Pamphlet to accompany:

NCGS Open File Report 2025-06

Compiled bedrock geologic map of the Chapel Hill 30' x 60' Quadrangle (Chapel Hill 100K), North Carolina (version 7/8/2026)

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New geochronology data reduction and interpretation by Adam C. Curry

2025 Revised 7/8/2026

Reference:

Bradley, P.J., Thompson, G.J., Pelt, K.E. and Curry, A.C., 2025, Compiled Bedrock Geologic Map of the Chapel Hill 30' x 60' Quadrangle (Chapel Hill 100K), North Carolina, North Carolina Geological Survey Open-file Report 2025-06, scale 1:100,000, in color, with accompanying pamphlet (version 7/8/2026).

BACKGROUND

This compiled geologic map, partially supported by the U.S. Geological Survey (USGS), National Cooperative Geologic Mapping Program under STATEMAP completes a multi-year project to compile the entire bedrock portion of the Chapel Hill 30'x 60' Quadrangle (Chapel Hill 100K) in support of the USGS US Geoframework Initiative's (USGI) vision for a nation-wide, seamless geologic map.

The goal of this compilation effort was to produce a new 1:100,000-scale digital geologic map of the study area using the USGS Geologic Mapping Schema (GeMS). When available, geologic data at scales more detailed than 1:100,000-scale were used (i.e. 1:24,000-scale data). FY21 phase of the compilation effort compiled data from detailed geologic mapping at the 1:24,000-scale in Chatham County. The FY22 phase of the compilation effort, included compilation work and new mapping at the 1:50K scale.

The FY23 phase of the compilation effort compiled legacy data at scales ranging from 125K- to 24K-scale. From July 2023 to June 2024, NCGS staff conducted targeted foot and vehicle traverses to validate contacts from the legacy sources and to collect new field data. Close attention was paid to rectifying edge-match issues between legacy data and recent 24K-scale mapping to allow accurate transitions of map units from areas with detailed data to areas of legacy data collected at smaller scales (e.g. 48K). More detailed and closer spaced traverses targeted areas of structural or stratigraphic complexity. Less detailed and wider spaced traverses were used in areas of less complex structure or rock types (e.g. areas underlain by homogenous plutons received less attention). LiDAR data displayed as hillshade was used to help identify lineaments and possible faults and dikes that may be groundwater sources or preferred pathways for groundwater contaminants. Additional edits were made in FY24 to the map; a few contacts were adjusted and some geologic units were reassigned based on mapping activities in the Southern Pines 100K. Future adjustments to the map and geologic units will occur as geochronology data is made available and refinement of the stratigraphy occurs.

PAST WORKERS

Specific data sources are listed in the DataSources table in the geodatabase. Individual open-file reports include additional references. Major data sources are provided in the index of workers figure on the map layout.

GEOLOGIC SETTING

The Chapel Hill 100K is underlain by five major geologic elements (see figure on map). From west to east they are: the Charlotte terrane, Carolina terrane, Deep River Triassic basin, the Easternmost Carolina terrane and small areas of Coastal Plain sediments. Coastal Plain sediments overlay units within the Deep River Triassic basin and the easternmost Carolina terrane. Older alluvium deposits are present along major drainages in addition to modern floodplain deposits. The map is a compiled bedrock map. Surficial sediments are not displayed but are provided in the GeMS database.

CHARLOTTE TERRANE

The Charlotte terrane (Hibbard et al., 2002) underlies the northwestern portions of the map area. The original contact between the Charlotte and Carolina terranes is obliterated by the intrusion of a granodiorite body (map unit Zgd-CHT and Zgd-CT). The contact is poorly located and is designated on the occurrence of gneissic xenoliths (Charlotte terrane side of contact) and metavolcanic xenoliths (Carolina terrane side of contact) present in the granodiorite. Several map-scale and abundant outcrop-scale xenoliths(?) of metamorphosed basalt, diorite and altered rocks are present throughout the map area in the Charlotte terrane. Intermediate to mafic metavolcanic rocks (Map unit CCv2) in the northwest corner of the map are interpreted to be related to the Albemarle arc of the Carolina terrane and were likely deposited on an already amalgamated, uplifted and eroded Charlotte and Carolina terranes.

CAROLINA TERRANE

The Carolina terrane underlies the largest area within the Chapel Hill 100K. The Carolina terrane is composed of Neoproterozoic to Cambrian metamorphosed volcanic, volcano-sedimentary, sedimentary and intrusive rocks (Hibbard et al., 2002; and Hibbard et al., 2006). The Carolina terrane is separated into three lithotectonic units: 1) the Hyco arc, 2) the Aaron Formation of the redefined Virgilina sequence (Hibbard et al., 2013) and 3) the Albemarle arc (Hibbard et al., 2013).

COMPILED U-Pb GEOCHRONOLOGY DATES FOR THE CAROLINA TERRANE IN THE CHAPEL HILL 100K

As part of the compilation efforts within the Chapel Hill 100K, U-Pb crystallization age and detrital zircon age data was compiled. Additionally, through STATEMAP support (FY23 and FY24), new samples were collected and have been analyzed. Geochronologic data is summarized in Table 1 with references.

Sample locations are identified and labeled on the geologic map. Geochronology plots and tables of NCGS collected samples are provided in Appendix A.

Table 1: Summary of available age dates in the Chapel Hill 100K. Refer to main map for sample locations. Geochronology plots and tables of NCGS collected samples are provided in Appendix A.

Label	Sample ID	Rock Type	Major Unit	Date	Source	Comments
A-1	UNC Chapel Hill sample DPF-14-02	brecciated rhyolite (dacite)	Hyco Formation	636.0 ± 2.3 Ma with a MSWD of 1.2	U-Pb zircon date (Barefoot, 2015)	Unpublished senior thesis
A-2	UNC Chapel Hill Sample DFP-14-03	gabbro	Hyco Formation intrusive	630.8 ± 3.2 Ma with a MSWD of 3.7	U-Pb zircon date (Barefoot, 2015)	Unpublished senior thesis
B	UNC Chapel Hill Sample WCP-14-02	Porphyritic granodiorite	Hyco Formation intrusive	640.9 ± 2.4 Ma with a MSWD of 0.88	U-Pb zircon date (Barefoot, 2015)	Unpublished senior thesis
C	Chapel Hill Granite	granite	Hyco Formation intrusive	633 ± 2.0/1.5 Ma	U-Pb zircon date (Wortman et al., 2000)	
D	NCGS Station CH-2311	dacitic tuff	Hyco Formation volcanic	630 ± 1 Ma	U-Pb zircon date (Bradley and Miller, 2011)	
E	UNC Chapel Hill Sample FP-AP-05	granodiorite	East Farrington pluton	578.7 +/- 5.5 Ma (MSWD = 1.30, n = 6)	U-Pb zircon date (Tadlock and Loewy, 2006)	
F	Flow banded rhyolite	dacite	Hyco Formation volcanic	632.9 +2.6/-1.9 Ma	U-Pb zircon date (Wortman et al., 2000)	
G	NCGS Station WX-1139	dacite	Hyco Formation volcanic	628.5 ± 1 Ma	U-Pb zircon date (Bradley and Miller, 2011)	
H	UNC-Chapel Hill sample EF19-01	granodiorite	East Farrington Pluton	569.0 ±1.1 Ma	U-Pb zircon date (Goliber and Coleman, 2023)	
I	UNC Chapel Hill Sample TC-14-01 Granodiorite	granodiorite	xenolith of older pluton in West Farrington Pluton	651.0 ± 3.4 Ma	U-Pb zircon date (Barefoot, 2015)	
J	SAX-1	granite	Greensboro Intrusive Suite (?) - Saxapahaw pluton	605 ± 7.4 Ma	U-Pb zircon date (Ingle et al., 2003)	
K	SB-5	dacite	Hyco Formation volcanic	618.1 ± 3 Ma	U-Pb zircon date (Ingle et al., 2003)	
L	NCGS Station CH100K-2962	granodiorite	Greensboro Intrusive Suite (?)	591.2 ± 3.8 Ma (MSWD = 1.9)	U-Pb zircon date by AZ LaserChron with data interpretation by A. Curry (2024), preliminary data	Foliated xenoliths in outcrop area
M	NCGS Station Bear Creek-626	sandstone	Albemarle Arc	Maximum Depositional Ages (MDAs) are between	detrital zircon dates (AZ LaserChron). Preliminary report	No or sparse quartz crystals - possible distal

				ca. 551 Ma and ca. 560 Ma (T. LaMaskin, personal communication, 2025). MDA – ca. 537 Ma (A. Curry, per comm., 2026)	in Pelt and Bradley, 2023. Additional data analysis by T. LaMaskin, personal communication, 2025. Additional data reduction by A. Curry, 2026)	sedimentation off of Albemarle arc
N	NCGS Station Coleridge-3055	sandstone	Albemarle Arc	Distinct age distribution that is < 600 Ma and all MDAs are between ca. 545 Ma and ca. 549 Ma (T. LaMaskin, personal communication, 2025) MDA – ca. 540 Ma (A. Curry, per comm., 2026)	detrital zircon dates (AZ LaserChron). Preliminary report in Pelt and Bradley, 2023. Additional data analysis by T. LaMaskin, personal communication, 2025. Additional data reduction by A. Curry, 2026)	Abundant quartz crystals
O	NCGS Station Bennett-710	tuff	Albemarle Arc	548.7 ± 1.1 Ma	U-Pb zircon date (Goliber and Coleman, 2023)	
P	Aaron Formation sample (Pollock et al., 2010)	conglomerate	Aaron Formation (lower portion)	youngest detrital zircon of 588 ± 11 Ma	detrital zircon date (Pollock et al., 2010)	Distinctive conglomerate
Q	NCGS Station Coleridge-472	sandstone	Albemarle Arc	MDA - ca. 554 Ma	detrital zircon dates (USC-Columbia). Data interpretation by A. Curry (2025), preliminary data	
R	UNC Chapel Hill sample NC-18-02 / NCGS Station Coleridge-458	felsic dike or tuff	Albemarle Arc	551.9 ± 0.82 Ma	U-Pb zircon date (R. Mills, personal com., 2018)	Adjacent to Coleridge-8005
S	NCGS Station Coleridge-8005	sandstone	Albemarle Arc	MDA - ca. 559 Ma	detrital zircon dates (USC-Columbia). Data interpretation by A. Curry (2025), preliminary data	
T	NCGS Station Bennett-165	sandstone	Albemarle Arc	MDA - ca. 552 Ma	detrital zircon dates (USC-Columbia). Data interpretation by A. Curry (2025), preliminary data	
U	UNC Chapel Hill sample Parks Crossroads Granodiorite / NCGS Sample PCX-1	granodiorite	Parks Crossroads Pluton (Albemarle Arc)	551.86 ± 0.88 Ma	U-Pb zircon date (Morrison and Coleman, 2023)	
V	FB	andesitic tuff	Albemarle or Hyco Arcs (?)	575 ± 27 Ma	U-Pb zircon date (Ingle et al., 2003)	

W	NCGS Station CH100K-3675	sandstone	Albemarle Arc	MDA - ca. 533 Ma	detrital zircon dates (AZ LaserChron). Data interpretation by A. Curry (2025), preliminary data	Abundant quartz crystals
X	NCGS Station CH100K-3839	tuffaceous conglomeratic sandstone	Albemarle Arc	MDA - ca. 523 Ma	detrital zircon dates (AZ LaserChron). Data interpretation by A. Curry (2025), preliminary data	NC Zoo Property
Y	"Uwharrie Formation" sample of Pollock et al. (2010)	pebble conglomerate	Albemarle Arc	youngest detrital zircon of 545 ± 7 Ma	detrital zircon date (Pollock et al., 2010)	Yow Mill area
Z	NCGS Sample ChapelHill100K-Seagrove1	rhyodacite	Albemarle Arc	536.4 ± 6.1 Ma (MSWD = 4.5)	U-Pb zircon date by AZ LaserChron with data interpretation by Bradley et al., 2025	
AA	NCGS Station CH100K-3834	sandstone	Albemarle Arc	MDA - ca. 526 Ma	detrital zircon dates (AZ LaserChron). Data interpretation by A. Curry (2025), preliminary data	North Asheboro Park - Uppermost Uwharrie Formation
BB	NCGS Station CH100K-3838	rhyodacite	Albemarle Arc	548.8 ± 2.8 Ma (MSWD = 1.4)	U-Pb zircon date (AZ LaserChron). Data interpretation by A. Curry (2025), preliminary data	Daves Mountain in Asheboro
CC	SB-7	"dacite" (rhyodacite)	Albemarle Arc	553 ± 20 Ma	U-Pb zircon date (Ingle et al., 2003)	Identified as a dacite in the Tillery Formation (Ingle et al., 2003)
DD	NCGS Sample ChapelHill100K-Caraway Mtn 1	rhyodacite	Albemarle Arc	542.7 ± 5.3 Ma (MSWD = 0.5)	U-Pb zircon date by AZ LaserChron with data interpretation by Bradley et al., 2025	Caraway Mountain
EE	SMG (Stony Mountain Gabbro)	gabbro	Albemarle Arc – Stony Mountain Gabbro	U-Pb TIMS 206Pb/238U date of 544.81 ± 0.55 Ma, and a 207Pb/235U date of 544.73 ± 0.95 Ma	DeDecker et al., 2013	Ridges Mountain
FF	NCGS Station CH100K-3840	rhyodacite	Albemarle Arc	537.4 ± 5.7 Ma (MSWD = 0.86)	U-Pb zircon date (AZ LaserChron). Data interpretation by A. Curry (2025), preliminary data	Luther Place Trail area (Forest Service trail)
GG	DRC-90-1 at 550 to 555 feet	felsic porphyritic dike	Albemarle Arc dike	Two zircon populations 550.27 ± 0.74 Ma and 547.00 ± 0.83 Ma	U-Pb zircon dates (Rapprecht, 2010)	Date from dike intruding Hyco Formation units

GG	DRC-07-6, DRC-07-7, DRC-07-4	molybdenite samples	Albemarle Arc mineralization	539 ± 2 Ma (DRC–07–6), 532 ± 2 Ma (DRC–07–7), 543 ± 2 Ma (DRC–07–4)	Re-Os dates of molybdenite (Rapprecht, 2010)	Same area as GG

HYCO ARC AND THE HYCO FORMATION

In the map area, the Hyco Arc consists of the Hyco Formation which includes ca. 633 to 612 Ma (Wortman et al., 2000; Bowman, 2010; Bradley and Miller, 2011 and Bowman et al., 2013) metamorphosed layered volcaniclastic rocks and plutonic rocks. Dating by Barefoot (2015), indicates that magmatism in the lower portions of the Hyco Formation may be as old as ca. 650 Ma. Available age dates (Wortman et al., 2000; Bradley and Miller, 2011) indicate the Hyco Formation may tentatively be divided into lower (ca. 630 Ma) and upper (ca. 615 Ma) portions with an apparent intervening hiatus of magmatism.

Map units of metavolcanic and metavolcaniclastic rocks include various lithologies that when grouped together are interpreted to indicate general environments of deposition. The dacitic lavas and tuffs unit is interpreted to represent dacitic domes and proximal pyroclastics. The andesitic to basaltic lavas (with tuffs or conglomerates) units are interpreted to represent eruption of intermediate to mafic lava flows and associated pyroclastic and/or epiclastic deposits. The epiclastic/pyroclastic units are interpreted to represent deposition from the erosion of dormant and active volcanic highlands. Deposition of the primary volcanics ranged from subaerial to subaqueous with concomitant deposition of various types and volumes of volcanic-derived sediments. Some of the metavolcaniclastic units within the map area display lithologic relationships similar to dated units present in northern Orange and Durham Counties. Due to these similarities, the metavolcanic and metavolcaniclastic units have been tentatively separated into upper and lower portions of the Hyco Formation; geochronologic data in the map area is needed to confirm this interpretation.

Generally, rock units of the Hyco Formation consist of packages of metamorphosed volcanic rocks and their volcanosedimentary detritus. Hyco Formation volcanic rocks and sedimentary rocks are quartz crystal *poor* or quartz is absent in hand sample. In contrast (discussed in a later section), the Aaron Formation sedimentary rocks and Uwharrie Volcanics and volcanosedimentary rocks range from quartz crystal-rich to having quartz locally present.

HYCO ARC PLUTONS

The best characterized plutons interpreted to be associated with the Hyco arc are present in the northeast corner of the map area within the Chapel Hill 1:24K Quadrangle and include the Chapel Hill Pluton and several unnamed plutons. Granite of the Chapel Hill pluton has an interpreted U-Pb zircon crystallization age of 633 +2/-1.5 Ma (Wortman et al., 2000) and an unpublished U-Pb zircon age of 631.6 +/- 7.9 Ma reported by Mehlop (1994). Barefoot (2015) in an unpublished senior thesis reports U-Pb ages of Ca. 631, 641 and 651 Ma from a diorite (reported as a gabbro), a granodiorite porphyry and a xenolith within the Farrington Pluton; respectively.

FARRINGTON IGNEOUS COMPLEX

The northeastern portion of Chatham County (and adjacent Orange County) is dominated by the Farrington igneous complex. The Farrington igneous complex consists of several map-scale plutons that are grouped into the East and West Farrington plutons. Wagener (1964 and 1965) conducted a study on the modal variation in the Farrington igneous complex. The East Farrington pluton is composed dominantly of granite to granodiorite with several map-scale facies with distinct mineral and textural characteristics. Two age dates are available for the East Farrington pluton: a recent date of 569.0 ± 1.1 Ma from Goliber and Coleman (2023) and a previous date of ca. 579 Ma (Tadlock and Loewy, 2006) in Orange County. The West Farrington pluton is a gradationally zoned composite pluton (Ragland and Butler, 1972) that is characterized by diorite in the northern portions of the map, diorite to granodiorite along its southwestern margins, and leucogranodiorite in the central portions of the pluton.

The intrusive relationships between the different phases of the East and West Farrington plutons are not well understood. Additional information on the phases of the Farrington igneous complex can be found in the Bynum and Farrington geologic maps (Bradley et al., 2013 and Bradley et al., 2007, respectively).

OTHER PLUTONS

Two age dates from plutons within the Carolina terrane are outside of accepted age ranges for the Hyco (Ca. 610 - 630 Ma) and Albemarle (Ca. 550 - 530 Ma) arcs. The ages are Ca. 591 Ma for a granodiorite (Geochron sample point "L" on map; NCGS Station CH100K-2962) from unit Zgd-CT and Ca. 605 Ma from a granite (Ingle et al., 2003) (geochron sample point "J" on the map; Sax-1) from unit Zsgr. The significance of these ages are unknown.

Discussion about other plutons: The terrane boundary between the Carolina and Charlotte terranes is interpreted to be present in the northwestern portion of the Chapel Hill 100K. The contact between the Charlotte and Carolina terranes is obliterated by the intrusion of a granodiorite body. The granodiorite is mapped as Zgd-CT (in the Carolina terrane) and Zgd-CHT (in the Charlotte terrane). These map units underlay the majority of the northwest portion of the Chapel Hill 100K. Preliminary mapping in the southwest portion of the Greensboro 100K (located immediately north of the Chapel Hill 100K) indicates the pluton continues to the north. The pluton is part of the poorly defined Greensboro Intrusive Suite (Hibbard et al., 2006). The Charlotte and Carolina terranes contact is poorly located and is designated on the occurrence of gneissic xenoliths (Charlotte terrane side of contact) and metavolcanic xenoliths (Carolina terrane side of contact) within the granodiorite. The ca. 591 Ma date is from a granodiorite from this unit and may be a stitching pluton. The ca. 605 Ma date may be a younger Hyco arc pluton or related to the magmatism associated with the Charlotte and Carolina terrane contacts.

AARON FORMATION

Harris (1984) and Harris and Glover (1988) mapped significant areas within the map area as being part of the Aaron Formation. NCGS mapping in the Chatham County portion of the Chapel Hill 100K grouped rocks similar to those sampled for detrital zircon analysis by Pollock et al. (2010) and distinctive quartz-bearing sandstones and other interlayered sedimentary rocks as described by Harris (1984) into the Aaron Formation (Bradley et al., 2017 (Siler City); Bradley et al., 2018 (Coleridge); Bradley et al., 2019a (Bennett) and Bradley et al., 2019b (Bear Creek)).

Results of detrital zircon data collected in 2022 (Bradley, 2023 and Pelt and Bradley, 2023), required the re-evaluation of areas mapped as Aaron Formation since large portions are much younger than previously interpreted. For the compiled Chatham County map (Bradley et al., 2022c) and this compiled 100K map, conglomerates and related rocks proximal to the contact with the Hyco Formation and including the detrital zircon sample location (geochronology data location P) of Pollock et al. (2010) were included in the newly revised Aaron Formation map unit.

Implications on the Aaron Formation for Other Areas in the Carolina Terrane

Geologic compilation work in 2022-2023 in the type area of the Aaron Formation to the south of Virgilina, VA noted the striking resemblance of the abundant quartz-bearing sandstones in the Aaron Formation to those in Chatham County and the Chapel Hill 100K. This is understandable inasmuch as Harris and Glover (1988) extended the Aaron Formation into Chatham and Randolph Counties. The new detrital zircon data from the map area has led to the reassignment of units identified as Aaron Formation to the Albemarle arc (tentatively assigned to the Seagrove formation). To test if portions of the Aaron Formation in the type area of the Virgilina Syncliorium may be Albemarle arc related, a sample of meta-sandstone in the Aaron Formation from the east limb of the Virgilina Syncliorium was collected for detrital zircon analysis and forwarded to the University of Arizona LaserChron Center. Preliminary LA-ICP-MS U-Pb zircon analyses from the meta-sandstone indicates all Maximum Depositional Ages (MDA) are between ca. 540 Ma and ca. 545 Ma (T. LaMaskin, personal communication, 2025). As such, large portions of the Aaron Formation in the type locality may be Albemarle arc related putting the stratigraphic placement of the Aaron Formation in question.

ALBEMARLE ARC UNITS

Age relationships between rocks mapped as the Uwharrie Formation (Conley and Bain, 1965; Stromquist and Sundelius, 1969) and the Albemarle Group (Milton, 1984) are unclear. Traditionally, the Uwharrie Formation has been viewed as being the older substrate to the Albemarle Group (e.g. Butler and Secor, 1991); this interpretation is supported by recent models of intra-arc rifting (Moye, 2023). However, radiometric ages from rocks mapped as Uwharrie Formation suggest that rocks of the Uwharrie Formation and Albemarle Group overlap in age, forming a time transgressive sequence (Pollock et al., 2010 and Hibbard et al., 2013). Before the mapping and new geochronology of this study, the stratigraphic relationships of the rocks yielding younger-than-expected ages compared to the bulk of the Uwharrie Formation were not confidently established. The goals of this new mapping and compilation work was to compile existing maps, rectify edge-match issues, and to collect rock samples for modern

geochronologic analysis to start to better define the Uwharrie Formation and its relationship to adjacent units.

Stratigraphically, the main outcome of this new study is the redefinition of the Uwharrie Formation to the Uwharrie Volcanic Complex - a package of lithodemic units that includes metamorphosed: extrusive and shallow intrusive volcanic rocks, volcaniclastic pyroclastic rocks, volcaniclastic sedimentary rocks and sedimentary rocks. Additionally, as part of this study, the Seagrove formation is established and the nomenclature of the Morrow Mountain Rhyodacite Suite is adopted (discussed below in more detail) (Figures 1 and 2). Refinement of the stratigraphy is ongoing.

MORROW MOUNTAIN RHYODACITE SUITE

The Morrow Mountain Rhyodacite Suite is a suite of intrusions with a range of ages and textures that are likely magmatically linked (Boorman et al., 2013 and Moye, 2023b). For this mapping, isolated bodies of rhyodacite surrounded by volcano-sedimentary rocks were grouped as part of the suite. Texturally similar bodies are present in areas mapped as part of the rhyodacitic lavas and tuffs unit of the Uwharrie Volcanic Complex (discussed below).

A summary of existing and new age dates within the Southern Pines 100K map are provided in Table 1. For a summary of existing and new age dates in the Chapel Hill 100K, see the Open-file report of the Chapel Hill 100K (Bradley et al., 2025a).

Ingle et al. (2003) reported TIMS $^{207}Pb/^{206}Pb$ ages of 539±5 Ma for the Morrow Mountain rhyodacite in the Charlotte 100K. Bradley et al. (2025b), reported LA-ICP-MS $^{206}Pb/^{238}U$ weighted mean ages for two samples in the Chapel Hill 100K: A sample from the Seagrove area yielded an age of 536.4 ± 6.1 Ma (MSWD =4.5) and a sample from Caraway Mountain yielded an age of 542.7 ± 5.3 Ma (MSWD = 0.5).

New and unpublished, LA-ICP-MS $^{206}Pb/^{238}U$ weighted mean ages completed in 2025 from samples from the suite include: 548.8 ± 2.8 Ma (MSWD = 1.4) for a sample collected from Daves Mountain in Asheboro, in the Chapel Hill 100K (Bradley et al., 2025a); 550.4 ± 4.2 Ma (MSWD = 0.44) for a sample collected from the Robbins area in the Southern Pines 100K (geochronology data location G); and 553.2 ± 2.5 Ma (MSWD = 1.6) for a sample collected near the landfill in the Troy area in the Southern Pines 100K (geochronology data location C). Two samples were analyzed from the eastern portion of the Charlotte 100K in the vicinity of Dennis Mountain in the Uwharrie National Forest. LA-ICP-MS $^{206}Pb/^{238}U$ weighted means ages from the samples yielded: 539.4 ± 1.8 Ma (MSWD = 1.6) (sample CLT100k_BoormanE7_CGS6) and 546.0 ± 3.1 Ma (MSWD = 1.6) (sample CLT100k_BoormanE9_CGS7).

The previously existing and new age data indicate that volcanism of the Morrow Mountain Rhyodacite Suite spanned from ca. 553 Ma to ca. 536 Ma and was contemporaneous with the Uwharrie Volcanic Complex (discussed below) and deposition in the Albemarle Group.

REDEFINITION OF THE UWHARRIE FORMATION TO UWHARRIE VOLCANIC COMPLEX

Seiders (1981) separated the Uwharrie Formation into multiple units that include metamorphosed felsic lavas, dikes and volcanic necks of varying textures along with associated coarse-grained volcaniclastic, pyroclastic and sedimentary rocks. The volcaniclastic rocks include metamorphosed tuffaceous sandstones, conglomeratic sandstones, and siltstones with lesser amounts of fine- to coarse tuff. Fiamme-like shaped clasts are common in the conglomerates, sandstones and tuffs. Quartz and feldspar crystal fragments are common in the sedimentary components, tuffs and lavas. Subordinate amounts of intermediate to mafic volcanic and volcano-sedimentary rocks and find grained clastics (siltstones and mudstones) are present in the Uwharrie Formation units of Seiders (1981).

Previous geochronological data indicated that the Uwharrie Formation is ca. 550 Ma (Ingles et al., 2003). Pollock et al. (2010), reported a youngest detrital zircon age of ca. 545 Ma from a sample reportedly from the oldest portions of the Formation. Hibbard et al. (2013) speculated that the Uwharrie Formation may be time transgressive or previous mapping was in error and that additional geochronologic and mapping work is needed to properly determine the extent and nature of the Uwharrie Formation. Recent geochronologic data from rocks assigned to the Uwharrie Formation indicate that problems exist with the definition of the Formation. Detrital zircon and crystallization ages from this study indicate that units previously interpreted as intrusive into surrounding volcaniclastic units are in disconformable contact (e.g. - Daves Mountain in the Asheboro area is older than the surrounding clastic unit). Additionally, a sample of rhyodacite from the "core" of the Uwharrie Formation (geochronology data location FF) yields a crystallization age of ca. 537 Ma (Table 1) which is inconsistent with the area being the oldest portions of the Formation. According to the North American Stratigraphic Code, a Formation should have a defined stratigraphic position. Geochronologic data indicates that rocks mapped as part of the Uwharrie Formation are packages of rocks that represent volcanic centers and related volcaniclastic debris that vary in age. As such, the Uwharrie Formation may be better defined as a package of lithodemic units. While additional investigation into the stratigraphic nomenclature continues, for this map, the Formation nomenclature is dropped and Uwharrie Volcanic Complex is used to emphasize the volcanic origin and restricted regional distribution of the package of rocks.

Uwharrie Volcanic Complex (Uwharrie Formation) legacy and new geochronology data

A summary of existing and new age dates within the Chapel Hill 100K map are provided in Table 1. For a summary of existing and new age dates in the Southern Pines 100K, see the Open-file report of the Southern Pines 100K.

Ingle et al. (2003) reported the weighted average of six $^{206}Pb/^{238}U$ ages for zircon grains by SHIRMP methods of 554±15 Ma for a sample from the Uwharrie Formation (SB-9) in unit Zurlt in the Southern Pines 100K. This location was resampled as part of this study and yielded LA-ICP-MS $^{206}Pb/^{238}U$ weighted means ages of 537.6 ± 2.8 Ma (MSWD = 1.8). Goliber and Coleman (2023) reported a CA-ID-TIMS weighted mean age of 548.7±1.1 Ma from a felsic volcanic rock in the unit on the Chapel Hill 100K

(geochronology data location O). A new and unpublished, LA-ICP-MS $^{206}Pb/^{238}U$ weighted means age yielded 537.4 ± 5.7 Ma (MSWD = 0.86) for a sample collected from Luther Place trail area in the Uwharrie Volcanics (geochronology data location FF).

New and unpublished LA-ICP-MS U-Pb detrital zircon ages include: MDA of 533 Ma. for sample CH100K-3675 (geochronology data location W); MDA of 526 Ma for sample CH100K-3834 (geochronology data location AA); and MDA of 552 Ma for sample CH100K-Ben-165 (geochronology data location T).

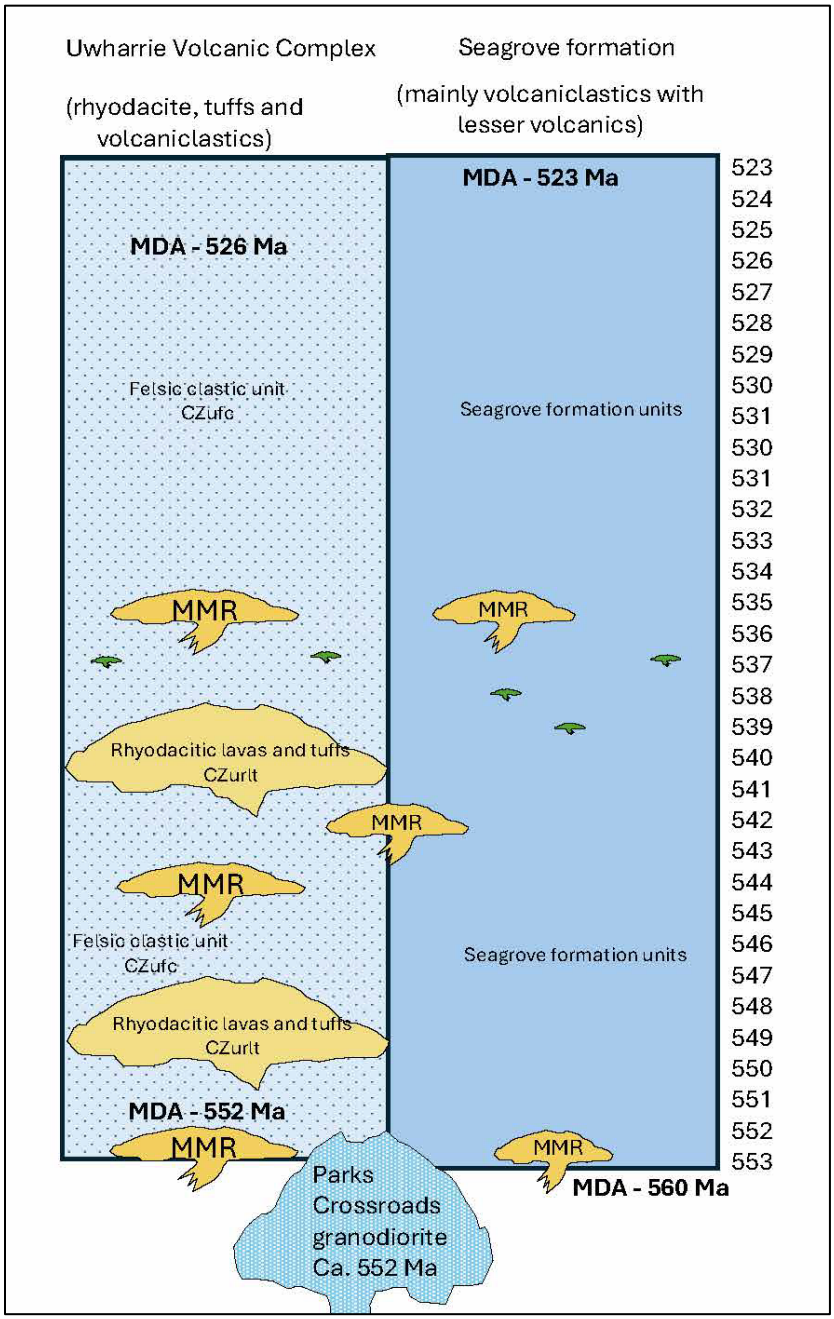


Figure 1: Generalized stratigraphy of the Uwharrie Volcanic Complex and Seagrove formation. MMR = Morrow Mountain Rhyodacite Suite.

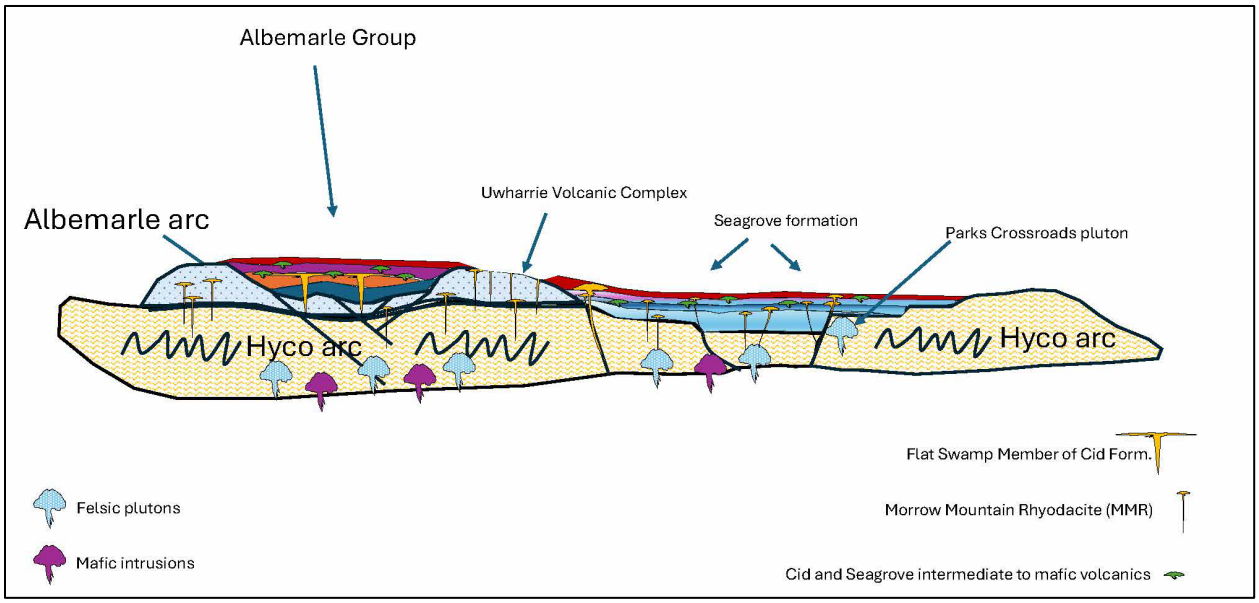


Figure 2: Sketch of proposed redefined Uwharrie Volcanic Complex and newly defined Seagrove formation and their relationship to the Albemarle Group - ca. 560 to 523 Ma.

The previously existing and new age data indicated that volcanism and sedimentation of the Uwharrie Volcanic Complex spanned from ca. 552 Ma to ca. 526 Ma and was contemporaneous with the deposition of the Seagrove formation and deposition in the Albemarle Group (Figures 1 and 2).

SEAGROVE FORMATION (informal name)

Extensive areas identified as Aaron Formation by Harris (1984) and Harris and Glover (1988) have been tentatively assigned to the newly defined Seagrove formation (this map). An overall defining characteristic of the Seagrove formation is the presence of quartz bearing conglomerates, conglomeratic sandstones and sandstones interlayered with varying amounts of finer-grained volcaniclastic sediments that include bedded siltstones and mudstone. Individual units of the Seagrove formation are generally defined by the abundance of coarse-grained clastic sediments with respect to fine-grained clastic sediments. Proximal facies (proximal to Uwharrie Volcanics units) are dominated by immature tuffaceous conglomerates, conglomeratic sandstones and sandstones with abundant clasts of rhyodacite and crystal fragments of plagioclase and quartz. Quartz crystal content locally varies. Medial to distal facies are dominated by conglomeratic siltstones (graywacke), sandy siltstones, siltstones and bedded siltstone and mudstone. Lenses of quartz bearing conglomeratic sandstones and sandstones are locally present (Figure 3).

Data from the Seiders (1981) map in the Asheboro area was utilized in the compilation effort for the Chapel Hill 100K and on-strike units in the Southern Pines 100K. Following accepted regional stratigraphy, Seiders (1981) separated his units, from oldest to youngest, into the Uwharrie Formation

and the Tillery and Cid Formations of the Albemarle Group (Stromquist and Sundelius, 1969 and Milton, 1984). The units of Seiders (1981) were maintained for the most part except in areas where new or recent age dates required modifications (ex. portions of the unit CZufc (felsic volcaniclastic rocks) on the east side of the Seiders (1981) map were reassigned to the Seagrove formation and CZups (porphyritic felsite near Seagrove) was reassigned to the Morrow Mountain Rhyodacite).

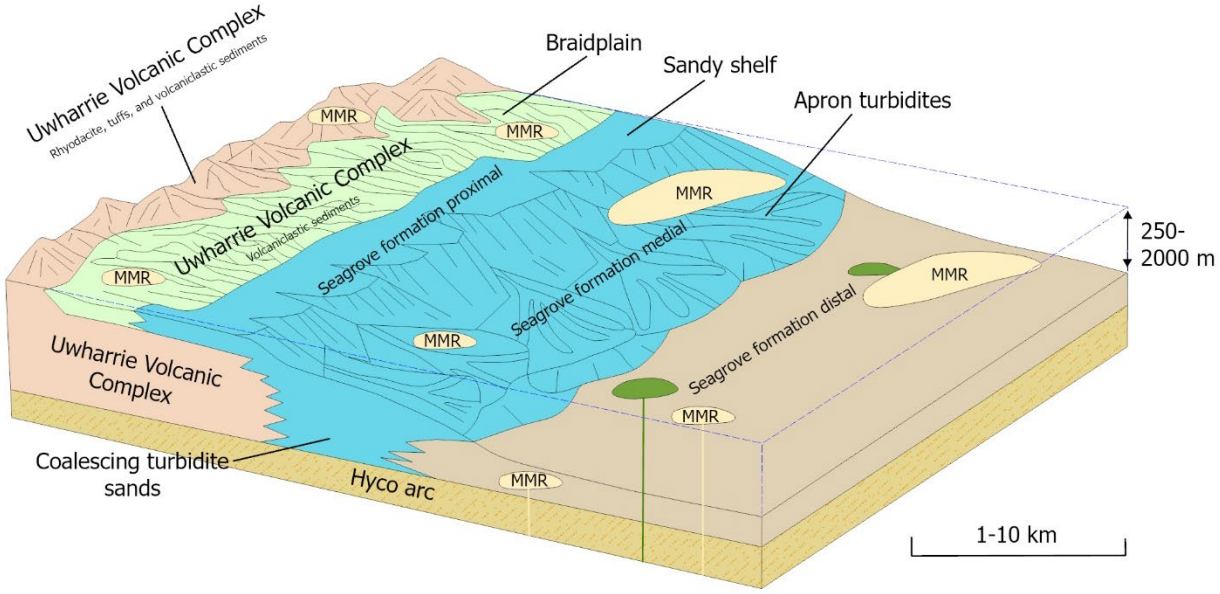


Figure 3: Preliminary interpretation of the environment of deposition of the newly defined Seagrove formation with respect to the Uwharrie Volcanic Complex. Base figure after Stow and Mayall (2000) and Reading and Richards (1994) of a sand-rich submarine fan system. Green units are andesitic to basaltic volcanics. Morrow Mountain Rhyodacite suite units (MMR).

Seagrove formation new geochronology data

Pollock et al. (2010) reported a youngest detrital zircon of ca. 545 Ma. from the Erect member of the Uwharrie Formation (now included in the Seagrove formation). LA-ICP-MS U-Pb zircon analyses from sandstones from Seagrove formation units in the Chapel Hill 100K indicate the presence of abundant detrital zircons associated with the Albemarle arc (Bradley, 2023; Pelt and Bradley, 2023). Additionally, a re-evaluation of these zircon analyses yield the following: for NCGS sample Coleridge-3055, there is a distinct age distribution that is < 600 Ma and all Maximum Depositional Ages (MDA) between ca. 545 Ma and ca. 549 Ma; for NCGS sample Bear Creek-626, all MDAs are between ca. 551 Ma and ca. 560 Ma (T. LaMaskin, personal communication, 2025). An additional re-revaluation of data by NCGS staff in 2026 of Coleridge-3055 and Bear Creek-626 yielded MDAs of Ca. 540 Ma and 537 Ma, respectively.

New and unpublished, LA-ICP-MS U-Pb zircon analyses from additional Seagrove formation unit samples in the Chapel Hill and Southern Pines 100K map areas include: MDA of 559 Ma for sample COL-8005 in the Chapel Hill 100K; MDA of 554 Ma for sample COL-472 in the Chapel Hill 100K; MDA of 543 Ma for sample SP100K-550363 in the Southern Pines 100K; MDA of 533 Ma for sample CH100K-3675 in the Chapel Hill 100K; MDA of 526 Ma for sample CH100K-3834 in the Chapel Hill 100K; MDA of 524 Ma for

sample SP100K-550946 in the Southern Pines 100K; and MDA of 523 Ma for sample CH100K-3839 in the Chapel Hill 100K. A summary of existing and new age dates within the Chapel Hill 100K map are provided in Table 1. For a summary of existing and new aged dates in the Southern Pines 100k, see the Open-file report of the Southern Pines 100K.

The previously existing and new age data indicated that sedimentation of the Seagrove formation spanned from ca. 560 Ma to ca. 523 Ma and was contemporaneous with the Uwharrie Volcanic Complex and deposition in the Albemarle Group.

ALBEMARLE GROUP

CID and TILLERY FORMATIONS

Rock units of the Cid and Tillery Formations are present in the western portion of the map area. These map areas are immediately on strike with mapped units in the Charlotte 250K (Goldsmith et al., 1988) and more detailed-scale map of Stromquist and Henderson (1985).

ALBEMARLE ARC RELATED PLUTONIC ROCKS

The Parks Crossroads pluton (Zagd-p) is located in the west-central part of the Chapel Hill 100K. Morrison and Coleman (2023) reported a new U-Pb zircon age for the Parks Crossroads pluton of ca. 552 Ma (Table 1) (geochronology data location U). Past regional mapping shows the Parks Crossroads pluton truncating units assigned to the Aaron Formation.

Also, a small pluton of diorite and gabbro is present in the southwestern portion of Chatham County in the map area. Informally named the Providence Church Road diorite (Zdi-pcr) (Bradley et al., 2022c), it was described by Green et al. (1982) as a “roughly circular” pluton that cuts the surrounding unit. The apparent truncation of the surrounding units by both the of Parks Crossroads pluton and the Providence Church Road diorite are problematic because detrital zircon data indicate the surrounding volcano-sedimentary units yield MDA ranges from ca. 560 Ma to 523 Ma (see Seagrove formation new geochronology data section).

Moye (2023), presents a new model of intra-arc rifting in the Carolina terrane. Generally, he proposes that Uwharrie magmatism was active ca. 554 – 551 Ma with rifting beginning ca. 547 Ma with the deposition of the Cid Formation. Rifting could have exhumed deeper plutonic rocks associated with the Uwharrie magmatic phase of the Albemarle arc (i.e. Parks Crossroads Pluton and the Providence Church Road diorite) and disconformably deposited sediments with younger MDAs on top of the plutonic units.

FOLDS IN THE CAROLINA TERRANE

Folds in Hyco and Aaron Formations

The Hyco Arc and Aaron Formation lithologies were folded and subjected to low grade metamorphism during the ca. 578 to 554 Ma (Pollock, 2007; Pollock et al., 2010) Virgilina deformation (Glover and

Sinha, 1973; Harris and Glover, 1985; Harris and Glover, 1988; and Hibbard and Samson, 1995). In the map area, original layering of Hyco and Aaron Formation lithologies is observed ranging from shallowly to steeply dipping. The range of structural attitude is interpreted to be a result of open to tight folds that are locally overturned. Sterograms and other structural data are provided in Thompson et al. (2023).

Rocks in the map area were also subjected to the ca. 450 Ma Cherokee deformation and low grade metamorphism (Hibbard et al., 2010 and 2012). Outcrop evidence of Cherokee deformation in the map area is scarce. Evidence is best exposed in area pyrophyllite mines where outcrop-scale folds deform an earlier foliation (see field trip stop 7 in Clark et al., 2011). This folding is associated with local deformation along several identified high-angle reverse faults in the map area (e.g. Glendon Fault).

In general, Hyco Formation rock units have been affected by the Virgilina and Cherokee deformations. Both deformations were generally co-planar, as such the metamorphic foliations in most locations are indistinguishable. The typical close to tight fold geometry of Hyco related units may be the result of the tightening of Virgilina deformation folds by the Cherokee deformation.

Folds in Albemarle arc units

Albemarle arc units have been affected by the Cherokee deformation. Folds attributed to the Cherokee deformation are generally open folds and include the well known Silver Valley Syncline, Denton Anticline, New London Syncline and Troy Anticline (located in the western portions of the Albemarle arc). These large folds do not appear to extend into the Chapel Hill 100K, however multiple map scale folds identified by past workers are included on the compiled map.

FAULTS

High-angle reverse faults

Several terrane-internal ductile faults have been recognized in Chatham, Moore and Randolph counties within the Carolina terrane. The best known is the Glendon fault which has long been recognized by past workers (e.g. Stuckey, 1928 and Conley, 1962). The Glendon fault is a high angle reverse fault that is a locus of pyrophyllite alteration for a distance of over 30 km (18 miles) in northeast Moore County and into southern Chatham County. The Glendon fault is interpreted to be parallel to the axial surfaces of regional-scale overturned folds and disrupts an anticline near its crest (Green et al., 1982 and Klein, 1985). In general, the Glendon fault is a zone of intense deformation ranging from 10 to 50 meters wide with abundant small-scale folds, fractures and deformed and undeformed quartz veins indicating a complicated movement history (Klein, 1985). Quartz veins may be folded and high-strain foliations present within the fault zone overprinting and/or transposing primary bedding and regional foliation. Main movement on the Glendon fault is speculated to be related to the Cherokee deformation.

Several other high-angle reverse faults with varying degrees of hydrothermal alteration were identified during mapping. Metamorphic foliation data indicate that the dip of the foliation progressively becomes more shallow to the southeast approaching the high-angle faults. In the immediate area of the faults, sericite (± pyrophyllite) phyllites and schistose phyllites with composite-like fabrics are common. It is

interpreted that the older foliation has been transposed to a younger phyllonitic foliation within the fault zones.

Thrust faulting in the Carolina terrane?

In the Erect 7.5-Minute Quadrangle area of the Chapel Hill100K, newly collected structural data by NCGS staff and compiled structural data of Carpenter (1999) and Hibbard (unpublished field data) indicate abundant anomalous shallow dipping foliations and primary beddings consistently dipping northwest. The foliations typically dip less than 54 degrees to the northwest with a significant population with dips between 18-36 degrees. Mineral lineation data is sparse but indicate possible stretching in a northwest to southeast parallel orientation. The nature of these low-lying foliations are not well understood but may be related to thrust faulting and the presence of thrust duplexes(?). Tentatively, a thrust fault has been mapped separating hydrothermally altered volcaniclastic rocks of the Hyco Formation and Seagrove formation rock types. If an accurate interpretation, other un-mapped thrust faults may be present in the surrounding areas.

Other faulting

The historic Clegg Copper Mine (Kerr and Hanna, 1893) located in the Colon Quadrangle is present within a quartz mineralized zone that is interpreted to have been a pre-metamorphic fault – the Copper Mine Fault (Babiker, 1978). The Copper Mine Fault is oriented parallel to later Mesozoic brittle faulting.

Abundant evidence of brittle faulting at the outcrop-scale and map-scale as well as large-scale lineaments (as interpreted from hillshade LiDAR data) are present in the map area. The brittle faulting and lineaments are interpreted to be associated with Mesozoic extension. Major named brittle normal faults include: the Jonesboro Fault, Bonsal-Morrisville Fault, Deep River Fault, Gulf Fault and Indian Creek Fault. The map area includes the Colon cross-structure that marks the transition between the Durham and Sanford sub-basins (Campbell and Kimball, 1923 and Reinemund, 1955). Numerous map-scale relay ramps are present in this area. A fault-bounded block within the Carolina terrane along the Deep River (in the northwest corner of the Moncure Quadrangle and southwest corner of the Merry Oaks Quadrangle) has been identified with metamorphic foliations rotated up to 90 degrees clockwise. This rotation is speculated to be related to rotation of a breeched relay ramp (see Bradley, 2023, field trip stop 8a).

LiDAR LINEAMENTS

Linear geomorphic features interpreted from hillshade LiDAR are included on the map. The inclusion of LiDAR lineaments is an outgrowth of NCGS derivative publication – *Groundwater Features Map of Chatham County and Surrounding Areas* (Bradley and Bolich, 2022).

The Hillshade LiDAR dataset displays a visually striking network of lineaments that are parallel to diabase dikes and known orientations of brittle faults. Some of these lineaments can be traced for multiple miles across the map area. The lineaments are interpreted to be likely fracture zones; however, field

observations could not confirm the presence of each potential brittle fault. The map area has hundreds of lineaments when viewed at varying scales. Only the major lineaments that are easily visible at 50,000- to 100,000-scale are identified on the map.

Multiple unmarked geomorphic lineaments are visible when viewed at 24,000- to 50,000-scale on the elevation data from LiDAR. These minor lineaments extend for short distances (100's to 1000's of feet). Minor lineaments are not indicated on the map but can be identified by a close inspection of the LiDAR data. These minor lineaments may have important implications for site-specific investigations. Site specific studies should review lineaments at the 24,000-scale or greater. Like brittle faults, lineaments can widely vary in length and width. Major lineaments extend for miles and have linear topographic expressions that are 100's to greater than 500 feet wide in some locations.

EASTERNMOST CAROLINA TERRANE IN CHATHAM COUNTY

The southeastern corner of the map area is underlain by metamorphosed crystalline rocks of the Cary sequence (Parker, 1979; Farrar, 1985). The Cary sequence is interpreted to be part of the Carolina terrane but separated from the rest of the terrane by the Triassic basin (Hibbard et al., 2002). One of the main rock units is the Big Lake-Raven Rock schist. In the Cary Quadrangle, a sample from the unit yielded discordant 207Pb/206Pb zircons ages of 573, 574, and 579 Ma and an upper intercept age of 575 ± 12 Ma, interpreted as the time of crystallization (Goldberg, 1994). This is a similar age to parts of the Aaron Formation.

DEEP RIVER TRIASSIC BASIN

Portions of the eastern and south-central areas of the map area are underlain by Triassic-aged sedimentary rocks of the Deep River Mesozoic basin. The basin is separated into three sub-basins (Durham, Sanford and Wadesboro). The Colon cross-structure (Campbell and Kimball, 1923 and Reinemund, 1955), located within Chatham and Lee counties, is a constriction zone in the basin characterized by crystalline rocks overprinted by complex brittle faulting. The Colon cross-structure marks the transition between the Durham and Sanford sub-basins.

SANFORD AND DURHAM SUB-BASINS STRATIGRAPHY

The Merry Oaks and Moncure quadrangles within the Chapel Hill 100K are situated in the transition between the Sanford and Durham sub-basins. In the Sanford sub-basin, three stratigraphic units have been identified and formalized from oldest to youngest as the Pekin, Cumnock and Sanford Formations (Campbell and Kimball, 1923 and Reinemund, 1955). In the Durham sub-basin, this three-layer system is not recognized. Previous mapping by North Carolina Geological Survey staff separated the Durham sub-basin into lithofacies associations using the nomenclature of Smoot et al. (1988). Hoffman and Gallagher (1989) began using the lithofacies association nomenclature and it was subsequently adopted for all mapping in the Durham sub-basin. The formation mapping of Reinemund (1955) in the Sanford sub-basin and the lithofacies association mapping in the Durham sub-basin are incompatible (Clark et al., 2001). These two methods of mapping meet in the Moncure and Merry Oaks quadrangles. The

detailed investigation of the contrasting mapping methods and establishment of a unified stratigraphic nomenclature for the Sanford and Durham sub-basins was out of the scope of this mapping project. As such, the map units from the adjacent Cokesbury Quadrangle (Butler et al., 2016) were extended into the Moncure Quadrangle to rectify edge-match issues and mark the change of unit nomenclature from the Sanford sub-basin to the Durham sub-basin. Olsen et al. (2015, figure 12), indicates that Lithofacies Association II and III of the Durham sub-basin are younger than units in the Sanford sub-basin. Additional work is needed to establish a new stratigraphic nomenclature for the entire Deep River basin.

POST-TRIASSIC ROCK UNITS

Dikes of Jurassic diabase intrude the Triassic sedimentary and older crystalline rocks of the map area. Coastal Plain sediments are present in the southern portion of the map area. Quaternary alluvium is present in most modern river valleys, with at least two levels of fluvial terraces along the major drainages. These terraces, where preserved, likely mark the location and elevation of ancestral river systems, prior to incision to the modern floodplain levels (see Grimley, 2023 this volume).

FUTURE WORK AND UNANSWERED QUESTIONS

The activities associated with this open-file report included the compilation of existing work, collection of new data to in-fill data gaps, refinement of geologic contacts and rectifying edge-match issues, and the collection of samples for modern geochronology. There are several unanswered questions and relationships that are still unresolved and out of the scope of this compilation effort.

Age, stratigraphic relationship and provenance of the Aaron Formation

The Aaron Formation, first defined by Glover and Sinha (1973) in the type-area near the North Carolina-Virginia line, was later extended into parts of Chatham and Randolph counties by Harris (1984) and Harris and Glover (1988). The Aaron Formation, as defined by Pollock (2007) and Pollock et al. (2010), contains sediments eroded from the Hyco arc prior to the Virgilina deformation. New detrital zircon analyses (this report) indicate that large portions of the geologic unit originally grouped with the Aaron Formation contain sediments with detrital zircons sourced from the Albemarle arc. Additionally, Bradley et al. (2025), reported Preliminary $^{206}Pb/^{238}U$ detrital zircon ages from a sample on the eastern limb of the Virgilina synclinorium in the type-area of the Aaron Formation as containing a significant population of Albemarle arc-aged zircons (e.g. Ca. 530-550 Ma). This data was further evaluated and yielded an MDA of Ca. 545 Ma. (T. LaMaskin, personal communication, 2025). As such, large portions of the Aaron Formation in the type locality may be Albemarle arc related putting the stratigraphic placement of the Aaron Formation in question.

Accuracy of youngest detrital zircons and resulting interpretations

The new detrital zircon data was analyzed by laser ablation inductively-coupled plasma mass spectrometry (LA-ICP-MS). Herriott et al. (2025) indicate that there may be a young bias for laser ablation dates. Additionally, Dai et al. (2025), demonstrated that hydrothermal alteration may affect zircons. The calculated maximum depositional ages (MDAs) include multiple young detrital zircons

(some as young as ca. 520 Ma.). If the detrital zircon data is biased to a younger age, then some of interpretation of this report may be in question and include: 1) the contact of portions of the Seagrove formation to the Parks Crossroads pluton interpretation as a disconformity and 2) the MDAs of the Seagrove formation and Uwharrie Volcanic Complex.

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The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

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DESCRIPTION OF MAP UNITS

UNMETAMORPHOSED INTRUSIVE BODIES

Jd **Diabase (Jurassic)**—Black to greenish-black, fine- to medium-grained, dense, consists primarily of plagioclase, augite and may contain olivine. Locally has gabbroic texture. Occurs as dikes up to 100 ft wide. Diabase typically occurs as spheriodally weathered boulders with a grayish-brown weathering rind. Red station location indicates outcrop or boulders of diabase. Purple station locations indicate outcrop or boulders of gabbroic textured diabase.

MPzgb **Gabbro (Mesozoic to Paleozoic)**—Melanocratic (CI>50), fine-grained gabbro. Distinctive brown weathering. Occurs as a small map scale body and dike in the Crutchfield Crossroads Quadrangle that is closely associated with a diabase dike. In the Siler City Quadrangle occurs as isolated boulders along the trend of a diabase dike. Appears unmetamorphosed.

MPzgb-wx **Olivine gabbronorite in the White Cross area (Mesozoic to Paleozoic)**—Unfoliated, black, medium- to coarse-grained gabbronorite. In thin section, olivine, plagioclase, orthopyroxene and clinopyroxene are present with no apparent metamorphic overprint. In field, rock is similar in appearance to coarse-grained diabase.

MZlamp **Lamprophyre (?) (Mesozoic to Neoproterozoic)**—Gray to pinkish gray, fine- to medium-grained, exceptionally dense, with alkali-feldspar, plagioclase and amphibole. The groundmass consists of alkali feldspar and plagioclase, with alkali feldspar more abundant than plagioclase. Plagioclase crystals (>1 cm)

also occur are subhedral and commonly zoned. Locally, amphibole occurs in elongate slender prismatic habit (1-4 mm) and is randomly oriented. Sparse amygdules of quartz(?) up to 5 mm present locally. The rock is unmetamorphosed but may have magmatic and/or hydrothermal alteration. Occurs as dikes that are coincident with diabase. Outcrop and boulders are typically spheriodally weathered with reddish-brown weathering rind. Red square station locations mark outcrops or boulders.

TRIASSIC SEDIMENTARY ROCKS OF THE NEWARK SUPERGROUP

DEEP RIVER BASIN

DURHAM SUBBASIN

LITHOFACIES ASSOCIATION III

Trcs Interbedded sandstone and pebbly sandstone of the Chatham Group Lithofacies Association III (Triassic)—Reddish-brown to dark brown, irregularly bedded to massive, poorly to moderately sorted, medium- to coarse-grained, muddy lithic arkoses, with occasional, matrix-supported granules and pebbles or as 1-5 cm thick basal layers. Muscovite is common to absent. Occasional bioturbation is usually surrounded by greenish-blue to gray reduction halos. Beds are tabular, 1-3 meters thick, with good lateral continuity. Unit grades eastward into Trcs/c.

Trcs/c Sandstone with interbedded conglomerate of the Chatham Group Lithofacies Association III (Triassic)—Reddish-brown to dark brown, irregularly bedded, poorly sorted, coarse-grained to pebbly, muddy lithic sandstones with interbedded pebble to cobble conglomerate. Muscovite is rare to absent in the matrix. Well-defined conglomerate beds distinguish this unit from conglomerate basal lags of Trcs. An arbitrary cut-off of less than 50 percent conglomerate distinguishes this unit from the Trcc conglomerate facies. Conglomerate beds are channel-shaped and scour into the underlying sandstone beds. Unit grades eastward into Trcc.

Trcc Conglomerate of the Chatham Group (Triassic)—Reddish-brown to dark brown, irregularly bedded, poorly sorted, cobble to boulder conglomerate. Muscovite is rare to absent in the very coarse-grained to gravelly matrix. An arbitrary cut-off of greater than 50 percent conglomerate distinguishes this unit from the Trcs/c facies. Clasts are chiefly miscellaneous felsic and intermediate metavolcanic rocks, quartz, epidote, bluish- gray quartz crystal tuff, muscovite schist, and rare meta-granitic material. Maximum clast diameters are in excess of 2 m locally.

LITHOFACIES ASSOCIATION II

Trcs/si2 Sandstone with interbedded siltstone of the Chatham Group Lithofacies Association II (Triassic)—Cyclical depositional sequences of whitish-yellow to grayish-pink to pale red, coarse- to very coarse-grained, trough cross-bedded

lithic arkose that fines upward through yellow to reddish-brown, medium- to fine-grained sandstone, to reddish-brown, burrowed and rooted siltstone. Bioturbation is usually surrounded by greenish-blue to gray reduction halos. Coarse-grained portions contain abundant muscovite, and basal gravel lags consist of clasts of quartz, bluish-gray quartz crystal tuff, and mudstone rip-ups.

Trcsi/s Siltstone with interbedded sandstone of the Chatham Group Lithofacies Association II (Triassic)—Reddish-brown, extensively bioturbated, muscovite-bearing, siltstone interbedded with tan to brown, fine- to medium-grained, muscovite-bearing, arkosic sandstone, usually less than one meter thick. Siltstones can contain abundant, bedded, calcareous concretions (interpreted as caliche) and iron nodules. Bioturbation is usually surrounded by greenish-blue to gray reduction halos.

Trcsi/sCL Siltstone with interbedded sandstone of the Chatham Group Lithofacies Association II with chert and limestone (Triassic)—Mainly siltstone of Lithofacies II with local occurrence of chert and less common limey sediments and nodular and thin limestones. Unit contacts are based on Bain and Harvey (1977) and Wheeler and Textoris (1978).

LITHOFACIES ASSOCIATION I

Trcs/si1 Sandstone with interbedded siltstone of the Chatham Group Lithofacies Association I (Triassic)—Pinkish-gray, light-gray, and light-tan; fine- to coarse-grained, micaeous, slightly clayey, moderately poor to moderately well sorted, subangular to subrounded arkose and lithic arkose; maroon, very silty, micaeous, moderately well sorted, fine-grained sandstone; and maroon, massive, and thickly laminated, bioturbated, micaeous to very micaeous, siltstone and mudstone. Muscovite flakes up to 3 mm diameter are common especially in the siltstone. Fine-grained flakes of biotite in the arkose and lithic arkose is a distinctive accessory. Randomly oriented and vertical, cylindrical structures often filled with pale-green, fine-grained, quartz sandstone are interpreted as burrows. Bedding, when observed, is parallel to slightly wavy, occurring as thick laminations to thinly bedded (0.5 cm to 5 cm). These rocks are assigned to the Lithofacies Association I of Hoffman and Gallagher, 1989 and Watson, 1998. The clastic rocks of Lithofacies Association I are interpreted to have been deposited in a braided stream fluvial system.

OTHER UNITS OF THE DURHAM SUBBASIN

Trcc-m **Conglomerate of the Chatham Group in the Merry Oaks Quadrangle (Triassic)**—Reddish-brown to dark brown, irregularly bedded, poorly sorted, cobble to boulder conglomerate. Clasts are chiefly miscellaneous felsic and intermediate metavolcanic rocks and quartz. Typically present adjacent to border faults.

SANFORD SUBBASIN

Trs **Sanford Formation (Triassic)**—Mainly red to brown, locally purple, coarse-grained, arkosic sandstones and conglomerates. Subordinate amounts of claystone, siltstone and fine-grained sandstone (Reinemund, 1955).

Trsc **Conglomerate of the Sanford Foramation (Triassic)**—Mainly conglomerates with fragments of metamorphic rock and quartz embedded in and interbedded with red mudstone, siltstone and sandstone (Reinemund, 1955). Equivalent to Trcc of Lithofacies Association III in the Cokesbury Quadrangle.

Trc **Cumnock Formation (Triassic)**—Gray and black claystone, shale and siltstone. Gray sandstone. Contains beds of coal and carbonaceous (organic-rich) shale (Reinemund, 1955). Includes coal horizons.

Trp **Pekin Formation (Triassic)**—Gray, Brown to maroon, white mica bearing, interbedded mudstones, siltstones and arkosic sandstones. Outcrops and boulders of float identified as part of Pekin Formation are strongly indurated compared to conglomerates identified as part of Chatham Group. Identified as the Pekin Formation by Reinemund (1955).

Trpc **Conglomerate of the Pekin Formation (Triassic)**—Reddish-brown to dark brown to purplish-red, irregularly bedded, poorly sorted, cobble to boulder conglomerate. Clasts are chiefly miscellaneous felsic and intermediate metavolcanic rocks and quartz. Typically present adjacent to border faults. Outcrops and boulders of float identified as part of Pekin Formation are strongly indurated compared to conglomerates identified as part of Chatham Group. Identified as the Pekin Formation-basal conglomerate by Reinemund (1955).

MISSISSIPPIAN TO PERMIAN INTRUSIVE ROCKS

PzZg **Granite of the Cane Creek Mountains (Paleozoic to Neoproterozoic)**—Distinctively pink to orange-pink, leucocratic, medium-grained hypidomorphic granular granite. Locally silicified. Silicification causes parts of rock to break conchoidally, similar to felsic volcanic rocks. Potassium feldspar minerals are obvious; mafic minerals are composed of aggregates of chlorite. This unit intrudes rocks interpreted to be related to Albemarle Arc. Locally leucocratic, medium-grained granodiorite. Similar in appearance to Zagd. Equivalent to Granite intrusions in the Cane Creek Mountains (Zcg) of Schmidt et al. (2006). Schmidt et al. (2006) interpreted this to be the youngest rock in the study area, a Carboniferous-age pluton, but lacks an age date.

EASTERNMOST CAROLINA TERRANE

METAINTRUSIVE UNITS

BUCKHORN DAM META-INTRUSIVE SUITE

CZbg **Meta-granitoid rocks of the Buckhorn Dam intrusive suite (Cambrian to Neoproterozoic)**—Dark-colored (CI=15-30), medium- to fine-grained, metatonalite, metagranodiorite and metagranite with variably developed

foliation; composed mainly of plagioclase, quartz, epidote, microcline, biotite, and opaque minerals, with minor amounts of sericite, sphene, chlorite, and garnet. The more felsic granitoid rocks are mineralogically and chemically similar to the felsic metavolcanic rocks described below, and are probably the intrusive equivalents. The unit includes a number of small granitoid bodies, probably originally dikes and plugs, intruding felsic metavolcanic rocks northeast of the main outcrops of Buckhorn Dam intrusive suite.

CARY METAMORPHIC SUITE

CZbr3 **Big Lake-Raven Rock schist 3 (Cambrian to Neoproterozoic)**—Light tan to orange-brown, fine- to medium-grained, white mica schist, phyllite and gneiss. Locally preserves primary volcanic texture, either fragmental or porphyritic. Inferred to have a dacitic volcanic and/or volcaniclastic protolith. Locally includes intermediate to mafic composition rocks that have been metamorphosed to mica phyllite.

CAROLINA TERRANE

ALBEMARLE ARC

ALBEMARLE ARC PLUTONS

CZagb-sm **Stony Mountain Gabbro (Cambrian to Neoproterozoic)**—Massive, grayish-green to dark-greenish-gray, fine to coarse grained. Composed of secondary amphibole, in part with cores of clinopyroxene, calcic plagioclase, epidote, chlorite, and quartz, with accessory sphene, apatite, calcite, phlogopite, and opaque minerals. Occurs as sheets, dikes, and irregular intrusive bodies; most common within well-bedded sedimentary and volcanic rocks. The sheet exposed west of Back Creek Lake has a basal zone rich in serpentine pseudomorphs after olivine; "comb layering" (Moore and Lockwood, 1973) is well exposed in the quarry at the top of the same sheet (Seiders and Wright, 1977). A sample collected from Ridges Mountain (west of Asheboro) in the unit yielded an age of ca. 545 Ma (DeDecker et al., 2013).

CZgb-e **Gabbro dikes in the Erect Quadrangle (Cambrian to Neoproterozoic)**—Medium- to dark-green, coarse-grained gabbro. Composed of amphibole, epidote, chlorite and uralite. May be related to Stony Mountain Gabbro.

CZdi-e **Diorite dikes in the Erect Quadrangle (Cambrian to Neoproterozoic)**—Medium-gray to pink, fine-grained dike. Contains plagioclase and hornblende with minor quartz, chlorite, epidote and opaque minerals.

CZda-e **Dacite dikes in the Erect Quadrangle (Cambrian to Neoproterozoic)**—Black to greenish-black, fine-grained dacite dikes. Contains plagioclase, quartz and magnetite. Has flow texture locally.

CZmd-r **Mafic porphyry dikes of the Ramseur area (Cambrian to Neoproterozoic)**—Dark greenish-gray to dark gray porphyritic dikes containing phenocrysts of plagioclase and pyroxene (pseudomorphed by actinolite) in an aphanitic

matrix. Present in the Ramseur area.

CZfd-r **Felsic porphyry dikes of the Ramseur area (Cambrian to Neoproterozoic)**—Medium to dark gray porphyritic dikes containing phenocrysts of plaqioclase +- quartz +- perthitic alkali feldspar in an aphanitic glassy matrix

Zagd-p **Granodiorite of the Parks Crossroads pluton (Neoproterozoic)**—Leucocratic (CI=5) , fine- to medium- grained, equigranular metamorphosed, granodiorite. Mineral assemblage includes quartz, plagioclase, and green hornblende +/- chlorite, +/- epidote. A sample collected from an abandoned quarry in the unit yielded a weighted mean age of ca. 552 Ma (Morrison and Coleman, 2023). Contact with Hyco arc units interpreted as an intrusive contact. Contact with Seagrove formation units may be an unconformity in places.

Zagd-pm **Granodiorite of the Pilot Mountain area (Neoproterozoic)**—Granodiorite, quartz monzonitic and dioritic plutonic rocks, dark greenish-gray; chlorite and epidote rich. Local porphyritic phases, some of which may include volcanic material. Generally foliated. No gradation to hydrothermally altered rocks recognized (Schmidt, 1985 USGS Bulletin 1562)

Zadigdt-pm **Diorite and granodiorite to tonalite of the Pilot Mountain area** (Neoproterozoic)—Diorite and granodiorite to tonalite, present in small plugs mapped by Harris (1982). Likely related to the Parks Crossroads pluton and granodiorite of the Pilot Mountain area. Contact with Hyco arc units interpreted as an intrusive contact. Contact with Seagrove formation units may be an unconformity in places.

Zdi-pcr **Diorite of the Providence Church Road area (Neoproterozoic)**—Mesocratic (CI~50), greenish-gray to grayish-green, fine- to medium-grained, metamorphosed, hypidiomorphic granular diorite. Major minerals include plagioclase and amphibole. Plagioclase crystals are typically sericitized and saussuritized. Amphiboles are typically altered to chlorite and actinolite masses. Gabbro intermingled locally.

Zdi-c **Diorite of the Colon Quadrangle (Neoproterozoic)**—Mesocratic (CI~50), greenish-gray to grayish-green, fine- to medium-grained, metamorphosed, hypidiomorphic granular diorite. Major minerals include plagioclase and amphibole. Plagioclase crystals are typically sericitized and saussuritized. Amphiboles are typically altered to chlorite and actinolite masses. Includes microdiorite textured rock. Locally, amphiboles are acicular up to 1 cm long. Located in the Colon Quadrangle.

Zabsi **Andesitic to basaltic shallow intrusive (Neoproterozoic)**—Grayish-green to light green, ranges from aphanitic to plagioclase porphyritic and locally amphibole/pyroxene porphyritic, metamorphosed, andesite to basalt. May exhibit a granular-textured groundmass with microdioritic to microgabbroic texture (visible with 7x hand lens). Dark green to black colored amphibole/pyroxene phenocrysts, when present, occurs as masses (up to 4 mm). Interpreted to intrude Hyco and Aaron Formations. May be an apophysis of the Zdi unit in map area. Occurs as spheroid-shaped boulders

and massive outcrop in map area.

Zgr-c **Granite of the Colon Quadrangle (Neoproterozoic)**—Leucocratic, locally pale pink; medium- to coarse-grained, equigranular metamorphosed granite and granodiorite; locally contains epidote and/or chlorite clots possibly pseudomorphic after hornblende. Located in the Colon Quadrangle.

Zhm **Hunter Mountain dike (Neoproterozoic)**—Distinctive, mesocratic, greenish-gray, plagioclase porphyritic (with plagioclase phenocrysts up to 1 cm long) granodiorite to diorite. Matrix is fine-grained consisting of interlocking plagioclase and amphibole (possibly pyroxene) crystals up to 1 mm. Correlated with the Hunter Mountain dike complex of Hauck (1977).

Zgbp **Gabbro to gabbro porphyry dike (Neoproterozoic)**—Gabbro to gabbro porphyry dike: Dark green to black, melanocratic, metamorphosed, medium-grained gabbro to fine-grained, plagioclase porhyritic gabbro porphyry. Present as a dike.

Zdi-porp **Diorite porphry of the Goldston Quadrangle (Neoproterozoic)**—Mesocratic to melanocratic (CI~50-60), greenish-gray to grayish-green, fine- to medium-grained groundmass with euhedral to subhedral phenocrysts (2-12 mm) of white to pale yellow plagioclase. Major minerals include plagioclase and amphibole. Plagioclase crystals are typically sericitized and saussuritized. Amphiboles are present as small clusters and are typically altered to chlorite and actinolite masses. The unit occurs as large boulders and/or outcrop that is nonfoliated and locally it includes aphanitic to porphyritic andesite to basalt. Appears to cut the Aaron Formation. Present in the Goldston Quadrangle.

Zic-z **Igneous complex of the Zachary Mines area (Neoproterozoic)**—Andesite to basalt, diorite to gabbro and granite. Includes microdiorite textured rock. Massive quartz locally present. Whole rock analyses of several rocks provided by Schmidt et al. (2006). Part of the Ztm unit of Schmidt et al. (2006).

MORROW MOUNTAIN RHYODACITE SUITE

CZmmr-ps **Morrow Mountain rhyodacite – porphyritic felsite near Seagrove (Cambrian to Neoproterozoic)**—Gray felsite with phenocrysts of albite and quartz. Occurs in a 3 km-wide belt and in small bodies on both sides of the belt. At the south end of the belt the felsite is flow layered, locally spherulitic, and the phenocrysts are relatively smaller and less abundant. To the north, in Randolph County, phenocrysts are larger (1-3 mm) and more abundant; flow layering and spherulites are generally absent. Both extrusive and shallow intrusive rocks may be represented. A sample collected from the southbound I-73/74 visitor center approximately 1.9 miles southwest of Seagrove in the unit yielded a preliminary concordia age of ca. 536 Ma (NCGS preliminary data).

CZmmr-psa **Altered Morrow Mountain rhyodacite – porphyritic felsite near Seagrove**

(Cambrian to Neoproterozoic)—Light gray quartzose sericite phyllite; locally contains pyrite; commonly iron oxide-stained where weathered. Pyrophyllite locally present. Interpreted as hydrothermally altered CZmmr-ps unit.

CZmmr-f **Morrow Mountain rhyodacite – felsite (Cambrian to Neoproterozoic)**—Light- to dark-gray felsite, in part with phenocrysts of albite and quartz. Locally spherulitic and flow layered. May include lava flows, domes, necks, and dikes. The felsic mass that includes Caraway Mountain, in the north-central part of the Seiders (1981) map area, in part has a fine-grained, holocrystalline groundmass and may have solidified at a somewhat deeper level. Select polygons of Ctf and CZuf from Seiders (1981) are reinterpreted as part of Morrow Mountain rhyodacite. A sample collected from Caraway Mountain in the unit yielded a preliminary concordia age of ca. 543 Ma (NCGS preliminary data).

ALBEMARLE GROUP

CID FORMATION

CZcv1 **Cid Formation volcanics and epiclastic rocks of northwestern Randolph County (Cambrian to Neoproterozoic)**—Mixed unit of mainly volcaniclastic sedimentary rocks and andesitic to basaltic lavas: grayish-green to green; metamorphosed non-tuffaceous to tuffaceous conglomerate, conglomeratic sandstone, sandstone, siltstone and bedded mudstone. Interlayed with gray-green, to green; typically unfoliated, amygdaloidal, plagioclase porphyritic, amphibole/pyroxene porphyritic, aphanitic and locally hyaloclastic; metamorphosed andesitic to basaltic lavas and shallow intrusions.

CZcv2 **Cid Formation volcanics and epiclastic rocks of High Point Lake area (Cambrian to Neoproterozoic)**—Mixed unit of mainly andesitic to basaltic lavas and volcaniclastic sedimentary rocks. Area with poor exposure of greenstones and metasedimentary rocks. Alternative interpretation is that area is a map scale xenolith of older Charlotte terrane related rock.

CZcmc **Mafic volcaniclastic rocks and subordinate mudstone (Cambrian to Neoproterozoic)**—Green, calcareous, thin- to very thick-bedded, tuff, lapilli tuff, and tuff breccia; commonly well bedded, poorly sorted, with abruptly alternating beds of tuff and lapilli tuff; local large-scale crossbedding. Mudstone is grayish-green, laminated to thin bedded

CZcml **Mafic lava flows (Cambrian to Neoproterozoic)**—Lens of grayish-green amygdaloidal basaltic lava

TILLERY FORMATION

CZtm **Laminated to thin-bedded graded mudstone (Cambrian to Neoproterozoic)**—Typically grayish-green, less commonly gray, in beds 1 mm to 4 cm thick. Beds grade upward from lighter colored siltstone to darker claystone. Beds are extremely regular, laterally persistent, and show no crossbedding. Thick-bedded mudstone is uncommon. Rare beds of graded sandstone consist of volcanic rock and mineral fragments of diverse composition in an abundant

argillaceous matrix. Contains biotite porphyroblasts

CZtpm **Pebbly mudstone and mudstone conglomerate (Cambrian to Neoproterozoic)**—Composed chiefly of angular- to well-rounded pebbles and locally cobbles of Tillery-like mudstone in a mudstone matrix. Locally contains sparse clasts of felsite. Subordinate volumes of laminated- to thin-bedded mudstone are interbedded with the conglomeratic rocks and locally show isoclinal folds of possible penecontemporaneous origin. Unit occurs in lenses near the volcanic neck at Shepherd Mountain in the northwestern part of the map area and may have formed when the neck was emplaced (Seiders and Wright, 1977)

CZtfc **Felsic volcaniclastic rocks (Cambrian to Neoproterozoic)**—Light-gray to pale-green tuff, lapilli tuff, and tuff breccia

CZtfm **Felsite, felsic volcaniclastic rocks and interbedded, laminated- to thin-bedded mudstone (Cambrian to Neoproterozoic)**—Felsite, felsic volcaniclastic rocks, and interbedded, laminated- to thin-bedded mudstone

CZtimv **Intermediate to mafic volcanics in the Tillery Formation (Cambrian to Neoproterozoic)**—Map scale bodies of metamorphosed gray-green, dark green and greenish-gray; typically unfoliated to weakly foliated, amygdaloidal, plagioclase porphyritic and aphanitic; andesitic to basaltic lavas and shallow intrusions. Hyaloclastic texture is common and imparts a fragmental texture on some outcrops and float boulders. Correlated with Ctb (basaltic rocks) of Stromquist and Henderson (1985).

CZtmc **Mafic volcaniclastic rocks (Cambrian to Neoproterozoic)**—Thin- to very thick bedded, grayish-green tuff, lapilli tuff, and tuff breccia. In addition to mafic volcanic debris, many rocks contain subordinate amounts of mudstone and felsic volcanic rock clasts

SEAGROVE FORMATION (INFORMAL)

CZsfc **Seagrove formation felsic volcaniclastic rocks (Cambrian to Neoproterozoic)**—Thin- to very thick bedded, light- to dark-gray, in part pale-green, tuff, lapilli tuff, and tuff breccia. The most abundant rock types are very thick bedded tuff, lapilli tuff, and tuff breccia, but in many parts of the map unit subordinate amounts of well-bedded, thin- to thick-bedded, in part graded, tuff, tuffaceous sandstones, tuffaceous conglomeratic sandstones and felsic volcanic mudstone are interbedded. In many rocks the principal clasts are dense felsite, like that occurring in the numerous felsite bodies of the formation. Clasts are angular to subrounded, very rarely well rounded. Other rocks have clasts with poorly preserved textures that are strongly suggestive of pumice. Such rocks occur throughout the unit but are especially abundant in a 3 km wide belt, extending from south of Center Cross Church to Purgatory Mountain and located just west of the belt of porphyritic felsite at Seagrove (CZmmr-ps). These rocks generally lack interbeds of well-bedded tuff and may represent thick ashflow deposits. The probable pumice

fragments are commonly flattened but the flattening is in the plane of the regional cleavage or foliation and may be tectonic. Textural details are too poorly preserved to record most features that would clearly indicate welding. Modified from Seider, 1981.

CZse-npm **Seagrove formation epiclastic rocks north of Purgatory Mountain (Cambrian to Neoproterozoic)**—Metasedimentary package that ranges from coarse-grained sandstones, pebbly sandstones and conglomerates. The sandstones, pebbly sandstones and conglomerates commonly contain rounded to subangular clasts of quartz ranging from sand- to gravel-sized. In the sandstones, feldspar is the most prominent mineral grain; quartz varies from sparse to abundant in hand sample. Lithic clasts are typically prominent and range from sand- to gravel-size. Local occurrence of felsic and intermediate tuffs and fine-grained volcaniclastic sedimentary rocks.

CZse-em **Seagrove formation epiclastics of the Erect member (Cambrian to Neoproterozoic)**—Metasedimentary package that ranges from coarse-grained sandstones, pebbly sandstones and conglomerates. Locally quartzitic (quartzite-like). The sandstones, pebbly sandstones and conglomerates commonly contain rounded to subangular clasts of quartz ranging from sand- to gravel-sized. In the sandstones, feldspar is the most prominent mineral grain; quartz varies from sparse to abundant in hand sample. Lithic clasts are typically prominent and range from sand- to gravel-size. A sample of sandstone from the unit was collected approximately 1.1 km west of Yow Mill, in the Erect Quadrangle, on a west-northwest trending branch of Fork Creek, for detrital zircon analysis. The youngest grain yielded a date of 545 + 7 Ma (Pollock et al., 2010).

CZsehc **Seagrove formation epiclastic rocks of the Harpers Crossroads area (Cambrian to Neoproterozoic)**—Metasedimentary package that ranges from fine-grained siltstones to coarse-grained sandstones, pebbly sandstones and conglomerates. The sandstones, pebbly sandstones and conglomerates commonly contain rounded to subangular clasts of quartz ranging from sand- to gravel-sized. In the sandstones, feldspar is the most prominent mineral grain; quartz varies from sparse to abundant in hand sample. Lithic clasts are typically prominent and range from sand- to gravel-size. A sample from the unit was collected adjacent to the Siler City Airport for detrital zircon analysis (NCGS sample COL-3055). The four youngest detrital zircons are: ca. 534, 538, 538 and 538. Previously mapped as part of the Aaron Formation on open file maps of western Chatham County.

CZsehc-a **Altered Seagrove formation epiclastic rocks of the Harpers Crossroads area (Cambrian to Neoproterozoic)**—Area of Seagrove formation epiclastic rocks of the Harpers Crossroads area that is mildly to moderately hydrothermally altered. Alteration consists of silicified, sericitized and pyrophyllitized rock. Chloritoid locally present.

CZsebc **Seagrove formation epiclastic rocks of the Bear Creek area (Cambrian to Neoproterozoic)**—Grayish-green to green, locally with distinctive reddish-

gray or maroon to lavender coloration, siltstones, sandstones, conglomeratic sandstone, and conglomeratic siltstone (greywacke). Siltstones are locally phyllitic. Siltstones typically display bedding ranging from mm-scale up to 10 cm, bedding layers traceable for several feet locally, may exhibit soft sediment deformation. Locally tuffaceous with a relict vitric texture. Locally contain interbedded intermediate to mafic lavas. Conglomerates and conglomeratic sandstones typically contain rounded to angular clasts. Deposition interpreted as distal from volcanic center. A sample from the unit was collected approximately 0.5 miles southwest of the Bear Creek intersection on a creek adjacent to HWY 902 on the property of Chatham Central High School for detrital zircon analysis (NCGS sample BK-626). Previously Zhesc on Bradley et al. (2019).

CZsmd **Seagrove formation mudstones (Cambrian to Neoproterozoic)**—Grayish-green, light gray to dark gray, locally with distinctive reddish-gray or maroon to lavender coloration, metamorphosed, thinly bedded mudstone, siltstone and sandy siltstone. Mudstone bedding ranges from mm-scale up to 10 cm, bedding layers traceable for several feet locally, may exhibit soft sediment deformation. Locally tuffaceous with a relict vitric texture. When present, crystal fragments are usually plagioclase with rare quartz. Deposition interpreted as distal from volcanic center.

CZsimvc **Seagrove formation intermediate to mafic volcanic and volcaniclastic rocks (Cambrian to Neoproterozoic)**—Map scale bodies of metamorphosed andesitic to basaltic lavas and shallow intrusions with interlayered volcaniclastic rocks consisting of phyllitic siltstone to conglomerate.

CZshar **Seagrove formation hydrothermally altered rocks (Cambrian to Neoproterozoic)**—Areas within the Seagrove formation of moderate to intense hydrothermally altered rock. Alteration consists of silicified, sericitized and pyrophyllitized rock. Chloritoid locally present. Sulfides are common. Primary sedimentary or volcanic textures are commonly obliterated.

UWHARRIE VOLCANIC COMPLEX (INFORMAL)

CZue/pl **Uwharrie Volcanic Complex mixed epiclastics, pyroclastics and lavas of the Devils Tramping Ground area (Cambrian to Neoproterozoic)**—Grayish-green to greenish-gray, metamorphosed tuffaceous sandstones, conglomeratic sandstones, siltstones and minor phyllite. The siltstones typically are weakly phyllitic. Contains lesser amounts of fine- to coarse tuff, welded tuff and dacitic lavas. Fiamme-like shaped clasts are common in the conglomerates, sandstones and tuffs. Quartz and feldspar crystal fragments are common in the sedimentary components, tuffs and lavas. Silicified and/or sericitized altered rock and quartz with adularia are locally present. A tuff from the unit yielded an U-Pb zircon age of 548.7 +- 1.1 Ma (Goliber and Coleman, 2023).

Contact with unit CZsehc designated at first occurrence of sandstones with angular clasts or primary volcanic rocks.

CZue/pl-A **Uwharrie Volcanic Complex epiclastics pyroclastics and lavas of Alamance County (Cambrian to Neoproterozoic)**—Grayish-green to greenish-gray, metamorphosed tuffaceous sandstones, conglomeratic sandstones, siltstones and minor phyllite. The siltstones typically are weakly phyllitic. Contains lesser amounts of tuff and intermediate to mafic lavas. Quartz and feldspar crystal fragments are common in the sedimentary components, tuffs and lavas. Similar looking rocks in Chatham County yielded an U-Pb zircon age of 548.7 ± 1.1 Ma (Goliber and Coleman, 2023). The unit is interpreted to be in unconformable contact with adjacent Hyco Formation units.

CZurlt **Uwharrie Volcanic Complex rhyodacitic lavas and tuffs (Cambrian to Neoproterozoic)**—Gray to dark gray, siliceous, aphanitic rhyodacites and tuffs, quartz-bearing tuffs and quartz-rhyodacite porphyry. Rhyodacites and tuffs are vitric-like and weakly to moderately foliated. Rhyodacites are locally flow layered and(or) spherulitic. Phenocrysts of albite are generally present, commonly accompanied by quartz. The size and abundance of phenocrysts varies widely. Tuffs locally contain fiamme-shaped clasts. May include lava flows, domes, necks , and dikes. Zuf, Felsite unit, of Seiders (1981).

CZuqdp **Quartz dacite porphyry (Cambrian to Neoproterozoic)**—Porphyritic with aphanitic groundmass and sub- to euhedral phenocrysts (2-6 mm) of white to salmon plagioclase and gray to dark gray (beta-) quartz; phenocrysts typically constitute 20 to 25% of the rock. May locally have fine-grained intrusive texture. Interpreted as either lava flows or shallow intrusives possibly associated with domes. Similar to texture to quartz dacite porphyry unit within the Bynum Quadrangle (Bradley et al., 2013)

CZudap **Dacite porphyry (Cambrian to Neoproterozoic)**—Generally light-gray; abundant quartz and plagioclase phenocrysts up to 5 mm across. Generally hydrothermally altered; contains pervasive disseminated pyrite

CZudap-a **Altered dacite (Cambrian to Neoproterozoic)**—Quartz-sericite-pyrite altered dacite. Altered version of unit Zudap

CZufc **Felsic volcaniclastic rocks (Cambrian to Neoproterozoic)**—Thin- to very thick bedded, light- to dark-gray, in part pale-green, tuff, lapilli tuff, and tuff breccia. The most abundant rock types are very thick bedded tuff, lapilli tuff, and tuff breccia, but in many parts of the map unit subordinate amounts of well-bedded, thin- to thick-bedded, in part graded, tuff, tuffaceous sandstones, tuffaceous conglomeratic sandstones and felsic volcanic mudstone are interbedded. In many rocks the principal clasts are dense felsite, like that occurring in the numerous felsite bodies. Clasts are angular to subrounded, very rarely well rounded. Other rocks have clasts with poorly preserved textures that are strongly suggestive of pumice. These rocks generally lack interbeds of well-bedded tuff and may represent thick ashflow deposits. The probable pumice fragments are commonly much flattened but the flattening is in the plane of the regional cleavage or foliation and may be

tectonic. Textural details are too poorly preserved to record most features that would clearly indicate welding.

CZupm **Porphyritic felsic volcaniclastic rock (Cambrian to Neoproterozoic)**—Thick bedded, light-gray, tuff and lapilli tuff composed of clasts of felsite with abundant large (1-3 mm) phenocrysts of albite and quartz. The clastic texture is obscure in outcrops but is more easily seen in sawed slabs and thin sections. The unit is exposed in the vicinity of Mechanic Church.

CZupu **Porphyritic felsite east of Ulah (Cambrian to Neoproterozoic)**—Medium-gray felsite with abundant 0.5-2 mm phenocrysts of albite and quartz. Locally flow layered. Includes some volcaniclastic rock of the same composition

CZufb **Felsic volcanic breccia (Cambrian to Neoproterozoic)**—Light- to dark-gray fragments of aphanitic to sparsely porphyritic felsite. In part, the clasts are much flattened and irregularly distorted with vague or wispy margins. In thin section there is little distinction between the microcrystalline texture of the clasts and that of the groundmass. This rock may represent a pumice-rich welded tuff

CZuimcl **Intermediate to mafic volcaniclastic rocks and lavas (Cambrian to Neoproterozoic)**—Thin- to very thick-bedded, grayish-green tuff, lapilli tuff, and tuff breccia. Local occurrence of andesitic to basaltic lavas with hyaloclastic textures. Commonly contains scattered clasts of felsic volcanic rock. Modified equivalent of CZumc of Seiders (1981).

CZuiml **Intermediate to mafic lavas (Cambrian to Neoproterozoic)**—Small bodies of metamorphosed andesite to basalt exposed chiefly in the northeastern part of the Seiders (1981) map area. Commonly amygdaloidal. Pillow lava occurs northeast of Asheboro, along the dead end road 1.5 km east of Oakie Mountain. May include some shallow intrusive rocks. Modified equivalent of CZuml of Seiders (1981).

CZums **Mudstone (Cambrian to Neoproterozoic)**—Laminated to medium-bedded , light-gray mudstone of probable felsic volcanic composition (fine-grained tuff). Subordinate grayish-green mudstone and thin- to thick-bedded felsic and mafic tuff

VIRGILINA SEQUENCE

VIRGILINA SEQUENCE PLUTONS

FARRINGTON IGNEOUS COMPLEX - EAST FARRINGTON

Zefg-m **East Farrington pluton main facies (Neoproterozoic)**—Unfoliated, orange pink to pinkish-gray to gray, medium- to coarse-grained, equigranular to slightly porphyritic, amphibole (va. hornblende?) granite. Amphibole content varies from approximately 5 to 10% by volume and occurs locally as dark green, elongate crystals up to 1.5 cm long and amorphous intergrowths with feldspar and quartz up to 0.5 cm diameter. Dark gray xenoliths/enclaves up to 8 cm in diameter are common. Grain size becomes

finer and xenoliths/enclaves larger near the pluton edge. Cavities, <1mm in diameter, with euhedral terminating crystals are common in some specimens. Weakly foliated outcrops are present along Pokeberry Creek and several other locations. In thin section the main facies can be separated into two groups: 1) rocks with a porphyritic texture with orthoclase and plagioclase phenocryts in a groundmass of intergrown orthoclase, plagioclase and quartz with a granophyric texture (micrographic texture) and 2) porphyritic and equigranular rocks consisting of orthoclase, plagioclase and quartz without a granophyric texture in matrix. The two varieties appear to be intermingled throughout the study area. A sample collected from the unit yielded a weighted mean age of ca. 569 Ma (Goliber and Coleman, 2023).

Zefg-m1 **East Farrington pluton main facies variety 1 (Neoproterozoic)**—Identical to main facies but with dark green, chlorite masses up to 4 mm diameter. In thin section, the chlorite masses are intergrowths of chlorite and dark green, fibrous amphibole.

Zefg-2 **East Farrington pluton porphyritic granite (Neoproterozoic)**—Gray, fine-grained groundmass with pink- and white-colored phenocrysts (1 mm to 4 mm) of orthoclase and plagioclase, granite. Anhedral to acicular-shaped, dark green, amphiboles (<1mm to 4 mm long) present in groundmass of quartz and orthoclase and as intergrowths with orthoclase and plagioclase phenocrysts. Present as several map scale bodies and as outcrop scale enclaves surrounded by East Farrington pluton main facies rock.

Zefg-3 **East Farrington pluton fine-grained granite (Neoproterozoic)**—Orange pink, fine-grained granite. Similar texture and mineralogy to East Farrington pluton main facies but with an overall finer-grained texture. White feldspar phenocrysts compose <5% of rock.

Zefg-4 **East Farrington pluton gray granitoid (Neoproterozoic)**—Unfoliated to foliated, light gray to light greenish-gray, medium-grained granite to granodiorite. White-colored feldspar content is greater than pink feldspars. Foliated specimens have visible white mica growth and less pink feldspars than unfoliated specimens. Foliated rock is present along portions of Pokeberry Creek, Pritchards Mill Creek and Cumbo Branch.

Zefg-5 **East Farrington pluton satellite granite (Neoproterozoic)**—Unfoliated, orange pink to pinkish-gray to gray, fine- to medium-grained, equigranular, amphibole (va. hornblende?) granite. Similar to East Farrington pluton main facies but overall finer-grained.

Zefg-6 **East Farrington pluton satellite granitoid (Neoproterozoic)**—White, creamy, pale pink, or pale greenish; fine- to medium-grained, locally plagioclase-porphyritic granite, granodiorite, leucogranite, leucogranodiorite, and quartz monzodiorite. Contains distinctive prismatic amphibole crystals, locally acicular and up to one cm. Amphibole-rich enclaves to 2 cm are present locally. At western contact in Heron Pond subdivision, contains enclaves of and cuts fine-grained gray diorite and

monzodiorite porphyry of the Zefmd unit.

Zefmd **East Farrington monzodiorite porphyry (Neoproterozoic)**—Leucocratic to mesocratic, light gray to dark grayish-green where fresh, olive drab weathering, plagioclase-phyric monzodiorite and diorite. Fine- to medium-grained groundmass, with phenocrysts to 8 mm. Quartz phenocrysts very rare. Commonly has a cloudy, splotchy, or mottled appearance. Locally contains salmon-colored feldspar phenocrysts and/or orange ovoids interpreted as cavity filling or weathered phenocrysts. May have a thin light beige outer weathering rind. Weathered surface may be pitted. Locally sulfide-bearing, saussuritized, or streaked with tiny epidote veins. Fine-grained near margins.

FARRINGTON IGNEOUS COMPLEX - WEST FARRINGTON

Zwfd **West Farrington pluton diorite (Neoproterozoic)**—Mesocratic, unfoliated, medium- to coarse-grained, with dark green amphibole (actinolite after hornblende) diorite. Locally with chlorite/biotite; dominantly equigranular but locally weakly plagioclase porphyritic; includes quartz diorite, granodiorite, quartz monzodiorite, and tonalite; commonly contains ovoid enclaves of green to black microdiorite to 0.5 m; grades to local patches of more mafic diorite and gabbro; fine dense to slabby hornfelsed country rocks occur locally as enclaves and near contacts; locally strongly saussuritized and pale greenish; white weathering with plagioclase occurring in positive relief giving a bumpy texture.

Zwfd-gd **West Farrington pluton diorite to granodiorite (Neoproterozoic)**—Mesocratic to leucocratic, unfoliated, medium- to coarse-grained with dark green amphibole and/or biotite diorite. Quartz content varies locally causing field identification to vary from diorite, quartz diorite, and leucogranodiorite (looks tonalitic locally). Locally with pinkish feldspars. Generally identical to Zwfd but with more intermingled granodiorite with abundant visible quartz.

Zwfgd **West Farrington pluton leucogranodiorite (Neoproterozoic)**—Leucocratic to mesocratic, unfoliated, medium- to coarse-grained, biotite-bearing with dark green amphiboles leucogranodiorite. Quartz content varies locally causing field identification to vary from quartz diorite, leucogranodiorite, to tonalite. Locally with pinkish feldspars. Granophyric texture occurs locally in map area south of Collins Mountain.

AARON FORMATION

Za **Aaron Formation (Neoproterozoic)**—Distinctive metasedimentary package that ranges from fine-grained siltstones to coarse-grained sandstones, pebbly sandstones and conglomerates. Siltstones are similar in appearance to Hyco Formation lithologies. The sandstones, pebbly sandstones and conglomerates (classified as litharenite, feldspathic litharenite and lithic feldsarenite by Harris (1984)) are distinctive and commonly contain rounded to subrounded clasts of quartz ranging from sand- to gravel-sized. In the

sandstones, feldspar is the most prominent mineral grain; quartz varies from sparse to abundant in hand sample. Lithic clasts are typically prominent and range from sand- to gravel-size. Harris (1984), performed a detailed sedimentary study of the Aaron Formation to the immediate west of the map area. Harris (1984) interpreted the Aaron Formation to have been deposited by turbidity currents in a retrogradational submarine fan setting.

OTHER PLUTONS (GREENSBORO INTRUSIVE SUITE?)

Zgd-CT **Granodiorite (intrusive into the Carolina terrane) (Neoproterozoic)**—Unfoliated to locally weakly foliated, leucocratic (CI<10), very light gray to yellowish gray, medium- to coarse-grained, hypidiomorphic granular, metamorphosed granodiorite to tonalitic granodiorite. Mafic minerals present in rock are biotite intergrown with chlorite. Weathering of rock produces distinctive coarse quartz sand grains in soil. Resistant, andesitic to basaltic, spheroidal boulders are common throughout the pluton and are interpreted as xenoliths. Cross cutting dikes of similar mineralogy are present in Hyco Formation rock types. Appears to crosscut the Zdi-gb unit. Pluton map pattern truncates Hyco Formation volcanics and pluton contains foliated xenoliths of volcanic rocks. A sample collected from Big Alamance Creek and Alamance Church Road in the unit yielded a preliminary concordia age of ca. 591 Ma (NCGS preliminary data).

Zsgr **Granite to granodiorite of the Saxapahaw pluton (Neoproterozoic)**—Mainly, leucocratic, medium-grained hypidomorphic granular, granite to granodiorite. Quartz grains are conspicuous and weather in positive relief. Mafic minerals are composed of aggregates of chlorite and epidote (likely from the alteration of biotite). Schmidt et al. (2006) interpreted the pluton as being noticeably silicified. Schmidt et al. (2006) reported several whole rock and point count analyses with interpreted rock types included granite, porphyritic granite, granite porphyry, porphyritic granodiorite and quartz monzonite. Based on map pattern and intrusive relationships (high angle truncation of Hyco Formation units), the Saxapahaw pluton may be related to the Farrington pluton family or Albemarle arc plutonism. Ingle (2003) reported a discordant age from the pluton with an upper intercept of 605 +-7.4 Ma.

HYCO ARC

HYCO ARC PLUTONS

Zcgr **Granite of the Chatham pluton (Neoproterozoic)**—Leucocratic, light brownish to beige or creamy, and locally pale pink or green; medium- to coarse-grained, equigranular metamorphosed leucocratic granodiorite and granite; locally weakly porphyritic with beta-quartz forms; grades to quartz porphyry in zones of cleavage development; quartz may be bluish; locally reddish weathering; locally contains epidote and/or chlorite clots possibly pseudomorphic after a hornblende; feldspar and quartz grains resist

weathering and produce a bumpy surface; plagioclase and quartz phenocrysts sit in a granophyric matrix of alkali feldspar and quartz. Correlative to the Chatham granite of Hauck (1977). May be genetically related to Zhqdp unit.

Zgr-ccr **Granite of the Crutchfield Crossroads Quadrangle (Neoproterozoic)**—Leucocratic, medium- grained, equigranular metamorphosed, granite or tonalite.

Zgd **Granodiorite (Neoproterozoic)**—Leucoractic to mesocratic, fine- to medium-grained, equigranular to porphyritic granodiorite. May contain quartz diorite and diorite. Typically contains dark green to black <1 mm to 4 mm clots of actinolitic (?) amphibole and chlorite masses. Plagioclase grains are often sericitized and saussuritized and may exhibit a greenish color. Locally, granodiorite is pinkish hued, fine- to medium-grained with dark green to black <1 mm to 4 mm clots of mafic minerals interpreted to be biotite and amphibole masses. Chlorite growth on biotite and amphibole is present. Medium-grained, with light pink to pinkish white alkali feldspars (up to 5 mm diameter), porphyritic granodiorite is intermingled in the northern portion of the Chapel Hill quadrangle. Locally, map scale xenoliths are present.

Zgr2 **Granite (Neoproterozoic)**—Light pink to pink and orange; fine- to coarse-grained granite. May be foliated.

Zgr-gd **Granite to granodiorite (Neoproterozoic)**—Leucocratic, fine- to medium-grained, equigranular metamorphosed, granite to granodiorite.

Zgd-ch **Granodiorite of the Chapel Hill pluton (Neoproterozoic)**—Leucoractic to mesocratic, fine- to medium-grained, equigranular to porphyritic granodiorite. In the central and southern portions of the Chapel Hill quadrangle the granodiorite is mainly whitish-gray, fine- to medium-grained, biotite, +/- hornblende granodiorite with minor pink-colored alkali feldspar. Plagioclase grains are often sericitized and saussuritized and exhibit a greenish color throughout the unit.

Zgr-ch **Granite of the Chapel Hill pluton (Neoproterozoic)**—Typically massive, fine- to medium-grained with dark green amphiboles (commonly rimmed by epidote and chlorite) and +/- biotite. Light-pink to pink, alkali feldspars are prominent and give the rock a pinkish hue. Orange-pink to grayish-orange pink, fine-grained aplite with a sub-graphitic texture is present in dikes ranging from centimeters to meters in width. Rocks of granitic composition occur primarily within the informally named Chapel Hill pluton. Granite of the Chapel Hill pluton has an interpreted U-Pb zircon crystallization age of 633 +2/-1.5 Ma (Wortman et al., 2000). An unpublished U-Pb zircon age of 631.6 +/- 7.9 Ma was also reported by Mehlop (1994) for the Chapel Hill pluton.

Zt-qdi **Tonalite to quartz diorite (Neoproterozoic)**—Light-gray, fine to medium-grained, hornblende tonalite to quartz diorite. Visible quartz content ranges from 5% up to 20%. Outcrops of this unit are typically finer-grained, lighter in color, and have visible quartz in comparison to typical medium-grained

diorite.

Zdi **Diorite (Neoproterozoic)**—Mesocratic (CI~50), greenish-gray to grayish-green, fine- to medium-grained, metamorphosed, hypidiomorphic granular diorite. Major minerals include plagioclase and amphibole. Plagioclase crystals are typically sericitized and saussuritized. Amphiboles are typically altered to chlorite and actinolite masses. May be gabbroic locally.

Zdi-fine **Fine-grained diorite (Neoproterozoic)**—Small plutonic bodies of green, very fine-grained diorite. The rock is green in hand sample from saussuritization of plagioclase. (mircodiorite like)

Zdi-gb **Diorite to gabbro (Neoproterozoic)**—Greenish-gray to gray, medium-grained, equigranular, hornblende diorite intermingled with dark-gray to greenish-gray, medium-grained gabbro with pyroxene. Plagioclase crystals are typically saussuritized and exhibit a greenish color. Outcrops with heavily saussuritized plagioclase have a high Color Index causing difficulty in distinguishing between gabbro and diorite in the field.

Zdi-porphy **Diorite porphyry of the Silk Hope Quadrangle (Neoproterozoic)**—Mesocratic to almost melanocratic, greenish-gray to gray diorite porphyry with fine- to medium-grained groundmass and euhedral phenocrysts (up to 18 mm) of light gray to white plagioclase. Plagioclase crystals can be saussuritized. Unit locally includes mesocratic, equigranular, plagioclase+amphibole, fine- to medium-grained intrusive diorite to monzodiorite.

Zqmd-sc **Quartz monzodiorite in the Snow Camp area (Neoproterozoic)**—Composite pluton of mesocratic, coarse- to medium-grained, equigranular, quartz monzodiorite, diorite and granodiorite. Major minerals include plagioclase and amphiboles with lesser amounts of quartz. Amphiboles appear altered to chlorite and actinolite masses. Feldspars have a light pinkish-hue locally. Includes a distinctive plagioclase porphyritic granodiorite to diorite on South Fork Cane Creek. Unit identified as the Lindley Farms Quartz Monzonite by Schmidt et al. (2006). Schmidt et al. (2006) whole rock and modal analyses were replotted on IUGS ternary diagrams and plot in the quartz monzodiorite field.

Zqmd-mf **Quartz monzodiorite in the Meadow Flats area (Neoproterozoic)**—Greenish-gray to gray, mesocratic, medium-grained, equigranular metamorphosed quartz monzodiorite. Major minerals include plagioclase and hornblende. In field, rock is indistinguishable from typical diorite except for rare pinkish alkali feldspar in some samples (specifically on the south side of Blackwood Mountain). Rock type designation based on recalculated whole rock chemical analyses of Bland (1972).

Zgb-mf **Gabbro in the Meadow Flats area (Neoproterozoic)**—Gabbro of the Meadow Flats pluton is Dark-gray to greenish-gray, mesocratic to melanocratic and medium-grained. Major minerals include plagioclase and augite. In outcrop, the diorites and gabbros are very similar in appearance and are difficult to distinguish from each other. According to Mann et al. (1965), the plagioclase crystals are zoned with cores of An53 and An31 at the margins. Augite grains

(present up to 3 mm) are fringed with uralite and are sometimes replaced by hornblende, chlorite, or magnetite. The map pattern of gabbro within the Meadow Flats pluton was drawn incorporating the Bland (1972) whole rock data with field data from this study. A small pod of gabbro is present in the southeast corner of the Hillsborough quadrangle that is dark green, melanocratic and fine-grained.

Zum **Ultramafic (Neoproterozoic)**—Black, coarse-grained (5 mm to 10 mm), metamorphosed ultramafic rock consisting mainly of poikilitic crystals of relict brown hornblende that are partially replaced by actinolite and chlorite. Other minerals include serpentine, talc, chlorite, actinolite, and opaque minerals. Minor relict orthopyroxene is present. Hayes (1962) interpreted the protoliths as olivine-rich wehrlite (with approximately 50% olivine) and clinopyroxenite. Bulter (1989) interpreted the body to be an intrusion of a crystal mush formed by differentiation of gabbroic magma at depth. Normalized whole rock analysis from a sample collected east of Iron Mine Hill (CH-2027) plots within the olivine-clinopyroxenite field on an Ol/Opx/Cpx ternary diagram.

HYCO FORMATION - UPPER PORTION

Hydrothermally altered units

Zq **Quartz body (Neoproterozoic)**—White, beige, red, and tan; sugary to porcelaneous; very fine- to medium-grained massive quartz rock to quartzite-like rock. Outcrops are usually massive. May contain vugs with crystal shaped terminations. Map areas contain boulders (up to several feet in diameter) and/or outcrops of white colored massive quartz.

Zhat-f **Altered tuffs within the Farrington Pluton (Neoproterozoic)**—Very light-gray, light-greenish-gray to white, mottled red and yellow, hydrothermally altered rock interpreted to be silicified and/or sericitized tuffs. Unit occurs as map scale xenoliths within the East Farrington pluton.

Zhat **Altered tuffs (Neoproterozoic)**—Very light gray to light greenish gray (whitish in areas) with red and yellow mottling, altered volcaniclastic rocks. Alteration consists of silicified, sericitized and pyrophyllitized rock. Sericite phyllite, pods of pyrophyllite, and quartz + phyrophyllite rock all with <1 mm to 2 mm diameter weathered sulfides are common. Relict lithic clasts and kaolinitized feldspar crystal shards are visible in some exposures. Relict structures are obliterated in heavily altered rocks. Map area contains boulders (up to several feet in diameter) and outcrop of massive milky quartz and quartz + sericite rock. Chloritoid and staurolite present locally.

Zhat (u) **Altered tuffs of the upper portion of the Hyco Formation (Neoproterozoic)**—Very light gray to light greenish gray (whitish in areas) with red and yellow mottling, altered volcaniclastic rocks. Alteration consists of silicified, sericitized and pyrophyllitized rock. Sericite phyllite, pods of pyrophyllite, and quartz + phyrophyllite rock all with <1 mm to 2 mm diameter weathered sulfides are common. Relict lithic clasts and kaolinitized feldspar crystal

shards are visible in some exposures. Relict structures are obliterated in heavily altered rocks. Map area contains boulders (up to several feet in diameter) and outcrop of massive milky quartz and quartz + sericite rock.

Zhhar **Hydrothermally altered rocks (Neoproterozoic)**—Mixed unit of hydrothermally altered rocks consisting of: dense siliceous cryptocrystalline rock; quartz-pyrophyllite rocks, +- kaolinite, andalusite, chloritoid, sericite, paragonite and iron oxides; quartz-sericite rocks, +- paragonite, k-feldspar and iron oxides; and quartz-chloritoid-chlorite rocks, +- sericite and hematite. Described in detail by Hughes (1987) and Schmidt et al. (2006).

Zhat/vcs **Altered tuffs and volcaniclastic sedimentary rocks (Neoproterozoic)**—Mixed unit of altered volcaniclastic rocks and volcaniclastic sedimentary rocks. Alteration consists of silicified, sericitized and pyrophyllitized rock. Chloritoid locally present. Volcaniclastic sedimentary rocks include conglomeratic siltstone to conglomerate that may be variably altered. Includes area of quartz-sericite-paragonite rock (Zvqs) of Schmidt et al. (2006). Andesitic to basaltic lavas and massive quartz locally present.

Zhhar-sg **Silica granofels hydrothermally altered rock (Neoproterozoic)**—Moderately to intensely silicified rock; quartz content commonly over 80 percent, especially on Pilot Mountain and Pine Hill.

Zhhar-ag **Advanced argillic hydrothermally altered rock (Neoproterozoic)**—Generally contains sparse pyrophyllite and a few percent of disseminated sulfide. Encloses unknown amount of silicified argillite and quartz-sericite-pyrite schist which does not commonly form outcrops. Includes pods containing abundant pyrophyllite, andalusite, topaz, and pyrite. Textural features of protolith mostly obliterated except for quartz phenocrysts

Zhhar-qsp **Quartz-sericite-pyrite schist (Neoproterozoic)**—Includes small pods of quartz granofels and lenses of chloritic volcanic rocks. Pyrite content generally 2-10 percent. Gradational to unaltered andesitic and dacitic volcanic rocks

Volcanoclastic-sedimentary units

Zhe **Epiclastics (Neoproterozoic)**—Mixed unit of metasedimentary rocks. Lithologies present include mudstone, siltstone, sandy siltstone, sandstone, pebbly sandstone, and conglomerate. Mudstones are greenish-gray to gray, typically silicified, with continuous, parallel to slightly wavy, very thin to medium lamina occasionally with small-scale loading structures. Siltstones are light green-gray to gray, with continuous, parallel to slightly wavy, thin lamina to very thin beds, occasionally with small-scale loading structures. The siltstones are composed of quartz, sericite, and traces of a black detrital heavy minerals (<1 mm in diameter). Siltstones are typically interbedded with the sandstones. Sandstones are dark-gray, gray, greenish-gray, grayish-green, litharenites and feldspathic litharenites composed of volcanic rock fragments, feldspar, quartz, and rare intrusive rock fragments. Textures range from fine-grained, and well sorted to very coarse-grained, and moderately poorly sorted. Bedding in the sandstones is continuous, parallel to inclined, thin lamina to thin beds; also massive bedding and cross-beds are

present. Individual beds are sometimes graded from sand-size to silt-size with abrupt upper surfaces. Conglomerates include matrix supported and clast supported polymictic conglomerate composed of angular to rounded, pebbles to large cobbles (up to 30 cm). Conglomerates are generally massive bedded, rarely with any imbrication of the clasts. Clast types include: dark-gray to gray, angular to subangular, microcrystalline volcanic rock fragments; black, subangular to subrounded, plagioclase-porphyritic dacite; black to dark gray, subrounded, flow-banded dacite; and greenish-gray to grayish-green, rounded to well rounded, fine to coarse plagioclase crystal tuff. Rare clast types include: white, subangular to rounded, granite and granodiorite (up to 12 cm); dark-brown, rounded, vesicular basalt (up to 2.5 cm); and gray, angular siltstone (up to 25 cm). Sandstone and conglomerate beds often fill scour channels in the siltstones.

Zhe-m1 **Morgan Creek epiclastics 1 (Neoproterozoic)**—Mixed unit of metasedimentary rocks that contains well bedded, greenish-gray to gray, siltstone, sandy siltstone, sandstone, conglomeratic sandstone, and conglomerate. The unit was divided into two lithofacies, Zhe-m1 and Zhe-m2: Zhme1 is exposed mainly along Morgan Creek; it is mostly well bedded siltstones with lesser sandstone and conglomerate beds. Siltstones range from thinly laminated to very thinly bedded (<1 mm to 10 mm) with individual beds that can be traced continuously in the outcrops. Sandstone and conglomerate beds often fill scour channels in the siltstones. The conglomerates range from matrix-supported to clast-supported, contain subrounded to rounded lithic clasts of porphyritic dacite, aphanitic volcanic rock, and granitoid in a silt to sand matrix. Individual beds are typically graded from sand-size to silt-size with abrupt upper surfaces.

Zhe-m2 **Morgan Creek epiclastics 2 (Neoproterozoic)**—Mixed unit of metasedimentary rocks that occurs to the south and southwest of Zhe-m1 and is overall coarser, containing mostly sandstones and conglomerates with lesser well bedded siltstones.

Zhel **Epiclastic rocks and lavas (Neoproterozoic)**—Conglomerate, conglomeratic sandstone, sandstone, siltstone and mudstone. Siltstones and mudstones typically display bedding ranging from mm-scale up to 10 cm, bedding layers traceable for several feet locally, may exhibit soft sediment deformation. Locally tuffaceous with a relict vitric texture. Locally contain interbedded dacitic to basaltic lavas. Conglomerates and conglomeratic sandstones typically contain subrounded to angular clasts of dacite in a clastic matrix. Deposition interpreted as distal from volcanic center, in deep water(?), and via turbidite flows.

Zhe/p-n **Mixed epiclastic-pyroclastic rocks of Neville Creek area (Neoproterozoic)**—Heterogeneous unit of felsic to intermediate composition metamorphosed tuffs and lavas, mudstone, siltstone, tuffaceous sandstones and conglomeratic sandstones. Unit appears to contain more andesitic to basaltic lavas and tuffs than Zhe/p unit.

Zhp/e **Mixed pyroclastic-epiclastics (Neoproterozoic)**—Gray to green, metamorphosed felsic tuffs interlayed with mudstone, siltstone, and sandstone and distinctive immature, monomictic, conglomeratic sandstone to conglomerate containing subangular to angular clasts of plagioclase porphyritic dacite. Minor andesitic to basaltic lavas and tuffs. The contact with the Zhdlt unit is interepreted to be gradational.

Zhe/p **Mixed epiclastic-pyroclastic rocks (Neoproterozoic)**—Grayish-green to greenish-gray, tuffaceous sandstones, conglomeratic sandstones, siltstones and minor phyllite. The siltstones typically are weakly phyllitic. Contains lesser amounts of fine- to coarse tuff and lapilli tuff. Tuffs are differentiated from other volcaniclastic rocks by the presence of zones of cryptocrystalline texture that exhibit conchoidal-like fractures in between foliation domains. Minor andesitic to basaltic lavas and tuffs present. Silicified and/or sericitized altered rock similar to Zhat unit are locally present. Unit is interpreted to grade into Zhe/pl unit. Contact with Zhe/pl designated at first occurrence of dacitic lavas.

Zhe/pl **Mixed epiclastic-pyroclastic rocks with interlayered dacitic lavas (Neoproterozoic)**—Mixed epiclastic-pyroclastic rocks with interlayered dacitic lavas: Grayish-green to greenish-gray, locally with distinctive reddish-gray or maroon to lavender coloration; metamorphosed: conglomerate, conglomeratic sandstone, sandstone, siltstone and mudstone. Lithologies are locally bedded; locally tuffaceous with a cryptocrystalline-like groundmass. Siltstones are locally phyllitic. Locally contain interbedded dacitic lavas identical to Zhdlt unit. Contains lesser amounts of fine- to coarse tuff and lapilli tuff with a cryptocrystalline-like groundmass. Pyroclastics, lavas, and epiclastics are mainly felsic in composition. Minor andesitic to basaltic lavas and tuffs present. Silicified and/or sericitized altered rock are locally present. Conglomerates and conglomeratic sandstones typically contain subrounded to angular clasts of dacite in a clastic matrix. Portions of the Zhe/pl unit are interpreted to have been deposited proximal to active volcanic centers represented by the Zhdlt unit but are also interpreted to record the erosion of proximal volcanic centers after cessation of active volcanism.

Zhe/pl-c **Conglomerate dominated mixed epiclastic-pyroclastic rocks (Neoproterozoic)**—Grayish-green to greenish-gray, metamorphosed, conglomerate and conglomeratic sandstone. Contains abundant subangular to angular clasts of dacite in a strongly tuffaceous (with a cryptocrystalline-like groundmass) clastic matrix. Interpreted as a resedimented hyaloclastite body likely sourced from a nearby dacite dome.

Felsic to intermediate volcanic units

Zhft **Felsic tuffs (Neoproterozoic)**—Grayish-green to greenish-gray and silvery-gray; massive to foliated volcaniclastic pyroclastic rocks consisting of fine- to coarse tuffs, lapilli tuffs and minor welded tuffs. Tuffs are differentiated from other volcaniclastic rocks by the presence of zones of cryptocrystalline texture that exhibit conchoidal-like fractures in between foliation domains.

Layering ranges from massive to thinly bedded. Contains lesser amounts of volcaniclastic sedimentary rocks consisting of volcanic sandstones, and greywackes with minor siltstones and phyllite.

Zhdlt (u) **Dacitic lavas and tuffs of the upper portion of the Hyco Formation (Neoproterozoic)**—Greenish-gray to dark gray, siliceous, aphanitic dacite, porphyritic dacite with plagioclase phenocrysts, and flow banded dacite. Dacite with hyaloclastic textures are common. Welded and non-welded tuffs associated with the lavas include: greenish-gray to grayish-green, fine tuff, coarse plagioclase crystal tuff and lapilli tuff. Locally, interlayers of immature conglomerate and conglomeratic sandstone with abundant dacite clasts are present. The dacites are interpreted to have been coherent extrusives or very shallow intrusions associated with dome formation. The tuffs are interpreted as episodic pyroclastic flow deposits, air fall tuffs or reworked tuffs generated during formation of dacite domes. The unit occurs as map scale pods surrounded by clastic rocks of Zhe/pl unit. Wortman et al. (2000) reports an age of 615.7+3.7/-1.9 Ma U-Pb zircon date for a dacitic tuff from the unit in the Rougemont quadrangle.

Zhdlt-Q **Quartz dacite lavas and tuffs (Neoproterozoic)**—Interlayered light-gray to white, unfoliated quartz and hornblende porphyritic dacite and foliated quartz crystal tuff. Quartz phenocrysts are distinctive with di-pyramidal form ranging from 1 mm up to 4 mm diameter. Hornblende phenocrysts are brown with a vitreous luster and are present up to 4 mm diameter. In hand sample, the groundmass is light-gray to white on weathered and fresh surfaces. Unfoliated varieties are interpreted to be lava or shallow intrusive bodies; foliated varieties are interpreted to be tuff. Quartz dacite porphyry unit of Eligman (1987).

Zhqdp **Quartz dacite porphyry (Neoproterozoic)**—Micro-granitic to Porphyritic with aphanitic groundmass and sub- to euhedral phenocrysts (2-6 mm) of white to salmon plagioclase and gray to dark gray (beta-) quartz; phenocrysts typically constitute 20 to 25% of the rock. May locally have fine-grained intrusive texture. Interpreted as either lava flows or shallow intrusives possibly associated with domes. Present as boulders in the northeast of the Siler City NE Quadrangle and within the Bynum Quadrangle.

Zhdsi (u) **Dacitic shallow intrusive of the upper portion of the Hyco Formation (Neoproterozoic)**—Gray-green, light green to green, greenish-gray to light gray; dacite, plagioclase porphyritic dacite with a granular-textured groundmass to micro-granodiorite (intrusive texture visible with 7x hand lens). Locally fine- to medium grained granodiorite present. Plagioclase phenocrysts , when present, range from less than 1 mm to 4 mm. Black colored amphibole, when visible, occurs as phenocrysts (less than 1 mm to 1 mm) and as intergrowths with plagioclase. Amphibole intergrowths distinguish rock from fine-grained tuffs. Interpreted as shallowly emplaced dacite probably co-magmatic with Zdlt (u) unit.

Zhdasi **Dacitic to andesitic shallow intrusive (Neoproterozoic)**—Gray to greenish-gray;

dacite to andesite. Aphanitic groundmass with plagioclase and acicular amphibole phenocrysts. Weak relict cryptocrystalline texture present (less than dacites). Aphanitic dacite to andesite clasts present locally likely indicating hyaloclastic texture.

Zhadlt (u) **Andesitic to dacitic lavas and tuffs of the upper portion of the Hyco Formation (Neoproterozoic)**—Black to dark gray, gray-green to green; aphanitic andesite to dacite and porphyritic andesite to dacite with plagioclase phenocrysts. Hyaloclastic textures are common. Interlayed with the lavas are gray to black; welded and non-welded; coarse tuff, lapilli tuff, and tuff breccia. Rocks interpreted as andesites have distinct interior weathering rind of light brown to gray and fresh surfaces exhibit non-vitric like textures in contrast to dacites.

Zhdlt-absi **Dacitic lavas and tuffs of the Hyco Formation infested by andesitic to basaltic dikes (Neoproterozoic)**—Mixed unit of metamorphosed dacitic lavas and tuffs of the Zhdlt unit intruded by plagioclase porphyritic andesite to basalt.

Intermediate to mafic volcanoclastic-sedimentary units

Zhime/pl **Mixed intermediate to mafic epiclastic-pyroclastic rocks with interlayered intermediate to mafic lavas (Neoproterozoic)**—Grayish-green to green, locally with distinctive reddish-gray or maroon to lavender coloration; metamorphosed: conglomerate, conglomeratic sandstone, sandstone, siltstone and mudstone. Lithologies are locally bedded; locally tuffaceous with a cryptocrystalline-like groundmass. Siltstones are locally phyllitic. Locally contain interbedded intermediate to mafic lavas identical to Zhablt, Zhabl, and Zhablc units. Contains lesser amounts of fine- to coarse tuff and lapilli tuff with a cryptocrystalline-like groundmass. Pyroclastics, lavas, and epiclastics are mainly intermediate to mafic in composition. Minor dacitic lavas and tuffs present. Silicified and/or sericitized altered rock similar to Zhat unit are locally present. Conglomerates and conglomeratic sandstones typically contain subrounded to angular clasts of andesite and basalt in a clastic matrix. Generally interpreted to have been deposited proximal to active intermediate to mafic composition volcanic centers and/or record the erosion of proximal intermediate to mafic composition volcanic centers after cessation of active volcanism. May be related to Green et al. (1982) unit C - Intermediate to Mafic Volcanics and Graywacke.

Zhe/plim **Mixed epiclastic-pyroclastic rocks with interlayered intermediate to basaltic lavas (Neoproterozoic)**—Grayish-green to greenish-gray, locally with distinctive reddish-gray or maroon to lavender coloration; metamorphosed: conglomerate, conglomeratic sandstone, sandstone, siltstone, mudstone, and felsic fine- to coarse tuff and lapilli tuff. Siltstones are locally phyllitic. Locally contain interbedded andesitic to basaltic lavas identical to Zhabl unit. Silicified and/or sericitized altered rock are locally present. Interpreted to be in gradational contact with unit Zhe/pl and identified by increase in intermediate to mafic lavas and decrease and/or absence of dacites.

Zhfit-bw **Felsic to intermediate tuffs of the Big Woods area (Neoproterozoic)**—

Heterogenous unit of felsic to intermediate composition tuffs and with lesser interlayers of andesitic to basaltic lavas and epiclastic rocks. Abundant dacitic lavas and tuffs, identical to Zdlt unit lithologies, are interlayered within unit.

Intermediate to mafic volcanic units

Zhabl **Andesitic to basaltic lavas (Neoproterozoic)**—Green, gray-green, gray, dark gray and black; typically unfoliated, amygdaloidal, plagioclase porphyritic, amphibole/pyroxene porphyritic and aphanitic; andesitic to basaltic lavas and shallow intrusions. Hyaloclastic texture is common and imparts a fragmental texture on some outcrops and float boulders. Conglomeratic rocks consisting of angular clasts of andesite and/or basalt occur locally and are interpreted as resedimented hyaloclastite.

Zhablc **Andesitic to basaltic lavas and conglomerate (Neoproterozoic)**—Green, gray-green, gray, dark gray and black; typically unfoliated, amygdaloidal, plagioclase porphyritic, amphibole/pyroxene porphyritic and aphanitic; andesitic to basaltic lavas and shallow intrusions. Hyaloclastic texture is common and imparts a fragmental texture on some outcrops and float boulders. Interlayers of conglomeratic rocks consisting of angular clasts of andesite and/or basalt are common and are interpreted as resedimented hyaloclastite. Locally interlayered with pyroclastic rocks and meta-sediments identical to the Zhime/pl units.

Zhable **Andesitic to basaltic lavas with interlayered epiclastic rocks (Neoproterozoic)**—Light green, gray-green, gray, and dark gray; typically unfoliated, amygdaloidal, plagioclase porphyritic, amphibole/pyroxene porphyritic and aphanitic; metamorphosed: andesitic to basaltic lavas and shallow intrusions. Hyaloclastic texture is common and imparts a fragmental texture on some outcrops and float boulders. Contains lesser amounts of grayish-green, light green, and light gray to white; metamorphosed conglomerate, conglomeratic sandstone, sandstone, siltstone and mudstone.

Zhablt **Andesitic to basaltic lavas and tuffs (Neoproterozoic)**—Green, gray-green, gray, dark gray and black; typically unfoliated, amygdaloidal, plagioclase porphyritic, amphibole/pyroxene porphyritic and aphanitic; andesitic to basaltic lavas and shallow intrusions. Hyaloclastic texture is common and imparts a fragmental texture similar to a lithic tuff on some outcrops. Locally interlayered with pyroclastic rocks and meta-sediments identical to the Zhe/pl and Zhime/pl units.

Zhabsi **Andesitic to basaltic shallow intrusive of the Hyco Formation (Neoproterozoic)**—Grayish-green to light green, metamorphosed: plagioclase porphyritic andesite to basalt with a granular-textured groundmass to very fine-grained diorite and gabbro (with intrusive texture visible with 7x hand lens – microdiorite/microgabbro). Contains lesser amounts of fine- to medium grained diorite and gabbro. Plagioclase phenocrysts typically range from 1 mm to 4 mm. Dark green to black colored amphibole, when present, occurs as phenocrysts (less than 1 mm to 1 mm)

and as intergrowths with plagioclase.

Zhablt-dc **Andesitic to basaltic lavas and tuffs of the Dry Creek area (Neoproterozoic)**—Green, gray-green, gray, dark gray and black; typically unfoliated, amygdaloidal, plagioclase porphyritic, amphibole/pyroxene porphyritic and aphanitic; andesitic to basaltic lavas and shallow intrusions. Locally interlayered with meta-sediments identical to the Zhel unit. Clasts of Zhablt-dcp locally occur in conglomerates of the unit adjacent to outcrop area of Zhablt-dcp. Includes rocks of the Dry Creek unit of Hauck (1977).

Zhablt-dcp **Andesite to basalt porphyry of the Dry Creek area (Neoproterozoic)**—Distinctive, green to dark green, andesite porphyry with aphanitic groundmass and euhedral phenocrysts (up to 10 mm) of greenish-white plagioclase; phenocrysts typically constitute 20 to 50% of the rock; local alignment of plagioclase; lesser pyroxene/amphibole phenocrysts. Green to dark green basalt porphyry with abundant pyroxene (altered to amphiboles) phenocrysts with minor plagioclase phenocrysts. Andesite and basalt porphyries locally amygdaloidal (up to 2 cm), amygdules in filling include calcite, quartz, chlorite, and epidote. Same as Dry Creek Porphyry complex of Hauck (1977).

HYCO FORMATION - LOWER PORTION

Felsic to intermediate volcanic units

Zhat (l) **Altered tuffs of the lower portion of the Hyco Formation (Neoproterozoic)**—Very light gray to light greenish gray (whitish in areas) with red and yellow mottling. Alteration consists of silicified, sericitized and pyrophyllitized rock. Sericite phyllite, pods of pyrophyllite, and quartz + phyrophyllite rock all with <1 mm to 2 mm diameter weathered sulfides are common. Fine-grained chloritoid porphyroblasts (<1 mm) are present in some pyrophyllite bearing rocks. Relict lithic clasts and kaolinitized feldspar crystal shards are visible in some exposures. Relict structures are obliterated in heavily altered rocks. Map area contains boulders (up to several feet in diameter) and outcrop of massive milky quartz and quartz + sericite rock.

Zhft (l) **Felsic tuffs (Neoproterozoic)**—Grayish-green to greenish-gray and silvery-gray; massive to foliated volcaniclastic pyroclastic rocks consisting of fine- to coarse tuffs, lapilli tuffs and minor welded tuffs. Tuffs are differentiated from other volcaniclastic rocks by the presence of zones of cryptocrystalline texture that exhibit conchoidal-like fractures in between foliation domains. Layering ranges from massive to thinly bedded. Contains lesser amounts of volcaniclatic sedimentary rocks consisting of volcanic sandstones, and greywackes with minor siltstones and phyllite.

Zhft-b (l) **Felsic tuffs of the Blackwood area (Neoproterozoic)**—Green-gray to gray, metamorphosed, coarse tuff and lapilli tuff. Plagioclase crystals and crystal fragments are common. Lithic clast types includes dark-gray to black; magnetic; 1 to 70 mm; cryptocrystalline lava, or clasts of porphyritic lava with feldspar phenocrysts. Porphyritic clasts are identical to the porphyritic

phases of unit Zhdlt. Outcrops and thin sections show a prominent welding and/or compaction foliation with fiamme-shaped clasts. Outcrops typically occur as very resistant fin-like outcrops.

Zhdlt (l) **Dacitic lavas and tuffs of the lower portion of the Hyco Formation (Neoproterozoic)**—Distinctive gray to dark gray, siliceous, cryptocrystalline dacite, porphyritic dacite with plagioclase phenocrysts, and flow banded dacite. Welded and non-welded tuffs associated with the lavas include: greenish-gray to grayish-green, fine tuff, coarse plagioclase crystal tuff; lapilli tuff; and tuff breccia. The dacites are interpreted to have been coherent extrusives or very shallow intrusions associated with dome formation. The tuffs are interpreted as episodic pyroclastic flow deposits, air fall tuffs or reworked tuffs generated during formation of dacite domes. Wortman et al. (2000) report a 632.9 +2.6/-1.9 Ma zircon date from a sample within the unit in the Chapel Hill quadrangle directly on strike with this unit.

Zhdsi (l) **Dacitic shallow intrusive of the lower portion of the Hyco Formation (Neoproterozoic)**—Gray-green, light green to green; plagioclase porphyritic dacite with a granular-textured groundmass to micro-granodiorite (intrusive texture visible with 7x hand lens). Contains lesser amounts of fine- to medium grained granodiorite. Plagioclase phenocrysts typically range from 1 mm to 4 mm. Black colored amphibole, when visible, occurs as phenocrysts (<1 mm to 1 mm) and as intergrowths with plagioclase. Amphibole intergrowths distinguish rock from fine-grained tuffs. Enclaves of dark gray, plagioclase porphyritic dacite are common and at times give rock a psuedo-clastic appearance. Bradley and Miller (2011) report an age of 628.5 ±1 Ma for a dacite from this unit in southern Orange County.

CHARLOTTE TERRANE

PLUTONS (INTRUSIVE INTO CHARLOTTE TERRANE)

Zgd-CHT **Granodiorite (intrusive into the Charlotte terrane) (Neoproterozoic)**—Unfoliated to locally weakly foliated, leucocratic (CI<10), very light gray to yellowish gray, medium- to coarse-grained, hypidiomorphic granular, metamorphosed granodiorite to tonalitic granodiorite. Mafic minerals present in rock are biotite intergrown with chlorite. Weathering of rock produces distinctive coarse quartz sand grains in soil. Resistant, gabbro, diorite and andesitic to basaltic, spheroidal boulders are common throughout the pluton and are interpreted as xenoliths. Xenoliths of gneissic rock present. Same pluton as Zgd-CT but interpreted as intrusive into the Charlotte terrane. May be associated with the Greensboro Intrusive Suite

Zbda-CHT **Xenoliths of basalt, diorite and altered rocks of the Charlotte terrane (Neoproterozoic)**—Map scale bodies of metmorphosed basalt, diorite and hydrothermally altered rock.

Zdi-CHT **Diorite of the Charlotte terrane (Neoproterozoic)**—Mesocratic (CI~50), greenish-gray to grayish-green, fine- to medium-grained, metamorphosed, hypidiomorphic granular diorite. Major minerals include plagioclase and

amphibole. Plagioclase crystals are typically sericitized and saussuritized. Amphiboles are typically altered to chlorite and actinolite masses. May be gabbroic locally. Locally foliated. Granodiorite locally present.

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Appendix A
Geochronology plots and tables

Geochronology data reduction and interpretation by Adam C. Curry

The majority of analyses of zircon for U-Pb geochronology were conducted using laser ablation inductively-coupled plasma mass spectrometry (LA-ICP-MS) at the University of Arizona LaserChron Center according to methods described in several publications (G. E. Gehrels et al., 2008; G. Gehrels & Pecha, 2014; Horstwood et al., 2016; Pullen et al., 2018; Sundell et al., 2021). Samples NCGS Station Coleridge-472, NCGS Station Coleridge-8005 and NCGS Station Bennett-165 were analyzed by University of South Carolina-Columbia laboratory. Sample UNC Chapel Hill sample NC-18-02 / NCGS Station Coleridge-458 was analyzed by UNC-Chapel Hill laboratory.

Zircon U-Pb isotope data were reduced using IsoplotR to assess degree of concordance prior to calculating a weighted mean crystallization (or metamorphic) age for igneous/metaigneous samples or estimating a maximum depositional age (MDA) for metasedimentary ages (Vermeesch, 2018, 2021a, 2021b). We used the Concordia distance filter (d_c) of Vermeesch (2021a) to filter data for degree of concordance, discarding values outside of the range $-2 < d_c < 4.6$, in addition to visual assessment of concordance, discarding any analyses not touching Concordia. Zircon U-Pb analyses were also excluded in cases where Pb loss was apparent (too young ages) or Th/U ratios were anomalous. Igneous crystallization ages reported here are zircon $^{238}U/^{206}Pb$ weighted mean ages, with errors reported at a 95% confidence interval. Outliers were not included in the weighted mean ages, using Chauvenet's Criterion in IsoplotR. Estimations of MDAs for detrital zircon ages are based on the Maximum Likelihood Aga (MLA) developed by Galbraith and Laslett (1993) for fission track thermochronology and extended to zircon U-Pb detrital zircon geochronology by Vermeesch (2021b).

Regarding Th/U ratios in zircon, a value of 0.1 has typically been the cutoff for igneous (Th/U > 0.1) and metamorphic (Th/U <0.1) zircons (Rubatto, 2017). However, metamorphic zircons can range from <0.01 to >10, whereas igneous zircons rarely have Th/U <0.1 (Yakymchuk et al., 2018). Therefore, to isolate a metamorphic signature in a zircon population, it is necessary to look at zircons with Th/U < 0.1

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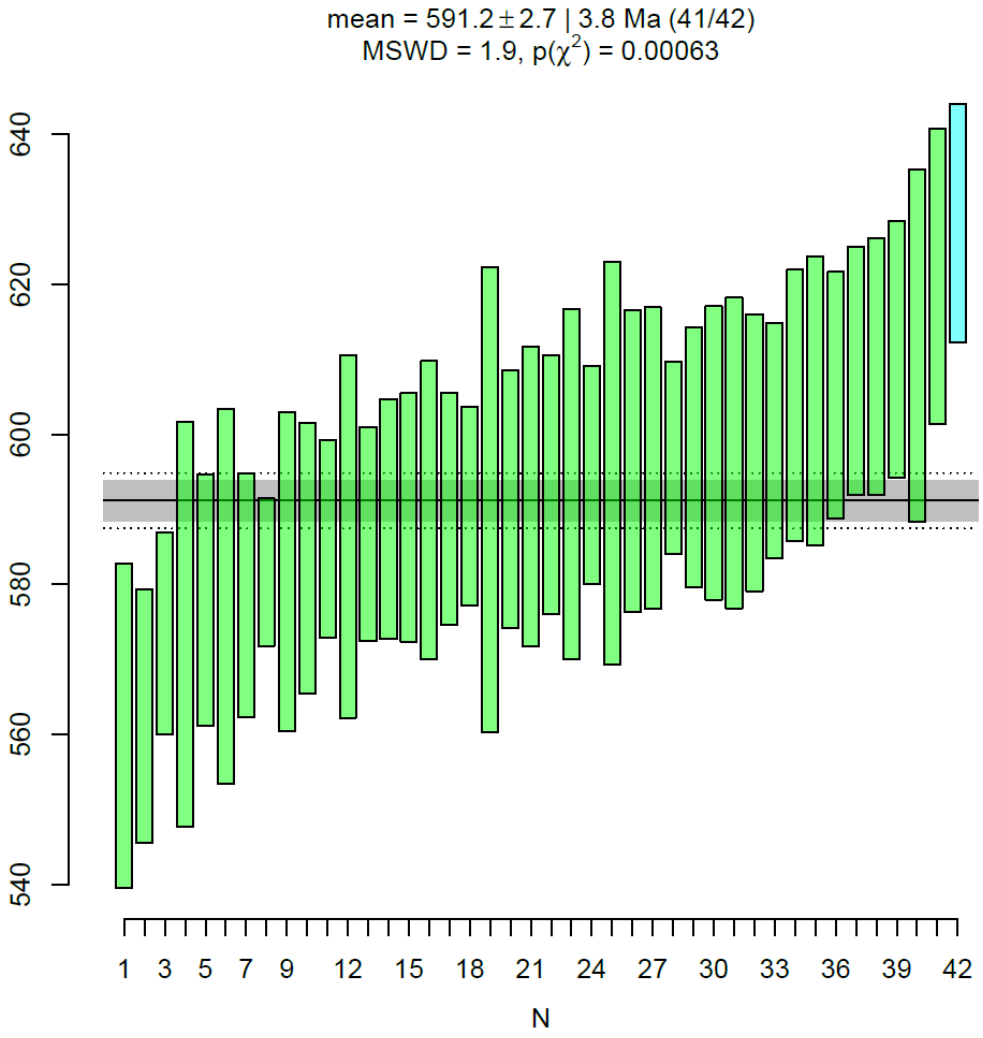
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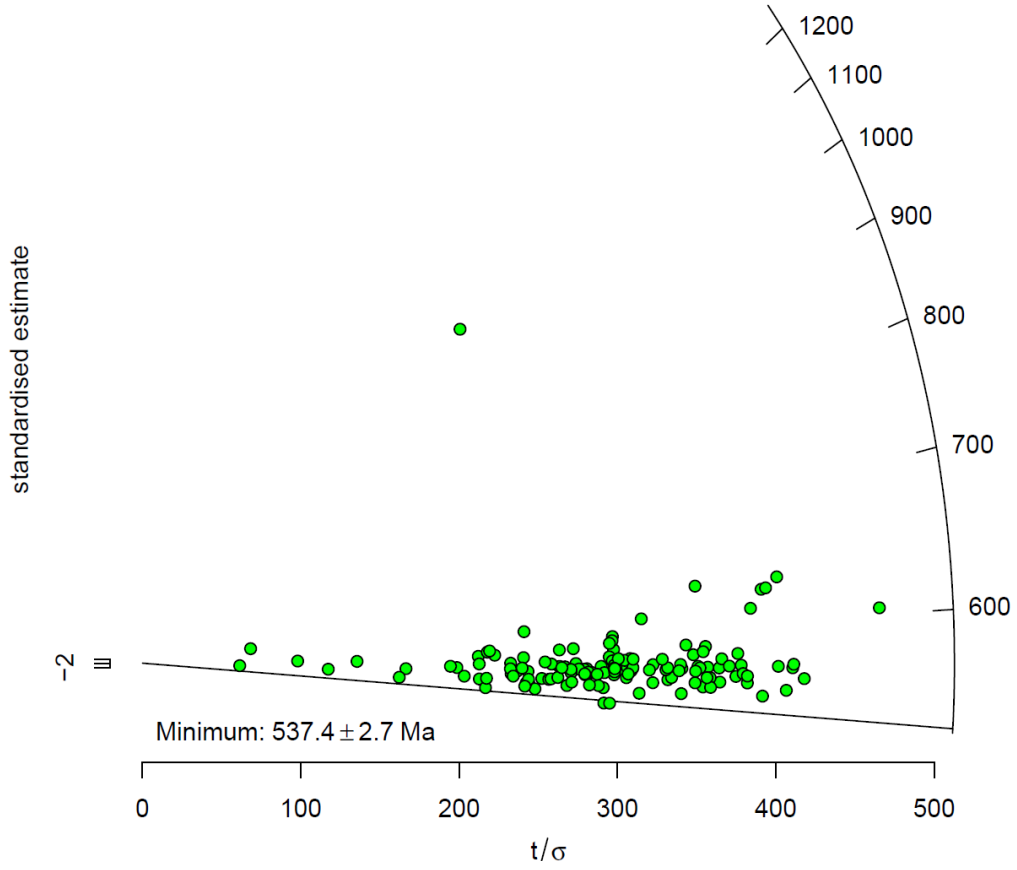
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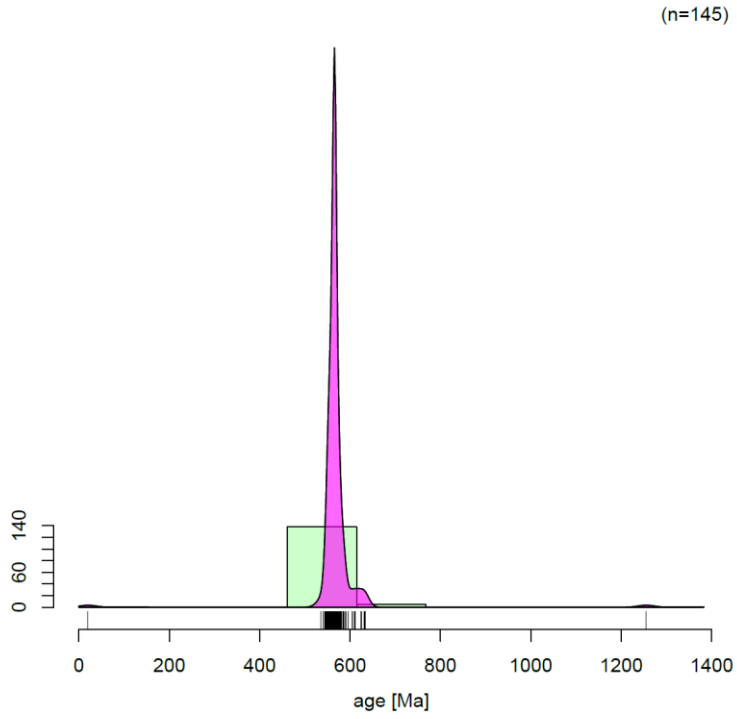
NCGS Station CH100K-2962
Granodiorite (metamorphosed)
Crystallization age



Notes:
The weighted mean age from zircons (n=41) from the granodiorite in the Greensboro Intrusive Suite is 591.2 ± 3.8 Ma (MSWD = 1.9), with one inherited zircon age of 628.1 ± 16.3 Ma. This granodiorite includes foliated xenoliths of Hyco Formation.

NCGS Station Bear Creek-626
Sandstone (metamorphosed)
Detrital age

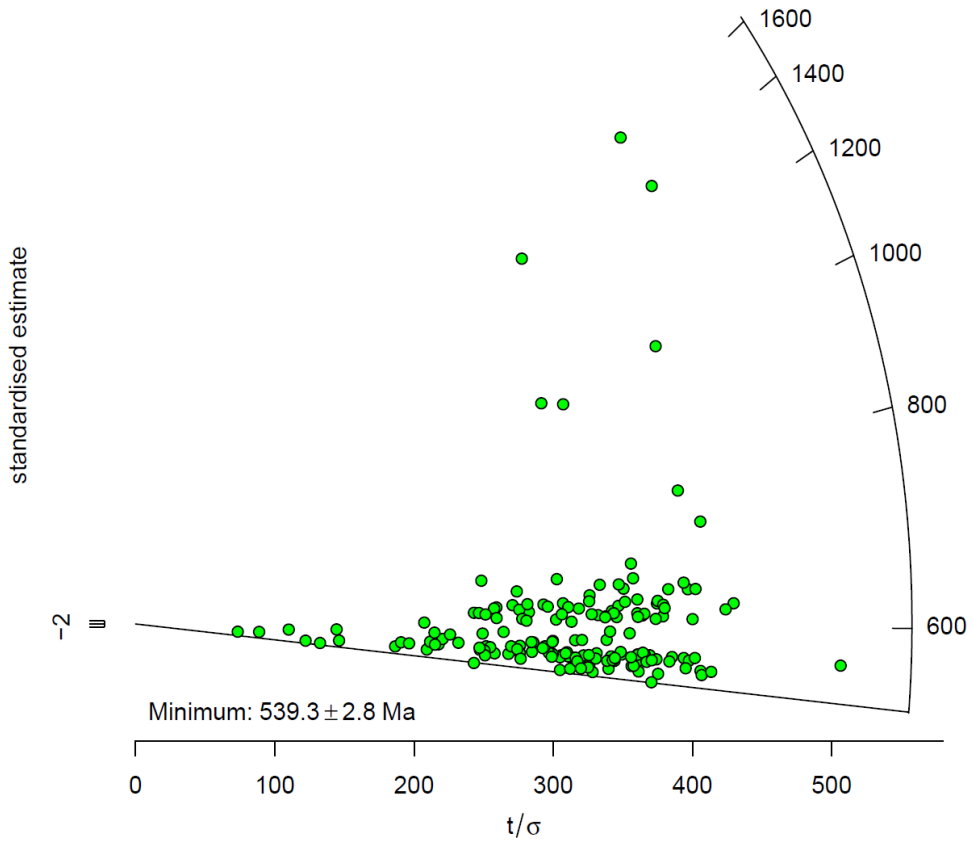


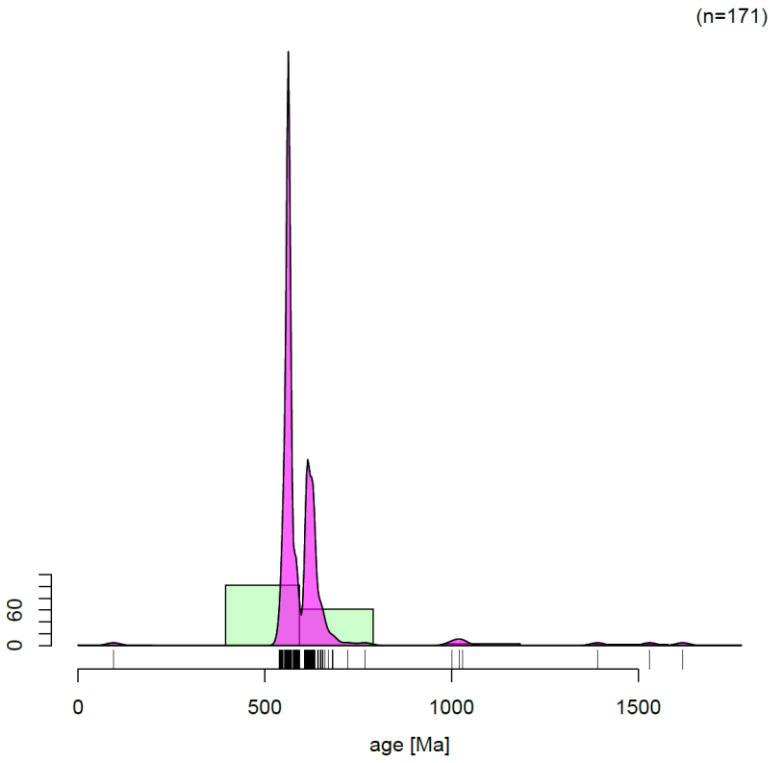


Notes:

Using all concordant analyses except one outlier, the MDA for sample Bear Creek-626 is 537.4 ± 2.7 Ma (n=144). This sample has 172 discordant analyses, and one concordant analysis with Th/U<0.1which is the outlier with an age of 20.2 ± 0.2 Ma.

NCGS Station Coleridge-3055
Sandstone (metamorphosed)
Detrital age

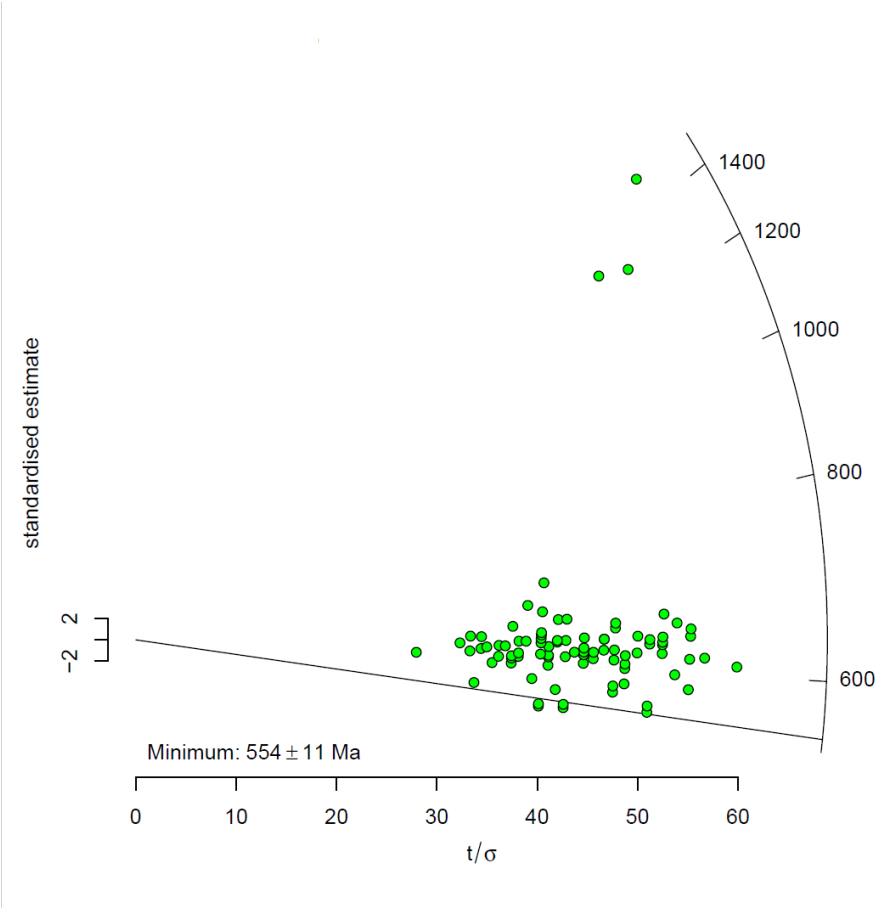


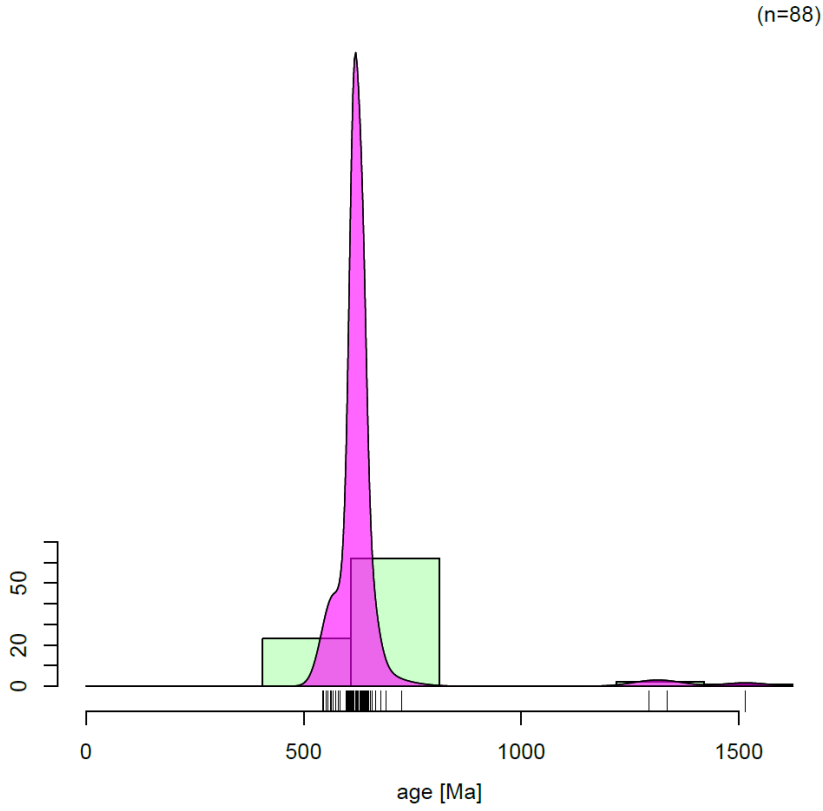


Notes:

Using all concordant analyses, the MDA for sample COL-3055 is 539.3 ± 2.8 Ma (n=171). This sample has 141 discordant analyses, and no concordant analyses with Th/U<0.1. This sample has one young, outlying age of 95 Ma. Removing this, the MDA does not change.

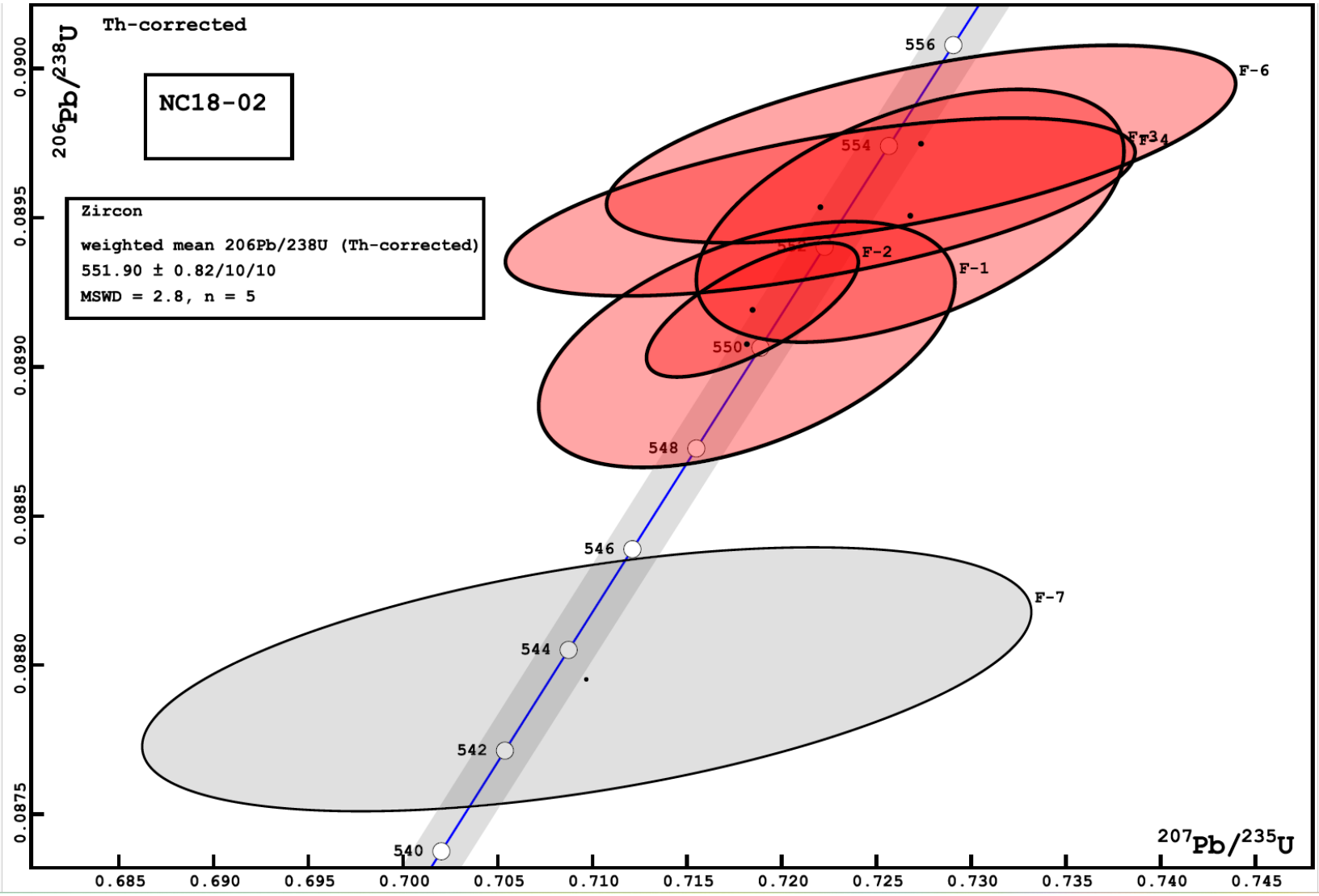
NCGS Station Coleridge-472
Sandstone (metamorphosed)
Detrital age





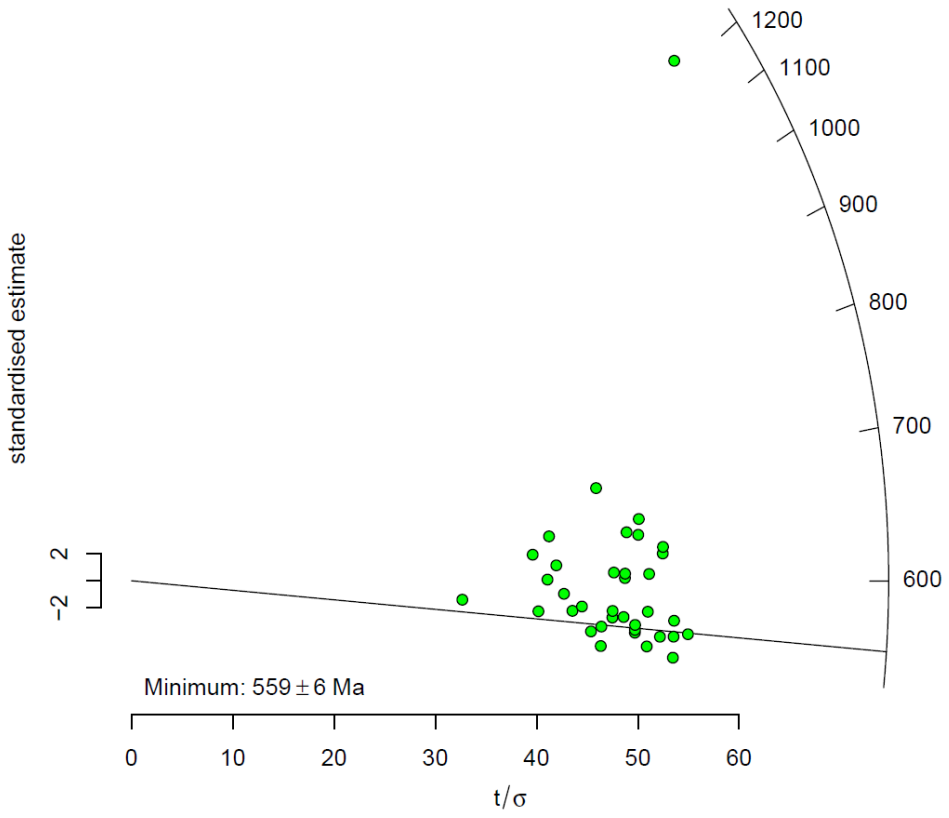
Notes:
MDA - ca. 554 Ma

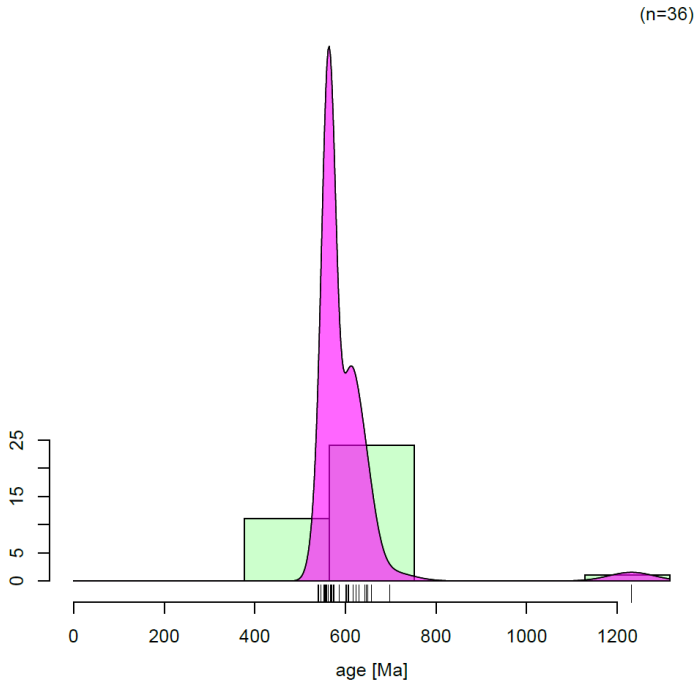
UNC Chapel Hill sample NC-18-02 /
NCGS Station Coleridge-458
Felsic dike or tuff (metamorphosed)
Crystallization age



Notes:
Ca. 552 Ma
550.1 ± 2.4 Ma and 550.7 ± 1.3 Ma for two of the grains (R. Mills, personal communication, 2018)

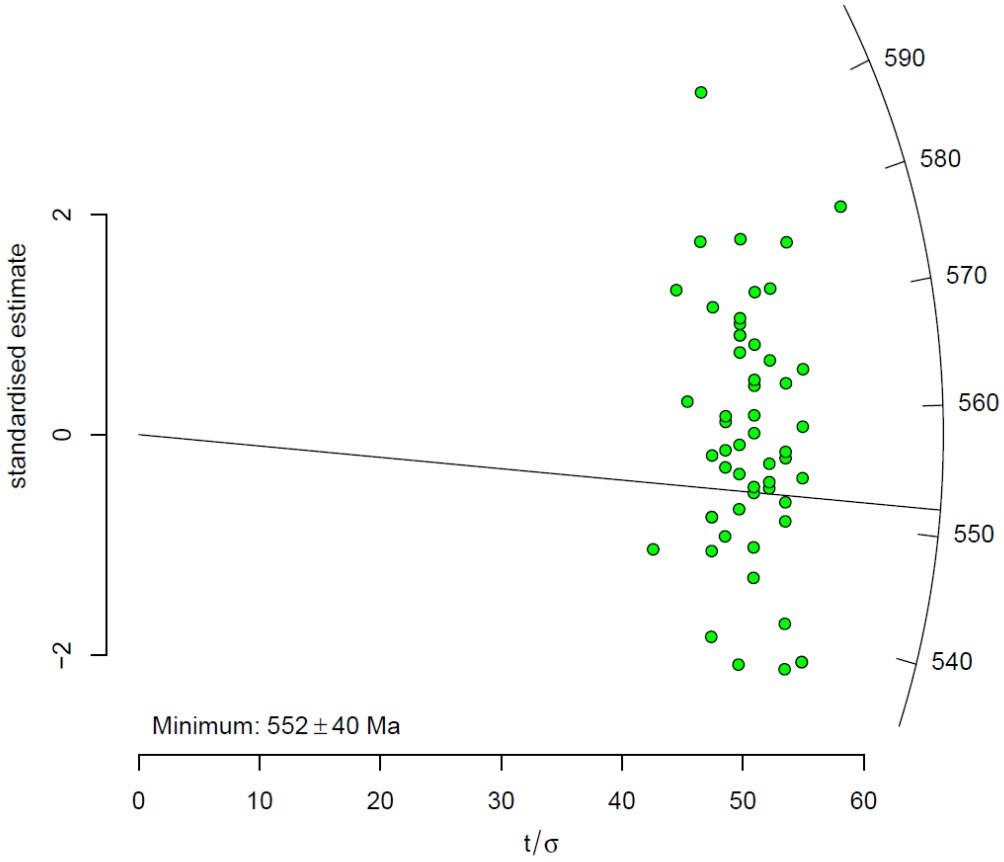
NCGS Station Coleridge-8005
Sandstone (metamorphosed)
Detrital age

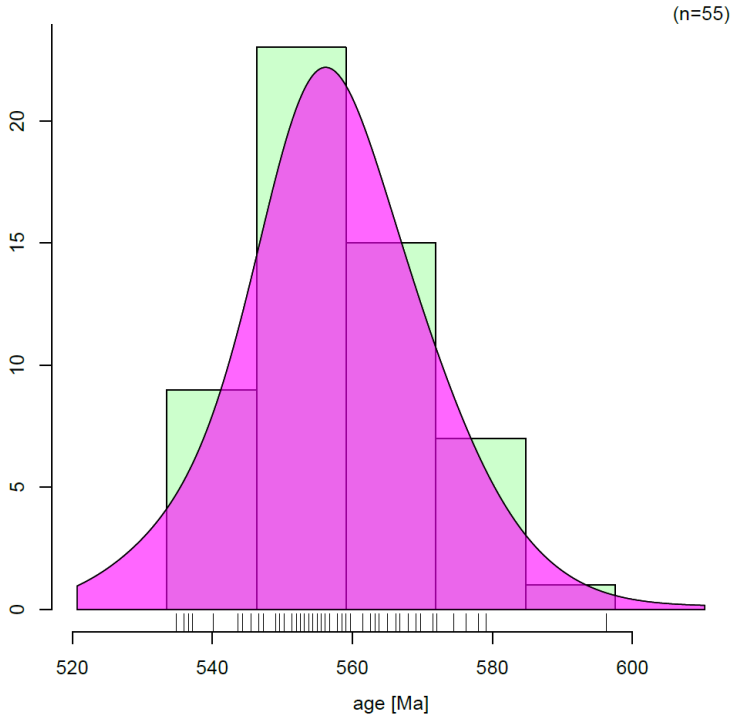


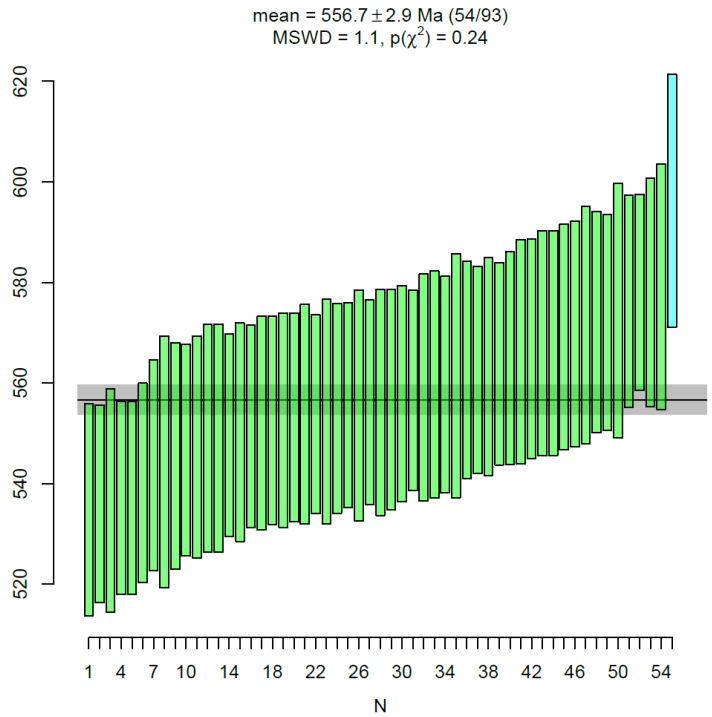


Notes:
MDA - ca. 559 Ma

NCGS Station Bennett-165
Sandstone (metamorphosed)
Detrital age

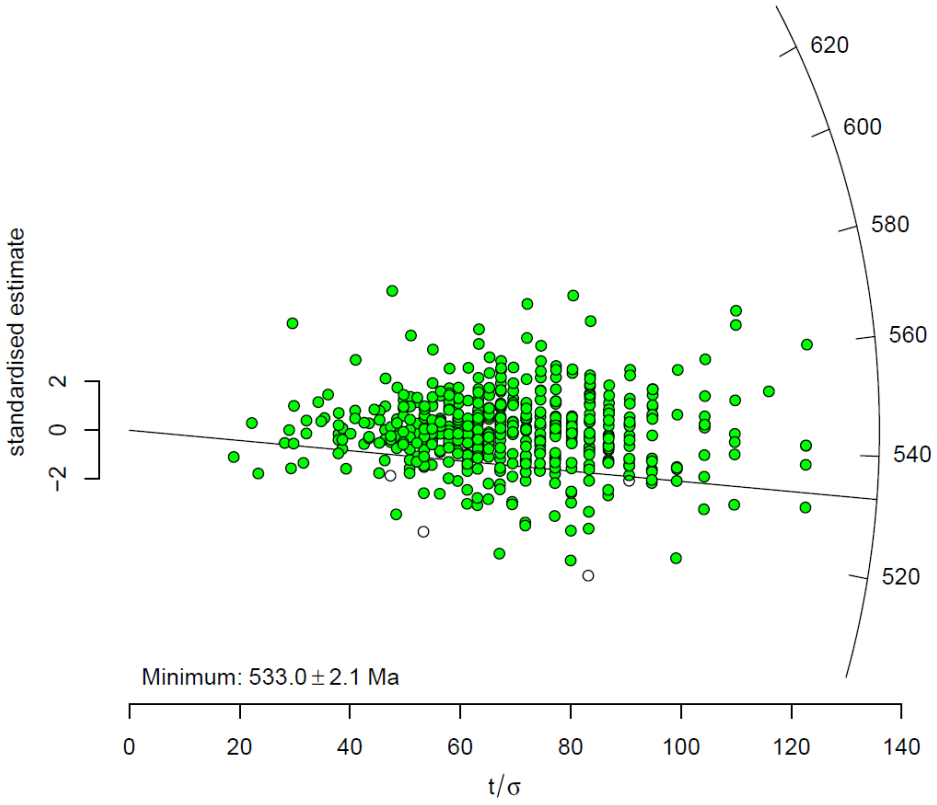


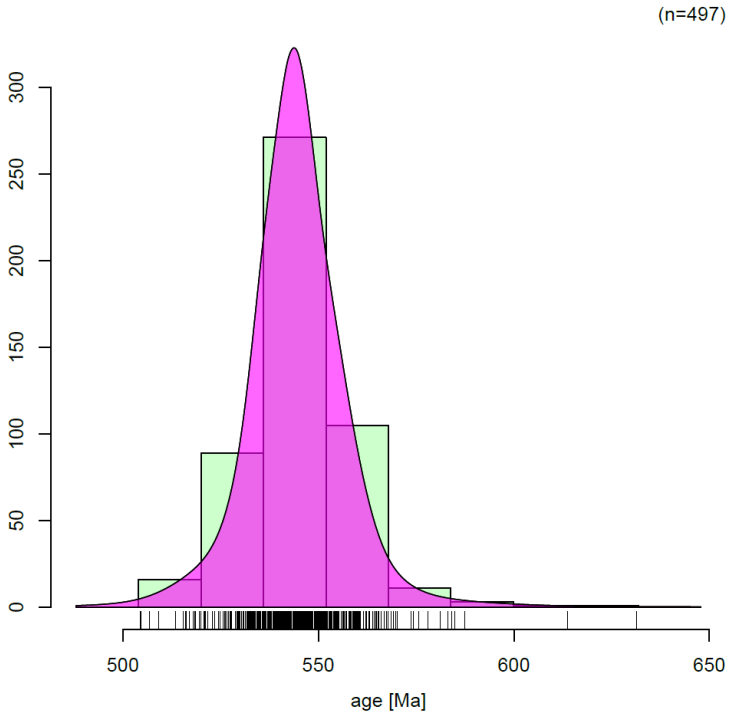




Notes:
The MDA for sample BEN-165 is 552 ± 40 Ma (n=55). It should be noted that this sample has a zircon age spectrum similar to an igneous crystallization age. In other words, it has low dispersion (see the ranked age plot for this sample). When a weighted mean age is calculated, it is 556.7 ± 2.9 Ma with an MSWD of 1.1, with one outlier (n=54).

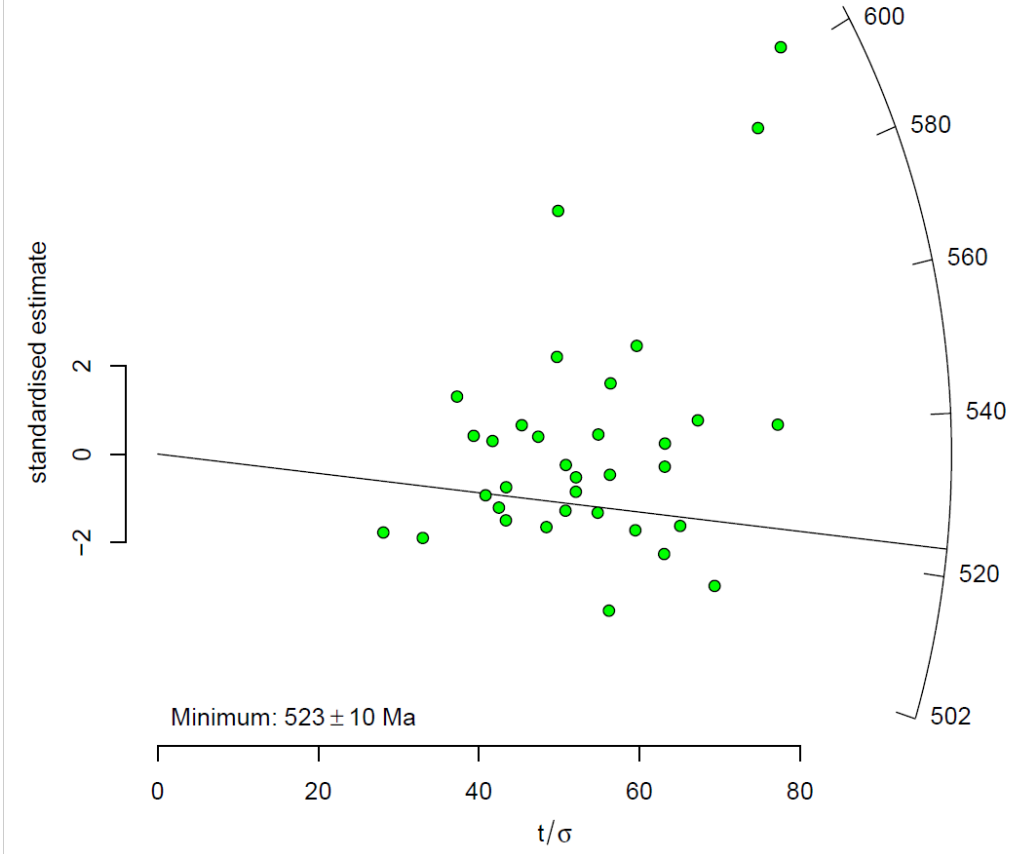
NCGS Station CH100K-3675
Sandstone (metamorphosed)
Detrital age

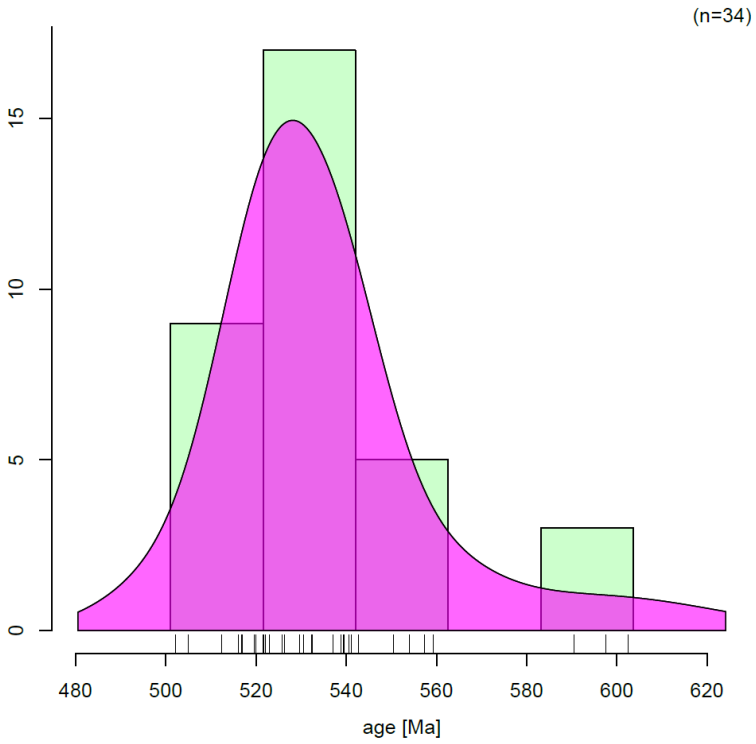




Notes:
MDA - ca. 533 Ma

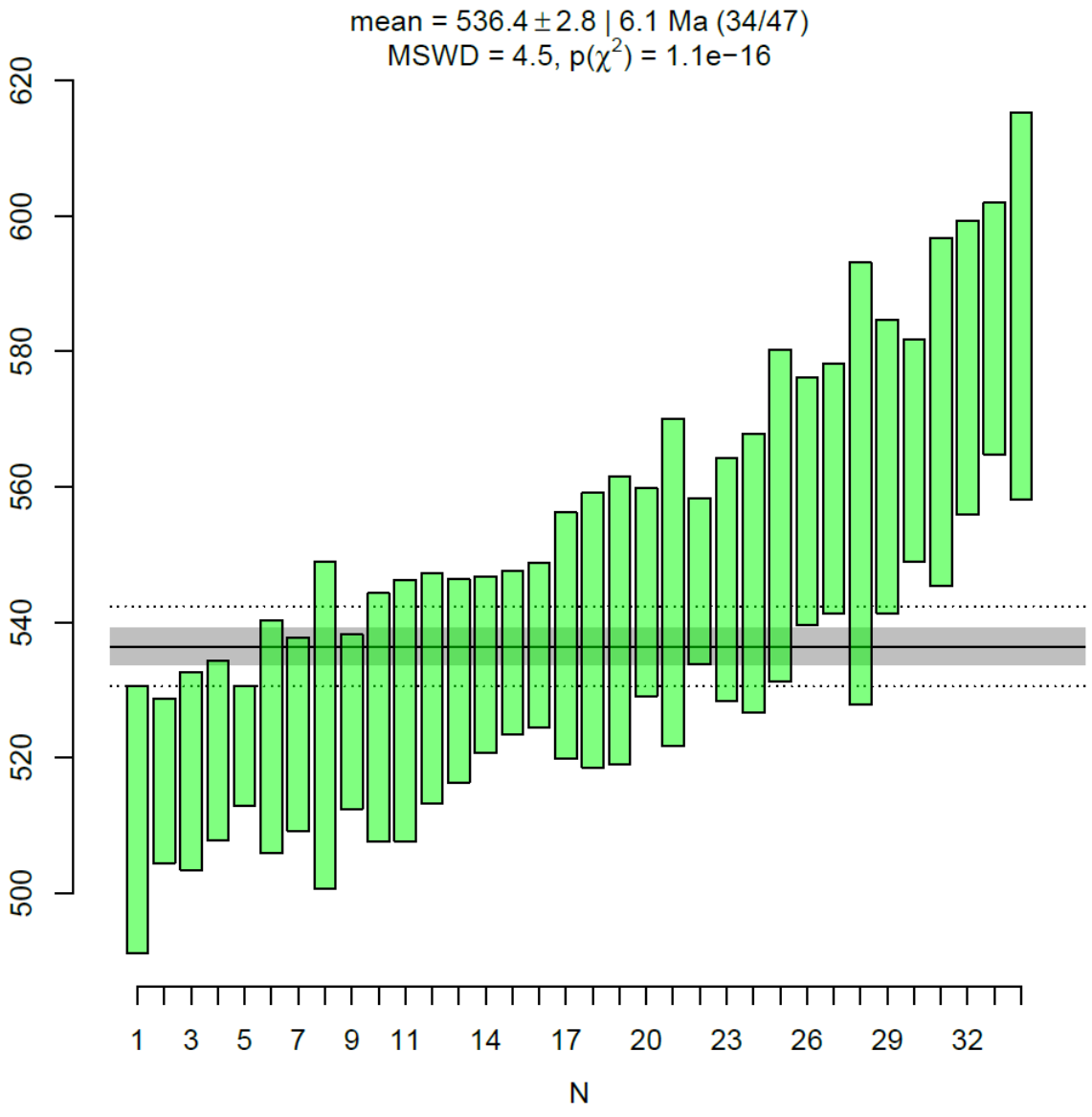
NCGS Station CH100K-3839
Tuffaceous conglomeratic sandstone (metamorphosed)
Detrital age





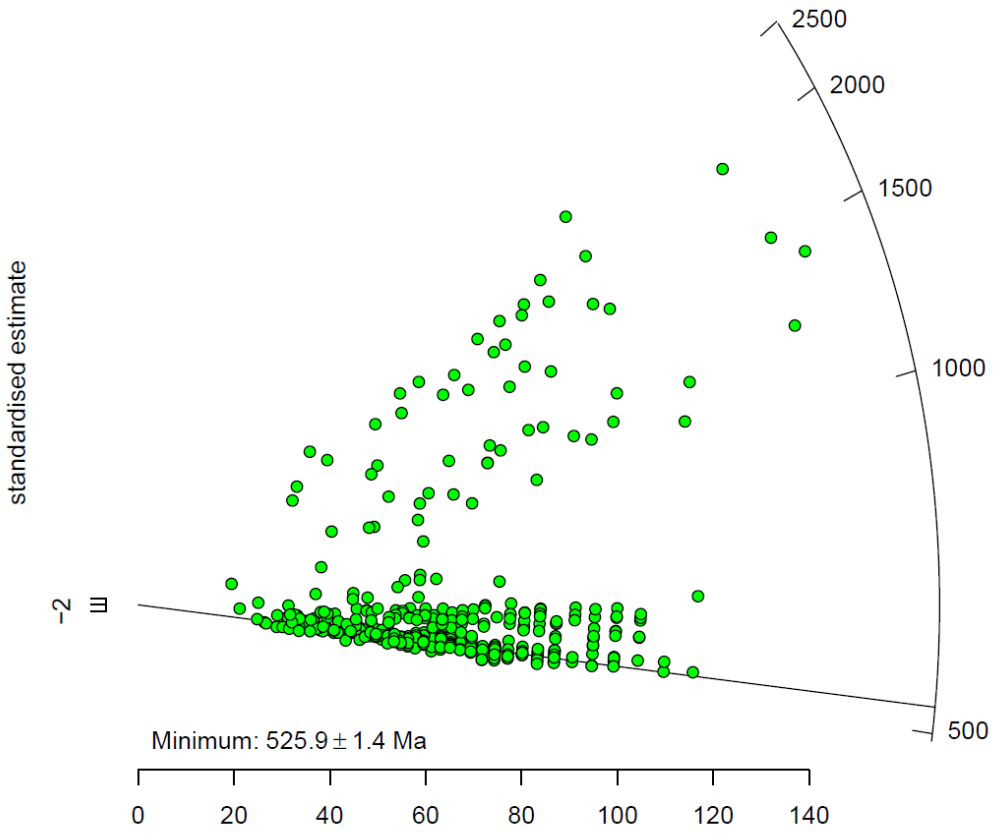
Notes:
MDA - ca. 523 Ma

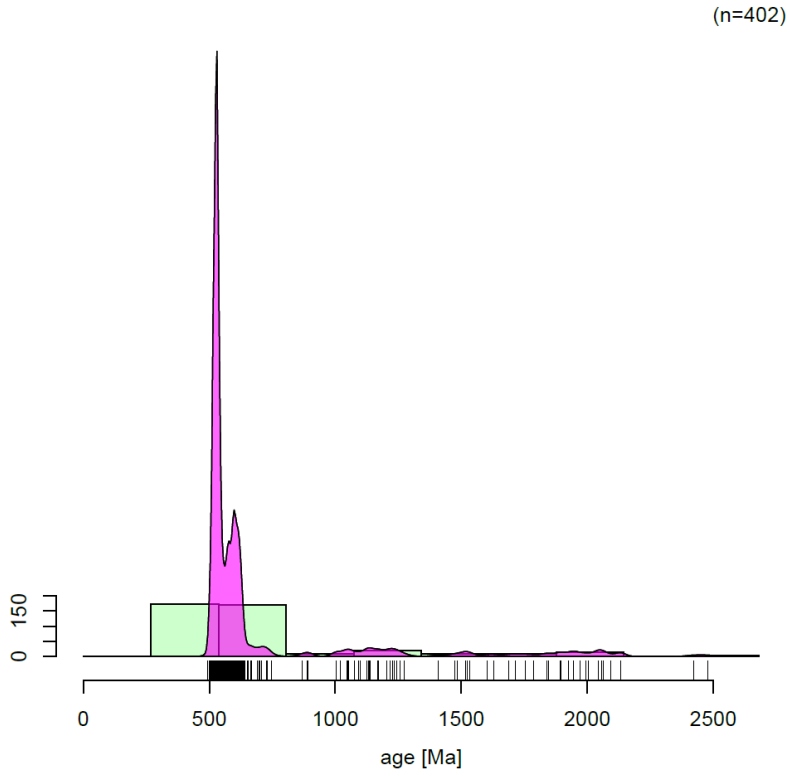
NCGS Sample ChapelHill100K-Seagrove1
Rhyodacite (metamorphosed)
Crystallization age



The weighted mean age of the sample (n = 34) is 536.4 ± 6.1 Ma (MSWD = 4.5).

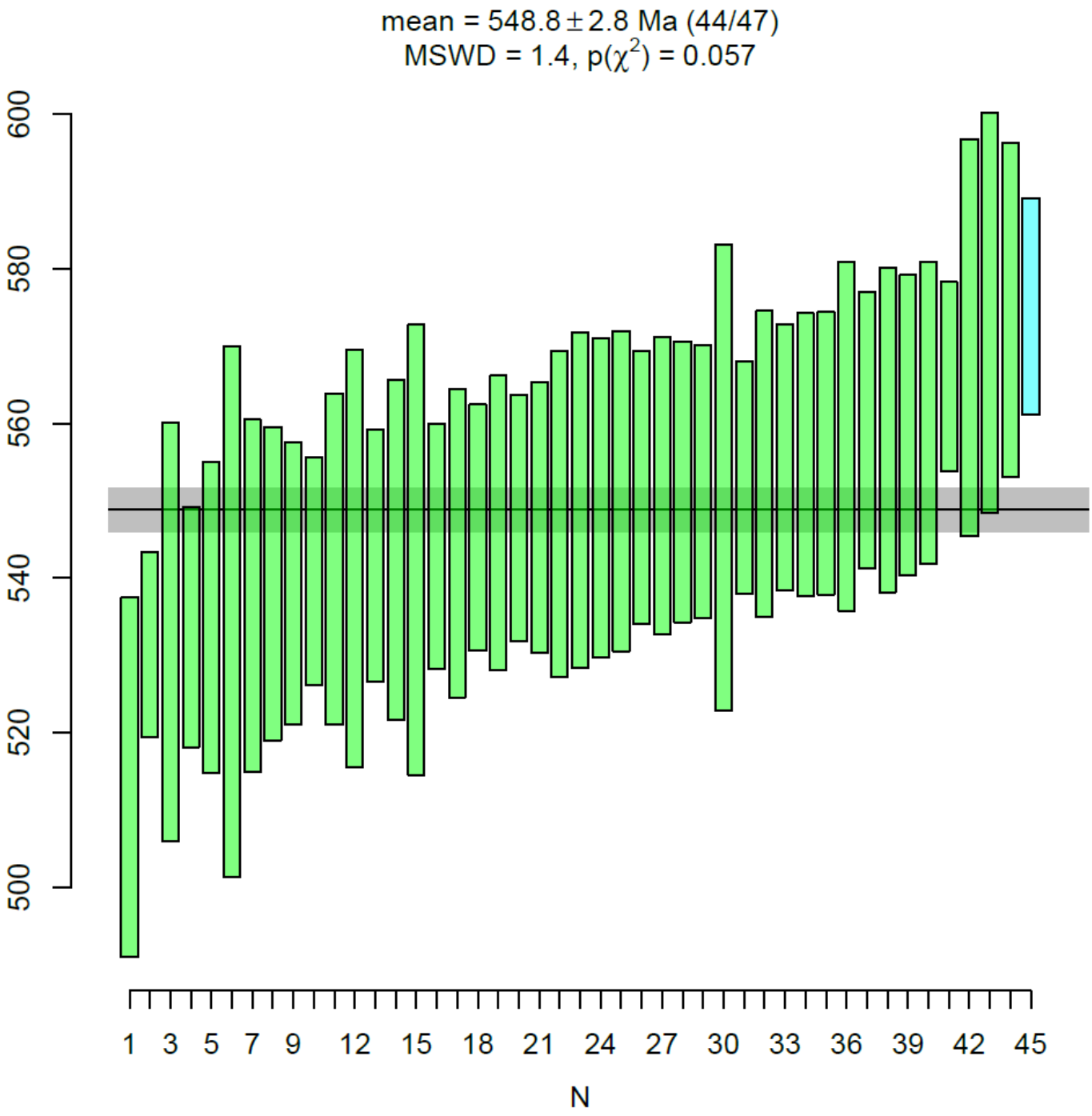
NCGS Station CH100K-3834
Sandstone (metamorphosed)
Detrital age





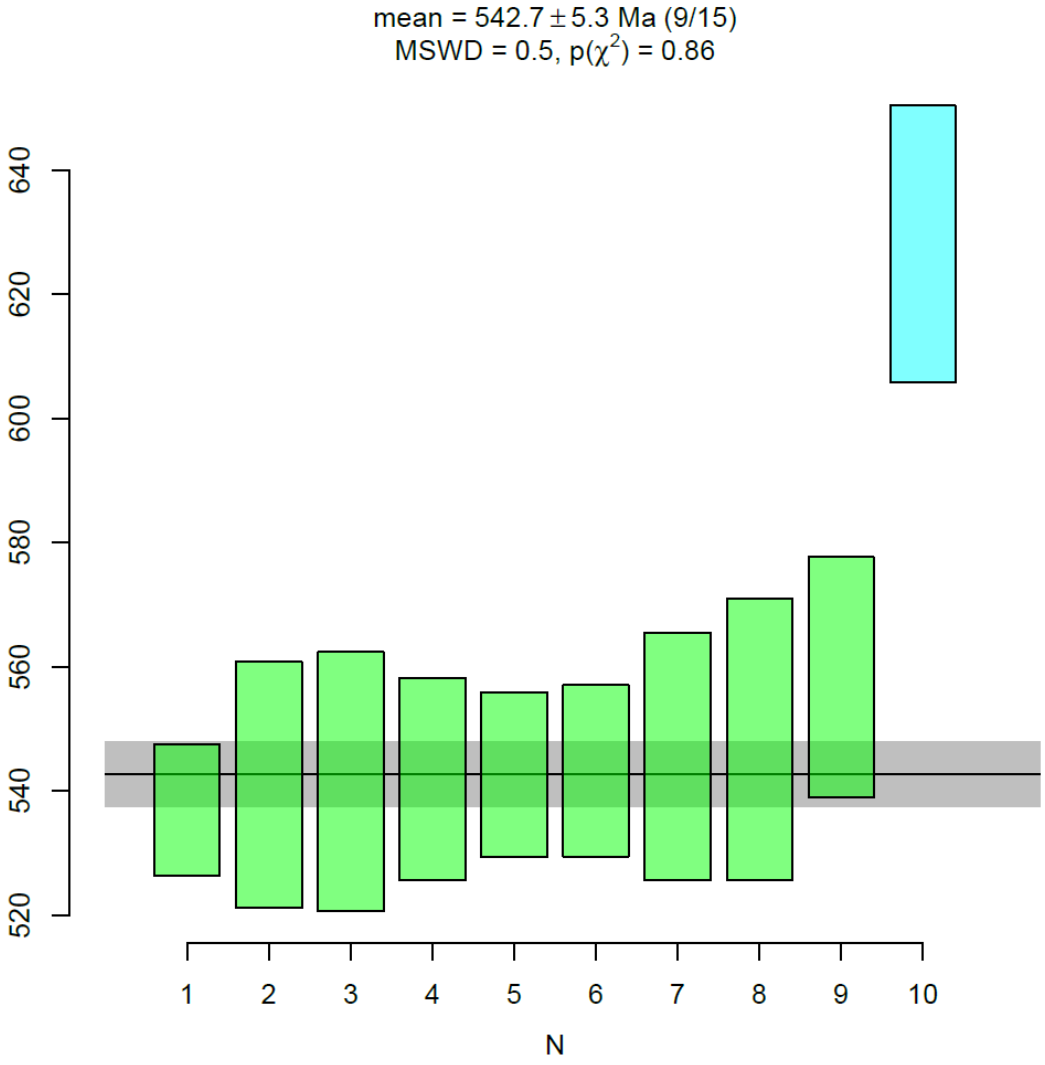
Notes:
MDA - ca. 526 Ma

NCGS Station CH100K-3838 (Daves Mountain)
Rhyodacite (metamorphosed)
Crystallization age



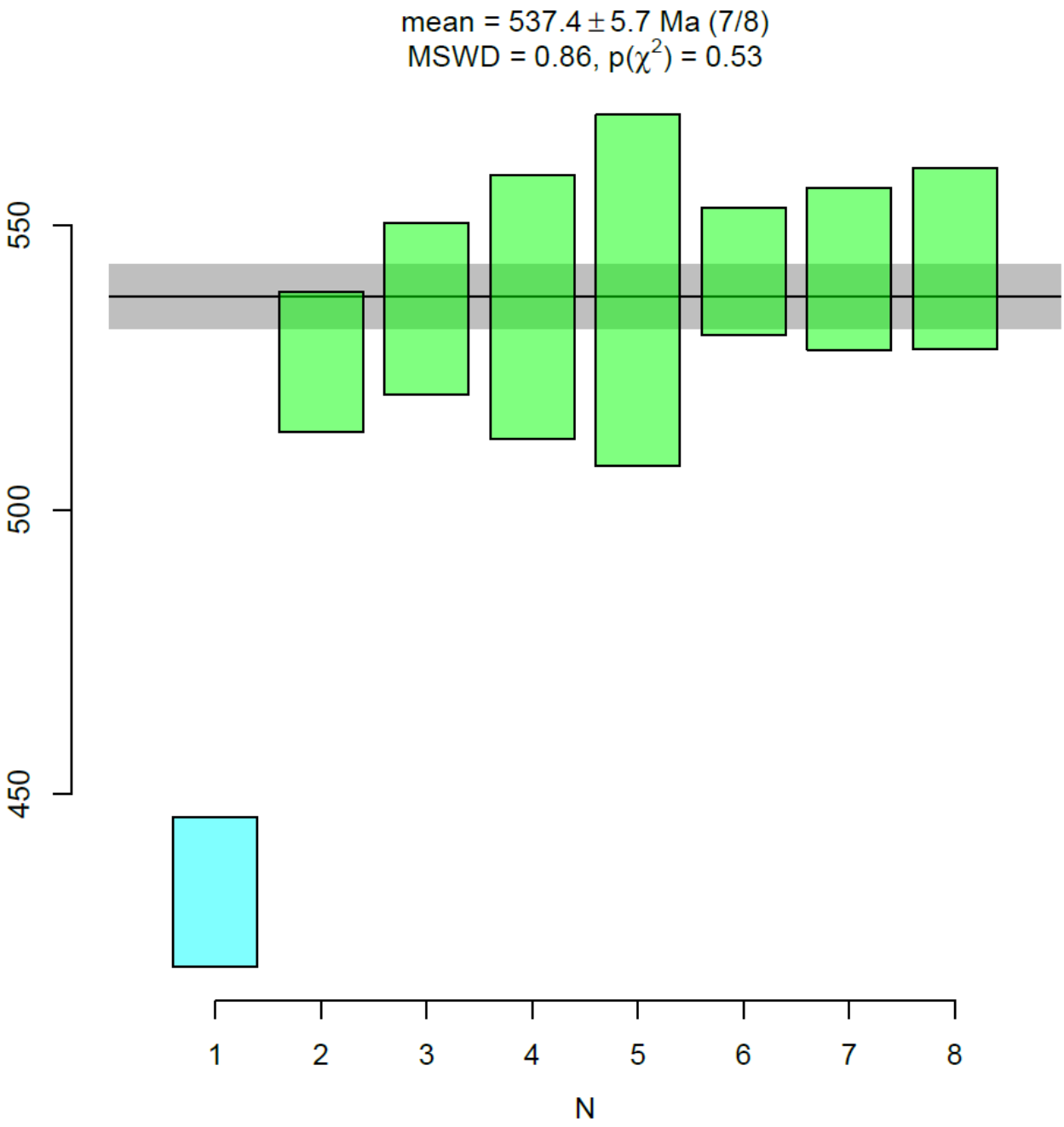
Notes:
The weighted mean age of zircon ages (n=44) from sample CH100K-3838 is 548.8 ± 2.8 Ma, with a mean standard of the weighted deviates (MSWD) of 1.4. Sample CH100K-3838 has one outlying age of 575.1 ± 14.6 Ma.

NCGS Sample ChapelHill100K-Caraway Mtn 1
Rhyodacite (metamorphosed)
Crystallization age



The weighted mean age of the rhyodacite at Caraway Mountain zircons (n = 9) is 542.7 ± 5.3 Ma (MSWD = 0.5), with one inherited zircon age of 628.1 ± 22.7 Ma.

NCGS Station CH100K-3840 (Luther Place Trail area in core of Uwharries)
Rhyodacite (metamorphosed)
Crystallization age



Notes:

The weighted mean age of sample CH100K-3840 (n=7) is 537.4 ± 5.7 Ma, with an MSWD of 0.86. Sample CH100K-3840 has a younger outlying age of 432.7 ± 13.4 Ma.

Table 1. LA-ICP-MS U-Pb zircon data for the Chapel Hill 100K (crystallization ages)

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	Th/U	$^{206}Pb/^{204}Pb$	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[a]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
Chapel Hill 100k																	
Sample 2962																	
2962_1	249	1.22	137716	16.949	2.1	0.792	3.5	0.0974	2.8	0.799	-0.95	599.1	16	592.3	15.7	566.2	45.8
2962_2	127	0.21	14980	16.491	4.7	0.8207	5.7	0.0982	3.2	0.569	0.76	603.8	18.6	608.4	26	625.5	100.7
2962_3	178	0.51	29020	17.049	3.5	0.7352	5.3	0.09095	4.1	0.761	-0.24	561.2	21.8	559.6	23	553.3	75.6
2962_4	351	0.60	834118	16.837	2.2	0.7891	3.8	0.0964	3.1	0.815	-0.36	593.3	17.7	590.7	17.2	580.6	48.2
2962_5	185	0.41	337197	16.38	3.9	0.8064	4.8	0.09585	2.8	0.583	1.7	590	15.6	600.4	21.5	640	83
2962_6	199	0.43	10989	16.999	3.6	0.7874	5	0.09712	3.5	0.696	-1.2	597.5	20	589.7	22.5	559.7	78.9
2962_7	329	0.93	72990	16.581	2.2	0.792	3.5	0.09528	2.6	0.767	0.85	586.7	14.9	592.3	15.5	613.7	47.9
2962_8	139	0.31	33822	16.542	4.2	0.8077	5.6	0.09694	3.6	0.653	0.75	596.4	20.7	601.1	25.2	618.8	90.9
2962_9	284	0.47	106531	16.529	2.7	0.8098	4.3	0.09713	3.3	0.781	0.69	597.6	19.1	602.4	19.5	620.5	57.7
2962_10	362	1.14	94087	16.809	2.6	0.784	3.9	0.09562	2.9	0.746	-0.14	588.7	16.4	587.8	17.5	584.1	56.5
2962_12	149	0.36	16551	16.675	4.4	0.7919	5.7	0.09582	3.6	0.629	0.39	589.8	20.3	592.2	25.7	601.5	96.3
2962_13	116	0.47	18480	16.538	4.3	0.7823	6.3	0.09387	4.6	0.73	1.3	578.4	25.4	586.8	28.1	619.3	93
2962_15	140	0.60	74473	16.752	3.5	0.7769	5.2	0.09443	3.9	0.75	0.31	581.7	21.8	583.7	23.2	591.5	74.8
2962_16	368	0.75	32880	16.779	2.8	0.7977	4.6	0.09712	3.7	0.789	-0.27	597.5	20.8	595.5	20.9	588	61.7
2962_17	154	0.42	49419	16.693	3.4	0.8127	4.5	0.09843	2.9	0.655	-0.19	605.2	16.8	603.9	20.3	599.2	72.9
2962_18	268	0.66	26575	16.67	3.4	0.7988	4.3	0.09662	2.6	0.614	0.26	594.6	15	596.2	19.3	602.1	73.3
2962_19	337	0.78	53283	16.75	2.7	0.7832	3.6	0.09518	2.4	0.663	0.19	586.1	13.5	587.3	16.3	591.8	59.2
2962_20	162	0.33	39779	16.95	2.5	0.7887	4.4	0.097	3.6	0.822	-0.88	596.8	20.5	590.4	19.6	566	54.3
2962_21	345	0.84	157683	16.661	1.6	0.7696	3	0.09304	2.5	0.841	0.85	573.5	13.9	579.5	13.3	603.3	35.3
2962_23	140	0.56	25080	16.718	3.5	0.792	4.7	0.09607	3.1	0.672	0.15	591.4	17.7	592.3	20.9	595.9	74.9
2962_24	165	0.41	1369983	16.391	3.4	0.7966	4.7	0.09474	3.3	0.703	1.8	583.5	18.5	594.9	21.3	638.6	72.3
2962_25	389	0.85	104682	16.676	2.4	0.776	3.8	0.0939	3	0.788	0.68	578.6	16.8	583.2	17.1	601.4	51.2
2962_26	91	0.17	29858	16.677	5.2	0.7938	7.6	0.09606	5.6	0.737	0.31	591.3	31.8	593.3	34.3	601.2	111.8
2962_27	299	0.39	59943	16.699	2.6	0.7741	4	0.09379	3.1	0.765	0.62	577.9	17	582.1	17.9	598.4	56.2
2962_28	220	0.45	20608	16.771	3.8	0.8142	4.8	0.09908	3	0.627	-0.66	609	17.6	604.8	22	589.1	81.5
2962_29	376	0.32	123280	16.53	2.6	0.8432	4.3	0.10113	3.4	0.792	-0.016	621	20.3	620.9	20.2	620.4	57.2
2962_31	283	0.75	46023	16.423	3.2	0.8028	4.4	0.09566	3	0.677	1.5	588.9	16.7	598.4	19.8	634.4	69.4
2962_32	53	0.32	15702	16.568	7	0.7756	8.5	0.09324	5	0.581	1.4	574.7	27.3	583	37.9	615.4	150.3
2962_33	1332	0.48	170436	16.661	2.6	0.7934	3.6	0.09592	2.4	0.682	0.42	590.5	13.7	593.1	16	603.3	56.3
2962_34	196	0.50	37037	16.69	3.3	0.7938	4.9	0.09613	3.6	0.73	0.24	591.7	20.2	593.3	22	599.5	72.4
2962_35	712	0.60	325693	16.342	2.1	0.8181	3.1	0.09701	2.3	0.743	1.5	596.9	13.2	607	14.3	645.1	45
2962_36	200	0.50	259071	16.34	2.4	0.7688	4	0.09116	3.2	0.793	2.5	562.4	17.1	579.1	17.7	645.2	52.5
2962_37	477	0.94	39594	17.118	2.5	0.7602	3.1	0.09442	1.8	0.592	-1.3	581.6	10.2	574.1	13.6	544.5	54.7
2962_39*	458	0.79	45063	16.697	2.2	0.8447	3.5	0.10234	2.7	0.779	-0.87	628.1	16.3	621.7	16.3	598.6	47.6
2962_40	278	0.76	697401	16.788	1.8	0.807	3.8	0.0983	3.4	0.885	-0.53	604.4	19.6	600.8	17.4	586.9	38.8
2962_41	262	0.88	15239	16.783	3.1	0.7967	4.4	0.09702	3.1	0.713	-0.3	596.9	18	594.9	19.9	587.5	67.1
2962_42	151	0.62	136549	16.563	3.6	0.7924	5.7	0.09523	4.4	0.771	0.9	586.4	24.7	592.5	25.7	616.1	78.5
2962_43	89	0.13	48166	17.191	4.8	0.7768	6.8	0.09689	4.8	0.703	-1.9	596.2	27.3	583.6	30.3	535.2	106.1
2962_44	228	0.14	21357	16.721	4.1	0.7947	5.8	0.09642	4.2	0.712	0.066	593.4	23.5	593.8	26.2	595.6	88.7
2962_47	200	0.48	772820	16.459	3.5	0.8336	5.4	0.09955	4.1	0.757	0.54	611.8	23.7	615.6	24.7	629.7	75.5
2962_48	235	0.41	146165	16.811	3.2	0.8115	4.3	0.09899	2.9	0.67	-0.79	608.5	16.8	603.3	19.6	583.9	69.4
2962_49	201	0.38	72026	16.631	3.6	0.8243	4.6	0.09947	3	0.644	-0.13	611.3	17.4	610.4	21.3	607.2	76.9
Seagrove																	
1	286	0.93	229807	17.272	3.1	0.6797	4.9	0.08518	3.9	0.786	-0.059	527	19.7	526.6	20.3	524.9	67
2	251	0.72	1855022	17.155	3.5	0.6796	4.5	0.08459	2.9	0.634	0.55	523.5	14.4	526.5	18.6	539.8	76.4
4	234	0.95	68481	17.262	3	0.7318	4.4	0.09166	3.1	0.716	-1.2	565.3	16.9	557.6	18.7	526.2	66.8
5	123	0.46	83335	16.881	4.2	0.7451	5.8	0.09126	4.1	0.696	0.38	563	21.9	565.4	25.3	574.9	91
6	85	0.67	13071	17.347	4.5	0.7359	6.6	0.09263	4.8	0.729	-1.7	571.1	26.1	560	28.2	515.3	98.6
7	167	0.66	17312	17.333	3.7	0.7454	5.4	0.09374	4	0.732	-1.8	577.6	21.9	565.5	23.5	517.1	81
9	69	0.53	12723	17.294	5.2	0.7592	7.3	0.09527	5.2	0.703	-2	586.6	28.9	573.5	32.1	522.1	114.4
11	118	0.74	27811	17.224	4.9	0.7204	6.8	0.09003	4.7	0.693	-0.79	555.7	25.1	550.9	28.9	531	107.4
16	168	0.66	17653	17.38	3.9	0.6902	5.3	0.08704	3.6	0.672	-0.86	538	18.5	532.9	22.1	511.2	86.8
17	277	0.90	67139	16.703	4.5	0.6805	6.1	0.08247	4.1	0.676	3	510.9	20.4	527.1	25.2	597.9	98
18	98	0.51	29398	17.048	4	0.7162	5.6	0.0886	4	0.708	0.19	547.2	20.8	548.4	23.7	553.4	86.3
20	142	0.44	156558	16.895	2.9	0.7188	4.2	0.08813	3	0.71	0.91	544.4	15.5	550	17.8	573	64.2
21	162	0.56	17441	17.274	5.2	0.6767	7.2	0.08481	4.9	0.682	0.0015	524.8	24.6	524.8	29.4	524.7	115
22	129	0.47	47449	17.124	4.1	0.7036	5.8	0.08742	4.2	0.717	0.11	540.2	21.6	540.9	24.4	543.8	88.7
24	234	1.00	1336944	16.768	3.2	0.7062	4.4	0.08592	3	0.676	1.9	531.4	15.1	542.5	18.4	589.5	69.7
25	118	0.41	19804	17.262	4.1	0.7218	5.4	0.0904	3.5	0.657	-1	557.9	19	551.7	23	526.2	89.3
27	282	0.70	2007278	16.917	2.8	0.6798	3.8	0.08344	2.5	0.667	1.8	516.6	12.5	526.6	15.5	570.2	61.1
28	168	0.70	12661	17.506	4	0.6796	4.8	0.08632	2.6	0.541	-1.3	533.8	13.3	526.5	19.7	495.3	88.8
29	89	0.55	20632	17.427	4.2	0.7184	7.5	0.09084	6.2	0.825	-1.6	560.5	33.2	549.7	31.8	505.3	93.3
30	228	0.94	53636	17.006	3	0.7164	3.8	0.0884	2.4	0.623	0.43	546.1	12.3	548.6	16	558.9	64.4
31	193	0.89	46480	17.149	3.6	0.6977	4.3	0.08681	2.4	0.551	0.14	536.7	12.2	537.4	18	540.5	78.8
33	264	0.72	49244	16.972	3.5	0.7035	4.2	0.08663	2.4	0.575	0.96	535.6	12.5	540.9	17.8	563.1	75.5
35	228	0.52	579085	17.09	2.7	0.7638	4.3	0.09472	3.4	0.784	-1	583.4	18.8	576.2	18.9	548	58.4
36	402	0.94	395583	17.109	2.7	0.6792	3.3	0.08431	1.8	0.563	0.85	521.8	9.2	526.3	13.4	545.6	59
37	96	0.47	13176	17.56	5.7	0.6842	7	0.08718	4	0.575	-1.7	538.8	20.7	529.3	28.7	488.5	125.9
38	187	0.67	64125	16.611	3.7	0.7014	5.1	0.08453	3.5	0.68	2.9	523.1	17.4	539.6	21.4	609.8	80.9
39	126	0.46	34692	17.468	4	0.6972	6.2	0.08837	4.7	0.763	-1.4	545.9	24.6	537.1	25.7	500.1	87.6
40	158	0.87	28209	17.291	4	0.6776	5.5	0.08501	3.7	0.679	-0.11	525.9	18.9	525.3	22.6	522.5	88.8
41	267	1.00	118003	17.007	3.4	0.6879	4.2	0.0849	2.6	0.609	1.1	525.3	13	531.6	17.5	558.6	73.1
44	210	1.20	22772	17.109	3.8	0.6741	4.8	0.08368	3	0.614	0.94	518	14.8	523.2	19.8	545.7	83.5
46	188	0.75	48420	17.406	3.1	0.7183	4.7	0.09071	3.5	0.742	-1.6	559.8	18.6	549.6	19.8	507.9	68.9
48	158	0.47	15354	17.333	5	0.6816	6.1	0.08573	3.4	0.567	-0.46	530.2	17.5	527.8	25	517.1	109.7
49	261	0.63	49001	17.36	2.8	0.7021	4.5	0.08844	3.5	0.789	-0.97	546.3	18.5	540.1	18.8	513.7	60.5
50	205	0.72	14200	16.714	4.8	0.6942	5.5	0.08418	2.7	0.499	2.7	521.1	13.8	535.3	22.9	596.5	103.5
Caraway Mtn																	
1	169	0.67	41869	16.792	4.9	0.7216	5.6	0.08792	2.7	0.481	1.5	543.2	13.9	551.6	23.6	586.3	105.7
6	177	0.73	69343	17.127	3.5	0.7279	5	0.09046	3.7	0.729	-0.46	558.3	19.7	555.3	21.6	543.3	75.5
7	99	0.61	78715	16.621	4.8	0.7266	6.3	0.08763	4.1	0.646	2.3	541.5	21.3	554.6	27.1	608.5	104.6
8	250	0.58	25428	16.239	4.3	0.7452	5	0.08781	2.6	0.51	4.2	542.6	13.4	565.5	21.9	658.6	93.1
10	111	0.53	8519	17.432	6	0.6982	7.1	0.08831	3.9	0.545	-1.4	545.5	20.3	537.7	29.8	504.6	131.6
11	766	1.19	143083	17.065	2.2	0.7082	3.9	0.08769	3.2	0.828	0.27	541.9	16.8	543.7	16.4	551.3	47.7
13*	194	0.53	58598	16.494	3	0.8551	4.8	0.10233	3.8	0.783	-0.081	628.1	22.7	627.4	22.7	625.1	65
17	65	0.39	13667	17.098	5.3	0.7056	6.6	0.08754	3.9	0.597	0.21	541	20.4	542.1	27.7	547	115.7
19	103	0.57	695592	16.837	3.5	0.7266	5.6	0.08877	4.4	0.789	0.98	548.2	23.3	554.5	24	580.5	75
20	425	0.76	44107	17.218	2.2	0.6953	3	0.08686	2.1	0.685	-0.16	537	10.6	536	12.6	531.7	48.1
Sample 3838																	
1	77	0.31	56542	17.0449	3.2	0.72176	5.1	0.089265	4	0.783	0.078	551.2	21.2	551.7	21.8	553.8	69.6
3	55	0.32	127267	16.6189	3	0.72965	5.3	0.087986	4.3	0.821	2	543.6	22.7	556.3	22.7	608.8	65.5
4	44	0.40	292063	16.6545	5.3	0.7412	7.9	0.08957	5.8	0.737	1.6	553	30.7	563.1	34	604.2	114.8
5	71	0.39	37013	16.8781	3.7	0.72988	5.3	0.089386	3.7	0.706	0.76	551.9	19.6	556.5	22.5	575.2	80.9
6	50	0.27	42999	16.8403	3.8	0.72496	5.3	0.088584	3.7	0.704	1.1	547.2	19.5	553.6	22.6	580.1	81.6
7	55	0.44	49729	16.8561	4.1	0.71127	6.1	0.086993	4.5	0.74	1.3	537.7	23.3	545.5	25.7	578.1	89.1
8	105	0.51	478709	17.021	3	0.72452	4.5	0.089481	3.4	0.755	0.14	552.5	18.1	553.3	19.3	556.9	64.9
9	66	0.29	29046	17.3147	3.9	0.70597	5	0.088694	3.1	0.625	-0.94	547.8	16.3	542.4	20.8	519.4	84.9
10	88	0.45	24995	16.7075	3.9	0.68502	6.2	0.083044	4.8	0.78	2.6	514.3	23.9	529.8	25.6	597.3	84.2
11	86	0.43	53197	17.0048	3.3	0.70711	5.1	0.087248	4	0.77	0.59	539.2	20.5	543	21.7	559	71.6
12	50	0.38	17737	17.1521	4.7	0.72689	6.4	0.090466	4.3	0.679	-0.6	558.3	23.2	554.7	27.3	540.1	102.7
13	76	0.30	130334	17.4511	3	0.69333	5.2	0.087793	4.2	0.814	-1.2	542.5	22.1	534.8	21.7	502.2	66.6

Table 1. LA-ICP-MS U-Pb zircon data for the Chapel Hill 100K (crystallization ages)

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	Th/U	$^{206}Pb/^{204}Pb$	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[a]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
Chapel Hill 100k																	
14	51	0.40	644062	16.7142	3.7	0.73193	5.6	0.088767	4.1	0.747	1.5	548.2	21.8	557.7	23.8	596.4	80.1
15	67	0.31	61525	16.8013	3.6	0.74411	5.2	0.090714	3.7	0.716	0.82	559.8	19.8	564.8	22.3	585.2	78.1
16	99	0.55	48103	17.2801	2.4	0.7057	4	0.088483	3.1	0.789	-0.68	546.6	16.3	542.2	16.6	523.8	53.3
17	56	0.44	37095	17.1957	3.7	0.69437	7.7	0.086638	6.8	0.877	-0.03	535.6	34.7	535.4	32	534.6	80.9
18	92	0.36	309253	17.0832	3.2	0.72612	4.6	0.090006	3.3	0.722	-0.22	555.6	17.7	554.3	19.6	548.9	69.5
19	48	0.41	662891	17.2806	4	0.74364	5.7	0.093243	4	0.707	-1.6	574.7	22.1	564.5	24.6	523.8	88.1
20	66	0.29	43519	17.0469	4.3	0.70982	6.8	0.087799	5.3	0.78	0.33	542.5	27.7	544.6	28.7	553.6	93
21	78	0.48	14565	17.073	3.3	0.73144	5.2	0.090611	4	0.771	-0.27	559.1	21.4	557.4	22.2	550.2	72.1
22	98	0.58	578564	16.976	3.1	0.7106	4.2	0.087529	2.9	0.691	0.71	540.9	15.2	545.1	17.8	562.7	66.5
23	80	0.43	204030	16.9554	3.4	0.73207	4.9	0.090065	3.5	0.714	0.3	555.9	18.6	557.8	21	565.3	74.4
24	64	0.44	19967	16.9407	5.2	0.72508	6.6	0.089128	4	0.611	0.57	550.4	21.2	553.7	28.1	567.2	113.4
25	86	0.51	70164	17.2155	3.8	0.69264	5.5	0.08652	4	0.719	-0.093	534.9	20.3	534.4	22.9	532.1	84
27	63	0.38	187230	16.7602	3.2	0.72355	6.6	0.087992	5.7	0.872	1.3	543.6	29.9	552.8	28	590.5	69.8
28	72	0.41	165934	17.0649	3.2	0.71933	5.3	0.089068	4.2	0.793	0.033	550	22.1	550.3	22.5	551.3	70.4
29	50	0.33	40347	17.3492	4.2	0.74012	6.4	0.09317	4.8	0.751	-1.8	574.3	26.5	562.5	27.8	515.1	93.3
30	56	0.31	11138	17.2313	4.9	0.72465	6	0.090603	3.4	0.573	-0.99	559.1	18.4	553.4	25.6	530.1	107.9
31*	75	0.50	60572	17.1381	3.9	0.75041	4.7	0.093316	2.6	0.565	-1.2	575.1	14.6	568.5	20.4	541.9	84.7
32	63	0.38	11427	17.3347	5.5	0.71034	6.4	0.089346	3.4	0.524	-1.2	551.7	17.8	544.9	27.1	516.9	120.3
33	60	0.30	69445	16.8618	3.3	0.75013	4.1	0.091777	2.3	0.573	0.39	566	12.6	568.3	17.7	577.4	72.5
34	80	0.48	134090	16.9365	3	0.71719	4.9	0.088135	3.9	0.796	0.69	544.5	20.3	549	20.7	567.8	64.4
36	69	0.45	31902	17.1584	3	0.7186	4.6	0.089465	3.5	0.761	-0.4	552.4	18.7	549.8	19.7	539.4	66
37	61	0.28	51399	17.1959	4.2	0.70422	5.3	0.087868	3.2	0.61	-0.29	542.9	16.9	541.3	22.3	534.5	92.2
38	93	0.55	42520	17.0639	2.7	0.71638	4.4	0.088699	3.4	0.782	0.11	547.8	17.9	548.5	18.5	551.4	59.3
39	71	0.39	33502	16.8712	3.2	0.70408	6.3	0.086192	5.4	0.862	1.2	533	27.7	541.2	26.3	576.2	69
40	47	0.41	30895	17.3452	3.6	0.73602	6	0.092633	4.8	0.804	-1.6	571.1	26.5	560.1	25.9	515.6	78.6
41	45	0.33	43982	17.0356	4.3	0.73602	5.7	0.090978	3.7	0.65	-0.21	561.3	20	560.1	24.6	555.1	94.8
42	69	0.45	339327	17.3841	3.4	0.69816	4.6	0.088065	3.1	0.665	-1.1	544.1	16	537.7	19.2	510.7	75.7
43	64	0.29	809278	17.0854	4.3	0.69621	5.3	0.08631	3.1	0.582	0.51	533.7	15.8	536.5	22.1	548.7	94
44	113	0.40	693450	17.1816	2.7	0.68922	3.6	0.085924	2.4	0.677	0.17	531.4	12.5	532.3	14.9	536.4	58
45	146	0.48	239420	17.2302	3.2	0.7164	4.3	0.089565	2.9	0.678	-0.74	553	15.4	548.5	18.2	530.2	69.2
46	60	0.38	29857	17.1677	3.1	0.72327	4.7	0.090096	3.5	0.746	-0.55	556.1	18.8	552.6	20.1	538.1	68.7
47	63	0.42	35365	16.2387	4.1	0.7627	5.6	0.089867	3.8	0.68	3.5	554.7	20.2	575.6	24.5	658.6	87.7
50	70	0.42	63954	17.0954	5.3	0.7034	6.4	0.087252	3.6	0.562	0.28	539.3	18.5	540.8	26.7	547.4	114.9
Sample 3840																	
Grain 1-1	193	0.70	105143	17.1062	3	0.70953	4.3	0.088068	3.1	0.709	0.055	544.1	16	544.5	18.2	546	66.4
Grain 1-2	170	0.75	26674	17.2034	2.5	0.70322	3.8	0.08778	2.8	0.758	-0.28	542.4	14.8	540.7	15.8	533.6	53.7
Grain 2-1	109	0.49	14373	17.1072	3.3	0.69765	4.5	0.086598	3	0.666	0.35	535.4	15.4	537.4	18.7	545.9	73.2
Grain 2-2	370	0.96	19354	17.2428	2.9	0.67943	3.8	0.085005	2.5	0.655	0.08	525.9	12.6	526.4	15.7	528.6	63.3
Grain 2-3	143	0.71	22546	17.4398	2	0.69295	3	0.087688	2.2	0.741	-1.2	541.8	11.6	534.6	12.5	503.7	44.4
Grain 3-1	70	0.92	31836	16.3438	5.8	0.73467	8.4	0.087125	6.1	0.728	3.5	538.5	31.6	559.3	36.2	644.8	124
Grain 3-2	74	0.68	15810	17.369	3.5	0.68753	5.8	0.086649	4.6	0.794	-0.69	535.7	23.7	531.3	24	512.6	77.6
Grain 4-3*	430	0.43	29113	17.5189	2.6	0.54616	4.1	0.069425	3.2	0.78	1.9	432.7	13.4	442.5	14.7	493.7	56.6

Notes:

[a]Concordia distance (d_c) was calculated using IsoplotR (Vermeesch, 2018), and we discarded analyses outside of the range $-2 < d_c < 4.6$ (Vermeesch, 2021).

*Analyses with an asterisk were considered outliers according to Chauvenet's Criterion in IsoplotR (Vermeesch, 2018). They were not included in the weighted mean.

Table 2. LA-ICP-MS U-Pb zircon data for the Chapel Hill 100K (detrital ages)

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
Chapel Hill 100k																	
COL-3055																	
3	256	0.27	55116	16.7988	0.72	0.7506	0.83	0.0923	0.41	0.4980	-0.13	569.29	2.25	568.56	3.61	565.68	15.63
4	107	0.52	19606	16.8783	0.98	0.7233	1.12	0.0901	0.51	0.4597	-0.61	556.00	2.74	552.64	4.77	538.81	21.74
5	107	0.54	15752	16.4795	0.82	0.7893	1.01	0.0962	0.59	0.5832	-0.25	592.27	3.34	590.78	4.53	585.08	17.81
9	148	0.68	17229	16.6762	0.88	0.7232	1.06	0.0890	0.58	0.5457	0.50	549.78	3.04	552.58	4.51	564.09	19.30
12	333	0.64	24480	16.8154	0.51	0.7242	0.87	0.0895	0.64	0.7329	0.07	552.73	3.39	553.17	3.73	555.00	12.97
13	304	0.62	118229	16.7719	0.81	0.7418	1.05	0.0907	0.67	0.6365	0.61	559.88	3.58	563.46	4.54	577.95	17.57
14	174	0.75	26527	16.6382	0.86	0.7446	1.08	0.0909	0.65	0.6010	0.69	561.11	3.50	565.10	4.70	581.20	18.81
15	314	0.81	59749	16.5777	0.56	0.8226	0.79	0.0996	0.55	0.6977	-0.37	612.00	3.23	609.48	3.64	600.13	12.29
16	267	0.54	42817	16.7815	0.65	0.7498	0.84	0.0920	0.53	0.6327	0.08	567.62	2.88	568.10	3.65	570.02	14.15
20	274	1.02	65084	17.0004	0.66	0.7170	0.86	0.0889	0.56	0.6456	-0.07	549.27	2.93	548.87	3.65	547.19	14.35
21	242	1.16	76404	16.3362	0.70	0.8471	0.93	0.1009	0.61	0.6568	0.50	619.77	3.62	623.07	4.35	635.11	15.16
22	170	0.94	15330	16.2520	0.64	0.8500	0.92	0.1020	0.61	0.6612	-0.21	626.01	3.61	624.62	4.27	619.58	14.84
24	438	0.48	51192	16.7905	0.59	0.7412	0.83	0.0908	0.58	0.6986	0.44	560.39	3.11	563.09	3.59	574.03	12.93
25	136	1.37	18587	16.7909	0.70	0.7125	1.03	0.0881	0.64	0.6157	0.39	544.01	3.31	546.26	4.36	555.62	17.75
29	191	0.94	48193	16.3494	0.67	0.8657	1.03	0.1033	0.78	0.7541	-0.07	633.76	4.68	633.22	4.85	631.33	14.57
30	218	1.26	28673	16.3342	0.74	0.8237	1.25	0.0986	1.01	0.8072	0.53	606.20	5.85	610.08	5.74	624.50	15.96
31	157	0.83	40079	16.3671	0.82	0.8321	1.02	0.0996	0.61	0.5961	0.45	611.96	3.54	614.79	4.69	625.22	17.64
32	104	0.40	10957	16.6876	0.92	0.7272	1.23	0.0902	0.81	0.6606	-0.30	556.68	4.32	554.89	5.24	547.57	20.10
33	43	0.63	4862	16.4976	1.53	0.7129	1.91	0.0899	0.59	0.3073	-1.60	555.05	3.12	546.47	8.06	510.89	39.87
34	116	0.87	11115	16.1650	0.85	0.8508	1.02	0.1022	0.56	0.5489	-0.35	627.27	3.35	625.06	4.77	617.04	18.44
35	89	0.83	7536	16.7280	1.18	0.7139	1.75	0.0898	1.12	0.6393	-1.20	554.15	5.95	547.03	7.41	517.47	29.59
36	118	0.92	24898	16.6373	0.84	0.7477	1.38	0.0914	1.10	0.7918	0.47	563.72	5.91	566.90	6.01	579.68	18.37
37	199	0.77	15321	16.4526	0.75	0.7847	1.73	0.0954	1.45	0.8383	0.10	587.44	8.14	588.17	7.72	591.00	20.42
40	343	1.21	33143	16.3190	0.51	0.8385	0.78	0.1003	0.58	0.7485	0.29	616.24	3.42	618.31	3.60	625.87	11.13
41	279	0.53	56667	16.8598	0.65	0.7436	0.84	0.0916	0.53	0.6288	-0.13	565.26	2.84	564.48	3.62	561.32	14.14
43	189	0.84	47003	16.2332	0.64	0.8816	0.83	0.1047	0.53	0.6369	0.00	641.85	3.24	641.85	3.96	641.87	13.80
46	199	0.67	53988	16.7639	0.71	0.7522	0.91	0.0922	0.57	0.6202	0.21	568.27	3.08	569.49	3.98	574.42	15.55
48	216	0.93	16862	16.7909	0.66	0.7173	0.92	0.0889	0.64	0.6958	0.00	549.06	3.38	549.05	3.91	549.01	14.47
50	187	0.45	172102	16.9484	0.73	0.7392	0.98	0.0913	0.65	0.6633	-0.21	563.18	3.50	561.93	4.22	556.90	15.96
51	97	1.31	49195	16.9327	1.03	0.7444	1.18	0.0922	0.58	0.4912	-0.61	568.45	3.15	564.99	5.11	551.09	22.41
53	41	0.53	13044	16.3523	1.21	0.7637	1.43	0.0926	0.76	0.5301	0.96	570.62	4.13	576.14	6.28	597.97	26.22
55	81	0.87	9205	16.4628	0.97	0.7229	1.33	0.0890	0.61	0.4629	0.51	549.56	3.24	552.36	5.65	563.90	25.64
57	90	0.64	24272	16.7860	0.97	0.7354	1.20	0.0908	0.67	0.5593	-0.12	560.40	3.61	559.70	5.17	556.85	21.72
61	430	1.16	70959	16.4415	0.52	0.8451	1.01	0.1015	0.86	0.8567	-0.18	623.33	5.13	621.94	4.69	616.84	11.22
63	275	0.82	26547	16.8249	0.72	0.7172	1.87	0.0887	1.71	0.9114	0.20	547.82	8.97	549.03	7.95	554.07	16.83
67	65	0.62	37080	16.6988	1.35	0.7483	1.66	0.0916	0.96	0.5770	0.42	564.80	5.19	567.23	7.23	576.95	29.51
68	312	1.00	54988	16.2476	0.57	0.8645	0.80	0.1027	0.56	0.6983	0.34	630.23	3.36	632.60	3.77	641.09	12.36
70	303	0.76	36815	16.3936	0.59	0.8458	0.79	0.1017	0.49	0.6217	-0.30	624.29	2.91	622.36	3.66	615.31	13.29
71	494	1.05	427860	15.9002	0.52	0.9602	0.79	0.1113	0.59	0.7532	0.40	680.28	3.82	683.38	3.91	693.64	11.02
74	80	0.55	9535	16.4565	1.05	0.7471	1.28	0.0919	0.63	0.4923	-0.04	566.78	3.42	566.56	5.56	565.72	24.30
77	103	0.52	14513	16.0304	1.09	0.9027	1.36	0.1072	0.77	0.5653	-0.47	656.30	4.79	653.18	6.55	642.47	24.10
78	56	0.94	14175	16.3210	1.21	0.8505	1.47	0.1029	0.81	0.5515	-1.00	631.24	4.87	624.93	6.86	602.14	26.52
79	60	0.80	126172	16.8191	1.11	0.7520	1.32	0.0924	0.71	0.5402	-0.07	569.84	3.88	569.41	5.73	567.72	24.08
81	245	1.39	232954	16.9530	0.70	0.7350	0.97	0.0910	0.68	0.7008	-0.28	561.26	3.67	559.50	4.19	552.33	15.17
83	111	0.73	14181	16.5451	0.89	0.7494	1.14	0.0920	0.60	0.5251	0.12	567.20	3.25	567.87	4.96	570.56	21.10
84	124	1.19	31782	16.3398	0.75	0.8263	1.03	0.0992	0.69	0.6725	0.28	609.69	4.04	611.54	4.74	618.37	16.50
85	93	0.59	9699	16.3359	0.91	0.8289	1.68	0.1012	0.74	0.4422	-1.40	621.55	4.40	613.02	7.73	581.61	32.71
86	168	0.98	37032	16.9359	0.84	0.7360	1.01	0.0915	0.56	0.5521	-0.76	564.42	3.02	560.05	4.35	542.29	18.44
88	88	0.62	30417	16.8059	0.89	0.7385	1.14	0.0912	0.70	0.6143	-0.23	562.89	3.77	561.55	4.91	556.10	19.57
89	129	1.15	21639	16.3495	0.88	0.8560	1.07	0.1032	0.58	0.5467	-0.81	633.07	3.51	627.93	4.99	609.47	19.27
90	75	0.62	50791	16.6589	1.17	0.7417	1.35	0.0905	0.68	0.5058	0.88	558.53	3.66	563.42	5.86	583.20	25.36
91	214	1.48	120087	16.8171	0.85	0.7379	1.04	0.0906	0.61	0.5819	0.32	559.32	3.25	561.16	4.50	568.64	18.45
92	133	0.87	30464	16.2791	0.68	0.8505	0.95	0.1017	0.66	0.6946	0.07	624.43	3.92	624.91	4.43	626.63	14.74
93	326	0.75	3748547	16.4432	0.58	0.8327	0.82	0.0998	0.58	0.7043	0.26	613.36	3.37	615.12	3.77	621.58	12.55
97	129	1.19	9340	16.2911	0.83	0.8098	1.08	0.0987	0.67	0.6199	-0.66	606.50	3.87	602.35	4.91	586.74	18.36
99	177	0.59	51888	16.7563	0.86	0.7367	1.16	0.0903	0.78	0.6695	0.49	557.58	4.16	560.49	5.02	572.31	18.81
104	186	0.69	99656	16.2497	0.64	0.9024	0.90	0.1071	0.63	0.7004	-0.37	655.61	3.93	652.99	4.34	643.97	13.80
105	244	0.61	35225	16.2051	0.50	0.8898	0.79	0.1057	0.60	0.7562	-0.22	647.89	3.70	646.27	3.79	640.61	11.15
112	135	0.56	14928	16.7200	0.96	0.7391	1.17	0.0915	0.61	0.5207	-0.41	564.16	3.30	561.86	5.07	552.54	21.87
114	167	0.39	58288	16.4774	0.74	0.8241	0.93	0.0991	0.56	0.6023	0.18	609.22	3.26	610.35	4.27	614.50	16.07
115	92	0.80	11786	16.4209	0.74	0.7577	1.45	0.0923	0.77	0.5350	0.62	569.12	4.22	572.66	6.34	586.71	26.54
116	185	1.05	45218	16.8117	0.90	0.7391	1.10	0.0908	0.63	0.5760	0.27	560.34	3.39	561.89	4.73	568.17	19.52
117	131	0.79	43099	16.8145	0.88	0.7365	1.07	0.0905	0.62	0.5737	0.29	558.70	3.30	560.38	4.63	567.23	19.15
119	94	0.90	13617	16.5043	0.91	0.7557	1.09	0.0923	0.57	0.5229	0.44	569.01	3.11	571.52	4.78	581.49	20.23
121	242	0.82	23503	16.6238	0.77	0.7437	2.95	0.0908	2.85	0.9648	1.40	559.98	15.27	564.54	12.78	582.91	16.84
125	145	1.06	21769	16.6569	0.65	0.7415	0.90	0.0908	0.61	0.6762	0.53	560.06	3.27	563.27	3.90	576.27	14.44
126	208	0.87	46357	17.0646	0.67	0.7039	0.96	0.0878	0.68	0.7103	-0.20	542.30	3.56	541.12	4.04	536.16	14.86
127	366	0.55	189434	16.9477	0.63	0.7157	0.92	0.0883	0.67	0.7279	0.47	545.24	3.49	548.10	3.89	560.01	13.72
128	160	0.62	34910	16.4502	0.80	0.8569	1.06	0.1031	0.68	0.6482	-0.66	632.81	4.12	628.42	4.94	612.64	17.37
130	372	1.67	87354	16.3312	0.63	0.8568	0.99	0.1019	0.76	0.7700	0.35	625.82	4.54	628.40	4.63	637.71	13.59
131	275	0.85	38720	16.8357	0.52	0.7599	0.90	0.0935	0.73	0.8098	-0.36	576.49	4.04	573.97	3.96	563.98	11.54
132	273	0.43	50967	10.0080	0.36	3.9165	0.74	0.2856	0.65	0.8730	-0.17	1619.32	9.30	1617.09	6.02	1614.17	6.76
134	134	0.56	26654	16.7810	0.81	0.7671	1.07	0.0944	0.66	0.6188	-0.61	581.80	3.69	578.12	4.72	563.68	18.34
136	38	0.87	7640	16.2351	1.28	0.8167	1.52	0.0995	0.75	0.4973	-0.83	611.21	4.40	606.21	6.93	587.57	28.56
140	231	0.88	11879	16.7294	0.76	0.7218	1.26	0.0897	1.00	0.7928	-0.27	553.49	5.29	551.74	5.36	544.51	16.74
143	98	0.80	18892	16.0897	0.92	0.9245	1.17	0.1095	0.70	0.5934	-0.78	670.00	4.43	664.72	5.72	646.89	20.28
146	58	1.00	34340	16.2558	1.27	0.8793	1.42	0.1047	0.64	0.4531	-0.23	642.07	3.94	640.63	6.76	635.57	27.31
148	190	1.18	77949	16.9215	0.81	0.7460	1.00	0.0921	0.58	0.5815	-0.39	568.17	3.15	565.87	4.32	556.63	17.65
150	85	0.59	9082	16.3088	0.98	0.8186	1.17	0.0998	0.62	0.5321	-0.93	612.95	3.63	607.29	5.34	586.22	21.45
151	227	1.34	35604	16.7884	0.64	0.7491	0.84	0.0922	0.52	0.6227	-0.09	568.26	2.83	567.73	3.63	565.62	14.25
152	124	0.71	17630	16.7994	0.66	0.7429	0.97	0.0921	0.54	0.5595	-0.66	567.90	2.95	564.10	4.19	548.76	17.54
154	107	0.41	34786	15.3640	0.76	1.1260	0.94	0.1267	0.54	0.5782	-0.39	768.76	3.95	765.83	5.07	757.29	16.22
155	192	0.85	29553	16.8671	0.85	0.7481	1.03	0.0926	0.57	0.5541	-0.61	570.64	3.13	567.10	4.50	552.94	18.81
157	148	0.62	40665	16.9328	0.70	0.7415	1.10	0.0919	0.83	0.7565	-0.53	566.77	4.50	563.30	4.74	549.34	15.66
161	164	1.19	104006	15.6904	0.80	1.0346	0.95	0.1184	0.52	0.5458	0.00	721.26	3.56	721.24	4.93	721.14	16.97
162	112	0.68	14543	16.7863	0.86	0.7014	1.24	0.0871	0.86	0.6928	0.18	538.60	4.43	539.66	5.18	544.09	19.52
163	172	0.75	18608	16.6119	0.88	0.7490	1.11	0.0917	0.67	0.6070	0.33	565.70	3.65	567.62	4.83	575.28	19.20
164	60	1.56	77292	15.8008	0.99	0.9682	1.30	0.1117	0.85	0.6514	0.71	682.45	5.50	687.54	6.51	704.21	21.02
165	460	0.49	53263	16.8346	0.51	0.7381	0.92	0.0908	0.76	0.8255	0.11	560.56	4.06	561.29	3.95	564.23	11.26
166	200	1.28	20328	16.3566	0.65	0.8308	0.91	0.1001	0.63	0.6935	-0.11	614.80	3.70	614.06	4.19	611.28	14.17
169	210	1.10	29747	16.8518	0.80	0.7383	0.97	0.0913	0.54	0.5633	-0.29	563.06	2.94	561.39	4.17	554.63	17.42
172	106	0.75	47626	16.7129	1.04	0.7633	1.41	0.0933	0.95	0.6719	0.15	575.01	5.22	575.92	6.20	579.55	22.69
176	138	1.34	90642	16.2814	0.83	0.8985	1.03	0.1068	0.61	0.5908	-0.46	654.03	3.77	650.95	4.93	640.31	17.82
177	20	0.85	8345	16.7818	2.75	0.7169	3.11	0.0902	1.43	0.4598	-1.50	556.85	7.62	548.85	13.17	515.74	60.60
178	349	0.52	375108	16.7610	0.63	0.7572	0.87	0.0925	0.60	0.6903	0.38	570.05	3.27	572.41	3.80	581.78	13.64
179	114	0.96	35374	16.0289	0.98	0.8936	1.13	0.1050	0.55	0.4847	0.78	643.42	3.36	648.30	5.43	665.30	21.22
180	480	0.40	797423	10.4018	0.36	3.5381	0.89	0.2681	0.81	0.9145	0.45	1530.90	11.04	1535.77	7.01	1542.47	6.74
181	295	0.82	84558	16.2694	0.46	0.8928	0.70	0.1061	0.53	0.7593	-0.27	649.87	3.30	647.85	3.37	640.87	9.82
184	112	0.89	16131	16.6821	0.93	0.7415	1.13	0.0914	0.64	0.5663	-0.12	563.99	3.46	563.30	4.90	560.54	20.37
188	139	1.02	41178	16.8521	0.80	0.7245	0.96	0.0894	0.51	0.5341	0.22	552.06	2.72	553.29	4.10	558.40	17.72
189	136	0.91	49195	16.3416	0.85	0.8420	0.99	0.1007	0.49	0.5007	0.33	618.28	2.92	620.27	4.59	627.52	18.46

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb^{a}$	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
192	134	0.77	62826	16.0005	0.71	0.8952	0.88	0.1047	0.52	0.5931	1.20	641.69	3.19	649.17	4.22	675.23	15.18
193	65	0.78	7287	16.5477	1.09	0.7321	1.57	0.0912	1.06	0.6767	-0.79	562.66	5.73	557.81	6.74	538.03	25.31
197	215	0.41	176349	16.4003	0.66	0.8483	1.08	0.1014	0.85	0.7895	0.14	622.71	5.05	623.74	5.02	627.46	14.28
199	118	0.63	53847	16.6020	0.92	0.7498	1.16	0.0911	0.70	0.6018	1.10	561.83	3.75	568.09	5.04	593.23	20.04
200	581	0.42	252685	13.5265	0.52	1.7403	0.78	0.1716	0.58	0.7447	0.24	1020.79	5.47	1023.58	5.01	1029.53	10.49
202	167	0.65	19205	16.5745	0.83	0.7729	2.08	0.0945	1.90	0.9160	-0.09	581.97	10.58	581.42	9.19	579.24	18.11
203	80	1.13	11619	16.1606	1.23	0.8543	1.51	0.1026	0.82	0.5388	-0.43	629.68	4.89	626.98	7.08	617.25	27.53
206	88	0.79	171256	16.2886	0.99	0.8454	1.17	0.1004	0.61	0.5235	0.85	616.90	3.59	622.11	5.43	641.12	21.37
208	108	0.90	16005	16.7165	0.93	0.7419	1.27	0.0917	0.82	0.6437	-0.36	565.68	4.44	563.53	5.51	554.88	21.29
209	323	0.76	511993	16.9426	0.61	0.7296	0.79	0.0901	0.50	0.6402	0.06	555.93	2.69	556.30	3.38	557.78	13.19
210	173	0.82	33920	16.8330	0.79	0.7363	0.98	0.0909	0.57	0.5832	-0.12	560.90	3.06	560.22	4.20	557.46	17.29
212	89	1.07	22596	16.3595	1.22	0.8560	1.43	0.1031	0.72	0.5008	-0.71	632.35	4.32	627.96	6.70	612.18	26.77
213	46	0.62	5783	16.2715	1.23	0.7465	1.63	0.0922	0.99	0.6056	-0.42	568.68	5.38	566.22	7.08	556.36	28.31
214	89	0.59	10877	16.4054	1.11	0.7756	1.64	0.0948	0.62	0.3768	-0.12	583.63	3.45	582.98	7.28	580.45	32.99
217	140	0.43	79474	16.2342	0.72	0.9097	0.93	0.1079	0.59	0.6314	-0.53	660.51	3.70	656.88	4.51	644.47	15.56
219	46	0.56	9823	16.5261	1.61	0.7781	1.98	0.0960	0.79	0.4001	-1.10	590.74	4.47	584.38	8.79	559.75	39.54
222	441	0.42	177424	16.9084	0.54	0.7365	0.99	0.0908	0.84	0.8414	0.01	560.28	4.48	560.37	4.28	560.75	11.72
223	168	1.39	49111	16.7250	0.76	0.7410	1.01	0.0907	0.66	0.6524	0.57	559.60	3.54	562.99	4.38	576.69	16.69
224	64	0.64	14716	16.5692	0.97	0.7399	1.30	0.0907	0.83	0.6415	0.45	559.70	4.47	562.33	5.61	573.00	21.69
228	201	1.08	52914	16.4560	0.62	0.8295	1.02	0.0998	0.81	0.7932	0.02	613.22	4.73	613.34	4.69	613.73	13.41
230	74	0.57	47843	16.5265	1.03	0.7984	1.20	0.0965	0.61	0.5105	0.33	593.96	3.49	595.91	5.42	603.31	22.38
231	62	0.59	11095	16.5868	1.27	0.7402	1.76	0.0913	0.70	0.3996	-0.17	563.43	3.80	562.50	7.60	558.72	35.20
233	113	0.64	50344	11.2608	0.55	2.9296	0.82	0.2409	0.60	0.7332	-0.10	1391.18	7.51	1389.58	6.19	1387.11	10.68
234	68	0.69	21013	16.5426	1.27	0.7389	1.40	0.0900	0.58	0.4179	1.10	555.50	3.11	561.75	6.02	587.10	27.52
235	1872	0.94	23079	20.6041	0.77	0.0973	1.09	0.0148	0.66	0.6046	-0.31	94.64	0.62	94.29	0.99	85.57	20.66
236	180	0.69	39496	16.7389	1.15	0.7768	1.51	0.0952	0.97	0.6450	-0.44	586.42	5.46	583.67	6.71	573.01	25.11
237	296	1.07	23445	16.8398	0.67	0.7363	0.90	0.0912	0.61	0.6724	-0.39	562.64	3.27	560.25	3.89	550.52	14.59
238	119	0.70	16870	16.7154	0.67	0.7393	1.00	0.0913	0.73	0.7353	-0.16	562.99	3.96	562.00	4.31	557.97	14.73
239	175	1.03	25998	16.7442	0.70	0.7419	0.93	0.0913	0.56	0.6035	0.08	563.03	3.04	563.49	4.04	565.35	16.21
242	118	0.75	25967	16.3043	0.92	0.8631	1.13	0.1033	0.64	0.5714	-0.30	633.77	3.89	631.83	5.31	624.87	19.98
243	102	0.47	24539	16.8086	0.84	0.7356	1.22	0.0908	0.84	0.6904	-0.11	560.52	4.53	559.82	5.26	556.95	19.32
244	350	0.61	673030	16.2557	0.93	0.8736	1.19	0.1034	0.75	0.6263	0.52	634.12	4.51	637.53	5.64	649.63	19.94
246	92	0.53	45967	16.6478	1.02	0.8130	1.15	0.0990	0.52	0.4540	-0.75	608.55	3.04	604.13	5.25	587.57	22.29
248	157	0.79	29099	16.7313	1.02	0.7326	1.22	0.0899	0.66	0.5407	0.52	555.18	3.50	558.08	5.22	569.95	22.27
249	135	0.78	15980	16.6798	0.83	0.7418	1.16	0.0915	0.68	0.5854	-0.12	564.14	3.65	563.44	5.00	560.61	20.40
250	169	1.06	35320	17.0282	0.71	0.7166	1.10	0.0895	0.83	0.7589	-0.57	552.34	4.40	548.66	4.64	533.42	15.63
251	66	0.68	9193	16.4669	1.40	0.7647	1.67	0.0941	0.70	0.4171	-0.55	579.84	3.87	576.73	7.36	564.49	33.11
252	84	0.80	12810	16.1498	1.04	0.8529	1.32	0.1021	0.68	0.5100	-0.11	626.90	4.03	626.22	6.19	623.77	24.56
253	73	0.95	16561	16.2997	1.26	0.8223	1.48	0.0990	0.75	0.5044	0.15	608.42	4.33	609.30	6.78	612.58	27.61
254	35	0.56	53425	17.0566	1.69	0.7329	1.89	0.0914	0.85	0.4470	-0.99	563.74	4.56	558.27	8.12	536.06	37.03
255	55	0.62	62335	16.7127	1.48	0.7508	1.66	0.0917	0.76	0.4584	0.60	565.37	4.13	568.71	7.24	582.10	32.08
256	173	0.87	56790	16.2672	0.64	0.8622	0.96	0.1025	0.71	0.7401	0.34	628.90	4.25	631.31	4.50	639.96	13.86
258	105	0.18	75254	16.6819	0.87	0.7687	1.14	0.0936	0.74	0.6463	0.36	576.82	4.06	579.00	5.02	587.57	18.82
260	76	0.71	23046	16.6473	0.87	0.7731	1.13	0.0946	0.65	0.5790	-0.15	582.43	3.63	581.54	4.99	578.06	19.98
261	105	0.91	9336	16.0450	0.77	0.8595	0.98	0.1028	0.60	0.6067	-0.16	630.85	3.59	629.82	4.62	626.11	16.89
262	148	0.98	26183	16.3832	0.83	0.8475	1.01	0.1019	0.55	0.5469	-0.33	625.36	3.30	623.30	4.72	615.80	18.31
266	377	1.51	48557	16.4552	0.46	0.8275	0.78	0.0996	0.62	0.8002	0.05	611.91	3.63	612.24	3.57	613.45	10.06
268	133	1.34	15959	16.5370	0.81	0.7807	1.20	0.0954	0.84	0.7003	-0.21	587.22	4.71	585.86	5.34	580.59	18.59
270	50	0.47	5961	16.4699	1.47	0.7360	2.88	0.0918	2.35	0.8165	-0.92	566.44	12.77	560.08	12.42	534.34	36.46
271	88	0.72	27461	16.6127	1.33	0.7776	1.63	0.0948	0.93	0.5671	0.06	583.77	5.17	584.12	7.25	585.53	29.18
273	614	0.23	94642	13.5287	0.40	1.7585	0.84	0.1734	0.74	0.8793	-0.04	1030.68	7.07	1030.30	5.47	1029.46	8.13
274	322	0.32	44164	13.7759	0.51	1.6695	0.87	0.1679	0.70	0.8079	-0.30	1000.50	6.52	997.01	5.53	989.33	10.43
275	209	1.17	45378	16.4528	0.82	0.8420	0.99	0.1012	0.55	0.5582	-0.20	621.48	3.27	620.24	4.59	615.69	17.73
278	35	0.84	8113	16.4859	1.76	0.7513	2.06	0.0927	0.71	0.3452	-0.51	571.76	3.89	568.97	8.97	557.89	42.16
280	34	0.82	23316	16.5406	1.85	0.7526	2.09	0.0914	0.97	0.4651	1.10	563.82	5.24	569.74	9.11	593.43	40.09
281	237	0.80	38513	16.8490	0.70	0.7185	0.97	0.0885	0.65	0.6740	0.49	546.85	3.42	549.78	4.11	561.89	15.58
285	165	1.49	18475	16.3030	0.82	0.8408	1.18	0.1009	0.83	0.7092	-0.03	619.75	4.93	619.56	5.46	618.86	17.93
286	183	0.39	25210	16.4049	0.76	0.8346	1.05	0.1004	0.68	0.6521	-0.13	616.97	4.03	616.13	4.85	613.03	17.22
287	179	1.22	54091	16.3493	0.74	0.8405	0.98	0.1003	0.64	0.6560	0.50	616.20	3.76	619.45	4.52	631.35	15.88
289	222	0.89	82729	16.9714	0.64	0.7228	0.99	0.0894	0.75	0.7623	0.04	552.08	3.99	552.34	4.22	553.44	13.98
291	167	0.58	15370	16.5657	0.71	0.7488	1.01	0.0916	0.59	0.5813	0.46	564.87	3.17	567.56	4.39	578.30	17.85
292	65	0.35	25199	16.5897	1.21	0.8229	1.34	0.1002	0.57	0.4281	-0.96	615.36	3.37	609.67	6.14	588.55	26.27
296	229	0.59	54313	16.7749	0.77	0.7669	1.04	0.0939	0.70	0.6706	-0.07	578.44	3.86	578.00	4.59	576.29	16.82
303	88	0.64	9748	16.7073	1.15	0.7088	1.96	0.0882	1.57	0.8017	-0.18	545.16	8.23	544.01	8.27	539.21	25.66
305	209	0.96	19777	16.6553	0.67	0.7536	1.03	0.0923	0.71	0.6922	0.18	569.19	3.89	570.33	4.50	574.87	16.20
309	79	0.46	25526	16.5834	1.07	0.7605	1.42	0.0924	0.90	0.6359	0.76	569.77	4.91	574.30	6.22	592.30	23.69
311	65	0.66	4975	16.3691	1.15	0.7238	1.31	0.0903	0.53	0.4041	-0.82	557.37	2.82	552.92	5.58	534.63	26.19
312	206	1.33	199988	16.4587	0.57	0.8324	0.81	0.0996	0.58	0.7163	0.46	611.81	3.39	614.94	3.74	626.43	12.22
314	142	0.64	19358	16.7810	0.72	0.7334	1.04	0.0905	0.70	0.6705	0.03	558.40	3.74	558.56	4.48	559.22	16.85
315	254	1.10	17457	17.0265	0.82	0.6967	1.10	0.0874	0.56	0.5107	-0.56	539.86	2.91	536.82	4.59	523.92	20.80
BK-626																	
1	25	0.45	10762	16.7453	2.45	0.7266	4.20	0.0908	3.40	0.8100	-0.81	560.05	18.24	554.53	17.94	531.99	53.92
2	141	0.47	64857	16.8737	1.02	0.7450	1.29	0.0920	0.79	0.6130	-0.35	567.41	4.31	565.32	5.61	556.92	22.29
6	102	0.87	16016	16.8033	1.33	0.7454	1.51	0.0927	0.69	0.4596	-1.00	571.46	3.79	565.56	6.53	541.89	29.25
10	137	0.80	92704	16.6201	0.73	0.8378	0.91	0.1017	0.54	0.5923	-1.00	624.40	3.20	617.91	4.20	594.19	15.82
13	35	0.40	43828	16.8852	1.60	0.7606	1.88	0.0941	0.99	0.5237	-0.92	579.71	5.47	574.36	8.26	553.24	35.01
19	64	0.55	62074	16.7218	1.11	0.7527	1.36	0.0920	0.79	0.5823	0.37	567.61	4.31	569.79	5.94	578.52	24.06
20	72	0.44	13172	16.6967	1.06	0.7254	1.58	0.0899	0.83	0.5254	-0.17	554.83	4.40	553.86	6.73	549.85	29.27
24	103	0.66	45024	16.6284	0.82	0.7636	1.07	0.0930	0.69	0.6397	0.47	573.19	3.77	576.06	4.72	587.37	17.90
25	120	0.83	16720	16.5647	1.30	0.7458	1.49	0.0913	0.68	0.4602	0.46	563.27	3.69	565.80	6.45	576.00	28.69
26	42	0.75	9833	16.7800	1.61	0.7302	2.04	0.0915	0.90	0.4399	-1.40	564.53	4.85	556.66	8.73	524.58	40.12
27	93	1.03	29914	16.7726	1.08	0.7396	1.66	0.0911	1.26	0.7574	0.01	562.11	6.76	562.19	7.16	562.52	23.57
28	36	0.71	8041	16.5656	1.77	0.7531	2.17	0.0937	0.87	0.4003	-1.30	577.26	4.80	570.02	9.47	541.24	43.52
29	301	0.47	186689	16.8788	0.55	0.7481	0.80	0.0921	0.59	0.7295	-0.13	567.94	3.18	567.10	3.49	563.69	11.95
31	67	0.42	23159	16.6119	1.18	0.7749	1.38	0.0948	0.59	0.4264	-0.22	583.80	3.28	582.55	6.12	577.69	27.12
34	89	0.54	69919	16.6924	0.97	0.7574	1.16	0.0924	0.65	0.5565	0.48	569.73	3.53	572.48	5.10	583.41	21.01
37	41	0.47	12964	16.6786	1.30	0.7679	1.48	0.0951	0.61	0.4114	-1.20	585.43	3.41	578.58	6.54	551.76	29.49
38	27	0.57	6514	16.2585	1.66	0.7456	2.01	0.0916	1.05	0.5236	0.11	565.04	5.69	565.65	8.71	568.14	37.24
39	91	0.55	12055	16.7422	1.06	0.7363	1.65	0.0916	0.77	0.4699	-0.85	564.97	4.19	560.22	7.10	540.98	31.82
40	365	0.57	35665	16.8704	0.54	0.7430	0.82	0.0919	0.61	0.7516	-0.40	566.76	3.33	564.16	3.53	553.73	11.74
41	51	0.47	78014	16.8033	1.14	0.7531	1.29	0.0924	0.61	0.4757	0.02	569.91	3.35	570.04	5.64	570.61	24.76
42	65	0.78	31389	16.3473	1.09	0.8579	3.26	0.1029	3.07	0.9417	-0.48	631.28	18.49	628.95	15.31	620.57	23.70
43	57	0.43	56774	16.6005	1.26	0.7721	1.40	0.0937	0.60	0.4295	0.61	577.53	3.32	580.99	6.19	594.55	27.37
45	152	0.38	46214	16.8565	0.89	0.7320	1.09	0.0904	0.63	0.5782	0.02	557.66	3.36	557.74	4.67	558.08	19.37
46	111	0.54	11495	16.7080	1.08	0.7401	1.48	0.0920	0.57	0.3873	-0.90	567.43	3.12	562.47	6.40	542.50	29.86
47	325	0.52	75610	16.9280	0.51	0.7434	0.85	0.0920	0.68	0.8008	-0.40	567.10	3.70	564.36	3.69	553.32	11.13
50	59	0.48	17575	16.6635	0.78	0.7521	1.13	0.0926	0.71	0.6231	-0.27	571.04	3.86	569.45	4.94	563.07	19.30
51	76	0.45	33248	16.9579	0.96	0.7294	1.20	0.0908	0.70	0.5863	-0.74	560.48	3.76	556.23	5.12	538.82	21.22
52	68	0.54	9141	16.6935	1.26	0.7318	1.43	0.0915	0.68	0.4732	-1.20	564.22	3.66	557.61	6.14	530.72	27.62
55	103	0.60	67280	16.6770	0.89	0.7638	1.06	0.0932	0.57	0.5403	0.35	574.19	3.14	576.20	4.65	584.16	19.32
56	99	0.64	97084	16.7793	0.84	0.7611	1.08	0.0933	0.68	0.6293	-0.06	575.04	3.74	574.67	4.74	573.20	18.22
57	726	0.36	81729	16.7466	0.46	0.7463	0.87	0.0913	0.74	0.8487	0.37	563.50	4.01	566.08	3.80	576.47	10.05
58	96	0.52	15600	17.0159	0.86	0.7279	1.14	0.0917	0.74	0.6510	-1.70	565.65	4.03	555.32	4.89	513.20	19.09
59	73	0.81	11754	16.8159	1.02	0.7322	1.29	0.0916	0.71	0.5506	-1.30	565.15	3.85	557.84	5.55	528.16	23.67

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
63	190	1.06	60717	16.9668	0.87	0.6972	1.13	0.0866	0.72	0.6358	0.34	535.18	3.67	537.14	4.69	545.42	18.95
64	42	0.50	16898	16.6380	1.48	0.7575	2.14	0.0932	1.54	0.7196	-0.31	574.54	8.48	572.56	9.38	564.69	32.44
65	169	0.80	15283	16.9099	0.69	0.7236	0.94	0.0907	0.62	0.6657	-1.10	559.46	3.35	552.78	4.00	525.34	15.36
66	14	0.64	4707	16.1843	2.35	0.7166	2.79	0.0890	0.86	0.3071	-0.18	549.60	4.51	548.66	11.81	544.79	57.94
67	141	0.57	27999	16.8104	0.80	0.7408	1.01	0.0916	0.62	0.6099	-0.35	564.93	3.33	562.86	4.37	554.49	17.48
70	83	0.71	88596	16.7780	1.19	0.7058	1.39	0.0866	0.71	0.5090	1.20	535.50	3.63	542.24	5.83	570.69	25.99
74	158	0.52	28020	16.9244	0.99	0.7195	1.18	0.0896	0.59	0.5012	-0.49	553.09	3.13	550.38	5.00	539.18	22.27
79	155	0.74	48936	16.4503	0.99	0.8235	1.19	0.0993	0.67	0.5582	-0.04	610.24	3.87	609.99	5.47	609.07	21.39
80	322	1.35	120877	16.8375	0.56	0.7335	0.80	0.0903	0.57	0.7171	0.24	557.12	3.06	558.63	3.43	564.79	12.11
81	108	0.69	43093	16.4816	0.90	0.8009	1.15	0.0968	0.71	0.6132	0.26	595.70	4.01	597.33	5.20	603.50	19.65
83	93	0.66	31395	16.8293	1.02	0.7453	1.18	0.0922	0.60	0.5030	-0.54	568.55	3.24	565.50	5.13	553.27	22.31
84	221	0.91	531954	16.9008	0.69	0.7231	1.20	0.0893	0.98	0.8192	0.18	551.27	5.18	552.50	5.10	557.53	14.97
85	51	0.44	22072	16.7103	1.24	0.7678	1.43	0.0947	0.70	0.4920	-0.85	583.45	3.92	578.52	6.30	559.21	27.11
87	40	0.51	20513	16.1561	1.23	0.8280	1.51	0.0988	0.87	0.5777	0.83	607.39	5.04	612.49	6.93	631.40	26.49
89	47	0.57	21280	16.8172	1.45	0.7534	1.67	0.0936	0.71	0.4251	-1.20	576.74	3.91	570.20	7.28	544.23	33.03
90	26	1.16	7266	16.4068	1.81	0.7352	2.24	0.0911	0.86	0.3832	-0.42	561.92	4.62	559.62	9.63	550.27	45.15
91	221	0.84	54285	16.4895	0.70	0.8217	0.89	0.0994	0.55	0.6103	-0.29	610.87	3.18	609.02	4.10	602.11	15.33
92	206	0.49	20113	16.7381	0.65	0.7420	0.94	0.0918	0.68	0.7198	-0.42	566.21	3.66	563.55	4.06	552.78	14.23
93	40	0.46	9159	16.5750	1.71	0.7400	1.92	0.0920	0.78	0.4084	-0.89	567.30	4.25	562.40	8.28	542.63	38.26
97	60	0.38	101747	16.6872	1.09	0.7347	1.36	0.0898	0.81	0.5994	0.89	554.21	4.32	559.33	5.84	580.19	23.60
99	40	0.98	11523	16.5539	1.75	0.7333	2.05	0.0906	0.90	0.4364	-0.06	558.83	4.80	558.49	8.83	557.12	40.33
100	82	0.68	168710	16.5542	1.29	0.7628	1.41	0.0924	0.55	0.3931	1.10	569.53	3.01	575.62	6.18	599.72	27.99
101	64	0.71	113777	16.6239	1.07	0.7640	1.28	0.0930	0.70	0.5489	0.56	573.05	3.86	576.29	5.64	589.09	23.25
106	408	0.70	44013	16.7896	0.58	0.7379	1.06	0.0911	0.88	0.8321	-0.12	561.98	4.75	561.16	4.57	557.88	12.82
107	74	0.46	63413	16.5998	1.03	0.7636	1.24	0.0930	0.69	0.5529	0.45	573.48	3.77	576.08	5.46	586.38	22.46
112	64	0.73	20518	16.6096	1.14	0.7468	1.44	0.0917	0.87	0.6037	0.15	565.45	4.72	566.36	6.27	570.02	25.04
113	107	0.65	134679	16.9838	0.83	0.7330	1.11	0.0911	0.74	0.6643	-0.62	562.06	3.96	558.33	4.75	543.17	18.08
115	96	0.73	297813	16.8403	0.98	0.7443	1.16	0.0917	0.63	0.5425	-0.12	565.61	3.42	564.91	5.05	562.06	21.32
117	56	0.53	47842	16.8490	1.48	0.7400	1.66	0.0916	0.75	0.4509	-0.48	565.12	4.05	562.43	7.17	551.60	32.38
118	73	0.46	14241	16.7512	1.22	0.7429	1.45	0.0926	0.76	0.5261	-1.10	570.63	4.17	564.10	6.28	537.89	26.98
121	88	0.67	10769	16.3225	0.85	0.7551	1.25	0.0921	0.72	0.5782	0.55	568.00	3.92	571.18	5.45	583.87	22.10
123	19	0.51	13596	16.9074	2.36	0.7301	2.60	0.0919	1.07	0.4126	-1.80	566.68	5.83	556.62	11.16	515.64	52.09
124	83	0.49	28486	16.7639	1.14	0.7468	1.34	0.0923	0.70	0.5236	-0.47	569.03	3.82	566.37	5.82	555.69	24.89
125	149	0.74	33754	16.1388	0.64	0.8676	0.83	0.1030	0.52	0.6296	0.31	632.22	3.16	634.26	3.93	641.54	13.92
127	269	0.27	396517	12.0202	0.44	2.4454	1.18	0.2149	1.10	0.9270	0.13	1254.98	12.52	1256.08	8.53	1257.99	8.69
128	23	0.62	9350	16.7770	2.42	0.7356	2.60	0.0926	0.90	0.3456	-2.00	570.93	4.91	559.83	11.19	514.95	53.62
130	109	0.55	33308	16.8633	1.02	0.7412	1.21	0.0920	0.63	0.5198	-0.72	567.22	3.42	563.12	5.24	546.60	22.64
135	275	0.97	35128	16.9188	0.66	0.7200	0.84	0.0896	0.51	0.6122	-0.44	553.22	2.72	550.67	3.56	540.17	14.48
138	71	0.59	12109	16.4510	1.18	0.7677	1.50	0.0941	0.59	0.3940	-0.24	579.76	3.27	578.44	6.61	573.26	29.95
141	84	0.59	30159	16.5696	0.75	0.7779	1.11	0.0949	0.79	0.7141	-0.06	584.70	4.44	584.31	4.94	582.76	16.90
142	360	0.59	80268	16.7079	0.64	0.7445	0.98	0.0912	0.74	0.7556	0.40	562.41	3.99	565.01	4.25	575.49	13.99
144	218	0.53	74458	16.9392	0.70	0.7309	0.91	0.0908	0.58	0.6371	-0.52	560.16	3.13	557.06	3.92	544.38	15.40
145	212	1.39	101344	16.9517	0.78	0.7270	1.94	0.0903	1.78	0.9162	-0.42	557.25	9.50	554.79	8.30	544.69	16.99
149	345	0.63	48289	16.7860	0.57	0.7456	0.88	0.0919	0.67	0.7651	-0.20	567.00	3.66	565.69	3.82	560.43	12.36
150	132	0.80	24853	16.8147	0.89	0.7344	1.15	0.0911	0.72	0.6241	-0.53	562.23	3.85	559.12	4.93	546.45	19.59
151	115	0.64	12801	16.7786	1.02	0.7259	1.56	0.0907	0.75	0.4786	-1.00	559.88	4.01	554.16	6.67	530.76	30.02
152	131	0.50	44567	16.9200	0.67	0.7146	0.86	0.0888	0.53	0.6195	-0.21	548.69	2.80	547.45	3.64	542.29	14.75
155	25	0.98	10519	16.5575	1.67	0.7095	1.87	0.0880	0.84	0.4495	0.14	543.70	4.39	544.47	7.89	547.74	36.55
162	134	0.63	131389	16.8474	0.94	0.7268	1.24	0.0899	0.81	0.6528	-0.02	554.76	4.30	554.67	5.30	554.29	20.48
164	339	0.62	197834	16.3451	0.47	0.8510	0.71	0.1018	0.53	0.7469	0.02	625.06	3.18	625.21	3.33	625.74	10.26
170	60	0.53	11827	16.6527	1.15	0.7529	2.63	0.0936	2.13	0.8114	-0.99	576.86	11.77	569.93	11.47	542.39	33.60
171	40	1.15	33203	16.8422	1.21	0.7377	1.44	0.0915	0.77	0.5347	-0.63	564.65	4.18	561.07	6.23	546.55	26.67
174	39	0.91	29112	16.6175	1.55	0.7367	1.74	0.0902	0.80	0.4570	0.72	556.46	4.24	560.45	7.50	576.66	33.66
176	148	0.45	30376	16.7550	0.84	0.7210	1.22	0.0890	0.86	0.7038	0.32	549.33	4.53	551.27	5.21	559.32	18.93
177	52	0.40	20298	16.8803	1.30	0.7281	1.50	0.0909	0.73	0.4842	-0.94	560.64	3.90	555.41	6.43	534.08	28.76
178	71	0.94	268068	16.7338	0.91	0.7481	1.28	0.0915	0.90	0.7045	0.42	564.49	4.86	567.10	5.55	577.56	19.69
180	1908	0.04	38763	20.9833	1.36	0.0204	1.58	0.0031	0.81	0.5123	0.91	20.25	0.16	20.47	0.32	46.93	32.44
181	226	0.53	273076	16.7582	0.76	0.7386	1.02	0.0905	0.68	0.6703	0.55	558.30	3.65	561.61	4.40	575.03	16.44
189	96	0.69	170154	17.0174	1.01	0.7201	1.16	0.0896	0.58	0.5004	-0.42	553.02	3.08	550.72	4.94	541.21	22.01
191	76	0.58	71486	16.7132	0.89	0.7855	1.13	0.0961	0.71	0.6220	-0.52	591.80	3.99	588.60	5.07	576.32	19.31
193	124	0.36	30707	16.8768	0.95	0.7379	1.22	0.0916	0.76	0.6201	-0.67	565.20	4.10	561.20	5.27	545.03	20.98
196	147	1.01	23019	16.8513	0.75	0.7210	1.14	0.0896	0.86	0.7517	-0.34	553.42	4.54	551.28	4.85	542.48	16.41
197	19	0.77	45855	16.6751	2.22	0.7220	2.39	0.0883	0.86	0.3622	1.10	545.76	4.52	551.86	10.16	577.12	48.31
199	178	0.95	372933	16.9188	0.71	0.7190	1.01	0.0888	0.72	0.7102	0.23	548.63	3.77	550.05	4.29	555.91	15.49
200	64	0.55	10679	16.6375	1.07	0.7316	1.35	0.0909	0.75	0.5519	-0.58	560.77	4.02	557.48	5.81	544.08	24.72
201	54	0.45	13159	16.6612	1.39	0.7532	1.60	0.0933	0.70	0.4355	-0.88	574.99	3.83	570.05	6.97	550.44	31.39
204	103	0.81	47861	16.8591	1.04	0.7188	1.30	0.0889	0.78	0.5982	0.20	548.82	4.10	549.96	5.53	554.63	22.74
206	108	0.58	13946	16.5602	1.04	0.7578	1.22	0.0932	0.64	0.5211	-0.25	574.21	3.50	572.75	5.35	566.98	22.70
207	209	0.57	40012	16.8396	0.81	0.7385	1.07	0.0913	0.70	0.6534	-0.27	563.13	3.78	561.52	4.62	555.02	17.70
208	232	1.15	42241	16.8379	0.80	0.7088	1.26	0.0876	0.96	0.7647	0.45	541.21	5.00	544.04	5.30	555.91	17.72
209	400	0.77	506398	17.0562	0.76	0.7117	0.97	0.0886	0.61	0.6298	-0.26	547.29	3.22	545.76	4.11	539.40	16.55
212	31	0.42	19437	16.5364	1.82	0.7791	1.98	0.0951	0.77	0.3887	-0.09	585.53	4.30	585.00	8.80	582.91	39.58
214	71	1.22	32844	17.2023	1.45	0.7002	1.60	0.0883	0.66	0.4156	-1.30	545.64	3.48	538.92	6.69	510.58	32.00
215	90	0.61	50301	16.6848	1.05	0.7549	1.17	0.0921	0.51	0.4354	0.56	567.92	2.77	571.04	5.10	583.46	22.83
218	171	0.66	38966	16.8715	0.71	0.7366	0.91	0.0910	0.56	0.6152	-0.18	561.50	3.00	560.42	3.90	556.05	15.58
220	201	0.56	24643	16.8774	0.77	0.7276	0.95	0.0903	0.55	0.5780	-0.35	557.12	2.92	555.14	4.04	547.01	16.84
221	88	0.78	80872	16.9382	1.08	0.7389	1.21	0.0914	0.55	0.4545	-0.33	563.61	2.97	561.77	5.23	554.32	23.54
222	32	0.49	14539	16.4344	1.68	0.7604	1.87	0.0925	0.81	0.4328	0.75	570.05	4.41	574.21	8.20	590.71	36.54
223	57	0.57	48263	16.6764	1.28	0.7728	1.59	0.0943	0.94	0.5913	0.11	580.71	5.22	581.36	7.04	583.96	27.83
226	122	0.67	81502	16.9613	0.91	0.7277	1.28	0.0901	0.89	0.6986	-0.16	556.21	4.75	555.22	5.46	551.17	19.92
229	83	0.55	34656	16.9547	0.92	0.7368	1.13	0.0916	0.65	0.5788	-0.81	565.25	3.53	560.54	4.86	541.45	20.10
230	325	1.10	192075	16.8082	0.57	0.7545	0.77	0.0925	0.51	0.6627	0.10	570.24	2.77	570.82	3.35	573.14	12.51
235	88	0.48	1216617	16.5195	1.10	0.7940	1.31	0.0957	0.71	0.5428	0.68	589.41	4.00	593.46	5.88	608.95	23.74
236	83	0.53	207734	16.8159	0.83	0.7408	1.13	0.0910	0.77	0.6823	0.22	561.54	4.15	562.88	4.89	568.29	17.99
237	87	0.78	30220	16.9650	1.09	0.7291	1.29	0.0910	0.68	0.5266	-0.97	561.51	3.66	556.04	5.54	533.69	24.08
238	149	0.95	51783	16.3883	0.91	0.8176	1.02	0.0982	0.45	0.4432	0.46	604.02	2.60	606.70	4.64	616.69	19.67
239	125	0.58	17833	16.8537	1.23	0.7114	1.79	0.0887	1.29	0.7205	-0.38	547.94	6.76	545.59	7.54	535.80	27.10
242	173	0.71	70217	16.9989	0.93	0.7213	1.13	0.0899	0.65	0.5730	-0.60	554.85	3.44	551.45	4.81	537.48	20.28
244	131	0.64	22695	16.7962	0.72	0.7310	0.99	0.0908	0.59	0.5888	-0.51	560.07	3.14	557.13	4.27	545.13	17.55
245	145	0.77	110412	16.7583	0.84	0.7588	1.08	0.0932	0.67	0.6254	-0.19	574.49	3.71	573.34	4.73	568.80	18.31
257	85	0.45	13183	16.6460	1.04	0.7450	1.43	0.0924	0.98	0.6858	-0.76	570.00	5.36	565.29	6.21	546.38	22.81
263	53	0.73	15979	16.4883	1.19	0.7748	1.66	0.0950	0.96	0.5797	-0.39	584.84	5.37	582.49	7.35	573.32	29.37
264	83	0.49	26096	16.6578	1.14	0.7464	1.35	0.0918	0.70	0.5179	-0.06	566.46	3.80	566.13	5.88	564.74	25.23
268	124	0.37	55963	16.8558	0.70	0.7445	0.87	0.0923	0.52	0.5952	-0.65	568.83	2.83	565.02	3.79	549.73	15.33
272	67	0.62	32167	16.7600	1.19	0.7700	1.53	0.0952	0.95	0.6258	-1.00	586.21	5.35	579.76	6.74	554.53	25.93
275	48	0.45	17428	16.6634	1.13	0.7500	1.43	0.0928	0.82	0.5761	-0.69	572.24	4.50	568.21	6.21	552.14	25.46
276	128	0.55	16624	16.7141	0.78	0.7406	1.18	0.0920	0.59	0.5028	-0.82	567.40	3.22	562.73	5.10	543.92	22.32
278	762	1.21	91079	16.7991	0.43	0.7370	0.66	0.0909	0.50	0.7585	-0.06	561.07	2.69	560.66	2.84	559.05	9.37
280	76	0.99	17301	16.9295	1.30	0.7115	1.63	0.0895	0.96	0.5900	-1.20	552.53	5.09	545.65	6.87	517.02	28.85
281	125	0.64	67385	16.6880	0.84	0.7343	1.04	0.0901	0.60	0.5771	0.55	555.96	3.19	559.09	4.46	571.84	18.43
290	173	0.17	112652	16.7419	0.80	0.7245	1.08	0.0891	0.72	0.6697	0.51	550.32	3.82	553.32	4.62	565.71	17.48
291	65	1.14	20328	16.5400	1.13	0.7460	1.37	0.0915	0.77	0.5621	0.22	564.63	4.17	565.90	5.96	570.98	24.71
294	153	0.56	46229	16.8356	0.61	0.7344	0.83	0.0911	0.55	0.6615	-0.46	561.95	2.94	559.15	3.55	547.78	13.54
295	31	1.10	72904	16.3320	1.88	0.7812	1.96	0.0938	0.56	0.2832	1.50	577.96	3.07	586.18	8.75	618.14	40.67

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
299	95	0.65	82277	16.8622	1.06	0.7444	1.20	0.0923	0.56	0.4697	-0.69	568.84	3.07	564.96	5.20	549.36	23.14
308	62	1.22	110461	16.0174	1.23	0.8792	1.37	0.1033	0.60	0.4401	1.10	633.81	3.63	640.55	6.50	664.41	26.29
309	77	0.49	74845	16.7597	0.84	0.7451	1.10	0.0918	0.70	0.6381	-0.11	566.00	3.79	565.35	4.76	562.69	18.42
311	157	0.73	132768	16.8869	0.82	0.7220	1.13	0.0895	0.77	0.6830	-0.10	552.45	4.08	551.83	4.80	549.29	17.98
312	287	0.57	59920	16.6645	0.60	0.7470	0.85	0.0916	0.60	0.6999	0.28	564.79	3.23	566.50	3.71	573.39	13.27
313	62	0.43	18329	16.7965	1.36	0.7365	1.62	0.0918	0.79	0.4860	-1.10	566.42	4.28	560.35	6.99	535.79	31.06
314	175	0.38	1121528	16.8118	0.76	0.7237	1.06	0.0891	0.74	0.6969	0.39	550.50	3.90	552.85	4.52	562.53	16.58
315	28	0.51	8556	16.8264	2.76	0.7072	3.01	0.0897	1.03	0.3409	-2.00	553.95	5.45	543.07	12.67	497.62	62.42
Sample 3839																	
2	104	0.53	54377	17.2492	3.8	0.68812	5.1	0.086124	3.3	0.661	-0.16	532.6	17.1	531.7	20.9	527.8	83.1
3	189	0.35	42486	17.2631	3.3	0.699	4.5	0.087557	3.1	0.682	-0.49	541.1	16	538.2	18.9	526	72.6
4	110	0.37	9308	17.1146	4.9	0.71772	6.1	0.089128	3.7	0.605	-0.19	550.4	19.5	549.3	26	544.9	106.6
5	156	0.47	38232	16.9833	3.8	0.72825	6.8	0.089742	5.6	0.828	0.23	554	30	555.5	29.2	561.7	83.2
6	170	0.51	20970	17.0013	4.3	0.68082	6.5	0.083987	4.9	0.749	1.2	519.9	24.3	527.3	26.7	559.4	93.5
7	129	0.53	6415	17.5486	6.6	0.68458	8.3	0.087169	5	0.605	-1.6	538.8	26.1	529.5	34.4	489.9	146.3
9	209	0.27	15646	16.3636	3.7	0.81798	5.6	0.097121	4.2	0.746	1.4	597.5	23.9	606.9	25.6	642.2	80.3
11	168	0.51	27755	16.8507	3.7	0.66259	8.2	0.081013	7.4	0.893	2.2	502.2	35.5	516.2	33.4	578.8	80.7
12	247	0.38	20579	17.1723	3.3	0.67374	4.9	0.083949	3.5	0.726	0.57	519.7	17.6	523	19.9	537.6	73.1
13	114	0.30	46602	16.2577	3.3	0.83049	4.3	0.097969	2.7	0.626	1.8	602.5	15.4	613.9	19.7	656.1	71.5
14	162	0.46	9720	17.1667	4.9	0.67831	7.1	0.08449	5.1	0.722	0.49	522.9	25.7	525.8	29.1	538.3	107.5
15	233	0.55	28310	16.6782	3.5	0.79274	4.4	0.095935	2.8	0.62	0.34	590.5	15.6	592.7	20	601.1	75.5
16	170	0.77	40922	16.8592	4.1	0.66232	5.5	0.081021	3.7	0.67	2.5	502.2	17.7	516	22.2	577.7	88.4
17	160	0.75	38667	16.6631	3.2	0.70817	5.1	0.085622	4	0.786	2.3	529.6	20.6	543.7	21.7	603	68.9
18	102	0.51	21642	17.0345	3	0.68262	4.8	0.084373	3.8	0.781	1	522.2	19	528.4	20	555.2	66.1
19	192	0.67	9038	16.5462	7.5	0.69515	8.9	0.083459	4.8	0.54	3.6	516.7	23.8	535.9	36.9	618.3	161
20	150	0.54	52636	17.3439	3.3	0.66969	5.2	0.084279	4.1	0.777	-0.18	521.6	20.4	520.5	21.4	515.7	72.5
21	141	0.30	122411	16.8779	3.7	0.71268	5.8	0.087279	4.4	0.769	1.1	539.4	22.9	546.3	24.3	575.3	80
22	211	0.68	46299	17.0639	3.5	0.68082	4.7	0.084296	3.2	0.673	0.97	521.7	16	527.3	19.5	551.4	76.5
23	121	0.32	9522	17.4641	5.5	0.67065	7.3	0.084983	4.8	0.657	-0.82	525.8	24.3	521.1	29.8	500.6	121.5
24	146	0.49	86908	16.861	3	0.6825	5.2	0.083499	4.3	0.821	1.8	517	21.3	528.3	21.5	577.5	64.8
25	239	0.68	28324	17.1486	3.3	0.68359	5.2	0.085058	4	0.765	0.44	526.2	20	528.9	21.3	540.6	72.8
26	108	0.74	17894	17.2176	4.1	0.70026	6.7	0.087483	5.3	0.789	-0.26	540.6	27.3	538.9	27.9	531.8	89.7
27	224	0.67	125010	16.9422	3.5	0.70029	5.4	0.086088	4.1	0.757	1.1	532.4	20.8	539	22.5	567	76.4
28	274	0.49	41267	16.8669	2.6	0.7098	4.3	0.086869	3.3	0.786	1.2	537	17.2	544.6	17.9	576.7	57.1
31	203	0.63	13518	16.6032	4.9	0.72428	6.2	0.087255	3.8	0.61	2.5	539.3	19.5	553.2	26.3	610.8	105.7
32	262	0.59	48618	16.9888	2	0.70827	3.4	0.087308	2.7	0.8	0.64	539.6	13.9	543.7	14.1	561.1	43.9
36	143	0.65	399654	16.9132	3.5	0.73844	5.5	0.090623	4.2	0.767	0.35	559.2	22.6	561.5	23.8	570.7	76.9
37	215	0.58	94033	16.6898	3.8	0.74586	5.1	0.090324	3.5	0.675	1.4	557.5	18.5	565.8	22.3	599.6	82
39	158	0.45	21636	17.0578	3.5	0.65841	7.2	0.081492	6.3	0.875	1.4	505	30.8	513.6	29.2	552.2	76.4
42	176	0.41	14033	17.1798	4.4	0.66862	5.5	0.083347	3.3	0.602	0.7	516.1	16.3	519.9	22.2	536.6	95.3
43	176	0.41	61586	17.2133	2.6	0.68682	4.5	0.085782	3.7	0.818	0.053	530.5	18.7	530.9	18.6	532.4	56.6
45	108	0.38	10298	17.1721	6.2	0.705	7.7	0.087842	4.6	0.596	-0.17	542.8	23.8	541.8	32.2	537.6	134.8
46	277	0.38	250574	17.0678	3.4	0.668	4.5	0.082727	3	0.66	1.3	512.4	14.7	519.5	18.4	550.9	74.3
Sample 3675																	
1	809	0.63	201271	16.8341	3	0.72153	5.4	0.088132	4.5	0.835	1.1	544.5	23.6	551.6	23	581	64.7
2	256	0.65	171657	17.2695	3.3	0.71538	4.9	0.089642	3.6	0.738	-0.87	553.4	19.3	547.9	20.8	525.2	72.8
3	236	0.48	41599	17.059	1.6	0.71348	2.8	0.088314	2.3	0.815	0.19	545.6	12.1	546.8	12	552	35.9
4	213	0.42	15664	17.3912	3.4	0.71758	4.7	0.090551	3.2	0.681	-1.6	558.8	17	549.2	19.8	509.8	75.3
6	207	0.45	22552	17.3237	2.5	0.71136	3.4	0.089418	2.3	0.667	-1.1	552.1	12	545.6	14.4	518.3	55.8
7	186	0.44	53707	17.1229	2.4	0.72498	5.1	0.090074	4.5	0.884	-0.35	556	24.2	553.6	21.9	543.8	52.5
8	64	0.62	11754	17.3799	4.8	0.7149	6.3	0.090154	4	0.637	-1.5	556.4	21.3	547.7	26.5	511.2	106.1
9	294	0.40	41398	16.9463	2.7	0.71276	4.2	0.087642	3.3	0.773	0.76	541.6	17	546.4	17.9	566.5	58.4
10	322	0.65	45820	17.1135	2.5	0.70655	4.5	0.087736	3.8	0.836	0.084	542.1	19.6	542.7	19	545.1	54.1
11	552	0.57	132831	17.177	1.5	0.69948	3.6	0.08718	3.3	0.906	-0.058	538.8	17	538.5	15.2	537	33.7
12	241	0.56	17531	17.2993	3.5	0.68224	5.2	0.085637	3.9	0.746	-0.26	529.7	19.9	528.1	21.6	521.4	76.6
13	207	0.38	37480	16.6993	2.9	0.7383	4.1	0.089459	2.9	0.698	1.5	552.3	15.2	561.4	17.7	598.4	63.6
15	169	0.43	30940	16.598	2.1	0.74242	3.8	0.089413	3.1	0.827	1.8	552.1	16.6	563.8	16.4	611.5	46
16	239	0.61	136419	17.2543	2	0.71345	3.2	0.089321	2.5	0.792	-0.72	551.5	13.4	546.8	13.6	527.2	42.9
18	175	0.62	24359	17.1447	2.9	0.70461	4.7	0.087654	3.6	0.778	-0.014	541.6	18.9	541.5	19.6	541.1	64.3
19	364	0.41	53912	17.1359	1.8	0.71306	2.9	0.08866	2.2	0.784	-0.16	547.6	11.8	546.6	12.1	542.2	39
20	263	0.51	102148	16.8953	2.8	0.69594	5	0.085317	4.1	0.818	1.3	527.8	20.5	536.4	20.6	573	61.9
23	239	0.79	21918	16.9484	2.1	0.70945	3.2	0.087246	2.5	0.76	0.82	539.2	12.7	544.4	13.6	566.2	45.7
24	257	0.40	78580	17.0897	2.9	0.70063	5.7	0.08688	4.9	0.858	0.31	537.1	25.1	539.2	23.7	548.1	63.6
25	279	0.51	57633	16.9257	2.5	0.66275	9.3	0.081393	8.9	0.962	3.3	504.4	43.2	516.3	37.5	569.2	54.9
26	242	0.54	88517	17.3653	2	0.71751	4.6	0.090407	4.2	0.901	-1.4	557.9	22.2	549.2	19.6	513.1	44
27	192	0.45	18799	16.2815	7.2	0.78053	8.1	0.092211	3.6	0.447	3.1	568.6	19.6	585.8	35.9	653	154.7
29	183	0.46	63285	17.1843	2.5	0.66505	11.1	0.082924	10.8	0.973	1.6	513.6	53.3	517.7	45	536	55.5
30	317	0.64	71852	17.0696	2.1	0.73705	3.5	0.091288	2.7	0.788	-0.37	563.2	14.8	560.7	15	550.7	46.8
31	197	1.02	14324	17.1429	3.6	0.70295	4.3	0.087439	2.3	0.537	0.037	540.4	12	540.6	18	541.3	79.3
32	302	0.54	56837	17.0215	1.6	0.71526	3.2	0.08834	2.8	0.861	0.32	545.7	14.6	547.9	13.7	556.9	36
34	194	0.49	40649	16.9852	3.1	0.72546	6.7	0.089408	5.9	0.882	0.27	552	31.1	553.9	28.5	561.5	68.6
35	233	0.69	23229	16.8914	2.7	0.73242	3.6	0.089768	2.5	0.679	0.62	554.2	13	558	15.5	573.5	57.7
37	227	0.58	29207	17.3355	2	0.71046	2.7	0.089365	1.8	0.683	-1.1	551.8	9.7	545	11.4	516.8	43.2
39	229	0.53	18356	17.4782	2.3	0.65747	3.7	0.083381	2.9	0.78	-0.52	516.3	14.5	513.1	15.1	498.8	51.6
40	164	0.51	26770	17.104	2.9	0.71042	4.1	0.088167	2.9	0.712	0.046	544.7	15.2	545	17.3	546.3	62.8
41	123	0.32	45633	17.2811	2.2	0.72348	3.5	0.090717	2.7	0.768	-1.1	559.8	14.2	552.7	14.7	523.7	48.5
42	116	0.90	20514	17.1233	3	0.71942	4.3	0.089385	3.1	0.728	-0.26	551.9	16.6	550.3	18.3	543.8	64.7
44	167	0.59	17043	17.3426	3.4	0.69782	4.2	0.087812	2.5	0.581	-0.9	542.6	12.8	537.5	17.6	515.9	75.5
45	220	0.44	23473	17.0391	3.1	0.71068	3.9	0.087865	2.3	0.59	0.4	542.9	12	545.2	16.5	554.6	68.7
47	157	0.63	171341	16.8407	3.6	0.74369	5.1	0.090876	3.6	0.708	0.62	560.7	19.2	564.6	21.9	580.1	77.7
48	271	0.51	161438	16.975	2.5	0.71483	4.2	0.088045	3.4	0.811	0.55	544	17.8	547.6	17.8	562.8	53.7
49	303	0.47	27048	17.091	2.7	0.71083	3.8	0.088152	2.7	0.712	0.1	544.6	14	545.2	15.9	548	57.9
50	174	0.37	39439	16.8736	3.2	0.7363	4.5	0.090148	3.2	0.712	0.62	556.4	17.1	560.2	19.4	575.8	68.8
51	178	0.55	17508	17.1547	2.8	0.74299	3.9	0.092483	2.8	0.708	-0.94	570.2	15.2	564.2	17	539.8	60.6
52	222	0.51	224203	16.9409	2.8	0.70298	7.9	0.086412	7.4	0.937	1.3	534.3	37.8	540.6	33	567.2	60
53	162	0.44	28156	17.0465	2.6	0.71606	3.9	0.088568	3	0.755	0.2	547.1	15.6	548.3	16.7	553.6	56.5
54	176	0.37	32509	17.2132	2.5	0.70929	4	0.08859	3.1	0.786	-0.45	547.2	16.4	544.3	16.7	532.4	53.8
55	251	0.50	46247	17.0511	2.3	0.71511	4.1	0.088475	3.4	0.83	0.18	546.5	17.9	547.8	17.4	553	50.2
56	170	0.30	200287	17.3013	2.6	0.71346	4	0.089566	3	0.758	-0.97	553	15.9	546.8	16.7	521.1	56.6
57	231	0.41	65275	16.8457	2.6	0.71758	4.4	0.087711	3.6	0.812	1.1	542	18.6	549.2	18.7	579.4	55.9
58	211	0.56	45263	17.0082	2.2	0.70196	4.1	0.086628	3.4	0.845	0.67	535.6	17.7	540	17.1	558.6	47.5
60	142	0.34	197599	16.9212	2.3	0.74665	3.6	0.091673	2.8	0.77	0.14	565.4	15.1	566.3	15.7	569.7	50.3
61	160	0.48	86974	17.0583	3.5	0.72579	6.5	0.089834	5.5	0.844	-0.065	554.6	29.2	554.1	27.8	552.1	76.3
62	109	0.50	50261	16.896	3	0.70499	7.6	0.08643	7	0.92	1.3	534.4	35.9	541.8	31.9	573	64.8
63	196	0.47	19900	17.305	3.2	0.72845	4.5	0.091468	3.2	0.711	-1.4	564.2	17.2	555.6	19.2	520.7	69.2
67	447	0.57	44760	17.0331	2.2	0.71325	3.4	0.088151	2.6	0.757	0.33	544.6	13.5	546.7	14.5	555.4	48.8
69	276	0.70	294261	17.1561	1.9	0.7066	3.6	0.087961	3	0.842	-0.11	543.5	15.7	542.7	15	539.6	42.3
70	294	1.03	101855	17.2289	1.8	0.71873	3.5	0.08985	3	0.857	-0.69	554.6	15.8	549.9	14.7	530.4	39
71	194	0.60	29626	17.1897	2.6	0.70231	4.1	0.087597	3.2	0.775	-0.18	541.3	16.7	540.2	17.3	535.3	57.3
72	195	0.47	51396	17.0917	3.3	0.73765	5.4	0.091481	4.3	0.788	-0.48	564.3	23	561	23.3	547.9	72.5
73	216	0.34	43554	17.2302	2.5	0.69301	4.4	0.086641	3.7	0.828	-0.16	535.6	18.8	534.6	18.4	530.2	54.4
74	239	0.52	18403	17.3003	3.1	0.69884	6.3	0.087726	5.5	0.87	-0.6	542.1	28.6	538.1	26.4	521.3	68.6
75	109	0.75	15837	16.6532	4.6	0.78478	6.9	0.094829	5.1	0.745	0.64	584	28.7	588.2	30.7	604.3	99.3
76	577	0.65	114714	16.996	1.9	0.71273	3	0.087895	2.4	0.792	0.5	543.1	12.5	546.4	12.8	560.1	40.4

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
77	340	0.43	26785	17.3833	2.1	0.70963	3	0.089507	2.2	0.727	-1.3	552.6	11.6	544.5	12.7	510.8	45.4
79	189	0.76	53959	17.1993	2.8	0.69512	3.9	0.086748	2.7	0.696	-0.073	536.3	14.1	535.9	16.4	534.1	62
80	284	0.48	21840	16.6999	2.8	0.72025	4.2	0.087275	3.2	0.758	1.8	539.4	16.7	550.8	18.1	598.3	59.9
82	140	0.53	27537	17.357	2.9	0.68735	4.3	0.086566	3.2	0.74	-0.65	535.2	16.5	531.2	18	514.1	64.2
83	193	0.42	18306	16.2843	4	0.7641	5.4	0.090284	3.6	0.671	3.2	557.2	19.3	576.4	23.7	652.6	85.8
84	292	0.54	41801	17.3358	2.5	0.69444	3.5	0.087352	2.5	0.712	-0.73	539.9	13.1	535.5	14.8	516.8	54.7
85	268	0.88	24592	17.31	2.3	0.71339	3.8	0.089603	3	0.784	-0.97	553.2	15.7	546.8	16	520	51.3
86	276	0.40	115589	17.0242	2.2	0.70622	3.3	0.087237	2.4	0.731	0.54	539.2	12.3	542.5	13.7	556.5	48.4
87	173	0.89	28760	17.1776	2.2	0.71245	4.2	0.0888	3.5	0.844	-0.33	548.4	18.5	546.2	17.6	536.9	48.9
88	431	1.23	1411482	16.9892	1.6	0.70203	3	0.086541	2.5	0.846	0.75	535	12.9	540	12.5	561	34.6
89	261	0.58	86238	17.0008	2.5	0.7035	3.8	0.086781	2.9	0.764	0.71	536.5	15	540.9	16	559.5	53.6
90	277	0.45	21029	17.1953	2.5	0.72469	3.3	0.090418	2.1	0.642	-0.78	558	11.2	553.4	13.9	534.7	54.8
92	540	0.57	67473	17.1171	2	0.7083	2.8	0.087972	1.9	0.688	0.037	543.5	10	543.7	11.7	544.6	44.3
93	185	0.65	14169	17.2886	3.6	0.67853	4.7	0.085118	3.1	0.652	-0.13	526.6	15.6	525.9	19.5	522.8	78.9
94	105	0.70	140167	17.3504	2.6	0.71355	4.4	0.089831	3.5	0.807	-1.1	554.5	18.8	546.8	18.5	514.9	56.8
96	239	0.47	51577	16.9228	2.4	0.70832	3.2	0.086975	2.2	0.667	1	537.6	11.2	543.7	13.6	569.5	52.5
97	276	0.56	26929	17.3323	2.6	0.69139	5	0.08695	4.3	0.857	-0.57	537.5	22.1	533.6	20.8	517.2	56.6
98	379	0.48	64113	17.1965	1.8	0.71078	3.4	0.088688	2.9	0.851	-0.38	547.8	15.3	545.2	14.4	534.5	39.4
99	184	0.46	16079	16.3395	3.4	0.75585	4.6	0.089612	3.1	0.671	3.1	553.2	16.5	571.6	20.3	645.4	74.1
101	198	0.47	58395	17.1185	2.2	0.70828	4.4	0.087976	3.8	0.866	0.023	543.6	19.9	543.7	18.5	544.4	48.2
102	236	0.36	35495	17.3424	3.3	0.70996	3.8	0.089338	2	0.517	-1.2	551.6	10.5	544.7	16.1	515.9	72
105	223	0.59	20129	16.9094	3.3	0.70873	4.3	0.086957	2.8	0.645	1.1	537.5	14.4	544	18.3	571.2	72.1
107	382	0.45	334973	17.0632	2	0.69522	3.4	0.086075	2.8	0.82	0.55	532.3	14.4	535.9	14.3	551.5	42.8
109	240	0.63	12750	16.2309	4.8	0.73559	5.3	0.086631	2.1	0.401	4.6	535.6	10.8	559.8	22.6	659.6	103.2
110	295	0.61	31377	16.5737	3.9	0.73374	4.8	0.088238	2.9	0.595	2.4	545.1	15.1	558.7	20.8	614.7	84.2
111	112	0.57	16017	16.8028	5	0.751	5.8	0.091563	3.1	0.526	0.71	564.8	16.6	568.8	25.4	585	107.8
112	221	0.44	41824	17.1986	2.5	0.72589	4.1	0.090586	3.3	0.798	-0.72	559	17.6	554.1	17.6	534.2	54.3
113	207	0.76	20780	17.0557	3.6	0.67683	5.3	0.083761	3.9	0.729	1.1	518.5	19.3	524.9	21.7	552.5	79.2
114	299	0.79	107806	17.1365	3.3	0.71005	6.3	0.088288	5.4	0.856	-0.09	545.4	28.3	544.8	26.6	542.1	71.5
116	284	0.64	140744	17.0948	3.2	0.7115	4.8	0.088253	3.6	0.745	0.073	545.2	18.7	545.6	20.2	547.5	69.7
117	350	0.49	24134	16.0415	4.8	0.77986	5.1	0.090772	1.7	0.323	4.6	560.1	8.9	585.4	22.8	684.8	103.3
118	463	0.75	42113	16.7865	2.6	0.69578	3.7	0.084747	2.6	0.717	2.1	524.4	13.3	536.3	15.3	587.1	55.6
119	268	0.67	129540	17.2319	2	0.67851	3.7	0.084837	3.1	0.835	0.14	524.9	15.6	525.9	15.2	530	44.8
120	161	0.74	50168	17.1729	2.7	0.69575	3.9	0.086695	2.7	0.705	0.049	536	14	536.3	16.1	537.5	60
121	223	0.70	13553	16.2811	5.3	0.76122	7.3	0.089927	5.1	0.692	3.2	555.1	26.9	574.7	32.1	653	113.4
122	391	0.43	56773	16.8582	2.1	0.73531	4	0.089944	3.4	0.847	0.65	555.2	18.2	559.7	17.4	577.8	46.6
123	218	0.62	16055	17.1839	3.3	0.70856	4.4	0.088347	3	0.671	-0.31	545.8	15.6	543.9	18.7	536.1	72
124	48	0.44	6082	15.5534	12.7	0.9119	14.6	0.102913	7.1	0.484	4.4	631.5	42.5	658.1	70.6	750.4	269.4
125	639	0.96	35438	16.378	8.6	0.74131	9.3	0.088096	3.5	0.376	3.5	544.3	18.2	563.2	40.1	640.3	184.9
126	231	0.79	81412	17.1663	2.3	0.69302	3.5	0.08632	2.6	0.743	0.14	533.7	13.2	534.6	14.4	538.3	50.7
127	159	0.47	230373	16.9303	2.5	0.71907	4.4	0.088335	3.6	0.824	0.67	545.7	19.1	550.1	18.8	568.6	54.6
130	182	0.43	37464	17.3271	2.7	0.69918	4.3	0.087903	3.3	0.776	-0.76	543.1	17.2	538.3	17.8	517.9	58.9
131	254	0.84	58638	17.268	2.3	0.71191	4.1	0.089199	3.3	0.818	-0.74	550.8	17.6	545.9	17.2	525.4	51.5
132	336	0.53	36040	17.2272	2.4	0.70466	4.3	0.088082	3.6	0.833	-0.38	544.2	18.5	541.6	17.9	530.6	51.6
133	199	0.37	44894	17.0815	2.8	0.713	3.9	0.088371	2.7	0.692	0.11	545.9	14.2	546.5	16.6	549.2	62
134	157	0.60	27684	16.9154	2.3	0.74353	6.5	0.091258	6.1	0.936	0.3	563	32.8	564.5	28.2	570.4	49.9
135	235	0.43	121578	17.1872	2.5	0.70916	3.6	0.08844	2.6	0.728	-0.33	546.3	13.7	544.3	15.1	535.7	53.9
137	184	0.62	24004	16.8789	2.9	0.7192	5.2	0.088083	4.3	0.832	0.9	544.2	22.7	550.2	22.2	575.1	62.9
139	244	0.63	42717	16.5712	3	0.74651	3.9	0.089761	2.5	0.639	2.1	554.1	13.4	566.2	17.1	615	65.6
140	310	0.37	31323	17.3096	2.4	0.64832	3.9	0.081428	3.1	0.791	0.46	504.6	15	507.4	15.6	520.1	52.3
141	135	0.56	446384	17.2891	3.7	0.70674	4.7	0.088659	2.9	0.624	-0.84	547.6	15.4	542.8	19.8	522.7	80.6
142	84	0.60	165818	17.2427	4.2	0.72423	5.9	0.090609	4.1	0.698	-0.98	559.1	21.9	553.2	25	528.6	91.9
143	272	0.46	200414	17.0641	2.3	0.68902	3.3	0.085311	2.4	0.721	0.75	527.7	12	532.2	13.6	551.4	49.6
144	785	0.79	80088	16.9829	2	0.70451	3.6	0.086815	3	0.839	0.72	536.7	15.7	541.5	15.2	561.8	42.9
145	187	0.55	136094	17.135	2.2	0.71344	3.8	0.088702	3.1	0.822	-0.16	547.9	16.4	546.8	16.1	542.3	47.4
146	292	0.88	50532	17.0712	2.4	0.71445	3.6	0.088497	2.7	0.74	0.12	546.6	13.9	547.4	15.2	550.5	52.7
147	151	0.65	15168	17.2703	3.7	0.70787	6.1	0.088705	4.8	0.793	-0.68	547.9	25.3	543.5	25.6	525.1	81.5
148	130	0.55	40362	17.1727	3.2	0.70502	5.1	0.087849	4	0.786	-0.16	542.8	21	541.8	21.5	537.5	69.4
149	147	0.58	19337	16.9415	4.7	0.70907	5.7	0.087163	3.3	0.572	0.99	538.7	16.8	544.2	24	567.1	101.8
150	203	0.64	47864	17.1202	2.6	0.71232	3.6	0.088486	2.5	0.692	-0.081	546.6	13.1	546.1	15.3	544.2	57
151	171	0.74	24314	17.0423	3.3	0.69413	4.2	0.085835	2.5	0.607	0.8	530.9	12.9	535.3	17.3	554.1	72.3
152	182	0.51	341060	17.0314	3	0.69775	5	0.086227	4	0.8	0.67	533.2	20.5	537.4	20.9	555.6	65.5
153	288	0.42	277918	17.0696	2.3	0.73186	3.2	0.090645	2.3	0.708	-0.27	559.3	12.3	557.6	13.9	550.7	49.9
154	153	0.51	55635	16.8413	2.8	0.73155	3.9	0.089395	2.7	0.691	0.91	552	14.4	557.5	16.8	580	61.6
157	231	0.64	60694	17.1774	2	0.7035	3.1	0.087683	2.5	0.783	-0.14	541.8	12.8	540.9	13.2	536.9	42.8
158	341	0.60	890568	17.1516	2.1	0.7101	3.1	0.088373	2.3	0.741	-0.17	545.9	11.9	544.8	12.9	540.2	45.1
159	187	0.69	30582	17.0392	2.6	0.73831	4.2	0.091281	3.3	0.783	-0.25	563.1	17.8	561.4	18.2	554.5	57.3
160	338	0.56	26642	17.3828	2.6	0.70464	4	0.088875	3.1	0.76	-1.1	548.9	16.1	541.6	16.9	510.9	57.5
161	234	0.45	767495	16.8171	2.5	0.73227	4.2	0.089354	3.3	0.802	0.96	551.7	17.6	557.9	17.8	583.1	54
163	205	0.52	53524	16.9224	2.5	0.73397	3.7	0.090123	2.7	0.735	0.43	556.3	14.4	558.9	15.8	569.5	54
164	234	0.67	18248	17.1054	3.7	0.71386	5	0.088602	3.4	0.673	-0.032	547.3	17.7	547	21.2	546.1	81
165	261	0.79	26243	17.2022	2.6	0.69784	4.5	0.087103	3.6	0.812	-0.14	538.4	18.7	537.5	18.6	533.8	57
166	224	0.58	49412	16.8494	1.9	0.72828	2.9	0.089038	2.2	0.75	0.9	549.8	11.4	555.5	12.3	579	41.3
167	292	0.64	42567	17.0931	2	0.71183	3.5	0.088285	2.8	0.811	0.061	545.4	14.8	545.8	14.7	547.7	44.5
168	37	0.32	32611	17.1556	4.8	0.70011	7.3	0.08715	5.5	0.749	0.031	538.7	28.2	538.9	30.5	539.7	105.7
169	323	0.70	27764	17.2925	2.9	0.70188	4.1	0.088067	2.9	0.702	-0.69	544.1	15	539.9	17.1	522.3	63.8
170	186	0.79	134271	16.7879	2.1	0.75174	3.7	0.091571	3	0.82	0.64	564.8	16.2	569.2	15.9	586.9	45.3
171	266	0.45	55642	17.0366	2.6	0.72168	3.4	0.089211	2.3	0.665	0.13	550.9	12.1	551.7	14.6	554.9	56
172	329	0.79	1025269	16.8665	2.9	0.68437	3.8	0.083754	2.5	0.644	2	518.5	12.2	529.4	15.8	576.7	63.5
173	517	0.46	42588	17.0288	2.4	0.71862	3.7	0.088793	2.8	0.757	0.23	548.4	14.5	549.9	15.5	555.9	52.1
174	383	0.63	94986	17.1698	2.3	0.68829	2.8	0.08575	1.7	0.593	0.25	530.4	8.5	531.8	11.6	537.9	49.5
176	550	0.60	1697985	17.0267	1.8	0.71858	3.2	0.088777	2.7	0.833	0.22	548.3	14	549.8	13.6	556.2	38.5
177	331	0.50	32759	17.339	2.3	0.703	3.5	0.088445	2.7	0.768	-0.9	546.3	14.2	540.6	14.8	516.4	49.6
179	210	0.41	452517	16.8577	2.8	0.71793	4.5	0.087817	3.6	0.795	1	542.6	18.8	549.4	19.3	577.9	59.8
180	195	0.52	26174	16.9996	2.8	0.70818	5.3	0.087353	4.5	0.846	0.57	539.9	23.2	543.7	22.3	559.6	61.5
181	196	0.42	19033	16.3303	5.2	0.77656	6.2	0.092016	3.4	0.551	2.8	567.5	18.5	583.5	27.5	646.6	111.1
182	524	0.48	161055	17.1321	2	0.70558	3.2	0.08771	2.5	0.779	0.024	542	13	542.1	13.5	542.7	44
183	246	0.68	46959	17.1251	2	0.70135	3.2	0.087149	2.5	0.772	0.15	538.7	12.8	539.6	13.4	543.6	44.7
184	193	0.43	23703	16.883	2.5	0.75155	4	0.092067	3.1	0.78	0.21	567.7	16.9	569.1	17.3	574.6	54.1
185	136	0.55	16266	17.3046	2.7	0.70861	5	0.088973	4.3	0.845	-0.81	549.5	22.4	543.9	21.2	520.7	59.1
186	181	0.50	23693	17.3576	2.8	0.70947	4.2	0.089355	3.1	0.742	-1.2	551.7	16.3	544.4	17.5	514	61.2
187	238	0.55	33470	17.1839	2.8	0.71994	5	0.089767	4.2	0.834	-0.52	554.2	22.2	550.6	21.3	536.1	60.7
188	186	0.54	35374	17.0004	2.5	0.71814	4.7	0.088585	4	0.853	0.34	547.2	21.2	549.6	20.1	559.5	53.9
189	189	0.69	21081	17.3329	3.4	0.704	4.5	0.088539	3	0.664	-0.96	546.9	15.7	541.2	18.9	517.1	74
190	150	0.54	30505	17.1405	2.8	0.71686	4.8	0.089156	3.9	0.813	-0.26	550.5	20.6	548.8	20.4	541.6	61.1
192	153	0.60	74346	17.0167	3.2	0.7176	4.8	0.088604	3.5	0.741	0.33	547.3	18.5	549.3	20.2	557.5	69.6
193	197	0.54	160359	16.8109	2.5	0.70988	4.1	0.08659	3.3	0.802	1.5	535.3	17.1	544.7	17.4	583.9	53.6
195	173	0.35	14392	17.0902	3.7	0.70593	4.8	0.087539	3.1	0.646	0.23	541	16.1	542.3	20.1	548.1	80
196	340	0.99	424281	17.0879	1.9	0.71551	3.3	0.088715	2.7	0.816	0.0067	547.9	14.1	548	13.9	548.4	41.6
197	104	0.32	11616	17.3158	3.8	0.70239	5.4	0.08825	3.9	0.715	-0.81	545.2	20.2	540.2	22.6	519.3	82.8
198	394	0.96	90955	17.2281	2.1	0.6936	3	0.086705	2.1	0.696	-0.18	536	10.7	535	12.4	530.5	47
199	231	0.37	82552	17.1091	2.1	0.71491	4.1	0.088751	3.5	0.858	-0.072	548.1	18.4	547.7	17.3	545.6	45.8
200	320	0.99	43600	16.5421	3.2	0.71639	4.2	0.085987	2.7	0.649	3	531.8	13.8	548.5	17.6	618.8	68.1
201	432	0.47	58284	17.0928	1.4	0.69356	2.7	0.086018	2.2	0.843	0.46	531.9	11.4	534.9	11	547.7	31.2

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb^{a}$	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
202	282	0.44	729442	16.8055	2.7	0.70769	6	0.086295	5.4	0.898	1.5	533.6	27.8	543.4	25.4	584.6	57.6
203	262	0.57	58914	17.163	2.2	0.70897	3.2	0.088291	2.4	0.741	-0.2	545.4	12.4	544.1	13.5	538.7	47.1
204	119	0.55	13284	16.4001	4.9	0.83945	6.6	0.099894	4.4	0.665	0.78	613.8	25.7	618.8	30.6	637.4	106
205	247	0.81	40944	17.1343	2.1	0.70687	3.9	0.087882	3.3	0.844	-0.012	543	17.3	542.9	16.5	542.4	46.2
206	260	0.74	29109	17.1687	2.7	0.71194	3.5	0.08869	2.1	0.618	-0.34	547.8	11.3	545.9	14.7	538.1	59.8
207	226	0.58	20163	17.0567	3.2	0.71161	4.2	0.08807	2.7	0.645	0.27	544.1	14.1	545.7	17.7	552.3	70.1
208	91	0.59	13690	17.5698	4.2	0.70004	7.7	0.089246	6.5	0.841	-1.8	551.1	34.4	538.8	32.4	487.3	92.4
209	262	0.40	83514	17.0232	1.9	0.69355	4.9	0.085667	4.5	0.92	0.88	529.9	22.9	534.9	20.3	556.6	41.6
210	247	0.61	51647	17.0794	2.8	0.70206	5	0.087005	4.2	0.826	0.33	537.8	21.5	540	21.1	549.4	62
211	175	0.51	16940	17.1604	2.8	0.68698	3.7	0.08554	2.4	0.649	0.33	529.1	12.2	531	15.3	539.1	61.4
212	198	0.33	100790	17.2087	2.2	0.69745	4.5	0.087087	3.9	0.871	-0.15	538.3	20.2	537.3	18.7	532.9	48.3
213	141	0.43	45604	17.3035	2.9	0.73598	5.3	0.092405	4.5	0.844	-1.4	569.7	24.5	560.1	22.9	520.9	62.7
214	85	0.39	41271	17.0313	3.9	0.68737	5.2	0.084943	3.5	0.669	1	525.6	17.5	531.2	21.5	555.6	84.3
215	222	0.69	69819	16.905	2.4	0.71287	3.4	0.087442	2.4	0.706	1	540.4	12.6	546.5	14.5	571.8	53
216	277	0.49	46076	16.9776	2.1	0.73731	3.3	0.090828	2.6	0.781	0.058	560.4	13.8	560.8	14.2	562.4	45
217	289	0.51	33292	17.2742	2.7	0.70023	4.2	0.087767	3.2	0.756	-0.54	542.3	16.5	538.9	17.5	524.6	60.2
218	226	0.61	23951	17.1366	3.1	0.7052	4.2	0.087687	2.8	0.665	0.0053	541.8	14.4	541.9	17.5	542.1	68
222	154	0.56	10138	17.5192	3.1	0.69236	5.3	0.088011	4.3	0.811	-1.4	543.8	22.2	534.2	21.8	493.6	67.9
224	285	1.14	94692	17.1541	2.4	0.70337	4.1	0.087548	3.3	0.809	-0.032	541	17.3	540.8	17.2	539.9	52.8
225	264	0.78	22662	17.3268	2.6	0.69927	3.8	0.087914	2.8	0.724	-0.77	543.2	14.3	538.4	15.9	517.9	57.5
226	246	0.74	159272	16.9253	2.1	0.70473	3.1	0.086547	2.2	0.722	1.1	535.1	11.5	541.6	13	569.2	46.7
227	361	0.91	21129	16.5848	2.7	0.73442	4.1	0.088379	3.1	0.746	2.1	545.9	16.1	559.1	17.7	613.2	59.4
228	153	0.62	48597	17.0297	3.7	0.72788	5.2	0.089942	3.6	0.698	0.023	555.2	19.3	555.3	22.2	555.8	81.3
229	165	0.63	17617	17.4608	3.3	0.71157	4.8	0.090152	3.5	0.724	-1.7	556.4	18.5	545.7	20.2	501	72.7
230	180	0.46	22945	16.9549	3.5	0.72257	5.1	0.088893	3.7	0.719	0.52	549	19.2	552.2	21.6	565.4	76.8
231	390	0.64	45378	17.1673	2.3	0.70746	4.8	0.088125	4.1	0.872	-0.18	544.4	21.6	543.2	20	538.2	50.9
232	166	0.60	23820	17.0633	2.9	0.72595	4.7	0.08988	3.8	0.798	-0.093	554.8	20.1	554.2	20.3	551.5	62.3
233	410	0.72	106657	16.8687	2.7	0.72301	4.1	0.088496	3.1	0.757	0.92	546.6	16.4	552.4	17.6	576.5	58.8
234	290	0.53	164212	16.8974	2.8	0.73763	4.6	0.090438	3.7	0.79	0.43	558.1	19.6	561	20	572.8	61.8
235	355	0.68	46898	16.9011	2.4	0.72148	3.5	0.088477	2.5	0.713	0.83	546.5	12.9	551.5	14.7	572.3	52.6
237	221	0.53	15433	17.0566	4	0.71719	5.5	0.088761	3.7	0.676	0.14	548.2	19.5	549	23.2	552.3	88
238	64	0.66	22629	16.747	4.4	0.73405	6.7	0.089198	5.1	0.755	1.3	550.8	26.8	558.9	28.9	592.2	95.5
239	311	0.57	268006	17.2731	1.9	0.68476	3.8	0.085823	3.3	0.86	-0.17	530.8	16.8	529.6	15.8	524.7	42.7
240	216	0.32	46964	17.1753	5.1	0.71475	7.8	0.089074	6	0.761	-0.38	550.1	31.4	547.6	33.1	537.2	111.1
241	129	0.32	54019	17.1793	3.2	0.70636	4.4	0.088049	3.1	0.689	-0.23	544	16	542.6	18.7	536.7	70.5
242	537	0.65	654212	17.0572	1.8	0.71776	3	0.088834	2.5	0.805	0.11	548.6	12.9	549.3	12.9	552.3	39.4
244	175	0.66	12624	17.3518	3.4	0.68703	4.6	0.0865	3.1	0.665	-0.65	534.8	15.7	531	19	514.7	75.4
245	361	0.41	29509	16.798	2.6	0.68392	3.3	0.08336	2.1	0.635	2.4	516.1	10.5	529.1	13.8	585.6	56.1
247	146	0.70	56437	17.051	2.5	0.70081	4.1	0.086704	3.3	0.797	0.51	536	17	539.3	17.3	553	54.5
248	98	0.37	55375	16.5058	7.2	0.78333	8.1	0.093815	3.8	0.469	1.6	578.1	21.1	587.4	36.3	623.5	155.1
249	191	0.34	11467	17.4137	3.5	0.7087	4.6	0.089546	2.9	0.634	-1.5	552.9	15.4	544	19.3	506.9	78
250	388	0.65	61671	16.9161	1.9	0.70003	3.5	0.085923	2.9	0.834	1.1	531.4	14.8	538.8	14.5	570.4	41.7
252	209	0.66	18452	16.7406	3.7	0.72887	5	0.088536	3.3	0.674	1.6	546.9	17.6	555.9	21.3	593	79.6
253	255	0.59	46130	17.0168	2.3	0.69283	3.6	0.085546	2.7	0.756	0.88	529.1	13.8	534.5	14.9	557.4	51.2
254	439	0.83	1275725	16.6855	4.2	0.67873	4.9	0.082173	2.6	0.526	3.3	509.1	12.6	526	20.1	600.1	90.4
255	224	0.53	28290	17.172	2.8	0.69613	4.7	0.086737	3.7	0.796	0.036	536.2	19.1	536.5	19.5	537.6	61.9
256	550	0.60	313312	16.8623	1.8	0.72296	3.4	0.088456	2.8	0.842	0.9	546.4	14.8	552.4	14.3	577.3	39.5
257	454	0.46	32902	16.9085	2.3	0.71985	3.1	0.088317	2	0.661	0.87	545.6	10.6	550.6	13	571.4	50.1
258	360	0.39	140808	16.9295	2.1	0.69588	3.6	0.085482	2.9	0.817	1.2	528.8	14.8	536.3	14.9	568.7	44.9
259	301	0.52	64353	17.1701	2.7	0.72064	4.6	0.089782	3.8	0.814	-0.47	554.2	20.1	551	19.7	537.8	59
260	221	0.69	17563	17.281	2.6	0.67224	4	0.084292	3	0.755	0.062	521.7	15.2	522.1	16.4	523.7	57.9
261	606	0.63	205905	17.1614	2.5	0.72177	4.8	0.089877	4.1	0.856	-0.45	554.8	21.7	551.7	20.3	538.9	53.9
262	206	0.51	34699	17.1479	2.7	0.70042	5.2	0.087149	4.4	0.856	0.055	538.7	23	539	21.7	540.7	58.7
263	190	0.36	28493	16.7465	2.6	0.73215	4.7	0.088965	3.9	0.834	1.2	549.4	20.6	557.8	20.1	592.3	56
264	279	0.70	152619	16.8396	2.4	0.71637	3.8	0.087531	2.9	0.771	1.2	540.9	15.2	548.5	16.1	580.2	52.6
265	241	0.56	206622	17.0468	2.7	0.70185	3.6	0.086812	2.4	0.662	0.57	536.7	12.3	539.9	15.2	553.6	59.2
266	216	0.66	367456	16.9331	2.4	0.70632	4.6	0.086783	3.9	0.85	0.91	536.5	20.3	542.6	19.5	568.2	53.2
267	249	0.62	80092	16.9953	2.3	0.71969	3.9	0.08875	3.2	0.81	0.35	548.1	16.7	550.5	16.7	560.2	50.1
268	169	0.52	128064	17.3213	2.3	0.69732	4.9	0.087641	4.3	0.882	-0.66	541.6	22.3	537.2	20.3	518.6	50.4
269	223	0.60	151913	16.9715	2.3	0.70497	4	0.086814	3.3	0.827	0.78	536.7	17.1	541.8	16.9	563.2	49.1
271	155	0.62	302138	16.8641	3.9	0.74173	5	0.090762	3.1	0.615	0.57	560	16.5	563.4	21.7	577.1	85.9
273	158	0.58	46759	17.1182	2.5	0.70294	3.5	0.087311	2.4	0.686	0.16	539.6	12.4	540.5	14.7	544.5	55.8
274	518	0.67	23544	17.2959	1.8	0.72359	3.3	0.090809	2.8	0.845	-1.1	560.3	15	552.8	14.1	521.8	38.8
276	164	0.33	56939	17.1317	2.6	0.72365	4.2	0.089954	3.3	0.794	-0.36	555.3	17.8	552.8	18	542.7	56.1
277	185	0.52	15241	17.5625	3.4	0.68544	5.1	0.087347	3.9	0.756	-1.6	539.8	20	530.1	21.2	488.2	74.1
278	166	0.61	10753	15.9768	5	0.79619	5.3	0.0923	1.9	0.365	4.6	569.1	10.6	594.7	24.1	693.4	106.1
280	152	0.65	25152	17.2181	3.6	0.70262	4.9	0.087781	3.4	0.69	-0.34	542.4	17.7	540.4	20.7	531.8	78.3
282	58	0.43	14093	17.3007	4.9	0.73224	7.6	0.09192	5.8	0.762	-1.4	566.9	31.4	557.9	32.5	521.2	107.6
283	269	0.69	46830	17.402	2.3	0.68057	3.7	0.085934	2.9	0.776	-0.68	531.4	14.7	527.1	15.3	508.4	51.6
284	333	0.36	26353	16.8471	2.6	0.70268	4	0.085897	3.1	0.77	1.5	531.2	15.7	540.4	16.8	579.2	55.5
285	352	0.50	146282	17.0763	2.4	0.69779	3.3	0.08646	2.2	0.679	0.51	534.6	11.5	537.5	13.8	549.8	53
286	192	0.78	42875	17.0492	2.6	0.68308	4.3	0.084503	3.4	0.79	0.92	522.9	16.9	528.6	17.5	553.3	57
287	479	0.65	50998	16.6063	1.6	0.73689	3.5	0.088791	3.1	0.893	1.8	548.4	16.4	560.6	15	610.4	33.9
288	376	0.94	36277	16.8399	2.7	0.7025	4.1	0.085838	3.1	0.753	1.5	530.9	15.8	540.3	17.2	580.2	58.8
290	370	0.46	64886	17.0009	2.1	0.71189	3.4	0.087817	2.6	0.778	0.52	542.6	13.7	545.9	14.3	559.5	46.3
291	126	0.34	56798	16.8686	2.8	0.73768	4.1	0.09029	3.1	0.744	0.59	557.3	16.4	561	17.8	576.5	59.9
292	344	0.61	33376	17.0396	2.4	0.73355	3.1	0.090695	2	0.651	-0.17	559.6	11	558.6	13.5	554.5	52.2
293	299	0.39	52737	17.1007	2.4	0.7051	4.5	0.087491	3.9	0.853	0.17	540.7	20.1	541.8	19	546.7	51.7
295	311	0.40	25577	17.1496	2.1	0.69661	3	0.086684	2.1	0.717	0.15	535.9	11	536.8	12.4	540.5	45.2
298	102	0.57	11238	17.4507	4.7	0.70441	6.3	0.089194	4.2	0.669	-1.6	550.8	22.3	541.4	26.5	502.3	103.5
299	158	0.54	59025	16.9121	2.3	0.72316	3.7	0.088742	2.9	0.793	0.69	548.1	15.5	552.5	15.8	570.9	49.2
301	440	0.52	52285	17.0135	1.9	0.71804	3.2	0.088642	2.6	0.806	0.3	547.5	13.7	549.5	13.8	557.9	41.9
302	184	0.64	16912	16.6504	3.9	0.7177	5.8	0.086708	4.3	0.738	2.2	536	22	549.3	24.6	604.7	84.8
304	191	0.56	30304	17.0949	2.7	0.6961	3.7	0.086344	2.5	0.681	0.45	533.9	12.8	536.5	15.3	547.5	58.8
308	259	0.68	12475	16.5402	5.1	0.74601	5.8	0.089532	2.7	0.467	2.4	552.8	14.4	565.9	25.2	619	110.8
309	203	0.42	36977	17.2899	2.1	0.70125	3.7	0.087975	3	0.817	-0.61	543.6	15.7	539.5	15.4	522.6	46.6
314	198	0.43	214680	16.7683	2.9	0.72812	3.8	0.08859	2.5	0.656	1.4	547.2	13	555.4	16.2	589.5	62
315	837	0.68	136494	17.1206	2.3	0.69692	3.5	0.086577	2.6	0.749	0.27	535.3	13.6	537	14.7	544.2	51.1
316	204	0.63	25957	17.2402	2.7	0.69828	4.5	0.087351	3.6	0.799	-0.32	539.8	18.6	537.8	18.7	528.9	59.1
317	439	0.51	137300	17.1256	1.8	0.69913	3.3	0.086876	2.7	0.823	0.18	537	13.8	538.3	13.6	543.5	40.4
318	458	0.47	57153	17.2224	2	0.69041	3.3	0.086277	2.7	0.799	-0.07	533.5	13.7	533	13.9	531.2	44.1
319	330	0.50	22110	17.3192	2.8	0.69072	4.5	0.0868	3.5	0.781	-0.53	536.6	18	533.2	18.6	518.9	61.5
321	254	0.57	20585	17.3654	3.2	0.69659	6.1	0.087772	5.2	0.853	-0.83	542.3	27	536.8	25.4	513.1	69.8
323	251	0.55	52365	17.0938	1.8	0.70507	4.2	0.087452	3.8	0.905	0.23	540.4	19.8	541.8	17.7	547.6	39.1
324	301	0.56	896726	16.9495	2.1	0.72564	3.3	0.089243	2.5	0.775	0.46	551.1	13.4	554	14	566.1	45.3
326	206	0.55	35708	16.8562	2.4	0.71145	4.1	0.087016	3.3	0.815	1.2	537.9	17.2	545.6	17.3	578.1	51.7
327	219	0.66	53807	17.1103	2.2	0.72047	3.8	0.089447	3.1	0.825	-0.2	552.3	16.6	550.9	16.2	545.5	47
328	280	0.65	405260	17.0661	2.5	0.70031	4.6	0.08672	3.9	0.842	0.43	536.1	20	539	19.3	551.1	54.3
329	74	0.49	22929	17.146	3.1	0.72293	4.7	0.08994	3.6	0.755	-0.43	555.2	19.1	552.4	20.2	540.9	68
331	306	0.58	97637	16.9168	2.2	0.71267	3.2	0.087478	2.4	0.738	0.93	540.6	12.4	546.3	13.7	570.3	47.5
332	278	0.45	261080	17.1351	1.8	0.69279	2.9	0.086136	2.2	0.777	0.3	532.6	11.5	534.5	12	542.3	39.9
333	210	0.56	58742	17.1649	3.6	0.70942	5.7	0.088356	4.4	0.779	-0.23	545.8	23.1	544.4	23.9	538.5	77.8
334	164	0.42	55480	17.1066	3.3	0.71431	5.1	0.088664	3.8	0.753	-0.05	547.6	20	547.3	21.4	545.9	72.6
335	245	0.69	33074	17.1302	2.4	0.70128	5.9	0.087167	5.4	0.914	0.13	538.8	27.9	539.6	24.7	542.9	52.3

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
336	432	0.74	76642	17.1584	2.5	0.69858	4.4	0.086974	3.6	0.826	0.056	537.6	18.8	537.9	18.4	539.4	54.4
337	175	0.46	35451	17.0962	3	0.70921	4.4	0.087976	3.2	0.736	0.11	543.6	16.7	544.3	18.4	547.3	64.5
338	135	0.47	20729	17.3537	2.3	0.72382	3.6	0.091141	2.8	0.769	-1.4	562.3	15	552.9	15.5	514.5	51
339	324	0.48	34319	17.0212	2.2	0.71143	3.8	0.087865	3.1	0.824	0.4	542.9	16.4	545.6	16.1	556.9	47.1
340	201	0.36	448350	17.105	2.6	0.71393	6.1	0.088608	5.5	0.907	-0.041	547.3	28.9	547.1	25.6	546.1	55.8
341	122	0.57	59432	16.9199	2.8	0.72507	4.4	0.089017	3.3	0.76	0.63	549.7	17.4	553.7	18.6	569.9	61.6
342	341	0.45	750936	17.1004	1.9	0.71188	3.3	0.08833	2.7	0.823	0.033	545.7	14	545.9	13.8	546.7	40.5
343	206	0.45	39895	17.2451	2.4	0.72017	3.4	0.090114	2.5	0.723	-0.85	556.2	13.2	550.8	14.5	528.3	51.7
344	50	0.57	16131	17.3868	4.7	0.69275	6.7	0.087396	4.8	0.717	-0.94	540.1	24.9	534.5	27.8	510.3	102.5
345	284	0.50	80314	17.024	2.1	0.6972	3.5	0.086121	2.8	0.801	0.72	532.6	14.2	537.1	14.5	556.5	45.2
347	118	0.37	67341	16.9579	3.2	0.72238	5.2	0.088886	4.1	0.794	0.48	548.9	21.8	552.1	22.2	565	68.9
348	241	0.67	26562	17.1609	2.2	0.70161	4	0.087363	3.4	0.838	-0.024	539.9	17.6	539.8	16.9	539	48.3
350	94	0.55	37992	16.9246	3.1	0.68559	4.5	0.084193	3.2	0.719	1.6	521.1	16.1	530.1	18.5	569.3	67.5
352	297	0.37	34731	17.0802	2	0.70661	3.3	0.087572	2.6	0.79	0.25	541.2	13.4	542.7	13.7	549.3	43.7
353	435	0.56	435659	17.0537	1.7	0.70222	2.9	0.086893	2.3	0.804	0.47	537.1	12	540.1	12.2	552.7	37.6
354	151	0.45	22406	17.2568	3.2	0.7017	4.9	0.087864	3.7	0.76	-0.49	542.9	19.4	539.8	20.5	526.8	69.8
355	108	0.53	24968	17.189	3.9	0.68889	5.7	0.08592	4.1	0.727	0.13	531.4	21	532.1	23.4	535.5	85
356	319	0.45	36446	16.7846	2.1	0.72479	3.1	0.088271	2.3	0.747	1.3	545.3	12.1	553.5	13.2	587.3	44.5
358	211	0.56	15547	17.283	3.4	0.71191	4.2	0.089277	2.4	0.579	-0.96	551.3	12.8	545.9	17.7	523.5	75
359	146	0.34	24793	17.124	3.2	0.72643	4.4	0.09026	3	0.688	-0.44	557.1	16	554.5	18.6	543.7	69.2
360	145	0.68	85816	17.1614	2.6	0.72051	5.3	0.08972	4.6	0.867	-0.43	553.9	24.3	551	22.4	538.9	57.5
361	222	0.53	25395	16.9401	2.6	0.69975	4.1	0.086011	3.1	0.761	1.1	531.9	15.8	538.6	17	567.3	57.5
362	367	0.58	248148	17.0013	1.9	0.69907	3	0.086237	2.3	0.777	0.81	533.2	11.8	538.2	12.3	559.4	40.5
365	262	0.50	82945	17.1275	2.1	0.70962	2.9	0.088189	2	0.696	-0.053	544.8	10.6	544.5	12.3	543.3	45.7
366	341	0.53	20639	17.218	2.3	0.69478	3.9	0.086801	3.1	0.806	-0.14	536.6	16.1	535.7	16.1	531.8	50.2
368	325	0.71	55067	16.6254	2.6	0.72854	3.5	0.087886	2.2	0.649	2.2	543	11.7	555.7	14.8	607.9	57
369	118	0.38	31028	17.0017	3	0.73286	4.8	0.090409	3.8	0.784	0.044	558	20.2	558.2	20.7	559.4	65.3
370	311	0.36	176772	17.0831	2.3	0.72405	3.2	0.089749	2.2	0.688	-0.16	554.1	11.8	553.1	13.8	549	51.3
371	279	0.65	189133	17.058	2	0.7199	2.9	0.089104	2.2	0.735	0.062	550.2	11.4	550.6	12.5	552.2	43.6
373	177	0.34	592871	16.7441	2.6	0.73255	3.5	0.089	2.4	0.684	1.4	549.6	12.7	558	15.1	592.6	55.5
374	235	0.55	203697	16.9684	2.3	0.73762	3.7	0.090817	2.9	0.783	0.093	560.4	15.4	561	15.8	563.6	49.8
375	276	0.48	24853	17.1872	2.6	0.72667	3.6	0.090623	2.5	0.686	-0.74	559.2	13.2	554.6	15.4	535.7	57.3
377	414	0.52	135250	17.1011	2.2	0.69827	3.2	0.086645	2.3	0.733	0.35	535.7	12	537.8	13.3	546.6	47.6
378	236	0.54	19481	17.2124	2.7	0.70492	3.8	0.088038	2.6	0.703	-0.38	543.9	13.8	541.7	15.8	532.4	58.5
379	370	0.46	63234	17.1537	1.8	0.68789	3.5	0.085619	3	0.862	0.3	529.6	15.3	531.5	14.4	539.9	38.7
380	233	0.38	42166	17.2054	2.4	0.69395	3.4	0.086634	2.3	0.7	-0.065	535.6	12.1	535.2	14	533.3	52.5
381	340	0.53	17706	17.3156	2.1	0.70642	3.3	0.088755	2.6	0.785	-0.86	548.2	13.8	542.6	14.1	519.3	45.5
383	271	0.65	108610	17.2357	2.1	0.69834	3.5	0.087335	2.8	0.798	-0.31	539.8	14.4	537.8	14.6	529.5	46.1
384	339	0.44	76939	17.1729	2.1	0.72896	4.7	0.090833	4.2	0.893	-0.68	560.5	22.7	555.9	20.3	537.5	46.8
385	222	0.59	38003	17.1327	2	0.70369	3.3	0.087478	2.6	0.797	0.06	540.6	13.6	541	13.8	542.6	43.5
386	142	0.46	45633	16.9342	2.3	0.72577	4.5	0.089178	3.9	0.862	0.49	550.7	20.3	554.1	19.1	568.1	49.3
387	190	0.67	77996	17.2384	2.8	0.68545	4.8	0.085736	3.8	0.807	-0.031	530.3	19.5	530.1	19.6	529.2	61.4
388	175	0.47	21343	17.2427	3	0.72265	3.7	0.090412	2.3	0.602	-0.96	558	12	552.2	15.9	528.6	65.5
390	190	0.38	24259	17.2663	2.8	0.71566	4	0.08966	2.8	0.713	-0.89	553.5	15	548.1	16.8	525.6	60.9
391	472	0.49	116493	17.3081	1.9	0.71459	2.9	0.089742	2.2	0.764	-1	554	11.8	547.5	12.3	520.3	41.1
392	271	0.51	42480	17.1914	1.8	0.72266	3.3	0.090144	2.8	0.835	-0.6	556.4	14.8	552.2	14.1	535.1	39.9
394	376	0.67	211287	16.9036	1.9	0.70281	3.9	0.086202	3.4	0.871	1.1	533	17.2	540.5	16.2	572	41.4
395	267	0.39	56161	17.2134	1.6	0.693	3.3	0.086555	2.9	0.872	-0.084	535.1	14.7	534.6	13.7	532.4	35.3
396	379	0.45	32878	17.2683	1.9	0.71488	3.1	0.089573	2.5	0.784	-0.8	553	13	547.6	13.2	525.4	42.6
397	154	0.61	26866	16.98	3.2	0.68409	7.3	0.084284	6.6	0.899	1.2	521.6	33	529.2	30.2	562.1	69.8
399	139	0.70	43562	17.0158	2.5	0.70054	3.8	0.086493	2.9	0.749	0.7	534.8	14.7	539.1	16	557.6	55.1
401	826	0.68	1813976	17.0183	1.4	0.71782	2.7	0.088639	2.3	0.851	0.28	547.5	12	549.4	11.4	557.3	30.8
404	139	0.60	20851	17.0102	3.5	0.72614	4.2	0.089624	2.4	0.564	0.17	553.3	12.6	554.3	18	558.3	75.8
405	163	0.41	24621	17.0922	3	0.70929	3.9	0.087967	2.5	0.637	0.14	543.5	13	544.3	16.5	547.8	66
406	141	0.60	52771	17.2867	2.4	0.72067	4.1	0.090394	3.3	0.815	-1	557.9	17.7	551.1	17.3	523	51.6
407	363	0.56	47908	17.1917	1.6	0.71186	2.9	0.088799	2.4	0.828	-0.38	548.4	12.4	545.9	12.1	535.1	35.1
408	220	0.51	31860	17.1092	3	0.72072	4.3	0.089473	3	0.705	-0.22	552.4	15.9	551.1	18.1	545.6	65.9
409	331	0.58	48107	16.8734	3	0.7135	4.8	0.087356	3.8	0.785	1.1	539.9	19.5	546.8	20.3	575.8	64.6
410	190	0.54	57728	16.9997	2.3	0.72535	4.3	0.089471	3.6	0.845	0.21	552.4	19.3	553.8	18.4	559.6	50.4
411	131	0.34	15618	17.1932	3.4	0.71254	4.6	0.088891	3.2	0.685	-0.45	549	16.7	546.3	19.5	534.9	73.8
412	109	0.54	67511	17.2537	3.5	0.70818	5.6	0.088659	4.3	0.772	-0.61	547.6	22.5	543.7	23.4	527.2	77.6
413	367	0.83	50169	17.2091	2	0.69707	2.6	0.087043	1.7	0.648	-0.16	538	8.8	537	10.9	532.9	43.7
414	133	0.39	450345	17.0641	2.8	0.74644	4.3	0.092421	3.2	0.749	-0.57	569.8	17.4	566.2	18.5	551.4	61.7
415	134	0.30	186650	17.1598	3	0.71448	5.5	0.08896	4.6	0.833	-0.29	549.4	24.1	547.4	23.2	539.2	66.3
416	154	0.57	64102	17.1046	3.8	0.71619	4.8	0.088886	2.9	0.614	-0.096	548.9	15.5	548.4	20.4	546.2	82.9
417	667	0.53	49077	17.1546	1.7	0.70395	2.4	0.087622	1.7	0.689	-0.044	541.5	8.6	541.1	10.1	539.8	38.2
419	398	0.58	44383	17.3587	1.9	0.68891	3.4	0.086771	2.9	0.827	-0.64	536.4	14.7	532.1	14.3	513.9	42.6
422	407	0.51	43849	17.1763	2.3	0.74938	4	0.093395	3.3	0.815	-1.1	575.6	18.1	567.9	17.6	537.1	51.2
423	177	0.33	11606	17.5427	2.8	0.69864	4.5	0.088929	3.5	0.783	-1.7	549.2	18.5	538	18.7	490.7	61.4
424	169	0.57	35877	17.321	3	0.7059	3.7	0.088718	2.2	0.599	-0.99	547.9	11.7	542.3	15.6	518.7	65.4
425	174	0.57	65760	17.4359	2.4	0.66144	4.2	0.083681	3.4	0.821	-0.41	518.1	17	515.5	16.8	504.1	52.3
426	284	0.41	117431	17.0564	2.6	0.72183	9.7	0.089334	9.4	0.963	0.045	551.6	49.7	551.7	41.5	552.3	57.1
427	254	0.40	79215	17.1245	2.3	0.71307	3	0.088602	2	0.668	-0.11	547.3	10.6	546.6	12.8	543.7	49.2
428	193	0.52	34487	17.1561	2.2	0.71931	3.8	0.089542	3.1	0.815	-0.38	552.8	16.5	550.3	16.2	539.7	48.3
429	311	0.96	96280	17.1018	2.1	0.71477	3.3	0.088695	2.6	0.78	-0.039	547.8	13.7	547.6	14.1	546.5	45.7
430	250	0.46	27777	17.3834	2.4	0.69672	3.8	0.087879	3	0.77	-0.95	543	15.4	536.8	16	510.8	53.8
431	258	0.68	394744	17.127	2.4	0.72478	3.4	0.09007	2.4	0.714	-0.4	556	13	553.5	14.6	543.3	52.5
432	150	0.31	48548	17.0879	3.3	0.73473	4.2	0.091098	2.7	0.628	-0.46	562	14.3	559.3	18.2	548.4	71.9
433	285	0.41	43239	17.2255	2.9	0.71685	4.9	0.089596	3.9	0.806	-0.65	553.2	20.9	548.8	20.7	530.8	63.3
434	362	0.53	140797	17.0705	2.3	0.70752	2.9	0.087634	1.7	0.583	0.31	541.5	8.6	543.3	12	550.6	50.6
435	273	0.56	180784	16.9435	1.8	0.7188	4.1	0.08837	3.7	0.893	0.62	545.9	19.2	550	17.5	566.9	40.2
436	71	0.30	10421	17.5485	5.2	0.68795	6.6	0.087598	4.1	0.623	-1.7	541.3	21.5	531.6	27.5	489.9	114.6
437	197	0.65	47012	17.0261	2.2	0.71104	4.1	0.087842	3.4	0.843	0.39	542.8	17.9	545.4	17.2	556.2	47.7
438	266	0.75	45455	16.5953	4.1	0.73056	4.8	0.08797	2.5	0.524	2.4	543.5	13.1	556.9	20.6	611.9	88.6
439	74	0.59	21270	17.1948	4.5	0.72057	6.2	0.089902	4.2	0.683	-0.65	555	22.5	551	26.3	534.7	99
440	169	0.34	293047	16.663	4	0.72201	5.2	0.087295	3.4	0.654	2.1	539.5	17.7	551.9	22.3	603.1	85.8
441	197	0.50	27602	17.0494	2.6	0.71777	4.7	0.088795	3.8	0.824	0.14	548.4	20.1	549.3	19.7	553.3	57.6
442	404	0.75	26893	17.1797	2.2	0.70697	3.6	0.088127	2.9	0.793	-0.23	544.5	14.9	542.9	15.1	536.6	47.8
444	214	0.63	22455	16.8377	2.6	0.72065	4.2	0.088045	3.3	0.786	1.1	544	17.2	551.1	17.8	580.5	56.3
445	168	0.56	10978	17.3282	4.4	0.6758	6	0.084969	4.1	0.685	-0.26	525.7	20.8	524.2	24.6	517.7	96.3
447	127	0.35	17563	17.3538	3.4	0.71776	4.6	0.090379	3.1	0.677	-1.4	557.8	16.6	549.3	19.4	514.5	74
449	261	0.67	31596	17.101	2.5	0.70583	3.7	0.087582	2.8	0.75	0.17	541.2	14.6	542.3	15.7	546.6	54.1
450	261	0.62	43029	16.8261	3.4	0.69196	4.2	0.084481	2.5	0.587	2.1	522.8	12.4	534	17.5	582	74.2
451	168	0.42	27678	17.0809	2.8	0.72405	4.3	0.089737	3.3	0.771	-0.14	554	17.8	553.1	18.5	549.2	60.3
452	99	0.53	30175	17.2449	3.5	0.74463	4.2	0.093174	2.5	0.583	-1.5	574.3	13.6	565.1	18.4	528.3	75.7
453	320	0.67	29477	16.8012	4	0.72813	6.3	0.088766	4.9	0.774	1.1	548.2	25.8	555.5	27.2	585.2	87.3
454	125	0.47	16727	17.2318	3.7	0.75443	4.9	0.094329	3.3	0.664	-1.6	581.1	18.2	570.8	21.6	530	80.8
455	199	0.81	23459	17.1255	2.5	0.68079	5.2	0.084596	4.6	0.877	0.57	523.5	23	527.2	21.5	543.5	54.9
456	237	0.67	25873	17.009	3	0.70932	4.1	0.087542	2.8	0.68	0.57	541	14.3	544.3	17.1	558.5	64.8
457	291	0.68	31989	17.054	3	0.69547	4.1	0.08606	2.8	0.687	0.68	532.2	14.2	536.1	16.9	552.7	64.4
459	182	0.47	97057	17.1051	2.3	0.71449	4	0.088678	3.3	0.826	-0.046	547.7	17.5	547.4	17.1	546.1	49.8
461	463	0.55	49699	17.2269	1.9	0.70752	2.9	0.088439	2.3	0.77	-0.47	546.3	11.8	543.3	12.3	530.6	40.8
462	202	0.45	47395	17.3058	2.9	0.69356	4	0.08709	2.8	0.698	-0.56	538.3	14.6	534.9	16.8	520.6	63.6
463	138	0.63	47146	16.97	2.8	0.68166	4.6	0.083935	3.7	0.791	1.3	519.6	18.2	527.8	19	563.4	61.7

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb^{a}$	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
464	106	0.55	15518	17.2617	3	0.70347	4.5	0.088109	3.3	0.737	-0.56	544.3	17.3	540.9	18.9	526.2	66.7
465	292	0.63	94600	17.0583	2.8	0.70939	4.7	0.087804	3.8	0.809	0.29	542.5	19.9	544.4	19.9	552.1	60.8
467	211	0.53	433882	16.897	2.6	0.7176	4.9	0.087981	4.2	0.851	0.83	543.6	21.9	549.3	20.9	572.8	56.4
469	236	0.63	133478	17.2332	2.5	0.70648	3.9	0.08834	3	0.769	-0.48	545.7	15.6	542.7	16.3	529.8	54.5
470	376	0.71	61084	17.2506	1.8	0.68996	3.4	0.086361	2.9	0.852	-0.18	534	14.9	532.8	14.2	527.6	39.2
471	230	0.50	21496	16.8612	3	0.70768	4.5	0.086581	3.4	0.755	1.3	535.3	17.4	543.4	18.9	577.4	64.1
472	87	0.66	10533	17.2795	4.2	0.69143	5.8	0.086692	4.1	0.698	-0.38	535.9	21	533.7	24.2	523.9	91.7
473	223	0.53	250521	16.9101	2.9	0.67916	7.7	0.083332	7.1	0.927	1.9	516	35.4	526.3	31.6	571.1	62.8
474	179	0.48	76449	17.0908	2.5	0.71628	3.4	0.088826	2.4	0.695	-0.022	548.6	12.6	548.5	14.6	548	54.1
475	202	0.51	47247	17.1161	3.1	0.7177	4.7	0.089134	3.5	0.747	-0.17	550.4	18.3	549.3	19.7	544.7	67.6
477	139	0.42	21336	16.9584	3.2	0.70344	4.6	0.086558	3.3	0.717	0.95	535.1	17	540.8	19.3	564.9	69.8
478	151	0.52	47628	17.1515	2.8	0.70612	4.7	0.087877	3.8	0.801	-0.085	543	19.6	542.4	19.7	540.2	61.4
479	303	0.40	53405	17.0711	2.1	0.71468	3.2	0.088525	2.4	0.767	0.11	546.8	12.8	547.5	13.5	550.5	44.7
480	201	0.38	34071	16.8116	2.5	0.6973	4	0.08506	3.2	0.779	1.7	526.3	15.9	537.2	16.9	583.9	55
481	241	0.53	21092	17.1769	3.2	0.70008	4.3	0.087254	2.9	0.671	-0.069	539.3	14.8	538.8	17.8	537	69.2
482	217	0.55	20362	17.3158	2.6	0.70697	4.3	0.088825	3.4	0.794	-0.86	548.6	18	542.9	18.2	519.3	57.6
483	304	0.61	64477	17.108	1.9	0.70244	2.8	0.087197	2	0.709	0.21	538.9	10.1	540.2	11.6	545.7	42.6
485	206	0.54	26504	16.9363	4.6	0.70952	6.3	0.087192	4.2	0.677	0.96	538.9	21.9	544.5	26.4	567.8	100.4
486	203	0.44	145454	16.9784	3	0.73494	4.7	0.09054	3.6	0.77	0.11	558.7	19.4	559.4	20.2	562.3	65.4
487	369	0.50	32631	16.9176	2.6	0.68562	3.9	0.084162	3	0.76	1.5	520.9	15	530.2	16.3	570.2	55.7
490	250	0.61	102788	16.9643	2.3	0.72959	4.6	0.089806	3.9	0.861	0.28	554.4	20.9	556.3	19.6	564.2	50.6
491	345	0.58	90723	17.012	1.8	0.72814	5	0.08988	4.7	0.933	0.12	554.8	24.8	555.5	21.4	558	39.2
492	103	0.51	27387	16.9716	2.9	0.70583	4.1	0.08692	2.8	0.693	0.85	537.3	14.5	542.3	17.1	563.2	63.9
493	189	0.51	22206	17.0417	2.6	0.70061	4.4	0.086633	3.5	0.806	0.56	535.6	18.2	539.2	18.4	554.2	56.6
495	341	0.47	52264	17.0646	2	0.69703	3.6	0.086306	3	0.826	0.5	533.7	15.3	537	15.1	551.3	44.5
496	154	0.64	47871	17.1622	2.3	0.72743	4	0.090586	3.2	0.808	-0.59	559	17.2	555	17	538.8	51.2
497	143	0.63	29638	17.118	3.3	0.68868	5.1	0.085539	3.9	0.763	0.47	529.1	19.7	532	21	544.5	71.9
500	112	0.50	28730	16.3061	4	0.80629	5.8	0.095397	4.1	0.714	2	587.4	23.1	600.4	26.1	649.8	86.7
502	229	0.55	51824	17.3295	1.7	0.67749	3.2	0.085188	2.6	0.836	-0.28	527	13.4	525.3	13	517.6	38.1
503	213	0.48	59038	17.1039	2.2	0.68702	3.4	0.085263	2.6	0.768	0.58	527.5	13.4	531	14.2	546.3	48.1
504	472	0.63	84718	17.1071	1.1	0.6944	2.4	0.086194	2.1	0.887	0.37	533	11	535.4	10.1	545.9	24.4
505	209	0.46	21089	17.1603	2.9	0.70154	4.3	0.087352	3.2	0.74	-0.026	539.9	16.3	539.7	17.8	539.1	62.6
506	462	0.54	40060	17.0429	1.8	0.69253	4.3	0.08564	3.9	0.91	0.75	529.7	19.8	534.3	17.8	554.1	38.8
508	194	0.45	172073	16.9104	2.7	0.72741	3.9	0.089254	2.9	0.728	0.62	551.1	15.1	555	16.8	571.1	58.4
511	507	0.53	214609	17.0579	1.6	0.68904	2.6	0.085283	2	0.785	0.76	527.6	10.4	532.2	10.8	552.2	35.4
512	481	0.54	87966	17.132	2.4	0.7032	3.3	0.087414	2.4	0.706	0.082	540.2	12.2	540.7	14	542.7	51.7
514	243	0.40	25458	17.3455	2.5	0.68758	3.7	0.086537	2.7	0.735	-0.61	535	13.9	531.3	15.2	515.6	54.7
515	100	0.50	24051	17.3848	4.2	0.70573	5.1	0.089023	2.8	0.546	-1.3	549.8	14.6	542.2	21.3	510.6	93.2
516	291	0.46	25891	17.2969	2.5	0.75425	3.6	0.094663	2.6	0.723	-1.9	583.1	14.6	570.7	15.8	521.7	54.7
517	191	0.40	67268	17.0433	2.5	0.71828	4.2	0.088826	3.3	0.801	0.16	548.6	17.6	549.7	17.7	554	54.6
518	336	0.45	19301	17.1952	3.1	0.66916	4	0.08349	2.6	0.631	0.59	516.9	12.7	520.2	16.5	534.7	68.7
519	149	0.34	39131	17.3857	2.5	0.69628	4.4	0.087835	3.6	0.82	-0.93	542.7	18.9	536.6	18.5	510.5	55.9
522	176	0.55	19414	17.194	3.4	0.67717	6.3	0.084483	5.3	0.841	0.35	522.8	26.5	525.1	25.7	534.8	74.4
524	270	0.48	64508	17.3406	2.1	0.7169	3.2	0.090202	2.5	0.767	-1.2	556.7	13.1	548.8	13.6	516.2	45.1
525	127	0.53	15799	17.2771	3.4	0.72677	4.6	0.091109	3.1	0.672	-1.2	562.1	16.7	554.7	19.8	524.2	75
526	140	0.69	42307	16.936	3.1	0.72429	4.5	0.089006	3.2	0.71	0.58	549.7	16.7	553.2	19	567.8	68.4
527	168	0.52	127411	16.8208	3.4	0.71816	5.1	0.087652	3.9	0.755	1.3	541.6	20	549.6	21.7	582.6	72.9
529	233	0.47	57935	17.0908	3	0.69205	6.3	0.085821	5.5	0.879	0.5	530.8	28.3	534	26.2	548	65.8
530	152	0.58	20995	16.6457	3.3	0.72631	7.3	0.087724	6.5	0.894	1.8	542.1	33.7	554.4	31	605.3	70.4
531	235	0.47	132939	16.8907	2.8	0.77487	4.1	0.094967	2.9	0.718	-0.36	584.8	16.3	582.6	18	573.7	61.4
532	350	0.47	49374	17.2209	1.8	0.71644	3.3	0.089522	2.7	0.83	-0.61	552.7	14.4	548.6	13.9	531.4	40.1
535	138	0.51	51653	17.4595	2.7	0.69044	4.4	0.087468	3.5	0.799	-1.2	540.5	18.3	533.1	18.4	501.2	58.6
536	164	0.50	104524	16.8074	2.7	0.70208	4.3	0.085621	3.4	0.787	1.7	529.6	17.3	540	18.1	584.4	57.8
537	183	0.62	29929	17.1977	2.8	0.71045	4.7	0.088653	3.7	0.791	-0.38	547.6	19.3	545	19.6	534.3	62.4
539	212	0.48	691218	17.1826	2.9	0.70038	4.5	0.08732	3.4	0.76	-0.1	539.7	17.8	539	18.9	536.3	64.4
540	875	0.59	379368	17.0735	1.6	0.71026	3	0.08799	2.6	0.858	0.19	543.6	13.5	544.9	12.8	550.2	33.9
542	379	0.56	52419	17.1574	3.1	0.69921	5.5	0.087047	4.6	0.831	0.037	538	23.6	538.3	23	539.5	67
543	191	0.43	578602	16.819	2.5	0.72086	3.7	0.087972	2.7	0.743	1.3	543.5	14.3	551.2	15.7	582.9	53.8
545	219	0.53	17416	17.1687	2.8	0.70122	4.2	0.087354	3.2	0.753	-0.054	539.9	16.6	539.5	17.8	538.1	61.1
547	293	0.52	58828	17.2934	1.9	0.70302	3.6	0.088214	3.1	0.854	-0.64	545	16.1	540.6	15.2	522.2	41.4
548	245	0.47	108342	17.0674	2.8	0.71201	4.8	0.088176	3.9	0.816	0.18	544.7	20.5	545.9	20.3	551	60.8
549	296	0.50	81236	16.7568	2	0.76549	3.5	0.093073	2.9	0.814	0.5	573.7	15.7	577.2	15.5	590.9	44.2
551	438	0.60	52518	16.9207	2.7	0.71419	3.5	0.087685	2.3	0.645	0.93	541.8	11.7	547.2	14.8	569.8	58.1
552	220	0.36	14382	17.2688	3.3	0.69539	5	0.087133	3.8	0.763	-0.4	538.6	19.8	536	21	525.3	71.3
553	466	0.56	98734	17.1136	1.3	0.71306	2.5	0.088545	2.2	0.853	-0.055	546.9	11.3	546.6	10.7	545.1	28.8
554	174	0.58	49785	16.9105	3	0.70442	4.1	0.086433	2.8	0.683	1.2	534.4	14.3	541.4	17.2	571.1	65
555	132	0.67	30787	16.9892	3.3	0.71544	5.1	0.088195	3.8	0.758	0.5	544.9	20	548	21.4	561	71.8
556	159	0.78	46493	17.1762	2.7	0.70504	4.2	0.087869	3.2	0.764	-0.18	542.9	16.7	541.8	17.6	537.1	59.3
557	258	0.68	48413	17.1321	2.3	0.69738	3.3	0.086692	2.4	0.717	0.22	535.9	12.3	537.2	13.9	542.7	50.8
558	161	0.60	58649	17.2556	2.8	0.72271	4.9	0.090487	4	0.813	-0.91	558.4	21.2	552.3	20.8	527	62.3
559	149	0.49	29942	17.275	2.8	0.7235	4.1	0.090688	3	0.732	-1.1	559.6	16.2	552.7	17.6	524.5	61.8
562	199	0.64	14566	16.9711	3.3	0.73696	5	0.09075	3.7	0.746	0.11	560	19.9	560.6	21.4	563.3	72
563	253	0.36	21729	16.8286	3.1	0.71682	5.7	0.087529	4.8	0.839	1.2	540.9	24.7	548.8	24	581.6	66.9
564	156	0.63	35522	17.1974	2.9	0.72215	4.1	0.090112	2.8	0.69	-0.7	556.2	14.9	551.9	17.3	534.4	64.3
565	131	0.66	14063	17.3553	3.3	0.72274	4.2	0.091014	2.6	0.62	-1.6	561.5	14	552.3	17.9	514.3	72.5
567	259	0.64	38033	17.1449	2.5	0.72679	4.4	0.090414	3.6	0.815	-0.48	558	19	554.7	18.6	541	55.3
568	268	0.65	35180	17.292	2.8	0.68421	4.8	0.085847	4	0.819	-0.25	530.9	20.1	529.3	19.9	522.3	60.7
569	99	0.60	21430	17.3573	4	0.72124	5.3	0.090836	3.5	0.656	-1.5	560.5	18.7	551.4	22.7	514	88.4
570	158	0.40	44594	17.0809	3	0.72979	3.9	0.090449	2.5	0.648	-0.3	558.2	13.6	556.4	16.8	549.2	65.2
572	166	0.65	43590	16.6403	4	0.72508	5.2	0.087547	3.3	0.635	2.2	541	17.2	553.7	22.2	606	87
573	283	0.74	25031	17.231	3.3	0.70223	4.3	0.087798	2.7	0.631	-0.42	542.5	13.9	540.1	17.8	530.1	72.3
574	346	0.53	58012	16.4403	4.1	0.70188	5.3	0.083727	3.3	0.626	4	518.3	16.6	539.9	22.2	632.1	89.2
575	109	0.51	16701	16.8594	4	0.70512	5.6	0.086258	3.9	0.7	1.5	533.4	20.1	541.8	23.6	577.7	87.4
577	121	0.67	25732	16.7087	3.2	0.72733	4.2	0.08818	2.7	0.643	1.8	544.8	14.1	555	17.9	597.1	69.6
578	349	0.53	58530	16.9953	1.9	0.71214	3.1	0.087819	2.4	0.776	0.53	542.6	12.3	546	12.9	560.2	41.9
579	451	0.56	93061	17.1135	1.6	0.70659	2.9	0.08774	2.4	0.827	0.085	542.2	12.3	542.7	12	545.1	35
580	228	0.59	182259	17.0383	2.3	0.70656	5	0.087351	4.4	0.881	0.43	539.9	22.6	542.7	20.8	554.7	51.1
581	329	0.50	55186	16.8577	2.9	0.74927	4.2	0.091649	3.1	0.732	0.39	565.3	16.6	567.8	18.3	577.9	62.2
583	141	0.47	21346	17.3329	3.4	0.71094	4.7	0.089413	3.2	0.686	-1.1	552.1	17	545.3	19.8	517.1	74.9
584	128	0.42	85443	16.9464	3.9	0.68316	4.8	0.084003	2.7	0.565	1.6	520	13.4	528.7	19.6	566.5	85.6
585	306	0.37	24881	16.8662	2.9	0.71613	5.2	0.08764	4.4	0.831	1	541.6	22.6	548.4	22.2	576.8	63.4
586	155	0.48	18733	16.8195	5.6	0.70504	6.5	0.086045	3.4	0.514	1.8	532.1	17.2	541.8	27.5	582.8	121.9
587	119	0.57	12156	17.2271	4.3	0.69614	5.4	0.087017	3.2	0.596	-0.26	537.9	16.5	536.5	22.4	530.6	94.5
588	200	0.67	21597	17.0727	4	0.70121	4.6	0.086865	2.2	0.491	0.47	537	11.6	539.5	19.2	550.3	87.1
589	332	0.75	10843	16.7304	4.6	0.72231	5	0.087685	1.9	0.389	1.9	541.8	10.1	552	21.3	594.3	99.8
590	261	0.63	50642	17.0849	2.3	0.71224	3.1	0.088295	2	0.659	0.1	545.4	10.6	546.1	13	548.7	50.5
592	233	0.56	67334	17.1558	2.9	0.69989	4.3	0.087123	3.1	0.724	0.041	538.5	15.9	538.7	17.8	539.7	64.1
593	378	0.53	271184	16.3688	3.5	0.73993	5	0.087883	3.5	0.703	3.3	543	18.2	562.4	21.5	641.5	76
594	202	0.55	16989	16.9971	3.6	0.70541	4.6	0.086998	2.7	0.601	0.77	537.8	14.1	542	19.2	560	79.5
595	297	0.55	81725	17.0663	2	0.71978	2.7	0.089132	1.9	0.682	0.026	550.4	9.8	550.5	11.6	551.1	43.5
596	384	0.49	90706	16.9935	1.9	0.70777	2.7	0.087271	1.9	0.713	0.69	539.4	10.1	543.4	11.5	560.4	41.7
597	231	0.52	48830	17.2453	2.7	0.69672	4.8	0.087182	4	0.829	-0.3	538.8	20.5	536.8	20	528.3	58.8
598	208	0.69	33062	17.158	2.9	0.68292	4.6	0.085022	3.6	0.784	0.4	526	18.3	528.5	19.1	539.4	63
600	493	0.47	52409	16.9935	1.6	0.70257	2.8	0.08663	2.3	0.813	0.73	535.6	11.8	540.3	11.8	560.4	35.8

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb^{a}$	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
602	144	0.47	153751	17.4126	3.3	0.70785	4.9	0.089433	3.6	0.74	-1.4	552.2	19.3	543.5	20.8	507.1	73
603	310	0.68	26102	17.1703	2.6	0.73673	3.3	0.091787	1.9	0.593	-0.98	566.1	10.5	560.5	14.1	537.8	57.7
604	318	0.50	39267	17.0653	1.8	0.7129	3.1	0.088275	2.6	0.814	0.16	545.3	13.4	546.5	13.3	551.2	39.8
605	169	0.52	53908	16.9983	3	0.70089	4.4	0.086446	3.3	0.748	0.79	534.5	17.1	539.3	18.6	559.8	64.3
607	581	0.56	88080	16.9415	1.7	0.70307	2.6	0.086426	2	0.75	1	534.4	10	540.6	11	567.1	37.6
608	407	0.65	1125704	16.9777	2.1	0.70626	3.2	0.087004	2.5	0.758	0.75	537.8	12.7	542.5	13.6	562.4	46.1
610	148	0.49	35197	17.0136	2.6	0.70407	3.4	0.086917	2.3	0.668	0.68	537.3	11.8	541.2	14.4	557.9	55.8
611	107	0.49	13841	16.8259	3.7	0.68171	4.6	0.083229	2.9	0.615	2.3	515.4	14.1	527.8	19.1	582	79.4
612	154	0.51	18774	16.938	2.6	0.7081	5	0.087026	4.2	0.852	0.85	537.9	21.9	543.6	21	567.6	56.7
613	222	0.61	10690	16.0087	11	0.7855	13	0.091242	7	0.536	4.5	562.9	37.7	588.6	58.3	689.2	234.9
614	266	0.59	48663	16.8318	3.1	0.68897	4.6	0.084144	3.3	0.726	2	520.8	16.6	532.2	19	581.2	68.4
615	434	0.60	517731	17.0417	1.8	0.69204	2.7	0.085574	1.9	0.721	0.81	529.3	9.7	534	11	554.2	40.2
616	184	0.47	42223	17.2243	2.4	0.65434	4.9	0.081779	4.3	0.877	0.69	506.7	21	511.1	19.7	531	51.7
621	341	0.49	46474	17.0526	2.3	0.6955	4.3	0.086056	3.6	0.847	0.59	532.2	18.6	536.1	17.9	552.9	49.9
623	354	1.12	69930	17.2491	2.7	0.70308	4	0.087997	3	0.748	-0.49	543.7	15.6	540.6	16.8	527.8	58.4
624	310	0.00	16831	17.1896	2.3	0.70523	3.5	0.087961	2.6	0.747	-0.25	543.5	13.4	541.9	14.5	535.3	50.2
625	120	0.38	32095	16.9572	3.4	0.74282	5.1	0.091397	3.8	0.748	0.035	563.8	20.5	564	21.9	565.1	73.2
627	137	0.75	114876	17.2787	2.5	0.70476	4.2	0.088358	3.4	0.81	-0.63	545.8	17.8	541.6	17.6	524	53.9
628	95	0.54	23595	17.0238	4	0.72357	5.1	0.089377	3.2	0.619	0.16	551.9	16.8	552.8	21.9	556.6	88.2
629	136	0.48	27030	16.9644	2.7	0.71243	4.2	0.087695	3.2	0.768	0.68	541.9	16.6	546.2	17.6	564.1	58.2
630	237	0.60	22917	17.1953	3.4	0.7063	8	0.088124	7.2	0.904	-0.29	544.4	37.7	542.5	33.6	534.7	74.7
Sample 3834																	
1	1062	1.45	307770	16.1772	2	0.86817	3.8	0.101907	3.3	0.855	1.2	625.6	19.6	634.6	18.1	666.8	42.6
3	173	0.93	40776	17.3155	3.3	0.70173	5.6	0.088166	4.5	0.81	-0.74	544.7	23.6	539.8	23.4	519.3	71.8
4	158	0.79	31178	17.1108	2.7	0.72266	4.1	0.089722	3.1	0.761	-0.26	553.9	16.7	552.2	17.6	545.4	58.5
5	1188	0.43	5658734	16.817	1.8	0.73894	2.8	0.090168	2.2	0.78	0.8	556.5	11.7	561.8	12.2	583.1	38.3
7	275	0.88	423486	17.0194	2.3	0.70925	3.5	0.087587	2.6	0.753	0.49	541.2	13.6	544.3	14.6	557.1	49.9
9	140	0.65	323343	11.9391	2	2.5242	4	0.218669	3.4	0.862	0.34	1274.8	39.5	1279	28.8	1286.1	39.1
10	410	0.30	235854	15.3414	2.5	1.10402	4.4	0.122896	3.6	0.814	0.9	747.2	25.2	755.3	23.3	779.3	53.5
11	395	1.85	71579	16.6934	2.2	0.84515	3.3	0.10237	2.5	0.756	-0.87	628.3	15	622	15.4	599.1	46.8
11	301	0.93	224409	16.5254	1.8	0.8402	3.2	0.100746	2.6	0.828	0.06	618.8	15.5	619.3	14.7	621	38.5
12	105	1.39	64313	16.8858	3.3	0.68558	5.8	0.083999	4.8	0.823	1.6	519.9	23.9	530.1	24	574.3	71.8
13	409	0.24	199050	10.514	1.7	3.52183	3.4	0.268678	2.9	0.868	-0.15	1534.1	40	1532.1	26.7	1529.4	31.6
14	384	0.67	536354	9.4617	1.8	4.43713	3	0.304624	2.4	0.792	0.29	1714.2	35.5	1719.3	24.7	1725.5	33.4
15	487	0.13	113229	15.4923	2.2	1.0234	3.6	0.115042	2.8	0.782	1.7	702	18.6	715.6	18.4	758.7	47
16	353	1.82	98841	16.9202	3.4	0.69647	4.5	0.085508	3	0.661	1.4	528.9	15.2	536.7	18.9	569.8	74.1
17	133	1.22	28711	17.0861	3.1	0.69266	5.5	0.085873	4.6	0.832	0.51	531.1	23.5	534.4	23	548.6	67.3
18	931	0.51	113119	16.2095	2.3	0.85858	5.1	0.100982	4.6	0.893	1.3	620.2	27.1	629.3	24.1	662.5	49.6
20	491	0.81	509289	7.4434	1.9	7.26515	3.4	0.392382	2.8	0.818	0.56	2133.9	50	2144.5	30	2154.8	33.8
21	512	1.33	170182	16.5937	2.4	0.78922	3.5	0.095025	2.6	0.736	0.83	585.2	14.4	590.7	15.7	612.1	51.3
22	201	0.62	51679	17.0611	2.6	0.69665	4.4	0.086241	3.5	0.807	0.56	533.3	18.1	536.8	18.2	551.7	56.4
23	358	0.88	411480	17.2168	2.4	0.69577	3.4	0.086919	2.4	0.716	-0.17	537.3	12.5	536.3	14.1	531.9	51.8
24	212	0.88	30716	16.5744	3.6	0.84677	5.2	0.101835	3.7	0.711	-0.33	625.2	21.8	622.9	24	614.6	78.4
25	242	0.52	44723	17.1302	2.4	0.68848	5.2	0.085575	4.6	0.883	0.39	529.3	23.2	531.9	21.4	542.9	53.1
26	736	1.32	230980	16.1647	2	0.87604	2.8	0.102751	2.1	0.724	1.2	630.5	12.4	638.8	13.5	668.4	41.9
27	183	0.68	121280	16.8104	2.8	0.69311	4.5	0.084543	3.6	0.788	1.8	523.2	17.9	534.7	18.8	584	60.3
28	206	0.84	128531	16.6811	2.9	0.81256	4.5	0.09835	3.4	0.767	-0.12	604.7	19.8	603.9	20.4	600.7	62.2
29	67	0.84	19453	17.0303	6.3	0.69783	7.9	0.086232	4.8	0.6	0.77	533.2	24.3	537.5	33.1	555.7	138.4
30	569	0.78	654377	12.9028	2	1.97136	4.2	0.184562	3.7	0.882	1.4	1091.8	37	1105.8	28.1	1133.2	39.1
32	380	0.78	202579	17.0077	1.9	0.68608	3.3	0.084667	2.6	0.808	1.1	523.9	13.2	530.4	13.5	558.6	41.9
33	284	1.52	36626	17.3176	2.8	0.70274	4.3	0.088304	3.3	0.762	-0.79	545.5	17.2	540.4	18.1	519.1	61.6
34	1009	0.85	277603	17.0902	3.8	0.72158	7.2	0.089479	6	0.844	-0.13	552.5	32	551.6	30.5	548.1	83.8
35	485	0.46	185572	7.7404	2.8	6.45088	5.5	0.362307	4.7	0.856	2.8	1993.1	80.1	2039.2	48	2086.2	49.6
36	170	0.62	105028	17.1327	3	0.68588	5.9	0.085265	5.1	0.863	0.43	527.5	25.6	530.3	24.2	542.6	64.7
38	245	1.06	58045	17.1693	2.3	0.70336	4.2	0.087624	3.5	0.831	-0.097	541.5	18.1	540.8	17.5	537.9	50.8
39	534	0.58	46629	16.3535	3.7	0.7378	5	0.087548	3.4	0.673	3.5	541	17.6	561.1	21.7	643.5	80
40	113	0.91	26349	16.3839	4.7	0.8345	6	0.099205	3.8	0.63	0.99	609.7	22.1	616.1	27.8	639.5	100.5
41	177	0.78	33776	17.3151	3.5	0.6745	5	0.084742	3.6	0.715	-0.15	524.4	18	523.4	20.5	519.4	76.8
42	466	1.82	145073	16.4277	2	0.85537	3.2	0.101959	2.5	0.784	0.23	625.9	14.8	627.6	14.8	633.8	42.3
43	254	0.56	158931	16.9934	2.3	0.68867	4.7	0.084916	4.1	0.874	1	525.4	20.7	532	19.5	560.4	49.8
44	361	0.97	152831	17.0978	2.7	0.6974	4.1	0.08652	3	0.743	0.38	534.9	15.6	537.2	17.1	547	60
45	142	0.58	92478	7.7019	1.8	6.52484	6.2	0.36464	5.9	0.958	3.8	2004.1	101.9	2049.3	54.4	2095	31.3
46	421	0.20	3837558	7.9765	2.6	6.08066	7.4	0.351931	7	0.938	3.5	1943.8	116.8	1987.5	64.7	2033.2	45.4
49A	309	1.01	73509	16.5908	1.5	0.81389	3.9	0.097977	3.6	0.92	0.35	602.5	20.8	604.6	17.9	612.4	33.4
49B	727	0.53	162556	17.2197	1.5	0.69866	2.5	0.087294	2.1	0.808	-0.22	539.5	10.6	538	10.6	531.6	32.9
50	261	0.68	82806	17.2019	2.2	0.68245	4.3	0.085181	3.7	0.863	0.2	527	18.9	528.3	17.9	533.8	48
51A	361	1.00	79599	17.0661	2.1	0.69021	3.5	0.085469	2.8	0.8	0.67	528.7	14.2	532.9	14.5	551.1	45.7
51B	210	0.84	65144	16.4703	2.6	0.80793	4.2	0.096554	3.3	0.789	1	594.2	18.8	601.3	19.1	628.2	55.8
53	206	0.78	159421	17.1676	2.8	0.68987	6	0.085935	5.3	0.887	0.19	531.5	27	532.7	24.8	538.1	60.5
54	99	1.16	30561	17.1852	4.5	0.67135	9.1	0.083713	7.9	0.87	0.51	518.2	39.3	521.5	37	535.9	97.8
56	273	0.95	23455	17.3247	2.8	0.70067	4.5	0.088079	3.5	0.776	-0.78	544.2	18.2	539.2	18.8	518.2	62.3
57	496	0.03	131222	12.2115	1.6	2.40473	3.1	0.213074	2.7	0.861	-0.097	1245.2	30.4	1244	22.4	1242	31.1
60	374	0.62	231560	16.4528	1.9	0.86906	3.4	0.103749	2.9	0.829	-0.17	636.3	17.3	635.1	16.3	630.5	41.5
61	369	0.93	260840	17.0511	2.8	0.69534	3.8	0.086029	2.6	0.669	0.68	532	13.1	536	15.9	553	62
62	105	0.82	74174	17.0513	3.5	0.66992	8.5	0.082885	7.8	0.912	1.2	513.3	38.4	520.7	34.8	553	76.3
63	337	0.58	820739	7.6551	1.7	6.794	3.5	0.377375	3.1	0.874	1.3	2064	54	2084.9	31	2105.7	29.9
64	537	0.39	290995	12.7572	2	2.076	4.1	0.192166	3.6	0.874	0.72	1133.1	37.3	1140.9	28.2	1155.8	39.6
65	1027	1.47	206138	16.4931	2.2	0.809	3.9	0.096816	3.1	0.816	0.87	595.7	17.9	601.9	17.5	625.2	48
67	1085	0.26	163216	11.2297	2.5	2.99718	3	0.244216	1.6	0.539	-0.14	1408.6	20.2	1406.9	22.6	1404.4	47.8
68	167	0.80	91363	16.9577	3.6	0.7504	5	0.092332	3.4	0.678	-0.14	569.3	18.3	568.5	21.6	565	79.3
69	463	0.38	141391	15.8506	2.6	0.92946	8.8	0.106899	8.4	0.957	3.2	654.7	52.5	667.4	43.1	710.3	54.4
70	817	0.72	4372307	17.2709	1.9	0.68062	3.5	0.085294	3	0.848	-0.072	527.6	15	527.2	14.4	525	40.5
71	130	0.73	48911	15.5545	3.2	1.0582	4.8	0.119431	3.6	0.745	0.68	727.3	24.8	732.9	25.3	750.2	68.3
72	152	1.11	36285	16.1365	3.1	0.85426	4.5	0.100021	3.2	0.718	1.9	614.5	18.8	627	20.9	672.2	66.6
73	445	0.07	181726	8.114	1.2	6.33686	3.1	0.373082	2.9	0.92	-1.5	2043.9	50.6	2023.6	27.5	2002.9	21.8
74	308	0.71	306083	16.8939	2.4	0.70633	4.4	0.086583	3.7	0.834	1.1	535.3	18.9	542.6	18.6	573.2	53.1
76	276	0.78	38960	17.3082	3.3	0.68174	6.4	0.085617	5.5	0.859	-0.27	529.6	28.1	527.8	26.4	520.3	72.1
77	318	0.70	46291	16.5341	3.1	0.7296	5.4	0.08753	4.4	0.813	2.4	540.9	22.6	556.3	23	619.8	67.4
78	155	0.84	805955	16.7621	3.4	0.69377	4.9	0.08438	3.5	0.717	2.2	522.2	17.7	535.1	20.4	590.3	74.3
79	90	0.94	16549	17.306	4.8	0.68775	6.7	0.086362	4.7	0.701	-0.43	534	24.2	531.4	27.9	520.6	105.4
80	527	1.33	547290	16.965	2.2	0.72852	7	0.089678	6.7	0.952	0.5	553.6	35.6	555.7	30.1	564.1	47.1
82	289	0.45	1101029	17.1919	3.8	0.71093	5.2	0.088684	3.6	0.682	-0.4	547.8	18.7	545.3	22.1	535	83.8
84	1071	0.88	2296713	17.195	1.7	0.69619	2.9	0.086861	2.4	0.819	-0.065	536.9	12.3	536.5	12.1	534.7	36.6
86	86	1.52	16785	16.4845	5.1	0.77139	6.5	0.092267	4	0.617	2	568.9	21.8	580.6	28.7	626.3	110.1
87	175	0.96	49943	17.1489	3.1	0.69746	4.6	0.086787	3.5	0.752	0.12	536.5	17.9	537.3	19.3	540.5	66.9
88	695	0.35	621089	8.8134	1.5	4.99444	3.9	0.319392	3.6	0.927	2.7	1786.8	56.8	1818.4	33.2	1854.8	26.7
89	432	0.63	219408	12.3288	2	2.22705	3.6	0.199226	3	0.833	1.4	1171.2	31.7	1189.6	24.9	1223.2	38.6
91	202	0.83	84400	16.6945	3.5	0.79387	4.7	0.096164	3.2	0.683	0.23	591.9	18.3	593.4	21.3	599	74.8
93	655	0.70	478035	16.8841	3	0.75921	5.2	0.093012	4.3	0.825	0.034	573.3	23.7	573.6	22.9	574.5	64.2
94	855	0.85	134928	16.2523	3.2	0.83205	10.4	0.098121	9.9	0.951	2.8	603.4	57.2	614.8	48.1	656.8	69.2
95	58	0.42	10034	17.6942	8.5	0.65185	10.2	0.08369	5.5	0.544	-1.6	518.1	27.5	509.6	40.7	471.7	189
96	494	1.00	68106	16.3945	1.7	0.86488	2.9	0.102883	2.3	0.802	0.2	631.3	13.8	632.8	13.5	638.2	36.8
97	259	1.02	59758	16.5882	2.2	0.80173	4	0.096499	3.4	0.838	0.54	593.9	19	597.8	18.1	612.8	47.2
98	872	0.01	146437	13.8913	5.8	1.67129	6.9	0.168458	3.7	0.535	-0.65	1003.6	34.4	997.7	44	984.7	119.1

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
99	831	0.92	146667	16.4656	1.8	0.82826	2.7	0.098955	2	0.752	0.63	608.3	11.7	612.6	12.3	628.8	38.1
100	173	0.58	108214	16.8336	3.4	0.66363	8	0.081058	7.2	0.903	2.3	502.4	34.8	516.8	32.3	581	74.6
104	227	0.90	26543	17.7268	3	0.6575	3.7	0.084571	2.3	0.606	-1.8	523.4	11.4	513.1	15	467.6	65.8
107	528	0.47	177003	16.7007	2.4	0.80422	3.6	0.097455	2.6	0.731	-0.045	599.5	14.9	599.2	16.2	598.2	52.8
108	249	0.67	44477	17.0666	2.9	0.69798	4.2	0.086434	3	0.726	0.54	534.4	15.6	537.6	17.5	551.1	62.9
110	170	0.56	180592	16.8475	2.8	0.71946	4.3	0.08795	3.3	0.759	1.1	543.4	17	550.3	18.2	579.2	60.8
111	141	0.42	210986	16.8422	3.5	0.70794	5.5	0.086515	4.3	0.77	1.4	534.9	21.9	543.5	23.3	579.9	76.7
112	149	1.10	48933	16.5873	5.3	0.72527	6.9	0.087291	4.5	0.643	2.5	539.5	23.1	553.8	29.6	612.9	114.7
113	66	0.89	266817	16.8113	4.2	0.69759	6	0.085093	4.3	0.721	1.9	526.5	21.8	537.3	25	583.9	90.2
117	305	0.10	613837	7.6113	1.3	6.80995	3.6	0.376092	3.3	0.935	2.3	2058	58.9	2087	31.7	2115.7	22.2
118	777	0.28	135897	13.086	1.8	1.85319	4.8	0.175963	4.4	0.926	2.7	1044.9	42.5	1064.6	31.4	1105.1	35.9
119	133	0.78	704433	16.9836	4.5	0.6865	7	0.084599	5.3	0.76	1.2	523.5	26.6	530.7	28.8	561.7	98.5
120	745	1.39	102367	16.4216	2	0.85352	3.6	0.101701	3	0.834	0.29	624.4	18	626.6	16.9	634.6	43
121	352	1.05	108583	17.023	2.4	0.68891	3.5	0.085093	2.6	0.736	0.96	526.4	13	532.1	14.5	556.6	51.7
122	595	0.77	91983	16.3292	2	0.84074	3.4	0.099614	2.7	0.796	1	612.1	15.6	619.6	15.5	646.7	43.6
123	467	1.43	251419	16.6117	1.7	0.82635	2.8	0.099603	2.2	0.796	-0.066	612.1	13	611.6	12.9	609.7	36.6
124	397	0.68	906974	7.7524	1.4	6.6365	2.8	0.373308	2.5	0.868	1.2	2044.9	43.3	2064.2	25.1	2083.5	24.9
125	182	0.81	108198	17.2579	3.6	0.71981	7.4	0.090137	6.4	0.873	-0.85	556.3	34.3	550.6	31.3	526.7	78.8
126	80	0.85	14804	17.3452	5.7	0.71175	6.6	0.089578	3.3	0.496	-1.3	553	17.3	545.8	27.7	515.6	125.3
127	243	0.83	104686	12.4394	1.8	2.27831	3.4	0.205639	2.9	0.842	0.0037	1205.5	31.5	1205.6	24	1205.7	36.2
128	208	0.48	31954	16.1353	5.5	0.75492	6.4	0.088383	3.3	0.513	4.6	546	17.2	571.1	28	672.3	117.7
130	95	0.68	73825	16.8584	4.1	0.70104	7.2	0.085754	6	0.827	1.4	530.4	30.5	539.4	30.3	577.8	88.3
131	586	0.60	5984585	8.7308	1.6	5.2129	3.4	0.330237	3	0.884	1.1	1839.5	47.9	1854.7	28.9	1871.8	28.6
132	181	0.57	62442	17.0694	2.7	0.69858	4.1	0.086523	3.1	0.749	0.49	534.9	15.7	537.9	17.1	550.7	59.3
133	253	0.81	123336	16.8481	2.4	0.68317	3.9	0.083517	3.1	0.794	1.9	517.1	15.6	528.7	16.3	579.1	52.2
135	238	0.15	54048	17.1543	2.9	0.70294	4.3	0.087496	3.2	0.739	-0.031	540.7	16.4	540.5	17.9	539.9	63
136	323	0.76	116999	17.1075	3.3	0.675	4.5	0.083788	3.1	0.69	0.89	518.7	15.5	523.7	18.5	545.8	71.5
137	256	1.43	168122	16.3241	2.2	0.8425	3	0.099792	2	0.662	1.1	613.2	11.5	620.5	13.8	647.4	48
138	776	0.87	692818	9.3755	2.3	4.59572	7.5	0.312638	7.1	0.952	-0.5	1753.7	109.5	1748.5	62.5	1742.3	41.9
139	165	1.22	20279	17.1568	4	0.67968	5.5	0.084612	3.9	0.699	0.52	523.6	19.5	526.6	22.8	539.6	86.7
141	396	0.07	1816538	6.1384	3.1	10.23838	7.4	0.456016	6.7	0.906	2.1	2421.9	134.7	2456.6	68.1	2485.3	52.4
142	408	0.55	144330	17.0433	2	0.70566	2.8	0.087265	2	0.705	0.47	539.3	10.4	542.2	12	554	44.1
143	221	1.05	67851	16.8555	3.5	0.71705	4.1	0.087697	2.2	0.533	1.3	541.9	11.4	548.9	17.5	578.2	75.9
144A	188	0.83	28127	16.295	2.6	0.85013	4.7	0.100515	3.9	0.831	0.96	617.4	23	624.7	22	651.2	56.3
144B	76	0.59	149145	16.8991	5.3	0.7051	7.6	0.086459	5.4	0.717	1.2	534.6	27.9	541.8	31.8	572.6	115.1
145A	69	0.96	11569	17.6087	5.2	0.65479	6.2	0.083661	3.3	0.529	-1.2	517.9	16.2	511.4	24.7	482.4	115.3
145B	770	0.37	137585	10.6479	1.7	3.35319	3.1	0.259069	2.6	0.835	0.59	1485.1	34.1	1493.5	24.1	1505.5	32.1
146	197	1.67	49266	16.5306	3.1	0.76711	6.5	0.092011	5.7	0.875	1.5	567.4	30.9	578.1	28.6	620.3	67.8
147	345	0.76	198128	16.4805	2.9	0.78294	6.9	0.093625	6.3	0.91	1.6	576.9	34.6	587.2	30.7	626.8	61.6
148	136	0.20	500940	7.4067	1.5	7.13337	4.3	0.383363	4	0.936	2.7	2092	71.9	2128.2	38.3	2163.4	26.3
149A	125	0.57	57754	16.8548	3.8	0.68396	7.3	0.083647	6.2	0.855	1.7	517.9	31	529.2	30.1	578.2	82.3
149B	283	0.61	62727	16.9928	2.8	0.69814	3.8	0.08608	2.7	0.695	0.91	532.3	13.7	537.7	16.1	560.5	60.3
151	368	0.61	80149	17.0207	3.1	0.71093	4.5	0.087801	3.3	0.734	0.45	542.5	17.2	545.3	19	556.9	66.9
153	145	0.81	121139	17.1246	4.1	0.712	5.9	0.08847	4.2	0.718	-0.091	546.5	22	545.9	24.7	543.7	89.1
154	127	1.04	60584	16.857	3.6	0.70019	6.8	0.085643	5.7	0.847	1.4	529.7	29.1	538.9	28.2	578	78
155	581	0.72	435868	17.0072	2.4	0.69731	3.4	0.08605	2.3	0.693	0.88	532.1	11.9	537.2	14	558.7	52.9
156	254	0.76	67480	17.2609	2.8	0.68358	5.1	0.085615	4.2	0.838	-0.099	529.6	21.6	528.9	20.9	526.3	60.5
157	1275	0.73	283503	16.1082	1.8	0.87313	3.1	0.102052	2.5	0.817	1.4	626.4	14.9	637.3	14.5	675.9	37.8
158	1106	0.51	1198132	16.8921	2	0.71404	2.9	0.087519	2.1	0.726	1	540.8	10.9	547.1	12.2	573.5	43.3
160	431	1.16	140044	16.8394	2.6	0.79639	4	0.097308	3	0.754	-0.56	598.6	17.3	594.8	18.1	580.2	57.4
161	706	0.52	121899	17.0713	2.4	0.72052	3.6	0.08925	2.7	0.755	-0.02	551.1	14.4	551	15.4	550.5	51.9
164	607	0.96	135472	16.086	1.9	0.87725	2.9	0.102392	2.2	0.76	1.5	628.4	13.3	639.5	13.9	678.8	40.7
166	284	0.97	36812	16.8873	3.5	0.67827	5.2	0.083111	3.8	0.731	1.9	514.7	18.7	525.7	21.2	574	76.7
173	1415	0.84	63165	16.264	4.8	0.75712	5.9	0.089349	3.5	0.592	3.6	551.7	18.5	572.3	25.9	655.3	102.5
175	316	0.82	151426	16.9423	2.1	0.69751	3.7	0.085747	3	0.826	1.1	530.3	15.4	537.3	15.3	567	44.9
177	614	0.56	772539	16.3682	1.9	0.87135	3.5	0.103488	2.9	0.837	0.19	634.8	17.6	636.3	16.5	641.6	41
178	88	0.84	51357	16.5937	4.4	0.71421	6.4	0.085993	4.6	0.717	2.6	531.8	23.3	547.2	26.9	612.1	95.7
179	221	0.69	108864	16.5094	3.4	0.78555	7.2	0.094102	6.4	0.883	1.3	579.8	35.4	588.6	32.3	623.1	73.2
180	182	0.92	17112	17.2466	4.1	0.68546	4.9	0.085779	2.8	0.567	-0.084	530.5	14.2	530.1	20.3	528.1	88.8
182	431	0.55	137869	16.3595	2.7	0.83907	3.4	0.099601	2.1	0.615	1	612.1	12.1	618.6	15.6	642.7	57.2
183	191	0.88	33603	16.8246	3.6	0.69234	5.3	0.084519	3.9	0.734	1.9	523	19.5	534.2	22	582.1	78
184	288	0.92	79948	17.1123	3.2	0.69048	4	0.085734	2.4	0.596	0.52	530.3	12.2	533.1	16.6	545.2	70.5
186	410	0.69	80034	16.7323	1.9	0.7635	3.7	0.092695	3.2	0.857	0.64	571.5	17.4	576	16.3	594.1	41.5
189	643	1.10	202631	16.556	2	0.79891	3.4	0.095973	2.7	0.808	0.78	590.8	15.3	596.2	15.1	617	42.7
190	147	0.55	57386	17.1343	4.1	0.69657	6	0.086601	4.3	0.722	0.23	535.4	22.3	536.7	25	542.4	90.6
191	383	1.59	44017	16.5363	2	0.82058	3.5	0.098458	2.8	0.81	0.41	605.4	16.3	608.4	16	619.6	44.1
192	233	1.28	51069	16.2436	3.3	0.82894	6.4	0.097701	5.5	0.854	1.6	600.9	31.6	613	29.7	658	71.8
193	737	0.71	338877	17.1411	1.6	0.69708	3.6	0.086699	3.3	0.903	0.17	536	16.9	537	15.1	541.6	34.1
195	230	0.94	79932	16.6008	3.2	0.83213	5	0.100234	3.8	0.763	-0.14	615.8	22.3	614.8	23	611.1	69.7
197	244	1.04	37320	16.9983	2.4	0.69842	3.8	0.086142	2.9	0.76	0.84	532.7	14.6	537.8	15.7	559.8	53.4
198	170	1.20	68853	17.1554	4	0.68661	6.7	0.085468	5.3	0.797	0.33	528.7	27	530.8	27.6	539.7	88
199	344	0.68	51020	16.8966	2.8	0.70196	4.7	0.086061	3.8	0.806	1.2	532.2	19.2	540	19.5	572.9	60
204	64	0.59	15826	17.3444	4.8	0.6846	9.7	0.086157	8.4	0.867	-0.49	532.8	43	529.6	40	515.7	105.9
205	279	0.75	74353	16.75	2.7	0.70847	4.1	0.086106	3.2	0.765	1.8	532.5	16.2	543.8	17.4	591.8	57.9
207	223	1.09	49990	16.5381	4.5	0.69053	5.2	0.082863	2.7	0.511	3.8	513.2	13.1	533.1	21.6	619.3	96.7
208	133	0.71	32106	17.4554	3.5	0.65921	4.5	0.083493	2.9	0.634	-0.5	516.9	14.2	514.1	18.1	501.7	76.6
209	127	0.83	66989	17.1134	4	0.66678	5.6	0.082796	3.9	0.693	1.1	512.8	19.1	518.8	22.7	545.1	88.2
210	171	1.09	113660	16.989	3.7	0.68003	4.4	0.083828	2.4	0.54	1.5	518.9	11.9	526.8	18.2	561	81.3
211	269	0.80	44193	17.2175	3	0.68546	4.2	0.085633	3	0.703	0.072	529.7	15.2	530.1	17.5	531.8	66.1
212	105	0.43	49630	16.5181	4.8	0.83598	6.5	0.100196	4.4	0.678	0.2	615.6	25.9	616.9	30.1	621.9	103.2
213	1022	0.74	1214097	16.9944	1.7	0.70164	4.3	0.08652	4	0.919	0.86	534.9	20.5	539.8	18.1	560.3	37.2
217	751	0.58	377596	16.3377	2	0.89802	2.7	0.106457	1.8	0.657	-0.21	652.1	11	650.7	13	645.6	43.9
218	282	1.47	170447	16.4636	2.6	0.80781	3.6	0.0965	2.5	0.696	1.1	593.9	14.2	601.2	16.4	629	55.9
219	188	0.80	48758	16.5407	2.9	0.80532	4.5	0.096654	3.5	0.764	0.73	594.8	19.6	599.8	20.5	619	62.9
220	575	0.43	500221	10.0821	1.5	3.93183	2.8	0.287632	2.3	0.839	-0.62	1629.7	33.5	1620.3	22.4	1608	28.1
221	264	0.95	24618	17.2947	3	0.6722	5.6	0.084354	4.7	0.846	0.0022	522.1	23.6	522.1	22.7	522	64.9
222	139	0.59	136721	16.938	3.4	0.70379	5.2	0.086497	3.9	0.748	1	534.8	19.8	541.1	21.6	567.6	74.4
223	342	0.78	461086	17.0582	2.6	0.69058	4.1	0.085475	3.2	0.78	0.71	528.7	16.2	533.1	17	552.1	55.9
224	201	0.44	448818	17.3162	3.3	0.67912	4.8	0.085328	3.5	0.723	-0.27	527.8	17.8	526.2	19.9	519.3	73.4
225	135	0.61	77049	16.5616	3.2	0.82975	5.4	0.099712	4.4	0.809	0.1	612.7	25.6	613.5	25	616.3	68.8
226	193	0.59	31723	17.0757	3.4	0.68264	5.1	0.08458	3.8	0.743	0.83	523.4	19.1	528.4	21.1	549.9	74.8
227	73	0.94	78726	16.3036	4.2	0.81849	6.6	0.096826	5.1	0.771	1.7	595.8	28.8	607.2	30	650.1	89.6
228	377	0.39	807022	12.0675	1.4	2.41026	2.7	0.211046	2.2	0.843	0.86	1234.4	25.2	1245.7	19.1	1265.2	27.9
229	343	0.32	353503	14.2556	2.4	1.39218	6	0.144004	5.6	0.921	2.6	867.3	45.2	885.6	35.7	931.8	48.5
230	295	0.98	89474	17.169	3	0.69181	4.2	0.086184	3	0.713	0.17	532.9	15.4	533.9	17.6	538	65
231	476	0.68	388806	17.1873	1.8	0.68271	2.6	0.085141	1.9	0.737	0.28	526.7	9.7	528.4	10.7	535.7	38.7
232	323	0.56	112121	16.9103	2.5	0.75245	3.5	0.092325	2.4	0.693	0.055	569.3	13.3	569.6	15.4	571.1	55.4
234	174	0.93	83949	16.4627	2.6	0.87478	3.8	0.104495	2.7	0.711	-0.36	640.7	16.3	638.2	17.8	629.2	56.9
235	272	0.75	141188	16.959	3.5	0.71879	5.4	0.088449	4.1	0.76	0.57	546.4	21.4	550	22.9	564.8	76.2
237	126	0.85	133363	17.2018	3.2	0.68205	5	0.08513	3.9	0.777	0.22	526.7	19.8	528	20.7	533.8	69.4
238	496	0.58	114770	16.9176	2.9	0.71302	3.7	0.087525	2.4	0.638	0.97	540.9	12.3	546.5	15.8	570.2	62.5
239	195	0.91	50897	17.3914	2.8	0.6717	4	0.084763	2.8	0.701	-0.47	524.5	14	521.7	16.1	509.8	62
241	215	0.85	103698	17.2404	2.9	0.70342	4.6	0.087995	3.5	0.775	-0.46	543.7	18.4	540.8	19.1	528.9	63.1
243	119	0.44	32310	16.0979	3.4	0.9798	6.7	0.114446	5.7	0.86	-0.61	698.5	38	693.5	33.5	677.3	72.8

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb^{a}$	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
244	823	0.52	128792	16.2513	1.9	0.92619	4.8	0.109214	4.4	0.914	-0.38	668.2	27.7	665.6	23.3	657	41.3
245	292	0.28	64340	12.2759	1.6	2.35704	3.1	0.209949	2.6	0.858	0.094	1228.5	29.4	1229.7	21.8	1231.7	30.8
246	173	0.90	155945	16.298	3.3	0.77905	4.7	0.092129	3.4	0.724	2.7	568.1	18.6	584.9	21	650.8	69.8
248	484	0.53	90476	16.4261	1.7	0.85479	3.9	0.10188	3.5	0.897	0.27	625.4	21	627.3	18.4	634	37.5
250	148	0.85	46707	16.8156	3.6	0.74878	6.2	0.091361	5	0.815	0.58	563.6	27.2	567.5	26.8	583.3	77.6
253	619	0.48	399483	8.7249	1.3	5.23593	3.3	0.331475	3.1	0.924	1	1845.5	49.6	1858.5	28.5	1873	23.1
254	105	0.98	81809	17.351	4.4	0.66029	7	0.08313	5.4	0.772	0.0021	514.8	26.7	514.8	28.2	514.8	97.6
255	273	0.79	96616	17.0002	2.9	0.68638	5	0.084667	4.1	0.816	1	523.9	20.6	530.6	20.7	559.6	63.2
258	116	0.66	2487442	8.3097	1.5	5.65759	3.8	0.341122	3.5	0.914	2.5	1892.1	56.9	1924.9	32.8	1960.5	27.4
259	164	0.66	20618	17.1873	3.7	0.65567	7.8	0.081769	6.9	0.883	0.83	506.7	33.6	512	31.4	535.7	80.1
260	508	0.87	401576	13.3514	2.5	1.74037	4	0.168602	3.1	0.78	1.7	1004.4	29.1	1023.6	25.8	1064.9	50.4
262	286	1.09	186005	17.2829	2.6	0.67889	4.5	0.085135	3.6	0.819	-0.099	526.7	18.4	526.1	18.3	523.5	56.1
265	257	1.08	878325	16.9576	3.1	0.68848	5.3	0.084713	4.3	0.813	1.2	524.2	21.7	531.9	22	565	67.4
266	171	0.68	53421	17.4056	3.1	0.66611	5.3	0.084126	4.3	0.818	-0.38	520.7	21.7	518.3	21.6	508	67.1
268	302	0.88	36619	16.5726	3.3	0.76494	5.6	0.091984	4.6	0.811	1.4	567.3	24.7	576.9	24.7	614.8	71
270	213	0.68	91257	16.5648	2.8	0.73069	4.5	0.087824	3.5	0.783	2.3	542.7	18.2	557	19.2	615.8	60.3
272	269	0.51	26110	17.0366	3.1	0.69846	3.8	0.086341	2.1	0.57	0.74	533.9	11	537.9	15.7	554.9	67.3
273	465	0.51	124333	16.686	2.6	0.73832	5.3	0.089391	4.6	0.868	1.4	551.9	24.2	561.4	22.8	600.1	56.7
274	1090	1.19	143691	15.5968	1.7	1.00049	5	0.113225	4.7	0.941	2.4	691.5	30.8	704.1	25.3	744.5	35.6
275	241	0.69	198682	17.1569	3	0.69982	4.1	0.08712	2.8	0.691	0.034	538.5	14.7	538.7	17.2	539.6	64.9
276	178	1.06	61994	16.9483	2.8	0.67597	5.8	0.083128	5.1	0.879	1.5	514.8	25.3	524.3	23.9	566.2	60.5
277	221	0.78	432908	16.8931	2.4	0.67905	4.7	0.083235	4.1	0.862	1.7	515.4	20.1	526.2	19.4	573.3	52
278	587	0.93	155969	16.586	2.4	0.8309	3.2	0.099997	2.1	0.673	-0.046	614.4	12.6	614.1	14.7	613.1	50.9
279	577	0.58	192191	17.0124	3.4	0.73574	7.1	0.09082	6.2	0.874	-0.068	560.4	33.2	559.9	30.5	558	74.9
280	570	0.29	501588	5.9176	1	10.91469	2.9	0.468654	2.7	0.933	2.3	2477.7	55.1	2515.9	26.7	2546.9	17.2
282	1467	1.05	113196	16.3048	2.7	0.85587	4.1	0.101255	3.1	0.751	0.85	621.8	18.4	627.9	19.4	649.9	58.7
283	536	0.60	932210	16.9372	2.7	0.71018	4	0.087278	3	0.749	0.88	539.4	15.6	544.9	16.9	567.7	57.9
285	179	0.67	162234	17.1657	3.5	0.68117	4.3	0.084842	2.5	0.576	0.47	525	12.4	527.5	17.5	538.4	76.1
286	136	0.95	150891	15.5055	3.8	1.06786	5.4	0.120143	3.8	0.71	0.8	731.4	26.6	737.7	28.4	756.9	80.5
289	193	0.32	34172	16.5642	3.3	0.77972	4.2	0.093714	2.6	0.62	1.3	577.5	14.3	585.3	18.5	615.9	70.7
290	150	0.69	140872	16.8299	4	0.67662	5.2	0.082627	3.3	0.634	2.4	511.8	16.1	524.7	21.2	581.5	86.9
291	196	0.94	99491	16.4242	3.1	0.78878	4.6	0.094001	3.3	0.726	1.8	579.2	18.3	590.5	20.4	634.3	67.5
293	617	0.09	180848	12.9806	2	1.92887	3.9	0.181674	3.3	0.855	1.3	1076.1	32.9	1091.1	26	1121.3	40.1
297	202	1.01	57694	16.9481	2.2	0.69254	3.9	0.085165	3.2	0.816	1.2	526.9	16	534.3	16.1	566.3	48.9
298	1118	0.19	250184	12.6793	1.9	2.06999	5.8	0.190441	5.4	0.944	2.1	1123.8	56.1	1138.9	39.4	1168	37.7
299	482	0.88	86456	16.7699	2.7	0.70387	3.7	0.085648	2.5	0.669	2	529.7	12.6	541.1	15.5	589.2	59.5
300	231	1.01	49907	17.0466	2.6	0.68563	3.8	0.084806	2.8	0.729	0.91	524.7	14	530.2	15.7	553.6	56.8
301	178	0.65	86350	17.0782	3.2	0.69208	5	0.085761	3.8	0.763	0.59	530.4	19.3	534	20.7	549.6	70.4
302	515	0.54	133687	16.1558	2.7	0.84387	4.7	0.098923	3.8	0.819	1.8	608.1	22.3	621.3	21.8	669.6	57.5
303	165	0.97	139897	16.7648	3.6	0.69391	4.6	0.084411	3	0.639	2.3	522.4	14.9	535.1	19.3	589.9	77.4
305	347	0.82	33317	16.7682	5.5	0.69163	6.1	0.08415	2.8	0.458	2.5	520.8	14.1	533.8	25.5	589.5	118.3
306	408	0.70	135014	17.2976	2.5	0.67486	3.6	0.084703	2.6	0.71	-0.077	524.1	12.9	523.7	14.8	521.6	55.8
307	228	0.58	137173	16.2238	2	0.8531	3.2	0.100427	2.5	0.784	1.3	616.9	15	626.4	15.2	660.6	43.2
308	197	0.69	154815	16.9402	3.5	0.67762	4.5	0.083291	3	0.649	1.7	515.7	14.6	525.3	18.6	567.3	75.3
309	249	0.97	71667	17.0661	2.7	0.68644	4.1	0.085002	3	0.745	0.81	525.9	15.3	530.7	16.8	551.1	59
312	297	1.00	108318	16.6444	3	0.70623	4.6	0.085292	3.5	0.758	2.5	527.6	17.5	542.5	19.2	605.5	64.4
313	185	0.91	69697	16.3935	3	0.80193	4.2	0.09539	2.9	0.689	1.7	587.3	16.1	597.9	18.9	638.3	65.1
314	547	0.65	48566	16.7933	2.9	0.67649	4.5	0.082432	3.4	0.764	2.4	510.6	16.9	524.7	18.4	586.2	63
317	701	0.50	241722	17.0491	1.9	0.708	3.1	0.087585	2.4	0.784	0.36	541.2	12.7	543.6	13.1	553.3	42.2
318	150	1.03	120890	16.4273	3.7	0.82895	5.7	0.098808	4.3	0.755	0.81	607.4	24.8	613	26.1	633.8	80.2
319	172	1.12	32185	16.9842	3.9	0.68675	5.1	0.084633	3.2	0.627	1.3	523.7	15.9	530.8	20.9	561.6	85.8
320	383	0.53	157316	10.1744	1.7	3.61264	4.8	0.266703	4.5	0.938	3	1524	61.6	1552.3	38.5	1591	31.4
322	194	1.04	181787	16.9791	2.7	0.70988	4.5	0.087457	3.6	0.802	0.65	540.5	18.8	544.7	19.1	562.3	58.9
323	382	0.77	137855	16.9425	3.1	0.73089	5.7	0.089851	4.8	0.84	0.35	554.7	25.6	557.1	24.5	567	67.6
324	177	0.91	29841	16.8863	3.4	0.76256	6.3	0.093433	5.3	0.841	-0.043	575.8	29	575.5	27.5	574.2	73.7
326	97	0.76	46438	17.0038	3.7	0.70158	5.4	0.08656	3.9	0.721	0.76	535.2	19.8	539.7	22.4	559.1	80.9
327	822	0.51	239434	16.4709	2.1	0.83891	3.1	0.10026	2.3	0.745	0.37	615.9	13.7	618.5	14.5	628.1	44.9
328	278	0.72	134486	17.0129	2.5	0.69518	3.5	0.085816	2.4	0.69	0.89	530.7	12.3	535.9	14.5	557.9	55
329	847	0.06	255946	16.5714	1.9	0.77975	2.7	0.093758	2	0.737	1.2	577.7	11.2	585.3	12.2	615	40.1
330	189	0.70	30550	16.8613	2.6	0.66783	4.5	0.081706	3.7	0.826	2.1	506.3	18.3	519.4	18.4	577.4	55.5
332	383	0.55	187052	7.5678	1.8	7.14283	4.7	0.392222	4.3	0.921	-0.26	2133.1	78.7	2129.4	41.9	2125.8	32.1
334	294	0.78	151907	16.3779	3.2	0.86831	7.4	0.103187	6.7	0.9	0.23	633.1	40.1	634.6	34.9	640.3	69.3
335	884	0.30	910129	12.547	1.6	2.17861	2.5	0.198341	1.9	0.775	0.59	1166.4	20.6	1174.2	17.3	1188.7	31.1
336	301	0.10	50005	16.7831	2.7	0.79416	4.5	0.09671	3.7	0.81	-0.22	595.1	20.9	593.5	20.4	587.5	57.9
337	733	0.65	677828	13.0511	2	1.86962	4.9	0.17705	4.5	0.91	2.3	1050.8	43.5	1070.4	32.6	1110.4	40.7
338	317	0.61	143552	16.9756	2.3	0.68399	4.5	0.08425	3.9	0.856	1.2	521.4	19.4	529.2	18.6	562.7	50.7
339	429	0.94	139678	16.9513	2.1	0.69446	4.1	0.085417	3.5	0.855	1.1	528.4	17.7	535.5	17	565.9	46
340	234	0.82	1191918	16.9125	2.8	0.68582	4.1	0.084161	2.9	0.719	1.6	520.9	14.7	530.3	16.9	570.9	61.9
341	393	0.88	1087832	17.0036	2.9	0.69247	3.9	0.085435	2.6	0.676	1	528.5	13.3	534.3	16.2	559.1	62.4
345	248	0.79	79610	17.2803	2.8	0.68197	5	0.085509	4.1	0.827	-0.15	528.9	21	528	20.6	523.8	61.6
349	136	0.56	19129	17.4043	3.7	0.67714	5.4	0.085512	3.9	0.724	-0.65	528.9	19.7	525	22	508.1	81.2
350	290	0.80	51362	17.2767	3.3	0.64977	4.3	0.081455	2.8	0.638	0.64	504.8	13.5	508.3	17.4	524.3	73.4
352	357	0.86	60539	17.1211	3.5	0.67269	5.6	0.083568	4.4	0.787	0.81	517.4	22	522.3	23	544.1	75.8
353	265	0.69	72008	16.4143	2	0.79538	3.7	0.09473	3.1	0.84	1.5	583.5	17.5	594.2	16.8	635.5	43.6
355	165	0.60	133559	16.3414	3.2	0.82856	4.7	0.098244	3.5	0.736	1.3	604.1	20.1	612.8	21.8	645.1	68.8
357	80	0.65	13766	16.8403	5.1	0.68823	6.6	0.084097	4.2	0.637	2	520.5	21.1	531.7	27.4	580.1	110.6
358	340	0.16	46952	16.6426	2.4	0.77848	3.1	0.094008	2	0.646	0.89	579.2	11.3	584.6	14	605.7	52
359	156	1.32	119771	16.8367	3.7	0.66457	7.6	0.081188	6.6	0.874	2.2	503.2	32	517.4	30.7	580.6	79.8
360	312	0.71	121744	16.9335	3	0.66916	4.1	0.082218	2.8	0.685	2	509.4	13.8	520.2	16.7	568.1	65.1
361	337	0.30	1711155	15.8556	2.6	0.94207	5.4	0.108382	4.7	0.875	1.3	663.3	29.8	674	26.6	709.6	55.6
362	389	1.01	151047	17.1963	1.9	0.66642	3.4	0.083153	2.9	0.832	0.56	514.9	14.2	518.5	14	534.5	41.9
364	773	0.28	253866	12.8234	1.6	2.07485	2.9	0.193056	2.4	0.828	0.21	1137.9	24.8	1140.5	19.7	1145.5	32.1
365	97	1.14	134051	16.8431	6.2	0.74837	9.2	0.091461	6.7	0.732	0.49	564.2	36.2	567.3	39.8	579.8	135.4
367	430	0.83	311415	17.0372	2.1	0.69911	3.3	0.086424	2.5	0.758	0.64	534.4	12.7	538.3	13.6	554.8	46.3
368	187	0.54	17859	17.5097	3	0.64572	4.5	0.082038	3.4	0.753	-0.42	508.3	16.6	505.8	18	494.8	65.5
369	218	0.49	1136579	17.1097	3.2	0.6736	5.9	0.083625	5	0.844	0.8	517.7	24.7	522.9	24	545.5	69
370	409	0.53	135225	16.9743	2.3	0.67568	3.4	0.083219	2.5	0.731	1.5	515.3	12.4	524.2	14	562.9	50.9
371	380	1.05	55445	16.9174	1.8	0.71042	3.8	0.087205	3.3	0.878	0.89	539	17.3	545	16	570.2	39.6
372	252	1.04	64316	17.035	2.5	0.67835	3.5	0.083847	2.5	0.696	1.2	519	12.2	525.8	14.5	555.1	55.2
373	553	0.65	150729	16.4835	1.8	0.82205	2.9	0.098321	2.3	0.782	0.64	604.6	13.2	609.2	13.4	626.4	39.5
375	88	0.64	34124	17.3753	3.2	0.67489	5.7	0.085086	4.7	0.826	-0.43	526.4	24	523.7	23.5	511.8	71.2
376	483	0.68	112907	16.9968	2.5	0.69973	3.8	0.086296	2.8	0.745	0.84	533.6	14.5	538.6	15.9	560	55.2
377	198	1.35	1019271	16.9891	3.7	0.69404	5.2	0.085556	3.7	0.709	1	529.2	18.8	535.2	21.8	561	80.4
378	186	0.61	125563	16.9295	3.7	0.69329	4.8	0.085164	3	0.631	1.4	526.9	15.2	534.8	19.8	568.7	80.3
381	93	0.85	56243	16.7839	3.5	0.7075	5.3	0.086161	4	0.755	1.7	532.8	20.4	543.3	22.2	587.4	75.1
382	402	1.01	82197	17.091	3	0.69452	3.8	0.086129	2.4	0.618	0.51	532.6	12.2	535.5	16	548	66.1
383	102	0.96	9829	17.0318	4.3	0.65736	6.2	0.081237	4.5	0.726	1.7	503.5	21.8	513	24.9	555.5	92.7
384	872	0.50	149073	16.9728	2.1	0.75244	3	0.092665	2.2	0.733	-0.26	571.3	12.2	569.6	13.2	563.1	44.9
385	285	0.67	1412169	17.146	2.4	0.68128	3.8	0.084759	2.9	0.768	0.51	524.5	14.6	527.5	15.5	540.9	52.8
386	629	0.80	4156621	16.1515	2.1	0.92594	4.2	0.108515	3.6	0.87	0.17	664.1	22.9	665.5	20.3	670.1	44
390	331	0.65	104162	15.4919	2.9	1.06051	4.5	0.11921	3.4	0.765	0.97	726	23.5	734.1	23.4	758.7	60.8
391	186	0.77	27191	17.2881	3.5	0.64687	4.9	0.081145	3.4	0.703	0.65	503	16.6	506.6	19.5	522.8	76.3
392	252	0.88	46767	17.5475	2.8	0.65478	5.2	0.083369	4.4	0.845	-0.74	516.2	21.7	511.4	20.8	490.1	61
393	194	1.16	114425	17.2184	3.4	0.71194	4.5	0.088946	3	0.666	-0.58	549.3	15.9	545.9	19.2	531.7	74.3

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
394	108	0.44	451820	9.3471	2.1	4.41405	3.9	0.29937	3.3	0.85	1.8	1688.2	49.7	1715	32.6	1747.8	38.1
395	562	0.22	358634	14.189	1.7	1.43645	4	0.14789	3.6	0.905	1.9	889.1	30.3	904.2	24.1	941.3	35.1
396	128	0.50	29080	16.9359	4.2	0.70251	6	0.086328	4.3	0.711	1.1	533.8	22	540.3	25.3	567.8	92.4
397	151	1.00	12917	17.575	4.2	0.67847	5.5	0.086521	3.6	0.653	-1.6	534.9	18.4	525.9	22.5	486.6	91.7
398	162	0.45	24030	16.7074	4.1	0.80978	5.1	0.098168	3.1	0.608	-0.22	603.7	17.9	602.3	23.2	597.3	87.8
399	382	0.48	143830	16.2954	2.2	0.81772	3.8	0.096686	3.1	0.806	1.6	595	17.4	606.8	17.3	651.2	48.1
400	195	0.91	117184	17.0302	3	0.69521	3.5	0.085908	1.8	0.523	0.86	531.3	9.2	535.9	14.4	555.7	64.5
402	379	0.55	133181	16.6156	2.2	0.81017	4.5	0.097676	3.9	0.877	0.24	600.8	22.5	602.5	20.4	609.2	46.5
404	214	0.70	64035	16.9847	2.6	0.70012	3.8	0.086283	2.8	0.735	0.89	533.5	14.4	538.9	16	561.5	56.6
406	184	0.62	48600	17.3197	2.7	0.69549	3.7	0.087403	2.5	0.678	-0.69	540.2	13	536.1	15.4	518.8	59.7
407	978	0.15	583424	11.8256	1.9	2.50587	3.6	0.215018	3	0.846	1.4	1255.5	34.3	1273.7	25.8	1304.6	36.9
408	504	0.70	144867	17.2935	3.1	0.66549	4.7	0.083506	3.5	0.753	0.16	517	17.5	518	19	522.1	67.5
410	149	0.24	95066	10.9179	1.9	3.24225	4.9	0.256849	4.6	0.924	-0.63	1473.7	60.2	1467.3	38.4	1458.1	36
411	270	0.48	110720	8.2493	2.3	5.70687	4.7	0.341593	4.2	0.879	2.6	1894.3	68.3	1932.4	40.9	1973.5	40.3
412	481	0.29	631124	8.3381	1.6	5.74805	3.1	0.347763	2.7	0.862	0.93	1923.9	44.6	1938.6	26.9	1954.4	28.2
413	384	0.75	359323	16.5375	2.4	0.83361	3.6	0.10003	2.7	0.751	0.15	614.6	15.9	615.6	16.6	619.4	51.3
414	370	0.61	57568	16.7505	2.5	0.7152	7	0.086925	6.5	0.932	1.9	537.3	33.5	547.8	29.6	591.7	55
416	583	0.19	589827	8.0126	1.9	6.15389	3.5	0.35778	2.9	0.837	1.5	1971.6	49.5	1997.9	30.4	2025.2	33.7
417	366	0.81	36280	16.6353	2.4	0.78034	3.8	0.094191	2.9	0.769	0.81	580.3	16.3	585.7	17	606.7	53
418	230	0.64	485007	16.9705	2.7	0.69323	6.1	0.085363	5.5	0.899	1.1	528.1	28	534.7	25.5	563.4	58.5
420	262	0.46	256406	17.1051	3.3	0.66477	4.7	0.082507	3.3	0.701	1.1	511.1	16.1	517.5	18.9	546.1	72.7
422	567	1.06	158736	16.3409	2.3	0.81652	3.4	0.096814	2.4	0.728	1.6	595.7	13.9	606.1	15.3	645.2	49.4
423	261	0.26	192606	12.6029	1.9	2.10295	2.9	0.192306	2.2	0.747	1.2	1133.9	22.4	1149.8	19.9	1179.9	38
424	901	0.25	472912	12.3894	1.2	2.28415	2.1	0.205338	1.6	0.801	0.25	1203.9	18.1	1207.4	14.5	1213.6	24.2
425	386	0.82	142423	16.9219	3.5	0.68627	4.1	0.084263	2.2	0.541	1.7	521.5	11.1	530.6	17	569.6	75
426	218	0.59	735765	16.7058	2.8	0.74157	6.4	0.08989	5.7	0.896	1.3	554.9	30.3	563.3	27.5	597.5	61.1
427	931	0.65	159423	17.0071	2.3	0.68189	3.2	0.084147	2.2	0.698	1.3	520.8	11	527.9	13	558.7	49.2
428	87	0.74	65307	16.5456	5.9	0.71353	8.1	0.085662	5.5	0.682	3	529.8	28.1	546.8	34.3	618.3	128
431	123	0.71	99380	16.6178	3.6	0.71	5.4	0.085611	4	0.742	2.6	529.5	20.4	544.7	22.9	608.9	78.7
432	243	1.47	24951	17.2337	2.6	0.67887	4.9	0.084891	4.2	0.847	0.13	525.2	21	526.1	20.2	529.8	57.3
434	454	0.74	1655880	16.9087	2.5	0.70829	4.6	0.0869	3.9	0.842	0.98	537.2	20.1	543.7	19.5	571.3	54.4
435	357	1.10	1866704	17.0395	3.2	0.7093	3.8	0.087697	1.9	0.517	0.45	541.9	10.1	544.3	15.8	554.5	70.1
436	183	0.30	80154	12.4643	2.1	2.19934	3.7	0.19891	3	0.813	0.87	1169.5	32	1180.8	25.7	1201.7	42.2
437	217	0.69	33675	16.3927	3.2	0.81499	4	0.096939	2.4	0.609	1.4	596.4	13.9	605.3	18.3	638.4	68.6
438	180	0.96	42199	16.5538	2.9	0.79578	4.9	0.095583	3.9	0.807	0.86	588.5	22.1	594.4	21.9	617.3	62.2
439	625	0.57	589379	16.5926	1.9	0.82523	3.2	0.099353	2.5	0.793	0.051	610.6	14.7	611	14.6	612.2	41.9
441	360	0.56	126576	16.6232	3.6	0.68717	4.5	0.082884	2.7	0.596	3.3	513.3	13.1	531.1	18.5	608.2	77.5
442	57	1.02	126489	17.0046	5.8	0.6833	8.1	0.084308	5.6	0.691	1.2	521.8	27.9	528.8	33.2	559	127.1
443	1317	0.12	2431246	13.5472	1.6	1.80433	2.5	0.177361	1.9	0.774	-0.46	1052.5	18.7	1047	16.3	1035.5	31.9
447	268	0.54	209324	16.5944	2.5	0.81485	4.3	0.098115	3.5	0.813	0.24	603.4	20.2	605.2	19.7	612	54.4
449	109	1.20	68229	16.4726	4.3	0.78654	7.9	0.094011	6.6	0.836	1.4	579.2	36.7	589.2	35.4	627.9	93.6
451	131	1.32	34887	16.6041	4.2	0.76723	8.4	0.092434	7.2	0.867	1.2	569.9	39.5	578.2	36.8	610.7	89.9
452	346	0.82	34393	16.4116	2.3	0.81143	5.7	0.096627	5.3	0.919	1.4	594.6	29.8	603.3	26	635.9	48.6
454	150	0.64	46202	17.3871	3.9	0.64486	5.3	0.081355	3.6	0.681	0.2	504.2	17.4	505.3	21	510.3	85.1
460	240	0.51	754334	16.8779	4.3	0.68279	5	0.083618	2.7	0.532	2	517.7	13.3	528.5	20.8	575.3	92.8
462	108	0.91	32526	16.2164	5	0.719	7.1	0.084602	5.1	0.713	4.6	523.5	25.5	550.1	30.2	661.6	106.8
468	934	0.70	78942	15.9291	2.9	0.8773	5.1	0.101399	4.2	0.827	2.2	622.6	25.2	639.5	24.3	699.7	61.3
469	237	0.42	24732	16.9386	3.8	0.69585	4.7	0.085524	2.8	0.601	1.3	529	14.4	536.3	19.7	567.5	82.1
471	370	0.76	89841	16.3489	2.4	0.79085	3.5	0.093816	2.5	0.717	2.1	578.1	13.9	591.7	15.7	644.1	52.5
473	745	0.45	171553	16.5523	2.2	0.76163	3.2	0.091474	2.4	0.741	1.7	564.2	12.9	574.9	14.1	617.5	46.7
474	921	0.31	407154	16.2084	2.2	0.85834	3	0.100947	2	0.658	1.4	620	11.5	629.2	13.9	662.6	47.8
475	147	0.46	37223	16.9618	3.2	0.66863	4.9	0.082291	3.7	0.759	1.7	509.8	18.3	519.9	20.1	564.5	70
476	284	0.75	116036	17.1784	3.3	0.66632	4.8	0.083054	3.4	0.725	0.74	514.3	17	518.5	19.3	536.8	71.6
479	291	0.84	143540	16.5591	2.3	0.79351	3.1	0.095342	2.1	0.684	0.97	587.1	11.9	593.2	14	616.6	48.9
483	254	1.16	58051	16.9012	2.6	0.67702	3.9	0.083026	3	0.75	1.8	514.2	14.6	525	16.2	572.3	56.8
484	1140	0.28	1122737	11.8349	4.8	2.41849	6.3	0.207684	4.2	0.658	2.6	1216.5	46.1	1248.1	45.4	1303.1	92.5
485	202	0.58	19730	16.9388	3.5	0.66443	5.3	0.081662	4	0.757	2	506	19.6	517.3	21.5	567.5	75.5
487	1340	0.09	397252	12.7735	3.3	2.00749	4	0.186062	2.3	0.578	1.8	1100	23.3	1118	27.1	1153.2	64.7
488	535	1.64	160476	16.8975	2.8	0.68675	3.9	0.0842	2.7	0.686	1.7	521.1	13.4	530.8	16.1	572.7	61.7
489	14	1.27	2000	14.465	17.7	1.41497	20.6	0.148511	10.5	0.509	0.32	892.6	87.3	895.2	122.7	901.7	366.3
491	339	0.66	870007	16.9135	3	0.6807	4.1	0.083538	2.8	0.673	1.8	517.2	13.8	527.2	16.9	570.7	66.2
492	687	0.79	124208	16.5046	1.6	0.79487	2.6	0.095191	2.1	0.799	1.1	586.2	11.6	593.9	11.7	623.7	33.8
495	278	1.16	451379	16.9105	2.4	0.69476	4.4	0.085248	3.7	0.834	1.3	527.4	18.7	535.7	18.4	571.1	53.1
496	105	0.68	18510	16.1291	4	0.80005	6.1	0.093631	4.6	0.753	3.1	577	25.5	596.9	27.7	673.1	86.3
498	616	0.67	86766	16.3771	2.2	0.82528	3.5	0.098069	2.7	0.773	1.1	603.1	15.6	611	16.1	640.4	48
500	519	0.36	58409	16.7384	2	0.77288	2.9	0.093868	2.1	0.709	0.47	578.4	11.4	581.4	12.8	593.3	44.3
502	433	0.83	59765	17.1255	2.4	0.68358	5.7	0.084943	5.1	0.903	0.54	525.6	25.9	528.9	23.4	543.5	53.3
503	592	0.64	135434	16.2931	2.1	0.81411	4.2	0.096246	3.7	0.869	1.7	592.4	20.9	604.8	19.4	651.5	45.1
505	185	0.70	37592	16.108	3.5	0.81701	5.1	0.095491	3.6	0.718	2.9	587.9	20.5	606.4	23.2	675.9	75.7
508	437	0.32	315764	16.5844	2.3	0.79978	4.6	0.096242	4	0.867	0.6	592.3	22.6	596.7	20.8	613.3	49.6
509	172	0.72	25408	16.9154	3.8	0.68398	5.2	0.08395	3.5	0.68	1.7	519.7	17.6	529.2	21.4	570.4	82.6
512	835	0.36	126005	16.7929	1.6	0.74232	2.7	0.090451	2.2	0.814	0.82	558.2	11.8	563.8	11.7	586.2	34.1
517	684	0.27	294880	10.0453	1.6	3.87054	3.3	0.282116	2.8	0.865	0.41	1602	40.2	1607.6	26.4	1614.8	30.5
518	768	0.45	156763	16.93	2.3	0.67998	3.3	0.083531	2.4	0.712	1.7	517.2	11.8	526.8	13.7	568.6	51
519	214	0.50	143897	17.3196	2.6	0.67852	4.4	0.08527	3.5	0.796	-0.26	527.5	17.5	525.9	17.9	518.8	57.9
520	874	0.32	691826	16.1776	2.1	0.85656	3.3	0.100547	2.6	0.773	1.5	617.6	15.1	628.2	15.6	666.7	45.1
521	191	0.69	63457	17.0978	3.7	0.67271	5	0.083457	3.3	0.668	1	516.7	16.5	522.4	20.3	547	81.1
523	307	0.73	22219	17.1211	3.1	0.68625	4	0.085253	2.4	0.612	0.58	527.4	12.3	530.5	16.4	544.1	68.6
527	110	0.65	72318	16.9907	3	0.66309	6.5	0.081748	5.8	0.887	1.6	506.5	28.3	516.5	26.5	560.8	65.8
532	389	0.81	684486	16.8913	1.9	0.69228	2.8	0.084847	2.1	0.741	1.5	525	10.4	534.2	11.6	573.5	40.7
533	192	0.62	65265	16.5191	3.9	0.69626	5	0.083455	3.1	0.627	3.7	516.7	15.6	536.6	20.8	621.8	84
534	336	0.70	102727	16.5083	2.9	0.75926	4.2	0.090946	3.1	0.729	2	561.1	16.6	573.6	18.5	623.2	62.4
535	87	0.78	321433	16.7459	6.1	0.70654	7.4	0.08585	4.2	0.571	2.2	530.9	21.6	542.7	31.2	592.3	132.1
537	128	0.76	12659	16.6475	4.3	0.65774	6.4	0.079451	4.8	0.748	3.7	492.8	22.8	513.2	25.8	605.1	92.1
542	278	1.10	194561	16.8995	2.6	0.68048	4	0.083442	3	0.763	1.8	516.6	15	527.1	16.3	572.5	55.7
547	148	0.73	685895	17.0178	5.2	0.67836	6.4	0.083764	3.8	0.585	1.3	518.6	18.7	525.8	26.4	557.3	113.6
550	377	0.85	152592	16.9978	2.6	0.67569	4.5	0.083336	3.7	0.816	1.3	516	18.4	524.2	18.6	559.9	57.2
552	149	0.75	32268	17.3653	4	0.67978	6.2	0.085653	4.7	0.763	-0.51	529.8	23.9	526.6	25.3	513.1	87.6
557	925	0.68	142939	8.1854	2	5.92864	2.7	0.352119	1.9	0.677	1	1944.7	31.1	1965.4	23.8	1987.3	35.9
561	249	0.86	137989	17.2171	3.1	0.67109	4.5	0.083837	3.2	0.724	0.41	519	16.2	521.4	18.3	531.9	67.7
562	255	0.97	21914	16.909	3.1	0.66826	4.9	0.081989	3.8	0.775	2	508	18.7	519.7	20	571.3	67.7
566	233	0.67	114063	16.1673	3.7	0.83521	6.5	0.097977	5.4	0.829	1.9	602.5	31.2	616.5	30.2	668.1	78.4
568	223	0.77	38203	16.7704	3.5	0.68704	4.5	0.083603	2.7	0.612	2.5	517.6	13.7	531	18.5	589.2	76.9
569	231	0.65	141322	16.5563	4.1	0.68639	4.8	0.082457	2.5	0.519	3.8	510.8	12.3	530.6	19.9	616.9	89
571	900	0.47	238594	16.5255	3.1	0.79909	3.8	0.095817	2.2	0.576	1.1	589.9	12.3	596.3	17	621	66.7
574	498	0.78	558598	16.4204	1.7	0.81955	2.9	0.097646	2.4	0.825	0.97	600.6	14	607.8	13.5	634.8	35.9
576	221	0.28	18917	17.0769	4	0.72414	5	0.089727	3	0.6	-0.14	553.9	16	553.1	21.4	549.7	87.6
577	360	0.58	84776	16.5861	2.3	0.80118	4	0.09642	3.3	0.824	0.56	593.4	18.8	597.5	18.2	613.1	49.4
578	1320	0.39	144797	16.1679	2.8	0.87237	4	0.102341	2.9	0.721	1.3	628.1	17.3	636.9	19	668	59.4
581	62	0.81	2000	17.6486	20.6	0.63032	21.5	0.080717	6.2	0.29	-0.84	500.4	30	496.3	84.5	477.4	456
582	299	0.68	145524	16.8384	2.9	0.66215	4.1	0.080901	2.9	0.718	2.6	501.5	14.2	515.9	16.6	580.4	62
585	224	0.64	211583	17.0695	3.1	0.65413	4.3	0.081018	2.9	0.687	1.6	502.2	14.2	511	17.1	550.7	67.7
586	385	0.75	136150	16.9213	2.3	0.67556	4.5	0.082945	3.8	0.854	1.6	513.7	18.9	524.1	18.3	569.7	50.7
587	197	0.65	54103	16.742	5.4	0.69766	6.4	0.084751	3.5	0.548	2.4	524.4	17.8	537.4	26.8	592.9	116.6

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
589	120	0.65	92073	16.8359	4.6	0.74307	7.4	0.090774	5.8	0.782	0.62	560.1	30.9	564.2	31.9	580.7	99.8
592	1320	0.03	994758	10.7074	1.1	3.41789	2	0.265543	1.7	0.837	-0.67	1518.1	22.5	1508.5	15.6	1495	20.6
593	569	1.28	119459	16.5953	2	0.77454	3	0.093265	2.2	0.726	1.2	574.8	11.8	582.4	13.1	611.9	44.1
595	272	1.08	36072	16.6827	3.6	0.7734	5.6	0.093619	4.3	0.76	0.72	576.9	23.5	581.7	24.8	600.5	78.7
596	2067	0.06	436490	13.6991	1.9	1.72254	3.2	0.17122	2.6	0.804	-0.16	1018.8	24.6	1017	20.8	1012.9	39
600	193	0.66	67230	16.1228	4	0.79597	5.7	0.093117	4	0.714	3.3	573.9	22.2	594.6	25.4	674	84.6
602	1362	0.04	142940	15.1367	4.6	1.05389	6	0.11575	3.9	0.641	3.4	706.1	25.8	730.8	31.4	807.5	96.8
611	220	0.88	72072	17.215	2.9	0.66537	4.9	0.083112	3.9	0.805	0.53	514.7	19.4	517.9	19.7	532.2	63.2
Sample COL-472																	
1	177.8	1.23		16.4744646	2.30643	0.845	4.260355	0.1003	3.688933	0.6252	0.76	616	33.02806	621	29.671433	621	51.67751861
2	269	1.45		16.0513644	2.08668	0.853	4.103165	0.1009	3.964321	0.66613	0.87	620	33.825503	626	28.72955	677	46.24624579
3	100	0.85		16.4473684	3.45395	0.983	5.391658	0.119	5.210084	0.69299	1.9	724	46.726966	693	37.225938	616	77.09624085
4	180.2	1.03		15.9489633	3.66826	0.828	5.072464	0.0994	4.627767	0.50841	0.22	611	36.357094	611	32.538698	694	76.4069614
10	251	1.33		16.4744646	3.45964	0.854	5.971897	0.1026	6.530214	0.81685	-0.42	628	48.267529	624	37.520525	610	74.11866737
11	141	0.99		16.7504188	4.0201	0.857	6.067678	0.1039	5.197305	0.68035	-1.1	637	40.819153	630	33.571071	599	94.84036489
12	144	0.97		16.6944908	2.67112	0.884	5.20362	0.1072	4.384328	0.7662	0.12	656	38.392402	641	34.724934	610	59.40182534
14	237	1.00		15.9744409	3.51438	0.757	5.944518	0.0885	5.19774	0.57671	3.8	546	35.740567	570	34.658075	675	76.33164018
15	205	0.92		16.3666121	3.76432	0.816	5.392157	0.0987	5.572442	0.67666	-0.13	606	41.254971	604	33.668542	637	85.06155643
17	211	0.89		16.2601626	3.73984	0.843	4.626335	0.0998	5.11022	0.64013	1	613	38.982232	622	28.679865	663	79.23646794
19	171	0.79		17.0940171	3.58974	0.751	5.05992	0.0921	4.994571	0.62765	0.12	567	36.473144	567	31.177282	556	80.85003636
22	451	0.08		11.3250283	3.17101	2.78	5.035971	0.23	4.782609	0.76848	3.7	1344	67.145451	1351	48.911555	1386	65.80760718
24	32.7	0.58		16.3666121	4.25532	0.841	5.588585	0.1008	4.662698	0.50191	0.081	619	37.180269	621	31.749022	650	93.01004446
25	210	1.16		16.3666121	2.61866	0.852	4.342723	0.1009	4.162537	0.66197	0.8	619	35.645923	625	29.898594	642	59.5507921
27	81.9	0.67		17.1821306	2.92096	0.728	6.181319	0.0892	4.932735	0.78729	0.7	550	35.056838	553	34.833564	536	67.94165675
28	199.8	1.03		16.6112957	3.32226	0.867	5.420992	0.104	4.711538	0.6987	-0.5	637	39.178782	632	34.940627	607	72.13849212
29	102.1	1.10		16.3398693	3.10458	0.853	5.158265	0.103	4.951456	0.62198	-0.74	631	40.098486	627	31.117918	644	70.31667238
31	138.3	0.90		16.5289256	3.96694	0.828	5.917874	0.0992	5.544355	0.70254	0.37	609	41.243242	610	36.422389	601	84.94560797
33	178.4	1.04		16.5016502	2.9703	0.811	5.055487	0.0996	4.919679	0.74282	-1.2	612	37.88259	605	28.649673	621	68.26101324
34	155	0.71		16.7785235	3.02013	0.752	5.053191	0.0929	4.413348	0.69164	-0.47	572	34.086926	568	30.757949	576	65.13633295
36	93.9	0.99		16.4203612	3.61248	0.819	5.616606	0.099	5.757576	0.76552	-0.15	608	41.992546	606	34.170122	644	72.28024913
39	216	0.83		16.4203612	2.29885	0.884	4.864253	0.1056	3.787879	0.75953	1.9	647	34.981314	645	29.569387	646	49.88562447
41	191	0.99		15.8730159	3.01587	0.899	4.560623	0.1037	4.532305	0.64809	1.9	636	37.518896	650	31.886212	694	68.57130413
42	144.7	0.76		16.3398693	2.94118	0.874	5.034325	0.1048	5.248092	0.73405	0.4	642	41.633123	639	30.550155	632	67.32504764
43	267	0.26		10.460251	3.13808	3.51	5.128205	0.265	4.528302	0.67097	3.8	1513	85.650509	1525	57.535479	1537	69.03518603
44	1008	0.18		15.6494523	5.32081	0.847	7.792208	0.0991	7.467205	0.74329	1.8	608	50.994792	627	37.300747	720	120.9515778
45	83.9	0.72		16.7785235	3.52349	0.881	4.994325	0.1068	3.932584	0.5645	2.3	654	35.945358	646	27.333475	609	73.13027895
46	43.6	0.83		16.5016502	3.79538	0.811	5.67201	0.0971	3.913491	0.67454	0.87	597	33.165752	601	34.710122	619	85.00275904
47	52.2	0.65		17.7935943	4.09253	0.688	6.104651	0.088	5.227273	0.65279	-1.8	543	35.71741	529	33.766638	471	83.58898552
50	129.2	0.55		17.0648464	1.70648	0.737	4.613297	0.0911	4.061471	0.8366	-0.2	562	31.513704	560	28.361014	556	38.80371606
51	258	0.68		16.2337662	3.73377	0.859	5.587893	0.102	5.784314	0.73414	0.46	625	43.831711	627	36.000415	654	81.17373569
52	120.1	0.83		16.3398693	3.10458	0.891	4.489338	0.1043	4.2186	0.34002	0.94	639	36.831821	649	28.225425	648	63.48007703
55	103.8	0.87		16.8634064	4.04722	0.849	4.829211	0.1027	4.089581	0.32311	-0.81	630	35.432735	623	31.750918	555	88.77069896
56	213	0.74		16.5289256	2.80992	0.874	4.919908	0.1042	3.838772	0.71873	-0.16	639	34.605499	640	29.164734	612	62.34306549
57	457	0.97		16.0513644	2.08668	0.867	4.844291	0.1	3.8	0.77782	2.7	614	33.617931	632	32.980605	677	48.15303988
58	156	0.95		16.722408	2.50836	0.879	4.778157	0.1036	4.054054	0.77491	0.64	635	35.820387	639	32.491176	597	59.34338084
59	141	0.95		16.2337662	2.92208	0.892	4.484305	0.1031	3.976722	0.61469	1.9	632	35.420295	646	31.763643	670	62.60626869
62	119.4	1.23		16.8634064	2.69815	0.868	4.032258	0.1041	4.034582	0.6497	3.8	642	31.811867	634	28.964629	579	55.35588869
63	414	1.71		16.9491525	2.0339	0.782	4.219949	0.0947	3.801478	0.74629	0.46	583	31.883325	586	28.087861	562	45.55979889
64	80.3	0.89		16.6389351	2.99501	0.852	4.812207	0.1026	3.996101	0.64508	-0.51	629	35.425247	624	32.398933	593	68.15079999
66	106.4	0.76		16.5016502	3.30033	0.75	5.2	0.09	4.111111	0.68541	1.9	555	31.84909	567	31.015694	620	71.20405217
67	122	0.67		16.3132137	2.93638	0.858	4.545455	0.1014	4.43787	0.64195	0.84	622	36.906774	628	30.932727	648	67.39228576
69	63.5	0.72		16.5562914	3.1457	0.928	5.280172	0.1087	4.047838	0.68885	-1.2	665	37.081104	668	32.265483	615	72.16845496
71	102.2	0.86		16.5837479	3.15091	0.87	4.942529	0.1061	4.429783	0.49964	-0.2	650	37.838342	634	32.995074	604	69.17626181
73	207	1.05		16.5289256	2.64463	0.831	5.054152	0.1003	4.287139	0.70145	-0.27	616	35.465922	612	33.203665	623	61.4138938
74	69.9	0.69		16.025641	2.88462	0.836	4.545455	0.099	3.535354	0.67965	1.2	612	28.433324	616	30.426545	687	59.77246952
8	186	1.03		15.600624	3.12012	0.892	5.269058	0.1019	5.103042	0.81093	2.9	625	39.9845	650	30.408479	732	67.77160666
9	105	0.90		16	3.68	0.892	5.941704	0.1073	5.591799	0.70341	-0.47	656	44.790273	644	38.812713	671	83.20539641
pt2_1	402	0.46		16.6112957	3.65449	0.82	6.219512	0.0986	4.259635	0.7258	0.28	609	31.840473	607	35.854361	613	83.00722633
pt2_10	219.5	0.78		16.8918919	4.39189	0.863	7.300116	0.1032	5.523256	0.7788	-0.19	633	42.034993	630	41.571534	572	97.74308603
pt2_13	221.5	1.20		16.5837479	3.81426	0.832	6.490385	0.0993	4.431017	0.70979	0.68	610	35.892267	614	36.776925	624	90.95173385
pt2_15	131	0.85		17.3611111	4.34028	0.751	7.057257	0.094	5.319149	0.70429	-1.5	579	37.747189	570	34.860257	525	96.632845
pt2_16	167.1	0.98		17.1232877	3.93836	0.859	7.334109	0.1034	5.029014	0.7896	-0.72	634	39.933286	627	42.421522	542	91.71111965
pt2_19	366	0.93		16.6944908	4.67446	0.922	7.266811	0.1086	4.972376	0.53193	-1.5	664	41.760353	661	43.4855	582	100.7462898
pt2_2	489	1.47		15.7977883	5.05529	0.851	7.520564	0.101	6.138614	0.73048	0.66	619	45.315822	623	42.556973	707	111.0003568
pt2_21	118.6	1.83		15.576324	4.82866	0.876	6.96347	0.0993	5.639476	0.69538	3.9	610	41.310931	638	39.656195	761	92.39664813
pt2_24	149	1.15		16.3132137	5.0571	0.856	7.593458	0.1002	6.287425	0.64537	1.7	615	45.038569	625	43.701355	628	110.7900397
pt2_25	79.2	0.84		16.9491525	5.08475	0.717	7.810321	0.0885	4.858757	0.68014	0.4	546	34.370218	547	39.633465	566	110.642175
pt2_26	82.7	0.81		15.9235669	5.73248	0.848	7.429245	0.0994	5.130785	0.44066	1.8	611	38.589363	625	38.486298	660	130.7389093
pt2_27	471	0.79		16.0771704	4.01929	0.85	6.352941	0.0977	4.298874	0.66842	3.7	601	34.431541	624	36.616138	690	81.30544398
pt2_28	195	1.00		16.9779287	4.58404	0.904	6.30531	0.113	5.39823	0.39263	3.2	690	44.962066	653	37.829427	549	100.6643296
pt2_3	1110	0.27		12.4378109	3.48259	2.494	6.816359	0.2221	4.502476	0.86692	-1.4	1292	73.029086	1267	61.236696	1203	74.43177388
pt2_30	166	0.86		15.8478605	4.12044	0.844	6.872038	0.0972	5.864198	0.66938	3.2	597	42.235233	619	40.091004	733	93.28257408
pt2_32	122	1.18		16.6666667	4.66667	0.863	7.068366	0.1028	5.155642	0.52995	0.13	630	40.808348	633	37.688877	617	100.8383642
pt2_34	813	0.37		15.9489633	3.82775	0.904	6.30531	0.1032	5.426357	0.75739	2.7	633	41.569968	656	34.829427	688	84.25174339
pt2_37	296	1.32		16.2601626	4.22764	0.857	6.184364	0.1013	4.540967	0.53577	0.91	622	36.738152	627	36.99313	643	91.01024769
pt2_38	201	0.72		16.4473684	4.76974	0.875	6.857143	0.1015	6.009852	0.62088	2	623	43.810002	636	40.688047	611	100.8222044
pt2_39	304	1.16		15.8982512	4.45151	0.864	6.712963	0.1001	5.494505	0.6426	2.3	614	41.619226	630	39.918526	727	88.33325619
pt2_4	154.8	0.88		16.9779287	4.9236	0.863	6.604867	0.1054	5.218216	0.64221	0.7	646	41.202026	634	34.947709	541	110.5868458
pt2_40	91	0.51		16.286645	6.18893	0.885	7.683616	0.1045	6.124402	0.50928	0.39	640	46.082501	654	31.515166	630	130.6734315
pt2_41	363	0.49		15.8478605	3.80349	0.865	6.705202	0.1	5.2	0.72334	2.6	614	39.634412	634	36.456997	712	86.30884819
pt2_42	99.7	0.63		16.722408	5.35117	0.819	7.203907	0.1002	4.690619	0.42762	-1.2	615	37.588061	605	40.850343	569	120.5951778
pt2_43	203.8	0.85		16.9491525	4.40678	0.815	6.748466	0.1008	4.563492	0.64819	-2	619	36.744774	604	37.84386	566	99.71304276
pt2_44	130.3	1.07		16.6112957	4.98339	0.828	6.884058	0.0974	5.13347	0.46351	1.9	599	38.155557	611	38.902287	624	120.7154418
pt2_45	184	0.52		16.8350168	4.0404	0.874	6.407323	0.1037	4.532305	0.65521	0.24	636	37.518896	636	38.437639	578	87.84510618
pt2_46	104.7	0.52		16.1812298	4.69256	0.87	6.551724	0.1007	4.766634	0.44878	2.4	622	34.021441	634	38.715895	646	100.918658
pt2_47	231	1.23		15.8982512	3.97456	0.86	6.511628	0.0983	4.679552	0.74554	4	604	36.760344	632	34.897682	704	81.35850903
pt2_48	479	0.52		15.625	3.75	0.891	7.295174	0.1019	5.691855	0.83066	3	625	42.762972	651	36.369144	737	81.4876635
pt2_5	266	0.86		17.0940171	5.64103	0.787	7.878018	0.0974	5.646817	0.50581	-1.4	599	40.480078	589	40.480735	600	120.6616141
pt2_50	215	1.28		16.5289256	4.29752	0.877	6.49943	0.1034	4.932302	0.53508	0.69	634	39.484678	638	38.47067	619	96.87863049
pt2_51	306	0.78		15.8982512	4.45151	0.942	7.855626	0.1047	6.303725	0.77088	-1.8	641	47.236696	671	46.820484	707	101.0993532
pt2_54	193	1.21		16.7504188	4.52261	0.841	6.539834	0.1002	4.690619	0.52199	0.58	616	36.588061	619	37.141749	579	98.75360455
pt2_55	124.1	1.17		16.3666121	4.58265	0.812	6.527094	0.0941	4.357067	0.55627	3.7	579	34.328124	605	34.292596	650	95.97847868
pt2_56	195	1.47		16.5016502	4.45545	0.878	6.833713	0.1017	4.719764	0.56042	2.2	624	38.002902	638	40.291327	621	91.93239869
pt2_6	129.8	0.86		17.3611111	4.51389	0.868	7.02765	0.1086	4.880295	0.67101	0.46	664	41.31594	633	40.374062	516	96.61140149
pt2_7	232	1.03		16.1812298	5.82524	0.768	8.59375	0.0914	6.236324	0.56922	2.3	563	41.471576	577	43.737279	650	120.7761084
pt2_8	149.4	0.95		16.8918919	4.22297	0.929	7.427341	0.1109	5.229937	0.79658	0.87	678	43.187553	664	44.973632	570	88.81272809
pt2_9	113.3	0.54		17.4216028	4.18118	0.762	6.299213	0.0947	4.329461	0.54515	-1.2	583	33.946181	574	34.867404	514	90.646852
Sample COL-8005																	
2	149	0.66		16.7785235	4.36242	0.745	6.577181	0.092	5.217391	0.70003	-0.3	567	36.786503	568	31.547217	588	98.77712187
5	588	0.17		16.2074554	3.88979	0.879	7.281001	0.1027	5.258033	0.80907	1.5	630	40.668857	639	41.566087	656	85.12540261
6	100.6	0.75		16.8067227	4.53782	0.77	7.012987	0.0921	4.343105	0.55224	2	568	32.825916	578	38.167151	583	110.6812097
7	398	0.18		15.9489633	3.98724	0.995	5.929648	0.1142	4.640981	0.70366	0.51	697	41.485577	701	37.601209	689	84.2553577
8	196	1.03		16.025641	4.16667	0.903	6.20155	0.1054	4.26945	0.55119	1	646	36.818964	652	37.88672	685	89.17137693
9	146.1	0.63		16.2074554	4.86224	0.808	6.806931	0.0953	4.931794	0.57647	2.2	586	37.188866	600	37.961129	643	100.9101838

	Composition		Isotopic Ratios									Ages (Ma)					
ID	U (ppm)	U/Th	$^{206}Pb/^{204}Pb$[a]	$^{206}Pb/^{207}Pb$	Error (%)	$^{207}Pb/^{235}U$	Error (%)	$^{206}Pb/^{238}U$	Error (%)	error correlation	concordia distance (d_c)[b]	$^{206}Pb/^{238}U$	Error (Ma)	$^{207}Pb/^{235}U$	Error (Ma)	$^{206}Pb/^{207}Pb$	Error (Ma)
11	190	1.18		16.9204738	3.89171	0.839	6.078665	0.1026	3.996101	0.55511	-1.6	630	34.425247	618	35.326117	566	89.79248797
13	192	1.28		17.2413793	6.2069	0.738	8.130081	0.0933	6.430868	0.60386	-2	575	42.348573	568	32.749678	510	140.4102566
14	49.9	1.32		16.8634064	6.23946	0.733	7.366985	0.0883	4.07701	0.23827	2.1	545	31.119155	556	38.960001	560	140.4944937
15	128	0.67		16.286645	4.23453	0.768	6.119792	0.09	3.888889	0.17809	3.6	556	30.026631	578	33.85189	639	90.9977863
17	228	0.71		17.3913043	3.65217	0.75	6.133333	0.0931	4.081633	0.71413	-0.92	574	32.02793	567	34.068871	510	81.70703855
21	127	0.69		17.0648464	4.60751	0.889	6.411699	0.1074	4.189944	0.18935	-1.6	658	36.746824	645	37.876491	560	110.6286707
22	171	0.66		17.2711572	4.14508	0.761	7.095926	0.0929	4.413348	0.754	0.35	572	34.086926	576	35.047638	527	88.6951933
23	105	0.90		16.3398693	4.57516	0.74	7.432432	0.0875	4.457143	0.68896	4.1	541	31.539244	564	35.481987	653	110.8539458
24	122	0.86		16.4473684	4.60526	0.759	6.192358	0.0904	4.20354	0.2974	2.4	558	31.691918	573	33.698387	654	100.9414452
26	239.9	0.70		16.722408	3.67893	0.72	5.972222	0.0873	3.894616	0.53288	1.9	539	30.219062	550.5	31.731424	599	76.05060691
27	190	1.14		16.7785235	4.36242	0.828	6.400966	0.0989	4.448938	0.54298	0.67	608	35.492023	611	37.141359	595	95.82057412
28	104	0.90		16.8918919	4.39189	0.753	6.108898	0.09	4.222222	0.36245	2.2	556	31.268832	569	33.79934	585	95.79333682
29	117.7	0.54		17.211704	4.30293	0.748	6.684492	0.0911	4.17124	0.63594	0.86	562	31.930497	569	32.739015	527	93.65808729
31	95.3	0.73		17.3913043	4.34783	0.766	6.788512	0.0933	4.71597	0.65917	0.39	575	34.809857	576	36.971072	517	100.5893622
32	147.5	0.78		16.6944908	4.00668	0.774	6.330749	0.0919	4.352557	0.54469	2.4	566	33.617125	581	35.162557	599	85.92842843
33	142.4	1.11		17.2413793	3.7931	0.757	6.076618	0.0921	3.908795	0.60254	0.71	568	31.158972	572	33.102239	538	78.81636103
36	81	1.02		17.3310225	4.50607	0.732	6.420765	0.0905	3.756906	0.32337	-0.12	558	30.658577	557	34.08554	500	100.5513451
37	214.9	0.95		17.0068027	3.91156	0.749	6.275033	0.0898	4.008909	0.56654	2.2	557	28.222036	569	31.942672	560	81.85171208
45	209	0.75		16.3132137	4.40457	0.831	6.618532	0.0978	5.112474	0.7511	1.8	601	38.553024	616	34.665446	632	93.94499476
50	115	1.13		16.9779287	4.41426	0.865	6.358382	0.1048	4.198473	0.40358	-1.3	643	35.819298	631	38.170108	545	97.67482675
51	170	0.70		16.5837479	4.47761	0.768	7.291667	0.0904	4.535398	0.47907	3.4	558	32.979363	581	34.963117	616	89.937925
53	194	2.33		16.2601626	3.57724	0.847	6.257379	0.0986	4.056795	0.76755	2.9	606	34.008781	622	36.553853	667	78.26730381
54	221.8	1.00		16.2074554	3.88979	0.823	6.075334	0.098	4.285714	0.58334	1	602	35.234942	609	35.084226	654	83.14550719
55	239	1.39		16.6666667	4	0.819	6.227106	0.0987	4.255319	0.59487	0.1	606	35.441229	609	33.300328	615	86.9671541
56	212	0.64		17.7935943	4.09253	0.705	6.382979	0.0895	4.581006	0.58323	-1.7	552	33.533465	541	33.297247	448	91.48644585
57	186.7	0.55		16.9491525	3.72881	0.743	6.460296	0.0925	4.756757	0.71333	-0.94	570	34.986148	563	34.931399	560	81.85171208
58	800	0.70		16.3398693	3.75817	0.894	6.375839	0.1061	5.089538	0.79027	-0.2	650	40.910737	648	37.534141	666	85.15973973
59	128.9	0.95		16.7785235	4.69799	0.818	6.601467	0.1004	4.98008	0.63841	-1.4	617	38.118478	609	34.060308	569	100.7134395
61	174	0.95		16.1550889	3.71567	0.844	6.042654	0.1016	4.035433	0.5386	-0.35	624	34.431588	621	35.064663	663	80.22105616
62	88.6	0.63		12.2850123	3.6855	2.372	5.902192	0.2105	4.085511	0.62466	0.21	1235	62.103536	1232	54.323603	1233	74.64858781
Sample BEN-165																	
1	178	0.61		16.3666121	3.92799	0.786	6.361323	0.0913	4.052574	0.50883	4.2	565	29.724834	588	35.405852	643	80.14901862
3	637	0.73		16.8918919	3.5473	0.741	5.937922	0.09	3.888889	0.67531	1.3	555	31.026631	562	32.960398	578	81.90703682
4	644	0.56		16.9204738	3.38409	0.736	6.11413	0.09	4.444444	0.78182	0.75	556	32.124214	564	28.501586	566	75.9387312
5	164.9	0.53		16.3398693	4.41176	0.771	6.485084	0.0901	3.884573	0.468	4	556	30.633287	579	35.906094	646	99.92785161
8	131.6	0.58		16.3132137	4.0783	0.747	6.425703	0.0894	4.138702	0.67264	2.5	552	31.211426	566	34.243126	658	81.18803184
10	239	0.59		16.4473684	3.78289	0.748	6.283422	0.0899	4.004449	0.69058	2.1	555	30.828514	568	32.365374	632	79.12434543
11	129.1	0.46		17.1526587	4.28816	0.747	7.095047	0.0912	4.057018	0.40725	0.63	562	32.119293	565	37.562754	543	100.6499347
12	260	0.87		16.286645	3.58306	0.759	6.192358	0.0896	4.017857	0.68109	3.6	553	31.008937	573	33.698387	655	82.16297418
17	301	0.60		16.4744646	3.78913	0.808	6.435644	0.0969	4.540764	0.68669	0.78	596	35.479538	600	36.626403	628	78.12447048
20	197	0.58		17.0357751	4.08859	0.728	6.318681	0.0906	4.304636	0.54551	-0.59	559	32.326696	554	34.29156	555	83.81668684
22	555	0.36		16.9779287	3.73514	0.769	6.111834	0.0935	3.850267	0.63941	0.49	578	29.629954	578	34.422955	565	80.87762771
23	600	0.52		16.6944908	3.50584	0.741	6.207827	0.0889	4.386952	0.78782	2.4	549	32.029497	562	33.860417	594	76.03325943
24	135.8	0.45		16.9779287	4.75382	0.754	6.763926	0.0932	4.72103	0.55113	-0.6	574	35.207057	570	35.65057	548	100.6619196
25	521	0.72		16.286645	3.90879	0.798	6.516291	0.0938	4.157783	0.73229	3.1	578	32.672661	597	34.042006	650	87.0796668
26	213	0.78		17.3010381	3.97924	0.753	5.976096	0.0928	4.094828	0.43799	-0.32	572	32.214525	569	33.353297	532	93.67058904
28	116	0.41		16.286645	4.72313	0.763	6.815203	0.0891	4.152637	0.38492	4.2	550	31.391953	574	37.260983	648	100.924329
30	499	0.69		16.5837479	3.48259	0.755	5.960265	0.0905	3.756906	0.71722	2.3	558	30.658577	572	31.506314	610	75.10377389
32	426	0.84		16.68335	3.33667	0.762	6.036745	0.0923	4.225352	0.83151	1.1	569	32.610267	574	33.97383	597	74.07183574
33	389	0.58		16.3666121	3.60065	0.745	6.040268	0.0886	4.288939	0.69201	3	547	31.782077	565	32.728621	637	78.15669122
36	429	0.93		16.9204738	3.5533	0.742	6.199461	0.0914	3.829322	0.48419	-0.039	564	30.515472	563	33.440402	565	78.89987746
41	195	0.76		16.722408	3.84615	0.746	6.032172	0.0928	3.987069	0.59785	-0.98	572	31.802247	565	33.307812	587	86.88152918
43	509	0.61		16.4203612	3.61248	0.773	6.338939	0.0924	4.220779	0.66555	1.9	569	33.214758	580	35.593937	630	78.13159217
48	221.2	0.65		16.6944908	4.00668	0.744	6.182796	0.0907	4.29989	0.61115	0.81	559	32.93199	564	33.599418	600	85.93151413
50	288	0.82		16.9204738	3.5533	0.745	6.040268	0.0921	4.234528	0.70624	-0.42	568	32.401144	567	30.728621	564	77.90822367
51	520	0.62		16.5562914	3.47682	0.736	6.25	0.0897	4.236343	0.7456	1.1	553	32.451021	560	32.955718	611	77.07864096
54	427.3	0.55		16.1030596	3.86473	0.786	6.10687	0.0916	4.039301	0.5435	3.9	565	31.541174	588	34.521635	677	85.19809417
55	167.9	0.77		16.6389351	3.82696	0.715	6.153846	0.0865	4.16185	0.59816	2.2	534	31.181596	547	32.742891	605	89.9048938
57	242	0.65		16.9779287	4.0747	0.721	6.241331	0.0895	4.022346	0.58759	-0.22	552	31.402316	551	32.732095	552	88.76242528
58	212.6	0.75		16.9779287	3.56537	0.704	6.392045	0.0868	4.37788	0.69629	0.79	537	30.856955	542	31.70477	574	79.91698567
59	150.4	0.65		16.9779287	4.0747	0.728	6.181319	0.089	3.932584	0.4657	0.95	550	29.957432	555	32.833564	552	88.76242528
60	306	0.89		16.6112957	3.48837	0.706	5.949008	0.0869	3.797468	0.67807	0.93	537	29.381022	541.7	31.803726	607	75.09302261
61	145.6	0.80		16.6666667	4.33333	0.717	6.136681	0.0874	3.89016	0.33672	1.4	540	29.82729	548	32.921265	612	94.87706685
62	197	1.03		16.722408	4.01338	0.723	6.085754	0.0867	3.921569	0.51781	2.8	536	29.568695	552	32.448538	586	85.88877286
63	393	0.73		16.8634064	3.54132	0.705	5.815603	0.0869	3.797468	0.61502	0.79	537.3	29.081022	541.7	30.755165	580	75.98543958
64	537	0.91		16.7504188	3.35008	0.728	5.906593	0.0885	4.067797	0.6717	1.4	546	31.33349	556.7	30.227987	595	78.01014309
67	477	0.94		16.025641	3.84615	0.786	6.234097	0.0927	4.422869	0.69257	2.8	571	33.879401	591	31.962246	679	83.23409605
68	218.5	0.65		17.0357751	3.74787	0.718	6.267409	0.0895	4.134078	0.53457	-0.51	552	31.817822	549	32.969449	548	82.80593008
71	522	1.03		16.5289256	3.63636	0.752	6.515957	0.091	4.615385	0.74267	1.3	561	34.045255	568	35.581769	624	73.18618647
72	790	1.00		16.3934426	3.77049	0.733	6.821282	0.0881	4.880817	0.83118	2.5	544	33.948794	557	36.062685	633	84.06082048
74	410	0.80		16.2074554	4.21394	0.74	5.945946	0.0883	4.416761	0.48741	2.6	545	32.391945	564	30.379137	660	90.07587022
75	541	0.81		16.9750467	3.39501	0.766	5.874674	0.0938	3.624733	0.65179	-0.086	577.8	30.854014	576.9	32.925536	565	75.93543747
77	425	0.96		16.5837479	3.81426	0.758	6.200528	0.0902	4.21286	0.67587	2.7	556	32.480469	572	34.124222	624	78.11029311
78	200.1	1.02		16.8350168	3.7037	0.728	6.043956	0.0893	3.919373	0.44016	0.64	551	30.778693	555	32.378985	581	77.96345637
79	291	0.84		17.1526587	3.60206	0.735	5.85034	0.0912	3.947368	0.54869	-0.5	562	31.708394	559.2	31.820456	541	83.77619271
81	536	0.69		16.3398693	3.43137	0.761	5.913272	0.0907	4.079383	0.62488	2.4	560	31.090873	574	32.957842	647	79.17794776
82	248.5	0.75		16.7785235	4.36242	0.737	6.51289	0.0904	4.09292	0.57778	0.46	557	32.273251	560	34.454315	572	95.75860727
83	130	1.05		17.3310225	3.98614	0.713	6.31136	0.0889	4.386952	0.70125	-0.41	549	32.029497	546	33.025173	519	90.65945188
85	310	0.77		16.8634064	3.54132	0.758	6.068602	0.094	4.468085	0.83763	-0.99	579	34.154732	575	30.677181	571	76.94287053
86	160.3	0.55		16.2601626	4.22764	0.761	6.30749	0.0898	4.342984	0.4181	3.2	554	32.482651	573	35.294634	666	90.09540094
90	263	0.91		16.1550889	4.20032	0.78	6.282051	0.0901	4.328524	0.46241	4.6	556	32.299521	585	34.567868	670	94.06138888
92	758	1.03		16.5562914	3.47682	0.744	5.913978	0.0897	3.790412	0.63261	1.9	555.5	28.303303	564.2	32.502269	621	78.09971786
93	181	0.62		16.1550889	4.03877	0.776	6.314433	0.0918	4.248366	0.3674	2.6	566	32.587104	585	32.29888	658	90.06939832
94	627	0.75		16.1812298	4.04531	0.778	6.298201	0.0921	4.234528	0.52631	2.6	568	32.401144	586	32.433982	658	83.15946437
99	335	0.65		16.8918919	3.37838	0.75	6.4	0.0919	4.134929	0.84776	0.3	566	32.771747	567	34.973614	581	75.98881845
100	214.3	0.55		16.9204738	4.06091	0.712	6.460674	0.088	4.090909	0.54299	0.38	543	31.297295	545	33.901166	558	88.7790167

Notes:

[a]The $^{206}Pb/^{204}Pb$ ratios were not provided for data acquired in Dr. David Barbeau's lab at the University of South Carolina

[b]Concordia distance (d_c) was calculated using IsoplotR (Vermeesch, 2018), and we discarded analyses outside of the range $-2 < d_c < 4.6$ (Vermeesch, 2021).

UNC Chapel Hill sample NC-18-02 / NCGS Station Coleridge-458
Analysis by UNC - Chapel Hill Laboratory (R. Mills)

	Dates (Ma)								Composition					Isotopic Ratios							
Fraction	206Pb/ 238U <Th> a	±2σ abs	207Pb/ 235U b	±2σ abs	207Pb/ 206Pb b	±2σ abs	Corr. coef.	% disc c	mass U(ng)	Th/ U d	Pb* (pg) e	Pbc (pg) f	Pb*/ Pbc g	206Pb/ 204Pb h	206Pb/ 238U i	±2σ %	207Pb/ 235U i	±2σ %	207Pb/ 206Pb i	±2σ %
Zircon																					
F-1	550.0635519	2.439263141	549.5755379	6.492360744	547.8764099	29.65827061	0.501840145	-0.384966691	0.128090794	0.773456668	12.7512602	1.066251227	11.95896415	699.2498515	0.08906171	0.462712553	0.718152299	1.529740747	0.058482274	1.357471202
F-2	550.7495972	1.331821545	549.7515623	3.303492151	545.9395623	13.6264625	0.713713262	-0.866839686	0.330483075	0.78666818	33.04520433	0.893138528	36.99896856	2117.653053	0.089177682	0.252334199	0.718450179	0.778186436	0.058430446	0.622821422
F-3	552.6164437	2.506320134	554.6609555	6.638452829	563.3825574	29.93945216	0.508784323	1.924783455	0.108968561	0.780058252	10.92076824	0.971645098	11.23946209	657.1004629	0.08949312	0.47332788	0.726779032	1.553357219	0.058899481	1.373953066
F-4	552.7898278	1.763367204	551.865894	9.799579869	548.3748202	46.14887725	0.615985842	-0.790951779	0.197821568	0.785349617	19.85106963	2.154807026	9.212458188	541.4634904	0.089522449	0.332929358	0.722032236	2.301771644	0.058495621	2.112783645
F-6	554.0382735	1.957974107	554.9998874	9.761627265	559.2747533	45.31873742	0.609735393	0.950579641	0.188171129	0.706303529	18.5720049	2.656033346	6.992383937	423.0681842	0.089733093	0.368879822	0.727355522	2.28311245	0.058788561	2.078604661
F-7	543.4163491	2.620696983	544.5703232	13.94069696	549.7329342	67.29242701	0.509348568	1.163366471	0.152615348	0.747518838	14.90902314	3.103880809	4.803349114	293.7260492	0.087939166	0.502974564	0.709703704	3.307488606	0.058532012	3.081676669

a Corrected for initial Th/U disequilibrium using radiogenic 208Pb and Th/U[magma] = 3.50000.
b Isotopic dates calculated using λ238 = 1.55125E-10 (Jaffey et al. 1971) and λ235 = 9.8485E-10 (Jaffey et al. 1971).
c % discordance = 100 - (100 * (206Pb/238U date) / (207Pb/206Pb date))
d Th contents calculated from radiogenic 208Pb and 230Th-corrected 206Pb/238U date of the sample, assuming concordance between U-Pb Th-Pb systems.
e Total mass of radiogenic Pb.
f Total mass of common Pb.
g Ratio of radiogenic Pb (including 208Pb) to common Pb.
h Measured ratio corrected for fractionation and spike contribution only.
i Measured ratios corrected for fractionation, tracer and blank.