**Detrital zircon U-Pb ages from the Paleoproterozoic Lulua and Luiza
Volcanosedimentary Groups in the Kasai Shield, Congo Craton: Implications for
the source of sediments and the Kasai-Ntem and São Francisco Craton
relationship.**

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21 **Abstract**

22 The Kasai Shield contains the southern Mesoarchean nucleus of the Congo Craton, which coalesced into a
23 major landmass by the end of the Archean. This study provides 193 U–Pb ages of Archean detrital zircons
24 within two related intracontinental (volcano)-sedimentary groups within the Archean Kasai Shield, the
25 Paleoproterozoic Lulua and Luiza Groups. The oldest zircons found in this study were dated at 3198 ± 18
26 Ma and 3167 ± 42 Ma, and three others were dated around 3100 Ma. These ages are consistent with a Paleo-
27 to Mesoarchean origin for this continental nucleus, and the earlier Hf model ages and the oldest known
28 rocks from the Upper Luanyi Granite Gneisses and the Kanda Kanda Tonalites constitute the probable
29 source. Most zircons in the western Lulua quartzites have ages between 3000 and 2700 Ma, with subpeaks
30 at 2935 Ma, 2850 Ma, and 2740 Ma. The samples from the more intensely metamorphosed Luiza Group
31 have an age population subpeak around 2815 Ma, and a peak around 2735 Ma and the zircons are more
32 euhedral, indicating a shorter transport distance or transport in a lower energy sedimentary environment.
33 The oldest zircons are dated at 3198 ± 18 Ma, 3167 ± 42 Ma, and around 3100 Ma ($n = 3$). The obtained
34 ages are consistent with the known Kasai ages, and a prominent local source component in these
35 intracontinental basins seems likely. Zircon ages that correspond to the intense Kasai magmatism around
36 2560 Ma are scarce, indicating that Neoarchean Kasai plutons were not part of the sources, or had limited
37 exposure during deposition of these sediments. Our results may indicate a relationship with the two-stage
38 Neoarchean accretion of the Ntem Complex to the northern border of the Congo Craton between 2900 and
39 2800 Ma. Lastly, the similarity between these ages and those in the southern São Francisco Craton (Rio das
40 Velhas I, II and Mamoma events) suggests that this craton may also be a potential source for the sediments.

41 **Keywords:** Congo Craton; Kasai Shield; Lulua Group; Luiza Group; detrital zircon; U–Pb

42 **1. Introduction**

The Kasai Shield forms a N–S elongated 700 km by 500 km ellipsoid within the Congo Craton, with unexposed extensions towards the south, west and north (Fig. 1; Key, 1992; Begg et al., 2009; Khoza et al., 2013). The borders of the Archean Kasai Shield are thus not precisely known, but this region is thought to extend into northeast Angola up to the border of the Cuango Shield (Delhal et al., 1976; de Wit and Linol, 2015). The latter was corroborated by U–Pb SHRIMP ages of 2824 ± 3 Ma for a TTG in the NE Angolan Lunda Province (de Wit and Linol, 2015). In addition, Archean biotite gneisses from the Dando-Kwanza region in the Eburnian border, 200 km south of the Cuango and Kasai Shields provided U–Pb SHRIMP ages of ca. 2522 Ma, suggesting that this region consists of extensively reworked Archean crust (Jelsma et al., 2012). The Archean crust is also inferred to extend towards the Ntem Shield (Begg et al., 2009; de Wit and Linol, 2015), and recent geophysical models favor a cratonic boundary at the failed Neoproterozoic rift in the central Congo Basin (Raveloson et al., 2015), dividing the Congo Craton into a South West Congo Craton and a Central Congo Craton, as proposed by Master (2004).

While the Neoarchean and Eburnian magmatism in the southeastern Kasai Shield around 2540–2560 Ma and 2050 Ma are accurately constrained (Key et al., 2001), crystallization ages for the oldest Archean rocks in the Kasai Shield are scarce (e.g., Cahen et al., 1984). The remnant of the cratonic nucleus of the Kasai Shield has an estimated age of 3300–3500 Ma based on Rb–Sr data (Delhal and Ledent, 1973), while adjacent tonalites gave U–Pb ages of ca. 3100 Ma (Cahen et al., 1984). The charnockites in the Kasai Shield are dated with U–Pb zircon and monazite at ca. 2835–2795 Ma (Cahen et al., 1984), coinciding with the main accretion stage of the Chailu-Gabon-Ntem Complex in Cameroon and Gabon to the northern margin of the Congo Craton between ca. 2900 and 2800 Ma (Shang et al., 2004, 2010; Pouclet et al., 2007).

Recently, zircon provenance studies on heavy mineral sands from the Luebo region (Batumike et al., 2009) and Phanerozoic sediments in the central Congo basin (Linol et al., 2016) provided a large dataset constraining the Archean to Phanerozoic history of the Kasai Shield and the surrounding regions. U–Pb and Hf isotope data of zircon grains from heavy mineral concentrates in the Lulua River and its tributaries in the Congolese Luebo district provide compelling evidence for a Mesoarchean origin of the crust in the

Kasai Shield at ca. 3200 Ma, with Late Archean reworking during ca. 2900 to 2500 Ma (Batumike et al., 2009). The study found a prominent population with ages around 2890 Ma, reinforcing the relationship with the Ntem accretion event at the northern border of the Congo Craton. Juvenile input was limited from the Paleoproterozoic era onwards, which is consistent with the relative stability within the Congo craton following its accretion to the São Francisco Craton around 2100–2070 Ma (e.g., Aguilar et al., 2017). The Archean fraction (n=32/125) of the detrital zircon study from Batumike et al. (2009) demonstrated that the currently available igneous age constraints for the Kasai Shield do not cover the full spectrum of the Archean age components.

This paper provides U–Pb data from zircons in the Paleoproterozoic sediments of the volcanosedimentary Lulua Group and the related Luiza Group (Delhal et al., 1966). These metasedimentary rocks are thought to be deposited shortly after the accretion between the Congo Craton and the São Francisco Craton at ca. 2100 Ma (André, 1994; Aguilar et al., 2017). This study allows a more detailed investigation of the Archean age components and also extracts the age signal from the basement exposed during the Paleoproterozoic sedimentation. The obtained age signal is compared with the main igneous ages in adjacent cratons, in order to identify potential Neoproterozoic cratonic relationship based on the similarity of their respective igneous events.

2. Geological setting

The Congo Craton in Central Africa comprises several exposed Archean nuclei such as the NE Congo Block, the Chailu-Gabon-Ntem Complex, the NE Angola (Cuango) Shield and the Kasai Shield, which were welded together during the Paleoproterozoic (De Waele et al., 2008). This section provides a chronological overview of the main units in the southeastern Archean nucleus of the Congo Craton (Fig. 1), and is summarized in Table 1.

2.1 The >3.3 Ga continental nucleus of the Kasai Shield

The Upper Luanyi Granite Gneisses are thought to be a remnant of the continental nucleus of the Kasai Shield (Cahen et al., 1984). The current outcropping area of the Upper Luanyi Granite Gneisses is limited to a triangular zone of c. 20 by 20 km at the southwest border of the Luiza Group, where the gneisses are separated from the neighboring units by faults (Fig. 2; Delhal, 1963). The Upper Luanyi Granite Gneisses are crosscut by pegmatites metamorphosed at amphibolite-grade conditions. A microcline crystal within one of these pegmatites gave Rb–Sr model ages of 3490 ± 170 Ma and 3380 ± 165 Ma and 3300 ± 160 Ma, depending on the assumed initial Sr ratios (0.700, 0.709 and 0.714, respectively; Delhal and Ledent, 1973).

Additional evidence for the early crustal history of the Kasai Shield is provided by zircon U–Pb provenance studies in the Kasai Shield (e.g., Batumike et al., 2009) and in adjacent regions (Rainaud et al., 2003; Batumike et al., 2007). In the Luebo District of the Kasai Shield, the oldest detrital zircon in heavy mineral sands from the Lulua river was dated at 3235 ± 7 Ma (Batumike et al., 2009). Together with ϵ_{Hf} model ages around 3.6 Ga, these data indicate crustal reworking of a Mesoarchean terrane (Batumike et al., 2009). In the Katanga Supergroup that borders the southeastern Kasai Shield, detrital zircons were dated at ca. 3169 and ca. 3225 Ma, which lead to the postulation of the existence of the cryptic Mesoarchean Likasi terrane by Rainaud et al. (2003). However, Batumike et al. (2007) pointed out that the extreme rounding of these zircons indicates long transport, and probably recycling. Therefore, these zircons might also be derived from the Kasai Shield, or indirectly from Mesoproterozoic Kibara metasediments. Hence, the presence of these zircons does not necessarily indicate the presence of a Mesoarchean nucleus beneath the Kundulungu province.

2.2 The ca. 3.1 Ga Kanda Kanda Tonalites and Granodiorite Gneisses

The Kanda Kanda Complex is situated at the contact between the ca. 2680 Ma Dibaya Assemblage and the ca. 2820 Ma Kasai-Lomami Assemblage east of the Luiza-Lulua Groups, and is interspersed with Kasai-Lomami charnockites; the exact limits of the complex are unclear (Cahen et al., 1984; Fig. 2). In the area around Kanda Kanda city, it is mostly composed of a single pluton is tonalitic in the central part and the

composition evolves towards granodioritic and finally (monzo)granitic at the border (Rumvegeri et al., 1991). The grey Kanda Kanda gneisses are crosscut by pink cm- to decameter-sized diffuse, hololeucocratic lenses of alaskitic gneiss. Zircon U–Pb dating of the tonalitic central part of this complex gave ages around 3100 Ma, but these ages are unreliable because the zircons lost much lead (Delhal, 1977; Cahen et al., 1984). Identical lenses are also present within the Kasai-Lomami Assemblage, and are thought to be generated during granulite facies metamorphism at ca. 2820 Ma (Delhal et al., 1976).

2.3 The Kasai-Lomami charnockitic (ca. 3.1–2.82 Ga) and gabbro-noritic (ca. 2.4 Ga) Assemblage

The Kasai-Lomami Assemblage forms a ~250 by ~110 km E-W oriented belt in the upper third of the Kasai Shield (Fig. 2) and experienced granulite facies metamorphism (Bingen et al., 1988). The northern part is known as the Lueta gabbro-noritic Complex (Fernandez-Alonso et al., 2016) and comprises predominantly gabbros, gabbro-norites, amphibolites, and subordinate amounts of anorthosites (Fig. 2). The southern Mufesu granulitic Complex consists of hypersthene gneisses (charnockites), aluminous garnet $\pm$ sillimanite-bearing quartzo-feldspathic rocks and leucogranites, crosscut by numerous gabbro-norites and quartz-bearing metadolerite dykes (Delhal, 1991). The age of the tonalitic precursors of the Mufesu granulitic Complex is estimated at around 3.1 Ga based on Sm–Nd depleted mantle model ages of 3.25–2.97 Ga (Delhal et al., 1986), which appears consistent with summaries of recent U–Pb dating campaigns (Boven et al., 2011; Jelsma et al., 2016). The Mufesu granulitic Complex is characterized by a granoblastic recrystallization, which was dated at ca. 2835 Ma (U–Pb zircon) and at ca. 2795–2820 Ma (U–Pb monazite; Delhal et al., 1976). This granoblastic recrystallization at granulite facies conditions (720 °C, 6–7 kbar; Bingen et al., 1988) was followed by a phase of retrograde metamorphism and cataclasis, which is more prominent in the felsic rocks than in the mafic dykes, which are inferred to be Paleoproterozoic (Cahen et al., 1984; Delhal, 1991). Outcrops of rocks with similar lithology are also present in the Cuango region in NE Angola (Delhal et al., 1976) and around the Cuanza River valley before it reaches the coastal plains (Delhal, 1991; Carvalho et al., 2000). The available Sm–Nd data in the Lueta gabbro-noritic Complex show high variability, but suggest a 2400 ± 100 Ma age for the gabbro-norites and metadolerites (Delhal et al.,

1986), and this is interpreted to reflect emplacement and partial recrystallization during a second granulite facies event (730 ± 50 °C, 5.5–7.2 kbar; Bingen et al., 1988). The Lueta gabbro-noritic Complex is in faulted contact with the Upper Luanyiri Granite Gneisses (Cahen et al., 1984).

2.4 The 2.72–2.56 Ga Dibaya granite-migmatite Assemblage

The Dibaya granite-migmatite Assemblage occupies largely the northernmost 200 km of the exposed Kasai Shield (Fig. 2). This assemblage comprises granitic to tonalitic gneisses and calc-alkaline granites, dated at ca. 2680–2560 Ma (Cahen et al., 1984). The gneisses are cataclased and are locally mylonitized, and have a porphyroclastic to heteroclastic texture (Cahen et al., 1984). The granites and migmatites are frequently crosscut by dolerites and intruded by three EW elongated 2 by 20 km ultramafic complexes: the Lutshatsha, Nkonko and Fwamba Massifs (Fernandez-Alonso et al., 2016). The highly radiogenic Sr isotope composition indicates that the source material for these granites and migmatites experienced a prolonged crustal history (Delhal et al., 1975).

One Dibaya migmatite was dated at 2680 ± 5 Ma using U–Pb on titanite (Cahen et al., 1984). The latter age is slightly younger than the 2720 ± 20 Ma U–Pb upper intercept age obtained with zircons, titanites, and apatites from both Dibaya granites and migmatites, and a migmatite-only assemblage gave an upper concordia date of 2725 ± 5 Ma (Delhal et al., 1975). The Malafundi Granites that are situated in the southern half of the Dibaya granite-migmatite Assemblage are seen as the final product of the Dibaya migmatization (Cahen et al., 1984). A four point zircon U–Pb isochron for two Malafundi Granite samples gave an upper intercept of ca. 2625 Ma (Delhal et al., 1975). The northern part of this granite is intensely cataclased, but the deformation intensity decreases southwards where the granite is undeformed (Cahen et al., 1984).

2.5 The 3.1–3.0 Ga, 2.56–2.54 Ga and 2.06 Ga magmatism in the Sandoa-Kapanga Complex

The southernmost part of the Kasai Shield is collectively named the Sandoa-Kapanga Complex (Fig. 2; Cahen et al., 1984). This complex consists of granulites, granites, granitic to tonalitic gneisses and minor amphibolites which experienced amphibolite- to granulite-grade metamorphism. The first NNE-SSW to NE-SW planar axial foliation S_1 was reworked during the regional NW-SE foliation that characterizes the Kasai-Lomami Assemblage (Walraven and Rumvegeri, 1993). Quartz veins and pegmatites form tight folds parallel to S_1 , and sigmoidal structures parallel to S_1 indicate dextral movements. The NW-SE foliated, pre- to synkinematic Kakonda Granodiorite ~10 km WNW of Sandoa was dated with a U–Pb errorchron at ca. 3021 ± 48 Ma, while the surrounding and more pervasively NW-SE foliated Tshambogo Biotite Gneiss located ~16 km NW of Sandoa has an age of at least 3086 Ma (Walraven and Rumvegeri, 1993). The Kakonda Granodiorite and the Tshambogo Gneiss both contain amphibolite xenoliths, and the granite was interpreted as a melting product of the surrounding gneiss (Walraven and Rumvegeri, 1993). A Rb–Sr errorchron of 2833 ± 39 Ma for one of these granitoids likely reflects the overprinting by the 2830 Ma granulite metamorphism (Delhal and Liegeois, 1982). In northwest Zambia at the southeastern border of the Kasai Shield, granitic magmatism is associated with migmatites and emplacement of dioritic bodies (Key et al., 2001). The equigranular Mwinilunga Granite was dated at 2561 ± 10 Ma, while a granulitic gneiss gave an age of 2543 ± 5 Ma and a foliated granite was dated at 2538 ± 10 Ma (SHRIMP U–Pb zircon; Key et al., 2001).

The Eburnian granites constitute the most recent major magmatic phase in the Kasai Region and were dated around 2050 Ma. The Lunge Granite that intrudes the northeastern corner of the Sandoa-Kapanga Complex was dated at 2037 ± 30 Ma (U–Pb zircon; Pasteels, 1971). Major porphyritic granite bodies are widespread in the southeastern border of the Kasai Shield (2058 ± 7 Ma), where they are associated with granitic dykes (Key et al., 2001). Contemporaneous magmatism is also found in the Kalahari Shield, in the Kafue Basement Complex in the Zambian Domes region and in the Zambian Irumide Belt (De Waele et al., 2001, 2006; Key et al., 2001).

2.6 The Paleoproterozoic Luiza Group and volcanosedimentary Lulua Group

The Luiza Group occurs to the south of the volcanosedimentary Lulua Group (also known as the Lulua Complex; e.g., Delhal et al., 1966), where it rests on the gabbro-norites of the Kasai-Lomami Assemblage (Fig. 2). The Luiza sequence consists of micaceous quartzites, banded iron formations, mica schists and local conglomerates. Its equivalent in the Katanga province consists of isolated patches of greenschist metamorphosed (graphitic) phyllites, quartzites and amphibolites, collectively referred to as Lukoshian Group. The Luiza Group experienced a higher metamorphic grade than the Lulua Group and is intruded at its base by undeformed pegmatites, which were dated at ca. 2115–2010 Ma (Delhal and Ledent, 1973; Delhal, 1991).

The contact between the Luiza Group and the Lulua Group is a structural contact of unclear nature, which could be interpreted as a transverse or a thrust fault (Delhal, 1963). Delhal (1991) and Fieremans (1991) preferred the interpretation that both belong to the same sedimentary sequence, where the Luiza Group constitutes the lower part (Delhal, 1991; Fieremans, 1991). At its northern border, the Lulua Group is in discordant contact with the Dibaya granite and migmatite assemblage via an unconformity in the west that develops into the near-vertical Malafudi Fault eastwards (Delhal et al., 1966). The Lulua Group is thought to be deposited in a Paleoproterozoic intracontinental basin (André, 1994), and is structurally separated from the Luiza group that experienced higher grade metamorphism. The Lulua Group sequence starts with basal conglomerates, followed by quartzites, sandstones, phyllites overlain by tholeiitic metavolcanic rocks. The metavolcanic rocks are overlain by a second metasedimentary sequence consisting of sandstones, phyllites and carbonaceous rocks. Its total thickness is estimated at ca. 6000–7000 m (Delhal et al., 1966). The sediments in the western part of the Lulua Group are undeformed, and dip gently and uniformly to the south. The sediments in the central and eastern part are deformed into north-verging, WSW-ENE trending folds with an intensity that increases eastwards and southwards (Delhal et al., 1966).

The metavolcanic rocks within the Lulua Group were identified as basaltic tholeiites and are found at three locations in the upper part of the Lulua sequence (André, 1994). The Kasadi-Sadi metavolcanics with unknown thickness are found in the western part of the Lulua Group, while the 700–850 m thick Yangwegi

metavolcanics occur in the central part and 900 m thick Malafudi tholeiitic basalts are found in the eastern part (Delhal et al. 1966). The Lulua Group also hosts a syenodiorite dyke, which crosscuts the southern sediments and evolves towards a sill in the northern part of the group (Delhal et al. 1966).

The Malafudi and Yangwegi Lavas provide a maximum Ar–Ar cooling age of 2078 ± 36 Ma in epidote-rich, low-K metavolcanic rocks (Cahen et al., 1984). Various younger Ar–Ar ages were obtained from petrographically different metavolcanics rocks at ca. 1476 ± 23 Ma, 1461 ± 33 Ma, 1426 ± 20 Ma, 1356 ± 30 Ma, 1217 ± 29 Ma, 1130 ± 30 Ma, 1126 ± 27 Ma, 1092 ± 30 Ma and 991 ± 30 Ma (Cahen et al., 1984). The chloritization of the Malafudi lavas was constrained with a Rb–Sr cooling age of 1901 ± 41 Ma (André, 1994). Based on these data, the depositional age of the Lulua Group was inferred to be at least 1901 ± 41 Ma (André, 1994), and possibly started before 2078 ± 36 Ma (Cahen et al., 1984).

2.7 Paleo- to Mesoproterozoic and more recent tectonothermal events

Major thermal events were also inferred from suites of Ar–Ar cooling ages used in an attempt to date the retrograde metamorphism in the Kasai-Lomami Assemblage, with the most prominent ages around 2200–2000 Ma (Transamazonian Orogeny), 1450 Ma and 1100–1000 Ma (Cahen et al., 1984). The presence of these tectonomagmatic events is consistent with zircon U–Pb data from Batumike et al. (2009), who reported prominent U–Pb zircon populations at 2200–2000 Ma, along with slightly less prominent populations at ca. 1450 Ma and ca. 1100–1000 Ma in heavy mineral sands from the Lulua river and its tributaries. Minor zircon populations were also found around 1900 Ma, 1750 Ma, 1300 Ma and 1200 Ma (Batumike et al., 2009). Based on the trace element signature of these zircons, the most common rock type from which the zircons are derived is granitoid *s.l.*, but some late Archean (2800–2600 Ma) and Neoproterozoic zircons (850–582 Ma) were recovered (as xenocrysts) from recurrent intracontinental kimberlite and lamprophyre magmatism, which continued episodically until the Cretaceous (116–70 Ma; Batumike et al., 2009).

3. Sample selection and methodology

The Luiza Group occurs as an E–W trending band between the Lulua Group to the north and the Kasai-Lomami Assemblage at its southern border (Delhal, 1963). The Lulua Group discordantly overlies the 2680 ± 5 Ma Dibaya Granite and associated migmatites that form its northern boundary (Delhal et al., 1975). The samples from the Luiza Group and Lulua Group have been studied petrographically by Delhal (1963) and Delhal et al. (1966), respectively. The samples selected for this study are listed in Supplementary Table A. Luiza Group sample RG39637 is from a fine-grained quartzite with average grain size of ca. 0.1 mm that contains minor sericite, while sample RG39655 is a coarser grained (c. 1 mm), dark-hued, partially mylonitized, mica-bearing quartzite from the Luiza Group. The metamorphic grade and deformation of the Lulua Group increases eastwards and southwards (Delhal et al., 1966). The three felspathic quartzite samples (RG63905, RG63915 and RG63918) are located in the least deformed western part of the $>1901 \pm 41$ Ma (Rb–Sr whole rock; André, 1994) to >2078 Ma (Ar–Ar amphibole; Cahen et al., 1984) volcanosedimentary Lulua Group, in the lower 400 m of the 2000 m sequence (Fig. 2). Sample RG63915 contains diverse lithic fragments and well-rounded, ca. 1 mm-sized quartz grains, while samples RG63905 and RG63918 contain less rounded grains and are more fine-grained, with a grain size modulus around 0.5 mm. Sample RG59536 is a partially mylonitized quartzite (50–60% matrix) from the central part of the Lulua Group.

Selected samples were crushed in a steel jaw crusher, followed by further grain size reduction to ca. 0.2 mm in a disc mill. The zircon grains were concentrated by panning, magnetic separation with a Frantz separator, and heavy liquid separation with methyl-iodide as required, followed by handpicking. The zircon grains were mounted in 0.5 cm round epoxy resin, polished using diamond paste and cleaned using 10% v/v HNO_3 followed by rinsing with de-ionized water. To select the spots for measurement with laser

ablation, the cathodoluminescence properties of the zircon grains were visualized with a JEOL JXA-8600S scanning electron microscope operating at 15 kV and 10–15 nA. The grains were then analyzed with a Photon Machines Excite 193 nm laser ablation system equipped with a two-volume HelEx ablation cell, coupled to a Thermo Scientific Element XR ICP-MS instrument. Thirty seconds of gas blank acquisition was followed by the ablation of the sample for 30 s in ultrapure He, with a laser frequency of 10 Hz, spot size of 25 μm and laser fluence of 4.74 Jcm^{-2} . Data for masses 202, 204, 206, 207, 208, and 235 were collected using the ion counting modes of the SEM detector. Masses 232 and 238 were analyzed in combined ion counting and analogue mode. Four points were measured per mass peak, and the respective dwell times per mass were 4, 8, 4, 16, 4, 4, 4 and 4 ms, in ascending order.

The Laboratory of Isotope Geology at University of Campinas opted for reducing the geochronological data off-line, using Iolite software (version 2.5), following the method described by Paton et al. (2010). The latter method involves subtraction of gas blank followed by down hole fractionation correction by comparison to the behavior of reference zircon 91500 (Wiedenbeck et al., 1995). The data were then further processed with VizualAge, a non-commercial plugin for Iolite (Petrus and Kamber, 2012), which calculates the age for each individual time-slice of the data and then averages that, and uses the spread on the age data to estimate the uncertainty of the ages, and the ages were calculated using IsoplotR (Vermeesch, 2018). The decay constant values used were $\lambda_{235} = 9.848 \times 10^{-10}$; $\lambda_{238} = 1.55125 \times 10^{-10}$, with a natural U value of 138.818 (Horstwood et al., 2016). Measurements with integration times below 20 s and measurements with >1% common lead were excluded. The data are reported in Table 2; all uncertainties are reported as 2 sigma values. The results for the validation standard Peixe and calibration standard (91500) for each of the three measurement sessions are reported in Supplementary Table B.

The age fractions are interpreted using kernel density estimate (KDE) plots, in accordance with the recommendations from Galbraith (2010) and Vermeesch (2004); probability density plots are also shown for comparison. The zircon morphology and zonation were described using the methodology of Batumike

et al. (2007). All zircon concentration and LA-ICP-MS analyses were done at the Institute of Geosciences of University of Campinas, Brazil.

4. Results

A total of 374 zircons were analyzed for U-Pb dating, but only 193 zircon ^{238}U – ^{206}Pb and ^{235}U – ^{207}Pb ages were within 10% concordant and contained less than 1% common lead (Table 2). Figure 3 presents the concordia diagrams for the feldspathic-quartzite samples from the Luiza Group (a: RG39637; b: RG39655), the western Lulua Group feldspathic quartzite samples (c: RG63905, d: RG63915, and e: RG63918), and the feldspathic quartzite sample from the central Lulua Group (f: RG59536).

The KDE diagram showing the zircon age distribution in the samples from the least deformed western Lulua quartzites RG63905, RG63915 and RG63918 (n=105) is trimodal (Fig. 4a). Three age peaks can be observed in the data, around 2935 Ma, 2850 Ma, and most prominently around 2740 Ma. The oldest zircon in these three samples was dated at 3167 ± 42 Ma, and three zircons were dated at ca. 3100 Ma. One zircon in sample RG63915 was dated at 2853 ± 36 Ma and is overgrown by a rim with an indistinguishable, but slightly younger age of 2802 ± 38 Ma. The youngest zircon found in the Lulua Group is rounded, unzoned and dated at 2472 ± 36 Ma. The central Lulua quartzite sample RG59536 contains a substantial number of discordant zircons (n=15/65). The remaining ages show an unimodal age distribution, with a peak at 2735 Ma (Fig. 4b). The KDE diagram for the Luiza samples is bimodal (Fig. 4c). The main age peak in the Luiza quartzite samples RG39637 and RG39655 (n = 38) is situated around 2730 Ma, with a less prominent peak around 2815 Ma. Furthermore, zircon crystals in the Luiza Group samples were generally more angular than zircons in the Lulua Group samples (Table 2).

5. Discussion

5.1 Relicts of Paleo- to Mesoarchean magmatism in the Kasai shield

The available depleted mantle Hf model ages in the Kasai region indicate recycling of older crust aged around 3.6 Ga (Batumike et al., 2009). The Paleoproterozoic nucleus of the Kasai Shield is currently only represented by the ≥ 3300 Ma Upper Luanyiri Granite Gneisses (Delhal, 1973). The Paleoproterozoic age estimate of the Kasai Craton corresponds well to the age of oldest zircons found in modern heavy mineral sands from Luebo (3235 ± 7 Ma; Batumike et al., 2009) and in the Paleoproterozoic Lulua Group (3198 ± 18 Ma and 3167 ± 42 Ma). Most of the oldest zircons were found in the feldspathic quartzite samples of the least metamorphosed Lulua Group. The oldest plutons are the ca. 3100 Ma Kanda Kanda Tonalite (U–Pb; Delhal, 1977; Cahen et al., 1984) and the 3100–3020 Ma Sandoa-Kapanga Granitoids (Walraven and Rumvegeri, 1993). These plutons likely constitute at least part of the sources for the detrital zircons around this age: four zircons gave ages around 3100 Ma, and two of these were found in the Luiza Group quartzite RG39637. Zircons of ca. 3100 Ma and 3200 Ma were also found by Batumike et al. (2009) in Quaternary heavy mineral sands from the Lulua river that crosscuts the volcanosedimentary Lulua Group and various Archean basement units of the Kasai craton (Fig. 5).

5.2 Protracted magmatism between 3000 Ma and 2700 Ma: a relationship with the accretion of the Ntem Craton?

Zircons with ages between 3000 Ma and 2700 Ma constitute the most important population in all Lulua Group and Luiza samples (Fig. 4, Fig. 5), and indicate fairly continuous magmatism over this period. The first important magmatic phase starts around 3000 Ma, and is most prominent in the least metamorphosed western Lulua Group samples, where the population shows a subpeak around ca. 2935 Ma. Interestingly, detrital zircons with ages around 2935 Ma were found in the Kundulungu Group sediments deposited near the eastern border of the Kasai Shield after 565 ± 5 Ma (Rainaud et al., 2005; Batumike et al., 2007). A fraction of these zircons might be derived from identical sources or recycling of the Lulua Group, although ϵNd depleted mantle model ages indicate that similar ages could be present in the Bangweulu Block to the west of the Katanga Belt (De Waele et al., 2006).

331 The central and lower panel in Fig. 5 show the ages of the main events and oldest components of the Kasai
 332 and Ntem cratons, respectively. The lines for the Ntem region in Fig. 5 correspond to Charnockite and TTG
 333 ages from Li et al. (2016) and high K pluton age of Shang et al. (2010). A prominent zircon population
 334 around 2900 Ma is present in both the Lulua and Luiza groups (Fig. 4), and was also found in the Lulua
 335 river sediments (Batumike et al., 2009). One Lulua Group zircon shows a core dated at 2853 Ma overprinted
 336 by a broad rim dated at 2802 Ma, indicating a close relationship between these separate events, which is
 337 highly reminiscent of the two-stage accretion event in the Ntem Craton (Pouclet et al., 2007).

338 The prominent zircon population around 2900–2800 Ma on Fig. 5 is roughly contemporaneous with the
 339 main accretion event in the Ntem Complex in Cameroon. In the Ntem complex, the peaks for charnockites
 340 and TTGs occur at 2850–2875 Ma and 2800–2825 Ma, respectively (Shang et al., 2004). Pouclet et al.
 341 (2007) argued that the peak age of the charnockites should be closer to 2900 Ma, based on crosscutting
 342 relationships, comparison of age data, and indications for partial resetting (Toteu et al., 1994; Shang et al.,
 343 2004; Pouclet et al., 2007). The latter is consistent with the presence of relict zircon cores in both the TTG
 344 intrusions and charnockites with ages up to 3025 Ma (Shang et al., 2004). In the Kasai region, the zircons
 345 around 2800–2830 Ma are likely derived from the Mufesu granulitic Complex, which consists of
 346 charnockites and more felsic rocks that experienced granulite facies metamorphism dated around 2795–
 347 2835 Ma (U–Pb zircon/monazite; Delhal et al., 1976). In addition, charnockites at Mufesu were dated at ca.
 348 2900 Ma (U–Pb zircon), indicating that this magmatic phase may have been initiated earlier (Delhal et al.,
 349 1976). However, detrital zircon sourced from the Ntem TTG and charnockites during the Paleoproterozoic
 350 deposition cannot be excluded due to the similarities in ages, and is consistent with the inferred accretion
 351 history (Fig. 5; Begg et al., 2009; Shang et al., 2010). Considering the relatively large distance between
 352 both cratons, it seems likely that the zircons derived from the Ntem Complex would be extremely rounded
 353 if the Ntem Complex is the source region. The majority of our zircons indeed appear to be quite rounded;
 354 the average roundness class is c. 4, using a system where 1 corresponds to euhedral and 5 to fully rounded
 355 (cf. Batumike et al., 2007). However, rocks with similar ages are present locally in the Kasai region (e.g.,

Cahen et al., 1984), and the precise exposure situation of the Ntem Complex during the Paleoproterozoic deposition of these sediments is unknown.

The least metamorphosed western Lulua Quartzites contain an age modus around 2740 Ma, extending towards 2700 Ma on the lower side of this peak. The only age between 2700–2740 Ma is a 2720 ± 20 Ma age from the Dibaya migmatite (Delhal et al., 1975). Because these zircons are generally highly concordant with low common Pb content, it seems unlikely that this age fraction represents a partial resetting of the 2835–2795 Ma granulite metamorphism in the Kasai Lomami Assemblage and associated magmatic phases. As expected, the more intensely metamorphosed central Lulua quartzite and Luiza Group quartzites contain larger fractions of discordant zircons, indicative of perturbation. However, all Kasai sediments have a modus with a similar age (2750–2730 Ma) and detrital zircons with ages up to 2900 Ma are still commonly encountered in the Luiza Group samples. The youngest zircons from the Luiza quartzite samples with ages around 2680 Ma could be inherited locally from rocks related to the 2680 ± 5 Ma Dibaya magmatism (e.g., Cahen et al., 1984), and this seems to be corroborated by the more angular shape of the zircons. However, the zircon population around 2740 Ma in the western Lulua Group quartzites predates the known age of the Dibaya migmatites, which dominate the northern part of the Kasai Shield. The Kasai Craton is thought to have experienced protracted magmatism around this time, culminating in the formation of the Malafundi Granites (e.g., Cahen et al., 1984). Therefore, it is possible that the currently available ages for the Dibaya magmatism do not capture the full age spectrum of this magmatic phase.

Alternatively, the detrital zircons with age peaks around 2740 Ma in the Lulua Group samples and around 2735 Ma in the Luiza Group samples could be sourced from the Ntem Craton. The late stages of the Ntem accretion coincide with the intrusion of high-K granites at 2722 ± 2 Ma, which contain inherited zircons of 2778 ± 4 Ma (Fig. 5; Shang et al., 2010). In the Ntem Craton, many ages between 2775 and 2675 Ma likely reflect partial resetting during a Pan-African metamorphic event (Shang et al., 2004). If this event extends to the Kasai region, the youngest age components found in the Lulua and Luiza Groups may reflect a similar

partial resetting. Overall, the similar evolution in the Ntem and the Kasai indicates that the Congo Craton experienced a regionally extensive, protracted event between 2890 and 2700 Ma.

5.3 Late Neoarchean events in the Kasai region

Curiously, the ca. 2680 Ma signal from the Dibaya granite-migmatite Assemblage (Delhal et al., 1975) is mostly absent in the Lulua quartzites in the western part of the volcanosedimentary Lulua Group, although this group discordantly overlays the Dibaya Assemblage. The absence of the 2680 Ma signal could be explained by restricted reworking of the Dibaya Assemblage in the western part of the Lulua Group. However, the ca. 2680 Ma ages are found in the central part of the Lulua Group (RG59536) and in the Western Luiza Group samples (RG39637, RG39655). Heavy mineral sands from the Lulua river tributaries that crosscut the extensive Dibaya Assemblage yield prominent peaks at 2890 ± 8 Ma and 2620 ± 10 Ma, but Batumike et al. (2009) dated some detrital zircons around 2680 Ma (Fig. 5). This could indicate that the duration for the Dibaya magmatism is not adequately captured by the available magmatic ages.

The 2560–2530 Ma signal that corresponds to the Mubindji Orogeny from Cahen et al. (1984) is only found in sample RG63905 ($n = 1$), while this period is associated with prominent magmatism in the southern part of the Kasai Craton (Key et al., 2001). Similarly, few ca. 2550 Ma detrital zircons were found in the Luebo region heavy mineral sands (Batumike et al., 2009) and in the Phanerozoic Congo Basin sediments (Fig. 5; Linol et al., 2016). The low frequency of this 2560–2540 Ma age component indicates that these plutons are not the major sources for the Paleoproterozoic Lulua and Luiza Group sediments, which could indicate that these plutons had limited exposure during their inferred deposition, estimated at around 2100 Ma for the Lulua Group (André, 1994), or sediment transport could have occurred in a different direction. Due to the absence of detrital zircon ages younger than ca. 2500 Ma, a depositional age of ca. 2400 Ma remains a possibility for the more intensely metamorphosed Luiza Group. However, apart from the lower frequency of the 2900–3000 Ma age component in the Luiza Group, the age signal is quite similar to signal in the Lulua Group. This may suggest that the Luiza Group constitutes the lower part of Lulua Group sequence,

and was subsequently separated by faulting, and a distinct tectonic and metamorphic history, as proposed by Delhal (1991) and Fieremans (1991).

5.4 The Paleoproterozoic source potential of the São Francisco Craton and Kasai's relationships with other Archean cratons

The global Hf and Nd isotope data in conjunction with global detrital zircon records indicate a period of increased crustal preservation around 2700 Ma, which normally coincides with supercontinent formation (Condie, 2014). Around 2700 Ma, the integrated paleomagnetic and radiometric data suggest that the continents are likely aggregated into a single landmass, the supercontinent Kenorland (Bleeker, 2003; Lubnina and Slabunov, 2011; Condie, 2014). In this context, we should note that the intense magmatism in the 3000–2700 Ma period in the Zimbabwe and Kaapvaal Cratons reflects the merging of their sub-terrane resulting in their final stabilization around 2700 Ma (e.g., Jelsma and Dirks, 2002; Eriksson et al., 2011). This indicates that the increased crustal preservation in the late Archean (Condie, 2014) may at least in part be related to the stabilization of larger cratonic areas in this period. While the age of stabilization in Zimbabwe and Kaapvaal is similar to our detrital zircon ages, there appears to be no clear evidence for an Archean relationship with the Congo Craton, and plate tectonic reconstructions (e.g., Begg et al., 2009; Pehrsson et al., 2013) seem to indicate that these two cratons weren't linked to the Congo Craton during the Paleoproterozoic deposition in the Lulua-Luiza Groups. The formation time of the Kalahari Shield by merging of the Zimbabwe and Kaapvaal cratons is also still debated and could be as late as ca. 2.0 Ga (Söderlund et al., 2010; Eriksson et al., 2011). Participation of the Kaapvaal Craton in Archean (super)continents thus remains controversial, while barcoding suggests that the Zimbabwe Craton was connected to Superia around 2.5 Ga (Söderlund et al., 2010).

In the case of the Kasai Shield, continuous detrital age spectra between ca. 3000 Ma and 2700 Ma may reflect the continental amalgamation that resulted in the Kenorland Supercontinent. While the exact position of the Kasai Shield, and by extension the Congo Craton, within this supercontinent is not known, the petrographic similarity and contemporaneity of the 2.9–2.8 Ga magmatism in the Kasai and Ntem terranes

(Fig. 5) strongly suggests that both regions were joined in a single craton, corroborating the conclusion that these events reflect the Ntem accretion to the Congo Craton starting at ca. 2.9 Ga (Toteu et al., 1994; Shang et al., 2004, 2010; Pouclet et al., 2007). Both Archean shields are thought to be connected by unexposed Archean crust (e.g., Begg et al., 2009; Linol et al., 2016), and are hypothesized to be part of a 2000 km large Congo Craton by ca. 2.7 Ga (Begg et al., 2009). As discussed above, the main igneous ages found in the Paleoproterozoic detrital sediments from the Kasai Shield are most closely matched by those in the Ntem Complex (Fig. 5; Toteu et al., 1994; Shang et al., 2004, 2010; Pouclet et al., 2007). Thus, the remnants of the Ntem orogen could be the hinterland during the deposition of the Kasai sediments.

In the early Paleoproterozoic, major tectonomagmatic events appear to be absent in the Kasai Shield, although there is evidence for episodic, recurrent Kimberlitic magmatism (Batumike et al., 2009). This relative magmatic quiescence was interrupted by the amalgamation of the Congo-São Francisco Craton (SFC) amalgamation initiated at ca. 2.1 Ga (e.g., Aguilar et al., 2017), and constitutes a potential source for the detrital zircons in the Paleoproterozoic Kasai sediments. The upper two panels in Fig. 5 compare the bedrock ages and the main events in the southern São Francisco Craton and the Kasai Shield. The figure shows the age of the main events alongside KDE spectra from the Rio das Velhas Supergroup and Minas Supergroup, both based on the review by Farina et al. (2016), and includes detrital data from Machado et al. (1996), Noce et al. (2005), Hartmann et al. (2006), Koglin et al. (2014), and Mendes et al. (2014).

The ages of the main events in the southern SFC show a remarkable similarity with the main detrital age peaks in the Paleoproterozoic sediments of the Kasai Shield (Fig. 5). The oldest event in the southern SFC is the Santa Bárbara Event (Farina et al., 2016), named after the Santa Bárbara Complex that contains the oldest preserved Paleoarchean crust, dated at 3210 ± 8 Ma and 3212 ± 9 Ma (Lana et al., 2013). The Santa Bárbara Complex and related gneissic complexes were reworked during the 2920–2850 Ma Rio das Velhas I event that likely corresponds to the accretion of multiple arc terranes (Farina et al., 2016). A second Rio das Velhas event between 2800–2760 Ma is interpreted as an active margin setting (Farina et al., 2016). The sediments deposited in the associated foreland wedge were buried during convergence, and later

produced high-K granites during the subsequent continent-continent collision at 2760–2680 Ma, representing the Mamoma event (Farina et al., 2016). The resulting Mamoma mountain range eroded to form the volcanosedimentary Nova Lima Group that forms the lower part of the Rio das Velhas Supergroup. Further erosion of the Mamoma Orogen then formed the Maquiné Group, a 2000 m thick flysch molasse sequence (Dorr II, 1969). Shortly after the Mamoma event, gabbro-noritic dykes were emplaced in the Passa Tempo Complex at 2658 ± 44 (Sm–Nd; Pinese et al., 1997). The period between 2680–2612 Ma was further characterized by the intrusion of small K-granite bodies (Lana et al., 2013), sinistral transpression, renewed N–S directed mylonitic deformation, and NW–SE fractures. Compiled detrital age data for the Nova Lima Group in the southern SFC preserves no peak around 2890 Ma (Fig. 5; Farina et al., 2016). In contrast, the Paleoproterozoic Minas Supergroup that records a passive margin to syn-orogenic sequence shows prominent detrital age peaks around 2890–2870 Ma in the lowermost groups, with a shift in prominence towards peaks at ca. 2790 Ma and 2720 Ma in its uppermost groups (Farina et al., 2016). The similarity between the detrital ages in the Paleoproterozoic sediments indicate at least a similar age range for the exposed Archean source rocks in the southern SFC and Kasai regions during their Proterozoic amalgamation.

5. Conclusions.

The oldest detrital zircons within the Paleoproterozoic Lulua and Luiza Groups of the Kasai Shield were dated at 3198 ± 18 Ma and 3167 ± 42 Ma, and three other zircons gave ages around 3100 Ma. If the zircons are locally sourced, these ages confirm a Paleo- to Mesoarchean origin for the Kasai Shield, and are consistent with Hf model ages and the inferred age of the continental nucleus of the Kasai Shield (Batumike et al., 2009), represented by the Upper Luanyiri Granite Gneisses and the Kanda Kanda Tonalites (Delhal and Ledent, 1973; Rumvegeri, 1991). The zircons in the least metamorphosed western Lulua Group quartzites indicate quasi-continuous magmatism between 3000 and 2700 Ma, with three KDE subpeaks at

2930 Ma, 2850 Ma, and 2740 Ma. The more intensely metamorphosed Luiza Group samples contains zircon populations around 2815 Ma and a modus at 2730 Ma. A significant portion of the zircons in both intracratonic Paleoproterozoic basins is likely be supplied locally. The Luiza Group zircon crystals are generally more euhedral, indicating local sources, less recycling or transport in a lower energy environment. The Luiza Group may represent the lower part of the volcanosedimentary Lulua Group, as proposed by Delhal (1991) and Fieremans (1991). The observed age spectra are consistent with a strong relationship with the Neoproterozoic accretion of the Ntem Complex to the northern border of the Congo Craton between 2900 and 2800 Ma (e.g., Pouclet et al., 2007; Shang et al., 2004, 2010), as these zircons make up the bulk of the age population ($n_{\text{tot}} = 193$). Based on similarities in age spectra, the southern São Francisco Craton is also a permissible source for the detrital zircons in the Kasai sediments. Magmatic ages around 2500 Ma are scant in both Kasai basins ($n = 1$), indicating that plutons of this age had limited exposure in their source areas during deposition of these sediments. In addition, no zircons gave ages between ca. 2500 Ma and the inferred depositional age around 2100 Ma (André, 1994), reflecting a period of relative magmatic quiescence prior to the amalgamation with the São Francisco Craton.

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Figure and table captions

Figure 1. Simplified geological map of the Congo craton; modified from Kadima et al. (2011) and de Wit and Linol (2015). Four-, five- and six-pointed stars indicate sample locations of the detrital zircon studies from Batumike et al. (2007, 2009), this study, and Linol et al. (2016), respectively. Abbreviations: Angola Shield (An), Kasai Shield (Ks), Cuango Shield (Cu), Tanzania Shield (Tz), NE Congo Craton (NE-C), Uganda Craton (Ug), Chailu-Gabon-Ntem Block (CGN), Bangweulu Block (Bg), Irumide Belt (IB), Karoo Graben (kg) Ubendian Belt (Ub), Usagaran Belt (Us), Rusizian Belt (RuB), Kibara Belt (KiB), Karagwe-Angkole Belt (KAB), Southern Irumide Belt (S-IB), Western Congo Belt (W-CB), Lufilian Belt (Luf).

Figure 2. Simplified geological map of the Kasai Shield. Based on the Promines map (Fernandez-Alonso et al. 2016), Cahen et al. (1984), and Batumike et al. (2009). Radiometric U-Pb ages (underlined), Rb–Sr (*italic*; cf. Table 1 for references).

Figure 3. a–f Concordia diagrams for the Luiza samples (RG39637, RG39655) and the Lulua samples (RG63905, RG63915, RG63918, and RG59536) within 10 % concordance. Plotted with Isoplot 4.1 (Ludwig, 2012).

Figure 4. Kernel density estimates (KDE; filled curves), probability density estimates (black lines) and histograms of the studied detrital zircons, using adaptive kernel widths and log-transformed data with the Densityplotter program (Vermeesch, 2012). a. Western Lulua quartzite samples, b. Central Lulua quartzite samples, Western Luiza quartzite samples.

Figure 5. Comparison between the main radiometric ages and the relative probability of detrital spectra in the southern São Francisco, Kasai and the Ntem cratons. The age of the events and detrital spectra in the southern São Francisco (upper panel) are based on the review by Farina et al. (2016). The central panel shows >2400 Ma detrital zircon ages in Phanerozoic sediments from the central Congo basin (Linol et al., 2016), heavy mineral sands from the Luebo area (Batumike et al., 2009), kimberlites in the Neoproterozoic

Kundulungu plateau east of the Kasai Craton (Batumike et al., 2007), and in the Paleoproterozoic Lulua and Luiza Groups (this study). The lower panel shows the main events in the Ntem Complex. The charnockite and TTG age ranges are from Shang et al. (2004), the charnockite date range is from Pouclet et al. (2007). The detrital spectra are kernel density estimates using log-transformed data made with Densityplotter (Vermeesch, 2012). Abbreviations: zircon (zr), monazite (mon), charnockite (CN), Tonalite Trondjhemite Granodiorite (TTG), Rio das Velhas (RdV), sediments (seds.), group (Gr).

753 **Table captions**

754 Table 1: Characteristics of the main units in the Kasai region: dated units mentioned in the description are
755 in italic, U–Pb ages are underlined.

756 Table 2: U-Pb geochronological data, morphology (M.) and cathodoluminescence structure (S.) for the
757 zircons in the Lulua and Luiza Group samples.

758 Supplementary Table A: Overview of the studies samples, localities and coordinates (WGS84).

759 Supplementary Table B: LA-ICP-MS results for the calibration standard (91500) and the validation
760 standard (Peixe) in each of the three measurement sessions.

Table 1: Characteristics of the main units in the Kasai region: dated units mentioned in the description are in italic, U-Pb ages are underlined.

S.	Unit	Description	Age	
2.1	Upper Luanyi Gneisses	Granite gneisses crosscut by <i>pegmatites</i>	>3300–3500 Ma	1A
2.2	Kanda Kanda Tonalites	Zoned intrusive complex with a <i>tonalitic core</i> , evolving to granodioritic and monzogranitic compositions	<u>Ca. 3100 Ma</u>	2B*
2.3	Kasai Lomami Assemblage: Mufesu granulitic Complex	NW–SE foliated hyperstene gneisses (charnockites) and garnet ± sillimanite-bearing quartzo-feldspathic rocks. <i>Mufesu charnockites</i> **	<u>2835 Ma</u> <u>2820–2795 Ma</u> <u>ca. 2900 Ma</u> <u>ca. 2850 Ma</u>	2C 2D 3C 3D
	Kasai Lomami Assemblage: Lueta gabbro-noritic Complex	Gabbros, gabbro-norites, amphibolites, subordinate anorthosites, metadolerites <i>Gabbros and metadolerites (n=19, MSWD 7)</i> <i>Metadolerites</i> <i>Gabbro-norites</i> <i>Gabbro</i>	2390 ± 14 Ma 2313 ± 292 Ma 2250 ± 100 Ma 2336 ± 100 Ma	4E 4E 4E 4E
2.4	Dibaya Migmatite-Granite Assemblage	Cataclased and are locally mylonitized granitic to tonalitic gneisses and calc-alkaline granites <i>Migmatites</i> <i>Migmatites and Granites</i> <i>Malafundi Granites</i>	<u>2680 ± 5 Ma</u> <u>2720 ± 20 Ma</u> <u>2648 ± 22 Ma</u> <u>2593 ± 92 Ma</u> <u>Ca. 2625 Ma</u>	5F 5CF 5A 5A 5B
2.5	Sandoa-Kapanga Complex, including Neoproterozoic and Eburnian Granites	NE–SE foliation overprinted by regional NW–SE foliation <i>Tshambogo Biotite Gneiss: NW–SE foliated</i> <i>Kakonda Granodiorite: NW–SE foliated, synkinematic</i>	<u>ca. 3086 Ma</u> <u>3021 ± 48 Ma</u>	6B 6B
		Contains Neoproterozoic Gneisses and Granites (foliated and non-foliated): <i>Equigranular Granite</i> , <i>Granulite gneiss</i> , <i>Foliated granite</i>	<u>2561 ± 10 Ma</u> <u>2543 ± 5 Ma</u> <u>2538 ± 10 Ma</u>	7G 7G 7G
		Intruded by Eburnian Porphyritic granites: <i>Porphyritic Granite in NW Zambia</i> <i>Lunge Granite</i>	<u>2058 ± 7 Ma</u> <u>2037 ± 30 Ma</u>	7G 8C
2.6	Luiza Group	In unconformable contact with the Kasai-Lomami Assemblage Local conglomerates, (arkosic) quartzites, mica schists, banded iron formations. Intruded by <i>undeformed granites and pegmatites</i> Separated from the Lulua Complex by a (thrust?) fault	Ca. 2.0 Ga ²	2
2.6	Lulua Group	6–7 km thick, in unconformable contact with Dibaya Assemblage Intensity of metamorphism increases eastwards and southwards. N-verging WSW–ENE trended folds that die out northwards. Lower sequence: Conglomerates, (arkosic) sandstones/quartzites, mica phyllites/schists East: >900 m <i>Malafundi basalts</i> , Central: 700–850 m <i>Yangwegi basalts</i> and West: Kasadi-Sadi basalts (thickness unknown) Upper sequence: sandstones, shales, and carbonaceous rocks	>2078 ± 36 Ma >1901 ± 40 Ma	1H 9B

1: Delhal and Ledent (1973), 2: Cahen et al. (1984), 3: Delhal et al. (1976), 4: Delhal et al. (1986), 5: Delhal et al. (1975), 6: Walraven and Rumvegeri (1993), 7: Key et al. (2001), 8: Pasteels (1971), 9: André (1994) * zircons experienced significant lead loss. ** U–Pb zircon ages of ca. 2900 Ma were also found in charnockites from the Cuango Shield (Delhal et al., 1976). A: Rb–Sr, <B: U–Pb errorchron, C: U–Pb zircon, D: U–Pb monazite, E: Sm–Nd isochron, F: U–Pb titanite, G: SHRIMP U–Pb, H: Hornblende Ar–Ar. Abbreviations: section (S.).

Table 2: U-Pb geochronological data, morphology (M.) and cathodoluminescence structure (S.) for the zircons in the Lulua Complex and Luiza Group samples.

Integration	M.	S.	U	Th	Pb	f206	Ratios						Rho	Ages						Conc.	
							²⁰⁶ Pb/ ²⁰⁴ Pb	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁶ Pb/ ²³⁸ U		2 σ	²⁰⁶ Pb/ ²³⁸ U	2 σ	²⁰⁶ Pb/ ²³⁸ U	2 σ	²⁰⁷ Pb/ ²³⁵ U		2 σ
RG39637_1	5	dif	123	100	119	0.05	35700	0.1886	0.0085	13.69	0.69	0.5390	0.0250	0.65	2779	104	2729	48	2729	74	102
RG39637_2	4	lam	36	42	55	0.16	11900	0.1987	0.0062	15.11	0.50	0.5540	0.0190	0.67	2842	78	2822	32	2815	52	101
RG39637_3r	4	osc	73	60	75	0.09	21650	0.1894	0.0041	13.58	0.35	0.5290	0.0150	0.68	2737	64	2721	24	2736	36	100
RG39637_6	4	dif	218	109	105	0.06	30400	0.1855	0.0049	6.41	0.24	0.2508	0.0086	0.75	1443	44	2034	34	2702	44	53
RG39637_7	5	osc	195	134	161	0.05	39850	0.196	0.0041	9.77	0.30	0.3630	0.0120	0.81	1996	56	2413	28	2792	34	71
RG39637_8	5	osc	53	36	44	0.11	17200	0.1912	0.0059	13.81	0.56	0.5290	0.0210	0.72	2737	88	2737	38	2752	52	99
RG39637_9	5	dif	108	146	198	0.05	36500	0.2189	0.0047	18.11	0.51	0.5910	0.0170	0.72	2993	68	2996	28	2972	36	101
RG39637_10	5	dif	51	50	67	0.10	18005	0.2341	0.0057	20.06	0.56	0.6160	0.0190	0.71	3094	76	3094	28	3080	40	100
RG39637_11	3	dif	181	258	156	0.05	39750	0.1908	0.0048	10.51	0.37	0.3950	0.0150	0.78	2146	70	2481	32	2748	42	78
RG39637_12	4	dif	148	89	105	0.04	43600	0.2354	0.0078	17.94	0.71	0.5610	0.0250	0.71	2871	104	2987	38	3088	54	93
RG39637_13	4	dif	96	92	98	0.08	22250	0.1978	0.0059	11.49	0.38	0.4240	0.0160	0.65	2279	72	2564	32	2807	50	81
RG39637_14	4	dif	90	131	47	0.18	10180	0.1873	0.0078	4.96	0.24	0.1886	0.0089	0.64	1114	48	1813	40	2718	68	41
RG39637_15	4	osc	79	94	106	0.10	19430	0.1975	0.0046	12.27	0.39	0.4490	0.0140	0.74	2391	62	2625	30	2805	38	85
RG39637_16	3	dif	268	156	172	0.07	28050	0.1992	0.0043	4.98	0.15	0.1804	0.0056	0.78	1069	30	1816	26	2819	36	38
RG39637_18	4	dif	88	91	104	0.07	25800	0.1876	0.0045	13.55	0.41	0.5160	0.0170	0.74	2682	72	2719	28	2720	40	99
RG39637_19	3	dif	122	111	144	0.05	39650	0.2139	0.0042	17.65	0.44	0.5940	0.0150	0.73	3006	60	2971	24	2935	32	102
RG39637_20	3	dif	239	269	98	0.06	33900	0.2276	0.006	8.12	0.29	0.2610	0.0100	0.74	1495	52	2244	32	3035	42	49
RG39637_21	3	dif	200	177	153	0.03	54600	0.2184	0.0057	15.93	0.55	0.5260	0.0180	0.74	2725	76	2873	34	2968	42	92
RG39637_22	3	dif	202	180	162	0.06	30350	0.1945	0.0065	6.95	0.29	0.2530	0.0110	0.72	1454	56	2105	38	2780	56	52
RG39637_23	2	dif	295	203	235	0.04	43150	0.1881	0.0054	7.18	0.30	0.2770	0.0120	0.78	1576	60	2134	38	2725	48	58
RG39637_25	3	osc	93	119	67	0.17	10955	0.2097	0.0099	6.31	0.34	0.2270	0.0130	0.71	1319	68	2020	48	2902	76	45
RG39637_27	2	osc	224	187	215	0.04	42400	0.1899	0.0041	8.52	0.26	0.3264	0.0094	0.77	1821	46	2288	28	2741	36	66
RG39637_29	3	lam	279	502	126	0.08	22750	0.2277	0.0073	4.38	0.31	0.1344	0.0091	0.92	813	52	1709	58	3035	52	27
RG39637_30	4	dif	176	222	124	0.07	27850	0.1868	0.0038	6.99	0.20	0.2670	0.0078	0.76	1526	40	2110	26	2713	34	56
RG39637_31	4	dif	167	47	70	0.04	46650	0.2019	0.0052	14.32	0.54	0.5090	0.0190	0.74	2652	82	2771	36	2841	42	93
RG39637_32	5	osc	186	286	52	0.21	8700	0.2367	0.0093	2.38	0.10	0.0744	0.0032	0.64	463	19	1237	30	3097	64	15
RG39637_34	3	unz	26	12	16	0.19	9600	0.202	0.011	15.50	1.10	0.5350	0.0350	0.75	2762	148	2846	68	2842	90	97
RG39637_35	3	dif	98	139	161	0.06	29450	0.1886	0.0051	13.53	0.47	0.5230	0.0190	0.73	2712	80	2717	34	2729	46	99
RG39637_37	4	dif	76	49	67	0.07	25300	0.1866	0.0049	14.23	0.51	0.5340	0.0180	0.72	1192	46	1928	36	2868	60	42
RG39637_38	5	dif	68	163	24	0.23	8170	0.2053	0.0075	5.68	0.23	0.2032	0.0084	0.66	2661	90	2668	38	2689	56	99
RG39637_39	5	dif	162	227	258	0.04	47300	0.1841	0.0063	12.84	0.51	0.5110	0.0210	0.69	2151	84	2448	44	2714	60	79
RG39637_40	5	dif	200	159	86	0.04	43200	0.1869	0.0068	10.14	0.48	0.3960	0.0180	0.74	1156	32	1872	26	2791	36	41
RG39637_41c	5	lam	210	183	127	0.08	24850	0.1958	0.0043	5.32	0.16	0.1965	0.0059	0.76	1686	70	2251	42	2859	58	59
RG39637_41r	5	lam	80	101	93	0.14	13255	0.2041	0.0073	8.18	0.38	0.2990	0.0140	0.74	2510	56	2631	26	2704	38	93
RG39637_42	4	dif	105	100	93	0.06	28850	0.1857	0.0041	12.35	0.33	0.4760	0.0130	0.75	2337	76	2693	38	2970	46	79
RG39637_43	4	lam	157	198	143	0.05	38250	0.2187	0.0063	13.18	0.54	0.4370	0.0170	0.72	1596	66	2081	50	2624	76	61
RG39637_45	3	osc	218	104	117	0.03	61100	0.21	0.0094	14.88	0.79	0.5160	0.0270	0.70	1490	66	2088	40	2811	72	53
RG39637_46	4	dif	158	172	137	0.08	22250	0.1982	0.0087	6.82	0.31	0.2600	0.0130	0.61	690	30	1447	34	3126	152	22
RG39637_47	4	dif	149	204	63	0.20	9150	0.241	0.023	3.16	0.14	0.1129	0.0052	0.54	2779	104	2729	48	2729	74	102
RG39637_48	4	lam	224	149	166	0.03	53700	0.2151	0.0062	12.52	0.46	0.4260	0.0170	0.76	2288	76	2644	34	2944	48	78
RG39637_49	5	dif	48	51	55	0.13	14030	0.1801	0.0045	12.86	0.40	0.5190	0.0170	0.72	2695	72	2669	30	2653	42	102
RG39637_50	5	dif	185	155	107	0.05	36000	0.2022	0.0045	9.53	0.28	0.3440	0.0110	0.79	1906	52	2390	28	2843	36	67
RG39637_51	4	dif	105	98	77	0.07	25750	0.1978	0.0052	12.70	0.46	0.4560	0.0170	0.79	2422	76	2658	34	2807	44	86
RG39655_1	3	lam	116	113	176	0.05	40500	0.1978	0.0045	16.85	0.52	0.5890	0.0180	0.72	2985	74	2926	30	2807	38	106
RG39655_2	4	dif	102	85	112	0.06	32900	0.1952	0.0044	15.39	0.43	0.5570	0.0160	0.70	2854	66	2840	26	2786	38	102
RG39655_3c	3	lam	96	69	98	0.06	32150	0.2015	0.0046	17.43	0.57	0.5960	0.0200	0.75	3014	80	2959	32	2838	38	106
RG39655_3r	3	lam	104	5	2	0.06	30500	0.1762	0.0052	14.04	0.53	0.5990	0.0260	0.37	3026	104	2752	36	2617	50	116
RG39655_4	3	dif	584	7	17	0.01	161500	0.1868	0.0059	13.44	0.57	0.5320	0.0220	0.74	2750	92	2711	40	2713	52	101
RG39655_5	2	unz	154	9	6	0.04	42400	0.1754	0.0042	11.29	0.33	0.4570	0.0140	0.66	2426	62	2547	28	2609	40	93

Integration	M.	S.	U	Th	Pb	f206	Ratios							Rho	Ages						Conc.
			ppm	ppm	ppm	%	²⁰⁶ Pb/ ²⁰⁴ Pb	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁶ Pb/ ²³⁸ U	2 σ		²⁰⁶ Pb/ ²³⁸ U	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	
RG39655_6	2	dif	84	9	33	0.12	16000	0.1648	0.0048	8.45	0.33	0.3650	0.0130	0.73	2006	62	2281	36	2505	50	80
RG39655_7	4	dif	322	142	186	0.02	88250	0.2034	0.0047	15.66	0.46	0.5440	0.0170	0.70	2800	72	2856	28	2853	38	98
RG39655_8	3	dif	327	11	9	0.02	86650	0.1801	0.0038	13.52	0.36	0.5310	0.0150	0.72	2746	64	2717	26	2653	36	104
RG39655_9	3	dif	311	50	72	0.03	60400	0.19	0.0046	11.24	0.34	0.4090	0.0130	0.70	2210	60	2543	28	2741	40	81
RG39655_10	3	dif	117	70	55	0.06	28950	0.1906	0.006	13.53	0.39	0.5350	0.0160	0.62	2762	68	2717	28	2747	52	101
RG39655_11	3	dif	131	7	1	0.05	34650	0.1749	0.0041	13.81	0.43	0.5940	0.0180	0.71	3006	72	2737	30	2604	40	115
RG39655_12	5	dif	184	11	24	0.05	38650	0.1859	0.0042	11.72	0.35	0.4510	0.0130	0.73	2400	58	2582	28	2705	38	89
RG39655_13	4	dif	131	21	22	0.08	22850	0.1839	0.0053	8.88	0.28	0.3560	0.0110	0.65	1963	52	2326	28	2688	48	73
RG39655_14	2	dif	244	33	36	0.04	48650	0.1828	0.0051	11.54	0.42	0.4340	0.0170	0.71	2324	76	2568	34	2678	46	87
RG39655_15	2	osc	109	46	50	0.07	26950	0.191	0.0038	14.80	0.39	0.5500	0.0150	0.73	2825	62	2802	26	2750	34	103
RG39655_16	3	osc	68	9	1	0.11	16900	0.1756	0.0052	13.40	0.50	0.5750	0.0210	0.73	2928	86	2708	36	2611	50	112
RG39655_17	4	dif	181	138	198	0.04	44300	0.197	0.0043	15.80	0.42	0.5830	0.0160	0.70	2961	66	2865	26	2801	36	106
RG39655_18	3	dif	334	33	45	0.03	66350	0.1911	0.0057	13.38	0.58	0.5190	0.0210	0.76	2695	90	2707	42	2751	50	98
RG39655_19	3	unz	75	34	31	0.10	18300	0.21	0.0052	16.30	0.51	0.5670	0.0190	0.74	2895	78	2895	30	2905	40	100
RG39655_20	4	lam	379	70	81	0.03	68350	0.1913	0.004	10.71	0.30	0.4070	0.0120	0.76	2201	56	2498	26	2753	36	80
RG39655_21	4	dif	136	130	121	0.06	30050	0.195	0.0045	13.63	0.38	0.5060	0.0140	0.69	2640	60	2724	26	2784	38	95
RG39655_22	4	dif	174	82	50	0.05	34500	0.1766	0.0036	11.44	0.34	0.4720	0.0140	0.78	2492	62	2560	28	2620	34	95
RG39655_23c	4	osc	439	153	168	1.83	1020	0.161	0.0044	6.68	0.27	0.3061	0.0097	0.76	1721	48	2070	36	2465	46	70
RG39655_23r	4	dif	125	162	159	0.08	23150	0.1895	0.0047	11.35	0.38	0.4360	0.0150	0.75	2333	68	2552	32	2737	42	85
RG39655_24	4	dif	183	14	5	0.05	35950	0.1755	0.0035	11.17	0.32	0.4670	0.0130	0.77	2470	58	2537	26	2610	34	95
RG39655_25	3	dif	199	189	237	0.04	42850	0.1919	0.0045	12.96	0.39	0.4960	0.0150	0.72	2597	64	2677	28	2758	40	94
RG39655_26	5	dif	227	14	25	0.05	40800	0.1841	0.0048	10.91	0.35	0.4390	0.0140	0.70	2346	62	2515	30	2689	44	87
RG39655_27	3	dif	114	37	37	0.08	24500	0.1856	0.0053	12.61	0.43	0.5190	0.0170	0.67	2695	72	2651	32	2703	48	100
RG39655_28c	3	lam	239	12	19	0.05	37450	0.1754	0.004	9.30	0.27	0.3860	0.0110	0.69	2104	52	2368	26	2609	38	81
RG39655_29	5	unz	101	112	158	0.08	22600	0.2048	0.0057	15.18	0.62	0.5180	0.0210	0.77	2691	90	2827	40	2864	46	94
RG39655_30	4	dif	206	2	2	0.04	48500	0.1807	0.0041	13.69	0.41	0.5620	0.0170	0.73	2875	70	2729	28	2659	38	108
RG39655_31	5	dif	45	8	9	0.15	12350	0.1976	0.0075	16.13	0.69	0.5880	0.0270	0.67	2981	110	2885	42	2806	62	106
RG39655_32	5	dif	34	1	0	0.23	8300	0.1741	0.0067	12.71	0.58	0.5650	0.0250	0.64	2887	104	2658	44	2597	64	111
RG39655_33	4	dif	247	1	5	0.03	58250	0.1848	0.0046	15.07	0.48	0.5980	0.0200	0.72	3022	80	2820	30	2696	42	112
RG63905_1c	4	osc	57	41	44	0.07	26050	0.2001	0.0046	14.51	0.41	0.5350	0.0150	0.72	2762	64	2784	28	2826	38	98
RG63905_1o	4	lam	69	239	83	0.06	29500	0.2058	0.0042	14.10	0.37	0.4930	0.0120	0.72	2584	52	2756	26	2872	34	90
RG63905_2	3	dif	69	131	64	0.08	24900	0.1929	0.0041	11.06	0.30	0.4220	0.0120	0.73	2270	54	2528	26	2766	36	82
RG63905_3	3	osc	103	116	85	0.04	47350	0.2055	0.0041	15.16	0.40	0.5450	0.0150	0.74	2804	62	2825	26	2870	34	98
RG63905_4	4	dif	42	45	52	0.10	18900	0.1995	0.0041	15.13	0.39	0.5520	0.0140	0.66	2833	58	2823	24	2821	34	100
RG63905_5c	5	dif	97	79	70	0.05	40550	0.1835	0.0034	13.12	0.31	0.5200	0.0130	0.72	2699	56	2688	22	2684	32	101
RG63905_5r	5	dif	27	12	14	0.16	11825	0.1876	0.0044	13.75	0.40	0.5310	0.0140	0.62	2746	60	2733	28	2720	40	101
RG63905_6	3	dif	21	30	30	0.20	9410	0.2169	0.0061	16.33	0.48	0.5690	0.0170	0.59	2904	70	2896	28	2957	46	98
RG63905_7	2	osc	121	112	114	0.04	49855	0.1897	0.0038	14.18	0.44	0.5330	0.0150	0.20	2754	64	2762	30	2739	34	101
RG63905_8	3	dif	52	41	42	0.09	20800	0.1841	0.004	13.06	0.34	0.5170	0.0140	0.67	2686	60	2684	24	2689	36	100
RG63905_9	5	osc	142	111	67	0.04	52500	0.2189	0.0049	15.66	0.57	0.5060	0.0160	0.26	2640	68	2856	34	2972	36	89
RG63905_10	5	dif	126	132	137	0.04	50350	0.1954	0.0038	14.11	0.36	0.5280	0.0130	0.70	2733	54	2757	24	2787	32	98
RG63905_11	4	osc	67	255	90	0.10	19300	0.1954	0.0045	10.12	0.28	0.3790	0.0110	0.50	2072	52	2446	26	2787	38	74
RG63905_13	4	dif	89	93	83	0.05	35200	0.1884	0.004	13.52	0.39	0.5300	0.0150	0.73	2741	64	2717	28	2728	36	100
RG63905_14	4	dif	91	133	148	0.05	37950	0.2015	0.0037	15.53	0.38	0.5570	0.0130	0.75	2854	54	2848	24	2838	30	101
RG63905_15	4	osc	133	267	131	0.05	39800	0.1948	0.0036	10.87	0.26	0.4015	0.0099	0.68	2176	46	2512	22	2782	32	78
RG63905_16	4	osc	91	144	60	0.06	31950	0.2189	0.0048	15.15	0.49	0.5230	0.0170	0.78	2712	72	2825	32	2972	36	91
RG63905_17	5	dif	49	83	90	0.10	19005	0.184	0.0041	13.52	0.35	0.5320	0.0140	0.68	2750	58	2717	24	2689	38	102
RG63905_18c	3	lam	33	122	140	0.14	13725	0.203	0.0047	16.27	0.48	0.5720	0.0160	0.70	2916	66	2893	28	2850	38	102
RG63905_18r	3	lam	89	29	31	0.06	32800	0.1903	0.0041	14.01	0.39	0.5390	0.0150	0.72	2779	62	2750	26	2744	36	101
RG63905_19	4	dif	40	48	53	0.13	14720	0.1867	0.0048	13.76	0.46	0.5410	0.0160	0.70	2788	66	2733	32	2713	42	103
RG63905_20c	4	osc	39	84	92	0.13	14000	0.1834	0.0045	13.41	0.39	0.5260	0.0150	0.73	2725	64	2709	28	2683	42	102

Integration	M.	S.	U ppm	Th ppm	Pb ppm	f206 %	Ratios ²⁰⁶ Pb/ ²⁰⁴ Pb	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁶ Pb/ ²³⁸ U	2 σ	Rho	Ages ²⁰⁶ Pb/ ²³⁸ U	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	Conc. %
RG63905_21	5	dif	104	103	104	0.06	33500	0.1616	0.0033	10.75	0.27	0.4800	0.0120	0.67	2527	52	2502	24	2472	36	102
RG63905_22	5	osc	37	25	30	0.13	13870	0.2033	0.0049	15.08	0.41	0.5470	0.0150	0.71	2813	62	2820	26	2852	40	99
RG63905_23	4	osc	24	38	43	0.21	8865	0.2008	0.005	15.25	0.45	0.5550	0.0160	0.66	2846	66	2831	28	2832	42	100
RG63905_24	5	dif	41	48	58	0.12	15015	0.2054	0.0053	15.18	0.45	0.5520	0.0170	0.74	2833	70	2827	28	2869	42	99
RG63905_25	4	dif	31	48	57	0.16	11610	0.2025	0.0048	15.91	0.44	0.5690	0.0160	0.67	2904	66	2871	26	2846	40	102
RG63905_26	4	osc	42	31	39	0.12	15800	0.2167	0.0048	17.24	0.43	0.5750	0.0140	0.63	2928	58	2948	24	2956	36	99
RG63905_27	4	osc	64	25	28	0.07	25150	0.2127	0.0044	17.43	0.43	0.5970	0.0160	0.69	3018	64	2959	24	2926	34	103
RG63905_28	5	osc	89	59	77	0.05	35150	0.2197	0.0042	17.99	0.44	0.5800	0.0140	0.72	2949	58	2989	24	2978	32	99
RG63905_29	3	dif	37	54	66	0.13	14030	0.2133	0.005	17.23	0.49	0.5850	0.0160	0.68	2969	66	2948	28	2930	38	101
RG63905_30	4	osc	89	188	87	0.08	24350	0.223	0.0047	13.15	0.34	0.4300	0.0120	0.68	2306	54	2690	24	3002	34	77
RG63905_31	3	dif	74	350	57	0.10	18050	0.1983	0.0042	11.92	0.41	0.4260	0.0130	0.78	2288	58	2598	32	2812	36	81
RG63905_32	4	dif	39	21	26	0.14	13690	0.1928	0.0044	14.49	0.42	0.5360	0.0150	0.72	2767	64	2782	28	2765	38	100
RG63905_33	3	osc	73	133	74	0.08	22650	0.2094	0.0044	14.18	0.40	0.4820	0.0140	0.71	2536	60	2762	28	2900	34	87
RG63905_34	5	dif	77	34	42	0.07	28150	0.1924	0.004	15.30	0.39	0.5620	0.0130	0.69	2875	54	2834	24	2762	34	104
RG63905_35	5	osc	50	55	60	0.11	16650	0.19	0.0042	14.06	0.39	0.5210	0.0140	0.71	2703	60	2754	26	2741	36	99
RG63905_36o	3	dif	41	27	32	0.13	13860	0.1855	0.0044	13.72	0.38	0.5330	0.0140	0.65	2754	58	2731	26	2702	40	102
RG63905_36c	3	lam	75	59	68	0.08	24500	0.1858	0.004	13.64	0.37	0.5200	0.0130	0.69	2699	56	2725	26	2705	36	100
RG63905_37	5	dif	57	55	69	0.09	20300	0.1911	0.0043	14.75	0.38	0.5460	0.0140	0.66	2809	58	2799	24	2751	38	102
RG63905_38	4	lam	51	41	54	0.10	18900	0.2071	0.0043	16.54	0.45	0.5650	0.0160	0.73	2887	66	2909	26	2882	34	100
RG63905_39	5	lam	53	20	28	0.10	18650	0.1971	0.004	16.06	0.44	0.5650	0.0150	0.70	2887	62	2880	26	2802	34	103
RG63905_40	5	lam	12	13	18	0.46	4035	0.2036	0.0075	15.53	0.55	0.5620	0.0210	0.64	2875	86	2848	34	2855	60	101
RG63905_41	5	osc	69	58	72	0.08	23400	0.2031	0.0047	15.69	0.43	0.5470	0.0140	0.66	2813	58	2858	26	2851	38	99
RG63915_1	4	unz	172	130	147	0.05	38250	0.1806	0.0045	13.17	0.45	0.5280	0.0190	0.79	2733	80	2692	32	2658	42	103
RG63915_2	1	dif	118	96	128	0.07	28350	0.1847	0.0038	14.00	0.36	0.5350	0.0130	0.66	2762	54	2750	24	2695	34	102
RG63915_3	2	osc	71	55	77	0.10	18700	0.2056	0.0046	17.23	0.46	0.5950	0.0170	0.69	3010	68	2948	26	2870	38	105
RG63915_4	2	osc	105	81	112	0.07	25050	0.1877	0.0037	14.06	0.36	0.5230	0.0140	0.71	2712	60	2754	24	2721	34	100
RG63915_5	5	lam	74	44	65	0.10	18550	0.2036	0.0048	15.97	0.46	0.5550	0.0160	0.68	2846	66	2875	28	2855	40	100
RG63915_6	5	lam	27	18	27	0.26	7175	0.2167	0.0064	17.72	0.60	0.5910	0.0200	0.68	2993	82	2975	32	2956	48	101
RG63915_7	3	dif	175	89	104	0.05	41400	0.1913	0.005	13.86	0.46	0.5130	0.0170	0.72	2669	72	2740	32	2753	44	97
RG63915_8	3	dif	162	166	226	0.05	40650	0.1885	0.0037	13.85	0.35	0.5290	0.0140	0.76	2737	60	2740	24	2728	34	100
RG63915_9	3	osc	43	29	38	0.16	11395	0.1954	0.0048	15.12	0.42	0.5560	0.0160	0.68	2850	66	2823	26	2787	40	102
RG63915_10	4	dif	20	19	28	0.38	4980	0.2074	0.0081	15.45	0.63	0.5460	0.0220	0.55	2809	92	2843	40	2885	64	97
RG63915_11	5	osc	56	42	58	0.12	15085	0.1996	0.0048	15.45	0.42	0.5540	0.0170	0.70	2842	70	2843	26	2822	40	101
RG63915_12	1	osc	84	66	84	0.09	21600	0.1824	0.0039	13.09	0.36	0.5140	0.0150	0.77	2674	64	2686	26	2674	36	100
RG63915_13	4	dif	42	125	40	0.19	9980	0.2172	0.0057	14.46	0.47	0.4770	0.0150	0.66	2514	66	2780	32	2959	42	85
RG63915_14	4	dif	108	70	91	0.06	30500	0.1931	0.0038	15.29	0.38	0.5670	0.0150	0.74	2895	62	2833	24	2768	34	105
RG63915_15	5	osc	65	165	61	0.12	16050	0.2275	0.0052	15.40	0.42	0.4820	0.0140	0.77	2536	60	2840	26	3034	38	84
RG63915_16	3	dif	77	61	77	0.09	20850	0.19	0.0041	14.38	0.38	0.5380	0.0150	0.70	2775	62	2775	26	2741	36	101
RG63915_17	5	dif	107	78	95	0.06	28900	0.1927	0.0041	14.56	0.37	0.5360	0.0140	0.70	2767	58	2787	24	2765	36	100
RG63915_18	5	osc	40	36	39	0.18	10545	0.1922	0.0045	13.94	0.38	0.5220	0.0150	0.68	2708	64	2746	26	2760	40	98
RG63915_19	5	lam	42	57	68	0.14	13035	0.2134	0.0052	17.70	0.52	0.5930	0.0190	0.73	3002	76	2974	28	2931	40	102
RG63915_20c	3	dif	64	148	23	0.13	13970	0.2063	0.0058	12.40	0.44	0.4220	0.0140	0.69	2270	64	2635	34	2876	46	79
RG63915_20r	3	dif	87	160	40	0.10	19500	0.2061	0.0051	11.59	0.36	0.4050	0.0130	0.72	2192	60	2572	30	2874	40	76
RG63915_21	5	osc	114	157	99	0.06	31450	0.2175	0.0056	16.13	0.52	0.5300	0.0170	0.71	2741	72	2885	32	2962	42	93
RG63915_22	3	dif	69	54	60	0.10	19150	0.1807	0.0041	13.30	0.36	0.5190	0.0140	0.70	2695	60	2701	26	2659	38	101
RG63915_23	5	osc	83	102	97	0.08	24650	0.2043	0.0043	15.63	0.40	0.5470	0.0140	0.70	2813	58	2854	24	2860	34	98
RG63915_24	3	unz	154	150	166	0.04	46750	0.1925	0.0039	14.86	0.37	0.5480	0.0140	0.74	2817	58	2806	24	2763	34	102
RG63915_25	5	osc	14	5	7	0.42	4425	0.2246	0.0073	18.65	0.68	0.5960	0.0210	0.56	3014	84	3024	36	3013	52	100
RG63915_27	4	dif	64	45	56	0.10	18155	0.1878	0.0044	13.73	0.38	0.5210	0.0150	0.73	2703	64	2731	26	2722	40	99
RG63915_28	5	unz	145	199	249	0.04	42100	0.1835	0.0036	14.04	0.37	0.5320	0.0140	0.75	2750	58	2752	26	2684	34	102
RG63915_29	4	osc	84	82	75	0.07	25750	0.2164	0.0048	17.33	0.47	0.5680	0.0150	0.69	2900	62	2953	26	2953	36	98

Integration	M.	S.	U ppm	Th ppm	Pb ppm	f206 %	Ratios ²⁰⁶ Pb/ ²⁰⁴ Pb	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁶ Pb/ ²³⁸ U	2 σ	Rho	Ages ²⁰⁶ Pb/ ²³⁸ U	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	Conc. %
RG63915_30	3	dif	61	40	49	0.11	17630	0.1912	0.0043	14.50	0.40	0.5370	0.0150	0.70	2771	62	2783	26	2752	38	101
RG63915_32	4	dif	150	140	170	0.04	41600	0.1892	0.0039	14.33	0.41	0.5320	0.0160	0.76	2750	68	2772	28	2734	34	101
RG63915_33	5	lam	17	11	13	0.37	5115	0.2178	0.0073	17.12	0.58	0.5750	0.0210	0.61	2928	86	2942	32	2964	54	99
RG63915_34	4	lam	80	121	158	0.08	22350	0.1991	0.0048	15.27	0.42	0.5450	0.0150	0.68	2804	62	2832	26	2818	40	100
RG63915_35	4	lam	68	57	72	0.10	19650	0.213	0.0048	16.83	0.45	0.5620	0.0150	0.73	2875	62	2925	26	2928	38	98
RG63915_36	5	osc	15	7	9	0.44	4280	0.2213	0.0072	17.92	0.65	0.6070	0.0230	0.68	3058	92	2985	36	2989	52	102
RG63915_37	3	osc	32	14	17	0.22	8535	0.2161	0.0066	15.75	0.49	0.5450	0.0180	0.70	2804	76	2862	30	2951	50	95
RG63915_38	5	dif	92	82	98	0.08	23400	0.1831	0.0037	13.34	0.36	0.5140	0.0140	0.75	2674	60	2704	26	2680	34	100
RG63915_39	5	dif	24	18	21	0.30	6185	0.1964	0.006	14.41	0.48	0.5290	0.0170	0.65	2737	72	2777	32	2796	50	98
RG63915_40	2	osc	97	79	93	0.08	24050	0.1944	0.0042	14.69	0.44	0.5380	0.0160	0.74	2775	68	2795	28	2779	36	100
RG63915_41	3	lam	177	128	139	0.04	46250	0.1888	0.0042	14.20	0.39	0.5300	0.0150	0.72	2741	64	2763	26	2731	38	100
RG63915_42	5	lam	72	82	101	0.10	19450	0.1942	0.0044	15.18	0.46	0.5490	0.0170	0.76	2821	70	2827	30	2777	38	102
RG63915_43	5	dif	82	71	88	0.08	22400	0.1971	0.0044	15.48	0.40	0.5550	0.0140	0.66	2846	58	2845	24	2802	38	102
RG63915_44	4	osc	39	23	28	0.18	10645	0.2111	0.0052	16.75	0.48	0.5560	0.0160	0.64	2850	66	2921	28	2913	40	98
RG63915_45	3	dif	113	117	128	0.06	29050	0.1885	0.0036	13.74	0.34	0.5140	0.0130	0.73	2674	56	2732	24	2728	32	98
RG63915_46	5	lam	40	28	33	0.15	12125	0.2191	0.0055	18.40	0.52	0.6080	0.0180	0.68	3062	72	3011	28	2973	42	103
RG63915_47c	5	osc	64	85	102	0.11	17550	0.2034	0.0043	16.28	0.42	0.5640	0.0150	0.71	2883	62	2893	24	2853	36	101
RG63915_47o	5	dif	50	48	57	0.14	13600	0.1971	0.0046	15.57	0.42	0.5550	0.0150	0.69	2846	62	2851	26	2802	38	102
RG63915_48	4	dif	139	143	140	0.05	36750	0.1893	0.0042	14.12	0.40	0.5360	0.0160	0.75	2767	68	2758	28	2735	38	101
RG63915_49	4	dif	153	213	134	0.07	26500	0.2025	0.0055	10.18	0.38	0.3570	0.0120	0.74	1968	58	2451	34	2846	44	69
RG63915_50	5	osc	80	46	54	0.08	22150	0.2038	0.0044	15.96	0.40	0.5590	0.0140	0.66	2862	58	2874	24	2856	36	100
RG63915_51	5	osc	99	180	69	0.07	25100	0.2171	0.0048	15.54	0.43	0.5030	0.0140	0.70	2627	60	2849	26	2959	36	89
RG63915_52	5	dif	31	21	26	0.23	8110	0.1945	0.0051	14.56	0.45	0.5320	0.0170	0.73	2750	72	2787	30	2780	44	99
RG63918_1	5	dif	109	95	112	0.06	31400	0.2358	0.0066	18.23	0.64	0.5630	0.0210	0.74	2879	86	3002	34	3091	46	93
RG63918_2	5	dif	47	10	14	0.12	15070	0.2137	0.0052	17.61	0.52	0.6000	0.0180	0.73	3030	72	2969	28	2933	40	103
RG63918_3	5	lam	73	50	72	0.08	23150	0.2129	0.0056	17.43	0.60	0.5930	0.0210	0.73	3002	86	2959	34	2927	44	103
RG63918_4	3	osc	44	29	35	0.14	13130	0.1878	0.0048	14.34	0.40	0.5420	0.0170	0.66	2792	72	2772	26	2722	42	103
RG63918_5	5	osc	107	91	104	0.06	31900	0.23	0.0062	18.37	0.66	0.5830	0.0210	0.75	2961	86	3009	34	3051	44	97
RG63918_8	5	lam	107	59	88	0.06	33650	0.229	0.0055	19.04	0.60	0.6050	0.0180	0.72	3050	72	3044	30	3044	40	100
RG63918_15	5	osc	52	76	107	0.13	14900	0.1885	0.0049	14.31	0.41	0.5540	0.0170	0.66	2842	70	2770	28	2728	44	104
RG63918_16	3	osc	256	110	189	0.02	77650	0.2192	0.0068	18.59	0.75	0.6060	0.0240	0.70	3054	96	3021	40	2974	50	103
RG63918_17	3	dif	175	111	174	0.04	44750	0.1966	0.0058	14.18	0.52	0.5160	0.0200	0.74	2682	86	2762	34	2797	48	96
RG63918_18	5	dif	194	243	366	0.04	50300	0.1943	0.0052	14.26	0.49	0.5280	0.0200	0.73	2733	84	2767	32	2778	44	98
RG63918_19c	3	osc	54	62	103	0.12	15250	0.206	0.005	16.13	0.52	0.5580	0.0180	0.76	2858	74	2885	32	2874	40	99
RG63918_20	5	osc	90	45	93	0.07	26700	0.2474	0.0066	20.67	0.69	0.5910	0.0190	0.68	2993	78	3123	32	3167	42	95
RG63918_21	4	osc	22	10	14	0.33	5690	0.2089	0.0075	15.89	0.66	0.5520	0.0230	0.76	2833	96	2870	40	2896	58	98
RG63918_23	3	osc	45	43	63	0.16	11950	0.2129	0.0063	16.97	0.59	0.5750	0.0220	0.72	2928	90	2933	34	2927	48	100
RG63918_24	5	dif	22	25	34	0.35	5365	0.1913	0.0066	14.42	0.51	0.5560	0.0210	0.66	2850	88	2778	34	2753	58	104
RG63918_25	5	dif	50	138	63	0.16	11950	0.2387	0.0085	18.18	0.72	0.5390	0.0210	0.53	2779	88	2999	38	3111	58	89
RG63918_28	4	dif	58	52	75	0.14	13700	0.201	0.0049	15.50	0.47	0.5590	0.0170	0.72	2862	70	2846	30	2834	40	101
RG63918_30	4	unz	89	97	142	0.09	20000	0.202	0.0057	15.62	0.52	0.5550	0.0200	0.71	2846	82	2854	32	2842	46	100
RG63918_31	5	dif	51	39	58	0.16	11845	0.1929	0.0059	14.40	0.53	0.5360	0.0210	0.69	2767	88	2776	36	2766	50	100
RG63918_32	5	dif	66	40	19	0.13	14650	0.1993	0.007	13.81	0.51	0.5020	0.0210	0.65	2622	90	2737	36	2820	58	93
RG63918_33	5	lam	67	27	41	0.12	15700	0.2049	0.005	16.29	0.48	0.5740	0.0170	0.66	2924	70	2894	28	2865	40	102
RG63918_34c	3	osc	64	55	95	0.13	14240	0.2098	0.0056	15.16	0.50	0.5190	0.0170	0.67	2695	72	2825	32	2903	44	93
RG63918_35	5	dif	56	71	104	0.14	12940	0.2108	0.006	16.46	0.61	0.5500	0.0190	0.74	2825	80	2904	36	2911	46	97
RG59536_2	4	dif	176	119	135	0.03	58800	0.1905	0.0021	13.24	0.17	0.5032	0.0065	0.60	2628	28	2697	13	2746	19	96
RG59536_3	4	dif	199	137	161	0.03	69150	0.1894	0.0021	14.11	0.18	0.5468	0.0082	0.67	2812	34	2757	13	2736	19	103
RG59536_4	5	lam	92	66	84	0.05	37450	0.2522	0.0026	21.20	0.25	0.6153	0.0078	0.62	3091	32	3148	12	3198	18	97
RG59536_5c	5	dif	143	139	171	0.04	50000	0.1978	0.0024	14.90	0.19	0.5550	0.0073	0.59	2846	30	2809	13	2807	22	101
RG59536_8	4	dif	85	63	74	0.07	28600	0.181	0.0027	13.05	0.19	0.5174	0.0085	0.55	2688	36	2683	14	2661	26	101

Integration	M.	S.	U	Th	Pb	f206	Ratios								Ages						Conc.
			ppm	ppm	ppm	%	²⁰⁶ Pb/ ²⁰⁴ Pb	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁶ Pb/ ²³⁸ U	2 σ	Rho	²⁰⁶ Pb/ ²³⁸ U	2 σ	²⁰⁷ Pb/ ²³⁵ U	2 σ	²⁰⁷ Pb/ ²⁰⁶ Pb	2 σ	%
RG59536_9	5	lam	144	37	46	0.04	51650	0.1975	0.0022	14.86	0.18	0.5489	0.0078	0.59	2821	32	2806	12	2805	19	101
RG59536_10	5	dif	153	200	117	0.04	42000	0.1869	0.0022	11.28	0.14	0.4396	0.0063	0.62	2349	28	2547	12	2714	20	87
RG59536_11	5	zoned	26	15	19	0.22	8345	0.2153	0.0051	15.75	0.38	0.5540	0.0140	0.55	2842	58	2862	24	2945	38	97
RG59536_12	5	lam	54	38	50	0.10	19600	0.2213	0.0033	17.84	0.28	0.5914	0.0096	0.54	2995	40	2981	16	2989	26	100
RG59536_13	3	dif	104	77	87	0.06	32150	0.1886	0.0025	12.64	0.20	0.4975	0.0078	0.61	2603	34	2653	15	2729	22	95
RG59536_14	5	dif	104	134	57	0.09	20100	0.2064	0.0038	8.49	0.16	0.2994	0.0061	0.52	1688	30	2285	17	2877	30	59
RG59536_15	5	dif	158	121	139	0.04	49150	0.1864	0.0021	13.34	0.16	0.5255	0.0063	0.51	2722	26	2704	12	2710	20	100
RG59536_16	5	unz	125	123	150	0.05	41500	0.1787	0.0022	12.93	0.16	0.5223	0.0071	0.61	2709	30	2675	12	2640	22	103
RG59536_17	5	dif	146	127	116	0.04	48150	0.227	0.0038	17.23	0.30	0.5658	0.0083	0.52	2891	34	2948	17	3030	28	95
RG59536_18	4	dif	97	84	103	0.06	30200	0.1916	0.0025	13.96	0.18	0.5352	0.0076	0.58	2763	32	2747	13	2755	22	100
RG59536_19	4	dif	88	85	104	0.06	28950	0.1847	0.0029	13.30	0.22	0.5240	0.0093	0.57	2716	40	2701	16	2695	26	101
RG59536_21	4	dif	78	90	113	0.07	25550	0.1815	0.0029	13.51	0.23	0.5388	0.0092	0.58	2778	38	2716	17	2666	28	104
RG59536_22	5	dif	157	99	85	0.05	35700	0.1901	0.0023	9.99	0.14	0.3766	0.0060	0.69	2060	28	2434	13	2742	22	75
RG59536_23	5	lam	92	117	162	0.06	30000	0.1978	0.0024	15.34	0.20	0.5602	0.0078	0.58	2867	32	2837	13	2807	22	102
RG59536_25	5	dif	101	109	135	0.06	33150	0.1892	0.0021	14.31	0.17	0.5522	0.0067	0.55	2834	28	2771	12	2735	20	104
RG59536_26	5	dif	63	41	53	0.09	20800	0.2014	0.003	15.83	0.26	0.5763	0.0093	0.62	2934	38	2867	16	2837	26	103
RG59536_27	4	dif	113	78	93	0.06	33000	0.182	0.0028	13.41	0.21	0.5406	0.0088	0.52	2786	36	2709	15	2670	26	104
RG59536_28	4	dif	67	51	68	0.09	21550	0.2081	0.0032	16.66	0.26	0.5777	0.0099	0.53	2939	40	2916	15	2890	26	102
RG59536_29	4	unz	59	55	58	0.10	18375	0.1822	0.003	13.21	0.21	0.5182	0.0090	0.53	2692	38	2695	15	2672	28	101
RG59536_30	5	unz	67	46	56	0.09	20600	0.1826	0.0031	13.46	0.21	0.5295	0.0087	0.45	2739	36	2713	15	2676	28	102
RG59536_31	5	unz	142	156	210	0.04	44950	0.1861	0.002	14.41	0.18	0.5500	0.0079	0.66	2825	32	2777	12	2707	19	104
RG59536_32	5	unz	51	54	73	0.11	16930	0.2004	0.0035	15.78	0.28	0.5620	0.0110	0.56	2875	46	2864	17	2829	30	102
RG59536_33	4	osc	58	81	101	0.11	17400	0.1871	0.0031	14.07	0.23	0.5343	0.0095	0.53	2760	40	2754	16	2716	28	102
RG59536_34	4	osc	97	77	103	0.06	33150	0.2061	0.0025	17.00	0.22	0.5839	0.0075	0.54	2965	30	2935	13	2874	20	103
RG59536_35	5	osc	102	113	140	0.06	30050	0.1739	0.0021	12.80	0.16	0.5223	0.0071	0.55	2709	30	2665	12	2595	22	104
RG59536_36	4	dif	56	28	36	0.11	17400	0.1853	0.0031	14.03	0.27	0.5190	0.0100	0.62	2695	42	2752	19	2700	28	100
RG59536_37	5	lam	141	131	154	0.05	40850	0.1995	0.0027	14.92	0.23	0.5394	0.0081	0.59	2781	34	2810	15	2821	24	99
RG59536_38	5	unz	106	82	127	0.05	34250	0.1897	0.0027	14.64	0.23	0.5351	0.0085	0.58	2763	36	2792	15	2739	24	101
RG59536_39	5	dif	122	125	163	0.05	39050	0.1931	0.0023	15.39	0.21	0.5576	0.0078	0.61	2857	32	2840	14	2768	20	103
RG59536_40	4	dif	65	71	60	0.11	17000	0.1942	0.0033	12.92	0.24	0.4640	0.0090	0.61	2457	40	2674	18	2777	28	88
RG59536_42	4	unz	60	76	88	0.12	15770	0.1742	0.0031	12.03	0.21	0.4929	0.0090	0.49	2583	38	2607	17	2598	30	99
RG59536_43	5	dif	83	80	102	0.08	23600	0.1864	0.0028	13.62	0.21	0.5178	0.0076	0.49	2690	32	2724	15	2710	26	99
RG59536_44	5	dif	45	41	38	0.15	12300	0.1847	0.0034	13.60	0.25	0.5228	0.0095	0.50	2711	40	2722	18	2695	32	101
RG59536_45	5	osc	71	94	123	0.08	22815	0.1963	0.003	15.44	0.26	0.5554	0.0086	0.54	2848	36	2843	17	2795	26	102
RG59536_46	5	lam	35	94	107	0.19	10020	0.1758	0.0039	12.34	0.25	0.5040	0.0100	0.47	2631	42	2631	19	2613	38	101
RG59536_47	4	dif	147	89	114	0.04	41750	0.1945	0.0023	14.17	0.17	0.5314	0.0073	0.60	2747	30	2761	12	2780	20	99
RG59536_48	5	osc	103	79	100	0.06	31700	0.2101	0.0023	16.51	0.20	0.5679	0.0070	0.56	2899	28	2907	12	2906	19	100
RG59536_49	4	dif	125	147	91	0.06	29600	0.204	0.003	13.38	0.23	0.4773	0.0077	0.64	2515	34	2707	17	2858	24	88
RG59536_50	4	unz	86	74	96	0.07	25300	0.1898	0.0027	14.47	0.21	0.5385	0.0081	0.57	2777	34	2781	14	2740	24	101
RG59536_51	5	unz	175	111	145	0.04	51550	0.1922	0.0022	14.37	0.17	0.5301	0.0064	0.53	2742	28	2775	12	2760	20	99
RG59536_52	5	dif	41	58	68	0.17	11105	0.1764	0.0033	12.48	0.23	0.5082	0.0091	0.48	2649	38	2641	18	2619	32	101
RG59536_53	5	dif	134	97	97	0.06	31900	0.2041	0.0028	12.87	0.19	0.4520	0.0074	0.58	2404	32	2670	14	2859	24	84
RG59536_54	4	dif	69	89	119	0.09	20700	0.19	0.0026	15.02	0.22	0.5661	0.0082	0.53	2892	34	2817	14	2741	24	106
RG59536_55	4	unz	80	26	34	0.08	24600	0.1908	0.0033	14.85	0.25	0.5400	0.0100	0.53	2783	42	2806	16	2748	30	101
RG59536_56	5	dif	250	206	193	0.04	43700	0.1921	0.0025	9.22	0.13	0.3443	0.0056	0.64	1907	26	2360	13	2759	22	69
RG59536_57	5	dif	53	21	28	0.12	15900	0.2159	0.0034	17.63	0.28	0.5850	0.0096	0.56	2969	40	2970	16	2950	26	101
RG59536_58	5	lam	179	131	168	0.04	47900	0.2044	0.003	14.95	0.22	0.5294	0.0075	0.47	2739	32	2812	15	2861	24	96
RG59536_59	5	dif	62	45	55	0.10	18450	0.2119	0.0041	17.33	0.31	0.5960	0.0120	0.48	3014	48	2953	18	2919	32	103
RG59536_60	1	osc	21	29	32	0.30	6285	0.1949	0.0057	15.76	0.44	0.5930	0.0170	0.52	3002	68	2862	26	2783	48	108
RG59536_61	4	unz	95	40	49	0.07	26500	0.2004	0.0036	15.46	0.28	0.5710	0.0120	0.58	2912	50	2844	18	2829	30	103
RG59536_62	3	lam	43	63	63	0.16	11790	0.1883	0.0041	14.27	0.32	0.5520	0.0120	0.48	2833	50	2768	22	2727	36	104

RG59536_63	4	lam	75	129	163	0.09	21210	0.1954	0.0035	14.78	0.28	0.5586	0.0095	0.51	2861	40	2801	18	2787	30	103

Data collected during three analytical sessions: session 1: RG63905, RG39655, session 2: RG39637, RG63918 and RG63915, session 3: RG59536. Abbreviations: a,b: spots within one zircon which are not c: core, o: overgrowth or r: rim, morph: morphology, struct: structure, bdl below detection limit, n.a., not available, conc.% = percentage concordance, calculated as $100 * ^{206}\text{Pb}/^{238}\text{U} \text{ age} / ^{207}\text{Pb}/^{206}\text{Pb} \text{ age}$. Morphology and structure described following Batumike et al. (2007): morph. 1= euhedral zircon, morph. 5 = fully rounded zircon. Structure: oscillatory (osc), laminated (lam), diffuse (dif), unzoned (unz).

Supplementary table A. Overview of the studies samples, localities and coordinates (WGS84, LatLong).

Sample ID	Group	Type	Locality
RG 39637	Luiza	feldspathic quartzite	Fwamba, Kambau, left tributary of the Ikaleji (c.-07.5667°, 21.98333°)
RG 39655	Luiza	feldspathic quartzite	Fwamba, Mutongo, right tributary of the Kaye, right tributary of the Kasai (c. -07.5667°, 21.98333°)
RG 59536	Lulua	mylonitized feldspathic quartzite	Dibaya, head of the Msulu, Ngandu, left tributary of the Malafudi, Lulua (c. -06.7833°, 22.7100°)
RG 63905	Lulua	feldspathic quartzite	Kasadi Sadi (c. -07.1250°, 21.68833°)
RG 63915	Lulua	feldspathic quartzite	Kasadi Sadi (c. -07.1250°, 21.68833°)
RG 63918	Lulua	Feldspathic quartzite	Kasadi Sadi (c. -07.1250°, 21.68833°)