PROVENANCE AND TECTONIC EVOLUTION OF THE PRE-MESOZOIC CAPARO BLOCK AND MERIDA TERRANE IN THE VENEZUELAN ANDES

by

JOSÉ HUMBERTO DUGARTE NEWMAN

(Under the Direction of James E. Wright)

ABSTRACT

2085 U/Pb detrital zircon ages were obtained from 22 samples of pre-Mesozoic strata of the Venezuelan Andes collected in the Caparo area (Bella Vista Association, and Caparo-El Horno formations), Merida Terrane area (Iglesias Complex and Mucuchachi Association), and Permian SupraTerrane (Sabaneta-Palmarito formations). A single, pre-Mesozoic Venezuelan Andean block model is proposed based on four lines of evidence: 1) Early Paleozoic, Neoproterozoic, and Mesoproterozoic detrital zircon populations are common to the studied strata and indicate Gondwanan provenance; 2) No high pressure metamorphic rocks that suggest a collision between blocks have been reported; 3) Paleozoic magmatism is found throughout the entire orogen; 4) No Silurian deformation is found, suggesting no participation of the Venezuelan Andes in the closure of Iapetus. The Venezuelan Andes may be correlative to pre-Mesozoic strata of the Eastern Colombian Andes, and the Maya Block, but no connections seem to exist between the Venezuelan Andes, Acatlan, and Oaxaquia.

INDEX WORDS: U/Pb detrital zircon provenance, Venezuelan Andes, Caparo Block, Merida Terrane, geochronology, South America, Oaxaquia, Acatlan, Maya Block

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JOSÉ HUMBERTO DUGARTE NEWMAN

Major Professor: James Wright

Committee: Sandra Wyld

Douglas Crowe

Maureen Grasso
Dean of the Graduate School
The University of Georgia
May 2012

DEDICATION

To my parents, Alba and Humberto

To my sister Alba Natalia, and my niece Natalia Sofia

To Yerli Gutierrez

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CHAPTER 1

INTRODUCTION

PURPOSE OF STUDY

The Venezuelan Andes form a complex northeast trending orogen that constitutes the northwestern termination of the South American plate (Bermudez et al., 2011; Colletta et al., 1997), extending 400 km from the Colombia-Venezuela border to south of Barquisimeto (figure 1.1) The Venezuelan Andes were formed as a result of oblique convergence between the Caribbean and South American plates, accretion of the Panamá arc, and rotation and translation of the continental Maracaibo block (Aleman and Ramos, 2000; Pindell and Kennan, 2001; Audemard and Audemard, 2002; Bermudez et at., 2010). The reactivation of faults associated with preexisting tectonic discontinuities of different ages and origins, mostly developed prior to the establishment of a passive margin after the breakup of Pangea in the early Mesozoic, has played an important role in the evolution of this orogen (Bermudez et at., 2010; Jacques, 2004; Mora et al., 2009). Oblique plate convergence resulted in local thrusting, rotation, translation, and extension along these structures, which led to exhumation of individual blocks at different times and rates from the late Eocene to the Pliocene (figure 1.2) (Bermudez et at., 2010; Shagam et al., 1984; Kohn et al., 1984; Lugo and Mann, 1995). The structure of the Venezuelan Andes is controlled by a complex system of strike-slip and thrusts faults. The two main systems are the dextral Bocono and Caparo fault systems, which accommodate the displacement for up to ~500km parallel to the orogen (figure 1.2) (Bermudez et al., 2010).

The Venezuelan Andes have been proposed as a source area for the Cretaceous passive margin suite that was deposited in northern South America after the breakup of Pangea (Noguera et al., 2011). Additionally, some studies have proposed that part of the pre-Mesozoic metamorphosed strata that is located in the Merida Terrane area might represent a remnant of the peri-gondwanan Maya Block that was left behind in northwestern Gondwana after the separation of Laurentia and Gondwana in the Early Mesozoic (Marechal, 1983; Bellizzia & Pimentel, 1994; Aleman & Ramos, 2010; Pindell et al., 2005). However, very little is known about the pre-Mesozoic geology of the Venezuelan Andes, except some mapping of the central Venezuelan Andes (Kovisars, 1971; Schubert, 1969) and some limited U-Pb multigrain zircon dates that have yielded equivocal or uninterpretable results (Burkley, 1976).

Currently, most of northern South America is covered by a thick Mesozoic to Cenozoic passive margin suite deposited after Pangea's breakup and the only exposures of pre-Mesozoic rocks in northern South America are located in four main areas. The first is the the Colombian Santa Marta massif, which is already undergoing some studies carried out by Horton et al., 2010, and Cardona et al., 2010. The second is the Perija Range, which is a poorly known orogenic belt located along the border between Colombia and Venezuela. Problems of accessibility caused by extensive vegetation and military conflicts in the area limit the possibility to study this range. The third is the Cordillera de La Costa and Eastern Massif, which are located in northeastern Venezuela, and represent a complex accretion belt formed by several juxtaposed allochthonous terranes that were accreted during the Caribbean – South America interaction. These mountain ranges, however, lack extensive outcrops due to the extensive tropical vegetation, and minimal exposures of pre-Caribbean rocks. The fourth area is the Venezuelan Andes, which is well suited

to carry out field work due to its extensive barren areas with excellent exposure above 3000 m as well as easily accessible Paleozoic strata in the foothills.

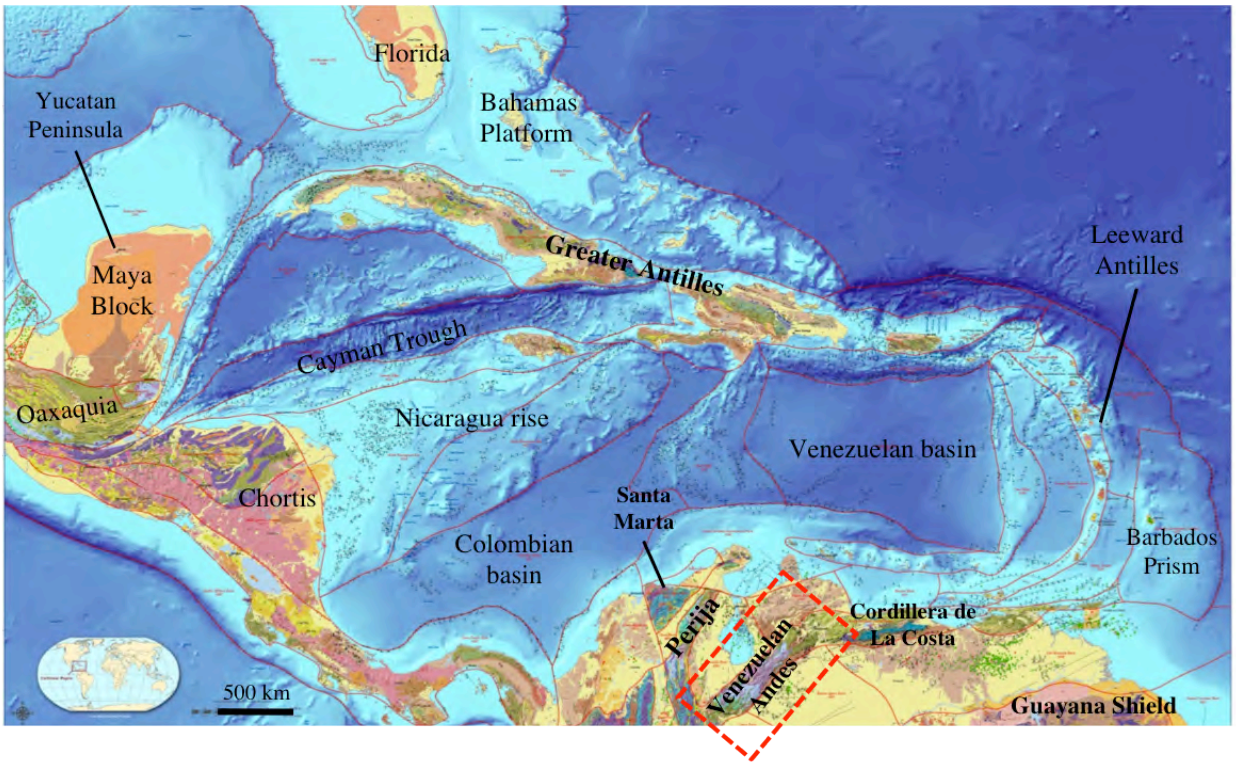

Figure 1.1 Location of the Venezuelan Andes. Modified from French & Schenk (2004).

Global tectonic reconstructions of Rodinia and Pangea place the northern margin of South America in a very active role during the Phanerozoic, especially as a source area for southern Laurentian allochthonous terranes (figure 1.3). For example, the presence of detrital zircon ages in Paleozoic strata of the Grenvillian Oaxaquia terrane in Mexico suggest a source region for this block in northern Gondwana, southwestern portions of the Amazon craton and/or the crystalline basement massifs in the northern Andes (Gillis et al., 2005; Keppie et al., 2008). Also, the existence of Gondwanan fauna of Silurian age has been described in Silurian clastic rocks in Oaxaquia (Keppie et al, 2010). On the other hand, the Acatlan (Mixteca) complex of Mexico is

believed to have formed either as a remanent of the collision between Gondwana and Laurentia at the end of the Ordovician related to the closure of the Iapetus ocean along the Appalachian margin (Ortega-Gutierrez et al., 1999) or during a rifting event at ca. 480 Ma contemporaneous with the separation of peri-Gondwanan terranes, such as Avalonia and Carolinia, from Amazonia–Oaxaquia, during the opening of the Rheic Ocean (Keppie et al., 2008). Finally, most of the paleogeographic reconstructions of the Maya (Yucatan) block locate this block between the northwestern Amazonian side of Gondwana's periphery and Laurentia prior to the breakup of Pangea (figures 1.1 and 1.3) (Pindell et al., 2005, Weber et al., 2006, Weber et al., 2008b).

The goal of the present study is to improve regional tectonic reconstructions of northwestern South America through a provenance analysis of the pre-Mesozoic strata as it is exposed in the Venezuelan Andes. Additionally, this study will provide a geologic framework for this region to establish its role in the active Paleozoic tectonism of northwestern Gondwana. The objective of this is that comparisons with peri-Gondwanan terranes (e.g. Oaxaca, Maya, and Acatlan terranes of Mexico), which are believed to have been derived from this region during the breakup of Pangea, can be more quantitatively assessed. A secondary goal is to expand the database concerning the temporal and spatial configuration of basement rocks in the Venezuelan Andes. We present 2085 zircon U-Pb ages generated by laser ablation–inductively coupled plasma–mass spectrometry (LA-ICP-MS) analyses. These detrital zircon ages shed light on source areas for the units located in the: a) Caparo Block area (Bella Vista Association, Caparo and El Horno formations); b) Merida Terrane area (Iglesias Complex, Mucuchachi, Tostos, and Rio Momboy associations); and c) Permian SupraTerrane (Sabaneta and Palmarito formations).

STUDY AREA

The Venezuelan Andes, also known as Cordillera de Los Andes Venezolanos or Merida Andes, is the northern extension of the Andes Mountains in northern South America (figure 1.1). The Venezuela Andes are an elongate, northeast-trending mountain range, which extends about 400 km between the Venezuelan-Colombian border in the state of Tachira, to the southwestern part of the state of Lara in western Venezuela.

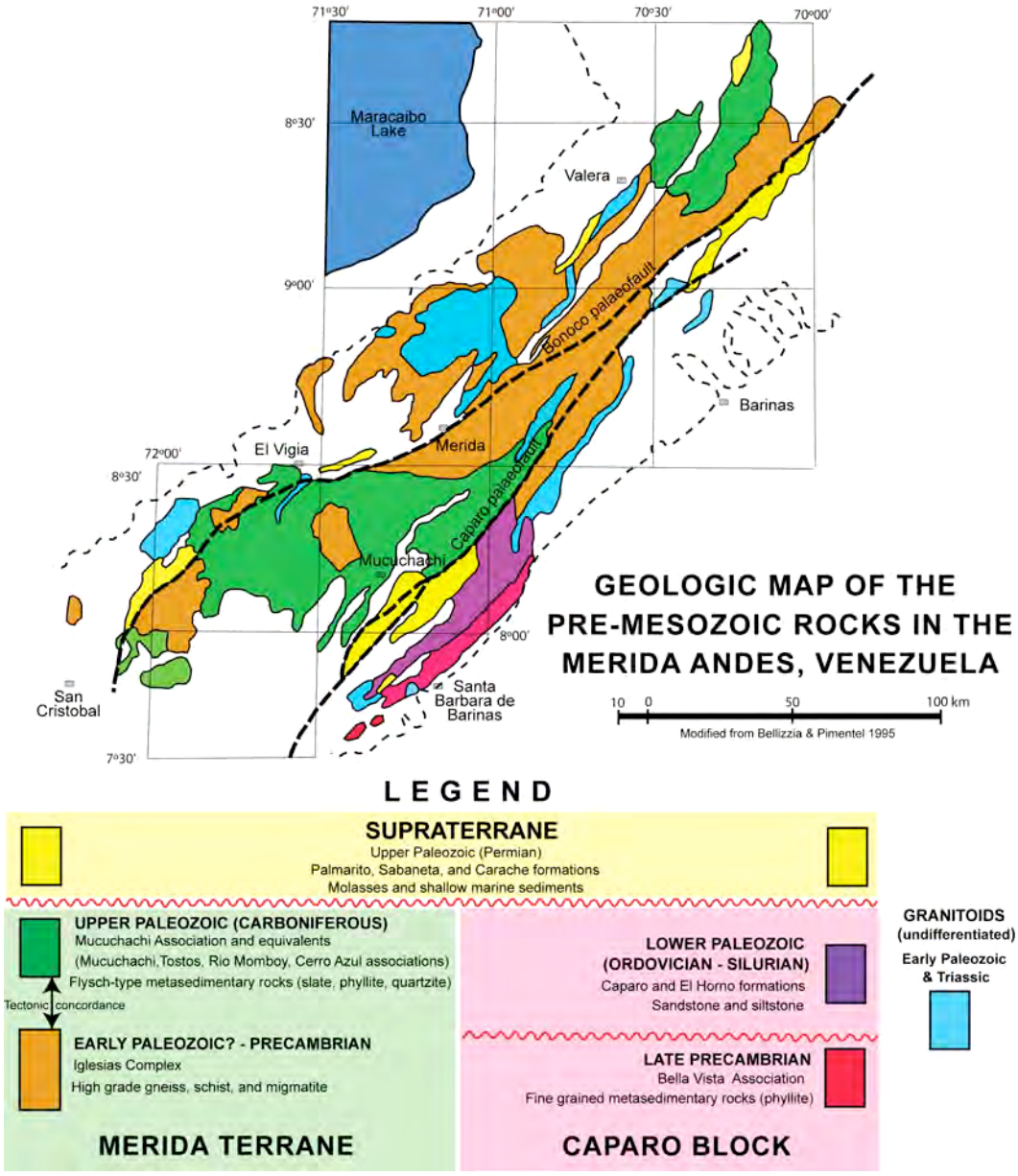

Figure 1.2 Pre-Mesozoic Geology of the Venezuelan Andes (after Bellizzia & Pimentel, 1994)

The study area for this project contains all the exposures of pre-Mesozoic sedimentary and metasedimentary rocks located throughout the entire mountain range. The Caparo Block area, located in the southeastern part of the mountain range (figure 1.2), contains exposures of the late Precambrian Bella Vista Association, and the Ordovician-Silurian Caparo and El Horno formations. The rest of the mountain range (referred in this work as the Merida Terrane area) contains the metasedimentary Upper Paleozoic Mucuchachi Association, which tectonically overlies the igneous-metamorphic Iglesias Complex (Marechal, 1983). The SupraTerrane is found on both sides of the Caparo palaeofault unconformably covering the strata of the two older areas.

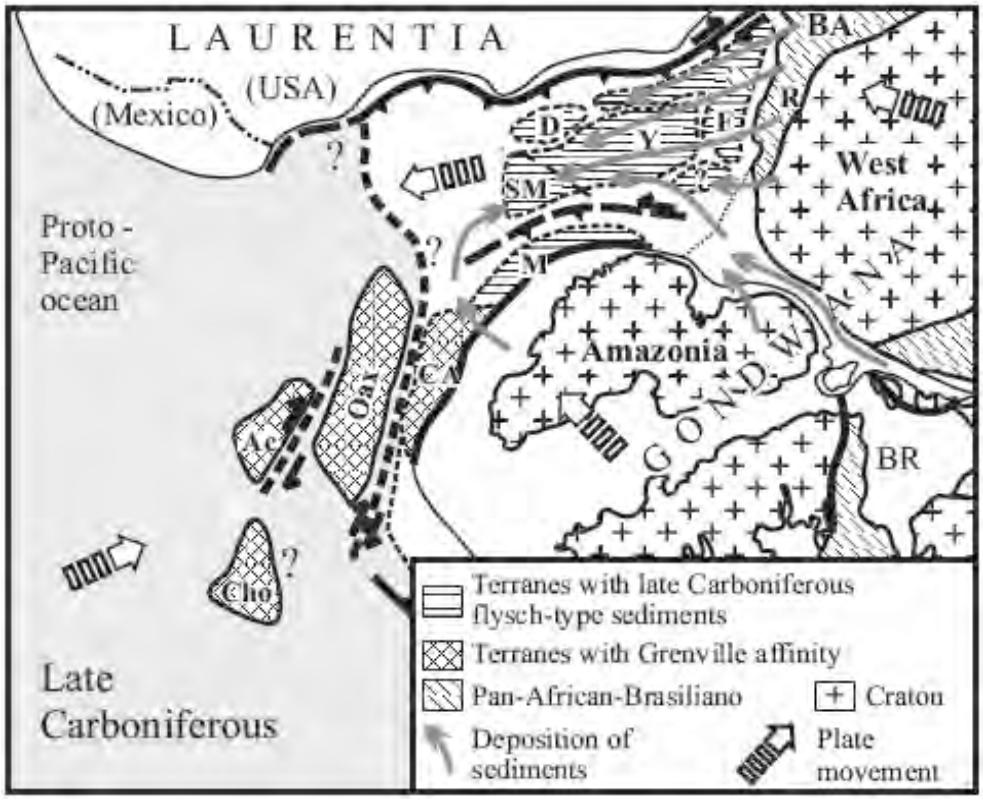

Figure 1.3 Late Paleozoic geotectonic reconstruction of northwest Gondwana showing Proterozoic and Paleozoic crystalline blocks of Mexico and northern South America. Note the position of the Maya block, Merida Terrane (Venezuelan Andes) and other blocks relative to Late Paleozoic flysch-type sediments. Abbreviations are Ac: Acatlan Complex; BA: Bassarides-Mauritanides; BR: Brasiliano belts; Chis: Chiapas Massif protoliths; Cho: Chortís block; CA: Colombian Andes; D: Delicias basin; F, Florida; M: Merida terrane; SM: Southern Maya block; R: Rokelides; Y: Yucatán. (Modified from Weber et al, 2006).

METHODS

The provenance of sandstones and metamorphic rocks from sedimentary protoliths as determined by U-Pb detrital zircon geochronology has become a powerful tool in tectonic reconstructions for western Pangean terranes (Ortega-Gutierrez et al., 1999; Gillis et al., 2005; Keppie et al., 2008). Samples from 22 sedimentary and metasedimentary units from the pre-Mesozoic strata of the Venezuelan Andes were collected, processed, and analyzed for U-Pb geochronology LA-ICP-MS following the methods and analytical protocols of Gehrels et al. (2008). Zircon grains were separated by standard density and magnetic separation techniques, selected randomly, and then mounted into epoxy pucks that were ground and polished to expose grains. Once the samples were mounted, locations of 30–40 μm diameter on individual zircon grains were identified using photomicrograph and/or cathodoluminescence (CL) images obtained for every sample. Interpreted ages are based on $^{206}Pb/^{238}U$ for grains < 1.0 Ga., and on $^{206}Pb/^{207}Pb$ for grains > 1.0 Ga. This division at 1.0 Ga results from the increasing uncertainty of $^{206}Pb/^{238}U$ ages and the decreasing uncertainty of $^{206}Pb/^{207}Pb$ ages as a function of age. The resulting interpreted ages for the detrital zircons are shown on relative age-probability diagrams (from Ludwig, 2003). These diagrams show each age and its uncertainty (for measurement error only) as a normal distribution, and sum all ages from a sample into a single curve. Further information about the analytical procedures followed in this work is located in Appendix B.

In addition to the detrital zircon geochronology analyses, conventional petrographic characterization of all the collected samples was also performed on thin sections in order to classify the rocks, estimate their mineralogical composition, and infer the protolith for the metamorphic samples.

CHAPTER 2

PREVIOUS WORK AND GEOLOGIC SETTING

PRE-MESOZOIC GEOLOGY OF THE VENEZUELAN ANDES

Numerous authors, including Marechal (1983), Bellizzia & Pimentel (1994), and Aleman & Ramos (2000), have postulated that the pre-Mesozoic geology of the Venezuelan Andes consist of two different terranes that were juxtaposed in the Late Carboniferous – Early Permian during the Hercynian (Alleghanian) Orogeny. These blocks were subsequently covered with Permian mixed siliciclastic-carbonate marine strata (figure 1.3). The autochthonous undeformed terrane, known as the Caparo Block, consists of a pre-Ordovician metamorphic basement (Bella Vista Association) overlain by clastic Ordovician-Silurian strata (Caparo and El Horno formations) that was juxtaposed with the allochthonous Merida Terrane (high grade gneiss and schist of sedimentary provenance from the Iglesias Complex overlain by phyllite and metasandstone from the Mucuchachi Association) in the Late Carboniferous. Permian marine mixed siliciclastic-carbonate sequences (Palmarito, Sabaneta and Carache formations) overlie the two terranes and represent the "SupraTerrane" that constrains the upper age of the juxtaposing event (figure 1.3).

Geotectonic reconstructions of NW Gondwana during the closure of the Rheic Ocean consider the Merida Terrane as a remnant of the southernmost part of the Maya (Yucatan) Block that was located on the northern margin of South America during the opening the Gulf of Mexico (figurez 1.1 and 1.2) (Marechal, 1983; Bellizzia & Pimentel, 1994; Pindell et al., 2005).

CAPARO BLOCK

This domain is located along the southeastern flank of the Andean mountain range (figure 1.3). The Caparo block area is believed to have been formed by a metamorphic Pre-Ordovician (Precambrian?) basement (Bella Vista Association) overlain by a non-deformed Ordovician-Silurian clastic sequence (Caparo and El Horno formations). The Bella Vista Association, is dominated by quartz-chlorite-muscovite phyllite (Figure 2.1) and siliceous laminated rocks (metachert). Additionally, some irregular bands of amphibolite and some dikes and sills of basalt with olivine have been found locally within this unit. This igneous intrusions has been interpreted as fissural volcanic activity in the Bella Vista Association. (Kunding, 1938; Pierce, 1960; Shagam, 1968, 1972; González de Juana et al, 1980; Pimentel et al 1992).

Figure 2.1 Exposure of the Bella Vista Association in the Caparo area. Sample HC11.

Unconformably overlying the Bella Vista Association, there is an Ordovician-Silurian undeformed clastic sequence composed by the Caparo and El Horno formations (Pierce, 1960; González de Juana et al, 1980) (figure 1.3). The Caparo Formation consists of black shale, siltstone, sandstone, and thin beds of sandy limestone in its upper part (figure 2.2). The Caparo Formation contains abundant brachiopods, trilobites, and graptolites of Acado-Baltic (Avalonian) affinity that are Upper Ordovician age (Arnold & Smith, 1964; Bellizzia & Pimentel, 1994). Above the Caparo unit, a sequence of mudstone and greenish gray micaceous siltstone, interbedded with fine silty micaceous sandstone of Silurian age has been described (Arnold & Smith, 1964). This clastic sequence corresponds to the El Horno Formation. These two Ordovician-Silurian units have been interpreted as turbidite deposits from a continental platform with a high subsidence rate. (González de Juana et al, 1980).

Figure 2.2 Exposure of the Caparo Formation in the Caparo area. Sample HC4.

MERIDA TERRANE

The "Complejo Iglesias" (Iglesias Complex) is believed to represent the basement of the Merida Terrane area (Figure 2.3). This complex is composed predominantly of quartzofeldespathic-micaceus-garnetiferous schist and gneiss, granitic orthogneiss and local amphibolitic lenses. (Kunding, 1938; Kovisars, 1969, 1975, Schubert, 1969; González de Juana et al., 1980; Shagam, 1968, 1969, 1972; Marechal, 1983; Bellizzia & Pimentel, 1994). Local lithological variations include lenticular bodies of quartzite, migmatite, marble, and well-laminated pelitic schist with kyanite, andalusite and staurolite. The metamorphic grade for this complex is amphibolite (high T-low P); no granulitic facies rocks have been found (Bellizzia & Pimentel, 1994).

Upper Paleozoic metasedimentary deposits outcrop widely in the Merida Terrane area (figure 1.3), and they have been interpreted to be in tectonic contact above the Iglesias Complex. These Upper Paleozoic rocks, known as the Mucuchachi Association, correspond with the Mucuchachi, Cerro Azul, Rio Momboy, El Aguila, Los Torres, and Tostos formations, and they have been interpreted to record variable regional metamorphism between green schist and staurolitic amphibolite facies (Bellizzia & Pimentel, 1994). The Mucuchachi Association is composed of a monotonous, well-laminated sequence of dark grayish slate and phyllite, intercalated with some coarse-grained metasandstone (figure 2.4). Metachert, felsic volcanic and pyroclastic rocks, intercalated with slate and phyllite, have been locally reported (Bellizzia & Pimentel, 1994). Some Mississippian fossils have been recognized in deposits of the Mucuchachi Formation and Rio Momboy Association, and sedimentological interpretations of these deposits suggest that the Mucuchachi Association may represent an alpine-flysch sequences that was deposited in a deep and narrow trough-type basin.

Figure 2.3 Exposure of the Iglesias Complex along the Piñango road.

In addition to the previously reported Early Paleozoic peraluminous magmatism (Burkley, 1976), Triassic intrusions and deformation, affecting the units of the Merida Terrane area (Iglesias Complex and Mucuchachi Association), have been recently described in the Central Andes (Brown, *forthcoming*; Van der Lelij et al, 2011). However, the metamorphic and deformational history of the Venezuelan Andes remains still unclear because the only studies carried out with this purpose have yielded ambiguous K/Ar and Rb/Sr data (Marechal, 1983) and strongly discordant multigrain U-Pb data (Burkley, 1976). It is expected that new studies (Brown, *forthcoming*; Van der Lelij et al, 2011) will shed light on the deformational and metamorphic history of this part of the Venezuelan Andes.

SUPRATERRANE

According to Bellizzia & Pimentel (1994), the presence of unmetamorphosed Permian clastic deposits overlying the Merida Terrane and Caparo Block areas indicates that the sedimentation of this sequence happened after the accretion of the Merida Terrane to the Caparo Block in the Late Carboniferous – Early Permian during the Hercynian Orogeny (figure 1.3). This Permian sequence contains the Sabaneta, Carache, and Palmarito formations, and it is found over on angular unconformity over the Merida Terrane and Caparo Block areas.

Figure 2.4 Exposure of the Mucuchachi Formation in the El Vigia area. Sample HMA19

The Sabaneta and Carache formations comprise a thick sequence of continental clastic rocks (conglomerate, sandstone, siltstone and shale). Sandstone within the Sabaneta Formation is grayish purple to pale grayish green; bedding is poorly developed, and some sandstone has wacke-type textures (Schubert, 1968). In the middle part of the Carache Formation there is flora that indicates an age between Middle Pennsylvanian and Late Pennsylvanian (Benedetto & Odreman, 1977; Odreman & Wagner, 1979). The Palmarito formation is comprised of shale, marl, and fossiliferous black limestone. The paleontological content includes foraminifera (fusulinids), brachiopods, ostracods, sponges, corals, bryozoans, cephalopods, bivalves, and trilobites that indicate an age of Middle Permian. (Benedetto & Odreman, 1977; Odreman & Wagner, 1979).

Figure 2.5 Exposure of the Sabaneta Formation in the Caparo area. Sample HC5a

CHAPTER 3

PROVENANCE OF THE PRE-MESOZOIC UNITS IN THE VENEZUELAN ANDES

INTRODUCTION

U/Pb detrital zircon geochronology and conventional petrographic characterization were performed for 22 samples collected from pre-Mesozoic metasedimentary units of the Caparo Block area, Merida Terrane area, and Permian SupraTerrane. This chapter contains the result of the petrographic characterization of the 22 samples studied in this work, the U/Pb detrital zircon geochronology results for these samples, and a discussion of the provenance of the pre-Mesozoic strata located in the Venezuelan Andes. The exact location, including GPS coordinates, for all samples is shown in Appendix A. The results of petrographic analyses is shown in Appendix C. The U/Pb zircon geochronology results are shown in Appendix D.

SAMPLE PETROGRAPHIC DESCRIPTION

Bella Vista Association (Precambrian? – Caparo Block area)

One sample from the Bella Vista Association was collected for U/Pb detrital zircon geochronology in an area located ~ 10 km to the north of the town of Santa Barbara de Barinas, in the southern foothills of the Venezuelan Andes (figure 3.1). In this area, the Bella Vista Association is characterized by fine-to very fine-grained low grade metasedimentary rocks. Petrographic analysis reveals that sample HC11 is a very homogeneous, quartzose phyllite with

sericite and chlorite. The hand sample is moderately foliated. The protolith of HC11 was likely siltstone or very fine-grained quartzose sandstone (figure 3.2).

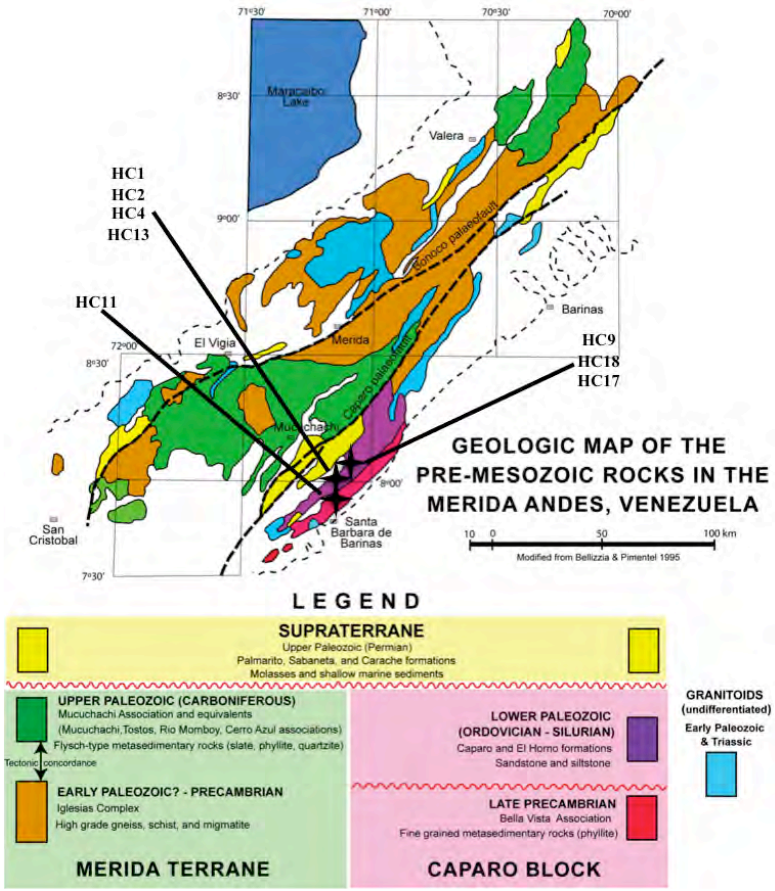

Figure 3.1 Location of the samples collected in the Caparo area (after Bellizzia & Pimentel, 1994)

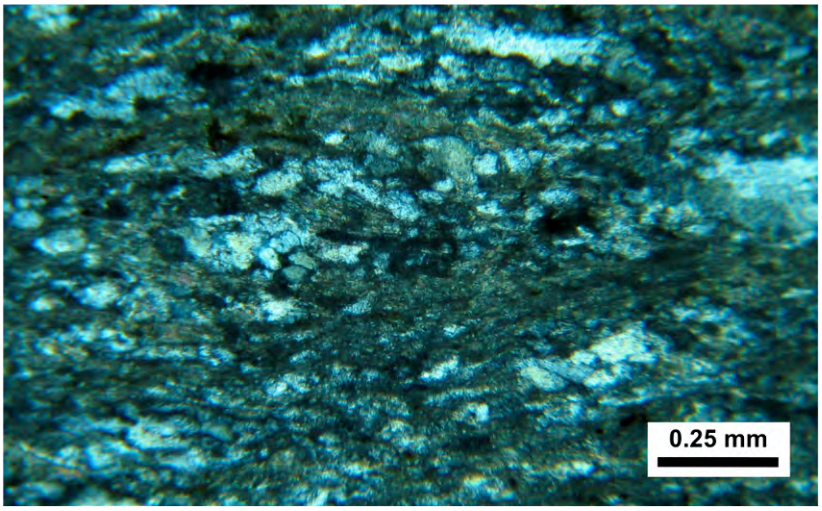

Figure 3.2 Fine-grained quartz-sericitic phyllite from the Bella Vista Association. Sample HC11

Caparo Formation (Ordovician – Caparo Block area)

Seven samples from the Caparo Formation collected in different areas within the Caparo region were collected for petrographic analyses and detrital zircon geochronology (figure 3.1). Along the road from Santa Barbara de Barinas to the Caparo Lake, the Caparo Formation consists of a monotonous intercalation of gray to white fine siltstone and shale, with occasional fine to medium-grained reddish sandy horizons. Based on the samples analyzed, this unit consists of lithic to sublithic sandstone and greywacke (Samples HC1, HC4, and HC13a) (figures 3.3, 3.4, and 3.5). The most abundant grains are quartz (metamorphic and volcanic in origin) and fragments of sedimentary rocks (siltstone, chert, and shale). Many of these sedimentary fragments (figure 3.4) have been interpreted as metasedimentary (clasts of phyllite). Pierce (1960) suggests that these clasts may represent reworked fragments of the Bella Vista Association. The matrix is mostly clay minerals and Fe-oxides. No deformation is observed in the hand samples nor thin sections.

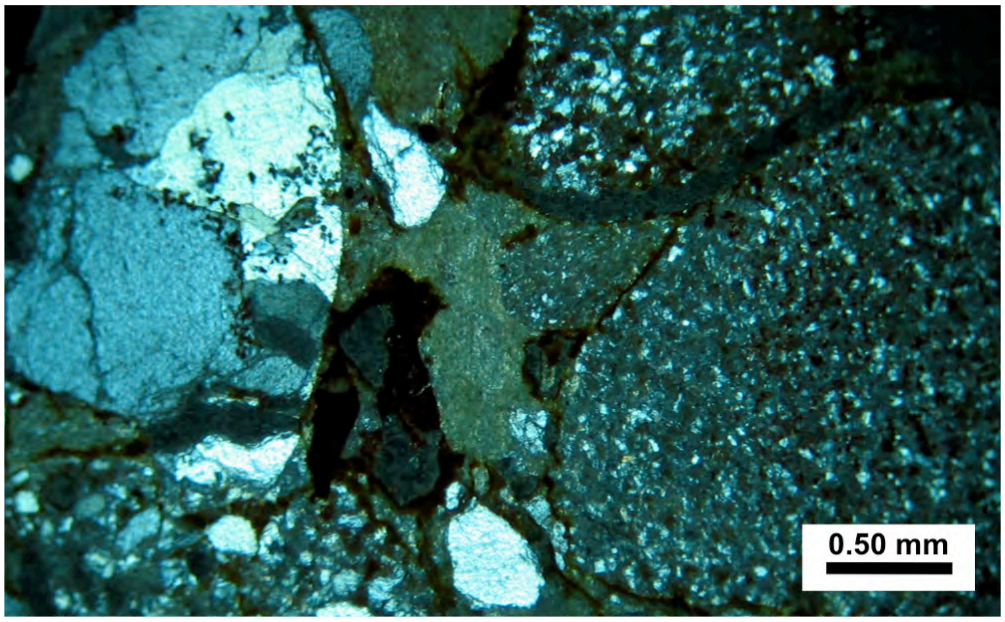

Figure 3.3 Lithic sandstone from the Caparo Formation. Sample HC13a

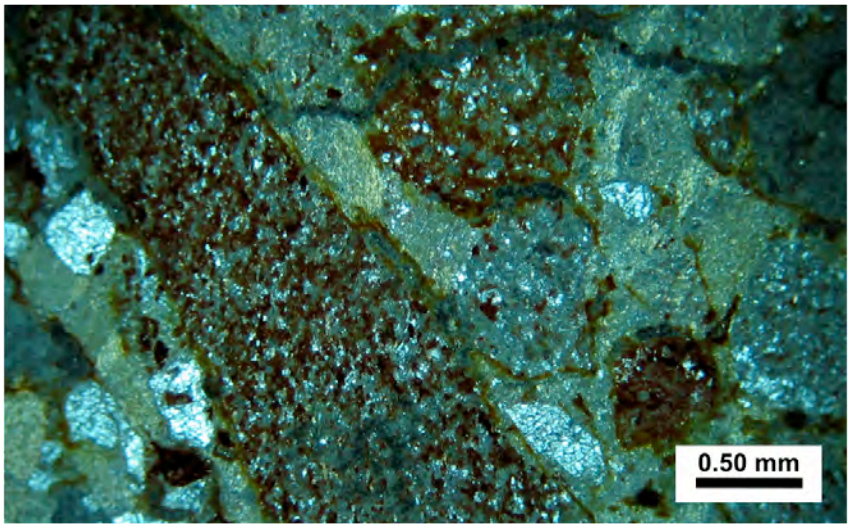

Figure 3.4 Altered sedimentary fragments from sample HC2. Caparo Formation

Additional lithological varieties from the Caparo Formation were also sampled. Sample HC2 is poorly consolidated, fine-grained polymictic orthoconglomerate. Grain sizes range from 2 to 5 mm. Grain types mainly consist of siltstone, shale, and chert. Most quartz grains have undulatory extinction, suggesting a metamorphic origin. The cement is generally Fe-oxides and sericite. In addition to the orthoconglomerate, samples HC17 and HC18 are siltstone and both samples contain quartz grains with igneous and metamorphic origin.

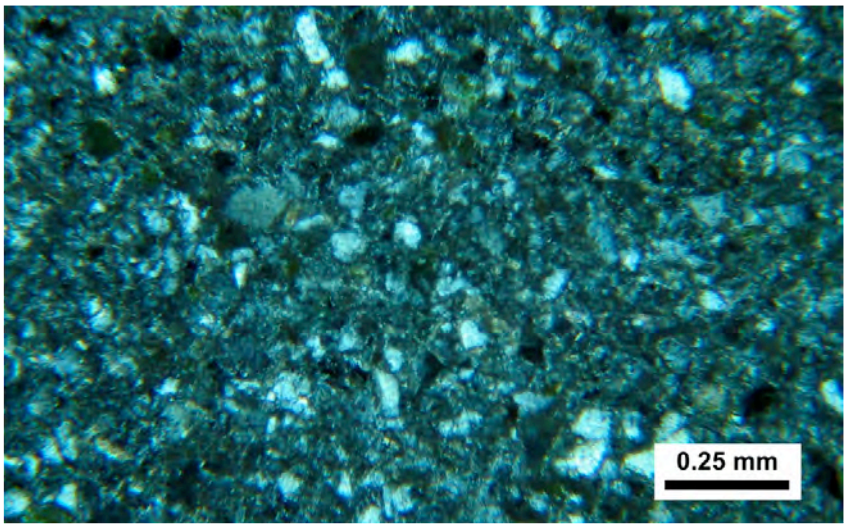

Figure 3.5 Siltstone from the Caparo Formation. Sample HC17.

El Horno Formation (Silurian – Caparo Block area)

The El Horno Formation has very limited outcrops in the Caparo Area, and are very fine-grained clastic rocks: mudstone, fossiliferous shale, and siltstone. Sample HC9 was collected from a coarser-grained sandy horizon for detrital geochronology. Petrographically, HC9 is classified as a polymictic orthoconglomerate. Texturally, the clasts range in size from 2 to 5 mm, and they exhibit medium sorting, with mostly subangular to subrounded clasts (figure 3.6). Grains are mainly igneous (straight extinction) quartz, monocrystalline metamorphic (undulatory extinction) quartz, and sedimentary lithic fragments (siltstone and chert). Some of the lithic fragments also seem to be reworked grains of the Bella Vista Association. Feldspar grains are practically absent. The cement is mainly quartz filling pore spaces, but some Fe- oxide cements are also present. No deformation is observed in thin sections nor hand sample.

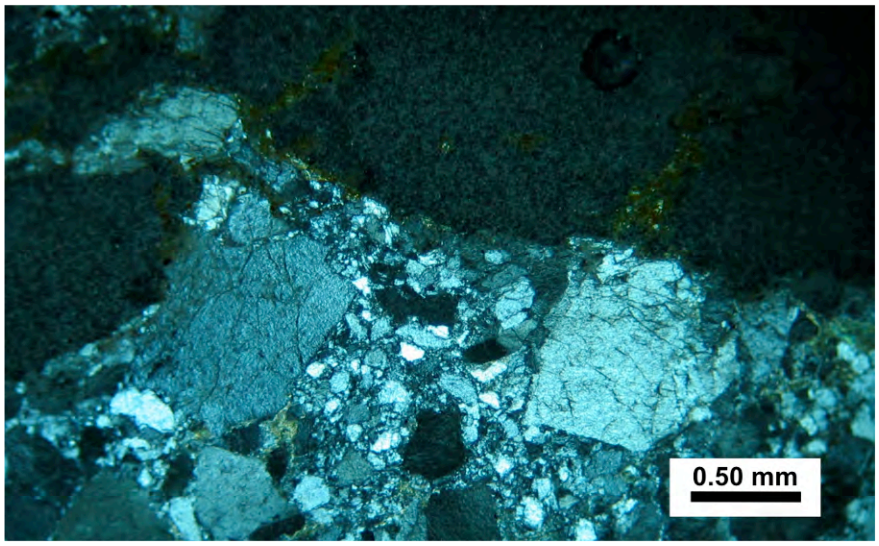

Figure 3.6 Polymictic orthoconglomerate from El Horno Formation. Sample HC9

Iglesias Complex (Early Paleozoic? – Merida Terrane area)

Two samples of the Iglesias Complex were collected for petrographic analysis and detrital zircon geochronology (figure 3.7). In the Mifafi valley area, the Iglesias Complex contains a complex

variety of different lithologies that ranges from mica-rich quartzofeldspathic fine-grained schist and paragneiss, some of which are garnet-bearing, to coarse-grained quartzofeldespathic orthogneiss. Sample AMA7 is a medium-grained, quartzofeldspathic-muscovitic schist (figure 3.8). The grain sizes range from 0.5 to 2 mm, with some muscovite that can be up to 4mm. The foliation is mainly manifested by the orientation of the micas, and the intensity of the foliation is moderate. The protolith of this schist was likely medium-grained, feldspathic graywacke, based on the important amount of feldspar, micas, and quartz, found in the sample.

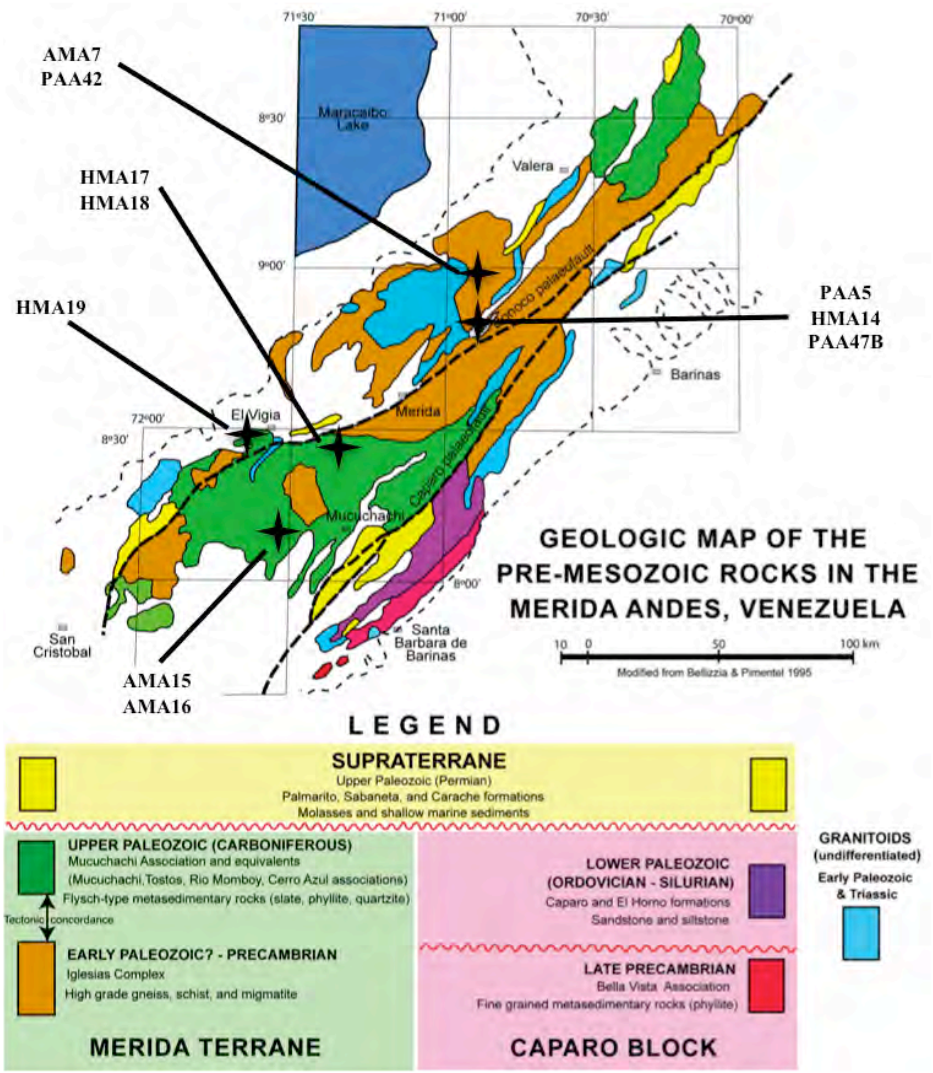

Figure 3.7 Location of the samples collected in the Merida Terrane area (after Bellizzia & Pimentel, 1994)

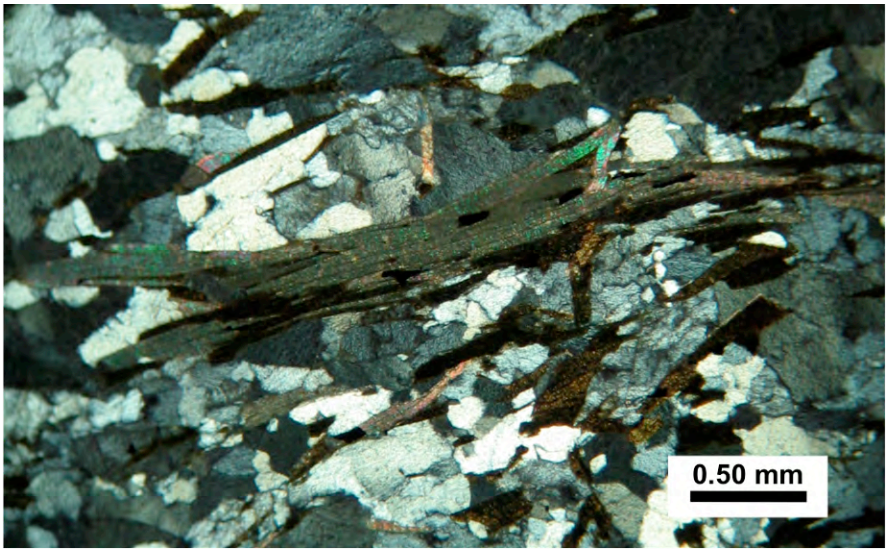

Figure 3.8 Quartzofeldspathic-muscovite schist from the Iglesias Complex. Sample AMA7

Along the Piñango – Pico El Aguila road, the Iglesias Complex is exposed as an intercalation of metasandstone, micaceous schist, and metasiltstone. Sample PAA42 was collected around 3km south of Piñango town, and it is classified as a micaceous, coarse-grained quartzite (figure 3.9). Texturally, the sample shows weak foliation, and the grain sizes range from 0.1 to 0.5 mm. The mica is generally muscovite, but some chlorite is also present. As we interpreted for AMA7, the protolith for this quartzite is a quartz-rich, medium-grained sandstone.

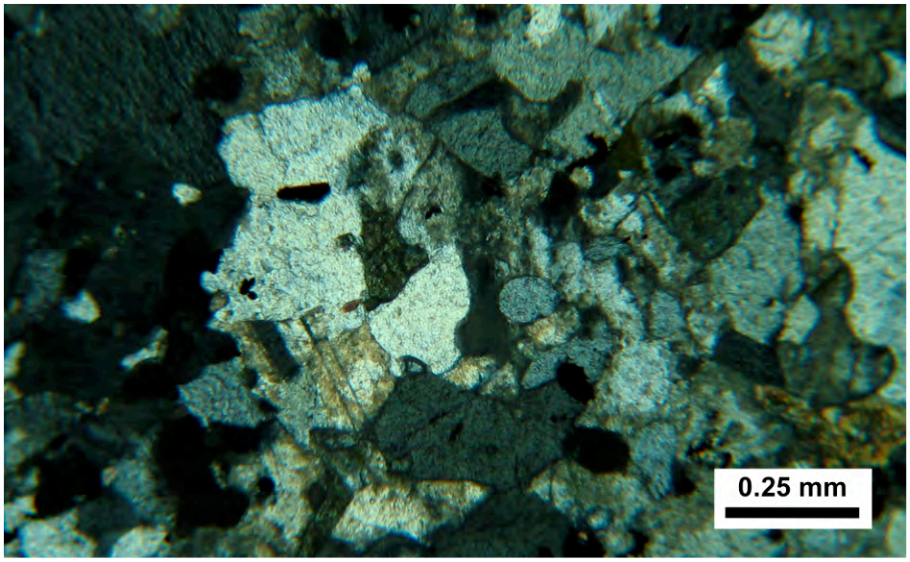

Figure 3.9 Quartzite from the Iglesias Complex. Sample PAA42.

Mucuchachi Formation (Carboniferous – Merida Terrane area)

A total of five samples from the Mucuchachi Formation were characterized petrographically (figure 3.7). In the vicinity of Timotes town along the Valera – Pico El Aguila road, the Mucuchachi Formation is exposed as mostly dark gray to black metashale that is often intercalated with thin layers of fine-grained metasandstone and quartzite. The metamorphic grade of this sequence is very low since bedding features can easily recognized in hand sample. Samples HMA14 and PAA5, collected from this area, are both fine-to medium-grained quartzite composed of monocrystalline metamorphic and igneous quartz, and fine-grained muscovite-rich matrix (figures 3.10 and 3.11). Abundant polycrystalline metamorphic quartz (chert) is present in PAA5. Both samples exhibit weak to moderate deformation that correspond with the low grade metamorphism that is reported in the literature for this unit (Bellizzia & Pimentel, 1994).

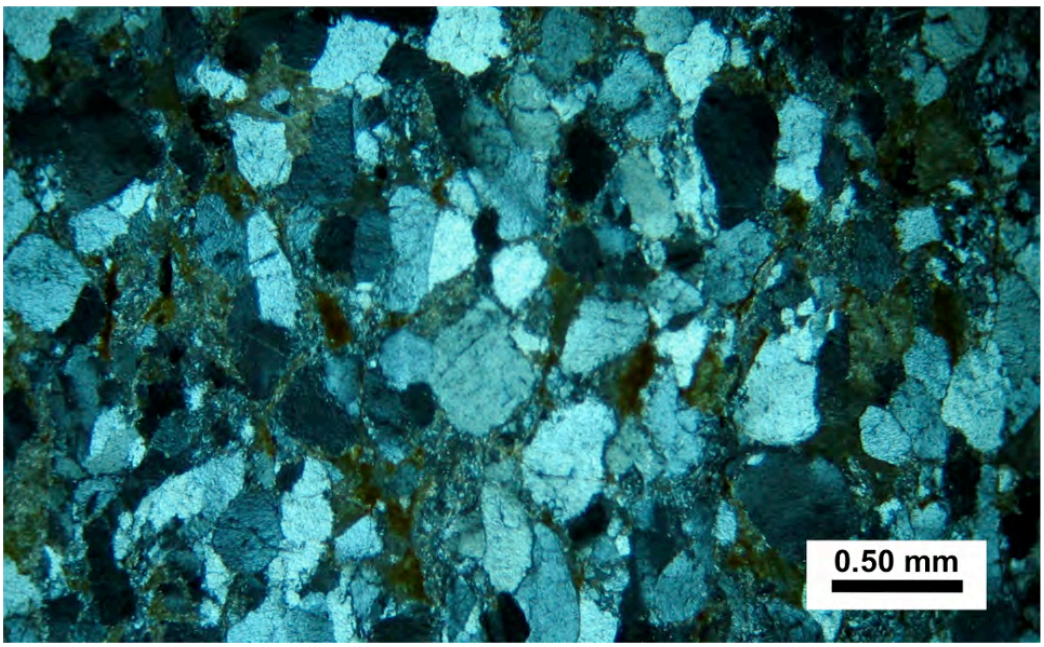

Figure 3.10 Quartzite from the Mucuchachi Formation. Sample PAA5.

In the Mucuchachi area (southeastern part of the Venezuelan Andes – figure 3.7), the Mucuchachi Formation deposits are slightly metamorphosed. They consist of intercalation of metashale, metasiltstone, and fine-grained, quartzo-micaceous metasandstone. Samples AMA15 and AMA16 collected from this region show that the Mucuchachi Formation is composed of coarser metasedimentary lithologies compared to those found in the highlands (Merida Terrane area). In this region, the Mucuchachi Formation is composed of medium-to coarse-grained quartzite with clasts of monocrystalline metamorphic quartz, monocrystalline igneuos quartz, and chert. Sample AMA15 exhibits a muscovitic matrix between the grains that defines the weak foliation of the sample. Some Fe-oxides are present in the matrix.

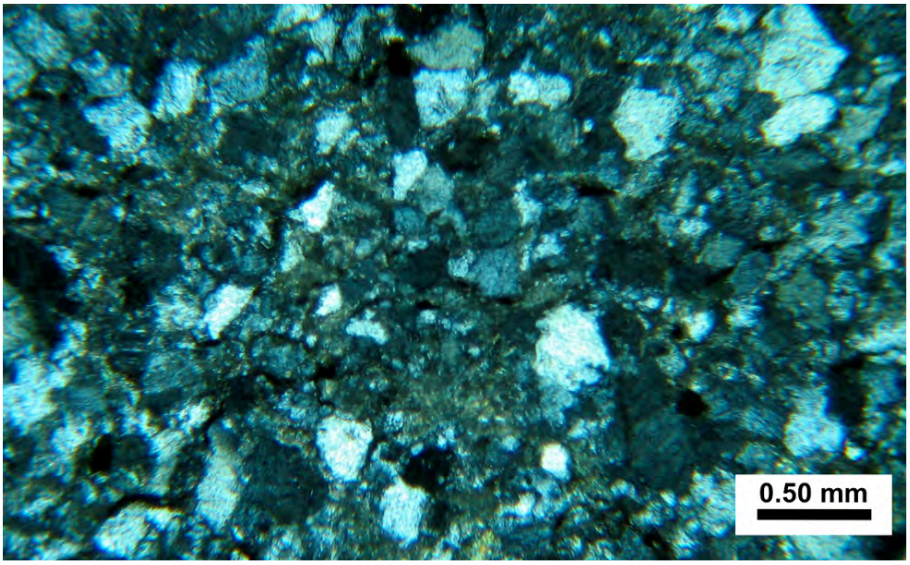

Figure 3.11. Quartzite from the Mucuchachi Formation. Sample AMA16.

Tostos Association (Upper Paleozoic (Carboniferous?) – Merida Terrane area)

Two samples of quartzite from the Tostos Association were collected for petrographic analysis and detrital zircon geochronology (figure 3.7). The unit comprises a deformed sequence of

phyllite intercalated with mica-rich quartzite. Sample HMA17 is a fine-to medium-grained quartzite collected in the Estanques area that is located about 30 km south of the city of Merida. Grain sizes range from 0.1 to 0.3 mm. On the hand, HMA18 is another quartzite but with smaller grain sizes (0.05 to 0.1 mm) (figure 3.12). Compositionally, this finer grained quartzite contains mostly metamorphic quartz, and a small (<5%) proportion of greenish chlorite. Based on the compositional and textural characteristics, the protolith for these two samples is likely to be quartz-rich sandstone.

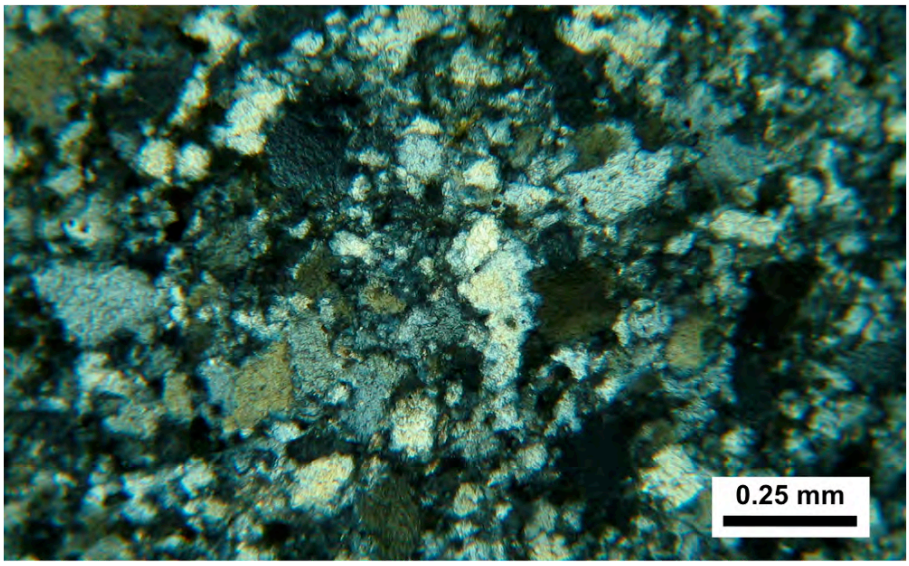

Figure 3.12 Quartzite from the Tostos Association. Sample HMA18.

Rio Momboy Association (Upper Paleozoic (Carboniferous?) – Merida Terrane area)

The Rio Momboy Association is a metasedimentary sequence formed by an intercalation of quartzo-micaceous schistose phyllite, and quartzite, that is exposed along the road between the towns of Piñango and Timotes (figure 3.7). Sample PAA47B is a mixed carbonate – siliciclastic lithology and it is classified as a packstone with 40% being siliciclastic components (quartz,

feldspar, and muscovite) (figure 3.13). Texturally, the grains are rounded and well sorted, and their sizes range from 0.1 to 0.3mm. The majority of the quartz grains are monocrystalline metamorphic in origin. Feldspathic grains account for less than 5% of the extraclasts, and they show moderate alteration. The siliciclastic grains are mainly supported by calcite cement (spar), and by a small proportion of micrite. No fossils are present. Although sample PAA47B has been classified as a sedimentary rock, it shows slight foliation.

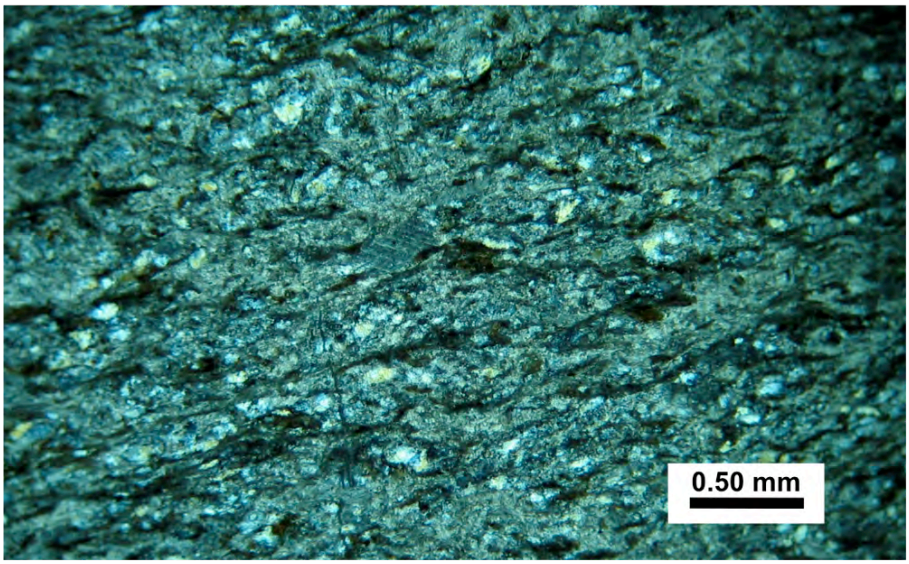

Figure 3.13 Packstone with siliclastic grains from Rio Momboy Association. Sample HMA18.

Sabaneta Formation (Permian – Caparo Block and Merida Terrane areas)

Along the road between Santa Barbara de Barinas and Mucuchachi, about 10 km north of the Caparo Lake (figure 3.14), the Sabaneta Formation is exposed as massive, reddish to violet, medium-grained, micaceous sandstone. Three samples (HC5a, HC5b, and HC6) were collected at different stratigraphic levels from this unit. In these samples, the Sabaneta Formation consists of fine-to medium-grained sublithic sandstone. Texturally, the samples have medium sorting and the grains are subangular to subrounded. The grain composition is mostly quartz (igneous and

metamorphic in origin), and lithic fragments of sedimentary and metasedimentary rocks (mudstone and siltstone) (figures 3.15 and 3.16). The main accessory mineral is muscovite. The matrix is mostly clay minerals and Fe-oxides; some of these same components are cementing (pore-filling) the grains. The degree of compaction seems moderate with deformation of ductile grains (muscovite).

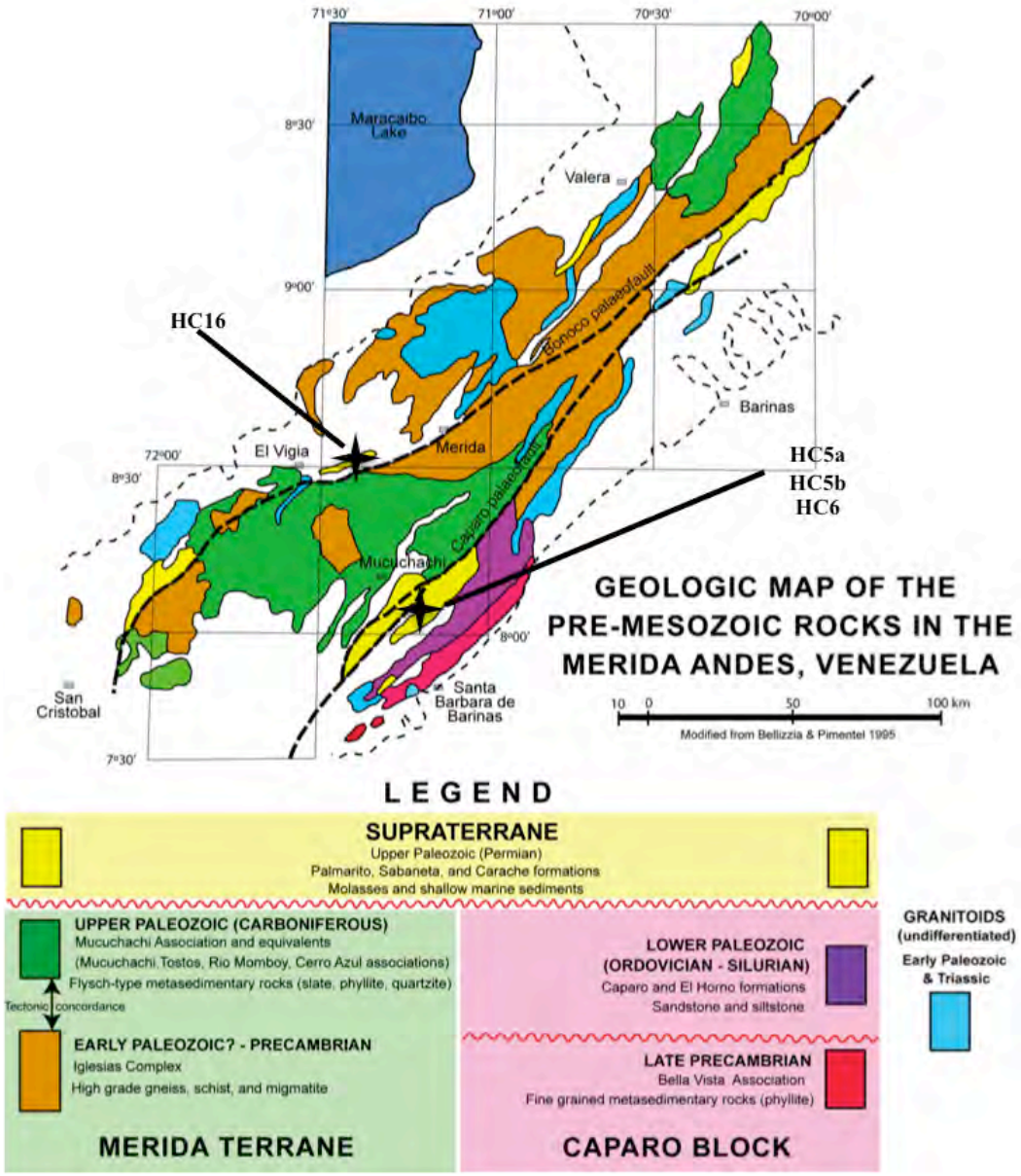

Figure 3.14 Location of the samples collected in the SupraTerrane (after Bellizzia & Pimentel, 1994)

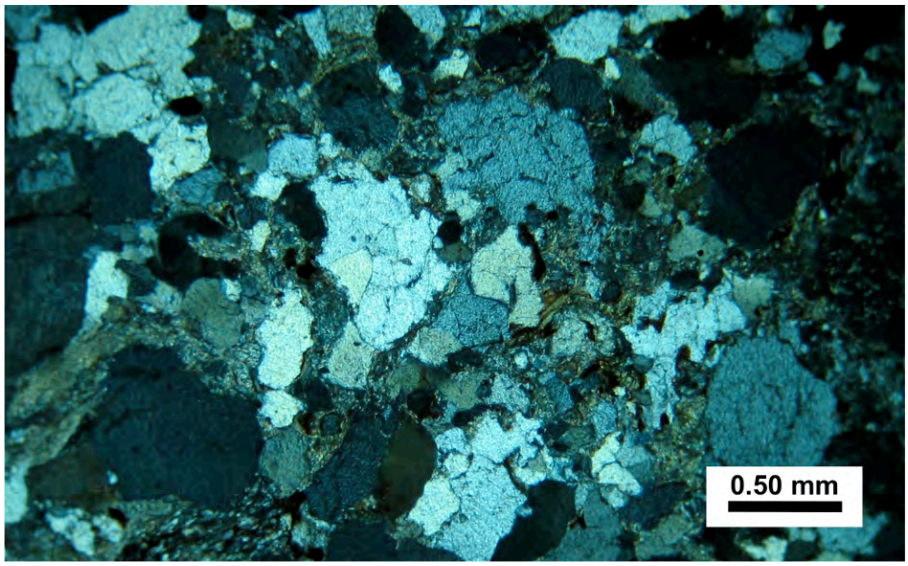

Figure 3.15. Medium-grained sublithic sandstone from the Sabaneta Formation. Sample HC5a.

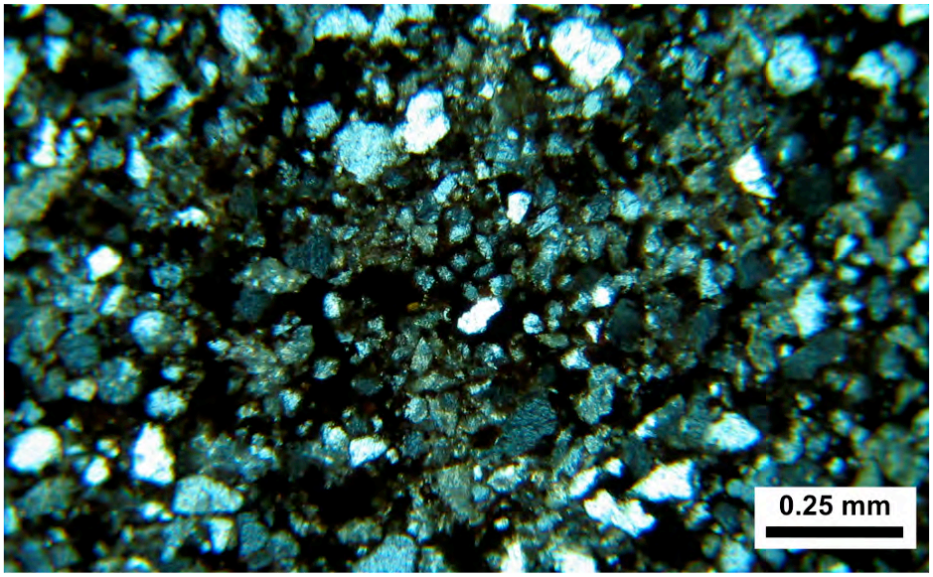

Figure 3.16 Fine-grained sublithic sandstone from the Sabaneta Formation. Sample HC6.

Palmarito Formation (Permian – Caparo Block and Merida Terrane areas)

One sample (HC-16) was collected from the Palmarito Formation about 15 km south of the city of Merida along the Chama river valley (figure 3.14). Petrographically, the Palmarito Formation

is a dark gray, fine-grained, quartzomicaceous sandstone (3.17). Texturally, it has excellent sorting with grains mainly rounded. Quartz grains are mostly monocrystalline metamorphic and volcanic, whereas the mica grains seem to be muscovite. Feldspathic grains are rare. Evidences of moderate compaction can be seen in the petrography by ductile deformation of micas, and the proportion of longitudinal contacts.

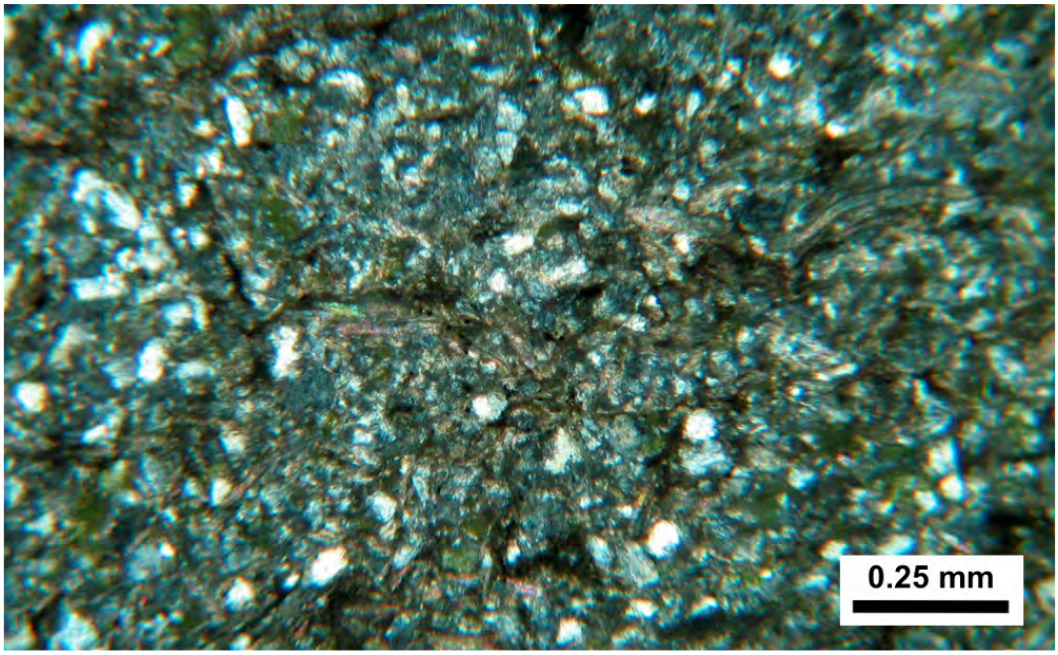

Figure 3.17 Quartzomicaceous sandstone from the Palmarito Formation. Sample HC16.

U/PB DETRITAL ZIRCON AGES

Caparo Block area

U/Pb zircon geochronology was carried on 788 detrital zircons extracted from one metasedimentary rock from the Bella Vista Association and seven undeformed sedimentary rocks from the Caparo and El Horno formations collected in Caparo area of the Venezuelan Andes. The results are discussed in the section below. The location of the samples collected from

the Caparo Block together with the individual probability density plots from every individual samples is shown in figure 3.19. The analytical results for all of the analyses carried out on these samples are shown in appendix B

Bella Vista Association (Sample: HC11)

A total of 101 detrital zircons were dated from sample HC11, and the probability density plot and histogram results are shown in figure 3.15. The probability density plot exhibits one major population of ages at ca. 1.55 Ga formed by 34 detrital grains. Secondary populations have age peaks at ca 1.36 Ga and 1.78 Ga. The youngest grain of this sample has a $^{206}Pb/^{207}Pb$ age of 1.15 Ga ± 15 Ma.

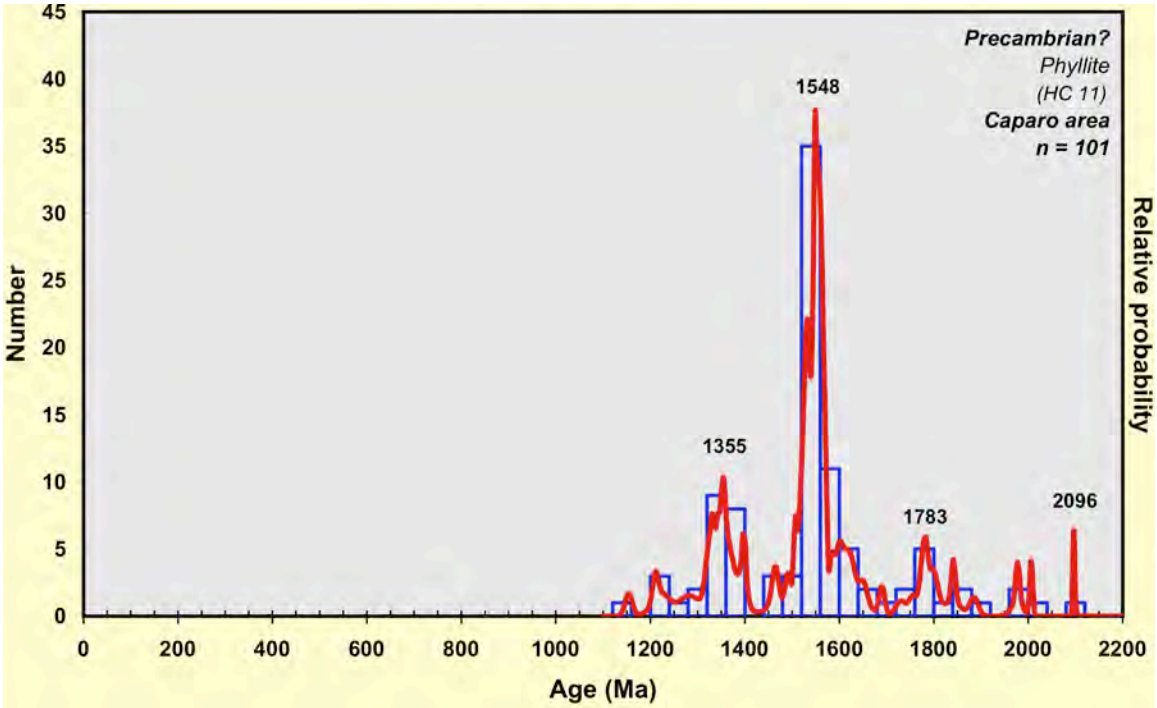

Figure 3.18 Age distribution of detrital zircons from the Bella Vista Association.

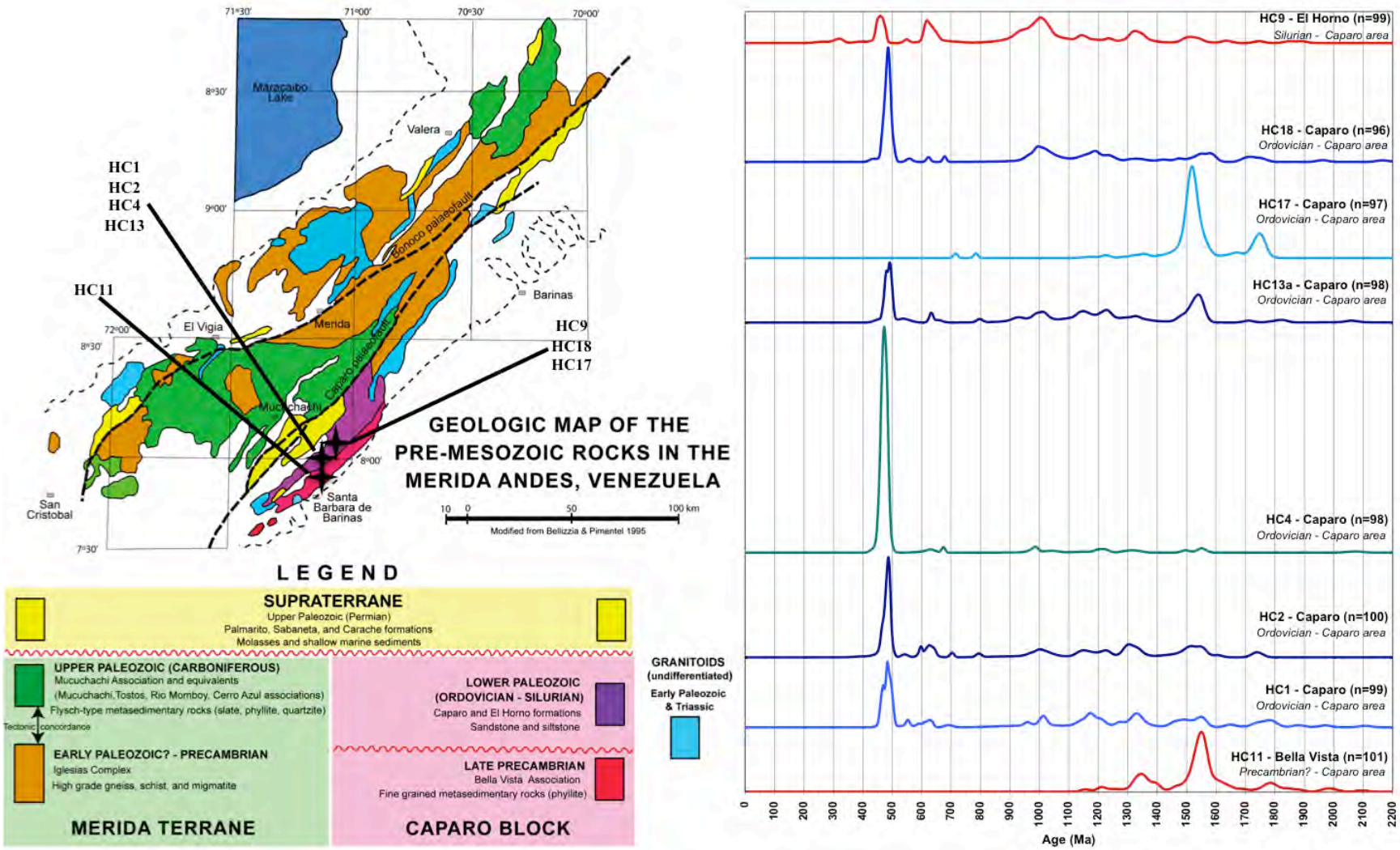

Figure 3.19 Locations of the samples collected in the Caparo Block area (left). Probability density plots for the samples HC11, HC1, HC2, HC4, HC9, HC13a, HC17, HC18 (right)

Caparo Formation (Samples: HC1, HC2, HC4, HC13a, HC17, HC18)

588 individual detrital zircons ages were obtained from six samples of the Caparo Formation, and the results of the histogram and probability density plot are shown in figure 3.20. The range of obtained ages spans from 460 Ma to 2.10 Ga, and two main age populations can be identified at ca. 483 Ma and 1.52 Ga. Other minor populations occur at ages of ca. 1.02 Ga, 1.75 Ga, 1.34 Ga, 1.20 Ga, and 635 Ma. The comparison of the individual probability density plots for each sample (figure 3.19) shows that the peak 1.52 Ga is common for all the samples whereas the Ordovician population (~483 Ma) is absent in sample HC17. The youngest grain of this unit has a $^{238}U/^{206}Pb$ age of 406 ± 31 Ma (sample HC2). However, Gehrels et al. (2006) indicate that significance of detrital ages should only be given to groups that include three or more similar ages because individual ages may be compromised by inheritance or by zircon Pb loss. Therefore, the inferred maximum depositional age for the Caparo Formation sample is ~456 Ma given by the age of four grains found in sample HC4.

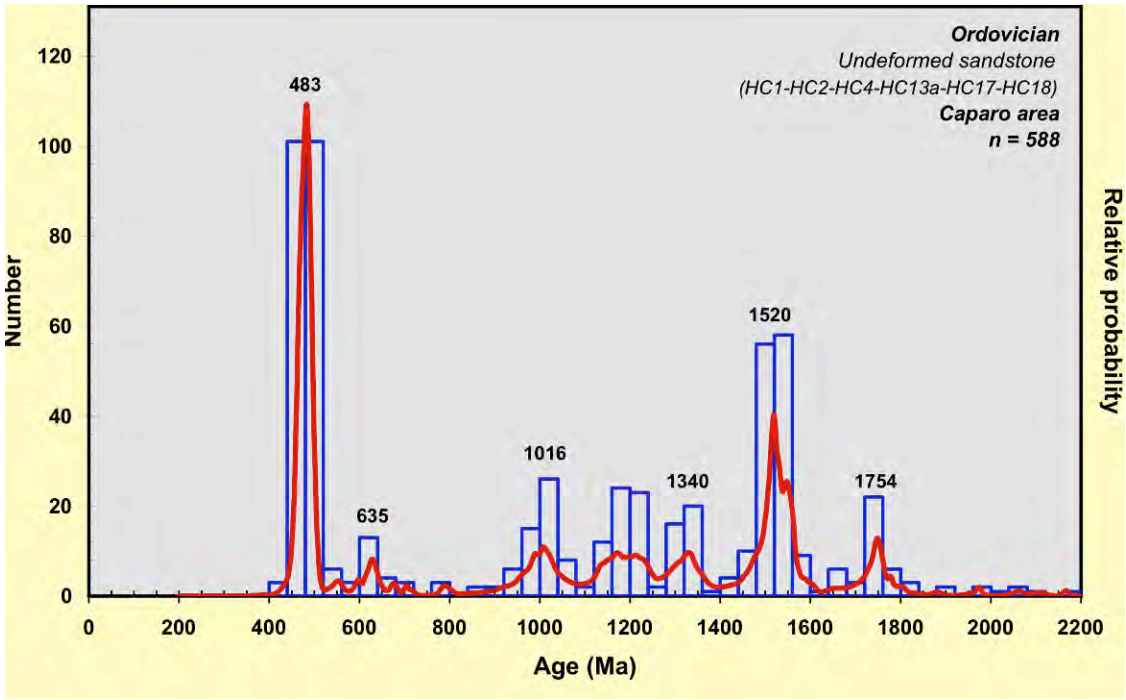

Figure 3.20 Age distribution of detrital zircons from the Caparo Formation.

El Horno Formation (Sample: HC9)

Ages obtained from 99 zircon grains extracted from one sample (HC9) collected from this unit exhibit a multimodal distribution of ages that range from 266 Ma to 1.89 Ga (figure 3.21) The major populations have ages (in order of decreasing abundance) of ca. 1.01 Ga , 460 Ma, 628 Ma, 1.31 Ga, 1.51 Ga and 1.14 Ga. The youngest grain of this sample has a $^{238}U/^{206}Pb$ age of 265 Ga ± 25 Ma; however, the youngest reliable population (3 grains) defines the maximum depositional age of the El Horno formation to be Late Ordovician to Early Silurian (~445 Ma).

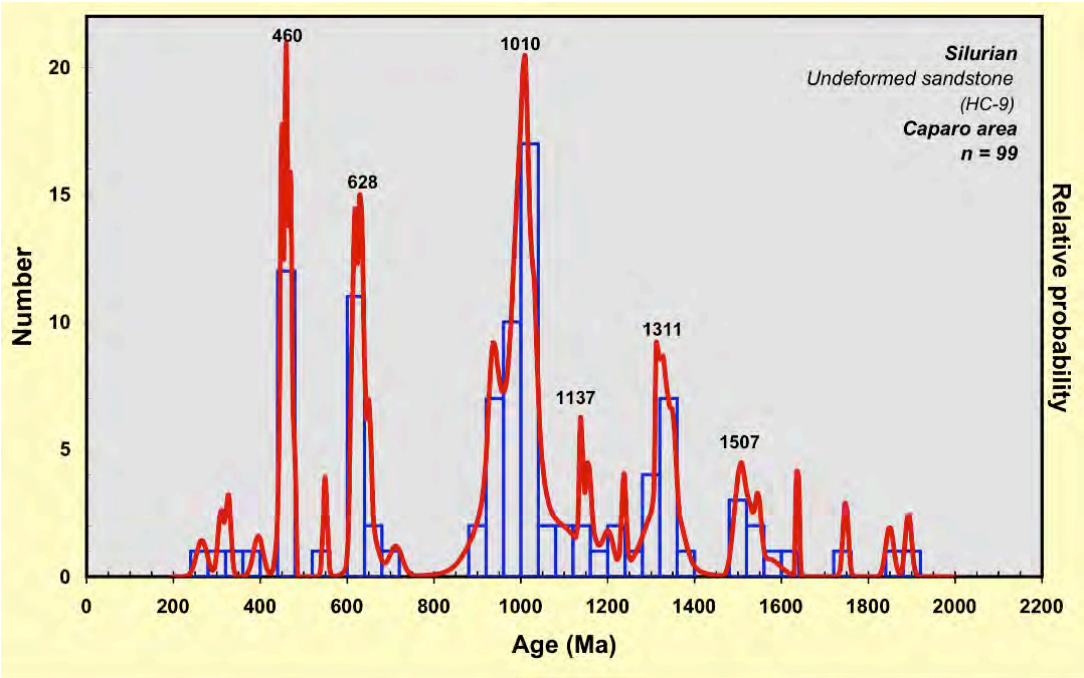

Figure 3.21 Age distribution of detrital zircons from the El Horno Formation.

Merida Terrane area

U/Pb zircon geochronology was performed on 161 detrital zircons extracted from two metasedimentary rocks from the Iglesias Complex collected in the Piñango area and Mifafi valley, and 663 detrital zircons extracted from seven samples collected from the Mucuchachi, Tostos, and Rio Momboy associations (Mucuchachi Association) from various geographic localities of the Venezuelan Andes (figure 3.22).

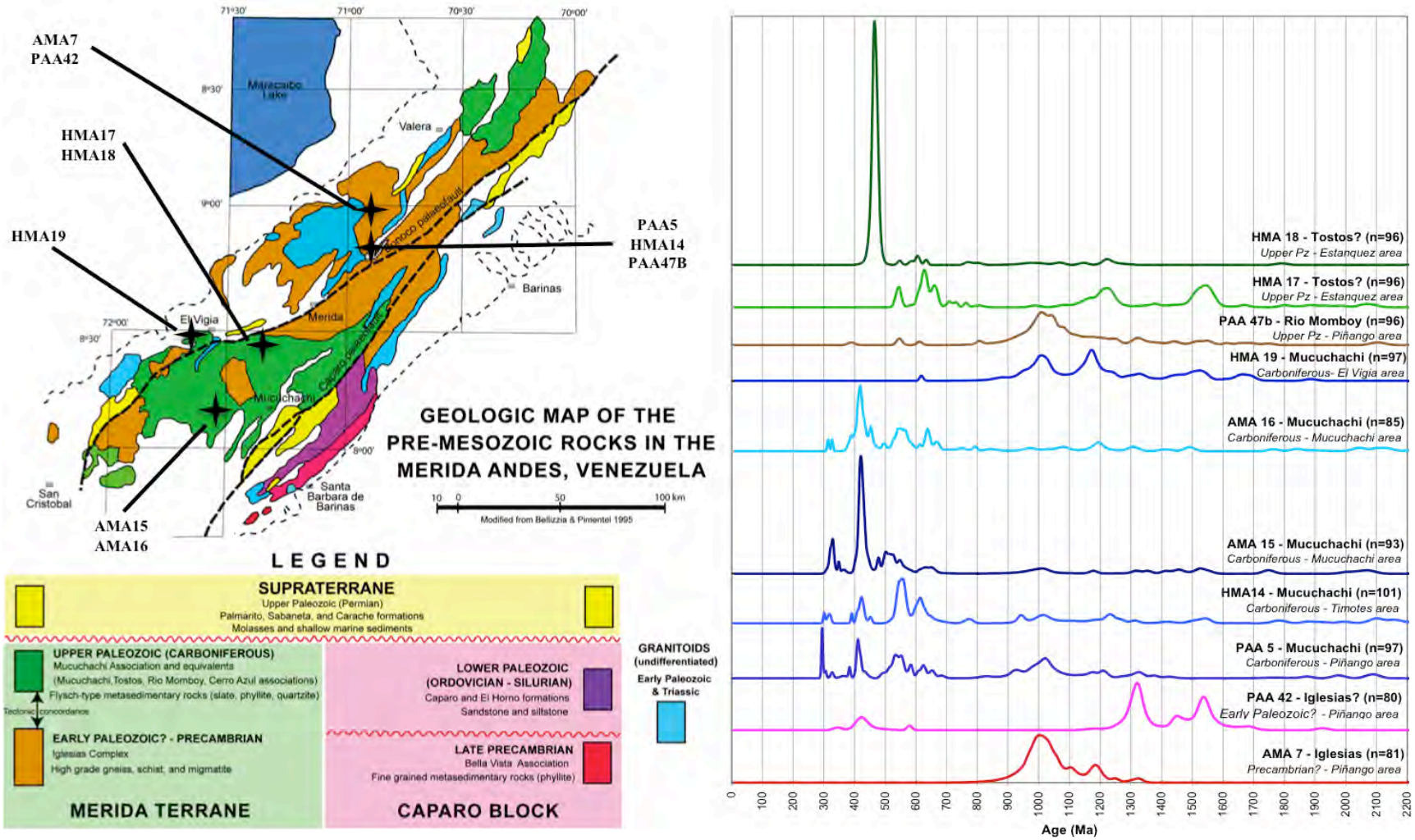

Figure 3.22 Locations of the samples collected in the Merida Terrane area (left). Probability density plots for the samples AMA7 , PAA42, HMA17, HMA18, HMA19, PAA5, HMA14, PAA47b (right).

Iglesias Complex (Samples: AMA7, PAA42)

Sample AMA7 is a muscovitic quartzofeldspathic schist from the Mifafi valley area, and 81 zircons grains dated from this sample define an unimodal distribution of ages at ca. 1.02 Ga, with a minor individual peak occurring at ca. 1.2 Ga (figure 3.22). On the other hand, 80 zircon grains obtained from PAA42 (Piñango area) exhibit a distribution of ages with major peaks at ca. 1.32 Ga, 1.54 Ga, and 1.45 Ga. A secondary peak formed by seven zircon grains at ca. 428 Ma is noticeable in this distribution. Figure 3.23 shows the probability density plot and histogram of detrital ages for the Iglesias Complex combining the results obtained from the two samples (AMA7 and PAA42) analyzed. The main populations of grains are Mesoproterozoic in age, with peaks located at ca. 1.01 Ga, 1.32 Ga, 1.54 Ga, 1.45 Ga, and 1.18 Ga.

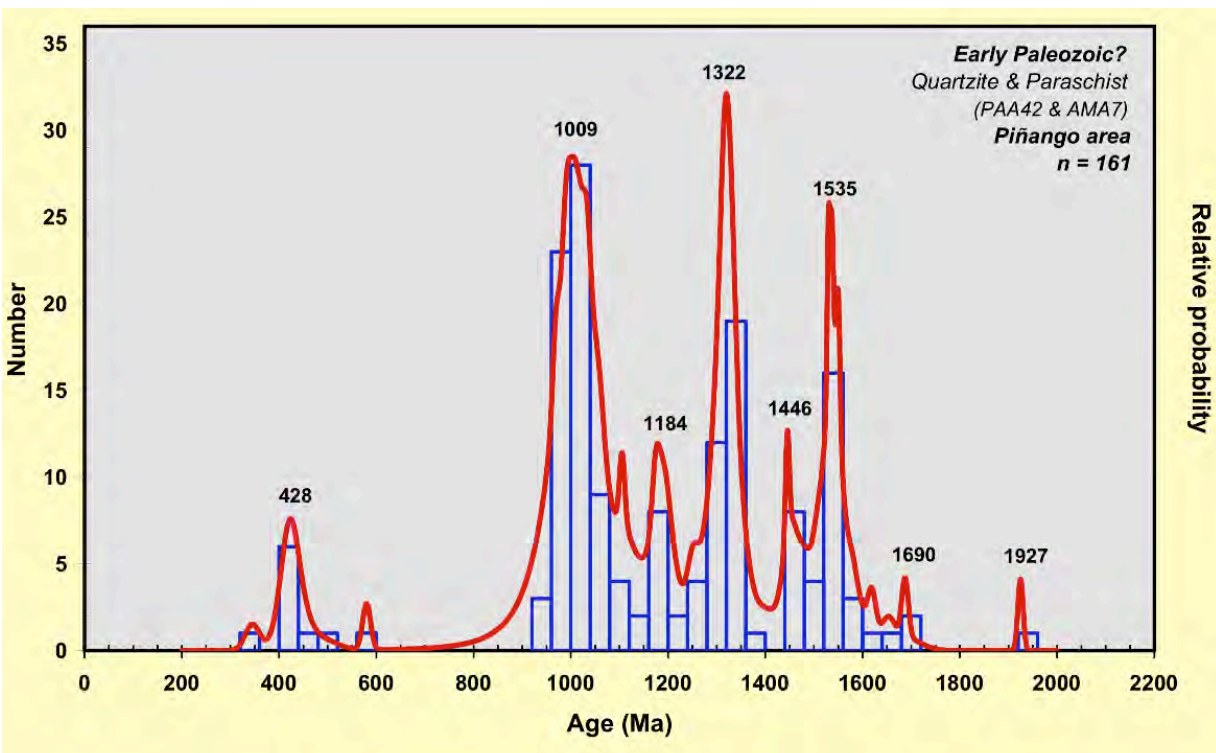

Figure 3.23 Age distribution of detrital zircons from the Iglesias Complex.

It is important to mention that seven individual grains that were analyzed from sample PAA42 define a population located at ca. 428 Ma. The individual U/Th ratios for these specific analyzes range between 6 and 20, which suggests those zircon grains are likely to have an igneous origin and not a metamorphic origin (figure 3.24) (Hoskin and Schaltegger, 2003). Therefore, this population of grains suggests that at least some rocks within the Iglesias Complex are Early Paleozoic (Silurian?) in age.

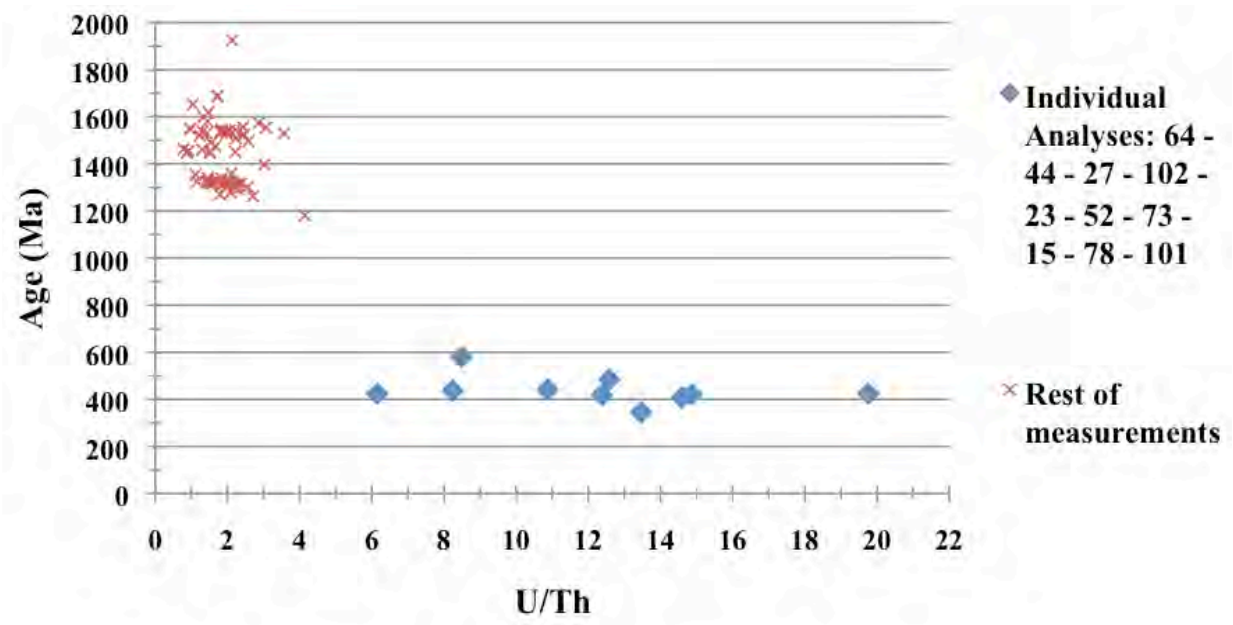

Figure 3.24 U/Th ratios versus ages for individual analyses on sample PAA42

<u>Mucuchachi Formation (PAA5, HMA14, AMA15, AMA16, HMA19)</u>

477 detrital zircons ages were obtained from five samples of the Mucuchachi Formation, and the results of the histogram and probability density plot are shown in figure 3.25. The range of obtained ages spans from 294 Ma to 2.58 Ga, expressed in a multimodal distribution of peaks located at ca. (in order of decreasing abundance) 422 Ma, 554 Ma, 1.02 Ga, 1.17 Ga, 611 Ma, 330 Ma, 1.52 Ga, and 1.32 Ga. The comparison of individual probability density plots for

individual samples (figure 3.19) shows that the sample HMA19, collected in the El Vigia area, lacks ages younger than 850 Ma, and only exhibits populations of ages at ca. 1.0 Ga and 1.18 Ga. The youngest grain for the Mucuchachi Formation was found in sample PAA5 and it has a $^{238}U/^{206}Pb$ age of 295 ± 4 Ma.

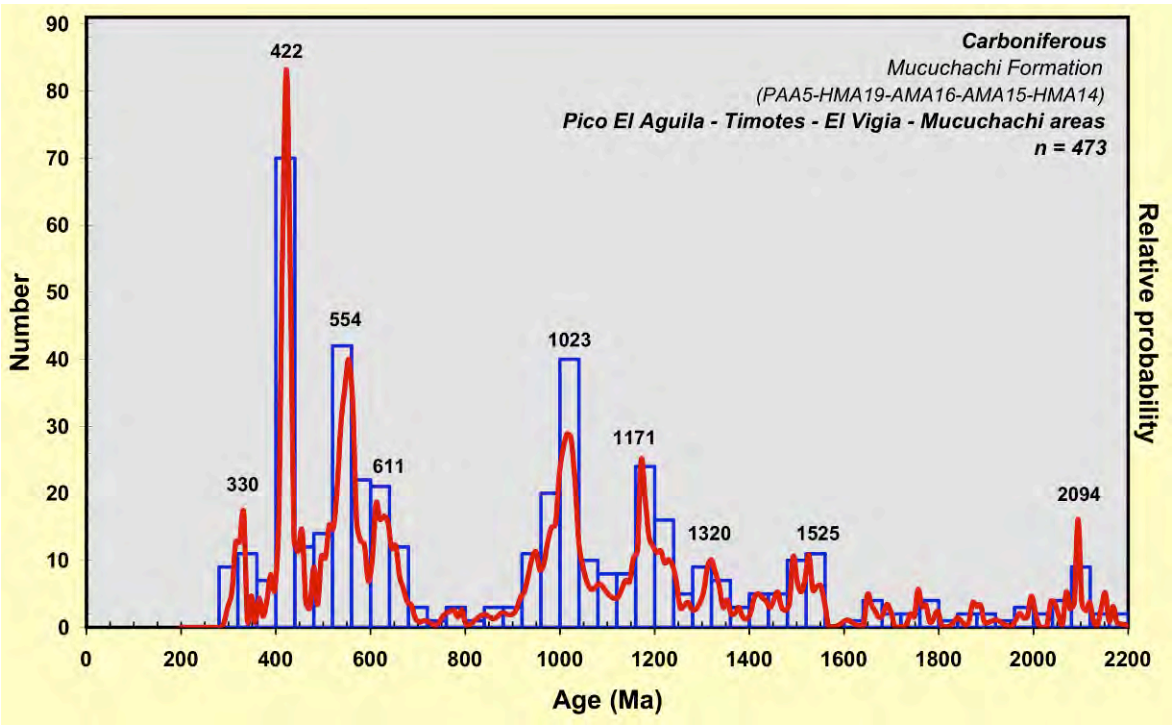

Figure 3.25 Age distribution of detrital zircons from the Mucuchachi Formation

<u>Rio Momboy Association (Sample: PAA47b)</u>

A total of 95 detrital zircons were dated from sample PAA47b. The probability density plot and histogram results for this unit are shown in figure 3.26. Sample PAA47b exhibits a slightly asymmetrical unimodal distribution of ages with the main peak at 1.01 Ga. The asymmetry of the distribution of ages is given by the presence of continuous ages from 950 Ma to 1.48 Ga.

Secondary peaks are present at ages ca. 1.39 Ga and 1.55 Ga. The youngest detrital grain recognized for this unit has a concordant $^{238}U/^{206}Pb$ age of 390 ± 11 Ma.

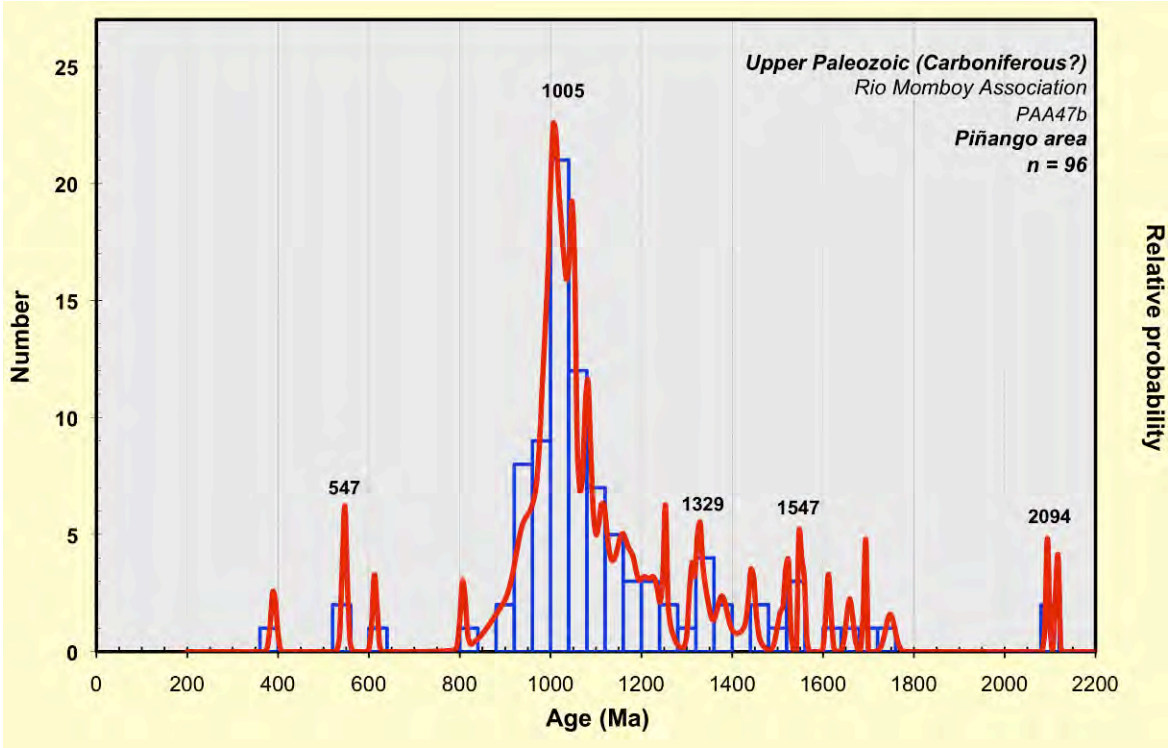

Figure 3.26 Age distribution of detrital zircons from the Rio Momboy Association

<u>Tostos Association (Samples: HMA18, HMA19)</u>

A total of 192 detrital zircons from two samples (HMA18 and HM19) of the Tostos Association collected in the Estanques area were analyzed for U/Pb geochronology. The probability density plot and histogram of ages for this unit are shown in figure 3.27. One major population of grains, defined by almost 80 grains, is located at ca. 470 Ma. Secondary peaks are located at 623 Ma, 1.22 Ga, 1.54 Ga, and 541 Ma. It is important to point out that sample HMA18 has only zircons of a single provenance (~470 Ma) as it is noted from figure 3.22. The implication of this record is that this specific quartzite may have been deposited in an isolated basin receiving detritus

solely from Ordovician granitic sources. The youngest grain analyzed from the Tostos Association has a concordant $^{238}U/^{206}Pb$ age of 447 ± 10 Ma (Sample HMA18).

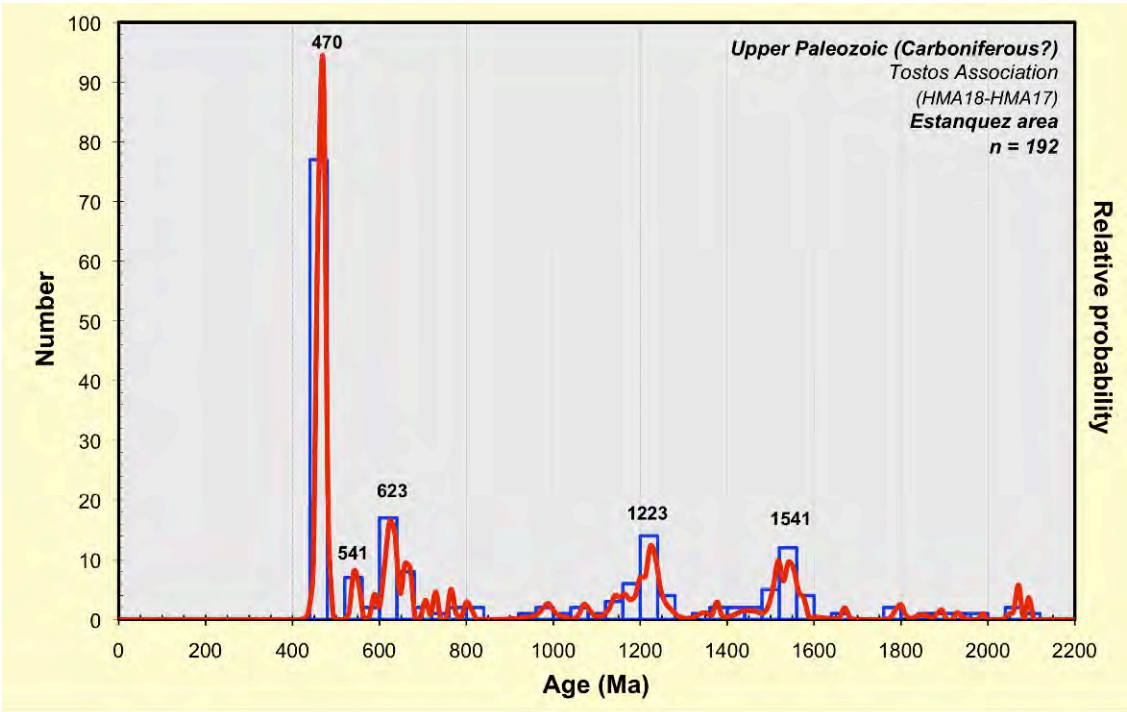

Figure 3.27 Age distribution of detrital zircons from the Tostos Formation

SupraTerrane (Merida and Caparo areas)

U/Pb zircon geochronology was performed on 473 detrital zircons extracted from three undeformed clastic samples from the Sabaneta Formation collected in the Caparo area and one undeformed clastic sample from the Palmarito Formation in the Merida City area. The location of the samples for these Permian units as well as the individual probability density plots are shown in figure 3.28

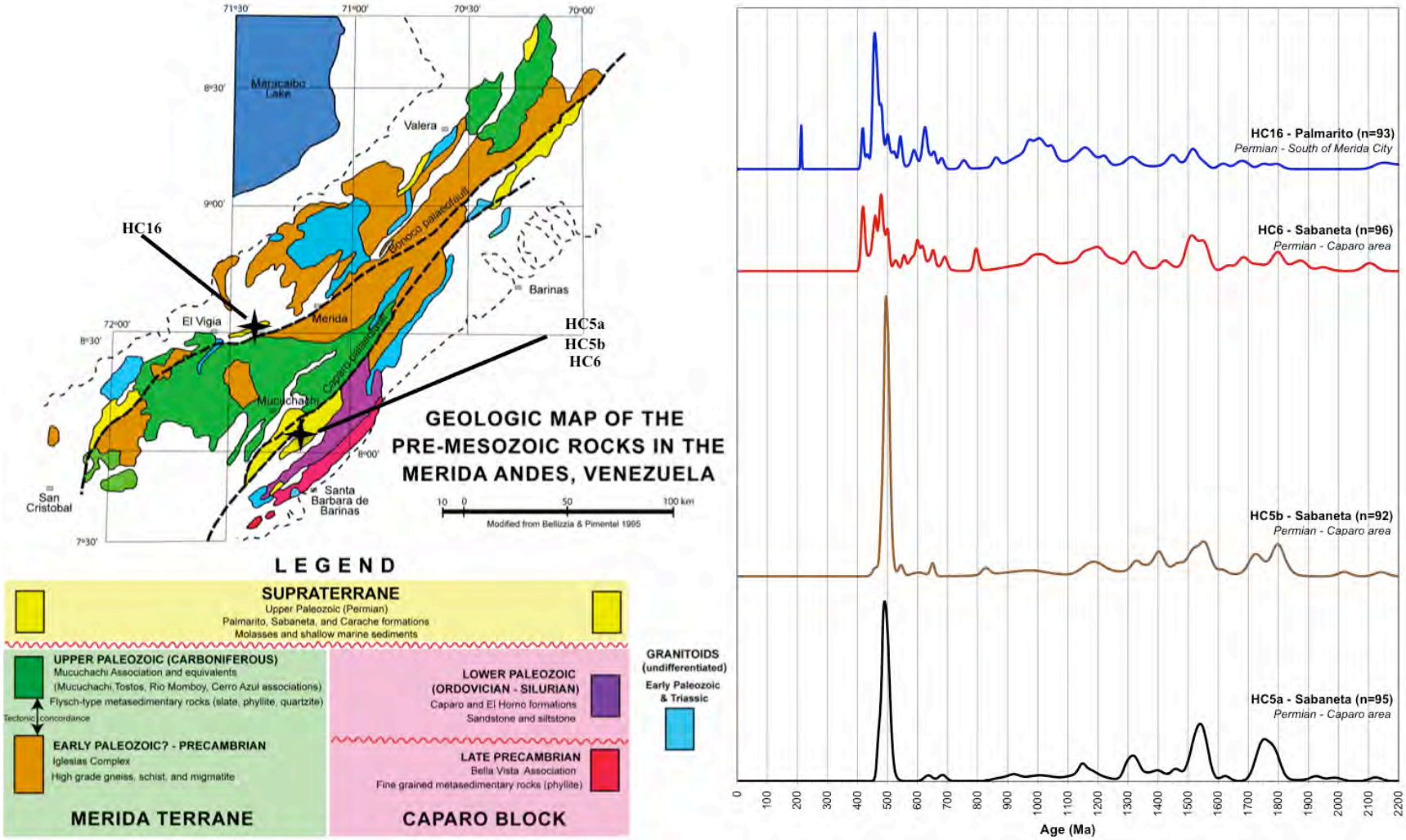

Figure 3.28 Locations of the samples collected in the Permian SupraTerrane in the study area (left). Probability density plots for the samples HC5a, HC5b, HC6, and HC16 (right).

Sabaneta Formation (Samples: HC5a, HC5b, HC6)

A total of 283 detrital ages were obtained from three samples of the Permian Sabaneta Formation collected in the Caparo area. The histogram and probability density plot obtained from these samples are shown in figure 3.29. The distribution of ages shows three major populations located at ca. 493 Ma, 1.52 Ga, and 1.75 Ga. In addition to those ages, minor populations can be located at ca. 1.33 Ga, 1.19 Ga, 1.0 Ga, and 420 Ma. The youngest detrital zircon grain analyzed for this unit has a $^{238}U/^{206}Pb$ age of 416 ± 6 Ma (Sample HC6).

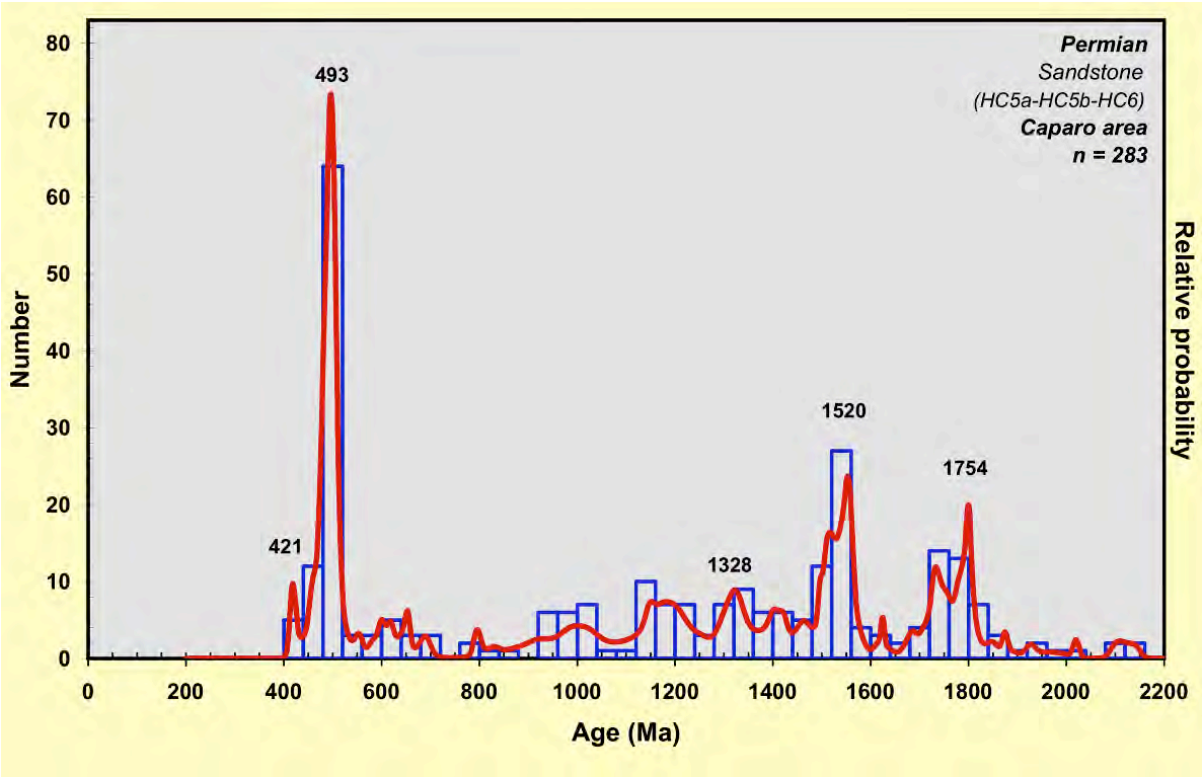

Figure 3.29 Age distribution of detrital zircons from the Sabaneta Formation

Palmarito Formation (Sample: HC16)

A total of 93 detrital zircon grains were extracted from one sandstone sample (HC16) collected in the Merida City area. The probability density plot and histogram with the U/Pb geochronology results are shown in figure 3.30. Two main populations of ages can be recognized at ca. 455 Ma and 1.0 Ga. Minor peaks are located at ca. 1.16 Ga, 623 Ma, 1.51 Ga, and 420 Ma. Although the youngest detrital zircon grain analyzed for this unit has a $^{238}U/^{206}Pb$ age of 213 ± 2 Ma, the youngest reliable population of ages that define the maximum depositional age for the Palmarito Formation is 416 ± 4Ma.

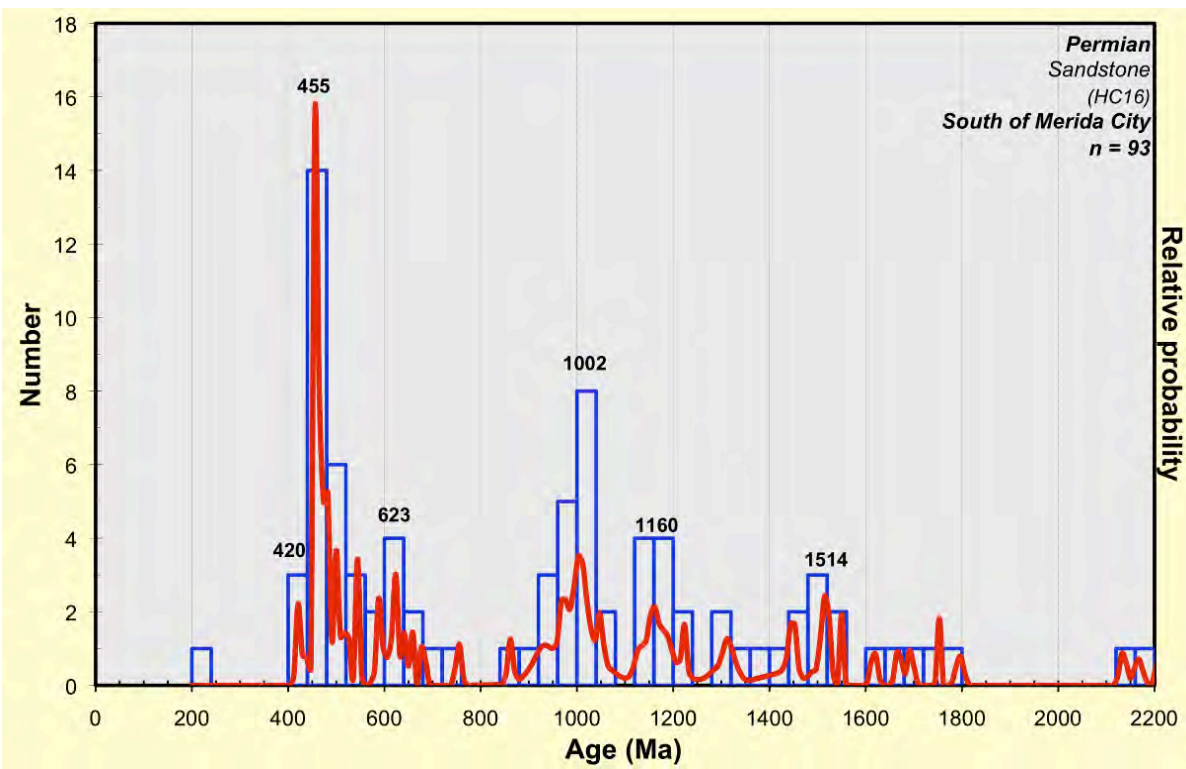

Figure 3.30 Age distribution of detrital zircons from the Palmarito Formation

PROVENANCE OF THE PRE-MESOZOIC STRATA OF THE VENEZUELAN ANDES

Some authors (Marechal, 1983; Bellizzia & Pimentel, 1994) have indicated that the pre-Mesozoic geologic evolution of the Venezuelan Andes involves a common a pre-Pangean geologic history for the Maya Block and the Merida Terrane as part of a larger block that was accreted to NW Gondwana during the Permo-Carboniferous closure of the Rheic Ocean in the Hercynian (Alleghanian) Orogeny. This model also suggests that the Caparo palaeofault (figure 1.2) represents the suture between the Merida Terrane and the autochthonous, unmetamorphosed Caparo Block of northern South America. This model also implies that the Merida Terrane was rifted away from the Maya Block and left in its current geographic position during the breakup of Pangea in the Triassic (Marechal, 1983; Bellizzia & Pimentel, 1994; Aleman & Ramos; 2000, Weber et al., 2006, Pindell et al., 2005). Therefore, one of the objectives of this work is to test the hypothesis of the existence of two different terranes by looking at the U/Pb detrital zircon record found in the pre-Mesozoic strata exposed in the Venezuelan Andes and compare these results with the detrital record of different peri-Gondwanan terranes (e.g. Maya Block, Oaxaquia, and Acatlan) currently located in southern Laurentia in order to identify possible relationships between the Paleozoic strata of the Venezuelan Andes and these peri-Gondwanan terranes.

Firstly, the comparison of the detrital zircon record for all the units analyzed in this work, including the age signatures of the Cretaceous passive margin suite of Northern South America obtained by Noguera et al., 2011, is shown in figure 3.31. The distribution of ages obtained for all the units is very similar among one another and are almost identical to the detrital record of the passive margin of northern South America. In fact, Mesoproterozoic populations like ~1.52 Ga, ~1.35 Ga, and ~1.20 Ga, are common to all the six units shown in figure 3.31.

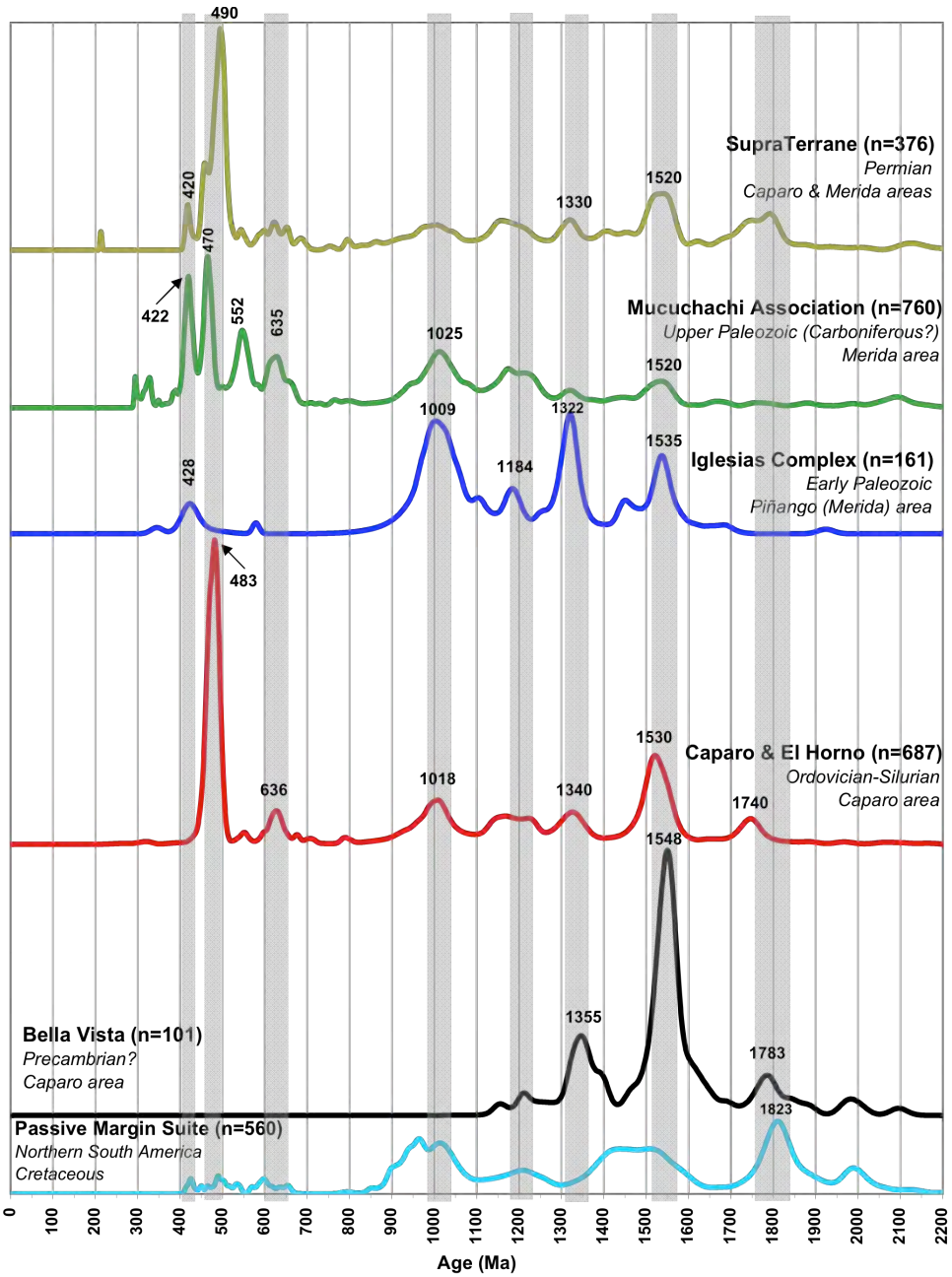

Figure 3.31 Relative probability density plot of the detrital record from the: *a)* Passive Margin of Northern South America (data from Noguera et al. 2011). *b)* Bella Vista Association; *c)* Caparo & El Horno formations; *d)* Iglesias Complex; *e)* Mucuchachi Association (Tostos, Mucuchachi, Rio Momboy); and *f)* Permian SupraTerrane (Sabaneta & Palmarito formations); the boxes in gray represent the population of ages that are common for the distributions plotted.

Additionally, population of grains with ages of ca. 1.0 Ga and ca. 630 Ma are common to all the units except the Bella Vista Association, which is logical because it is very likely that Bella Vista rocks are older than ~1.10 Ga. Also, the population of grains at ca. 420 Ma, ~480 Ma, and 1.82

Ga, are fairly common to all of the distributions analyzed. The similarity of these detrital records can also be observed in the cumulative probability plot (figure 3.32), where the curves of distribution of ages from the metasedimentary Mucuchachi Association (Tostos and Rio Momboy associations, and Mucuchachi Formation), Caparo and El Horno formations, and Permian SupraTerrane, are fairly similar in both slope and relative abundances. Therefore, based on these results, it seems reasonable to consider that all pre-Mesozoic strata of the Venezuelan Andes had a similar paleogeographic position during their deposition, rather than having different origins (and provenances) as it was proposed by the authors of the autochthonous-allochthonous model of the pre-Mesozoic evolution of the Venezuelan Andes (Marechal, 1983; Bellizzia & Pimentel, 1994).

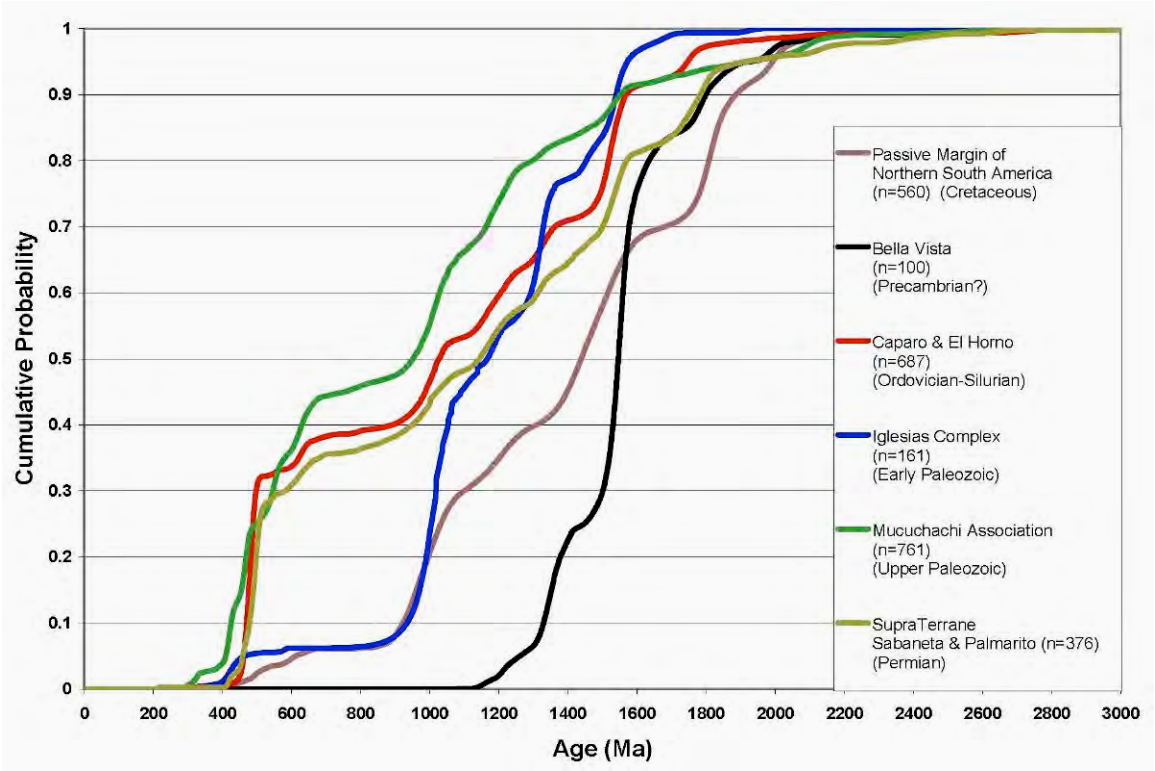

Figure 3.32 Cumulative probability plot of the detrital record from the: *a)* Passive Margin of Northern South America (data from Noguera et al. 2011). *b)* Bella Vista Association; *c)* Caparo & El Horno formations; *d)* Iglesias Complex; *e)* Mucuchachi Association (Tostos, Mucuchachi, Rio Momboy); and *f)* Permian SupraTerrane (Sabaneta & Palmarito formations).

Regarding the provenance of these Venezuelan pre-Mesozoic strata, the Mesoproterozoic detrital zircon populations can easily be matched with the known age provinces located in the Guyana Shield. First, the population with ages of ca. 1.52 Ga is likely to have been derived from the Rapakivi Parguaza Batholith, which is now located on the Venezuelan side of the Guyana Shield and belongs to the Rio Negro-Juruena Province of the Western Amazonian craton (figure 3.33) (Cordiani, et al., 2000; Tassinari, et al., 2000). Second, the signatures observed between ~550 and 650 Ma in the SupraTerrane, Mucuchachi Association, and Caparo and El Horno formations are likely related with the Pan-African Brasiliano province of the Western Amazonian craton in northern Gondwana (figure 1.3) (Cordiani et al., 2000).

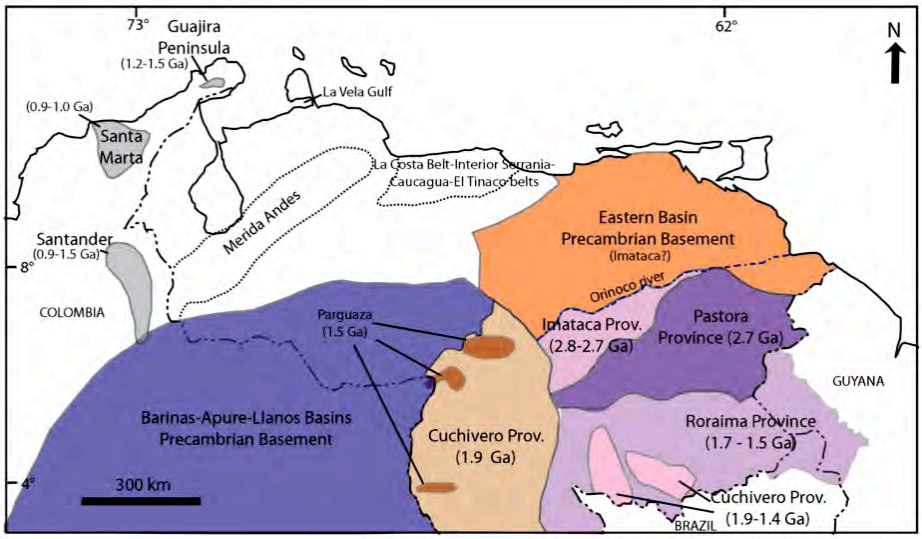

Figure 3.33. Precambrian provinces of Venezuela and Colombia (after Yoris & Ostos, 1997)

Third, the population of grains with ages between 950 Ma and 1.09 Ga was likely derived from Grenvillian orogens, which have been described in the crystalline basement of the Falcon Basin in northwestern Venezuela (Grande & Urbani, 2009), the Santa Marta and Garzon massifs of the Colombian Andes (Horton et al., 2010), the basement of the Oaxaquia in Mexico (Keppie et al., 2008), the Sunsas Province (including Grenvillian sources) in the Western Amazonian craton (Cordiani, et al., 2000; Tassinari, et al., 2000), and the Appalachian belt in North America

(Keppie et al., 2008). Fourth, the population of detrital grains observed at ca. 1.20 Ga was likely derived from either the Sunsas Province in the Amazonian Craton of Bolivia (Cordiani et al., 2000) or other potential sources of that age that may be present in Colombia or the Perija Range (Noguera, et al. 2011). Finally, the population located at ca. 1.35 Ga also seems to have a Western Amazonian craton source, specifically the Rodonian – San Ignacio Province. Based on these pieces of evidence, it seems very likely that the northwestern part of South America – including the Rio Negro-Juruena, Pan-African Brasiliano, and Rodonian-San Ignacio provinces of the Amazonian Craton – represented the main source of sediments for all the pre-Mesozoic sedimentary units located in the Venezuelan Andes.

The most striking evidence to suggest a closely related paleogeographic origin for these pre-Mesozoic rocks of the Venezuelan Andes is the presence of zircons with ages of ~ 1.52 Ga in both the Caparo Block and the Merida Terrane. Significant magmatism of this specific age is very rare and uncommon worldwide, and it has only been described in Baltica (Konigsberian-Gothian magmatic suite), Central Australia (Musgrave Province), and the Rapakivi Parguaza Batholith in the Rio Negro-Juruena Province in the Western Amazonian craton of Gondwana (Gaudette et al. 1977, Martens et al., 2010; Cordiani et al., 2000). Therefore, the presence of this signature in the pre-Mesozoic rocks of the Venezuelan Andes constrains the paleogeographic position during deposition of these rocks to a basin that drained the Parguaza Batholith in the northwest of the Guyana Shield. Furthermore, the detrital records of the supposed basements of the Bella Vista Association and the Iglesias Complex not only exhibit a similar distribution of ages, but they also clearly have the ubiquitous early Mesoproterozoic signature associated with the Parguaza Batholith. This ~1.52 Ga signature, therefore, suggests a depositional area

somewhere close to the Parguaza Batholith of the Guyana Shield for all the pre-Mesozoic strata of the Venezuelan Andes.

REGIONAL TECTONIC IMPLICATIONS

Tectonic reconstructions of NW Gondwana during the late Neoproterozoic and Paleozoic commonly invoke the existence of peri-Gondwanan terranes – eg. Maya Block, Chortis, Oaxaquia, Acatlan (Mixteca) – in Gondwana's periphery, especially in the southern margin of the Iapetus and Rheic Oceans (figure 1.3) (Murphy et al., 2006; Keppie et al., 2008). In fact, the Acatlan complex is believed to have formed either as: 1) a remnant of the Ordovician collision between Gondwana and Laurentia related to the closure of the Iapetus ocean along the Appalachian margin (Ortega-Gutierrez et al., 1999) or 2) during a rifting setting (Rheic Ocean) at ca. 480 Ma contemporaneous with the separation of peri-Gondwanan terranes like Avalonia and Carolinia from Amazonia–Oaxaquia, (Keppie et al., 2008). Therefore, detrital zircon data obtained from pre-Mesozoic metasedimentary units from Oaxaquia, the Maya Block, Acatlan, and the Eastern Colombian Andes, were analyzed together with the data obtained in this work in order to identify possible tectono-stratigraphic relationships that may be present between these peri-Gondwanan terranes and the pre-Mesozoic strata of the Venezuelan Andes.

Firstly, comparisons of detrital age records between the Cretaceous passive margin of northern South America, the Bella Vista Association, the Caparo-El Horno sequence, and Cambrian to Ordovician strata from the Oaxaquia, Acatlan, Maya Block, and Eastern Colombian Andes, are shown in figures 3.34 and 3.35. Four main observations can be made from this comparison:

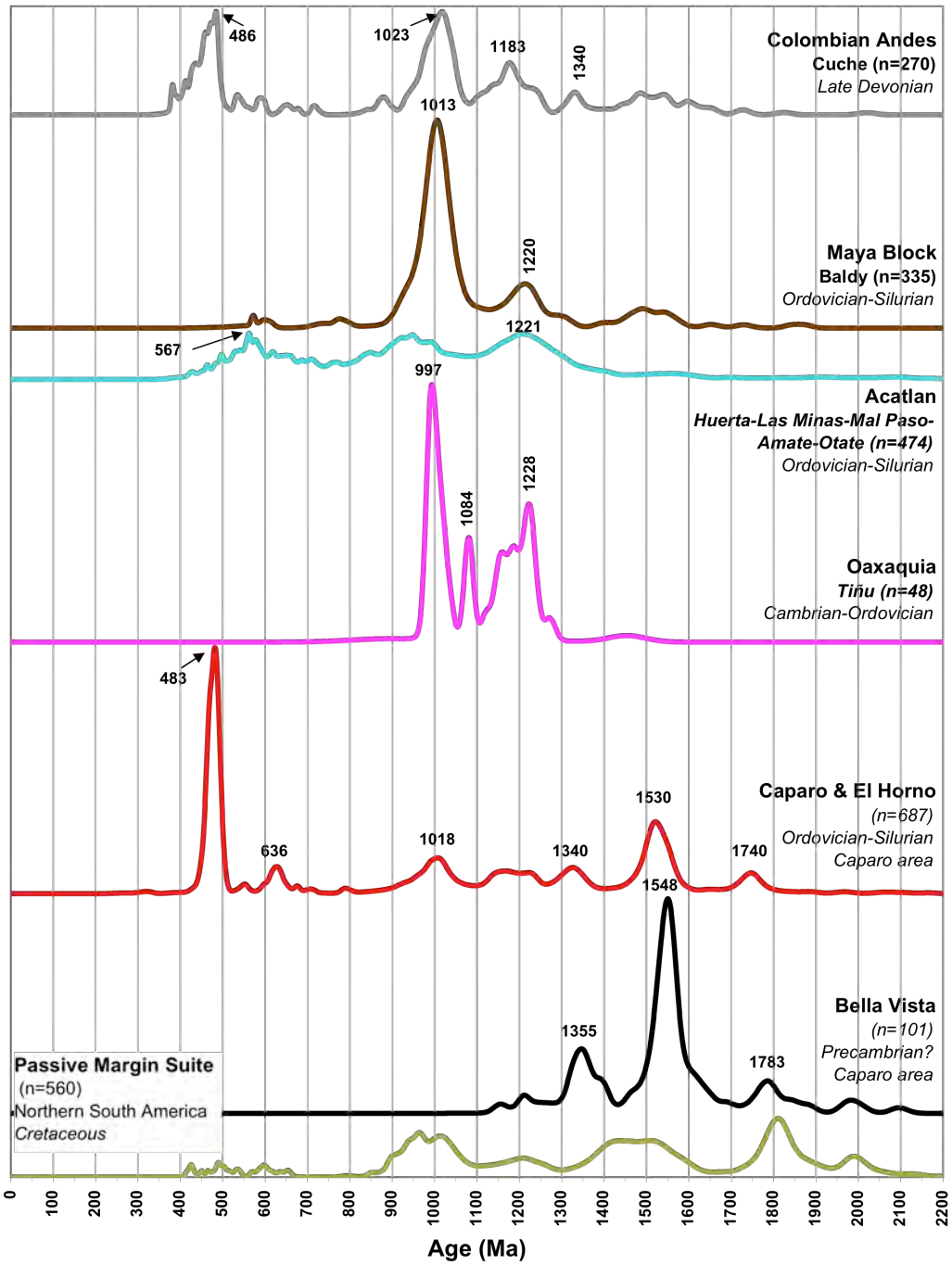

Figure 3.34 Comparison of the relative probability density plots for the detrital zircon ages between: 1) the Cretaceous passive margin of northern South America (data from Noguera, 2009); 2) Bella Vista Association, 3) Caparo-El Horno formations, 4) the Cambrian-Ordovician Tiñu Fm from Oaxaquia (data from Gillies et al, 2005); 5) the Devonian Cuche Fm. from the Colombian Andes (data from Horton et al, 2010); 6) Ordovician-Silruian Baldy Fm. From the Maya Block (data from Martens et al, 2010); and 7) Ordovician-Silurian strata from Acatlan (Huerta-Las Minas-Mal Paso-Amate-Otate units; data from Keppie et al, 2008; Talavera-Mendoza et al, 2005; Grodzicki et al, 2008). For the location of all the samples used in this comparison, see the original references mentioned above.

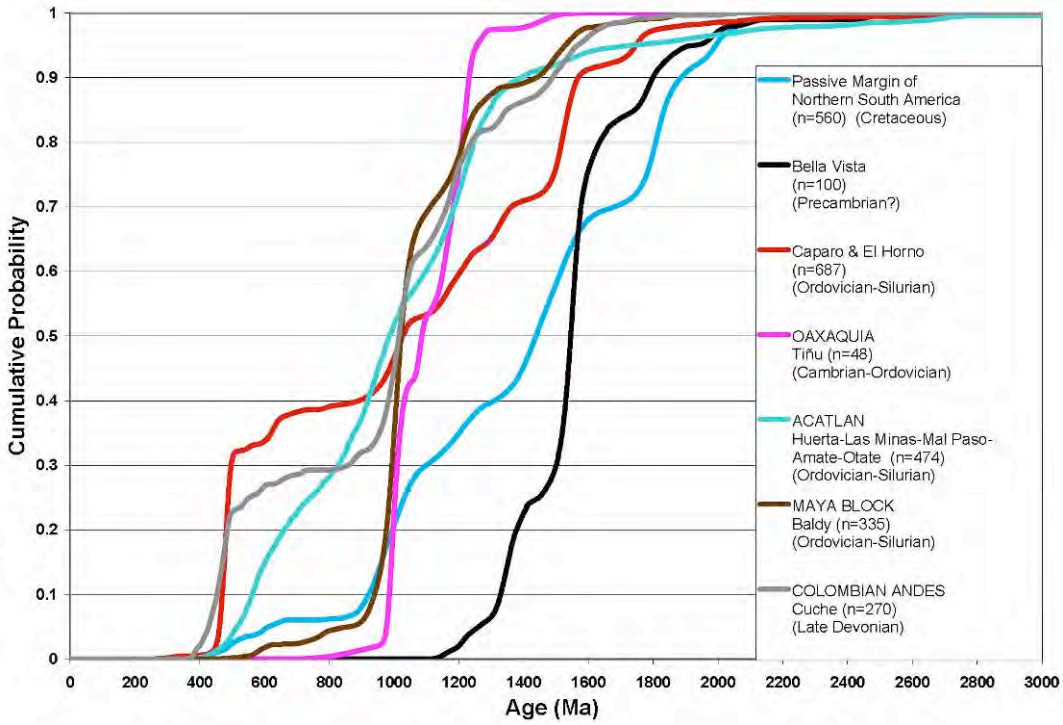

Figure 3.35 Comparison of the cumulative probability curves for the detrital zircon distributions of the same units plotted in figure 3.34. For references see figure 3.34.

1) The detrital zircon records of the Devonian Cuche Formation in the Eastern Colombian Andes, and the Ordovician-Silurian Caparo-El Horno sequence are quite similar, especially with respect to Ordovician (~480 Ma) magmatism, and the existence of populations with Grenvillian to early Mesoproterozoic ages. These similar records suggest that these two units were proximal to one another in an area with sedimentary influence coming from the Western Amazonian Craton.

The provenance for the Neoproterozoic and Mesoproterozoic grains can be easily matched in the Guyana Shield zone of the Amazon Craton. The provenance for the Ordovician (~480 Ma) grains can be matched to local Ordovician granitic intrusions (eg. El Cambur, Islitas, La Raya, El Tapo granitoids) that have been described in the Venezuelan Andes, El Baul Complex, and the

Eastern Cordillera in Colombia (figure 3.36) (Horton et al, 2010; Burkley, 1976; Brown, forthcoming; Viscarret et al., 2007; Viscarret, 2009; Van der Lelij et al, 2011). Various authors have interpreted this Ordovician magmatism as an expression of continental rifting of peri-Gondwanan Avalonian-type terranes during the opening of the Rheic Ocean in northwestern Gondwana (Keppie et al., 2008).

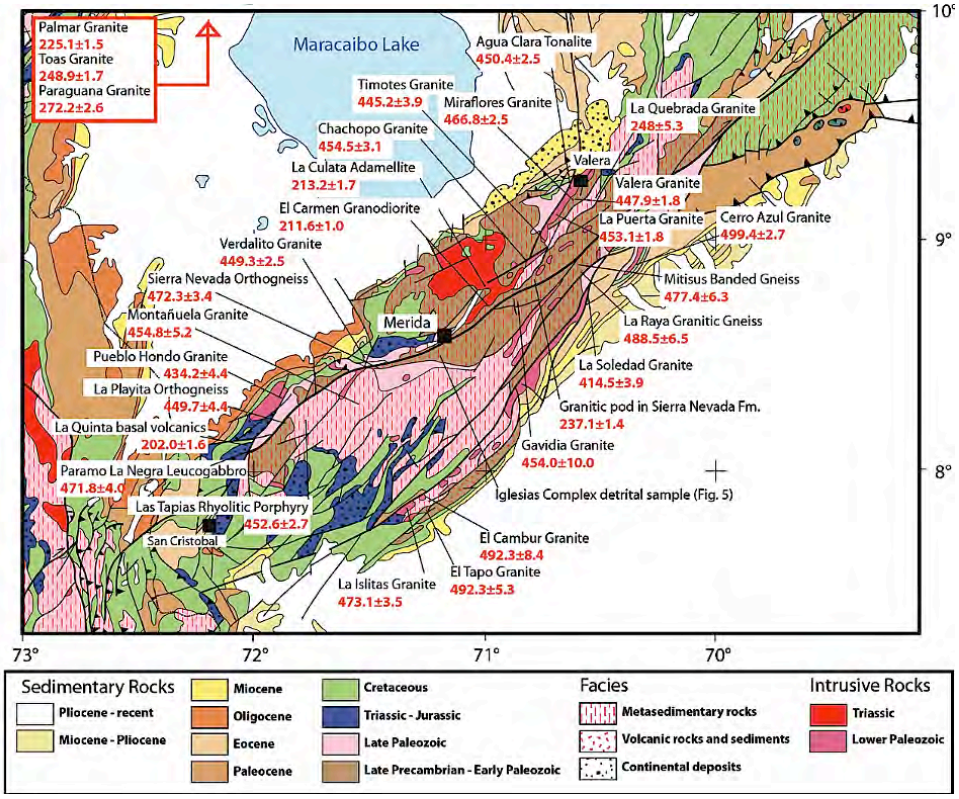

Figure 3.36. Geologic Map of the Venezuelan Andes showing the U/Pb ages ± 2 σ of igneous intrusions in the Merida Terrane and Caparo Block areas (From Van der Lelij et al, 2011).

2) The detrital record of the Ordovician-Silurian Baldy unit of the Maya Block in the Belize Mountains also seems similar to the detrital record of the Caparo-El Horno sequence. This implies that the idea suggested by Martens et al. (2010) that by the time of deposition of the Baldy unit, the Maya block was located along the periphery of Gondwana seems to be plausible. Furthermore, the presence of Rio Negro– Juruena signatures in the Baldy unit, including the ~1.52 Ga peak associated with the Parguaza Batholith in the Guyana Shield, suggests that the

Caparo-El Horno sequence and the Baldy unit in the Maya Block may be correlative and were deposited in an area close to NW Gondwana.

3) Based on paleomagnetic data, detrital geochronology, Nd isotopic data, and fossil fauna correlations, Gillies et al. (2005) suggested that Oaxaquia's position during the Paleozoic was along the periphery of Gondwana on the southern margin of the Rheic Ocean. Excepting the Grenvillian grains that are present in both records, the detrital age populations of the Cambrian-Ordovician Tiñu Formation of Oaxaquia and the Caparo-El Horno sequence do not show a similar distribution of signatures. However, the detrital record of the Tiñu Formation is composed almost 100% of Grenville-type ages, and this ~1.0 Ga population is not very informative for provenance constraints. These lines of evidence render as unlikely the existence of a connection between Oaxaquia and the Venezuelan Andes in the Early Paleozoic; however, the possibility of an Oaxaquia-Venezuelan Andes connection for the Ordovician-Silurian cannot be completely discarded. Further studies focused on this hypothesis need to be done in order to confirm whether there was a connection or not between Oaxaquia and the Venezuelan Andes.

4) No significant correlation in the detrital record of the Caparo-El Horno sequence and the pre-Devonian sequence of Acatlan is observed. Although these units from Acatlan clearly exhibit Amazonian provenance, the absence of ~1.52 Ga and Ordovician grains in the pre-Devonian Acatlan record render as unlikely a potential connection between Acatlan and the Venezuelan Andes in the Early Paleozoic.

Additionally, comparisons of the detrital zircon records of the Upper Paleozoic strata in the Venezuelan Andes and peri-Gondwanan terranes were carried out to further evaluate potential connections of the Venezuelan Andes in the Late Paleozoic. Detrital zircon age records of the Iglesias Complex, Mucuchachi Association (Mucuchachi, Tostos, and Rio Momboy associations), Carboniferous Santa Rosa Formation and equivalents units from the Maya Block, and several Carboniferous units from Oaxaquia, Acatlan, and the Eastern Colombian Andes, are shown in figures 3.37 and 3.38. Four main observations can be made from this comparison:

1) The detrital zircon distributions of ages between the Mucuchachi Association, the Santa Rosa Formation and Sepultura units from the Chiapas Massif (SW of the Maya Block), and the Carboniferous Macal unit from the Belize Mountains (SE of the Maya Block), are strikingly similar. Both the relative and cumulative density curves show that distribution of ages is almost identical for the Carboniferous strata of the Venezuelan Andes and the Maya Block. It seems reasonable that the Mesoproterozoic and late Neoproterozoic detrital zircon populations that are common to both blocks can be linked with Rondonian-San Ignacio and PanAfrican-Brasiliano sources of the Western Amazonian craton.

It is important to point out that Martens et al. (2010) indicated that ca. 410 to 420 Ma zircons are ubiquitous within the Maya block (figure 3.37 – Macal unit), both in basement sources and in late Paleozoic strata. As a result, these authors regarded this Lower Devonian tectonomagmatic event as distinctive of the Maya block, along with the previously recognized ca. 560–540 Ma basement age (Keppie et al., 2006). It turns out that one of the most prominent zircon population

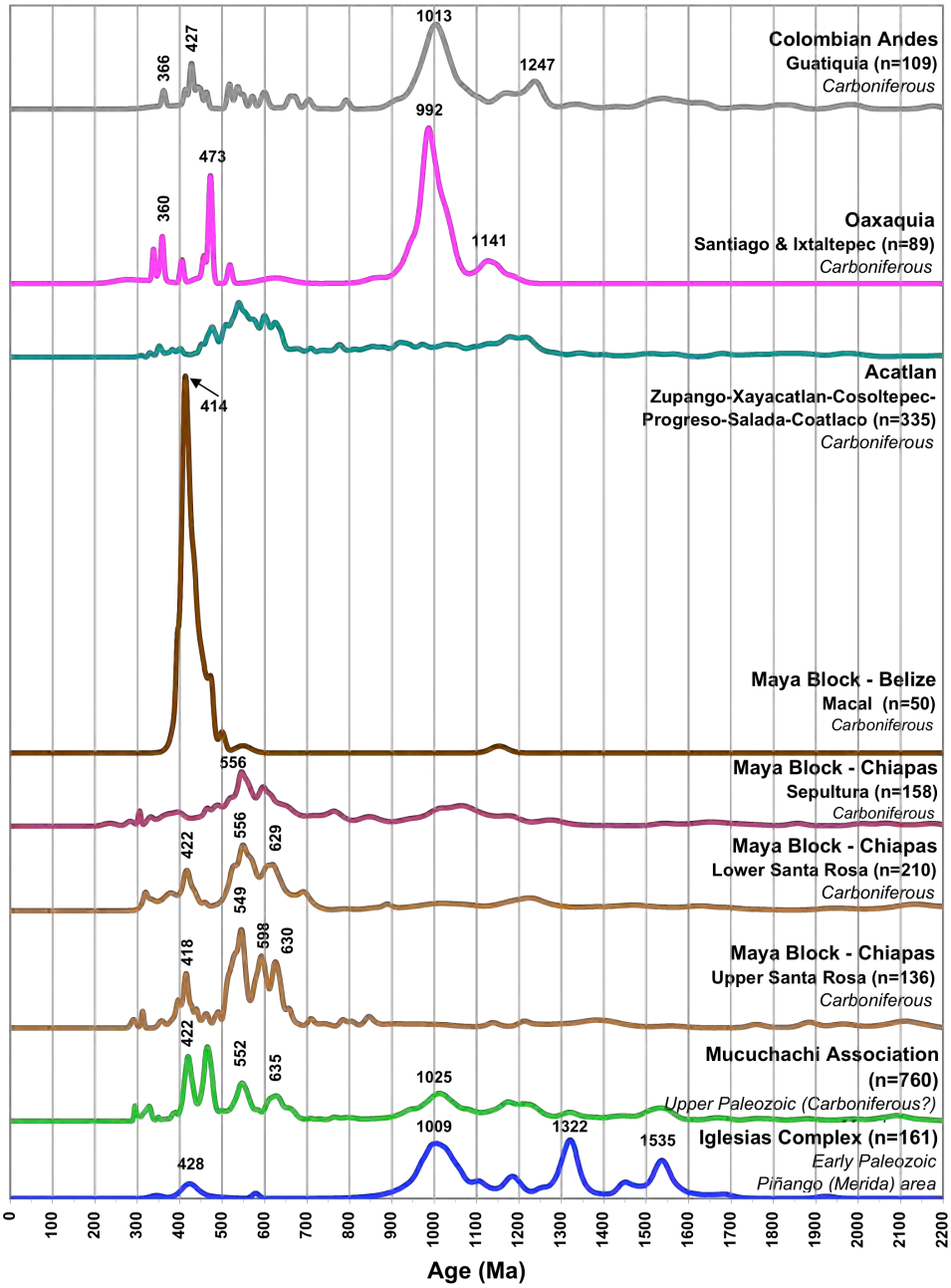

Figure 3.37 Comparison of the relative probability density plots for the detrital zircon ages between: 1) Iglesias Complex; 2) Mucuchachi Association (Mucuchachi, Tostos, and Rio Momboy associations); 3) Upper Santa Rosa Fm (data from Weber et al, 2006); 4) Lower Santa Rosa Fm (data from Weber et al, 2008b); 5) Sepultura unit in the Chiapas Massif (data from Weber et al, 2008a); 6) Macal Fm. from the Maya Block (data from Martens et al, 2010); 7) Carboniferous strata from Acatlan (Zupango-Xayacatlan-Cosoltepec-Progreso-Salada-Coatlaco units; data from Keppie et al, 2008; Morales-Gamez et al, 2008; Talavera-Mendoza et al, 2005; Grodzicki et al, 2008; Ortega-Obregon et al., 2009); 8) Carboniferous Santiago & Ixtaltepec units from Oaxaquia (data from Gillies et al, 2005); and 9) the Carboniferous Guatiquia Fm. from the Colombian Andes (data from Horton et al, 2010). For the location of all the samples used in this comparison, see the original references mentioned above.

ages (~ 410 to 420 Ma – figure 3.25) of the Mucuchachi Association is equivalent, within error, to the timing of the distinctive Lower Devonian tectonomagmatic event in Maya Block described by Martens et al., (2010). This similarity, therefore, can be considered as evidence to suggest a geologic evolution somehow related between the Maya Block and the Venezuelan Andes during the Paleozoic.

The only significant difference between these distributions is the presence of the Ordovician peak (~470 Ma) in the Mucuchachi Association that is completely missing in all of the Carboniferous strata of the Maya Block. Although this might be considered an important difference, the only unit within the Mucuchachi Association that contains that population is the Tostos Association (figure 3.27). Neither the Mucuchachi Formation (figure 3.25) nor the Rio Momboy Association (figure 3.26) detrital zircon records have this Ordovician population. Additional comments regarding this observation are: 1) the Mucuchachi Formation and Rio Momboy Association do share an almost identical detrital zircon signature with the Santa Rosa Formation and equivalents within the Maya Block, suggesting a common provenance for all of the Carboniferous units in the two blocks; 2) the detrital record of the Tostos Association may be considered different from the rest of the Upper Paleozoic strata in the Venezuelan Andes, and thus it should not be included in the Mucuchachi Association; 3) the sample HMA18, which is the only sample that records this Ordovician magmatism in a strongly unimodal fashion (sample HMA17 lacks the ~470Ma peak – see figure 3.22), may not actually belong to the Tostos Association but to some other possibly older unit within the Venezuelan Andes.

2) Detrital zircon ages within Carboniferous strata of Oaxaquia differ considerably from those of the Mucuchachi Association, and Santa Rosa Formation. Both, Ixtaltepec and Santiago

formations in Oaxaquia have mainly Grenville-type detrital zircons and they lack Pan-African-Brasiliano and Rio Negro-Juruena province signatures, including the ~1.52 Ga population that is recognized in all the pre-Mesozoic Venezuelan strata, and Paleozoic strata of the Maya Block. Therefore, it seems very unlikely that a connection between Oaxaquia and the Venezuelan Andes existed in the Upper Paleozoic.

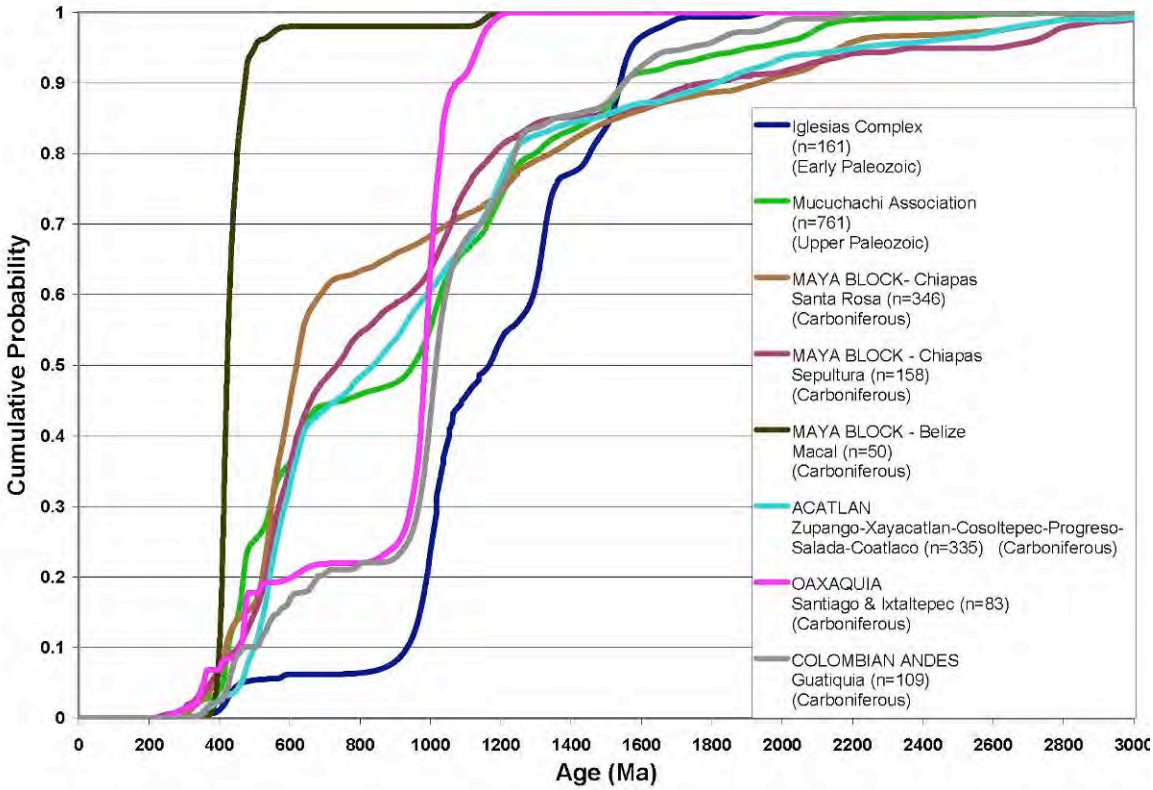

Figure 3.38 Comparison of the cumulative probability curves for the detrital zircon distributions of the same units plotted in figure 3.37. For references see figure 3.37.

3) Some authors have recently attempted to correlate Upper Paleozoic strata of Acatlan, particularly the Cosoltepec Formation, with the Santa Rosa Formation (Martens et al., 2010), and the Iglesias Complex (Van der Lelij et al, 2011). However, the comparison of the detrital zircon record obtained in this study with the Cosoltepec and other Upper Paleozoic strata of Acatlan, seems to be inconclusive in terms of supporting an Acatlan – Venezuelan Andes connection in the Upper Paleozoic. In fact, most of the detrital zircon ages from Acatlan are late

Neoproterozoic to Ordovician, and the ~1.52 Ga signature is completely missing in this peri-Gondwanan block. Therefore, the idea of independent sources and geologic evolution for the Acatlan and the Venezuelan Andes in the Upper Paleozoic is favored in this study.

4) Similar to the comparison between the detrital records of the Devonian Cuche Formation of Colombia and the Lower Paleozoic strata in the Venezuelan Andes shown in figures 3.34 and 3.35, the main age signatures observed in the Carboniferous Guatiquia Formation of the Eastern Colombian Andes can be identified in the detrital zircon record of the Mucuchachi Association and Iglesias Complex in the Venezuelan Andes. This striking similarity in the detrital zircon age distribution of the pre-Mesozoic Venezuelan Andes and Colombia strata is another strong piece of evidence that favors a more autochthonous model for the provenance of all the pre-Mesozoic rocks that are found in the Venezuelan Andes. Furthermore, the extended magmatism in the Cambrian-Silurian (~520 to 420 Ma) that has been identified in the Eastern Cordillera in Colombia (figures 3.34 and 3.37) and has been associated with the well-known Famatinian arc magmatism of the central Andes (Horton et al, 2010), also seems to be present in the Venezuelan Andes (figure 3.36). Although no reliable geochemical and petrological data about the nature of the Paleozoic magmatism in Venezuela is available to support a possible correlation between the magmatism observed in Colombia and Venezuela, the time span involved in this magmatism is similar in both areas. Therefore, if this Paleozoic magmatism in the Colombian and Venezuelan Andes was somehow genetically and tectonically related, combined with the fact that the intrusions are equally present in both sides of the Caparo palaeofault (Merida Terrane and Caparo Block), then the current geologic model of the Venezuelan Andes of having two different terranes seems to be very unlikely.

Finally, a comparison of detrital records to evaluate the provenance of the Permian units of the Venezuelan Andes (SupraTerrane) and Upper Paleozoic strata from peri-Gondwanan terranes was performed. Detrital age records of the Permian SupraTerrane (Sabaneta and Palmarito formations), Cretaceous passive margin, Mucuchachi Association, Permian Olinala and Tecomate units of Acatlan, Carboniferous Santa Rosa Formation, and Carboniferous Guatiquia Formation from Eastern Colombian Andes, are shown in figures 3.38 and 3.39. Two main observations can be made from this comparison:

1) The Permian SupraTerrane strata of the Venezuelan Andes exhibit a distribution of ages very similar to the Mucuchachi Association, Santa Rosa Formation and equivalent units from the Maya Block, Carboniferous strata exposed in the Colombian Andes, and the Permian strata (Tecomate and Olinala formations) of Acatlan. In particular, the similarity of the detrital zircon records of the SupraTerrane and the Permian strata in Acatlan seems significant given that the age signatures in both records are almost the same, except for the early Mesoproterozoic signal (~1.52 Ga) that is largely present in the Venezuelan Andes but is absent in Acatlan. Based on these results, it seems reasonable to suggest that the Maya Block, Acatlan, and the Venezuelan Andes were proximal to one another by the Permian. In fact, tectonic reconstructions of NW Gondwana establish that the closure of the Rheic Ocean and assembly of Pangea (Hercynian-Alleghanian Orogeny) started in the Late Pennsylvanian to Early Permian, which unavoidably places all these peri-Gondwanan terranes proximal to one another between NW Gondwana and SW Laurentia by this time (Murphy et al., 2006; Keppie et al., 2008).

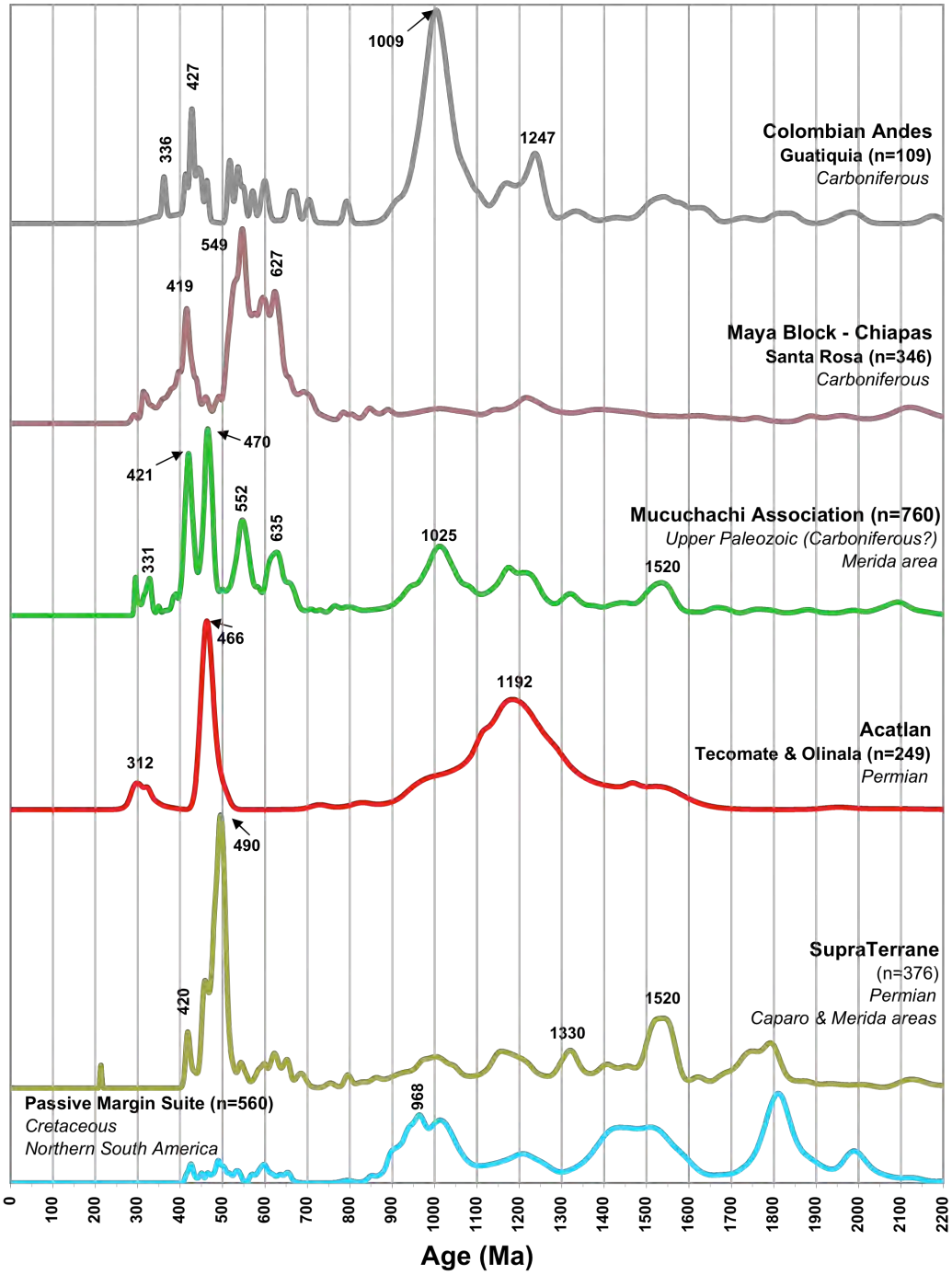

Figure 3.39 Comparison of the relative probability density plots for the detrital zircon ages between: 1) Cretaceous passive margin of northern South America (data from Noguera, 2009); 2) SupraTerrane (Sabaneta and Palmarito formations); 3) Permian Tecomate and Olinala formations of Acatlan (data from Sanchez Zalava et al., 2004; Keppie et al, 2007); 4) Mucuchachi Association (Mucuchachi, Tostos, and Rio Momboy associations); 5) Santa Rosa Fm in the Chiapas Massif (data from Weber et al, 2006, 2008a, 2008b); and 6) Carboniferous Guatiquia Fm. from the Colombian Andes (data from Horton et al, 2010). For the location of all the samples used in this comparison, see the original references mentioned above.

2) The detrital population at ca. 300 Ma that is recognized within the Permian strata of Acatlan (Tecomate and Olinana formations) is also present in the SupraTerrane, Mucuchachi Association, and the Santa Rosa Formation in the Maya Block. The most plausible tectonic event that can account for magmatism of this age in the region is the closure of the Rheic Ocean and the assemblage of Pangea in the northwestern part of Gondwana (Murphy et al., 2006; Keppie et al., 2008). Coeval magmatism generated during these events seems to be recorded within detrital zircon populations in the Upper Paleozoic strata of the Venezuelan Andes, Maya Block, and Acatlan. This evidence also supports the idea a proximal relationships between all these blocks to NW Gondwana in the Permian.

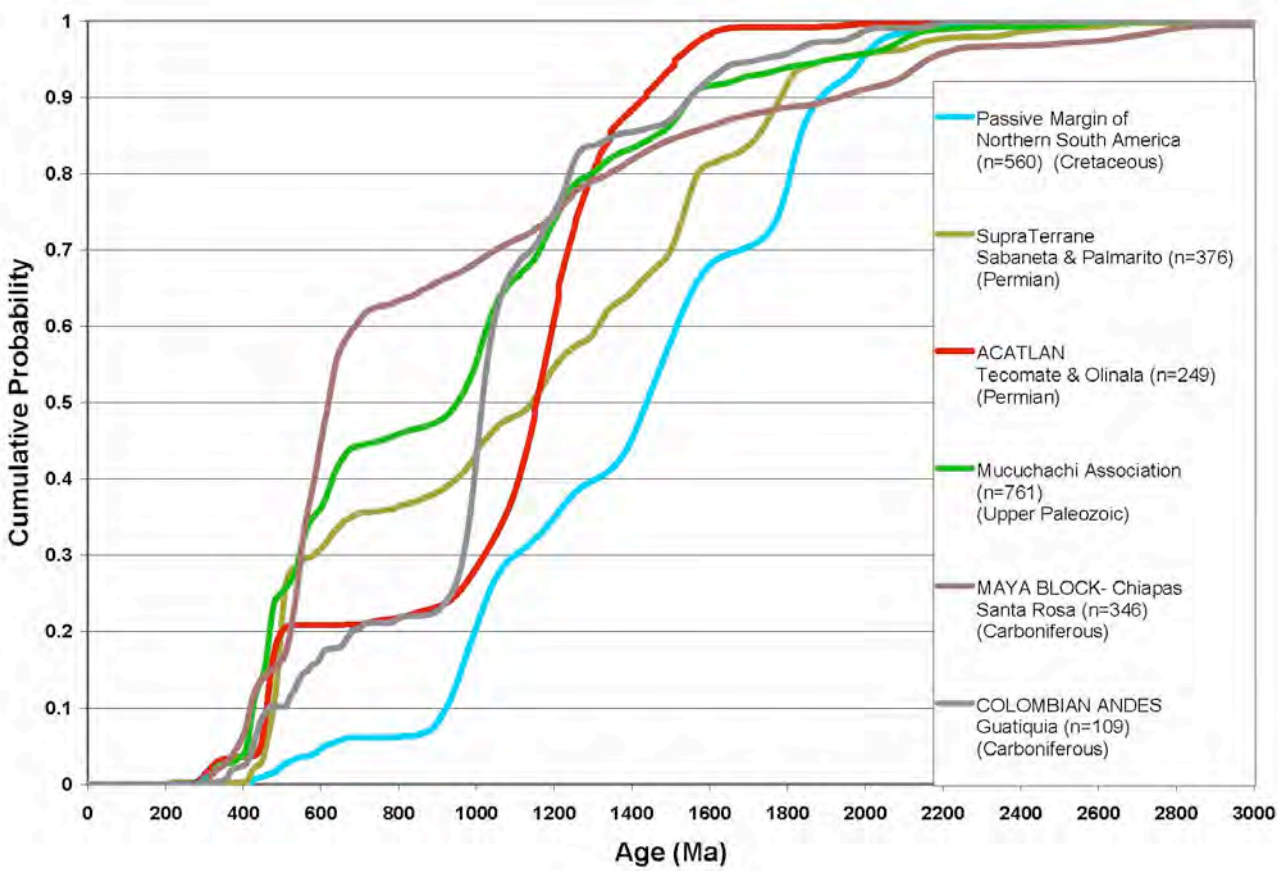

Figure 3.40 Comparison of the cumulative probability curves for the detrital zircon distributions of the same units plotted in figure 3.39. For references see figure 3.39.

CHAPTER 4

CONCLUSIONS

U/Pb ages of detrital zircons from the pre-Mesozoic strata in the Venezuelan Andes provide insight into sediment provenance and basement framework of northern South America. The complete geochronological data set, consisting of 2085 individual grain ages obtained by LA-ICP-MS analyses of 22 samples of the Mucuchachi Association (Mucuchachi, Tostos, and Rio Momboy associations), Iglesias Complex, Bella Vista Association, and the Caparo, El Horno, Palmarito and Sabaneta formations, provides an initial reference for zircon provenance of the pre-Mesozoic geology of northern South America.

The current model proposed by Marechal (1983) for the pre-Mesozoic evolution of the Venezuelan Andes, where the allochthonous Merida Terrane was unrelated to the Caparo Block until its accretion to NW Gondwana during the Hercynian (Alleghanian) Orogeny, fails to explain the almost identical similarity of the detrital zircon records present within all the pre-Mesozoic strata in the Venezuelan Andes. In contrast, the interpretation of a single, para-autochthonous pre-Mesozoic Venezuelan Andean block formed by the Iglesias Complex, Bella Vista Association, Caparo and El Horno formations, Mucuchachi Association, and SupraTerrane, seems more plausible to explain the pre-Mesozoic geology of the Venezuelan. The evidence that supports this conclusion are:

1) The detrital zircon record obtained for the Mucuchachi Association is almost identical to the record obtained for the Caparo and El Horno formations. Detrital populations that are common for both rock associations include grains with these ages: Late Devonian–Early Silurian (~410 to 420 Ma), Ordovician (~470 to 480 Ma), late Neoproterozoic (~550 to 620 Ma), Mesoproterozoic (~1.0 Ga, ~1.20Ga, ~ 1.35, and ~ 1.52 Ga), and late Paleoproterozoic (~1.82 Ga). These results strongly support the idea that both blocks shared a common geographic depositional history associated with source areas like the Rio Negro-Juruena (including the ubiquitous ~1.52 Ga peak associated to the Parguaza Batholith in the Guyana Shield), Pan-African Brasiliano, and Rodonian-San Ignacio provinces, located in the Western Amazonian craton.

2) High pressure rocks that would provide evidence for a collision between the block Merida Terrane and the Caparo Block have not been reported in the Venezuelan Andes. Furthermore, no oceanic-type rocks that might represent the suture between the Merida Terrane and the Caparo Block – in the case they were two independent blocks – have been found anywhere in Venezuela or Colombia.

3) Magmatism in the Venezuelan Andes shows fairly continuous activity during the Early Paleozoic, lasting from the late Cambrian until the Devonian. In addition, the location of these igneous intrusions is ubiquitously along the entire mountain chain, equally affecting the Caparo Block and the Merida Terrane areas. It seems very unlikely that two different blocks could have had this similar extended timing of magmatism without being tectono-geographically proximal during the Paleozoic.

4) Although the timing of the deformational history of the Iglesias Complex is still very unclear, the existence of a Silurian deformational event associated with the Acadian Orogeny and the closure of the Iapetus Ocean has not been reported anywhere in the Venezuelan Andes nor elsewhere in northern South America.

One argument seems to contradict the idea of one single pre-Mesozoic Venezuelan Andes block. This argument is the absence of any Triassic deformation in the units that are exposed in the Caparo area. It seems that this Triassic deformation is only present in the rocks of the Iglesias Complex and the Mucuchachi Association. However, two main reasons can explain this situation: a) rocks showing Triassic deformation have not been found in the Caparo area yet, or b) the units that are exposed within the Caparo area correspond to a higher crustal level of one single Venezuelan Andes block that suffered very little to no deformation in the Triassic during the breakup of Pangea; whereas the Iglesias Complex and Mucuchachi Association were more extensively deformed (mainly stretching due to the rifting episode) because these units were originally located in a deeper crustal domain. The latter explanation seems to be a reasonable explanation for the absence of this Triassic deformation in the Caparo area, and also it is consistent with the idea of one single block for the Venezuelan Andes. In this new proposed model for the Venezuelan Andes, the Caparo palaeofault represents an reverse fault that allowed the uplift and exposure of rocks from a lower crustal domain (Iglesias Complex and Mucuchachi Association), and place them next to rocks that occupied a higher crustal position with slight to no Triassic deformation (Bella Vista Association and Caparo-El Horno sequence) in the footwall of the Caparo palaeofault.

Finally, the data obtained in this work suggest that the para-autochthonous pre-Mesozoic strata of the Venezuelan Andes are correlative with the Paleozoic sedimentary strata of the Eastern Colombian Andes, and with the Paleozoic metasedimentary units of the Maya Block. The strong similarity of the detrital zircon records of the Venezuelan Andes with the records of the (autochthonous to NW Gondwana) Paleozoic strata in Colombia combined with the ubiquitous signatures of Amazonian Provinces (Rio Negro-Juruena, Pan-African Brasiliano, and Rodonian-San Ignacio provinces) place the Venezuelan Andes block to the NW of Gondwana during the Paleozoic. Additionally, the relationship of the detrital signatures between the Paleozoic strata of the Maya Block and Venezuelan Andes is also evident. It seems likely that the Maya Block was connected to the Venezuelan Andes during at least some part of the Paleozoic. The separation of these two blocks probably occurred during the Triassic rifting of Pangea. Further studies focused on comparing the nature of the crystalline basements of the two blocks should be done, however, in order to verify whether these terranes were closely related in the Precambrian. Lastly, the comparison of detrital zircon records between the Paleozoic strata of Acatlan and the Venezuelan Andes does not suggest any pre-Pangean connection between these two blocks. Conversely, no connection seems to have existed between Oaxaquia and the Venezuelan Andes in the Paleozoic.

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APPENDICES

APPENDIX A

SAMPLES INVENTORY

Table A1. Location of the units and locations visited

UNIT	AGE	SAMPLE	# of zircons analyzed	LOCATION	GPS Location
Bella Vista Association	Precambrian?	HC11	101	Caparo Area. Road between the Caparito creek and Caño La Playa. Santa Barbara de Barinas.	UTM (N19º) N243.116m E864.084m
Caparo	Ordovician	HC1	99	Caparo area. Road between Santa Barbara de Barinas and the Caparo Lake. Around 1km from El Cambur creek.	UTM (N19º) N249.724m E871.700m
		HC2	100	Caparo area. Road between Santa Barbara de Barinas and the Caparo Lake. Around 1km from El Cambur creek.	UTM (N19º) N249.724m E871.700m
		HC4	98	Caparo area. Road between Santa Barbara de Barinas and the Caparo Lake. Around 1km from the Caparo Lake.	UTM (N19º) N247.891m 873.713m
		HC13a	98	Caparo area. Road between Santa Barbara de Barinas and the Caparo Lake. Around 1km from the Caparo Lake.	UTM (N19º) N250.031m 871.638m
		HC17	97	Caparo area. Road between Santa Barbara de Barinas and the Caparo Lake. Along the El Cambur creek.	UTM (N19º) N 872.049 E 249.621
		HC18	96	Caparo area. Road between Santa Barbara de Barinas and the Caparo Lake. Along the El Cambur creek.	UTM (N19º) N 872.620 E 250.220
El Horno	Silurian	HC9	99	Caparo Area. Road between the Caparito creek and Caño La Playa. Santa Barbara de Barinas	UTM (N19º) N241.224m 864.913m
Iglesias Complex	Early Paleozoic? (Silurian?)	AMA7	81	Mifafi creek area. Along the road between Collado del Condor and Mucumpis town.	N8°51.418' W70°51.916'
		PAA42	80	Piñango area. Road between Pico El Aguila and Piñango. About 15km from Piñango town	N8°59.326' W70°51.510'

UNIT	AGE	SAMPLE	# of zircons analyzed	LOCATION	GPS Location
Mucuchachi Formation	Carboniferous	PAA5	97	Pico El Aguila area. Road between Pico El Aguila and Piñango. About 5km from Pico El Aguila.	N8°51.954' W70°50.032'
		HMA14	101	Timotes area. Road between Valera and Timotes. Aproximately 2km north of Timotes.	N9°0.757' W70°44.347'
		AMA15	93	Mucuchachi area. Road between Canagua and El Molino. Around 2 kms from Canagua	N8°9.393' W71°28.455'
		AMA16	85	Mucuchachi area. Road between Canagua and El Molino. Around 5 kms from Canagua	N8°9.340' W71°29.742'
		HMA19	97	El Vigia area. Road between Zea and "15km" security checkpoint in the panamerican highway. Around 5km from Zea town.	N8°24.852' W71°45.501'
Rio Momboy Association	Upper Pz? Carboniferous?	PAA47b	96	Piñango area. Road between Timotes and Piñango. About 25km from Timotes.	N9°2.456' W70°46.754'
Tostos Association	Upper Pz? Carboniferous?	HMA17	96	Estanquez area. El Vigia-Merida highway. Road between El Anis and Chiguara town, about 2km from the El Anis security checkpoint	N8°28.209' W71°31.418'
		HMA18	96	Estanquez area. El Vigia-Merida highway. Road between Chichuy and San Jose de Acequias, near "Tierra Negra"	N8°28.469' W70°20.000'
Sabaneta	Permian	HC5a	95	Caparo area. Road between the Caparo Lake the Mucuchachi town. Between towns of Sabaneta and Portachuelo.	UTM (N19º) N243.697m 885.473m
		HC5b	92	Caparo area. Road between the Caparo Lake the Mucuchachi town. Between towns of Sabaneta and Portachuelo.	UTM (N19º) N243.697m 885.473m
		HC6	96	Caparo area. Road between the Caparo Lake the Mucuchachi town. Between towns of Sabaneta and Portachuelo.	UTM (N19º) N255.428m 885.400m
Palmarito	Permian	HC16	93	South of Merida city. Road between Merida and Jaji. Loma de Los Maitines area.	N8º 24.204' W71º 0.012'

APPENDIX B

ANALYTICAL TECHNIQUES

The provenance of sandstones and metamorphic rocks from sedimentary protoliths as determined by U-Pb detrital zircon geochronology has become a helpful tool in tectonic reconstructions for western Pangean terranes (Ortega-Gutierrez et al.,1999; Gillis et al., 2005; Keppie et al., 2008). Samples from 22 clastic sedimentary and metasedimentary units from the Merida Terrane and Caparo Block in the Venezuelan Andes were collected, processed, and analyzed for U-Pb geochronology by laser ablation–inductively coupled plasma–mass spectrometry (LA-ICP-MS) following the methods and analytical protocols of Gehrels et al. (2008). Zircon grains were separated by standard density and magnetic separation techniques, selected randomly, and then mounted into epoxy pucks that were ground and polished to expose grains. Laser spot locations of 30–40 μm diameter, chiefly on sufficiently wide rims of zoned grains, were identified using a base map constructed from photomicrograph and/or cathodoluminescence images.

The analyses in the LA-MC-ICPMS involved ablation of zircon with a New Wave/Lambda Physik DUV193 Excimer laser (operating at a wavelength of 193nm) using a spot diameter of 30 microns. The ablated material is carried in helium into the plasma source of a GVI Isoprobe, which is equipped with a flight tube of sufficient width that U, Th, and Pb isotopes are measured simultaneously. All measurements are made in static mode, using 1011 ohm Faraday detectors

for ^{238}U, ^{232}Th, ^{208}Pb, and ^{206}Pb, a 1012 ohm faraday collector for ^{207}Pb, and an ion counting channel for ^{204}Pb. Ion yields are ~1.0mv per ppm (Noguera et a., 2011).

Each analysis consists of one 12-second integration on peaks with the laser off (for backgrounds), 12 one-second integrations with the laser firing, and a 30 second delay to purge the previous sample and prepare for the next analysis. The ablation pit is ~12 microns in depth. For each analysis, the errors in determining $^{206}Pb/^{238}U$ and $^{206}Pb/^{204}Pb$ result in a measurement error of ~1-2% (at 2-sigma level) in the $^{206}Pb/^{238}U$ age. The errors in measurement of $^{206}Pb/^{207}Pb$ and $^{206}Pb/^{204}Pb$ also result in ~1-2% (at 2-sigma level) uncertainty in age for grains that are >1.0Ga, but are substantially larger for younger grains due to low intensity of the ^{207}Pb signal (Noguera et a., 2011).

For most analyses, the cross-over in precision of $^{206}Pb/^{238}U$ and $^{206}Pb/^{207}Pb$ ages occurs at 0.8-1.0 Ga. Common Pb correction is accomplished by using the measured ^{204}Pb and assuming an initial Pb composition from Stacey and Kramers (1975) (with uncertainties of 1.0 for $^{206}Pb/^{204}Pb$ and 0.3 for $^{206}Pb/^{207}Pb$). Our measurement of ^{204}Pb is unaffected by the presence of ^{204}Hg because backgrounds are measured on peaks (thereby subtracting any background ^{204}Hg and ^{204}Pb), and because very little Hg is present in the argon gas. Inter-element fractionation of Pb/U is generally ~20%, whereas apparent fractionation of Pb isotopes is generally ~2%. In-run analysis of fragments of a large zircon crystal (generally every fifth measurement) with known age of 564 ± 4Ma (2-sigma error) is used to correct for this fractionation (Noguera et a., 2011).

The uncertainty resulting from the calibration correction is generally 1-2% (2-sigma) for both $^{206}Pb/^{207}Pb$ and $^{206}Pb/^{238}U$ ages. Uncertainties shown in appendix B are at the 1-sigma level, and include only measurement errors. Interpreted ages are based on $^{206}Pb/^{238}U$ for <1000Ma grains and on $^{206}Pb/^{207}Pb$ for >1000Ma grains. This division at 1000Ma results from the increasing uncertainty of $^{206}Pb/^{238}U$ ages and the decreasing uncertainty of $^{206}Pb/^{207}Pb$ ages as a function of age. The resulting interpreted ages for the detrital zircons are shown on relative age-probability diagrams (from Ludwig, 2003). These diagrams show each age and its uncertainty (for measurement error only) as a normal distribution, and sum all ages from a sample into a single curve (Noguera et a., 2011).

APPENDIX C

PETROGRAPHIC ANALYSES

Unit	Sample	Rock name	Composition	Grain size (mm)	Deformation / Metamorphism	Protolith
Bella Vista Association	HC11	Phyllite	Quartz (90%), sericite (5%), chlorite (5%)	0.05 to 0.25	Moderate foliation. Low grade metamorphism	Very fine-grained quartzose sandstone
Caparo Formation	HC1	Lithic graywacke	Quartz (75%), sedimentary lithic (10%), matrix (15% - Fe-oxides and clays)	0.1 to 0.25	Moderate compaction.	N/A
	HC2	Polymictic orthoconglomerate	Sedimentary lithics (80%-shale,siltstone) quartz (20%), matrix (2%- Fe-oxides)	0.5 to 5.5	No deformation. Slight to moderate compaction	N/A
	HC4	Coarse-grained, sublithic arenite	Quartz (70%), sedimentary lithic (15%), matrix (10% - Fe-oxides and clays)	1.0 to 2.0	Moderate compaction. Deformation of micas	N/A
	HC13A	Coarse-grained, lithic arenite	Quartz (50%), sedimentary lithic (40%), matrix (10% - Fe-oxides and clays)	1.0 to 2.0	Moderate compaction. Deformation of micas	N/A
	HC17	Siltstone	Quartz (90%), muscovite (5%), matrix (5% - clay minerals and Fe-oxides)	0.01 to 0.05	No deformation	N/A
	HC18	Siltstone	Quartz (80%), muscovite (5%), matrix (15% - clay minerals and Fe-oxides)	0.01 to 0.05	No deformation	N/A
El Horno Formation	HC9	Polymictic orthoconglomerate	Quartz (85%), sedimentary lithics (8%-shale,siltstone,chert), felds (5%), matrix	0.5 to 5.0	No deformation. Slight to moderate compaction	N/A
Iglesias Complex	AMA7	Paraschist	Quartz (45%), feldspar (35%), muscovite (10%)	0.1 to 4.0	Moderate foliation, mainly given by the micas	Medium-grained, feldspathic graywacke
	PAA42	Quartzite	Quartz (80%), feldspar (10%), muscovite (7%), chlorite (3%)	0.1 to 0.5	Weak foliation	Medium-grained, quartz-rich sandstone

Unit	Sample	Rock name	Composition	Grain size (mm)	Deformation / Metamorphism	Protolith
Mucuchachi Formation	HMA19	Medium-grained phyllite	Quartz (65%), muscovite (25%), matrix (10% clays and fe-oxides)	0.03 to 1.0	Low grade metamorphism	Medium-grained quartz-rich greywacke
	AMA15	Medium-grained metasandstone	Quartz (80% - monocrystalline), chert (10%). matrix/muscovite (10%)	0.05 to 0.5	Barely deformed. Very low grade metamorphism	Medium-grained quartz-rich sandstone
	AMA16	Fine-grained mestasandstone	Quartz (90% - monocrystalline igneous and metamorphic), chert (10%).	0.05 to 0.20	Barely deformed. Very low grade metamorphism	Fine-grained, quartz-rich sandstone
	PAA5	Medium-grained quartzite	Quartz (85%), muscovite (5%), matrix (10% - micaceous)	0.15 to 1.0	Weak to moderate foliation. Low grade	Medium-grained quartz-rich sandstone
	HMA14	Medium-grained quartzite	Quartz (80%), chert (10%), muscovite (5%), matrix (5% - fe-oxides and clays)	0.1 to 0.8	Weak to moderate foliation. Low grade	Medium-grained quartz-rich sandstone
Rio Momboy Association	PAA47B	Packstone with extraclasts	Extraclasts: Qtz, felds, mica (40%); Micrite (10%); Spar (50%)	0.05 to 0.25	Minimal deformation. No metamorphism	N/A
Tostos Association	HMA17	Fine-to medium-grained quartzite	Quartz (98%), matrix/muscovite (2%)	0.1 to 0.5	Weak to moderate folation	Fine-grained, quartz-rich sandstone
	HMA18	Medium to coarse-grained quartzite	Quartz (95%), matrix/chlorite (5%)	0.05 to 0.1	Moderate foliation	Medium-grained, quartz-rich sandstone
Sabaneta Formation	HC5A	Medium-grained lithic arenite	Quartz (60%), sedimentary lithics (30%) felds (5%), matrix (5% - Fe-oxides)	0.3 to 1.2	Medium compaction. No metamorphishm	N/A
	HC5B	Medium-grained sublithic arenite	Quartz (75%), sedimentary lithics (12%) felds (3%), matrix (10% - Fe-oxides)	0.5 to 1.5	Medium compaction. No metamorphishm	N/A
	HC6	Fine-grained sublithic arenite	Quartz (60%), sedimentary lithics (15%) felds (5%), matrix (20% - Fe-oxides	0.03 to 0.5	Medium compaction. No metamorphishm	N/A
Palmarito Formation	HC16	Very fine-grained sandstone	Quartz (85%), muscovite (10%), matrix (5%)	0.05 to 0.15	Moderate compaction. No metamorphism	N/A

APPENDIX D

U/PB DETRITAL ZIRCON GEOCHRONOLOGY DATA

				Isotope Ratios									Apparent Ages					
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb */ ^{207}Pb*	± (%)	^{207}Pb */ ^{235}U*	± (%)	^{206}Pb */ ^{238}U	± (%)	Error Conc	^{206}Pb */ ^{207}Pb*	± (Ma)	^{207}Pb */ ^{235}U*	± (Ma)	^{206}Pb */ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC11-27	207	155024	3.1	12.7725	0.8	2.1605	1.3	0.2001	1.0	0.80	1176.1	11.0	1168.4	8.9	1154.3	15.4	1154.3	15.4
HC11-13	190	136615	2.5	12.413	0.6	2.3024	0.9	0.2073	0.7	0.73	1214.3	7.3	1213.0	6.4	1210.8	12.1	1210.8	12.1
HC11-20	97	39153	1.5	12.3726	2.0	2.277	2.5	0.2043	1.5	0.60	1198.5	16.5	1205.2	17.8	1217.2	39.7	1217.2	39.7
HC11-33	162	58007	1.4	12.3111	1.5	2.3191	1.9	0.2071	1.2	0.63	1213.2	13.5	1218.2	13.8	1226.9	29.8	1226.9	29.8
HC11-68	106	40828	1.2	11.9859	1.7	2.5091	2.6	0.2181	1.9	0.74	1271.9	22.3	1274.7	18.8	1279.3	33.7	1279.3	33.7
HC11-37	72	40886	2.5	11.9726	3.3	2.5246	3.5	0.2192	1.3	0.37	1277.8	15.3	1279.2	25.7	1281.5	63.8	1281.5	63.8
HC11-34	44	19851	1.3	11.9616	4.8	2.5247	5.1	0.219	1.7	0.33	1276.7	19.2	1279.2	37.1	1283.3	94.1	1283.3	94.1
HC11-1	133	45171	2.0	11.7338	0.7	2.6828	1.2	0.2283	1.0	0.83	1325.6	12.0	1323.7	8.9	1320.6	13.1	1320.6	13.1
HC11-72	246	114123	1.7	11.695	0.6	2.7316	0.8	0.2317	0.5	0.61	1343.4	5.9	1337.1	6.0	1327.0	12.3	1327.0	12.3
HC11-29	53	20212	1.7	11.6752	2.6	2.4715	4.4	0.2093	3.6	0.81	1225.0	39.9	1263.7	32.0	1330.3	50.6	1330.3	50.6
HC11-44	383	120523	2.1	11.6607	0.4	2.7371	3.0	0.2315	3.0	0.99	1342.3	35.9	1338.6	22.3	1332.7	7.9	1332.7	7.9
HC11-81	128	61950	2.0	11.6512	1.1	2.7534	1.5	0.2327	1.1	0.72	1348.5	13.6	1343.0	11.5	1334.3	20.6	1334.3	20.6
HC11-57	291	161508	2.4	11.6024	0.4	2.663	0.9	0.2241	0.8	0.91	1303.4	9.7	1318.3	6.7	1342.4	7.2	1342.4	7.2
HC11-18	281	232979	2.6	11.5481	0.5	2.7911	1.3	0.2338	1.2	0.91	1354.2	14.2	1353.1	9.5	1351.5	10.1	1351.5	10.1
HC11-78	355	232331	1.5	11.5302	0.4	2.7778	1.9	0.2323	1.9	0.97	1346.5	22.5	1349.6	14.2	1354.4	8.4	1354.4	8.4
HC11-35	160	50480	2.0	11.529	1.1	2.6629	1.9	0.2227	1.5	0.80	1295.9	17.7	1318.2	13.9	1354.7	21.7	1354.7	21.7
HC11-65	74	26328	2.0	11.4953	3.4	2.8381	4.3	0.2366	2.6	0.60	1369.1	31.7	1365.7	32.3	1360.3	66.4	1360.3	66.4
HC11-59	322	127407	1.3	11.4883	0.9	2.8075	1.8	0.2339	1.6	0.88	1355.0	19.7	1357.6	13.8	1361.5	17.0	1361.5	17.0
HC11-66	164	71575	2.0	11.4875	1.1	2.7702	1.8	0.2308	1.4	0.78	1338.7	17.3	1347.6	13.6	1361.6	21.9	1361.6	21.9
HC11-53	126	87885	2.2	11.4813	1.4	2.8327	1.8	0.2359	1.2	0.67	1365.2	15.2	1364.2	13.8	1362.6	26.3	1362.6	26.3
HC11-63	145	67543	2.2	11.3909	1.2	2.8168	1.5	0.2327	0.9	0.58	1348.7	10.6	1360.0	11.2	1377.9	23.4	1377.9	23.4
HC11-26	135	66002	2.1	11.3302	1.4	2.9852	2.0	0.2453	1.4	0.70	1414.2	17.6	1403.9	15.0	1388.1	27.0	1388.1	27.0
HC11-46	108	103167	1.6	11.2758	0.8	2.9773	1.5	0.2435	1.3	0.85	1404.8	16.6	1401.8	11.7	1397.4	15.4	1397.4	15.4
HC11-4	263	178793	2.0	11.2698	0.4	2.9572	1.1	0.2417	1.0	0.93	1395.6	12.6	1396.7	8.2	1398.4	7.6	1398.4	7.6
HC11-16	44	35093	2.0	10.9322	3.9	3.0577	4.5	0.2424	2.1	0.47	1399.4	26.4	1422.2	34.2	1456.4	75.0	1456.4	75.0
HC11-60	114	34143	1.8	10.8937	1.0	3.125	1.3	0.2469	0.8	0.60	1422.5	9.8	1438.9	9.9	1463.2	19.7	1463.2	19.7
HC11-45	179	137866	2.7	10.8811	0.7	3.2595	3.4	0.2572	3.3	0.98	1475.7	43.9	1471.5	26.4	1465.4	12.7	1465.4	12.7
HC11-2	206	124933	2.3	10.7396	0.6	3.2195	1.7	0.2508	1.6	0.94	1442.4	21.2	1461.9	13.5	1490.2	10.8	1490.2	10.8
HC11-24	461	268266	2.3	10.6474	0.3	3.3683	1.4	0.2601	1.3	0.97	1490.4	17.5	1497.0	10.6	1506.5	6.1	1506.5	6.1

HC11-79	80	41827	1.3	10.5824	1.3	3.5227	2.2	0.2704	1.8	0.81	1542.7	24.9	1532.3	17.7	1518.0	24.7	1518.0	24.7
HC11-9	51	25885	1.8	10.5703	3.4	3.5631	4.4	0.2732	2.8	0.64	1556.8	39.1	1541.4	35.0	1520.2	63.8	1520.2	63.8
HC11-93	116	57928	2.3	10.5648	1.2	3.5911	3.7	0.2752	3.6	0.95	1566.9	49.6	1547.6	29.8	1521.2	21.7	1521.2	21.7
HC11-99	82	60102	1.1	10.5487	1.1	3.4702	2.0	0.2655	1.7	0.84	1517.9	23.0	1520.5	16.0	1524.0	20.7	1524.0	20.7
HC11-21	172	88670	1.7	10.5438	1.1	3.4673	1.6	0.2651	1.1	0.73	1516.1	15.4	1519.8	12.4	1524.9	20.2	1524.9	20.2
HC11-90	99	42528	1.9	10.532	1.2	3.3787	1.6	0.2581	1.1	0.68	1480.0	14.3	1499.5	12.5	1527.0	21.9	1527.0	21.9
HC11-41	72	42050	2.0	10.5283	1.0	3.603	1.4	0.2751	1.0	0.70	1566.7	13.9	1550.2	11.4	1527.7	19.3	1527.7	19.3
HC11-71	193	24402	1.4	10.514	0.8	3.1447	2.2	0.2398	2.0	0.94	1385.6	25.5	1443.7	16.8	1530.3	14.1	1530.3	14.1
HC11-70	97	48747	2.0	10.5077	0.8	3.5503	1.7	0.2706	1.5	0.88	1543.7	20.4	1538.5	13.4	1531.4	15.2	1531.4	15.2
HC11-83	108	33012	1.1	10.5068	0.8	3.5291	1.5	0.2689	1.3	0.85	1535.4	17.8	1533.8	12.1	1531.5	15.0	1531.5	15.0
HC11-31	139	50910	1.7	10.5062	0.9	3.6261	2.1	0.2763	1.9	0.90	1572.7	26.6	1555.3	16.9	1531.7	17.5	1531.7	17.5
HC11-49	52	39764	0.9	10.5038	1.8	3.5128	1.9	0.2676	0.7	0.36	1528.7	9.4	1530.1	15.3	1532.1	34.0	1532.1	34.0
HC11-30	175	63033	2.1	10.5028	0.7	3.514	1.4	0.2677	1.2	0.85	1529.0	15.7	1530.4	10.7	1532.3	13.2	1532.3	13.2
HC11-67	439	41611	1.2	10.5015	0.4	3.1644	1.8	0.241	1.8	0.97	1392.0	21.9	1448.5	13.9	1532.5	8.1	1532.5	8.1
HC11-76	60	25580	0.8	10.4883	1.7	3.5706	2.3	0.2716	1.5	0.67	1549.0	21.2	1543.0	18.2	1534.9	32.0	1534.9	32.0
HC11-42	186	163920	2.4	10.4566	0.8	3.6025	1.6	0.2732	1.4	0.86	1557.1	18.7	1550.1	12.5	1540.6	15.2	1540.6	15.2
HC11-48	119	43681	2.0	10.4561	1.1	3.5981	1.6	0.2729	1.1	0.71	1555.3	15.4	1549.1	12.4	1540.6	20.5	1540.6	20.5
HC11-15	426	136308	2.2	10.4238	0.3	3.6234	1.1	0.2739	1.1	0.95	1560.7	14.9	1554.7	9.0	1546.5	6.3	1546.5	6.3
HC11-100	362	224014	2.5	10.4225	0.7	3.5584	4.8	0.269	4.7	0.99	1535.6	64.9	1540.3	38.1	1546.7	13.5	1546.7	13.5
HC11-7	41	33266	1.1	10.4213	3.9	3.5547	4.1	0.2687	1.3	0.31	1534.1	17.5	1539.5	32.5	1546.9	73.2	1546.9	73.2
HC11-54	461	90202	1.5	10.4203	0.4	3.5075	1.3	0.2651	1.2	0.95	1515.8	16.6	1528.9	10.2	1547.1	7.4	1547.1	7.4
HC11-19	132	88999	1.9	10.4111	1.1	3.6199	1.9	0.2733	1.5	0.79	1557.7	20.4	1553.9	14.9	1548.8	21.5	1548.8	21.5
HC11-92	377	163022	2.7	10.4104	0.5	3.5601	1.0	0.2688	0.9	0.86	1534.7	11.9	1540.7	8.1	1548.9	9.8	1548.9	9.8
HC11-50	960	106772	2.3	10.4033	0.2	3.6388	1.3	0.2746	1.3	0.99	1563.9	17.4	1558.1	10.1	1550.2	3.8	1550.2	3.8
HC11-84	580	65460	2.6	10.4031	0.3	3.5745	1.1	0.2697	1.1	0.96	1539.2	14.6	1543.9	8.8	1550.2	6.0	1550.2	6.0
HC11-95	512	25748	2.3	10.3981	0.5	3.2799	1.7	0.2474	1.6	0.96	1424.8	20.5	1476.3	13.0	1551.1	8.5	1551.1	8.5
HC11-98	238	142120	1.9	10.3892	0.6	3.5716	1.3	0.2691	1.1	0.87	1536.3	15.0	1543.3	9.9	1552.7	11.4	1552.7	11.4
HC11-32	135	10259	1.5	10.3859	0.8	3.0429	3.6	0.2292	3.5	0.98	1330.3	42.1	1418.4	27.4	1553.3	14.8	1553.3	14.8
HC11-74	359	23926	1.4	10.3796	0.6	3.4659	1.4	0.2609	1.3	0.91	1494.5	17.7	1519.5	11.4	1554.4	11.0	1554.4	11.0
HC11-25	123	145359	1.7	10.371	1.1	3.5399	2.3	0.2663	2.1	0.89	1521.8	28.3	1536.2	18.6	1556.0	20.0	1556.0	20.0
HC11-43	622	463166	2.1	10.3681	0.3	3.6536	1.1	0.2747	1.1	0.96	1564.8	14.7	1561.3	8.8	1556.5	5.8	1556.5	5.8
HC11-5	231	113478	1.9	10.3679	0.7	3.6785	1.0	0.2766	0.8	0.75	1574.2	10.6	1566.7	8.1	1556.6	12.6	1556.6	12.6
HC11-91	244	112617	2.7	10.3582	0.9	3.6056	1.2	0.2709	0.9	0.70	1545.2	11.9	1550.8	9.8	1558.3	16.5	1558.3	16.5
HC11-55	149	144860	1.9	10.357	0.7	3.6178	1.6	0.2718	1.5	0.91	1549.7	20.0	1553.4	12.7	1558.5	12.6	1558.5	12.6
HC11-12	417	283570	2.0	10.3554	0.4	3.6968	4.8	0.2776	4.8	1.00	1579.5	66.9	1570.7	38.3	1558.8	7.1	1558.8	7.1
HC11-23	325	118612	3.4	10.3529	0.4	3.6569	1.3	0.2746	1.2	0.94	1564.0	17.2	1562.0	10.5	1559.3	8.1	1559.3	8.1
HC11-75	98	75041	2.3	10.3489	1.6	3.6255	2.0	0.2721	1.3	0.64	1551.6	17.9	1555.1	16.2	1560.0	29.4	1560.0	29.4
HC11-47	345	126362	3.1	10.3344	0.5	3.6155	0.9	0.271	0.8	0.86	1545.8	10.8	1552.9	7.2	1562.6	8.6	1562.6	8.6
HC11-40	273	109769	1.7	10.3331	0.4	3.6959	1.3	0.277	1.2	0.94	1576.1	17.0	1570.5	10.4	1562.9	8.3	1562.9	8.3

HC11-69	246	227520	2.8	10.3317	0.6	3.6229	0.9	0.2715	0.7	0.80	1548.3	10.2	1554.6	7.4	1563.1	10.6	1563.1	10.6
HC11-73	352	293003	2.0	10.3194	0.4	3.6579	1.6	0.2738	1.5	0.96	1559.9	21.4	1562.2	12.8	1565.4	8.1	1565.4	8.1
HC11-62	256	202629	1.7	10.308	0.3	3.6872	1.3	0.2757	1.3	0.97	1569.5	18.1	1568.6	10.8	1567.4	6.5	1567.4	6.5
HC11-8	186	169137	1.8	10.2843	0.2	3.6849	1.6	0.2749	1.6	0.99	1565.4	22.7	1568.1	13.2	1571.7	4.4	1571.7	4.4
HC11-88	341	89744	2.1	10.2157	0.6	3.5677	5.5	0.2643	5.4	0.99	1512.0	73.2	1542.4	43.3	1584.3	10.6	1584.3	10.6
HC11-80	171	72103	1.8	10.1814	1.0	3.7984	2.0	0.2805	1.7	0.86	1593.8	24.2	1592.4	16.1	1590.6	19.4	1590.6	19.4
HC11-64	168	91205	2.4	10.1329	0.6	3.8243	1.2	0.281	1.0	0.84	1596.6	13.8	1597.9	9.3	1599.5	11.7	1599.5	11.7
HC11-36	36	36060	0.3	10.1313	4.5	3.6644	4.8	0.2693	1.9	0.38	1537.0	25.4	1563.7	38.5	1599.8	83.2	1599.8	83.2
HC11-82	111	56435	1.7	10.0911	1.5	3.9026	5.8	0.2856	5.6	0.96	1619.6	79.7	1614.2	46.7	1607.2	28.7	1607.2	28.7
HC11-94	146	73305	1.9	10.0755	0.8	4.028	1.9	0.2943	1.7	0.91	1663.2	24.7	1639.9	15.1	1610.1	14.7	1610.1	14.7
HC11-86	68	38829	1.4	10.0363	1.7	3.9305	2.0	0.2861	1.0	0.51	1622.0	14.5	1620.0	15.9	1617.3	31.4	1617.3	31.4
HC11-56	161	63684	1.6	9.9954	0.9	3.9624	1.2	0.2872	0.8	0.70	1627.8	12.0	1626.5	9.7	1624.9	16.0	1624.9	16.0
HC11-17	109	92036	1.4	9.9903	1.3	3.8671	1.6	0.2802	0.9	0.58	1592.4	13.2	1606.8	12.9	1625.9	24.2	1625.9	24.2
HC11-11	151	115492	0.7	9.8564	0.9	4.0495	1.2	0.2895	0.9	0.70	1638.9	12.6	1644.2	10.1	1650.9	16.5	1650.9	16.5
HC11-38	64	74046	1.2	9.8559	1.9	3.8827	4.4	0.2775	3.9	0.90	1579.0	55.3	1610.1	35.5	1651.0	35.9	1651.0	35.9
HC11-51	147	94343	2.4	9.6482	0.6	4.2245	1.6	0.2956	1.4	0.91	1669.5	21.0	1678.8	12.9	1690.4	12.0	1690.4	12.0
HC11-89	110	87859	1.6	9.4407	1.2	4.3882	1.5	0.3005	0.9	0.56	1693.6	12.7	1710.1	12.5	1730.4	22.9	1730.4	22.9
HC11-28	108	71730	0.9	9.3037	0.9	4.5693	1.3	0.3083	0.9	0.71	1732.5	14.3	1743.7	11.1	1757.2	17.3	1757.2	17.3
HC11-97	134	141155	2.3	9.2212	0.6	4.6764	3.6	0.3127	3.6	0.99	1754.2	55.2	1763.0	30.4	1773.5	10.2	1773.5	10.2
HC11-6	126	81311	2.2	9.187	0.5	4.7786	1.2	0.3184	1.1	0.91	1781.9	17.2	1781.1	10.2	1780.2	9.2	1780.2	9.2
HC11-10	73	109714	1.8	9.1624	0.5	4.8784	2.2	0.3242	2.1	0.97	1810.1	33.7	1798.5	18.5	1785.1	9.5	1785.1	9.5
HC11-77	154	106805	2.2	9.0977	1.0	4.9626	1.9	0.3274	1.7	0.87	1826.0	26.3	1813.0	16.1	1798.0	17.4	1798.0	17.4
HC11-52	87	72779	1.5	9.0921	0.9	4.9125	2.3	0.3239	2.1	0.91	1808.9	33.1	1804.4	19.4	1799.2	16.9	1799.2	16.9
HC11-61	62	47509	1.3	9.0107	2.0	4.9054	2.5	0.3206	1.6	0.62	1792.5	24.6	1803.2	21.4	1815.5	36.1	1815.5	36.1
HC11-96	170	135743	2.3	8.8824	0.5	5.1555	2.3	0.3321	2.2	0.98	1848.7	36.1	1845.3	19.5	1841.5	8.4	1841.5	8.4
HC11-87	66	93441	1.9	8.8619	1.5	5.0175	1.9	0.3225	1.2	0.62	1801.9	18.9	1822.3	16.5	1845.7	27.6	1845.7	27.6
HC11-39	69	53797	1.2	8.6704	1.0	5.4541	1.7	0.343	1.4	0.81	1900.9	23.1	1893.4	14.9	1885.1	18.5	1885.1	18.5
HC11-3	39	83715	2.6	8.2417	1.3	5.9799	1.7	0.3574	1.1	0.64	1970.0	18.8	1972.9	15.1	1975.9	23.9	1975.9	23.9
HC11-22	203	164210	2.5	8.233	0.5	5.9914	1.1	0.3578	1.0	0.90	1971.5	17.0	1974.6	9.7	1977.8	8.6	1977.8	8.6
HC11-58	203	185841	1.3	8.1022	0.4	6.1758	1.2	0.3629	1.2	0.96	1995.9	20.4	2001.0	10.8	2006.3	6.2	2006.3	6.2
HC11-85	379	244507	1.2	7.6965	0.2	7.0593	1.2	0.3941	1.2	0.98	2141.6	21.7	2118.9	10.8	2097.0	3.9	2097.0	3.9
HC11-14	254	320266	0.7	6.1832	0.2	10.5465	1.0	0.473	1.0	0.99	2496.5	21.4	2484.0	9.7	2473.8	2.8	2473.8	2.8

				Isotope Ratios									Apparent Ages					
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC1-35	356	60235	1.0	17.8087	2.0	0.5734	2.2	0.0741	1.0	0.45	460.6	4.4	460.2	8.1	458.4	43.3	460.6	4.4
HC1-31	137	24180	1.0	18.4609	8.6	0.5545	8.7	0.0742	1.6	0.18	461.7	7.0	447.9	31.5	378.0	192.7	461.7	7.0

HC1-38	94	18208	1.1	16.8402	6.9	0.6085	7.5	0.0743	2.9	0.39	462.2	13.0	482.6	28.9	581.1	150.9	462.2	13.0
HC1-30	748	160866	1.8	17.6564	0.7	0.5869	1.1	0.0752	0.8	0.75	467.1	3.6	468.9	4.0	477.4	15.8	467.1	3.6
HC1-93	232	33887	1.5	17.5797	3.1	0.5911	3.4	0.0754	1.4	0.40	468.4	6.2	471.5	12.9	487.0	69.1	468.4	6.2
HC1-100	145	30526	0.7	18.5616	4.7	0.5618	4.9	0.0756	1.1	0.22	470.0	4.9	452.7	17.7	365.8	106.7	470.0	4.9
HC1-71	181	18145	1.4	18.2611	2.7	0.5729	3.0	0.0759	1.4	0.46	471.5	6.2	459.9	11.1	402.5	59.9	471.5	6.2
HC1-55	634	5465	1.5	17.2475	3.0	0.6075	3.7	0.076	2.2	0.59	472.1	9.8	482.0	14.0	529.0	64.7	472.1	9.8
HC1-17	419	89479	2.6	17.6724	2.2	0.5976	2.5	0.0766	1.3	0.52	475.7	6.1	475.7	9.6	475.4	47.7	475.7	6.1
HC1-85	92	7884	0.9	16.1164	12.3	0.6564	12.5	0.0767	2.1	0.17	476.5	9.7	512.4	50.4	675.8	264.6	476.5	9.7
HC1-77	375	67197	1.5	17.4555	1.8	0.6122	1.9	0.0775	0.8	0.42	481.2	3.8	485.0	7.5	502.7	38.9	481.2	3.8
HC1-95	229	42072	1.2	17.5659	3.2	0.6099	3.3	0.0777	1.0	0.29	482.4	4.6	483.5	12.9	488.8	70.6	482.4	4.6
HC1-61	479	26156	1.5	17.4417	1.4	0.6144	1.6	0.0777	0.7	0.43	482.5	3.2	486.3	6.2	504.4	31.8	482.5	3.2
HC1-81	112	20657	2.6	17.1141	6.0	0.6274	6.2	0.0779	1.2	0.20	483.4	5.7	494.5	24.2	546.0	132.2	483.4	5.7
HC1-99	184	65680	1.7	17.3459	3.1	0.6201	4.6	0.078	3.4	0.74	484.2	15.8	489.9	17.8	516.5	68.1	484.2	15.8
HC1-86	214	34508	4.5	17.8777	2.6	0.6034	2.7	0.0782	0.9	0.33	485.6	4.2	479.4	10.5	449.8	57.5	485.6	4.2
HC1-46	422	43655	1.8	17.5793	1.7	0.6166	1.8	0.0786	0.7	0.40	487.8	3.4	487.7	7.0	487.1	36.5	487.8	3.4
HC1-78	421	104403	1.0	17.3685	1.3	0.6245	2.0	0.0787	1.5	0.76	488.1	7.1	492.6	7.7	513.6	28.1	488.1	7.1
HC1-20	157	35921	1.8	17.6967	3.3	0.6168	3.7	0.0792	1.8	0.47	491.1	8.3	487.8	14.4	472.4	72.5	491.1	8.3
HC1-97	345	68912	2.4	17.8584	2.1	0.6124	2.4	0.0793	1.1	0.46	492.1	5.2	485.1	9.2	452.2	46.8	492.1	5.2
HC1-23	100	16417	1.6	17.6649	7.6	0.6193	7.8	0.0793	1.8	0.23	492.2	8.5	489.4	30.2	476.4	167.8	492.2	8.5
HC1-60	155	25176	1.3	17.2536	2.9	0.6351	3.7	0.0795	2.3	0.63	493.0	10.9	499.3	14.5	528.2	62.7	493.0	10.9
HC1-49	164	25916	2.1	17.4148	4.3	0.6293	4.5	0.0795	1.1	0.25	493.1	5.4	495.7	17.5	507.8	95.0	493.1	5.4
HC1-72	276	33259	1.6	17.4186	2.4	0.632	2.7	0.0798	1.2	0.45	495.2	5.8	497.3	10.5	507.3	52.4	495.2	5.8
HC1-13	210	46502	1.7	17.3167	3.1	0.638	7.2	0.0801	6.5	0.90	496.9	31.1	501.1	28.4	520.2	67.3	496.9	31.1
HC1-94	146	19352	1.5	17.8002	3.4	0.6247	3.7	0.0806	1.5	0.40	500.0	7.2	492.8	14.5	459.4	75.5	500.0	7.2
HC1-73	305	50667	1.3	17.6638	1.7	0.6302	2.1	0.0807	1.3	0.60	500.5	6.2	496.2	8.4	476.5	37.9	500.5	6.2
HC1-47	403	79797	2.4	17.4778	1.4	0.638	1.6	0.0809	0.7	0.46	501.3	3.6	501.1	6.4	499.9	31.4	501.3	3.6
HC1-84	42	11337	1.3	19.0224	15.4	0.6483	15.7	0.0894	3.3	0.21	552.3	17.6	507.5	62.9	310.3	351.5	552.3	17.6
HC1-88	95	19748	1.2	17.0544	5.2	0.7248	5.4	0.0897	1.3	0.25	553.5	7.0	553.5	23.0	553.6	113.9	553.5	7.0
HC1-90	158	43589	1.2	16.939	3.5	0.7829	3.9	0.0962	1.6	0.41	592.0	9.0	587.1	17.2	568.4	76.4	592.0	9.0
HC1-33	95	14261	1.2	16.8953	4.4	0.8119	4.6	0.0995	1.2	0.27	611.4	7.2	603.5	20.7	574.0	95.5	611.4	7.2
HC1-70	125	37249	3.2	16.8101	4.7	0.8338	4.8	0.1017	1.0	0.21	624.1	6.1	615.7	22.3	585.0	102.7	624.1	6.1
HC1-6	415	63977	3.4	16.494	1.2	0.8656	1.6	0.1035	1.0	0.65	635.2	6.3	633.2	7.5	626.0	26.3	635.2	6.3
HC1-8	311	32254	1.5	14.7629	1.7	1.0568	2.8	0.1132	2.2	0.79	691.0	14.3	732.2	14.4	860.5	35.2	691.0	14.3
HC1-62	64	28220	3.6	14.6595	3.8	1.4677	4.0	0.1561	1.1	0.27	934.8	9.2	917.2	23.9	875.1	79.0	875.1	79.0
HC1-2	108	29944	1.8	14.4068	2.9	1.5066	3.1	0.1574	1.1	0.36	942.4	9.7	933.1	19.0	911.0	59.8	911.0	59.8
HC1-79	250	59573	2.9	14.0699	0.5	1.5594	1.3	0.1591	1.2	0.92	951.9	10.7	954.2	8.2	959.5	10.5	959.5	10.5
HC1-41	38	13536	3.0	13.8689	4.9	1.736	5.7	0.1746	2.9	0.51	1037.5	27.8	1022.0	37.0	988.9	100.7	988.9	100.7
HC1-53	44	9861	1.5	13.8559	4.1	1.7354	5.5	0.1744	3.7	0.67	1036.3	35.7	1021.8	35.6	990.8	83.2	990.8	83.2
HC1-96	244	33240	2.3	13.7647	1.2	1.6805	1.4	0.1678	0.8	0.56	999.8	7.5	1001.2	9.2	1004.2	24.4	1004.2	24.4

HC1-34	175	55261	2.7	13.7536	2.9	1.6266	3.6	0.1623	2.0	0.57	969.3	18.1	980.5	22.3	1005.8	59.3	1005.8	59.3
HC1-83	609	174506	5.0	13.7421	0.2	1.6755	0.9	0.167	0.9	0.97	995.5	8.4	999.3	6.0	1007.5	4.7	1007.5	4.7
HC1-12	350	172088	4.5	13.6986	0.4	1.65	1.3	0.1639	1.2	0.94	978.6	11.0	989.6	8.2	1013.9	9.1	1013.9	9.1
HC1-56	673	146909	6.3	13.6505	0.4	1.7254	0.7	0.1708	0.6	0.84	1016.6	5.5	1018.0	4.5	1021.1	7.8	1021.1	7.8
HC1-52	81	23581	1.6	13.4041	2.8	1.9065	3.4	0.1853	1.9	0.56	1096.1	19.1	1083.4	22.7	1057.9	57.0	1057.9	57.0
HC1-11	163	35605	2.9	12.8665	1.2	2.061	1.6	0.1923	1.1	0.67	1133.9	11.4	1135.9	11.2	1139.8	24.3	1139.8	24.3
HC1-7	330	86105	3.0	12.8303	1.0	2.1375	2.4	0.1989	2.2	0.92	1169.4	23.1	1161.0	16.3	1145.4	18.9	1145.4	18.9
HC1-69	210	55386	1.3	12.7929	0.9	2.1228	2.0	0.197	1.8	0.89	1159.0	18.7	1156.2	13.8	1151.1	18.3	1151.1	18.3
HC1-25	42	14844	1.2	12.7772	2.6	2.1208	3.2	0.1965	1.9	0.59	1156.6	20.0	1155.6	22.1	1153.6	51.2	1153.6	51.2
HC1-50	343	182645	2.4	12.6652	0.4	2.1702	0.9	0.1993	0.8	0.88	1171.8	8.1	1171.5	6.0	1171.1	8.3	1171.1	8.3
HC1-75	526	135965	3.4	12.6558	0.4	2.1637	0.9	0.1986	0.9	0.92	1167.8	9.2	1169.5	6.5	1172.5	7.4	1172.5	7.4
HC1-59	36	13265	1.4	12.6163	4.8	2.1851	5.5	0.1999	2.8	0.51	1175.0	30.1	1176.3	38.6	1178.7	94.4	1178.7	94.4
HC1-80	653	6358	1.8	12.614	1.8	1.9275	10.0	0.1763	9.8	0.98	1046.9	94.6	1090.7	66.7	1179.1	35.4	1179.1	35.4
HC1-66	203	41371	2.1	12.6008	1.1	2.1963	2.0	0.2007	1.7	0.82	1179.2	18.0	1179.9	14.2	1181.2	22.7	1181.2	22.7
HC1-24	314	15428	1.8	12.5874	0.6	2.2073	1.5	0.2015	1.3	0.90	1183.4	14.4	1183.4	10.3	1183.2	12.7	1183.2	12.7
HC1-87	134	78235	2.0	12.4772	1.8	2.1967	1.9	0.1988	0.8	0.40	1168.8	8.3	1180.0	13.4	1200.6	34.7	1200.6	34.7
HC1-21	128	228483	2.5	12.4584	0.8	2.3249	1.7	0.2101	1.5	0.88	1229.2	16.7	1219.9	12.0	1203.5	15.7	1203.5	15.7
HC1-40	337	292295	3.3	12.4006	0.3	2.2867	0.5	0.2057	0.4	0.83	1205.7	4.6	1208.2	3.6	1212.7	5.5	1212.7	5.5
HC1-27	103	37168	2.4	12.3819	1.9	2.2895	2.1	0.2056	0.8	0.40	1205.4	9.0	1209.1	14.5	1215.7	37.1	1215.7	37.1
HC1-15	235	74677	5.5	12.0253	0.6	2.3318	2.2	0.2034	2.2	0.97	1193.4	23.6	1222.0	15.9	1272.9	11.0	1272.9	11.0
HC1-43	83	43625	2.1	11.8663	1.4	2.7042	1.6	0.2327	0.9	0.54	1348.8	10.7	1329.6	12.2	1298.8	27.0	1298.8	27.0
HC1-98	65	34523	1.6	11.7843	2.2	2.6361	2.4	0.2253	1.1	0.46	1309.8	13.3	1310.8	18.0	1312.3	42.1	1312.3	42.1
HC1-1	51	79649	1.7	11.7669	3.2	2.6441	3.5	0.2256	1.5	0.42	1311.7	17.6	1313.0	26.1	1315.2	62.3	1315.2	62.3
HC1-14	186	71583	1.1	11.7006	0.8	2.6585	1.3	0.2256	1.0	0.76	1311.4	11.5	1317.0	9.5	1326.1	16.3	1326.1	16.3
HC1-57	267	119831	1.4	11.6924	0.3	2.7498	1.1	0.2332	1.0	0.96	1351.2	12.7	1342.0	8.1	1327.5	6.1	1327.5	6.1
HC1-68	142	47116	2.0	11.6899	1.0	2.7086	1.1	0.2296	0.5	0.44	1332.6	5.9	1330.8	8.3	1327.9	19.4	1327.9	19.4
HC1-91	99	34646	2.1	11.6815	1.5	2.6784	1.8	0.2269	1.0	0.55	1318.3	12.1	1322.5	13.6	1329.3	29.8	1329.3	29.8
HC1-29	81	33603	1.8	11.6666	1.3	2.7099	1.4	0.2293	0.7	0.46	1330.8	7.9	1331.2	10.7	1331.7	24.7	1331.7	24.7
HC1-5	110	51045	1.8	11.6253	1.7	2.7517	2.1	0.232	1.2	0.58	1345.0	14.8	1342.5	15.7	1338.6	33.1	1338.6	33.1
HC1-82	110	72217	2.2	11.6016	0.8	2.7276	1.5	0.2295	1.3	0.87	1331.9	16.0	1336.0	11.4	1342.5	14.8	1342.5	14.8
HC1-18	172	77614	1.9	11.5502	1.4	2.736	1.8	0.2292	1.0	0.59	1330.3	12.6	1338.3	13.1	1351.1	27.4	1351.1	27.4
HC1-39	78	5805	2.2	11.2552	3.4	2.5938	4.9	0.2117	3.4	0.71	1238.1	38.7	1298.9	35.7	1400.9	66.1	1400.9	66.1
HC1-22	196	150963	2.2	10.9362	0.4	3.3765	3.6	0.2678	3.5	0.99	1529.7	48.1	1499.0	27.9	1455.8	8.1	1455.8	8.1
HC1-44	337	183668	3.3	10.8501	1.4	3.406	1.9	0.268	1.2	0.66	1530.8	16.9	1505.8	14.8	1470.8	26.9	1470.8	26.9
HC1-54	272	213718	1.6	10.8281	0.4	3.3382	1.0	0.2622	0.9	0.93	1500.9	12.6	1490.0	7.9	1474.6	6.9	1474.6	6.9
HC1-36	74	39949	1.2	10.7227	1.6	3.3386	1.9	0.2596	1.0	0.50	1488.0	12.6	1490.1	14.7	1493.2	30.8	1493.2	30.8
HC1-92	331	117045	1.9	10.7163	0.7	3.3628	2.6	0.2614	2.5	0.97	1496.8	33.0	1495.8	20.0	1494.3	12.3	1494.3	12.3
HC1-28	181	72147	2.7	10.6593	0.9	3.2971	1.4	0.2549	1.0	0.76	1463.7	13.6	1480.4	10.6	1504.4	16.6	1504.4	16.6
HC1-51	33	15123	1.3	10.5802	3.5	3.5846	4.0	0.2751	2.0	0.49	1566.5	27.5	1546.1	31.8	1518.4	65.8	1518.4	65.8

HC1-89	446	22888	1.2	10.5327	0.2	3.2784	3.5	0.2504	3.5	1.00	1440.7	45.1	1475.9	27.3	1526.9	4.5	1526.9	4.5
HC1-16	76	57083	2.0	10.4754	1.2	3.5574	1.3	0.2703	0.6	0.49	1542.2	8.9	1540.1	10.5	1537.2	21.7	1537.2	21.7
HC1-10	402	177502	2.7	10.4135	0.5	3.6848	2.4	0.2783	2.3	0.98	1582.8	32.5	1568.1	18.9	1548.3	8.5	1548.3	8.5
HC1-45	285	118695	2.8	10.4074	0.4	3.69	0.7	0.2785	0.5	0.76	1583.9	7.1	1569.2	5.3	1549.4	8.0	1549.4	8.0
HC1-67	234	275911	1.0	10.3755	0.6	3.4473	2.6	0.2594	2.5	0.98	1486.8	33.4	1515.2	20.3	1555.2	10.7	1555.2	10.7
HC1-3	564	260187	3.2	10.348	0.2	3.5111	0.5	0.2635	0.5	0.90	1507.8	6.3	1529.7	4.1	1560.2	4.1	1560.2	4.1
HC1-42	280	215425	2.5	9.8709	0.7	3.8696	2.9	0.277	2.8	0.97	1576.4	38.7	1607.4	23.0	1648.2	12.8	1648.2	12.8
HC1-37	58	66072	1.5	9.7488	2.1	4.321	2.6	0.3055	1.5	0.59	1718.6	23.3	1697.4	21.4	1671.3	38.7	1671.3	38.7
HC1-48	176	417240	1.0	9.436	0.3	4.3284	1.6	0.2962	1.5	0.98	1672.5	22.7	1698.8	13.0	1731.3	5.9	1731.3	5.9
HC1-64	195	43264	0.8	9.3653	0.4	4.2379	4.4	0.2879	4.4	0.99	1630.8	62.8	1681.4	36.0	1745.1	8.2	1745.1	8.2
HC1-63	201	111553	0.9	9.2949	0.4	4.5317	0.7	0.3055	0.6	0.80	1718.5	8.4	1736.8	5.8	1758.9	7.7	1758.9	7.7
HC1-9	377	185977	1.8	9.1995	0.2	4.6019	0.6	0.307	0.5	0.93	1726.1	8.2	1749.6	4.9	1777.8	3.9	1777.8	3.9
HC1-26	131	71662	1.4	9.1532	0.6	4.7886	1.1	0.3179	1.0	0.87	1779.4	15.3	1782.9	9.5	1787.0	10.3	1787.0	10.3
HC1-74	137	65404	1.2	9.1465	0.6	4.708	1.2	0.3123	1.1	0.89	1752.1	16.5	1768.7	10.2	1788.3	10.3	1788.3	10.3
HC1-76	196	115433	1.5	9.0649	0.4	4.8721	1.0	0.3203	0.9	0.93	1791.3	14.6	1797.4	8.4	1804.6	6.6	1804.6	6.6
HC1-4	167	105261	1.1	8.6934	0.5	5.3104	0.7	0.3348	0.5	0.69	1861.7	8.4	1870.5	6.4	1880.3	9.7	1880.3	9.7
HC1-19	94	2041	1.0	8.6026	4.2	5.6418	8.8	0.352	7.8	0.88	1944.2	130.2	1922.5	76.3	1899.2	75.9	1899.2	75.9
HC1-58	244	314826	1.8	8.2506	0.3	6.0607	0.7	0.3627	0.6	0.91	1994.8	10.7	1984.6	5.9	1974.0	5.0	1974.0	5.0
HC1-65	97	66312	1.9	7.6512	0.7	6.9489	1.8	0.3856	1.6	0.92	2102.4	29.0	2104.9	15.5	2107.4	11.9	2107.4	11.9

				Isotope Ratios							Apparent Ages							
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb */ ^{207}Pb*	± (%)	^{207}Pb */ ^{235}U*	± (%)	^{206}Pb */ ^{238}U	± (%)	Error Conc	^{206}Pb */ ^{207}Pb*	± (Ma)	^{207}Pb */ ^{235}U*	± (Ma)	^{206}Pb */ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC2-7	589	2478	0.5	17.3939	4.2	0.5154	9.0	0.065	8.0	0.88	406.1	31.4	422.1	31.2	510.4	92.5	406.1	31.4
HC2-37	631	14636	1.6	17.4752	1.7	0.5684	4.3	0.072	3.9	0.92	448.4	16.9	457.0	15.6	500.2	37.1	448.4	16.9
HC2-38	104	17251	1.2	17.856	6.0	0.5771	6.5	0.0747	2.6	0.40	464.6	11.6	462.6	24.1	452.5	132.3	464.6	11.6
HC2-18	307	74178	2.1	17.6445	2.5	0.5842	2.7	0.0748	1.2	0.44	464.8	5.4	467.2	10.3	478.9	54.5	464.8	5.4
HC2-54	546	11128	1.6	17.4925	1.1	0.5897	2.3	0.0748	2.0	0.87	465.1	9.0	470.7	8.7	498.0	24.6	465.1	9.0
HC2-1	110	23843	1.3	18.1865	7.0	0.5704	7.2	0.0752	1.5	0.21	467.6	6.8	458.3	26.4	411.6	156.7	467.6	6.8
HC2-19	367	42468	2.4	17.4736	2.1	0.5967	2.4	0.0756	1.1	0.47	469.9	5.1	475.1	8.9	500.4	45.7	469.9	5.1
HC2-69	607	90526	1.2	17.6407	0.9	0.5926	3.6	0.0758	3.5	0.97	471.1	16.1	472.5	13.8	479.4	19.3	471.1	16.1
HC2-82	195	33278	0.7	17.6798	2.8	0.597	3.5	0.0766	2.1	0.59	475.5	9.6	475.3	13.4	474.5	62.8	475.5	9.6
HC2-30	414	130394	0.6	17.5905	0.9	0.6005	1.5	0.0766	1.2	0.80	475.9	5.7	477.6	5.9	485.7	20.5	475.9	5.7
HC2-17	491	40337	1.9	17.5011	1.7	0.6059	1.9	0.0769	0.9	0.47	477.6	4.2	480.9	7.4	496.9	37.7	477.6	4.2
HC2-97	85	18774	2.2	18.54	6.9	0.5738	7.1	0.0772	1.6	0.22	479.1	7.3	460.5	26.3	368.4	156.0	479.1	7.3
HC2-98	233	45482	0.6	17.8832	1.7	0.5968	2.5	0.0774	1.9	0.73	480.6	8.6	475.2	9.6	449.1	38.4	480.6	8.6
HC2-24	124	43408	1.3	18.2379	4.9	0.5855	5.3	0.0774	2.1	0.40	480.8	9.9	468.0	20.0	405.3	109.4	480.8	9.9
HC2-39	313	32426	2.4	17.4871	1.3	0.6116	1.6	0.0776	0.9	0.57	481.6	4.2	484.5	6.0	498.7	28.3	481.6	4.2

HC2-43	300	46985	1.2	17.5326	2.6	0.6103	2.8	0.0776	0.9	0.32	481.8	4.1	483.7	10.6	492.9	57.9	481.8	4.1
HC2-40	499	144696	1.6	17.5474	1.9	0.6115	2.6	0.0778	1.8	0.70	483.2	8.6	484.5	10.2	491.1	41.6	483.2	8.6
HC2-27	367	32181	0.8	17.764	2.8	0.6051	3.1	0.078	1.3	0.43	483.9	6.2	480.5	11.9	463.9	62.3	483.9	6.2
HC2-20	331	36128	2.2	17.7519	2.5	0.607	2.7	0.0781	1.0	0.36	485.0	4.6	481.6	10.3	465.5	55.3	485.0	4.6
HC2-52	308	60909	0.9	17.791	2.4	0.6065	2.7	0.0783	1.2	0.43	485.7	5.4	481.3	10.2	460.6	53.1	485.7	5.4
HC2-63	233	49708	2.6	17.6186	2.9	0.6147	3.0	0.0785	0.8	0.27	487.4	3.8	486.5	11.6	482.2	64.0	487.4	3.8
HC2-95	331	74589	1.9	17.8248	1.8	0.6081	2.3	0.0786	1.5	0.63	487.9	6.9	482.4	8.9	456.4	39.8	487.9	6.9
HC2-55	247	81986	1.6	17.6166	2.1	0.6154	2.8	0.0786	1.8	0.66	487.9	8.6	487.0	10.7	482.4	46.2	487.9	8.6
HC2-28	286	86907	1.4	17.5063	1.8	0.6197	2.0	0.0787	0.9	0.46	488.2	4.4	489.7	7.9	496.2	40.1	488.2	4.4
HC2-73	816	172383	1.7	17.4013	0.9	0.6236	2.3	0.0787	2.1	0.93	488.4	10.1	492.1	9.0	509.5	19.2	488.4	10.1
HC2-12	140	19258	1.3	17.6761	7.6	0.6139	7.7	0.0787	1.4	0.18	488.4	6.5	486.0	29.7	474.9	167.5	488.4	6.5
HC2-15	274	55751	1.4	17.6691	2.0	0.615	2.3	0.0788	1.1	0.49	489.0	5.2	486.7	8.7	475.8	43.3	489.0	5.2
HC2-56	237	71628	0.9	17.4084	3.4	0.6244	3.6	0.0788	1.1	0.30	489.2	5.1	492.6	13.9	508.6	74.8	489.2	5.1
HC2-36	263	50804	1.7	17.4977	2.3	0.6218	2.5	0.0789	1.0	0.40	489.6	4.7	491.0	9.6	497.3	49.7	489.6	4.7
HC2-45	210	53473	1.0	17.9922	3.2	0.6065	3.4	0.0791	1.2	0.36	491.0	5.8	481.4	13.1	435.6	70.9	491.0	5.8
HC2-4	199	65115	2.0	17.7529	3.0	0.6163	3.2	0.0793	1.0	0.33	492.2	5.0	487.5	12.4	465.4	67.3	492.2	5.0
HC2-50	309	77984	3.2	17.933	2.5	0.6139	2.6	0.0798	0.8	0.30	495.2	3.7	486.0	10.0	442.9	54.9	495.2	3.7
HC2-66	406	145398	1.6	17.5245	1.5	0.6283	1.8	0.0799	1.1	0.57	495.3	5.0	495.1	7.2	494.0	33.4	495.3	5.0
HC2-60	442	95955	1.4	17.7267	1.2	0.6322	1.7	0.0813	1.3	0.72	503.8	6.1	497.5	6.8	468.6	26.7	503.8	6.1
HC2-53	85	27427	1.2	16.4193	7.5	0.737	7.8	0.0878	2.3	0.29	542.3	11.9	560.7	33.7	635.9	160.9	542.3	11.9
HC2-77	168	61461	1.7	17.0572	1.9	0.7821	2.4	0.0968	1.4	0.60	595.4	8.1	586.7	10.7	553.2	42.1	595.4	8.1
HC2-61	853	62553	1.6	16.6282	0.6	0.8064	1.1	0.0973	0.9	0.81	598.3	4.9	600.4	4.8	608.6	13.5	598.3	4.9
HC2-59	269	32820	4.9	16.3967	1.1	0.841	1.4	0.1	0.7	0.54	614.4	4.3	619.7	6.3	638.8	24.6	614.4	4.3
HC2-58	332	27939	1.7	16.5465	1.4	0.8367	5.7	0.1004	5.5	0.97	616.8	32.3	617.3	26.2	619.2	30.0	616.8	32.3
HC2-22	231	37538	1.6	16.8418	1.8	0.8314	1.9	0.1015	0.7	0.38	623.5	4.3	614.4	8.8	580.9	38.1	623.5	4.3
HC2-91	382	44952	1.0	16.5104	1.3	0.8563	1.5	0.1025	0.8	0.51	629.3	4.6	628.1	7.0	623.9	27.9	629.3	4.6
HC2-71	114	33278	2.0	15.7997	2.0	0.9104	2.4	0.1043	1.3	0.54	639.7	7.8	657.3	11.4	718.0	42.1	639.7	7.8
HC2-62	99	19559	1.4	17.189	7.0	0.8436	7.2	0.1052	1.4	0.20	644.6	8.8	621.1	33.4	536.4	154.4	644.6	8.8
HC2-67	173	40894	2.6	16.2405	2.8	0.9792	2.9	0.1153	0.6	0.22	703.7	4.3	693.2	14.4	659.4	59.8	703.7	4.3
HC2-23	573	63229	1.9	15.1673	1.0	1.1919	1.6	0.1311	1.2	0.79	794.2	9.2	796.8	8.6	804.2	20.0	794.2	9.2
HC2-48	51	49563	4.1	14.6949	5.9	1.4669	6.0	0.1563	0.9	0.15	936.4	7.7	916.8	36.3	870.1	123.3	870.1	123.3
HC2-42	38	31646	2.1	14.1553	8.8	1.6555	9.0	0.17	1.9	0.21	1011.9	17.4	991.6	56.8	947.2	180.0	947.2	180.0
HC2-46	88	38402	1.9	14.0066	3.7	1.5722	3.9	0.1597	1.2	0.31	955.2	10.7	959.3	24.1	968.7	75.5	968.7	75.5
HC2-100	253	107030	7.3	13.9921	0.8	1.5002	2.5	0.1522	2.4	0.95	913.5	20.1	930.5	15.1	970.8	15.6	970.8	15.6
HC2-47	316	142654	2.7	13.8104	0.6	1.671	0.9	0.1674	0.7	0.76	997.6	6.5	997.6	5.9	997.4	12.2	997.4	12.2
HC2-2	167	82304	1.2	13.7387	1.5	1.7337	1.9	0.1728	1.1	0.58	1027.3	10.2	1021.1	12.0	1008.0	31.0	1008.0	31.0
HC2-13	219	99595	1.1	13.6986	0.8	1.7228	1.1	0.1712	0.8	0.67	1018.5	7.2	1017.1	7.3	1013.9	17.1	1013.9	17.1
HC2-44	196	25574	0.9	13.6671	1.4	1.7642	1.8	0.1749	1.0	0.58	1038.9	9.7	1032.4	11.4	1018.6	29.2	1018.6	29.2
HC2-89	87	87917	2.1	13.5846	1.2	1.7574	1.7	0.1732	1.2	0.71	1029.4	11.6	1029.9	11.1	1030.8	24.7	1030.8	24.7

HC2-21	54	28181	3.5	13.3771	5.3	1.834	5.4	0.1779	0.8	0.15	1055.7	8.1	1057.7	35.5	1061.9	107.4	1061.9	107.4
HC2-80	49	19868	1.6	13.0862	5.9	1.3751	7.1	0.1305	4.0	0.56	790.8	29.6	878.4	41.7	1106.0	117.2	1106.0	117.2
HC2-9	315	131074	3.2	12.8864	0.8	2.0845	2.9	0.1948	2.8	0.97	1147.4	29.8	1143.7	20.1	1136.7	15.2	1136.7	15.2
HC2-57	487	176497	18.4	12.796	0.9	2.0034	1.6	0.1859	1.3	0.81	1099.3	13.2	1116.7	10.9	1150.7	18.7	1150.7	18.7
HC2-51	192	83126	3.6	12.7308	1.4	2.0783	2.4	0.1919	2.0	0.82	1131.6	20.7	1141.7	16.6	1160.8	27.2	1160.8	27.2
HC2-92	272	142457	3.2	12.703	1.0	2.1386	1.5	0.197	1.1	0.74	1159.4	12.2	1161.4	10.7	1165.1	20.5	1165.1	20.5
HC2-99	124	87980	2.7	12.5408	1.9	2.2136	2.2	0.2013	1.2	0.53	1182.5	12.9	1185.3	15.7	1190.5	37.5	1190.5	37.5
HC2-83	91	46206	1.9	12.4489	1.9	2.3279	2.1	0.2102	0.8	0.40	1229.8	9.4	1220.8	15.0	1205.0	38.3	1205.0	38.3
HC2-26	231	109732	2.5	12.4199	1.2	2.3238	2.8	0.2093	2.5	0.91	1225.2	28.4	1219.6	19.9	1209.7	23.4	1209.7	23.4
HC2-49	35	15126	2.8	12.3383	5.9	2.3601	6.6	0.2112	2.9	0.44	1235.2	32.2	1230.6	46.8	1222.6	115.9	1222.6	115.9
HC2-86	160	92505	2.1	12.3283	0.8	2.36	1.3	0.211	1.0	0.78	1234.2	11.6	1230.6	9.4	1224.2	16.2	1224.2	16.2
HC2-79	343	322235	1.7	12.2767	0.7	2.3898	1.2	0.2128	1.0	0.80	1243.6	11.2	1239.6	8.8	1232.5	14.3	1232.5	14.3
HC2-64	359	140159	5.8	11.8791	0.7	2.3612	3.3	0.2034	3.3	0.98	1193.7	35.4	1230.9	23.7	1296.7	13.2	1296.7	13.2
HC2-29	221	73523	1.9	11.847	0.8	2.6403	1.5	0.2269	1.3	0.84	1318.0	15.1	1311.9	11.2	1302.0	16.0	1302.0	16.0
HC2-14	143	48292	2.0	11.826	1.0	2.6752	1.3	0.2295	0.9	0.67	1331.6	10.4	1321.6	9.5	1305.4	18.5	1305.4	18.5
HC2-81	80	46227	2.9	11.8111	1.7	2.6435	3.0	0.2264	2.4	0.82	1315.9	28.9	1312.8	21.9	1307.9	33.3	1307.9	33.3
HC2-68	150	98200	1.9	11.7948	1.0	2.6826	1.3	0.2295	0.8	0.62	1331.8	9.7	1323.7	9.6	1310.6	19.7	1310.6	19.7
HC2-3	110	150095	1.9	11.7933	1.3	2.6651	1.5	0.228	0.9	0.55	1323.8	10.3	1318.8	11.4	1310.8	25.0	1310.8	25.0
HC2-34	78	36951	1.9	11.783	1.6	2.5811	2.4	0.2206	1.8	0.76	1284.9	21.3	1295.3	17.7	1312.5	30.5	1312.5	30.5
HC2-96	104	67462	2.0	11.6992	1.2	2.6999	1.7	0.2291	1.2	0.69	1329.7	14.2	1328.4	12.6	1326.3	23.8	1326.3	23.8
HC2-93	80	28816	1.9	11.6498	1.8	2.7221	2.0	0.23	1.0	0.48	1334.5	11.7	1334.5	15.0	1334.5	34.4	1334.5	34.4
HC2-11	383	60392	1.6	11.6335	0.3	2.6885	1.8	0.2268	1.8	0.98	1317.9	21.1	1325.3	13.3	1337.2	6.0	1337.2	6.0
HC2-78	65	48381	1.8	11.6031	1.7	2.7503	2.2	0.2314	1.4	0.64	1342.1	17.2	1342.2	16.7	1342.3	33.5	1342.3	33.5
HC2-25	308	41799	1.8	11.0868	1.6	2.194	2.3	0.1764	1.7	0.73	1047.4	16.1	1179.2	16.0	1429.7	30.1	1429.7	30.1
HC2-70	32	14989	1.2	10.8065	3.9	3.3418	4.2	0.2619	1.5	0.36	1499.6	20.3	1490.9	32.7	1478.4	74.0	1478.4	74.0
HC2-32	75	38830	1.3	10.7737	1.9	3.2837	2.1	0.2566	1.0	0.48	1472.3	13.3	1477.2	16.5	1484.2	35.2	1484.2	35.2
HC2-74	68	36329	1.1	10.7149	1.8	3.4811	2.2	0.2705	1.3	0.58	1543.5	17.4	1522.9	17.3	1494.5	33.8	1494.5	33.8
HC2-84	48	26025	2.2	10.7059	2.5	3.3633	3.1	0.2611	1.8	0.59	1495.7	24.0	1495.9	23.9	1496.1	46.8	1496.1	46.8
HC2-85	395	449482	2.4	10.6454	0.4	3.3961	0.6	0.2622	0.5	0.76	1501.1	6.2	1503.5	4.8	1506.8	7.6	1506.8	7.6
HC2-31	101	58735	1.1	10.6233	1.4	3.3715	2.4	0.2598	1.9	0.81	1488.6	25.3	1497.8	18.5	1510.8	26.4	1510.8	26.4
HC2-35	41	21279	0.2	10.5955	2.2	3.5481	8.3	0.2727	8.0	0.97	1554.3	110.6	1538.0	65.8	1515.7	40.6	1515.7	40.6
HC2-10	63	45106	1.0	10.5873	1.4	3.4673	1.6	0.2662	0.8	0.48	1521.7	10.3	1519.8	12.6	1517.2	26.6	1517.2	26.6
HC2-8	395	177647	2.1	10.5751	0.4	3.5002	1.0	0.2685	0.9	0.93	1533.0	12.8	1527.3	8.0	1519.3	7.0	1519.3	7.0
HC2-87	63	74089	1.0	10.5456	1.9	3.4768	2.0	0.2659	0.6	0.28	1520.0	7.6	1522.0	16.0	1524.6	36.7	1524.6	36.7
HC2-16	157	118607	2.6	10.4687	1.0	3.5446	1.3	0.2691	0.8	0.63	1536.4	11.1	1537.2	10.2	1538.4	18.9	1538.4	18.9
HC2-65	357	250616	6.3	10.3988	0.4	3.6202	0.8	0.273	0.7	0.86	1556.2	9.6	1554.0	6.4	1551.0	7.7	1551.0	7.7
HC2-90	499	224036	2.4	10.3758	0.4	3.6567	2.1	0.2752	2.1	0.98	1567.0	29.1	1562.0	17.0	1555.1	7.6	1555.1	7.6
HC2-88	336	170018	2.1	10.3523	0.3	3.6647	0.6	0.2752	0.5	0.85	1566.9	7.3	1563.7	4.9	1559.4	6.1	1559.4	6.1
HC2-33	441	358575	7.2	10.097	0.3	3.8143	0.9	0.2793	0.9	0.93	1587.9	12.1	1595.8	7.5	1606.1	6.5	1606.1	6.5

HC2-5	219	167588	1.6	9.4277	0.5	4.5281	1.0	0.3096	0.8	0.86	1738.8	12.8	1736.2	8.1	1732.9	9.1	1732.9	9.1
HC2-6	104	82591	1.3	9.3782	1.0	4.6775	1.2	0.3181	0.6	0.49	1780.7	9.0	1763.2	9.9	1742.6	19.0	1742.6	19.0
HC2-76	165	180965	1.4	9.3576	0.5	4.6954	1.8	0.3187	1.7	0.97	1783.2	27.1	1766.4	15.1	1746.6	8.4	1746.6	8.4
HC2-75	126	104495	2.5	5.3565	0.2	14.1268	2.6	0.5488	2.6	1.00	2820.2	59.6	2758.3	24.8	2713.2	3.6	2713.2	3.6
HC2-72	89	171899	1.7	5.3471	1.1	13.8601	1.4	0.5375	0.9	0.65	2773.0	20.6	2740.2	13.3	2716.1	17.5	2716.1	17.5
HC2-94	88	82534	1.9	5.1355	0.3	14.6547	1.0	0.5458	1.0	0.95	2807.8	22.0	2793.1	9.7	2782.5	5.2	2782.5	5.2
HC2-41	69	121941	2.1	4.3967	0.6	17.0205	1.5	0.5428	1.4	0.91	2795.0	30.7	2936.0	14.2	3034.1	9.6	3034.1	9.6

				Isotope Ratios							Apparent Ages							
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC4-68	72	12272	1.4	17.7732	13.6	0.5411	13.8	0.0698	2.4	0.17	434.7	10.1	439.2	49.4	462.8	303.1	434.7	10.1
HC4-32	122	22940	1.8	17.864	2.9	0.5632	3.2	0.073	1.3	0.40	454.0	5.5	453.6	11.6	451.5	64.9	454.0	5.5
HC4-76	149	31003	0.9	18.4869	5.2	0.5447	5.4	0.073	1.5	0.28	454.4	6.6	441.5	19.4	374.9	117.4	454.4	6.6
HC4-17	83	12312	1.9	18.6262	6.8	0.5441	7.3	0.0735	2.8	0.38	457.2	12.2	441.1	26.1	358.0	152.8	457.2	12.2
HC4-47	87	13579	1.9	17.7392	7.4	0.5715	7.7	0.0735	1.9	0.24	457.4	8.2	459.0	28.3	467.1	164.8	457.4	8.2
HC4-21	95	12766	2.2	18.016	4.0	0.5661	4.6	0.074	2.2	0.48	460.1	9.9	455.5	17.0	432.6	90.2	460.1	9.9
HC4-23	76	10475	1.7	17.6557	8.3	0.5781	8.7	0.074	2.7	0.31	460.4	11.9	463.3	32.4	477.5	183.6	460.4	11.9
HC4-5	87	16632	1.5	17.7252	11.1	0.5763	11.2	0.0741	1.3	0.12	460.7	5.9	462.1	41.7	468.8	247.4	460.7	5.9
HC4-46	173	31510	1.9	18.0016	4.1	0.5677	4.1	0.0741	0.8	0.20	460.9	3.7	456.5	15.2	434.4	90.3	460.9	3.7
HC4-31	70	13419	1.7	17.6915	9.2	0.5803	9.5	0.0745	2.3	0.24	462.9	10.3	464.6	35.5	473.0	204.5	462.9	10.3
HC4-83	83	12658	1.7	18.6227	7.1	0.5513	7.2	0.0745	1.1	0.15	463.0	4.9	445.8	25.9	358.4	160.5	463.0	4.9
HC4-16	135	39733	1.9	17.3975	4.2	0.5909	4.7	0.0746	2.0	0.44	463.6	9.2	471.5	17.7	510.0	92.9	463.6	9.2
HC4-40	157	23032	2.3	18.0092	3.5	0.572	3.7	0.0747	1.3	0.35	464.5	5.7	459.3	13.6	433.5	77.0	464.5	5.7
HC4-3	158	19925	1.2	18.3315	4.5	0.5625	4.6	0.0748	1.2	0.26	464.9	5.4	453.1	16.9	393.8	100.1	464.9	5.4
HC4-29	183	20013	1.8	17.9756	2.8	0.5745	3.7	0.0749	2.5	0.67	465.6	11.3	460.9	13.9	437.7	61.8	465.6	11.3
HC4-28	134	33079	1.6	17.9027	6.7	0.5769	6.8	0.0749	1.2	0.18	465.7	5.5	462.5	25.3	446.7	148.9	465.7	5.5
HC4-48	117	36383	1.5	19.2897	4.0	0.5355	4.9	0.0749	2.8	0.57	465.7	12.6	435.5	17.3	278.4	91.7	465.7	12.6
HC4-84	108	19004	1.7	19.3344	7.1	0.5349	7.4	0.075	2.1	0.29	466.2	9.5	435.0	26.2	273.1	162.5	466.2	9.5
HC4-35	111	35170	1.7	18.0116	4.5	0.5747	5.1	0.0751	2.3	0.46	466.6	10.5	461.0	18.8	433.2	100.6	466.6	10.5
HC4-94	189	29645	1.6	17.7452	3.9	0.5837	4.2	0.0751	1.6	0.37	466.9	7.0	466.8	15.6	466.3	85.6	466.9	7.0
HC4-7	142	27701	1.9	18.4345	7.2	0.562	7.4	0.0751	1.4	0.19	467.0	6.4	452.8	26.9	381.3	162.5	467.0	6.4
HC4-24	118	10833	1.2	19.2868	5.3	0.5372	5.6	0.0751	1.8	0.32	467.1	8.2	436.6	20.0	278.8	122.4	467.1	8.2
HC4-41	108	18831	1.6	18.3213	7.6	0.5657	7.7	0.0752	1.1	0.15	467.2	5.2	455.2	28.2	395.1	170.5	467.2	5.2
HC4-27	152	22605	1.8	18.2411	2.5	0.5687	2.7	0.0752	1.1	0.41	467.7	4.9	457.2	9.9	404.9	55.1	467.7	4.9
HC4-63	133	21096	2.1	18.5836	5.8	0.5585	6.0	0.0753	1.5	0.24	467.8	6.6	450.5	21.8	363.1	131.0	467.8	6.6
HC4-13	106	22738	1.7	17.8846	5.6	0.5805	5.9	0.0753	1.6	0.28	468.0	7.4	464.8	21.9	448.9	125.3	468.0	7.4
HC4-26	116	24511	1.7	18.0364	4.2	0.5758	4.7	0.0753	2.2	0.46	468.2	9.8	461.8	17.5	430.1	93.3	468.2	9.8

HC4-56	121	18857	1.3	18.1135	3.9	0.5734	4.1	0.0753	1.3	0.32	468.2	5.9	460.2	15.2	420.6	86.6	468.2	5.9
HC4-6	151	24963	1.6	17.993	4.5	0.5774	4.7	0.0754	1.4	0.31	468.3	6.5	462.8	17.4	435.5	99.2	468.3	6.5
HC4-36	82	22839	1.6	17.5753	8.1	0.5914	8.4	0.0754	2.2	0.26	468.5	9.9	471.8	31.5	487.6	178.1	468.5	9.9
HC4-15	152	30756	1.8	17.6087	3.0	0.5907	4.1	0.0754	2.8	0.68	468.8	12.7	471.3	15.6	483.4	67.1	468.8	12.7
HC4-20	91	25770	1.6	17.807	4.2	0.5844	4.6	0.0755	1.7	0.38	469.0	7.9	467.3	17.2	458.6	94.3	469.0	7.9
HC4-34	151	53553	1.7	17.6713	4.0	0.5891	4.2	0.0755	1.0	0.25	469.3	4.7	470.3	15.7	475.5	89.2	469.3	4.7
HC4-2	127	16863	1.6	18.0216	5.8	0.5791	6.1	0.0757	1.7	0.28	470.4	7.7	463.9	22.6	432.0	129.7	470.4	7.7
HC4-51	84	14339	1.9	18.2295	9.7	0.573	10.2	0.0758	3.3	0.32	470.8	14.8	460.0	37.9	406.3	217.4	470.8	14.8
HC4-80	114	13980	1.1	17.7472	5.9	0.5887	6.0	0.0758	0.9	0.15	470.8	4.2	470.0	22.5	466.0	130.7	470.8	4.2
HC4-18	170	37776	2.4	18.2399	3.4	0.5729	3.6	0.0758	1.1	0.30	471.0	4.8	459.9	13.2	405.1	76.5	471.0	4.8
HC4-1	168	25713	1.3	18.2761	2.8	0.5724	3.5	0.0759	2.1	0.59	471.4	9.5	459.6	13.1	400.6	63.7	471.4	9.5
HC4-19	106	12754	1.6	18.5617	6.9	0.5637	7.0	0.0759	1.2	0.17	471.6	5.5	454.0	25.5	365.8	155.0	471.6	5.5
HC4-89	129	29694	1.7	18.2203	5.3	0.5757	5.7	0.0761	2.1	0.36	472.7	9.4	461.7	21.2	407.5	119.0	472.7	9.4
HC4-42	107	13041	1.7	17.9148	4.8	0.5857	5.1	0.0761	1.7	0.33	472.8	7.8	468.1	19.1	445.2	106.7	472.8	7.8
HC4-69	170	40854	1.8	17.578	3.2	0.5971	3.4	0.0761	1.1	0.34	473.0	5.2	475.4	12.8	487.2	70.3	473.0	5.2
HC4-99	104	20792	1.7	17.4618	7.0	0.6011	7.1	0.0761	1.4	0.20	473.0	6.5	478.0	27.2	501.9	153.9	473.0	6.5
HC4-38	165	37685	1.2	17.887	5.4	0.5871	5.4	0.0762	0.9	0.17	473.2	4.1	469.0	20.4	448.6	119.2	473.2	4.1
HC4-50	148	51110	1.1	17.8608	3.2	0.5889	3.4	0.0763	1.0	0.31	473.9	4.7	470.2	12.7	451.9	71.5	473.9	4.7
HC4-78	160	35439	1.5	17.9226	3.1	0.5877	4.3	0.0764	3.1	0.71	474.6	14.1	469.4	16.3	444.2	67.9	474.6	14.1
HC4-82	64	15243	1.8	18.6635	9.3	0.5645	10.0	0.0764	3.6	0.36	474.6	16.3	454.4	36.6	353.5	211.0	474.6	16.3
HC4-8	83	12737	1.6	18.4544	6.3	0.5709	6.7	0.0764	2.3	0.35	474.7	10.6	458.6	24.7	378.8	141.2	474.7	10.6
HC4-25	284	54546	2.0	17.9421	2.2	0.588	2.6	0.0765	1.4	0.52	475.3	6.2	469.6	9.8	441.8	49.6	475.3	6.2
HC4-30	64	9294	1.9	17.1371	9.3	0.6168	9.4	0.0767	1.1	0.12	476.2	5.0	487.8	36.4	543.0	204.1	476.2	5.0
HC4-54	137	22582	1.2	17.4568	2.6	0.6063	2.8	0.0768	1.0	0.37	476.8	4.7	481.2	10.6	502.5	56.8	476.8	4.7
HC4-55	110	22609	1.8	17.583	4.0	0.6022	4.1	0.0768	0.8	0.19	477.0	3.6	478.6	15.7	486.6	89.1	477.0	3.6
HC4-14	134	57156	1.9	17.4746	8.7	0.6059	9.0	0.0768	2.2	0.25	477.0	10.2	481.0	34.5	500.3	192.5	477.0	10.2
HC4-49	163	41714	1.8	18.1375	5.7	0.5839	5.9	0.0768	1.5	0.25	477.1	6.8	467.0	22.1	417.7	127.9	477.1	6.8
HC4-67	103	14755	1.8	17.8506	6.9	0.5933	7.0	0.0768	1.3	0.19	477.1	6.1	473.0	26.6	453.2	153.6	477.1	6.1
HC4-59	78	18185	1.7	18.1884	14.7	0.5825	14.8	0.0768	1.9	0.13	477.2	8.9	466.1	55.5	411.4	330.7	477.2	8.9
HC4-60	138	28293	1.2	18.1196	4.6	0.5854	4.8	0.0769	1.6	0.32	477.8	7.1	467.9	18.2	419.9	102.5	477.8	7.1
HC4-39	105	19327	1.7	16.9804	6.4	0.6248	6.6	0.0769	1.5	0.22	477.9	6.7	492.9	25.7	563.1	140.0	477.9	6.7
HC4-81	112	44348	1.8	19.3563	7.2	0.5483	7.7	0.077	2.9	0.37	478.1	13.2	443.9	27.7	270.5	164.3	478.1	13.2
HC4-52	75	13999	1.9	18.3525	6.2	0.5786	6.7	0.077	2.4	0.36	478.3	11.1	463.6	24.9	391.3	140.1	478.3	11.1
HC4-72	139	34350	1.9	18.157	3.6	0.5849	3.8	0.077	1.3	0.34	478.3	6.1	467.6	14.4	415.3	80.5	478.3	6.1
HC4-98	243	28501	1.2	18.1638	3.6	0.586	3.7	0.0772	0.9	0.26	479.4	4.4	468.3	13.9	414.4	80.0	479.4	4.4
HC4-96	83	9750	1.9	18.4073	3.3	0.5783	3.6	0.0772	1.5	0.42	479.4	6.9	463.4	13.4	384.6	73.5	479.4	6.9
HC4-33	387	123029	1.1	17.7434	1.1	0.6001	1.5	0.0772	1.0	0.69	479.5	4.8	477.3	5.8	466.5	24.2	479.5	4.8
HC4-43	106	22159	1.5	16.561	4.5	0.6433	4.8	0.0773	1.8	0.37	479.8	8.3	504.4	19.2	617.3	97.0	479.8	8.3
HC4-37	103	16811	1.3	17.8652	9.8	0.5979	9.9	0.0775	1.5	0.15	481.0	7.0	475.9	37.7	451.3	218.2	481.0	7.0

HC4-85	178	34661	1.6	17.3184	3.4	0.6174	3.6	0.0776	1.1	0.31	481.5	5.1	488.2	13.8	520.0	74.4	481.5	5.1
HC4-71	138	32533	1.2	18.2209	5.6	0.5878	5.8	0.0777	1.7	0.30	482.3	8.0	469.5	21.9	407.4	124.7	482.3	8.0
HC4-66	97	25671	1.8	17.7506	4.8	0.6037	5.2	0.0777	2.0	0.38	482.5	9.3	479.6	19.9	465.6	106.4	482.5	9.3
HC4-87	168	38692	0.9	17.8251	6.9	0.6015	7.0	0.0778	1.2	0.16	482.8	5.4	478.2	26.8	456.4	154.1	482.8	5.4
HC4-95	324	38829	1.7	17.603	1.3	0.6094	1.6	0.0778	1.0	0.60	483.0	4.6	483.2	6.3	484.1	29.1	483.0	4.6
HC4-62	419	179969	1.8	17.8118	1.5	0.6023	1.7	0.0778	0.8	0.48	483.0	3.7	478.7	6.4	458.0	32.8	483.0	3.7
HC4-75	118	20992	1.8	18.2015	15.2	0.5904	15.3	0.0779	1.4	0.09	483.8	6.7	471.1	57.8	409.8	342.9	483.8	6.7
HC4-45	126	15860	1.1	17.7388	4.5	0.6063	4.8	0.078	1.7	0.35	484.2	7.8	481.2	18.3	467.1	99.0	484.2	7.8
HC4-73	150	27988	1.9	17.6714	3.5	0.6087	3.8	0.078	1.3	0.35	484.2	6.2	482.7	14.5	475.5	78.2	484.2	6.2
HC4-74	147	32250	1.2	17.6294	4.9	0.6123	5.4	0.0783	2.1	0.39	485.9	9.9	485.0	20.7	480.8	109.1	485.9	9.9
HC4-97	148	18545	1.9	17.4533	4.1	0.6187	4.2	0.0783	1.0	0.25	486.1	4.9	489.0	16.4	502.9	89.9	486.1	4.9
HC4-70	103	24765	1.7	17.632	5.5	0.6128	5.7	0.0784	1.6	0.28	486.4	7.7	485.3	22.2	480.5	121.7	486.4	7.7
HC4-64	154	24670	1.8	17.6303	4.6	0.6133	4.6	0.0784	0.9	0.19	486.7	4.1	485.6	17.9	480.7	100.7	486.7	4.1
HC4-58	166	25839	1.5	17.5216	4.8	0.6171	4.9	0.0784	1.1	0.23	486.7	5.2	488.0	19.2	494.3	106.3	486.7	5.2
HC4-93	133	27606	1.8	18.7256	9.0	0.5799	9.4	0.0788	2.8	0.30	488.7	13.1	464.4	35.1	346.0	203.8	488.7	13.1
HC4-91	162	25755	1.0	18.0099	4.3	0.6088	4.6	0.0795	1.6	0.35	493.3	7.6	482.8	17.8	433.4	96.7	493.3	7.6
HC4-10	44	12773	0.4	17.619	10.5	0.7836	11.8	0.1001	5.5	0.46	615.2	32.1	587.5	52.9	482.1	232.6	615.2	32.1
HC4-88	524	103457	9.7	16.4991	1.0	0.8595	2.5	0.1028	2.4	0.93	631.1	14.2	629.8	11.9	625.4	20.6	631.1	14.2
HC4-12	130	30380	0.9	16.1453	2.7	0.942	2.9	0.1103	1.0	0.36	674.5	6.6	673.9	14.3	672.0	58.0	674.5	6.6
HC4-92	356	227385	8.1	13.9589	0.7	1.6665	1.5	0.1687	1.3	0.87	1005.0	11.8	995.9	9.3	975.7	14.7	975.7	14.7
HC4-90	637	175062	5.3	13.8715	0.3	1.6724	0.7	0.1683	0.6	0.91	1002.5	5.5	998.1	4.2	988.5	5.5	988.5	5.5
HC4-22	83	54557	6.3	13.8397	3.5	1.5082	3.8	0.1514	1.5	0.41	908.7	13.0	933.7	23.1	993.2	70.3	993.2	70.3
HC4-79	151	118966	3.0	13.5227	1.1	1.755	3.0	0.1721	2.8	0.93	1023.8	26.2	1029.0	19.4	1040.1	23.0	1040.1	23.0
HC4-77	107	56810	2.4	12.7376	2.0	2.0984	2.6	0.1939	1.6	0.62	1142.2	16.5	1148.3	17.6	1159.7	39.9	1159.7	39.9
HC4-11	396	149949	4.1	12.4708	0.3	2.2838	1.2	0.2066	1.2	0.96	1210.5	12.8	1207.3	8.5	1201.6	6.2	1201.6	6.2
HC4-57	269	226085	4.5	12.315	0.5	2.357	1.6	0.2105	1.5	0.94	1231.6	17.0	1229.7	11.4	1226.3	10.4	1226.3	10.4
HC4-9	162	101673	2.8	11.8683	1.1	2.5714	3.2	0.2213	3.0	0.94	1289.0	35.5	1292.5	23.6	1298.5	21.5	1298.5	21.5
HC4-100	155	82885	2.8	11.667	1.0	2.7551	1.5	0.2331	1.1	0.72	1350.9	13.2	1343.5	11.2	1331.7	20.1	1331.7	20.1
HC4-65	127	126162	1.5	10.6993	0.5	3.4912	1.4	0.2709	1.3	0.92	1545.4	17.2	1525.2	10.7	1497.3	9.9	1497.3	9.9
HC4-44	253	155040	4.0	10.4003	0.5	3.67	0.9	0.2768	0.7	0.85	1575.4	10.2	1564.9	6.9	1550.7	8.5	1550.7	8.5
HC4-61	207	211246	2.5	10.3914	0.6	3.7144	2.3	0.2799	2.2	0.97	1591.1	30.8	1574.5	18.1	1552.3	10.9	1552.3	10.9
HC4-53	40	30883	1.3	7.8096	1.6	6.8131	2.1	0.3859	1.4	0.67	2103.8	25.7	2087.4	19.0	2071.3	28.2	2071.3	28.2

				Isotope Ratios									Apparent Ages					
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC13A-82	1407	6368	2.3	17.6621	1.1	0.5661	3.4	0.0725	3.2	0.95	451.3	14.1	455.5	12.5	476.7	24.2	451.3	14.1
HC13A-99	535	318190	1.6	17.7359	1.2	0.5875	1.6	0.0756	1.1	0.66	469.6	4.9	469.3	6.1	467.5	27.1	469.6	4.9

HC13A-13	225	57872	2.6	17.7667	2.0	0.5962	2.4	0.0768	1.3	0.54	477.2	6.0	474.8	9.1	463.6	44.7	477.2	6.0
HC13A-32	253	20466	2.1	17.5682	3.1	0.6031	3.9	0.0768	2.3	0.59	477.3	10.4	479.2	14.8	488.5	69.2	477.3	10.4
HC13A-37	266	89187	0.9	17.8622	3.0	0.5938	3.1	0.0769	0.9	0.28	477.8	4.0	473.3	11.7	451.7	65.8	477.8	4.0
HC13A-4	185	33863	1.5	18.2536	5.7	0.5849	5.8	0.0774	0.9	0.16	480.8	4.3	467.6	21.7	403.4	128.3	480.8	4.3
HC13A-10	535	84829	2.3	17.6918	1.6	0.6055	2.0	0.0777	1.1	0.57	482.4	5.3	480.7	7.6	473.0	36.2	482.4	5.3
HC13A-12	240	27774	2.8	17.9167	4.4	0.5987	4.6	0.0778	1.5	0.32	482.9	6.8	476.4	17.5	445.0	96.9	482.9	6.8
HC13A-19	398	39819	2.5	17.5756	1.7	0.6105	2.4	0.0778	1.6	0.68	483.1	7.5	483.9	9.1	487.5	38.2	483.1	7.5
HC13A-31	356	83158	1.2	17.6248	1.8	0.6097	6.3	0.0779	6.0	0.96	483.8	28.1	483.4	24.3	481.3	40.8	483.8	28.1
HC13A-65	132	25174	2.4	17.7277	4.5	0.607	4.9	0.078	2.0	0.41	484.4	9.5	481.7	18.9	468.5	99.4	484.4	9.5
HC13A-45	90	19173	1.0	17.1986	7.1	0.63	7.5	0.0786	2.3	0.32	487.7	11.0	496.1	29.3	535.2	155.0	487.7	11.0
HC13A-92	261	61469	1.6	17.8125	2.3	0.6102	3.7	0.0788	2.8	0.77	489.1	13.2	483.7	14.0	457.9	51.7	489.1	13.2
HC13A-52	333	61243	0.9	17.6085	1.9	0.6173	2.2	0.0788	1.1	0.48	489.2	5.0	488.2	8.6	483.4	42.8	489.2	5.0
HC13A-24	210	35896	2.6	17.8039	2.7	0.6117	3.6	0.079	2.3	0.64	490.1	10.9	484.6	13.8	459.0	61.0	490.1	10.9
HC13A-34	615	66003	1.4	17.6055	1.4	0.622	1.6	0.0794	0.7	0.44	492.7	3.3	491.1	6.3	483.8	32.0	492.7	3.3
HC13A-46	2484	426668	2.4	17.5564	0.3	0.6241	0.8	0.0795	0.7	0.92	492.9	3.4	492.4	3.0	490.0	6.7	492.9	3.4
HC13A-38	318	103849	3.3	17.5876	2.7	0.6247	2.9	0.0797	1.1	0.38	494.2	5.3	492.8	11.5	486.0	60.2	494.2	5.3
HC13A-80	180	30835	0.8	17.7169	4.1	0.6202	4.3	0.0797	1.3	0.30	494.3	6.2	490.0	16.7	469.8	90.5	494.3	6.2
HC13A-35	244	46991	3.2	17.8265	3.0	0.6178	3.4	0.0799	1.6	0.46	495.3	7.5	488.4	13.2	456.2	67.1	495.3	7.5
HC13A-75	320	97267	2.4	17.7227	1.8	0.6264	2.1	0.0805	1.0	0.47	499.2	4.6	493.9	8.0	469.1	40.2	499.2	4.6
HC13A100	456	136235	0.9	17.5427	1.1	0.6339	3.8	0.0806	3.6	0.96	500.0	17.4	498.5	14.9	491.7	24.3	500.0	17.4
HC13A-61	312	45463	2.5	17.4586	2.9	0.6381	3.1	0.0808	1.1	0.36	500.9	5.5	501.2	12.4	502.3	64.6	500.9	5.5
HC13A-90	312	130274	10.9	16.757	2.8	0.7125	3.8	0.0866	2.5	0.68	535.3	13.1	546.2	15.8	591.9	59.8	535.3	13.1
HC13A-2	492	146211	3.4	15.5437	2.5	0.7978	4.0	0.0899	3.1	0.78	555.2	16.4	595.6	17.9	752.6	52.6	555.2	16.4
HC13A-74	540	198777	3.9	16.3647	0.4	0.8667	1.5	0.1029	1.4	0.97	631.2	8.7	633.8	7.1	643.0	8.2	631.2	8.7
HC13A-66	588	253162	3.6	16.5905	1.3	0.8576	1.6	0.1032	0.9	0.57	633.1	5.5	628.8	7.4	613.5	28.0	633.1	5.5
HC13A-30	128	28560	0.7	16.0495	3.5	0.9227	4.1	0.1074	2.2	0.53	657.7	13.7	663.8	19.9	684.7	73.8	657.7	13.7
HC13A-23	50	20320	1.4	15.4031	4.7	1.1791	4.9	0.1317	1.4	0.29	797.7	10.7	790.9	26.8	771.8	98.1	797.7	10.7
HC13A-44	48	16027	3.4	14.5193	6.9	1.4971	7.2	0.1577	2.0	0.28	943.7	17.3	929.2	43.6	895.0	142.3	895.0	142.3
HC13A-16	79	49144	2.1	14.3411	2.1	1.5503	2.7	0.1612	1.7	0.62	963.7	14.9	950.6	16.6	920.4	43.4	920.4	43.4
HC13A-94	312	109997	1.5	14.3066	0.8	1.5044	1.7	0.1561	1.5	0.87	935.0	12.6	932.2	10.2	925.3	16.8	925.3	16.8
HC13A-1	344	82488	2.7	14.226	1.3	1.5359	1.6	0.1585	1.0	0.61	948.3	8.5	944.9	9.7	936.9	25.7	936.9	25.7
HC13A-71	245	89627	1.9	13.8602	0.9	1.6921	1.9	0.1701	1.6	0.88	1012.6	15.3	1005.5	11.8	990.2	18.0	990.2	18.0
HC13A-48	419	104683	0.7	13.8532	0.6	1.6535	0.9	0.1661	0.6	0.69	990.8	5.4	990.9	5.4	991.2	12.6	991.2	12.6
HC13A-67	52	15194	2.1	13.8246	7.3	1.7415	7.6	0.1746	2.0	0.27	1037.5	19.3	1024.0	49.1	995.4	149.2	995.4	149.2
HC13A-81	129	38220	2.4	13.7762	1.2	1.7119	1.5	0.171	0.9	0.63	1017.9	8.9	1013.0	9.6	1002.5	23.5	1002.5	23.5
HC13A-76	134	40979	2.8	13.7664	2.7	1.7481	3.0	0.1745	1.2	0.40	1037.1	11.6	1026.5	19.3	1003.9	55.4	1003.9	55.4
HC13A-20	161	65141	3.2	13.7367	1.8	1.7597	2.4	0.1753	1.7	0.69	1041.4	16.1	1030.8	15.8	1008.3	35.9	1008.3	35.9
HC13A-36	56	19671	3.1	13.7261	4.0	1.7198	4.7	0.1712	2.6	0.54	1018.7	24.1	1015.9	30.4	1009.9	80.9	1009.9	80.9
HC13A-25	805	207639	10.3	13.6931	0.5	1.7354	1.2	0.1723	1.1	0.91	1025.0	10.6	1021.7	7.9	1014.8	10.4	1014.8	10.4

HC13A-70	289	64334	2.7	13.6246	0.8	1.7288	1.0	0.1708	0.7	0.67	1016.7	6.5	1019.3	6.6	1024.9	15.6	1024.9	15.6
HC13A-93	95	20135	3.8	13.4449	4.1	1.6553	5.6	0.1614	3.8	0.68	964.6	34.3	991.6	35.6	1051.7	82.9	1051.7	82.9
HC13A-63	128	45614	3.5	13.4408	2.8	1.8108	2.9	0.1765	0.9	0.30	1047.9	8.5	1049.4	19.0	1052.4	55.8	1052.4	55.8
HC13A-22	208	61350	1.0	13.1675	1.2	1.9268	2.1	0.184	1.7	0.83	1088.9	17.2	1090.4	13.9	1093.6	23.3	1093.6	23.3
HC13A-21	289	186709	1.9	12.9323	1.1	2.0601	1.4	0.1932	0.8	0.58	1138.8	8.2	1135.6	9.3	1129.6	21.9	1129.6	21.9
HC13A-56	674	254675	2.7	12.9067	0.3	2.0764	1.2	0.1944	1.2	0.97	1145.0	12.4	1141.1	8.4	1133.5	6.2	1133.5	6.2
HC13A-69	355	78755	3.8	12.8006	0.4	2.0361	1.6	0.189	1.5	0.96	1116.1	15.4	1127.7	10.6	1150.0	8.3	1150.0	8.3
HC13A-9	148	96448	1.7	12.7774	1.7	2.1124	1.9	0.1958	0.9	0.46	1152.5	9.0	1152.9	12.9	1153.5	32.9	1153.5	32.9
HC13A-95	85	33277	1.6	12.7246	2.1	2.0939	2.4	0.1932	1.3	0.52	1138.9	13.3	1146.8	16.8	1161.8	41.2	1161.8	41.2
HC13A-43	132	65358	2.4	12.7124	0.9	2.1852	1.8	0.2015	1.6	0.87	1183.2	17.1	1176.3	12.7	1163.7	18.0	1163.7	18.0
HC13A-7	251	118114	2.1	12.6858	0.8	2.1054	1.9	0.1937	1.7	0.91	1141.4	18.0	1150.6	13.1	1167.8	16.0	1167.8	16.0
HC13A-77	85	18974	2.8	12.6772	2.9	2.0681	3.0	0.1902	0.9	0.31	1122.2	9.5	1138.3	20.5	1169.2	56.5	1169.2	56.5
HC13A-14	105	57847	0.9	12.5342	2.1	2.2633	3.6	0.2057	2.9	0.82	1206.1	32.4	1200.9	25.4	1191.6	41.0	1191.6	41.0
HC13A-15	81	29125	1.7	12.5319	4.4	2.3223	6.1	0.2111	4.3	0.70	1234.5	48.3	1219.1	43.5	1192.0	86.0	1192.0	86.0
HC13A-40	45	17885	1.3	12.4269	3.8	2.361	5.0	0.2128	3.2	0.65	1243.7	36.7	1230.9	35.8	1208.6	75.4	1208.6	75.4
HC13A-68	156	54111	2.9	12.4203	0.9	2.3102	1.7	0.2081	1.4	0.83	1218.7	15.3	1215.4	11.8	1209.6	18.5	1209.6	18.5
HC13A-8	160	72381	0.7	12.3404	1.4	2.2947	1.7	0.2054	0.9	0.54	1204.1	9.8	1210.6	11.7	1222.3	27.6	1222.3	27.6
HC13A-83	186	75452	3.3	12.3337	1.1	2.3406	1.7	0.2094	1.3	0.76	1225.5	14.5	1224.7	12.2	1223.3	22.0	1223.3	22.0
HC13A-41	187	144895	2.6	12.3272	1.0	2.3521	1.4	0.2103	1.0	0.70	1230.4	11.3	1228.2	10.3	1224.4	20.3	1224.4	20.3
HC13A-54	116	64182	2.1	12.3219	1.9	2.3184	2.5	0.2072	1.6	0.65	1213.8	17.7	1217.9	17.5	1225.2	37.0	1225.2	37.0
HC13A-78	215	77548	1.8	12.287	0.7	2.3687	0.8	0.2111	0.4	0.49	1234.6	4.5	1233.2	5.9	1230.8	14.0	1230.8	14.0
HC13A-50	159	73190	3.5	12.2451	0.8	2.3768	1.1	0.2111	0.8	0.70	1234.6	8.6	1235.6	7.8	1237.5	15.3	1237.5	15.3
HC13A-98	136	14872	0.9	11.9146	1.3	2.3074	3.3	0.1994	3.0	0.92	1172.0	32.2	1214.6	23.2	1290.9	25.4	1290.9	25.4
HC13A-33	147	42802	2.2	11.8862	1.2	2.6788	1.3	0.2309	0.6	0.48	1339.4	7.6	1322.6	9.8	1295.6	22.6	1295.6	22.6
HC13A-51	68	23977	2.0	11.7947	1.9	2.68	2.2	0.2293	1.2	0.54	1330.6	14.7	1323.0	16.6	1310.6	36.5	1310.6	36.5
HC13A-5	51	30099	1.9	11.7208	2.9	2.7139	3.3	0.2307	1.5	0.47	1338.2	18.7	1332.3	24.2	1322.8	55.6	1322.8	55.6
HC13A-85	279	130775	2.7	11.6808	0.6	2.6862	2.0	0.2276	1.9	0.96	1321.8	23.3	1324.7	15.0	1329.4	11.0	1329.4	11.0
HC13A-18	145	113535	2.1	11.5501	1.3	2.8326	1.4	0.2373	0.6	0.45	1372.6	8.0	1364.2	10.8	1351.1	24.8	1351.1	24.8
HC13A-88	65	45109	1.8	11.4917	2.1	2.8078	2.3	0.234	0.9	0.39	1355.5	11.1	1357.6	17.3	1360.9	40.9	1360.9	40.9
HC13A-87	75	35283	1.8	11.0969	2.1	3.1175	2.4	0.2509	1.1	0.47	1443.1	14.6	1437.0	18.7	1427.9	41.0	1427.9	41.0
HC13A-39	130	72385	1.3	10.7922	1.0	3.2316	1.6	0.2529	1.2	0.76	1453.7	15.3	1464.8	12.0	1480.9	19.2	1480.9	19.2
HC13A-11	110	58542	2.0	10.7869	0.7	2.9882	2.4	0.2338	2.3	0.95	1354.3	28.3	1404.6	18.5	1481.9	13.6	1481.9	13.6
HC13A-60	95	57217	0.7	10.6907	1.2	3.3576	1.7	0.2603	1.2	0.72	1491.5	16.2	1494.6	13.1	1498.8	21.8	1498.8	21.8
HC13A-57	409	122770	3.0	10.6458	0.3	3.2065	1.0	0.2476	0.9	0.95	1426.0	12.1	1458.7	7.7	1506.8	6.1	1506.8	6.1
HC13A-6	208	198029	2.0	10.5843	0.7	3.403	1.1	0.2612	0.9	0.80	1496.1	11.8	1505.1	8.7	1517.7	12.6	1517.7	12.6
HC13A-59	194	224296	1.4	10.5666	0.6	3.4269	1.1	0.2626	0.9	0.84	1503.2	12.2	1510.6	8.5	1520.9	11.2	1520.9	11.2
HC13A-64	79	77200	1.2	10.5542	1.2	3.6665	1.7	0.2807	1.2	0.68	1594.7	16.3	1564.1	13.4	1523.1	23.2	1523.1	23.2
HC13A-53	175	140907	2.5	10.5465	0.6	3.521	1.5	0.2693	1.3	0.90	1537.4	18.3	1531.9	11.7	1524.4	12.1	1524.4	12.1
HC13A-58	177	78412	2.4	10.5416	0.6	3.4829	1.3	0.2663	1.1	0.87	1521.9	14.9	1523.4	10.0	1525.3	11.6	1525.3	11.6

HC13A-55	85	36324	1.4	10.5404	1.3	3.5461	1.5	0.2711	0.8	0.52	1546.3	10.6	1537.6	11.9	1525.5	24.2	1525.5	24.2
HC13A-29	97	70631	0.4	10.5107	2.3	3.4002	2.4	0.2592	0.8	0.35	1485.8	11.1	1504.4	18.9	1530.9	42.6	1530.9	42.6
HC13A-27	99	46742	2.5	10.4897	1.0	3.5191	1.4	0.2677	0.9	0.70	1529.3	12.9	1531.5	10.7	1534.6	18.3	1534.6	18.3
HC13A-72	484	359360	3.3	10.4664	0.3	3.3643	1.2	0.2554	1.2	0.96	1466.2	15.8	1496.1	9.8	1538.8	6.3	1538.8	6.3
HC13A-3	313	139450	3.2	10.45	0.5	3.5611	3.7	0.2699	3.7	0.99	1540.3	50.9	1540.9	29.7	1541.7	9.3	1541.7	9.3
HC13A-42	182	126434	2.5	10.4385	0.7	3.5703	1.3	0.2703	1.1	0.86	1542.3	15.0	1543.0	10.2	1543.8	12.5	1543.8	12.5
HC13A-79	230	140446	2.9	10.4344	0.6	3.6779	1.2	0.2783	1.0	0.87	1583.0	14.1	1566.6	9.3	1544.6	10.9	1544.6	10.9
HC13A-91	389	217281	2.5	10.4308	0.3	3.6367	1.0	0.2751	1.0	0.95	1566.8	13.6	1557.6	8.2	1545.2	5.9	1545.2	5.9
HC13A-28	216	165460	2.7	10.4291	0.5	3.5505	0.9	0.2686	0.8	0.83	1533.5	10.8	1538.5	7.5	1545.5	9.9	1545.5	9.9
HC13A-47	527	316965	2.0	10.4059	0.3	3.664	0.8	0.2765	0.7	0.91	1573.8	10.4	1563.6	6.5	1549.7	6.2	1549.7	6.2
HC13A-84	227	126935	2.0	10.405	0.7	3.6779	0.9	0.2776	0.6	0.64	1579.0	8.2	1566.6	7.4	1549.9	13.4	1549.9	13.4
HC13A-62	415	398860	1.7	10.3897	0.3	3.6258	1.1	0.2732	1.0	0.95	1557.1	14.2	1555.2	8.6	1552.6	6.5	1552.6	6.5
HC13A-89	494	314460	2.9	10.3659	0.3	3.6633	1.2	0.2754	1.1	0.96	1568.2	15.7	1563.4	9.4	1556.9	6.6	1556.9	6.6
HC13A-26	132	66660	1.5	9.5392	0.7	4.4873	1.1	0.3105	0.8	0.77	1742.9	12.4	1728.6	8.7	1711.3	12.3	1711.3	12.3
HC13A-49	103	40671	1.5	9.0782	1.4	4.8532	1.9	0.3195	1.2	0.64	1787.5	18.6	1794.2	15.7	1801.9	26.0	1801.9	26.0
HC13A-96	282	139353	4.1	8.9537	1.0	4.1108	2.0	0.2669	1.7	0.86	1525.3	23.0	1656.4	16.0	1827.0	18.0	1827.0	18.0
HC13A-73	16	11245	0.6	7.9872	6.0	6.0136	7.8	0.3484	5.0	0.64	1926.7	83.0	1977.8	67.7	2031.6	105.6	2031.6	105.6
HC13A-86	180	152427	1.7	7.8544	0.5	6.6897	1.2	0.3811	1.1	0.89	2081.3	19.3	2071.3	10.7	2061.2	9.6	2061.2	9.6

				Isotope Ratios								Apparent Ages						
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC17-49	98	67095	1.6	11.8236	2.0	2.6952	2.3	0.2311	1.1	0.49	1340.4	13.9	1327.1	17.3	1305.8	39.5	1305.8	39.5
HC17-74	119	53829	2.1	11.6902	1.1	2.7309	1.7	0.2315	1.2	0.74	1342.6	15.0	1336.9	12.4	1327.8	21.7	1327.8	21.7
HC17-79	308	159608	1.9	11.5089	0.5	2.7585	0.9	0.2303	0.8	0.84	1335.8	9.2	1344.4	6.7	1358.0	9.4	1358.0	9.4
HC17-32	29	11756	0.9	10.9492	3.8	3.2646	4.0	0.2592	1.3	0.31	1486.0	16.7	1472.7	31.3	1453.5	72.7	1453.5	72.7
HC17-92	23	19407	1.0	10.9247	4.8	3.2769	5.7	0.2596	3.0	0.53	1488.0	40.2	1475.6	44.1	1457.8	91.0	1457.8	91.0
HC17-43	54	24103	1.1	10.8607	1.8	3.376	3.3	0.2659	2.8	0.84	1520.1	38.1	1498.8	26.2	1468.9	34.2	1468.9	34.2
HC17-11	33	16100	1.0	10.811	4.1	3.5416	4.4	0.2777	1.8	0.40	1579.7	24.6	1536.6	35.0	1477.6	77.0	1477.6	77.0
HC17-96	43	37081	1.1	10.7856	2.8	3.3705	3.1	0.2637	1.4	0.44	1508.5	18.5	1497.6	24.2	1482.1	52.5	1482.1	52.5
HC17-38	94	146129	1.1	10.7459	1.1	3.3571	1.3	0.2616	0.7	0.56	1498.3	9.6	1494.5	10.1	1489.1	20.2	1489.1	20.2
HC17-28	53	27125	0.7	10.7402	3.7	3.3309	3.9	0.2595	1.2	0.31	1487.1	16.2	1488.3	30.6	1490.1	70.6	1490.1	70.6
HC17-13	116	52247	1.3	10.7361	0.9	3.1896	1.4	0.2484	1.1	0.76	1430.0	13.5	1454.6	10.7	1490.8	17.0	1490.8	17.0
HC17-64	28	12176	0.9	10.7219	4.4	3.3934	4.5	0.2639	1.0	0.23	1509.7	13.8	1502.9	35.5	1493.3	83.5	1493.3	83.5
HC17-57	80	54861	2.2	10.7213	1.8	3.3943	1.9	0.2639	0.5	0.26	1510.0	6.6	1503.1	15.0	1493.4	34.9	1493.4	34.9
HC17-44	37	31458	0.5	10.6963	2.8	3.4367	3.0	0.2666	1.0	0.33	1523.6	13.3	1512.8	23.6	1497.8	53.7	1497.8	53.7
HC17-40	244	72660	1.6	10.6632	0.6	3.2068	1.2	0.248	1.1	0.88	1428.2	14.1	1458.8	9.7	1503.7	11.2	1503.7	11.2
HC17-1	126	56844	1.9	10.6523	0.7	3.5322	1.4	0.2729	1.2	0.84	1555.4	16.0	1534.5	10.8	1505.6	13.9	1505.6	13.9

HC17-82	63	45892	1.7	10.6493	2.3	3.405	2.8	0.263	1.5	0.54	1505.1	20.1	1505.5	21.9	1506.2	44.3	1506.2	44.3
HC17-95	51	82279	1.3	10.6484	3.3	3.429	3.6	0.2648	1.4	0.38	1514.5	18.5	1511.1	28.0	1506.3	62.2	1506.3	62.2
HC17-91	120	51069	1.4	10.6411	0.9	3.4174	1.4	0.2637	1.2	0.81	1509.0	15.6	1508.4	11.3	1507.6	16.1	1507.6	16.1
HC17-34	150	71581	2.0	10.6347	0.7	3.3581	1.9	0.259	1.8	0.94	1484.8	24.1	1494.7	15.2	1508.7	12.9	1508.7	12.9
HC17-39	59	40158	0.7	10.6346	3.2	3.5525	3.9	0.274	2.2	0.58	1561.1	31.1	1539.0	30.7	1508.8	59.8	1508.8	59.8
HC17-85	81	84946	1.0	10.6329	1.7	3.3853	2.0	0.2611	1.1	0.54	1495.3	14.3	1501.0	15.6	1509.1	31.9	1509.1	31.9
HC17-98	169	76710	2.1	10.6276	1.0	3.4485	1.2	0.2658	0.7	0.57	1519.5	9.2	1515.5	9.5	1510.0	18.7	1510.0	18.7
HC17-4	129	60595	2.1	10.6177	0.8	3.5539	1.8	0.2737	1.6	0.88	1559.4	21.7	1539.3	14.1	1511.8	15.8	1511.8	15.8
HC17-22	168	136730	1.5	10.6141	0.4	3.4034	1.0	0.262	1.0	0.94	1500.1	13.2	1505.2	8.2	1512.4	6.7	1512.4	6.7
HC17-20	272	130898	1.4	10.6115	0.4	3.3823	1.0	0.2603	1.0	0.93	1491.4	12.8	1500.3	8.1	1512.9	7.4	1512.9	7.4
HC17-60	190	175152	1.4	10.6016	0.6	3.5232	1.1	0.2709	0.9	0.86	1545.4	13.0	1532.4	8.8	1514.6	10.8	1514.6	10.8
HC17-97	90	59825	1.3	10.5992	1.6	3.4274	2.0	0.2635	1.1	0.56	1507.6	15.0	1510.7	15.7	1515.1	31.1	1515.1	31.1
HC17-17	186	73122	1.6	10.599	0.7	3.3906	1.2	0.2606	1.0	0.82	1493.1	12.9	1502.2	9.2	1515.1	12.7	1515.1	12.7
HC17-53	270	160995	1.4	10.5985	0.5	3.4825	1.1	0.2677	1.0	0.87	1529.1	13.3	1523.2	8.8	1515.2	10.3	1515.2	10.3
HC17-62	252	98607	1.5	10.5951	0.4	3.4783	0.9	0.2673	0.8	0.90	1527.0	10.4	1522.3	6.7	1515.8	7.1	1515.8	7.1
HC17-10	172	68573	1.5	10.5947	0.7	3.6553	1.4	0.2809	1.2	0.87	1595.8	17.1	1561.7	11.1	1515.9	13.0	1515.9	13.0
HC17-46	149	219063	2.2	10.5938	1.0	3.5395	1.7	0.272	1.3	0.77	1550.7	17.6	1536.1	13.1	1516.0	19.8	1516.0	19.8
HC17-5	182	149036	1.6	10.5897	0.7	3.5595	1.2	0.2734	1.0	0.83	1558.0	13.2	1540.6	9.1	1516.7	12.3	1516.7	12.3
HC17-41	486	478001	1.8	10.5893	0.2	3.5219	1.0	0.2705	1.0	0.98	1543.3	13.6	1532.1	8.0	1516.8	4.2	1516.8	4.2
HC17-12	54	104633	1.2	10.5885	1.2	3.4281	1.9	0.2633	1.5	0.76	1506.5	19.8	1510.9	15.2	1516.9	23.5	1516.9	23.5
HC17-23	222	132035	0.8	10.5869	0.3	3.4582	0.8	0.2655	0.7	0.94	1518.1	9.6	1517.7	6.0	1517.2	5.0	1517.2	5.0
HC17-72	349	155399	1.5	10.5865	0.5	3.4252	0.9	0.263	0.7	0.84	1505.1	10.0	1510.2	7.0	1517.3	9.0	1517.3	9.0
HC17-69	292	207389	0.9	10.5852	0.4	3.4891	0.9	0.2679	0.7	0.85	1529.9	9.9	1524.7	6.8	1517.5	8.4	1517.5	8.4
HC17-47	603	499721	1.8	10.5848	0.2	3.5601	0.8	0.2733	0.8	0.96	1557.5	10.9	1540.7	6.5	1517.6	4.2	1517.6	4.2
HC17-70	220	143611	2.0	10.5832	0.5	3.4784	1.6	0.267	1.5	0.95	1525.5	20.7	1522.3	12.7	1517.9	9.6	1517.9	9.6
HC17-45	46	19797	0.7	10.5777	2.4	3.563	2.6	0.2733	1.0	0.39	1557.7	14.2	1541.3	20.8	1518.9	45.5	1518.9	45.5
HC17-16	373	258960	1.4	10.5763	0.2	3.3957	1.2	0.2605	1.2	0.99	1492.3	15.3	1503.4	9.2	1519.1	3.6	1519.1	3.6
HC17-76	115	29379	1.7	10.5709	1.4	3.4904	1.7	0.2676	1.0	0.60	1528.6	13.9	1525.1	13.5	1520.1	25.8	1520.1	25.8
HC17-36	457	717916	2.8	10.5696	0.3	3.4913	0.9	0.2676	0.9	0.94	1528.8	11.6	1525.3	7.1	1520.3	5.7	1520.3	5.7
HC17-84	244	129203	1.6	10.5693	0.4	3.4916	0.6	0.2677	0.5	0.76	1528.9	6.6	1525.3	5.0	1520.4	7.7	1520.4	7.7
HC17-7	283	128267	1.3	10.5657	0.4	3.5953	2.4	0.2755	2.4	0.99	1568.7	33.2	1548.5	19.2	1521.0	7.2	1521.0	7.2
HC17-99	170	208199	1.8	10.5654	0.6	3.4835	1.4	0.2669	1.3	0.90	1525.2	17.3	1523.5	11.2	1521.1	11.9	1521.1	11.9
HC17-73	440	633999	1.9	10.5623	0.2	3.5141	1.1	0.2692	1.0	0.97	1536.7	14.1	1530.4	8.4	1521.6	4.5	1521.6	4.5
HC17-61	207	102705	2.3	10.5619	0.9	3.4489	1.4	0.2642	1.1	0.78	1511.2	14.7	1515.6	10.9	1521.7	16.3	1521.7	16.3
HC17-89	134	86377	2.1	10.5603	0.8	3.4617	1.4	0.2651	1.2	0.83	1516.1	16.0	1518.5	11.3	1522.0	15.0	1522.0	15.0
HC17-87	92	37584	1.1	10.5594	1.5	3.4684	1.8	0.2656	1.1	0.60	1518.6	14.9	1520.1	14.4	1522.1	27.6	1522.1	27.6
HC17-100	446	166077	3.7	10.5533	0.5	3.5068	2.2	0.2684	2.1	0.97	1532.7	28.8	1528.7	17.2	1523.2	9.5	1523.2	9.5
HC17-6	332	261265	1.6	10.5497	0.3	3.4819	0.9	0.2664	0.8	0.95	1522.6	11.4	1523.1	6.9	1523.9	5.1	1523.9	5.1
HC17-24	300	347724	1.8	10.5427	0.5	3.4485	1.1	0.2637	0.9	0.87	1508.7	12.2	1515.5	8.3	1525.1	9.9	1525.1	9.9

HC17-50	60	62802	0.9	10.5418	1.4	3.438	1.9	0.2629	1.2	0.64	1504.4	16.0	1513.1	14.7	1525.3	26.9	1525.3	26.9
HC17-86	84	85051	0.6	10.5382	1.3	3.5025	2.7	0.2677	2.4	0.87	1529.1	32.4	1527.8	21.6	1525.9	25.0	1525.9	25.0
HC17-94	222	110645	1.7	10.5328	0.8	3.5545	1.5	0.2715	1.3	0.86	1548.6	18.1	1539.4	12.1	1526.9	14.4	1526.9	14.4
HC17-65	728	314140	####	10.5097	0.2	3.5256	0.8	0.2687	0.8	0.98	1534.4	10.6	1533.0	6.3	1531.0	3.0	1531.0	3.0
HC17-29	109	72364	0.6	10.5093	0.7	3.4883	1.2	0.2659	1.0	0.83	1519.8	13.5	1524.6	9.4	1531.1	12.5	1531.1	12.5
HC17-66	234	133934	1.4	10.5069	0.5	3.5165	1.5	0.268	1.4	0.95	1530.5	19.6	1530.9	12.0	1531.5	8.9	1531.5	8.9
HC17-25	519	245275	3.0	10.5035	0.2	3.4613	0.9	0.2637	0.9	0.98	1508.6	12.5	1518.4	7.5	1532.1	3.5	1532.1	3.5
HC17-63	622	366486	5.9	10.4798	0.4	3.5102	0.9	0.2668	0.8	0.90	1524.5	10.6	1529.5	6.8	1536.4	7.0	1536.4	7.0
HC17-59	144	87511	1.7	10.4504	1.4	3.5747	1.6	0.2709	0.8	0.49	1545.6	10.6	1543.9	12.5	1541.7	25.9	1541.7	25.9
HC17-81	387	688123	8.2	10.4411	0.4	3.6765	1.3	0.2784	1.2	0.95	1583.3	16.7	1566.3	10.0	1543.4	7.7	1543.4	7.7
HC17-15	497	296161	4.6	10.4255	0.3	3.531	1.6	0.267	1.6	0.98	1525.5	21.3	1534.2	12.6	1546.2	5.3	1546.2	5.3
HC17-52	116	963	1.3	10.4141	6.6	3.4255	6.9	0.2587	2.2	0.31	1483.3	28.6	1510.3	54.5	1548.2	123.9	1548.2	123.9
HC17-80	321	238190	1.4	10.3986	0.5	3.6526	0.8	0.2755	0.6	0.79	1568.5	9.0	1561.1	6.5	1551.0	9.4	1551.0	9.4
HC17-30	166	177276	2.2	10.3782	0.6	3.6553	1.5	0.2751	1.3	0.90	1566.8	18.7	1561.7	11.9	1554.7	11.9	1554.7	11.9
HC17-48	421	178786	3.0	10.3398	0.2	3.8705	2.6	0.2903	2.6	1.00	1642.8	37.7	1607.5	21.0	1561.6	3.9	1561.6	3.9
HC17-75	44	43521	1.0	10.3145	4.1	3.6326	5.1	0.2717	3.1	0.61	1549.7	43.3	1556.7	40.9	1566.3	76.0	1566.3	76.0
HC17-90	520	680617	2.7	10.2951	0.3	3.7482	0.7	0.2799	0.7	0.91	1590.7	9.2	1581.7	5.7	1569.8	5.4	1569.8	5.4
HC17-8	250	124514	2.0	10.2888	0.6	3.6941	1.3	0.2757	1.1	0.87	1569.5	15.3	1570.1	10.1	1570.9	11.8	1570.9	11.8
HC17-58	72	52551	3.4	9.9097	2.0	3.9682	2.7	0.2852	1.8	0.68	1617.5	25.7	1627.7	21.6	1640.9	36.4	1640.9	36.4
HC17-55	178	116480	2.7	9.7717	1.2	4.3283	1.9	0.3068	1.4	0.75	1724.7	21.3	1698.8	15.5	1666.9	23.0	1666.9	23.0
HC17-19	248	171444	2.3	9.7376	1.9	3.9137	5.2	0.2764	4.9	0.93	1573.2	67.9	1616.5	42.2	1673.4	34.9	1673.4	34.9
HC17-77	282	192242	4.0	9.733	0.8	4.1016	2.3	0.2895	2.2	0.95	1639.2	31.6	1654.6	18.8	1674.2	13.9	1674.2	13.9
HC17-93	85	33302	1.4	9.4928	1.0	4.4735	1.9	0.308	1.7	0.87	1730.8	25.6	1726.1	16.1	1720.3	17.9	1720.3	17.9
HC17-33	130	110312	1.7	9.4823	0.9	4.458	1.4	0.3066	1.0	0.73	1723.9	15.5	1723.2	11.5	1722.3	17.4	1722.3	17.4
HC17-78	92	66323	2.1	9.4083	1.0	4.5898	1.6	0.3132	1.2	0.78	1756.4	19.2	1747.4	13.4	1736.7	18.6	1736.7	18.6
HC17-3	140	154859	1.6	9.4036	0.7	4.6647	1.3	0.3181	1.2	0.87	1780.6	18.2	1760.9	11.2	1737.6	12.0	1737.6	12.0
HC17-14	465	228880	1.7	9.3776	0.3	4.5252	1.1	0.3078	1.0	0.97	1729.7	15.7	1735.6	8.9	1742.7	4.9	1742.7	4.9
HC17-37	264	293665	2.5	9.3525	0.3	4.5123	0.8	0.3061	0.8	0.93	1721.4	11.6	1733.2	6.8	1747.6	5.5	1747.6	5.5
HC17-51	126	94825	1.5	9.3489	1.0	4.6312	1.5	0.314	1.1	0.71	1760.4	16.3	1754.9	12.4	1748.3	19.2	1748.3	19.2
HC17-9	62	29595	1.0	9.3472	1.9	4.5899	2.3	0.3112	1.2	0.52	1746.4	18.2	1747.4	19.0	1748.6	35.7	1748.6	35.7
HC17-26	255	250515	1.4	9.3403	0.5	4.5453	0.9	0.3079	0.8	0.83	1730.4	11.5	1739.3	7.6	1750.0	9.2	1750.0	9.2
HC17-27	292	141426	1.3	9.3362	0.4	4.555	0.8	0.3084	0.7	0.89	1733.0	10.6	1741.1	6.5	1750.8	6.4	1750.8	6.4
HC17-54	327	265525	1.4	9.3268	0.3	4.6003	1.0	0.3112	0.9	0.93	1746.5	13.9	1749.3	8.1	1752.6	6.3	1752.6	6.3
HC17-82	154	132373	0.9	9.3228	0.6	4.4749	1.2	0.3026	1.1	0.88	1704.0	15.9	1726.3	10.0	1753.4	10.3	1753.4	10.3
HC17-56	196	58560	1.3	9.3149	0.5	4.6667	1.1	0.3153	1.0	0.90	1766.6	15.6	1761.3	9.4	1755.0	8.8	1755.0	8.8
HC17-2	174	99065	1.5	9.3052	0.5	4.6889	1.4	0.3164	1.3	0.93	1772.3	19.6	1765.3	11.4	1756.9	9.0	1756.9	9.0
HC17-35	113	72107	1.3	9.2861	0.7	4.649	1.1	0.3131	0.8	0.75	1756.0	12.8	1758.1	9.2	1760.6	13.2	1760.6	13.2
HC17-21	121	90292	1.5	9.2755	0.9	4.5908	1.3	0.3088	0.9	0.72	1735.0	14.2	1747.6	10.8	1762.7	16.3	1762.7	16.3

Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	Isotope Ratios ± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	Apparent Ages ± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC18-50	230	49297	1.1	17.3448	2.7	0.5545	3.9	0.0698	2.8	0.73	434.7	11.8	448.0	14.0	516.6	58.5	434.7	11.8
HC18-72	307	2780	3.2	17.5512	4.3	0.5873	5.0	0.0748	2.6	0.52	464.8	11.6	469.1	18.7	490.6	93.9	464.8	11.6
HC18-22	703	142386	5.3	17.6965	0.7	0.5839	1.3	0.0749	1.1	0.83	465.9	4.9	467.0	4.9	472.4	16.3	465.9	4.9
HC18-27	615	109578	2.7	17.5973	0.7	0.5879	1.4	0.075	1.2	0.87	466.4	5.4	469.5	5.2	484.8	15.1	466.4	5.4
HC18-64	269	53975	1.7	17.606	2.0	0.5944	2.3	0.0759	1.0	0.46	471.6	4.8	473.7	8.6	483.7	44.8	471.6	4.8
HC18-84	325	38037	1.0	17.7532	2.2	0.5901	4.3	0.076	3.7	0.86	472.1	16.7	470.9	16.1	465.3	48.5	472.1	16.7
HC18-66	383	101945	2.4	17.6474	1.2	0.594	1.5	0.076	0.9	0.60	472.3	4.0	473.4	5.6	478.5	26.3	472.3	4.0
HC18-60	407	44620	1.1	17.694	1.1	0.5958	1.6	0.0765	1.2	0.75	475.0	5.7	474.6	6.2	472.7	23.9	475.0	5.7
HC18-59	164	44011	1.3	17.9288	5.4	0.5901	5.6	0.0767	1.7	0.30	476.6	7.7	470.9	21.2	443.4	119.5	476.6	7.7
HC18-61	493	155704	1.4	17.5948	1.6	0.602	1.9	0.0768	1.1	0.55	477.1	4.9	478.5	7.4	485.1	35.9	477.1	4.9
HC18-15	151	20790	1.3	17.914	5.3	0.593	5.4	0.077	1.1	0.20	478.4	5.0	472.8	20.4	445.3	117.6	478.4	5.0
HC18-39	662	166145	1.9	17.5257	1.0	0.6066	2.1	0.0771	1.8	0.87	478.8	8.4	481.4	8.1	493.8	22.7	478.8	8.4
HC18-12	369	11452	1.4	17.5958	2.6	0.6068	3.1	0.0774	1.6	0.52	480.8	7.5	481.5	11.8	485.0	58.1	480.8	7.5
HC18-55	205	7170	2.1	17.632	2.2	0.606	2.5	0.0775	1.2	0.47	481.2	5.5	481.0	9.6	480.5	48.7	481.2	5.5
HC18-17	242	55259	1.2	17.5386	3.9	0.6094	4.0	0.0775	1.1	0.27	481.3	5.0	483.2	15.4	492.2	85.1	481.3	5.0
HC18-52	357	120802	0.6	17.6004	1.5	0.6074	2.6	0.0775	2.1	0.82	481.4	9.9	481.9	10.0	484.5	33.1	481.4	9.9
HC18-65	214	40506	1.4	17.8802	5.1	0.5993	5.2	0.0777	1.2	0.23	482.5	5.6	476.8	19.8	449.5	112.6	482.5	5.6
HC18-79	489	72205	4.9	17.6212	0.7	0.6085	1.3	0.0778	1.1	0.84	482.7	5.0	482.6	4.9	481.8	15.4	482.7	5.0
HC18-33	478	8213	1.6	17.4228	2.1	0.6176	2.2	0.078	0.8	0.37	484.4	3.8	488.4	8.6	506.8	45.4	484.4	3.8
HC18-89	360	84996	1.8	17.772	1.1	0.6082	1.4	0.0784	0.9	0.61	486.5	4.0	482.4	5.4	463.0	24.9	486.5	4.0
HC18-99	397	79114	4.7	17.4207	0.9	0.6208	1.5	0.0784	1.2	0.78	486.8	5.6	490.4	5.9	507.0	20.8	486.8	5.6
HC18-56	289	61584	1.6	17.3378	3.2	0.6243	3.4	0.0785	1.2	0.34	487.2	5.5	492.6	13.4	517.5	70.8	487.2	5.5
HC18-62	359	39214	1.9	17.8146	1.6	0.6079	1.8	0.0785	0.7	0.42	487.4	3.4	482.2	6.7	457.7	35.4	487.4	3.4
HC18-77	146	46043	1.9	16.9783	5.5	0.6378	5.6	0.0785	1.2	0.21	487.4	5.5	501.0	22.3	563.3	120.3	487.4	5.5
HC18-70	216	37657	1.7	17.4589	2.3	0.6206	2.8	0.0786	1.5	0.53	487.7	6.9	490.2	10.7	502.2	51.3	487.7	6.9
HC18-96	154	28214	2.3	17.2275	4.9	0.6296	5.1	0.0787	1.5	0.28	488.1	6.9	495.8	20.1	531.5	107.7	488.1	6.9
HC18-97	162	31390	1.4	18.0705	2.9	0.6028	3.1	0.079	1.3	0.41	490.1	6.1	479.0	12.0	425.9	63.7	490.1	6.1
HC18-7	453	53835	2.1	17.6544	1.4	0.6172	1.9	0.079	1.3	0.69	490.3	6.3	488.1	7.5	477.6	30.9	490.3	6.3
HC18-9	523	19687	0.9	17.4483	1.0	0.6248	1.2	0.0791	0.7	0.60	490.6	3.5	492.9	4.8	503.6	21.8	490.6	3.5
HC18-2	367	61038	2.4	17.7102	2.2	0.6162	2.5	0.0792	1.2	0.46	491.1	5.5	487.5	9.6	470.7	48.8	491.1	5.5
HC18-67	386	94952	1.5	17.6718	1.7	0.6183	2.1	0.0793	1.3	0.61	491.6	6.0	488.8	8.2	475.5	37.2	491.6	6.0
HC18-78	100	33168	1.6	17.2763	6.0	0.6355	6.1	0.0796	1.0	0.17	493.9	4.9	499.5	23.9	525.3	130.9	493.9	4.9
HC18-45	102	16538	1.6	16.9581	6.2	0.6497	6.4	0.0799	1.5	0.24	495.5	7.3	508.3	25.4	566.0	134.4	495.5	7.3
HC18-75	1255	14526	0.8	17.2962	2.5	0.6377	2.6	0.08	0.7	0.28	496.1	3.5	500.9	10.4	522.8	55.6	496.1	3.5
HC18-1	372	23965	1.2	17.4423	2.2	0.6332	2.9	0.0801	2.0	0.67	496.7	9.3	498.1	11.6	504.3	48.2	496.7	9.3

HC18-85	495	123274	1.6	17.5334	1.5	0.6341	1.9	0.0806	1.2	0.61	499.9	5.6	498.7	7.6	492.8	33.5	499.9	5.6
HC18-25	493	47731	1.2	17.7897	1.8	0.6273	2.4	0.0809	1.6	0.68	501.7	7.8	494.4	9.4	460.7	39.0	501.7	7.8
HC18-76	321	56583	2.0	17.5666	2.5	0.6424	2.7	0.0818	1.1	0.41	507.1	5.4	503.8	10.8	488.7	54.6	507.1	5.4
HC18-69	121	18246	0.6	17.6305	4.3	0.7075	4.7	0.0905	1.9	0.41	558.3	10.3	543.2	19.8	480.6	94.8	558.3	10.3
HC18-28	225	43067	5.0	16.4145	1.1	0.8529	1.7	0.1015	1.3	0.75	623.4	7.6	626.3	8.0	636.5	24.5	623.4	7.6
HC18-19	130	42467	5.0	15.6235	2.3	0.979	2.5	0.1109	1.0	0.39	678.2	6.2	693.1	12.4	741.8	47.8	678.2	6.2
HC18-71	70	22879	3.6	14.1341	4.3	1.4112	4.8	0.1447	2.0	0.42	871.0	16.3	893.7	28.4	950.2	88.9	950.2	88.9
HC18-95	401	164357	2.7	14.0378	0.7	1.5852	1.6	0.1614	1.4	0.90	964.5	13.0	964.4	10.1	964.2	14.5	964.2	14.5
HC18-38	61	19781	2.4	13.9281	4.1	1.6788	4.2	0.1696	1.0	0.23	1009.8	9.0	1000.5	26.6	980.2	83.0	980.2	83.0
HC18-100	215	94425	3.0	13.8578	1.2	1.6954	1.5	0.1704	1.0	0.63	1014.3	9.1	1006.8	9.8	990.5	24.1	990.5	24.1
HC18-13	352	295727	3.8	13.8536	0.5	1.6408	1.5	0.1649	1.4	0.95	983.7	13.2	986.0	9.6	991.1	9.4	991.1	9.4
HC18-18	141	46534	2.0	13.7665	1.4	1.6632	1.7	0.1661	0.9	0.52	990.4	7.9	994.6	10.5	1003.9	28.7	1003.9	28.7
HC18-49	122	52147	3.1	13.7541	2.2	1.7126	2.5	0.1708	1.1	0.46	1016.7	10.7	1013.2	15.8	1005.7	44.4	1005.7	44.4
HC18-66	78	31765	2.9	13.7493	1.7	1.6818	2.1	0.1677	1.1	0.54	999.5	10.2	1001.7	13.1	1006.4	35.3	1006.4	35.3
HC18-44	615	335425	7.2	13.744	0.7	1.624	1.3	0.1619	1.1	0.85	967.2	10.2	979.5	8.4	1007.2	14.3	1007.2	14.3
HC18-6	391	37884	2.0	13.7038	1.2	1.6824	4.2	0.1672	4.0	0.96	996.7	37.2	1001.9	26.7	1013.2	23.8	1013.2	23.8
HC18-54	132	83870	1.6	13.6967	1.8	1.7037	2.0	0.1692	0.9	0.44	1007.9	8.1	1009.9	12.6	1014.2	35.7	1014.2	35.7
HC18-94	173	67078	2.1	13.6749	1.9	1.7333	2.3	0.1719	1.1	0.50	1022.6	10.7	1021.0	14.5	1017.5	39.4	1017.5	39.4
HC18-29	49	24781	2.2	13.6722	4.8	1.6992	5.1	0.1685	1.8	0.35	1003.8	16.6	1008.2	32.7	1017.9	97.1	1017.9	97.1
HC18-93	191	95335	3.0	13.6317	1.2	1.7183	1.4	0.1699	0.8	0.56	1011.5	7.2	1015.4	8.9	1023.9	23.3	1023.9	23.3
HC18-16	81	25444	6.2	13.594	2.4	1.7004	2.7	0.1677	1.3	0.50	999.2	12.5	1008.7	17.3	1029.4	47.5	1029.4	47.5
HC18-42	128	159014	3.2	13.5431	2.0	1.7692	2.3	0.1738	1.2	0.54	1032.9	11.8	1034.2	15.0	1037.0	39.5	1037.0	39.5
HC18-37	97	52706	2.2	13.4464	3.0	1.6723	3.5	0.1631	1.7	0.48	973.9	15.1	998.1	22.0	1051.5	61.2	1051.5	61.2
HC18-32	80	30557	3.0	13.4119	2.3	1.752	2.6	0.1704	1.3	0.50	1014.4	12.3	1027.9	17.0	1056.7	46.0	1056.7	46.0
HC18-88	99	59258	1.6	13.3066	2.5	1.8243	3.4	0.1761	2.3	0.67	1045.4	22.0	1054.2	22.3	1072.5	50.6	1072.5	50.6
HC18-31	137	108963	2.7	12.7853	1.3	2.1075	2.1	0.1954	1.7	0.80	1150.7	17.9	1151.3	14.6	1152.3	25.2	1152.3	25.2
HC18-5	146	55528	1.9	12.7158	1.7	2.1881	2.7	0.2018	2.1	0.78	1185.0	23.0	1177.3	19.0	1163.1	33.6	1163.1	33.6
HC18-21	172	83516	1.7	12.7055	1.3	2.1533	1.9	0.1984	1.4	0.73	1166.9	14.7	1166.1	13.1	1164.7	25.8	1164.7	25.8
HC18-98	178	91267	4.3	12.6398	1.5	2.1994	2.2	0.2016	1.6	0.72	1184.1	17.4	1180.9	15.5	1175.0	30.3	1175.0	30.3
HC18-20	65	33489	1.6	12.5878	3.6	2.1537	3.8	0.1966	1.1	0.29	1157.2	11.5	1166.3	26.1	1183.2	71.4	1183.2	71.4
HC18-53	50	22506	1.9	12.5793	3.6	2.3161	4.4	0.2113	2.5	0.56	1235.8	28.0	1217.2	31.2	1184.5	71.8	1184.5	71.8
HC18-83	234	88853	2.7	12.5663	1.1	2.2027	1.6	0.2008	1.1	0.73	1179.4	12.3	1181.9	10.9	1186.6	20.9	1186.6	20.9
HC18-81	86	58579	3.0	12.5606	2.1	2.4643	3.2	0.2245	2.4	0.76	1305.6	28.7	1261.6	23.2	1187.5	41.4	1187.5	41.4
HC18-3	523	286156	2.5	12.5377	0.4	2.2318	1.0	0.2029	0.9	0.92	1191.1	9.8	1191.1	6.9	1191.1	7.5	1191.1	7.5
HC18-51	283	156009	3.9	12.4371	1.5	2.0764	2.4	0.1873	1.9	0.77	1106.7	18.9	1141.1	16.5	1206.9	30.2	1206.9	30.2
HC18-34	114	61705	2.8	12.375	0.9	2.5333	4.3	0.2274	4.2	0.98	1320.7	50.6	1281.6	31.6	1216.8	18.6	1216.8	18.6
HC18-14	325	103630	2.1	12.254	0.6	2.3468	1.7	0.2086	1.6	0.94	1221.2	17.8	1226.6	12.1	1236.1	11.0	1236.1	11.0
HC18-46	412	123448	6.1	12.1332	0.7	2.1749	2.5	0.1914	2.3	0.95	1128.9	24.3	1173.0	17.1	1255.5	14.5	1255.5	14.5
HC18-91	116	177136	1.7	11.8049	1.2	2.6805	1.7	0.2295	1.2	0.71	1331.8	14.4	1323.1	12.5	1308.9	23.1	1308.9	23.1

HC18-80	133	94661	1.9	11.6695	1.3	2.7601	1.7	0.2336	1.1	0.62	1353.3	13.0	1344.8	12.7	1331.3	25.9	1331.3	25.9
HC18-26	96	50996	2.5	11.5264	1.4	2.778	1.9	0.2322	1.4	0.71	1346.2	16.5	1349.6	14.4	1355.1	26.2	1355.1	26.2
HC18-24	150	52492	2.6	11.1372	1.0	3.0065	2.7	0.2428	2.5	0.93	1401.5	31.1	1409.3	20.3	1421.0	19.3	1421.0	19.3
HC18-48	42	36571	0.9	10.9026	3.4	3.1507	4.4	0.2491	2.7	0.62	1434.0	35.0	1445.2	33.8	1461.6	65.4	1461.6	65.4
HC18-10	671	180137	5.5	10.8229	0.5	3.0713	3.0	0.2411	3.0	0.98	1392.3	37.3	1425.6	23.2	1475.5	10.2	1475.5	10.2
HC18-43	45	13454	1.5	10.6276	2.5	3.4103	3.2	0.2629	2.0	0.63	1504.5	27.0	1506.8	25.0	1510.0	46.5	1510.0	46.5
HC18-68	302	194571	6.2	10.5896	0.4	3.4737	1.0	0.2668	0.9	0.93	1524.5	12.9	1521.3	8.0	1516.8	6.8	1516.8	6.8
HC18-41	131	52399	1.1	10.4378	0.8	3.4526	1.5	0.2614	1.3	0.84	1496.8	17.3	1516.5	12.2	1543.9	16.0	1543.9	16.0
HC18-30	438	59991	1.4	10.4213	0.4	3.275	1.6	0.2475	1.6	0.96	1425.7	19.8	1475.1	12.5	1546.9	8.3	1546.9	8.3
HC18-63	328	247343	3.0	10.3858	0.3	3.5137	0.9	0.2647	0.8	0.94	1513.7	11.3	1530.3	7.0	1553.3	5.7	1553.3	5.7
HC18-8	375	321064	6.7	10.276	0.8	3.4613	2.1	0.258	1.9	0.93	1479.4	25.2	1518.5	16.2	1573.3	14.5	1573.3	14.5
HC18-87	83	53901	1.1	10.2308	0.9	4.0025	2.4	0.297	2.3	0.93	1676.4	33.7	1634.7	19.9	1581.5	16.6	1581.5	16.6
HC18-86	421	187840	2.0	10.1914	0.4	3.7528	0.9	0.2774	0.8	0.86	1578.2	10.6	1582.7	7.0	1588.7	8.4	1588.7	8.4
HC18-82	491	186835	3.3	10.177	0.5	3.7248	1.5	0.2749	1.4	0.94	1565.8	19.7	1576.7	12.0	1591.4	9.4	1591.4	9.4
HC18-35	145	73922	1.6	9.6262	0.6	4.2995	1.5	0.3002	1.3	0.91	1692.2	19.8	1693.3	12.0	1694.6	10.9	1694.6	10.9
HC18-4	167	147568	1.6	9.5266	0.8	4.4783	1.6	0.3094	1.4	0.87	1737.9	21.1	1727.0	13.2	1713.8	14.4	1713.8	14.4
HC18-23	282	256425	1.7	9.4873	0.5	4.4056	2.6	0.3031	2.5	0.98	1706.9	38.0	1713.4	21.3	1721.4	8.9	1721.4	8.9
HC18-74	188	166320	0.8	9.3682	0.5	4.55	1.3	0.3091	1.2	0.92	1736.5	18.5	1740.2	10.9	1744.5	9.3	1744.5	9.3
HC18-92	163	94372	1.6	9.2786	0.7	4.7392	1.3	0.3189	1.1	0.87	1784.5	17.7	1774.2	11.0	1762.1	12.0	1762.1	12.0
HC18-36	170	121492	0.7	8.3058	0.8	5.2803	1.9	0.3181	1.8	0.92	1780.3	27.8	1865.7	16.5	1962.1	13.4	1962.1	13.4
HC18-47	200	120245	1.7	7.3964	0.4	7.0084	2.1	0.376	2.1	0.98	2057.4	36.2	2112.5	18.5	2166.6	6.4	2166.6	6.4
HC18-40	198	132070	7.7	6.6611	0.3	9.0172	0.7	0.4356	0.6	0.88	2331.0	11.6	2339.7	6.2	2347.3	5.5	2347.3	5.5

				Isotope Ratios							Apparent Ages							
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC9-55	1117	5131	1.5	17.2279	1.4	0.3365	9.7	0.042	9.6	0.99	265.5	24.9	294.5	24.8	531.5	30.2	265.5	24.9
HC9-54	605	4996	1.1	17.2271	1.9	0.3937	4.9	0.0492	4.5	0.92	309.5	13.6	337.1	14.0	531.6	41.6	309.5	13.6
HC9-24	1366	5308	7.1	16.8766	0.7	0.425	3.6	0.052	3.6	0.98	326.9	11.4	359.6	11.0	576.4	15.5	326.9	11.4
HC9-89	342	10485	0.6	17.6764	2.5	0.4936	6.3	0.0633	5.8	0.92	395.5	22.3	407.4	21.2	474.9	54.5	395.5	22.3
HC9-34	126	23642	1.8	17.6781	4.3	0.5598	5.7	0.0718	3.8	0.67	446.8	16.4	451.4	20.8	474.7	94.3	446.8	16.4
HC9-75	394	68963	1.1	17.6976	1.9	0.5601	2.2	0.0719	1.2	0.53	447.5	5.2	451.6	8.2	472.2	42.0	447.5	5.2
HC9-17	711	128332	2.8	17.8207	1.6	0.5594	2.0	0.0723	1.2	0.60	450.0	5.2	451.1	7.3	456.9	35.4	450.0	5.2
HC9-66	57	6130	2.6	18.9589	11.7	0.5298	12.5	0.0729	4.3	0.34	453.3	18.6	431.7	43.9	317.8	267.5	453.3	18.6
HC9-25	172	26116	2.3	18.2672	5.1	0.5532	5.6	0.0733	2.3	0.42	456.0	10.3	447.1	20.1	401.7	113.3	456.0	10.3
HC9-38	295	51069	3.8	17.8704	3.2	0.5689	3.4	0.0737	1.3	0.37	458.7	5.6	457.3	12.7	450.7	71.2	458.7	5.6
HC9-33	208	33087	0.6	17.4366	5.3	0.5862	5.5	0.0741	1.3	0.24	461.0	5.8	468.4	20.6	505.1	117.4	461.0	5.8

HC9-93	182	4626	1.0	18.1229	7.0	0.5667	7.7	0.0745	3.1	0.41	463.1	14.0	455.9	28.2	419.5	156.9	463.1	14.0
HC9-59	251	37072	1.4	17.6738	2.4	0.5822	3.3	0.0746	2.3	0.69	464.0	10.2	465.9	12.3	475.2	52.4	464.0	10.2
HC9-73	297	69552	1.7	17.8267	2.2	0.583	2.4	0.0754	0.9	0.38	468.5	4.1	466.4	8.9	456.2	48.8	468.5	4.1
HC9-65	609	117297	1.2	17.5894	1.5	0.5937	2.1	0.0757	1.5	0.71	470.6	6.7	473.2	8.0	485.8	32.9	470.6	6.7
HC9-85	196	46997	1.8	18.0373	5.1	0.5883	5.2	0.077	1.1	0.21	478.0	5.0	469.8	19.7	430.0	114.1	478.0	5.0
HC9-99	303	48747	1.4	17.2348	1.6	0.7119	2.3	0.089	1.7	0.74	549.5	9.1	545.9	9.8	530.6	34.3	549.5	9.1
HC9-69	194	33531	1.4	16.5706	2.0	0.8245	2.4	0.0991	1.4	0.56	609.1	7.8	610.6	11.0	616.1	43.0	609.1	7.8
HC9-58	60	8036	1.4	17.2715	11.3	0.7987	11.4	0.1001	1.5	0.13	614.7	8.8	596.1	51.6	525.9	249.1	614.7	8.8
HC9-82	147	42360	1.7	16.5829	3.6	0.8353	3.8	0.1005	1.1	0.28	617.1	6.3	616.5	17.5	614.4	78.5	617.1	6.3
HC9-46	97	24551	1.9	16.5875	6.3	0.8414	6.6	0.1012	1.8	0.27	621.6	10.4	619.9	30.5	613.9	137.1	621.6	10.4
HC9-67	26	10767	0.0	18.9233	16.7	0.744	17.9	0.1021	6.4	0.36	626.8	38.3	564.7	77.6	322.2	381.6	626.8	38.3
HC9-32	335	46775	1.4	16.3181	2.7	0.864	3.3	0.1023	1.8	0.56	627.6	11.0	632.3	15.5	649.1	58.6	627.6	11.0
HC9-47	77	22707	1.8	16.1187	5.3	0.8798	5.5	0.1028	1.7	0.30	631.1	10.0	640.9	26.2	675.5	112.5	631.1	10.0
HC9-2	120	32514	0.5	16.5462	3.3	0.8576	3.9	0.1029	2.1	0.54	631.5	12.8	628.8	18.5	619.2	71.7	631.5	12.8
HC9-22	132	8720	2.2	16.6867	3.3	0.8554	5.2	0.1035	4.1	0.78	635.0	24.6	627.6	24.4	600.9	70.5	635.0	24.6
HC9-16	186	35907	2.2	16.3562	3.8	0.8744	4.2	0.1037	1.9	0.45	636.2	11.5	638.0	20.0	644.1	80.9	636.2	11.5
HC9-88	63	20640	0.6	16.381	8.4	0.8736	9.5	0.1038	4.5	0.47	636.6	27.1	637.5	44.9	640.9	180.1	636.6	27.1
HC9-26	134	39908	0.7	16.2824	3.1	0.9002	3.4	0.1063	1.4	0.42	651.2	8.9	651.8	16.6	653.9	67.2	651.2	8.9
HC9-7	19	6284	2.4	19.6992	25.6	0.7555	26.0	0.1079	4.5	0.17	660.7	28.4	571.4	113.9	230.1	599.0	660.7	28.4
HC9-20	282	68857	1.5	16.0018	1.2	1.0059	4.6	0.1167	4.4	0.96	711.8	29.7	706.8	23.3	691.0	26.1	711.8	29.7
HC9-49	116	65146	1.5	14.5253	2.6	1.4551	2.8	0.1533	0.9	0.33	919.4	8.0	912.0	16.8	894.1	54.4	894.1	54.4
HC9-48	45	19109	1.4	14.3622	7.2	1.6155	7.5	0.1683	1.9	0.25	1002.6	17.7	976.3	47.0	917.4	149.1	917.4	149.1
HC9-10	99	57820	3.1	14.3225	1.9	1.5429	2.6	0.1603	1.7	0.67	958.3	15.6	947.7	16.1	923.1	39.7	923.1	39.7
HC9-31	342	328890	2.3	14.253	0.8	1.4883	1.4	0.1538	1.2	0.83	922.5	10.3	925.6	8.7	933.0	16.2	933.0	16.2
HC9-41	230	56406	2.2	14.207	1.6	1.5048	1.9	0.1551	0.9	0.48	929.2	7.8	932.4	11.5	939.7	33.8	939.7	33.8
HC9-63	239	53480	9.6	14.1989	1.1	1.5189	3.0	0.1564	2.8	0.93	936.8	24.2	938.0	18.2	940.9	21.9	940.9	21.9
HC9-86	162	77629	2.1	14.1676	1.7	1.5446	2.3	0.1587	1.7	0.70	949.6	14.6	948.3	14.5	945.4	34.1	945.4	34.1
HC9-92	140	105967	95.3	14.1526	1.6	1.6253	1.9	0.1668	1.1	0.55	994.6	9.8	980.0	12.2	947.5	33.0	947.5	33.0
HC9-97	45	20544	2.0	14.0957	5.7	1.7009	5.8	0.1739	1.2	0.20	1033.5	11.2	1008.9	37.2	955.8	116.4	955.8	116.4
HC9-9	51	14200	2.8	14.0341	4.7	1.5677	5.0	0.1596	1.9	0.37	954.3	16.6	957.5	31.3	964.8	95.7	964.8	95.7
HC9-100	125	37903	3.2	14.004	1.3	1.5755	1.9	0.16	1.3	0.71	956.9	11.7	960.6	11.5	969.1	26.7	969.1	26.7
HC9-90	68	22476	2.2	13.9949	4.9	1.6517	5.2	0.1676	1.8	0.33	999.1	16.2	990.2	33.2	970.5	101.0	970.5	101.0
HC9-87	59	58433	1.2	13.9466	5.0	1.5441	6.2	0.1562	3.6	0.59	935.5	31.6	948.1	38.3	977.5	102.6	977.5	102.6
HC9-13	202	66965	1.9	13.9314	1.3	1.6664	1.7	0.1684	1.2	0.68	1003.1	10.7	995.8	10.8	979.7	25.5	979.7	25.5
HC9-6	267	112340	2.6	13.8978	0.9	1.6886	1.6	0.1702	1.4	0.83	1013.2	12.8	1004.2	10.5	984.6	18.7	984.6	18.7
HC9-15	121	41460	1.5	13.8662	2.0	1.6811	2.2	0.1691	0.9	0.41	1006.9	8.4	1001.4	13.8	989.3	40.2	989.3	40.2
HC9-62	47	17414	2.4	13.8376	4.5	1.6566	4.9	0.1663	1.9	0.40	991.4	17.7	992.1	30.7	993.5	90.7	993.5	90.7
HC9-21	265	113605	1.9	13.8346	0.9	1.703	1.3	0.1709	1.0	0.72	1016.9	9.0	1009.6	8.5	993.9	18.6	993.9	18.6
HC9-28	160	63514	2.2	13.8131	1.0	1.6827	1.7	0.1686	1.4	0.80	1004.2	12.8	1002.0	11.0	997.0	20.9	997.0	20.9

HC9-35	210	84189	1.9	13.7744	1.2	1.69	3.3	0.1688	3.0	0.93	1005.7	28.3	1004.8	21.0	1002.7	25.3	1002.7	25.3
HC9-43	132	41499	2.2	13.7688	1.1	1.6542	1.3	0.1652	0.7	0.55	985.5	6.6	991.2	8.4	1003.6	22.5	1003.6	22.5
HC9-36	104	28247	3.0	13.7665	2.4	1.7288	2.8	0.1726	1.4	0.51	1026.5	13.4	1019.3	17.8	1003.9	48.1	1003.9	48.1
HC9-39	43	18832	1.6	13.7511	6.2	1.7034	6.5	0.1699	1.8	0.27	1011.5	16.6	1009.8	41.4	1006.2	126.4	1006.2	126.4
HC9-74	25	6948	1.0	15.2991	12.3	1.5242	12.5	0.1691	2.1	0.17	1007.3	20.0	940.2	76.5	786.0	258.4	1007.3	20.0
HC9-44	468	128013	1.9	13.7281	0.6	1.6625	2.0	0.1655	2.0	0.96	987.4	18.0	994.3	13.0	1009.6	11.5	1009.6	11.5
HC9-29	91	31082	2.6	13.7228	2.9	1.719	3.1	0.1711	1.1	0.36	1018.1	10.6	1015.6	19.9	1010.4	58.7	1010.4	58.7
HC9-8	158	69928	3.4	13.7178	1.0	1.7599	1.8	0.1751	1.5	0.83	1040.1	14.4	1030.8	11.8	1011.1	20.7	1011.1	20.7
HC9-11	76	26995	1.6	13.6991	4.3	1.6866	4.5	0.1676	1.3	0.30	998.7	12.4	1003.5	28.6	1013.9	86.7	1013.9	86.7
HC9-98	96	45941	2.9	13.6956	2.3	1.6987	3.0	0.1687	1.8	0.61	1005.1	16.6	1008.0	18.9	1014.4	47.6	1014.4	47.6
HC9-94	169	52060	3.6	13.6954	0.9	1.7702	1.9	0.1758	1.7	0.89	1044.1	15.9	1034.6	12.1	1014.4	17.4	1014.4	17.4
HC9-96	91	35041	2.3	13.6871	2.0	1.7078	2.6	0.1695	1.6	0.63	1009.5	15.1	1011.5	16.4	1015.6	40.2	1015.6	40.2
HC9-40	122	49022	2.1	13.6718	1.9	1.7835	2.5	0.1768	1.7	0.67	1049.7	16.2	1039.4	16.3	1017.9	37.5	1017.9	37.5
HC9-80	110	52619	3.5	13.651	2.1	1.744	2.7	0.1727	1.8	0.65	1026.8	16.8	1024.9	17.7	1021.0	42.3	1021.0	42.3
HC9-95	150	49788	3.5	13.5836	1.4	1.7352	1.7	0.1709	0.9	0.55	1017.3	8.5	1021.7	10.7	1031.0	28.1	1031.0	28.1
HC9-60	46	19656	2.2	13.5825	5.6	1.812	7.0	0.1785	4.2	0.60	1058.8	40.6	1049.8	45.5	1031.2	112.7	1031.2	112.7
HC9-76	174	89255	2.4	13.5819	0.6	1.7446	1.6	0.1719	1.5	0.93	1022.3	13.9	1025.2	10.2	1031.3	12.0	1031.3	12.0
HC9-72	92	59945	3.4	13.4246	3.7	1.8451	4.4	0.1796	2.5	0.56	1065.0	24.1	1061.7	29.1	1054.8	73.9	1054.8	73.9
HC9-57	74	32821	1.4	13.2739	3.2	1.7138	4.3	0.165	2.9	0.68	984.5	26.9	1013.7	27.7	1077.5	63.6	1077.5	63.6
HC9-4	36	13685	2.1	13.0791	5.2	1.9008	7.2	0.1803	5.0	0.69	1068.6	48.9	1081.4	47.6	1107.1	103.1	1107.1	103.1
HC9-37	79	18208	3.5	12.9992	2.6	1.8916	5.1	0.1783	4.3	0.85	1057.9	42.1	1078.1	33.6	1119.3	52.6	1119.3	52.6
HC9-5	573	371102	3.6	12.8744	0.3	2.1036	1.4	0.1964	1.4	0.97	1156.1	14.7	1150.0	9.8	1138.5	7.0	1138.5	7.0
HC9-1	338	91962	2.6	12.7703	0.6	2.0499	1.8	0.1899	1.7	0.94	1120.6	17.3	1132.3	12.2	1154.7	12.5	1154.7	12.5
HC9-42	141	73424	2.1	12.7249	1.5	2.1799	1.8	0.2012	1.0	0.55	1181.7	11.0	1174.6	12.8	1161.7	30.3	1161.7	30.3
HC9-51	98	65623	3.1	12.4754	1.2	2.2608	1.8	0.2046	1.3	0.73	1199.8	14.4	1200.2	12.6	1200.9	24.0	1200.9	24.0
HC9-84	325	155765	3.2	12.246	0.5	2.4092	1.9	0.214	1.9	0.97	1250.0	21.3	1245.3	13.9	1237.4	9.8	1237.4	9.8
HC9-3	25	23142	2.4	12.109	10.7	2.3773	10.8	0.2088	1.8	0.17	1222.3	20.2	1235.8	77.5	1259.4	209.0	1259.4	209.0
HC9-68	190	11553	1.8	11.8875	5.3	2.0549	5.7	0.1772	2.3	0.39	1051.5	21.9	1133.9	39.2	1295.4	102.6	1295.4	102.6
HC9-30	51	23987	3.2	11.8762	2.1	2.5415	2.8	0.2189	1.9	0.66	1276.1	21.5	1284.0	20.6	1297.2	41.6	1297.2	41.6
HC9-27	34	27077	2.4	11.7882	2.8	2.4487	3.2	0.2093	1.5	0.48	1225.4	16.9	1257.0	22.9	1311.7	54.2	1311.7	54.2
HC9-12	911	82291	1.9	11.7788	0.3	2.4899	2.5	0.2127	2.5	0.99	1243.2	27.7	1269.1	17.9	1313.2	6.0	1313.2	6.0
HC9-45	324	274822	2.2	11.7233	0.6	2.6294	1.0	0.2236	0.8	0.80	1300.7	9.1	1308.9	7.1	1322.4	11.2	1322.4	11.2
HC9-91	83	66802	2.3	11.7	1.5	2.6757	2.4	0.2271	1.8	0.77	1319.0	21.9	1321.8	17.7	1326.2	29.7	1326.2	29.7
HC9-81	246	56858	1.9	11.6704	0.9	2.7075	1.5	0.2292	1.2	0.79	1330.1	14.5	1330.5	11.3	1331.1	17.8	1331.1	17.8
HC9-71	330	85780	1.6	11.636	0.9	2.7261	2.4	0.2301	2.2	0.93	1334.8	26.6	1335.6	17.7	1336.8	17.5	1336.8	17.5
HC9-18	78	61825	3.1	11.6014	2.1	2.7146	2.3	0.2284	0.8	0.36	1326.2	10.0	1332.5	17.1	1342.6	41.4	1342.6	41.4
HC9-53	39	24169	1.4	11.6013	4.5	2.7466	5.0	0.2311	2.2	0.44	1340.2	26.9	1341.2	37.3	1342.6	86.8	1342.6	86.8
HC9-78	191	74501	3.4	11.5484	0.6	2.7758	1.8	0.2325	1.7	0.93	1347.5	20.2	1349.1	13.3	1351.4	12.5	1351.4	12.5
HC9-78	72	84830	1.4	11.4689	1.7	2.8051	2.1	0.2333	1.2	0.58	1351.9	14.9	1356.9	15.8	1364.7	33.0	1364.7	33.0

HC9-19	246	87770	1.9	10.7185	1.0	3.2808	1.9	0.255	1.6	0.85	1464.4	21.2	1476.5	14.8	1493.9	18.8	1493.9	18.8
HC9-50	160	77240	1.9	10.6382	0.9	3.3539	1.4	0.2588	1.1	0.78	1483.5	14.4	1493.7	10.9	1508.1	16.6	1508.1	16.6
HC9-61	117	52159	1.3	10.6244	1.2	3.4426	1.8	0.2653	1.3	0.74	1516.7	18.1	1514.2	14.2	1510.6	22.8	1510.6	22.8
HC9-56	84	35264	1.9	10.5263	0.9	3.5778	1.5	0.2731	1.1	0.77	1556.7	15.6	1544.6	11.6	1528.1	17.7	1528.1	17.7
HC9-70	176	288085	1.0	10.4233	0.7	3.5643	2.4	0.2695	2.3	0.95	1538.0	31.6	1541.6	19.2	1546.6	13.6	1546.6	13.6
HC9-23	49	24079	2.3	10.2865	2.7	3.6485	3.4	0.2722	1.9	0.57	1551.9	26.4	1560.2	26.7	1571.3	51.5	1571.3	51.5
HC9-77	535	12590	1.1	9.9288	0.2	3.4993	1.6	0.252	1.6	0.99	1448.7	20.5	1527.1	12.6	1637.3	4.6	1637.3	4.6
HC9-52	151	92130	1.1	9.3513	0.6	4.6391	2.0	0.3146	1.9	0.95	1763.5	29.1	1756.3	16.6	1747.8	11.7	1747.8	11.7
HC9-64	414	176943	2.2	8.844	1.0	4.0903	2.6	0.2624	2.4	0.93	1501.9	32.8	1652.4	21.6	1849.3	18.0	1849.3	18.0
HC9-14	142	93565	1.4	8.6344	0.8	5.4649	2.2	0.3422	2.0	0.93	1897.4	33.5	1895.1	18.8	1892.6	14.2	1892.6	14.2

				Isotope Ratios									Apparent Ages					
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
AMA7-62	47	22256	2.3	14.2801	6.4	1.5257	6.9	0.158	2.8	0.40	945.7	24.4	940.8	42.5	929.2	130.6	929.2	130.6
AMA7-53	84	29410	5.1	14.0987	1.6	1.5633	4.1	0.1599	3.8	0.92	956.0	33.4	955.8	25.3	955.3	32.9	955.3	32.9
AMA7-21	41	17505	3.3	14.0911	8.2	1.64	8.3	0.1676	1.2	0.14	998.9	10.8	985.7	52.3	956.4	168.0	956.4	168.0
AMA7-7	176	35959	3.0	14.0205	1.4	1.4455	1.8	0.147	1.1	0.60	884.0	9.0	908.0	10.9	966.7	29.4	966.7	29.4
AMA7-68	1108	68029	6.5	14.0044	0.3	1.4193	0.9	0.1442	0.9	0.95	868.1	7.2	897.1	5.6	969.1	6.2	969.1	6.2
AMA7-49	82	20341	1.4	14.0012	3.1	1.6142	3.4	0.1639	1.4	0.43	978.5	13.2	975.8	21.4	969.5	62.9	969.5	62.9
AMA7-41	78	29611	2.2	13.9857	3.1	1.6625	3.2	0.1686	1.0	0.30	1004.6	9.0	994.3	20.5	971.8	62.9	971.8	62.9
AMA7-12	53	19869	2.2	13.9852	4.6	1.6602	5.2	0.1684	2.4	0.46	1003.3	22.0	993.5	32.9	971.8	94.1	971.8	94.1
AMA7-67	137	40335	3.8	13.9539	2.1	1.5102	2.4	0.1528	1.1	0.49	916.9	9.8	934.5	14.4	976.4	41.9	976.4	41.9
AMA7-37	76	34744	2.3	13.9413	3.2	1.6799	3.6	0.1699	1.7	0.45	1011.3	15.5	1000.9	23.2	978.2	66.2	978.2	66.2
AMA7-35	187	152186	3.3	13.9384	1.1	1.6522	1.3	0.167	0.6	0.50	995.7	5.9	990.4	8.1	978.7	22.6	978.7	22.6
AMA7-4	42	8670	1.8	13.9298	8.6	1.6616	8.9	0.1679	2.3	0.26	1000.4	21.6	994.0	56.3	979.9	174.8	979.9	174.8
AMA7-59	82	29881	2.3	13.9209	2.7	1.628	3.1	0.1644	1.6	0.50	981.0	14.1	981.1	19.4	981.3	54.2	981.3	54.2
AMA7-83	100	27866	1.4	13.9199	3.6	1.66	3.7	0.1676	0.8	0.23	998.8	7.9	993.4	23.6	981.4	73.7	981.4	73.7
AMA7-28	55	30362	1.8	13.9079	4.8	1.7242	5.1	0.1739	1.8	0.34	1033.7	16.8	1017.6	32.8	983.2	97.7	983.2	97.7
AMA7-55	140	96138	2.3	13.9064	1.1	1.6363	1.9	0.165	1.5	0.81	984.7	13.9	984.3	11.9	983.4	22.6	983.4	22.6
AMA7-60	64	37816	2.6	13.9058	3.3	1.6742	3.5	0.1688	1.2	0.33	1005.8	10.8	998.8	22.2	983.5	67.0	983.5	67.0
AMA7-64	103	40494	9.6	13.8793	1.8	1.5985	2.1	0.1609	1.0	0.47	961.8	8.8	969.6	13.1	987.4	37.6	987.4	37.6
AMA7-58	28	8375	2.2	13.8784	4.3	1.7204	5.5	0.1732	3.5	0.64	1029.5	33.5	1016.2	35.6	987.5	87.1	987.5	87.1
AMA7-44	162	67885	2.2	13.87	1.9	1.6081	2.2	0.1618	1.1	0.50	966.6	10.0	973.4	13.9	988.7	39.0	988.7	39.0
AMA7-75	877	70732	21.0	13.8602	0.4	1.4895	2.5	0.1497	2.5	0.99	899.5	20.6	926.1	15.1	990.2	7.5	990.2	7.5
AMA7-73	238	146500	1.4	13.8549	0.8	1.6278	1.3	0.1636	1.0	0.79	976.6	9.5	981.0	8.4	990.9	16.6	990.9	16.6
AMA7-82	253	213709	1.7	13.8357	0.8	1.6199	1.1	0.1626	0.7	0.67	970.9	6.7	978.0	7.0	993.7	16.8	993.7	16.8
AMA7-5	199	75481	2.7	13.8276	1.3	1.6011	1.6	0.1606	1.0	0.62	960.0	9.1	970.7	10.2	994.9	26.0	994.9	26.0

AMA7-17	230	62723	3.5	13.8229	0.7	1.6548	1.6	0.1659	1.5	0.89	989.5	13.3	991.4	10.3	995.6	14.8	995.6	14.8
AMA7-31	207	87987	1.6	13.8133	1.0	1.6675	1.3	0.1671	0.9	0.66	995.9	8.1	996.2	8.4	997.0	20.2	997.0	20.2
AMA7-11	115	50815	2.2	13.7897	2.0	1.6648	2.6	0.1665	1.6	0.63	992.8	14.9	995.2	16.5	1000.5	41.1	1000.5	41.1
AMA7-63	62	28446	3.5	13.7839	3.3	1.6143	7.1	0.1614	6.3	0.89	964.4	56.3	975.8	44.5	1001.3	66.7	1001.3	66.7
AMA7-56	186	117323	3.0	13.7804	1.8	1.6684	2.1	0.1667	1.1	0.54	994.2	10.4	996.6	13.3	1001.9	35.9	1001.9	35.9
AMA7-50	86	34407	3.1	13.7651	3.3	1.7033	3.7	0.17	1.5	0.42	1012.4	14.5	1009.8	23.6	1004.1	67.9	1004.1	67.9
AMA7-71	334	118740	25.6	13.7595	0.8	1.6775	1.4	0.1674	1.1	0.81	997.8	10.6	1000.1	9.0	1004.9	16.6	1004.9	16.6
AMA7-30	546	229200	4.7	13.7515	0.5	1.6843	0.8	0.168	0.6	0.76	1001.0	5.4	1002.6	4.9	1006.1	10.0	1006.1	10.0
AMA7-25	91	47330	2.2	13.737	3.1	1.6091	3.7	0.1603	2.0	0.54	958.5	18.0	973.8	23.4	1008.3	63.8	1008.3	63.8
AMA7-54	126	87983	3.9	13.7207	2.8	1.704	2.9	0.1696	0.8	0.29	1009.7	7.9	1010.0	18.6	1010.7	56.4	1010.7	56.4
AMA7-51	54	18681	3.1	13.6912	5.3	1.7721	5.7	0.176	2.1	0.36	1044.9	20.1	1035.3	37.2	1015.0	108.2	1015.0	108.2
AMA7-61	147	111013	1.8	13.6859	1.5	1.6594	1.7	0.1647	0.8	0.46	982.9	6.9	993.2	10.5	1015.8	29.9	1015.8	29.9
AMA7-46	157	51496	2.0	13.6762	1.3	1.6899	1.6	0.1676	0.9	0.59	999.0	8.6	1004.7	10.2	1017.3	26.1	1017.3	26.1
AMA7-45	110	31144	2.1	13.6729	1.9	1.7148	2.0	0.1701	0.5	0.27	1012.4	5.0	1014.1	12.6	1017.7	38.3	1017.7	38.3
AMA7-8	178	66717	2.7	13.6677	0.7	1.7238	1.0	0.1709	0.8	0.76	1016.9	7.3	1017.4	6.5	1018.5	13.3	1018.5	13.3
AMA7-26	72	34975	2.9	13.6654	4.0	1.7009	4.3	0.1686	1.5	0.34	1004.3	13.6	1008.9	27.3	1018.9	81.2	1018.9	81.2
AMA7-32	496	142938	4.0	13.6556	0.6	1.7494	1.5	0.1733	1.4	0.93	1030.0	13.6	1026.9	10.0	1020.3	11.9	1020.3	11.9
AMA7-84	162	77752	2.7	13.6266	1.7	1.6629	1.9	0.1643	0.8	0.44	980.9	7.7	994.5	12.1	1024.6	34.7	1024.6	34.7
AMA7-76	117	63700	1.5	13.626	2.2	1.6393	2.6	0.162	1.4	0.55	967.9	13.0	985.4	16.7	1024.7	44.8	1024.7	44.8
AMA7-6	231	103986	8.6	13.6202	1.4	1.704	4.0	0.1683	3.7	0.94	1002.9	34.6	1010.0	25.4	1025.6	27.6	1025.6	27.6
AMA7-72	132	49027	2.6	13.6082	2.3	1.7303	2.6	0.1708	1.2	0.46	1016.4	11.2	1019.9	16.5	1027.3	45.8	1027.3	45.8
AMA7-36	89	25606	3.3	13.6062	2.7	1.7899	3.0	0.1766	1.3	0.44	1048.6	12.9	1041.8	19.7	1027.6	55.1	1027.6	55.1
AMA7-15	109	26772	3.8	13.6029	2.7	1.648	2.8	0.1626	0.9	0.30	971.1	7.7	988.8	17.9	1028.1	54.6	1028.1	54.6
AMA7-23	192	81016	3.3	13.6008	1.1	1.6727	1.3	0.165	0.8	0.58	984.5	6.9	998.2	8.2	1028.4	21.3	1028.4	21.3
AMA7-39	56	14489	2.6	13.5926	4.2	1.686	4.4	0.1662	1.2	0.28	991.2	11.1	1003.3	28.0	1029.7	85.3	1029.7	85.3
AMA7-66	149	89520	4.5	13.5808	1.7	1.6618	2.6	0.1637	2.1	0.78	977.2	18.6	994.1	16.8	1031.4	33.7	1031.4	33.7
AMA7-16	750	310595	9.2	13.5653	0.3	1.7236	1.0	0.1696	1.0	0.95	1009.8	9.1	1017.4	6.6	1033.7	6.8	1033.7	6.8
AMA7-14	284	92098	14.2	13.5624	0.7	1.7155	0.9	0.1687	0.6	0.68	1005.2	5.7	1014.4	5.8	1034.2	13.3	1034.2	13.3
AMA7-27	235	101514	3.7	13.5587	1.2	1.7664	1.5	0.1737	0.9	0.62	1032.5	8.9	1033.2	9.7	1034.7	23.7	1034.7	23.7
AMA7-43	83	53127	3.5	13.5312	2.7	1.7049	3.0	0.1673	1.5	0.48	997.3	13.5	1010.4	19.5	1038.8	54.1	1038.8	54.1
AMA7-70	288	136987	4.0	13.4748	0.9	1.7254	1.1	0.1686	0.7	0.61	1004.5	6.2	1018.0	7.0	1047.3	17.5	1047.3	17.5
AMA7-42	60	22030	1.7	13.4392	4.4	1.6985	4.6	0.1656	1.3	0.28	987.5	11.6	1008.0	29.2	1052.6	88.6	1052.6	88.6
AMA7-18	81	44098	2.9	13.411	1.3	1.7474	2.0	0.17	1.6	0.79	1011.9	15.2	1026.2	13.2	1056.8	25.2	1056.8	25.2
AMA7-3	278	121547	2.4	13.4015	0.5	1.816	1.2	0.1765	1.0	0.90	1047.9	10.1	1051.2	7.6	1058.3	10.0	1058.3	10.0
AMA7-85	64	22403	1.8	13.3862	4.0	1.7197	4.5	0.167	2.2	0.48	995.3	19.9	1015.9	29.1	1060.6	80.1	1060.6	80.1
AMA7-33	168	166222	4.1	13.3753	1.4	1.7351	3.4	0.1683	3.1	0.91	1002.9	28.5	1021.7	21.8	1062.2	28.7	1062.2	28.7
AMA7-34	45	22879	1.6	13.3721	5.9	1.7191	6.3	0.1667	2.0	0.32	994.0	18.8	1015.7	40.3	1062.7	119.6	1062.7	119.6
AMA7-52	44	17174	2.8	13.3685	6.3	1.7438	6.5	0.1691	1.4	0.22	1007.0	13.5	1024.9	41.7	1063.2	126.7	1063.2	126.7
AMA7-48	186	30114	2.0	13.2607	4.2	1.8368	5.8	0.1767	4.0	0.69	1048.7	38.8	1058.7	38.1	1079.5	83.8	1079.5	83.8

AMA7-65	53	20483	2.5	13.1946	3.7	1.748	3.9	0.1673	1.5	0.37	997.1	13.5	1026.4	25.5	1089.5	73.5	1089.5	73.5
AMA7-69	1407	188603	####	13.0896	0.3	1.6937	2.8	0.1608	2.8	1.00	961.2	24.9	1006.2	17.9	1105.5	5.4	1105.5	5.4
AMA7-22	869	380859	7.1	13.0556	0.8	1.9661	1.0	0.1862	0.6	0.61	1100.6	6.1	1104.0	6.7	1110.7	15.7	1110.7	15.7
AMA7-80	96	46854	2.1	12.9968	2.2	1.9532	2.8	0.1841	1.6	0.59	1089.4	16.3	1099.5	18.6	1119.7	44.5	1119.7	44.5
AMA7-79	60	28683	1.1	12.9586	2.9	2.0369	3.5	0.1914	1.9	0.56	1129.1	20.0	1127.9	23.7	1125.5	57.7	1125.5	57.7
AMA7-20	215	72566	4.5	12.9087	1.3	2.0236	2.0	0.1895	1.5	0.76	1118.4	15.6	1123.5	13.5	1133.2	25.5	1133.2	25.5
AMA7-24	103	51127	2.0	12.698	1.6	1.9903	1.9	0.1833	0.9	0.48	1084.9	9.0	1112.2	12.6	1165.9	32.4	1165.9	32.4
AMA7-78	686	232906	3.7	12.6421	0.4	2.0885	0.8	0.1915	0.7	0.90	1129.5	7.7	1145.0	5.7	1174.7	7.3	1174.7	7.3
AMA7-29	637	319644	61.2	12.5905	0.9	2.1801	2.9	0.1991	2.8	0.96	1170.4	30.0	1174.7	20.4	1182.8	17.1	1182.8	17.1
AMA7-38	280	149744	3.6	12.5737	0.7	1.9073	1.4	0.1739	1.2	0.85	1033.7	11.5	1083.6	9.4	1185.4	14.4	1185.4	14.4
AMA7-1	160	76893	2.7	12.553	0.9	2.1969	1.8	0.2	1.6	0.87	1175.4	17.0	1180.1	12.7	1188.7	17.7	1188.7	17.7
AMA7-81	822	242846	11.0	12.5323	0.6	2.2129	1.4	0.2011	1.3	0.91	1181.4	13.7	1185.1	9.8	1191.9	11.3	1191.9	11.3
AMA7-77	100	82548	2.6	12.5116	1.5	2.1745	1.6	0.1973	0.7	0.40	1160.9	7.0	1172.9	11.4	1195.1	29.6	1195.1	29.6
AMA7-40	197	68002	2.4	12.4347	0.8	2.2294	2.7	0.2011	2.6	0.96	1181.0	27.7	1190.3	18.8	1207.3	15.2	1207.3	15.2
AMA7-2	95	17571	2.2	12.4326	2.9	2.0269	3.7	0.1828	2.3	0.62	1082.0	22.7	1124.6	25.1	1207.7	57.1	1207.7	57.1
AMA7-10	359	140654	2.5	12.1656	0.5	2.3594	1.2	0.2082	1.0	0.89	1219.1	11.5	1230.4	8.4	1250.3	10.7	1250.3	10.7
AMA7-47	265	203494	3.2	11.8081	0.9	2.601	1.3	0.2227	0.9	0.73	1296.4	11.1	1300.9	9.6	1308.4	17.5	1308.4	17.5
AMA7-19	195	54133	3.3	11.6779	0.7	2.6753	1.2	0.2266	1.0	0.81	1316.6	11.5	1321.7	8.8	1329.9	13.5	1329.9	13.5

				Isotope Ratios								Apparent Ages						
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
PAA42-64	62	686	13.5	17.9085	12.3	0.4236	13.0	0.055	4.4	0.34	345.3	14.8	358.6	39.4	446.0	273.7	345.3	14.8
PAA42-44	29	289	14.6	19.82	17.6	0.4542	18.1	0.0653	4.3	0.24	407.7	17.1	380.2	57.4	216.0	409.3	407.7	17.1
PAA42-27	44	845	12.4	20.1324	21.7	0.4582	22.0	0.0669	4.0	0.18	417.5	16.0	383.0	70.3	179.6	509.9	417.5	16.0
PAA42-102	30	257	14.9	19.2852	13.8	0.4829	15.2	0.0675	6.4	0.42	421.3	26.0	400.0	50.3	279.0	317.2	421.3	26.0
PAA42-23	36	557	19.8	19.7529	13.8	0.4754	14.4	0.0681	4.1	0.28	424.7	16.8	394.9	47.1	223.8	320.2	424.7	16.8
PAA42-52	57	627	6.1	16.7443	7.9	0.561	8.7	0.0681	3.5	0.40	424.9	14.3	452.2	31.7	593.5	172.5	424.9	14.3
PAA42-73	36	878	8.2	15.9199	12.5	0.6085	13.2	0.0703	4.5	0.34	437.7	19.0	482.6	50.9	702.0	266.3	437.7	19.0
PAA42-15	28	399	10.9	16.5107	16.1	0.592	17.0	0.0709	5.3	0.31	441.5	22.6	472.1	64.2	623.9	349.9	441.5	22.6
PAA42-78	15	244	12.6	14.2652	19.8	0.7549	21.0	0.0781	7.0	0.33	484.8	32.7	571.1	91.8	931.3	409.3	484.8	32.7
PAA42-101	182	58838	8.5	14.091	3.4	0.9211	3.7	0.0941	1.5	0.40	580.0	8.4	663.0	18.2	956.4	70.1	580.0	8.4
PAA42-31	252	176675	4.1	12.6006	1.5	1.5339	3.2	0.1402	2.8	0.88	845.7	22.4	944.1	19.8	1181.2	30.5	1181.2	30.5
PAA42-88	229	138247	2.7	12.0851	1.0	2.0221	2.4	0.1772	2.1	0.90	1051.8	20.8	1123.0	16.2	1263.2	20.4	1263.2	20.4
PAA42-41	340	179628	1.8	12.0445	1.9	2.6703	9.5	0.2333	9.3	0.98	1351.6	113.7	1320.3	70.3	1269.8	36.1	1269.8	36.1
PAA42-71	82	31045	2.1	11.988	1.2	2.2476	2.6	0.1954	2.3	0.89	1150.7	24.5	1196.0	18.4	1279.0	23.5	1279.0	23.5
PAA42-48	60	41890	2.3	11.9132	3.9	2.3054	4.4	0.1992	2.0	0.44	1171.0	20.9	1214.0	31.2	1291.2	76.7	1291.2	76.7
PAA42-36	165	153153	2.6	11.8477	1.1	2.5385	1.5	0.2181	1.0	0.68	1271.9	11.5	1283.1	10.6	1301.9	20.6	1301.9	20.6

PAA42-84	205	64114	2.2	11.8423	0.9	2.5668	2.2	0.2205	2.0	0.91	1284.3	22.8	1291.2	15.7	1302.8	17.4	1302.8	17.4
PAA42-43	146	120126	2.0	11.8416	0.7	2.6396	1.7	0.2267	1.6	0.91	1317.2	18.6	1311.7	12.6	1302.9	13.9	1302.9	13.9
PAA42-87	133	71269	2.0	11.8369	1.4	2.3222	2.2	0.1994	1.8	0.80	1171.9	19.2	1219.1	15.9	1303.6	26.2	1303.6	26.2
PAA42-97	77	36061	2.3	11.8032	1.8	2.6033	2.7	0.2229	2.0	0.74	1296.9	23.7	1301.6	20.0	1309.2	35.7	1309.2	35.7
PAA42-8	190	104119	2.2	11.7857	1.0	2.4773	2.8	0.2118	2.6	0.93	1238.2	29.3	1265.4	20.2	1312.1	19.5	1312.1	19.5
PAA42-30	155	81077	1.9	11.7682	1.1	2.5698	1.7	0.2193	1.3	0.78	1278.4	15.2	1292.1	12.4	1314.9	20.7	1314.9	20.7
PAA42-100	439	363889	2.4	11.7634	0.4	2.5441	0.7	0.2171	0.6	0.84	1266.3	6.7	1284.8	5.0	1315.7	7.3	1315.7	7.3
PAA42-65	329	63356	1.6	11.7626	0.6	2.4763	1.1	0.2113	0.9	0.82	1235.5	10.3	1265.1	8.0	1315.9	12.3	1315.9	12.3
PAA42-75	90	32882	1.5	11.7514	2.0	2.6705	2.9	0.2276	2.1	0.73	1321.9	25.6	1320.3	21.8	1317.7	39.2	1317.7	39.2
PAA42-47	138	131194	1.9	11.7363	1.1	2.6671	1.7	0.227	1.3	0.76	1318.9	15.4	1319.4	12.5	1320.2	21.1	1320.2	21.1
PAA42-99	169	95568	1.9	11.7337	1.1	2.625	1.6	0.2234	1.1	0.69	1299.7	12.8	1307.7	11.6	1320.6	22.3	1320.6	22.3
PAA42-69	36	14936	1.7	11.7279	3.2	2.4196	4.8	0.2058	3.7	0.76	1206.4	40.3	1248.4	34.7	1321.6	61.2	1321.6	61.2
PAA42-63	287	191771	1.4	11.7256	0.8	2.6632	0.9	0.2265	0.5	0.56	1316.1	6.2	1318.3	6.9	1322.0	15.0	1322.0	15.0
PAA42-7	157	68472	2.2	11.7248	1.0	2.5451	1.5	0.2164	1.2	0.76	1263.0	13.4	1285.0	11.2	1322.1	19.3	1322.1	19.3
PAA42-18	180	151226	1.7	11.7205	0.7	2.6375	1.3	0.2242	1.1	0.84	1304.0	13.2	1311.1	9.8	1322.8	14.0	1322.8	14.0
PAA42-81	96	57438	1.7	11.7167	1.6	2.6868	1.9	0.2283	1.1	0.54	1325.7	12.6	1324.8	14.3	1323.5	31.5	1323.5	31.5
PAA42-76	389	188541	2.0	11.7061	0.5	2.6809	1.2	0.2276	1.0	0.90	1322.0	12.5	1323.2	8.6	1325.2	9.7	1325.2	9.7
PAA42-12	161	89078	1.2	11.7048	0.6	2.6719	1.4	0.2268	1.3	0.90	1317.8	15.3	1320.7	10.6	1325.4	12.3	1325.4	12.3
PAA42-28	257	108144	1.5	11.6999	0.7	2.5495	1.2	0.2163	1.0	0.83	1262.5	11.4	1286.3	8.8	1326.2	13.1	1326.2	13.1
PAA42-29	237	223615	2.1	11.6928	0.7	2.6585	1.7	0.2255	1.5	0.90	1310.6	18.1	1317.0	12.5	1327.4	14.1	1327.4	14.1
PAA42-6	127	101056	1.7	11.6918	1.4	2.6407	1.6	0.2239	0.7	0.43	1302.6	8.1	1312.1	11.7	1327.6	27.7	1327.6	27.7
PAA42-46	290	191204	1.7	11.6834	0.7	2.6099	2.3	0.2212	2.2	0.96	1288.0	26.0	1303.4	17.0	1329.0	12.7	1329.0	12.7
PAA42-9	90	51504	1.7	11.6798	1.3	2.6266	1.8	0.2225	1.2	0.65	1295.0	13.5	1308.1	12.9	1329.6	25.7	1329.6	25.7
PAA42-11	145	63423	1.8	11.6302	1.5	2.6152	2.2	0.2206	1.6	0.71	1285.0	18.3	1304.9	16.2	1337.8	29.7	1337.8	29.7
PAA42-66	117	67111	1.5	11.6141	1.3	2.6599	2.1	0.2241	1.6	0.78	1303.2	19.2	1317.4	15.5	1340.5	25.5	1340.5	25.5
PAA42-14	148	71145	1.1	11.5289	0.8	2.7	1.6	0.2258	1.4	0.87	1312.3	16.6	1328.5	11.9	1354.7	15.1	1354.7	15.1
PAA42-72	46	38564	2.1	11.501	4.4	2.6671	4.5	0.2225	0.8	0.19	1294.9	9.8	1319.4	33.3	1359.3	85.4	1359.3	85.4
PAA42-50	271	173930	3.0	11.2763	1.0	2.2091	5.6	0.1807	5.5	0.98	1070.6	54.6	1183.9	39.4	1397.3	19.5	1397.3	19.5
PAA42-89	535	169774	1.5	10.996	0.2	3.0154	1.8	0.2405	1.8	0.99	1389.2	21.9	1411.5	13.5	1445.4	3.9	1445.4	3.9
PAA42-53	308	174624	0.9	10.9819	0.7	2.9807	2.2	0.2374	2.1	0.94	1373.2	25.8	1402.7	16.8	1447.8	13.8	1447.8	13.8
PAA42-26	236	154858	2.2	10.9645	0.6	3.1585	2.2	0.2512	2.1	0.96	1444.5	27.5	1447.1	17.1	1450.8	11.9	1450.8	11.9
PAA42-34	175	61219	1.5	10.9559	1.0	2.8877	2.5	0.2295	2.3	0.92	1331.6	27.6	1378.7	18.8	1452.3	18.4	1452.3	18.4
PAA42-3	65	28708	0.9	10.9379	1.9	3.2795	2.6	0.2602	1.8	0.69	1490.6	24.4	1476.2	20.6	1455.5	36.3	1455.5	36.3
PAA42-19	105	60808	1.3	10.9082	1.9	3.2288	2.3	0.2554	1.3	0.56	1466.5	17.1	1464.1	18.1	1460.6	36.8	1460.6	36.8
PAA42-80	55	32665	0.8	10.8971	1.8	3.2299	2.7	0.2553	2.1	0.76	1465.6	27.5	1464.4	21.3	1462.6	33.6	1462.6	33.6
PAA42-67	230	303005	1.7	10.8227	0.8	3.2079	1.9	0.2518	1.8	0.92	1447.7	23.1	1459.1	15.1	1475.6	14.9	1475.6	14.9
PAA42-42	104	59713	1.6	10.7462	1.0	3.0165	2.4	0.2351	2.2	0.91	1361.2	27.0	1411.8	18.5	1489.0	19.4	1489.0	19.4
PAA42-10	131	106592	2.6	10.7057	1.0	3.1339	1.4	0.2433	1.0	0.72	1404.0	12.5	1441.1	10.6	1496.2	18.0	1496.2	18.0
PAA42-17	264	217489	2.2	10.6395	0.5	3.1686	1.1	0.2445	1.0	0.89	1410.1	12.0	1449.5	8.2	1507.9	9.0	1507.9	9.0

PAA42-91	52	61877	1.2	10.5716	2.5	3.4783	2.7	0.2667	1.0	0.35	1524.0	13.0	1522.3	21.4	1520.0	47.8	1520.0	47.8
PAA42-37	217	107122	2.5	10.5407	0.6	3.6019	4.7	0.2754	4.7	0.99	1567.9	65.6	1550.0	37.7	1525.5	10.6	1525.5	10.6
PAA42-49	233	239671	2.0	10.5196	0.7	3.2495	2.3	0.2479	2.2	0.95	1427.7	27.6	1469.1	17.6	1529.3	12.9	1529.3	12.9
PAA42-13	474	838582	3.6	10.5175	0.1	3.314	1.9	0.2528	1.9	1.00	1452.9	24.3	1484.4	14.6	1529.6	2.6	1529.6	2.6
PAA42-22	129	105368	1.4	10.5158	0.8	3.3597	1.1	0.2562	0.8	0.70	1470.6	10.3	1495.1	8.8	1529.9	15.1	1529.9	15.1
PAA42-1	187	346051	1.8	10.4845	0.7	3.5093	1.4	0.2668	1.2	0.86	1524.8	16.3	1529.3	11.0	1535.6	13.3	1535.6	13.3
PAA42-21	899	512031	1.8	10.4815	0.2	3.4339	0.9	0.261	0.9	0.98	1495.2	11.9	1512.2	7.2	1536.1	3.1	1536.1	3.1
PAA42-56	313	168058	1.8	10.4804	0.6	3.557	1.4	0.2704	1.3	0.89	1542.7	17.3	1540.0	11.2	1536.3	12.0	1536.3	12.0
PAA42-40	90	39864	1.3	10.4717	1.4	3.3754	1.9	0.2564	1.2	0.66	1471.2	16.2	1498.7	14.6	1537.9	26.4	1537.9	26.4
PAA42-82	279	184192	2.0	10.4707	0.5	3.4795	1.1	0.2642	1.0	0.90	1511.5	12.9	1522.6	8.4	1538.0	8.6	1538.0	8.6
PAA42-16	178	177866	2.1	10.446	0.8	3.4854	1.9	0.2641	1.7	0.91	1510.6	23.5	1523.9	15.1	1542.5	14.5	1542.5	14.5
PAA42-79	185	109302	2.2	10.4355	0.5	3.4823	0.8	0.2636	0.6	0.76	1508.0	7.8	1523.2	6.0	1544.4	9.3	1544.4	9.3
PAA42-24	172	114211	1.8	10.4334	0.8	3.4962	1.1	0.2646	0.7	0.68	1513.1	10.0	1526.4	8.7	1544.7	15.2	1544.7	15.2
PAA42-94	84	44244	1.0	10.4166	1.2	3.5689	2.7	0.2696	2.4	0.89	1538.9	33.1	1542.6	21.4	1547.8	22.8	1547.8	22.8
PAA42-93	714	441765	1.0	10.4046	0.2	3.5515	1.6	0.268	1.6	0.99	1530.7	22.2	1538.8	13.0	1549.9	3.5	1549.9	3.5
PAA42-4	288	178137	3.1	10.3762	0.5	3.6007	3.7	0.271	3.7	0.99	1545.7	50.3	1549.7	29.3	1555.1	9.0	1555.1	9.0
PAA42-38	534	538207	2.4	10.3725	1.7	2.7028	4.2	0.2033	3.8	0.91	1193.2	41.7	1329.2	31.2	1555.7	32.5	1555.7	32.5
PAA42-33	639	355151	2.9	10.2717	0.6	2.7572	2.9	0.2054	2.9	0.98	1204.3	31.3	1344.0	21.7	1574.0	11.3	1574.0	11.3
PAA42-61	135	34400	1.5	10.2398	0.8	3.584	2.7	0.2662	2.6	0.96	1521.3	35.1	1546.0	21.5	1579.9	14.8	1579.9	14.8
PAA42-35	103	79548	1.3	10.1378	1.0	3.7587	2.1	0.2764	1.8	0.87	1573.0	25.3	1584.0	16.7	1598.6	19.1	1598.6	19.1
PAA42-39	266	213952	1.5	10.0266	0.5	3.9024	2.3	0.2838	2.3	0.98	1610.4	32.2	1614.2	18.6	1619.1	8.6	1619.1	8.6
PAA42-45	153	122528	1.0	9.8503	0.8	4.0072	1.7	0.2863	1.5	0.89	1622.9	22.1	1635.7	14.0	1652.1	14.3	1652.1	14.3
PAA42-83	409	395307	1.7	9.6643	0.4	4.214	3.9	0.2954	3.8	1.00	1668.3	56.4	1676.8	31.6	1687.3	6.6	1687.3	6.6
PAA42-85	95	82733	1.7	9.6585	1.7	4.0666	2.7	0.2849	2.1	0.79	1615.8	30.3	1647.6	22.0	1688.4	30.7	1688.4	30.7
PAA42-5	329	141611	2.1	8.4812	0.3	5.255	1.8	0.3232	1.7	0.99	1805.5	27.4	1861.6	15.1	1924.7	5.4	1924.7	5.4

				Isotope Ratios							Apparent Ages							
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
PAA5-34	414	41217	1.1	18.9173	2.7	0.3402	2.8	0.0467	0.7	0.26	294.1	2.1	297.3	7.2	322.9	61.2	294.1	2.1
PAA5-18	342	74934	1.3	18.8328	4.1	0.3423	4.3	0.0468	1.3	0.30	294.6	3.7	298.9	11.0	333.0	92.0	294.6	3.7
PAA5-48	475	32533	1.2	18.8745	2.7	0.3417	2.8	0.0468	0.9	0.33	294.7	2.7	298.4	7.3	328.0	60.2	294.7	2.7
PAA5-52	612	161800	0.8	18.9512	2.0	0.3429	2.1	0.0471	0.7	0.34	296.9	2.1	299.4	5.5	318.8	45.2	296.9	2.1
PAA5-71	231	21590	1.7	19.1455	4.7	0.3497	4.9	0.0486	1.4	0.29	305.7	4.2	304.5	13.0	295.6	108.2	305.7	4.2
PAA5-12	153	21939	1.1	19.9864	5.0	0.3597	5.3	0.0521	1.8	0.35	327.6	5.9	312.0	14.2	196.6	115.7	327.6	5.9
PAA5-33	71	17570	1.1	17.883	10.8	0.4507	11.4	0.0585	3.7	0.33	366.2	13.3	377.8	36.0	449.1	240.3	366.2	13.3
PAA5-35	718	157009	5.1	18.2908	1.7	0.463	1.9	0.0614	0.7	0.39	384.3	2.7	386.3	6.1	398.8	39.0	384.3	2.7
PAA5-3	94	24048	1.3	18.6119	7.4	0.4817	7.6	0.065	1.6	0.21	406.1	6.3	399.2	25.0	359.7	167.2	406.1	6.3

PAA5-91	354	46352	1.7	18.6603	2.5	0.4844	2.7	0.0656	0.9	0.35	409.3	3.7	401.1	9.0	353.9	57.5	409.3	3.7
PAA5-95	211	32709	1.1	17.8843	4.0	0.5072	4.2	0.0658	1.1	0.26	410.7	4.3	416.6	14.3	449.0	89.7	410.7	4.3
PAA5-54	563	125049	2.9	17.8903	1.2	0.5076	1.3	0.0659	0.7	0.49	411.2	2.6	416.9	4.6	448.2	26.0	411.2	2.6
PAA5-62	195	37429	1.3	17.8133	4.3	0.5119	4.5	0.0661	1.2	0.27	412.8	4.8	419.7	15.4	457.8	96.1	412.8	4.8
PAA5-22	353	53197	5.9	18.6754	2.0	0.4915	2.4	0.0666	1.3	0.56	415.5	5.3	405.9	7.9	352.0	44.5	415.5	5.3
PAA5-2	207	49263	1.6	18.0345	3.4	0.5137	3.6	0.0672	1.1	0.29	419.2	4.3	421.0	12.4	430.4	76.8	419.2	4.3
PAA5-26	469	136230	1.7	17.9867	1.7	0.5162	1.9	0.0673	0.8	0.44	420.1	3.4	422.6	6.5	436.3	37.8	420.1	3.4
PAA5-85	598	106931	5.9	18.4512	1.4	0.5169	2.2	0.0692	1.7	0.77	431.1	7.2	423.1	7.7	379.2	31.7	431.1	7.2
PAA5-77	432	101664	2.2	18.011	1.8	0.5404	3.0	0.0706	2.4	0.80	439.7	10.2	438.7	10.7	433.3	40.5	439.7	10.2
PAA5-72	90	18827	1.3	17.555	12.3	0.6221	12.4	0.0792	1.8	0.15	491.4	8.7	491.2	48.3	490.1	271.3	491.4	8.7
PAA5-5	171	32816	1.2	17.4398	5.7	0.652	6.2	0.0825	2.4	0.39	510.8	11.8	509.7	25.0	504.7	126.6	510.8	11.8
PAA5-79	117	51837	1.9	18.543	6.4	0.621	6.6	0.0835	1.6	0.24	517.1	7.9	490.5	25.8	368.1	145.4	517.1	7.9
PAA5-49	58	8627	0.8	18.4286	14.7	0.6269	15.0	0.0838	2.8	0.19	518.7	13.9	494.2	58.6	382.0	331.8	518.7	13.9
PAA5-87	70	14354	1.1	17.3125	5.7	0.6701	6.7	0.0841	3.5	0.52	520.8	17.5	520.8	27.2	520.7	125.1	520.8	17.5
PAA5-19	458	44288	1.7	17.2791	2.0	0.6812	2.2	0.0854	1.0	0.46	528.1	5.2	527.5	9.1	524.9	43.2	528.1	5.2
PAA5-37	230	45500	0.6	17.1627	2.7	0.6925	3.0	0.0862	1.1	0.38	533.0	5.8	534.3	12.3	539.8	60.1	533.0	5.8
PAA5-43	132	28961	1.5	16.8603	2.9	0.7136	3.3	0.0873	1.4	0.43	539.3	7.3	546.9	13.8	578.5	63.8	539.3	7.3
PAA5-83	407	106944	0.6	17.4343	1.3	0.691	1.9	0.0874	1.4	0.74	540.0	7.5	533.4	8.1	505.3	28.8	540.0	7.5
PAA5-65	153	40940	2.1	17.7187	6.2	0.68	6.3	0.0874	1.3	0.21	540.1	6.9	526.8	26.0	469.6	136.9	540.1	6.9
PAA5-4	66	17494	2.5	16.5084	11.9	0.7325	12.2	0.0877	2.7	0.22	542.0	14.3	558.0	52.5	624.2	257.8	542.0	14.3
PAA5-100	721	154223	0.9	17.316	0.8	0.7082	1.3	0.0889	1.1	0.81	549.2	5.6	543.7	5.5	520.3	16.8	549.2	5.6
PAA5-45	275	40525	1.6	17.3044	2.1	0.7158	2.3	0.0898	0.9	0.39	554.6	4.8	548.2	9.8	521.7	46.5	554.6	4.8
PAA5-13	57	10101	1.1	18.8125	7.6	0.66	8.1	0.09	2.9	0.36	555.8	15.5	514.6	32.7	335.4	171.5	555.8	15.5
PAA5-44	75	21638	1.4	17.7679	9.2	0.7001	9.3	0.0902	1.3	0.14	556.8	6.9	538.9	38.9	463.5	204.3	556.8	6.9
PAA5-71	529	117907	3.1	16.9655	1.0	0.7395	1.6	0.091	1.3	0.79	561.4	6.8	562.1	6.9	565.0	21.6	561.4	6.8
PAA5-55	227	37315	1.3	16.8392	2.3	0.7714	2.8	0.0942	1.7	0.59	580.4	9.3	580.5	12.5	581.3	49.5	580.4	9.3
PAA5-28	236	40298	1.2	16.7997	2.0	0.7747	2.5	0.0944	1.4	0.56	581.5	7.8	582.5	11.0	586.4	44.4	581.5	7.8
PAA5-8	311	49576	2.1	16.7558	1.1	0.7821	1.4	0.095	0.8	0.61	585.3	4.7	586.7	6.2	592.0	23.8	585.3	4.7
PAA5-59	108	13738	1.0	15.8398	3.3	0.861	3.5	0.0989	1.1	0.32	608.1	6.5	630.7	16.3	712.7	69.8	608.1	6.5
PAA5-47	79	41295	1.0	16.2228	5.5	0.8551	6.3	0.1006	3.1	0.50	618.0	18.5	627.5	29.6	661.7	117.7	618.0	18.5
PAA5-30	164	44552	1.1	16.3885	1.6	0.8545	1.9	0.1016	1.1	0.55	623.6	6.3	627.1	9.1	639.9	34.9	623.6	6.3
PAA5-14	71	17404	1.3	17.0221	3.6	0.8278	3.8	0.1022	1.3	0.34	627.3	7.8	612.4	17.6	557.7	78.6	627.3	7.8
PAA5-98	108	13304	1.6	16.4429	4.6	0.8578	5.2	0.1023	2.3	0.45	627.8	13.8	628.9	24.2	632.8	99.5	627.8	13.8
PAA5-80	137	24174	2.0	16.6305	3.9	0.884	4.2	0.1066	1.3	0.32	653.1	8.3	643.1	19.8	608.2	85.1	653.1	8.3
PAA5-78	99	42903	1.8	16.9966	7.3	0.8657	7.5	0.1067	1.5	0.20	653.7	9.1	633.2	35.2	561.0	159.7	653.7	9.1
PAA5-58	367	144300	1.9	15.827	1.0	0.9749	2.1	0.1119	1.8	0.86	683.8	11.5	691.0	10.3	714.4	22.2	683.8	11.5
PAA5-68	54	28040	0.5	14.9955	6.2	1.2594	6.8	0.137	2.8	0.41	827.5	21.8	827.6	38.7	828.0	130.1	827.5	21.8
PAA5-93	248	131878	1.1	14.3916	1.2	1.4573	2.2	0.1521	1.8	0.83	912.8	15.3	912.9	13.0	913.1	24.9	913.1	24.9
PAA5-41	36	9619	2.1	15.26	3.8	1.386	4.1	0.1534	1.4	0.34	920.0	11.9	883.0	24.1	791.4	80.7	920.0	11.9

PAA5-94	407	102000	2.2	14.2345	0.6	1.4992	1.7	0.1548	1.6	0.93	927.7	13.4	930.1	10.1	935.7	12.1	935.7	12.1
PAA5-51	53	24646	1.6	14.2023	4.0	1.5269	4.2	0.1573	1.2	0.28	941.6	10.3	941.3	25.7	940.4	82.5	940.4	82.5
PAA5-86	48	19356	0.4	14.156	3.7	1.6414	4.1	0.1685	1.9	0.45	1003.9	17.3	986.2	26.2	947.1	75.9	947.1	75.9
PAA5-32	197	92241	2.6	14.1145	1.6	1.5556	2.0	0.1592	1.1	0.56	952.5	9.8	952.7	12.1	953.0	32.9	953.0	32.9
PAA5-50	208	154488	5.4	13.9552	0.7	1.5947	1.7	0.1614	1.5	0.90	964.6	13.9	968.2	10.7	976.3	14.9	976.3	14.9
PAA5-38	47	28719	3.1	13.9308	5.3	1.6611	5.4	0.1678	1.0	0.19	1000.2	9.4	993.8	34.2	979.8	107.9	979.8	107.9
PAA5-70	52	24228	2.8	13.9135	5.1	1.7127	5.4	0.1728	1.5	0.28	1027.7	14.0	1013.3	34.3	982.4	104.8	982.4	104.8
PAA5-96	130	39759	3.5	13.8721	1.9	1.6922	2.2	0.1703	1.0	0.48	1013.5	9.8	1005.6	13.8	988.4	38.6	988.4	38.6
PAA5-40	213	61176	2.9	13.7927	0.9	1.6313	1.2	0.1632	0.8	0.63	974.5	6.9	982.4	7.6	1000.0	19.1	1000.0	19.1
PAA5-84	229	98767	5.6	13.7823	1.0	1.6841	1.5	0.1683	1.1	0.75	1002.9	10.1	1002.5	9.3	1001.6	19.7	1001.6	19.7
PAA5-25	214	124284	4.8	13.7343	1.3	1.7331	1.5	0.1726	0.9	0.57	1026.6	8.2	1020.9	9.9	1008.7	25.6	1008.7	25.6
PAA5-15	280	209728	3.3	13.711	1.0	1.7048	1.3	0.1695	0.9	0.64	1009.5	8.1	1010.3	8.6	1012.1	20.8	1012.1	20.8
PAA5-24	121	126010	2.6	13.6907	1.9	1.7301	2.3	0.1718	1.3	0.58	1022.0	12.5	1019.8	14.7	1015.1	37.8	1015.1	37.8
PAA5-27	91	26595	2.9	13.6896	2.2	1.7487	2.4	0.1736	0.9	0.36	1032.0	8.1	1026.7	15.3	1015.3	44.8	1015.3	44.8
PAA5-11	60	24770	2.1	13.6891	5.0	1.6081	5.2	0.1597	1.3	0.24	954.9	11.2	973.4	32.6	1015.3	102.3	1015.3	102.3
PAA5-88	172	134359	2.8	13.6629	1.5	1.7352	2.0	0.1719	1.3	0.64	1022.8	12.3	1021.7	13.0	1019.2	31.4	1019.2	31.4
PAA5-46	177	63817	2.2	13.6574	1.2	1.6605	1.6	0.1645	1.0	0.66	981.6	9.5	993.6	10.0	1020.0	24.0	1020.0	24.0
PAA5-23	202	58340	2.2	13.6441	1.2	1.6728	4.2	0.1655	4.0	0.96	987.5	36.6	998.2	26.5	1022.0	23.6	1022.0	23.6
PAA5-6	94	44118	4.9	13.6434	3.1	1.7213	3.1	0.1703	0.6	0.19	1013.9	5.4	1016.5	20.0	1022.1	61.9	1022.1	61.9
PAA5-29	130	64043	1.9	13.6408	2.7	1.748	2.8	0.1729	1.0	0.34	1028.3	9.2	1026.4	18.4	1022.5	54.1	1022.5	54.1
PAA5-73	900	264153	10.0	13.6344	0.4	1.692	1.2	0.1673	1.1	0.95	997.3	10.4	1005.5	7.6	1023.5	7.8	1023.5	7.8
PAA5-89	323	410009	5.2	13.6224	0.7	1.8046	0.8	0.1783	0.5	0.58	1057.7	4.5	1047.1	5.3	1025.2	13.3	1025.2	13.3
PAA5-92	52	36590	2.6	13.541	5.8	1.718	6.2	0.1687	2.1	0.34	1005.1	19.5	1015.3	39.8	1037.4	117.7	1037.4	117.7
PAA5-9	96	33254	2.8	13.5101	2.5	1.7429	2.9	0.1708	1.3	0.47	1016.4	12.5	1024.5	18.5	1042.0	51.0	1042.0	51.0
PAA5-90	461	295076	4.7	13.4949	0.9	1.7709	5.1	0.1733	5.0	0.98	1030.4	48.0	1034.8	33.3	1044.2	18.3	1044.2	18.3
PAA5-60	55	17416	2.9	13.4282	3.8	1.7151	4.2	0.167	1.6	0.38	995.8	14.4	1014.2	26.6	1054.3	77.6	1054.3	77.6
PAA5-1	39	61255	1.3	13.3362	3.3	1.9382	3.9	0.1875	2.1	0.53	1107.7	20.9	1094.4	26.2	1068.1	66.8	1068.1	66.8
PAA5-66	220	93910	2.8	13.2946	1.5	1.5112	3.7	0.1457	3.4	0.92	876.9	28.1	934.9	22.8	1074.4	29.7	1074.4	29.7
PAA5-97	186	78880	2.7	12.7496	1.4	2.1441	1.7	0.1983	0.9	0.52	1166.0	9.2	1163.2	11.5	1157.9	28.1	1157.9	28.1
PAA5-63	96	39944	1.9	12.7313	1.5	2.0966	1.8	0.1936	0.9	0.49	1140.8	9.2	1147.7	12.2	1160.7	30.6	1160.7	30.6
PAA5-76	352	278597	6.6	12.6383	0.4	2.261	3.3	0.2072	3.3	0.99	1214.1	36.2	1200.2	23.2	1175.3	8.4	1175.3	8.4
PAA5-17	110	41016	2.2	12.6083	2.1	2.2789	2.4	0.2084	1.3	0.52	1220.2	14.1	1205.8	17.3	1180.0	41.4	1180.0	41.4
PAA5-81	342	327693	1.9	12.4194	0.7	2.3827	1.4	0.2146	1.2	0.87	1253.4	13.6	1237.4	9.8	1209.7	13.1	1209.7	13.1
PAA5-16	146	49708	3.0	12.4041	0.7	2.3657	1.2	0.2128	1.0	0.84	1243.9	11.8	1232.3	8.9	1212.1	13.4	1212.1	13.4
PAA5-7	203	110450	2.8	12.396	0.9	2.2959	1.3	0.2064	0.9	0.70	1209.7	10.0	1211.0	9.1	1213.5	18.1	1213.5	18.1
PAA5-61	176	67185	3.3	12.0032	0.9	2.473	1.4	0.2153	1.0	0.74	1256.9	11.8	1264.2	10.1	1276.5	18.2	1276.5	18.2
PAA5-21	157	84561	1.9	11.803	0.8	2.6534	1.4	0.2271	1.2	0.84	1319.5	14.4	1315.6	10.7	1309.2	15.5	1309.2	15.5
PAA5-53	362	160960	1.8	11.6852	0.7	2.3415	1.5	0.1984	1.4	0.90	1166.9	14.6	1225.0	10.8	1328.7	12.7	1328.7	12.7
PAA5-16	82	69514	1.7	11.6814	1.7	2.6546	1.9	0.2249	0.8	0.41	1307.7	9.0	1315.9	13.8	1329.3	33.1	1329.3	33.1

PAA5-10	207	32336	1.7	11.6571	0.8	2.6568	1.4	0.2246	1.2	0.83	1306.2	13.9	1316.5	10.5	1333.3	15.3	1333.3	15.3
PAA5-39	218	115542	1.9	11.4023	0.6	2.802	1.1	0.2317	0.9	0.85	1343.5	11.5	1356.1	8.3	1375.9	11.1	1375.9	11.1
PAA5-42	112	108183	14.8	11.1185	1.1	2.9787	1.4	0.2402	0.9	0.63	1387.7	10.8	1402.2	10.4	1424.2	20.3	1424.2	20.3
PAA5-31	32	18200	1.3	9.2422	2.7	4.7691	3.0	0.3197	1.3	0.42	1788.2	19.7	1779.5	25.2	1769.3	49.7	1769.3	49.7
PAA5-36	79	97623	1.1	8.7242	0.8	5.298	1.3	0.3352	1.0	0.77	1863.6	16.4	1868.5	11.2	1874.0	15.1	1874.0	15.1
PAA5-99	131	144331	0.9	8.2732	0.7	5.9249	1.0	0.3555	0.7	0.71	1960.9	12.1	1964.9	8.8	1969.1	12.7	1969.1	12.7
PAA5-57	75	52206	2.3	8.1975	1.1	5.952	1.6	0.3539	1.2	0.74	1953.0	20.6	1968.9	14.3	1985.5	19.7	1985.5	19.7
PAA5-67	121	368807	2.0	7.7992	0.6	6.6306	1.1	0.3751	0.9	0.85	2053.2	16.3	2063.4	9.6	2073.7	10.2	2073.7	10.2
PAA5-56	673	931954	9.4	7.7057	0.2	6.7191	1.0	0.3755	0.9	0.99	2055.3	16.7	2075.1	8.5	2094.9	2.9	2094.9	2.9
PAA5-64	234	114356	1.6	7.7048	0.4	6.7591	2.1	0.3777	2.1	0.99	2065.6	37.2	2080.4	18.9	2095.1	6.2	2095.1	6.2

				Isotope Ratios									Apparent Ages					
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HMA14-18	819	61684	0.6	19.2812	2.2	0.3425	2.3	0.0479	0.8	0.35	301.6	2.4	299.1	6.0	279.4	50.0	301.6	2.4
HMA14-65	204	24348	1.0	18.7974	7.8	0.3669	8.1	0.05	2.2	0.27	314.6	6.6	317.3	22.0	337.3	176.4	314.6	6.6
HMA14-49	264	6784	1.9	18.489	5.1	0.3802	5.4	0.051	1.8	0.33	320.6	5.6	327.2	15.0	374.6	113.8	320.6	5.6
HMA14-8	353	183145	1.1	18.1493	2.6	0.4762	2.7	0.0627	0.7	0.26	391.9	2.7	395.4	8.8	416.2	57.8	391.9	2.7
HMA14-19	1070	226296	10.5	18.0164	1.5	0.5007	1.7	0.0654	0.7	0.42	408.6	2.8	412.2	5.8	432.6	34.3	408.6	2.8
HMA14-70	241	31403	2.2	18.0306	3.1	0.5095	3.5	0.0666	1.7	0.48	415.8	6.8	418.1	12.1	430.8	68.9	415.8	6.8
HMA14-71	338	50065	1.9	17.991	2.7	0.5163	3.0	0.0674	1.3	0.44	420.3	5.4	422.7	10.4	435.7	60.3	420.3	5.4
HMA14-4	163	31244	2.2	18.7946	6.2	0.4996	6.4	0.0681	1.4	0.22	424.7	5.9	411.4	21.6	337.6	141.2	424.7	5.9
HMA14-33	263	65064	1.0	18.4689	2.5	0.5096	3.6	0.0683	2.5	0.70	425.7	10.3	418.2	12.2	377.1	57.1	425.7	10.3
HMA14-48	133	29174	2.5	17.9808	5.9	0.5249	6.2	0.0685	1.8	0.30	426.8	7.6	428.4	21.8	437.0	132.4	426.8	7.6
HMA14-14	280	43635	1.6	18.1878	4.1	0.519	4.4	0.0685	1.5	0.35	426.9	6.3	424.5	15.1	411.5	91.2	426.9	6.3
HMA14-24	172	11541	0.9	16.5955	16.4	0.5707	16.6	0.0687	2.6	0.16	428.2	10.8	458.4	61.4	612.8	356.9	428.2	10.8
HMA14-91	128	28870	0.9	18.1195	5.9	0.5534	6.0	0.0727	1.2	0.20	452.5	5.3	447.2	21.7	419.9	131.5	452.5	5.3
HMA14-86	77	13510	0.4	17.3298	11.3	0.672	11.5	0.0845	2.0	0.17	522.7	10.1	521.9	46.9	518.5	249.0	522.7	10.1
HMA14-61	438	69793	1.8	16.9565	1.1	0.7051	2.1	0.0867	1.8	0.86	536.1	9.5	541.8	9.0	566.2	24.1	536.1	9.5
HMA14-95	612	62339	1.4	17.117	0.6	0.7019	1.2	0.0871	1.1	0.89	538.6	5.6	539.9	5.1	545.6	12.4	538.6	5.6
HMA14-68	150	24547	1.2	17.2788	4.1	0.6957	4.2	0.0872	1.2	0.28	538.8	6.1	536.2	17.7	525.0	89.5	538.8	6.1
HMA14-42	392	412024	1.1	17.1996	1.3	0.705	1.6	0.0879	0.9	0.56	543.4	4.7	541.8	6.8	535.1	29.5	543.4	4.7
HMA14-11	321	68996	2.4	17.1686	2.4	0.7089	2.5	0.0883	0.7	0.30	545.3	3.9	544.1	10.4	539.0	51.5	545.3	3.9
HMA14-94	77	33109	1.4	16.2976	5.5	0.751	5.6	0.0888	1.4	0.25	548.2	7.4	568.8	24.5	651.9	117.2	548.2	7.4
HMA14-77	240	83511	2.0	17.1452	3.2	0.715	3.4	0.0889	1.3	0.37	549.1	6.6	547.7	14.6	542.0	70.0	549.1	6.6
HMA14-81	93	15439	0.8	17.8175	8.1	0.6884	8.4	0.089	2.1	0.25	549.3	11.1	531.8	34.6	457.3	179.5	549.3	11.1
HMA14-6	295	87797	4.6	17.1309	3.1	0.7238	3.3	0.0899	1.3	0.38	555.1	6.8	552.9	14.2	543.8	67.3	555.1	6.8
HMA14-80	261	37423	1.5	17.3394	1.6	0.7155	3.1	0.09	2.6	0.85	555.4	13.9	548.0	13.0	517.3	35.5	555.4	13.9

HMA14-63	108	39662	0.8	16.6906	4.7	0.7453	4.9	0.0902	1.6	0.32	556.9	8.4	565.5	21.3	600.4	101.0	556.9	8.4
HMA14-60	94	15130	1.1	17.018	6.1	0.7315	6.8	0.0903	3.1	0.45	557.2	16.3	557.4	29.4	558.3	133.8	557.2	16.3
HMA14-7	43	10177	0.9	19.804	14.8	0.6288	14.9	0.0903	1.6	0.10	557.4	8.3	495.3	58.5	217.8	344.6	557.4	8.3
HMA14-90	229	52229	36.8	14.2532	6.4	0.8749	6.5	0.0904	1.5	0.23	558.2	7.9	638.2	30.9	933.0	130.5	558.2	7.9
HMA14-36	77	13634	1.4	16.7752	6.0	0.7438	6.3	0.0905	1.9	0.30	558.4	10.3	564.6	27.4	589.5	130.9	558.4	10.3
HMA14-59	66	14238	1.3	18.347	7.5	0.6819	7.7	0.0907	2.0	0.26	559.9	10.7	527.9	31.8	391.9	167.5	559.9	10.7
HMA14-39	123	26108	1.4	16.6944	3.2	0.7507	3.6	0.0909	1.7	0.47	560.8	9.0	568.6	15.5	600.0	68.2	560.8	9.0
HMA14-35	55	12171	0.6	16.6071	9.3	0.7571	9.5	0.0912	2.3	0.24	562.6	12.2	572.4	41.7	611.3	200.4	562.6	12.2
HMA14-41	524	117127	4.6	16.981	1.0	0.7406	1.3	0.0912	0.8	0.63	562.7	4.5	562.8	5.8	563.0	22.6	562.7	4.5
HMA14-46	114	20553	2.0	17.2322	8.3	0.7404	8.5	0.0925	1.4	0.17	570.5	7.8	562.7	36.6	531.0	183.1	570.5	7.8
HMA14-57	174	97883	1.5	17.0812	4.5	0.7529	7.1	0.0933	5.5	0.78	574.9	30.3	569.9	31.0	550.2	98.1	574.9	30.3
HMA14-99	24	5509	1.2	23.8763	36.4	0.5442	36.8	0.0942	5.7	0.16	580.6	31.8	441.2	132.5	-233.6	943.7	580.6	31.8
HMA14-98	536	176460	0.7	16.5114	1.2	0.7977	6.2	0.0955	6.1	0.98	588.1	34.1	595.5	27.8	623.8	25.0	588.1	34.1
HMA14-56	122	25770	1.7	17.4066	2.8	0.7638	4.6	0.0964	3.6	0.78	593.4	20.2	576.2	20.0	508.8	62.5	593.4	20.2
HMA14-67	189	34891	1.7	16.7189	2.9	0.8029	3.5	0.0974	1.8	0.53	598.9	10.4	598.5	15.7	596.8	63.7	598.9	10.4
HMA14-83	86	17636	1.1	17.808	4.5	0.754	4.7	0.0974	1.4	0.31	599.1	8.3	570.5	20.4	458.5	98.8	599.1	8.3
HMA14-96	85	13002	0.8	17.2748	6.7	0.7895	6.8	0.0989	1.5	0.22	608.0	8.8	590.9	30.6	525.5	146.2	608.0	8.8
HMA14-1	84	14304	1.1	17.4574	6.5	0.7829	6.8	0.0991	1.7	0.26	609.3	10.2	587.1	30.2	502.4	144.1	609.3	10.2
HMA14-79	403	65202	1.5	16.6793	1.6	0.8198	2.3	0.0992	1.6	0.71	609.5	9.5	607.9	10.5	601.9	35.3	609.5	9.5
HMA14-69	386	113585	25.5	16.3868	1.3	0.841	2.0	0.1	1.5	0.76	614.2	8.9	619.7	9.2	640.1	27.5	614.2	8.9
HMA14-87	261	38130	2.6	16.7623	2.3	0.8266	2.4	0.1005	0.8	0.31	617.3	4.5	611.7	11.2	591.2	50.3	617.3	4.5
HMA14-53	269	60715	4.2	16.4774	1.7	0.8417	2.0	0.1006	1.2	0.56	617.9	6.8	620.1	9.5	628.2	36.4	617.9	6.8
HMA14-93	249	46341	1.5	16.7343	3.5	0.8448	3.6	0.1025	1.1	0.30	629.3	6.5	621.8	16.8	594.8	74.9	629.3	6.5
HMA14-52	123	32057	1.8	16.5227	3.0	0.8603	3.6	0.1031	2.0	0.54	632.5	11.8	630.3	17.0	622.3	65.8	632.5	11.8
HMA14-25	95	30192	2.1	17.0096	2.5	0.8375	3.0	0.1033	1.5	0.52	633.9	9.3	617.8	13.7	559.3	54.8	633.9	9.3
HMA14-43	74	16500	1.4	16.6808	7.0	0.8749	7.1	0.1059	1.4	0.20	648.6	8.9	638.2	33.9	601.7	151.6	648.6	8.9
HMA14-34	176	113888	1.7	16.3857	2.5	0.9103	3.3	0.1082	2.1	0.65	662.2	13.4	657.2	15.8	640.3	53.5	662.2	13.4
HMA14-64	77	16012	2.4	15.6205	5.0	0.9892	5.9	0.1121	3.1	0.52	684.7	20.0	698.3	29.8	742.2	106.3	684.7	20.0
HMA14-3	77	16544	1.0	15.8801	3.1	1.0957	3.6	0.1262	1.8	0.51	766.2	13.1	751.3	18.9	707.3	65.0	766.2	13.1
HMA14-40	242	131169	2.1	15.19	1.4	1.1633	2.1	0.1282	1.5	0.73	777.4	11.2	783.5	11.5	801.0	30.3	777.4	11.2
HMA14-55	914	383965	9.7	14.213	0.4	1.5638	1.6	0.1612	1.5	0.97	963.5	13.7	956.0	9.8	938.8	8.1	938.8	8.1
HMA14-73	445	179284	4.8	14.2036	1.0	1.5042	1.2	0.155	0.7	0.57	928.7	6.1	932.1	7.5	940.2	20.7	940.2	20.7
HMA14-13	698	232613	####	14.1515	0.3	1.518	1.0	0.1558	0.9	0.95	933.4	8.1	937.7	6.0	947.7	6.0	947.7	6.0
HMA14-29	247	159419	31.5	13.8098	1.4	1.7086	1.6	0.1711	0.7	0.47	1018.3	6.9	1011.7	10.1	997.5	28.3	997.5	28.3
HMA14-78	102	38351	1.2	13.7585	2.0	1.714	2.2	0.171	1.0	0.44	1017.8	9.3	1013.8	14.4	1005.1	41.0	1005.1	41.0
HMA14-12	259	80044	3.3	13.7162	1.5	1.6848	1.7	0.1676	0.9	0.50	998.9	8.0	1002.8	10.9	1011.3	29.9	1011.3	29.9
HMA14-41	245	115630	3.6	13.7158	0.8	1.7104	1.3	0.1701	1.0	0.76	1012.9	8.9	1012.4	8.0	1011.4	16.5	1011.4	16.5
HMA14-4	356	142837	4.6	13.6921	1.0	1.7496	1.9	0.1737	1.7	0.85	1032.7	15.8	1027.0	12.5	1014.9	20.5	1014.9	20.5
HMA14-20	79	22761	2.6	13.6623	4.1	1.7099	4.3	0.1694	1.3	0.29	1009.0	11.7	1012.3	27.6	1019.3	83.4	1019.3	83.4

HMA14-27	180	94567	4.9	13.6348	1.0	1.7252	1.3	0.1706	0.7	0.58	1015.4	7.0	1018.0	8.3	1023.4	21.2	1023.4	21.2
HMA14-38	42	26575	1.4	13.4609	4.7	1.8972	5.0	0.1852	1.6	0.31	1095.4	15.7	1080.1	33.2	1049.4	95.6	1049.4	95.6
HMA14-50	95	14543	1.7	13.1917	2.8	1.808	3.2	0.173	1.4	0.44	1028.5	13.4	1048.4	20.7	1089.9	57.0	1089.9	57.0
HMA14-31	81	43100	3.0	13.1658	3.1	1.9871	3.4	0.1897	1.4	0.40	1120.0	13.9	1111.1	22.9	1093.9	62.3	1093.9	62.3
HMA14-37	91	32973	1.6	13.0864	1.9	1.9082	2.2	0.1811	1.0	0.44	1073.0	9.5	1083.9	14.4	1106.0	38.8	1106.0	38.8
HMA14-89	62	44278	2.6	12.6363	5.9	2.0734	9.8	0.19	7.9	0.80	1121.5	81.0	1140.0	67.4	1175.6	116.3	1175.6	116.3
HMA14-15	160	201778	3.2	12.5593	1.1	2.2128	1.5	0.2016	1.0	0.70	1183.7	11.1	1185.1	10.3	1187.7	20.8	1187.7	20.8
HMA14-51	103	117396	2.6	12.3848	1.8	2.3088	2.0	0.2074	1.0	0.49	1214.9	10.8	1215.0	14.3	1215.2	34.6	1215.2	34.6
HMA14-22	217	100932	1.4	12.3088	0.5	2.3349	1.3	0.2084	1.1	0.91	1220.5	12.7	1223.0	8.9	1227.3	10.3	1227.3	10.3
HMA14-2	42	27652	2.1	12.2907	3.6	2.4283	3.9	0.2165	1.5	0.40	1263.1	17.7	1251.0	28.0	1230.2	70.1	1230.2	70.1
HMA14-84	168	113827	2.3	12.2775	1.8	2.2999	2.0	0.2048	0.9	0.46	1201.0	10.1	1212.3	14.3	1232.3	35.2	1232.3	35.2
HMA14-45	234	247098	2.9	12.274	0.5	2.3704	0.8	0.211	0.6	0.74	1234.2	6.3	1233.7	5.4	1232.9	10.0	1232.9	10.0
HMA14-5	247	111376	1.2	12.2221	0.7	2.4439	1.8	0.2166	1.7	0.93	1264.0	19.1	1255.6	12.9	1241.2	12.7	1241.2	12.7
HMA14-23	252	353377	3.6	12.0569	0.6	2.4553	1.6	0.2147	1.4	0.91	1253.8	16.3	1259.0	11.4	1267.8	12.6	1267.8	12.6
HMA14-72	542	458013	7.9	11.778	0.5	2.3982	2.7	0.2049	2.6	0.98	1201.4	28.7	1242.1	19.1	1313.3	9.6	1313.3	9.6
HMA14-54	113	65770	0.5	11.1381	1.2	3.1025	1.5	0.2506	0.9	0.60	1441.7	11.6	1433.3	11.4	1420.9	22.7	1420.9	22.7
HMA14-32	65	53324	18.6	10.7466	8.1	2.6714	8.5	0.2082	2.3	0.27	1219.3	25.2	1320.6	62.6	1488.9	154.6	1488.9	154.6
HMA14-85	133	69385	1.9	10.6653	1.1	3.423	1.4	0.2648	1.0	0.68	1514.2	13.2	1509.7	11.3	1503.3	19.9	1503.3	19.9
HMA14100	103	75151	1.5	10.5572	1.0	3.5224	2.4	0.2697	2.2	0.91	1539.3	29.7	1532.3	18.8	1522.5	18.1	1522.5	18.1
HMA14-28	696	398086	1.4	10.4306	0.2	3.6519	0.8	0.2763	0.7	0.96	1572.5	10.2	1560.9	6.1	1545.3	4.1	1545.3	4.1
HMA14-82	155	156828	2.7	10.4063	0.4	3.5942	1.0	0.2713	0.8	0.89	1547.2	11.7	1548.2	7.6	1549.6	8.2	1549.6	8.2
HMA14-47	144	174201	2.8	9.2328	0.6	4.7746	0.9	0.3197	0.7	0.78	1788.4	11.0	1780.4	7.5	1771.2	10.2	1771.2	10.2
HMA14-66	124	111120	1.2	9.1119	0.5	4.7765	0.9	0.3157	0.8	0.85	1768.5	11.9	1780.8	7.6	1795.2	8.5	1795.2	8.5
HMA14-62	207	71607	2.4	8.7184	0.3	5.4429	0.8	0.3442	0.7	0.91	1906.7	12.1	1891.6	6.9	1875.2	5.9	1875.2	5.9
HMA14-92	152	130028	1.7	8.49	1.4	4.3112	3.0	0.2655	2.7	0.89	1517.7	35.9	1695.5	24.6	1922.9	24.4	1922.9	24.4
HMA14-17	177	662351	1.2	8.1559	0.4	6.0548	1.1	0.3582	1.0	0.92	1973.4	17.2	1983.8	9.5	1994.5	7.5	1994.5	7.5
HMA14-16	45	40130	1.7	7.7397	2.4	6.5868	3.2	0.3697	2.2	0.68	2028.2	38.2	2057.6	28.4	2087.1	41.4	2087.1	41.4
HMA14-26	53	106556	0.9	7.7008	1.2	6.8987	1.6	0.3853	1.1	0.67	2101.0	19.3	2098.5	14.1	2096.0	20.6	2096.0	20.6
HMA14-76	212	325768	2.4	7.693	0.2	6.9569	0.7	0.3882	0.7	0.94	2114.3	12.7	2105.9	6.6	2097.8	4.3	2097.8	4.3
HMA14-97	177	22094	0.7	7.6366	0.8	6.3309	1.7	0.3506	1.4	0.87	1937.7	24.2	2022.7	14.6	2110.7	14.5	2110.7	14.5
HMA14-30	277	205543	2.2	7.4536	0.2	7.4573	1.0	0.4031	1.0	0.98	2183.4	17.8	2167.9	8.8	2153.2	3.5	2153.2	3.5
HMA14-44	146	175582	2.2	7.3932	0.5	7.6756	1.9	0.4116	1.8	0.97	2222.1	34.3	2193.7	16.9	2167.3	8.2	2167.3	8.2
HMA14-21	482	62553	1.9	7.3472	2.4	5.5929	7.5	0.298	7.1	0.95	1681.5	104.8	1915.0	64.4	2178.2	41.5	2178.2	41.5
HMA14-58	80	61086	1.1	6.9132	1.1	8.6911	1.5	0.4358	1.0	0.70	2331.7	20.4	2306.1	13.5	2283.6	18.2	2283.6	18.2
HMA14-74	25	24126	0.7	6.3739	1.9	9.9682	2.1	0.4608	0.9	0.45	2443.1	19.2	2431.8	19.5	2422.4	32.2	2422.4	32.2
HMA14-88	20	33577	2.1	6.0649	1.2	10.4811	1.4	0.461	0.8	0.55	2444.1	15.7	2478.2	12.9	2506.3	19.6	2506.3	19.6
HMA14-10	167	129289	3.4	5.8095	0.5	10.4981	1.3	0.4423	1.2	0.93	2361.1	24.6	2479.8	12.4	2578.5	8.1	2578.5	8.1
HMA14-75	40	30260	43.1	5.7896	8.8	11.9273	11.6	0.5008	7.5	0.65	2617.3	161.0	2598.7	108.6	2584.2	147.3	2584.2	147.3

Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	Isotope Ratios ± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	Apparent Ages ± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
AMA15-1	91	26688	1.8	19.354	11.9	0.3548	12.2	0.0498	2.5	0.20	313.3	7.6	308.4	32.4	270.8	274.3	313.3	7.6
AMA15-63	378	46422	1.3	19.1206	3.1	0.369	3.2	0.0512	0.8	0.25	321.7	2.5	318.9	8.9	298.5	71.5	321.7	2.5
AMA15-52	246	48859	2.6	19.0617	2.6	0.3708	3.2	0.0513	1.9	0.60	322.3	6.1	320.3	8.9	305.5	58.8	322.3	6.1
AMA15-45	219	36883	1.6	18.8554	7.5	0.3817	7.7	0.0522	1.9	0.24	328.0	6.0	328.3	21.7	330.3	170.4	328.0	6.0
AMA15-95	610	72698	1.8	19.338	1.4	0.3738	2.0	0.0524	1.4	0.71	329.4	4.5	322.4	5.4	272.7	31.7	329.4	4.5
AMA15-61	711	65414	1.4	18.7463	1.1	0.3874	1.6	0.0527	1.1	0.72	330.9	3.7	332.5	4.5	343.4	25.1	330.9	3.7
AMA15-43	482	71100	1.6	18.8659	1.3	0.3855	2.3	0.0527	1.9	0.82	331.4	6.1	331.1	6.5	329.1	29.4	331.4	6.1
AMA15-92	154	16247	1.4	18.9994	8.4	0.3853	9.0	0.0531	3.2	0.35	333.5	10.2	330.9	25.5	313.0	192.4	333.5	10.2
AMA15-62	2369	125518	0.6	18.708	0.4	0.4108	1.0	0.0557	1.0	0.92	349.7	3.3	349.5	3.1	348.1	9.5	349.7	3.3
AMA15-16	79	12001	2.2	20.3173	16.1	0.3959	16.2	0.0583	2.3	0.14	365.5	8.2	338.7	46.8	158.3	378.2	365.5	8.2
AMA15-55	586	192707	8.2	18.1037	1.2	0.4924	1.6	0.0647	1.0	0.64	403.9	4.0	406.5	5.4	421.8	27.9	403.9	4.0
AMA15100	157	33808	2.7	18.8417	4.4	0.482	6.0	0.0659	4.1	0.68	411.2	16.3	399.5	19.9	331.9	99.9	411.2	16.3
AMA15-91	215	7736	1.3	18.6238	3.6	0.4897	4.3	0.0661	2.4	0.55	412.9	9.5	404.7	14.5	358.2	81.8	412.9	9.5
AMA15-77	476	91400	2.8	18.2218	1.3	0.5019	1.7	0.0663	1.1	0.65	414.0	4.4	413.0	5.7	407.3	28.3	414.0	4.4
AMA15-66	294	32304	1.9	18.1399	3.0	0.505	3.4	0.0664	1.6	0.46	414.6	6.3	415.1	11.7	417.4	68.0	414.6	6.3
AMA15-65	1436	198376	25.3	18.2453	0.5	0.5059	1.4	0.0669	1.3	0.93	417.7	5.1	415.7	4.6	404.4	11.1	417.7	5.1
AMA15-76	323	65321	1.0	18.2047	1.5	0.5073	1.9	0.067	1.1	0.60	417.9	4.6	416.6	6.4	409.4	33.6	417.9	4.6
AMA15-21	322	36989	1.6	18.0756	1.3	0.511	1.7	0.067	1.0	0.62	418.0	4.1	419.1	5.7	425.3	29.0	418.0	4.1
AMA15-79	191	24971	3.8	18.3483	2.6	0.5035	2.8	0.067	1.0	0.36	418.1	4.2	414.1	9.6	391.8	59.3	418.1	4.2
AMA15-13	410	29499	6.9	18.2467	1.9	0.507	2.2	0.0671	1.1	0.51	418.6	4.6	416.4	7.5	404.2	42.3	418.6	4.6
AMA15-24	311	45570	2.1	17.7485	2.6	0.5213	3.0	0.0671	1.5	0.50	418.7	5.9	426.0	10.3	465.9	56.8	418.7	5.9
AMA15-40	93	14777	1.1	18.6736	5.3	0.4958	5.5	0.0672	1.3	0.25	419.0	5.5	408.9	18.5	352.2	120.5	419.0	5.5
AMA15-69	154	22922	2.2	18.503	5.2	0.5018	5.4	0.0673	1.6	0.30	420.1	6.5	412.9	18.4	372.9	117.0	420.1	6.5
AMA15-12	124	32375	2.1	18.875	5.7	0.4929	6.0	0.0675	1.7	0.28	420.9	6.8	406.9	20.0	328.0	130.4	420.9	6.8
AMA15-84	260	36349	1.7	18.0612	3.1	0.5151	4.0	0.0675	2.6	0.64	420.9	10.5	421.9	13.9	427.1	69.3	420.9	10.5
AMA15-41	151	27050	1.0	17.6639	4.8	0.5285	4.9	0.0677	1.0	0.21	422.4	4.1	430.8	17.2	476.5	105.8	422.4	4.1
AMA15-60	457	69446	2.2	18.1592	1.5	0.5143	1.7	0.0677	0.9	0.51	422.5	3.6	421.3	5.9	415.0	33.1	422.5	3.6
AMA15-68	394	61913	1.9	18.2156	2.2	0.5144	2.6	0.068	1.4	0.54	423.8	5.7	421.4	8.9	408.1	48.4	423.8	5.7
AMA15-25	320	63233	1.7	17.8499	3.1	0.5255	3.2	0.068	0.9	0.29	424.3	3.9	428.8	11.3	453.2	68.6	424.3	3.9
AMA15-22	1074	352517	17.4	18.0118	0.8	0.5217	1.5	0.0682	1.2	0.83	425.0	5.0	426.3	5.1	433.2	18.6	425.0	5.0
AMA15-10	162	28897	1.4	18.485	3.6	0.5091	4.2	0.0683	2.3	0.53	425.6	9.3	417.8	14.5	375.1	80.3	425.6	9.3
AMA15-97	260	10754	2.7	17.7988	5.2	0.529	5.4	0.0683	1.4	0.26	425.9	5.8	431.2	18.9	459.6	115.1	425.9	5.8
AMA15-87	358	36243	3.4	18.2895	2.1	0.515	3.0	0.0683	2.1	0.71	426.0	8.8	421.8	10.3	399.0	46.9	426.0	8.8
AMA15-18	131	32360	1.9	19.121	7.6	0.4927	7.7	0.0683	1.3	0.17	426.0	5.3	406.7	26.0	298.5	174.3	426.0	5.3
AMA15-19	219	40723	1.0	18.4556	4.1	0.5125	4.3	0.0686	1.5	0.34	427.7	6.2	420.1	14.9	378.7	91.5	427.7	6.2

AMA15-49	268	69036	2.6	18.5457	2.9	0.5108	3.3	0.0687	1.6	0.48	428.4	6.4	419.0	11.2	367.7	64.4	428.4	6.4
AMA15-64	108	21516	0.8	18.8794	4.8	0.5026	5.3	0.0688	2.3	0.43	429.1	9.5	413.5	18.1	327.4	109.0	429.1	9.5
AMA15-73	467	70738	3.7	18.1016	1.7	0.5258	2.3	0.069	1.5	0.67	430.3	6.4	429.0	8.0	422.1	37.8	430.3	6.4
AMA15-36	283	35448	2.4	18.1777	3.4	0.5246	3.5	0.0692	0.7	0.21	431.1	3.1	428.2	12.1	412.7	75.8	431.1	3.1
AMA15-80	199	38188	0.8	18.3488	4.4	0.5219	4.7	0.0694	1.6	0.34	432.8	6.8	426.4	16.3	391.7	98.6	432.8	6.8
AMA15-53	291	26329	2.2	18.6796	2.2	0.5138	2.6	0.0696	1.4	0.54	433.8	5.9	421.0	9.0	351.5	49.8	433.8	5.9
AMA15-94	468	72255	1.4	18.2893	2.3	0.5264	4.0	0.0698	3.3	0.82	435.1	14.0	429.4	14.1	399.0	51.4	435.1	14.0
AMA15-38	482	86652	1.9	17.9782	1.7	0.5466	2.2	0.0713	1.4	0.64	443.8	6.2	442.8	8.1	437.3	38.4	443.8	6.2
AMA15-96	202	28375	2.0	17.5625	4.2	0.5622	4.4	0.0716	1.5	0.34	445.9	6.5	453.0	16.2	489.2	91.9	445.9	6.5
AMA15-15	111	21362	1.9	16.621	4.4	0.6096	5.4	0.0735	3.1	0.58	457.1	13.7	483.3	20.6	609.5	94.6	457.1	13.7
AMA15-26	289	41138	1.4	17.9966	2.3	0.5905	2.8	0.0771	1.5	0.54	478.7	6.9	471.2	10.5	435.0	52.3	478.7	6.9
AMA15-20	379	163988	2.0	17.4328	1.8	0.61	2.1	0.0771	1.0	0.49	479.0	4.7	483.6	8.0	505.5	39.8	479.0	4.7
AMA15-39	769	11015	0.9	14.9751	17.5	0.7107	18.0	0.0772	4.2	0.23	479.3	19.2	545.2	75.9	830.8	366.8	479.3	19.2
AMA15-99	570	99722	2.4	17.4563	1.0	0.6352	2.1	0.0804	1.9	0.89	498.6	9.0	499.3	8.3	502.5	20.9	498.6	9.0
AMA15-29	80	25790	1.2	18.1088	8.2	0.6151	8.2	0.0808	1.0	0.13	500.8	5.1	486.8	31.9	421.2	182.6	500.8	5.1
AMA15-33	277	53710	5.8	17.2247	1.8	0.6495	2.4	0.0811	1.5	0.63	502.9	7.2	508.2	9.4	531.9	40.2	502.9	7.2
AMA15-82	187	35348	6.1	17.5603	3.6	0.6379	4.5	0.0812	2.7	0.59	503.5	12.9	501.0	17.8	489.5	80.0	503.5	12.9
AMA15-50	101	20191	1.8	17.4225	4.4	0.6535	5.0	0.0826	2.3	0.46	511.5	11.2	510.6	19.9	506.8	97.1	511.5	11.2
AMA15-89	198	43000	3.0	17.3705	3.5	0.6601	3.8	0.0832	1.4	0.38	515.0	7.0	514.7	15.3	513.4	77.3	515.0	7.0
AMA15-81	135	52103	0.8	17.356	5.6	0.6621	5.8	0.0833	1.5	0.26	516.1	7.5	515.9	23.5	515.2	123.1	516.1	7.5
AMA15-98	186	24299	2.7	17.0104	3.4	0.6803	3.9	0.0839	1.8	0.47	519.5	9.1	526.9	15.9	559.3	74.6	519.5	9.1
AMA15-83	312	70631	1.2	17.0843	1.4	0.6898	1.8	0.0855	1.2	0.64	528.7	6.0	532.7	7.6	549.8	30.8	528.7	6.0
AMA15-54	866	115284	1.9	17.1345	0.5	0.6881	1.6	0.0855	1.5	0.95	528.9	7.8	531.6	6.7	543.4	10.8	528.9	7.8
AMA15-86	197	44861	1.9	17.6115	1.8	0.6822	3.8	0.0871	3.4	0.88	538.6	17.4	528.1	15.7	483.1	39.3	538.6	17.4
AMA15-2	89	20140	0.9	16.2761	4.6	0.7505	4.9	0.0886	1.5	0.31	547.2	7.9	568.5	21.1	654.7	99.0	547.2	7.9
AMA15-8	228	44866	1.5	17.2775	1.7	0.7071	2.3	0.0886	1.6	0.69	547.3	8.5	543.0	9.8	525.2	36.7	547.3	8.5
AMA15-35	139	24595	0.9	17.5651	4.5	0.6972	4.9	0.0888	1.9	0.39	548.6	10.1	537.1	20.4	488.8	99.5	548.6	10.1
AMA15-70	432	151984	2.6	17.1281	1.1	0.7374	1.9	0.0916	1.5	0.81	565.0	8.3	560.9	8.1	544.2	24.3	565.0	8.3
AMA15-42	97	38127	1.8	16.8219	4.8	0.7745	5.2	0.0945	1.8	0.35	582.1	10.2	582.4	23.0	583.5	105.2	582.1	10.2
AMA15-27	80	34998	1.0	16.4478	7.5	0.8385	7.7	0.1	1.7	0.22	614.5	9.7	618.3	35.5	632.1	161.2	614.5	9.7
AMA15-44	132	34626	2.4	16.3402	3.3	0.8666	3.6	0.1027	1.4	0.38	630.2	8.1	633.7	16.9	646.3	71.4	630.2	8.1
AMA15-93	195	67819	2.2	16.264	3.1	0.9011	3.6	0.1063	1.9	0.52	651.1	11.8	652.3	17.4	656.3	66.1	651.1	11.8
AMA15-88	70	21298	0.7	16.4594	6.2	0.891	6.5	0.1064	1.9	0.30	651.6	12.0	646.9	30.9	630.6	132.6	651.6	12.0
AMA15-74	1463	73293	1.2	15.8377	2.1	0.942	7.0	0.1082	6.7	0.96	662.3	42.3	673.9	34.6	712.9	43.6	662.3	42.3
AMA15-31	72	24673	3.0	13.986	3.9	1.631	4.4	0.1654	2.1	0.48	987.0	19.6	982.2	27.9	971.7	79.2	971.7	79.2
AMA15-57	99	65094	1.6	13.9572	2.0	1.6859	2.2	0.1707	1.1	0.48	1015.8	10.2	1003.2	14.3	975.9	40.1	975.9	40.1
AMA15-3	163	78957	2.2	13.8612	1.4	1.5838	1.9	0.1592	1.4	0.71	952.5	12.1	963.9	12.0	990.0	27.6	990.0	27.6
AMA15-72	45	24354	2.2	13.8021	4.6	1.757	5.4	0.1759	2.8	0.52	1044.4	27.1	1029.7	34.8	998.7	93.0	998.7	93.0
AMA15-7	136	93183	3.1	13.7629	1.2	1.7335	1.8	0.173	1.4	0.74	1028.8	12.9	1021.1	11.8	1004.4	25.1	1004.4	25.1

AMA15-58	343	196058	1.0	13.6643	0.8	1.7281	1.1	0.1713	0.7	0.66	1019.0	7.0	1019.0	7.2	1019.0	17.1	1019.0	17.1
AMA15-14	46	16508	2.2	13.4874	7.1	1.7943	7.5	0.1755	2.5	0.33	1042.4	23.6	1043.4	48.7	1045.4	142.4	1045.4	142.4
AMA15-6	362	689852	44.6	12.62	0.6	2.1669	1.5	0.1983	1.4	0.91	1166.4	15.0	1170.5	10.7	1178.1	12.6	1178.1	12.6
AMA15-28	407	171899	1.8	11.7483	0.4	2.5029	1.2	0.2133	1.1	0.94	1246.2	12.2	1272.9	8.3	1318.2	7.7	1318.2	7.7
AMA15-37	61	32246	2.4	11.744	3.3	2.6761	3.5	0.2279	1.1	0.31	1323.7	13.1	1321.9	25.9	1318.9	64.6	1318.9	64.6
AMA15-34	759	580959	4.8	11.5244	0.4	2.7477	1.7	0.2297	1.6	0.98	1332.7	19.5	1341.5	12.3	1355.4	6.8	1355.4	6.8
AMA15-75	420	167595	3.6	11.1796	0.6	2.248	4.2	0.1823	4.2	0.99	1079.4	41.3	1196.2	29.5	1413.8	10.9	1413.8	10.9
AMA15-59	833	3981	2.9	10.9804	1.0	2.5615	5.9	0.204	5.8	0.99	1196.7	63.8	1289.7	43.3	1448.1	19.2	1448.1	19.2
AMA15-51	210	95426	2.1	10.9202	0.6	3.2392	1.3	0.2565	1.2	0.88	1472.1	15.3	1466.6	10.3	1458.5	11.8	1458.5	11.8
AMA15-5	108	94050	0.5	10.6809	1.3	3.3801	1.8	0.2618	1.2	0.69	1499.2	16.6	1499.8	14.0	1500.5	24.4	1500.5	24.4
AMA15-90	230	287158	1.8	10.5331	0.3	3.5677	1.4	0.2725	1.3	0.97	1553.7	18.5	1542.4	10.9	1526.8	6.1	1526.8	6.1
AMA15-17	251	320582	1.8	10.5226	0.7	3.6103	2.3	0.2755	2.1	0.95	1568.8	29.9	1551.8	18.0	1528.7	13.5	1528.7	13.5
AMA15-71	553	380493	3.1	10.3666	0.3	3.7062	1.2	0.2787	1.2	0.98	1584.6	16.9	1572.7	9.9	1556.8	5.1	1556.8	5.1
AMA15-23	143	167312	1.9	9.3786	0.6	4.6347	0.8	0.3153	0.6	0.69	1766.5	8.9	1755.5	6.9	1742.5	11.0	1742.5	11.0
AMA15-11	465	328389	1.7	9.3101	0.3	4.6801	1.0	0.316	1.0	0.97	1770.2	15.3	1763.7	8.6	1755.9	4.9	1755.9	4.9
AMA15-4	128	108396	0.9	8.1251	0.6	6.1488	3.9	0.3623	3.9	0.99	1993.3	66.9	1997.2	34.5	2001.3	10.0	2001.3	10.0
AMA15-56	230	107986	2.9	7.9444	0.3	5.7578	1.8	0.3318	1.8	0.98	1846.9	29.0	1940.1	15.9	2041.1	5.7	2041.1	5.7
AMA15-67	207	86929	1.1	7.8264	0.3	6.463	1.3	0.3669	1.2	0.98	2014.6	21.5	2040.9	11.2	2067.5	4.9	2067.5	4.9
AMA15-32	149	78605	0.8	7.7438	0.6	6.5675	1.5	0.3688	1.4	0.93	2024.0	24.8	2055.0	13.5	2086.2	9.7	2086.2	9.7

				Isotope Ratios								Apparent Ages						
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb */ ^{207}Pb*	± (%)	^{207}Pb */ ^{235}U*	± (%)	^{206}Pb */ ^{238}U	± (%)	Error Conc	^{206}Pb */ ^{207}Pb*	± (Ma)	^{207}Pb */ ^{235}U*	± (Ma)	^{206}Pb */ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
AMA16-70	483	50322	1.8	18.9173	1.9	0.3649	2.2	0.0501	1.2	0.52	314.9	3.6	315.8	6.1	322.9	43.4	314.9	3.6
AMA16-31	294	63150	1.3	18.6015	2.9	0.3859	3.1	0.0521	1.0	0.33	327.2	3.3	331.4	8.7	361.0	65.7	327.2	3.3
AMA16-30	340	30068	3.4	18.3374	3.5	0.4588	4.0	0.061	1.9	0.48	381.8	7.0	383.4	12.6	393.1	78.0	381.8	7.0
AMA16-37	300	22299	2.3	18.2744	2.9	0.4703	3.2	0.0623	1.3	0.40	389.8	4.9	391.4	10.4	400.8	65.7	389.8	4.9
AMA16-14	331	96274	3.9	18.5607	3.1	0.4683	3.8	0.063	2.1	0.55	394.1	7.9	390.0	12.2	365.9	70.7	394.1	7.9
AMA16-48	487	47557	4.0	18.5469	2.4	0.4759	2.7	0.064	1.1	0.40	400.0	4.1	395.3	8.7	367.6	55.0	400.0	4.1
AMA16-61	532	62086	2.2	18.308	1.7	0.4939	3.0	0.0656	2.5	0.83	409.5	9.9	407.6	10.1	396.7	38.1	409.5	9.9
AMA16-27	539	111425	1.2	18.0771	1.8	0.501	2.2	0.0657	1.2	0.56	410.1	4.8	412.3	7.4	425.1	40.3	410.1	4.8
AMA16-36	474	59403	0.6	17.8503	2.1	0.5093	2.3	0.0659	0.9	0.41	411.6	3.7	418.0	7.8	453.2	46.2	411.6	3.7
AMA16-33	345	68680	1.3	18.0619	1.8	0.5061	2.4	0.0663	1.6	0.67	413.8	6.4	415.8	8.2	427.0	40.2	413.8	6.4
AMA16-29	299	53570	0.8	17.8472	2.5	0.5126	2.9	0.0664	1.5	0.52	414.1	6.2	420.2	10.1	453.6	55.7	414.1	6.2
AMA16-66	349	47930	2.3	18.1731	3.1	0.5046	3.5	0.0665	1.6	0.45	415.1	6.4	414.8	12.0	413.3	70.3	415.1	6.4
AMA16-24	319	50379	2.5	17.6639	1.6	0.5216	2.7	0.0668	2.1	0.79	417.0	8.5	426.2	9.3	476.5	36.4	417.0	8.5
AMA16-22	340	57751	1.6	18.4616	1.6	0.4993	1.7	0.0669	0.6	0.33	417.2	2.3	411.2	5.9	378.0	36.8	417.2	2.3
AMA16-82	159	13424	1.0	19.0126	5.0	0.4856	5.3	0.067	1.6	0.30	417.8	6.5	401.9	17.5	311.4	114.3	417.8	6.5

AMA16-16	337	94090	1.8	18.1699	2.1	0.5101	2.2	0.0672	0.9	0.39	419.4	3.6	418.5	7.7	413.7	45.8	419.4	3.6
AMA16-72	268	72024	2.4	18.1947	1.8	0.5125	2.1	0.0676	1.1	0.51	421.9	4.3	420.2	7.1	410.6	40.0	421.9	4.3
AMA16-5	393	60885	1.8	18.2344	2.9	0.5128	3.0	0.0678	1.0	0.32	423.0	4.0	420.3	10.4	405.7	63.8	423.0	4.0
AMA16-6	430	59209	1.2	18.1167	2.8	0.5171	9.8	0.0679	9.4	0.96	423.7	38.8	423.2	34.1	420.2	61.6	423.7	38.8
AMA16-8	319	52947	1.4	18.1463	1.7	0.5172	2.2	0.0681	1.4	0.63	424.5	5.8	423.3	7.7	416.6	38.6	424.5	5.8
AMA16-12	245	73303	1.1	18.5427	2.9	0.5112	3.3	0.0687	1.7	0.50	428.6	6.9	419.3	11.4	368.1	64.9	428.6	6.9
AMA16-65	219	29739	3.0	17.74	2.1	0.5379	2.5	0.0692	1.4	0.55	431.3	5.7	437.0	8.9	467.0	46.2	431.3	5.7
AMA16-77	444	60293	2.5	18.2077	1.7	0.5254	2.1	0.0694	1.2	0.58	432.4	5.0	428.7	7.2	409.0	37.3	432.4	5.0
AMA16-38	468	32131	0.8	17.2649	8.1	0.5562	8.6	0.0696	2.7	0.32	434.0	11.3	449.0	31.1	526.8	178.4	434.0	11.3
AMA16-19	624	64849	0.9	18.1742	0.9	0.5344	2.2	0.0704	2.0	0.92	438.8	8.5	434.7	7.8	413.1	19.5	438.8	8.5
AMA16-32	125	14727	2.3	18.2479	7.6	0.5435	7.9	0.0719	2.3	0.30	447.8	10.2	440.8	28.3	404.1	169.6	447.8	10.2
AMA16-18	447	76340	1.0	17.9495	1.5	0.5601	1.9	0.0729	1.1	0.59	453.7	4.9	451.6	7.0	440.9	34.5	453.7	4.9
AMA16-92	192	34015	2.9	18.4688	4.1	0.5449	4.4	0.073	1.4	0.32	454.1	6.2	441.6	15.7	377.1	93.3	454.1	6.2
AMA16-2	509	101088	4.2	17.5901	1.8	0.575	3.1	0.0734	2.5	0.82	456.3	11.0	461.2	11.3	485.7	38.8	456.3	11.0
AMA16-46	680	138361	1.1	17.7711	1.1	0.5829	3.4	0.0751	3.2	0.95	467.0	14.6	466.3	12.8	463.1	23.6	467.0	14.6
AMA16-75	236	47888	5.2	17.4937	3.3	0.6311	3.6	0.0801	1.3	0.35	496.6	6.0	496.8	14.0	497.8	73.7	496.6	6.0
AMA16-35	392	24983	0.6	16.4653	2.1	0.6878	6.6	0.0821	6.2	0.95	508.9	30.4	531.5	27.2	629.8	45.9	508.9	30.4
AMA16-44	185	43117	0.7	17.4943	3.2	0.6654	4.8	0.0844	3.6	0.74	522.5	17.8	517.9	19.5	497.8	71.5	522.5	17.8
AMA16-4	220	46201	1.6	17.0329	3.2	0.6895	3.4	0.0852	1.2	0.35	527.0	5.9	532.5	14.0	556.3	69.4	527.0	5.9
AMA16-62	155	32118	1.5	17.9294	5.5	0.6696	5.7	0.0871	1.4	0.24	538.2	7.2	520.4	23.2	443.4	122.9	538.2	7.2
AMA16-10	707	128822	0.2	17.0769	1.1	0.7041	1.4	0.0872	0.8	0.61	539.0	4.3	541.3	5.7	550.7	23.4	539.0	4.3
AMA16-95	266	61408	2.5	17.293	2.5	0.7051	3.1	0.0884	1.8	0.59	546.3	9.6	541.8	12.9	523.2	54.5	546.3	9.6
AMA16-54	676	235797	0.7	17.0619	0.9	0.7193	1.5	0.089	1.2	0.78	549.7	6.1	550.2	6.3	552.7	20.0	549.7	6.1
AMA16-64	100	27379	1.7	16.764	6.2	0.739	6.4	0.0898	1.5	0.24	554.6	8.1	561.8	27.8	590.9	135.6	554.6	8.1
AMA16-89	163	38389	0.8	16.916	3.7	0.7328	4.0	0.0899	1.6	0.39	555.0	8.3	558.2	17.2	571.4	80.4	555.0	8.3
AMA16-9	180	59581	6.6	16.7872	1.8	0.7543	2.1	0.0918	1.2	0.57	566.4	6.6	570.7	9.3	588.0	38.1	566.4	6.6
AMA16-39	88	19146	1.2	17.3362	5.7	0.731	5.9	0.0919	1.6	0.27	566.8	8.5	557.1	25.3	517.7	125.0	566.8	8.5
AMA16-53	69	21209	1.6	17.7534	7.0	0.7179	7.5	0.0924	2.6	0.35	569.9	14.4	549.4	31.7	465.3	154.8	569.9	14.4
AMA16-56	326	83587	1.0	17.0941	1.3	0.7473	3.4	0.0927	3.1	0.92	571.2	17.1	566.7	14.7	548.5	28.2	571.2	17.1
AMA16-40	75	16357	1.4	17.0234	8.3	0.7566	8.7	0.0934	2.6	0.30	575.7	14.2	572.1	38.2	557.6	181.9	575.7	14.2
AMA16-94	64	9662	0.7	16.6402	9.6	0.79	9.9	0.0953	2.1	0.21	587.1	11.6	591.2	44.2	607.0	209.0	587.1	11.6
AMA16-80	164	53501	1.1	16.5993	2.6	0.8288	2.7	0.0998	0.9	0.32	613.1	5.1	612.9	12.5	612.3	55.4	613.1	5.1
AMA16-93	127	67875	1.3	16.529	4.3	0.8606	4.5	0.1032	1.5	0.32	633.0	8.8	630.5	21.2	621.5	92.4	633.0	8.8
AMA16-50	494	71078	0.9	16.6964	1.0	0.8563	1.5	0.1037	1.2	0.75	636.0	7.0	628.1	7.2	599.7	22.0	636.0	7.0
AMA16-28	119	33034	2.9	16.757	4.9	0.8539	5.0	0.1038	1.1	0.21	636.5	6.5	626.8	23.5	591.9	106.3	636.5	6.5
AMA16-42	150	42404	1.3	16.2312	3.4	0.8901	3.7	0.1048	1.4	0.38	642.4	8.6	646.4	17.5	660.6	72.7	642.4	8.6
AMA16-43	457	112774	2.2	16.5143	1.0	0.8758	1.3	0.1049	0.8	0.61	643.1	4.9	638.7	6.2	623.4	22.5	643.1	4.9
AMA16-45	222	41968	4.1	16.0007	5.8	0.9315	7.0	0.1081	4.0	0.56	661.7	24.9	668.4	34.4	691.2	123.9	661.7	24.9
AMA16-76	218	52994	0.6	16.405	1.6	0.9112	2.0	0.1084	1.2	0.61	663.5	7.5	657.7	9.5	637.7	33.4	663.5	7.5

AMA16-88	95	16204	1.6	16.15	5.0	0.9381	5.1	0.1099	1.2	0.23	672.1	7.4	671.9	25.2	671.3	106.9	672.1	7.4
AMA16-73	767	266372	1.9	15.8125	0.5	1.0236	3.4	0.1174	3.4	0.99	715.5	23.0	715.7	17.6	716.3	11.3	715.5	23.0
AMA16-25	314	128951	2.0	15.2722	1.6	1.1194	2.6	0.124	2.1	0.80	753.5	14.9	762.7	14.1	789.7	33.5	753.5	14.9
AMA16-57	184	82954	1.0	15.2941	2.2	1.1788	2.5	0.1308	1.2	0.47	792.2	8.9	790.7	13.9	786.7	46.8	792.2	8.9
AMA16-85	52	11256	1.2	15.3912	5.8	1.2535	6.3	0.1399	2.4	0.39	844.2	19.4	825.0	35.4	773.4	121.4	844.2	19.4
AMA16-7	41	25621	1.0	14.0742	4.5	1.6606	5.2	0.1695	2.6	0.50	1009.4	24.2	993.6	32.8	958.9	91.8	958.9	91.8
AMA16-84	406	174769	19.8	14.0031	0.8	1.6585	1.2	0.1684	0.8	0.70	1003.5	7.5	992.8	7.3	969.3	16.8	969.3	16.8
AMA16-87	60	16968	3.4	13.8197	4.5	1.7268	4.6	0.1731	1.1	0.23	1029.1	10.2	1018.6	29.6	996.1	90.9	996.1	90.9
AMA16-60	99	53719	2.8	13.5126	1.9	1.853	2.1	0.1816	0.9	0.41	1075.7	8.7	1064.5	14.1	1041.6	39.2	1041.6	39.2
AMA16-78	134	67581	2.2	13.3138	2.0	1.9052	2.3	0.184	1.2	0.50	1088.6	11.6	1082.9	15.3	1071.5	40.0	1071.5	40.0
AMA16-47	296	60052	2.3	13.2398	0.8	1.9897	1.3	0.1911	1.0	0.79	1127.1	10.5	1112.0	8.7	1082.6	15.8	1082.6	15.8
AMA16-52	266	137013	1.9	12.551	0.9	2.2544	1.2	0.2052	0.8	0.64	1203.3	8.5	1198.2	8.5	1189.0	18.4	1189.0	18.4
AMA16-68	128	40762	3.3	12.551	1.1	2.2268	1.7	0.2027	1.3	0.78	1189.8	14.1	1189.5	11.7	1189.0	20.7	1189.0	20.7
AMA16-71	525	141322	2.9	12.4974	0.5	2.1173	1.4	0.1919	1.3	0.92	1131.7	13.2	1154.4	9.5	1197.4	10.4	1197.4	10.4
AMA16-90	83	39804	2.2	12.457	1.5	2.3988	2.3	0.2167	1.7	0.74	1264.5	19.2	1242.2	16.1	1203.8	29.7	1203.8	29.7
AMA16-15	94	73845	2.3	12.441	2.6	2.3526	2.7	0.2123	0.7	0.26	1240.9	8.0	1228.3	19.3	1206.3	51.5	1206.3	51.5
AMA16-83	32	20015	2.3	12.4157	4.5	2.1825	5.7	0.1965	3.6	0.63	1156.7	38.1	1175.5	39.9	1210.3	87.8	1210.3	87.8
AMA16-1	209	182795	1.1	11.83	0.8	2.6111	1.0	0.224	0.6	0.61	1303.1	7.3	1303.8	7.5	1304.8	15.6	1304.8	15.6
AMA16-13	151	71953	2.4	11.7635	0.9	2.6045	1.7	0.2222	1.4	0.84	1293.5	17.0	1301.9	12.6	1315.7	17.8	1315.7	17.8
AMA16-58	161	62653	3.2	11.183	1.1	2.8354	1.6	0.23	1.2	0.75	1334.3	14.8	1365.0	12.3	1413.2	20.7	1413.2	20.7
AMA16-59	271	141652	3.2	10.7372	1.1	3.1924	3.9	0.2486	3.7	0.96	1431.3	47.6	1455.3	29.9	1490.6	20.8	1490.6	20.8
AMA16-69	564	214308	2.9	10.7287	0.3	3.3142	1.0	0.2579	0.9	0.96	1479.0	12.2	1484.4	7.5	1492.1	5.1	1492.1	5.1
AMA16-41	170	48136	1.2	9.2639	0.7	4.6811	1.4	0.3145	1.2	0.86	1762.9	18.6	1763.9	11.8	1765.0	13.3	1765.0	13.3
AMA16-67	171	172865	2.0	8.8908	0.9	5.2506	2.1	0.3386	1.9	0.91	1879.8	31.1	1860.9	17.8	1839.8	15.6	1839.8	15.6
AMA16-63	147	6997	1.3	8.6324	2.4	4.9741	5.0	0.3114	4.4	0.88	1747.7	67.7	1814.9	42.4	1893.0	42.4	1893.0	42.4
AMA16-86	209	195257	0.5	7.961	0.4	6.1621	1.1	0.3558	1.1	0.92	1962.2	18.0	1999.1	10.0	2037.4	7.8	2037.4	7.8
AMA16-74	355	221101	2.7	7.909	0.4	6.0522	1.5	0.3472	1.5	0.97	1921.0	24.4	1983.4	13.2	2049.0	6.4	2049.0	6.4
AMA16-23	112	110309	9.5	7.699	0.4	6.7355	0.7	0.3761	0.6	0.82	2058.0	9.9	2077.3	6.1	2096.4	7.0	2096.4	7.0
AMA16-91	142	110118	1.4	7.598	0.5	7.0904	1.4	0.3907	1.3	0.94	2126.2	24.4	2122.8	12.7	2119.6	8.4	2119.6	8.4
AMA16-21	163	82536	1.8	7.494	0.4	7.3652	2.6	0.4003	2.5	0.99	2170.5	46.5	2156.8	22.9	2143.7	7.5	2143.7	7.5
AMA16-81	172	110062	1.8	7.1376	0.4	8.0357	1.2	0.416	1.1	0.94	2242.2	21.1	2235.0	10.7	2228.5	6.7	2228.5	6.7

				Isotope Ratios									Apparent Ages					
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HMA19-93	102	29388.7	1.9	16.14387	3.1	0.8596	3.3	0.10065	1.0	0.30	618.2	5.7	629.9	15.4	672.2	67.0	618.2	5.7
HMA19-37	70	32700.9	2.4	14.8541	4.3	1.35412	5.0	0.14588	2.4	0.49	877.8	20.0	869.3	29.0	847.7	90.1	877.8	20.0
HMA19-80	70	20644	3.4	14.63539	2.4	1.46884	2.7	0.15591	1.2	0.46	934.0	10.8	917.6	16.3	878.5	49.7	878.5	49.7

HMA19-84	45	18860.7	1.5	14.55921	4.8	1.53674	4.9	0.16227	1.3	0.27	969.4	11.9	945.2	30.5	889.3	98.6	889.3	98.6
HMA19-76	233	93658.2	3.5	14.22054	1.3	1.50346	1.4	0.15506	0.5	0.33	929.3	4.0	931.8	8.6	937.7	27.2	937.7	27.2
HMA19-64	217	55646.8	2.0	14.15891	0.8	1.52666	1.2	0.15677	0.9	0.75	938.8	7.8	941.2	7.4	946.6	16.4	946.6	16.4
HMA19-51	237	72107.8	1.9	14.09952	0.6	1.56634	1.3	0.16017	1.1	0.87	957.7	10.2	957.0	8.1	955.2	13.0	955.2	13.0
HMA19-53	30	11482.8	1.3	14.06604	9.6	1.54028	10.0	0.15713	2.7	0.27	940.8	23.8	946.6	61.6	960.1	196.9	960.1	196.9
HMA19-35	68	17147.2	1.2	13.98775	2.8	1.64691	3.1	0.16708	1.3	0.43	996.0	12.3	988.4	19.5	971.5	56.8	971.5	56.8
HMA19-77	103	38304.5	5.5	13.96556	1.4	1.6783	2.0	0.16999	1.4	0.70	1012.1	12.9	1000.3	12.5	974.7	28.6	974.7	28.6
HMA19-27	656	28562.6	5.0	13.94576	0.8	1.52686	3.6	0.15443	3.5	0.97	925.8	30.5	941.2	22.3	977.6	17.1	977.6	17.1
HMA19-5	400	122351	2.6	13.9302	0.4	1.63828	1.4	0.16552	1.3	0.95	987.4	12.4	985.1	8.9	979.9	8.6	979.9	8.6
HMA19-32	173	100180	3.7	13.87359	1.8	1.7001	1.8	0.17107	0.4	0.21	1018.0	3.6	1008.6	11.5	988.2	35.8	988.2	35.8
HMA19-50	88	18825.8	1.1	13.83596	2.8	1.72037	7.6	0.17264	7.1	0.93	1026.6	67.4	1016.2	49.0	993.7	57.0	993.7	57.0
HMA19-38	859	241358	5.6	13.81416	0.4	1.65577	2.0	0.16589	2.0	0.98	989.4	18.3	991.8	12.9	996.9	8.1	996.9	8.1
HMA19-52	82	34103.7	2.5	13.79666	2.9	1.73787	3.2	0.1739	1.3	0.41	1033.5	12.3	1022.7	20.5	999.5	59.1	999.5	59.1
HMA19-26	166	53553.9	2.5	13.78847	1.7	1.7042	1.8	0.17043	0.8	0.44	1014.5	7.6	1010.1	11.8	1000.7	33.5	1000.7	33.5
HMA19-59	219	76927.5	2.7	13.77422	1.0	1.63213	1.8	0.16305	1.5	0.84	973.7	13.9	982.7	11.5	1002.8	19.9	1002.8	19.9
HMA19-81	684	112670	4.4	13.77338	0.5	1.70586	1.0	0.17041	0.9	0.87	1014.3	8.1	1010.7	6.4	1002.9	9.8	1002.9	9.8
HMA19-63	70	39187.7	2.5	13.7641	4.6	1.72948	4.7	0.17265	0.9	0.20	1026.7	9.0	1019.6	30.3	1004.3	93.6	1004.3	93.6
HMA19-46	313	201119	3.6	13.73843	0.6	1.72615	1.0	0.17199	0.7	0.73	1023.1	6.6	1018.3	6.1	1008.1	13.1	1008.1	13.1
HMA19-86	384	120667	2.2	13.70231	0.7	1.72347	1.2	0.17128	1.0	0.83	1019.1	9.2	1017.3	7.6	1013.4	13.5	1013.4	13.5
HMA19-71	113	43279.8	6.3	13.68351	2.2	1.7121	2.3	0.16991	0.6	0.27	1011.6	5.8	1013.1	14.9	1016.2	45.5	1016.2	45.5
HMA19-57	271	106594	3.1	13.68309	0.6	1.77993	1.2	0.17664	1.0	0.84	1048.6	9.6	1038.2	7.7	1016.2	13.1	1016.2	13.1
HMA19-100	76	27756.5	2.9	13.68078	3.1	1.70595	3.4	0.16927	1.4	0.41	1008.1	13.1	1010.8	22.1	1016.6	63.8	1016.6	63.8
HMA19-14	298	87322.6	3.4	13.65135	0.9	1.72752	1.4	0.17104	1.0	0.74	1017.8	9.7	1018.8	9.0	1020.9	19.2	1020.9	19.2
HMA19-36	202	64420.7	1.8	13.64531	0.8	1.73013	1.6	0.17122	1.4	0.88	1018.8	13.6	1019.8	10.5	1021.8	15.4	1021.8	15.4
HMA19-1	93	58856.9	1.6	13.62847	3.2	1.71669	3.5	0.16968	1.3	0.38	1010.4	12.4	1014.8	22.2	1024.3	64.8	1024.3	64.8
HMA19-96	179	84733	3.0	13.62093	1.1	1.80993	3.4	0.1788	3.2	0.94	1060.4	31.0	1049.1	22.0	1025.5	22.6	1025.5	22.6
HMA19-70	205	80706	2.7	13.60816	1.0	1.7187	2.2	0.16963	2.0	0.88	1010.1	18.2	1015.5	14.2	1027.3	21.1	1027.3	21.1
HMA19-19	1078	156217	4.0	13.58439	0.3	1.71659	1.6	0.16912	1.5	0.98	1007.3	14.4	1014.8	10.1	1030.9	6.1	1030.9	6.1
HMA19-85	146	65409.9	5.1	13.57597	1.6	1.8629	2.3	0.18342	1.7	0.73	1085.7	16.9	1068.0	15.2	1032.1	31.6	1032.1	31.6
HMA19-54	210	58639.8	2.7	13.53741	1.5	1.82117	3.3	0.17881	2.9	0.89	1060.5	28.6	1053.1	21.5	1037.9	29.9	1037.9	29.9
HMA19-47	110	33922.7	2.7	13.51809	1.3	1.77215	1.7	0.17375	1.1	0.64	1032.7	10.2	1035.3	10.9	1040.8	26.1	1040.8	26.1
HMA19-75	74	33897.8	2.6	13.15582	1.2	2.01937	2.3	0.19268	2.0	0.86	1135.9	21.0	1122.0	15.9	1095.4	23.9	1095.4	23.9
HMA19-49	117	49854.8	1.3	13.06033	2.3	1.97032	2.6	0.18663	1.3	0.49	1103.1	13.0	1105.4	17.5	1109.9	45.3	1109.9	45.3
HMA19-29	66	25492.7	2.9	13.02551	2.8	2.12039	3.1	0.20031	1.3	0.42	1177.0	13.9	1155.5	21.1	1115.3	55.2	1115.3	55.2
HMA19-16	104	36456.7	2.9	13.02279	2.2	2.0037	3.3	0.18925	2.5	0.75	1117.3	25.6	1116.8	22.6	1115.7	44.1	1115.7	44.1
HMA19-4	1008	68885	2.3	12.93252	1.0	2.14135	5.9	0.20085	5.8	0.99	1179.9	62.6	1162.3	40.8	1129.6	18.9	1129.6	18.9

HMA19-21	151	94299.9	2.5	12.89946	2.1	2.06425	2.8	0.19312	1.9	0.67	1138.3	19.4	1137.0	19.0	1134.6	40.8	1134.6	40.8
HMA19-8	775	257820	4.6	12.88991	0.4	2.05225	0.9	0.19186	0.8	0.89	1131.4	8.2	1133.0	6.1	1136.2	8.0	1136.2	8.0
HMA19-72	439	36661	1.3	12.7869	0.6	2.16761	10.0	0.20102	10.0	1.00	1180.8	107.9	1170.7	69.7	1152.1	11.0	1152.1	11.0
HMA19-34	254	116962	2.4	12.76436	1.2	2.15672	1.4	0.19966	0.8	0.56	1173.5	8.5	1167.2	9.8	1155.6	23.1	1155.6	23.1
HMA19-2	1434	65306.4	40.4	12.74422	0.3	2.01444	1.5	0.18619	1.5	0.98	1100.7	15.3	1120.4	10.5	1158.7	5.8	1158.7	5.8
HMA19-95	140	67463.1	2.4	12.74311	1.5	2.31047	2.7	0.21354	2.2	0.83	1247.6	24.9	1215.5	18.9	1158.9	29.8	1158.9	29.8
HMA19-23	362	240391	3.0	12.68597	0.5	2.17127	1.1	0.19977	1.0	0.89	1174.1	10.7	1171.9	7.8	1167.8	10.3	1167.8	10.3
HMA19-60	150	96311.4	3.5	12.67014	1.0	2.17604	1.3	0.19996	0.8	0.63	1175.1	8.9	1173.4	9.2	1170.3	20.5	1170.3	20.5
HMA19-48	107	99705	2.7	12.66789	1.9	2.14825	2.0	0.19737	0.8	0.39	1161.2	8.4	1164.5	14.1	1170.6	37.0	1170.6	37.0
HMA19-41	123	54869.7	2.0	12.66128	1.2	2.17298	1.5	0.19954	0.9	0.60	1172.9	9.8	1172.4	10.5	1171.7	23.8	1171.7	23.8
HMA19-98	550	529613	4.1	12.65636	0.5	2.2186	1.1	0.20365	1.0	0.90	1194.9	11.1	1186.9	7.9	1172.4	10.0	1172.4	10.0
HMA19-90	731	277327	30.0	12.65367	0.2	2.10066	1.1	0.19278	1.1	0.98	1136.4	11.1	1149.0	7.5	1172.9	4.1	1172.9	4.1
HMA19-67	818	138382	13.2	12.646	0.3	2.13508	0.7	0.19582	0.6	0.89	1152.8	6.5	1160.2	4.8	1174.1	6.2	1174.1	6.2
HMA19-17	81	24657.6	2.7	12.63318	2.6	2.16965	3.1	0.19879	1.7	0.55	1168.8	18.0	1171.4	21.3	1176.1	50.8	1176.1	50.8
HMA19-99	202	143924	3.1	12.62106	0.6	2.22624	2.0	0.20378	1.9	0.95	1195.6	20.5	1189.3	13.9	1178.0	12.4	1178.0	12.4
HMA19-6	426	225263	3.4	12.62005	0.5	2.21108	1.0	0.20238	0.9	0.87	1188.1	9.4	1184.6	6.9	1178.1	9.6	1178.1	9.6
HMA19-31	100	71386.9	2.6	12.59066	2.3	2.19993	2.6	0.20089	1.1	0.43	1180.1	11.8	1181.0	18.0	1182.7	46.1	1182.7	46.1
HMA19-3	174	109544	1.3	12.57808	1.3	2.21184	1.7	0.20177	1.2	0.68	1184.8	12.5	1184.8	11.9	1184.7	24.8	1184.7	24.8
HMA19-40	57	33052.9	1.5	12.56643	4.3	2.09073	4.5	0.19055	1.4	0.32	1124.4	14.9	1145.8	31.1	1186.5	84.8	1186.5	84.8
HMA19-66	195	196519	1.5	12.56528	0.8	2.29762	1.6	0.20939	1.4	0.88	1225.6	15.6	1211.6	11.3	1186.7	15.2	1186.7	15.2
HMA19-56	141	92733.3	2.9	12.55127	0.9	2.20253	1.5	0.2005	1.2	0.80	1178.0	12.9	1181.8	10.5	1188.9	17.8	1188.9	17.8
HMA19-61	117	51616.1	1.6	12.42865	1.0	2.28499	2.7	0.20597	2.5	0.93	1207.3	28.0	1207.7	19.3	1208.3	19.4	1208.3	19.4
HMA19-88	173	115349	2.1	12.37101	1.2	2.20689	2.0	0.19801	1.7	0.81	1164.6	17.6	1183.2	14.3	1217.4	23.7	1217.4	23.7
HMA19-43	159	72097.1	1.6	12.31187	1.6	2.37011	2.6	0.21164	2.0	0.79	1237.5	22.9	1233.6	18.4	1226.8	30.8	1226.8	30.8
HMA19-82	103	43129.4	1.2	12.30456	1.4	2.33853	1.8	0.20869	1.1	0.62	1221.8	12.8	1224.1	13.1	1228.0	28.2	1228.0	28.2
HMA19-15	103	91707.9	3.1	12.25508	1.7	2.44163	2.3	0.21702	1.5	0.67	1266.1	17.6	1255.0	16.5	1235.9	33.3	1235.9	33.3
HMA19-45	362	243252	6.4	12.21557	0.4	2.44055	1.4	0.21622	1.3	0.96	1261.9	15.3	1254.6	10.0	1242.2	7.1	1242.2	7.1
HMA19-39	95	68075.3	3.3	12.18068	1.9	2.39438	2.0	0.21153	0.5	0.28	1236.9	6.2	1240.9	14.1	1247.8	36.9	1247.8	36.9
HMA19-12	306	151454	3.2	11.90309	0.7	2.51207	1.6	0.21687	1.4	0.89	1265.3	15.8	1275.5	11.3	1292.8	14.0	1292.8	14.0
HMA19-87	29	10659.2	2.4	11.89013	4.4	2.71486	4.7	0.23412	1.6	0.35	1356.0	19.7	1332.5	34.7	1294.9	85.4	1294.9	85.4
HMA19-7	249	35784.1	6.0	11.78081	1.1	2.27525	3.3	0.1944	3.1	0.95	1145.2	32.4	1204.6	23.0	1312.9	20.4	1312.9	20.4
HMA19-97	119	126687	1.1	11.69948	1.0	2.69404	1.8	0.2286	1.5	0.83	1327.1	17.8	1326.8	13.2	1326.3	19.3	1326.3	19.3
HMA19-30	203	75092.4	3.8	11.67094	0.8	2.65523	1.9	0.22475	1.8	0.91	1306.9	20.7	1316.1	14.3	1331.0	15.9	1331.0	15.9
HMA19-25	76	56488.5	1.4	11.61916	1.3	2.77694	4.2	0.23401	4.0	0.95	1355.5	49.0	1349.4	31.4	1339.6	24.4	1339.6	24.4
HMA19-62	84	44475.7	1.8	11.43954	1.8	2.76749	2.4	0.22961	1.6	0.68	1332.5	19.8	1346.8	18.1	1369.7	34.3	1369.7	34.3
HMA19-13	590	339795	12.2	11.27754	1.7	2.58632	5.9	0.21154	5.6	0.95	1237.0	63.0	1296.8	43.0	1397.1	33.5	1397.1	33.5

HMA19-22	399	207352	15.1	11.07306	0.7	2.95167	3.3	0.23705	3.3	0.98	1371.3	40.2	1395.3	25.3	1432.1	13.9	1432.1	13.9
HMA19-79	116	67118.6	1.9	11.01534	1.5	3.14993	2.5	0.25165	2.0	0.80	1447.0	25.5	1445.0	19.1	1442.0	28.6	1442.0	28.6
HMA19-58	146	39076.9	1.4	10.91728	0.7	3.2606	2.3	0.25817	2.2	0.95	1480.5	29.2	1471.7	18.0	1459.0	13.3	1459.0	13.3
HMA19-74	148	62633.3	1.6	10.83577	1.3	3.20861	2.5	0.25216	2.2	0.85	1449.6	28.0	1459.2	19.6	1473.3	25.2	1473.3	25.2
HMA19-92	120	39349	3.2	10.77042	1.8	3.45612	2.5	0.26997	1.8	0.72	1540.7	25.0	1517.3	20.1	1484.7	33.7	1484.7	33.7
HMA19-44	386	419789	2.4	10.70287	0.3	3.45279	1.0	0.26802	0.9	0.96	1530.8	12.8	1516.5	7.7	1496.7	5.5	1496.7	5.5
HMA19-83	79	40242.1	1.5	10.66574	2.0	3.54504	2.3	0.27423	1.3	0.54	1562.2	17.6	1537.3	18.6	1503.2	37.3	1503.2	37.3
HMA19-91	80	26821.6	2.8	10.66391	1.0	3.40747	2.2	0.26354	2.0	0.88	1507.9	26.2	1506.1	17.4	1503.6	19.8	1503.6	19.8
HMA19-78	109	53452.3	1.6	10.60383	1.6	3.14796	2.0	0.2421	1.3	0.62	1397.6	15.8	1444.5	15.7	1514.2	30.3	1514.2	30.3
HMA19-10	429	134625	6.1	10.56513	0.3	3.42309	0.8	0.2623	0.8	0.93	1501.6	10.4	1509.7	6.6	1521.1	6.0	1521.1	6.0
HMA19-68	154	171790	0.9	10.53907	1.4	3.68923	1.7	0.28199	0.9	0.54	1601.4	12.9	1569.0	13.5	1525.8	26.7	1525.8	26.7
HMA19-89	393	74701.7	2.5	10.50871	0.9	3.19579	1.7	0.24357	1.5	0.85	1405.2	18.4	1456.1	13.2	1531.2	17.0	1531.2	17.0
HMA19-42	194	115254	1.8	10.47092	1.0	3.60167	1.2	0.27352	0.7	0.59	1558.6	9.9	1549.9	9.6	1538.0	18.4	1538.0	18.4
HMA19-20	335	166748	2.5	10.41677	0.4	3.59321	1.0	0.27147	0.9	0.93	1548.2	12.3	1548.0	7.6	1547.7	6.6	1547.7	6.6
HMA19-18	111	117444	2.7	10.09443	1.2	3.89718	1.5	0.28532	0.9	0.63	1618.1	13.5	1613.1	12.1	1606.6	21.6	1606.6	21.6
HMA19-55	720	67638.1	1.3	9.862895	0.3	3.85246	3.0	0.27558	3.0	1.00	1569.0	41.2	1603.8	23.9	1649.7	5.3	1649.7	5.3
HMA19-11	501	39396.6	1.8	9.814208	0.5	3.84716	4.3	0.27384	4.3	0.99	1560.3	59.0	1602.7	34.6	1658.9	9.2	1658.9	9.2
HMA19-73	30	15121.6	2.5	9.777619	2.6	4.46973	4.0	0.31697	3.0	0.76	1774.9	46.8	1725.4	33.0	1665.8	48.0	1665.8	48.0
HMA19-9	196	118330	1.5	9.76371	0.9	4.20504	3.6	0.29777	3.5	0.96	1680.3	51.2	1675.0	29.5	1668.4	17.5	1668.4	17.5
HMA19-24	258	156176	2.1	9.664885	0.4	4.25949	0.8	0.29857	0.7	0.86	1684.2	9.6	1685.6	6.2	1687.2	7.2	1687.2	7.2
HMA19-28	295	189441	1.6	9.619809	0.4	4.33686	0.8	0.30258	0.7	0.87	1704.1	10.9	1700.4	6.9	1695.8	7.6	1695.8	7.6
HMA19-69	297	304611	2.4	8.66191	0.5	5.46346	2.0	0.34323	1.9	0.97	1902.2	32.1	1894.9	17.2	1886.9	8.1	1886.9	8.1

				Isotope Ratios							Apparent Ages							
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb */ ^{207}Pb*	± (%)	^{207}Pb */ ^{235}U*	± (%)	^{206}Pb */ ^{238}U	± (%)	Error Conc	^{206}Pb */ ^{207}Pb*	± (Ma)	^{207}Pb */ ^{235}U*	± (Ma)	^{206}Pb */ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
PAA47B-34	221	37781.2	1.3	18.35816	4.8	0.46877	5.8	0.06241	3.1	0.54	390.3	11.9	390.3	18.7	390.6	108.6	390.3	11.9
PAA47B-59	57	11924.7	0.6	17.25503	13.3	0.7065	13.5	0.08842	2.3	0.17	546.2	12.0	542.7	56.8	528.0	292.8	546.2	12.0
PAA47B-65	158	34556.1	1.1	17.50807	4.4	0.69685	4.8	0.08849	1.7	0.36	546.6	9.0	536.9	19.8	496.0	97.8	546.6	9.0
PAA47B-87	397	73685.1	2.0	16.7629	1.2	0.82031	2.1	0.09973	1.6	0.80	612.8	9.6	608.2	9.4	591.1	27.1	612.8	9.6
PAA47B-72	68	30656.2	1.2	15.54211	5.6	1.18349	5.8	0.13341	1.4	0.25	807.3	10.9	792.9	31.7	752.8	117.7	807.3	10.9
PAA47B-74	55	27291.2	2.1	14.54551	3.4	1.49588	3.7	0.15781	1.5	0.40	944.6	12.8	928.7	22.4	891.3	69.8	891.3	69.8
PAA47B-54	94	35948.1	2.4	14.40404	3.2	1.48236	4.9	0.15486	3.7	0.76	928.1	32.4	923.2	29.8	911.4	65.5	911.4	65.5
PAA47B-3	54	38856.8	2.1	14.30333	5.6	1.58797	5.8	0.16473	1.3	0.22	983.0	11.7	965.5	35.9	925.8	115.3	925.8	115.3
PAA47B-24	77	21253.8	1.3	14.27174	1.5	1.55516	2.0	0.16097	1.3	0.65	962.2	11.4	952.5	12.2	930.4	30.8	930.4	30.8
PAA47B-17	327	96159.2	2.4	14.20942	1.3	1.43771	1.9	0.14817	1.4	0.71	890.7	11.3	904.8	11.4	939.3	27.2	939.3	27.2

PAA47B-47	44	18610.5	1.5	14.20285	6.7	1.62452	7.4	0.16734	3.1	0.41	997.4	28.3	979.7	46.6	940.3	138.4	940.3	138.4
PAA47B-29	50	37305.9	2.4	14.18328	5.3	1.67784	5.6	0.17259	2.0	0.35	1026.4	19.0	1000.2	35.9	943.1	108.2	943.1	108.2
PAA47B-22	57	17244.6	5.1	14.1772	6.1	1.66363	6.2	0.17106	1.3	0.20	1017.9	11.8	994.8	39.2	944.0	124.1	944.0	124.1
PAA47B-98	50	20952.2	2.5	14.1519	6.0	1.68361	6.2	0.1728	1.6	0.25	1027.5	14.9	1002.3	39.6	947.6	123.2	947.6	123.2
PAA47B-50	171	75739.7	3.3	14.09523	1.6	1.6186	2.1	0.16547	1.4	0.65	987.1	12.4	977.4	13.2	955.8	32.8	955.8	32.8
PAA47B-23	191	73149.7	3.4	13.99108	1.7	1.60589	2.5	0.16295	1.9	0.75	973.2	17.1	972.5	15.9	971.0	34.5	971.0	34.5
PAA47B-79	87	24368.8	2.1	13.93899	2.5	1.68129	2.7	0.16997	1.1	0.40	1011.9	10.2	1001.5	17.4	978.6	50.9	978.6	50.9
PAA47B-82	130	114178	3.4	13.92005	1.9	1.62144	2.2	0.1637	1.0	0.46	977.3	9.0	978.5	13.6	981.4	39.1	981.4	39.1
PAA47B-32	147	61269.1	2.9	13.91415	1.9	1.71581	2.1	0.17315	0.7	0.36	1029.4	7.1	1014.5	13.3	982.3	39.4	982.3	39.4
PAA47B-30	90	32721.3	4.0	13.89922	4.3	1.75554	4.5	0.17697	1.4	0.31	1050.4	13.7	1029.2	29.1	984.4	87.0	984.4	87.0
PAA47B-73	283	117565	1.9	13.89421	0.7	1.65606	1.2	0.16688	1.0	0.83	994.9	9.3	991.9	7.8	985.1	14.0	985.1	14.0
PAA47B-76	164	62872.1	1.4	13.80335	1.5	1.67526	1.9	0.16771	1.3	0.65	999.5	11.6	999.2	12.4	998.5	30.2	998.5	30.2
PAA47B-86	236	104209	3.2	13.79823	1.5	1.66897	1.8	0.16702	0.9	0.50	995.7	8.2	996.8	11.3	999.2	31.4	999.2	31.4
PAA47B-45	254	74566.8	2.0	13.79529	1.0	1.63719	1.6	0.16381	1.2	0.75	977.9	10.9	984.6	10.0	999.7	21.1	999.7	21.1
PAA47B-84	126	50511.7	3.5	13.7835	1.8	1.69889	2.0	0.16983	0.9	0.45	1011.2	8.3	1008.1	12.7	1001.4	36.1	1001.4	36.1
PAA47B-14	396	183203	2.3	13.78125	0.6	1.68435	1.8	0.16835	1.7	0.94	1003.0	15.4	1002.6	11.3	1001.7	12.5	1001.7	12.5
PAA47B-77	86	54023.8	2.8	13.7626	1.7	1.72249	2.1	0.17193	1.3	0.60	1022.7	12.1	1017.0	13.6	1004.5	34.4	1004.5	34.4
PAA47B-36	247	88370.8	3.7	13.75671	1.1	1.72935	2.0	0.17254	1.6	0.82	1026.1	15.5	1019.5	12.9	1005.4	23.3	1005.4	23.3
PAA47B-2	80	28760.2	2.4	13.74945	3.7	1.68201	4.1	0.16773	1.8	0.42	999.6	16.3	1001.7	26.3	1006.4	76.0	1006.4	76.0
PAA47B-75	547	20549.9	6.0	13.74612	0.9	1.66562	1.6	0.16606	1.4	0.83	990.3	12.4	995.5	10.4	1006.9	18.8	1006.9	18.8
PAA47B-55	294	118805	2.3	13.74435	1.1	1.7476	1.4	0.17421	0.8	0.59	1035.2	8.0	1026.3	9.1	1007.2	23.0	1007.2	23.0
PAA47B-69	355	122090	2.6	13.73043	0.5	1.70253	1.0	0.16954	0.8	0.83	1009.6	7.4	1009.5	6.1	1009.2	11.0	1009.2	11.0
PAA47B-61	247	53530.8	3.8	13.66674	0.9	1.70582	1.3	0.16908	1.0	0.75	1007.1	9.2	1010.7	8.4	1018.7	17.5	1018.7	17.5
PAA47B-21	109	29889.4	3.6	13.65612	2.7	1.67792	3.1	0.16619	1.4	0.46	991.1	13.0	1000.2	19.4	1020.2	54.8	1020.2	54.8
PAA47B-94	92	24795.1	1.9	13.64506	2.1	1.67013	2.6	0.16528	1.4	0.56	986.1	13.2	997.2	16.4	1021.9	43.3	1021.9	43.3
PAA47B-68	156	54980.4	1.9	13.64224	1.8	1.75438	2.0	0.17358	0.7	0.35	1031.8	6.4	1028.8	12.6	1022.3	37.1	1022.3	37.1
PAA47B-93	211	115913	3.3	13.6407	1.1	1.75896	1.6	0.17402	1.1	0.70	1034.2	10.8	1030.5	10.4	1022.5	23.0	1022.5	23.0
PAA47B-7	53	13816.1	8.0	13.63928	4.1	1.70982	4.2	0.16914	1.2	0.28	1007.4	10.9	1012.2	27.2	1022.7	82.5	1022.7	82.5
PAA47B-91	63	17307.2	2.7	13.6324	4.5	1.74976	4.7	0.173	1.5	0.32	1028.6	14.2	1027.1	30.6	1023.7	90.8	1023.7	90.8
PAA47B-60	234	105543	1.4	13.62104	0.9	1.74184	1.4	0.17207	1.1	0.80	1023.5	10.9	1024.1	9.3	1025.4	17.5	1025.4	17.5
PAA47B-12	172	76416.2	2.1	13.61115	1.2	1.78226	1.7	0.17594	1.2	0.72	1044.8	11.7	1039.0	10.9	1026.9	23.4	1026.9	23.4
PAA47B-96	226	76051.8	3.5	13.60831	1.2	1.74488	1.4	0.17221	0.8	0.59	1024.3	8.0	1025.3	9.2	1027.3	23.3	1027.3	23.3
PAA47B-9	72	41703.8	2.9	13.58314	3.2	1.75252	3.4	0.17265	1.3	0.39	1026.7	12.6	1028.1	22.3	1031.1	64.4	1031.1	64.4
PAA47B-33	94	56910.8	2.4	13.56047	2.8	1.74287	3.0	0.17141	1.2	0.40	1019.9	11.3	1024.5	19.5	1034.4	56.2	1034.4	56.2
PAA47B-43	356	144320	38.1	13.54189	0.9	1.77433	1.4	0.17427	1.1	0.80	1035.6	11.0	1036.1	9.4	1037.2	17.6	1037.2	17.6
PAA47B-16	116	26470.5	3.3	13.50283	2.7	1.74284	2.9	0.17068	1.1	0.39	1015.9	10.8	1024.5	18.9	1043.0	54.4	1043.0	54.4

PAA47B-6	212	104896	1.4	13.49684	0.7	1.80639	1.3	0.17682	1.0	0.81	1049.6	10.1	1047.8	8.4	1043.9	15.1	1043.9	15.1
PAA47B-81	357	385392	3.2	13.47664	0.5	1.8079	1.5	0.17671	1.4	0.94	1049.0	13.8	1048.3	9.9	1047.0	10.0	1047.0	10.0
PAA47B-51	452	329531	5.0	13.4702	0.7	1.77896	1.0	0.1738	0.6	0.65	1033.0	6.0	1037.8	6.3	1048.0	14.9	1048.0	14.9
PAA47B-20	1071	807526	16.3	13.44899	0.3	1.80536	0.7	0.1761	0.7	0.89	1045.6	6.3	1047.4	4.8	1051.1	6.8	1051.1	6.8
PAA47B-83	177	24357.8	3.5	13.42842	1.2	1.67559	2.1	0.16319	1.7	0.81	974.5	15.1	999.3	13.1	1054.2	24.0	1054.2	24.0
PAA47B-88	75	21031.2	2.5	13.42021	3.2	1.70379	3.4	0.16583	1.2	0.36	989.1	11.3	1010.0	22.0	1055.5	64.8	1055.5	64.8
PAA47B-46	63	35976.5	2.3	13.40994	3.9	1.75656	4.4	0.17084	2.1	0.47	1016.7	19.6	1029.6	28.5	1057.0	78.2	1057.0	78.2
PAA47B-92	67	30343.4	2.6	13.38292	3.7	1.7998	3.9	0.17469	1.1	0.28	1037.9	10.4	1045.4	25.3	1061.1	74.9	1061.1	74.9
PAA47B-53	160	22739.3	1.9	13.37651	2.3	1.78357	3.9	0.17303	3.2	0.82	1028.8	30.7	1039.5	25.7	1062.0	45.6	1062.0	45.6
PAA47B-35	41	12169.3	2.1	13.34229	5.1	1.73456	5.7	0.16785	2.5	0.44	1000.2	23.0	1021.4	36.5	1067.2	102.3	1067.2	102.3
PAA47B-5	233	72393.1	2.6	13.26162	0.6	1.89514	1.4	0.18228	1.3	0.92	1079.4	13.1	1079.4	9.6	1079.3	11.5	1079.3	11.5
PAA47B-62	287	46842.6	1.6	13.25254	0.6	1.81603	2.2	0.17455	2.1	0.96	1037.1	20.6	1051.3	14.6	1080.7	12.4	1080.7	12.4
PAA47B-13	389	120814	1.6	13.21645	0.7	1.86604	1.3	0.17887	1.1	0.85	1060.8	11.0	1069.1	8.8	1086.2	14.2	1086.2	14.2
PAA47B-11	104	98340.5	1.5	13.15191	2.2	1.96394	2.5	0.18733	1.2	0.47	1106.9	11.8	1103.2	16.6	1096.0	43.7	1096.0	43.7
PAA47B-95	68	26285.8	2.0	13.12856	3.9	1.86481	4.1	0.17756	1.1	0.27	1053.6	11.0	1068.7	27.2	1099.5	79.1	1099.5	79.1
PAA47B-28	70	16092	1.7	13.04731	3.4	2.0131	4.6	0.1905	3.1	0.67	1124.1	31.8	1119.9	31.4	1111.9	68.9	1111.9	68.9
PAA47B-37	279	180331	5.7	13.02578	1.5	1.84861	2.9	0.17464	2.5	0.86	1037.6	24.1	1062.9	19.2	1115.2	29.6	1115.2	29.6
PAA47B-57	169	62617.6	3.4	13.0256	0.8	1.97357	1.5	0.18644	1.3	0.87	1102.1	13.4	1106.5	10.3	1115.3	15.2	1115.3	15.2
PAA47B-18	36	10641.1	2.6	12.98033	8.4	1.78102	8.6	0.16767	2.0	0.23	999.3	18.1	1038.6	56.1	1122.2	167.6	1122.2	167.6
PAA47B-10	57	19974	2.1	12.9079	3.5	2.06188	3.8	0.19303	1.6	0.43	1137.8	17.0	1136.2	26.1	1133.4	68.8	1133.4	68.8
PAA47B-63	63	25030.5	2.7	12.83099	1.8	2.00703	2.3	0.18677	1.4	0.61	1103.9	14.2	1117.9	15.6	1145.3	36.3	1145.3	36.3
PAA47B-15	76	52508.8	1.8	12.75911	3.6	2.14907	3.8	0.19887	1.2	0.31	1169.2	12.3	1164.8	26.0	1156.4	70.8	1156.4	70.8
PAA47B-38	72	40399.3	4.2	12.73903	1.1	2.19029	1.4	0.20237	0.9	0.66	1188.0	10.2	1178.0	9.8	1159.5	20.9	1159.5	20.9
PAA47B-90	91	49040.4	2.4	12.70995	1.7	2.26257	2.6	0.20857	2.0	0.77	1221.2	22.7	1200.7	18.6	1164.0	33.3	1164.0	33.3
PAA47B-40	92	31840.3	2.9	12.61505	2.9	2.24139	3.1	0.20507	1.0	0.32	1202.5	11.0	1194.1	21.8	1178.9	58.2	1178.9	58.2
PAA47B-41	313	250046	7.6	12.59295	0.9	2.18462	1.3	0.19953	0.9	0.70	1172.8	9.5	1176.2	8.9	1182.4	18.2	1182.4	18.2
PAA47B-26	231	128857	3.1	12.45271	1.0	2.29093	1.4	0.20691	1.0	0.74	1212.3	11.6	1209.5	10.0	1204.4	18.8	1204.4	18.8
PAA47B-71	140	83148.6	4.3	12.34437	1.3	2.3561	2.5	0.21094	2.1	0.86	1233.8	23.6	1229.4	17.5	1221.6	24.7	1221.6	24.7
PAA47B-39	129	100315	4.5	12.29276	1.0	2.32608	2.6	0.20738	2.4	0.92	1214.9	26.8	1220.3	18.7	1229.9	20.5	1229.9	20.5
PAA47B-66	325	148990	3.8	12.15301	0.3	2.4295	1.2	0.21414	1.2	0.96	1250.8	13.6	1251.4	9.0	1252.3	6.7	1252.3	6.7
PAA47B-99	177	86318.7	2.5	12.13618	1.3	2.46489	2.0	0.21696	1.6	0.79	1265.8	18.5	1261.8	14.8	1255.0	24.6	1255.0	24.6
PAA47B-27	338	282687	2.7	11.7973	0.5	2.63109	1.2	0.22512	1.1	0.90	1308.9	12.9	1309.4	8.9	1310.2	10.4	1310.2	10.4
PAA47B-52	205	114048	2.2	11.69794	0.5	2.72906	1.0	0.23154	0.9	0.86	1342.6	10.5	1336.4	7.5	1326.5	10.1	1326.5	10.1
PAA47B-25	168	82430	3.1	11.69684	1.0	2.64818	1.5	0.22465	1.1	0.71	1306.4	12.7	1314.1	11.1	1326.7	20.3	1326.7	20.3
PAA47B-97	141	125450	2.4	11.6156	1.0	2.7463	1.4	0.23136	0.9	0.67	1341.6	11.0	1341.1	10.1	1340.2	19.4	1340.2	19.4
PAA47B-56	515	98726.7	3.4	11.52188	4.6	2.36537	5.5	0.19766	3.1	0.56	1162.7	32.8	1232.2	39.4	1355.8	88.2	1355.8	88.2

PAA47B-64	135	92058.7	1.0	11.39598	1.1	2.88943	1.3	0.23882	0.7	0.51	1380.5	8.1	1379.2	9.7	1377.0	21.3	1377.0	21.3
PAA47B-4	55	31626.1	2.6	11.33912	2.9	3.04336	3.2	0.25028	1.3	0.40	1439.9	16.3	1418.6	24.3	1386.6	56.0	1386.6	56.0
PAA47B-48	151	76116.7	3.6	11.0268	1.7	3.02822	4.4	0.24218	4.0	0.92	1398.0	50.6	1414.8	33.4	1440.0	32.7	1440.0	32.7
PAA47B-44	218	109881	2.8	11.0061	0.7	3.04452	1.5	0.24302	1.4	0.91	1402.4	17.6	1418.9	11.8	1443.6	12.5	1443.6	12.5
PAA47B-1	253	110699	3.4	10.63493	1.0	3.535	1.7	0.27266	1.4	0.83	1554.3	19.9	1535.1	13.7	1508.7	18.0	1508.7	18.0
PAA47B-80	340	229281	2.5	10.56194	0.4	3.51641	1.4	0.26937	1.3	0.95	1537.6	18.3	1530.9	11.1	1521.7	8.4	1521.7	8.4
PAA47B-67	535	206194	2.0	10.40917	0.2	3.63277	1.1	0.27425	1.0	0.98	1562.4	14.5	1556.7	8.5	1549.1	3.8	1549.1	3.8
PAA47B-85	287	156062	1.9	10.37051	0.4	3.69232	0.8	0.27771	0.7	0.85	1579.8	9.9	1569.7	6.7	1556.1	8.4	1556.1	8.4
PAA47B-89	177	155514	1.5	10.06507	0.5	3.93333	1.1	0.28713	1.0	0.89	1627.2	14.3	1620.6	9.1	1612.0	9.7	1612.0	9.7
PAA47B-19	193	82490	2.4	9.815354	0.8	4.07979	2.5	0.29043	2.4	0.95	1643.7	34.4	1650.3	20.4	1658.7	14.3	1658.7	14.3
PAA47B-70	592	289910	1.9	9.639322	0.2	4.33052	0.9	0.30275	0.9	0.96	1704.9	13.3	1699.2	7.6	1692.1	4.5	1692.1	4.5
PAA47B-31	403	202956	3.6	9.350706	1.1	4.70561	2.7	0.31912	2.5	0.91	1785.4	38.9	1768.2	22.9	1748.0	20.2	1748.0	20.2
PAA47B-42	237	182977	1.6	7.615659	0.4	7.17062	0.9	0.39606	0.9	0.92	2150.9	15.7	2132.9	8.3	2115.5	6.2	2115.5	6.2

				Isotope Ratios									Apparent Ages					
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HMA17-94	88	20559	0.4	17.21726	9.2	0.69378	9.3	0.08663	1.6	0.17	535.6	8.0	535.1	38.8	532.9	201.5	535.6	8.0
HMA17-76	237	113557	1.4	17.45359	4.0	0.68741	4.2	0.08702	1.2	0.29	537.9	6.2	531.2	17.2	502.9	87.6	537.9	6.2
HMA17-18	256	69622.8	1.1	16.95287	2.7	0.71728	3.1	0.08819	1.4	0.46	544.8	7.4	549.1	13.1	566.6	59.7	544.8	7.4
HMA17-59	1656	268671	1.4	17.03317	0.5	0.71561	1.0	0.0884	0.8	0.83	546.1	4.2	548.1	4.1	556.3	11.9	546.1	4.2
HMA17-91	124	21259.1	1.2	17.48442	4.6	0.69755	5.0	0.08846	2.0	0.40	546.4	10.4	537.3	20.8	499.0	100.7	546.4	10.4
HMA17-4	290	42831.6	1.0	17.03091	3.1	0.72336	3.4	0.08935	1.4	0.42	551.7	7.6	552.6	14.7	556.6	68.2	551.7	7.6
HMA17-26	69	10584.3	1.2	17.18605	10.3	0.76786	10.5	0.09571	2.2	0.21	589.2	12.5	578.5	46.5	536.8	225.7	589.2	12.5
HMA17-57	369	53836.4	2.7	16.63916	1.1	0.81814	1.4	0.09873	0.8	0.62	607.0	4.9	607.0	6.2	607.1	22.9	607.0	4.9
HMA17-31	304	65200	6.1	16.41503	1.4	0.83337	1.6	0.09922	0.7	0.42	609.8	3.9	615.5	7.3	636.4	30.8	609.8	3.9
HMA17-100	334	119251	0.5	16.71836	1.2	0.8268	1.9	0.10025	1.5	0.78	615.9	8.6	611.8	8.6	596.9	25.0	615.9	8.6
HMA17-28	351	141965	5.1	16.33837	1.5	0.85388	1.9	0.10118	1.1	0.58	621.3	6.6	626.8	8.9	646.5	33.0	621.3	6.6
HMA17-30	66	15920.6	1.0	16.78985	6.8	0.83248	6.9	0.10137	1.4	0.21	622.4	8.6	615.0	31.9	587.6	146.7	622.4	8.6
HMA17-24	93	25518.5	1.2	16.93501	4.7	0.82932	4.9	0.10186	1.4	0.29	625.3	8.3	613.2	22.6	568.9	102.2	625.3	8.3
HMA17-54	313	38725.4	1.3	16.41147	1.0	0.85806	1.8	0.10213	1.5	0.83	626.9	8.9	629.1	8.5	636.9	21.8	626.9	8.9
HMA17-64	59	12631.7	0.4	16.33461	8.1	0.86258	8.2	0.10219	1.3	0.15	627.2	7.5	631.5	38.4	647.0	173.4	627.2	7.5
HMA17-70	271	61215.3	2.0	16.578	1.0	0.85132	1.9	0.10236	1.7	0.86	628.2	9.9	625.4	9.0	615.1	21.6	628.2	9.9
HMA17-79	212	61328.8	1.1	16.78131	3.8	0.842	4.1	0.10248	1.3	0.33	628.9	8.1	620.2	18.8	588.7	83.1	628.9	8.1
HMA17-13	1763	399951	4.3	16.4613	0.2	0.86074	0.8	0.10276	0.7	0.97	630.6	4.5	630.5	3.6	630.4	4.3	630.6	4.5
HMA17-87	78	20598	1.2	16.70127	4.4	0.85339	5.1	0.10337	2.6	0.51	634.1	15.7	626.5	23.7	599.1	94.5	634.1	15.7

HMA17-22	285	71963.9	1.3	16.41887	1.3	0.86902	1.7	0.10348	1.2	0.69	634.8	7.2	635.0	8.2	635.9	27.2	634.8	7.2
HMA17-46	302	87885.9	1.9	16.33676	1.2	0.87833	1.4	0.10407	0.9	0.59	638.2	5.2	640.1	6.9	646.7	25.1	638.2	5.2
HMA17-86	120	25177.7	1.0	16.75724	5.2	0.86375	5.4	0.10498	1.6	0.30	643.5	10.0	632.2	25.4	591.8	111.7	643.5	10.0
HMA17-63	427	69548.1	2.0	16.17975	1.0	0.9051	1.5	0.10621	1.1	0.75	650.7	7.0	654.5	7.3	667.4	21.2	650.7	7.0
HMA17-52	326	159136	0.5	16.45399	1.7	0.89769	2.0	0.10713	1.0	0.51	656.0	6.2	650.5	9.4	631.3	36.4	656.0	6.2
HMA17-88	1075	395261	3.7	16.12997	0.6	0.92174	1.2	0.10783	1.0	0.88	660.1	6.6	663.3	5.8	674.0	11.9	660.1	6.6
HMA17-27	771	196703	2.6	16.15164	0.7	0.92174	1.7	0.10798	1.6	0.91	661.0	9.9	663.3	8.5	671.1	15.7	661.0	9.9
HMA17-14	360	53192.1	0.5	16.1469	1.1	0.93072	2.2	0.10899	1.8	0.85	666.9	11.6	668.0	10.6	671.8	24.3	666.9	11.6
HMA17-47	193	65282.1	8.6	16.31355	1.4	0.92352	1.6	0.10927	0.9	0.53	668.5	5.4	664.2	7.8	649.7	29.1	668.5	5.4
HMA17-62	846	278055	1.3	16.10264	0.6	0.93712	1.3	0.10944	1.2	0.89	669.5	7.4	671.4	6.4	677.6	12.6	669.5	7.4
HMA17-77	519	174408	4.7	16.01972	0.7	1.00042	3.2	0.11624	3.1	0.98	708.9	21.1	704.0	16.3	688.7	14.9	708.9	21.1
HMA17-41	277	93120.5	2.6	15.74817	1.4	1.01813	1.6	0.11629	0.8	0.47	709.2	5.1	713.0	8.3	725.0	30.4	709.2	5.1
HMA17-49	1479	414449	1.9	15.69943	0.3	1.05313	0.8	0.11991	0.8	0.93	730.1	5.3	730.4	4.3	731.6	6.4	730.1	5.3
HMA17-43	94	24388	1.6	15.9577	4.7	1.08615	4.8	0.12571	0.9	0.18	763.3	6.3	746.6	25.2	696.9	99.9	763.3	6.3
HMA17-89	383	131253	10.0	15.30095	1.2	1.19804	2.5	0.13295	2.2	0.87	804.7	16.3	799.7	13.7	785.8	25.1	804.7	16.3
HMA17-71	322	72694.1	12.0	13.86903	0.8	1.61878	1.0	0.16283	0.5	0.53	972.5	4.8	977.5	6.3	988.9	17.2	988.9	17.2
HMA17-74	198	176921	2.3	13.26891	0.9	1.82757	1.6	0.17588	1.3	0.80	1044.4	12.3	1055.4	10.4	1078.2	19.0	1078.2	19.0
HMA17-3	127	48574.8	1.3	13.02171	2.0	2.00325	2.2	0.18919	0.9	0.40	1117.0	9.2	1116.6	15.1	1115.9	40.7	1115.9	40.7
HMA17-17	162	91590.4	2.3	12.8613	1.0	2.08149	3.2	0.19416	3.0	0.95	1143.9	31.5	1142.7	21.8	1140.6	20.2	1140.6	20.2
HMA17-99	178	72264.1	2.6	12.85692	1.2	2.04358	1.9	0.19056	1.5	0.79	1124.4	15.7	1130.2	13.2	1141.2	23.8	1141.2	23.8
HMA17-95	216	135681	2.7	12.70221	0.7	2.13958	1.4	0.19711	1.2	0.86	1159.8	12.6	1161.7	9.5	1165.2	14.0	1165.2	14.0
HMA17-96	311	148406	7.7	12.70053	1.0	2.01362	2.2	0.18548	1.9	0.89	1096.8	19.6	1120.1	14.7	1165.5	19.2	1165.5	19.2
HMA17-42	71	40135	2.4	12.57726	2.6	2.22875	3.1	0.2033	1.7	0.54	1193.0	18.2	1190.1	21.5	1184.8	50.8	1184.8	50.8
HMA17-58	93	53244.5	3.6	12.5608	1.6	2.12116	2.8	0.19324	2.4	0.84	1138.9	24.8	1155.7	19.6	1187.4	30.9	1187.4	30.9
HMA17-98	164	63282.9	3.7	12.55818	1.1	2.21345	2.6	0.2016	2.4	0.91	1183.9	25.6	1185.3	18.2	1187.8	21.0	1187.8	21.0
HMA17-2	74	42241.4	1.6	12.48459	2.6	2.17619	2.9	0.19705	1.2	0.42	1159.4	13.0	1173.5	20.1	1199.4	51.6	1199.4	51.6
HMA17-92	281	141127	3.5	12.47531	0.5	2.24347	1.3	0.20299	1.2	0.91	1191.4	13.0	1194.7	9.2	1200.9	10.4	1200.9	10.4
HMA17-19	159	111326	3.3	12.46034	1.1	2.27239	1.7	0.20536	1.2	0.73	1204.0	13.2	1203.8	11.7	1203.2	22.5	1203.2	22.5
HMA17-50	930	275870	2.5	12.44093	0.2	2.2923	1.0	0.20683	1.0	0.98	1211.9	10.6	1209.9	6.9	1206.3	3.4	1206.3	3.4
HMA17-32	169	88730.3	2.2	12.42516	1.0	2.21095	1.5	0.19924	1.1	0.73	1171.2	11.6	1184.5	10.4	1208.8	20.1	1208.8	20.1
HMA17-37	200	69392.8	2.6	12.41971	1.4	2.3113	2.3	0.20819	1.8	0.79	1219.2	20.4	1215.8	16.5	1209.7	28.3	1209.7	28.3
HMA17-7	314	112351	2.8	12.37238	0.4	2.2596	2.2	0.20276	2.2	0.98	1190.1	23.8	1199.8	15.7	1217.2	8.6	1217.2	8.6
HMA17-6	291	79370.1	3.9	12.33281	0.7	2.25366	1.0	0.20158	0.6	0.64	1183.8	6.6	1197.9	6.7	1223.5	14.5	1223.5	14.5
HMA17-78	139	52700.2	3.0	12.30607	1.0	2.36764	1.7	0.21132	1.4	0.81	1235.8	15.4	1232.9	12.1	1227.7	19.5	1227.7	19.5
HMA17-36	286	167006	1.8	12.27584	0.7	2.40206	1.5	0.21386	1.3	0.89	1249.4	15.2	1243.2	10.8	1232.6	13.7	1232.6	13.7
HMA17-56	342	120260	3.1	12.25051	0.5	2.3902	1.1	0.21237	1.0	0.88	1241.4	10.8	1239.7	7.8	1236.7	10.1	1236.7	10.1

HMA17-34	260	193395	1.7	12.23203	1.0	2.30818	1.6	0.20477	1.3	0.81	1200.9	14.6	1214.8	11.6	1239.6	18.8	1239.6	18.8
HMA17-85	261	239178	3.5	12.2249	0.9	2.35385	1.5	0.2087	1.1	0.78	1221.9	12.7	1228.7	10.4	1240.7	17.7	1240.7	17.7
HMA17-55	83	32762.4	1.6	12.15698	1.4	2.43107	1.6	0.21435	0.8	0.49	1251.9	9.2	1251.8	11.7	1251.7	27.8	1251.7	27.8
HMA17-73	297	21821.2	3.5	12.13285	1.4	2.33385	2.5	0.20537	2.1	0.84	1204.1	22.8	1222.7	17.7	1255.6	26.7	1255.6	26.7
HMA17-84	519	171965	5.8	11.57578	1.5	2.48245	2.0	0.20842	1.4	0.69	1220.4	15.4	1266.9	14.5	1346.8	28.0	1346.8	28.0
HMA17-61	889	436123	7.7	11.38201	0.4	2.68366	1.1	0.22154	1.1	0.94	1290.0	12.5	1324.0	8.4	1379.4	7.3	1379.4	7.3
HMA17-8	16	10643.4	2.1	11.32414	6.8	2.96722	7.7	0.2437	3.5	0.46	1405.9	44.5	1399.3	58.2	1389.2	130.6	1389.2	130.6
HMA17-80	21	17863.7	0.4	11.04542	6.7	3.34016	7.0	0.26758	2.0	0.29	1528.5	27.7	1490.5	54.8	1436.8	127.9	1436.8	127.9
HMA17-67	108	58637.3	2.3	11.03568	1.5	3.23315	1.6	0.25878	0.4	0.27	1483.6	5.7	1465.1	12.4	1438.5	29.5	1438.5	29.5
HMA17-44	22	9109.6	1.1	10.93374	7.2	3.39399	8.2	0.26914	3.9	0.47	1536.4	52.8	1503.0	64.4	1456.2	137.8	1456.2	137.8
HMA17-20	78	34328.6	1.8	10.86373	1.7	3.16724	3.2	0.24955	2.7	0.85	1436.2	35.1	1449.2	24.7	1468.4	31.6	1468.4	31.6
HMA17-11	318	220647	3.1	10.67755	0.8	3.25998	1.2	0.25246	1.0	0.78	1451.1	12.6	1471.6	9.7	1501.1	14.7	1501.1	14.7
HMA17-35	220	125972	1.0	10.62714	0.7	3.39485	0.9	0.26166	0.7	0.70	1498.3	8.8	1503.2	7.3	1510.1	12.6	1510.1	12.6
HMA17-60	107	57769.1	2.6	10.61999	1.3	3.47781	1.9	0.26787	1.3	0.70	1530.0	17.8	1522.2	14.7	1511.4	25.1	1511.4	25.1
HMA17-93	254	207703	2.1	10.61065	0.5	3.3908	1.0	0.26094	0.9	0.90	1494.7	12.2	1502.3	8.0	1513.0	8.6	1513.0	8.6
HMA17-90	282	345415	1.4	10.59124	0.4	3.43426	0.7	0.2638	0.6	0.85	1509.3	8.2	1512.3	5.6	1516.5	7.1	1516.5	7.1
HMA17-38	343	121951	4.4	10.55528	0.7	3.52255	6.6	0.26967	6.5	0.99	1539.1	89.2	1532.3	51.9	1522.9	13.9	1522.9	13.9
HMA17-29	86	50755.2	2.2	10.54425	1.1	3.3823	2.4	0.25866	2.1	0.88	1483.0	27.3	1500.3	18.5	1524.8	21.5	1524.8	21.5
HMA17-1	227	126032	2.3	10.49852	0.7	3.53263	1.0	0.26898	0.7	0.70	1535.6	9.6	1534.6	7.9	1533.0	13.5	1533.0	13.5
HMA17-75	88	71411.5	1.8	10.49017	1.8	3.50796	2.3	0.26689	1.4	0.60	1525.0	18.5	1529.0	18.0	1534.5	34.5	1534.5	34.5
HMA17-72	206	193417	3.1	10.47798	0.7	3.59197	1.5	0.27297	1.4	0.88	1555.8	18.8	1547.8	12.3	1536.7	13.8	1536.7	13.8
HMA17-15	347	158269	2.6	10.44319	0.5	3.5752	0.7	0.27079	0.4	0.62	1544.8	5.7	1544.0	5.3	1543.0	9.9	1543.0	9.9
HMA17-65	215	89797.2	2.3	10.43846	0.4	3.57564	1.1	0.2707	1.0	0.94	1544.4	13.8	1544.1	8.4	1543.8	6.6	1543.8	6.6
HMA17-23	90	49811	1.9	10.42955	1.3	3.58011	1.9	0.27081	1.3	0.72	1544.9	18.5	1545.1	14.9	1545.4	24.4	1545.4	24.4
HMA17-21	722	727929	2.5	10.41275	0.3	3.58033	0.6	0.27039	0.6	0.91	1542.8	7.8	1545.2	5.0	1548.5	4.9	1548.5	4.9
HMA17-48	542	198310	3.1	10.40804	0.2	3.57709	0.9	0.27002	0.9	0.97	1540.9	11.7	1544.5	7.0	1549.3	4.3	1549.3	4.3
HMA17-40	368	290811	3.0	10.38589	0.3	3.62543	0.9	0.27309	0.8	0.93	1556.5	11.2	1555.1	6.9	1553.3	6.0	1553.3	6.0
HMA17-33	462	292507	5.4	10.35566	0.2	3.58894	1.2	0.26955	1.2	0.99	1538.5	16.9	1547.1	9.9	1558.8	3.7	1558.8	3.7
HMA17-12	550	186220	3.2	10.33491	0.3	3.67757	0.9	0.27566	0.9	0.96	1569.4	12.1	1566.5	7.2	1562.5	4.9	1562.5	4.9
HMA17-16	443	222986	2.1	10.29502	0.2	3.67554	0.7	0.27444	0.7	0.95	1563.3	9.4	1566.1	5.7	1569.8	4.4	1569.8	4.4
HMA17-53	321	205215	2.2	10.26778	0.4	3.66632	0.9	0.27303	0.8	0.91	1556.1	11.7	1564.1	7.4	1574.8	7.0	1574.8	7.0
HMA17-10	232	35299.7	2.2	10.17845	3.3	3.75726	5.6	0.27736	4.6	0.81	1578.1	64.3	1583.7	45.3	1591.1	61.2	1591.1	61.2
HMA17-69	233	174648	2.1	9.749491	0.7	4.20998	1.5	0.29769	1.4	0.90	1679.8	20.3	1676.0	12.5	1671.1	12.5	1671.1	12.5
HMA17-39	144	145603	1.5	9.089502	0.8	4.90482	2.4	0.32334	2.2	0.93	1806.0	35.0	1803.1	20.1	1799.7	15.5	1799.7	15.5
HMA17-5	63	35761.4	1.2	8.843071	1.7	5.20564	1.9	0.33387	0.9	0.47	1857.1	14.5	1853.5	16.3	1849.5	30.6	1849.5	30.6
HMA17-45	158	108453	0.7	8.64924	0.5	5.43368	1.0	0.34086	0.8	0.86	1890.8	13.8	1890.2	8.4	1889.5	9.1	1889.5	9.1

HMA17-97	250	155743	1.3	8.43543	0.4	5.68969	0.9	0.34809	0.8	0.91	1925.5	13.8	1929.8	7.9	1934.4	6.6	1934.4	6.6
HMA17-66	589	522027	3.3	8.196993	0.1	6.4002	2.8	0.38049	2.8	1.00	2078.6	50.0	2032.3	24.7	1985.6	2.4	1985.6	2.4
HMA17-83	53	31785.1	1.6	7.880227	0.9	6.51181	1.1	0.37217	0.6	0.52	2039.6	9.8	2047.5	9.6	2055.4	16.4	2055.4	16.4
HMA17-9	364	269668	2.5	7.816683	0.2	6.20797	1.6	0.35194	1.6	0.99	1943.9	26.6	2005.6	14.0	2069.7	4.1	2069.7	4.1
HMA17-51	121	72481.9	3.0	7.708546	0.4	6.86331	1.0	0.38371	0.9	0.92	2093.6	16.4	2093.9	8.8	2094.2	6.6	2094.2	6.6

				Isotope Ratios							Apparent Ages							
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HMA18-82	166	22839.1	1.2	18.14121	3.8	0.54551	4.4	0.07177	2.2	0.49	446.8	9.3	442.1	15.7	417.2	85.0	446.8	9.3
HMA18-76	130	16972.7	1.0	16.98119	10.5	0.58581	11.7	0.07215	5.2	0.44	449.1	22.5	468.2	44.0	563.0	229.9	449.1	22.5
HMA18-70	644	79530	1.3	17.58625	1.4	0.57068	2.2	0.07279	1.6	0.75	452.9	7.2	458.5	8.1	486.2	31.9	452.9	7.2
HMA18-53	161	46324.4	1.1	18.16921	3.3	0.55631	3.8	0.07331	1.9	0.51	456.1	8.5	449.1	13.8	413.8	73.1	456.1	8.5
HMA18-44	176	32442.9	0.6	17.6144	3.8	0.57447	5.8	0.07339	4.3	0.75	456.5	19.0	460.9	21.3	482.7	84.3	456.5	19.0
HMA18-12	96	24279.8	1.4	18.04554	7.2	0.56329	7.6	0.07372	2.3	0.31	458.5	10.4	453.7	27.8	429.0	161.6	458.5	10.4
HMA18-27	215	40340.1	0.9	18.12605	3.4	0.56091	3.6	0.07374	1.2	0.33	458.6	5.2	452.1	13.1	419.1	75.5	458.6	5.2
HMA18-99	196	28784.4	1.5	18.20669	3.9	0.55873	4.7	0.07378	2.6	0.55	458.9	11.4	450.7	17.1	409.1	87.6	458.9	11.4
HMA18-16	199	48321.6	1.0	17.63389	2.4	0.57707	3.0	0.0738	1.7	0.58	459.0	7.7	462.6	11.1	480.2	53.8	459.0	7.7
HMA18-24	120	33746.6	1.0	18.0622	5.8	0.56406	6.6	0.07389	3.1	0.48	459.6	13.9	454.2	24.1	426.9	128.9	459.6	13.9
HMA18-13	80	21842.4	1.4	18.21101	8.5	0.55971	10.2	0.07393	5.7	0.56	459.8	25.4	451.3	37.2	408.6	189.5	459.8	25.4
HMA18-79	142	25360.1	1.3	18.2102	7.5	0.56	7.8	0.07396	2.2	0.27	460.0	9.6	451.5	28.6	408.7	168.7	460.0	9.6
HMA18-4	124	39875.7	1.2	17.54353	4.7	0.58278	4.9	0.07415	1.4	0.30	461.1	6.4	466.2	18.3	491.6	102.9	461.1	6.4
HMA18-25	305	96545.2	1.0	17.43619	2.8	0.58644	3.0	0.07416	1.2	0.40	461.2	5.4	468.6	11.4	505.1	61.1	461.2	5.4
HMA18-100	72	10119.2	1.5	17.69674	5.0	0.57828	5.5	0.07422	2.1	0.39	461.5	9.5	463.4	20.3	472.4	111.3	461.5	9.5
HMA18-36	281	46644.7	1.4	17.69901	2.6	0.57826	2.8	0.07423	1.0	0.37	461.6	4.5	463.3	10.3	472.1	56.7	461.6	4.5
HMA18-86	1311	640498	0.8	17.76087	0.7	0.57644	1.4	0.07425	1.2	0.88	461.7	5.4	462.2	5.1	464.4	14.7	461.7	5.4
HMA18-17	125	11502.8	1.3	18.03651	8.0	0.56788	8.1	0.07429	1.1	0.13	461.9	4.8	456.6	29.7	430.1	178.5	461.9	4.8
HMA18-15	110	42948.5	1.0	17.8499	5.0	0.57418	5.4	0.07433	2.0	0.37	462.2	9.0	460.7	19.9	453.2	110.8	462.2	9.0
HMA18-87	818	208209	1.0	17.76589	0.7	0.57732	1.2	0.07439	1.0	0.84	462.5	4.5	462.7	4.5	463.8	14.5	462.5	4.5
HMA18-38	144	48281.3	0.9	17.80188	7.0	0.57624	7.3	0.0744	2.1	0.28	462.6	9.2	462.0	27.2	459.2	156.1	462.6	9.2
HMA18-65	541	142384	1.2	17.45651	1.2	0.58802	1.9	0.07445	1.5	0.77	462.9	6.6	469.6	7.2	502.5	27.2	462.9	6.6
HMA18-57	87	20693.3	1.4	17.13203	7.5	0.59961	7.8	0.0745	2.0	0.26	463.2	9.1	477.0	29.6	543.7	164.3	463.2	9.1
HMA18-23	136	17558.9	1.3	18.0226	6.3	0.5702	6.7	0.07453	2.3	0.33	463.4	10.1	458.1	24.8	431.8	141.5	463.4	10.1
HMA18-52	133	43384.5	1.4	17.59986	5.4	0.58432	7.7	0.07459	5.4	0.71	463.7	24.2	467.2	28.7	484.5	119.7	463.7	24.2
HMA18-28	104	13752.5	1.7	18.66928	10.3	0.55096	10.6	0.0746	2.5	0.24	463.8	11.2	445.6	38.4	352.8	234.1	463.8	11.2
HMA18-71	385	105585	1.0	17.57103	1.7	0.58564	2.0	0.07463	1.1	0.55	464.0	4.9	468.1	7.5	488.1	36.7	464.0	4.9

HMA18-89	128	29493	1.1	18.80633	4.7	0.54719	5.1	0.07463	1.8	0.36	464.0	8.2	443.2	18.2	336.2	107.3	464.0	8.2
HMA18-66	88	8763.18	1.2	18.6246	7.0	0.55258	7.4	0.07464	2.4	0.32	464.1	10.6	446.7	26.7	358.1	158.4	464.1	10.6
HMA18-90	242	95598.9	1.4	17.78018	2.8	0.57891	3.2	0.07465	1.6	0.51	464.1	7.2	463.8	11.9	461.9	61.1	464.1	7.2
HMA18-21	490	33682.4	1.0	17.53053	1.6	0.58718	2.5	0.07466	2.0	0.78	464.1	8.9	469.1	9.6	493.2	35.0	464.1	8.9
HMA18-43	214	26345.1	1.7	17.63444	2.5	0.5839	3.3	0.07468	2.2	0.65	464.3	9.6	467.0	12.5	480.1	56.2	464.3	9.6
HMA18-10	138	52980.3	1.1	18.05987	4.9	0.57019	5.0	0.07469	1.2	0.23	464.3	5.2	458.1	18.4	427.2	108.3	464.3	5.2
HMA18-72	263	69354.4	1.2	18.15419	2.6	0.56723	2.7	0.07469	0.9	0.34	464.3	4.1	456.2	10.1	415.6	57.6	464.3	4.1
HMA18-101	250	92934.9	1.1	17.49782	3.2	0.58867	3.5	0.07471	1.3	0.37	464.4	5.7	470.0	13.1	497.3	71.3	464.4	5.7
HMA18-93	155	28139.6	1.0	18.00145	3.7	0.57264	4.1	0.07476	1.7	0.42	464.8	7.6	459.7	15.1	434.4	82.6	464.8	7.6
HMA18-81	117	16873.4	1.0	17.47202	5.8	0.5903	6.0	0.0748	1.3	0.22	465.0	5.9	471.1	22.5	500.6	128.5	465.0	5.9
HMA18-45	151	53386.3	1.2	17.84442	4.3	0.57801	4.5	0.07481	1.3	0.29	465.0	5.8	463.2	16.7	454.0	95.5	465.0	5.8
HMA18-94	2043	134354	0.9	17.6982	0.5	0.58282	2.4	0.07481	2.3	0.98	465.1	10.4	466.3	8.8	472.2	11.4	465.1	10.4
HMA18-26	122	27515.7	1.2	18.09387	8.3	0.57074	9.1	0.0749	3.7	0.40	465.6	16.4	458.5	33.4	423.0	185.3	465.6	16.4
HMA18-63	147	18278.4	1.1	17.49155	2.7	0.5911	3.9	0.07499	2.8	0.72	466.1	12.6	471.6	14.7	498.1	59.9	466.1	12.6
HMA18-95	475	147967	1.3	17.45073	1.3	0.59263	2.0	0.07501	1.5	0.75	466.2	6.8	472.5	7.6	503.3	29.2	466.2	6.8
HMA18-34	205	33681.8	1.4	17.70631	3.2	0.5844	3.4	0.07505	1.2	0.33	466.5	5.2	467.3	12.9	471.2	71.8	466.5	5.2
HMA18-50	595	85891.9	0.5	17.94255	1.4	0.57681	1.6	0.07506	0.8	0.48	466.6	3.4	462.4	5.9	441.7	30.7	466.6	3.4
HMA18-11	98	13668.2	1.3	19.65298	8.4	0.52667	8.6	0.07507	2.1	0.24	466.6	9.4	429.6	30.2	235.6	193.2	466.6	9.4
HMA18-30	123	18221.7	1.4	17.47089	5.1	0.59291	5.4	0.07513	1.8	0.34	467.0	8.3	472.7	20.4	500.7	111.8	467.0	8.3
HMA18-73	101	17898.7	1.6	17.60829	7.3	0.58888	7.4	0.0752	0.9	0.12	467.4	4.1	470.1	27.7	483.5	161.3	467.4	4.1
HMA18-96	228	43924.7	1.4	17.84964	3.4	0.58113	4.0	0.07523	2.2	0.54	467.6	9.8	465.2	15.1	453.3	75.5	467.6	9.8
HMA18-77	262	30922.8	1.0	17.36409	2.5	0.59762	3.2	0.07526	2.0	0.62	467.8	9.0	475.7	12.2	514.2	55.5	467.8	9.0
HMA18-91	121	23218.1	1.4	17.18331	4.5	0.60414	4.8	0.07529	1.7	0.35	468.0	7.5	479.9	18.2	537.2	97.8	468.0	7.5
HMA18-69	209	43777.2	1.1	17.77476	3.7	0.58546	3.9	0.07547	1.4	0.37	469.1	6.5	468.0	14.7	462.6	81.1	469.1	6.5
HMA18-61	91	19289.7	1.2	18.56777	8.9	0.5611	9.2	0.07556	2.4	0.26	469.6	11.0	452.2	33.7	365.0	201.3	469.6	11.0
HMA18-20	233	59886.5	1.3	17.82495	3.1	0.58538	3.9	0.07568	2.5	0.63	470.3	11.2	467.9	14.8	456.4	68.3	470.3	11.2
HMA18-29	215	34971.6	1.9	17.81739	2.6	0.5861	3.0	0.07574	1.4	0.47	470.6	6.4	468.4	11.2	457.3	58.4	470.6	6.4
HMA18-64	104	29449.1	1.0	16.82046	7.1	0.62086	7.3	0.07574	2.0	0.27	470.6	8.9	490.4	28.5	583.6	153.3	470.6	8.9
HMA18-33	1075	112036	0.7	17.61024	0.6	0.59365	2.3	0.07582	2.2	0.97	471.1	10.2	473.2	8.7	483.2	12.4	471.1	10.2
HMA18-78	287	49188.5	1.2	17.96634	2.6	0.5825	2.8	0.0759	1.1	0.40	471.6	5.1	466.1	10.5	438.8	57.5	471.6	5.1
HMA18-55	174	36954.5	1.1	17.83044	3.8	0.58708	4.0	0.07592	1.2	0.31	471.7	5.6	469.0	15.1	455.7	84.9	471.7	5.6
HMA18-51	201	28132.5	1.1	17.45974	1.6	0.59973	2.1	0.07594	1.4	0.64	471.9	6.2	477.1	8.0	502.1	35.5	471.9	6.2
HMA18-74	377	90526.6	2.1	17.8716	1.2	0.58619	2.2	0.07598	1.8	0.84	472.1	8.3	468.4	8.1	450.5	25.7	472.1	8.3
HMA18-6	221	37554.8	1.4	17.97486	2.0	0.58327	2.4	0.07604	1.4	0.59	472.4	6.6	466.6	9.2	437.7	44.0	472.4	6.6
HMA18-31	150	53454	1.5	17.6536	3.5	0.59417	3.8	0.07607	1.4	0.36	472.7	6.3	473.5	14.3	477.7	78.0	472.7	6.3
HMA18-58	541	75237	1.0	17.60762	1.3	0.59583	1.5	0.07609	0.7	0.44	472.7	3.0	474.6	5.6	483.5	29.3	472.7	3.0

HMA18-49	404	39632.6	1.0	17.65253	1.1	0.59451	4.3	0.07611	4.2	0.97	472.9	19.2	473.7	16.4	477.9	23.3	472.9	19.2
HMA18-39	88	16070	1.3	19.00007	9.3	0.55236	9.5	0.07612	1.9	0.21	472.9	8.9	446.5	34.3	312.9	211.6	472.9	8.9
HMA18-32	191	47415.4	1.1	18.11745	6.1	0.57996	6.3	0.07621	1.2	0.19	473.4	5.4	464.4	23.3	420.1	137.1	473.4	5.4
HMA18-68	651	80997	1.2	17.70446	1.0	0.59351	1.3	0.07621	0.9	0.68	473.5	4.2	473.1	5.1	471.4	21.7	473.5	4.2
HMA18-48	216	40128.2	0.9	18.10232	4.0	0.58104	4.4	0.07628	1.8	0.41	473.9	8.3	465.1	16.3	422.0	88.9	473.9	8.3
HMA18-60	205	30486.5	1.6	17.8662	2.9	0.58982	3.2	0.07643	1.4	0.42	474.8	6.3	470.8	12.2	451.2	65.1	474.8	6.3
HMA18-67	247	38007	1.0	17.91798	2.8	0.589	3.5	0.07654	2.2	0.61	475.5	9.9	470.2	13.3	444.8	62.2	475.5	9.9
HMA18-54	164	25080.7	1.1	17.4771	1.9	0.60651	2.2	0.07688	1.1	0.50	477.5	5.0	481.4	8.4	500.0	42.1	477.5	5.0
HMA18-40	117	18454.7	1.3	17.50745	8.0	0.60584	8.3	0.07693	2.3	0.28	477.8	10.6	480.9	31.9	496.1	176.2	477.8	10.6
HMA18-62	247	33587.6	1.0	17.51727	4.1	0.60577	5.2	0.07696	3.1	0.60	478.0	14.3	480.9	19.8	494.9	91.4	478.0	14.3
HMA18-59	362	83875.2	0.8	17.77529	1.9	0.59701	2.3	0.07697	1.2	0.54	478.0	5.7	475.3	8.6	462.6	42.3	478.0	5.7
HMA18-19	167	24625	1.1	17.24605	2.3	0.61673	3.2	0.07714	2.2	0.70	479.0	10.2	487.8	12.2	529.2	49.7	479.0	10.2
HMA18-75	107	13295.7	1.3	18.10076	3.8	0.58833	4.1	0.07724	1.7	0.41	479.6	7.9	469.8	15.6	422.2	84.3	479.6	7.9
HMA18-41	102	12820.8	0.9	18.23437	8.0	0.58414	8.2	0.07725	1.8	0.22	479.7	8.4	467.1	30.7	405.7	178.9	479.7	8.4
HMA18-14	138	20762.2	1.8	16.09149	2.6	0.75948	3.0	0.08864	1.5	0.49	547.5	7.7	573.7	13.2	679.1	56.1	547.5	7.7
HMA18-35	570	62851.2	1.1	16.81105	1.1	0.77929	1.8	0.09501	1.5	0.80	585.1	8.2	585.1	8.1	584.9	23.7	585.1	8.2
HMA18-92	443	87570.3	4.5	16.56519	1.3	0.81688	1.5	0.09814	0.8	0.50	603.5	4.4	606.3	7.0	616.8	28.7	603.5	4.4
HMA18-2	155	41373.7	0.8	16.92779	2.8	0.80717	3.0	0.0991	1.2	0.39	609.1	6.9	600.9	13.8	569.9	60.8	609.1	6.9
HMA18-98	788	184909	6.9	16.32541	0.7	0.87231	1.3	0.10328	1.1	0.83	633.6	6.6	636.8	6.2	648.2	15.9	633.6	6.6
HMA18-84	94	31257.9	1.5	15.46372	3.0	1.12986	3.5	0.12672	1.6	0.48	769.1	11.9	767.7	18.6	763.5	64.0	769.1	11.9
HMA18-42	223	81238.8	6.6	15.27401	2.3	1.1953	2.9	0.13241	1.9	0.64	801.6	14.2	798.4	16.3	789.5	47.5	801.6	14.2
HMA18-46	97	26703.6	0.9	14.11021	2.6	1.59097	3.3	0.16282	2.0	0.61	972.4	17.9	966.7	20.4	953.7	53.2	953.7	53.2
HMA18-7	244	62936.5	3.4	13.93196	1.3	1.6289	2.1	0.16459	1.6	0.77	982.2	14.7	981.4	13.2	979.6	27.2	979.6	27.2
HMA18-88	120	61512.2	2.4	13.7262	2.1	1.70493	2.3	0.16973	1.1	0.49	1010.6	10.7	1010.4	15.0	1009.9	41.6	1009.9	41.6
HMA18-5	763	305814	2.5	13.32996	0.8	1.47249	1.3	0.14236	1.0	0.81	858.0	8.4	919.1	7.8	1069.0	15.4	1069.0	15.4
HMA18-97	425	126822	4.7	12.82397	0.7	2.06778	3.0	0.19232	2.9	0.97	1133.9	30.2	1138.2	20.5	1146.3	14.7	1146.3	14.7
HMA18-18	407	164617	2.8	12.34312	0.4	2.35161	2.8	0.21052	2.8	0.99	1231.6	31.3	1228.0	20.0	1221.8	6.9	1221.8	6.9
HMA18-85	242	165308	2.5	12.33301	0.9	2.35084	3.4	0.21028	3.2	0.96	1230.3	36.2	1227.8	24.0	1223.4	18.6	1223.4	18.6
HMA18-22	137	154575	2.5	12.30087	1.2	2.37413	2.7	0.21181	2.5	0.90	1238.4	27.7	1234.8	19.4	1228.6	22.8	1228.6	22.8
HMA18-83	78	75821.2	1.4	12.04499	1.5	2.5206	1.8	0.2202	1.1	0.59	1282.9	12.6	1278.0	13.4	1269.7	29.0	1269.7	29.0
HMA18-3	190	179765	1.5	9.127765	1.1	4.02055	2.9	0.26616	2.7	0.93	1521.3	36.6	1638.4	23.7	1792.0	19.9	1792.0	19.9
HMA18-47	597	471902	2.3	5.870169	0.1	10.5917	1.4	0.45093	1.4	1.00	2399.4	28.4	2488.0	13.2	2561.1	1.8	2561.1	1.8
HMA18-1	65	85148.3	1.4	3.097576	0.3	32.463	1.6	0.72931	1.6	0.98	3530.8	43.3	3564.4	16.0	3583.4	5.0	3583.4	5.0

Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	Isotope Ratios ± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	Apparent Ages ± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC5A-6	190	56640.6	1.4	17.62282	4.6	0.59267	4.7	0.07575	1.2	0.25	470.7	5.5	472.6	17.9	481.6	101.0	470.7	5.5
HC5A-49	147	40481.9	1.0	18.01616	4.0	0.58362	4.4	0.07626	1.8	0.41	473.8	8.2	466.8	16.3	432.6	88.4	473.8	8.2
HC5A-94	194	60132.7	2.5	17.64749	4.8	0.60176	5.1	0.07702	1.8	0.36	478.3	8.5	478.4	19.6	478.5	106.2	478.3	8.5
HC5A-14	420	61580	2.5	17.66204	1.7	0.60523	2.0	0.07753	1.1	0.55	481.4	5.2	480.6	7.8	476.7	37.9	481.4	5.2
HC5A-65	303	75757.6	1.9	17.57633	2.7	0.61064	3.2	0.07784	1.8	0.54	483.2	8.2	484.0	12.5	487.5	60.0	483.2	8.2
HC5A-86	318	94299.1	1.4	17.63528	2.5	0.61196	3.5	0.07827	2.5	0.71	485.8	11.7	484.8	13.6	480.0	54.7	485.8	11.7
HC5A-15	1029	187866	1.0	17.53107	0.5	0.61586	2.8	0.0783	2.8	0.98	486.0	12.9	487.2	10.9	493.1	11.2	486.0	12.9
HC5A-7	609	188494	4.1	17.49572	1.2	0.61761	1.5	0.07837	0.9	0.60	486.4	4.2	488.3	5.7	497.6	26.2	486.4	4.2
HC5A-23	333	79280.8	1.0	17.18273	2.0	0.62975	2.2	0.07848	0.9	0.40	487.0	4.1	495.9	8.6	537.2	44.0	487.0	4.1
HC5A-3	510	75588.7	6.9	17.51127	1.2	0.61939	1.6	0.07867	1.0	0.64	488.2	4.9	489.5	6.3	495.6	27.2	488.2	4.9
HC5A-29	451	91285.7	1.9	17.50722	1.4	0.61986	1.9	0.07871	1.3	0.70	488.4	6.2	489.8	7.3	496.2	29.8	488.4	6.2
HC5A-33	230	31336.3	1.1	17.23359	3.0	0.63751	3.2	0.07968	0.9	0.28	494.2	4.2	500.8	12.5	530.8	66.5	494.2	4.2
HC5A-63	309	67306.2	3.1	17.36363	2.1	0.63356	3.2	0.07979	2.4	0.74	494.8	11.3	498.3	12.5	514.3	46.7	494.8	11.3
HC5A-76	357	64844.9	3.6	17.39485	1.7	0.63244	1.9	0.07979	0.7	0.37	494.9	3.3	497.6	7.4	510.3	38.4	494.9	3.3
HC5A-18	159	28260.7	1.6	17.32948	2.9	0.63508	3.5	0.07982	1.9	0.55	495.1	9.3	499.3	13.9	518.6	64.4	495.1	9.3
HC5A-91	163	30182	1.8	17.71653	4.5	0.62164	5.1	0.07988	2.4	0.48	495.4	11.6	490.9	19.9	469.9	99.3	495.4	11.6
HC5A-88	582	173615	4.8	17.53596	1.3	0.63143	2.5	0.08031	2.2	0.86	498.0	10.5	497.0	10.0	492.5	28.3	498.0	10.5
HC5A-39	59	7892.65	1.3	19.0533	8.1	0.58198	8.6	0.08042	2.8	0.32	498.6	13.3	465.7	32.0	306.6	184.8	498.6	13.3
HC5A-60	495	95841.7	2.4	17.4795	1.6	0.63529	3.4	0.08054	3.0	0.89	499.3	14.5	499.4	13.4	499.7	34.3	499.3	14.5
HC5A-42	356	69258.3	2.1	17.39206	2.7	0.64009	3.4	0.08074	2.1	0.61	500.5	10.0	502.4	13.4	510.7	58.8	500.5	10.0
HC5A-41	135	47174.6	2.3	17.13241	6.1	0.64986	6.3	0.08075	1.5	0.24	500.6	7.2	508.4	25.0	543.6	132.8	500.6	7.2
HC5A-90	648	157132	53.9	17.32373	1.2	0.64302	1.8	0.08079	1.3	0.75	500.8	6.4	504.2	7.0	519.3	25.6	500.8	6.4
HC5A-81	193	37479.3	0.8	17.33582	4.9	0.64275	5.1	0.08081	1.4	0.28	501.0	6.8	504.0	20.1	517.8	107.0	501.0	6.8
HC5A-56	666	92874.7	6.2	17.5211	1.2	0.63809	1.7	0.08109	1.1	0.68	502.6	5.5	501.1	6.6	494.4	26.9	502.6	5.5
HC5A-30	334	90887.1	1.8	17.58026	2.0	0.63836	4.3	0.08139	3.8	0.88	504.4	18.4	501.3	17.0	487.0	44.1	504.4	18.4
HC5A-52	166	40224	1.6	16.89397	2.8	0.6688	3.5	0.08195	2.0	0.59	507.7	10.0	520.0	14.1	574.2	60.8	507.7	10.0
HC5A-36	145	37072.1	2.4	17.46958	3.9	0.65019	4.1	0.08238	1.3	0.31	510.3	6.3	508.6	16.6	500.9	86.9	510.3	6.3
HC5A-34	166	36014.5	4.1	17.2325	2.9	0.6593	4.3	0.0824	3.2	0.74	510.4	15.7	514.2	17.5	530.9	64.2	510.4	15.7
HC5A-64	102	27143.5	2.7	16.6098	5.6	0.86152	6.0	0.10378	2.3	0.38	636.5	14.1	631.0	28.4	610.9	120.5	636.5	14.1
HC5A-78	1363	628300	11.8	15.98252	0.3	0.96447	2.2	0.1118	2.2	0.99	683.2	13.9	685.6	10.8	693.6	6.5	683.2	13.9
HC5A-12	280	63752.4	4.7	14.39276	0.8	1.39301	3.6	0.14541	3.5	0.98	875.2	29.0	886.0	21.4	913.0	15.9	875.2	29.0
HC5A-54	279	71620.4	41.7	14.34209	0.9	1.50642	2.0	0.1567	1.8	0.88	938.4	15.6	933.0	12.4	920.3	19.5	920.3	19.5
HC5A-24	80	35188.9	1.5	13.99877	2.1	1.63829	3.6	0.16633	2.9	0.81	991.9	26.6	985.1	22.6	969.9	43.2	969.9	43.2

HC5A-57	70	25855.1	2.5	13.72495	2.6	1.74967	3.1	0.17417	1.5	0.50	1035.0	14.7	1027.0	19.7	1010.0	53.5	1010.0	53.5
HC5A-74	237	16218.3	3.5	13.65368	1.9	1.47673	4.0	0.14623	3.5	0.88	879.8	28.9	920.9	24.0	1020.6	37.6	1020.6	37.6
HC5A-85	50	21957.8	1.3	13.59648	4.9	1.70547	7.1	0.16818	5.2	0.73	1002.1	48.3	1010.6	45.7	1029.1	98.5	1029.1	98.5
HC5A-20	137	86101.9	2.9	12.99469	1.4	1.98917	3.0	0.18747	2.7	0.89	1107.7	27.1	1111.8	20.2	1120.0	27.0	1120.0	27.0
HC5A-66	49	24392.2	1.4	12.85775	3.3	2.15587	3.9	0.20104	2.1	0.53	1180.9	22.2	1166.9	26.9	1141.1	65.3	1141.1	65.3
HC5A-27	675	393389	3.1	12.81539	0.4	2.13845	1.7	0.19876	1.6	0.97	1168.7	17.3	1161.3	11.5	1147.7	7.8	1147.7	7.8
HC5A-5	147	110874	2.9	12.75258	1.1	2.08529	1.6	0.19287	1.1	0.71	1136.9	11.9	1144.0	11.0	1157.4	22.4	1157.4	22.4
HC5A-10	236	79233.3	2.4	12.64391	1.0	2.14304	2.2	0.19652	1.9	0.88	1156.6	20.4	1162.8	15.1	1174.4	20.2	1174.4	20.2
HC5A-95	130	41034.4	4.2	12.45154	1.4	1.73422	2.7	0.15661	2.3	0.85	937.9	20.4	1021.3	17.7	1204.6	28.6	1204.6	28.6
HC5A-35	84	41245.7	2.9	12.40724	3.6	2.27695	3.7	0.20489	1.1	0.29	1201.6	11.9	1205.2	26.3	1211.6	70.3	1211.6	70.3
HC5A-87	236	145585	2.5	11.8845	0.6	2.40296	1.4	0.20712	1.2	0.89	1213.5	13.8	1243.5	10.0	1295.9	12.3	1295.9	12.3
HC5A-2	252	144960	2.7	11.80972	1.2	2.33284	2.2	0.19981	1.9	0.85	1174.3	20.0	1222.3	15.6	1308.1	22.6	1308.1	22.6
HC5A-4	366	242715	2.9	11.80278	0.8	2.07124	2.5	0.1773	2.3	0.94	1052.2	22.4	1139.3	16.8	1309.3	16.3	1309.3	16.3
HC5A-58	155	78889.2	2.3	11.72925	0.9	2.64421	1.6	0.22494	1.3	0.82	1307.9	15.7	1313.0	12.0	1321.4	18.1	1321.4	18.1
HC5A-1	164	135516	2.6	11.71453	0.8	2.66818	1.7	0.22669	1.5	0.88	1317.1	17.8	1319.7	12.5	1323.8	15.5	1323.8	15.5
HC5A-92	282	176457	2.8	11.68932	0.9	2.63499	1.8	0.22339	1.6	0.87	1299.8	18.4	1310.5	13.2	1328.0	17.0	1328.0	17.0
HC5A-38	67	36446.3	1.4	11.58966	2.7	2.84516	3.2	0.23915	1.7	0.54	1382.3	21.5	1367.5	24.2	1344.5	52.6	1344.5	52.6
HC5A-55	203	87842.1	2.1	11.48399	1.0	2.82786	1.4	0.23553	1.1	0.74	1363.4	12.9	1363.0	10.6	1362.2	18.3	1362.2	18.3
HC5A-25	159	83931	2.0	11.26727	1.0	2.9971	1.6	0.24492	1.3	0.79	1412.2	15.9	1406.9	12.1	1398.8	18.7	1398.8	18.7
HC5A-21	70	56216.2	1.6	11.24736	1.2	2.9649	2.7	0.24186	2.4	0.90	1396.3	30.4	1398.7	20.4	1402.2	22.1	1402.2	22.1
HC5A-83	216	67689.4	2.1	11.0124	1.5	2.13864	4.2	0.17081	4.0	0.93	1016.6	37.2	1161.4	29.4	1442.5	29.2	1442.5	29.2
HC5A-99	260	235440	4.2	10.91798	0.6	2.80826	1.7	0.22237	1.5	0.94	1294.4	18.1	1357.7	12.4	1458.9	11.1	1458.9	11.1
HC5A-48	261	21996.7	2.0	10.8628	1.2	2.69459	6.8	0.21229	6.7	0.98	1241.0	75.2	1327.0	50.2	1468.6	23.5	1468.6	23.5
HC5A-69	187	142478	1.0	10.64691	1.2	3.40578	3.1	0.26299	2.8	0.93	1505.1	38.1	1505.7	24.1	1506.6	21.8	1506.6	21.8
HC5A-44	260	238228	1.2	10.61769	0.6	3.34925	1.8	0.25792	1.7	0.95	1479.2	22.9	1492.6	14.3	1511.8	10.7	1511.8	10.7
HC5A-79	749	763109	3.7	10.59799	0.4	3.21551	1.9	0.24716	1.8	0.98	1423.8	23.4	1460.9	14.5	1515.3	6.8	1515.3	6.8
HC5A-28	232	189003	1.4	10.53022	0.5	3.55747	1.6	0.27169	1.5	0.96	1549.4	20.6	1540.1	12.4	1527.4	8.7	1527.4	8.7
HC5A-13	93	73718.9	1.1	10.52238	1.4	3.3265	2.5	0.25386	2.0	0.82	1458.4	26.4	1487.3	19.4	1528.8	26.9	1528.8	26.9
HC5A-26	140	81278.7	2.3	10.51185	0.5	3.35828	2.6	0.25603	2.6	0.98	1469.5	33.5	1494.7	20.4	1530.6	10.3	1530.6	10.3
HC5A-62	182	121236	1.9	10.50498	0.6	3.48561	2.7	0.26557	2.7	0.98	1518.3	36.2	1524.0	21.7	1531.9	11.4	1531.9	11.4
HC5A-43	160	96042.6	1.2	10.4939	1.2	3.594	5.5	0.27354	5.4	0.98	1558.7	74.8	1548.2	44.0	1533.9	22.2	1533.9	22.2
HC5A-98	105	66353.6	1.2	10.46641	1.2	3.50101	2.1	0.26576	1.8	0.82	1519.2	23.7	1527.4	16.8	1538.8	22.6	1538.8	22.6
HC5A-31	398	319252	2.5	10.44363	0.4	3.356	1.1	0.2542	1.1	0.93	1460.1	13.9	1494.2	9.0	1542.9	7.8	1542.9	7.8
HC5A-70	312	246756	1.5	10.432	0.3	3.44793	1.9	0.26087	1.9	0.98	1494.3	25.2	1515.4	15.1	1545.0	6.6	1545.0	6.6
HC5A-72	267	169428	2.3	10.4257	0.4	3.60697	1.4	0.27274	1.3	0.95	1554.7	17.9	1551.1	10.9	1546.1	8.2	1546.1	8.2
HC5A-53	71	18956.9	1.3	10.40573	1.1	3.71046	3.0	0.28003	2.8	0.93	1591.5	40.0	1573.6	24.3	1549.7	20.7	1549.7	20.7

HC5A-77	238	146383	3.5	10.36805	0.4	3.66647	1.3	0.2757	1.2	0.94	1569.7	17.0	1564.1	10.3	1556.5	8.0	1556.5	8.0
HC5A-100	246	279055	2.1	10.35903	0.3	3.67002	1.1	0.27573	1.1	0.96	1569.8	14.9	1564.9	8.9	1558.2	5.8	1558.2	5.8
HC5A-16	66	59232.5	1.2	10.3528	1.3	3.42806	2.1	0.2574	1.7	0.79	1476.5	22.4	1510.9	16.8	1559.3	24.4	1559.3	24.4
HC5A-67	133	85045.1	2.4	10.33162	0.8	3.57399	1.7	0.26781	1.6	0.89	1529.7	21.1	1543.8	13.8	1563.1	14.9	1563.1	14.9
HC5A-45	346	206821	1.6	9.997962	0.2	3.99624	1.5	0.28978	1.5	0.99	1640.4	21.4	1633.4	12.1	1624.4	3.6	1624.4	3.6
HC5A-73	192	391688	1.5	9.477466	0.8	4.37649	1.9	0.30083	1.7	0.91	1695.4	25.2	1707.9	15.3	1723.3	14.0	1723.3	14.0
HC5A-8	324	238393	2.2	9.418379	0.5	4.36273	1.5	0.29801	1.4	0.94	1681.4	21.2	1705.3	12.7	1734.7	10.0	1734.7	10.0
HC5A-22	179	330497	2.3	9.407125	0.4	4.34292	1.2	0.2963	1.2	0.95	1673.0	17.1	1701.6	10.1	1736.9	7.2	1736.9	7.2
HC5A-37	42	52983.5	1.0	9.368274	1.8	4.49866	2.5	0.30566	1.8	0.72	1719.3	27.6	1730.7	21.0	1744.5	32.1	1744.5	32.1
HC5A-19	308	95233.5	1.6	9.34365	0.7	3.82291	8.5	0.25907	8.4	1.00	1485.1	111.7	1597.6	68.1	1749.3	13.0	1749.3	13.0
HC5A-50	232	164666	1.6	9.343159	0.7	4.66208	1.7	0.31592	1.5	0.91	1769.8	24.0	1760.5	14.2	1749.4	12.6	1749.4	12.6
HC5A-96	181	223168	1.5	9.326759	0.5	4.61207	3.7	0.31198	3.6	0.99	1750.4	55.6	1751.5	30.6	1752.6	9.6	1752.6	9.6
HC5A-80	127	87342.4	1.3	9.322407	0.8	4.68036	1.8	0.31645	1.6	0.90	1772.4	25.1	1763.7	15.0	1753.5	14.2	1753.5	14.2
HC5A-93	105	66003.2	1.6	9.311152	1.1	4.57806	2.4	0.30916	2.1	0.89	1736.6	32.1	1745.3	19.7	1755.7	19.9	1755.7	19.9
HC5A-59	148	82120.4	1.3	9.250109	0.8	4.70898	1.1	0.31592	0.8	0.72	1769.8	12.5	1768.8	9.4	1767.7	14.1	1767.7	14.1
HC5A-46	182	135432	2.1	9.1991	0.4	4.81611	1.8	0.32132	1.8	0.98	1796.2	28.1	1787.7	15.4	1777.8	6.7	1777.8	6.7
HC5A-84	156	259036	1.6	9.181436	0.6	4.83155	1.5	0.32173	1.4	0.91	1798.2	22.0	1790.4	13.0	1781.3	11.6	1781.3	11.6
HC5A-82	270	141334	1.7	9.169625	0.5	4.44334	2.2	0.2955	2.1	0.97	1669.0	31.0	1720.5	18.0	1783.7	9.6	1783.7	9.6
HC5A-9	138	72951.8	2.6	9.121675	0.8	4.8689	2.2	0.32211	2.0	0.94	1800.0	32.0	1796.9	18.3	1793.2	13.7	1793.2	13.7
HC5A-75	123	112774	1.1	9.113434	0.7	4.81471	1.7	0.31824	1.5	0.91	1781.1	23.9	1787.5	14.2	1794.9	12.7	1794.9	12.7
HC5A-40	165	114707	1.7	9.069646	0.5	4.93977	1.7	0.32493	1.6	0.96	1813.8	24.9	1809.1	13.9	1803.6	8.8	1803.6	8.8
HC5A-68	91	35219.6	1.3	8.819039	3.3	4.99497	4.5	0.31949	3.1	0.69	1787.2	48.5	1818.5	38.1	1854.4	58.9	1854.4	58.9
HC5A-32	173	176139	2.5	8.471015	0.5	5.31439	6.7	0.3265	6.7	1.00	1821.4	106.3	1871.2	57.5	1926.9	9.7	1926.9	9.7
HC5A-97	63	51637.8	1.3	8.183806	1.3	5.99041	1.7	0.35556	1.0	0.63	1961.1	17.7	1974.5	14.5	1988.5	23.1	1988.5	23.1
HC5A-17	100	81203.7	1.0	7.574898	0.6	7.17929	1.8	0.39442	1.7	0.94	2143.3	30.6	2133.9	15.9	2124.9	10.5	2124.9	10.5
HC5A-61	178	220925	5.4	6.681564	1.0	7.6947	7.6	0.37288	7.5	0.99	2042.9	132.0	2196.0	68.4	2342.1	16.3	2342.1	16.3

				Isotope Ratios								Apparent Ages						
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC5B-77	59	9299.1	0.7	18.13188	9.9	0.56398	10.2	0.07417	2.4	0.24	461.2	10.7	454.1	37.3	418.3	221.3	461.2	10.7
HC5B-44	185	44875.4	1.3	17.20779	5.7	0.62043	5.8	0.07743	1.1	0.19	480.8	5.0	490.1	22.5	534.0	124.4	480.8	5.0
HC5B-27	263	61197.9	2.0	17.61709	1.9	0.60796	2.2	0.07768	1.2	0.54	482.3	5.6	482.3	8.6	482.4	41.6	482.3	5.6
HC5B-84	214	48450.6	1.2	17.67837	2.6	0.6079	3.0	0.07794	1.5	0.52	483.8	7.2	482.2	11.5	474.7	56.5	483.8	7.2
HC5B-79	331	50653.6	1.7	17.36956	2.8	0.62629	3.4	0.0789	2.0	0.59	489.5	9.6	493.8	13.4	513.5	60.9	489.5	9.6
HC5B-6	236	99538.3	2.4	17.79626	2.7	0.61145	3.2	0.07892	1.8	0.56	489.7	8.4	484.5	12.3	459.9	58.9	489.7	8.4

HC5B-29	535	37248.8	2.1	16.96588	2.6	0.64432	3.0	0.07928	1.5	0.49	491.8	7.0	505.0	12.0	564.9	56.9	491.8	7.0
HC5B-16	169	45461	2.2	18.05	5.2	0.60641	5.3	0.07939	1.0	0.20	492.5	4.9	481.3	20.3	428.4	115.6	492.5	4.9
HC5B-33	191	89607.1	4.6	17.09579	2.7	0.64061	3.0	0.07943	1.3	0.43	492.7	6.2	502.7	11.9	548.3	59.2	492.7	6.2
HC5B-96	414	73789.1	1.6	17.46222	1.5	0.62743	1.6	0.07946	0.7	0.46	492.9	3.5	494.5	6.4	501.8	32.0	492.9	3.5
HC5B-30	211	43492.2	3.8	17.16951	4.4	0.63925	4.5	0.0796	0.9	0.20	493.8	4.4	501.8	17.8	538.9	96.5	493.8	4.4
HC5B-61	431	262159	5.1	17.51201	1.7	0.62688	2.2	0.07962	1.5	0.65	493.8	7.0	494.1	8.8	495.6	37.4	493.8	7.0
HC5B-43	259	55395.8	1.8	17.72458	2.3	0.61951	2.8	0.07964	1.6	0.59	494.0	7.8	489.5	10.9	468.9	50.3	494.0	7.8
HC5B-97	301	104806	6.3	17.33285	2.4	0.63437	2.6	0.07975	0.9	0.35	494.6	4.3	498.8	10.2	518.1	53.2	494.6	4.3
HC5B-74	116	35375	0.9	16.80039	3.5	0.6549	3.8	0.0798	1.3	0.35	494.9	6.3	511.5	15.1	586.3	76.3	494.9	6.3
HC5B-52	153	18258.8	1.1	17.65477	3.3	0.62542	3.6	0.08008	1.6	0.43	496.6	7.5	493.2	14.2	477.6	72.4	496.6	7.5
HC5B-48	46	15558.3	1.2	19.11085	14.3	0.57797	14.4	0.08011	2.0	0.14	496.8	9.5	463.2	53.7	299.7	327.0	496.8	9.5
HC5B-47	137	116529	1.2	17.57194	4.9	0.6299	5.2	0.08028	1.9	0.36	497.8	9.0	496.0	20.5	488.0	107.5	497.8	9.0
HC5B-7	190	38320.4	1.0	17.31729	2.3	0.6409	3.4	0.08049	2.5	0.74	499.1	12.1	502.9	13.5	520.1	50.7	499.1	12.1
HC5B-4	162	46965.9	1.1	17.40529	4.2	0.63801	4.3	0.08054	1.2	0.27	499.3	5.7	501.1	17.1	509.0	91.7	499.3	5.7
HC5B-64	403	98293.3	5.0	17.44338	1.7	0.63777	2.0	0.08068	1.0	0.48	500.2	4.6	500.9	7.9	504.2	38.5	500.2	4.6
HC5B-21	172	52390.5	2.1	17.38522	4.9	0.64138	5.4	0.08087	2.2	0.42	501.3	10.8	503.2	21.3	511.6	107.3	501.3	10.8
HC5B-45	321	42542.2	0.6	17.46413	3.1	0.63894	3.4	0.08093	1.4	0.42	501.7	6.9	501.6	13.6	501.6	68.4	501.7	6.9
HC5B-83	111	20476.6	1.3	17.99926	8.2	0.62003	8.3	0.08094	0.9	0.11	501.7	4.5	489.9	32.3	434.7	184.0	501.7	4.5
HC5B-9	369	56159.6	0.6	17.34771	2.0	0.64368	2.1	0.08099	0.8	0.39	502.0	4.0	504.6	8.4	516.3	42.8	502.0	4.0
HC5B-92	469	103345	3.5	17.58862	0.9	0.63783	1.5	0.08136	1.1	0.76	504.3	5.4	501.0	5.8	485.9	20.9	504.3	5.4
HC5B-39	295	43235.8	1.9	17.35662	2.4	0.64738	2.9	0.08149	1.6	0.56	505.0	7.9	506.9	11.8	515.1	53.8	505.0	7.9
HC5B-60	262	31583.7	1.2	17.55511	1.4	0.64015	1.9	0.0815	1.4	0.71	505.1	6.7	502.4	7.7	490.1	30.4	505.1	6.7
HC5B-73	302	32555.6	8.5	17.13535	2.7	0.65826	3.2	0.08181	1.7	0.54	506.9	8.5	513.5	13.0	543.3	59.1	506.9	8.5
HC5B-85	171	29879.8	1.1	17.66998	2.9	0.6388	3.2	0.08186	1.3	0.41	507.2	6.5	501.6	12.8	475.7	65.2	507.2	6.5
HC5B-78	228	39090.4	2.6	18.01004	2.9	0.62733	3.6	0.08194	2.2	0.61	507.7	10.8	494.4	14.2	433.4	64.3	507.7	10.8
HC5B-59	161	26385.2	1.4	17.5805	3.1	0.64345	3.6	0.08204	1.6	0.46	508.3	8.0	504.4	14.1	486.9	69.5	508.3	8.0
HC5B-35	168	32997.3	1.4	17.50877	4.3	0.6465	5.2	0.0821	2.9	0.56	508.6	14.2	506.3	20.8	496.0	95.7	508.6	14.2
HC5B-10	205	36786.2	5.7	14.70118	3.4	0.82876	3.8	0.08836	1.6	0.43	545.9	8.6	612.9	17.5	869.2	71.0	545.9	8.6
HC5B-90	56	12810.5	1.4	15.68035	6.6	0.86323	7.8	0.09817	4.1	0.53	603.7	23.7	631.9	36.8	734.2	140.9	603.7	23.7
HC5B-94	229	45609.6	2.1	16.36082	2.2	0.89473	2.5	0.10617	1.2	0.48	650.5	7.3	648.9	11.8	643.5	46.4	650.5	7.3
HC5B-14	113	40532	1.5	15.2095	2.8	1.24131	3.3	0.13693	1.7	0.51	827.3	13.1	819.5	18.5	798.4	59.3	827.3	13.1
HC5B-54	56	25193.1	4.8	14.33644	4.7	1.50643	4.7	0.15664	0.8	0.17	938.1	7.2	933.0	28.9	921.1	96.0	921.1	96.0
HC5B-80	53	20626.7	1.4	14.30896	3.0	1.59505	3.3	0.16553	1.2	0.37	987.4	11.1	968.3	20.3	925.0	62.1	925.0	62.1
HC5B-17	47	27105	3.4	14.05836	4.9	1.56711	5.4	0.15978	2.0	0.38	955.6	18.1	957.3	33.2	961.2	101.2	961.2	101.2
HC5B-58	28	14816	1.6	14.01196	9.9	1.70708	10.4	0.17348	3.2	0.31	1031.3	30.1	1011.2	66.4	968.0	201.6	968.0	201.6
HC5B-24	144	51626.9	2.6	13.86843	2.0	1.6655	2.5	0.16752	1.5	0.58	998.4	13.5	995.5	15.8	989.0	41.1	989.0	41.1

HC5B-67	126	31754.2	3.8	12.81129	5.0	1.66027	6.4	0.15427	4.0	0.63	924.8	34.8	993.5	40.8	1148.3	99.6	1148.3	99.6
HC5B-22	123	60045.5	3.1	12.75572	1.3	2.12753	1.9	0.19682	1.4	0.74	1158.2	14.6	1157.8	12.9	1156.9	24.8	1156.9	24.8
HC5B-68	121	52946.5	3.6	12.5757	1.7	2.27346	2.2	0.20736	1.4	0.63	1214.7	15.2	1204.1	15.3	1185.1	33.1	1185.1	33.1
HC5B-26	119	62847	3.2	12.55897	1.4	2.2183	1.9	0.20206	1.3	0.68	1186.4	14.2	1186.8	13.4	1187.7	27.6	1187.7	27.6
HC5B-18	159	61009.6	0.9	12.51381	1.3	2.2501	2.0	0.20422	1.6	0.77	1197.9	17.2	1196.8	14.2	1194.8	25.3	1194.8	25.3
HC5B-55	72	56098.3	2.1	12.37716	1.9	2.26214	2.6	0.20307	1.8	0.68	1191.8	19.4	1200.6	18.6	1216.5	38.2	1216.5	38.2
HC5B-75	47	21316.5	2.1	12.16106	3.1	2.59066	3.6	0.2285	1.8	0.51	1326.6	21.7	1298.0	26.2	1251.0	60.4	1251.0	60.4
HC5B-25	93	67565.9	1.9	11.83789	2.5	2.63005	2.9	0.22581	1.5	0.51	1312.5	18.0	1309.1	21.7	1303.5	49.1	1303.5	49.1
HC5B-1	120	75695.9	0.6	11.70801	1.2	2.71122	1.4	0.23022	0.8	0.55	1335.7	9.2	1331.5	10.3	1324.9	22.4	1324.9	22.4
HC5B-42	251	177964	2.1	11.69106	0.6	2.68732	1.3	0.22786	1.1	0.87	1323.3	13.2	1325.0	9.5	1327.7	12.4	1327.7	12.4
HC5B-63	26	15151.7	2.1	11.49125	4.5	3.02717	4.7	0.25229	1.5	0.32	1450.3	19.5	1414.5	36.0	1361.0	86.1	1361.0	86.1
HC5B-86	79	77190.2	1.5	11.45415	1.1	2.92491	1.8	0.24298	1.4	0.76	1402.2	17.1	1388.4	13.4	1367.2	22.1	1367.2	22.1
HC5B-71	147	63475.5	1.6	11.44499	1.3	2.48901	3.0	0.2066	2.7	0.90	1210.7	29.6	1268.8	21.4	1368.7	24.3	1368.7	24.3
HC5B-15	338	182429	6.7	11.26096	0.8	2.30062	1.9	0.1879	1.7	0.90	1110.0	17.0	1212.5	13.2	1399.9	15.8	1399.9	15.8
HC5B-32	242	195936	1.9	11.24902	0.5	2.72711	1.4	0.22249	1.3	0.94	1295.0	15.2	1335.9	10.3	1401.9	9.0	1401.9	9.0
HC5B-20	227	117469	3.5	11.20669	0.6	2.99022	1.2	0.24304	1.0	0.86	1402.5	13.2	1405.1	9.3	1409.1	12.0	1409.1	12.0
HC5B-31	106	66137.3	1.7	11.15567	1.4	2.9021	1.9	0.2348	1.3	0.67	1359.6	15.9	1382.5	14.6	1417.9	27.3	1417.9	27.3
HC5B-11	123	62720.7	1.0	11.00981	1.1	2.93382	2.1	0.23427	1.8	0.85	1356.8	22.2	1390.7	16.1	1443.0	21.2	1443.0	21.2
HC5B-2	174	146258	2.4	10.87126	0.6	3.24053	1.6	0.2555	1.5	0.93	1466.8	19.1	1466.9	12.2	1467.1	11.2	1467.1	11.2
HC5B-93	104	53945.7	2.0	10.74573	1.5	3.47329	2.0	0.27069	1.3	0.66	1544.3	17.8	1521.2	15.4	1489.1	27.8	1489.1	27.8
HC5B-81	125	48184.9	9.4	10.68278	1.0	3.42358	1.8	0.26526	1.5	0.84	1516.7	20.8	1509.8	14.4	1500.2	18.8	1500.2	18.8
HC5B-53	263	204031	0.8	10.59285	0.5	3.32163	1.4	0.25519	1.3	0.93	1465.2	16.6	1486.1	10.6	1516.2	9.3	1516.2	9.3
HC5B-99	66	37739.5	2.2	10.54605	1.5	3.47244	2.0	0.2656	1.4	0.69	1518.4	19.2	1521.0	16.1	1524.5	27.8	1524.5	27.8
HC5B-40	236	175784	1.3	10.54177	0.5	3.50856	1.8	0.26825	1.7	0.96	1531.9	23.7	1529.1	14.3	1525.3	9.4	1525.3	9.4
HC5B-70	109	58889.9	2.0	10.50966	1.6	3.63137	2.0	0.27679	1.2	0.60	1575.2	16.4	1556.4	15.7	1531.0	29.8	1531.0	29.8
HC5B-38	113	80007.8	2.3	10.48541	1.2	3.49875	1.9	0.26607	1.5	0.78	1520.8	19.7	1526.9	14.7	1535.4	21.8	1535.4	21.8
HC5B-49	64	39156.7	1.0	10.47846	2.2	3.42671	2.8	0.26042	1.7	0.63	1492.0	23.2	1510.5	21.8	1536.6	40.6	1536.6	40.6
HC5B-36	505	290991	6.1	10.39768	0.2	3.55826	1.5	0.26833	1.5	0.99	1532.3	19.8	1540.3	11.7	1551.2	4.5	1551.2	4.5
HC5B-34	219	67878.2	2.6	10.3821	0.5	2.98419	1.6	0.2247	1.5	0.94	1306.7	17.3	1403.6	11.8	1554.0	9.8	1554.0	9.8
HC5B-50	396	324326	2.4	10.36923	0.3	3.66016	1.0	0.27526	1.0	0.95	1567.5	13.4	1562.7	8.1	1556.3	6.0	1556.3	6.0
HC5B-69	186	248226	2.5	10.33825	0.6	3.65059	1.4	0.27372	1.3	0.89	1559.7	17.6	1560.6	11.4	1561.9	12.2	1561.9	12.2
HC5B-28	183	97130.2	1.5	10.26058	0.7	3.78097	1.4	0.28137	1.2	0.86	1598.2	17.0	1588.7	11.3	1576.1	13.6	1576.1	13.6
HC5B-82	357	74726.2	3.0	10.05427	0.5	2.89491	4.6	0.2111	4.6	0.99	1234.7	51.8	1380.6	35.0	1614.0	9.3	1614.0	9.3
HC5B-89	165	154131	2.2	9.736647	2.2	2.88145	3.3	0.20348	2.4	0.75	1194.0	26.5	1377.1	24.5	1673.6	39.9	1673.6	39.9
HC5B-76	248	359476	1.5	9.546762	0.5	4.43987	1.8	0.30741	1.7	0.96	1728.0	25.4	1719.8	14.5	1709.9	9.6	1709.9	9.6
HC5B-57	382	33226.4	1.6	9.510434	0.8	3.23895	7.1	0.22341	7.0	0.99	1299.9	82.6	1466.5	54.8	1716.9	14.1	1716.9	14.1

HC5B-62	349	449987	1.8	9.430301	0.6	3.9649	5.1	0.27118	5.0	0.99	1546.8	69.0	1627.0	41.0	1732.4	10.6	1732.4	10.6
HC5B-23	208	95337.1	2.8	9.427698	0.4	4.14983	3.1	0.28375	3.1	0.99	1610.2	43.8	1664.2	25.4	1732.9	7.5	1732.9	7.5
HC5B-100	63	41997.8	1.9	9.419116	1.4	4.59878	3.3	0.31416	3.0	0.90	1761.1	45.8	1749.0	27.4	1734.6	25.9	1734.6	25.9
HC5B-91	204	330239	1.6	9.298375	0.5	4.58423	1.2	0.30915	1.0	0.90	1736.5	16.0	1746.4	9.7	1758.2	9.4	1758.2	9.4
HC5B-95	182	203991	1.8	9.175927	0.5	4.79284	1.3	0.31896	1.2	0.93	1784.7	19.4	1783.6	11.3	1782.4	9.1	1782.4	9.1
HC5B-65	125	88637.2	1.6	9.106106	0.4	4.88182	2.0	0.32241	1.9	0.97	1801.5	29.8	1799.1	16.4	1796.3	8.2	1796.3	8.2
HC5B-72	130	129744	1.5	9.103216	0.6	4.91779	1.3	0.32469	1.2	0.91	1812.6	19.1	1805.3	11.2	1796.9	10.1	1796.9	10.1
HC5B-56	298	371424	5.2	9.09026	0.3	4.8101	1.0	0.31712	0.9	0.96	1775.7	14.2	1786.7	8.0	1799.5	4.9	1799.5	4.9
HC5B-98	376	341997	1.5	9.083952	0.2	4.97609	1.2	0.32784	1.2	0.98	1827.9	18.3	1815.3	9.9	1800.8	3.8	1800.8	3.8
HC5B-46	190	211258	1.4	9.059308	0.4	4.93229	1.2	0.32407	1.1	0.93	1809.6	18.0	1807.8	10.4	1805.7	8.1	1805.7	8.1
HC5B-51	108	56792.6	2.1	8.972414	1.8	3.69102	3.5	0.24019	2.9	0.85	1387.7	36.7	1569.4	27.6	1823.2	32.9	1823.2	32.9
HC5B-37	125	72346.6	1.8	8.95524	0.7	4.97136	1.6	0.32289	1.4	0.88	1803.8	21.6	1814.5	13.2	1826.7	13.5	1826.7	13.5
HC5B-87	209	249100	1.7	8.039948	0.3	6.38238	1.4	0.37216	1.3	0.97	2039.6	22.9	2029.8	11.9	2020.0	5.9	2020.0	5.9
HC5B-8	114	125663	2.8	7.500259	0.6	7.18285	1.1	0.39073	0.9	0.86	2126.2	17.1	2134.4	9.8	2142.3	9.6	2142.3	9.6

				Isotope Ratios								Apparent Ages						
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC6-44	421	84919.9	2.7	18.36126	2.3	0.50007	2.7	0.06659	1.4	0.52	415.6	5.7	411.8	9.2	390.2	52.1	415.6	5.7
HC6-18	312	62657.7	3.6	18.07458	3.0	0.50874	3.1	0.06669	0.9	0.29	416.2	3.6	417.6	10.6	425.4	65.9	416.2	3.6
HC6-61	550	81774.2	1.8	18.01694	1.3	0.51806	1.7	0.0677	1.0	0.62	422.3	4.3	423.9	5.8	432.5	29.4	422.3	4.3
HC6-25	284	36770.4	3.8	17.92249	2.2	0.52164	3.1	0.06781	2.2	0.70	422.9	8.8	426.2	10.7	444.2	48.9	422.9	8.8
HC6-7	130	19322.5	2.6	19.11503	3.4	0.48931	3.8	0.06784	1.9	0.49	423.1	7.7	404.4	12.8	299.2	76.4	423.1	7.7
HC6-92	366	79201.6	3.5	18.18082	2.7	0.53592	3.1	0.07067	1.7	0.53	440.2	7.1	435.7	11.1	412.3	59.4	440.2	7.1
HC6-14	276	76956.3	1.4	17.40737	1.8	0.57617	2.2	0.07274	1.3	0.59	452.7	5.7	462.0	8.2	508.7	39.1	452.7	5.7
HC6-62	583	22674.6	1.4	17.60967	1.5	0.57654	2.1	0.07363	1.4	0.69	458.0	6.3	462.2	7.6	483.3	32.9	458.0	6.3
HC6-12	249	32578.4	0.9	17.86321	1.7	0.57131	2.1	0.07402	1.1	0.53	460.3	4.9	458.9	7.6	451.6	38.9	460.3	4.9
HC6-85	146	17455.2	0.8	17.90829	3.8	0.57621	4.7	0.07484	2.8	0.60	465.2	12.7	462.0	17.4	446.0	83.4	465.2	12.7
HC6-91	103	12229.9	1.6	17.53148	6.2	0.59447	6.9	0.07559	3.2	0.46	469.7	14.4	473.7	26.2	493.1	135.9	469.7	14.4
HC6-80	350	60334.3	1.1	17.56029	1.6	0.59658	2.3	0.07598	1.7	0.72	472.1	7.6	475.1	8.7	489.5	35.0	472.1	7.6
HC6-27	223	56364.6	1.1	17.72448	3.5	0.59714	3.7	0.07676	1.2	0.32	476.8	5.4	475.4	14.2	468.9	78.5	476.8	5.4
HC6-3	224	46475	1.3	17.39099	3.3	0.61387	3.4	0.07743	1.0	0.29	480.8	4.6	486.0	13.3	510.8	72.2	480.8	4.6
HC6-22	202	50759.7	1.8	17.95646	3.1	0.59701	3.7	0.07775	1.9	0.53	482.7	9.0	475.3	13.9	440.0	69.5	482.7	9.0
HC6-78	299	18044.9	1.2	17.68196	3.3	0.60945	4.0	0.07816	2.3	0.57	485.1	10.7	483.2	15.3	474.2	72.0	485.1	10.7
HC6-26	911	288724	1.9	17.64808	1.0	0.61206	3.0	0.07834	2.9	0.95	486.2	13.4	484.9	11.7	478.4	21.5	486.2	13.4
HC6-69	347	43917.3	1.0	17.5865	2.0	0.61905	2.5	0.07896	1.5	0.61	489.9	7.2	489.3	9.7	486.2	43.6	489.9	7.2

HC6-60	507	37470.5	3.6	17.39491	1.0	0.64004	1.3	0.08075	0.8	0.62	500.6	4.0	502.3	5.2	510.3	22.8	500.6	4.0
HC6-34	205	37048.4	1.6	17.90598	2.6	0.62567	2.8	0.08125	1.0	0.35	503.6	4.8	493.4	10.9	446.3	57.9	503.6	4.8
HC6-5	121	41205.7	0.5	17.18496	3.1	0.68442	3.5	0.0853	1.6	0.47	527.7	8.3	529.4	14.4	536.9	67.5	527.7	8.3
HC6-36	123	25761.8	1.2	17.32604	6.2	0.71568	6.3	0.08993	1.3	0.20	555.1	6.7	548.1	26.7	519.0	135.4	555.1	6.7
HC6-98	27	11014.2	2.4	17.07565	11.4	0.76263	11.9	0.09445	3.4	0.28	581.8	18.7	575.5	52.3	550.9	249.9	581.8	18.7
HC6-72	76	18938	1.0	16.78785	7.4	0.78006	7.6	0.09498	1.8	0.24	584.9	10.2	585.5	33.9	587.9	160.7	584.9	10.2
HC6-33	337	72156.1	2.2	16.91305	2.3	0.79483	2.5	0.0975	1.0	0.40	599.7	5.8	593.9	11.5	571.7	50.9	599.7	5.8
HC6-16	213	54524	1.8	16.55908	2.0	0.82482	2.5	0.09906	1.5	0.59	608.9	8.6	610.7	11.4	617.6	43.0	608.9	8.6
HC6-68	34	5314.48	1.8	16.42173	18.3	0.84266	18.7	0.10036	3.4	0.18	616.5	20.1	620.6	86.9	635.5	397.9	616.5	20.1
HC6-21	595	299556	2.5	16.47849	1.0	0.84316	1.4	0.10077	1.0	0.70	618.9	5.8	620.9	6.5	628.1	21.6	618.9	5.8
HC6-23	60	10022.8	0.7	16.64459	8.7	0.86617	8.9	0.10456	1.9	0.21	641.1	11.4	633.5	41.9	606.4	188.1	641.1	11.4
HC6-82	679	142161	3.1	16.21463	0.3	0.90754	0.8	0.10673	0.7	0.90	653.7	4.5	655.7	3.9	662.8	7.5	653.7	4.5
HC6-48	387	74018.4	30.9	16.30679	1.3	0.94089	3.5	0.11128	3.2	0.92	680.2	20.7	673.3	17.1	650.6	28.4	680.2	20.7
HC6-2	141	24693.8	3.4	16.09975	1.7	0.96916	2.2	0.11317	1.3	0.61	691.1	8.8	688.0	10.9	678.0	37.0	691.1	8.8
HC6-83	184	65036.7	1.6	15.12216	1.5	1.19538	1.7	0.13111	0.9	0.51	794.2	6.5	798.5	9.4	810.4	30.7	794.2	6.5
HC6-29	68	18426.7	1.4	16.19686	3.7	1.12178	3.9	0.13178	1.1	0.28	798.0	8.3	763.8	20.9	665.1	79.9	798.0	8.3
HC6-8	128	69018	2.0	14.31656	2.2	1.53155	2.4	0.15903	0.9	0.38	951.4	8.1	943.1	14.8	923.9	45.8	923.9	45.8
HC6-96	68	16885.5	1.5	14.11293	4.5	1.66517	4.7	0.17044	1.6	0.34	1014.5	15.1	995.3	30.0	953.3	91.1	953.3	91.1
HC6-1	83	35405.6	1.8	14.09382	2.7	1.60881	3.4	0.16445	2.0	0.59	981.5	18.0	973.6	21.0	956.0	55.4	956.0	55.4
HC6-54	332	118245	0.8	13.89932	0.8	1.63468	1.1	0.16479	0.7	0.66	983.3	6.5	983.7	6.8	984.4	16.4	984.4	16.4
HC6-15	239	66372.2	0.6	13.8709	1.3	1.68714	1.9	0.16973	1.4	0.73	1010.6	13.1	1003.7	12.2	988.6	26.6	988.6	26.6
HC6-37	46	27696.6	1.7	13.77273	5.4	1.72245	5.7	0.17205	1.8	0.31	1023.4	16.8	1016.9	36.6	1003.0	109.8	1003.0	109.8
HC6-71	64	21266.8	1.9	13.76592	3.9	1.68987	4.1	0.16872	1.3	0.32	1005.0	12.4	1004.7	26.3	1004.0	79.3	1004.0	79.3
HC6-67	351	171607	2.2	13.71782	0.9	1.73859	1.8	0.17297	1.5	0.86	1028.5	14.3	1022.9	11.3	1011.1	18.4	1011.1	18.4
HC6-51	302	73036.7	1.1	13.60353	0.9	1.79063	1.3	0.17667	1.0	0.73	1048.7	9.3	1042.1	8.7	1028.0	18.5	1028.0	18.5
HC6-76	109	50391.1	2.5	13.435	1.8	1.79772	7.4	0.17517	7.2	0.97	1040.5	69.0	1044.6	48.4	1053.2	37.2	1053.2	37.2
HC6-81	97	18737.3	2.0	13.09656	2.9	1.93652	3.3	0.18394	1.6	0.48	1088.5	16.0	1093.8	22.2	1104.4	57.9	1104.4	57.9
HC6-57	79	43660.1	2.4	12.98574	2.1	2.07821	2.2	0.19573	0.8	0.37	1152.3	8.6	1141.6	15.2	1121.4	41.1	1121.4	41.1
HC6-86	298	181582	4.5	12.77824	0.7	2.09023	1.2	0.19372	1.0	0.83	1141.5	10.7	1145.6	8.4	1153.4	13.4	1153.4	13.4
HC6-11	125	44071	1.8	12.77217	2.6	2.12488	2.8	0.19683	1.0	0.35	1158.3	10.4	1156.9	19.2	1154.4	51.7	1154.4	51.7
HC6-79	227	40966.5	3.5	12.76809	1.3	2.2328	8.7	0.20676	8.6	0.99	1211.6	94.8	1191.4	60.9	1155.0	25.7	1155.0	25.7
HC6-65	280	162268	2.7	12.63067	0.7	2.18921	1.3	0.20055	1.1	0.86	1178.2	12.0	1177.6	9.0	1176.5	13.1	1176.5	13.1
HC6-24	64	38069.3	2.3	12.56507	3.3	2.26109	3.5	0.20605	1.4	0.39	1207.8	15.0	1200.2	24.8	1186.8	64.2	1186.8	64.2
HC6-73	291	187410	1.5	12.48513	0.8	2.23699	1.5	0.20256	1.3	0.86	1189.1	14.0	1192.7	10.5	1199.4	14.8	1199.4	14.8
HC6-31	124	52290.3	2.7	12.45903	1.3	2.41124	3.0	0.21788	2.7	0.90	1270.7	31.0	1246.0	21.3	1203.4	24.9	1203.4	24.9
HC6-94	64	25679.4	3.1	12.43699	4.4	2.33573	4.9	0.21069	2.0	0.41	1232.5	22.6	1223.2	34.6	1207.0	87.2	1207.0	87.2

HC6-35	150	48525.1	2.0	12.40944	1.1	2.34961	1.7	0.21147	1.3	0.76	1236.6	14.3	1227.4	11.9	1211.3	21.3	1211.3	21.3
HC6-66	193	94026.8	1.1	12.3897	1.1	2.28486	1.7	0.20531	1.3	0.78	1203.8	14.3	1207.6	11.8	1214.4	20.7	1214.4	20.7
HC6-56	69	3225.28	1.5	12.18815	4.9	2.37432	5.0	0.20988	1.1	0.23	1228.2	12.7	1234.9	36.0	1246.7	96.1	1246.7	96.1
HC6-53	192	122822	6.6	12.13939	0.8	2.48866	1.3	0.21911	1.0	0.76	1277.2	11.3	1268.7	9.3	1254.5	16.5	1254.5	16.5
HC6-77	163	12129.5	2.4	11.90539	4.2	2.36477	4.5	0.20419	1.8	0.39	1197.8	19.2	1232.0	32.3	1292.4	81.3	1292.4	81.3
HC6-95	66	49944.5	4.0	11.79601	3.0	2.76898	4.1	0.23689	2.7	0.67	1370.5	33.7	1347.2	30.3	1310.4	58.2	1310.4	58.2
HC6-59	107	187687	1.9	11.73858	1.1	2.72814	1.6	0.23226	1.1	0.70	1346.3	13.7	1336.2	12.0	1319.8	22.2	1319.8	22.2
HC6-70	260	139770	2.0	11.73367	0.7	2.65037	1.2	0.22555	1.0	0.81	1311.1	11.6	1314.7	8.9	1320.6	13.9	1320.6	13.9
HC6-40	120	77516.7	3.7	11.72895	1.0	2.72213	1.5	0.23156	1.1	0.75	1342.7	13.3	1334.5	10.9	1321.4	18.7	1321.4	18.7
HC6-88	133	59179.4	2.0	11.50593	6.6	2.64236	6.9	0.2205	1.8	0.27	1284.5	21.4	1312.5	50.7	1358.5	127.7	1358.5	127.7
HC6-74	357	139393	4.8	11.13253	0.4	3.09846	1.1	0.25017	1.0	0.94	1439.4	13.4	1432.3	8.4	1421.8	6.9	1421.8	6.9
HC6-45	124	77206.3	1.9	11.0482	1.2	3.15318	1.4	0.25266	0.7	0.54	1452.2	9.7	1445.8	10.7	1436.3	22.4	1436.3	22.4
HC6-30	817	522007	21.0	10.70522	0.2	3.34788	1.2	0.25994	1.2	0.99	1489.5	15.8	1492.3	9.4	1496.2	3.5	1496.2	3.5
HC6-49	115	143585	2.8	10.6755	1.3	3.42143	2.0	0.26491	1.5	0.76	1514.9	20.6	1509.3	15.7	1501.5	24.3	1501.5	24.3
HC6-75	406	629127	2.9	10.64725	0.3	3.50539	1.3	0.27069	1.2	0.97	1544.3	17.1	1528.4	10.1	1506.5	5.4	1506.5	5.4
HC6-63	151	94940	1.1	10.62095	0.7	3.51704	1.8	0.27092	1.7	0.92	1545.5	23.1	1531.1	14.4	1511.2	13.6	1511.2	13.6
HC6-55	177	110451	3.1	10.61638	0.7	3.34785	1.4	0.25778	1.2	0.86	1478.5	16.1	1492.3	11.0	1512.0	13.4	1512.0	13.4
HC6-84	320	88775.4	1.8	10.61025	0.4	3.13248	2.4	0.24105	2.3	0.98	1392.2	29.0	1440.7	18.2	1513.1	8.4	1513.1	8.4
HC6-99	220	59675	1.6	10.55832	0.8	3.58038	1.4	0.27417	1.1	0.80	1561.9	15.0	1545.2	10.8	1522.3	15.5	1522.3	15.5
HC6-38	249	207352	5.2	10.48155	0.4	3.47792	1.4	0.26439	1.3	0.96	1512.3	18.1	1522.2	11.1	1536.1	7.5	1536.1	7.5
HC6-42	293	164618	2.6	10.44601	0.4	3.66811	1.1	0.2779	1.0	0.93	1580.8	13.8	1564.5	8.4	1542.5	7.0	1542.5	7.0
HC6-64	466	278494	3.0	10.38937	0.3	3.46637	0.8	0.26119	0.7	0.92	1495.9	9.4	1519.6	6.0	1552.7	5.7	1552.7	5.7
HC6-90	120	87931.4	2.0	10.36569	0.9	3.65619	2.7	0.27487	2.6	0.94	1565.5	35.7	1561.9	21.7	1557.0	16.7	1557.0	16.7
HC6-97	281	175710	3.6	10.35117	0.3	3.75314	1.9	0.28176	1.8	0.99	1600.2	26.0	1582.8	14.9	1559.6	5.5	1559.6	5.5
HC6-9	411	170437	4.1	10.34803	0.4	3.75466	1.6	0.28179	1.6	0.97	1600.4	22.1	1583.1	12.9	1560.2	6.9	1560.2	6.9
HC6-4	132	95326.1	1.4	9.948565	0.7	4.08088	1.4	0.29445	1.2	0.87	1663.7	17.5	1650.5	11.2	1633.7	12.4	1633.7	12.4
HC6-93	229	54815.8	0.8	9.729461	0.6	3.59769	3.0	0.25387	3.0	0.98	1458.4	38.8	1549.0	24.1	1674.9	11.3	1674.9	11.3
HC6-28	350	524097	2.0	9.671302	0.4	4.34075	1.6	0.30447	1.5	0.96	1713.4	22.4	1701.1	12.8	1686.0	8.2	1686.0	8.2
HC6-10	118	120017	2.4	9.621995	1.0	4.53401	5.1	0.31641	5.0	0.98	1772.2	78.2	1737.2	42.8	1695.4	17.9	1695.4	17.9
HC6-89	515	246917	1.4	9.451058	0.3	4.34523	3.5	0.29785	3.5	1.00	1680.6	51.7	1702.0	29.0	1728.4	5.8	1728.4	5.8
HC6-13	96	104695	1.3	9.287711	1.2	4.66813	1.3	0.31445	0.6	0.43	1762.6	8.7	1761.5	10.9	1760.3	21.5	1760.3	21.5
HC6-47	294	378375	2.1	9.137305	0.4	4.85636	1.0	0.32183	0.9	0.93	1798.7	14.6	1794.7	8.5	1790.1	6.8	1790.1	6.8
HC6-19	236	155526	1.8	9.088111	0.3	4.89358	1.0	0.32255	0.9	0.95	1802.2	14.2	1801.2	8.1	1799.9	5.5	1799.9	5.5
HC6-50	188	87721.2	3.6	9.067118	0.7	4.35736	2.5	0.28654	2.4	0.96	1624.2	34.6	1704.3	20.7	1804.2	12.8	1804.2	12.8
HC6-52	168	136388	2.1	9.064409	0.6	4.97821	1.0	0.32727	0.9	0.84	1825.2	13.8	1815.6	8.7	1804.7	10.1	1804.7	10.1
HC6-87	179	149056	3.1	8.842936	0.5	5.12167	1.0	0.32848	0.8	0.83	1831.0	13.0	1839.7	8.3	1849.6	9.8	1849.6	9.8

HC6-41	338	279373	0.7	8.722359	0.3	5.39645	0.8	0.34138	0.7	0.92	1893.3	11.6	1884.3	6.6	1874.3	5.4	1874.3	5.4
HC6-6	109	84511.9	0.7	8.675651	0.9	5.53691	1.3	0.34839	0.9	0.68	1926.9	14.4	1906.3	11.0	1884.0	17.0	1884.0	17.0
HC6-17	128	61032	2.1	8.363892	1.3	4.98133	2.1	0.30217	1.7	0.80	1702.1	24.8	1816.2	17.6	1949.7	22.4	1949.7	22.4
HC6-32	103	173339	0.8	7.677344	0.7	7.21673	1.0	0.40184	0.7	0.74	2177.5	13.3	2138.6	8.6	2101.4	11.4	2101.4	11.4
HC6-58	108	115074	3.8	7.650857	0.8	7.15935	1.2	0.39727	0.9	0.76	2156.4	16.3	2131.5	10.4	2107.4	13.3	2107.4	13.3
HC6-100	99	92234	1.5	5.582726	0.5	12.8908	1.4	0.52195	1.3	0.94	2707.4	29.7	2671.7	13.5	2644.8	8.1	2644.8	8.1

				Isotope Ratios								Apparent Ages						
Analysis	U (ppm)	^{206}Pb / ^{204}Pb	U/Th	^{206}Pb*/ ^{207}Pb*	± (%)	^{207}Pb*/ ^{235}U*	± (%)	^{206}Pb*/ ^{238}U	± (%)	Error Conc	^{206}Pb*/ ^{207}Pb*	± (Ma)	^{207}Pb*/ ^{235}U*	± (Ma)	^{206}Pb*/ ^{238}U	± (Ma)	Best age (Ma)	± (Ma)
HC16-40	398	32651.8	1.2	20.79149	4.7	0.22289	4.8	0.03361	1.0	0.21	213.1	2.1	204.3	8.8	104.0	110.0	213.1	2.1
HC16-71	760	85333.8	1.2	18.02848	0.9	0.50981	1.3	0.06666	0.9	0.70	416.0	3.6	418.3	4.4	431.1	20.2	416.0	3.6
HC16-57	168	77331.9	1.2	18.2913	7.9	0.50627	8.0	0.06716	1.2	0.15	419.0	5.0	415.9	27.5	398.8	178.4	419.0	5.0
HC16-73	287	53329.8	2.9	18.24624	1.5	0.52588	2.2	0.06959	1.6	0.73	433.7	6.8	429.1	7.8	404.3	34.0	433.7	6.8
HC16-17	377	53457.5	1.1	17.80016	1.5	0.56422	2.1	0.07284	1.4	0.68	453.2	6.2	454.3	7.6	459.5	33.9	453.2	6.2
HC16-38	162	42167.2	1.6	17.85514	3.9	0.56367	4.1	0.07299	1.3	0.31	454.2	5.7	453.9	15.2	452.6	87.4	454.2	5.7
HC16-68	861	100944	7.0	17.89633	0.9	0.56409	1.6	0.07322	1.3	0.83	455.5	5.9	454.2	5.9	447.5	20.2	455.5	5.9
HC16-33	362	111056	3.0	17.83625	1.4	0.56612	1.9	0.07323	1.3	0.66	455.6	5.5	455.5	7.0	455.0	31.7	455.6	5.5
HC16-36	292	47933	1.9	18.13719	4.6	0.55678	4.6	0.07324	0.5	0.11	455.7	2.2	449.4	16.8	417.7	102.8	455.7	2.2
HC16-11	131	39335.1	1.3	17.98986	4.0	0.56439	4.3	0.07364	1.6	0.38	458.0	7.1	454.4	15.7	435.9	88.5	458.0	7.1
HC16-91	834	87991.3	1.2	17.79176	0.9	0.57277	1.1	0.07391	0.5	0.47	459.7	2.3	459.8	4.0	460.5	21.0	459.7	2.3
HC16-62	574	52228.5	2.5	17.81414	1.7	0.57243	2.4	0.07396	1.6	0.69	460.0	7.2	459.6	8.7	457.7	38.2	460.0	7.2
HC16-30	408	42476	4.2	17.88865	3.7	0.57593	3.8	0.07472	1.0	0.25	464.5	4.4	461.8	14.2	448.4	82.0	464.5	4.4
HC16-29	110	32505.6	0.9	16.83584	8.6	0.61203	8.6	0.07473	1.1	0.12	464.6	4.7	484.8	33.3	581.7	186.6	464.6	4.7
HC16-86	222	58602.2	1.5	17.951	2.3	0.58023	2.6	0.07554	1.3	0.51	469.5	6.0	464.6	9.8	440.7	50.5	469.5	6.0
HC16-31	229	55161.6	2.1	18.18582	3.0	0.57334	3.3	0.07562	1.3	0.39	469.9	5.8	460.2	12.2	411.7	68.0	469.9	5.8
HC16-35	262	72305.2	0.9	17.59741	2.5	0.59756	2.8	0.07627	1.2	0.43	473.8	5.4	475.7	10.5	484.8	55.2	473.8	5.4
HC16-72	335	75015.6	2.7	17.14858	3.3	0.61504	4.8	0.07649	3.6	0.74	475.2	16.4	486.7	18.8	541.6	71.4	475.2	16.4
HC16-90	148	40708.2	1.9	17.93303	3.9	0.59515	4.0	0.07741	0.9	0.23	480.6	4.3	474.1	15.3	442.9	87.6	480.6	4.3
HC16-82	350	53947.7	1.3	17.9168	1.9	0.59593	2.2	0.07744	1.1	0.52	480.8	5.3	474.6	8.4	444.9	42.1	480.8	5.3
HC16-54	323	26088.4	1.8	17.64895	1.9	0.61378	2.3	0.07857	1.4	0.61	487.6	6.7	485.9	9.0	478.3	41.0	487.6	6.7
HC16-56	523	61525.7	0.8	17.51022	1.1	0.63638	1.5	0.08082	0.9	0.63	501.0	4.4	500.1	5.7	495.8	24.8	501.0	4.4
HC16-95	319	35601.3	1.0	17.63932	2.8	0.63582	3.2	0.08134	1.6	0.50	504.1	7.9	499.7	12.7	479.5	61.7	504.1	7.9
HC16-75	336	44284.6	2.3	17.65417	1.6	0.65002	4.1	0.08323	3.8	0.92	515.4	18.9	508.5	16.6	477.7	35.9	515.4	18.9
HC16-7	186	40646.8	2.8	17.38243	2.4	0.66954	2.9	0.08441	1.6	0.54	522.4	7.8	520.4	11.8	511.9	53.4	522.4	7.8
HC16-13	96	20622.6	0.9	17.74808	5.3	0.68219	5.5	0.08781	1.1	0.21	542.6	5.9	528.1	22.5	466.0	118.5	542.6	5.9

HC16-1	549	134950	0.9	16.99266	1.2	0.71717	1.8	0.08839	1.3	0.75	546.0	7.0	549.0	7.5	561.5	25.5	546.0	7.0
HC16-96	875	222041	2.7	16.72365	0.7	0.78801	1.5	0.09558	1.3	0.88	588.4	7.6	590.0	6.8	596.2	15.5	588.4	7.6
HC16-93	390	4033.84	1.1	16.04594	12.4	0.82991	12.9	0.09658	3.8	0.29	594.3	21.4	613.6	59.6	685.2	264.9	594.3	21.4
HC16-43	216	36867.7	0.6	16.60456	2.3	0.8183	5.5	0.09855	5.1	0.91	605.9	29.2	607.1	25.3	611.6	49.1	605.9	29.2
HC16-84	167	42293.3	1.9	16.39147	1.9	0.84778	2.2	0.10079	1.2	0.52	619.0	6.9	623.4	10.5	639.5	41.3	619.0	6.9
HC16-100	209	51812.3	0.9	16.33193	2.6	0.86148	2.8	0.10204	1.1	0.37	626.4	6.3	630.9	13.4	647.3	56.7	626.4	6.3
HC16-3	743	142661	1.4	16.46966	0.9	0.85556	1.2	0.1022	0.7	0.63	627.3	4.5	627.7	5.5	629.2	19.8	627.3	4.5
HC16-74	155	14214	1.5	16.24297	3.4	0.88788	3.7	0.1046	1.5	0.40	641.3	9.0	645.2	17.6	659.1	72.5	641.3	9.0
HC16-81	488	91372.1	6.3	16.19114	0.8	0.91289	1.3	0.1072	1.1	0.83	656.5	6.9	658.6	6.5	665.9	16.1	656.5	6.9
HC16-78	79	30717.5	2.9	16.19474	7.4	0.94739	7.5	0.11128	1.2	0.17	680.2	8.0	676.7	37.0	665.4	158.4	680.2	8.0
HC16-15	233	59606.3	2.1	15.3265	1.0	1.11662	1.8	0.12412	1.5	0.84	754.2	10.9	761.4	9.7	782.3	20.5	754.2	10.9
HC16-8	97	63032.2	1.6	14.7676	4.5	1.33547	4.7	0.14304	1.3	0.28	861.8	10.6	861.3	27.3	859.8	93.8	861.8	10.6
HC16-26	121	23021.9	2.4	14.35678	2.1	1.5055	2.3	0.15676	1.1	0.45	938.8	9.3	932.6	14.3	918.2	42.9	918.2	42.9
HC16-46	129	23972.1	2.2	14.25989	1.4	1.53875	1.6	0.15914	0.7	0.46	952.0	6.4	946.0	9.8	932.1	29.1	932.1	29.1
HC16-52	73	18929.1	2.7	14.16744	3.8	1.58893	4.4	0.16327	2.2	0.50	974.9	19.9	965.9	27.3	945.4	77.7	945.4	77.7
HC16-85	79	14831.5	2.0	14.0982	4.0	1.53818	4.0	0.15728	0.8	0.20	941.6	7.0	945.8	24.9	955.4	81.0	955.4	81.0
HC16-76	713	117475	2.7	13.99183	0.5	1.5624	1.9	0.15855	1.8	0.96	948.7	15.9	955.4	11.6	970.9	10.7	970.9	10.7
HC16-92	117	43537.4	3.2	13.96444	1.7	1.65454	1.9	0.16757	0.9	0.47	998.7	8.4	991.3	12.3	974.9	35.1	974.9	35.1
HC16-6	27	13117.7	1.8	13.90517	8.2	1.68439	8.5	0.16987	2.2	0.26	1011.4	20.6	1002.6	54.1	983.6	166.9	983.6	166.9
HC16-55	113	36877.3	2.7	13.88141	2.3	1.7321	2.5	0.17438	0.9	0.37	1036.2	8.8	1020.5	16.1	987.0	47.2	987.0	47.2
HC16-48	181	50985.5	2.5	13.87165	1.7	1.70101	2.0	0.17113	0.9	0.45	1018.3	8.2	1008.9	12.5	988.5	35.5	988.5	35.5
HC16-47	162	144798	3.7	13.76784	1.6	1.69539	1.9	0.16929	1.0	0.52	1008.2	9.2	1006.8	12.1	1003.7	32.8	1003.7	32.8
HC16-27	274	126104	2.4	13.75298	0.8	1.69896	1.3	0.16946	1.0	0.78	1009.2	9.5	1008.1	8.3	1005.9	16.6	1005.9	16.6
HC16-45	177	48385.9	3.0	13.73246	1.1	1.76447	1.5	0.17574	1.0	0.67	1043.6	9.5	1032.5	9.5	1008.9	22.0	1008.9	22.0
HC16-50	48	27425.8	1.6	13.73089	4.5	1.72534	5.1	0.17182	2.3	0.45	1022.1	21.4	1018.0	32.7	1009.2	92.3	1009.2	92.3
HC16-66	189	49086.9	4.4	13.72085	1.5	1.74054	1.8	0.17321	1.0	0.55	1029.8	9.6	1023.7	11.8	1010.6	30.9	1010.6	30.9
HC16-83	95	39079.7	1.1	13.70403	2.3	1.65083	2.5	0.16408	0.9	0.35	979.4	7.8	989.9	15.5	1013.1	46.6	1013.1	46.6
HC16-4	92	54542.3	1.7	13.66157	2.8	1.67732	3.3	0.16619	1.6	0.50	991.1	15.0	1000.0	20.9	1019.4	57.6	1019.4	57.6
HC16-70	189	98256.6	2.7	13.65473	2.0	1.73654	2.2	0.17198	1.0	0.45	1023.0	9.5	1022.2	14.3	1020.4	40.1	1020.4	40.1
HC16-98	568	175708	1.9	13.4653	0.5	1.7921	1.0	0.17502	0.9	0.86	1039.7	8.3	1042.6	6.5	1048.7	10.3	1048.7	10.3
HC16-53	54	52064.1	4.5	13.37417	2.2	1.80576	2.6	0.17516	1.4	0.55	1040.5	13.9	1047.5	17.3	1062.4	44.5	1062.4	44.5
HC16-5	216	84429.2	3.5	12.93021	0.9	2.077	1.6	0.19478	1.3	0.82	1147.2	13.8	1141.2	11.1	1129.9	18.6	1129.9	18.6
HC16-60	105	83451.2	3.3	12.86036	2.5	2.14084	2.9	0.19968	1.4	0.49	1173.6	15.0	1162.1	19.8	1140.7	49.5	1140.7	49.5
HC16-79	484	84201.4	9.8	12.76583	1.0	2.07036	3.0	0.19169	2.8	0.94	1130.5	29.2	1139.1	20.4	1155.3	19.5	1155.3	19.5
HC16-44	265	101972	1.1	12.74086	0.9	2.13298	1.6	0.1971	1.4	0.85	1159.7	14.5	1159.6	11.1	1159.2	17.0	1159.2	17.0
HC16-39	95	33377.5	23.7	12.6825	2.0	2.28483	2.4	0.21016	1.4	0.57	1229.7	15.3	1207.6	16.9	1168.3	38.8	1168.3	38.8

HC16-80	186	106793	2.1	12.58623	1.2	2.2497	1.4	0.20536	0.8	0.57	1204.1	9.0	1196.7	10.1	1183.4	23.2	1183.4	23.2
HC16-77	103	48423.5	2.7	12.57442	1.9	2.22812	3.6	0.2032	3.0	0.84	1192.5	32.4	1189.9	24.9	1185.3	38.4	1185.3	38.4
HC16-22	73	29163.6	8.0	12.50945	3.1	2.15469	4.4	0.19549	3.0	0.70	1151.0	32.1	1166.6	30.3	1195.5	61.7	1195.5	61.7
HC16-65	314	126096	1.1	12.33679	0.5	2.3362	1.0	0.20903	0.8	0.87	1223.7	9.3	1223.4	6.8	1222.8	9.2	1222.8	9.2
HC16-59	41	18819.5	0.8	12.28996	5.6	2.34794	5.8	0.20928	1.5	0.25	1225.0	16.5	1226.9	41.6	1230.3	110.9	1230.3	110.9
HC16-94	239	19822.1	3.8	11.90616	1.7	2.42102	4.5	0.20906	4.2	0.93	1223.8	46.4	1248.9	32.3	1292.3	32.6	1292.3	32.6
HC16-19	193	126129	1.7	11.78944	0.9	2.74902	2.4	0.23506	2.2	0.93	1360.9	26.9	1341.8	17.6	1311.4	17.1	1311.4	17.1
HC16-14	136	173559	2.0	11.70793	1.2	2.70619	1.4	0.22979	0.7	0.50	1333.4	8.5	1330.2	10.5	1324.9	23.8	1324.9	23.8
HC16-61	71	16570.2	1.3	11.31967	3.4	2.93252	3.7	0.24075	1.5	0.40	1390.6	18.4	1390.3	27.8	1389.9	64.7	1389.9	64.7
HC16-32	60	28943	1.6	11.04874	2.5	3.17167	3.0	0.25416	1.5	0.52	1459.9	20.0	1450.3	22.8	1436.3	48.1	1436.3	48.1
HC16-41	110	87282.1	2.2	10.99433	1.0	3.14008	1.5	0.25039	1.1	0.75	1440.5	14.8	1442.6	11.7	1445.7	19.1	1445.7	19.1
HC16-10	160	165874	2.4	10.97293	0.6	3.13732	0.8	0.24968	0.5	0.65	1436.8	6.5	1441.9	6.0	1449.4	11.2	1449.4	11.2
HC16-20	64	41843.8	1.6	10.69361	1.5	3.3007	1.8	0.25599	0.9	0.51	1469.3	11.9	1481.2	14.0	1498.3	29.3	1498.3	29.3
HC16-9	234	375753	2.1	10.62409	0.4	3.40803	0.9	0.2626	0.8	0.88	1503.1	10.2	1506.2	6.8	1510.6	7.6	1510.6	7.6
HC16-99	216	93080.9	2.7	10.57159	0.8	3.31482	1.1	0.25416	0.8	0.70	1459.9	10.2	1484.5	8.7	1520.0	14.9	1520.0	14.9
HC16-49	311	58416.3	1.4	10.56698	0.5	3.42015	1.3	0.26212	1.1	0.90	1500.7	15.3	1509.0	9.9	1520.8	10.3	1520.8	10.3
HC16-25	456	194450	2.9	10.39649	0.3	3.57286	0.5	0.2694	0.4	0.80	1537.8	5.7	1543.5	4.1	1551.4	5.8	1551.4	5.8
HC16-2	238	167211	2.3	10.03596	0.7	3.89287	1.4	0.28335	1.2	0.86	1608.2	16.9	1612.2	11.2	1617.4	13.1	1617.4	13.1
HC16-87	235	261261	3.0	9.765505	0.7	4.14659	1.1	0.29369	0.8	0.79	1659.9	12.3	1663.5	8.7	1668.1	12.1	1668.1	12.1
HC16-24	201	92247.3	1.6	9.635626	0.7	4.12118	3.5	0.288	3.5	0.98	1631.6	50.1	1658.5	29.0	1692.8	12.9	1692.8	12.9
HC16-23	196	145269	2.6	9.334874	0.3	4.70819	1.0	0.31876	1.0	0.96	1783.7	15.7	1768.7	8.8	1751.1	5.4	1751.1	5.4
HC16-97	89	48562.4	1.7	9.110615	0.9	4.80918	1.8	0.31777	1.5	0.87	1778.8	23.8	1786.5	14.7	1795.4	15.5	1795.4	15.5
HC16-28	76	124698	1.7	7.53214	0.8	6.85263	1.3	0.37435	1.0	0.79	2049.8	17.8	2092.6	11.3	2134.8	13.6	2134.8	13.6
HC16-37	89	57484	1.3	7.396821	1.0	6.47136	3.3	0.34717	3.2	0.95	1921.1	52.6	2042.0	29.2	2166.5	17.6	2166.5	17.6
HC16-16	100	85636.7	1.3	7.212371	0.7	7.52228	2.0	0.39348	1.8	0.93	2139.0	33.2	2175.6	17.6	2210.4	12.5	2210.4	12.5
HC16-58	100	76207.5	1.4	6.546203	0.4	7.66738	6.4	0.36403	6.4	1.00	2001.2	110.4	2192.8	57.8	2377.0	6.8	2377.0	6.8
HC16-89	273	318132	1.7	6.532164	0.4	8.75388	1.9	0.41472	1.8	0.97	2236.5	34.0	2312.7	16.9	2380.7	7.7	2380.7	7.7
HC16-64	73	73445.1	2.7	6.2763	0.4	10.192	1.1	0.46394	1.0	0.94	2456.9	20.2	2452.3	9.7	2448.5	6.0	2448.5	6.0
HC16-51	130	74515.3	0.9	6.135876	1.1	10.3756	2.5	0.46173	2.3	0.90	2447.2	46.5	2468.9	23.5	2486.8	18.6	2486.8	18.6
HC16-18	197	321483	2.0	5.642503	0.3	12.3984	1.2	0.50738	1.1	0.96	2645.4	24.5	2635.1	11.1	2627.1	5.8	2627.1	5.8
HC16-67	262	75642.3	1.3	4.139568	0.2	19.0005	2.1	0.57045	2.1	0.99	2909.7	49.9	3041.8	20.7	3130.3	3.8	3130.3	3.8