old prejudices and new perspectives of U-Pb dating of zircons and monazites. – Freiberger Forschungshefte, **C 471**: 226–228, Leipzig.

Quadt, A. von (1993): The Saxonian Granulite Massif: new aspects from geochronological studies. – Geologische Rundschau, **82**: 516–530, Berlin.

Zeh, A.; Gerdes, A.; Barton Jr., J.; Klemd, R. (2010): U–Th–Pb and Lu–Hf systematics of zircon from TTG's, leucosomes, meta-anorthosites and quartzites of the Limpopo Belt (South Africa): Constraints for the formation, recycling and metamorphism of Palaeoarchaean crust. – Precambrian Research, **179**: 50–68, Amsterdam.

Appendix

Table 2. U-Pb-Th data of zircons from sample GrMit, n = 35 of 152 measured spots on 148 zircon grains within 90–110% concordance, monzo- to syenogranite, large intrusive body near Mittweida, 50° 59′ 14.63″ N; 13° 00′ 00.89″ E.

Tabelle 2. U-Th-Pb-Daten der Zirkone aus Probe GrMit, n = 35 von 152 Messpunkten auf 148 Zirkonkörnern innerhalb 90–110% Konkordanz, Monzo- bis Syenogranit aus einem großen Intrusivkörper nahe Mittweida, 50° 59′ 14.63″ N; 13° 00′ 00.89″ E.

Name (spot)	$^{207}Pb^a$ (cps)	$^{207}Pb^a$ (cps)	Pb^b (ppm)	Th^b/U	$^{206}Pb^c/^{204}Pb$	$^{206}Pb^c/^{238}U$	2 σ (%)	$^{207}Pb^c/^{235}U$	2 σ (%)	$^{207}Pb^c/^{206}Pb$	2 σ (%)	Rho^d	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
a1	68075	2936	196	0.05	1364	0.05341	2.3	0.39193	2.9	0.05322	1.7	0.81	335	8	336	8	338	38	**99**
a2	39602	1202	73	0.07	345	0.05967	2.2	0.41974	3.9	0.05102	3.2	0.56	374	8	356	12	242	75	155
a3	25265	494	38	0.81	156	0.05351	2.1	1.03084	3.9	0.13971	3.3	0.54	336	7	719	20	2224	56	15
a4	7480	160	11	0.48	181	0.05349	2.6	0.98242	3.5	0.13320	2.4	0.74	336	9	695	18	2141	41	16
a5	20383	1086	63	0.33	257	0.05469	2.2	0.37964	6.8	0.05034	6.5	0.32	343	7	327	19	211	150	163
a6	131923	823	84	0.23	26	0.03113	3.1	2.55298	6.6	0.59482	5.8	0.48	198	6	1287	49	4495	84	4
a7	24135	345	26	0.58	109	0.04645	4.0	1.21087	20.9	0.18905	20.5	0.19	293	11	806	123	2734	338	11
a8	71509	683	77	0.48	64	0.06636	2.3	2.51954	3.5	0.27538	2.7	0.64	414	9	1278	26	3337	43	12
a9	12835	325	24	0.47	277	0.06194	2.2	0.47891	6.1	0.05608	5.6	0.37	387	8	397	20	455	125	85
a10	40609	503	46	0.53	92	0.05617	2.6	1.66890	10.3	0.21548	10.0	0.25	352	9	997	68	2947	162	12
a11	34670	854	58	0.35	225	0.05693	2.2	0.40233	7.7	0.05125	7.3	0.29	357	8	343	23	252	169	141
a12	91454	1185	108	0.10	90	0.05490	2.4	1.63410	3.2	0.21588	2.1	0.76	345	8	983	20	2950	33	12
a13	6590	370	21	0.39	12301	0.05295	2.4	0.38839	3.2	0.05320	2.1	0.74	333	8	333	9	337	48	**99**
a14	45931	632	56	0.72	105	0.05297	2.9	1.37108	7.1	0.18773	6.5	0.41	333	9	877	42	2722	106	12
a15	12825	310	19	0.32	195	0.04778	2.5	0.86331	5.7	0.13105	5.1	0.44	301	7	632	27	2112	90	14
a16	3100	171	11	0.72	5776	0.05364	2.5	0.39349	4.2	0.05320	3.4	0.59	337	8	337	12	338	77	**100**
a17	25258	290	24	0.56	61	0.04494	2.3	1.67250	10.4	0.26992	10.2	0.22	283	6	998	69	3306	160	9
a18	6663	354	22	0.64	795	0.05421	3.7	0.46407	5.7	0.06209	4.3	0.65	340	12	387	18	677	92	50
a19	6832	372	20	0.26	12769	0.05163	2.4	0.37783	3.5	0.05307	2.5	0.69	325	8	325	10	332	56	**98**
a20	19967	583	39	0.57	238	0.05108	2.5	0.80919	6.2	0.11490	5.7	0.41	321	8	602	29	1878	102	17
a21	6223	366	20	0.26	11094	0.05311	2.2	0.40993	5.0	0.05598	4.5	0.44	334	7	349	15	452	101	74
a22	2275	132	7	0.24	4149	0.05178	2.4	0.39100	4.5	0.05477	3.8	0.53	325	8	335	13	403	86	81
a23	10317	504	31	0.64	1117	0.05137	2.4	0.46606	5.9	0.06580	5.3	0.42	323	8	388	19	800	112	40
a24	153527	1423	147	0.11	57	0.05197	2.4	2.26571	4.4	0.31619	3.7	0.54	327	8	1202	32	3551	57	9
a25	21768	758	52	0.64	208	0.05592	2.3	0.80393	5.7	0.10427	5.2	0.40	351	8	599	26	1701	95	21
a26	13622	774	37	0.05	2920	0.05030	2.4	0.39050	3.4	0.05631	2.4	0.71	316	8	335	10	464	54	68
a27	6664	282	19	0.65	432	0.05649	2.0	0.58507	4.1	0.07512	3.5	0.49	354	7	468	15	1072	71	33
a28	29527	510	42	0.58	116	0.05526	3.0	1.25855	10.9	0.16520	10.5	0.27	347	10	827	64	2510	177	14
a29	494	21	2	1.36	745	0.05136	6.5	0.46069	12.2	0.06506	10.3	0.53	323	20	385	40	776	217	42

Table 2 continued.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho^{d}	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
a30	4448	278	16	0.37	8315	0.05295	2.1	0.38720	3.4	0.05304	2.7	0.62	333	7	332	10	330	60	**101**
a31	1253	342	15	0.03	10430	0.04775	2.8	0.07799	17.2	0.01185	16.9	0.17	301	8	76	13	-6081	1754	-5
a32	767	45	3	0.71	1445	0.05335	2.8	0.39096	7.5	0.05315	7.0	0.37	335	9	335	22	335	158	**100**
a33	725	43	4	1.89	1353	0.05339	3.2	0.39080	6.0	0.05308	5.1	0.54	335	11	335	17	332	115	**101**
a34	1321	85	6	1.65	2441	0.04711	3.1	0.35052	9.1	0.05396	8.5	0.35	297	9	305	24	370	192	80
a35	3522	206	12	0.11	6591	0.05962	2.3	0.43547	4.0	0.05298	3.2	0.58	373	8	367	12	328	74	114
a36	3658	231	14	0.51	6825	0.05336	2.4	0.39172	3.7	0.05325	2.8	0.65	335	8	336	11	339	64	**99**
a37	37431	367	46	1.03	48	0.06862	3.6	2.99428	7.7	0.31648	6.8	0.47	428	15	1406	61	3553	105	12
a38	913	48	3	0.96	1708	0.05358	2.8	0.39376	7.4	0.05330	6.9	0.38	336	9	337	22	342	156	**98**
a39	1538	74	4	0.14	2667	0.04975	3.5	0.39676	10.6	0.05784	10.0	0.33	313	11	339	31	524	220	60
a40	1465	76	8	2.66	2743	0.05335	2.6	0.39121	5.2	0.05319	4.5	0.51	335	9	335	15	337	101	**100**
b1	5225	198	16	1.23	820	0.05662	2.7	0.53713	8.2	0.06880	7.8	0.32	355	9	437	30	893	161	40
b2	94207	4152	207	0.03	6046	0.05354	2.3	0.39237	2.5	0.05315	1.2	0.89	336	7	336	7	335	27	**100**
b3	7019	248	13	0.20	877	0.05134	2.6	0.38152	8.2	0.05390	7.8	0.32	323	8	328	23	367	176	88
b4	928	46	3	0.69	916	0.05444	2.8	0.38230	6.6	0.05094	6.0	0.43	342	9	329	19	238	138	144
b5	3908	148	9	0.24	7212	0.06007	2.7	0.44823	4.1	0.05412	3.2	0.65	376	10	376	13	376	71	**100**
b6	2211	108	8	0.89	4196	0.05563	2.5	0.40308	4.9	0.05255	4.2	0.51	349	9	344	15	310	96	113
b7	5911	219	15	0.69	704	0.05715	2.9	0.53692	5.0	0.06814	4.1	0.58	358	10	436	18	873	85	41
b8	5911	283	20	0.53	294	0.06325	3.0	0.59427	5.1	0.06814	4.1	0.59	395	12	474	20	873	85	45
b9	1252	60	8	4.33	2345	0.05350	2.9	0.39267	5.6	0.05323	4.8	0.52	336	9	336	16	339	109	**99**
b10	505	25	2	2.48	1066	0.05562	5.5	0.35565	14.7	0.04637	13.7	0.37	349	19	309	40	17	329	2045
b11	1811	81	5	0.07	3269	0.06864	2.3	0.52460	6.6	0.05543	6.2	0.35	428	9	428	23	430	138	**100**
b12	4426	222	12	0.17	539	0.05365	2.9	0.41786	5.1	0.05648	4.2	0.57	337	10	355	15	471	92	71
b13	1046	51	2	0.15	1927	0.03829	3.3	0.28707	7.0	0.05437	6.1	0.48	242	8	256	16	386	137	63
b14	61820	1020	73	0.29	113	0.04870	3.8	0.37561	9.0	0.05594	8.2	0.42	307	11	324	25	450	183	68
b15	12850	236	15	0.36	166	0.05328	2.6	0.39100	14.4	0.05322	14.2	0.18	335	8	335	42	338	322	**99**
b16	18279	518	33	0.74	296	0.05202	2.3	0.36767	6.9	0.05126	6.5	0.34	327	7	318	19	252	150	130
b17	56169	1080	83	0.27	103	0.05507	2.9	1.11161	4.7	0.14641	3.7	0.62	346	10	759	26	2304	64	15
b18	66030	1256	112	0.08	182	0.06678	3.6	0.49537	5.3	0.05380	3.9	0.68	417	14	409	18	363	87	115
b19	5933	237	13	0.56	1341	0.04629	3.6	0.35024	6.6	0.05487	5.6	0.54	292	10	305	18	407	125	72
b20	83298	1519	85	0.28	85	0.03469	2.5	1.04896	7.3	0.21929	6.9	0.34	220	5	728	39	2975	111	7
b21	19259	356	24	0.76	112	0.04249	4.5	1.10530	18.7	0.18868	18.2	0.24	268	12	756	105	2731	299	10
b22	3250	105	4	0.30	138	0.02877	56.9	0.73876	90.0	0.18624	69.6	0.63	183	103	562	489	2709	1149	7
b23	82145	1229	91	0.11	102	0.05934	2.8	0.46034	11.4	0.05627	11.0	0.24	372	10	384	37	463	245	80
b24	3722	185	11	0.28	6851	0.05899	2.4	0.43954	6.1	0.05404	5.6	0.40	370	9	370	19	373	125	**99**
b25	21798	432	33	0.93	230	0.05344	2.8	0.39258	6.5	0.05327	5.8	0.43	336	9	336	19	341	132	**99**

Table 2 continued.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho^{d}	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
b26	10766	435	29	0.73	546	0.05257	2.6	0.37124	7.6	0.05122	7.1	0.34	330	8	321	21	251	164	132
b27	919	45	2	0.04	1521	0.04750	2.8	0.39473	8.1	0.06027	7.6	0.34	299	8	338	24	613	164	49
b28	33437	547	41	0.54	127	0.05497	2.6	0.39017	7.0	0.05147	6.5	0.37	345	9	334	20	262	149	132
b29	8142	256	19	0.54	373	0.06291	2.5	0.48586	8.9	0.05602	8.5	0.28	393	10	402	30	453	189	87
b30	142349	346	154	0.90	30	0.21172	2.8	15.53345	5.4	0.53212	4.6	0.52	1238	32	2849	53	4333	68	29
b31	5572	208	15	0.09	6461	0.07758	2.3	0.61055	3.5	0.05708	2.7	0.65	482	11	484	14	495	59	**97**
b32	31231	526	38	0.91	116	0.04338	3.4	0.33584	14.8	0.05615	14.5	0.23	274	9	294	39	458	321	60
b33	59685	1355	100	0.09	135	0.05612	3.0	0.40014	5.6	0.05171	4.7	0.54	352	10	342	16	273	107	129
b34	184593	1828	152	0.06	34	0.03204	2.5	2.19757	3.6	0.49748	2.6	0.69	203	5	1180	26	4234	39	5
b35	1953	72	5	0.61	342	0.06244	3.2	0.65319	17.9	0.07587	17.6	0.18	390	12	510	75	1092	353	36
b36	3607	208	19	1.91	2486	0.05359	2.5	0.42656	4.7	0.05772	3.9	0.54	337	8	361	14	519	87	65
b37	2658	146	12	1.26	470	0.05521	3.8	0.47894	7.8	0.06292	6.8	0.49	346	13	397	26	705	145	49
b38	3004	159	9	0.20	5259	0.05744	2.5	0.41659	3.8	0.05260	2.9	0.66	360	9	354	11	312	65	116
b39	14693	605	38	0.67	1057	0.05179	2.6	0.46982	4.1	0.06579	3.2	0.64	326	8	391	14	800	67	41
b40	18263	594	40	0.72	429	0.05437	2.4	0.38556	4.4	0.05143	3.7	0.54	341	8	331	13	260	85	131
b41	74057	925	71	0.11	76	0.05206	3.4	0.42671	9.2	0.05944	8.5	0.37	327	11	361	28	583	185	56
b42	16291	178	17	0.18	129	0.07408	2.7	1.78573	5.4	0.17483	4.6	0.51	461	12	1040	35	2604	77	18
b43	11196	337	21	0.74	559	0.05321	2.5	0.38943	10.2	0.05309	9.9	0.24	334	8	334	30	332	225	**101**
b44	54230	504	46	0.53	77	0.05194	2.4	1.71772	6.9	0.23984	6.5	0.35	326	8	1015	45	3119	103	10
b45	84535	574	59	0.29	52	0.05060	3.3	2.38601	8.6	0.34199	7.9	0.38	318	10	1238	63	3672	121	9
b46	195871	1130	112	0.12	33	0.04252	3.0	2.94578	7.8	0.50247	7.2	0.39	268	8	1394	61	4248	106	6
b47	32572	405	32	0.28	139	0.06196	3.2	1.48426	4.6	0.17374	3.3	0.69	388	12	924	29	2594	56	15
b48	12653	320	21	0.69	645	0.05306	2.3	0.39112	5.0	0.05346	4.4	0.47	333	8	335	14	348	99	**96**
b49	7429	181	11	0.62	687	0.05436	2.5	0.53775	4.3	0.07174	3.4	0.59	341	8	437	15	979	70	35
b50	878	6	1	1.25	60	0.06297	10.1	2.77040	12.2	0.31910	6.9	0.83	394	39	1348	96	3565	106	11
b51	7675	119	9	1.32	228	0.04794	3.3	0.38507	9.1	0.05825	8.5	0.36	302	10	331	26	539	186	56
b52	10579	197	13	0.13	718	0.06592	2.6	0.51421	5.8	0.05658	5.2	0.44	412	10	421	20	475	116	87
b53	17469	120	12	0.78	78	0.05690	2.5	1.83793	27.9	0.23427	27.8	0.09	357	9	1059	203	3081	444	12
b54	7327	73	6	0.70	179	0.05745	3.1	1.13811	11.6	0.14367	11.2	0.27	360	11	772	65	2272	193	16
b55	563	14	1	1.11	471	0.04014	3.8	0.27841	12.7	0.05030	12.1	0.30	254	9	249	28	209	280	121
b56	24924	183	14	0.49	119	0.05682	5.5	0.46373	16.0	0.05919	15.0	0.34	356	19	387	53	574	326	62
b57	44380	383	25	0.54	166	0.04626	2.5	0.34822	6.3	0.05459	5.8	0.40	292	7	303	17	396	130	74
b58	967	21	1	0.27	1820	0.06273	3.2	0.45919	7.0	0.05309	6.2	0.45	392	12	384	23	333	141	118
b59	29918	285	23	0.65	130	0.05743	4.0	1.18372	4.6	0.14950	2.2	0.88	360	14	793	26	2340	38	15
b60	79836	279	30	0.36	50	0.06866	3.8	0.63299	14.7	0.06687	14.2	0.26	428	16	498	60	834	296	51
c1	15437	338	22	0.59	106	0.04731	2.2	0.39228	9.8	0.06013	9.6	0.23	298	7	336	29	608	207	49

Table 2 continued.

Name (spot)	^{207}Pb^{a} (cps)	^{207}Pb^{a} (cps)	Pb^{b} (ppm)	Th^{b}/U	^{206}Pb^{c}/^{204}Pb	^{206}Pb^{c}/^{238}U	2 σ (%)	^{207}Pb^{c}/^{235}U	2 σ (%)	^{207}Pb^{c}/^{206}Pb	2 σ (%)	Rho^{d}	^{206}Pb/^{238}U	±2 σ (Ma)	^{207}Pb/^{235}U	±2 σ (Ma)	^{207}Pb/^{206}Pb	±2 σ (Ma)	conc (%)
c2	40343	626	45	0.45	146	0.05427	2.4	1.19688	4.7	0.15995	4.0	0.51	341	8	799	26	2455	68	14
c3	12196	469	30	0.62	1096	0.05350	2.3	0.39126	6.8	0.05304	6.4	0.34	336	8	335	20	330	144	**102**
c4	53306	623	42	0.42	70	0.03723	13.0	0.27234	22.0	0.05305	17.8	0.59	236	30	245	49	331	403	71
c5	125327	808	102	0.29	45	0.07361	1.9	0.50640	17.4	0.04989	17.3	0.11	458	8	416	61	190	403	241
c6	4810	224	15	0.68	5323	0.05748	2.3	0.42781	4.9	0.05398	4.3	0.46	360	8	362	15	370	97	**97**
c7	3400	160	10	0.54	6329	0.05769	2.0	0.42898	4.7	0.05393	4.2	0.42	362	7	362	14	368	95	**98**
c8	10364	227	21	0.79	185	0.07201	2.5	1.12075	12.7	0.11288	12.5	0.19	448	11	763	71	1846	226	24
c9	17419	268	25	0.90	99	0.06291	3.0	1.42721	9.1	0.16455	8.6	0.33	393	11	900	56	2503	145	16
c10	19784	380	29	0.54	192	0.06087	3.3	0.47575	8.6	0.05669	7.9	0.38	381	12	395	28	480	175	79
c11	1418	73	4	0.29	2647	0.05321	2.5	0.39140	7.7	0.05335	7.3	0.33	334	8	335	22	344	165	**97**
c12	48509	633	53	0.71	75	0.04718	2.2	1.58886	5.2	0.24426	4.8	0.41	297	6	966	33	3148	76	9
c13	5400	250	16	0.54	1375	0.05438	1.9	0.44329	8.2	0.05913	8.0	0.23	341	6	373	26	572	174	60
c14	5029	267	17	0.64	9444	0.05312	1.9	0.39042	4.6	0.05331	4.2	0.41	334	6	335	13	342	96	**98**
c15	49104	1485	107	0.09	292	0.04887	2.5	0.36378	4.9	0.05399	4.2	0.51	308	8	315	13	371	95	83
c16	21453	464	28	0.26	184	0.05092	2.1	0.38215	8.6	0.05443	8.4	0.24	320	6	329	25	389	188	82
c17	7240	240	16	0.79	462	0.05477	2.1	0.63466	4.2	0.08403	3.6	0.50	344	7	499	17	1293	70	27
c18	684	24	1	0.25	1029	0.05245	3.0	0.47650	11.4	0.06589	11.0	0.26	330	9	396	38	803	231	41
c19	16197	543	38	0.57	85	0.05966	2.9	0.47341	8.9	0.05755	8.4	0.33	374	11	394	29	513	185	73
c20	25753	411	40	0.77	93	0.06758	2.5	1.61272	9.8	0.17309	9.5	0.25	422	10	975	63	2588	158	16
c21	27871	452	35	0.43	109	0.05183	2.4	1.34189	6.4	0.18779	5.9	0.38	326	8	864	38	2723	97	12
c22	14116	309	25	0.81	212	0.05903	2.4	0.47596	8.4	0.05848	8.1	0.29	370	9	395	28	548	177	67
c23	9011	303	22	0.76	401	0.05804	1.7	0.41200	21.3	0.05148	21.2	0.08	364	6	350	65	262	488	139
c24	16658	483	37	0.93	234	0.05312	2.7	0.77982	7.1	0.10646	6.6	0.38	334	9	585	32	1740	120	19
c25	8949	293	20	0.65	315	0.05174	2.4	0.68692	20.3	0.09629	20.1	0.12	325	8	531	87	1554	378	21
c26	10194	539	34	0.63	6276	0.05440	1.9	0.41527	2.6	0.05536	1.8	0.72	342	6	353	8	427	40	80
c27	8026	219	18	0.86	307	0.06248	2.2	0.86983	8.9	0.10097	8.7	0.25	391	8	635	43	1642	161	24
c28	67186	512	67	0.73	45	0.06095	2.8	3.11335	16.3	0.37044	16.1	0.17	381	10	1436	134	3793	244	10
c29	—	—	—	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—
c30	12817	634	45	0.45	2887	0.06653	2.2	0.51990	3.7	0.05667	2.9	0.61	415	9	425	13	479	65	87
c31	8791	238	22	0.03	14622	0.09940	1.9	0.82318	2.7	0.06007	1.9	0.70	611	11	610	12	606	42	**101**
c32	2719	156	9	0.13	5012	0.05964	2.1	0.44568	3.6	0.05420	2.9	0.59	373	8	374	11	379	64	**98**
c33	14137	439	28	0.45	268	0.05313	2.3	0.39046	9.5	0.05330	9.2	0.24	334	8	335	27	342	208	**98**
c34	10592	209	17	0.15	209	0.07329	2.6	0.53458	18.0	0.05290	17.9	0.14	456	11	435	66	324	405	141
c35	2781	151	11	0.96	5477	0.05590	2.5	0.39233	5.4	0.05090	4.8	0.46	351	8	336	16	236	111	148
c36	4282	129	10	0.86	474	0.05814	2.6	0.76173	5.2	0.09502	4.5	0.51	364	9	575	23	1528	85	24
c37	1699	91	6	0.41	2549	0.06189	3.1	0.47594	7.6	0.05578	6.9	0.41	387	12	395	25	443	154	87

Table 2 continued.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho^{d}	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
c38	2386	112	8	0.84	4422	0.05872	2.0	0.43485	4.1	0.05371	3.6	0.49	368	7	367	13	359	81	**103**
c39	2368	118	7	0.34	4160	0.06073	2.0	0.45291	5.6	0.05409	5.3	0.36	380	7	379	18	375	118	**101**
c40	4443	128	9	0.61	579	0.06084	2.3	0.48804	8.7	0.05818	8.4	0.26	381	9	404	29	537	184	71
c41	2760	106	7	0.61	4491	0.05681	2.4	0.47978	5.2	0.06125	4.6	0.46	356	8	398	17	648	99	55
c42	5472	131	8	0.20	494	0.06150	3.3	0.42152	11.2	0.04971	10.7	0.29	385	12	357	34	182	249	212
c43	16367	349	27	0.82	263	0.05763	2.4	0.84224	8.0	0.10600	7.6	0.30	361	8	620	38	1732	140	21
c44	5505	223	12	0.20	10293	0.05531	2.0	0.40715	3.7	0.05338	3.1	0.54	347	7	347	11	345	71	**101**
c45	20827	286	19	0.36	182	0.05665	2.3	0.45589	6.4	0.05836	6.0	0.36	355	8	381	21	543	131	65
c46	3710	133	8	0.29	5546	0.05529	2.4	0.40819	3.9	0.05354	3.0	0.62	347	8	348	11	352	69	**99**
c47	1608	60	4	0.57	1495	0.05336	2.4	0.39214	5.1	0.05330	4.5	0.47	335	8	336	15	342	102	**98**
c48	10126	354	22	0.56	18930	0.05549	2.1	0.40847	2.9	0.05339	2.1	0.71	348	7	348	9	345	47	**101**
c49	7702	168	13	1.05	473	0.05525	2.1	0.62162	4.1	0.08160	3.5	0.51	347	7	491	16	1236	69	28
c50	3425	104	7	0.72	6350	0.05756	2.0	0.42621	3.2	0.05370	2.4	0.63	361	7	360	10	359	55	**101**
c51	1058	30	2	0.31	1905	0.06130	2.2	0.47456	7.0	0.05615	6.7	0.31	384	8	394	23	458	148	84
c52	2383	68	4	0.18	4544	0.05440	2.2	0.39291	5.9	0.05239	5.5	0.38	341	7	336	17	302	125	113
c53	26089	200	17	1.08	95	0.05276	2.7	0.35823	11.8	0.04925	11.4	0.23	331	9	311	32	160	268	208
c54	19434	133	13	0.81	95	0.06207	2.0	1.74321	5.1	0.20369	4.7	0.39	388	7	1025	33	2856	76	14
c55	40293	130	18	1.32	45	0.06339	2.8	3.32313	4.7	0.38022	3.8	0.58	396	11	1486	37	3833	58	10
c56	3728	89	6	0.75	6306	0.05838	2.4	0.42676	6.6	0.05302	6.1	0.37	366	9	361	20	330	139	111
c57	5124	39	2	0.84	162	0.02885	4.2	0.58718	7.0	0.14761	5.6	0.60	183	8	469	27	2318	96	8
c58	145100	226	54	0.56	26	0.08803	3.0	7.24336	6.8	0.59679	6.1	0.44	544	16	2142	62	4500	88	12
c59	11120	80	7	0.90	117	0.05405	2.7	1.31691	5.1	0.17670	4.3	0.53	339	9	853	30	2622	71	13
c60	16670	112	10	0.78	123	0.06735	2.6	0.57129	16.3	0.06152	16.1	0.16	420	11	459	62	658	346	64

Table 3. U-Pb-Th data of zircons from sample Gr3, n = 45 of 119 measured spots on 108 zircon grains within 90–110% concordance, microgranite, small dyke near Penig, 50° 55′51.23″ N; 12° 41′24.69″ E.

Tabelle 3. U-Th-Pb-Daten der Zirkone aus Probe Gr3, n = 45 von 119 Messpunkten auf 108 Zirkonkörnern innerhalb 90–110 % Konkordanz, Mikrogranit aus einem kleinen Gang nahe Penig, 50°55′51.23″ N; 12° 41′24.69″ E.

Name (spot)	^{207}Pb^{a} (cps)	^{207}Pb^{a} (cps)	Pb^{b} (ppm)	Th^{b}/U	^{206}Pb^{c}/^{204}Pb	^{206}Pb^{c}/^{238}U	2 σ (%)	^{207}Pb^{c}/^{235}U	2 σ (%)
a1	5330	228	14	0.27	578	0.06010	2.1	0.66204	5.2
a2	25093	1565	81	0.24	2780	0.05292	2.1	0.38943	3.0
a3	41931	2745	179	0.09	13907	0.05486	3.0	0.40325	3.8
a4	7505	466	25	0.23	14166	0.05668	1.9	0.41566	3.3
a5	2403	151	9	0.43	4523	0.05822	2.3	0.42837	4.4
a6	2293	132	10	0.85	3806	0.06760	2.2	0.56466	8.4
a7	44462	2186	139	0.13	732	0.06116	2.0	0.45755	3.4
a8	4101	264	16	0.89	1568	0.05613	2.1	0.43347	4.9
a9	2715	156	9	0.13	4910	0.06071	2.3	0.46114	4.8
a10	15233	874	59	0.82	2270	0.05803	2.8	0.43390	3.6
a11	16537	758	44	0.24	407	0.05695	2.1	0.41857	6.8
a12	—	—	—	—	—	—	—	—	—
a13	1756	122	7	0.57	3303	0.05325	2.9	0.39136	4.6
a14	173	10	1	0.29	280	0.06485	5.0	– 0.39670	264.3
a15	7139	256	23	0.03	11869	0.09749	2.1	0.81065	3.0
a16	564	39	2	0.10	1061	0.05455	2.7	0.40084	7.5
a17	432	26	1	0.09	769	0.05811	3.1	0.45359	11.1
a18	231	16	1	0.29	464	0.06453	4.8	0.44583	13.0
a19	98001	2772	111	0.14	90	0.01942	9.4	0.71183	9.6
a20	1721	95	3	0.58	1066	0.01919	23.6	0.69656	68.5
a21	450	35	3	2.31	858	0.05316	2.8	0.39101	12.0
a22	3477	250	15	0.84	6570	0.05326	2.0	0.39015	3.8
a23	99	6	0	0.85	174	0.06569	8.2	0.51826	16.8
a24	170	13	1	0.20	348	0.05483	4.7	0.37403	14.8
a25	1582	120	7	0.32	2976	0.05636	2.4	0.41478	6.7
a26	3527	205	17	0.11	6618	0.09100	2.2	0.67504	4.1
a27	1140	84	5	0.30	1002	0.05646	3.5	0.40702	8.9
a28	2214	166	9	0.51	2284	0.05613	2.1	0.41238	4.7
a29	5604	173	9	0.22	99	0.03706	2.1	1.06635	7.5
a30	4141	172	16	0.74	4823	0.08370	2.9	0.69831	4.8
a31	1077	71	4	0.42	2032	0.05682	2.5	0.41818	6.4
a32	2666	187	11	0.27	4835	0.05788	2.7	0.44172	5.4
a33	967	64	5	0.61	1747	0.06871	2.3	0.52526	8.0
a34	2193	151	10	0.56	3984	0.06313	3.1	0.48049	5.7

Name (spot)	^{207}Pb^{c}/^{206}Pb	2 σ (%)	Rho^{d}	^{206}Pb/^{238}U	±2 σ (Ma)	^{207}Pb/^{235}U	±2 σ (Ma)	^{207}Pb/^{206}Pb	±2 σ (Ma)	conc (%)
a1	0.07989	4.8	0.40	376	8	516	21	1194	94	32
a2	0.05337	2.1	0.71	332	7	334	9	344	48	**97**
a3	0.05331	2.4	0.78	344	10	344	11	342	54	**101**
a4	0.05319	2.7	0.58	355	7	353	10	337	61	**106**
a5	0.05337	3.8	0.51	365	8	362	14	344	86	**106**
a6	0.06058	8.1	0.26	422	9	455	31	624	175	68
a7	0.05426	2.7	0.59	383	7	383	11	382	61	**100**
a8	0.05601	4.4	0.43	352	7	366	15	453	98	78
a9	0.05509	4.2	0.48	380	8	385	15	416	93	**91**
a10	0.05423	2.2	0.79	364	10	366	11	380	50	**96**
a11	0.05330	6.4	0.31	357	7	355	20	342	146	**104**
a12	—	—	—	—	—	—	—	—	—	—
a13	0.05330	3.6	0.63	334	10	335	13	342	81	**98**
a14	– 0.04437	264.2	0.02	405	20	– 513	– 1023	—	—	—
a15	0.06031	2.1	0.70	600	12	603	14	615	46	**98**
a16	0.05329	7.0	0.37	342	9	342	22	341	158	**100**
a17	0.05662	10.7	0.28	364	11	380	36	477	236	76
a18	0.05011	12.1	0.37	403	19	374	41	200	280	202
a19	0.26585	1.9	0.98	124	12	546	41	3282	30	4
a20	0.26321	64.3	0.34	123	29	537	336	3266	1012	4
a21	0.05334	11.7	0.24	334	9	335	35	343	264	**97**
a22	0.05312	3.3	0.52	335	6	334	11	334	74	**100**
a23	0.05722	14.6	0.49	410	33	424	60	500	322	82
a24	0.04947	14.1	0.32	344	16	323	42	170	328	202
a25	0.05338	6.3	0.36	353	8	352	20	345	142	**102**
a26	0.05380	3.5	0.53	561	12	524	17	363	79	155
a27	0.05229	8.2	0.39	354	12	347	27	298	188	119
a28	0.05329	4.2	0.45	352	7	351	14	341	96	**103**
a29	0.20868	7.2	0.28	235	5	737	40	2895	116	8
a30	0.06051	3.8	0.61	518	15	538	20	622	82	83
a31	0.05338	5.9	0.39	356	9	355	19	345	134	**103**
a32	0.05535	4.7	0.49	363	9	371	17	426	105	85
a33	0.05544	7.6	0.29	428	10	429	28	430	170	**100**
a34	0.05520	4.8	0.54	395	12	398	19	420	107	**94**

Table 3 continued.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho^{d}	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
a35	1346	106	6	0.36	2518	0.05278	3.3	0.39019	5.7	0.05362	4.6	0.58	332	11	335	16	355	104	**93**
a36	51938	889	80	0.64	127	0.06455	2.6	0.70816	4.1	0.07957	3.2	0.62	403	10	544	17	1186	63	34
a37	197041	12342	672	0.03	508	0.05279	2.4	0.38651	2.9	0.05310	1.5	0.84	332	8	332	8	333	35	**100**
a38	802	55	3	0.39	1497	0.05569	3.5	0.41041	10.0	0.05345	9.3	0.35	349	12	349	30	348	211	**100**
a39	1803	69	6	0.49	2796	0.09022	4.6	0.81989	12.0	0.06591	11.0	0.38	557	24	608	56	804	231	69
a40	1669	100	5	0.41	3161	0.05316	3.1	0.38999	6.2	0.05320	5.3	0.50	334	10	334	18	338	121	**99**
a41	1701	67	5	0.47	1997	0.07865	2.6	0.61135	5.8	0.05638	5.2	0.45	488	12	484	23	467	115	**104**
a42	1604	66	6	1.62	2767	0.06781	3.9	0.54313	9.9	0.05809	9.1	0.39	423	16	440	36	533	198	79
a43	402	21	2	3.20	770	0.06556	4.7	0.47135	12.5	0.05215	11.6	0.38	409	19	392	42	292	265	140
a44	52659	468	47	0.97	58	0.06103	3.6	0.37154	12.3	0.04416	11.7	0.29	382	13	321	34	-102	289	-375
a45	3588	169	13	0.58	5526	0.06764	14.9	1.05876	74.0	0.11352	72.5	0.20	422	61	733	486	1856	1310	23
a46	9586	337	17	0.14	2337	0.05338	2.2	0.39237	4.9	0.05331	4.4	0.44	335	7	336	14	342	99	**98**
a47	3295	131	8	0.31	6008	0.06625	2.2	0.50215	3.8	0.05498	3.1	0.58	414	9	413	13	411	70	**101**
a48	10810	521	26	0.21	15926	0.05289	2.0	0.38443	2.4	0.05272	1.5	0.80	332	6	330	7	317	33	**105**
a49	6962	247	16	0.46	12401	0.06313	2.1	0.49006	4.0	0.05630	3.4	0.53	395	8	405	13	464	75	85
a50	62940	1379	18	0.23	45	0.00063	195.8	0.02949	195.8	0.34179	3.6	1.00	4	8	30	59	3671	56	0
a51	663	16	1	0.36	334	0.04545	14.7	-0.80012	234.3	-0.12768	233.9	0.06	287	41	-1635	-2376	-	-	-
a52	5633	139	10	0.56	301	0.06144	3.4	0.88855	8.2	0.10488	7.5	0.41	384	13	646	40	1712	137	22
a53	8200	181	13	1.28	401	0.05478	2.3	0.40476	8.9	0.05359	8.6	0.26	344	8	345	26	354	194	**97**
a54	27161	467	24	0.70	143	0.03806	3.6	0.28157	9.5	0.05366	8.8	0.38	241	9	252	21	357	198	68
a55	48301	1029	44	0.17	90	0.02525	7.9	0.78495	9.5	0.22548	5.2	0.84	161	13	588	43	3020	83	5
a56	101418	759	62	0.42	45	0.04313	2.9	2.28301	5.3	0.38392	4.4	0.56	272	8	1207	38	3847	66	7
a57	57189	352	34	1.08	51	0.04896	2.5	2.25307	7.8	0.33379	7.4	0.32	308	7	1198	57	3635	114	8
a58	62069	398	40	0.89	51	0.05408	3.0	2.59751	5.1	0.34835	4.2	0.59	340	10	1300	38	3700	64	9
a59	28081	746	49	0.14	2252	0.05320	3.5	0.39072	5.2	0.05327	3.9	0.66	334	11	335	15	340	89	**98**
a60	13263	251	16	0.86	339	0.05374	2.9	0.39619	14.1	0.05347	13.8	0.21	337	10	339	42	349	313	**97**
b1	40472	6299	86	0.05	295	0.01151	3.8	0.08793	8.5	0.05539	7.6	0.44	74	3	86	7	428	169	17
b2	157537	2067	178	0.12	37	0.03761	1.9	2.34083	2.9	0.45144	2.2	0.66	238	4	1225	21	4090	32	6
b3	74387	1518	86	0.27	49	0.02779	4.6	1.24293	6.1	0.32436	4.1	0.75	177	8	820	35	3591	63	5
b4	32242	728	59	1.30	104	0.05252	2.4	1.44338	4.8	0.19930	4.1	0.50	330	8	907	29	2820	67	12
b5	23526	1118	73	0.73	253	0.05239	2.6	0.78176	12.0	0.10822	11.7	0.22	329	8	586	55	1770	213	19
b6	10988	842	48	0.76	7460	0.04629	2.6	0.35311	3.7	0.05532	2.7	0.69	292	7	307	10	425	60	69
b7	9028	685	42	1.27	3315	0.05085	2.5	0.37627	3.5	0.05366	2.4	0.72	320	8	324	10	357	55	90
b8	21314	1545	64	0.27	386	0.03325	4.5	0.38091	5.9	0.08308	3.8	0.76	211	9	328	17	1271	75	17
b9	40035	1523	61	0.52	77	0.02483	2.7	0.85814	5.7	0.25064	5.0	0.48	158	4	629	27	3189	79	5
b10	8867	396	24	0.96	452	0.05302	2.3	0.38829	8.3	0.05311	8.0	0.28	333	8	333	24	334	181	**100**

Table 3 continued.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho^{d}	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
b11	45057	2129	139	0.13	285	0.04755	2.7	0.69961	4.3	0.10671	3.4	0.63	299	8	539	18	1744	62	17
b12	8263	401	22	0.29	415	0.05306	2.2	0.38740	7.6	0.05295	7.3	0.29	333	7	332	22	327	166	**102**
b13	57427	1186	75	0.39	53	0.03108	4.1	1.35089	8.0	0.31523	6.9	0.51	197	8	868	48	3547	106	6
b14	50330	1777	65	0.26	84	0.02035	3.5	0.64487	6.4	0.22988	5.4	0.54	130	4	505	26	3051	86	4
b15	43756	2691	188	0.20	787	0.03097	4.8	0.22065	5.2	0.05167	2.0	0.92	197	9	202	10	271	45	73
b16	15176	965	60	0.98	1015	0.05323	2.1	0.38898	4.5	0.05299	4.0	0.47	334	7	334	13	329	90	**102**
b17	33948	1147	52	0.66	72	0.02709	2.3	0.99005	6.3	0.26509	5.8	0.37	172	4	699	32	3277	91	5
b18	42031	1101	73	0.38	99	0.04599	3.1	0.34934	11.0	0.05509	10.5	0.29	290	9	304	29	416	235	70
b19	34549	2090	135	0.14	516	0.04522	5.3	0.34471	5.5	0.05529	1.4	0.97	285	15	301	14	424	31	67
b20	25732	2862	151	0.16	940	0.03812	2.4	0.35133	3.5	0.06685	2.5	0.69	241	6	306	9	833	52	29
b21	16624	1304	82	0.67	3352	0.05617	2.1	0.41392	2.8	0.05345	1.9	0.75	352	7	352	8	348	42	**101**
b22	26540	1218	137	0.22	314	0.09933	2.4	0.79420	6.3	0.05799	5.9	0.37	610	14	594	29	529	129	115
b23	6288	487	20	0.60	444	0.03711	3.4	0.41952	6.2	0.08199	5.1	0.55	235	8	356	19	1245	101	19
b24	40723	1396	62	0.36	89	0.02139	9.8	0.62235	17.6	0.21106	14.5	0.56	136	13	491	71	2914	235	5
b25	22849	1241	77	0.33	440	0.04923	3.4	0.60035	5.2	0.08845	4.0	0.65	310	10	477	20	1392	76	22
b26	18646	925	67	0.83	401	0.05283	2.5	0.38950	8.0	0.05347	7.6	0.31	332	8	334	23	349	172	**95**
b27	126786	1251	213	0.49	39	0.09266	2.6	5.20770	6.8	0.40764	6.3	0.37	571	14	1854	60	3937	95	15
b28	8601	626	37	1.07	708	0.05273	3.1	0.38602	5.9	0.05309	5.0	0.52	331	10	331	17	333	114	**100**
b29	32196	1845	69	0.26	216	0.02647	2.2	0.18294	10.4	0.05012	10.1	0.22	168	4	171	16	201	235	84
b30	15938	704	35	0.94	158	0.03603	3.1	0.77583	10.5	0.15616	10.1	0.29	228	7	583	48	2414	171	9
b31	18124	1237	78	0.65	1693	0.05934	2.3	0.47434	4.2	0.05797	3.5	0.55	372	8	394	14	529	78	70
b32	16336	1131	41	0.28	149	0.02516	5.5	0.51567	7.3	0.14863	4.7	0.76	160	9	422	25	2330	81	7
b33	28955	2480	110	0.08	921	0.04604	2.0	0.34341	3.8	0.05409	3.3	0.52	290	6	300	10	375	74	77
b34	8720	530	28	0.11	463	0.05328	1.9	0.38918	8.5	0.05298	8.3	0.23	335	6	334	24	328	188	**102**
b35	18844	1120	57	0.62	188	0.04071	3.9	0.74995	10.7	0.13362	9.9	0.37	257	10	568	48	2146	174	12
b36	2280	140	9	0.21	3886	0.06815	2.3	0.55150	5.6	0.05869	5.1	0.42	425	10	446	20	556	111	76
b37	3179	156	11	0.17	3920	0.07463	2.5	0.58467	5.0	0.05682	4.4	0.49	464	11	467	19	484	96	**96**
b38	4650	329	17	0.41	1634	0.05059	2.3	0.42809	5.6	0.06137	5.1	0.41	318	7	362	17	652	109	49
b39	1901	90	11	0.56	3312	0.12017	1.8	0.95267	4.4	0.05750	4.0	0.42	732	13	679	22	511	88	143
b40	879	32	3	0.68	1397	0.09025	3.8	0.78869	9.5	0.06338	8.7	0.40	557	20	590	43	721	184	77
b41	833	66	3	1.08	470	0.04705	31.4	-1.36152	214.3	-0.20989	212.0	0.15	296	91	-	-	-	-	-
b42	23982	1362	71	0.19	1356	0.05382	2.6	0.39374	4.6	0.05306	3.8	0.56	338	9	337	13	331	86	**102**
b43	3539	176	11	0.13	6348	0.06384	1.9	0.49264	4.1	0.05596	3.6	0.46	399	7	407	14	451	81	88
b44	3475	145	9	0.09	6065	0.06396	2.6	0.50547	5.3	0.05732	4.6	0.49	400	10	415	18	504	101	79
b45	6852	395	27	1.32	4500	0.05985	4.0	0.48139	4.7	0.05834	2.4	0.86	375	15	399	16	543	52	69
b46	6842	249	16	1.02	543	0.05523	2.0	0.42256	4.4	0.05549	3.9	0.46	347	7	358	13	432	87	80

Table 3 continued.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho^{d}	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
b47	12287	625	37	0.45	1857	0.04871	2.5	0.33871	3.2	0.05043	2.0	0.79	307	8	296	8	215	45	143
b48	5117	218	14	1.40	9310	0.05327	2.0	0.39145	4.4	0.05329	3.9	0.47	335	7	335	13	341	88	**98**
b49	2933	145	8	0.55	5555	0.05302	2.8	0.38823	4.3	0.05311	3.2	0.66	333	9	333	12	334	73	**100**
b50	5910	176	11	1.06	506	0.04969	1.9	0.54078	6.1	0.07894	5.9	0.30	313	6	439	22	1171	116	27
b51	4635	177	12	1.49	1365	0.05349	2.6	0.39262	12.1	0.05323	11.8	0.21	336	8	336	35	339	267	**99**
b52	8402	297	18	1.34	525	0.05095	3.3	0.40231	6.7	0.05727	5.9	0.49	320	10	343	20	502	129	64
b53	13397	228	18	0.18	262	0.07568	2.6	0.60663	5.5	0.05814	4.9	0.47	470	12	481	21	535	107	88
b54	1934	78	4	0.47	3398	0.05323	2.6	0.39010	6.1	0.05315	5.6	0.42	334	8	334	18	335	126	**100**
b55	14857	560	32	0.63	3159	0.05326	2.1	0.39437	3.0	0.05371	2.2	0.68	334	7	338	9	359	50	**93**
b56	3852	100	6	0.18	6736	0.06381	2.7	0.50480	3.5	0.05737	2.3	0.76	399	10	415	12	506	51	79
b57	42902	255	21	0.88	45	0.03639	5.6	2.01373	6.8	0.40131	3.8	0.83	230	13	1120	47	3914	56	6
b58	5195	181	9	0.27	9718	0.05324	2.6	0.39322	4.2	0.05357	3.3	0.62	334	9	337	12	353	74	**95**
b59	7829	289	16	0.79	14559	0.05306	2.9	0.39369	3.8	0.05381	2.5	0.77	333	9	337	11	363	55	**92**
b60	320	6	0	0.32	510	0.05500	4.6	0.44479	14.0	0.05866	13.2	0.33	345	16	374	45	554	289	62

Table 4. U-Pb-Th data of zircons from sample Gr4, n = 17 of 138 measured spots on 127 zircon grains within 90–110% concordance, granite to granite gneiss, large intrusive body near Mittweida, 51° 04′41.38″ N; 12° 53′05.19″ E.

Tabelle 4. U-Th-Pb-Daten der Zirkone aus Probe Gr4, n = 17 von 138 Messpunkten auf 127 Zirkonkörnern innerhalb 90–110 % Konkordanz, Granit bis Granitgneis aus einem aus einem großen Intrusivkörper nahe Mittweida, 51° 04′41.38″ N; 12° 53′05.19″ E.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho^{d}	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
a1	10307	774	49	1.29	19426	0.05342	2.2	0.39187	3.2	0.05320	2.3	0.68	335	7	336	9	337	53	**99**
a2	50986	4138	79	0.22	117	0.01345	2.3	0.33299	2.7	0.17959	1.5	0.83	86	2	292	7	2649	26	3
a3	81153	5909	156	0.08	145	0.01923	2.6	0.40773	3.7	0.15380	2.6	0.70	123	3	347	11	2389	44	5
a4	19110	1371	89	0.24	1998	0.05353	2.2	0.45515	3.1	0.06166	2.3	0.69	336	7	381	10	662	49	51
a5	36264	2621	150	0.10	1496	0.04550	2.1	0.39409	2.5	0.06281	1.4	0.84	287	6	337	7	702	30	41
a6	17203	1078	65	0.85	575	0.05351	2.5	0.41226	3.9	0.05588	3.0	0.63	336	8	351	12	447	67	75
a7	63054	4513	180	0.09	260	0.03136	2.5	0.23883	4.4	0.05523	3.6	0.58	199	5	217	9	422	80	47
a8	9118	568	32	1.26	701	0.04755	2.4	0.35119	6.7	0.05357	6.3	0.35	299	7	306	18	353	142	85
a9	15865	1231	86	0.23	8015	0.05285	2.8	0.39065	3.3	0.05361	1.7	0.85	332	9	335	9	355	39	**94**
a10	9328	342	8	2.06	147	0.00624	19.7	0.13494	20.9	0.15678	7.1	0.94	40	8	129	26	2421	120	2
a11	12077	580	32	0.82	271	0.04475	3.5	0.67339	8.4	0.10914	7.6	0.42	282	10	523	35	1785	138	16
a12	5776	308	15	0.49	260	0.04408	2.8	0.66437	4.8	0.10930	3.9	0.58	278	8	517	19	1788	70	16

Table 4 continued.

Name (spot)	^{207}Pb[a] (cps)	^{207}Pb[a] (cps)	Pb[b] (ppm)	Th[b]/U	^{206}Pb[c]/^{204}Pb	^{206}Pb[c]/^{238}U	2 σ (%)	^{207}Pb[c]/^{235}U	2 σ (%)	^{207}Pb[c]/^{206}Pb	2 σ (%)	Rho[d]	^{206}Pb/^{238}U	±2 σ (Ma)	^{207}Pb/^{235}U	±2 σ (Ma)	^{207}Pb/^{206}Pb	±2 σ (Ma)	conc (%)
a13	28837	2308	160	0.13	5228	0.05217	2.0	0.40063	2.4	0.05570	1.3	0.83	328	6	342	7	440	30	74
a14	70531	4683	142	0.11	121	0.02360	4.4	0.17437	8.5	0.05359	7.3	0.52	150	7	163	13	354	164	42
a15	38942	2955	202	0.10	24736	0.05699	1.9	0.41546	2.0	0.05288	0.7	0.93	357	7	353	6	323	17	110
a16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
a17	14392	993	33	0.55	424	0.02800	4.8	0.31435	5.1	0.08142	1.8	0.93	178	8	278	13	1232	36	14
a18	12870	959	69	0.98	1517	0.05993	2.3	0.43718	3.2	0.05290	2.3	0.70	375	8	368	10	325	52	116
a19	38672	2916	189	0.08	1930	0.05824	2.0	0.42064	2.4	0.05238	1.2	0.86	365	7	357	7	302	27	121
a20	15905	1265	85	0.35	4567	0.05357	2.4	0.39213	3.0	0.05309	1.8	0.79	336	8	336	9	333	42	**101**
a21	16497	989	48	0.31	992	0.04677	2.4	0.45183	4.2	0.07007	3.5	0.56	295	7	379	13	930	72	32
a22	12600	991	32	0.38	217	0.02754	3.4	0.45329	5.1	0.11936	3.8	0.66	175	6	380	16	1947	69	9
a23	14319	986	59	0.63	445	0.04370	4.1	0.51059	5.4	0.08473	3.6	0.75	276	11	419	19	1309	69	21
a24	14718	846	36	1.24	119	0.02942	5.3	0.76271	12.4	0.18805	11.3	0.42	187	10	576	56	2725	186	7
a25	23112	1625	96	0.63	1039	0.05284	2.3	0.38809	3.7	0.05326	2.9	0.63	332	8	333	11	340	66	**98**
a26	6497	564	27	0.58	11698	0.04952	2.1	0.38038	3.5	0.05571	2.8	0.60	312	6	327	10	441	63	71
a27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
a28	2513	119	7	0.73	1560	0.05633	4.4	0.53414	6.8	0.06877	5.2	0.64	353	15	435	24	892	108	40
a29	17644	1541	75	0.65	2368	0.03971	3.5	0.31431	4.1	0.05741	2.1	0.86	251	9	278	10	507	46	50
a30	20048	1772	94	0.41	3081	0.04453	2.7	0.32927	3.4	0.05363	2.1	0.80	281	8	289	9	356	47	79
a31	59058	4072	237	0.08	726	0.04758	1.9	0.34494	2.5	0.05258	1.5	0.78	300	6	301	6	311	35	**96**
a32	37113	3106	141	0.10	470	0.03520	2.5	0.26198	3.4	0.05398	2.3	0.74	223	6	236	7	370	51	60
a33	39233	3236	193	0.10	413	0.05189	1.9	0.38727	4.7	0.05413	4.3	0.40	326	6	332	13	376	96	87
a34	34257	3277	196	0.08	1690	0.05341	2.3	0.38955	3.2	0.05290	2.2	0.71	335	7	334	9	324	50	**103**
a35	35463	2774	72	0.11	109	0.01772	2.6	0.46475	3.2	0.19021	1.9	0.80	113	3	388	11	2744	32	4
a36	14144	1269	89	0.47	6843	0.05631	1.9	0.42380	2.6	0.05458	1.7	0.74	353	7	359	8	395	39	89
a37	33989	1721	116	0.17	143	0.05069	2.6	1.06628	3.6	0.15257	2.5	0.73	319	8	737	19	2375	42	13
a38	26214	2266	109	0.11	828	0.04013	2.1	0.39722	2.8	0.07179	1.8	0.76	254	5	340	8	980	37	26
a39	23072	1632	93	0.17	1112	0.04602	3.0	0.41496	4.8	0.06540	3.7	0.63	290	9	352	14	787	78	37
a40	35980	2821	116	0.08	401	0.03388	4.0	0.41723	4.9	0.08931	2.9	0.81	215	8	354	15	1411	56	15
a41	22880	1415	68	0.16	332	0.03746	3.4	0.49168	4.4	0.09521	2.7	0.78	237	8	406	15	1532	51	15
a42	59760	1513	96	0.35	102	0.04168	2.3	1.08948	5.0	0.18956	4.4	0.45	263	6	748	27	2738	73	10
a43	23863	1915	70	0.13	477	0.03207	2.2	0.36314	3.3	0.08212	2.5	0.66	204	4	315	9	1248	49	16
a44	22246	1432	67	0.14	595	0.03627	2.1	0.35320	2.9	0.07062	1.9	0.75	230	5	307	8	946	39	24
a45	34946	1927	103	0.11	632	0.04263	2.1	0.30917	3.0	0.05260	2.1	0.71	269	6	274	7	311	48	86
a46	39337	2297	99	0.09	261	0.03582	1.9	0.50577	4.9	0.10242	4.5	0.39	227	4	416	17	1668	83	14
a47	19652	1132	43	0.15	453	0.02940	2.4	0.34360	3.5	0.08477	2.5	0.68	187	4	300	9	1310	49	14
a48	17231	984	48	0.59	1039	0.04513	3.0	0.42309	4.0	0.06800	2.6	0.75	285	8	358	12	868	54	33

Table 4 continued.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho^{d}	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
a49	17556	830	52	0.47	3670	0.05318	2.4	0.40869	3.2	0.05574	2.1	0.76	334	8	348	10	442	47	76
a50	107048	1589	82	0.15	50	0.02407	2.7	1.11080	3.5	0.33465	2.3	0.77	153	4	759	19	3638	35	4
a51	23932	1056	69	0.12	8161	0.05430	2.0	0.40938	2.5	0.05468	1.5	0.81	341	7	348	7	399	33	85
a52	543	20	2	3.48	903	0.05595	5.2	0.46984	10.2	0.06091	8.8	0.51	351	18	391	34	636	189	55
a53	31861	980	61	0.25	335	0.05231	2.9	0.69036	4.1	0.09571	2.9	0.71	329	9	533	17	1542	55	21
a54	37013	1149	60	0.12	312	0.04177	2.3	0.56278	4.2	0.09771	3.5	0.55	264	6	453	15	1581	66	17
a55	30164	1003	73	0.12	893	0.06239	2.0	0.45448	2.6	0.05283	1.7	0.76	390	7	380	8	321	38	121
a56	78896	2743	153	0.06	887	0.04820	2.6	0.45622	2.8	0.06866	1.1	0.92	303	8	382	9	888	22	34
a57	40528	850	49	0.14	256	0.04239	2.2	0.32509	4.5	0.05562	3.9	0.50	268	6	286	11	437	86	61
a58	28651	967	60	0.15	3403	0.05443	2.3	0.43252	2.9	0.05764	1.7	0.80	342	8	365	9	516	38	66
a59	9099	277	16	0.38	1705	0.05496	2.4	0.45017	5.1	0.05940	4.5	0.48	345	8	377	16	582	98	59
a60	19479	538	31	0.71	1077	0.04784	2.3	0.35652	3.5	0.05405	2.5	0.68	301	7	310	9	373	57	81
b1	18782	1153	67	0.68	870	0.04797	2.2	0.34202	4.4	0.05171	3.8	0.49	302	6	299	11	272	88	111
b2	47772	4074	92	0.07	173	0.01631	2.5	0.30066	3.6	0.13372	2.6	0.68	104	3	267	9	2147	46	5
b3	45401	2097	110	0.11	190	0.04077	3.7	0.30177	4.8	0.05369	3.1	0.77	258	9	268	11	358	70	72
b4	46441	2901	148	0.09	588	0.04365	2.8	0.33019	3.8	0.05487	2.6	0.74	275	8	290	10	407	58	68
b5	67726	5210	276	0.08	1616	0.04164	1.9	0.35362	2.9	0.06160	2.1	0.68	263	5	307	8	660	45	40
b6	48692	1631	150	0.31	123	0.06166	3.0	0.44363	5.9	0.05218	5.0	0.52	386	11	373	18	293	114	132
b7	18610	1012	63	0.35	357	0.04700	2.0	0.62346	4.4	0.09620	3.9	0.45	296	6	492	17	1552	74	19
b8	27737	1849	97	0.12	535	0.04097	2.9	0.45069	3.2	0.07978	1.3	0.91	259	7	378	10	1192	26	22
b9	50893	3872	228	0.18	1835	0.06036	2.5	0.44067	2.7	0.05295	1.0	0.93	378	9	371	8	326	23	116
b10	31153	2339	143	0.11	1991	0.04794	2.4	0.40421	2.7	0.06115	1.1	0.91	302	7	345	8	645	24	47
b11	41390	2914	194	0.09	1739	0.05649	2.1	0.40941	2.3	0.05256	1.1	0.89	354	7	348	7	310	24	114
b12	25889	2072	98	0.12	286	0.03964	2.0	0.55845	5.2	0.10217	4.8	0.39	251	5	451	19	1664	89	15
b13	39304	5251	130	0.05	550	0.02157	2.7	0.23270	3.1	0.07824	1.4	0.88	138	4	212	6	1153	29	12
b14	66189	4720	106	0.07	187	0.01701	3.2	0.12390	5.0	0.05285	3.9	0.63	109	3	119	6	322	89	34
b15	19076	1186	67	0.65	938	0.04894	2.1	0.36360	3.4	0.05388	2.7	0.61	308	6	315	9	366	60	84
b16	62481	3956	129	0.07	170	0.02648	2.6	0.49546	3.9	0.13570	2.9	0.66	168	4	409	13	2173	50	8
b17	4115	210	14	0.35	2150	0.06545	1.9	0.54107	4.2	0.05995	3.7	0.46	409	8	439	15	602	81	68
b18	89572	1851	135	0.12	52	0.04077	2.3	1.83990	4.4	0.32730	3.7	0.52	258	6	1060	29	3604	57	7
b19	18009	462	33	1.29	257	0.05060	2.5	0.35187	14.1	0.05043	13.8	0.18	318	8	306	38	215	321	148
b20	73399	2606	103	0.11	68	0.02171	2.0	0.80264	2.4	0.26811	1.2	0.85	138	3	598	11	3295	19	4
b21	25970	2046	65	0.15	293	0.02557	3.3	0.35898	4.3	0.10184	2.7	0.77	163	5	311	12	1658	50	10
b22	32957	3898	96	0.20	851	0.02459	4.6	0.17254	4.7	0.05088	1.1	0.97	157	7	162	7	235	26	67
b23	14331	953	61	1.02	4399	0.05562	2.2	0.43776	3.0	0.05708	2.0	0.75	349	8	369	9	495	44	71
b24	18528	1187	86	0.17	997	0.05805	2.1	0.48760	3.5	0.06092	2.8	0.60	364	7	403	12	636	61	57

Table 4 continued.

Name (spot)	^{207}Pb[a] (cps)	^{207}Pb[a] (cps)	Pb[b] (ppm)	Th[b]/U	^{206}Pb[c]/^{204}Pb	^{206}Pb[c]/^{238}U	2 σ (%)	^{207}Pb[c]/^{235}U	2 σ (%)	^{207}Pb[c]/^{206}Pb	2 σ (%)	Rho[d]	^{206}Pb/^{238}U	±2 σ (Ma)	^{207}Pb/^{235}U	±2 σ (Ma)	^{207}Pb/^{206}Pb	±2 σ (Ma)	conc (%)
b25	13041	635	37	1.38	372	0.04534	3.3	0.53986	5.1	0.08635	3.9	0.65	286	9	438	18	1346	75	21
b26	36690	2262	65	0.14	125	0.02024	2.2	0.48566	2.6	0.17402	1.4	0.84	129	3	402	9	2597	23	5
b27	17496	852	43	1.10	376	0.03818	2.5	0.47764	4.6	0.09074	3.9	0.53	242	6	396	15	1441	75	17
b28	22391	1382	60	0.53	441	0.04130	2.4	0.30568	3.5	0.05368	2.5	0.69	261	6	271	8	358	58	73
b29	48309	1551	64	0.17	80	0.02370	2.4	0.75970	3.3	0.23253	2.3	0.71	151	4	574	15	3070	37	5
b30	87327	3919	161	0.08	180	0.03234	3.1	0.21709	5.3	0.04868	4.4	0.58	205	6	199	10	132	103	155
b31	26071	1622	86	0.37	42329	0.05340	3.1	0.39511	3.5	0.05366	1.5	0.91	335	10	338	10	357	33	**94**
b32	13681	733	54	1.10	914	0.06286	2.0	0.61116	5.2	0.07051	4.8	0.39	393	8	484	20	943	99	42
b33	64100	1547	84	0.13	79	0.02921	2.7	0.92795	5.9	0.23042	5.2	0.46	186	5	667	29	3055	83	6
c1	24529	1383	61	0.12	514	0.03568	2.8	0.26492	4.4	0.05385	3.3	0.65	226	6	239	9	365	74	62
c2	24666	924	47	0.41	181	0.03774	2.3	0.67537	4.0	0.12978	3.4	0.56	239	5	524	17	2095	59	11
c3	42731	1805	84	0.10	158	0.03526	2.5	0.74060	3.9	0.15233	3.1	0.63	223	5	563	17	2372	52	9
c4	45760	1883	77	0.09	217	0.03181	3.2	0.24569	5.3	0.05601	4.1	0.61	202	6	223	11	453	92	45
c5	66531	3537	191	0.08	715	0.04428	3.5	0.32148	3.9	0.05266	1.7	0.90	279	9	283	10	314	38	89
c6	50042	3684	108	0.07	352	0.02318	2.7	0.30429	3.1	0.09523	1.5	0.88	148	4	270	7	1533	28	10
c7	87672	4694	142	0.11	90	0.01952	2.8	0.60138	4.8	0.22349	3.9	0.59	125	3	478	18	3006	62	4
c8	32961	1839	108	0.10	1455	0.04651	2.7	0.38879	3.2	0.06063	1.8	0.83	293	8	333	9	626	39	47
c9	45804	1962	94	0.13	244	0.04011	2.5	0.60711	4.9	0.10977	4.2	0.50	254	6	482	19	1796	76	14
c10	30886	1268	66	0.13	206	0.04041	3.6	0.66382	4.1	0.11915	2.0	0.87	255	9	517	17	1944	36	13
c11	15282	860	50	0.88	1160	0.05004	3.1	0.45911	4.7	0.06655	3.5	0.66	315	9	384	15	824	73	38
c12	13662	802	42	0.18	13190	0.05559	2.6	0.41876	3.6	0.05463	2.5	0.72	349	9	355	11	397	56	88
c13	13177	670	36	1.08	700	0.04473	2.4	0.43691	4.5	0.07084	3.8	0.54	282	7	368	14	953	77	30
c14	16428	909	55	0.64	2400	0.04690	2.6	0.38070	3.7	0.05887	2.6	0.71	295	8	328	10	562	56	53
c15	37621	2645	85	0.31	558	0.03005	3.2	0.32476	3.6	0.07837	1.7	0.89	191	6	286	9	1156	33	17
c16	6852	231	19	0.52	5597	0.08036	3.0	0.77697	3.8	0.07012	2.4	0.78	498	14	584	17	932	49	53
c17	41409	3077	104	0.07	332	0.02898	2.8	0.38665	3.3	0.09677	1.9	0.83	184	5	332	9	1563	35	12
c18	5828	339	20	0.79	10644	0.05366	2.7	0.40664	3.3	0.05496	1.9	0.82	337	9	346	10	411	43	82
c19	16444	748	33	0.58	1142	0.03794	3.8	0.34269	4.3	0.06550	2.0	0.88	240	9	299	11	791	43	30
c20	29417	1596	105	0.11	547	0.05249	2.7	0.58497	3.9	0.08083	2.8	0.70	330	9	468	15	1217	56	27
c21	6278	320	18	0.74	1480	0.05031	2.8	0.46255	5.9	0.06669	5.2	0.48	316	9	386	19	828	108	38
c22	3300	191	13	0.73	6098	0.06223	2.5	0.46754	4.5	0.05449	3.7	0.55	389	9	389	15	391	84	**99**
c23	30608	2284	95	0.09	702	0.03471	2.8	0.35621	3.3	0.07444	1.7	0.85	220	6	309	9	1053	34	21
c24	25122	1400	84	0.52	815	0.05301	2.3	0.38834	3.8	0.05313	3.0	0.62	333	8	333	11	334	68	**100**
c25	42565	1420	77	0.22	150	0.03777	2.4	0.80437	4.7	0.15446	4.0	0.51	239	6	599	21	2396	68	10
c26	51507	3500	84	0.07	150	0.01649	5.2	0.34490	5.7	0.15169	2.3	0.91	105	5	301	15	2365	40	4
c27	25325	1266	70	0.18	325	0.04077	4.6	0.54603	5.7	0.09713	3.4	0.80	258	12	442	21	1570	64	16

Table 4 continued.

Name (spot)	$^{207}Pb^{a}$ (cps)	$^{207}Pb^{a}$ (cps)	Pb^{b} (ppm)	Th^{b}/U	$^{206}Pb^{c}/^{204}Pb$	$^{206}Pb^{c}/^{238}U$	2 σ (%)	$^{207}Pb^{c}/^{235}U$	2 σ (%)	$^{207}Pb^{c}/^{206}Pb$	2 σ (%)	Rho[d]	$^{206}Pb/^{238}U$	±2 σ (Ma)	$^{207}Pb/^{235}U$	±2 σ (Ma)	$^{207}Pb/^{206}Pb$	±2 σ (Ma)	conc (%)
c28	40006	2917	177	0.08	3443	0.05304	2.8	0.38806	3.1	0.05307	1.4	0.89	333	9	333	9	332	32	**100**
c29	37901	1860	67	0.15	171	0.02185	3.6	0.39932	4.5	0.13256	2.7	0.80	139	5	341	13	2132	47	7
c30	58989	2475	83	0.15	76	0.01932	4.0	0.64779	7.0	0.24312	5.8	0.56	123	5	507	28	3140	92	4
c31	7590	233	22	0.03	12571	0.10303	2.4	0.86111	3.8	0.06062	2.9	0.63	632	14	631	18	626	63	**101**
c32	50740	4129	94	0.06	141	0.01935	2.7	0.14419	6.5	0.05404	6.0	0.41	124	3	137	8	373	134	33
c33	6409	333	15	0.35	710	0.04274	4.3	0.48306	9.9	0.08198	9.0	0.43	270	11	400	33	1245	176	22
c34	4051	290	15	0.31	7645	0.05357	2.7	0.39332	4.0	0.05325	2.9	0.68	336	9	337	12	340	67	**99**
c35	3508	236	13	0.69	6321	0.05145	3.0	0.39411	4.5	0.05555	3.3	0.68	323	10	337	13	435	74	74
c36	28111	1563	73	0.18	293	0.03657	2.6	0.50615	4.5	0.10038	3.7	0.57	232	6	416	16	1631	70	14
c37	11135	679	36	0.27	4099	0.05515	2.2	0.40811	3.5	0.05367	2.7	0.63	346	8	348	10	357	61	**97**
c38	29417	2231	85	0.19	470	0.03479	2.5	0.27036	3.9	0.05635	3.0	0.64	220	5	243	8	466	66	47
c39	19263	1090	65	0.49	3446	0.05041	2.3	0.36892	2.8	0.05307	1.6	0.83	317	7	319	8	332	35	**95**
c40	35319	1964	121	0.10	1670	0.05108	2.5	0.37422	2.9	0.05314	1.6	0.83	321	8	323	8	335	37	**96**
c41	71721	4274	113	0.06	162	0.02050	3.3	0.40285	4.3	0.14252	2.8	0.77	131	4	344	13	2258	48	6
c42	9314	390	19	0.51	858	0.04666	2.3	0.48149	3.7	0.07484	2.9	0.63	294	7	399	12	1064	58	28
c43	46339	2629	135	0.12	613	0.03860	3.1	0.41067	3.3	0.07717	1.2	0.94	244	8	349	10	1126	23	22
c44	42116	33	38	0.72	24	0.49141	7.2	46.05405	8.9	0.67971	5.3	0.80	2577	154	3911	93	4688	77	55
c45	53338	1709	99	0.11	288	0.04266	3.1	0.60866	4.1	0.10347	2.7	0.76	269	8	483	16	1687	49	16
c46	12491	521	33	1.16	3911	0.05359	2.6	0.42965	3.3	0.05815	2.0	0.79	337	8	363	10	535	44	63
c47	21017	870	55	0.23	2745	0.05302	2.3	0.38930	3.3	0.05326	2.4	0.68	333	7	334	10	340	55	**98**
c48	1689	65	2	0.99	118	0.02117	26.3	0.41997	35.9	0.14388	24.5	0.73	135	35	356	114	2274	422	6
c49	16660	679	25	0.61	467	0.03002	5.7	0.35020	7.0	0.08459	4.0	0.82	191	11	305	19	1306	79	15
c50	32644	1290	75	0.09	2085	0.05260	2.3	0.38533	3.2	0.05313	2.2	0.74	330	8	331	9	334	49	**99**

[a] within-run background-corrected mean ^{207}Pb signal in counts per second

[b] U and Pb content and Th/U ratio were calculated relative to GJ-1 and are accurate to approximately 10%.

[c] corrected for background, mass bias, laser induced U-Pb fractionation and common Pb (if detectable, see analytical method) using Stacey and Kramers (1975) model Pb composition. $^{207}Pb/^{235}U$ calculated using $^{207}Pb/^{206}Pb/(^{238}U/^{206}Pb \times 1/137.88)$. Errors are propagated by quadratic addition of within-run errors (2SE) and the reproducibility of GJ-1 (2SD).

[d] Rho is the error correlation defined as $err^{206}Pb/^{238}U/err^{207}Pb/^{235}U$.