



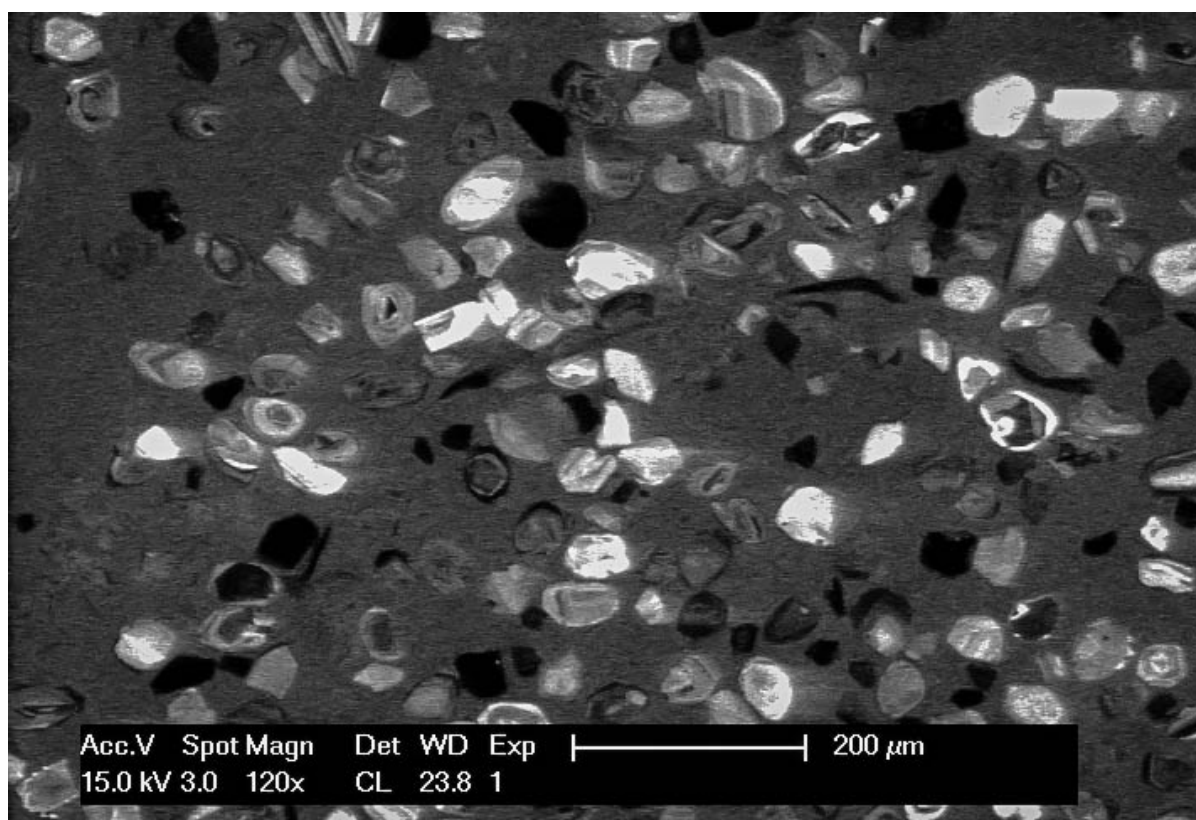
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Master Thesis

Degree Project in
Geology 60 hp

Detrital zircon U-Pb geochronology of Permian-Triassic strata of North Slope, Alaska

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Stockholm 2018

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Front page: Cathodoluminescent (CL) image of zircon from sample 12TM-33A from the Sadlerochit Mountains of North Slope of Alaska.

ABSTRACT

The paleotectonic history of the circum-Arctic is surprisingly unknown, despite many recent studies conducted in the region. Determining the tectonic development of the Arctic Ocean has proved difficult, and many ideas and models that would explain the history of the Arctic have been suggested recently. With dating of crustal fragments and investigations of the rift-related opening of the Amerasia Basin, the tectonic history of the Arctic Ocean and its surrounding continental shelves can be established. This is especially true using sediments and sedimentary basins, as they reflect these tectonic processes and are associated with uplift, exhumation, rifting and subsidence.

This study presents detrital zircon U-Pb ages from 14 Permian and Triassic age metasedimentary samples of the Ivishak Formation in the Sadlerochit Mountains of the North Slope of Alaska. These ages are used to infer the ultimate source(s) of the sediment, i.e. - its provenance. Using laser ablation inductively coupled plasma mass spectrometry to analyse detrital zircons, the age spectra and maximum depositional ages of the sediment samples were determined. The data are presented on concordia diagrams and as kernel density estimate (KDE) plots. The results from the various samples have similar detrital zircon U-Pb signatures with a few exceptions and the majority of grains are Mesoproterozoic to Paleoproterozoic in ages. All samples have a maximum depositional age that is 100-800 Ma older than their stratigraphic age, consistent with a tectonic setting similar to an intracratonic basin and/or a passive margin. The samples also have strongly similar age spectra to their off-shore equivalents in northern Alaska. The samples from the Sadlerochit Mountains and their off-shore equivalents provide U-Pb detrital zircon ages characteristic of Baltican, Laurentian and Siberian sources.

SAMMANFATTNING

Den geotekniska historien kring Arktis är förvånansvärt okänd, trots de flertal studier som gjorts inom området. Det har visat sig vara svårt att fastställa den tektoniska evolutionen av norra ishavet, men många idéer och modeller som skulle kunna förklara den geologiska historien i Arktis har föreslagits på senare tid. Med hjälp av att datera delar av jordskorpan och undersöka förkastningsrelaterade öppnanden av den Amerasiska bassängen kan man upprätta den tektoniska evolutionen av norra ishavet och dess kringliggande kontinentalsocklar. Detta är särskilt sant när man tittar på sediment och sedimentära bassänger, då de reflekterar dessa tektoniska processer och är förknippade med bl.a. upphävning, klyftbildning och subducering.

Denna studie presenterar detritiska zirkoner från 14 metasedimentprover av åldrar från perm till trias från Ivishakformationen i Sadlerochitbergen i North Slope, Alaska. Dessa åldrar används för att antyda de ultimata källorna för sedimenten, d.v.s. dess ursprung. Genom att använda laserablation induktivt kopplad plasmamasspektrometri för att analysera detritiska zirkoner har åldersspektrum och den maximala depositionsåldern för zirkonerna bestämts, vilket i sin tur har presenterats i concordia-diagram och kernel sannolikhetsfördelningskurvor (KDE). Resultaten från de olika proverna visar liknande detritiska zirkon U-Pb ålderssignaturer med varandra med några få undantag, och majoriteten av kornen är Mesoproterozoikum och Paleoproterozoikum i ålder. Alla prover har en maximal depositionsålder som är 100-800 miljoner år äldre än deras antagna stratigrafiska ålder, vilket är överensstämmande med en tektonisk miljö från ett kontinentalblock (inre kraton) och/eller en passiv förkastning. Proverna visar även liknelser i åldersspektrum med deras ekvivalenter från havskusten av norra Alaska. Proverna från Sadlerochitbergen och deras havskustsekvivalenter visar U-Pb detritiska zirkonåldrar som är karaktäristiska för Baltiska, Laurentiska och Sibiriska källor.

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1. INTRODUCTION

The tectonic history of the world over the latest 500 Ma is well documented, with the exception of the circum-Arctic region. Despite an increased interest in exploring the Arctic Ocean to better understand its plate tectonic origin, there is remarkably little known about the formation of this ocean basin and its changing paleogeography through time (Miller et al., 2006). The Amerasia Basin is one of the last unknowns in tectonic reconstructions related to the Arctic Ocean, where understanding the age and tectonic events of the basin are vital to determining the evolutionary history of the Arctic Ocean (Miller et al., 2010).

U-Pb analyses of individual zircon crystals preserved as detritus in sediment, allow us to determine individual crystallisation ages as well as a combined age-signature for the sediment, which in turn provides sediment provenance information, i.e. - where the detritus being deposited into the sedimentary basin is from. Together with modern instruments, the U-Pb dating method is a powerful tool for reconstructing the history of plate tectonics (Vermeesch, 2012). Analyses of detrital zircon from the circum-Arctic could therefore provide very useful information of the tectonic history of the Arctic Ocean and its evolution (Miller et al., 2006).

This project aims to determine the maximum age of 14 sedimentary rocks from the eastern North Slope of Alaska via U-Pb dating of detrital zircon, and thereby determine the provenance of these on-shore deposits. Through comparison with their off-shore equivalents, the regional provenance of this important reservoir rock is assessed. This project will also investigate the geological events through comparison with regional data sets, in hopes to better understand the tectonic history of the Arctic.

2. BACKGROUND

2.1 Detrital zircon & provenance

Zircon (ZrSiO_4) is as an accessory mineral that occurs naturally in sedimentary, igneous and metamorphic rocks. It is an extremely variable mineral in terms of its external morphology and internal textures, its features commonly revealing the geological history of the mineral. Due to its resistance against heat and corrosion, zircon can survive through geological processes like magmatism, metamorphism and erosion that destroy most other common minerals (Corfu et al., 2003). Zircon contains up to one percent of the radioactive elements uranium (U) and thorium (Th) that naturally decay to various lead (Pb) isotopes with known half-lives (Corfu et al., 2003; Vermeesch, 2012). In addition, the mineral can be used to determine the isotopic composition of oxygen and rare earth elements (REEs), including the radiogenic isotopic tracer hafnium (Hf); these methods are often applied to investigate mantle/magmatic sources of the zircon.

Detrital zircon in clastic sedimentary rocks is derived from pre-existing rocks via weathering and erosion before being transported (Fedo et al., 2003). Zircon is often transported into depositional systems through sedimentary processes to then form sedimentary successions. Their physiochemical resilience and high concentrations of trace elements have made them an important tracer of crustal evolution and sedimentary provenance analysis (Cawood et al., 2012).

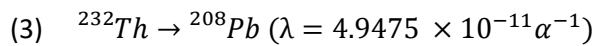
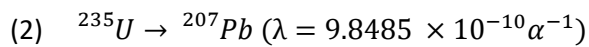
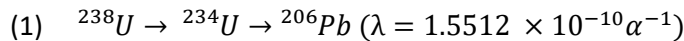
Zircon is highly refractory at the Earth's surface and occurs in virtually all sedimentary deposits, though in differing amounts. The age of clastic material deposited into sedimentary basins is controlled mainly by the tectonic setting and hydrogeological processes (Cawood et al., 2012). By comparing the stratigraphic age of the sediment and its maximum age of deposition, i.e. - the youngest zircon age present in the sediment, sediment provenance and tectonic regime during deposition can be determined (Miller et al., 2006). If specific ages of detrital zircon grains can be traced to their original source(s), they can be used to interpret the origin and provenance of the

sediment, and may enhance our knowledge further by comparisons with other detrital data that might suggest similarity or dissimilarity between the detritus/sources (Fedó et al., 2003).

2.2 The U-Th-Pb isotopic system

With three decay reactions, the U-Th-Pb (uranium-thorium-lead) system is a powerful radiometric dating method in geochronology. Its three decay schemes can be used independently with the standard isochron technique, but are even more significant when applied in combination, e.g. ^{235}U - ^{207}Pb and ^{238}U - ^{206}Pb systems. The U-Pb dating method can provide absolute ages of the Solar System as well as the oldest rocks on Earth with routine precisions of 0.1-1%, thereby proving its tremendous significance to geochronology (White, 2015).

In excess of any original Pb, the isotopic composition of Pb in rocks can be derived from the breakdown of U, Th and Pb through the following three decay reaction chains (Winter, 2014):



If the radiogenic isotopes ^{206}Pb and ^{207}Pb both evolve in unison via equations (1) and (2), and are standardised by dividing their parent concentrations, the isotopes will follow a curve known as the concordia (Fig. 1). All natural samples that have coherent U-Pb systems must develop along the concordia curve (Winter, 2014).

Events such as melting, metamorphism, fluid infiltration, etc., can result in loss of Pb from a rock (Winter, 2014). Pb isotopes do not fractionate during depletion and are depleted in proportion to

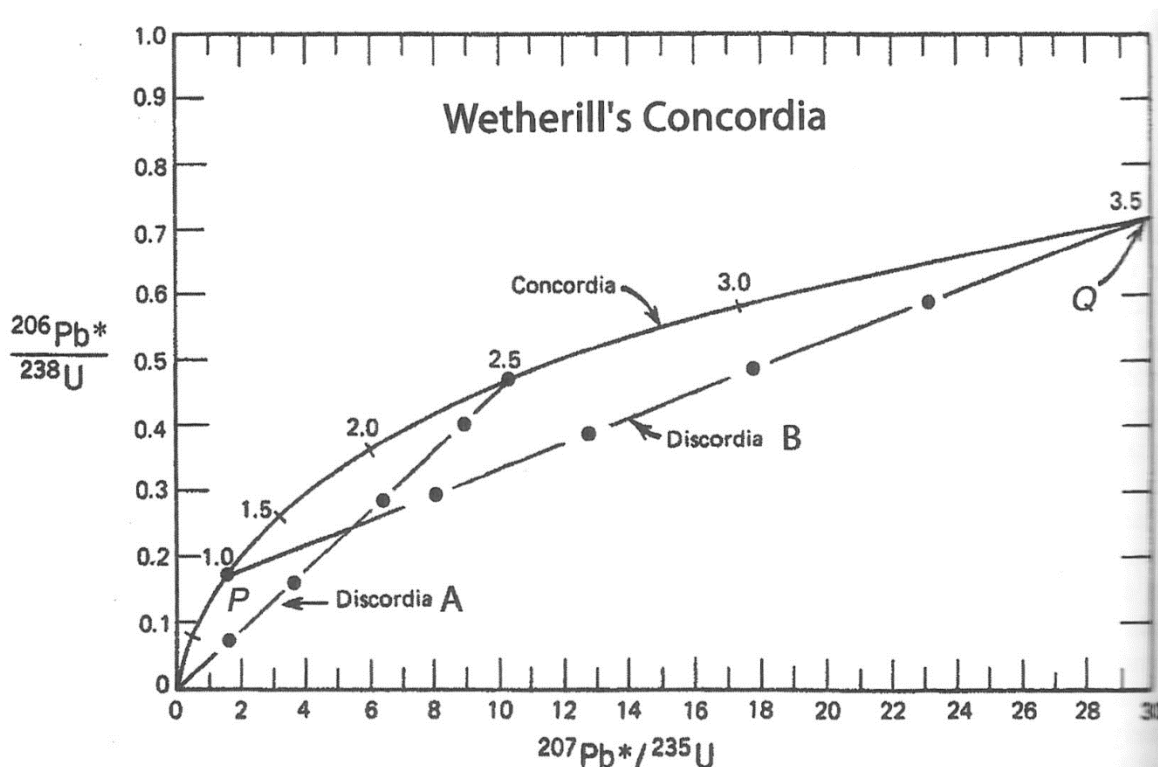


Figure 1. Wetherill's (normal) concordia diagram for the interpretation of U-bearing minerals that lost radiogenic Pb and therefore yield discordant dates. Source: Faure & Mensing, 2005.

their concentration in the rock. This will cause the isotopic system to advance towards the origin point on a concordia diagram, resulting in a line known as the discordia (Fig. 1) (Winter, 2014).

In addition to the Wetherill concordia plot (also known as a normal Concordia diagram) with $^{206}\text{Pb}/^{238}\text{U}$ and $^{207}\text{Pb}/^{235}\text{U}$ as axes, tracing concordance through geological time can also be visualised through a Tera-Wasserburg (inverse) concordia diagram (White, 2015). This diagram plots $^{206}\text{Pb}/^{207}\text{Pb}$ against $^{238}\text{U}/^{206}\text{Pb}$ and the concordant and discordant data are interpreted identically to the Wetherill diagram. However, in contrast to the normal concordia plot, a cogenetic suite of samples representing variable contamination of a single initial Pb composition will define a linear array that intercepts the concordia evolution curve at the true of the suite on the Tera-Wasserburg diagram (Schoene, 2014). The diagram thereby displays initial Pb compositions with the power of a concordia diagram while simultaneously testing for signs of open system behaviour. In addition, modern Pb-loss is easily recognised as a horizontal trajectory from the concordia evolution curve on a Tera-Wasserburg plot.

2.3 LA-ICP-MS

Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) is a popular technique for *in situ* U-Pb dating due to its low cost, wide availability and speed of analysis. Although not well suited for high-resolution sampling, the LA-ICP-MS is very effective for projects needing large numbers of analyses (Jackson et al., 2004). The mass spectrometer consists of four parts; the vacuum system, the ion source, the analyser and the detector. Each selected zircon portion is targeted with a focused laser beam that generate fine particles that are transported in vacuum, otherwise known as laser ablation. The fine ablated particles are thereafter transported to the secondary excitation source where the sampled volume undergoes digestion and ionisation. The excited ions in the plasma torch are then introduced to the mass spectrometer and transported to the detector for both elemental and isotopic analysis (Sylvester, 2001).

2.4 Data processing

Single-grain age measurements have become a common and popular way to determine sedimentary provenance. However, certain conditions must be fulfilled for the method to work and the most important one is that the measured grains are representative of the total detrital population (Vermeesch, 2004). The statistical recommendation for the necessary number of grains analysed to be representative of the sample varies with different authors, but Vermeesch (2004) concludes that 117 zircon grains are needed to be 95% certain that no fraction ≥ 0.05 of the population was missed. This is considered to be a fairly large number of analyses, perhaps too high for analytical methods like fission-track, (U-Th)/He, or TIMS, yet an achievable number for ion-microprobe and LA-ICP-MS.

If prior knowledge about the sample population indicates a non-uniform grain distribution, it is possible to date fewer grains (Vermeesch, 2014). In this case, to be 95% certain that no fraction ≥ 0.05 of the population is missed, it is recommended that not less than 95 grains should be dated. Dating even fewer grains lowers the certainty and ability to confidently interpret the sample. In this study, 50 to 150 number grains were typically analysed.

When using instruments like LA-ICP-MS, it is also necessary to use reference materials in order to calibrate the instrument and provide quality control of the analysed material. When analysing zircon for U-Pb dating, zircon reference materials are needed with homogenous and concordant radiogenic Pb/U ratios, low common Pb contents, moderate U contents, crystalline structure and of a size suited for repeated ablation analyses (Sláma et al., 2008). This investigation uses the Plešovice international zircon standard of Sláma et al. (2008) as an external standard.

In addition to the external standard, a secondary standard, or internal standard, is also required when using instruments like LA-ICP-MS in order to assess data accuracy. The use of an internal standard permits the correct functionality of the instrument to be established by comparing the results (known) age of the internal standard to the external Plešovice standard. The international zircon standard from the Duluth gabbro, Minnesota (FC-5z, Paces & Miller, 1993) was used as the secondary standard in this study.

Partially open system behaviour (Pb loss) has been a major problem since the inception of U-Pb isotopic dating of zircon and is limiting the accuracy of zircon age determinations (Mattinson, 2005). Although this still can create errors in some datasets, new developments in instrumentation and experimental methodology have made it possible to correct for common Pb accurately. The LA-ICP-MS can generate U-Pb ages with an accuracy of better than 1% for most zircon standards (Gehrels et al., 2008). Combined with high efficiency and fine spatial resolution, the high precision of LA-ICP-MS is poised to have a significant impact on the generation and application of U-Pb geochronology.

3. REGIONAL SETTING

3.1 Overview

The tectonic history of the older part of the Arctic Ocean, known as the Amerasia Basin, is still an unsolved puzzle, resulting in numerous theories. Arctic Alaska is located entirely north of the Arctic Circle and covers an area of approximately 400 000 km² (Fig. 2). It faces the Canada Basin of the Arctic Ocean to the north along a 1050 km long arcuate continental margin that stretches from the Mackenzie Delta in the east to the Seward Peninsula in the west (Fig. 2). The geological character of this margin is the result of a number of distinct, yet partly related, tectonic events of rifting, rotation and thrusting (Grantz et al., 1994).

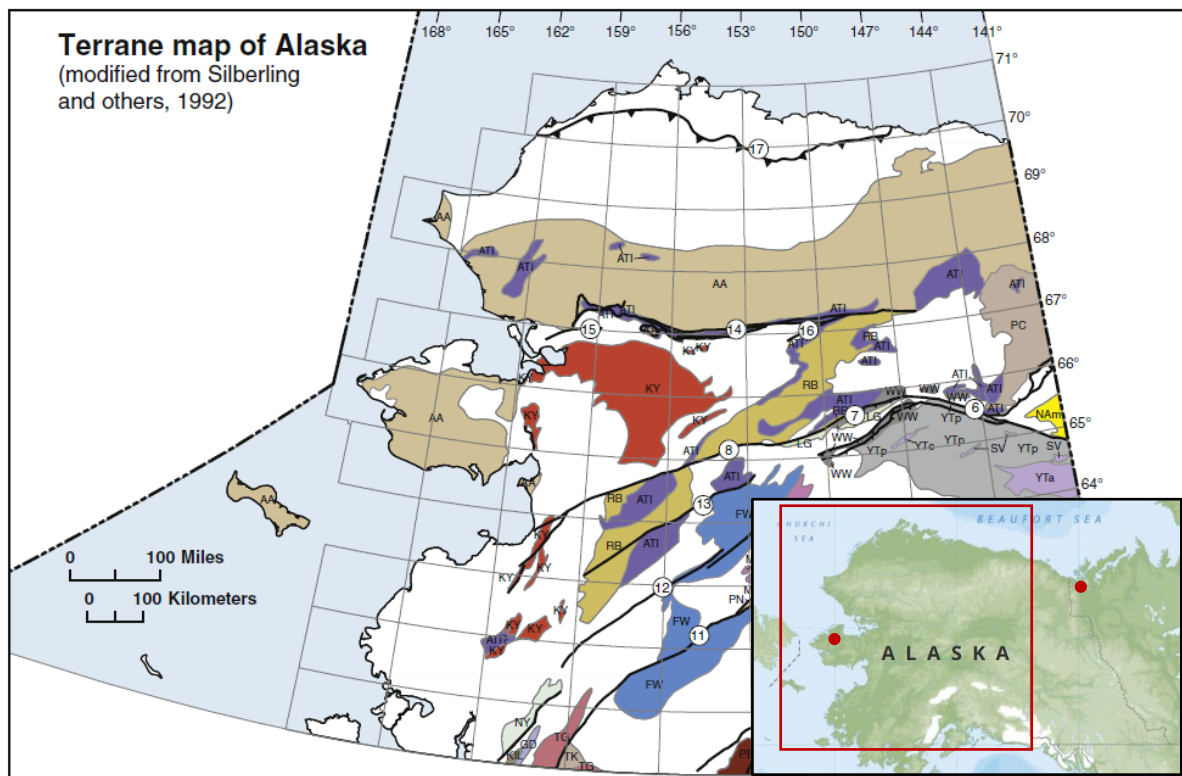


Figure 2. Terrane map of Alaska, generalised from Silberling et al. (1992). Arctic Alaska is marked as AA on the map. Source: Moore & Box (2016). The markings in the inset show the locations of the Seward Peninsula (left) and the Mackenzie Delta (right).

The Arctic Ocean consists of two major basins, the Eurasia and the Amerasia oceanic basins; the former is accepted to have been created by sea floor spreading since the late Paleocene (Grantz et al., 1998). However, the origin of the Amerasia basin is more controversial. The Arctic Alaska Chukotka microplate (AACM) consists of the northernmost parts of Alaska, Russian Chukotka and the large continental shelves north of Russia, and is suggested to be a key element in the plate tectonic evolution of the Amerasia Basin (Fig. 3) The microplate is believed to be a unified continental fragment (Grantz et al., 2011 and references therein).

The most favourable geological and geophysical data suggest that rifting between Arctic Canada and Arctic Alaska occurred in Late Jurassic or Early Cretaceous and that the Arctic Alaska-Chukotka microplate rotated counter-clockwise southward from the Arctic margin of Canada, thereby opening the Amerasian Basin on one side and colliding with northern Asia on the other (Grantz et al., 2011 and references therein). The Amerasian margin of the Lomonosov Ridge serves as a transform boundary in this model (Miller et al., 2006). The AACM is believed to have been separated from the Siberian Craton by the Anyui Ocean, which closed in connection with the opening of the Amerasia Basin and Arctic Ocean (Midwinter et al., 2016).

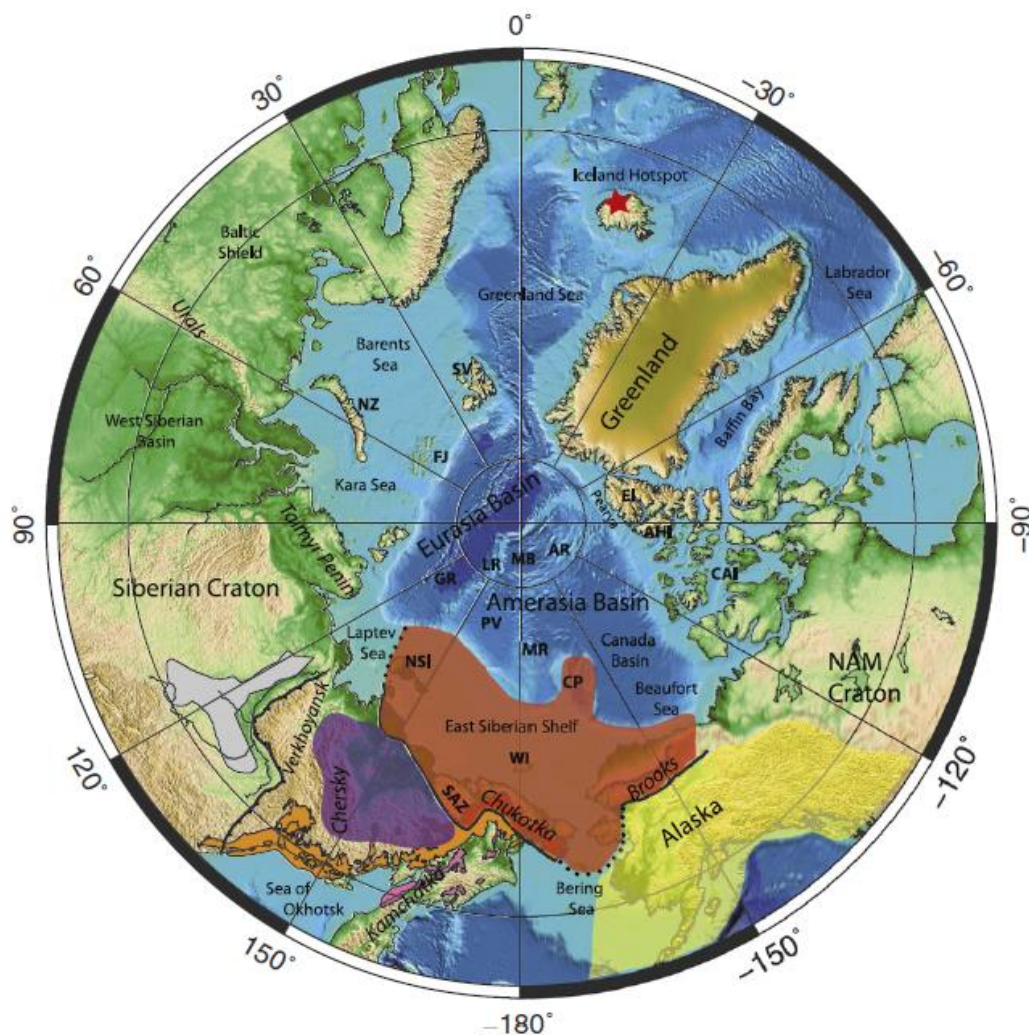


Figure 3. Topographic and bathymetric map of the circum-Arctic. Shaded regions are approximate, with the Arctic-Alaska Chukotka microplate (AACM) marked in brown (after Shephard et al., 2013).

3.2. The North Slope

The North Slope subterranean of Arctic Alaska is the largest of six subterranean in the region and is situated between the Brooks Range to the south and the Arctic Ocean basin to the north. The North Slope subterranean contains four recognised tectonostratigraphies: the Franklinian, Ellesmerian, Beaufortian and Brookian sequences (Grantz et al., 1994; Moore et al., 1994). The Brookian tectonostratigraphy is an important component for understanding the geological evolution of the circum-Arctic region and the accretionary history of Alaska (Crowder, 1990). It comprises a great thickness of sedimentary rocks and a minor amount of igneous rocks (Grantz et al., 1994).

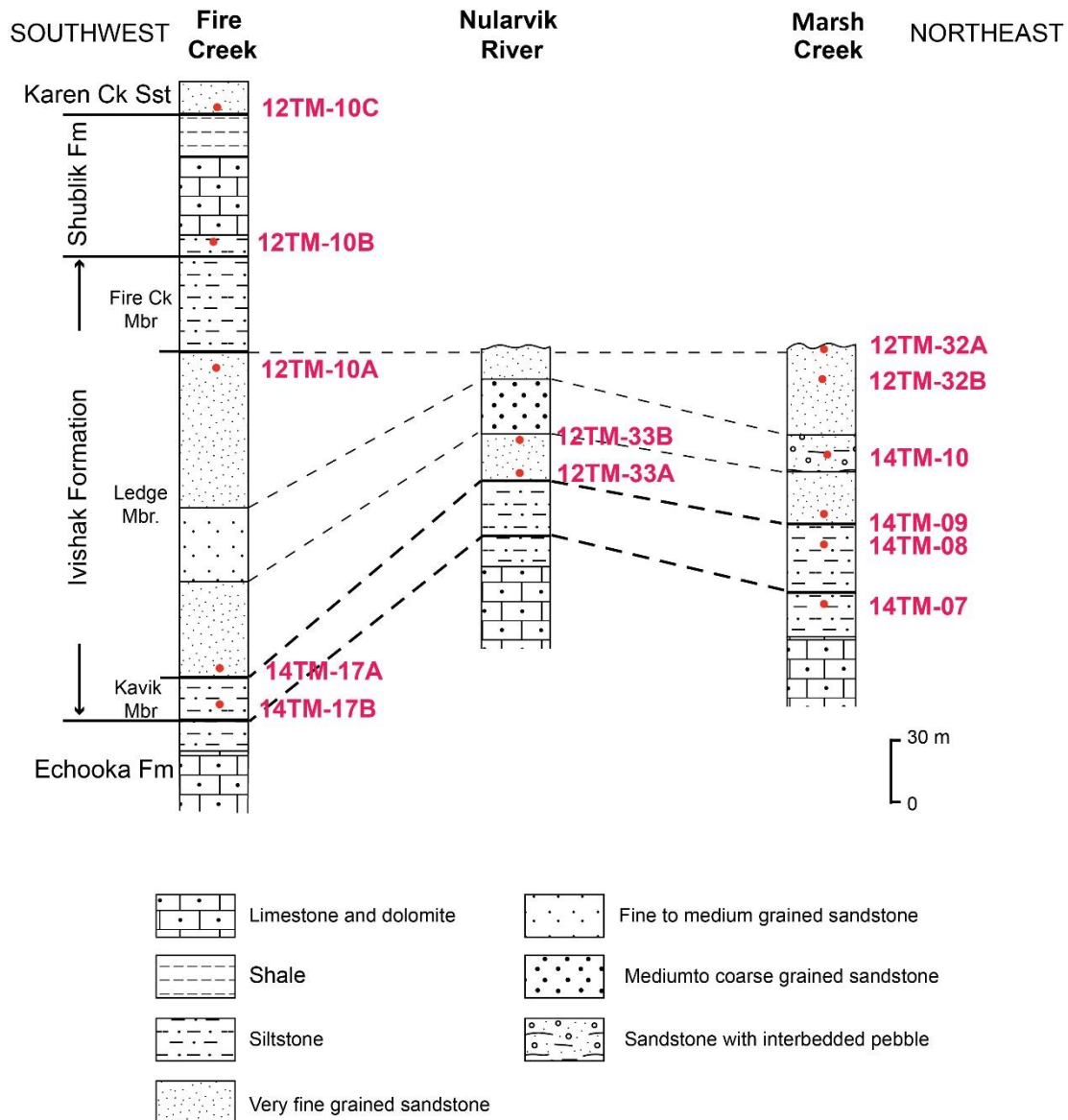


Figure 4. Simplified stratigraphy of the collected samples. Sample CAK14-28 is located farther south and not shown in the image, but it belongs to the Kavik Shale Member.

The Ellesmerian Sequence was unconformably deposited on the Franklinian Sequence as Arctic Alaska developed a gradually subsiding passive margin facing the Angayucham Ocean prior to Ellesmerian Orogeny (Omama, 2014). The sequence has an age from Mississippian to lower Cretaceous and consists of the following units (oldest to youngest): Endicott Group, Lisburne Group,

Echooka Formation, Kavik Formation, Ivishak Formation, Eileen Formation, Shublik Formation and Sag River/Karen Creek sandstones (Fig. 4).

The Ivishak Formation is a fine- to coarse-grained sandstone unit deposited in marine and non-marine environments of Triassic age. It is made up of three dominating members: in ascending order, the Kavik Siltstone Member, the Ledge Sandstone Member and the Fire Creek Siltstone Member (also referred to as the Eileen Formation) (Grantz et al., 1994; Moore et al., 1994). The Ledge Sandstone Member is the primary reservoir for the Prudhoe Bay oil field; its sandstone beds thicken and coarsen northward and are inbedded with thin siltstone and shale layers (Detterman, 1970). The sandstones in the formation are chert-rich and the conglomerates contain chert grains up to cobble size (Detterman et al., 1975). The shallow marine Eileen formation (upper Ledge member and Fire Creek Member) consists of upward fining argillaceous sandstones and siltstones that conformably overlies the lower member (Omma, 2014).

The Echooka Formation is a Permian age transgressive unit consisting mainly of calcareous mudstone, siltstones, radiolarian chert and glauconitic limestone. It is less than 200 m thick and thins upwards (Grantz et al., 1994). It contrasts with the Triassic Shublik Formation, a heterogenous assemblage of organic rich fossiliferous shale, mudstone, limestone, siltstone and sandstone with a thickness of approximately 100 m, and the Sag River/Karen Creek Member that is composed of intensely bioturbated fine-grained argillaceous, glauconitic sandstone of Late Triassic-early Jurassic age, with a maximum thickness of 100 m (Omma, 2014).

3.3 Sample descriptions

A total of 14 samples were selected for detrital zircon U-Pb analysis (Table 1). All the samples were collected from the Sadlerochit Mountains at the eastern part of North Slope, Alaska, from the Ivishak Formation and surrounding units (Fig. 5). The rocks are all quartzite and collected from the Fire Creek, Mash Creek and Nularvik River sections with ages ranging from Permian (258-251 Ma) to Triassic (251-201 Ma). Their location, unit, stratigraphic section, rock type and age are given in Table 1 and shown on Figure 5.

Table 1. Summary of samples from the North Slope, Alaska. The rock age is the depositional age of the sediment.

Sample name	Latitude	Longitude	Stratigraphic Section	Unit	Rock type	Rock age
14TM-07	69.68154°	144.84825°	Mash Creek	Echooka Formation	Quartzite	Permian
14TM-08	69.68228°	144.84924°	Mash Creek	Kavik Member	Quartzite	Permian
14TM-09	69.68240°	144.84750°	Mash Creek	Lower Ledge Member	Quartzite	Early Triassic
14TM-10	69.68279°	144.84852°	Mash Creek	Middle Ledge Member	Quartzite	Early Triassic
12TM-32B	69.68317°	144.84437°	Mash Creek	Upper Ledge Member	Quartzite	Early Triassic
12TM-32A	69.68330°	144.84432°	Mash Creek	Upper Ledge Member	Quartzite	Early Triassic
14TM-17B	69.53214°	145.20735°	Fire Creek	Kavik Member	Quartzite	Permian
14TM-17A	69.53274°	145.20636°	Fire Creek	Lower Ledge Member	Quartzite	Early Triassic
12TM-10A	69.53443°	145.20480°	Fire Creek	Upper Ledge Member	Quartzite	Early Triassic
12TM-10B	69.53487°	145.20392°	Fire Creek	Shublik Formation	Quartzite	Middle Triassic
12TM-10C	69.53618°	145.19693°	Fire Creek	Karen Creek	Quartzite	Early Triassic
12TM-33A	69.64510°	145.09692°	Nularvik River	Lower Ledge Member	Quartzite	Early Triassic
12TM-33B	69.64503°	145.09740°	Nularvik River	Lower Ledge Member	Quartzite	Early Triassic
CAK14-28	69.39710°	145.60539°	Nularvik River	Kavik Member	Quartzite	Permian

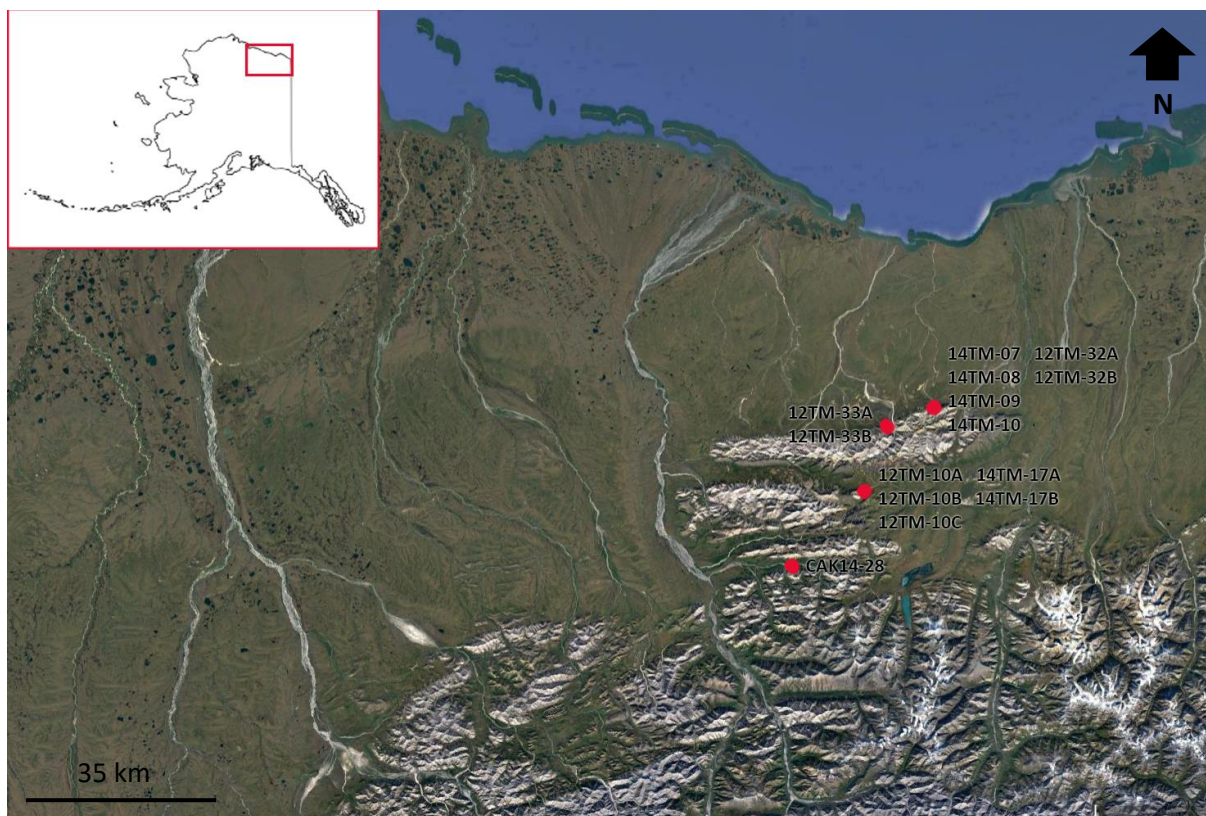


Figure 5. Locations of the 14 collected samples in the Sadlerochit Mountains, North Slope, Alaska.

4. METHODS

4.1 Sample preparation

A total of 14 whole rock samples were crushed, using a stainless steel jaw crusher. All the samples were thereafter processed through a swing mill to create coarse powder, commonly with settings of 800-1000 rotations per minute over a span of 15 to 25 seconds. A Wilfley Table was used to separate the heavy minerals from the light minerals in all samples; in addition, five of these samples needed heavy liquid separation procedures as they contained an abundance of accessory minerals. The minerals were separated by density using methylene iodide (density of 3.28 g mL^{-1}) and the heavy mineral fractions from each sample was collected in filters, rinsed and allowed to dry at room temperature. The zircon fractions from each sample was picked by hand from a glass disk using a binocular microscope. The samples were wetted with ethanol and picked before being mounted on two grain mounts with a diameter of approximately 2 cm, later set with epoxy. The grains separated for analysis were randomly selected in order to prevent any bias zircon populations.

4.2 Cathodoluminescence imaging

The two epoxy mounts were polished to expose internal grain surfaces at the Museum of Natural History in Stockholm, and a thin layer of gold was applied to the polished surface after cleaning to reduce charging effects during imaging. Imaging internal features of the zircon on the grain mounts used a cathodoluminescence (CL) detector attached to a Scanning Electron Microscope (SEM) at the Museum of Natural History in Stockholm. This instrument produces high-resolution digital CL images of luminescent material, like zircon, and provides images of several hundred-times magnifications (Fig. 6). The images were taken to identify fractures and inclusions to be avoided in the positioning of

the laser beam during LA-ICP-MS. Each sample on the grain mounts was imaged in both SEM and CL mode using a beam of 15.0 kV and an image magnification of 120x.

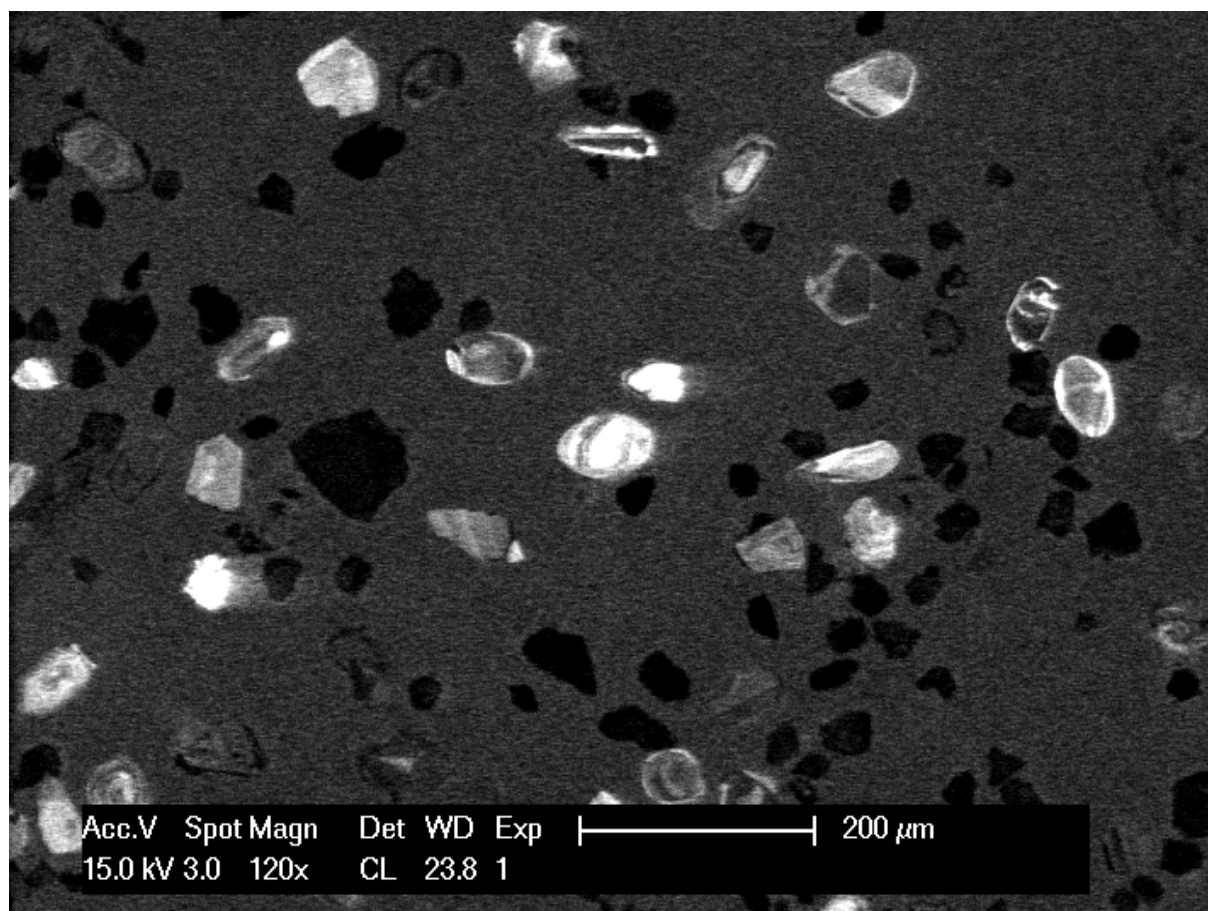


Figure 6. CL image of sample 12TM-33B, showing the internal textures of zircon.

4.3 LA-ICP-MS

The selected zircon of the 14 samples were analysed at Stockholm University using a New Wave Research-193 Excimer Laser Ablation system coupled to a Thermo XSeries™ II quadrupole mass spectrometer. The concentrations of U, Pb and Th were determined relative to international standards. Plešovice zircon was used as the external standard to provide precision and accuracy (Sláma et al., 2008) and the Duluth gabbro zircon FC-5z zircon was used as an internal standard (Paces & Miller, 1993) to insure correct functioning of the instrument. Plešovice zircon was analysed as a bracketing standard between every 12 analyses and as the four first and last four analyses. A FC-5z zircon was also analysed between every 12 analyses, in addition to two analyses at the beginning and end of the sample analyses.

He and Ar gas were used to deliver the ablated material into the plasma source of the mass spectrometer. The selected grains of analysed zircon varied in size and texture and those with inclusions and/or fractures were excluded. The complete settings of the mass spectrometer can be viewed in table 2.

4.4 Data reduction

The software Iolite was used to reduce analytical data (Paton et al., 2011). In addition, the VisualAge subroutine of Petrus & Kamber (2012) was also used. In Iolite, the imported data are represented as a time series called a wave or a channel for each of the masses determined. Each data point of a wave/channel corresponds to a single measurement for the wave's mass at a given sampling time.

Table 2. Analytical conditions associated with the LA-ICP-MS analyses.

Settings	New Wave Research-193 Excimer Laser Ablation Thermo XSeries™ II quadrupole
Cones	REE and REE
Spot size	20 µm
Energy density	7-8 J/cm ²
Laser Frequency	10 Hz
External standard	Plešovice
2nd standard	Fc5z
Nebuliser gas (Ar) flow	0.93 l/min
Aux	0.75
Cooling gas	13.0 l/min
Energy output	56%
Fluency	7.9-8.3 J/cm ²

The corrected data was thereafter processed using Microsoft Excel and each sample was plotted with both conventional and inverse concordia diagrams using the Excel add-in IsoPlot (Ludwig, 2012). Analyses containing common lead (values of Pb/Hg*100 > 25 and ²⁰⁴Pb>100 cps) were discarded together with analyses of >10% discordance. The uncorrected ages without common lead or discordance were used without further filtering (e.g. large errors, commonly >50 Ma), to maximise the number of analyses. Further plotting of the results used either ²⁰⁷Pb/²³⁵U or ²⁰⁷Pb/²⁰⁶Pb age: analyses of <1200 Ma used the ²⁰⁷Pb/²³⁵U ages, whereas analyses >1200 Ma used the ²⁰⁷Pb/²⁰⁶Pb ages. This selection was made in order to avoid uncertain data due to the different half-lives of the systems, where the ²⁰⁷Pb/²³⁵U system represents “middle-aged” isotopes and ²⁰⁷Pb/²⁰⁶Pb ages represents “old-aged” isotopes.

The final data were used to create Kernel Density Estimation (KDE) plots with embedded histograms in DensityPlotter (Vermeesch, 2012). A KDE adds a kernel with a certain bandwidth above each measurement plotted along a time axis, so the relative height of the peaks resemble the relative abundance of that age population (Vermeesch, 2012). Due to low number of analyses from individual samples, the results of samples from the same unit were combined to increase the number of analyses. The bandwidth for the histograms was set to 50 and the bin width was set to 100 Ma for all samples. The time axis ranges from 0 Ma to 3 800 Ma in all KDE plots.

5. RESULTS

5.1 Upper Echooka Formation/Kavik Member

Three samples are from the Echooka Formation and the lower Ivishak Formation (Kavik Member). Sample 14TM-07 is from the upper Echooka Formation and sample 14TM-08 and 14TM-17B were collected from the Kavik Member, both units represent Permian aged sediments. A total of 91 zircon grains from the three samples were analysed, but only 28 analyses were acceptable after data filtering. The maximum depositional age for the Echooka sample is 734±25 Ma and the maximum depositional age for the Kavik Member samples is 350±10 Ma. The summarised data of the samples can be found in Table 3, and their KDE plots in Figures 7 and 8.

A fourth and fifth sample, labelled 14TM-17B and CAK14-28 were also from the Kavik Member, but had too few remaining analyses to plot after data filtering and were therefore neglected from further analysis.

Table 3. Summary of the results for the samples within the Echooka Formation and Kavik Member.

Sample name	Stratigraphic unit	Stratigraphic period	Stratigraphic age (Ma)	Maximum age (Ma)
14TM-07	Echooka Formation	Permian	299-251	734±25
14TM-08	Kavik Member	Permian	299-251	350±10
14TM-17B	Kavik Member	Permian	299-251	350±10

Sample 14TM-07 is from the Marsh Creek section in the upper Echooka Formation and is of Permian age. The sample has 27 analysed zircon grains, but only 12 of them were acceptable after filtering as the other analyses were discordant. The remaining grains are very low in number, but the few analyses show one significant area of peaks in between 1400 Ma and 2000 Ma (Mesoproterozoic to Paleoproterozoic ages) (Fig. 7). There are also two smaller peaks at around 800 Ma (Neoproterozoic age) and 2400 Ma (Paleoproterozoic age). Its maximum depositional age is 734±25 Ma.

Sample 14TM-08 is from the Marsh Creek section and sample 14TM-17B is from the Fire Creek section. The two samples are both of Permian age, collected from the Kavik Member (lower Ivishak), and have therefore been combined. The samples together consist of 64 analysed zircon grains, but only 16 of these were not discordant and used for KDE plots (Fig. 8). The number of analyses is still far too low, yet nonetheless reveal a significant peak at 350 Ma (Paleozoic age). This is also the maximum depositional age of the sample, 350±10 Ma.

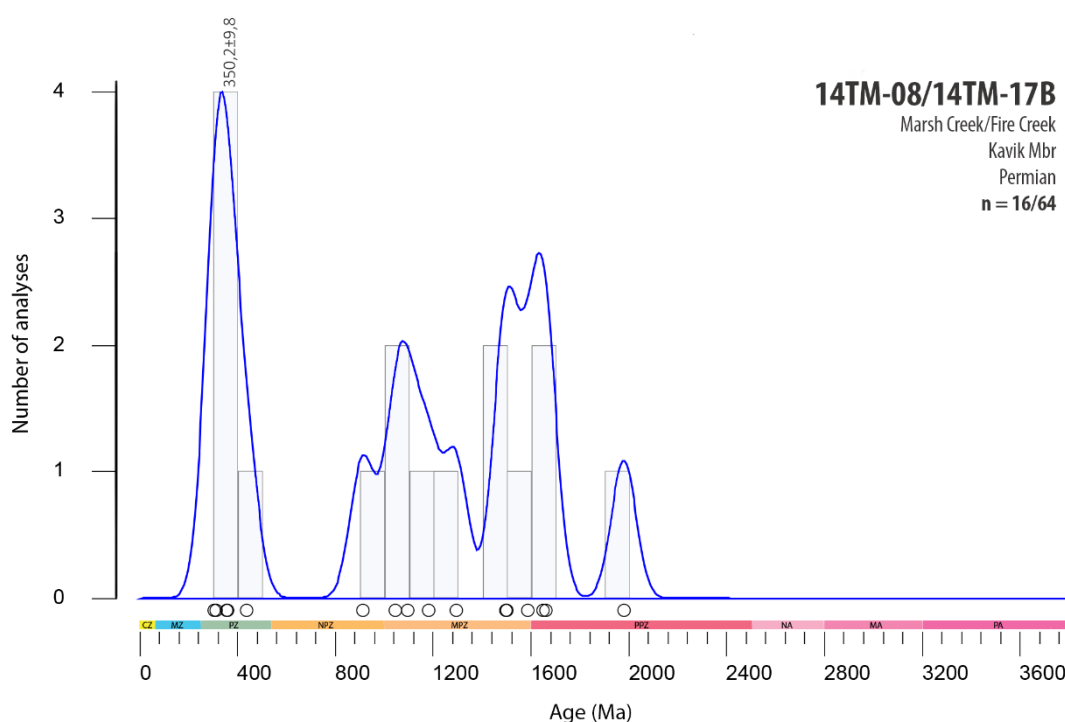


Figure 7. KDE plot for samples 14TM-08 and 14TM-17B within the Kavik Member. The maximum depositional age are shown within the graph and the coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

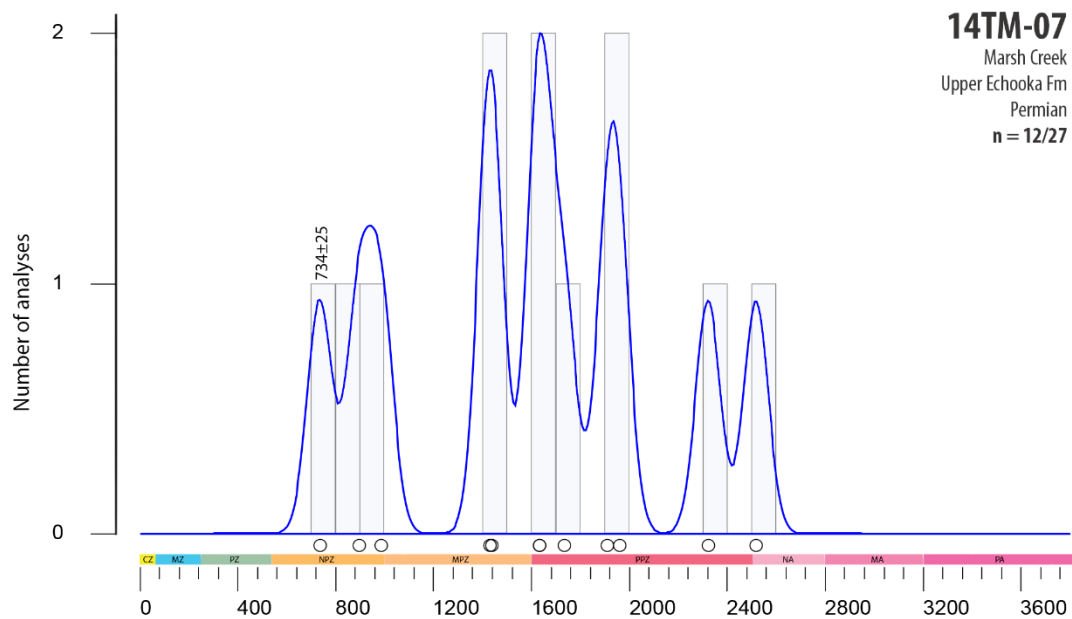


Figure 7. KDE plot for sample 14TM-07 within the Echooka Formation. The maximum depositional age is shown and the coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

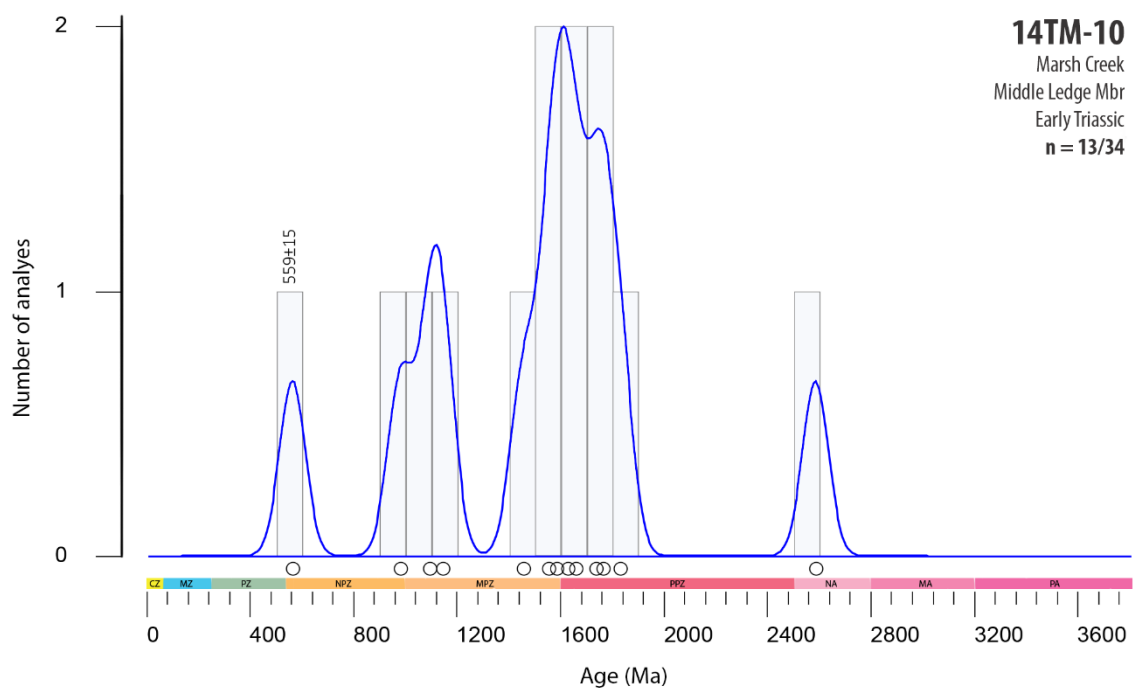


Figure 8. KDE plot for sample 14TM-10 within the Middle Ledge Member. The maximum depositional age is shown and the coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

5.2 Ivishak Formation

Six samples are from the Ivishak Formation (the Ledge Member), which has an Early Triassic age. Samples 14TM-09, 12TM-33A and 12TM-33B are from the lower Ledge Member, sample 14TM-10 is from the middle Ledge Member and samples 12TM-10A and 12TM-32A are from the upper Ledge Member. A total of 449 zircon grains from the six samples were analysed, but only 183 analyses were acceptable after data filtering. The maximum age for the lower Ledge sample is 447 ± 19 Ma, 559 ± 15 Ma for the middle Ledge sample and 473 ± 14 Ma for the upper Ledge sample. The date are summarised in Table 4, and their KDE plots in figures 9 and 10.

Table 4. Summary of the results for the Ivishak Formation.

Sample name	Stratigraphic unit	Stratigraphic period	Stratigraphic age (Ma)	Maximum age (Ma)
12TM-10A	Upper Ledge Member	Early Triassic	251-247	473 ± 14
12TM-32A	Upper Ledge Member	Early Triassic	251-247	473 ± 15
12TM-33A	Lower Ledge Member	Early Triassic	251-247	447 ± 19
12TM-33B	Lower Ledge Member	Early Triassic	251-247	447 ± 20
14TM-09	Lower Ledge Member	Early Triassic	251-247	447 ± 21
14TM-10	Middle Ledge Member	Early Triassic	251-247	559 ± 15

Sample 12TM-32B is from the upper Ledge Member, but the analytical data from the sample were lost and unable to be recovered. Sample 14TM-17A is also from the lower Ledge Member, but has too few acceptable analyses after data filtering and is therefore neglected from further plotting.

Sample 14TM-09 is from the Marsh Creek section, whereas samples 12TM-33A and 12TM-33B are from the Nularvik River section. They are all of Early Triassic age, from the lower Ledge Member in the Ivishak Formation. Since they belong to the same unit, the samples can be combined to create a total of 326 analyses. Only 125 analyses were acceptable after filtering, giving a maximum depositional age of 447 ± 19 Ma. The KDE plot (Fig. 9) reveals a high peak at around 1800 Ma (Paleoproterozoic age) and another peak at around 900 Ma (Neoproterozoic age). Two smaller peaks are also shown at 640 Ma (Neoproterozoic age) and as early on as 2500 Ma to 2720 Ma (Neoproterozoic age).

Sample 14TM-10 is also from the Marsh Creek section, middle Ledge Member of the Ivishak Formation. The sample is of Early Triassic age and has a total of 34 analysed zircon grains, though only 13 of these are acceptable after filtering. The number of analyses is very low, but the remaining analyses reveal a peak at 1600 Ma (Paleoproterozoic age) (Fig. 10). The maximum deposition age is 559 ± 15 Ma.

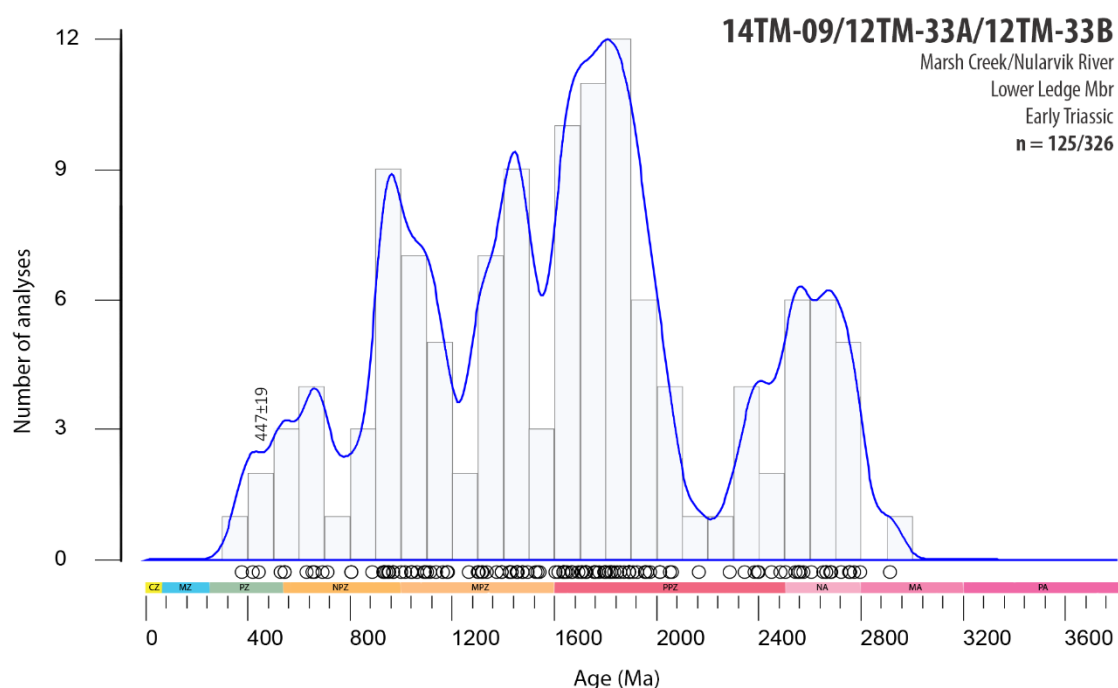


Figure 9. KDE plot for samples 14TM-09, 12TM-33A and 12TM-33B within the Lower Ledge Member. The maximum depositional age is shown and the coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

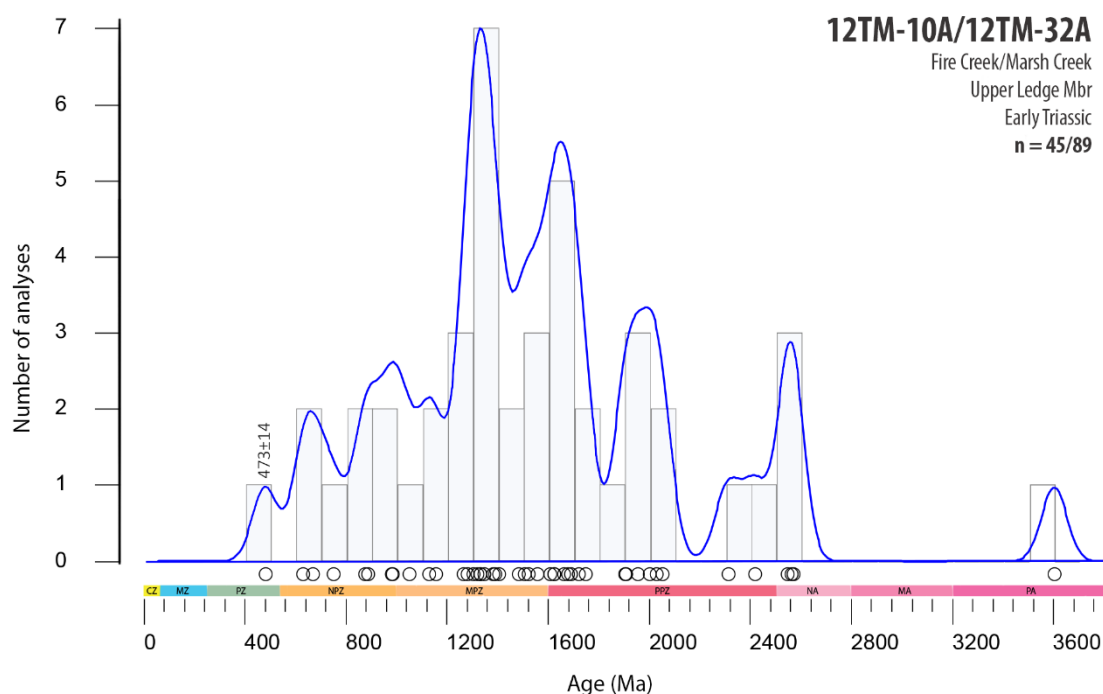


Figure 10. KDE plot for samples 12TM-10A and 12TM-32A within the Upper Ledge Member. The maximum depositional age is shown and the coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

Sample 12TM-10A is from the Fire Creek section and sample 12TM-32A is from the Marsh Creek section, both representing the upper Ledge Member in the Ivishak Formation. The samples were combined as they are from the same unit and of Early Triassic age. Together, they provide a total of 89 analysed zircon grains, whereas 45 of them were acceptable after filtering. The two samples reveal a high peak at 1300 Ma (Neoproterozoic age) and a smaller peak at 1650 Ma (Paleoproterozoic age) (Fig. 11). The maximum depositional age of the unit is 473 ± 14 Ma.

5.3 Shublik Formation

Sample 12TM-10B is from the lower Shublik Formation and sample 12TM-10C is from the Karen Creek Sandstones, the former being Middle Triassic age and the latter Late Triassic age. A total of 40 zircon grains from the two sample were analysed, but only 17 analyses were accepted after data filtering. The maximum deposition age for the lower Shublik sample is 394 ± 11 Ma and 1039 ± 41 Ma for the Karen Creek sample. The summarised data of the samples can be found in Table 5, and their KDE plots (Fig. 12 and 13).

Table 5. Summary of the Shublik formation and Karen Creek Sandstones.

Sample name	Stratigraphic unit	Stratigraphic period	Stratigraphic age (Ma)	Maximum age (Ma)
12TM-10B	Shublik Formation	Middle Triassic	247-237	394 ± 11
12TM-10C	Karen Creek Sandstone	Late Triassic	237-201	1039 ± 41

Sample 12TM-10B is from the Fire Creek section in the lower Shublik Formation. It is of Middle Triassic age and has a total of 12 analysed zircon grains, whereas seven were deemed concordant enough to plot as a KDE (Fig. 12). The number of analyses are far too low, nevertheless the data define peaks at 1000 Ma (Mesoproterozoic age) and 2000 Ma (Paleoproterozoic age). The maximum deposition age is 394 ± 11 Ma.

Sample 12TM-10C is from the Fire Creek section in the Karen Creek Sandstones (upper Shublik Formation). The sample is of Late Triassic age and has a total of 28 analysed zircon grains and ten were acceptable after final filtering. While the number of analyses is statistically too low, the KDE plot (Fig. 13) reveals a peak at 1900 Ma (Paleoproterozoic age) and 2600 Ma (Neoarchean age). The maximum depositional age is 1039 ± 41 Ma.

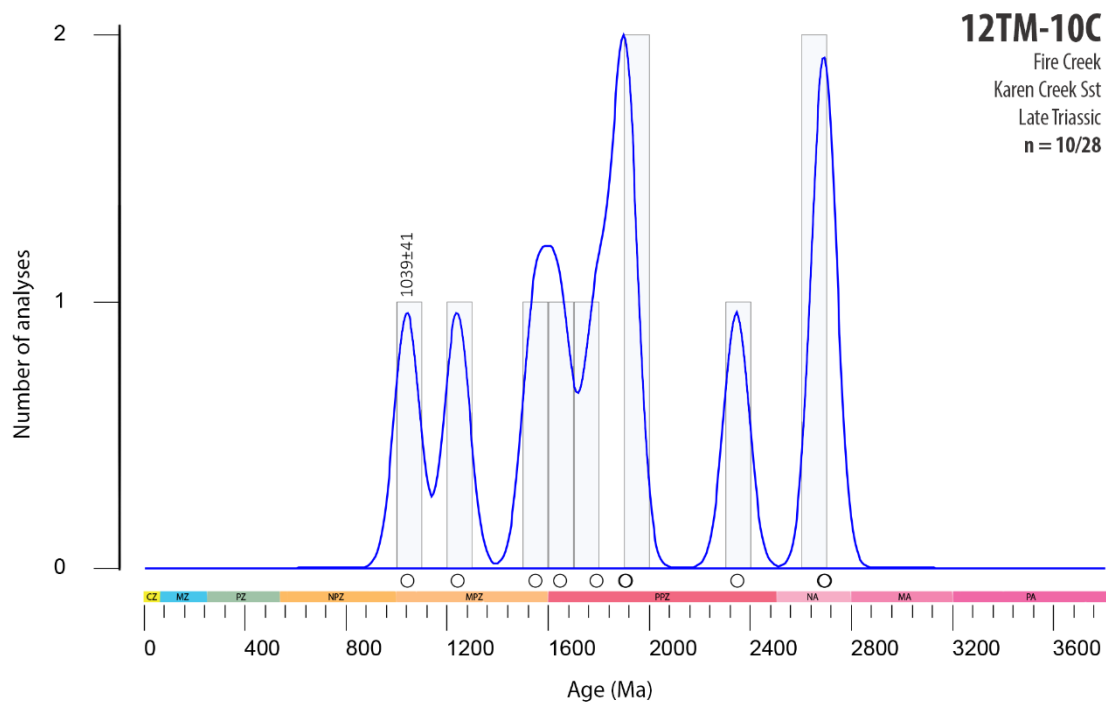


Figure 11. KDE plot for sample 12TM-10C within the Karen Creek Sandstones. The maximum depositional age is shown and the coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

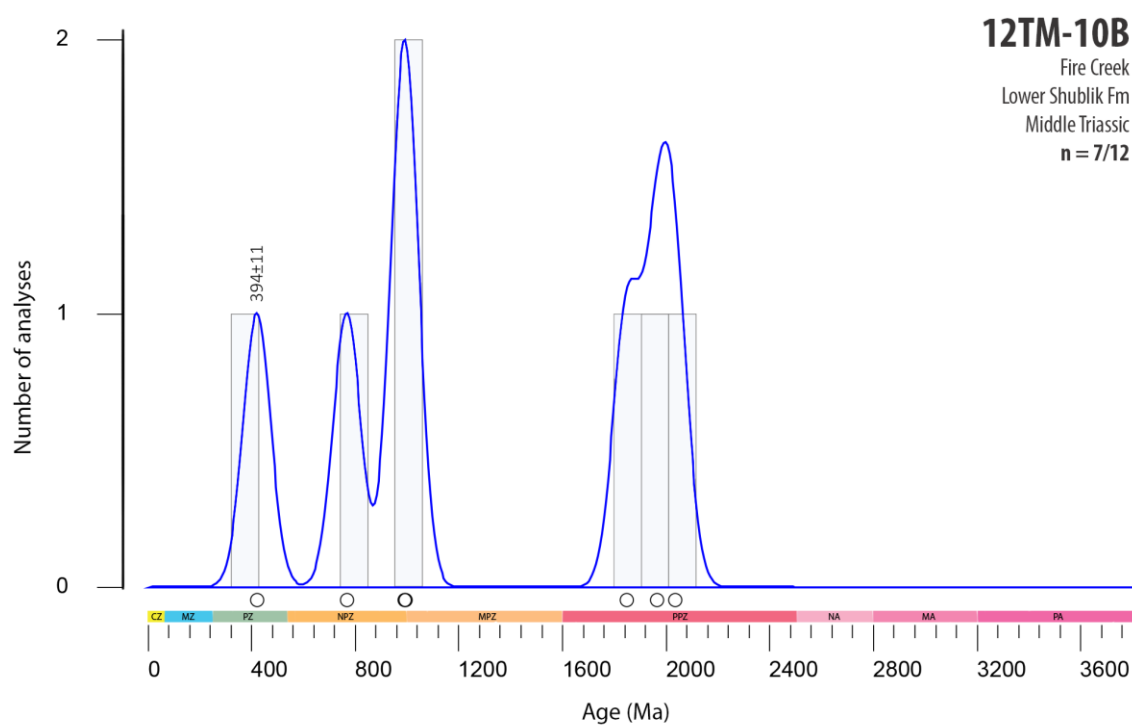


Figure 12. KDE plot for sample 12TM-10B within the Lower Shublik Formation. The maximum depositional age is shown and the coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

6. DISCUSSION

6.1 Local comparison

It is notable that the majority of the samples contain too few acceptable analyses to retain a high certainty and this reduces our ability to confidently interpret the samples. The number of analyses varies with each sample, but even after combining samples from the same unit, only one unit has an acceptable number of analyses of >95 grain analyses (Vermeesch, 2004). However, two out of the seven units have a decent number of acceptable analyses of >45, which will still result in fairly robust KDE plots. The five remaining units with a significantly low quantity of acceptable analyses (<35) will still be used for general comparison, but their low credibility and the certainty behind the calculated maximum depositional age will be kept in mind throughout the discussion.

The samples from the same unit of this study have shown similarities in age distribution and have therefore been combined. The units in turn show no distinct agreement in age spectra when combined, but some units individually are rather similar to each other (Fig. 14). The highest common peak is more or less present in all the samples at around 1500 Ma to 2000 Ma (Mesoproterozoic to Paleoproterozoic age) and is most distinct in the samples from the Lower and Middle Ledge Member of the Ivishak Formation. The same peak is significantly weaker in the samples from the Kavik Member and more spread out in the units of low grain analyses, like the Upper Echooka Formation.

Other common ages throughout the samples appear at around 1000 Ma (Neoproterozoic age) and approximately 2500 Ma (Neoarchean age). The shared peak at 1000 Ma is present within all the samples, only with a weaker spike in the Upper Ledge Member of the Ivishak Formation. Five of the seven samples reveal a noticeable peak at 2500 Ma, whereas it is completely missing in the remaining two units of the Lower Shublik Formation and the Kavik Member. There is also a shared peak around 300 to 400 Ma, with its most distinct spike in the Kavik Member. The other units (Lower Shublik, Middle Ledge) with grains of this age generally have too few acceptable analyses to draw reliable conclusions.

Overall, the most similar age spectra is shown between the Lower, Middle and Upper Ledge Member, which are all within the Ivishak Formation. The Kavik Member also show some similarities in age spectra with the Ledge Member, which can be assumed as it is located at the lowermost part of the Ivishak Formation. However, the Kavik Member also displays a similar spectra to that of Lower Shublik, while there is also some common ages between the Upper Echooka Formation and the Karen Creek Sandstones. The Upper Echooka Formation, Lower Shublik Formation and Karen Creek Sandstones show no specific similarity with the Ivishak Formation, but since these are the three units with the least robust results, reliable conclusions cannot be drawn.

The maximum depositional ages, i.e. the average age of the three youngest grains in a sample, varies with each unit. However, all units have a maximum depositional age that is significantly older than the stratigraphic ages of the sediments. The Upper Echooka Formation is Permian in age (245-286 Ma) but has a maximum depositional age of 735 Ma, which is almost 500 Ma older than the inferred stratigraphic age of the sample. The Kavik Member is also of Permian age and located on top of the Echooka Formation and has a maximum age of deposition of 350 Ma, around 100 Ma older than its stratigraphic age.

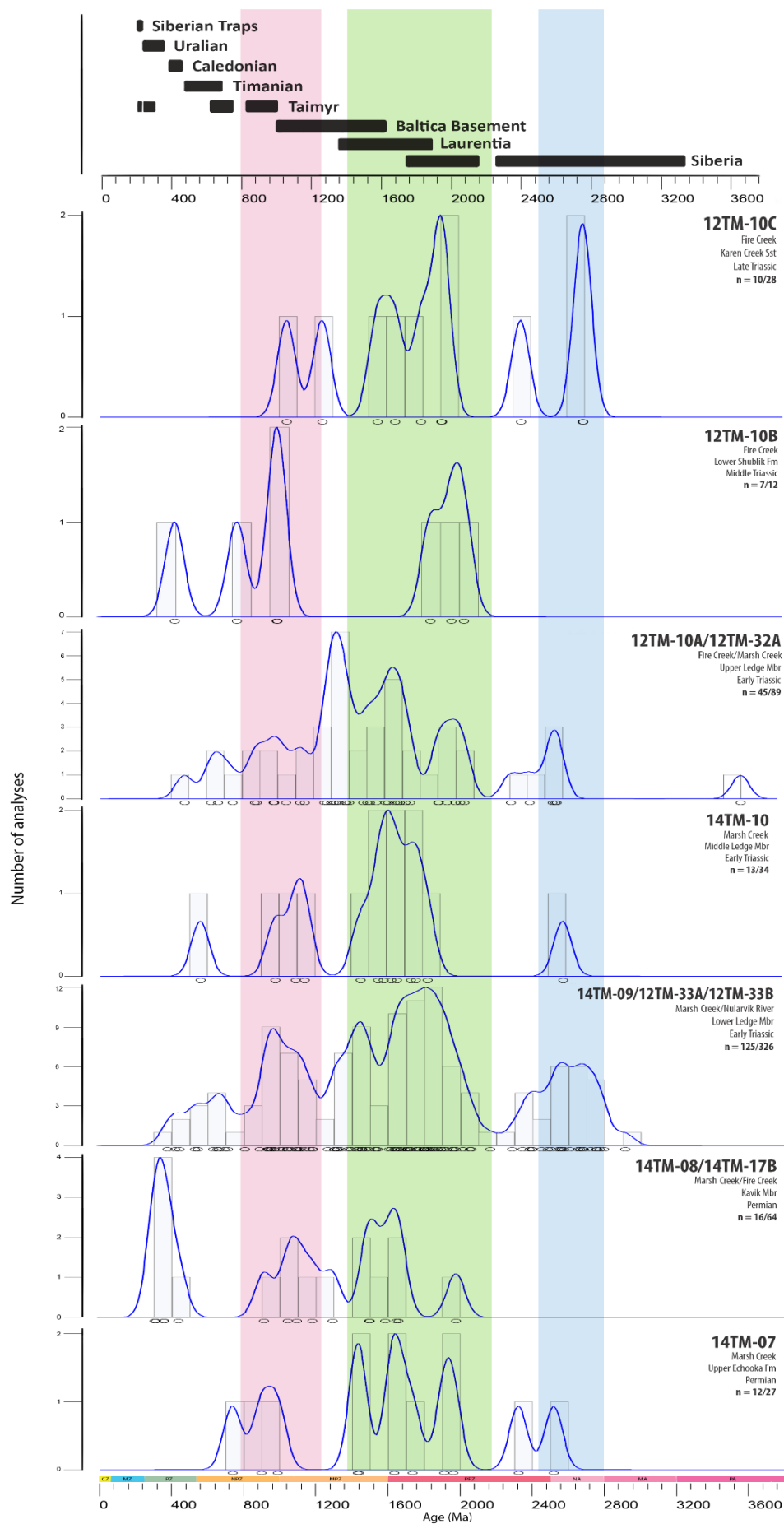


Figure 13. All samples plotted against each other to show potential similarity. The top boxes reveal characteristic ages for respective provenance, based on data from Zhang et al. (2016) and Moore & Box (2016). The coloured columns show common peaks amongst the samples. The coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

Continuing up the stratigraphic section, the samples of the Lower Ledge Member have a maximum deposition age of 447 Ma, which is 200 Ma older than its stratigraphic age of 247-251 Ma (Early Triassic). The Middle Ledge Member has a maximum age of deposition of 559 Ma that is 300 Ma older than its stratigraphic age, and the Upper Ledge Member has a maximum age of deposition of 473 Ma that is 220 Ma older than its stratigraphic age. In general, the Ledge Member has similar maximum depositional ages (200-300 Ma) in relation to the inferred stratigraphic age, indicating a rather uniform sedimentary process(es) within the Ivishak Formation.

The remaining units of the Lower Shublik Formation and the Karen Creek Sandstone have too few analyses to provide a confident interpretation, but nonetheless are meaningful. The Lower Shublik sample is of Middle Triassic age (237-247 Ma) and has a maximum depositional age of 364 Ma; the Karen Creek Sandstone sample has a stratigraphic age of Late Triassic (201-237 Ma) but has a maximum depositional age of 1039 Ma. The Lower Shublik unit defines an age difference of about 100 Ma whereas the Karen Creek Sandstone unit has an age difference of c. 800 Ma between the stratigraphic and maximum depositional ages.

The difference in the age of the sediment and the youngest detrital zircon ages can be used to deduce the geological setting at the time of sediment deposition, assuming that the given stratigraphic ages of the samples are correct (Cawood et al., 2012). A large difference between the stratigraphic age and the youngest zircon ages within a sample can be indicative of passive margins. Little to no difference in the ages between the youngest zircon and the stratigraphic age is characteristic of a sedimentary basin near an active margin that continuously provides new material, e.g. subduction zone arc magmatism (Cawood et al., 2012).

All the samples have an average age difference of 100-300 Ma, with a few exceptions of 500 and 800 Ma. Since none of the samples have any zircon grains with ages approximating the depositional age of the sediment (Fig. 14), the presence of an active margin can be excluded. Instead, the ages suggest a passive margin or extensional basin environment as the differences between the youngest zircon and the stratigraphic age is large. By comparison of detrital zircon age spectra with Cawood et al. (2012), most units have similar characteristic age spectra of foreland or rift basins. However, as these age spectra lack a significant proportion of grains (50% to 10%) with ages within 150 Ma of the host sediment, it is less diagnostic of a foreland basin. In other words, the sediment basin associated with the deposition of these units was most likely a passive margin or rift basin with no input of newly formed zircon (Cawood et al., 2012). The sediment likely received detritus from a large stable, intracratonic region, far from an active margin.

Figure 14 shows all the units and their KDE plots, as well as a top inset of potential sources with age ranges, based on characteristic detrital zircon ages for each basin (Zhang et al., 2016; Robinson et al. in press). The majority of older ages suggest sources consistent with Baltica, Laurentia and Siberia, but the few younger ages suggest younger sources. However, it is difficult to distinguish between the younger ages and tectonic events as they tend to overlap each with multiple tectonic events occurring between 200 Ma and 900 Ma. Baltica, Laurentia and Siberia record older events unique to each craton, thereby making their characteristic provenance ages easier to distinguish.

According to Amato et al. (2009), the Arctic Alaska-Chukotka microplate (AACM) is formed of Neoproterozoic metamorphic and plutonic rocks, yet the U-Pb zircon ages of 540 to 870 Ma reflect the basement rocks of the AACM in Alaska. If this is true, it would explain the younger ages within the samples, but not the majority of grains with Proterozoic and Archean input. There has been no identification of crystalline basement of Mesoproterozoic age or older within the AACM, nor has any pre-Neoproterozoic basement been found (Hoiland et al, 2018; Moore et al., 2015). The detritus of

Neoproterozoic age is therefore most likely eroded from an intracratonic region, e.g. Baltica or Laurentia.

6.2 On-shore compared to off-shore equivalents

Omma (2014) conducted a provenance study of 37 Carboniferous through Cretaceous sediment samples collected from wells in Arctic Alaska and the Chukchi Shelf (Fig. 15). Within that study, four samples contain detrital zircon data from the same formations as the ones presented in this study: the Echooka Formation, the Ivishak Formation and the Sag River Sandstone (in contact with the Karen Creek Sandstone). The samples from Omma (2014) were collected at the coast and sea shelf of northern Alaska, and represent the off-shore equivalents of the on-shore samples from this study. By comparing these results, it may provide a better understanding for the larger region of Arctic Alaska regions and its tectonic history.

Figure 15 compares the samples from the Upper Echooka on-shore (this study) and off-shore (Omma, 2014). Given the on-shore Upper Echooka sample has an insufficient number of 12 acceptable analyses compared to 166 by Omma (2014), it will result in bias. Nonetheless, there is similarity with its off-shore equivalent, as they both show grains between the ages of 1400 Ma to 2100 Ma (Mesoproterozoic to Paleoproterozoic age). The on-shore deposit also has ages between 600 to 950 Ma (Neoproterozoic age) which is almost completely absent in the off-shore deposit. Both locations have ages consistent with Baltica, Laurentia and Siberia, and the off-shore sample also has ages similar to some of the younger tectonic events. The few analyses present with Neoproterozoic ages of the on-shore sample are consistent with Taimyr (Zhang et al., 2016).

Two samples from the Ivishak Formation are presented in the Omma (2014) study, and they can be compared with the four units from this study (Fig. 16). The number of analyses within these units are more acceptable and the on-shore deposits show a large similarity between their off-shore equivalents. Both deposits show a majority of ages between 900 Ma to 2100 Ma (Neoproterozoic to Paleoproterozoic age), as well as 400-600 Ma (Paleozoic to Neoproterozoic age) and 2500 to 2600 Ma (Neoarchean) ages. The majority of these ages are consistent with Baltica, Laurentia and Siberia sources, but the younger ages suggest younger basins. The Kavik Member shows several absent ages in comparison to the Ledge Member and the off-shore samples, which may reflect the number of analyses.

One off-shore sample from Omma (2014) represents the Sag River Sandstones, which is equivalent to the Karen Creek Sandstone. The on-shore deposit from the Karen Creek Sandstones can therefore be compared with the off-shore Sag River sample. However, the number analyses are far too low for the Karen Creek Sandstones and will be underrepresented with only 10 grains compared to 107 by Omma (2014). The 10 analyses of the on-shore sample are similar in as much as ages at 1000 Ma to 2100 Ma (Neoproterozoic to Paleoproterozoic ages), as well as some older ages around 2500 Ma to 2900 Ma (Neoarchean to Mesoarchean age) are equivalent to the off-shore sample (Fig. 16). The off-shore sample has younger ages at 400 to 800 Ma (Paleozoic to Neoproterozoic age) that are lacking from the limited data of the on-shore sample. The majority of analyses suggest Baltican, Laurentian and Siberian sources.

As seen in Figure 15-17, the off-shore samples from Omma (2014) generally have maximum depositional ages between 360-385 Ma in comparison to the stratigraphic age of 200-300 Ma (Triassic to Permian), resulting in a difference of 50 to 150 Ma.

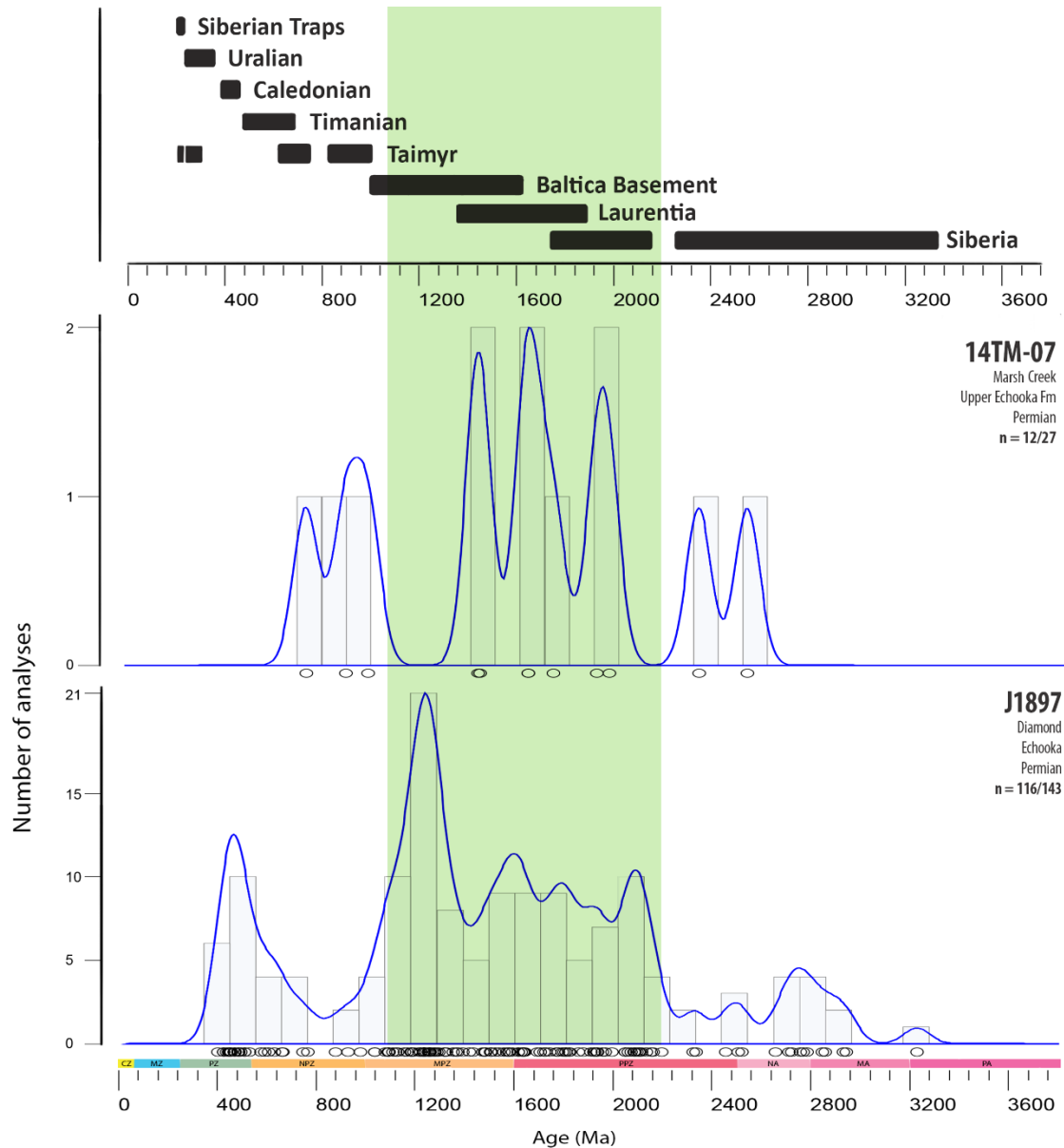


Figure 14. On-shore and off-shore samples from Omma (2014) of the Echooka Formation plotted against each other to show potential similarity. The top boxes reveal characteristic ages for respective provenance, based on data from Zhang et al. (2016) and Moore & Box (2016). The coloured column show common peaks amongst the samples. The coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

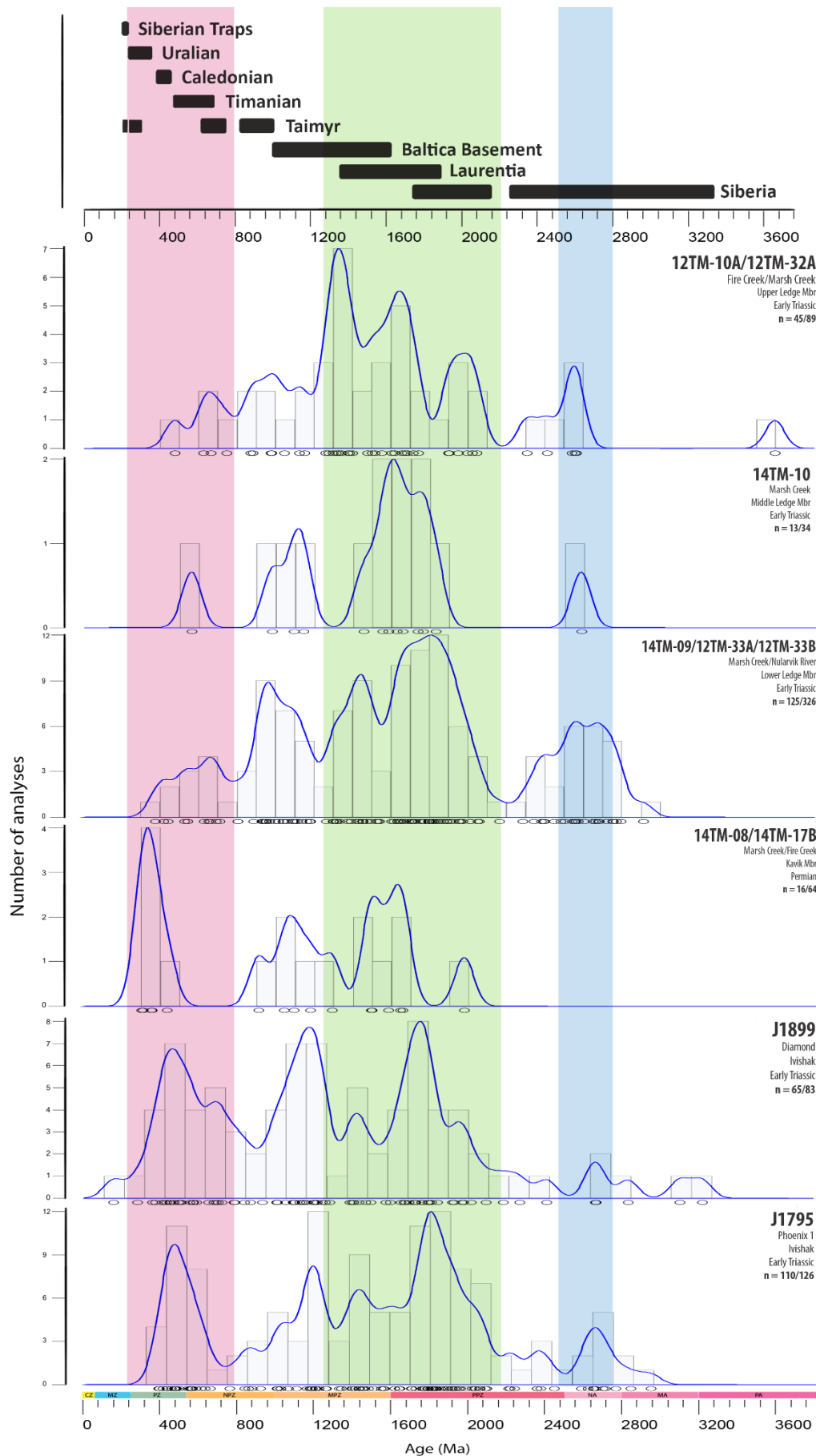


Figure 15. On-shore and off-shore samples of Omma (2014) from the Ivishak Formation plotted against each other to show potential similarity. The top boxes reveal characteristic ages for respective provenance, based on data from Zhang et al. (2016) and Moore & Box (2016). The coloured columns show common peaks amongst the samples. The coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

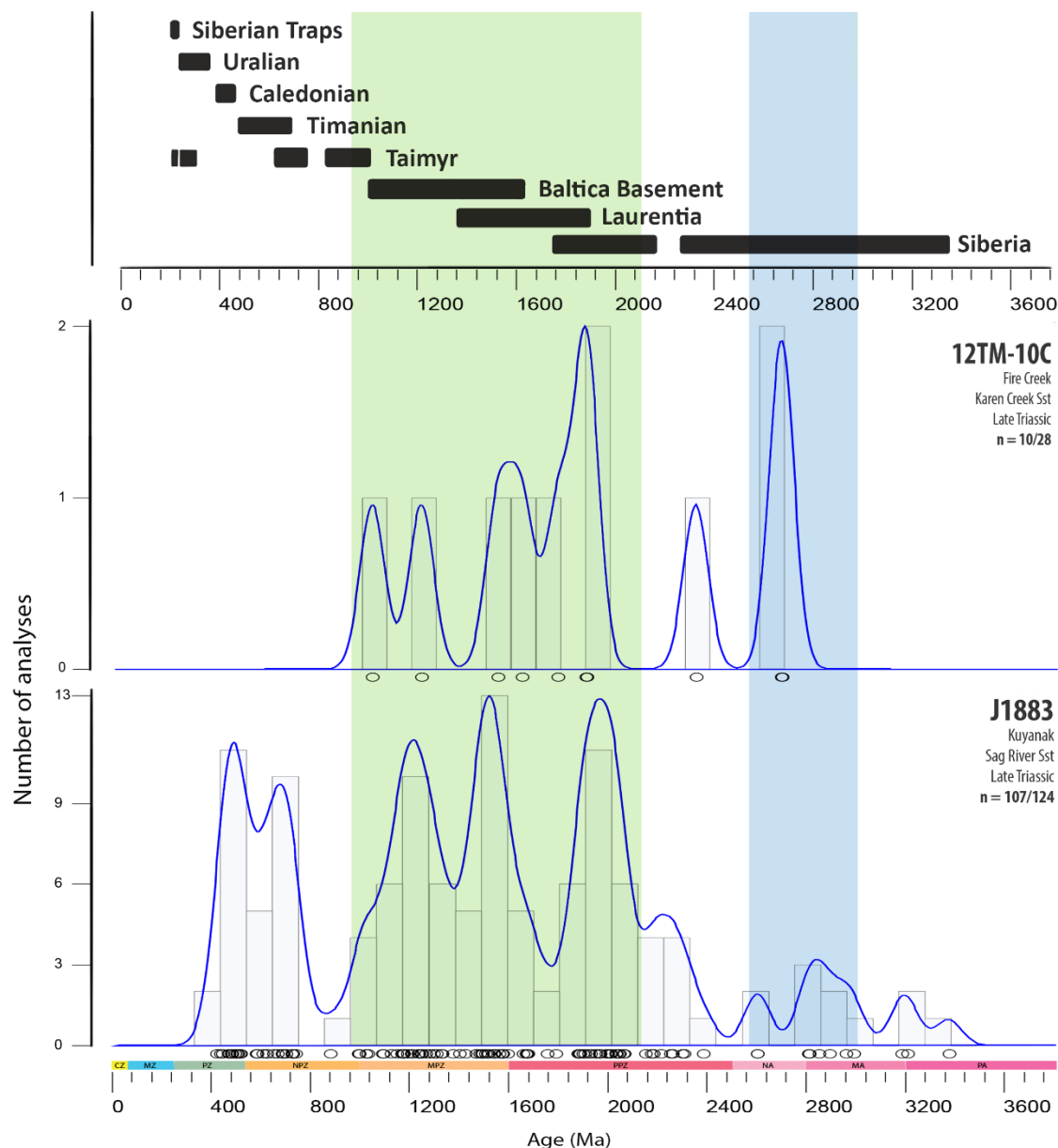


Figure 16. On-shore and off-shore samples of Omma (2014) from the Karen Creek Sandstones and Sag River Sandstones plotted against each other to show potential similarity. The top boxes reveal characteristic ages for respective provenance, based on data from Zhang et al. (2016) and Moore & Box (2016). The coloured columns show common peaks amongst the samples. The coloured time line represents eons and eras according to the international chronostratigraphic chart v2017/02.

Overall, the off-shore samples show a large degree of similarity with the on-shore samples in terms of ages and their possible provenance. Since the off-shore samples also show ages extending far beyond the period of 540-870 Ma for the AACM, the majority of the represented detritus probably originated from a different source, most likely an intracratonic region. It is clear that Baltica, Laurentia and Siberia are the major source for detritus within both the samples from Omma (2014)

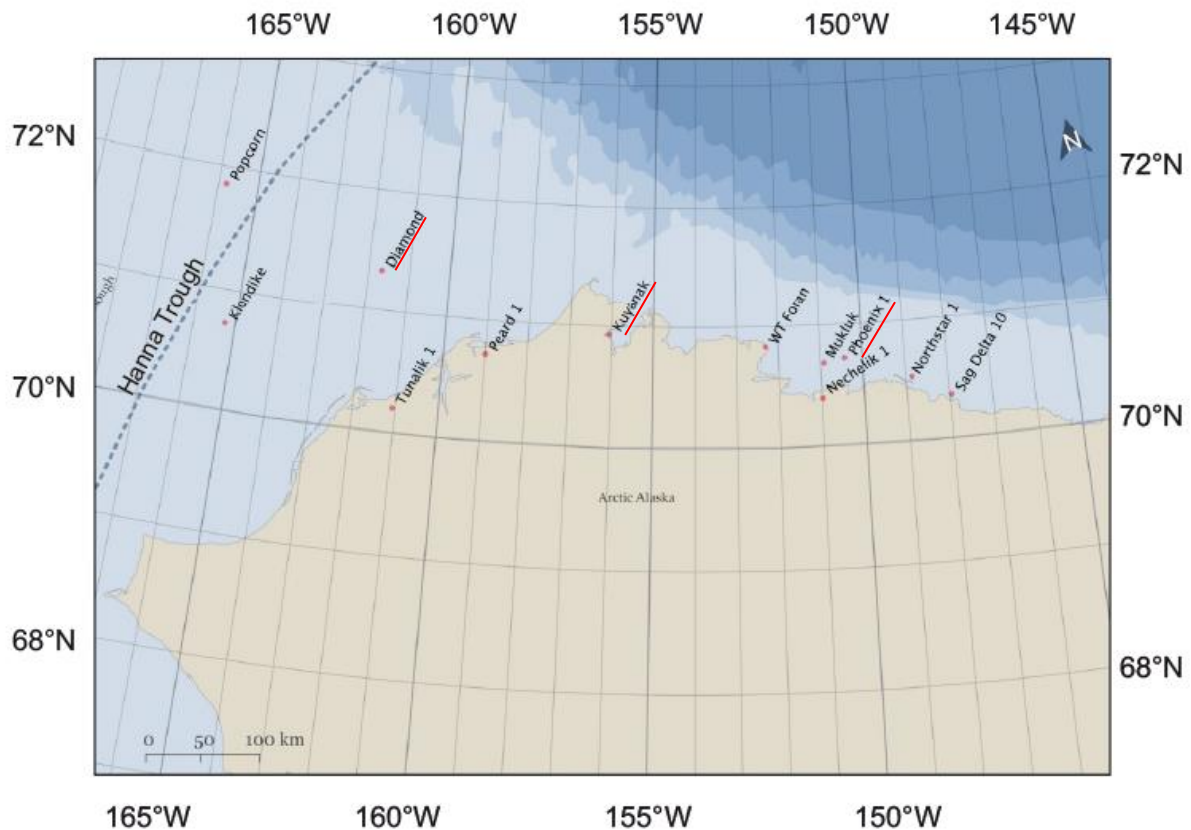


Figure 17. Location map for the samples of Omma (2014). The locations with samples used for comparison has been marked with a red line.

and the samples from this study, and suggests a mature fluvial transport system depositing these units over large distances.

Zircon of Mesoproterozoic to earliest Neoproterozoic age in the Arctic could have eroded from several different parts of Baltica and Laurentia, both prior to the break-up of the supercontinent Rodinia around 700 Ma and during the late Neoproterozoic (550 Ma) break-up and formation of passive margins (Hoiland et al., 2018). However, these signatures might as well represent the second- or third-cycle reworking of sediment, thereby making the distinction of provenance difficult. Miller et al. (2010) define the age interval of 900-2000 Ma to be characteristic of detrital zircon suites from the Baltic shield of Europe. The presence of Neoproterozoic age detritus from the Baltic shield in Arctic Alaska would suggest that the AACM, the sedimentary basin of the Ivishak Formation sediments, and the off-shore sediments from Omma (2014), would have been located close to the Barents Shelf before the opening of the Arctic Ocean (Miller et al., 2010).

6.3 Regional comparison

The Omma (2014) study supports the “Alaska Rotation Model”, which in simple terms suggests that during the Jurassic-Cretaceous, the Amerasia Basin opened by a rotation of the Alaska-Chukotka block away from the Canadian Arctic Islands around a pole in the Mackenzie Delta region. Many authors that study the tectonic evolution of the Arctic today support some variant of the Alaska Rotation Model, which suggests that the continental margin of the North Slope in Alaska is a passive margin formed by rifting in the Early Cretaceous, and that the Arctic Alaska and East Siberian Shelf were part of the same tectonic plate before the opening of the basin (Omma, 2014). The data from Omma (2014) favours the reconstruction of the Canada Basin in close proximity to the Canadian Arctic margin, like presented in the Alaska Rotation, as the detritus of Arctic Alaska show uniform

provenance of Baltica origin that has been recycled and deposited in Arctic Alaska over a period in excess of 200 Ma.

The data produced from this study agrees with the rotational model suggested from Omma (2014), as the ages and possible provenance is similar with the off-shore samples. With detritus from Baltica, Laurentia and Siberia, it would suggest a counter-clockwise rotation of Alaska that in turned opened the Amerasia Basin around Early Cretaceous (140 Ma) (Fig.19-21). It would also suggest that the AACM was divided into two microplates; the North Slope and Eastern Siberia (Shephard et al., 2013). Around 120 Ma ago, when the opening of the Amerasia Basin was completed, subduction resumed from the Siberian to western Laurentian margin (Shephard et al., 2013).

Gottlieb et al. (2014) also follow the consistent model of a 55° counter clockwise rotation of the northern Alaska margin with respect to the conjugate Canadian margin during opening of the Canada

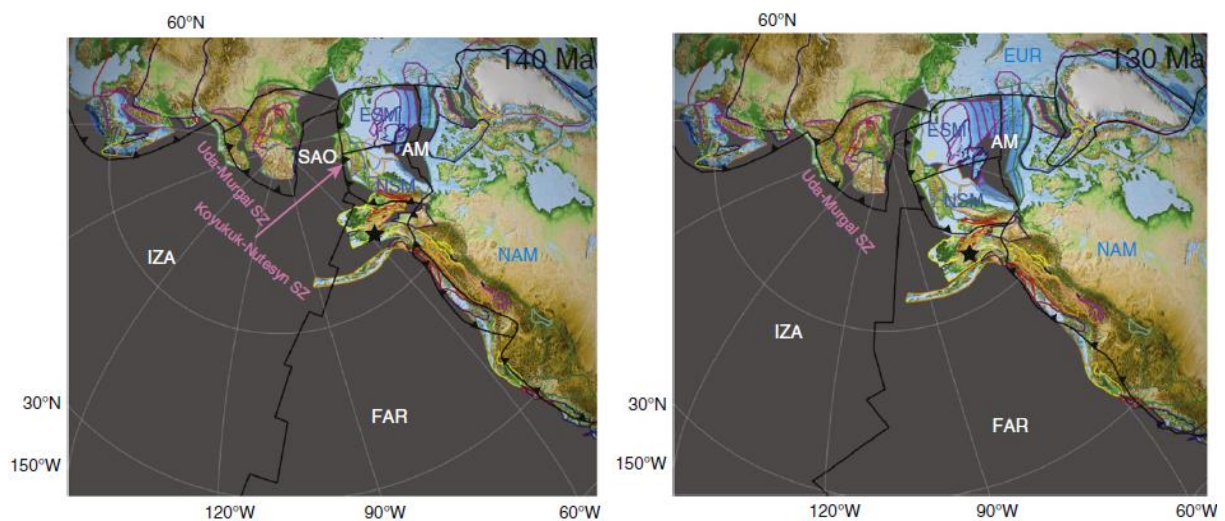


Figure 18. Regional map of the circum-Arctic, showing the tectonic change and development of the Amerasia Basin 140 Ma and 130 Ma ago. The AACM is being divided into two microplates; the North Slope (NSM) and Eastern Siberian (ESM). Source: Shephard et al. (2013).

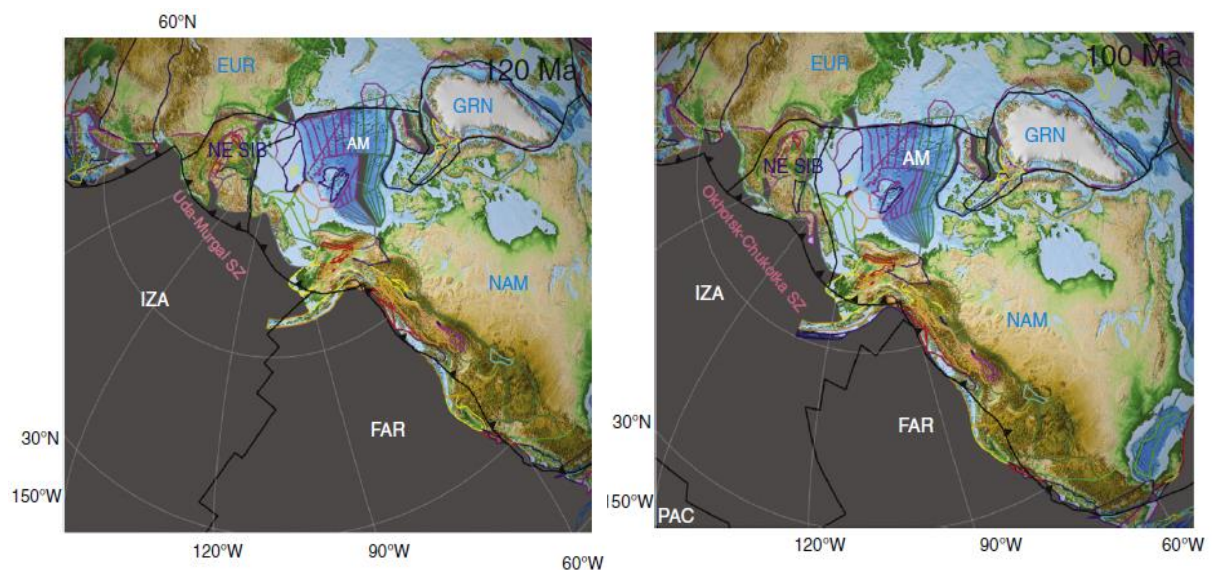


Figure 20. Regional map of the circum-Arctic, showing the tectonic change and development of the Amerasia Basin 120 Ma and 100 Ma ago. The Amerasia Basin has completed opening and subduction has resumed from the Siberian to western Laurentia margin. Source: Shephard et al. (2013).

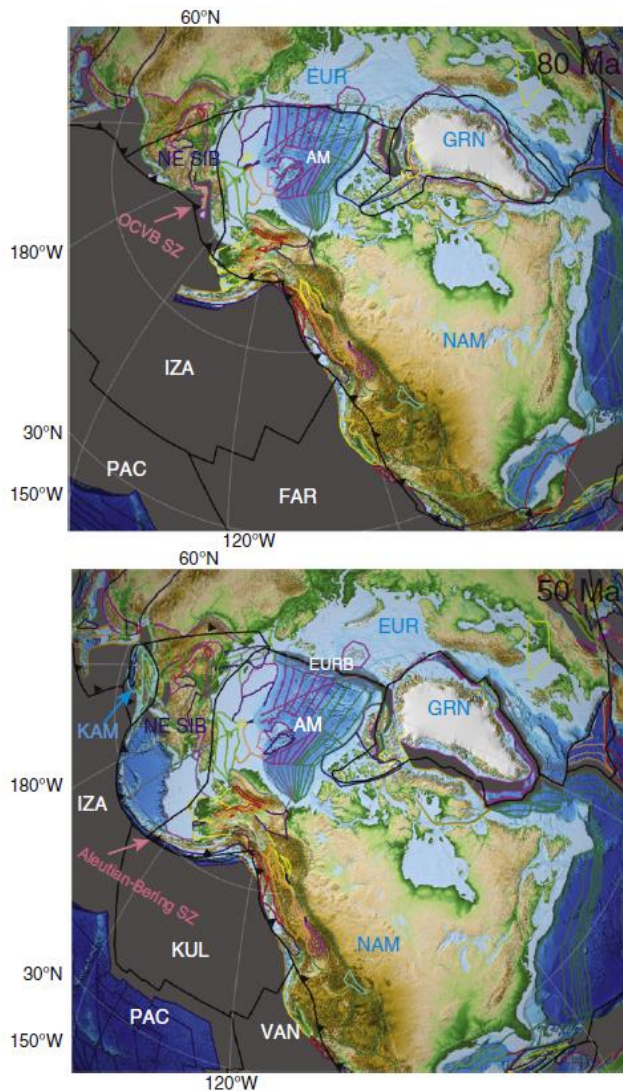


Figure 21. Regional map of the circum-Arctic, the tectonic change and the development of the Amerasia Basin at 80 Ma and 50 Ma ago. Progressive subduction of the Aleutian-Bering subduction. Source: Shephard et al., (2013).

Basin. Their detrital zircon results are consistent with the transition from rift to passive margin setting which lead to the deposition of the Ellesmerian and Beaufortian sequence strata. Prior to the formation of the Canada Basin, the continuous axes of the Sverdrup Basin, Hanna Through and Arctic Alaska Basin isolated the northern Alaska shelf, which prevented it from receiving clastic input of non-Laurentian source regions like those feeding the northern Sverdrup Basin (Gottlieb et al., 2014).

Miller et al. (2010) present detrital zircon data from Wrangel Island, which is located in eastern Russia and is part of the AACM. Their Paleozoic age data reveals compatibility with Baltic Shield provenance as well as some minor zircons of younger age derived from the Arctic part of the Caledonide belt. The Triassic sediments show compatibility with the Uralians, Taimyr and Siberia sources. This would suggest that Wrangel Island, Chukotka and northern Alaska (the AACM) restore against the Lomonosov Ridge in the Arctic upon closing of the Amerasia Basin, and that the Barents Shelf was proximal to the paleo-Pacific margin during Early Mesozoic. It also believed that subduction-driven tectonics in the Arctic have been a greater factor in the development of the Amerasia Basin that previously suspected (Miller et al., 2010).

Several detrital studies support the idea of the AACM was proximal to the Baltic Shield and its flanking Neoproterozoic basement before the Iapetus Ocean closed (Hoiland et al., 2018). There is also evidence for an ocean basin located between Siberia and Laurentia in the Late Jurassic before the rotation of the AACM, known as the South Anyui Ocean (SAO), which is expressed along the South Anyui Suture that stretches from New Siberian Islands through to the North Slope of Alaska (Shephard et al., 2013). Various authors (e.g. Zonenshain et al., 1990; Sokolov et al., 2002) suggest that the SAO existed between Siberia and Laurentia since its opening in the Middle-Late Palaeozoic. Before that, several authors suggest a potential collision of Siberia (and Baltica) with Laurentia sometime around 370-430 Ma, which saw the subduction of the Iapetus Ocean and is believed to have led the transfer of Chukotka from the Siberian and Canadian margin to Ellesmere Island (Shephard et al., 2013). The accretion of components of the AACM to Laurentia followed with Siberia rotating clockwise away from Laurentia towards Baltica, where the rifting and seafloor spreading would have formed the SAO.

Midwinter et al. (2016) provide new detrital zircon data that serves to constrain the provenance of the Sverdrup Basin in northern Canada during the Triassic-Jurassic, which provide important insight for the tectonic history of the Arctic Ocean. The data suggests that the Sverdrup Basin has two identifiable detrital zircon provenance signatures during the Triassic: an active margin north of the basin, and a recycled source to the south and east of the basin. These two signatures both show similarity to the two distinct sources observed in Arctic Alaska and Yukon Tanana Terrane, and deviate from previous beliefs of provenance in Siberia, since north-eastern Russia, Chukotka contain only the active margin source (Midwinter et al., 2016). The northern active margin at Sverdrup Basin indicate volcanic activity lasting more than 50 Ma, however it remained relatively proximal to this margin, which is consistent with a convergent outboard margin of the AACM during the Triassic (Midwinter et al., 2016).

Detrital zircon from southern and central Taimyr in northern Siberia, Russia, show a provenance from the Siberian platform passive margin in the Ediacaran (Zhang et al., 2016). During Permian, detritus from the Uralian orogen was deposited in Taimyr and the New Siberian Island, but not on Wrangel Island or Lisburne Hills in western Alaska. However, in the Triassic, Taimyr, Chukotka, Wrangel Island and Lisburne Hills amongst others, shared common sources from Taimyr, the Siberian Traps and the Urals (Zhang et al., 2016). This wide distribution of eroded material was likely due to an uplift associated with the Siberian plume head in Late Permian to Triassic time. Although these areas share several sediment provenance signatures in the Triassic, it is therefore not required that the Chukotka part of the AACM restored to the Barents Shelf (Zhang et al., 2016).

Integrated circum-Arctic detrital zircon U-Pb investigations such as those discussed above constrain sediment provenance and in turn can be used to test tectonic reconstructions and hypotheses. With more data collected of sediment provenance around the Arctic, the better are the possibilities to construct new and accurate models of the tectonic history. The results of the samples from the Sadlerochit Mountains in Alaska provide another piece to a rather complex puzzle, where correlating the age spectra of detrital zircon and the possible provenance around the region will help clarifying the understanding of the circum-Arctic. Together with other detrital zircon U-Pb investigations, the complete tectonic evolution of the Arctic Ocean can be solved.

7. CONCLUSIONS

7.1 Research summary

The 14 samples from the Sadlerochit Mountains of North Slope, Alaska, are quartzites from the Echooka Formation, Ivishak Formation and the Shublik Formation and the Karen Creek Sandstones. After U-Pb zircon analysis, the remaining samples after filtering of data indicate zircon ages between 1500 Ma to 2200 Ma (Mesoproterozoic to Paleoproterozoic age), but some samples have smaller peaks at 500 Ma to 800 Ma (Paleozoic to Mesoproterozoic age) and around 2200 Ma to 2800 Ma (Paleoproterozoic to Neoproterozoic age).

All the analysed samples have a maximum depositional age that is older than the inferred stratigraphic age (100-800 Ma), which indicates that the sediments are most likely derived from a passive margin, with no input of newly formed zircon. The detritus is believed to have eroded from a large stable, intracratonic type far from an active margin. The majority of ages of the detrital zircon suggest Baltican, Laurentian and Siberian sources.

Comparing the on-shore samples of this study to their off-shore equivalents from Omma (2014), there is similarity in age spectra and provenance ages between the majority of samples and the Mesoproterozoic to Paleoproterozoic detritus. As with the on-shore samples, there are zircon with ages extending beyond the period of 540-870 Ma (ages associated with the AACM) likely originate

from Baltica, Laurentia or Siberia. Miller et al. (2010) suggested that the AACM, the sedimentary basin of the Ivishak Formation and the off-shore sediments from Omma (2014) would have been located close to the Barents Shelf prior to the opening of the Arctic Ocean.

7.2 Limitations of the study

The most significant limitation of this study has been the low number of analyses for KDE plotting. The amount of zircon available from the samples for LA-ICP-MS was lower than predicted, in addition to the low acceptability after filtering the data which is a natural function of the samples themselves. When the number of analyses for a KDE plot of a sample is low, it decreases the certainty and confidence to interpret the maximum depositional age and sediment provenance. Providing results with confidence has therefore been challenging for this study and limited the ability to reach strong conclusions.

7.3 Suggestions for further research

In order to better understand the history of the circum-Arctic, more studies of detrital zircon from the region are needed. By correlating the age spectra of detrital zircon and the possible provenance around the Arctic, a greater knowledge of the large-scale tectonic movements and the opening of the Arctic Ocean will be gained. Collecting more samples from both explored and unexplored places across the Arctic to generate more age spectra will provide a more complete picture of the sedimentary provenance(s) and the change in sediment origin over time. In addition, to complete the results from this study, additional investigations should be made from the same region to compensate the lack of analyses from these samples and thereby provide a better understanding for the tectonic evolution of Arctic Alaska.

ACKNOWLEDGEMENTS

A great thank you to my supervisor Victoria Pease at Stockholm University for providing me with this project and teaching me about the tectonic evolution of the Arctic Ocean, as well as her continuous help and feedback on this report. Many thanks to my supervisor Emelie Axelsson at Stockholm University for the support and help with the sample preparation, the LA-ICP-MS analyses and data reduction, as well as the educational and supportive help throughout the project. My gratitude also goes to the Museum of Natural History in Stockholm for allowing me to use their instrument for CL-imaging and conducting the preparation needed beforehand.

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ELECTRONIC APPENDICES UPON REQUEST TO AUTHOR

1. Figure 22A-22M. Conventional concordia diagrams of all analyses and of concordant analyses only for each sample.
2. Figure 23A-23E. Microscopic images for some of the samples, ordered according to their stratigraphic unit.
3. Figure 24A-24N. CL images for all samples with the marked spots for the laser beam of LA-ICP-MS.
4. Table 5. Comprehensive data table of the U-Pb analyses for all samples.

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1. Figure 22A-22Z. Conventional concordia diagrams of all analyses and of concordant analyses only for each sample.

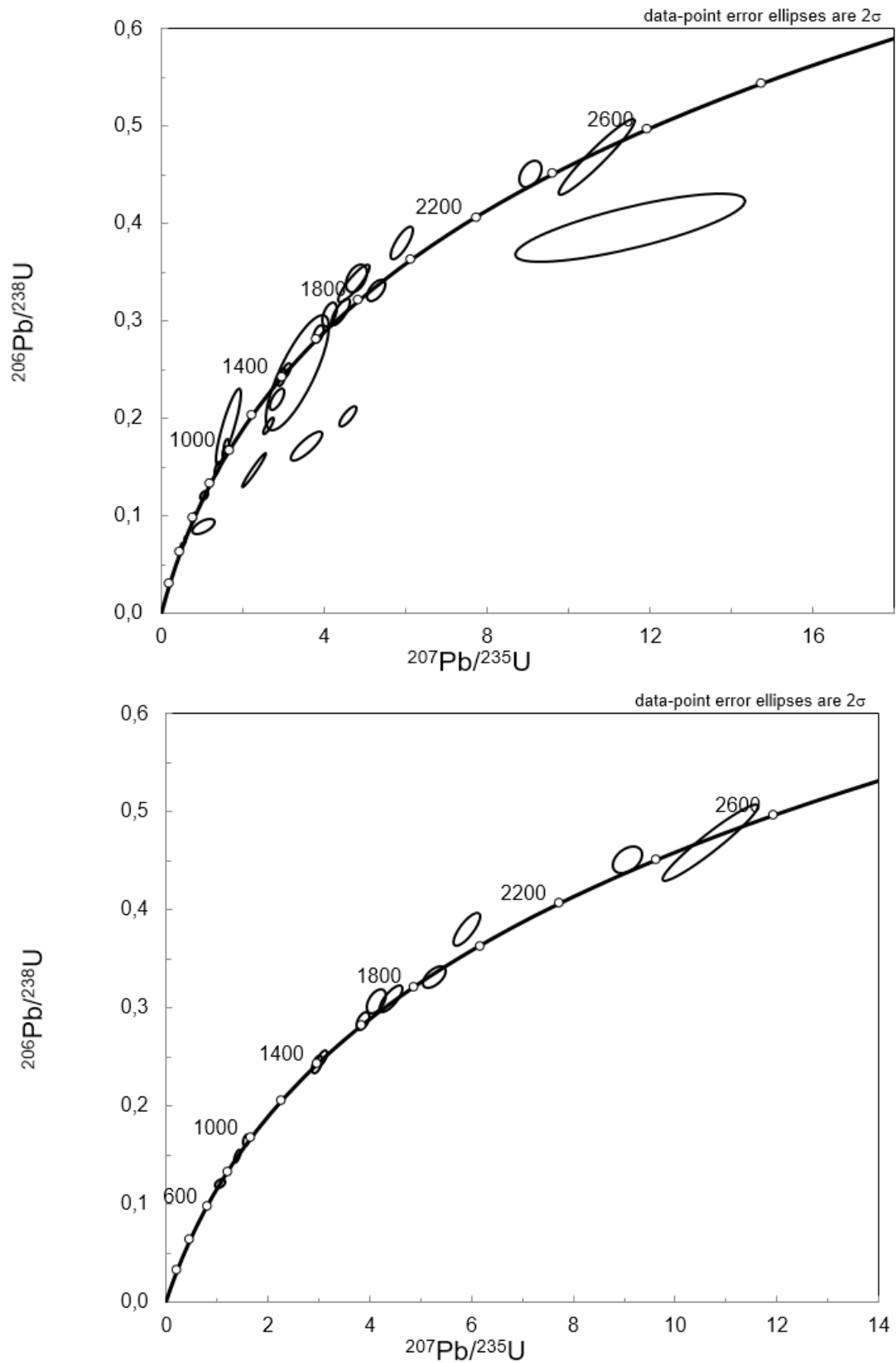


Figure 22A. Concordia diagram for sample 14TM-07 (top) and its concordant analysis (<10% discordance) only (bottom).

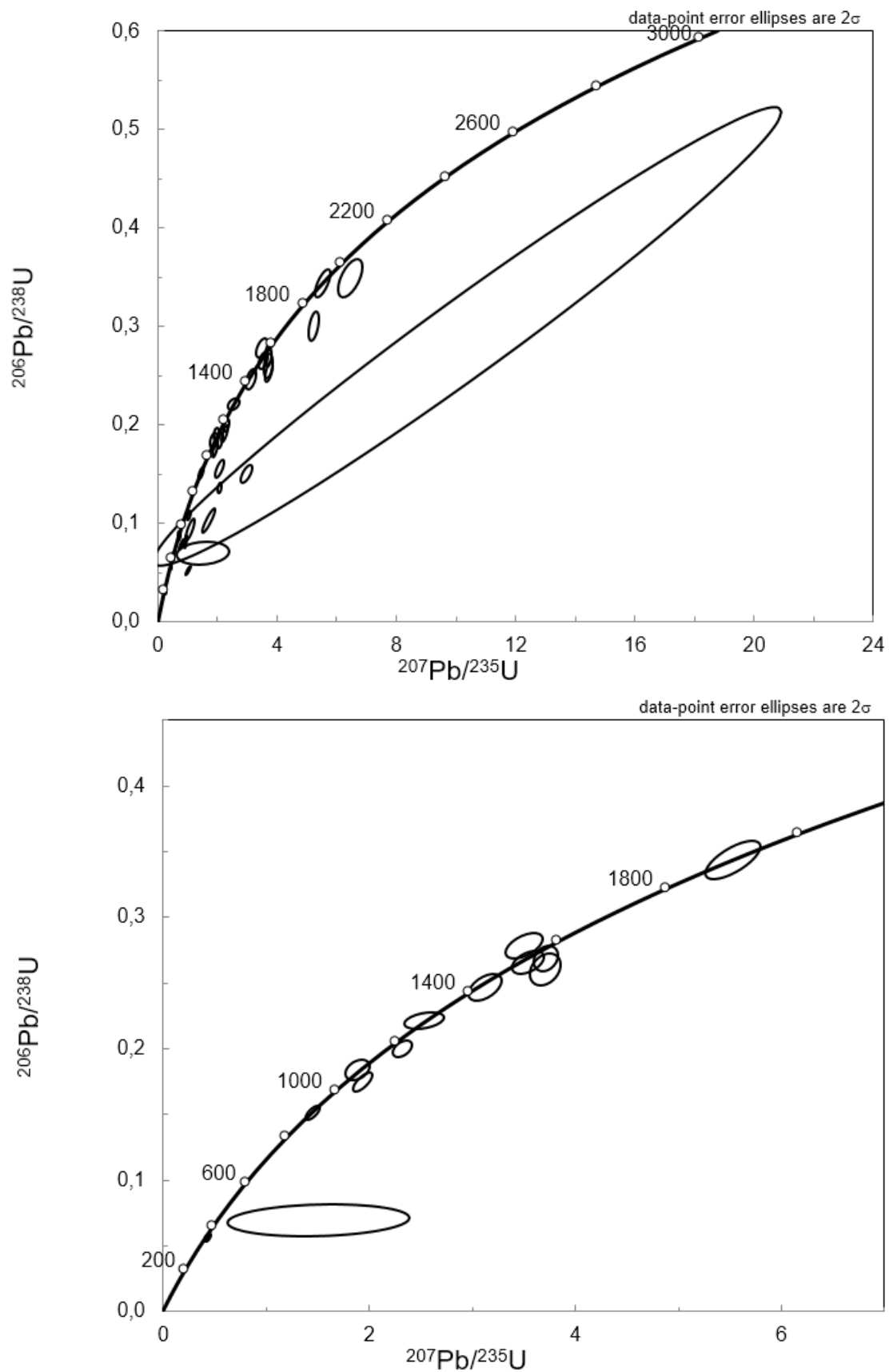


Figure 22B. Concordia diagram for sample 14TM-08 (top) and its concordant analysis (<10% discordance) only (bottom).

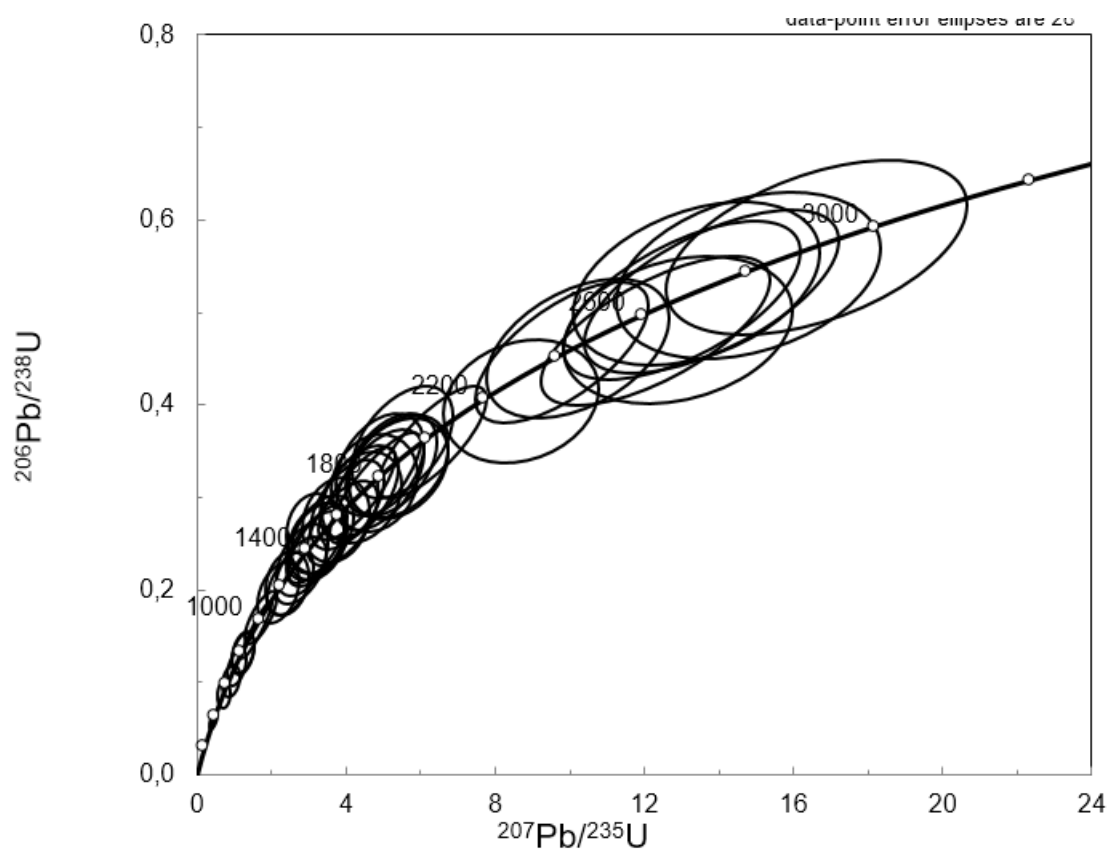
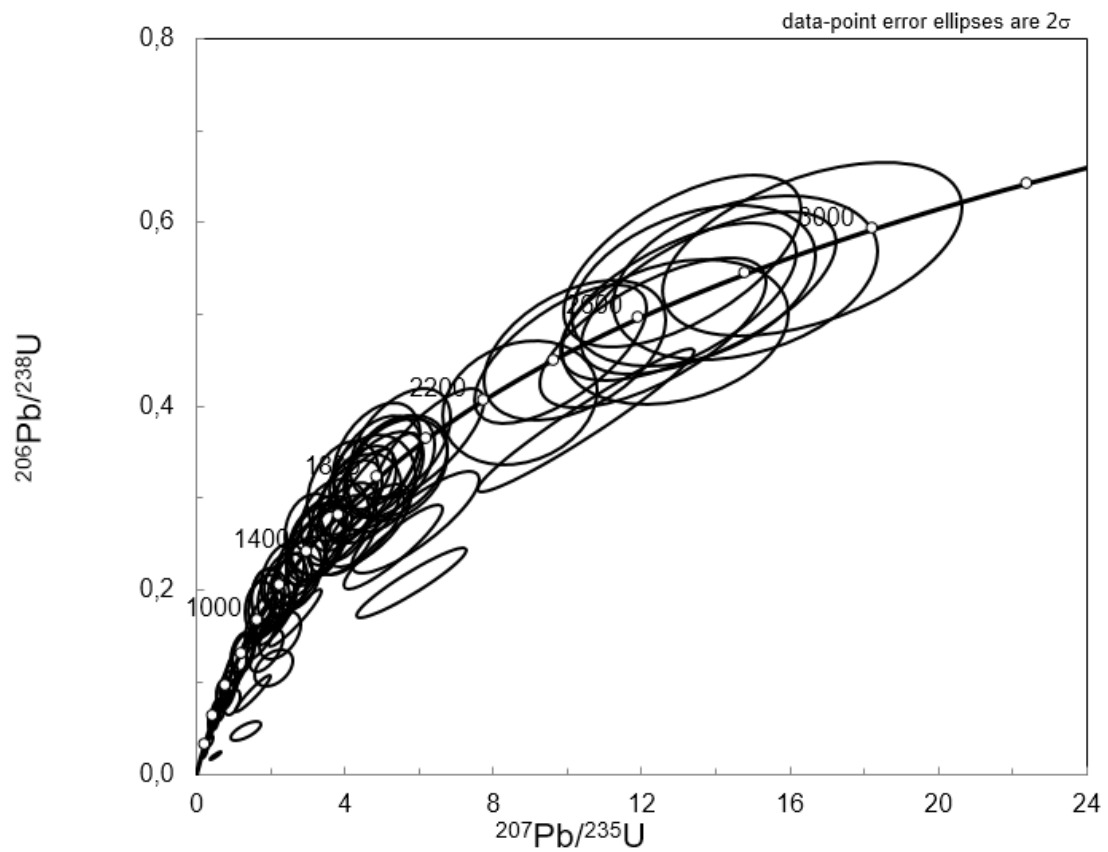


Figure 22C. Concordia diagram for sample 14TM-09 (top) and its concordant analysis (<10% discordance) only (bottom).

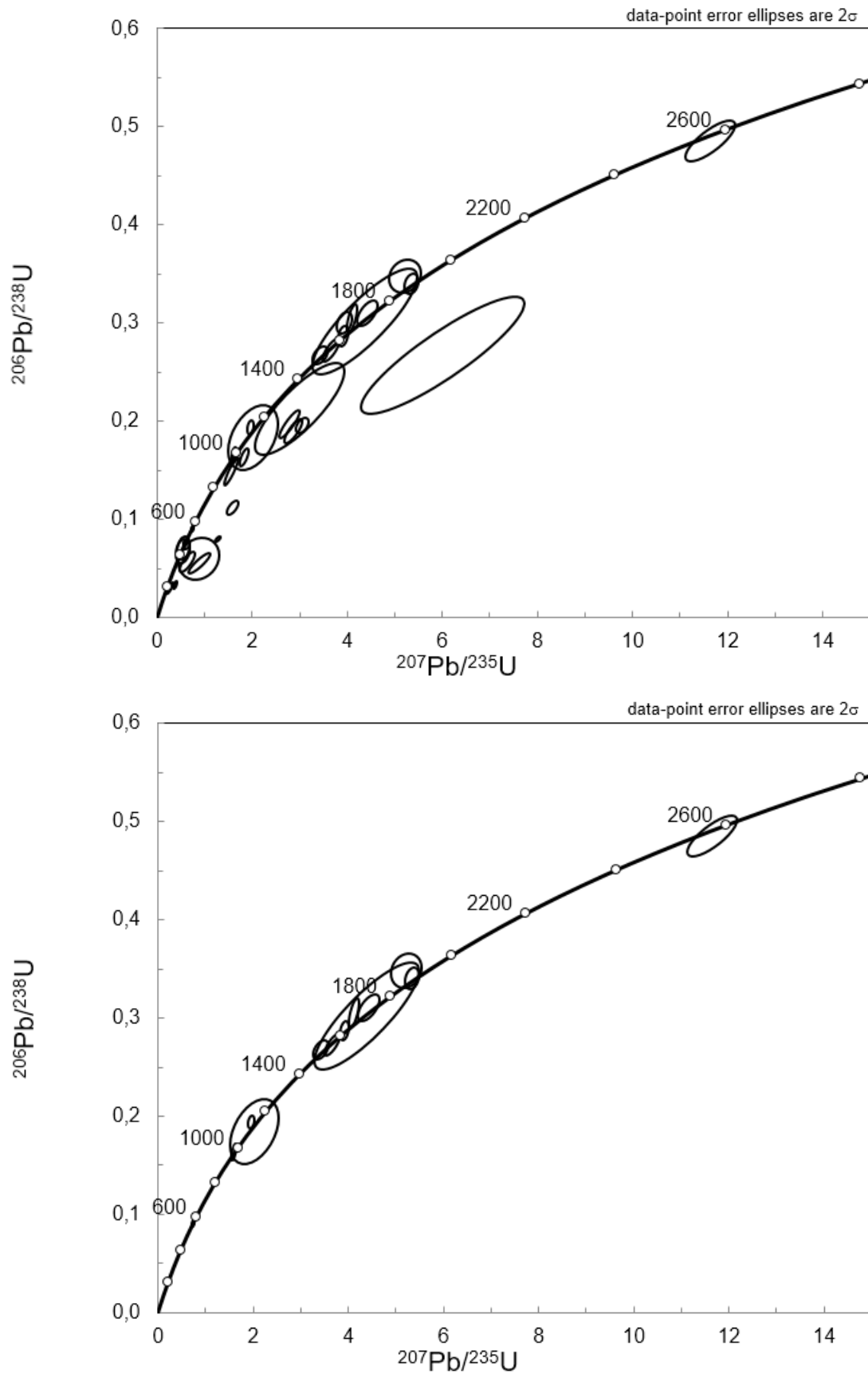


Figure 22D. Concordia diagram for sample 14TM-10 (top) and its concordant analysis (<10% discordance) only (bottom).

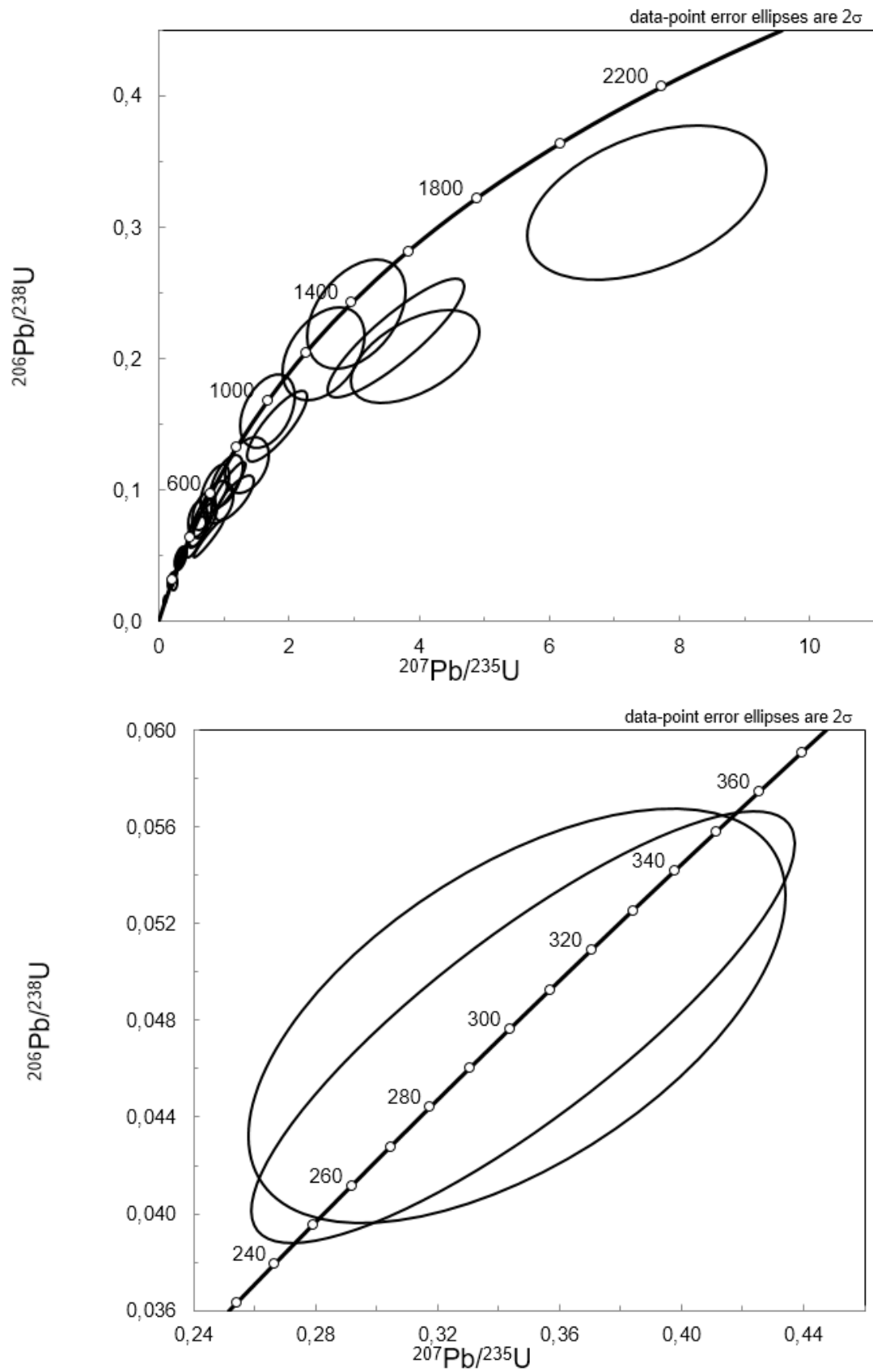


Figure 22E. Concordia diagram for sample 14TM-17B (top) and its concordant analysis (<10% discordance) only (bottom).

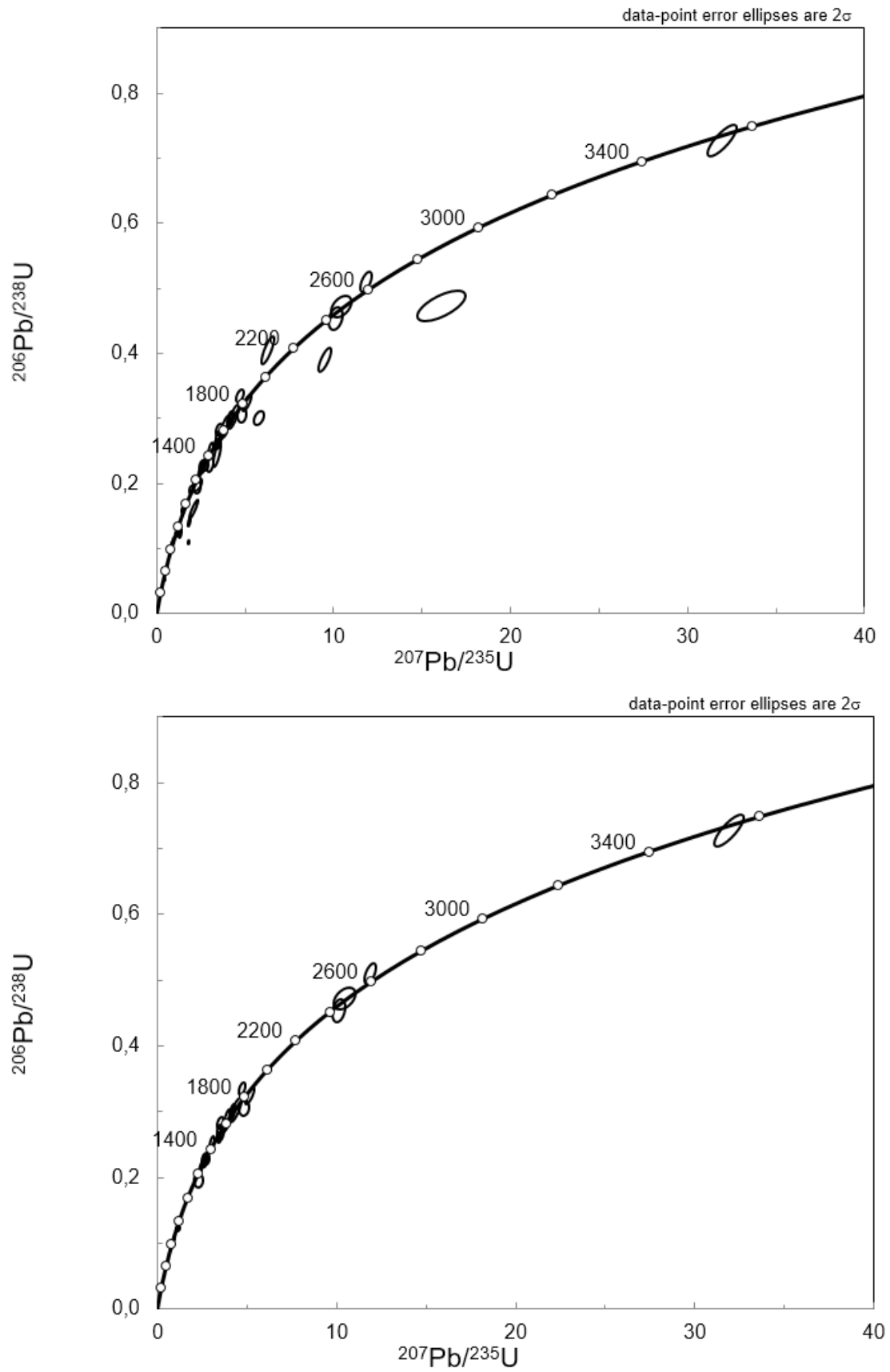


Figure 22F. Concordia diagram for sample 12TM-32A (top) and its concordant analysis (<10% discordance) only (bottom).

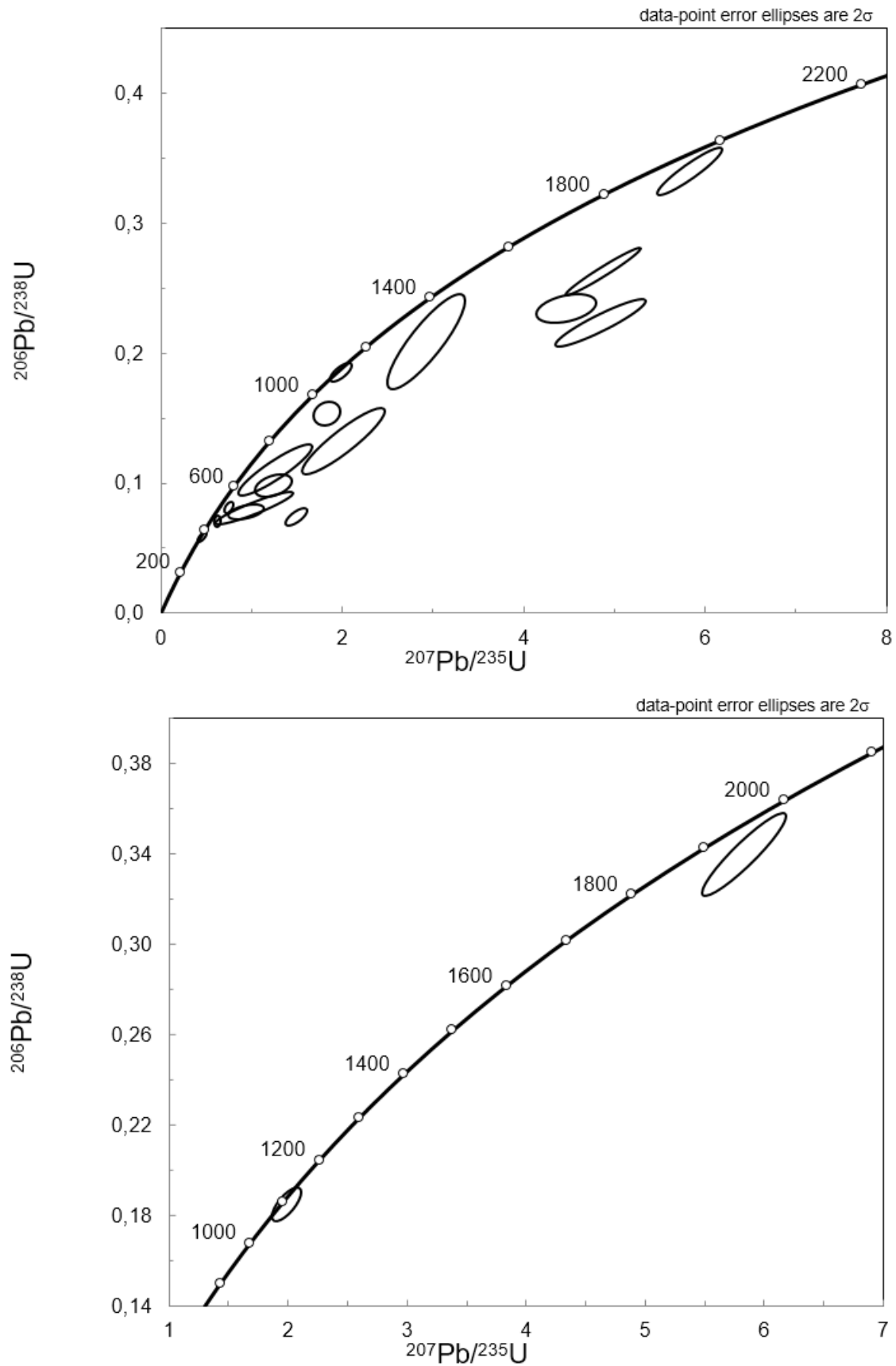


Figure 22G. Concordia diagram for sample CAK14-28 (top) and its concordant analysis (<10% discordance) only (bottom).

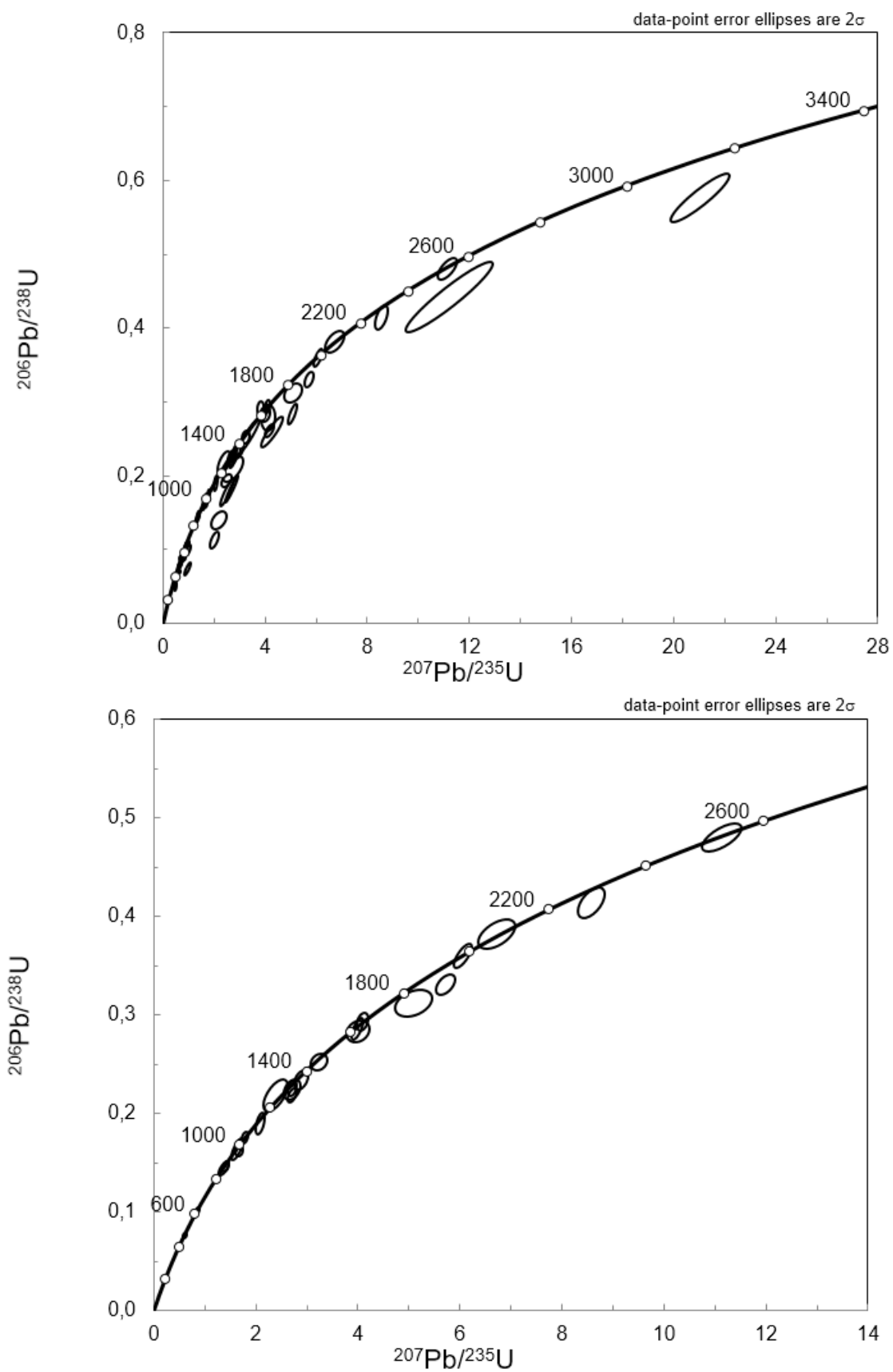


Figure 22H. Concordia diagram for sample 12TM-10A (top) and its concordant analysis (<10% discordance) only (bottom).

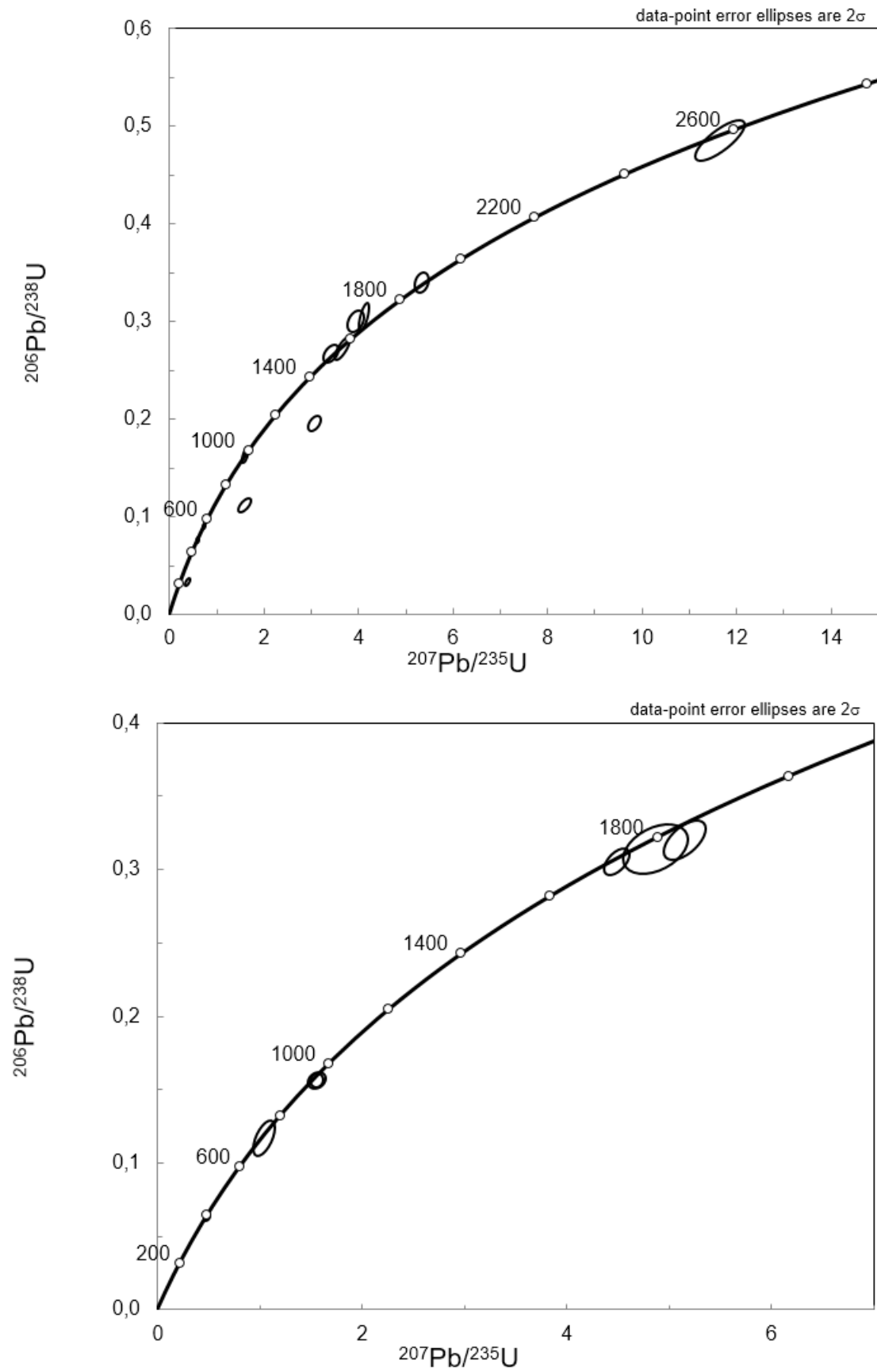


Figure 22I. Concordia diagram for sample 12TM-10B (top) and its concordant analysis (<10% discordance) only (bottom).

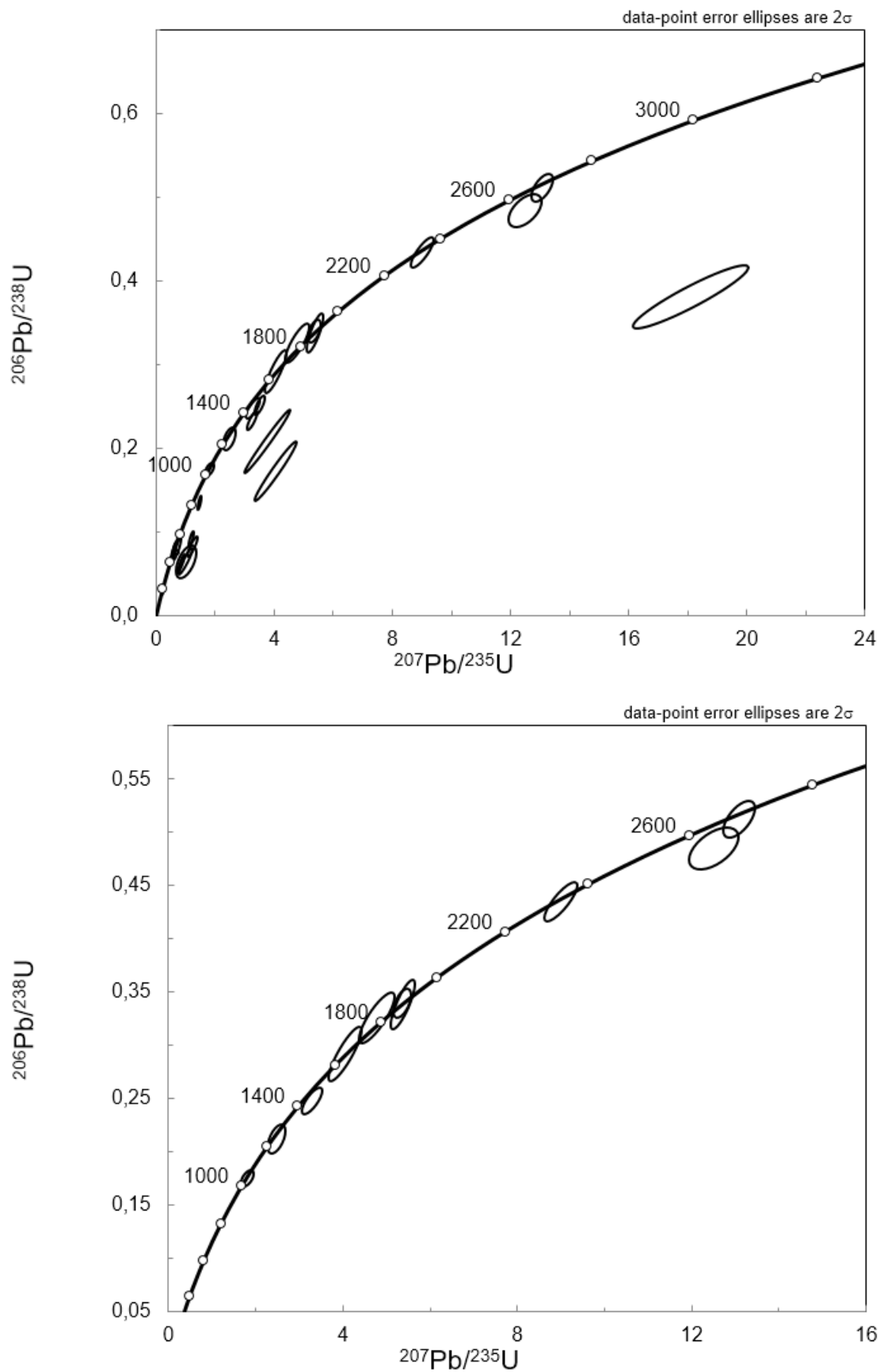


Figure 22J. Concordia diagram for sample 12TM-10C (top) and its concordant analysis (<10% discordance) only (bottom).

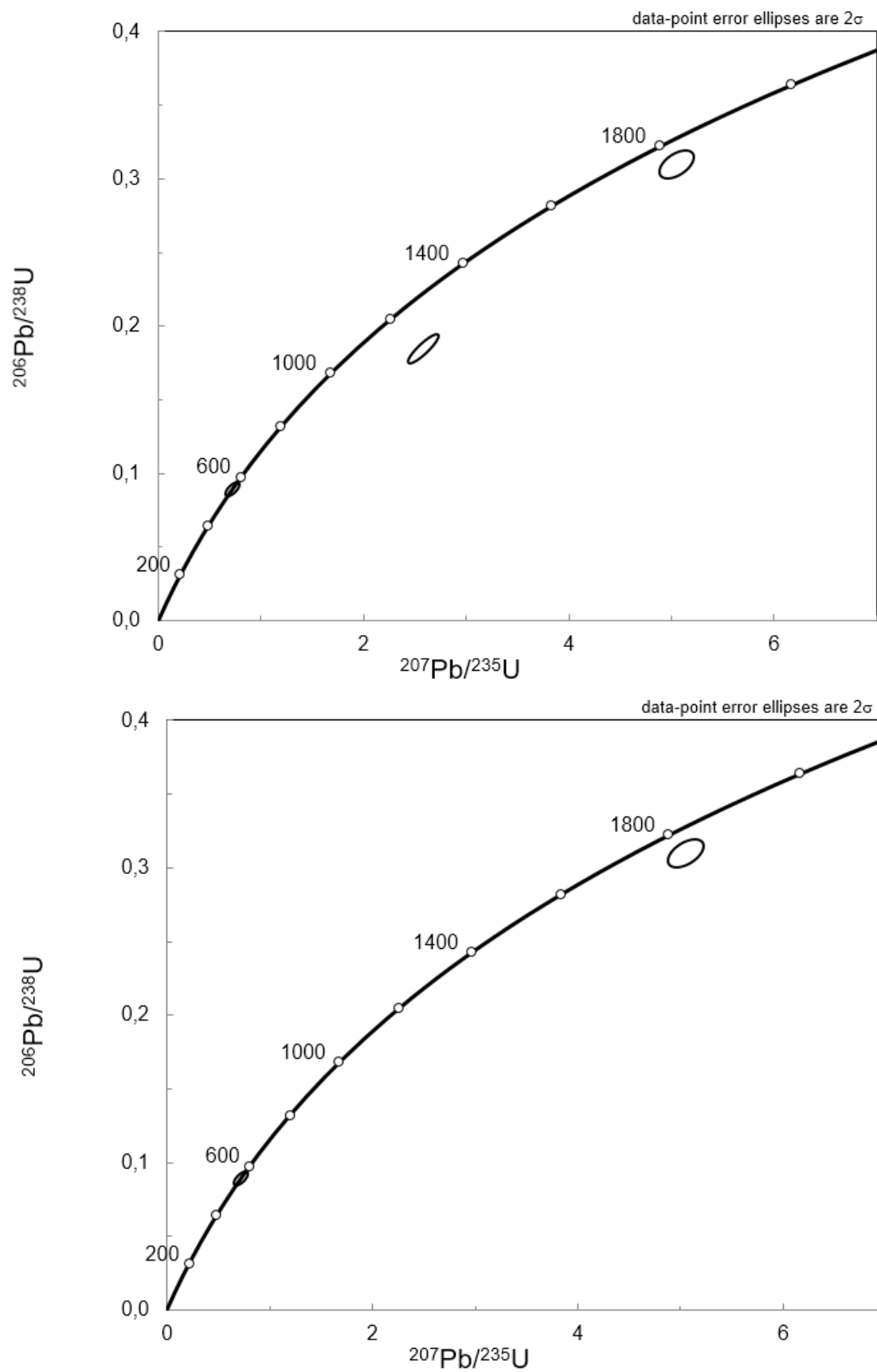


Figure 22K. Concordia diagram for sample 14TM-17A (top) and its concordant analysis (<10% discordance) only (bottom).

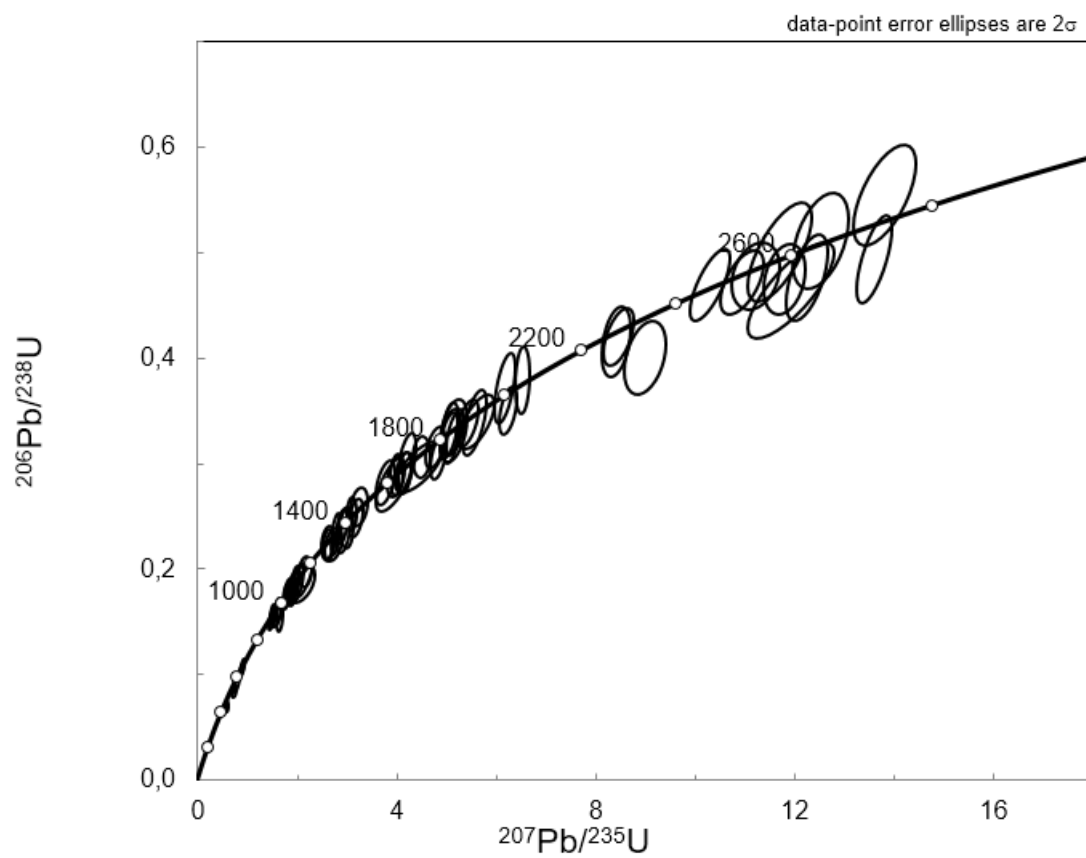
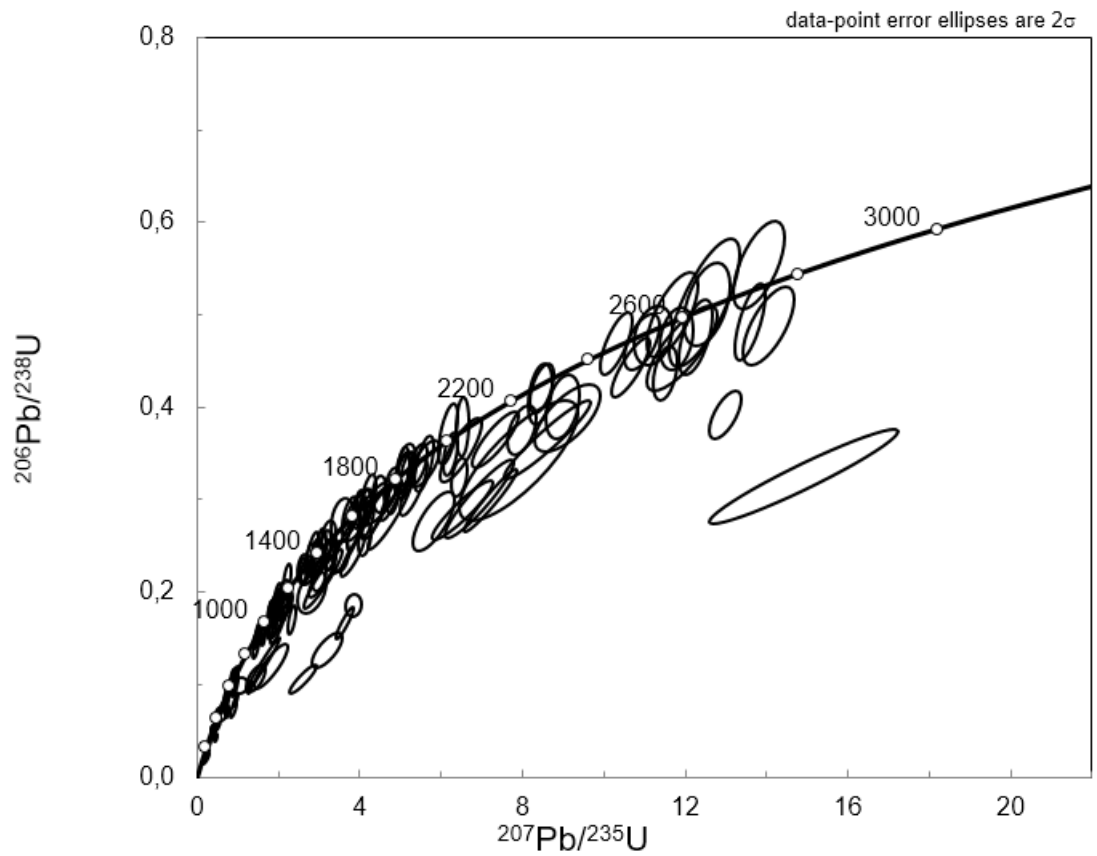


Figure 22L. Concordia diagram for sample 12TM-33A (top) and its concordant analysis (<10% discordance) only (bottom).

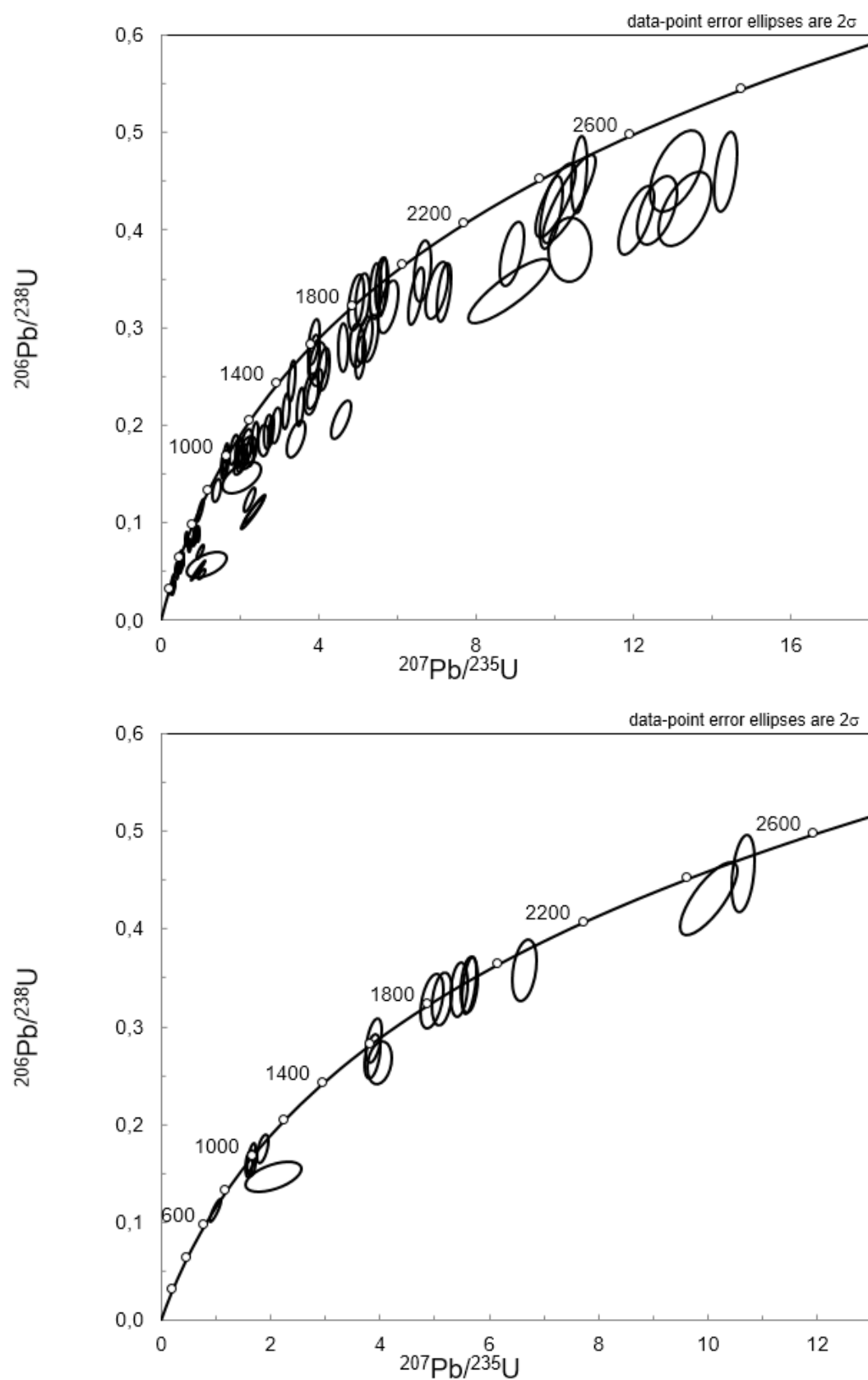


Figure 22M. Concordia diagram for sample 12TM-33B (top) and its concordant analysis (<10% discordance) only (bottom).

2. Figure 23A-23E. Microscopic images for some of the samples, ordered according to their stratigraphic unit.

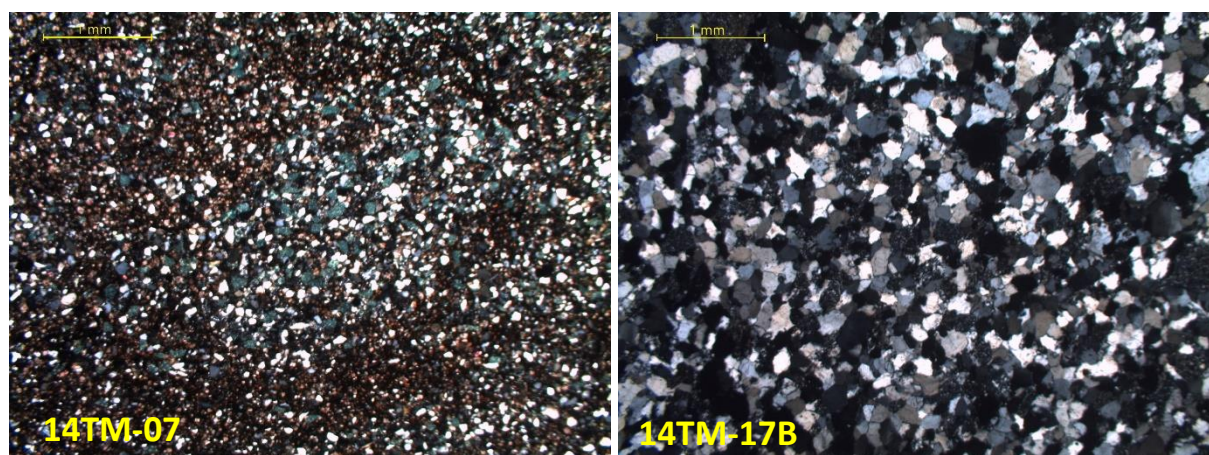


Figure 23A. Photomicrographs of the Upper Echooka Formation (left) and the Kavik Member (right). The left image show a poorly sorted quartz arenite with an abundance of glauconite. The right image show a moderately sorted quartz arenite with minor amounts of mica and lithic fragments.

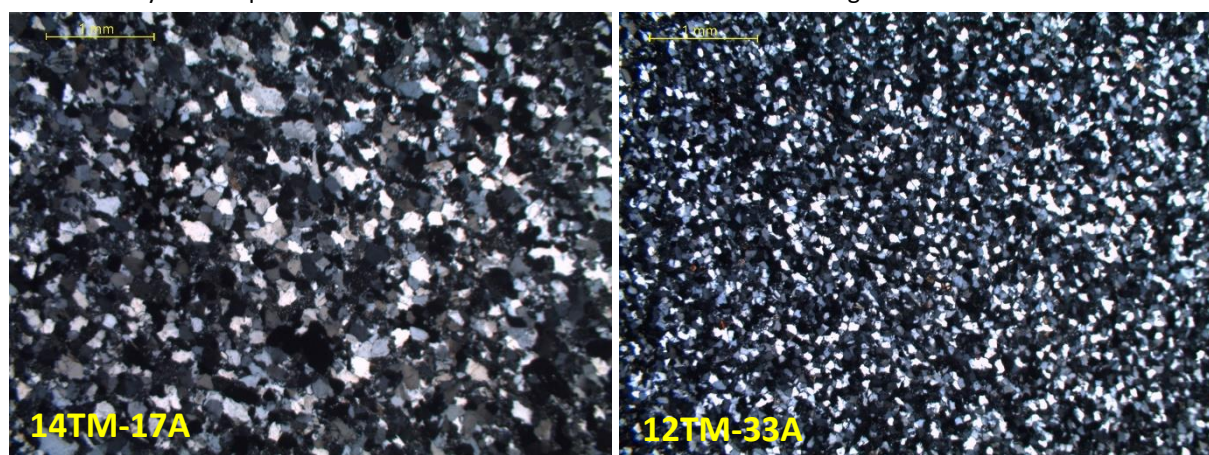


Figure 23B. Photomicrographs of the Lower Ledge Member within the Ivishak Formation. The left image show a well sorted quartz arenite with some lithic fragments and mica. The right image show a moderately sorted quartz arenite with minor amounts of mica and lithic fragments.

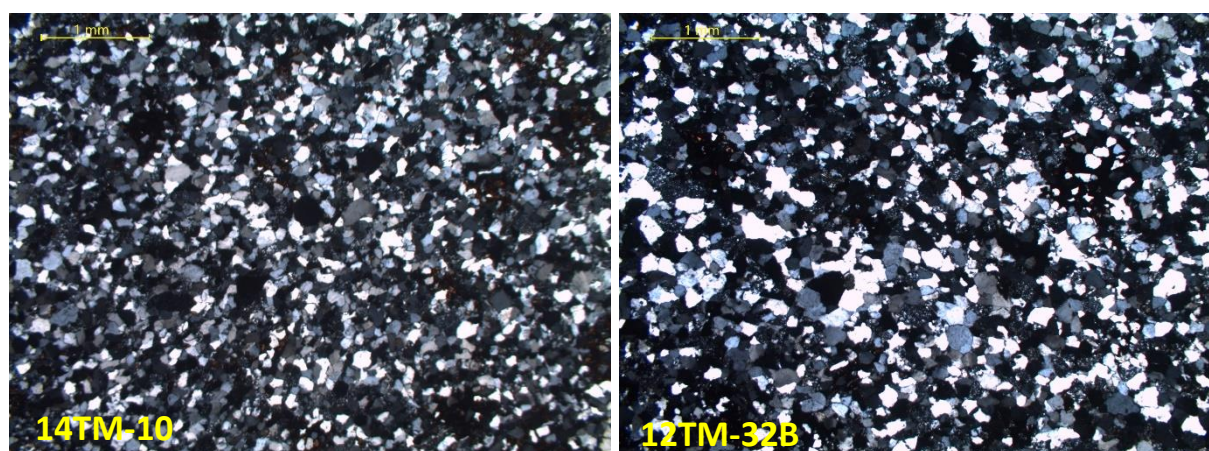


Figure 23C. Photomicrographs of the Middle Ledge Member (left) and the Upper Ledge Member (right) within the Ivishak Formation. The left image show a moderately sorted quartz arenite with some lithic fragments. The right image show a well sorted quartz containing some lithic fragments.

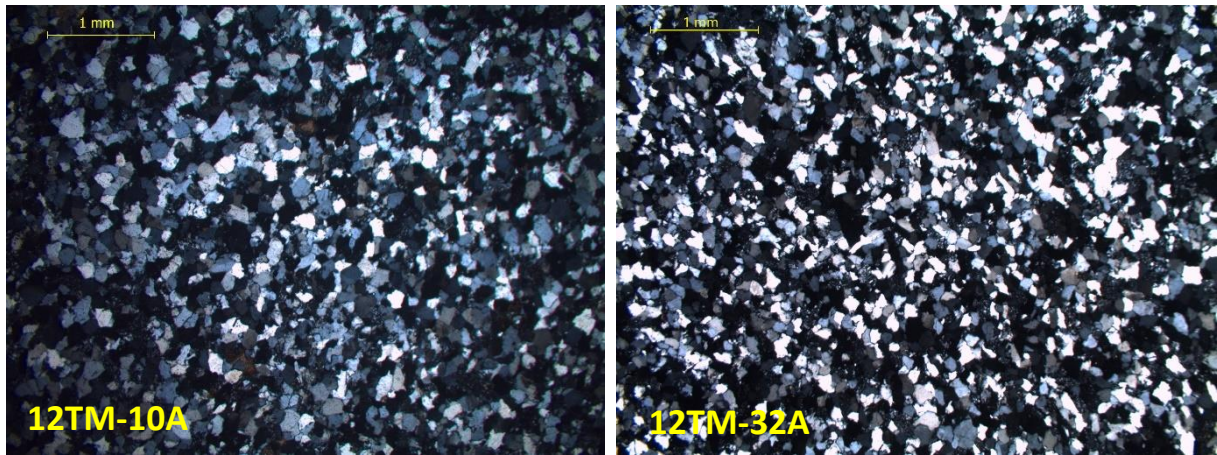


Figure 23D. Photomicrographs of the Upper Ledge Member within the Ivishak Formation. The left image show a moderately sorted quartz arenite. The right image show a moderately to well sorted quartz arenite with minor amounts of lithic fragments.

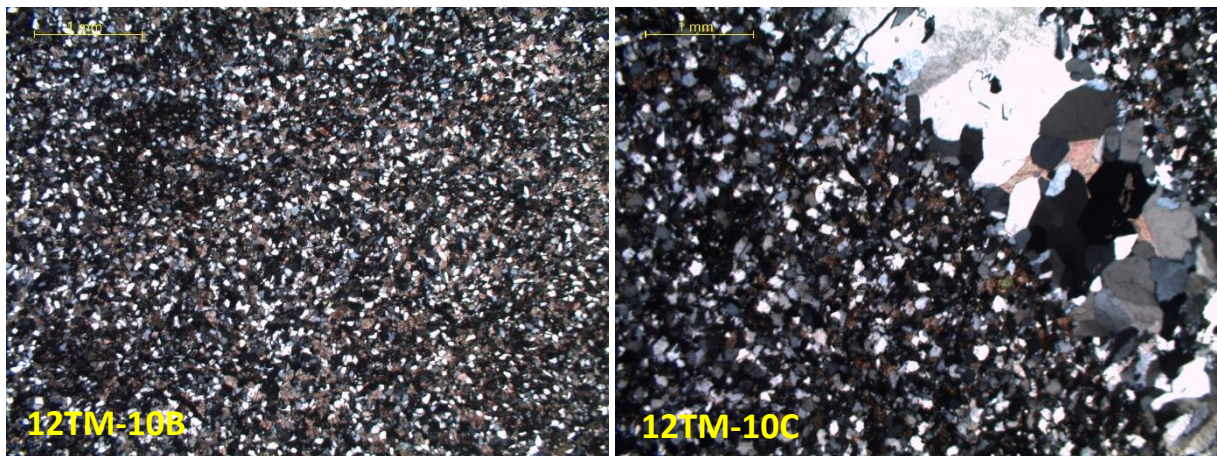


Figure 23E. Photomicrographs of the Lower Shublik Formation (left) and the Karen Creek Sandstones (right). The left image show a moderately sorted quartz arenite with calcite cement in between grains, as well as minor amounts of mica and K-feldspar. The right image show a poorly sorted quartz arenite with veins of very coarse quartz and calcite grains, as well as minor amounts of mica and K-feldspar.

3. Figure 24A-24N. CL images for all samples with the marked spots for the laser beam of LA-ICP-MS.

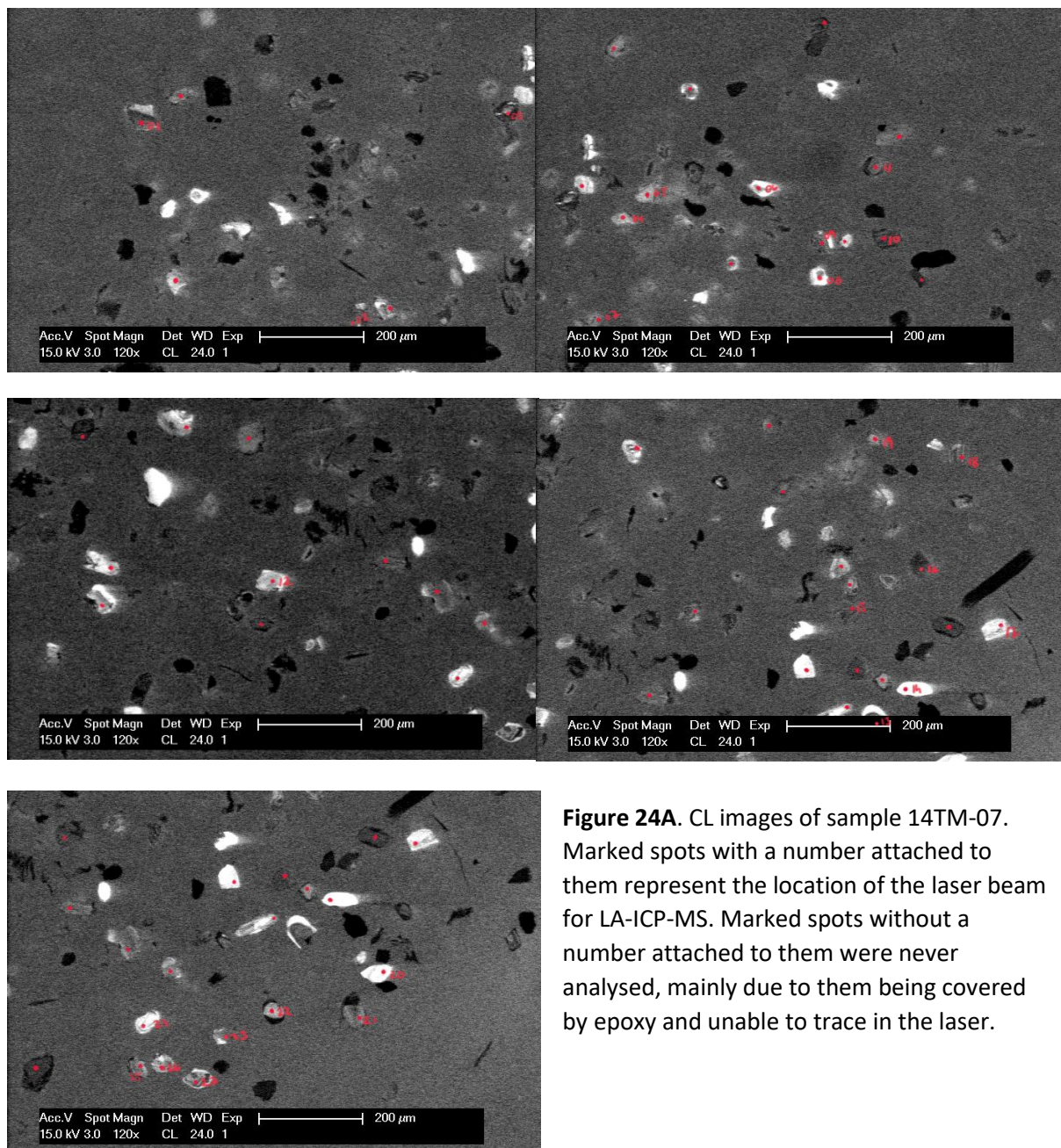


Figure 24A. CL images of sample 14TM-07. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

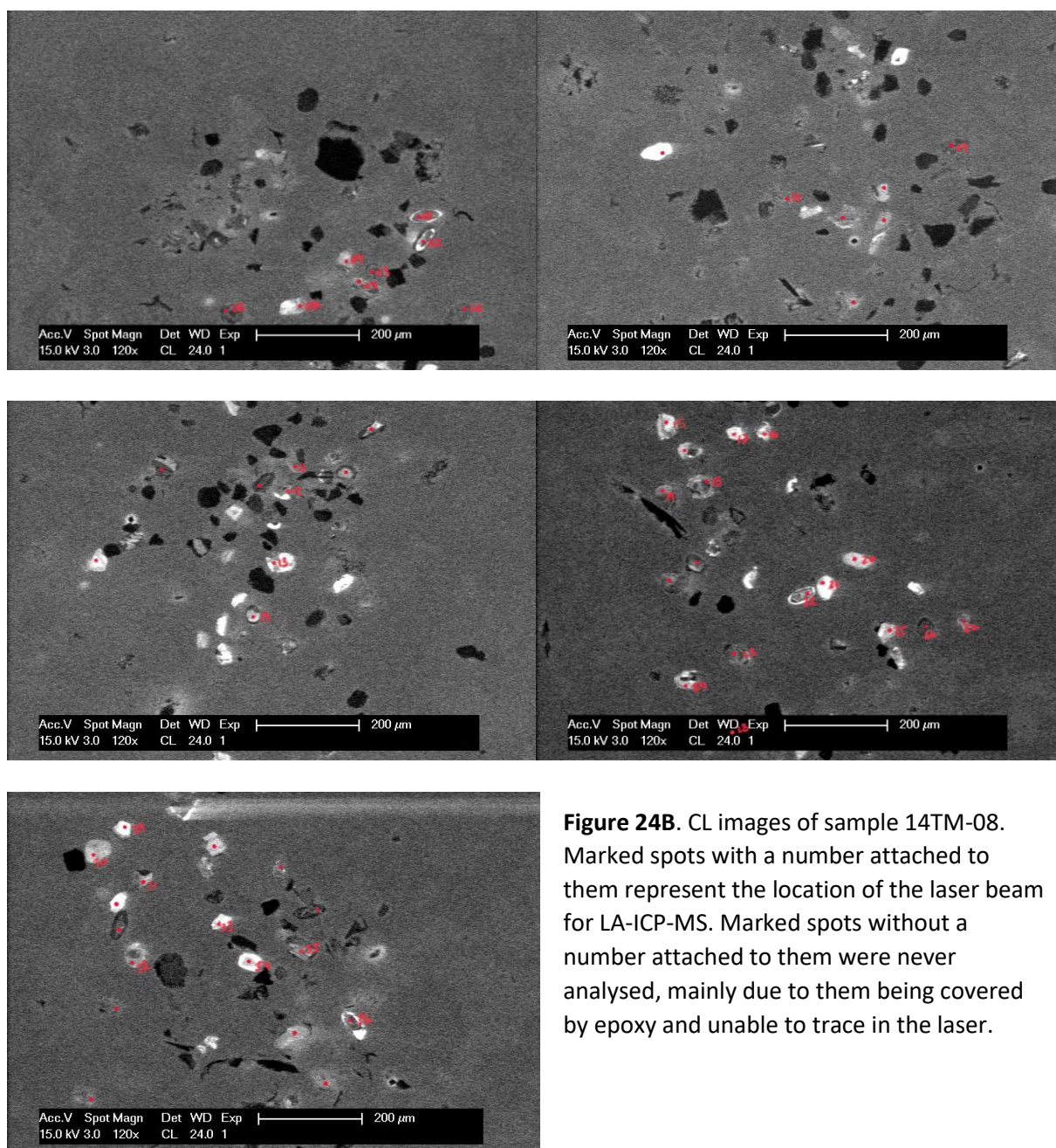


Figure 24B. CL images of sample 14TM-08. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

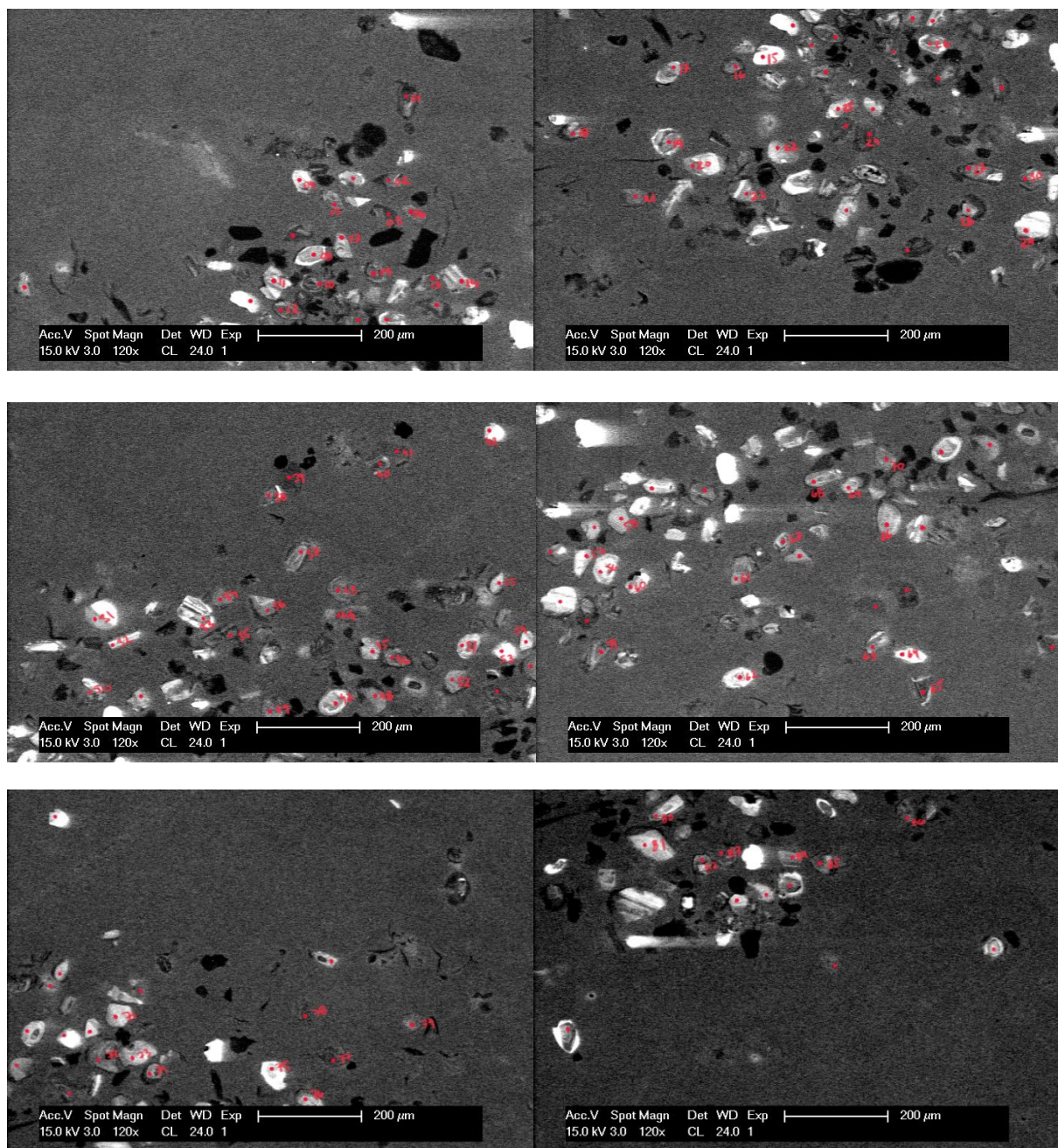


Figure 24C. CL images of sample 14TM-09. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

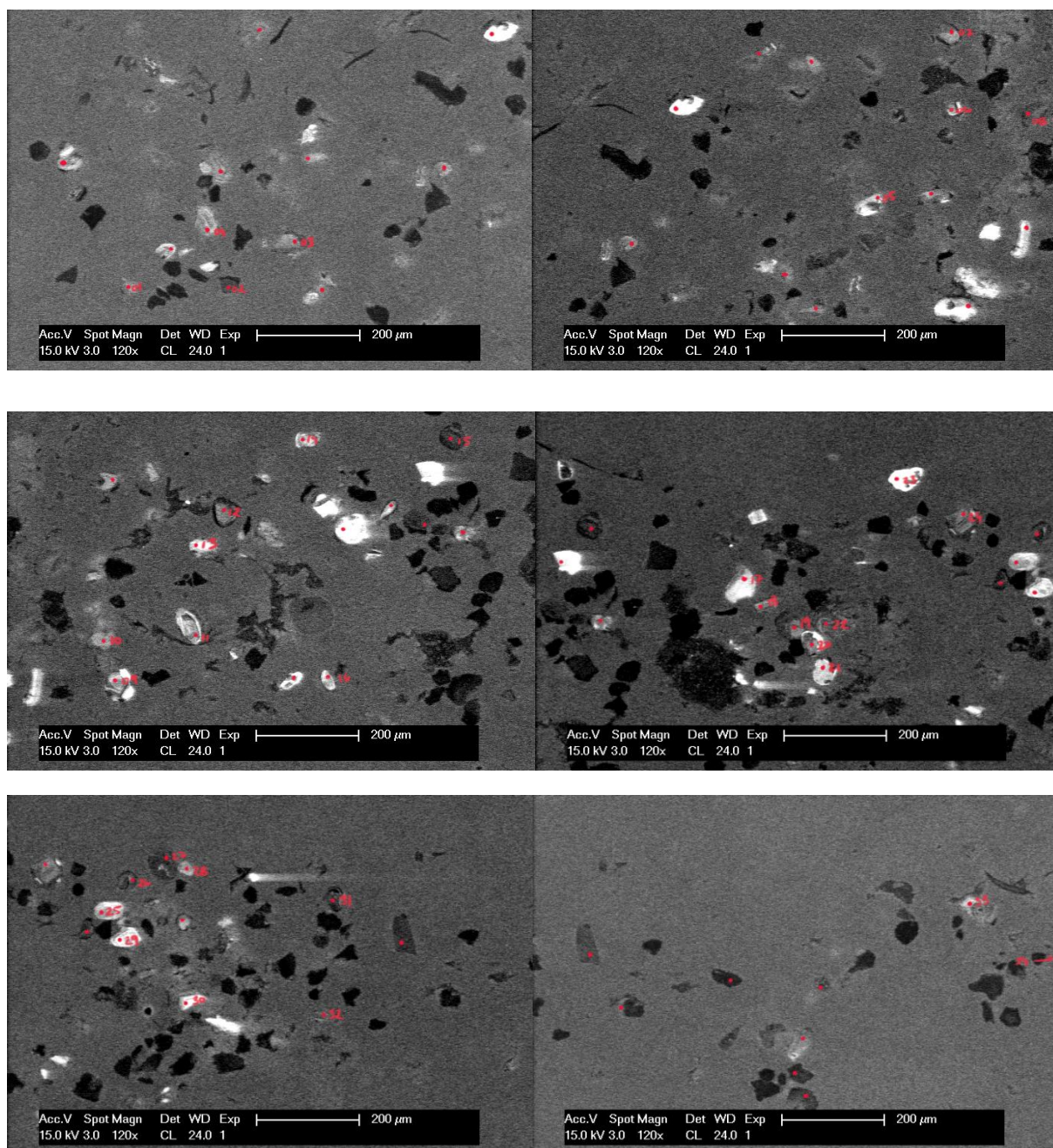


Figure 24D. CL images of sample 14TM-10. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

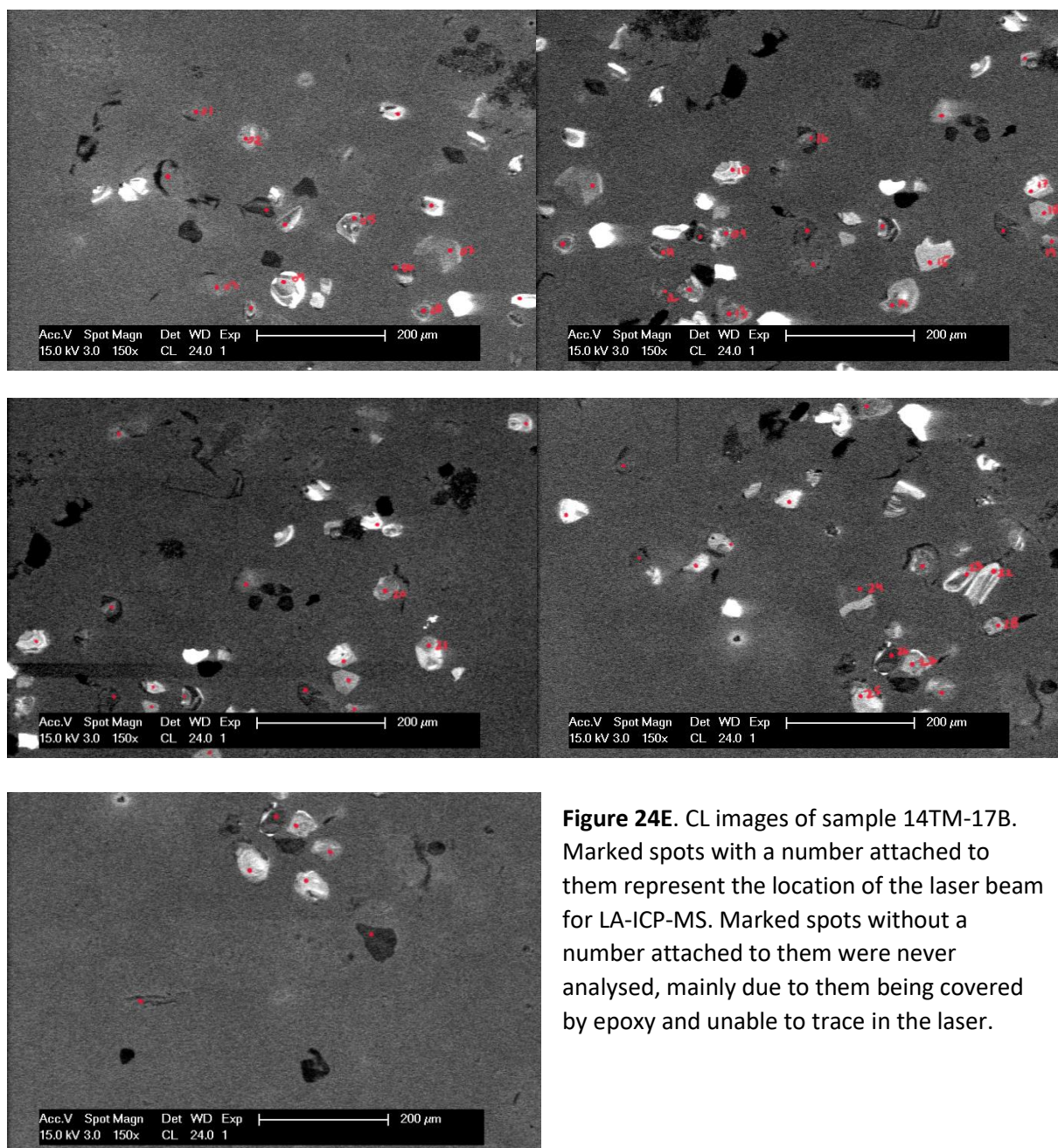


Figure 24E. CL images of sample 14TM-17B. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

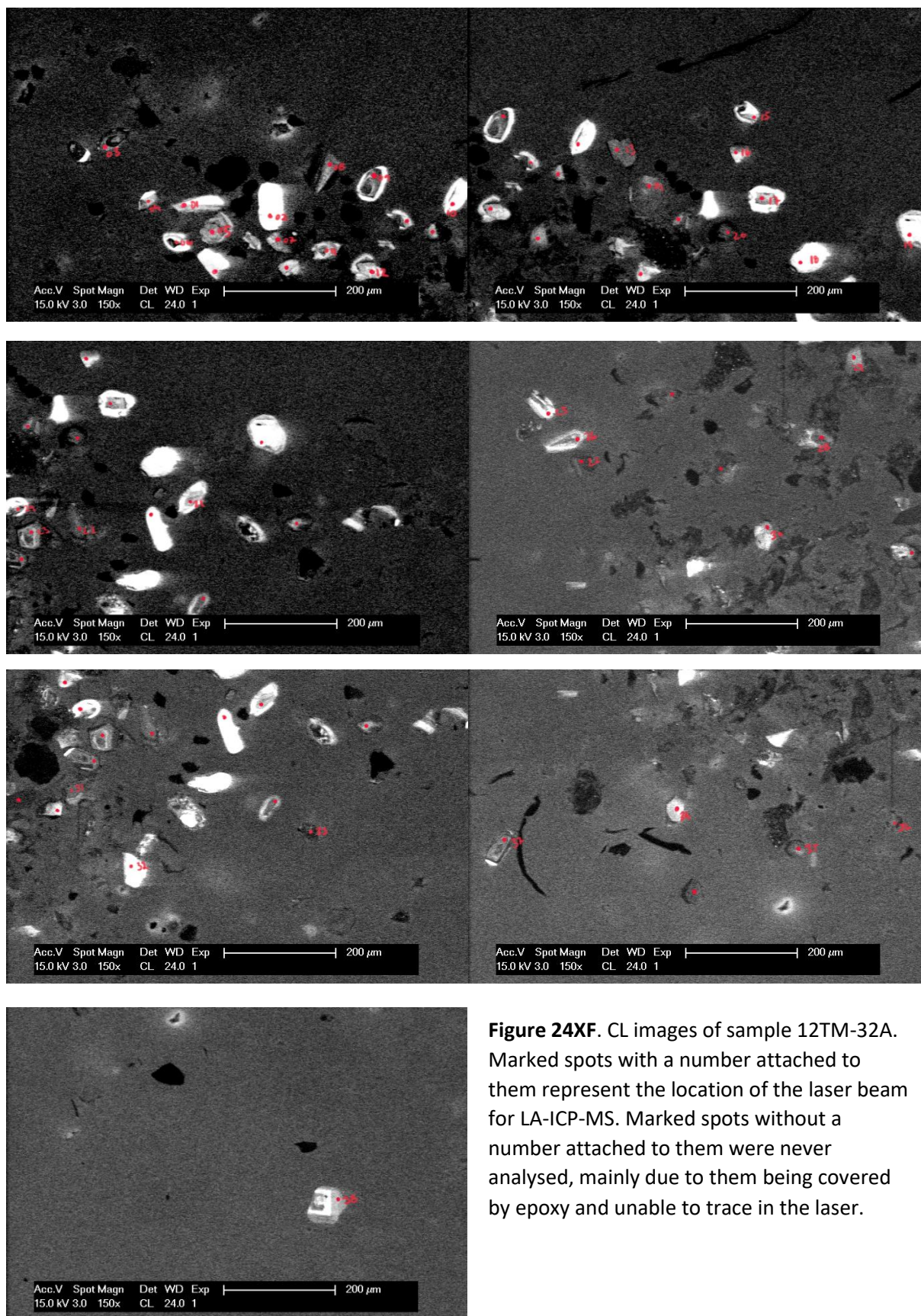


Figure 24XF. CL images of sample 12TM-32A. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

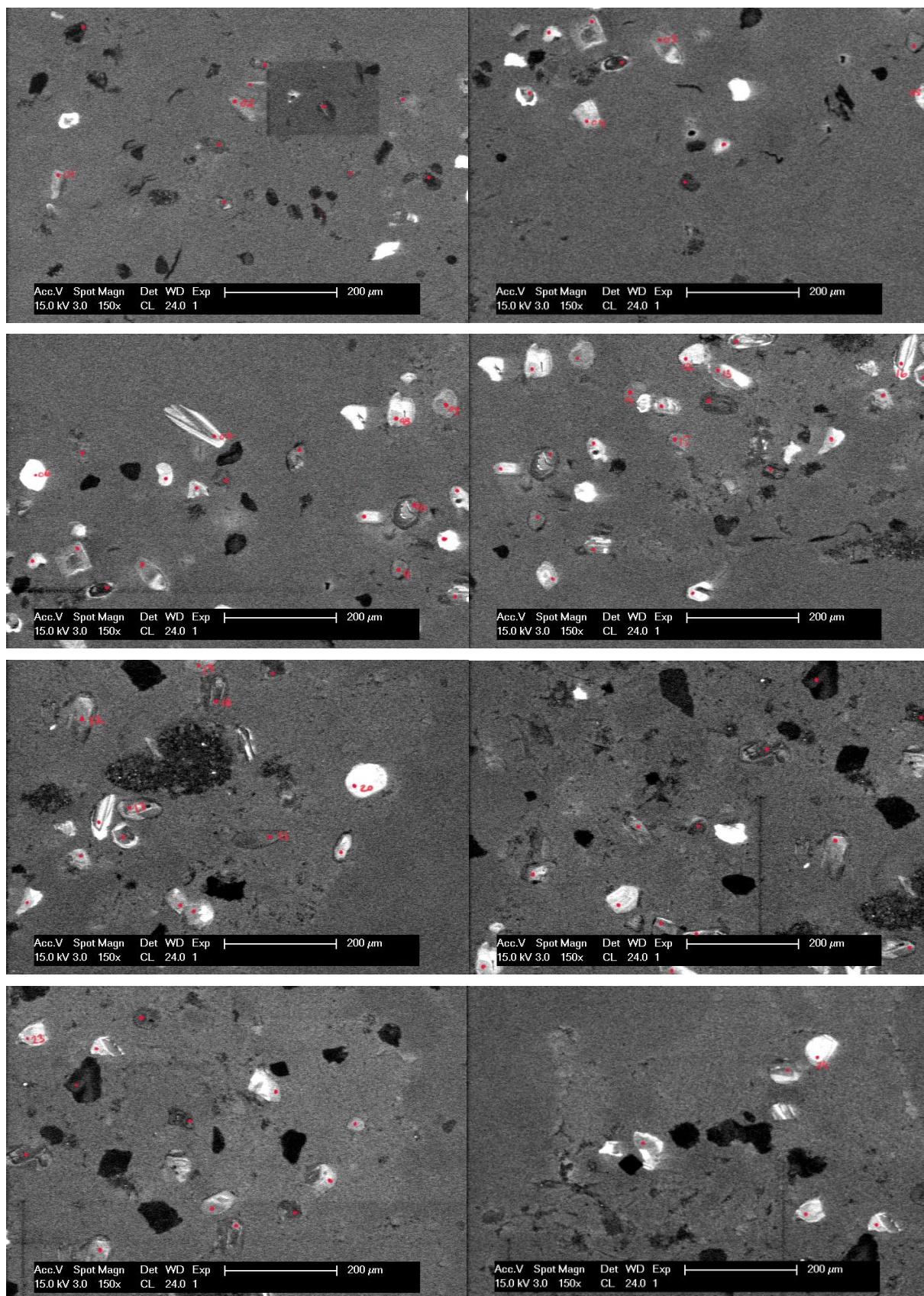


Figure 24XG. CL images of sample 12TM-32A. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

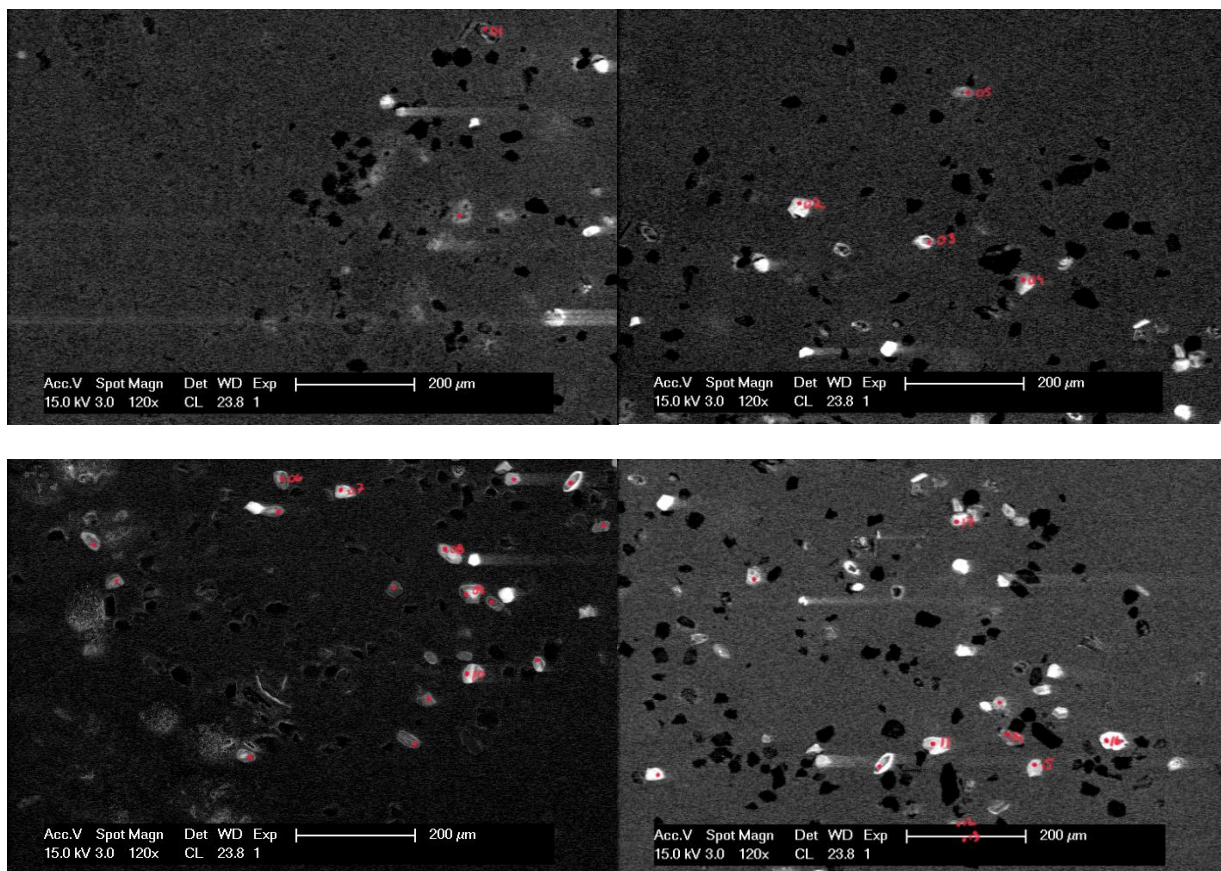


Figure 24H. CL images of sample CAK14-28. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

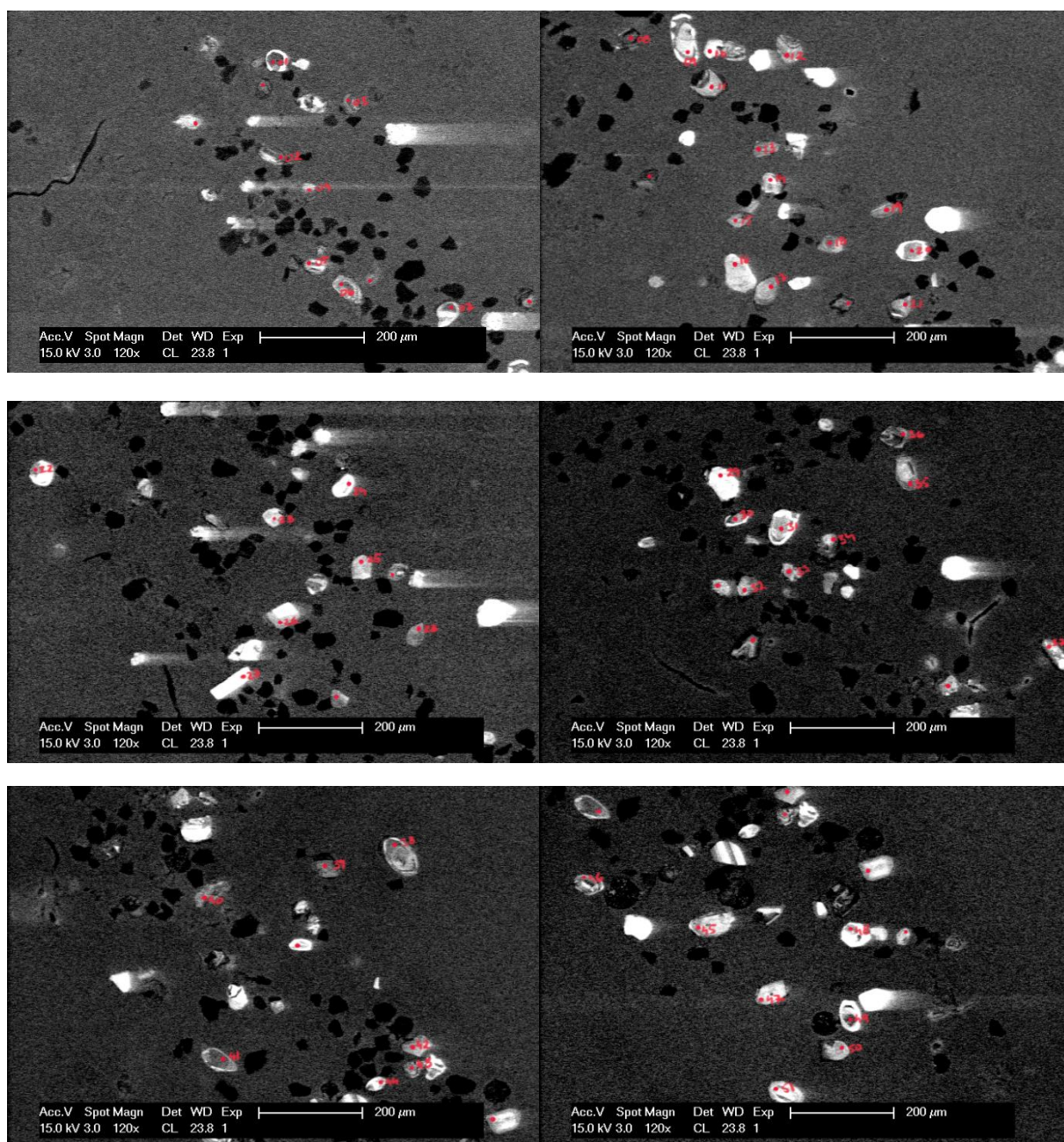


Figure 24I. CL images of sample 12TM-10A. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

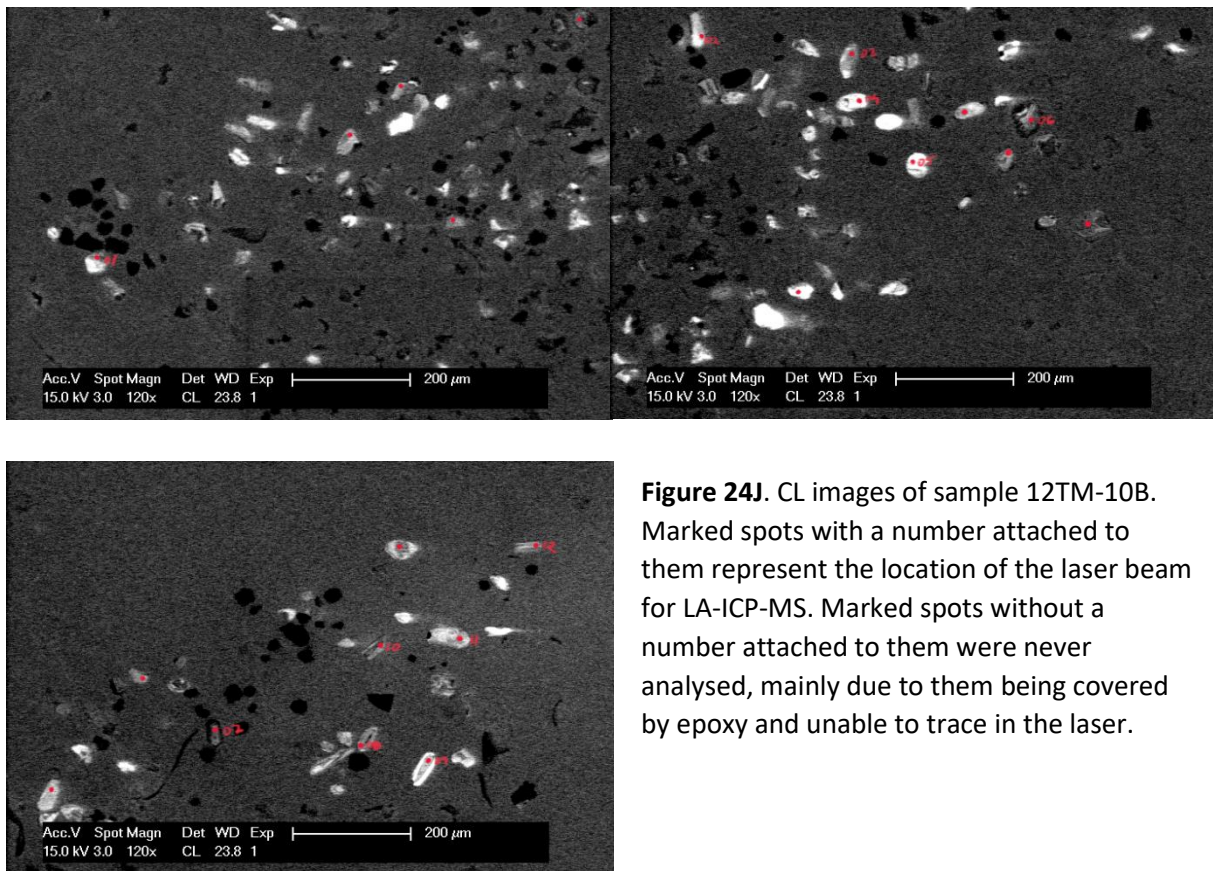


Figure 24J. CL images of sample 12TM-10B. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

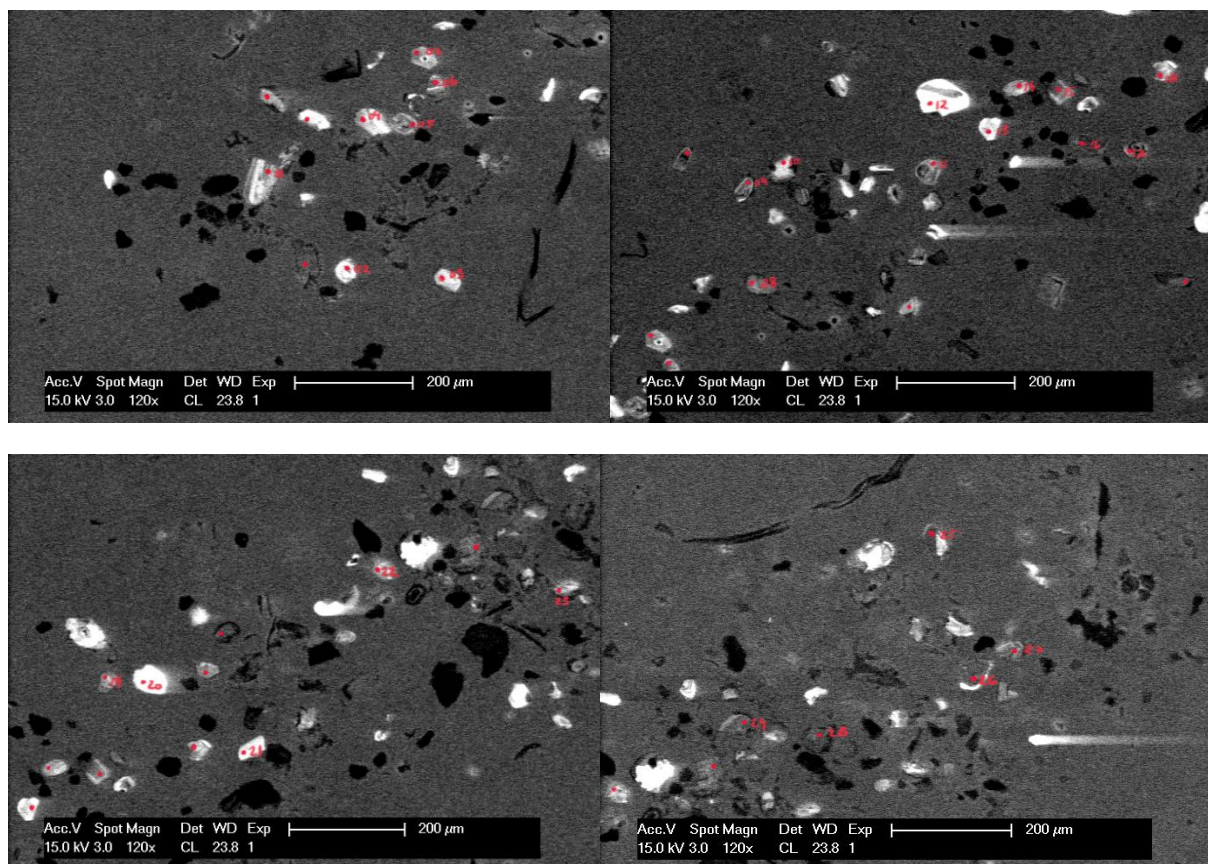


Figure 24K. CL images of sample 12TM-10C. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

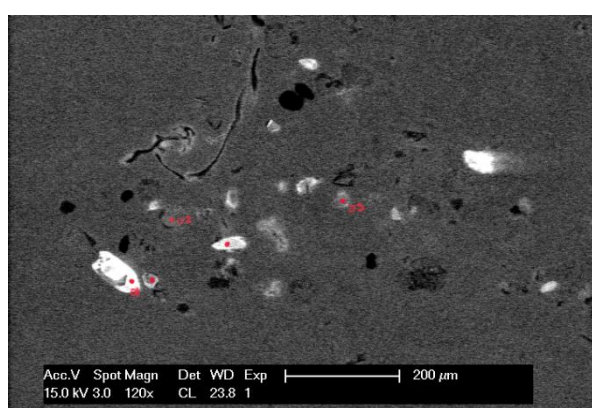
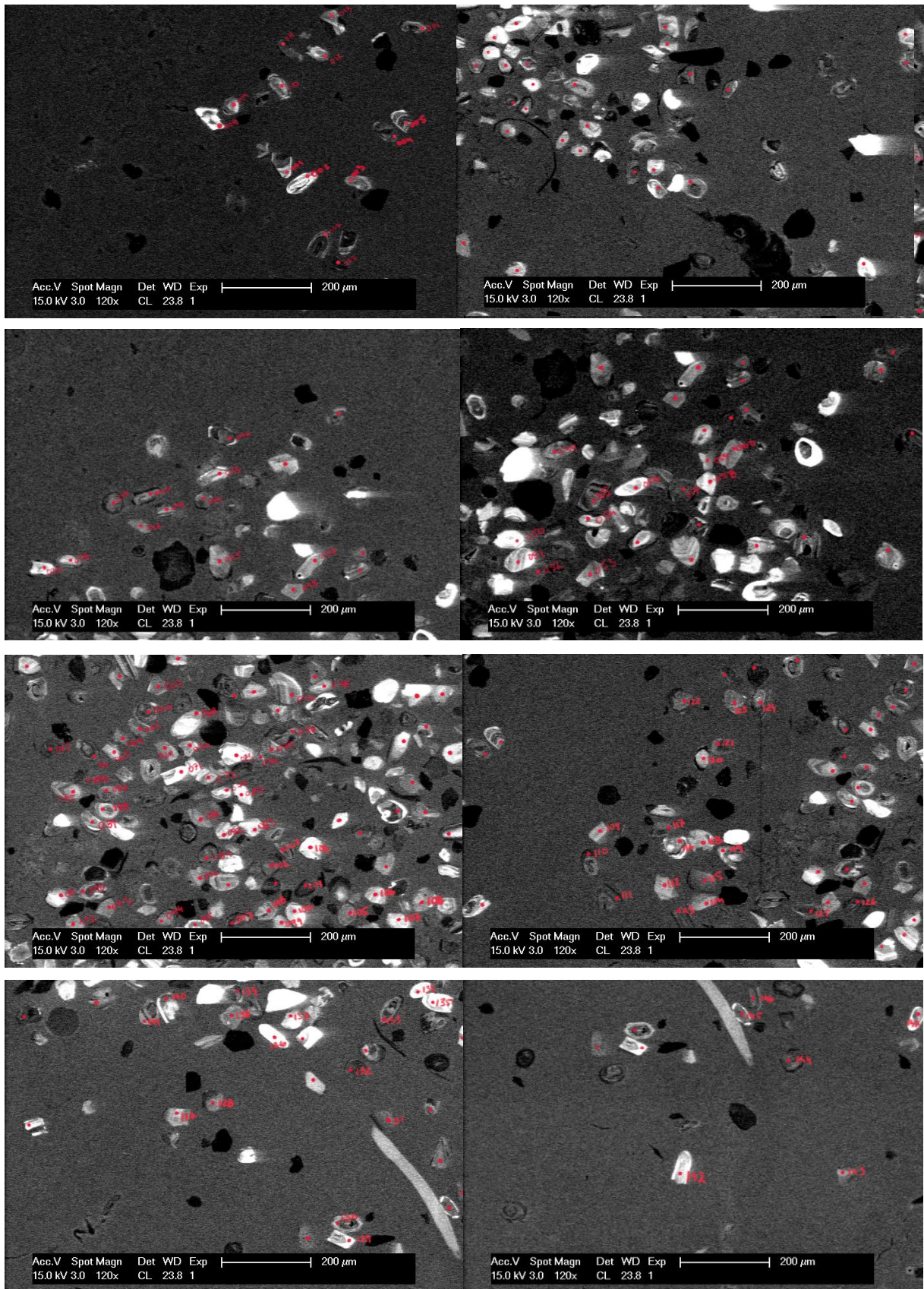


Figure 24L. CL images of sample 14TM-17A. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.



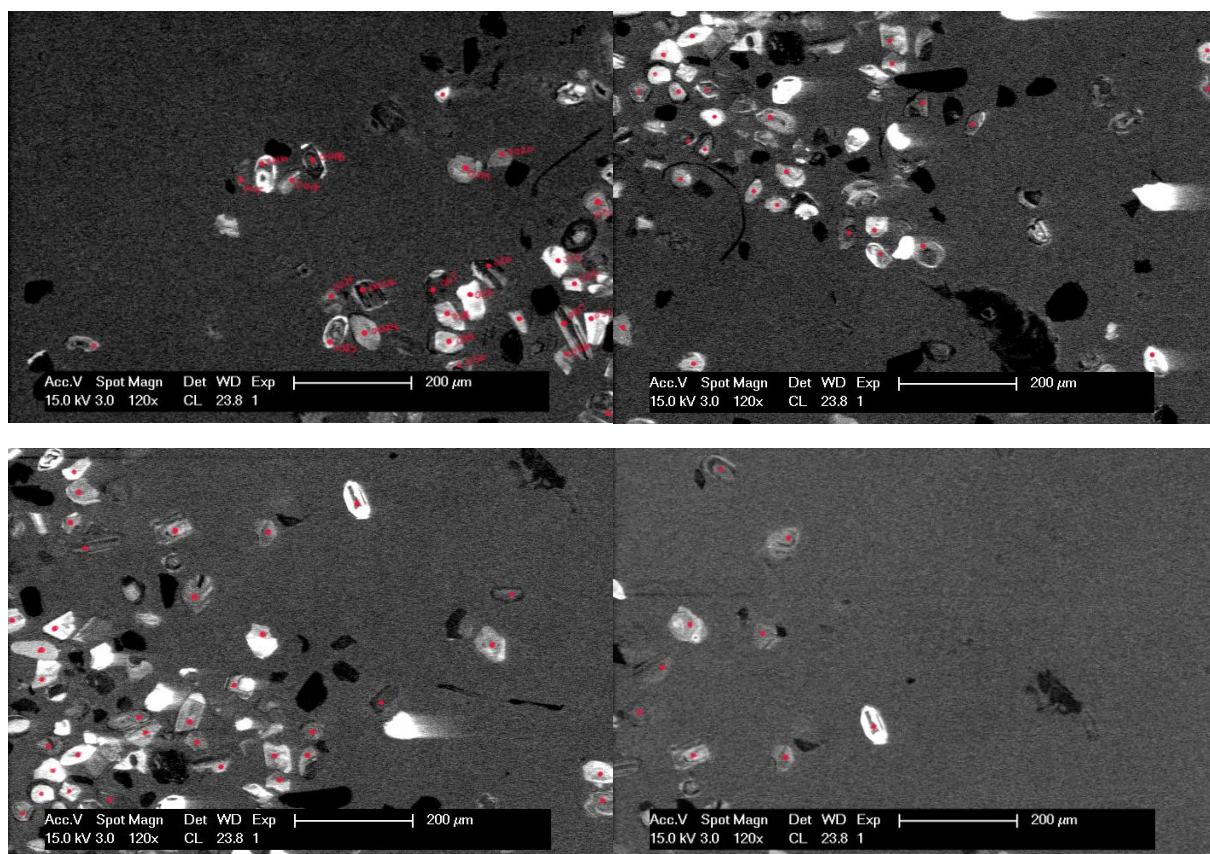


Figure 24M. CL images of sample 12TM-33A. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

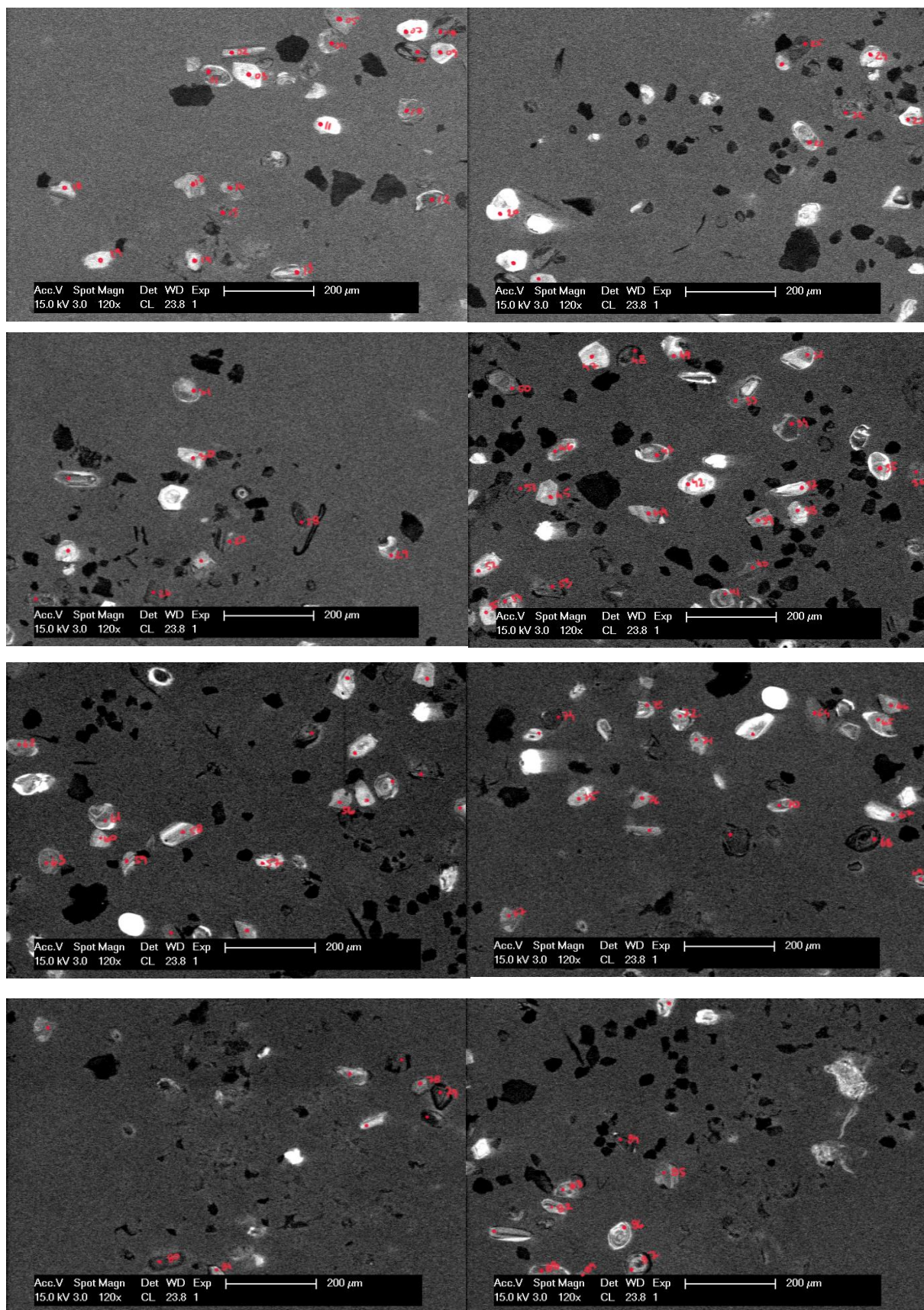


Figure 24N. CL images of sample 12TM-33B. Marked spots with a number attached to them represent the location of the laser beam for LA-ICP-MS. Marked spots without a number attached to them were never analysed, mainly due to them being covered by epoxy and unable to trace in the laser.

4. Table 5. Comprehensive data table of the U-Pb analyses for all samples.

Sample Name		cPb		Discordance		U (ppm)	
14TM-07		Pb/Hg*100 > 25 AND 204Pb>100 cps		>10%		>1400	

					cPb			uncorrected ratios							uncorrected ages							inversed conc.			
Run	U	Pb	Th		204	202	Pb/Hg	207Pb/2		207Pb/	2S	206Pb/		error	206Pb/	+	207Pb/	+	207Pb/2	+	disc	238/	2	207Pb/2	2sig
name	(ppm)	(ppm)	(ppm)	U/Th	Pb	Hg	*100	06Pb	2SE	235U	E	238U	2SE	corr.	238U	-	235U	-	06Pb	-	%	206	sigma	06Pb	ma
A4	176	94	106	2	6	-17	-35	0.0636	035	1.052	75	0,1207	038	16	734	2	729	6	710	0	3	8,285	0.00	0.0636	35
A5	119	291	87	2	5	-15	-33	0.1474	034	9.06	3	0,451	11	9	2398	9	2340	3	2321	9	-5	2,217	0.01	0.1474	34
A8	457	591	221	2	-8	1	-800	0.1172	030	5.91	2	0,38	14	53	2076	6	1960	3	1909	7	-10	2,631	0.01	0.1172	30
A7	433	177	60	18	7	7	100	0.1204	033	5.27	9	0,3312	089	97	1844	3	1868	0	1958	8	6	3,019	0.00	0.1204	000
A11	276	1002	277	1	-4	11	-36	0.1659	039	10.69	7	0,469	32	72	2490	0	2501	4	2517	1	3	324	89	0.1204	33
A9	1327	248	127	12	4	12	33	0.0998	022	3.858	98	0,287	072	43	1626	6	1607	1	1630	4	-1	2,132	0.03	0.1659	000
A12	412	39	36	13	3	-2	-150	0.0711	019	1.390	53	0,1489	053	95	894	0	886	2	950	3	-4	196	2	0.1659	39
A13	509	215	98	4	5	-26	-19	0.0904	026	2.958	83	0,2426	070	03	1400	7	1401	3	1428	6	1	3484	0.00	0.0998	22
A16	634	367	164	3	2	1	200	0.0904	021	3.062	87	0,2489	064	57	1432	3	1421	2	1435	7	1	6,715	0.00	0.0711	19
A19	292	227	85	2	4	14	29	0.1010	032	4.13	5	0,307	10	89	1725	0	1662	1	1632	9	-5	917	53	0.0711	000
A24	495	290	196	2	0	-25	0	0.0726	031	1.581	51	0,1651	051	8	985	8	962	0	1012	1	-1	4,122	0.00	0.0904	26
A27	1047	497	196	4	0	-11	0	0.1058	027	4.41	8	0,309	11	3	1732	6	1710	3	1732	4	-2	4,017	0.00	0.0904	000

Discordant																									
A1	455	1817	768	1	-2	-40	5	0.1023	042	4.79	2	0,344	12	63	1907	5	1797	3	1655	7	-14	2,906	0.01	0.1023	000
A2	744	453	762	1	5	-5	-100	0.0569	023	0.587	24	0,0756	023	28	470	8	470	6	491	3	-14	977	2	0.1023	42
A3	1860	900	618	4	29	7	414	0.1020	029	2.64	1	0,1926	068	07	1135	3	1308	1	1670	7	33	13,22	0.00	0.0569	000
A6	279	197	249	1	-6	-6	100	0.0612	027	0.796	45	0,0983	039	99	604	4	470	6	491	3	-14	751	23	0.0569	23

A10	374	793	348	1	-7	29	-24	0.1015	0.0	0.3	0.0	0.882	7	6	7	2,949	0.01	0.00					
								0.045	4.73	2	0.339	16	22	1881	8	1764	1	1678	9	-12	853	6	0.1015
A14	441	1076	612	1	-3	-4	75	0.0966	0.0	0.1	0.0	0.685	5	4	7	4,549	0.00	0.00					
								0.038	2.84	5	0.2198	086	73	1293	2	1372	3	1549	5	14	591	86	0.0966
A15	1745	182	322	4	12	9	133	0.0547	0.0	0.0	0.0	0.498	1	2	1	14,55	0.00	0.00					
								0.025	0.511	31	0,0687	024	13	428	5	418	1	380	0	-17	604	24	0.0547
A17	451	185	120	2	3	-13	-23	0.0697	0.0	0.0	0.0	0.387	3	2	8	5,797	0.00	0.00					
								0.028	1.597	62	0,1725	057	97	1025	1	967	5	914	8	-26	101	57	0.0697
A18	1090	642	422	2	5	23	22	0.1158	0.0	0.2	0.0	0.970	7	7	4	6,802	0.01	0.00					
								0.028	2.27	4	0,147	14	17	879	8	1207	9	1887	4	53	721	4	0.1158
A20	175	27	51	41	19	-5	-380	0.093	0.0	0.2	0.0	0.599	3	4	4	11,24	0.00	0.02					
								0.020	1.04	3	0,0889	065	6	549	8	760	0	1330	0	36	859	65	0.093
A21	648	411	276	1	20	21	95	0.1684	0.0	0.1	0.0	0.792	4	2	4	4,948	0.00	0.00					
								0.044	4.58	6	0,2021	083	02	1186	4	1742	9	2555	3	53	046	83	0.1684
A22	721	103	443	1	-4	-15	27	0.122	0.0	0.6	0.0	0.796	2	8	5	4,048	0.04	0.01					
								0.10	3.34	2	0,247	48	81	1400	0	1360	0	1940	0	21	583	8	0.122
A23	902	457	409	1	22	-12	-183	0.0669	0.0	0.2	0.0	0.866	7	9	2	5,208	0.03	0.00					
								0.040	1.64	5	0,192	32	3	1120	0	968	0	810	0	-15	333	2	0.0669
A25	650	469	408	1	-6	-5	120	0.1555	0.0	0.3	0.0	0.835	6	6	6	5,813	0.01	0.00					
								0.057	3.57	1	0,172	12	53	1023	4	1558	5	2399	3	56	953	2	0.1555
A26	595	1168	344	1	0	-6	0	0.202	0.0	0.0	0.0	0.785	1	1	1	2,525	0.02	0.02					
								0.025	11.5	2.3	0,396	29	6	2200	0	2500	0	2790	0	22	253	9	0.202

Sample Name	cPb	Discordance	U (ppm)
14TM-08	Pb/Hg*100 > 25 AND 204Pb>100 cps	>10%	>1400

		2014-2015				cPb			uncorrected ratios							uncorrected ages							inversed conc.						
Run name	U (ppm)	Pb (ppm)	Th (ppm)	U/Th	204Pb	202Hg	Pb/Hg*100	207Pb/206Pb	2SE	207Pb/235U	2SE	206Pb/238U	2SE	error corr.	206Pb/238U	+	207Pb/235U	+	207Pb/206Pb	+	disc. %	238/206	sig ma	207Pb/206Pb	2sig ma				
B4	265	161	77	3	-6	-16	38	0.102	0.00	0.1	0.295	6	45	3.71	2	0.26	10	78	1488	1	1579	0	1656	3	9	3,84	0.01	0.1026	0.045
B5	1590	218	453	3	6	-8	-75	0.054	0.00	0.0	0.460	3	22	0.422	16	0,0556	021	17	349	3	357	1	389	7	-8	17,9	0.00	0.0543	0.022
B7	339	86	50	6	6	-8	-75	0.074	0.00	0.0	0.361	0	38	1.885	96	0,1841	062	01	1089	4	1073	4	1020	0	-8	5,43	0.00	0.0740	0.038
B15	603	585	254	2	-4	-13	31	0.098	0.00	0.1	0.464	3	33	3.54	3	0,2654	072	09	1517	6	1538	9	1582	3	2	3,76	0.00	0.0983	0.033
B19	594	317	226	2	12	-22	-55	0.079	0.00	0.0	0.727	2	21	1.937	73	0,1748	060	57	1038	3	1092	5	1181	4	9	5,72	0.00	0.0792	0.021
B21	417	176	91	5	3	8	38	0.084	0.00	0.0	0.451	3	25	2.317	78	0,1998	050	87	1174	7	1215	4	1290	9	8	5,00	0.00	0.0843	0.025

B22	808	3735	2596	1	3	4	75	0.100	0.00	0.0	0.0	0.249	4	2	4	3,72	0.00	0.0	
								7	29	3.713	93	0,2687	078	62		1623	78	0.1007	029
B26	1804	1382	2990	1	9	-24	-38	0.058	0.00	0.0	0.0	0.716	1534	0	1573	0	1644	9	8
								4	18	0.442	20	0,0562	026	56	352	6	371	4	532
B27	1098	342	822	1	9	-10	-90		0.07	0.7	0.0	0.148		5		2	6		
								0.138	3	1.51	2	0,0693	096	71	431	7	780	0	1370
B28	443	443	196	3	19	16	119	0.083	0.00	0.1	0.0	0.375		2		4	1		
								8	51	2.53	6	0,2211	050	95	1288	7	1272	3	1250
B29	203	226	103	2	19	-8	-238	0.093	0.00	0.1	0.0	0.537		4		3	6		
								8	33	3.50	5	0,2784	082	93	1583	1	1524	4	1494
B31	644	919	492	2	-10	3	-333	0.093	0.00	0.1	0.0	0.504		4		3	6		
								6	34	3.12	3	0,2466	084	8	1420	4	1435	2	1489
B33	465	968	862	1	-5	-22	23	0.070	0.00	0.0	0.0	0.700		2		2	6		
								5	21	1.453	58	0,1511	045	95	907	5	915	6	936
B35	294	940	385	1	-9	-4	225	0.121	0.00	0.2	0.0	0.702		5		3	4		
								7	31	5.53	2	0,344	12	24	1912	3	1906	5	1975

Common Pb

B24	1200	2543	793	1	366	90	407							8	6	5									
								0.07				0.1	0.978	9	8	0	3,44	0.0							
								0.247	4	10.4	8.6	0,29	9	93	1580	0	2280	0	3100	0	50	8276	0.19	0.247	74

Discordant

B1	719	220	150	5	19	2	950	0.094	0.00	0.1	0.0	0.728	4	3	7	6,45	0.00	0.0	
								7	37	2.07	1	0,155	074	44	936	0	1133	8	1510
B2	784	206	128	7	1	17	6	0.084	0.00	0.0	0.0	0.740	3	2	5	5,23	0.00	0.0	
								7	24	2.249	90	0,1912	068	17	1127	7	1199	9	1300
B3	1798	186	259	7	37	-15	-247	0.110	0.00	0.0	0.0	0.387	2	1	5	7,35	0.00	0.0	
								4	33	2.065	55	0,136	040	57	822	3	1136	8	1802
B6	1478	457	467	3	58	5	1160	0.143	0.00	0.1	0.0	0.678	4	3	5	6,66	0.00	0.0	
								4	46	2.97	5	0,15	077	37	900	3	1397	8	2263
B8	1696	199	340	5	20	13	154		0.082	0.00	0.0	0.669	3	2	1	12,2	0.00	0.0	
								2	43	0.933	51	0,0814	052	92	504	1	667	8	1230
B9	2178	318	1091	2	30	-8	-375	0.064	0.00	0.0	0.0	0.602	8.	1	7	34,3	0.00	0.0	
								8	23	0.266	15	0,0291	013	28	185.0	0	239	2	750
B10	2967	237	1524	2	38	-2	-1900	0.139	0.00	0.0	0.0	0.900	2	3	5	19,1	0.00	0.0	
								0	39	1.003	71	0,0521	034	38	327	1	701	7	2222
B11	266	510	209	1	2	28	7	0.125	0.00	0.1	0.0	0.485	6	2	4	3,33	0.01	0.0	
								4	38	5.24	4	0,3	12	33	1690	2	1858	4	2042
B12	887	716	332	2	2	-25	-8	0.104	0.00	0.0	0.0	0.622	4	2	3	3,94	0.00	0.0	
								1	23	3.719	99	0,2538	083	24	1458	3	1574	1	1704
B13	685	164	284	2	4	-11	-36		0.056	0.00	0.0	0.071	1	1	0	15,0	0.00	0.0	
								3	26	0.514	23	0,0663	019	249	414	1	420	5	440
B14	1947	320	450	4	13	18	72	0.076	0.00	0.0	0.0	0.862	2	3	9	12,7	0.00	0.0	
								4	33	0.817	65	0,0787	040	19	488	4	620	2	1092

B16	503	559	349	1	8	4	200	0.082	0.00	2.086	77	0,1841	0.067	68	1089	3	2	6	5,43	0.00	0.0827	0.0			
								7	27														0.057	0.00	0.0
B17	281	189	238	1	-8	-21	38	8	27	0.699	30	0,0888	0.028	7	548	6	536	8	509	5	29	6126	28	0.0578	0.027
								0.135	0.00																
B18	266	401	157	2	27	-3	-900	6	55	6.45	4	0,349	16	35	1928	6	2042	5	2162	9	10	2,86	0.01	0.1356	0.055
								0.069	0.00																
B20	655	180	201	3	4	0	#DIV/0!	5	28	1.028	50	0,1079	0.036	34	660	1	715	5	906	2	22	9,26	0.00	0.0695	0.028
								0.120	0.00																
B23	1108	589	1014	1	33	-17	-194	3	47	1.72	7	0,1029	0.097	53	630	7	1004	8	1969	5	68	8173	97	0.1203	0.047
								0.061	0.00																
B25	386	234	306	1	3	-6	-50	5	28	0.715	38	0,0862	0.030	97	533	8	545	3	653	4	58	0093	30	0.0615	0.028
								0.074	0.00																
B30	264	202	135	2	-10	-20	50	3	25	1.960	64	0,1907	0.051	82	1125	8	1100	2	1049	1	-11	3838	51	0.0743	0.025
								0.057	0.00																
B32	1100	145	298	6	1	18	6	4	28	0.496	30	0,0637	0.022	48	398	3	407	1	480	0	16	15,6	0.00	0.0574	0.028
								0.058	0.00																
B34	539	255	505	2	10	-44	-23	2	30	0.511	23	0,0672	0.026	73	419	6	419	5	510	0	34	14,8	0.00	0.0582	0.030
								0.085	0.00																
B36	2680	1151	1580	2	58	28	207	3	29	1.08	2	0,0939	0.088	89	577	2	733	0	1315	4	56	4963	88	0.0853	0.029

Sample Name 14TM-09	cPb Pb/Hg*100 > 25 AND 204Pb>100 cps	Discordance >10%	U (ppm) >1400
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				cPb			uncorrected ratios							uncorrected ages							inversed conc.					
Run name	U (ppm)	Pb (ppm)	Th (ppm)	U/Th	204 Pb	202 Hg	Pb/Hg *100	207Pb/206Pb	2SE	207Pb/235U	2S E	206Pb/238U	2SE	error corr.	206Pb/238U	+ -	207Pb/235U	+ -	207Pb/206Pb	+ -	disc %	238/206	2 sigma a	207Pb/206Pb	2 sigma ma	
C7	823	281	560	1	-12	-30	40	0.0549	031	0.436	88	0,0593	081	5	371	5	371	7	400	2	-4	16,86341	0.0081	0.0549	0.0031	
C11	267	293	136	2	-2	-7	29	0.1044	051	3.90	7	0,272	37	93	1550	9	1620	5	1716	8	6	9	3,676471	0.037	0.1044	0.0051
C14	435	245	327	1	-10	10	-100	0.0602	037	0.71	4	0,087	12	674	539	7	546	9	590	4	-4	11,49425	0.012	0.0602	0.0037	
C16	504	780	290	2	8	-28	-29	0.1126	061	4.91	8	0,319	44	67	1780	1	1810	0	1830	0	3	3,134796	0.044	0.1126	0.0061	
C17	314	879	244	1	12	-5	-240	0.187	10	12.3	2.5	0,48	66	6	2520	2	2630	1	2720	8	6	8	2,083333	0.066	0.187	0.010
C18	531	362	341	1	7	-19	-37	0.0646	037	0.91	8	0,102	14	27	625	8	658	9	740	2	1	9,803922	0.014	0.0646	0.0037	

C19	651	301	136	4	-17	-42	40	0.0909	0.0 047	3.20	0.6 4	0.0 0.252	0.428 34 75	1450	1 8 0	1450	1 5 0	1450	1 0 0	-1	3,968 254	0.03 4	0.0909	0.00 47
C20	58	190	63	1	2	-11	-18	0.1060	0.0 061	4.75	0.9 5	0.0 0.316	0.158 43 6	1770	2 2 0	1780	6 0 0	1720	0 0 0	-1	3,164 557	0.04 3	0.1060	0.00 61
C21	352	296	134	2	2	9	22	0.0920	0.0 045	3.24	0.6 4	0.0 0.253	0.295 34 34	1450	8 0 1	1470	5 0 1	1470	9 0 0	1	3,952 569	0.03 4	0.0920	0.00 45
C22	280	279	148	2	1	21	5	0.0833	0.0 049	2.41	0.4 8	0.0 0.207	0.234 28 17	1210	5 0 2	1250	3 0 1	1260	1 0 0	5	4,830 918	0.02 8	0.0833	0.00 49
C23	111	189	49	2	6	-36	-17	0.1915	0.0 089	12.9	2.5	0.0 0.481	0.258 65 64	2530	8 0 2	2670	9 0 1	2755	7 8 8	7	2,079 002	0.06 5	0.1915	0.00 89
C26	1148	349	99	11	11	8	138	0.1547	0.0 074	8.7	1.7	0.0 0.404	0.200 55 61	2190	5 0 1	2310	8 0 1	2394	8 1 1	9	2,475 248	0.05 5	0.1547	0.00 74
C29	217	228	105	2	-13	-7	186	0.0852	0.0 046	2.81	0.5 6	0.0 0.232	0.457 32 78	1340	7 0 1	1350	5 0 1	1330	1 0 0	-4	4,310 345	0.03 2	0.0852	0.00 46
C31	304	978	354	1	-8	-28	29	0.0950	0.0 048	3.73	0.7 4	0.0 0.276	0.194 37 46	1570	9 0 1	1580	6 0 1	1539	9 6 1	-4	3,623 188	0.03 7	0.0950	0.00 48
C32	357	529	211	2	7	8	88	0.0950	0.0 056	3.19	0.6 4	0.0 0.245	0.544 33 83	1410	7 0 3	1460	6 0 1	1520	1 0 0	8	4,081 633	0.03 3	0.0950	0.00 56
C33	360	635	123	3	-9	-1	900	0.1954	0.0 091	14.8	2.9	0.0 0.54	0.324 73 01	2780	0 2 1	2800	0 1 7	2792	7 2 8	-1	1,851 852	0.07 3	0.1954	0.00 91
C34	194	194	61	3	6	-4	-150	0.1015	0.0 050	4.34	0.8 6	0.0 0.306	0.511 41 17	1720	1 0 2	1700	7 0 2	1663	8 3 3	-3	3,267 974	0.04 1	0.1015	0.00 50
C36	222	354	76	3	-8	-2	400	0.1592	0.0 078	10.2	2.0	0.0 0.461	0.433 62 16	2440	8 0 2	2460	0 0 1	2444	8 2 0	0	2,169 197	0.06 2	0.1592	0.00 78
C39	635	576	188	3	3	-4	-75	0.1013	0.0 045	4.28	0.8 5	0.0 0.304	0.784 41 57	1710	0 0 1	1690	6 0 1	1646	8 3 1	-3	3,289 474	0.04 1	0.1013	0.00 45
C43	754	1170	587	1	12	-7	-171	0.0907	0.0 044	2.78	0.5 5	0.0 0.221	0.527 30 21	1290	6 0 1	1350	4 0 1	1447	9 8 1	9	4,524 887	0.03 0	0.0907	0.00 44
C46	502	231	137	3	11	-12	-92	0.0752	0.0 037	1.60	0.3 4	0.0 0.157	0.930 25 38	930	4 0 2	950	4 0 1	1060	0 0 1	8	6,369 427	0.02 5	0.0752	0.00 37
C47	93	180	59	2	5	10	50	0.1119	0.0 071	4.8	1.0	0.0 0.311	0.821 49 05	1740	4 0 2	1770	7 0 1	1810	1 0 0	5	3,215 434	0.04 9	0.1119	0.00 71
C48	137	116	29	4	3	1	300	0.1101	0.0 054	5.5	1.1	0.0 0.36	0.473 49 97	1980	3 0 0	1890	7 0 0	1794	8 8 -10		2,777 778	0.04 9	0.1101	0.00 54

C49	282	530	130	2	13	8	163	0.1538	0.0 072	9.8	1.9	0,457	0.0 62	0.664 96	2420	2 8 0	1 8 0	2391	8 2 -1	2,188 184	0.06 2	0.1538	0.00 72
C51	474	64	53	8	14	-24	-58	0.0676	0.0 035	1.23	0.2 4	0,133	0.0 18	0.372 37	800	0 0 1	1 1 0	850	0 0 2	7,518 797	0.01 8	0.0676	0.00 35
C55	73	61	21	3	-9	3	-300	0.0899	0.0 070	3.17	0.6 4	0,261	0.0 36	0.065 085	1490	0 2 2	1440 1 8	1420	0 1 9	3,831 418	0.03 6	0.0899	0.00 70
C59	203	243	78	2	-7	-29	24	0.1183	0.0 061	5.4	1.1	0,334	0.0 45	0.357 76	1860	0 2 1	1880 8 1	1921	4 9 4	2,994 012	0.04 5	0.1183	0.00 61
C60	327	517	213	1	-1	-18	6	0.0941	0.0 050	3.36	0.6 7	0,26	0.0 35	0.436 08	1490	0 2 2	1500 1 7	1531	0 9 1	3,846 154	0.03 5	0.0941	0.00 50
C61	184	328	114	1	-3	-5	60	0.1052	0.0 054	4.90	0.9 7	0,335	0.0 45	0.389 43	1860	0 2 1	1800 3 1	1722	9 9 -8	2,985 075	0.04 5	0.1052	0.00 54
C63	599	178	115	5	6	10	60	0.0726	0.0 033	1.71	0.3 4	0,17	0.0 23	0.747 67	1010	0 2 2	1010 1 7	1000	2 9 -4	5,882 353	0.02 3	0.0726	0.00 33
C66	146	20	6	25	-8	18	-44	0.1139	0.0 056	5.2	1.0	0,335	0.0 45	0.432 1	1860	0 3 2	1850 1 8	1852	0 7 9	2,985 075	0.04 5	0.1139	0.00 56
C68	118	179	44	3	-10	-2	500	0.211	0.0 10	16.6	3.3	0,571	0.0 77	0.483 1	2910	0 2 2	2920 1 7	2910	7 7 0	1,751 313	0.07 7	0.211	0.01 0
C70	245	230	91	3	-1	-11	9	0.1169	0.0 056	5.4	1.1	0,331	0.0 45	0.317 33	1840	0 3 0	1880 1 9	1905	7 1 2	3,021 148	0.04 5	0.1169	0.00 56
C71	72	213	62	1	4	18	22	0.1817	0.0 091	13.0	2.6	0,514	0.0 70	0.616 39	2670	0 2 4	2670 1 8	2675	9 0 7	1,945 525	0.07 0	0.1817	0.00 91
C72	350	409	171	2	37	162	23	0.1264	0.0 062	6.3	1.2	0,36	0.0 49	0.770 82	1980	0 2 0	2010 1 6	2056	9 1 9	2,777 778	0.04 9	0.1264	0.00 62
C73	196	264	133	2	11	-17	-65	0.1026	0.0 050	4.03	0.8 0	0,292	0.0 40	0.545 43	1650	0 1 0	1640 1 1	1667	1 1 0	3,424 658	0.04 0	0.1026	0.00 50
C74	412	68	58	8	-16	-9	178	0.0688	0.0 035	1.25	0.2 5	0,131	0.0 18	0.373 77	800	0 2 0	830 1 6	880	0 1 9	7,633 588	0.01 8	0.0688	0.00 35
C75	143	185	97	2	4	3	133	0.1052	0.0 054	4.42	0.8 8	0,3	0.0 40	0.281 11	1690	0 3 1	1720 1 9	1704	5 1 7	3,333 333	0.04 0	0.1052	0.00 54
C76	77	82	27	3	-6	33	-18	0.1931	0.0 093	13.8	2.8	0,523	0.0 72	0.626 11	2710	0 3 0	2730 1 9	2769	5 1 8	1,912 046	0.07 2	0.1931	0.00 93
C79	110	155	54	2	5	6	83	0.1752	0.0 089	13.4	2.7	0,531	0.0 72	0.371 65	2740	0 0 0	2710 0 8	2601	5 5 -5	1,883 239	0.07 2	0.1752	0.00 89

C80	234	122	176	2	1	6	17	0.0662	0.0 047	1.07	0.2 2	0.0 16	0.455 91	709	9 2	740	1 0	790	1 0	-9	8,620 69	0.01 6	0.0662	0.00 47
C81	145	36	29	5	12	-15	-80	0.0788	0.0 046	2.18	0.4 4	0.0 27	0.390 88	1160	4 0	1180	4 0	1150	2 0	-10	5,076 142	0.02 7	0.0788	0.00 46
C82	255	157	105	3	-3	-68	4	0.0919	0.0 054	3.23	0.6 6	0.0 35	0.696 92	1440	8 0	1460	6 0	1470	2 0	3	4 5	0.03	0.0919	0.00 54
C85	497	190	159	3	-15	-13	115	0.0847	0.0 041	2.51	0.5 0	0.0 28	0.495 35	1210	5 0	1270	4 0	1310	0 0	7	4,830 918	0.02 8	0.0847	0.00 41

Discordant																									
C1	3244	827	3483	1	48	9	533	0.0670	0.0	0.265	0.0	0.0293	0.0	0.643	186	2	238	4	820	1	76	34,12	0.00	0.0670	0.00
									045		54		041	86		6		3		0		4	969		41
C2	632	1012	460	2	6	-10	-60	0.198	0.0	10.5	2.4	0.385	0.0	0.965	2080	3	2420	2	2799	8	25	2,597	0.06	0.198	0.01
									10		2.4		64	61		0		5		0		5	403		4
C3	1605	462	350	5	6	8	75	0.0934	0.0	2.16	0.4	0.169	0.0	0.842	1000	1	1170	1	1492	9	33	5,917	0.02	0.0934	0.00
									045		3		24	19		0		5		0		3	16		4
C4	446	109	212	2	12	17	71	0.0561	0.0	0.454	0.0	0.059	0.0	0.031	369	4	383	6	450	7	64	16,94	0.00	0.0561	0.00
									043		94		080	283		9		2		0		2	915		80
C5	722	183	478	2	-9	29	-31	0.1263	0.0	1.52	0.3	0.088	0.0	0.945	540	9	920	4	2030	1	73	11,36	0.01	0.1263	0.00
									081		7		16	48		5		0		0		1	364		6
C6	783	643	328	3	10	27	37	0.1198	0.0	2.66	0.5	0.17	0.0	0.940	1010	4	1330	4	1947	8	47	5,882	0.02	0.1198	0.00
									059		7		25	6		0		0		0		1	353		5
C8	541	779	369	1	3	1	300	0.1104	0.0	3.91	0.7	0.26	0.0	0.456	1490	8	1610	6	1811	8	17	3,846	0.03	0.1104	0.00
									051		7		35	07		0		0		0		8	8		154
C9	1736	550	1711	1	46	22	209	0.0732	0.0	0.370	0.0	0.0362	0.0	0.681	229	3	319	5	1010	2	76	27,62	0.00	0.0732	0.00
									042		75		051	59		2		6		0		1	431		51
C10	1637	391	1091	1	7	15	47	0.0638	0.0	0.360	0.0	0.0427	0.0	0.888	269	4	314	5	730	1	61	23,41	0.00	0.0638	0.00
									036		76		065	83		0		4		0		1	92		65
C12	775	841	839	1	27	-25	-108	0.2018	0.0	5.8	1.2	0.208	0.0	0.936	1210	1	1960	1	2837	8	57	4,807	0.03	0.2018	0.00
									099		1.2		31	88		0		8		0		1	692		1
C13	1457	299	463	3	16	-6	-267	0.0893	0.0	0.96	0.1	0.078	0.0	0.458	486	6	682	9	1400	1	65	12,82	0.01	0.0893	0.00
									050		9		11	64		4		9		0		1	051		1
C15	368	468	188	2	2	20	10	0.1223	0.0	4.63	0.9	0.27	0.0	0.687	1540	1	1760	1	1985	8	22	3,703	0.03	0.1223	0.00
									059		2		37	85		0		6		0		5	704		7

C24	2347	312	775	3	31	17	182	0.0616	0.0 029	0.53	0.1 1	0,0615	0.0 084	0.805 14	384	5 1	434	7 0	670	1 0	43	16,26 016	0.00 84	0.0616	0.00 29
C25	422	127	174	2	3	9	33	0.0615	0.0 035	0.60	0.1 2	0,0691	0.0 093	0.240 39	431	5 6	478	7 7	700	1 0	35	14,47 178	0.00 93	0.0615	0.00 35
C27	494	635	388	1	61	18	339	0.134	0.0 10	2.08	0.4 3	0,115	0.0 16	0.398 34	700	9 2	1140	4 0	2120	3 0	66	8,695 652	0.01 6	0.134	0.01 0
C28	939	321	225	4	10	-39	-26	0.0768	0.0 039	0.95	0.2 0	0,091	0.0 15	0.917 32	560	8 5	670	0 0	1120	1 0	48	10,98 901	0.01 5	0.0768	0.00 39
C30	1557	514	672	2	40	6	667	0.0591	0.0 033	0.57	0.1 2	0,0699	0.0 096	0.702 89	435	5 8	460	7 5	580	2 0	16	14,30 615	0.00 96	0.0591	0.00 33
C35	1295	833	738	2	43	64	67	0.0989	0.0 048	1.88	0.3 8	0,135	0.0 19	0.596 54	820	1 0	1070	1 0	1598	9 1	50	7,407 407	0.01 9	0.0989	0.00 48
C37	940	460	190	4	1	-19	-5	0.0905	0.0 049	2.69	0.5 4	0,216	0.0 30	0.347 88	1260	6 0	1330	4 0	1442	9 6	12	4,629 63	0.03 0	0.0905	0.00 49
C38	972	255	388	2	6	-1	-600	0.0555	0.0 040	0.474	0.0 96	0,0609	0.0 087	0.215 7	381	5 3	393	6 6	400	6 0	28	16,42 036	0.00 87	0.0555	0.00 40
C40	413	863	279	1	-7	-11	64	0.0915	0.0 052	3.94	0.7 9	0,311	0.0 42	0.329 96	1750	1 0	1620	6 0	1450	1 0	-19	3,215 434	0.04 2	0.0915	0.00 52
C41	1280	298	380	3	5	1	500	0.0531	0.0 032	0.52	0.1 1	0,0704	0.0 095	0.478 44	438	5 7	424	6 8	310	3 0	59	14,20 455	0.00 95	0.0531	0.00 32
C42	135	88	85	2	5	-24	-21	0.0697	0.0 053	0.84	0.1 8	0,086	0.0 13	0.623 86	529	7 6	613	9 9	890	7 0	41	11,62 791	0.01 3	0.0697	0.00 53
C44	77	246	43	1	10	28	36	0.1679	0.0 084	13.1	2.6	0,558	0.0 76	0.598 62	2860	3 2	2700	1 0	2531	7 5	-14	1,792 115	0.07 6	0.1679	0.00 84
C45	113	269	80	1	-9	-27	33	0.1019	0.0 049	4.84	0.9 6	0,346	0.0 47	0.398 12	1910	2 0	1790	7 0	1655	9 2	-16	2,890 173	0.04 7	0.1019	0.00 49
C50	290	152	78	3	18	-18	-100	0.0718	0.0 037	1.93	0.3 8	0,191	0.0 26	0.034 777	1130	4 0	1090	4 0	970	0 0	-19	5,235 602	0.02 6	0.0718	0.00 37
C52	160	91	50	3	-12	-29	41	0.0677	0.0 036	1.70	0.3 4	0,18	0.0 24	0.152 77	1060	1 0	1010	1 0	860	1 0	-43	5,555 556	0.02 4	0.0677	0.00 36
C53	64	28	15	4	9	10	90	0.0697	0.0 054	1.84	0.3 8	0,185	0.0 26	0.238 74	1090	4 0	1050	4 0	940	6 0	-25	5,405 405	0.02 6	0.0697	0.00 54
C54	95	238	152	1	-17	-23	74	0.152	0.0 11	5.9	1.4	0,274	0.0 45	0.841 3	1550	3 0	1930	1 0	2350	2 0	35	3,649 635	0.04 5	0.152	0.01 1

C56	285	133	221	1	-2	4	-50	0.0552	0.0	0.437	0.0	0.0552	0.0	0.0552	364	4	6	1	17,21	0.00	0.00	0.00
									040		89	0,0581	079	902		8	2	5	17	79	0.0552	40
																1	1	0				
C57	465	174	94	4	18	-16	-113	0.0845	0.0	2.09	0.4	0.0845	0.0	0.813	1060	4	4	9	5,617	0.02	0.00	0.00
									042		3	0,178	25	01		0	0	8	978	5	0.0845	42
																1	1	1				
C58	148	112	59	2	4	20	20	0.0744	0.0	1.99	0.4	0.0744	0.0	0,008	1130	4	4	5	5,235	0.02	0.00	0.00
									058		1	0,191	26	789		0	0	0	602	6	0.0744	58
																1	1	1				
C62	304	276	142	2	1	12	8	0.0768	0.0		0.4	0.0768	0.0	0.339	1260	6	4	1	4,629	0.02	0.00	0.00
									047		6	0,216	29	16		0	0	0	63	9	0.0768	47
																1	1	1				
C64	414	109	66	6	-1	39	-3	0.0882	0.0	1.77	0.3	0.0882	0.0	0.794	900	2	3	9	6,666	0.02	0.00	0.00
									046		6	0,15	21	1		0	0	3	667	1	0.0882	46
																		1				
C65	2796	1148	4674	1	452	41	1102	0.203	0.0	1.33	0.3	0.203	0.0	0.696	299	5	3	4	21,05	0.00	0.01	0.01
									19		2	0,0475	086	5		3	0	0	263	86	0.203	9
																		1				
C67	455	276	349	1	-3	3	-100	0.0629	0.0	0.83	0.1	0.0629	0.0	0.457	595	7	9	9	10,30	0.01	0.00	0.00
									057		8	0,097	13	64		9	8	0	928	3	0.0629	57
																		1				
C69	1182	109	350	4	9	-7	-129	0.0689	0.0	0.272	0.0	0.0689	0.0	0.456	183	2	4	2	34,72	0.00	0.00	0.00
									037		54	0,0288	039	18		5	3	0	222	39	0.0689	37
																1	1	2				
C77	309	154	98	4	6	20	30	0.1256	0.0	4.50	0.9	0.1256	0.0	0.803	1490	8	9	8	3,831	0.03	0.00	0.00
									060		0	0,261	36	21		0	0	5	418	6	0.1256	60
																1	1	1				
C78	785	436	491	2	4	-23	-17	0.1518	0.0	5.3	1.1	0.1518	0.0	0.903	1420	9	8	8	4,048	0.03	0.00	0.00
									075		1.1	0,247	37	57		0	0	9	583	7	0.1518	75
																1	1	1				
C83	1311	163	84	17	74	1	7400	0.1048	0.0	2.25	0.4	0.1048	0.0	0.459	910	2	4	3	6,622	0.02	0.00	0.00
									064		6	0,151	21	7		0	0	0	517	1	0.1048	64
																		1				
C84	1833	456	3798	1	32	-7	-457	0.0697	0.0	0.220	0.0	0.0697	0.0	0.731	139	2	3	3	45,87	0.00	0.00	0.00
									042		45	0,0218	032	14		0	8	0	156	32	0.0697	42
									0.0		0.1		0.0	0.924		2	7	7	49,01	0.00	0.00	0.00
C86	2731	289	1035	3	128	-5	-2560	0.1786	0.0	0.51	1	0,0204	032	34	130	0	2	9	961	32	0.1786	85
									085		1		032	34		0	418	2	2637	9		

Sample Name	cPb Pb/Hg*100 > 25 AND 204Pb>100 cps	Discordance >10%	U (ppm)
14TM-17B			>1400

					cPb			uncorrected ratios						uncorrected ages							inversed conc.				
Run	U	Pb	Th		204	202	Pb/Hg	207Pb/2		2S	206Pb/			206Pb/	+	207Pb/	+	207Pb/2	+	disc	238/	2	207Pb/2	2sig	
name	(ppm)	(ppm)	(ppm)	U/Th	Pb	Hg	*100	06Pb	2SE	E	238U	2SE	corr.	238U	-	235U	-	06Pb	-	%	206	sigma	06Pb	ma	
D4	571	111	61	5	9	25	36	0.0704	0.0	0.18	1.603	45	0.1637	065	21	976	3	974	1	940	5	-7	6,108	0.00	0.00
																						735	65	0.0704	18

D5	467	32	27	9	4	-2	-200	0.0588	0.0	0.0	0.0	0.370	1	1	7	11,04	0.00	0.00							
									020	0.736	25	0,0905	024	75	559	4	559	4	543	2	-8	972	24	0.0588	20
									0.0	0.4	0.0	0.784	7	3	3	2,061	0.01	0.00							
D7	313	465	95	1	2	-30	-7	0.1727	038	11.64	3	0,485	17	11	2563	9	2573	4	2581	7	0	856	7	0.1727	38
									0.0	0.1	0.0	0.281	4	2	4	2,940	0.00	0.00							
									030	5.34	2	0,3401	089	02	1887	3	1877	0	1826	6	-5	312	89	0.1117	30
D8	256	304	80	1	17	26	65	0.1117	0.0	0.1	0.0	0.777	4	3	4	3,672	0.00	0.00							
									020	3.66	4	0,2723	091	91	1551	6	1562	1	1549	1	-2	42	91	0.0960	20
									0.0	0.1	0.0	0.477	3	3	6	3,736	0.00	0.00							
D9	324	801	278	1	0	21	0	0.0960	033	3.42	3	0,2676	076	88	1528	9	1510	0	1450	9	-7	921	76	0.0919	33
									0.0	0.0	0.0	0.672	6	1	5	3,278	0.01	0.00							
									029	4.111	89	0,305	12	5	1713	1	1656	8	1580	5	-8	689	2	0.0980	29
D11	207	253	84	1	12	12	100	0.0919	0.0	0.1	0.0	0.612	5	3	5	3,225	0.01	0.00							
									0.0	0.0	0.0	0.612	5	3	5	3,225	0.01	0.00							
									0.0	0.1	0.0	0.612	5	3	5	3,225	0.01	0.00							
D12	581	504	182	1	-6	-5	120	0.0980	031	4.42	8	0,31	11	21	1741	4	1721	1	1654	7	-7	806	1	0.1005	31
									0.0	0.2	0.0	0.167	6	4	0	2,873	0.01	0.00							
									061	5.22	7	0,348	14	68	1935	4	1850	5	1760	0	-6	563	4	0.1089	61
D15	67	239	75	0	0	2	0	0.1089	0.0	0.0	0.0	0.310	2	2	5	5,159	0.00	0.00							
									0.0	0.0	0.0	0.310	2	2	5	5,159	0.00	0.00							
									0.0	0.0	0.0	0.310	2	2	5	5,159	0.00	0.00							
D16	540	188	99	2	1	28	4	0.0748	022	1.958	57	0,1938	054	17	1141	9	1103	1	1063	7	-9	959	54	0.0748	22
									0.0	0.0	0.0	0.350	4	1	5	3,484	0.00	0.00							
									0.0	0.0	0.0	0.350	4	1	5	3,484	0.00	0.00							
D18	200	477	163	1	2	-6	-33	0.0993	029	3.907	82	0,287	084	9	1626	2	1614	7	1624	5	-1	321	84	0.0993	29
									0.0	0.9	0.0	0.845	2	1	8	3,311	0.04	0.00							
									0.0	0.9	0.0	0.845	2	1	8	3,311	0.04	0.00							
D23	209	317	154	3	11	20	55	0.1059	048	4.38	0	0,302	44	26	1700	0	1700	0	1732	6	3	258	4	0.1059	48
									0.0	0.4	0.0	0.415	1	1	4	5,434	0.02	0.00							
									0.0	0.4	0.0	0.415	1	1	4	5,434	0.02	0.00							
D29	219	122	70	6	5	-1	-500	0.0793	052	2.02	2	0,184	27	53	1090	0	1130	0	1180	0	6	783	7	0.0793	52
									0.0	0.4	0.0	0.415	1	1	4	5,434	0.02	0.00							
									0.0	0.4	0.0	0.415	1	1	4	5,434	0.02	0.00							
D33	219	122	70	6	5	-1	-500	0.0793	052	2.02	2	0,184	27	53	1090	0	1130	0	1180	0	6	783	7	0.0793	52
									0.0	0.4	0.0	0.415	1	1	4	5,434	0.02	0.00							
									0.0	0.4	0.0	0.415	1	1	4	5,434	0.02	0.00							

Discordant																									
D1	803	582	380	1	8	21	38	0.1111	034	3.06	1	0,1952	063	1	1149	4	1419	8	1821	3	37	5,122	0.00	0.1111	0.00
									0.0		0.0		0.0	0.200		1		1			9	13,10	0.00		0.00
D2	663	203	230	2	3	-6	-50	0.0567	024	0.589	20	0,0763	024	29	474	4	470	3	441	0	37	616	24	0.0567	24
									0.0		0.1		0.0	0.662		3		4			8	8,944	0.00		0.00
D3	479	549	280	1	14	3	467	0.1022	044	1.59	0	0,1118	055	63	688	3	960	0	1647	0	58	544	55	0.1022	44
																					1				
D6	1911	602	1119	1	52	36	144	0.0817	062	0.381	43	0,0335	031	64	212	9	331	3	1190	0	82	29,85	0.00		0.00
									0.0		0.1		0.0	0.368		4		2			6	075	31	0.0817	62
D10	137	230	75	1	2	-5	-40	0.0953	033	3.94	4	0,3001	091	34	1691	5	1623	8	1530	2	-12	3,332	0.00		0.00
																						223	91	0.0953	33
																					1				
D13	518	271	360	1	6	17	35	0.0625	047	0.625	50	0,0736	035	37	458	1	496	0	700	0	55	13,58	0.00		0.00
									0.0		0.0		0.0	0.697		1		2			7	696	35	0.0625	47
D14	1742	706	692	1	50	38	132	0.1127	030	1.280	46	0,0802	022	32	497	3	835	0	1846	1	73	12,46	0.00		0.00
									0.0		0.1		0.0	0.889		6		5			5	883	22	0.1127	30
D17	264	244	116	1	16	-4	-400	0.1076	036	2.79	8	0,197	12	56	1155	6	1376	1	1751	0	34	5,076	0.01		0.00
									0.0		0.1		0.0	0.914		6		4			6	142	2	0.1076	36
D19	1187	333	218	2	46	69	67	0.0768	024	1.57	2	0,149	12	57	891	8	974	2	1109	3	19	6,711	0.01		0.00
									0.0		0.0		0.0	0.710		4		2			6	409	2	0.0768	24
D20	614	293	195	1	18	-34	-53	0.0821	027	1.830	73	0,1633	074	9	975	1	1054	6	1240	5	22	6,123	0.00		0.00
																						699	74	0.0821	27

D21	371	416	157	1	8	2	400	0.1110	0.0	0.1	0.0	0.808	5	3	6	5,263	0.01	0.00
									038									
D22	369	96	57	3	1	-6	-17	0.0704	0.0	0.0	0.0	0.300	3	2	7	6,020	0.00	0.00
									023									
D25	290	84	161	4	4	-46	-9	0.0567	0.0	0.1	0.0	0.252	6	7	8	14,70	0.01	0.00
									048									
D26	1292	955	1705	2	33	-22	-150	0.0824	0.0	0.1	0.0	0.785	5	8	9	17,57	0.00	0.00
									041									
D27	442	405	205	5	37	27	137	0.0992	0.0	0.7	0.0	0.816	0	8	2	4,694	0.03	0.00
									067									
D28	161	154	81	5	12	7	171	0.1717	0.0	0.0	0.0	0.885	5	0	2	3,745	0.04	0.00
									099									
D30	246	54	97	5	7	24	29	0.0560	0.0	0.1	0.0	0.271	6	7	4	14,08	0.01	0.00
									035									
D31	2040	412	1450	3	34	97	35	0.0650	0.0	0.0	0.0	0.884	3	4	2	33,44	0.00	0.00
									037									
D32	650	361	1028	2	3	11	27	0.104	0.0	0.3	0.0	0.165	1	1	8	16,66	0.01	0.04
									46									
D34	3074	662	4095	1	96	48	200	0.1204	0.0	0.1	0.0	0.894	5	1	8	18,18	0.00	0.00
									061									

Sample Name	cPb Pb/Hg*100 > 25 AND 204Pb>100 cps	Discordance >10%	U (ppm)
14TM-17B			>1400

					cPb			uncorrected ratios						uncorrected ages							inversed conc.				
Run name	U (ppm)	Pb (ppm)	Th (ppm)	U/Th	204 Pb	202 Hg	Pb/Hg *100	207Pb/206Pb	2SE	207Pb/235U	2S E	206Pb/238U	2SE	error corr.	206Pb/238U	+ -	207Pb/235U	+ -	207Pb/206Pb	+ -	disc .%	238/206	sigma	207Pb/206Pb	2sigma
E12	503	151	356	2	8	-12	-67	0.0550	0.029	0.346	72	0,0482	0.070	0.58009	304	43	303	58	400	0	7	20,74689	0.0070	0.0550	0.0029
E25	2593	103	206	26	-13	7	-186	0.0531	0.026	0.348	73	0,0477	0.073	0.85044	300	45	303	55	330	0	1	20,96436	0.0073	0.0531	0.0026

Discordant																											
																		1									
E1	1041	386	545	3	16	16	100	0.0811	0.036	1.07	2	0.103	0.15	0.892	633	9	740	1	0	1222	8	9	48	9,708	0.01	0.00	
																								738	5	0.0811	36

E2	361	34	98	6	-5	11	-45	0.0526	0.0	0.323	0.0	0.0486	0.0	0.559	306	4	283	5	1	300	5	64	20,57	0.00	0.0526	0.00
									037		68		069	77		2		2	0		613		69	37		
E3	454	172	155	4	17	26	65	0.0812	0.0	1.67	0.3	0,16	0.0	0.402	960	3	1000	3	9	1233	4	22	6,25	0.02	0.0812	0.00
									037		4		23	58		0		0	4		3		6,25	3		37
E4	170	217	127	2	12	-12	-100	0.1017	0.0	3.03	0.6	0,234	0.0	0.412	1350	8	1410	6	9	1650	0	16	4,273	0.03	0.1017	0.00
									050		2		34	14		0		0	0		504		4	50		
E5	242	540	338	1	0	-17	0	0.0961	0.0	2.53	0.5	0,204	0.0	0.389	1200	6	1280	5	9	1545	2	22	4,901	0.02	0.0961	0.00
									048		2		29	47		0		0	2		961		9	48		
E6	227	27	38	10	-16	-7	229	0.0669	0.0	0.85	0.1	0,101	0.0	0.572	619	8	620	0	3	860	0	23	9,900	0.01	0.0669	0.00
									042		8		15	89		7		0	0		99		5	42		
E7	447	151	244	3	5	-6	-83	0.0600	0.0	0.60	0.1	0,078	0.0	0.274	484	6	478	7	1	620	0	15	12,82	0.01	0.0600	0.00
									030		2		11	43		6		8	1		051		1	30		
E8	250	140	117	3	18	60	30	0.1332	0.0	3.65	0.8	0,216	0.0	0.872	1250	2	1540	2	1	2120	2	43	4,629	0.03	0.1332	0.00
									090		6		37	74		0		0	0		63		7	90		
E9	425	512	396	2	24	21	114	0.0975	0.0	1.81	0.3	0,149	0.0	0.835	890	2	1040	4	9	1570	6	43	6,711	0.02	0.0975	0.00
									050		8		22	42		0		0	1		409		2	50		
E10	71	42	18	7	-5	3	-167	0.1861	0.0	7.5	1.5	0,319	0.0	0.426	1790	3	2170	8	7	2707	7	34	3,134	0.04	0.1861	0.00
									087		1.5		48	25		0		0	1		796		8	87		
E11	506	131	278	3	26	32	81	0.0971	0.0	1.16	0.2	0,094	0.0	0.761	580	8	780	1	1	1560	0	62	10,63	0.01	0.0971	0.00
									055		4		14	94		0		0	1		83		4	55		
E13	695	105	297	5	17	15	113	0.0946	0.0	0.76	0.1	0,063	0.0	0.959	391	7	570	1	0	1510	0	74	15,87	0.01	0.0946	0.00
									051		9		12	92		5		0	1		302		2	51		
E14	182	36	115	3	4	7	57	0.0479	0.0	0.197	0.0	0,0314	0.0	0.310	199	2	182	3	3	100	0	119	31,84	0.00	0.0479	0.00
									030		41		045	73		8		5	0		713		45	30		
E15	236	88	111	4	18	-46	-39	0.0630	0.0	0.69	0.1	0,084	0.0	0.443	521	7	533	8	2	710	0	21	11,90	0.01	0.0630	0.00
									033		4		12	21		3		7	0		476		2	33		
E16	174	16	41	9	10	30	33	0.0792	0.0	0.61	0.1	0,072	0.0	0.814	440	1	500	2	4	1270	0	76	13,88	0.01	0.0792	0.00
									070		7		19	33		0		0	2		889		9	70		
E17	295	31	90	6	16	16	100	0.0589	0.0	0.227	0.0	0,03	0.0	0.098	191	2	207	4	1	520	0	101	33,33	0.00	0.0589	0.00
									054		49		046	434		9		1	0		333		46	54		
E18	195	47	51	8	-13	22	-59	0.0743	0.0	1.04	0.2	0,107	0.0	0.575	657	9	720	1	1	1040	0	37	9,345	0.01	0.0743	0.00
									039		1		16	18		2		0	9		794		6	39		
E19	712	125	430	3	2	-24	-8	0.0440	0.0	0.172	0.0	0,0298	0.0	0.286	189	2	161	3	9	-69	9	182	33,55	0.00	0.0440	0.00
									024		36		043	35		7		1	9		705		43	24		
E20	522	94	281	4	17	9	189	0.0497	0.0	0.219	0.0	0,0334	0.0	0.797	212	3	200	4	3	210	0	111	29,94	0.00	0.0497	0.00
									055		55		051	92		2		3	0		012		51	55		

E21	206	108	148	3	2	-27	-7	0.0650	0.0 045	0.60	0.1 3	0.0 0,071	0.549 11 68	440	6 1	8 1	750	0	36	14,08 451	0.01 1	0.0650	0.00 45
E22	114	112	64	4	-3	-12	25	0.1428	0.0 069	3.93	0.8 1	0.0 0,202	0.527 29 56	1180	6 0	6 0	2264	7	48	4,950 495	0.02 9	0.1428	0.00 69
E23	856	363	469	4	18	70	26	0.0696	0.0 033	0.71	5	0,077	0.681 11 81	479	7	8 7	913	7	47	12,98 701	0.01 1	0.0696	0.00 33
E24	253	200	158	3	-11	-34	32	0.0849	0.0 039	1.35	0.2 8	0.0 0,119	0.377 17 24	727	9 6	2 0	1306	0	44	8,403 361	0.01 7	0.0849	0.00 39
E26	529	61	91	11	0	-11	0	0.0624	0.0 035	0.58	0.1 2	0.0 0,068	0.587 10 38	424	6 1	7 8	690	0	38	14,70 588	0.01 0	0.0624	0.00 35
E27	292	64	70	8	-1	-38	3	0.0739	0.0 033	0.91	0.1 9	0.0 0,091	0.300 13 13	563	7 1	9 1	1030	1	45	10,98 901	0.01 3	0.0739	0.00 33
E28	1409	53	269	9	0	7	0	0.0425	0.0 024	0.097	0.0 20	0.0 0,0164	0.470 024 06	105	5	8	-129	7	50	60,97 561	0.00 24	0.0425	0.00 24

Sample Name	cPb Pb/Hg*100 > 25 AND 204Pb>100 cps	Discordance >10%	U (ppm)
12TM-32A			>1400

					cPb			uncorrected ratios							uncorrected ages							inversed conc.			
Run name	U (ppm)	Pb (ppm)	Th (ppm)	U/Th	204 Pb	202 Hg	Pb/Hg *100	207Pb/206Pb	2SE	207Pb/235U	2S E	206Pb/238U	2SE	error corr.	206Pb/238U	+	207Pb/235U	+	207Pb/206Pb	+	disc .%	238/206	2 sigma	207Pb/206Pb	2sigma
F2	102	168	45	2	0	-19	0	0.1710	0.053	10.11	0.31	0.453	1418	0.3050.785	2407	60	32441	37	2562	64	7	2,207506	0.014	0.1710	0.0053
F6	559	2515	1249	0	6	-2	-300	0.1197	0.030	5.11	00.1	0.324	101	0.7850.501	1806	14	31839	42	1947	45	7	3,08642	0.010	0.1197	0.0030
F7	222	482	171	1	5	9	56	0.1055	0.030	4.71	60.1	0.3345	0862	0.4550.69	1859	23	31764	93	1713	36	-8	53786	0.1055	0.1055	0.0030
F8	223	328	155	1	-3	9	-33	0.0940	0.033	3.50	50.1	0.2825	07369	0.4280.69	1603	73	31529	28	1497	88	-8	3,539823	0.0073	0.0940	0.0033
F10	83	159	78	1	-3	18	-17	0.0988	0.034	3.77	70.2	0.2785	07533	0.1110.808	1583	84	31580	53	1614	09	0	66475	0.0988	0.0988	0.0034
F12	51	195	82	1	2	-6	-33	0.1171	0.058	4.81	20.6	0.306	09384	0.8080.331	1720	67	21779	92	1897	22	6	97493	0.1171	0.1171	0.0058
F14	225	394	88	2	-5	-8	63	0.3260	0.048	31.94	80.1	0.728	2004	0.3310.059	3522	43	33549	23	3596	38	2	1,373626	0.020	0.3260	0.0048
F15	290	221	133	2	-9	-31	29	0.0849	0.036	2.58	10.1	0.2267	06732	0.0590.882	1316	64	31291	13	1339	29	0	11667	0.0849	0.0849	0.0036
F17	244	110	49	5	0	-1	0	0.0971	0.049	3.49	40.1	0.2677	096882		1528	94	21522	23	1548	31	1	52596	0.0971	0.0971	0.0049
F18	43	30	20	2	5	-15	-33	0.0864	0.076	2.28	80.1	0.195	0838	0.026	1147	45	51194	86	1380	06	5	9,11577	0.0083	0.0864	0.0076

F19	55	48	26	2	-2	25	-8	0.0864	0.0	0.1	0.0	0.044	1324	3	4	1	4,384	0.00	0.00
									051	2.72	6	0,2281	067	392	2	0	042	67	0.0864
									0.0	0.0	0.0	0.013		1	1	8	9,259	0.00	0.00
F21	301	260	304	1	0	25	0	0.0626	0.0	0.0	0.0	0.382	661	5	655	8	259	25	0.0626
									0.0	0.0	0.0	0.382		3	2	5	4,488	0.00	0.00
F22	310	197	102	2	3	33	9	0.0860	0.0	0.1	0.0	0.510	1296	2	1306	5	33	61	0.0860
									0.0	0.0	0.0	0.510		4	2	5	3,347	0.00	0.00
F23	230	410	168	1	-13	21	-62	0.1031	0.0	0.2	0.0	0.792	1684	8	1670	7	841	96	0.1031
									0.0	0.0	0.0	0.792		7	4	5	3,311	0.01	0.00
F28	647	862	364	2	10	16	63	0.1072	0.0	0.0	0.0	0.725	1709	3	1692	5	258	5	0.1072
									0.0	0.0	0.0	0.725		3	2	3	4,659	0.00	0.00
F29	598	318	168	3	3	-7	-43	0.0825	0.0	0.2	0.0	0.592	1252	4	1246	0	832	65	0.0825
									0.0	0.0	0.0	0.592		5	2	2	1,960	0.01	0.00
F31	246	343	92	2	-3	32	-9	0.1694	0.0	0.4	0.0	0.434	2655	4	2590	1	784	3	0.1694
									0.0	0.0	0.0	0.434		6	4	7	2,118	0.01	0.00
F32	23	112	29	1	5	5	100	0.1570	0.0	0.0	0.0	0.237	2499	5	2462	3	644	4	0.1570
									0.0	0.0	0.0	0.237				1			
F34	172	91	99	2	9	-33	-27	0.0682	0.0	0.1	0.0	0.564	741	8	766	4	445	32	0.0682
									0.0	0.0	0.0	0.564		4	2	7	3,995	0.00	0.00
F36	222	105	64	4	8	-6	-133	0.0886	0.0	0.1	0.0	0.828	1439	9	1417	9	206	94	0.0886
									0.0	0.0	0.0	0.828		7	4	4	3,508	0.01	0.00
F37	422	265	130	4	3	-3	-100	0.0986	0.0	0.0	0.0	0.122	1610	8	1587	2	772	5	0.0986
									0.0	0.0	0.0	0.122		3	2	5	3,829	0.00	0.00
F38	132	134	68	2	1	23	4	0.0941	0.0	0.0	0.0	0.122	1495	3	1508	1	95	64	0.0941
									0.0	0.0	0.0	0.122				8	0		

Discordant																			
F1	87	64	38	2	-1	-8	13	0.0762	0.0	0.0	0.0	0.382	1122	2	3	9	5,260	0.00	0.00
									036	1.973	91	0,1901	053	86	1	-16	389	53	0.0762
									0.0	0.0	0.0	0.704		2	2	5	7,112	0.00	0.00
F3	797	545	790	1	11	-51	-22	0.0980	0.0	0.1	0.0	0.380	848	9	1056	6	376	51	0.0980
									0.0	0.0	0.0	0.380		4	3	8	4,374	0.00	0.00
F4	303	479	256	1	1	14	7	0.0985	0.0	0.0	0.0	0.406	1326	6	1414	4	453	89	0.0985
									0.0	0.0	0.0	0.406		2	1	7	8,912	0.00	0.00
F5	478	53	55	8	4	5	80	0.0612	0.0	0.0	0.0	0.081	685	0	660	8	656	34	0.0612
									0.0	0.0	0.0	0.081		2	2	7	6,341	0.00	0.00
F9	429	390	319	1	0	16	0	0.0686	0.0	0.2	0.0	0.914	944	3	912	0	154	41	0.0686
									0.0	0.0	0.0	0.914		6	6	7		0.01	0.00
F11	561	90	70	7	14	-10	-140	0.0989	0.0	0.1	0.0	0.742	952	4	1139	9	6,25	2	0.0989
									0.0	0.0	0.0	0.742		8	4	7	4,081	0.01	0.00
F13	605	516	309	2	30	-8	-375	0.1048	0.0	0.0	0.0	0.608	1407	6	1503	2	633	6	0.1048
									0.0	0.0	0.0	0.608				1			
F16	139	88	69	2	13	6	217	0.0833	0.0	0.3	0.0	0.771	756	4	857	6	615	57	0.0833
									0.0	0.0	0.0	0.771		6	3	4	2,557	0.01	0.00
F20	291	389	174	1	-13	-13	100	0.1813	0.0	0.0	0.0	0.667	2124	8	2384	1	545	5	0.1813
									0.0	0.0	0.0	0.667		8	6	8	2,114	0.01	0.01
F24	114	119	25	4	21	-35	-60	0.244	0.0	0.0	0.0	0.244	2494	4	2872	4	165	9	0.244
									0.0	0.0	0.0	0.244				5	19		

F25	416	295	167	2	55	-5	-1100	0.0882	0.072	2.29	0.19	0.1988	0.080	0.51753	1168	43	1200	54	1390	613	5,030181	0.0080	0.0882	0.0072
F26	158	81	139	1	3	9	33	0.0552	0.044	0.488	0.035	0.0669	0.023	0.050164	418	14	399	24	340	587	14,94768	0.0023	0.0552	0.0044
F27	289	242	88	3	0	-9	0	0.1140	0.024	6.28	0.07	0.405	0.18	0.63	2209	54	2012	88	1861	9-20	136136	0.018	0.1140	0.0024
F30	97	241	79	1	8	-30	-27	0.1408	0.050	5.80	0.04	0.3009	0.086	0.48	1695	24	1939	55	2221	323	3,323363	0.0086	0.1408	0.0050
F33	1235	315	865	1	3	3	100	0.0602	0.033	0.431	0.020	0.0517	0.017	0.233	325	14	363	44	600	034	19,34236	0.0017	0.0602	0.0033
F35	938	300	498	2	19	3	633	0.1203	0.025	1.787	0.038	0.1097	0.026	0.72	671	55	1043	55	1958	666	9,11577	0.0026	0.1203	0.0025

Sample Name CAK14-28		cPb Pb/Hg*100 > 25 AND 204Pb>100 cps			Discordance >10%			U (ppm) >1400																	
Run name	U (pp m)	Pb (ppm)	Th (ppm)	U/Th	cPb			uncorrected ratios						uncorrected ages						inversed conc.					
					204 Pb	202 Hg	Pb/Hg *100	207Pb/ 206Pb	2SE	207Pb/ 235U	2S E	206Pb/ 238U	2SE	error corr.	206Pb/ 238U	+	207Pb/ 235U	+	207Pb/ 206Pb	+	disc. %	238/ 206	2 sigm a	207Pb/ 206Pb	2sig ma
H11	368	811	287	1	20	50	40	0.1225	0.041	5.83	9	0,34	15	52	1885	74	1947	44	1988	59	5	2,941	0.01		0.00
									0.0		0.0			0.722								176	5	0.1225	41
H13	727	109	64	10	3	-5	-60	0.0782	0.029	1.989	99	0,185	0.060	63	1094	33	1108	34	1158	71	6	5,405	0.00		0.00
																						405	60	0.0782	29

Discordant																									
H1	2955	869	1255	2	87	15	580	0.1475	0.065	1.49	0	0,0741	0.057	0.72266	460	3417	921	4110	2306	7720	80	13,49528	0.0057	0.1475	0.0065
H2	395	200	110	3	19	37	51	0.103	0.011	2.92	5	0,209	0.030	0.86067	1210	00	1360	00	1680	020	26	4,784689	0.030	0.103	0.001
H3	899	29	34	27	13	-7	-186	0.0650	0.038	0.627	29	0,0706	0.036	0.54	440	22	497	1714	750	027	30	14,16431	0.0036	0.0650	0.0038
H4	411	97	116	3	7	36	19	0.0717	0.092	1.26	3	0,11	0.16	0.33	669	91	790	00	970	027	12	9,090909	0.016	0.0717	0.0092
H5	676	209	290	2	-1	-1	100	0.076	0.011	1.03	5	0,081	0.10	0.28	499	61	680	00	1020	027	47	12,34568	0.010	0.076	0.001
H6	1044	741	516	2	46	-22	-209	0.1560	0.056	4.85	1	0,223	0.15	0.44	1297	7712	1778	7412	2405	6026	46	4,484305	0.015	0.1560	0.0056
H7	558	292	286	2	6	2	300	0.1100	0.053	2.01	7	0,132	0.21	0.67	790	00	1060	00	1808	7626	56	7,575758	0.021	0.1100	0.0053
H8	733	92	133	5	6	7	86	0.083	0.011	0.94	6	0,0778	0.045	0.82	483	27	658	78	1220	011	55	12,85347	0.0045	0.083	0.001
H10	480	11	15	48	-12	36	-33	0.0666	0.038	0.748	42	0,0813	0.033	0.19	504	20	565	24	800	011	29	12,30012	0.0033	0.0666	0.0038

H12	592	657	279	2	35	-25	-140	0.1327	0.0	4.88	0.3	0.0	0.973	1506	79	1794	61	2132	62	29	3,802	0.01	0.00	
									047												15	55		281
H14	811	339	210	3	15	-19	-79	0.0862	0.0	1.83	0.1	0.0	0.177	928	38	1063	41	1310	14	0	32	6,527	0.00	0.00
									059													2	0,1532	
H15	213	366	118	2	25	32	78	0.1386	0.0	4.47	0.2	0.0	0.386	1356	46	1730	49	2210	11	0	38	4,268	0.00	0.00
									096													7	0,2343	
H16	345	89	150	2	7	-21	-33	0.0582	0.0	0.452	0.0	0.0	0.723	369	20	376	31	510	13	0	28	16,97	0.00	0.00
									036													43	0,0589	
H17	342	232	307	1	27	-6	-450	0.092	0.0	1.24	0.1	0.0	0.408	603	40	810	72	1520	22	0	57	10,19	0.00	0.01
									10													7	0,0981	

No Value																								
H9	0	1	0	no value	-1	-21	5	no value	NA	no value	NA	no value	NA	NaN	no value	N	no value	N	no value	N	no value	#VAL	no value	NA
									N		N		N			N		N		N	e	UE!	NAN	N

Sample Name		cPb Pb/Hg*100 > 25 AND 204Pb>100 cps			Discordance >10%			U (ppm)																	
12TM-10A								>1400																	
					cPb			uncorrected ratios						uncorrected ages						inversed conc.					
Run name	U (ppm)	Pb (ppm)	Th (ppm)	U/Th	204 Pb	202 Hg	Pb/Hg *100	207Pb/206Pb	2SE	207Pb/235U	2S E	206Pb/238U	2SE	error corr.	206Pb/238U	+ -	207Pb/235U	+ -	207Pb/206Pb	+ -	disc . %	238/206	2 sigma a	207Pb/206Pb	2sigma ma
I1	682	681	343	4	4	20	20	0.0993	0.021	3.99	0	0,286	0.086	45	1621	4 3	1630 1	2 1	1616 7	3 1		3,496 503	0.00 86	0.0993	21
I7	446	712	236	3	4	18	22	0.1468	0.036	8.57	1	0,414	0.13	11	2233	9 4	2291 2	3 2	2304 4	2 4	3	2,415 459	0.01 3	0.1468	0.00 36
I9	284	417	164	3	18	-11	-164	0.1237	0.031	5.72	5	0,3307	0.087	74	1847	0 4	1937 2	4 2	2020 6	5 7		3,023 889	0.00 87	0.1237	0.00 31
I11	568	274	154	5	13	-21	-62	0.0881	0.029	2.89	1	0,2338	0.076	16	1354	0 3	1376 2	9 2	1375 5	4 2		4,277 16	0.00 76	0.0881	0.00 29
I12	672	484	275	3	12	-5	-240	0.0854	0.022	2.714	77	0,2255	0.063	97	1315	4 2	1330 2	1 2	1325 8	0 0		4,434 59	0.00 63	0.0854	0.00 22
I14	522	316	310	2	-21	-23	91	0.0747	0.033	1.672	66	0,1626	0.047	88	971	6 4	996 3	5 3	1045 8	7 3		6,150 062	0.00 47	0.0747	0.00 33
I16	325	304	212	1	-6	-1	600	0.0854	0.039	2.71	3	0,2244	0.086	59	1305	5 3	1328 3	5 3	1313 8	4 -1		4,456 328	0.00 86	0.0854	0.00 39
I20	354	578	366	1	-8	-7	114	0.0923	0.036	3.24	3	0,2522	0.069	71	1449	5 3	1469 3	3 3	1475 0	1		3,965 107	0.00 69	0.0923	0.00 36
I21	810	529	344	2	-11	13	-85	0.0882	0.020	2.702	70	0,2182	0.058	7	1272	0 3	1328 1	9 4	1382 4	6		4,582 951	0.00 58	0.0882	0.00 20
I23	134	765	334	0	3	-14	-21	0.1162	0.064	5.09	9	0,312	0.11	22	1751	5 4		4 9				3,205 128	0.01 1		0.00 64
I28	864	275	176	4	9	5	180	0.0786	0.033	2.080	66	0,1898	0.085	14	1120	6 4	1146 2	4 4	1148 8	0		5,268 704	0.00 85	0.0786	0.00 33

I30	339	128	81	4	-6	-9	67	0.0716	0.0	0.0	0.0	0.746	5	4	9	6,093	0.00	0.00
									036	1.637	95	0,1641	091	16	978	1	990	0
I31	94	164	58	1	2	4	50	0.1019	0.0	0.1	0.0	0.219	4	3	7	3,529	0.00	0.00
									044	4.00	8	0,2833	086	34	1607	3	1634	8
I32	293	294	171	1	1	38	3	0.0749	0.0	0.0	0.0	0.422	2	2	6	5,701	0.00	0.00
									024	1.783	53	0,1754	052	35	1041	8	1040	0
I34	855	347	459	2	0	-15	0	0.0575	0.0	0.0	0.0	0.335	1	1	9	13,12	0.00	0.00
									027	0.602	27	0,0762	022	68	473	3	481	6
I35	583	76	55	10	-6	26	-23	0.0692	0.0	0.0	0.0	0.712	3	3	8	6,930	0.00	0.00
									026	1.371	75	0,1443	060	28	868	4	880	5
I36	1075	570	566	2	5	-4	-125	0.0609	0.0	0.0	0.0	0.456	1	1	9	9,842	0.00	0.00
									026	0.866	33	0,1016	030	26	623	7	633	8
I38	234	613	194	1	1	-7	-14	0.1019	0.0	0.0	0.0	0.357	3	1	4	3,405	0.00	0.00
									024	4.098	89	0,2936	073	95	1659	6	1659	9
I39	284	401	79	3	5	-19	-26	0.1684	0.0	0.3	0.0	0.671	5	2	3	2,083	0.01	0.00
									033	11.13	1	0,48	12	76	2527	4	2533	5
I40	114	150	40	3	-2	1	-200	0.1274	0.0	0.0	0.0	0.544	5	4	7	2,617	0.01	0.00
									049	6.72	0	0,382	12	11	2085	4	2068	0
I41	758	512	307	2	11	13	85	0.0697	0.0	0.0	0.0	0.432	2	1	5	6,835	0.00	0.00
									019	1.406	44	0,1463	039	27	880	2	893	8
I42	248	437	198	1	23	-18	-128	0.0844	0.0	0.1	0.0	0.622	6	6	3	4,587	0.01	0.00
									057	2.39	9	0,218	13	07	1272	9	1231	3
I49	814	1178	333	2	6	-14	-43	0.1228	0.0	0.1	0.0	0.740	4	2	2	2,777	0.01	0.00
									020	6.06	5	0,36	10	83	1979	9	1983	1

Discordant																								
I2	1519	463	1103	3	-1	29	-3	0.0601	0.0 023	0.473	18	0,0573	0.0 025	0.532 89	1 359	1 5	1 393	8 2	0 614	32	17,45 201	0.00 25	0.00 0.0601	0.00 23
I3	633	1089	574	2	37	14	264	0.1152	0.0 028	4.16	0.1 5	0,2605	0.0 069	0.661 83	3 1492	2 5	2 1664	4 9	4 1879	21	3,838 772	0.00 69	0.00 0.1152	0.00 28
I4	419	202	100	7	-6	-2	300	0.0943	0.0 030	3.80	0.1 0	0,292	0.0 079	0.170 72	3 1651	2 9	2 1595	5 0	7 1516	-11	3,424 658	0.00 79	0.00 0.0943	0.00 30
I5	691	122	157	8	3	20	15	0.0624	0.0 029	0.974	0.0 55	0,109	0.0 030	0.402 28	1 667	2 7	2 687	1 8	1 710	-11	9,174 312	0.00 30	0.00 0.0624	0.00 29
I6	523	164	218	4	7	-2	-350	0.0593	0.0 028	0.734	0.0 31	0,0898	0.0 027	0.172 52	1 554	1 6	1 564	9 9	7 563	63	11,13 586	0.00 27	0.00 0.0593	0.00 28
I8	327	919	213	2	2	-19	-11	0.2587	0.0 060	21.02	0.9 4	0,577	0.0 27	0.913 13	1 2930	4 0	4 3130	3 4	7 3234	10	1,733 102	0.02 7	0.00 0.2587	0.00 60
I10	363	217	288	2	2	-5	-40	0.0699	0.0 045	0.998	0.0 78	0,0997	0.0 052	0.612 6	3 612	4 0	4 707	3 2	0 890	30	10,03 009	0.00 52	0.00 0.0699	0.00 45
I13	1228	244	272	5	13	13	100	0.0705	0.0 035	0.955	0.0 40	0,0979	0.0 035	0.049 862	2 602	2 1	2 679	1 1	0 940	27	10,21 45	0.00 35	0.00 0.0705	0.00 35
I15	956	469	766	1	-4	-37	11	0.0643	0.0 026	0.759	0.1 35	0,0848	0.0 025	0.467 05	1 525	2 5	2 572	8 0	4 746	23	11,79 245	0.00 25	0.00 0.0643	0.00 26
I17	1468	532	216	7	111	-7	-1586	0.1251	0.0 065	2.01	0.1 4	0,1124	0.0 094	0.655 26	5 685	4 4	4 1112	8 8	8 2015	66	8,896 797	0.00 94	0.00 0.1251	0.00 65

I18	766	526	883	1	-4	-13	31	0.0607	0.0 035	0.0 0.669	0.0 37	0.0 0,0803	0.0 023	0,185 84	498	1 4	2 1	630	1 4 0	-31	12,45 33	0.00 23	0.0607	0.00 35
I19	556	330	297	2	22	-28	-79	0.0937	0.0 059	2.75	0.3 4	0.0 0,209	0.0 14	0.626 7	1221	7 7	9 0	1520	1 0	25	4,784 689	0.01 4	0.0937	0.00 59
I22	121	177	73	1	19	-1	-1900	0.1106	0.0 072	4.11	0.2 3	0.0 0,279	0.0 14	0.079 981	1585	7 1	4 5	1810	1 0	11	3,584 229	0.01 4	0.1106	0.00 72
I24	590	416	239	2	8	-21	-38	0.1199	0.0 044	4.27	0.3 3	0.0 0,26	0.0 17	0.893 63	1488	8 6	5 9	1947	6 6	23	3,846 154	0.01 7	0.1199	0.00 44
I25	573	367	193	3	4	-44	-9	0.1093	0.0 025	2.71	0.2 0	0.0 0,182	0.0 15	0.956 81	1075	7 8	5 1	1784	4 1	39	5,494 505	0.01 5	0.1093	0.00 25
I26	507	246	360	1	-7	4	-175	0.0603	0.0 031	0.644	0.0 39	0.0 0,0777	0.0 028	0.101 88	482	1 7	2 4	590	1 0	14	12,87 001	0.00 28	0.0603	0.00 31
I27	547	234	202	2	16	11	145	0.0929	0.0 057	0.98	0.1 0	0.0 0,0741	0.0 071	0.858 62	460	4 3	5 1	1490	2 0	67	13,49 528	0.00 71	0.0929	0.00 57
I29	161	120	130	1	-1	9	-11	0.0615	0.0 040	0.896	0.0 68	0.0 0,1037	0.0 033	0.355 77	636	1 9	3 7	670	6 0	18	9,643 202	0.00 33	0.0615	0.00 40
I33	777	831	639	1	21	28	75	0.1125	0.0 087	2.19	0.2 4	0.0 0,139	0.0 098	0.454 88	837	5 6	6 8	1790	1 0	53	7,194 245	0.00 98	0.1125	0.00 87
I37	1072	484	194	5	22	-7	-314	0.1014	0.0 029	2.51	0.2 2	0.0 0,178	0.0 16	0.917 06	1054	8 6	6 2	1655	5 0	35	5,617 978	0.01 6	0.1014	0.00 29
I43	1436	120	91	17	17	53	32	0.0677	0.0 032	0.640	0.0 35	0.0 0,0691	0.0 023	0.481 21	431	1 4	2 3	843	9 6	49	14,47 178	0.00 23	0.0677	0.00 32
I44	2091	229	318	6	4	33	12	0.0738	0.0 056	0.500	0.0 42	0.0 0,0501	0.0 046	0.402 01	315	2 8	2 8	1030	7 0	77	19,96 008	0.00 46	0.0738	0.00 56
I45	750	639	167	4	50	48	104	0.1275	0.0 027	5.07	0.1 6	0.0 0,284	0.0 11	0.793 56	1612	5 4	2 1	2061	3 7	23	3,521 127	0.01 1	0.1275	0.00 27
I46	628	604	127	5	15	1	1500	0.1826	0.0 095	11.2	1.4 0.1	0.0 0,442	0.0 39	0.940 66	2350	8 0	2 0	2681	8 2	13	2,262 443	0.03 9	0.1826	0.00 95
I47	447	292	123	3	8	-29	-28	0.0933	0.0 043	2.94	0.1 7	0.0 0,2333	0.0 086	0.520 84	1351	4 5	4 3	1483	8 7	10	4,286 327	0.00 86	0.0933	0.00 43
I48	97	34	35	2	-9	4	-225	0.0608	0.0 081	0.78	0.1 0	0.0 0,0884	0.0 031	0.153 04	546	1 8	5 5	650	6 0	118	11,31 222	0.00 31	0.0608	0.00 81
I50	445	359	163	2	15	-25	-60	0.0939	0.0 046	2.49	0.1 5	0.0 0,194	0.0 071	0.498 87	1142	3 8	4 3	1487	9 3	25	5,154 639	0.00 71	0.0939	0.00 46
I51	641	244	102	7	4	-6	-67	0.0957	0.0 046	3.33	0.3 8	0.0 0,252	0.0 21	0.937 03	1440	1 0	0 0	1527	9 1	10	3,968 254	0.02 1	0.0957	0.00 46

Sample Name	cPb Pb/Hg*100 > 25 AND 204Pb>100 cps	Discordance >10%	U (ppm)
12TM-10B			>1400

					cPb			uncorrected ratios							uncorrected ages							inversed conc.			
Run name	U (ppm)	Pb (ppm)	Th (ppm)	U/Th	204 Pb	202 Hg	Pb/Hg *100	207Pb/206Pb	2SE	207Pb/235U	2S E	206Pb/238U	2SE	error corr.	206Pb/238U	+	207Pb/235U	+	207Pb/206Pb	+	disc . %	238/206	2 sigma	207Pb/206Pb	2 sigma
J1	443	438	245	2	58	198	29	0.0722	0.034	1.555	68	0,1561	046	54	935	6	950	7	1013	5	6	6,40614	0.00	0.0722	0.00
J2	116	237	69	1	12	26	46	0.1147	0.060	4.87	6	0,314	14	79	1760	1	1801	7	1856	9	5	3,18471	0.01	0.1147	0.00
J3	373	580	186	2	-2	25	-8	0.1181	0.038	5.15	7	0,32	11	96	1790	5	1842	8	1922	8	6	3,125	1	0.1181	0.00
J4	897	132	65	12	12	-11	-109	0.0716	0.026	1.554	46	0,156	040	606	934	2	951	8	977	1	4	6,41025	0.00	0.0716	0.00
J6	416	580	212	2	5	-22	-23	0.1069	0.021	4.49	0	0,305	075	97	1715	7	1726	9	1746	8	2	8525	75	0.1069	0.00
J7	1273	296	495	3	3	-31	-10	0.0543	0.024	0.475	25	0,063	019	59	394	1	397	6	367	9	2	15,8730	0.00	0.0543	0.00
J9	514	198	186	3	6	-14	-43	0.0679	0.038	1.041	84	0,1167	099	12	723	2	730	8	840	0	6	8,56898	0.00	0.0679	0.00
Discordant																									
J5	619	500	528	1	5	-31	-16	0.0596	0.021	0.739	30	0,091	042	38	561	2	560	8	570	6	-14	10,9890	0.00	0.0596	0.00
J8	633	182	331	2	29	10	290	0.074	0.016	0.44	0	0,0468	041	68	294	2	358	6	920	0	64	21,3675	0.00	0.074	0.01
J10	1099	46	105	16	6	18	33	0.0542	0.048	0.430	31	0,059	024	61	370	1	362	2	340	0	124	16,9491	0.00	0.0542	0.00
J11	207	246	300	1	2	-12	-17	0.1029	0.068	2.69	9	0,1864	087	89	1101	4	1333	8	1710	0	33	5,36480	0.00	0.1029	0.00
J12	1479	351	1049	2	12	27	44	0.0524	0.021	0.358	23	0,0488	017	79	307	7	310	7	291	1	16	20,4918	0.00	0.0524	0.00

Sample Name	cPb Pb/Hg*100 > 25 AND 204Pb>100 cps	Discordance >10%	U (ppm)
12TM-10C			>1400

				cPb			uncorrected ratios							uncorrected ages							inversed conc.			
Run name	U	Pb	Th	204	202	Pb/Hg	207Pb/2	207Pb/	2S	206Pb/	error	206Pb/	+	207Pb/	+	207Pb/2	+	disc	238/	2	207Pb/2	2sig		
	(ppm)	(ppm)	(ppm)	Pb	Hg	*100	06Pb	2SE	235U	E	238U	2SE	corr.	238U	-	235U	-	06Pb	-	%	206	sigma	06Pb	ma

K3	211	1165	360	1	2	-9	-22	0.1844	0.0	0.2	0.0	0.609	5	2	3	1,953	0.01	0.00
									034									
K8	340	379	176	2	-11	10	-110	0.1162	0.0	0.1	0.0	0.563	5	2	5	2,941	0.01	0.00
									035									
K10	209	100	86	3	0	7	0	0.0771	0.0	0.1	0.0	0.558	3	3	9	5,711	0.00	0.00
									034									
K18	275	903	203	1	-5	44	-11	0.1845	0.0	0.4	0.0	0.541	6	3	4	2,061	0.01	0.00
									051									
K20	136	112	52	3	14	-4	-350	0.0878	0.0	0.1	0.0	0.549	5	5	2	4,716	0.01	0.00
									052									
K21	121	127	38	3	-2	-7	29	0.1098	0.0	0.3	0.0	0.829	9	6	8	3,067	0.01	0.00
									050									
K22	210	402	129	2	6	15	40	0.1016	0.0	0.3	0.0	0.869	1	6	7	3,424	0.02	0.00
									038									
K24	571	766	422	2	-3	15	-20	0.0963	0.0	0.1	0.0	0.762	5	4	6	4,032	0.01	0.00
									035									
K26	720	577	164	5	18	26	69	0.1167	0.0	0.2	0.0	0.821	9	3	5	2,958	0.01	0.00
									032									
K28	234	514	104	3	11	-16	-69	0.1495	0.0	0.3	0.0	0.827	6	3	4	2,298	0.01	0.00
									041									

Discordant																								
K1	570	94	106	13	0	-2	0	0.0635	0.0 027	0.0 0.826	0.0 42	0.0 0,097	0.562 036	5	597	2 1	2 614	2 3	9 4	44	10,30 928	0.00 36	0.00 0.0635	0.00 27
K2	413	139	305	2	-11	-9	122	0.0538	0.0 028	0.0 0.449	0.0 25	0.0 0,0603	0.130 017	55	378	1 0	1 374	1 7	2 380	0 68	16,58 375	0.00 17	0.00 0.0538	0.00 28
K4	679	206	346	2	4	16	25	0.0626	0.0 044	0.1 0.68	0.1 3	0.0 0,08	0.814 12	95	495	7 3	7 510	2 9	0 710	32	12,5 2	0.01 2	0.0626	0.00 44
K5	1431	802	763	2	29	25	116	0.1096	0.0 053	0.1 1.24	0.1 3	0.0 0,0826	0.876 096	46	510	5 7	5 810	9 8	1 1775	72	12,10 654	0.00 96	0.1096	0.00 53
K6	871	197	188	6	5	-15	-33	0.0782	0.0 022	0.0 1.469	0.0 64	0.0 0,1351	0.794 062	21	816	3 5	2 915	5 7	5 1154	28	7,401 925	0.00 62	0.0782	0.00 22
K7	904	304	523	2	25	19	132	0.0677	0.0 053	0.0 0.707	0.0 56	0.0 0,0759	0.167 019	48	472	1 2	3 540	5 3	0 860	37	13,17 523	0.00 19	0.0677	0.00 53
K9	1339	1538	665	3	9	3	300	0.1282	0.0 046	0.6 3.78	0.6 3	0.0 0,208	0.986 31	03	1200	7 0	5 1510	6 0	7 2075	43	4,807 692	0.03 1	0.1282	0.00 46
K11	623	1112	691	1	24	6	400	0.1161	0.0 088	0.2 1.00	0.2 0	0.0 0,066	0.923 13	26	406	8 1	1 690	5 0	0 1850	77	15,15 152	0.01 3	0.1161	0.00 88
K12	499	144	236	2	15	-8	-188	0.0572	0.0 028	0.0 0.605	0.0 58	0.0 0,0782	0.805 074	46	484	4 5	3 473	1 7	0 480	24	12,78 772	0.00 74	0.0572	0.00 28
K13	318	123	121	3	22	17	129	0.122	0.0 24	0.2 1.02	0.2 8	0.0 0,064	0.555 16	91	397	9 8	4 660	2 0	0 1890	81	15,62 5	0.01 6	0.122	0.02 4

K14	542	192	200	3	-3	24	-13	0.1008	0.0	0.85	0.1	0.0625	0.0	0.918	389	5	7	1610	3	75	16	88	0.1008	0.00
K15	577	659	328	2	16	11	145	0.1007	0.0	3.51	0.1	0.2522	0.0	0.764	1449	4	2	1633	4	11	3,965	0.00	0.1007	0.00
K16	1460	1069	536	3	21	3	700	0.1023	0.0	3.26	0.1	0.2331	0.0	0.838	1350	8	3	1672	3	19	4,290	0.00	0.1023	0.00
K17	3731	752	2291	2	1	19	5	0.0607	0.0	0.231	0.0	0.0279	0.0	0.709	177	1	1	630	4	65	35,84	0.00	0.0607	0.00
K19	1426	347	236	6	18	26	69	0.0955	0.0	1.204	0.0	0.0925	0.0	0.811	569	4	3	1557	8	62	10,81	0.00	0.0955	0.00
K23	167	49	61	3	2	6	33	0.0572	0.0	0.547	0.0	0.0691	0.0	0.225	431	1	2	570	6	38	14,47	0.00	0.0572	0.00
K25	152	188	28	6	6	-23	-26	0.345	0.0	18.1	1.6	0.381	0.0	0.930	2110	4	8	3696	5	43	2,624	0.03	0.345	0.01
K27	1034	770	657	2	52	-16	-325	0.1805	0.0	4.05	0.5	0.173	0.0	0.973	1020	1	1	2663	6	61	5,780	0.02	0.1805	0.00

Sample Name	cPb Pb/Hg*100 > 25 AND 204Pb>100 cps	Discordance >10%	U (ppm)
14TM-17A			>1400

					cPb			uncorrected ratios							uncorrected ages							inversed conc.			
Run name	U (ppm)	Pb (ppm)	Th (ppm)	U/Th	204 Pb	202 Hg	Pb/Hg *100	207Pb/206Pb	2SE	207Pb/235U	2S E	206Pb/238U	2SE	eror corr.	206Pb/238U	+	207Pb/235U	+	207Pb/206Pb	+	disc . %	238/206	2 sigma	207Pb/206Pb	2 sigma
L1	351	11	6	81	-2	-12	17	0.0630	0.030	0.720	55	0.0894	0.040	86	552	4	555	1	670	0	-4	11,18	0.00	0.0630	0.00
L2	439	515	152	2	2	-13	-15	0.1154	0.024	5.05	4	0.3098	0.077	4	1739	8	1830	2	1891	6	8	568	40	0.1154	30

Discordant																									
L3	455	354	159	2	-17	-5	340	0.1012	0.025	2.58	2	0.1845	0.080	88	1091	4	1292	3	1649	4	8	33	5,420	0.00	0.00
																							054	80	0.1012

Sample Name	cPb Pb/Hg*100 > 25 AND 204Pb>100 cps	Discordance >10%	U (ppm)
12TM-33A			>1400

					cPb			uncorrected ratios						uncorrected ages						inversed conc.			
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Run name	U (ppm)	Pb (ppm)	Th (ppm)	U/Th	204 Pb	202 Hg	Pb/Hg *100	207Pb/206Pb	2SE	207Pb/235U	2S E	206Pb/238U	2SE	error corr.	206Pb/238U	+	207Pb/235U	+	207Pb/206Pb	+	disc .%	238/206	2 sigma a	207Pb/206Pb	2 sigma ma
M003	720	135	212	4	-19	11	-173	0.062	0.015	0.716	0.043	0.085	0.051	0.31298	526	31	547	5	660	04	-3	11,76471	0.0051	0.062	0.015
M005	725	411	306	2	1	-9	-11	0.072	0.016	1.616	0.057	0.1617	0.084	0.36327	966	46	983	2	990	04	-2	6,184292	0.0084	0.072	0.016
M008	1124	185	208	5	-23	6	-383	0.062	0.014	0.895	0.042	0.1072	0.066	0.78403	656	38	648	2	660	04	-1	9,328358	0.0066	0.062	0.014
M043	422	77	50	9	-3	-14	21	0.072	0.016	1.495	0.048	0.1565	0.083	0.49042	937	46	929	9	980	04	1	6,389776	0.0083	0.072	0.016
M052	644	364	378	2	-5	21	-24	0.063	0.014	0.895	0.040	0.1056	0.057	0.71084	647	33	647	1	710	04	2	9,469697	0.0057	0.063	0.014
M129	514	4	7	64	-5	16	-31	0.0589	0.046	0.773	0.059	0.0926	0.075	0.63854	571	41	578	4	570	04	4	10,79914	0.0075	0.0589	0.0046
M019	324	915	268	1	-17	-30	57	0.150	0.034	8.42	0.04	0.415	0.027	0.3734	2240	20	2275	5	2340	04	3	2,409639	0.027	0.150	0.034
M020	303	588	233	1	3	64	5	0.104	0.024	4.15	0.01	0.291	0.016	0.33018	1652	78	1662	3	1700	04	3	3,436426	0.016	0.104	0.024
M021	291	488	189	1	-7	36	-19	0.108	0.025	4.50	0.04	0.306	0.016	0.10181	1718	81	1729	5	1760	04	4	3,267974	0.016	0.108	0.025
M024	197	421	125	1	9	16	56	0.145	0.033	8.46	0.04	0.42	0.022	0.55805	2260	00	2286	9	2280	04	1	2,380952	0.022	0.145	0.033
M027	255	688	398	1	-13	1	-1300	0.083	0.019	2.61	0.01	0.225	0.013	0.2792	1317	72	1301	2	1260	04	-10	4,444444	0.013	0.083	0.019
M028	610	269	188	3	-10	-3	333	0.080	0.018	2.16	0.02	0.192	0.014	0.83105	1132	74	1172	5	1190	04	6	5,208333	0.014	0.080	0.018
M029	364	354	193	2	-5	13	-38	0.091	0.021	3.17	0.01	0.248	0.015	0.42751	1426	79	1447	8	1490	04	5	4,032258	0.015	0.091	0.021
M030	1030	199	385	3	2	-7	-29	0.057	0.013	0.565	0.026	0.0705	0.041	0.034828	439	25	454	7	490	04	-6	14,1844	0.0041	0.057	0.013
M031	225	726	292	1	-1	-23	4	0.112	0.025	5.09	0.06	0.33	0.018	0.41236	1839	89	1832	7	1820	04	0	3,030303	0.018	0.112	0.025
M035	962	480	913	1	13	8	163	0.054	0.013	0.511	0.023	0.0664	0.041	0.28273	415	24	418	5	370	04	-2	15,06024	0.0041	0.054	0.013

M037	214	276	162	1	-4	4	-100	0.079	0.0 18	2.16	0.1 1	0,198	0.0 12	0.187 12	1175	5 9	3 5	1140	4 0	-3	5,050 505	0.01 2	0.079	0.01 8
M038	783	332	247	3	-18	-33	55	0.074	0.0 17	1.504	0.0 72	0,1544	0.0 096	0.735 22	925	5 4	3 0	1020	6 0	8	6,476 684	0.00 96	0.074	0.01 7
M039	399	95	38	11	3	-5	-60	0.102	0.0 23	3.99	0.1 0	0,29	0.0 16	0.207 53	1640	8 1	2 0	1680	8 0	2	3,448 276	0.01 6	0.102	0.02 3
M045	144	320	83	2	-14	6	-233	0.165	0.0 37	10.30	0.3 2	0,469	0.0 28	0.735 5	2480	2 0	3 1	2500	8 0	0	2,132 196	0.02 8	0.165	0.03 7
M046	484	1284	429	1	6	8	75	0.116	0.0 26	5.17	0.1 4	0,33	0.0 18	0.617 47	1836	8 9	2 3	1890	1 0	3	3,030 303	0.01 8	0.116	0.02 6
M047	389	436	278	1	-1	-18	6	0.078	0.0 18	1.863	0.0 75	0,18	0.0 10	0.344 27	1066	5 6	2 7	1180	4 0	8	5,555 556	0.01 0	0.078	0.01 8
M049	322	285	121	3	-22	11	-200	0.091	0.0 21	3.095	0.0 79	0,252	0.0 13	0.072 528	1448	6 6	2 0	1430	4 0	-1	3,968 254	0.01 3	0.091	0.02 1
M051	311	207	92	3	-11	-53	21	0.090	0.0 20	2.911	0.0 79	0,24	0.0 13	0.402 25	1385	6 9	2 0	1420	3 0	1	4,166 667	0.01 3	0.090	0.02 0
M053	227	127	63	3	10	-15	-67	0.086	0.0 20	2.627	0.0 98	0,223	0.0 12	0.184 17	1297	6 5	2 7	1380	4 0	4	4,484 305	0.01 2	0.086	0.02 0
M055	277	188	107	2	9	-16	-56	0.077	0.0 18	1.821	0.0 62	0,178	0.0 10	0.337 98	1058	5 7	2 2	1110	6 0	-1	5,617 978	0.01 0	0.077	0.01 8
M056	124	358	124	1	17	-42	-40	0.124	0.0 29	5.60	0.2 9	0,339	0.0 21	0.652 21	1880	1 0	4 5	2010	3 0	6	2,949 853	0.02 1	0.124	0.02 9
M058	133	97	44	3	6	1	600	0.091	0.0 21	3.24	0.1 4	0,259	0.0 15	0.287 21	1485	7 7	3 3	1450	7 0	-4	3,861 004	0.01 5	0.091	0.02 1
M060	384	208	110	3	-2	-10	20	0.075	0.0 17	1.892	0.0 50	0,1833	0.0 098	0.354 77	1084	5 3	1 8	1090	7 0	1	5,455 537	0.00 98	0.075	0.01 7
M064	328	179	68	5	4	19	21	0.115	0.0 26	5.04	0.1 5	0,327	0.0 18	0.579 16	1822	8 8	2 6	1870	1 0	2	3,058 104	0.01 8	0.115	0.02 6
M065	326	1374	514	1	-17	-7	243	0.120	0.0 27	5.42	0.1 8	0,338	0.0 18	0.570 5	1874	8 9	2 9	1960	1 0	4	2,958 58	0.01 8	0.120	0.02 7
M067	153	981	243	1	2	-16	-13	0.171	0.0 39	10.93	0.3 6	0,471	0.0 25	0.583 23	2500	2 0	3 3	2560	8 0	3	2,123 142	0.02 5	0.171	0.03 9
M073	182	445	214	1	17	-12	-142	0.100	0.0 23	3.99	0.1 4	0,287	0.0 15	0.383 46	1625	7 7	2 9	1630	2 0	-1	3,484 321	0.01 5	0.100	0.02 3

M075	194	469	160	1	-2	-6	33	0.183	0.0	11.80	0.3	0,474	0.0	0.279	2500	1	2586	2	2680	3	7	2,109	0.02	0.183	0.04
									42		4		27	82		2		0		7		705	7		2
M077	906	50	38	24	-9	-17	53	0.075	0.0	1.773	0.0	0,174	0.0	0.477	1033	5	1034	2	1060	8	0	5,747	0.01	0.075	0.01
									17		58		10	5		6		1		0		126	0		7
M078	937	317	174	5	-7	-34	21	0.101	0.0	3.77	0.1	0,282	0.0	0.528	1600	8	1583	3	1630	3	0	3,546	0.01	0.101	0.02
									23		6		17	84		5		3		0		099	7		3
M081	488	473	204	2	-4	-26	15	0.127	0.0	6.24	0.1	0,35	0.0	0.509	1934	9	2008	2	2050	4	0	2,857	0.01	0.127	0.02
									29		4		19	87		2		0		0		143	9		6
M082	323	211	135	2	15	-10	-150	0.088	0.0	2.73	0.1	0,224	0.0	0.383	1303	6	1332	4	1390	4	0	4,464	0.01	0.088	0.02
									20		5		13	0.383		9		2		0		7	286		3
M085	666	156	156	4	3	1	300	0.073	0.0	1.578	0.0	0,1578	0.0	0.450	944	5	959	3	1030	4	0	6,337	0.00	0.073	0.01
									17		85		096	45		4		4		8		136	96		7
M092	190	856	388	0	-4	-39	10	0.110	0.0	4.77	0.1	0,315	0.0	0.523	1766	8	1786	2	1790	0	0	3,174	0.01	0.110	0.02
									25		5		16	58		1		7		0		0	603		6
M094	261	274	91	2	7	14	50	0.170	0.0	11.21	0.4	0,478	0.0	0.268	2520	1	2550	3	2550	9	0	2,092	0.02	0.170	0.03
									39		0		26	63		0		3		0		4	05		6
M096	362	421	198	1	-19	-22	86	0.113	0.0	4.84	0.1	0,306	0.0	0.518	1721	8	1790	2	1840	2	0	3,267	0.01	0.113	0.02
									26		3		17	46		1		3		0		6	974		7
M102	434	1138	240	1	-15	-35	43	0.163	0.0	11.69	0.5	0,5	0.0	0.693	2610	6	2575	4	2480	1	0		0.03	0.163	0.01
									10		2		38	37		1		1		-4		2	8		0
M104	266	430	112	2	3	3	100	0.1148	0.0	6.17	0.1	0,371	0.0	0.593	2030	1	1998	2	1890	1	0	2,695	0.02	0.1148	0.00
									075		8		27	33		3		6		-7		418	7		75
M105	327	91	37	9	-5	-26	19	0.0840	0.0	2.775	0.0	0,234	0.0	0.541	1353	8	1351	2	1300	3	0	4,273	0.01	0.0840	0.00
									055		83		16	81		1		4		-5		504	6		55
M106	185	447	91	1	9	-31	-29	0.169	0.0	12.52	0.4	0,511	0.0	0.449	2660	6	2641	3	2570	3	0	1,956	0.03	0.169	0.01
									11		7		37	67		0		6		-2		947	7		1
M107	190	307	115	1	3	-10	-30	0.0884	0.0	2.99	0.1	0,239	0.0	0.081	1381	8	1402	2	1390	4	0	4,184	0.01	0.0884	0.00
									062		0		16	642		1		6		-2		1	6		62
M109	192	332	100	1	6	38	16	0.1092	0.0	5.13	0.2	0,331	0.0	0.410	1840	1	1848	3	1800	3	0	3,021	0.02	0.1092	0.00
									071		2		24	39		0		2		-2		148	4		71
M112	232	312	92	2	0	10	0	0.1086	0.0	5.07	0.1	0,329	0.0	0.353	1830	1	1827	2	1770	2	0	3,039	0.02	0.1086	0.00
									070		4		23	51		0		3		-4		514	3		70
M114	310	423	120	2	4	4	100	0.154	0.0	9.00	0.3	0,4	0.0	0.367	2180	2	2334	3	2380	2	0		0.02	0.154	0.01
									11		4		28	46		0		5		9		2,5	8		1

M116	893	803	190	3	-2	1	-200	0.181	0.0 12	12.25	0.3 4	0.0 0,476	0.583 33 35	2510	1 5 0	2622	2 6	2660	1 1 0	5	2,100 84	0.03 3	0.181	0.01 2
M118	996	241	144	4	5	23	22	0.0764	0.0 054	1.942	0.0 81	0.0 0,184	0.649 15 48	1088	8 2	1094	2 8	1120	3 0	2	5,434 783	0.01 5	0.0764	0.00 54
M119	530	723	191	2	6	-9	-67	0.1240	0.0 078	6.53	0.1 2	0.0 0,379	0.163 26 67	2070	2 0	2048	1 6	2010	1 0	-4	2,638 522	0.02 6	0.1240	0.00 78
M122	581	202	88	5	-4	-40	10	0.0994	0.0 070	4.19	0.1 6	0.0 0,3	0.574 23 53	1700	1 1 0	1668	3 2	1600	3 0	-8	3,333 333	0.02 3	0.0994	0.00 70
M123	273	562	140	1	13	1	1300	0.181	0.0 12	13.80	0.5 2	0.0 0,554	0.624 39 92	2840	6 0	2740	3 8	2660	1 0	-7	1,805 054	0.03 9	0.181	0.01 2
M126	1903	486	370	4	-5	13	-38	0.0764	0.0 053	2.016	0.0 81	0.0 0,188	0.634 15 21	1109	7 9	1119	2 7	1090	4 0	-4	5,319 149	0.01 5	0.0764	0.00 53
M140	614	326	187	5	19	21	90	0.192	0.0 12	13.60	0.3 0	0.0 0,493	0.692 34 08	2580	5 0	2720	2 1	2750	1 0	7	2,028 398	0.03 4	0.192	0.01 2
M143	533	510	431	2	-1	-38	3	0.1198	0.0 079	5.57	0.2 0	0.0 0,339	0.623 25 2	1880	2 0	1917	3 4	1950	2 0	2	2,949 853	0.02 5	0.1198	0.00 79
M144	869	563	599	2	4	-8	-50	0.0878	0.0 059	2.92	0.1 2	0.0 0,236	0.375 17 71	1363	8 8	1391	2 9	1370	3 0	4	4,237 288	0.01 7	0.0878	0.00 59
M148	996	129	193	8	-2	-13	15	0.0750	0.0 049	1.636	0.0 46	0.0 0,155	0.312 11 62	930	5 9	988	1 8	1070	3 0	9	6,451 613	0.01 1	0.0750	0.00 49
M032	89	227	102	1	-2	-21	10	0.109	0.0 26	4.45	0.3 9	0.0 0,297	0.704 20 57	1670	1 0	1732	6 2	1750	4 0	2	3,367 003	0.02 0	0.109	0.02 6
M034	75	65	47	2	-5	20	-25	0.080	0.0 19	2.08	0.2 2	0.0 0,186	0.454 15 35	1096	8 3	1127	7 4	1180	5 0	-5	5,376 344	0.01 5	0.080	0.01 9
M127	440	969	332	1	-12	29	-41	0.180	0.0 12	11.93	0.7 1	0.0 0,464	0.784 37 4	2450	1 6 0	2591	5 4	2650	1 0	6	2,155 172	0.03 7	0.180	0.01 2
M134	338	302	278	2	5	4	125	0.1004	0.0 082	3.95	0.3 1	0.0 0,283	0.701 23 91	1600	2 0	1645	6 5	1610	5 0	-4	3,533 569	0.02 3	0.1004	0.00 82
Discordant																								
M001	426	324	243	2	-15	8	-188	0.099	0.0 23	3.00	0.1 3	0.0 0,219	0.383 14 34	1275	7 2	1415	3 6	1590	4 0	18	4,566 21	0.01 4	0.099	0.02 3
M002	1035	2346	642	2	62	18	344	0.240	0.0 55	12.98	0.3 2	0.0 0,392	0.658 21 97	2132	9 8	2676	2 3	3130	7 0	31	2,551 02	0.02 1	0.240	0.05 5

M004	958	74	94	12	-1	29	-3	0.064	0.0 15	0.0 0.788	0.0 60	0.0 0,0896	0.0 084	0.891 25	552	5 0	3 4	720	4 17	11,16 071	0.00 84	0.064	0.01 5
M006	848	250	702	1	31	9	344	0.063	0.0 15	0.0 0.404	0.0 30	0.0 0,047	0.0 027	0.029 605	296	1 7	2 2	650	2 42	21,27 66	0.00 27	0.063	0.01 5
M007	3433	747	1199	4	28	21	133	0.083	0.0 19	0.0 0.940	0.0 49	0.0 0,0836	0.0 058	0.850 63	517	3 4	2 5	1270	2 59	11,96 172	0.00 58	0.083	0.01 9
M009	511	1276	580	1	-1	1	-100	0.108	0.0 24	0.1 4.20	0.1 2	0.0 0,28	0.0 16	0.645 13	1589	8 2	2 3	1760	2 10	3,571 429	0.01 6	0.108	0.02 4
M010	882	1306	685	1	1	-2	-50	0.099	0.0 23	0.1 3.32	0.1 2	0.0 0,24	0.0 13	0.766 07	1387	6 9	2 8	1610	2 12	4,166 667	0.01 3	0.099	0.02 3
M011	752	642	258	3	-2	-1	200	0.149	0.0 34	0.3 7.98	0.3 0	0.0 0,376	0.0 22	0.486 09	2060	1 0	3 4	2330	3 12	2,659 574	0.02 2	0.149	0.03 4
M012	851	189	455	2	2	-10	-20	0.054	0.0 12	0.0 0.377	0.0 27	0.0 0,0519	0.0 028	0.395 88	326	1 7	2 0	330	2 -17	19,26 782	0.00 28	0.054	0.01 2
M013	1350	291	525	2	18	3	600	0.065	0.0 15	0.0 0.524	0.0 53	0.0 0,0563	0.0 054	0.805 21	353	3 3	3 5	760	3 47	17,76 199	0.00 54	0.065	0.01 5
M014	925	222	540	2	9	13	69	0.052	0.0 12	0.0 0.385	0.0 20	0.0 0,0516	0.0 032	0.427 33	324	2 0	1 4	270	2 45	19,37 984	0.00 32	0.052	0.01 2
M015	266	344	162	2	-12	-12	100	0.114	0.0 26	0.1 4.14	0.1 3	0.0 0,258	0.0 15	0.379 14	1478	7 5	2 7	1860	2 20	3,875 969	0.01 5	0.114	0.02 6
M016	1225	762	373	3	1	-20	-5	0.115	0.0 26	0.2 3.82	0.2 4	0.0 0,239	0.0 18	0.871 88	1379	9 2	5 0	1870	5 26	4,184 1	0.01 8	0.115	0.02 6
M017	480	721	289	2	54	3	1800	0.109	0.0 25	0.1 3.53	0.1 7	0.0 0,239	0.0 14	0.274 51	1380	7 3	3 7	1740	3 22	4,184 1	0.01 4	0.109	0.02 5
M018	663	431	291	3	11	-7	-157	0.091	0.0 21	0.1 1.99	0.1 4	0.0 0,161	0.0 14	0.868 21	959	7 6	4 8	1420	4 30	6,211 18	0.01 4	0.091	0.02 1
M022	2291	3263	2402	1	268	-43	-623	0.175	0.0 40	0.2 2.61	0.2 8	0.0 0,106	0.0 13	0.905 42	645	7 4	8 1	2590	8 74	9,433 962	0.01 3	0.175	0.04 0
M023	726	710	805	1	-9	22	-41	0.152	0.0 35	0.1 3.85	0.1 5	0.0 0,185	0.0 10	0.111 78	1091	5 7	3 2	2360	3 53	5,405 405	0.01 0	0.152	0.03 5
M025	602	1237	700	1	3	-12	-25	0.166	0.0 38	0.6 6.53	0.6 1	0.0 0,289	0.0 26	0.923 78	1630	1 3	8 8	2530	3 34	3,460 208	0.02 6	0.166	0.03 8
M026	4755	361	1513	3	71	40	178	0.081	0.0 19	0.0 0.224	0.0 59	0.0 0,0197	0.0 047	0.855 27	126	2 9	3 1	1200	9 103	50,76 142	0.00 47	0.081	0.01 9

M033	296	166	257	1	1	-3	-33	0.061	0.0 14	0.607	0.0 32	0.0748	0.0 043	0.459 68	465	2 6	1 9	590	5 0	-47	13,36 898	0.00 43	0.061	0.01 4				
	M036	388	674	411	1	5	49	10	0.104	0.0 24	3.07	0.2 7	0,217	0.0 19	0.852 2	1289	8 9	7 1414	1 1	1690	3 0	26	4,608 295	0.01 9	0.104	0.02 4		
		M040	269	454	204	1	9	7	129	0.174	0.0 39	7.22	0.5 4	0,299	0.0 27	0.960 66	1690	3 0	6 2129	8 6	2590	3 0	36	3,344 482	0.02 7	0.174	0.03 9	
			M041	1087	444	367	3	14	-58	-24	0.099	0.0 23	1.311	0.0 60	0,0973	0.0 061	0.757 01	598	3 6	2 849	2 6	1620	4 0	62	10,27 749	0.00 61	0.099	0.02 3
				M042	198	252	119	2	19	-50	-38	0.145	0.0 33	6.45	0.1 7	0,325	0.0 17	0.389 77	1825	8 4	2 2042	2 2	2300	3 0	21	3,076 923	0.01 7	0.145
M044	545	163	178	3	-5	-9	56	0.061	0.0 14	0.822	0.0 35	0,0991	0.0 056	0.194 68	609	3 1	1 608	9	640	0 4	-19	10,09 082	0.00 56	0.061	0.01 4			
	M048	906	698	472	2	13	20	65	0.088	0.0 20	2.06	0.1 9	0,176	0.0 18	0.903 73	1040	0 0	6 1119	5	1370	3 0	23	5,681 818	0.01 8	0.088	0.02 0		
		M050	169	46	74	2	-5	8	-63	0.056	0.0 13	0.461	0.0 36	0,0622	0.0 034	0,058 517	389	2 1	2 383	5	420	0 4	110	16,07 717	0.00 34	0.056	0.01 3	
			M054	419	175	270	2	-4	-11	36	0.054	0.0 13	0.499	0.0 25	0,0684	0.0 040	0.248 14	426	2 4	1 410	7	380	8 0	67	14,61 988	0.00 40	0.054	0.01 3
				M057	426	502	273	1	26	-20	-130	0.124	0.0 28	4.73	0.4 4	0,284	0.0 30	0.922 6	1600	1 0	7 1765	7	2010	4 0	21	3,521 127	0.03 0	0.124
M059	397	330	370	1	6	26	23	0.061	0.0 14	0.745	0.0 36	0,0903	0.0 051	0.379 37	557	3 0	2 568	2	620	5 0	-20	11,07 42	0.00 51	0.061	0.01 4			
	M061	1871	620	1323	1	28	-13	-215	0.058	0.0 13	0.425	0.0 15	0,0531	0.0 031	0.551 46	334	1 9	1 359	1	550	4 0	39	18,83 239	0.00 31	0.058	0.01 3		
		M062	738	874	344	2	9	-5	-180	0.118	0.0 27	4.77	0.2 0	0,3	0.0 18	0.855 29	1689	9 1	3 1777	6 1	1920	1 4	11	3,333 333	0.01 8	0.118	0.02 7	
			M063	231	729	392	1	9	-43	-21	0.182	0.0 43	7.9	1.2 53	0,342	0.0 53	0.787 95	1870	5 0	4 2150	4 0	2640	3 0	30	2,923 977	0.05 3	0.182	0.04 3
				M066	1413	534	965	1	2	16	13	0.058	0.0 13	0.475	0.0 20	0,0604	0.0 033	0.456 03	378	2 0	1 394	1 4	510	9 0	20	16,55 629	0.00 33	0.058
M068	436	129	90	5	5	-9	-56	0.076	0.0 19	1.07	0.1 4	0,0991	0.0 074	0.143 13	609	4 3	6 726	6 2	1040	7 0	32	10,09 082	0.00 74	0.076	0.01 9			
	M069	354	416	194	2	5	-18	-28	0.116	0.0 26	4.39	0.2 8	0,283	0.0 22	0.857 72	1600	1 0	5 1700	5 4	1900	9 0	18	3,533 569	0.02 2	0.116	0.02 6		

M070	694	608	641	1	0	12	0	0.077	0.0 17	1.464	0.0 64	0,1399	0.0 087	0.681 68	844	4 9	914	2 6	1120	4 8 0	23	7,147 963	0.00 87	0.077	0.01 7
M071	405	483	316	1	6	21	29	0.084	0.0 19	1.841	0.0 91	0,1598	0.0 092	0.448 72	955	5 1	1057	3 2	1270	6 0	23	6,257 822	0.00 92	0.084	0.01 9
M072	496	440	308	2	5	-25	-20	0.101	0.0 24	2.83	0.2 9	0,201	0.0 19	0.420 17	1180	0 1	1362	7 5	1660	4 0	27	4,975 124	0.01 9	0.101	0.02 4
M074	938	1036	430	2	30	1	3000	0.149	0.0 34	7.34	0.4 7	0,365	0.0 25	0.847 94	2020	2 0	2151	5 9	2330	8 0	13	2,739 726	0.02 5	0.149	0.03 4
M076	2875	510	1347	2	18	32	56	0.060	0.0 14	0.369	0.0 20	0,046	0.0 028	0.582 89	290	1 7	322	1 6	590	1 0	41	21,73 913	0.00 28	0.060	0.01 4
M079	215	106	139	2	23	29	79	0.067	0.0 16	0.912	0.0 53	0,1028	0.0 061	0.226	631	3 6	662	3 0	800	5 0	15	9,727 626	0.00 61	0.067	0.01 6
M080	183	169	102	2	2	5	40	0.098	0.0 23	3.27	0.1 1	0,241	0.0 14	0.356 01	1392	7 1	1472	2 8	1580	4 0	11	4,149 378	0.01 4	0.098	0.02 3
M083	609	220	113	5	3	-38	-8	0.105	0.0 24	3.85	0.1 4	0,265	0.0 16	0.701 07	1516	8 1	1607	2 8	1710	2 0	11	3,773 585	0.01 6	0.105	0.02 4
M084	1585	1365	1774	1	32	30	107	0.103	0.0 24	1.44	0.1 9	0,106	0.0 12	0.638 37	666	6 3	891	8 1	1650	0 0	62	9,433 962	0.01 2	0.103	0.02 4
M086	2610	1850	938	3	94	3	3133	0.101	0.0 25	1.81	0.3 3	0,12	0.0 20	0.858 74	720	1 2	990	1 3	1650	4 0	54	8,333 333	0.02 0	0.101	0.02 5
M087	2586	277	515	4	5	-22	-23	0.060	0.0 14	0.561	0.0 32	0,0705	0.0 043	0.752 88	439	2 6	451	2 1	600	8 0	21	14,18 44	0.00 43	0.060	0.01 4
M088	1073	195	246	4	-16	-20	80	0.064	0.0 15	0.705	0.0 49	0,0788	0.0 061	0.844 1	488	3 6	538	2 9	720	4 0	27	12,69 036	0.00 61	0.064	0.01 5
M089	427	820	299	1	-1	-20	5	0.175	0.0 40	10.65	0.3 9	0,443	0.0 26	0.829 82	2360	1 0	2489	3 6	2610	3 0	10	2,257 336	0.02 6	0.175	0.04 0
M090	799	650	239	3	18	36	50	0.190	0.0 43	11.51	0.2 5	0,437	0.0 24	0.398 97	2340	1 0	2564	2 0	2740	7 0	15	2,288 33	0.02 4	0.190	0.04 3
M091	483	491	382	1	0	11	0	0.083	0.0 19	1.93	0.1 3	0,1629	0.0 092	0.690 08	973	5 1	1086	4 4	1250	4 0	22	6,138 735	0.00 92	0.083	0.01 9
M093	189	254	173	1	12	20	60	0.155	0.0 36	5.81	0.4 1	0,276	0.0 26	0.725 42	1560	1 0	1951	6 0	2390	8 0	36	3,623 188	0.02 6	0.155	0.03 6
M095	278	729	629	0	0	-24	0	0.074	0.0 17	1.52	0.1 4	0,153	0.0 11	0.749 61	916	6 3	961	4 8	1060	3 0	22	6,535 948	0.01 1	0.074	0.01 7

M097	2695	813	1996	1	32	29	110	0.0579	0.0 043	0.314	0.0 15	0.0391	0.0 032	0.626 14	247	2 0	1 1	530	1 0	48	25,57 545	0.00 32	0.0579	0.00 43
M098	359	260	110	3	1	-14	-7	0.0705	0.0 049	1.980	0.0 80	0.193	0.0 14	0.573 96	1137	7 7	2 1107	8 950	5 0	-23	5,181 347	0.01 4	0.0705	0.00 49
M099	372	542	199	1	9	-28	-32	0.1027	0.0 073	3.77	0.3 4	0.259	0.0 31	0.902 29	1480	6 0	7 1570	6 1660	3 0	13	3,861 004	0.03 1	0.1027	0.00 73
M100	270	533	208	1	3	-9	-33	0.0824	0.0 054	2.83	0.1 2	0.243	0.0 18	0.743 48	1401	9 4	3 1367	4 1250	3 0	-14	4,115 226	0.01 8	0.0824	0.00 54
M101	1732	208	93	14	7	-3	-233	0.0973	0.0 063	2.333	0.0 69	0.17	0.0 13	0.629 37	1013	7 0	2 1221	1 1580	1 0	36	5,882 353	0.01 3	0.0973	0.00 63
M103	1448	2516	815	1	111	20	555	0.319	0.0 22	14.9	1.9	0.325	0.0 42	0.956 95	1800	2 0	1 2760	3 0	1 3570	50	3,076 923	0.04 2	0.319	0.02 2
M108	627	485	218	2	0	-8	0	0.0724	0.0 049	2.221	0.0 81	0.213	0.0 15	0.542 78	1242	8 2	2 1186	2 1010	3 0	-26	4,694 836	0.01 5	0.0724	0.00 49
M110	2258	322	101	14	97	39	249	0.0704	0.0 055	0.948	0.0 66	0.0982	0.0 092	0.747 97	603	5 4	3 686	3 9	7 950	35	10,18 33	0.00 92	0.0704	0.00 55
M111	946	533	160	4	32	14	229	0.1189	0.0 079	5.32	0.2 7	0.313	0.0 25	0.804 59	1750	2 0	4 1875	6 1930	2 0	10	3,194 888	0.02 5	0.1189	0.00 79
M113	1390	667	278	3	18	-36	-50	0.159	0.0 11	6.93	0.7 0	0.301	0.0 35	0.925 08	1690	1 0	1 2080	0 2440	1 0	33	3,322 259	0.03 5	0.159	0.01 1
M115	757	104	132	3	7	-4	-175	0.0536	0.0 036	0.522	0.0 18	0.0686	0.0 048	0.389 19	428	2 9	1 426	1 340	5 0	54	14,57 726	0.00 48	0.0536	0.00 36
M117	2800	369	461	4	39	33	118	0.0734	0.0 054	0.729	0.0 26	0.0708	0.0 054	0.417 57	441	3 2	1 556	1 1030	4 0	56	14,12 429	0.00 54	0.0734	0.00 54
M120	2486	217	216	8	49	10	490	0.0752	0.0 063	0.451	0.0 34	0.0422	0.0 032	0.518 44	266	2 0	2 376	3 1040	7 0	75	23,69 668	0.00 32	0.0752	0.00 63
M121	842	393	482	1	-2	13	-15	0.0605	0.0 053	0.934	0.0 51	0.1082	0.0 080	0.209 99	662	4 6	2 667	2 640	9 0	-54	9,242 144	0.00 80	0.0605	0.00 53
M124	1846	459	542	3	3	25	12	0.0617	0.0 046	0.950	0.0 55	0.11	0.0 080	0.643 73	672	4 6	2 675	2 640	6 0	-18	9,090 909	0.00 80	0.0617	0.00 46
M125	2332	494	1441	1	9	21	43	0.0588	0.0 041	0.405	0.0 18	0.0508	0.0 037	0.451 46	319	2 3	1 344	1 560	4 0	41	19,68 504	0.00 37	0.0588	0.00 41
M128	2679	742	1051	2	10	-30	-33	0.0921	0.0 066	1.62	0.3 4	0.122	0.0 24	0.981 9	740	4 0	3 930	3 1470	4 0	49	8,196 721	0.02 4	0.0921	0.00 66

M130	1153	256	613	2	-16	-13	123	0.0573	0.0 058	0.0 0.512	0.0 46	0.0 0,0635	0.0 050	0.407 04	397	3 0	3 425	3 3	500 0	2 32	15,74 803	0.00 50	0.0573	0.00 58
M131	886	548	827	1	-1	1	-100	0.0600	0.0 042	0.0 0.892	0.0 49	0.0 0,1068	0.0 080	0.574 66	654	4 6	2 645	2 6	590 0	5 -21	9,363 296	0.00 80	0.0600	0.00 42
M132	1815	994	4611	0	-4	1	-400	0.1566	0.0 098	0.1 3.63	0.1 7	0.0 0,166	0.0 14	0.919 41	991	7 8	3 1552	3 7	2430 0	2 59	6,024 096	0.01 4	0.1566	0.00 98
M133	5502	175	798	8	23	12	192	0.0706	0.0 048	0.0 0.268	0.0 15	0.0 0,0267	0.0 024	0.842 36	170	1 5	1 240	1 2	950 0	1 81	37,45 318	0.00 24	0.0706	0.00 48
M135	109	179	136	1	-17	-3	567	0.0940	0.0 079	0.2 3.57	0.2 2	0.0 0,277	0.0 20	0.265 77	1580	0 0	4 1535	4 8	1480 0	6 -13	3,610 108	0.02 0	0.0940	0.00 79
M136	222	7	8	35	9	-35	-26	0.0657	0.0 085	0.0 0.641	0.0 95	0.0 0,0683	0.0 060	0.589 78	426	3 6	5 496	5 7	730 0	8 72	14,64 129	0.00 60	0.0657	0.00 85
M137	667	242	262	3	-30	-12	250	0.1001	0.0 084	0.3 3.09	0.3 9	0.0 0,214	0.0 26	0.935 66	1250	4 0	1 1400	1 0	1600 0	6 24	4,672 897	0.02 6	0.1001	0.00 84
M138	522	400	398	2	1	20	5	0.1318	0.0 093	0.4 6.48	0.4 2	0.0 0,354	0.0 28	0.822 3	1950	3 0	5 2034	5 9	2110 0	2 10	2,824 859	0.02 8	0.1318	0.00 93
M139	4285	274	970	5	19	-66	-29	0.0865	0.0 068	0.0 0.896	0.0 77	0.0 0,0736	0.0 070	0.741 01	458	4 2	4 645	4 1	1360 0	7 64	13,58 696	0.00 70	0.0865	0.00 68
M141	860	151	655	2	2	31	6	0.0537	0.0 050	0.0 0.399	0.0 41	0.0 0,0517	0.0 046	0.502 97	325	2 8	3 343	3 0	330 0	0 76	19,34 236	0.00 46	0.0537	0.00 50
M142	175	256	160	2	-9	23	-39	0.164	0.0 14	0.7 12.47	0.7 2	0.0 0,513	0.0 57	0.752 49	2790	2 0	5 2632	5 5	2470 0	5 -11	1,949 318	0.05 7	0.164	0.01 4
M145	2205	694	2968	1	17	-33	-52	0.167	0.0 12	0.3 3.20	0.3 2	0.0 0,137	0.0 15	0.720 4	823	8 4	7 1454	7 5	2520 0	2 67	7,299 27	0.01 5	0.167	0.01 2
M146	1019	351	486	3	5	-5	-100	0.0841	0.0 054	0.0 2.158	0.0 73	0.0 0,184	0.0 13	0.556	1088	7 0	2 1165	2 4	1290 0	3 15	5,434 783	0.01 3	0.0841	0.00 54
M147	657	1357	854	1	6	8	75	0.207	0.0 13	0.5 14.05	0.5 2	0.0 0,488	0.0 34	0.677 94	2560	5 0	3 2749	3 6	2880 0	0 13	2,049 18	0.03 4	0.207	0.01 3
M149	107	63	42	4	2	-8	-25	0.161	0.0 12	0.6 9.12	0.6 6	0.0 0,388	0.0 30	0.667 16	2110	4 0	6 2353	6 2	2450 0	3 12	2,577 32	0.03 0	0.161	0.01 2
M150	632	387	259	4	-5	-33	15	0.169	0.0 11	0.8 8.61	0.8 7	0.0 0,365	0.0 35	0.946 6	2000	7 0	9 2306	9 3	2540 0	1 22	2,739 726	0.03 5	0.169	0.01 1

Sample Name		cPb Pb/Hg*100 > 25 AND 204Pb>100 cps			Discordance >10%			U (ppm)																	
12TM-33B								>1400																	
					cPb			uncorrected ratios							uncorrected ages							inversed conc.			
Run	U	Pb	Th		204	202	Pb/Hg	207Pb/		207Pb/	2S	206Pb/		error	206Pb/	+	207Pb/	+	207Pb/	+	disc	238/20	2	207Pb/	2sig
name	(ppm)	(ppm)	(ppm)	U/Th	Pb	Hg	*100	206Pb	2SE	235U	E	238U	2SE	corr.	238U	-	235U	-	206Pb	-	-%	6	sigma	206Pb	ma
N20	255	176	107	3	1	-5	-20	0.099	0.017	2.05	0.41	0.147	0.013	0.53267	883	72	1053	80	1440	80	-2	6,80272109	0.013	0.099	0.017
N59	258	187	40	11	1	-6	-17	0.1062	0.0080	4.00	0.18	0.263	0.018	0.23121	1506	94	1628	36	1750	4	9	3,80228137	0.018	0.1062	0.0080
N61	311	493	128	2	-1	-5	20	0.1034	0.0069	3.87	0.12	0.27	0.019	0.406	1539	95	1604	26	1690	30	8	3,7037037	0.019	0.1034	0.0069
N62	632	601	229	3	-5	24	-21	0.0763	0.0053	1.846	0.084	0.175	0.012	0.55365	1037	68	1066	32	1110	30	7	5,71428571	0.012	0.0763	0.0053
N64	505	602	136	4	7	-11	-64	0.1158	0.0074	5.45	0.13	0.338	0.023	0.23468	1880	10	1891	21	1890	20	2	2,95857988	0.023	0.1158	0.0074
N65	873	324	142	6	-6	37	-16	0.0729	0.0049	1.596	0.054	0.159	0.011	0.27436	950	61	971	20	1000	40	1	6,28930818	0.011	0.0729	0.0049
N66	693	229	100	6	-21	-20	105	0.0711	0.0051	1.642	0.063	0.161	0.011	0.14434	965	63	988	25	960	40	-5	6,21118012	0.011	0.0711	0.0051
N69	438	1346	275	1	-12	-11	109	0.1354	0.0089	6.64	0.18	0.358	0.026	0.31733	1970	20	2067	25	2160	10	8	2,79329609	0.026	0.1354	0.0089
N71	1595	202	117	12	-6	1	-600	0.0634	0.0048	0.990	0.077	0.1127	0.0095	0.87374	688	55	695	39	700	60	-5	8,87311446	0.0095	0.0634	0.0048
N72	1233	686	158	7	7	2	350	0.1196	0.0075	5.63	0.10	0.342	0.024	0.50095	1890	10	1919	16	1950	10	3	2,92397661	0.024	0.1196	0.0095
N76	153	315	77	2	-1	5	-20	0.1142	0.0075	5.12	0.15	0.329	0.022	0.29909	1830	10	1839	26	1890	20	2	3,03951368	0.022	0.1142	0.0075
N78	587	190	100	4	-9	-1	900	0.0720	0.0047	1.650	0.060	0.167	0.012	0.65089	994	68	990	22	980	40	-3	5,98802395	0.012	0.0720	0.0047
N82	360	572	121	2	-9	7	-129	0.168	0.011	10.01	0.42	0.431	0.031	0.77117	2310	40	2431	39	2540	10	9	2,32018561	0.031	0.168	0.011
N84	1310	312	78	18	5	-9	-56	0.170	0.011	10.63	0.17	0.457	0.032	0.33823	2430	40	2491	15	2550	10	4	2,18818381	0.032	0.170	0.011

N88	438	731	248	1	6	-20	-30	0.1108	0.075	4.96	0.17	0.326	0.023	0.42172	1820	1	1817	27	1820	1	3	0	-1	3,06748466	0.023	0.1108	0.0075
N89	518	360	118	4	-20	-44	45	0.1211	0.079	5.62	0.13	0,343	0.023	0.24624	1900	1	1918	21	1970	1	2	0	3	2,9154519	0.023	0.1211	0.0079
N90	485	628	247	2	9	-31	-29	0.0996	0.064	3.89	0.11	0,286	0.019	0.48158	1620	9	1610	23	1630	2	2	0	0	3,4965035	0.019	0.0996	0.0064

Discordant																											
N1	2438	501	1812	2	5	-32	-16	0.0654	0.046	0.423	0.015	0,046	0.0032	0.54027	290	2	358	11	780	1	4	0	54	21,7391304	0.0032	0.0654	0.0046
N2	1433	182	177	13	-10	15	-67	0.0816	0.054	2.002	0.065	0,171	0.012	0.48068	1019	6	1115	22	1230	1	3	0	15	5,84795322	0.012	0.0816	0.0054
N3	293	54	90	4	9	23	39	0.132	0.034	1.17	0.041	0,057	0.011	0.5305	354	6	760	80	1850	1	4	0	78	17,5438596	0.011	0.132	0.005
N4	684	945	397	2	5	-46	-11	0.171	0.011	10.37	0.056	0,432	0.037	0.85561	2310	7	2462	51	2570	1	1	0	10	2,31481481	0.037	0.171	0.001
N5	1144	628	367	4	2	10	20	0.1165	0.081	4.63	0.041	0,28	0.020	0.040506	1591	9	1759	22	1900	3	3	0	15	3,57142857	0.020	0.1165	0.0081
N6	5609	297	687	20	35	-20	-175	0.0997	0.086	1.001	0.086	0,0703	0.0056	0.82798	438	3	699	43	1590	1	6	0	73	14,2247511	0.0056	0.0997	0.0086
N7	377	106	88	5	-16	-22	73	0.0890	0.089	2.20	0.020	0,172	0.014	0.39134	1023	7	1170	65	1400	2	0	0	25	5,81395349	0.014	0.0890	0.0089
N8	1552	895	553	3	18	-39	-46	0.158	0.010	4.59	0.041	0,206	0.016	0.69245	1204	8	1740	38	2430	1	1	0	50	4,85436893	0.016	0.158	0.001
N9	1079	1707	874	1	-5	21	-24	0.1258	0.081	5.17	0.06	0,288	0.020	0.49392	1640	9	1850	25	2040	1	1	0	19	3,47222222	0.020	0.1258	0.0081
N10	1071	1505	659	2	-10	-14	71	0.1369	0.086	6.48	0.07	0,332	0.024	0.66072	1850	1	2041	23	2180	1	1	0	16	3,01204819	0.024	0.1369	0.0086
N11	300	112	83	4	6	23	26	0.0996	0.079	2.61	0.02	0,185	0.013	0.10006	1091	7	1298	34	1620	5	5	0	32	5,40540541	0.013	0.0996	0.0079
N12	3513	282	417	10	7	-12	-58	0.0694	0.045	0.888	0.025	0,09	0.0063	0.39691	555	3	647	13	900	3	3	0	37	11,1111111	0.0063	0.0694	0.0045
N13	1341	355	222	7	-6	42	-14	0.0902	0.062	2.260	0.074	0,173	0.012	0.15573	1031	6	1206	23	1430	1	3	0	28	5,78034682	0.012	0.0902	0.0062

N14	513	561	211	3	-4	-25	16	0.1104	0.072	4.13	0.12	0,258	0.018	0.39375	1481	93	1658	5	1800	18	3,87596899	0.018	0.1104	0.0072
N15	2415	1462	704	4	-2	-20	10	0.1132	0.073	3.540	0.088	0,219	0.016	0.44383	1275	83	1535	20	1860	30	4,56621005	0.016	0.1132	0.0073
N16	871	563	178	6	-10	8	-125	0.1507	0.096	7.20	0.15	0,336	0.024	0.50669	1870	10	2140	7	2350	20	2,97619048	0.024	0.1507	0.0096
N17	397	424	99	5	1	16	6	0.217	0.015	14.34	0.25	0,46	0.033	0.46022	2440	50	2777	9	2960	17	2,17391304	0.033	0.217	0.015
N18	810	284	146	7	11	-41	-27	0.1030	0.075	2.927	0.096	0,2	0.015	0.39413	1174	81	1394	7	1700	32	55	0.015	0.1030	0.0075
N19	456	205	73	8	7	19	37	0.1289	0.086	5.32	0.17	0,289	0.020	0.46041	1640	20	1873	8	2090	22	3,46020761	0.020	0.1289	0.0086
N21	2110	435	719	4	-4	-1	400	0.0649	0.049	0.512	0.26	0,0558	0.041	0.50304	350	25	419	7	770	38	17,921147	0.0041	0.0649	0.0049
N22	1748	2813	784	3	3	-10	-30	0.194	0.014	10.38	0.45	0,38	0.027	0,033829	2070	30	2465	2	2760	25	2,63157895	0.027	0.194	0.014
N23	914	746	261	5	-9	27	-33	0.1143	0.074	3.90	0.16	0,237	0.017	0.64391	1371	89	1615	2	1890	27	4,21940928	0.017	0.1143	0.0074
N24	817	111	104	11	-5	19	-26	0.0735	0.052	0.942	0.38	0,0887	0.062	0.14499	548	37	676	9	1020	41	11,2739572	0.0062	0.0735	0.0052
N25	3038	426	840	6	11	4	275	0.0653	0.044	0.344	0.16	0,0375	0.029	0.66465	237	18	299	2	800	64	26,6666667	0.0029	0.0653	0.0044
N26	8395	1009	2310	6	18	32	56	0.0729	0.059	0.331	0.36	0,0318	0.043	0.92848	201	27	288	8	1020	79	31,4465409	0.0043	0.0729	0.0059
N27	2959	308	371	14	9	-2	-450	0.0620	0.044	0.543	0.26	0,0617	0.046	0.4167	386	28	440	7	680	41	16,2074554	0.0046	0.0620	0.0044
N28	12705	2811	2846	7	312	640	49	0.144	0.010	1.041	0.78	0,0481	0.043	0.76272	303	27	720	8	2290	87	20,7900208	0.0043	0.144	0.010
N29	797	200	78	16	-3	5	-60	0.0987	0.068	2.727	0.85	0,193	0.014	0.29796	1140	74	1333	3	1590	27	5,18134715	0.014	0.0987	0.0068
N30	1102	492	226	8	-1	-8	13	0.1284	0.091	2.25	0.3	0,124	0.010	0.80137	755	81	1192	0	2070	63	8,06451613	0.010	0.1284	0.0091
N31	408	729	151	5	48	4	1200	0.185	0.016	8.83	0.5	0,337	0.027	0.85396	1870	30	2301	1	2680	32	2,96735905	0.027	0.185	0.016

N32	1163	610	170	12	-6	24	-25	0.1307	0.0 080	5.06	0.1 1	0,27	0.0 18	0.409 35	1542	9 3	1828	1 8	2110	1 0 0 26	3,7037 037	0.01 8	0.1307	0.00 80
N33	2344	17	23	217	-12	19	-63	0.0656	0.0 054	0.498	0.0 34	0,0544	0.0 046	0.671 15	341	2 8	416	2 0	770	1 7 0 46	18,382 3529	0.00 46	0.0656	0.00 54
N34	1473	1619	320	8	19	30	63	0.204	0.0 14	12.07	0.3 7	0,41	0.0 29	0.674 6	2210	0 1 3	2607	2 9	2850	1 0 1 22	2,4390 2439	0.02 9	0.204	0.01 4
N35	176	337	61	5	2	11	18	0.206	0.0 13	12.60	0.4 1	0,42	0.0 29	0.516 47	2270	5 0	2647	3 0	2870	1 0 1 20	2,3809 5238	0.02 9	0.206	0.01 3
N36	1191	300	108	21	-14	-2	700	0.1018	0.0 064	2.795	0.0 64	0,194	0.0 13	0.570 08	1143	7 2	1353	1 7	1660	1 1 0 31	5,1546 3918	0.01 3	0.1018	0.00 64
N37	495	651	116	9	-4	-12	33	0.221	0.0 15	13.31	0.5 5	0,422	0.0 31	0.548 15	2270	4 0	2716	3 8	2980	1 1 0 24	2,3696 6825	0.03 1	0.221	0.01 5
N38	391	345	93	9	8	-15	-53	0.1132	0.0 078	3.81	0.1 4	0,232	0.0 17	0.314 34	1346	8 8	1591	2 9	1840	2 0 2 26	4,3103 4483	0.01 7	0.1132	0.00 78
N39	1185	159	166	16	-6	-4	150	0.0611	0.0 057	0.532	0.0 36	0,0597	0.0 043	0,012 105	374	2 6	431	2 4	620	1 0 1 38	16,750 4188	0.00 43	0.0611	0.00 57
N40	901	248	60	33	-5	-14	36	0.1226	0.0 083	4.98	0.1 4	0,282	0.0 19	0,093 056	1599	9 7	1819	2 3	1990	2 0 1 18	3,5460 9929	0.01 9	0.1226	0.00 83
N41	1885	55	39	109	3	5	60	0.0702	0.0 045	0.858	0.0 35	0,0857	0.0 062	0.672 04	530	3 7	631	1 9	970	3 0 1 44	11,668 6114	0.00 62	0.0702	0.00 45
N42	1167	83	36	104	-1	3	-33	0.0744	0.0 059	0.882	0.0 59	0,0842	0.0 071	0.764 41	521	4 2	647	2 9	1070	6 0 1 48	11,876 4846	0.00 71	0.0744	0.00 59
N43	1450	684	211	15	-8	-32	25	0.1030	0.0 065	3.174	0.0 75	0,215	0.0 15	0.359 52	1253	7 7	1449	1 8	1680	2 0 1 24	4,6511 6279	0.01 5	0.1030	0.00 65
N44	933	57	57	36	-2	-3	67	0.0610	0.0 047	0.536	0.0 27	0,0614	0.0 042	0.069 496	384	2 5	434	1 8	590	7 0 1 26	16,286 645	0.00 42	0.0610	0.00 47
N45	718	261	100	16	-12	-9	133	0.0852	0.0 059	2.031	0.0 78	0,166	0.0 11	0.482 22	994	6 6	1128	2 7	1310	3 0 1 21	6,0240 9639	0.01 1	0.0852	0.00 59
N46	2042	506	346	13	-3	-6	50	0.0709	0.0 048	0.876	0.0 29	0,0872	0.0 060	0.355 2	539	3 5	638	1 5	950	3 0 1 40	11,467 8899	0.00 60	0.0709	0.00 48
N47	209	631	111	4	-1	-5	20	0.166	0.0 11	8.90	0.2 5	0,376	0.0 27	0.550 83	2060	3 0	2325	2 6	2510	1 0 1 17	2,6595 7447	0.02 7	0.166	0.01 1
N48	3523	1370	888	9	6	-42	-14	0.1410	0.0 090	2.37	0.2 2	0,114	0.0 12	0.961 11	695	7 0	1216	6 5	2240	1 1 0 69	8,7719 2982	0.01 2	0.1410	0.00 90

N49	698	172	163	8	-1	-16	6	0.0628	0.0 048	0.538	0.0 25	0.0619	0.0 043	0.147 64	387	2 6	1 6	670	1 6 0	35	16,155 0889	0.00 43	0.0628	0.00 48
N50	1497	171	185	16	-2	1	-200	0.0617	0.0 046	0.528	0.0 22	0,0592	0.0 042	0.268 29	371	2 5	1 5	660	1 7 0	35	16,891 8919	0.00 42	0.0617	0.00 46
N51	1559	643	223	13	9	-11	-82	0.1303	0.0 094	3.42	0.1 9	0,186	0.0 15	0.577 42	1100	8 3	4 3	2090	1 2 0	47	5,3763 4409	0.01 5	0.1303	0.00 94
N52	640	90	65	19	3	2	150	0.0660	0.0 052	0.731	0.0 39	0,0768	0.0 055	0.258 4	477	3 3	2 3	810	1 7 0	27	13,020 8333	0.00 55	0.0660	0.00 52
N53	3130	1284	2118	3	35	2	1750	0.1452	0.0 095	2.32	0.2 4	0,11	0.0 13	0.961 33	672	7 3	7 1	2290	1 1 0	70	9,0909 0909	0.01 3	0.1452	0.00 95
N54	512	343	116	8	-17	21	-81	0.0906	0.0 060	2.394	0.0 74	0,188	0.0 13	0.505 84	1107	7 2	2 3	1430	1 3 0	19	5,3191 4894	0.01 3	0.0906	0.00 60
N55	284	264	95	5	-9	-11	82	0.0824	0.0 061	2.011	0.0 91	0,173	0.0 12	0.288 98	1028	6 7	3 1	1230	1 5 0	13	5,7803 4682	0.01 2	0.0824	0.00 61
N56	579	166	63	16	-21	1	-2100	0.0833	0.0 064	2.18	0.1 2	0,18	0.0 13	0.386 33	1065	6 9	4 0	1280	1 6 0	14	5,5555 5556	0.01 3	0.0833	0.00 64
N57	966	376	254	7	7	-3	-233	0.0672	0.0 051	0.865	0.0 36	0,0897	0.0 064	0.265 8	553	3 8	2 0	820	1 6 0	24	11,148 272	0.00 64	0.0672	0.00 51
N58	280	673	109	4	-2	7	-29	0.197	0.0 13	13.11	0.5 6	0,461	0.0 34	0.538 78	2440	1 5 0	4 0	2820	1 1 0	12	2,1691 974	0.03 4	0.197	0.01 3
N60	257	311	61	7	5	25	20	0.1290	0.0 088	5.77	0.2 2	0,322	0.0 22	0.523 99	1800	1 0	3 4	2080	1 2 0	14	3,1055 9006	0.02 2	0.1290	0.00 88
N63	1820	20	13	145	-7	1	-700	0.0606	0.0 044	0.506	0.0 21	0,0598	0.0 042	0.218 71	374	2 5	1 4	600	1 6 0	18	16,722 408	0.00 42	0.0606	0.00 44
N67	529	122	135	4	1	-34	-3	0.0588	0.0 054	0.527	0.0 43	0,0636	0.0 049	0.391 75	397	3 0	2 8	510	2 0 0	77	15,723 2704	0.00 49	0.0588	0.00 54
N68	5967	634	1139	5	16	76	21	0.1287	0.0 086	0.94	0.1 5	0,0514	0.0 079	0.978 08	322	4 9	7 6	2070	1 2 0	85	19,455 2529	0.00 79	0.1287	0.00 86
N70	727	719	172	4	8	-23	-35	0.1498	0.0 096	7.01	0.2 4	0,338	0.0 24	0.548 01	1880	1 0	3 0	2340	1 1 0	21	2,9585 7988	0.02 4	0.1498	0.00 96
N73	1171	162	63	15	5	6	83	0.0766	0.0 059	1.407	0.0 84	0,1334	0.0 094	0.423 56	807	5 3	3 5	1090	1 5 0	26	7,4962 5187	0.00 94	0.0766	0.00 59
N74	1954	323	100	8	9	25	36	0.0919	0.0 086	2.07	0.1 8	0,166	0.0 13	0.716 59	991	7 2	6 2	1440	1 8 0	31	6,0240 9639	0.01 3	0.0919	0.00 86

N75	773	2235	674	1	-2	5	-40	0.0996	0.0	3.328	0.0	0.245	0.0	0.468	1410	8	1490	1	1630	1	12	4,0816	0.01	0.0996	0.00		
									064		79		17	25		8		8		2		3265	7		64		
N77	503	363	333	1	0	-1	0	0.0564	0.0	0.647	0.0	0.084	0.0	0.046	520	3	505	1	440	6	55	11,904	0.00	0.0564	0.00		
									043		26		058	746		5		6		0		7619	58		43		
N79	5036	772	2835	2	69	149	46	0.0720	0.0	0.285	0.0	0.031	0.0	0.877	196	2	252	1	1000	7	56	32,258	0.00	0.0720	0.00		
									059		25		043	09		7		9		0		0645	43		59		
N80	2803	185	333	6	3	-2	-150	0.0557	0.0	0.291	0.0	0.0406	0.0	0.865	256	3	258	1	430	6	39	24,630	0.00	0.0557	0.00		
									039		25		048	22		0		9		0		5419	48		39		
N81	936	176	281	3	5	-10	-50	0.0568	0.0	0.414	0.0	0.0547	0.0	0.574	343	2	350	2	440	9	86	18,281	0.00	0.0568	0.00		
									051		31		040	26		4		2		0		5356	40		51		
N83	680	289	362	1	9	23	39	0.0560	0.0	0.480	0.0	0.0647	0.0	0.216	404	2	397	1	420	7	77	15,455	0.00	0.0560	0.00		
									043		20		045	99		7		4		0		9505	45		43		
N85	542	716	196	2	4	-39	-10	0.176	0.0	9.91	0.2	0.418	0.0	0.577	2250	1	2424	2	2620	1	14	2,3923	0.03	0.176	0.01		
									11		4		30	31		4		2		0		445	0		1		
N86	642	203	302	2	1	-6	-17	0.0574	0.0	0.506	0.0	0.0665	0.0	0.303	415	2	418	2	470	8	32	15,037	0.00	0.0574	0.00		
									049		29		047	3		8		1		0		594	47		49		
N87	1290	282	467	2	6	-32	-19	0.0565	0.0	0.447	0.0	0.058	0.0	0.432	363	2	374	1	450	7	65	17,241	0.00	0.0565	0.00		
									043		24		042	63		6		7		0		3793	42		43		