Detrital zircon ages and the origins of the Nashoba terrane and Merrimack belt in southeastern New England, USA

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ABSTRACT

The fault-bounded Nashoba–Putnam terrane, a metamorphosed early Paleozoic, Ganderian arc/back-arc complex in SE New England, lies between rocks of Avalonian affinity to the southeast and middle Paleozoic sedimentary rocks, interpreted as cover on Ganderian basement, in the Merrimack belt to the northwest. U–Pb detrital zircon laser ablation inductively coupled plasma mass spectrometry analysis were conduced on six samples from the Nashoba terrane in Massachusetts and seven samples associated with the Merrimack belt in Massachusetts and SE New Hampshire to investigate their depositional ages and provenance. Samples from the Nashoba terrane yielded major age populations between ~560 and ~540 Ma, consistent with input from local sources formed during the Ediacaran–Cambrian Penobscot orogenic cycle and its basement rocks. Youngest detrital zircons in the terrane, however, are as young as the Early to Middle Ordovician. Six formations from the Merrimack belt were deposited between ~435 and 420 Ma based on youngest zircon age populations and crosscutting plutons, and yielded large ~470–443 Ma age populations. Three of these formations show only Gondwanan provenance. Three others have a mixed Gondwanan-Laurentian signal, which is known to be typical for younger and/or more westerly sedimentary rocks and may indicate that they are the youngest deposits in the Merrimack belt (late Silurian to early Devonian) and/or have been deposited in the equivalent of the more westerly Central Maine basin. Detrital zircon age populations from the Tower Hill Formation, along the faulted contact between the Merrimack belt and Nashoba terrane, are different from either of these tectonic domains and may indicate that the boundary is complex.

RÉSUMÉ

Le terrane limité par des failles de Nashoba-Putnam, un complexe d'arc/arrière-arc métamorphisé gandérien du Paléozoïque précoce dans le sud-est de la Nouvelle-Angleterre, se trouve entre des roches ayant une affinité avalonienne au sud-est et des roches sédimentaires du Paléozoïque moyen, interprétées comme une couverture du socle gandérien, dans la ceinture de Merrimack au nord-ouest. Six échantillons provenant du terrane de Nashoba au Massachusetts et sept échantillons associés à la ceinture de Merrimack au Massachusetts et dans le sud-est du New Hampshire ont fait l'objet d'une analyse par spectrométrie de masse avec plasma à couplage inductif et par ablation par laser de datation U–Pb sur zircon détritique aux fins de l'examen de leurs âges sédimentaires et de leur provenance. Les échantillons provenant du terrane de Nashoba ont révélé des populations principalement âgées entre environ 560 et 540 Ma, ce qui correspond à la contribution des sources locales apparues durant le cycle orogénique édiacarien-cambrien de Penobscot et aux roches de son socle. Les zircons détritiques les plus récents dans le terrane remontent cependant seulement à l'Ordovicien précoce à moyen. Six formations de la ceinture de Merrimack se sont déposées à peu près entre 435 et 420 Ma selon les populations des âges les plus récents sur zircon et les plutons transversaux, et elles ont présenté de vastes populations âgées d'environ 470 à 443 Ma. Trois de ces formations témoignent uniquement d'une provenance gondwanienne. Trois autres évoquent de façon mixte le Gondwanien et le Laurentien, ce qui est reconnu comme un trait typique des roches sédimentaires plus récentes ou plus à l'ouest et qui pourrait révéler qu'il s'agit de dépôts plus récents dans la ceinture de Merrimack (du Silurien tardif au Dévonien précoce) ou qui se seraient mis en place dans l'unité équivalente du bassin plus occidental du centre du Maine. Les populations d'un âge sur zircon détritique de la Formation de Tower Hill le long de la zone de contact faillé entre la ceinture de Merrimack et le terrane de Nashoba diffèrent de l'un et l'autre de ces domaines tectoniques et pourraient indiquer que leur limite est complexe.

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INTRODUCTION

Two Neoproterozoic to early Paleozoic Gondwanan-derived terranes form the eastern portion of southeastern New England: Avalonia to the southeast and the Nashoba–Putnam terrane of Ganderian affinity to its northwest. These are followed westward by a thick succession of Silurian–Devonian cover rocks in the Merrimack belt (Fig. 1). In order to develop a comprehensive overview of the sedimentary and tectonic history of Ganderia in southeastern New England, analyses of detrital zircon from representative metasedimentary rocks in both the Nashoba terrane and Merrimack belt were carried out by U–Pb laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS) to determine their maximum depositional ages, provenance and potential correlations in the northern Appalachians. Six samples from the Nashoba terrane in Massachusetts and six from the Merrimack belt in Massachusetts and southeastern New Hampshire were analyzed. One additional sample was taken from along the faulted boundary between the Merrimack belt and the Nashoba terrane.

Geological background

Nashoba terrane

The Nashoba terrane in eastern Massachusetts (Fig. 1) is an early Paleozoic arc/back-arc complex that, based on Sm/Nd isotope compositions and model ages, developed on an older crustal basement (e.g., Goldsmith 1991a; Hepburn *et al.* 1995; Kay *et al.* 2017; Walsh *et al.* 2021). It has been interpreted as the trailing edge of Ganderia in SE New England

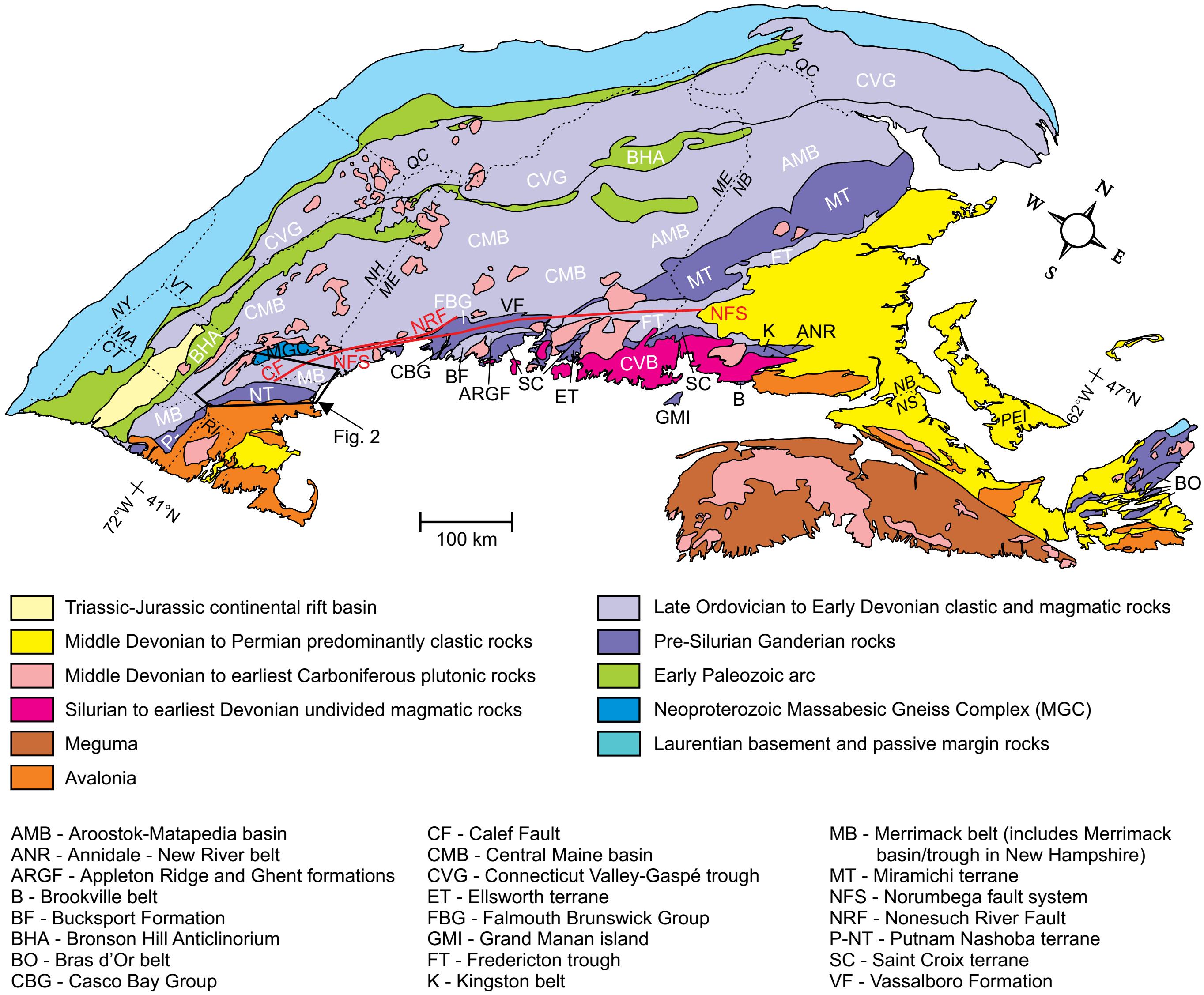


Figure 1. Simplified geological map of the northern Appalachians. Modified after Hibbard *et al.* (2006). CT – Connecticut, MA – Massachusetts, ME – Maine, NB – New Brunswick, NH – New Hampshire, NS – Nova Scotia, NY – New York, PEI – Prince Edward Island, RI – Rhode Island, QC – Quebec, VT – Vermont.

(e.g., Hibbard *et al.* 2006; van Staal *et al.* 2009; Walsh *et al.* 2011b, 2015, 2021; Kay *et al.* 2017). The Nashoba terrane consists of highly metamorphosed and multiply deformed early Paleozoic volcanic and volcanogenic sedimentary rocks that are intruded by abundant middle Paleozoic dioritic and granitic plutons (e.g., Wones and Goldsmith 1991; Zartman and Marvin 1991; Hepburn *et al.* 1995). It is separated from the Avalonian rocks to the southeast by the Burlington mylonite zone, which was later overprinted by the more brittle Bloody Bluff fault zone (Castle *et al.* 1976; Zen *et al.* 1983; Skehan *et al.* 1998; Kohut and Hepburn 2004), and from the Merrimack belt to the northwest by the Clinton-Newbury fault zone (Figs. 1, 2; Skehan 1968; Castle *et al.* 1976; Zen *et al.* 1983; Goldsmith 1991b). The stratified units generally dip moderately to steeply northwest (Bell and Alvord 1976; Goldsmith 1991a). In the southeast, the terrane consists largely of mafic metavolcanic and metasedimentary rocks of the Marlboro Formation, while to the northwest predominantly volcanogenic metasedimentary rocks of the Nashoba Formation dominate (Bell and Alvord 1976; Goldsmith 1991a; Hepburn *et al.* 1995). Other major units include a schistose unit (Tadmuck Brook Schist), an orthogneiss (Fish Brook Gneiss) and a paragneiss (Shawsheen Gneiss) (Fig. 2; Bell and Alvord 1976; Zen *et al.* 1983; Goldsmith 1991a; Hepburn *et al.* 1995). The metavolcanic and metasedimentary units in the southeast are interpreted to have been part of an arc or formed in a near-arc basin, while those in the northwest have been interpreted to represent largely contemporaneous to somewhat younger sedimentary deposits with minor volcanic input in a back-arc basin developed farther from an arc (e.g., Goldsmith 1991a; Hepburn *et al.* 1995; Kay *et al.* 2017).

The terrane is intruded by abundant Silurian to Carboniferous granitic and dioritic plutons. Some of these plutons have been dated using various methods of U–Pb zircon geochronology. These include the 430 ± 5 Ma Sharpner's Pond Diorite (Zartman and Naylor 1984), two phases of the Andover Granite, which are 419 ± 0.5 Ma (Dabrowski

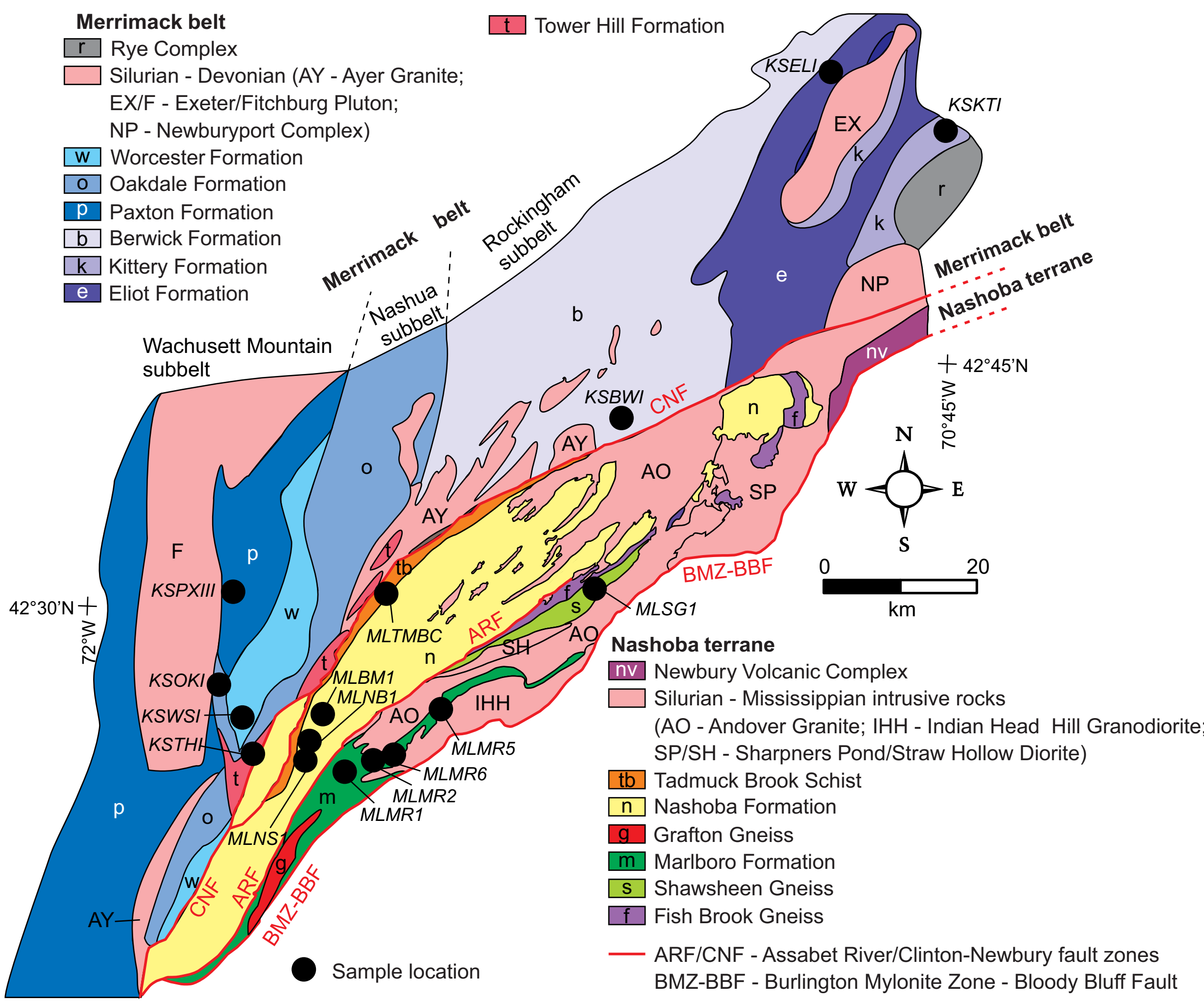


Figure 2. Simplified geological map and sample locations (labeled in italic) for the Nashoba terrane and Merrimack belt. Modified after Robinson and Goldsmith (1991), Hepburn *et al.* (1995) and Lyons *et al.* (1997). Subbelts of the Merrimack belt from Robinson and Goldsmith (1991).

2013; Dabrowski *et al.* 2013) and 412 ± 2 Ma (Hepburn *et al.* 1995), the 420.5 ± 0.5 Ma Sudbury granite (Dabrowski 2013; Dabrowski *et al.* 2013), the 385 ± 10 Ma Straw Hollow diorite (Acaster and Bickford 1999) and the 349 ± 4 Ma Indian Head Hill Granite (Hepburn *et al.* 1995).

Previous age determinations on rocks associated with the stratified units in the Nashoba terrane are limited. They include a ~540 Ma mafic boudin in the Quinebaug Formation (a unit in the Putnam terrane to the south in Connecticut correlated with the Marlboro Formation), a 515 ± 4 Ma date on the Grafton Gneiss that cross-cuts part of the Marlboro Formation, and a 500.6 ± 4.2 Ma date on a feldspathic granofels in the Marlboro Formation structurally above the Grafton Gneiss (U–Pb zircon SHRIMP, Walsh *et al.* 2009, 2011a, b, 2021). The granofels was derived from a proximal volcanic source and its age is interpreted as the approximate age of deposition (Walsh *et al.* 2021). In addition to the ~540–500 Ma volcanic rocks of the Marlboro Formation and the Grafton Gneiss, the Fish Brook orthogneiss (Fig. 2) has also been dated as Cambrian (499 +6/-3 Ma, U–Pb zircon ID-TIMS, Hepburn *et al.* 1995).

Deformation and metamorphism in the Nashoba terrane are primarily a result of the late Silurian–Devonian Acadian orogeny that resulted from accretion of Avalonia and its subsequent westward convergence (e.g., Hepburn *et al.* 1995; van Staal *et al.* 2009, 2020; Kuiper *et al.* 2014; Walsh *et al.* 2015, 2021; Severson 2020). Post-Acadian zircon and monazite in the Nashoba terrane have been interpreted to be a result of the late Devonian Neoacadian and/or Pennsylvanian–Permian Alleghanian orogenic events and/or hydrothermal fluids (Wintsch *et al.* 2007; Stroud *et al.* 2009; Loan 2011; Buchanan *et al.* 2017; Walsh *et al.* 2021).

Late Ordovician to Early Devonian cover successions

Late Ordovician to Early Devonian calcareous and pelitic turbiditic rocks form extensive cover successions on older Ganderian rocks throughout the northern Appalachians from southern New England to Newfoundland (e.g., Williams 1978; Tucker *et al.* 2001; Tremblay and Pinet 2005; Hibbard *et al.* 2006). In New England, these sedimentary rocks show increasing Laurentian affinity to the west where they define the Connecticut Valley-Gaspé trough (Fig. 1; e.g., Hibbard *et al.* 2006; Rankin *et al.* 2007). To the east (Fig. 1), two extensive depocenters of these rocks, the Fredericton trough and Central Maine basin, are defined by their location with respect to inliers of Cambrian–Ordovician basement rocks (e.g., Reusch and van Staal 2012; Ludman *et al.* 2018). However, the terminology that has been applied to these rocks across New England is complex and varied as it includes both structural and sedimentary terms (i.e., belt, synclinorium, basin, trough) as well as various stratigraphic names and correlations. Figure 3 summarizes the principal stratigraphic names by location for the relevant Late Ordovician to Early Devonian cover rocks in eastern and central New England and southern New Brunswick. Below we explain, from north to south, some of the definitions of basins used by others, and the rationale behind them. We then summarize the definitions used in this contribution, which are largely based on this previous work.

In eastern Maine and New Brunswick, the Fredericton trough lies between the Late Ordovician and older rocks of the St. Croix terrane to the SE and the Miramichi terrane to the NW (Fig. 1; e.g., Reusch and van Staal 2012; Ludman *et al.* 2017, 2018; Dokken *et al.* 2018). The broader Central Maine basin, including the along-strike Aroostook-Matapedia basin to the north, formed between the Miramichi terrane to the SE and older rocks of the Bronson Hill arc and related inliers to the NW (Fig. 1; Osberg *et al.* 1985; Tucker *et al.* 2001; Fyffe *et al.* 2009, 2011; Reusch and van Staal 2012; Bradley and O'Sullivan 2017; Ludman *et al.* 2017, 2018). Both the Fredericton trough and Central Maine basin contain late Ordovician (?) and Silurian sedimentary rocks. Deposition ended in the Fredericton trough by the late Silurian as it was deformed prior to intrusion by the 421.9 ± 2.4 Ma Pocomooshine gabbro-diorite (West *et al.* 1992; Ludman *et al.* 2018), while deposition continued into the Devonian in the Central Maine basin (Osberg 1988; Bradley *et al.* 2000; Tucker *et al.* 2001; Bradley and O'Sullivan 2017; Ludman *et al.* 2018). In south-central Maine and coastal southern Maine the Fredericton trough includes the Late Ordovician (?) and Silurian Ghent, Appleton Ridge and Bucksport formations (Figs. 1, 3; Hussey 1988; Berry and Osberg 1989; Hussey *et al.* 2010; West and Condit 2016; Cartwright *et al.* 2019) that lie southeast of Miramichi terrane-correlative Ordovician and older rocks in the Falmouth-Brunswick Group and Casco Bay Group (West *et al.* 2004, 2006; Hussey *et al.* 2010; Reusch and van Staal 2012; West and Hussey 2016, Hussey and West 2018).

In southwestern Maine and southeastern most New Hampshire, Late Ordovician and Silurian rocks that are approximately along strike, and can be correlated with those of the Fredericton trough and eastern part of the Central Maine basin form the Merrimack basin or Merrimack trough (Lyons *et al.* 1997; Fig. 1) and were originally included in the Merrimack Group (Fig. 3; Eliot, Kittery and Berwick formations; e.g., Hitchcock 1877; Katz 1917; Billings 1956; Lyons *et al.* 1997; Fargo and Bothner 1995; Hussey *et al.* 2010; see Hussey *et al.* 2010 for details). Hussey *et al.* (2010), however, redefined the Merrimack Group in SW Maine and New Hampshire to include only sedimentary rocks interpreted as Late Ordovician–early Silurian (Eliot and Kittery formations) and correlated them with those in the Fredericton trough. They correlated sedimentary rocks interpreted to be late Silurian–Early Devonian (Berwick Formation) with the Central Maine basin. Hussey *et al.* (1999, 2010) suggested that their redefined Late Ordovician–early Silurian Merrimack Group, in addition to the Fredericton trough deposits, including the Bucksport and associated formations of south-central Maine, represent a potentially continuous single basin and named it the Merribuckfred basin (Fig. 3). However, it is now known that the Fredericton trough also includes late Silurian deposits (Dokken *et al.* 2018; Ludman *et al.* 2018). Therefore, the Merribuckfred basin now refers

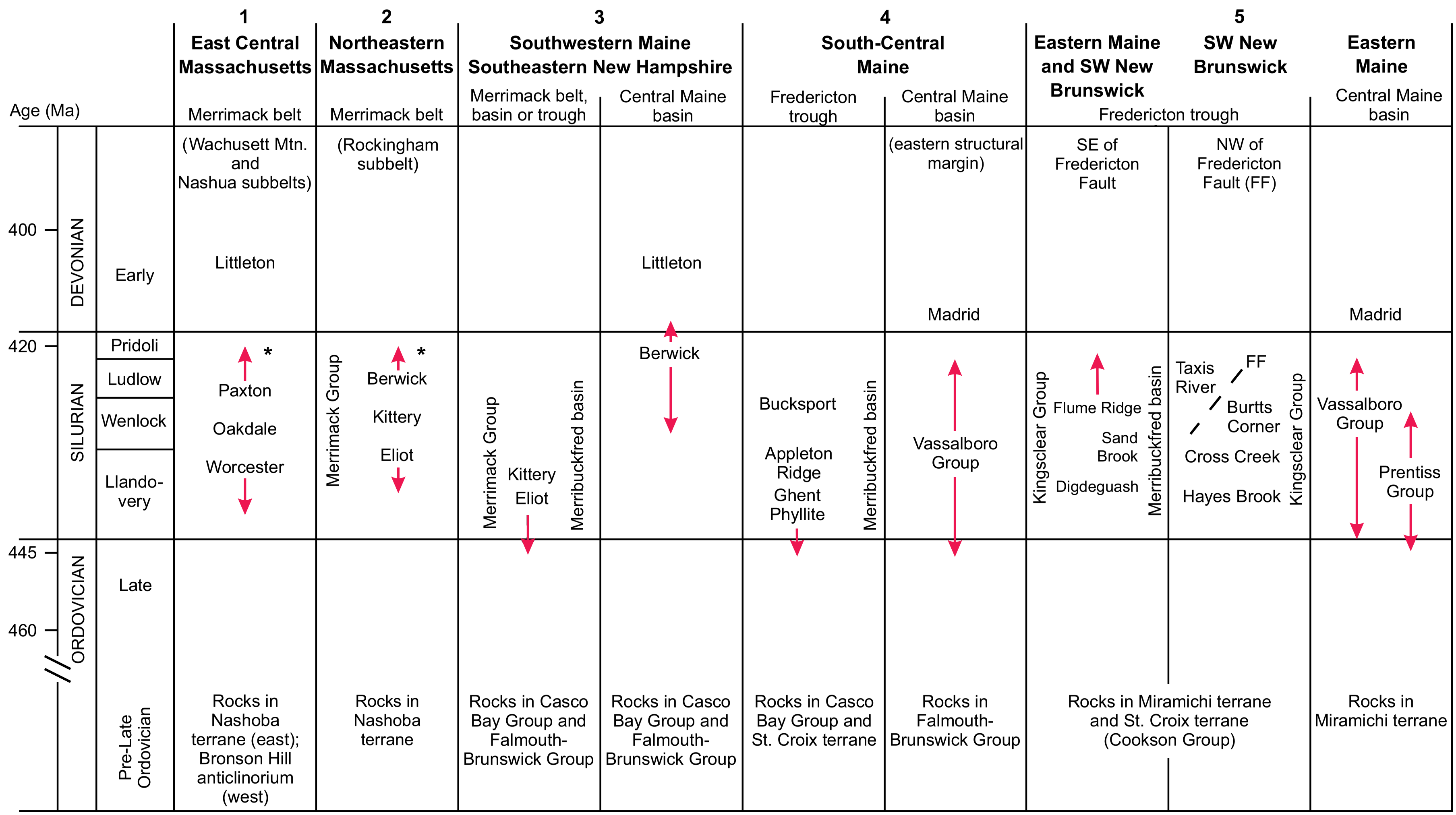


Figure 3. Simplified stratigraphy based on previous work for the Late Ordovician, Silurian and Early Devonian cover sequence units referred to in the text for rocks from Massachusetts to SW New Brunswick in the Merrimack belt, Merrimack basin, Fredericton trough and eastern portions of the Central Maine basin (see Figures 1 and 2 for locations). *Exact ages and stratigraphic order of these units is not well defined in these areas. Merribuckfred basin from Hussey *et al.* (2010). Columns 1 and 2 after Zen *et al.* (1983) and Robinson and Goldsmith (1991). Subbelts after Robinson and Goldsmith (1991), see text and Figure 2. Column 3 after Hussey *et al.* (2010). Column 4 after Cartwright *et al.* (2019). Column 5 after Ludman *et al.* (2017, 2018), Dokken *et al.* (2018) and Cartwright *et al.* (2019).

more to a location than an age range and may include multiple basins deposited through time. We will use Merribuckfred basin as a general term for the Late Ordovician–Silurian basins east of the Miramichi terrane and its equivalents to the south, to differentiate them from the Central Maine basin on the west. We will use Fredericton trough and Merrimack basin when referring to deposits in specific locations (Figs. 1, 3).

The Central Maine basin continues southwest from eastern Maine and New Brunswick into southeastern New Hampshire (Fig. 1; Osberg *et al.* 1985; Zen *et al.* 1983; Lyons *et al.* 1997; Tucker *et al.* 2001; Hibbard *et al.* 2006; Wintsch *et al.* 2007; Hussey *et al.* 2010; Reusch and van Staal 2012). However, Ordovician and older rocks of the Miramichi terrane, Casco Bay Group or Falmouth-Brunswick Group are not present south of southwestern Maine, making the boundary between rocks in the Central Maine and Merribuckfred basins difficult to distinguish. In SE New Hampshire, Dorais *et al.* (2012) and Reusch and van Staal (2012) interpret these basins to be separated by the Ganderian Neoproterozoic Massabesic Gneiss Complex (Fig. 1). However, Hussey *et al.* (2010, 2016) separate these basins east of the Massabesic Gneiss Complex along the Nonesuch River fault in southwestern Maine and its continuation, the Calef fault, in New Hampshire (Fig. 1).

Merrimack belt in Massachusetts and SE New Hampshire

In Massachusetts, there is no clearly identified boundary between rocks correlative with those in the Merribuckfred or Central Maine basins. Therefore, Zen *et al.* (1983) and Robinson and Goldsmith (1991) included all the late Ordovician (?), Silurian and early Devonian metasedimentary rocks between Ordovician and older rocks in the Nashoba terrane to the east and the Bronson Hill anticlinorium to the west in the Merrimack belt (Figs. 1, 2). However, on some maps, the Central Maine basin continues south into Massachusetts between the Merrimack belt and the Bronson Hill anticlinorium (e.g., Hibbard *et al.* 2006; Rankin *et al.* 2007; Wintsch *et al.* 2007, 2014; Reusch and van Staal 2012; Kopera and Walsh 2014, Walsh *et al.* 2021). Here, we will follow the usage of Zen *et al.* (1983) and Robinson and Goldsmith (1991) and use the inclusive term Merrimack belt to include the Worcester, Oakdale, Paxton, Eliot, Kittery and Berwick formations (Figs. 2, 3) in Massachusetts and SE New Hampshire, but recognize that the Merrimack belt likely includes rocks that can be correlated with those in both the Merribuckfred and Central Maine basins (Tucker *et al.* 2001; Wintsch *et al.* 2007; Hussey *et al.* 2010). The Tower Hill Formation occurs along the Clinton-Newbury fault zone on the east side of the Merrimack belt in east-central Massachusetts (Fig. 2; Zen *et al.* 1983; Robinson and Goldsmith 1991). However, its placement within the Merrimack belt has been debated (see Robinson and Goldsmith 1991) and it will be considered separately below.

The Merrimack belt, excluding the Tower Hill Formation, generally consists of a thick succession of metamorphosed calcareous and pelitic turbiditic units containing sandstone, siltstone, phyllite and impure quartzite (e.g., Grew 1973; Peck 1976; Robinson 1981; Zen *et al.* 1983; Robinson and Goldsmith 1991; Hussey and Bothner 1993; Lyons *et al.* 1997; Hussey *et al.* 2010). Because of (1) the lack of fossils, (2) the presence of thick successions of similar rock types in various areas, (3) a paucity of clear sedimentary structures to give facing directions, (4) varying degrees of metamorphism across and along strike, and (5) structural complexities due to several generations of folds, the internal stratigraphic order and along-strike correlations of units of the Merrimack belt has long been debated (e.g., Billings 1956, Robinson and Goldsmith 1991, Hussey *et al.* 2010). Robinson and Goldsmith (1991) presented a thorough discussion of the stratigraphic arguments for rocks in the Merrimack belt in central Massachusetts and Hussey *et al.* (2010) for SE New Hampshire. These are not repeated or further discussed here.

The Merrimack belt in Massachusetts is divided into six stratigraphic-tectonic subbelts by Robinson and Goldsmith (1991). Our samples are from the eastern three: the Wachusett Mountain, Nashua and Rockingham subbelts (Fig. 2). The Rockingham subbelt continues into SE New Hampshire and contains the Eliot, Kittery and Berwick formations of the original Merrimack Group (Hitchcock 1877; Katz 1917; Billings 1956; Lyons *et al.* 1997; Fargo and Bothner 1995; Hussey *et al.* 2010). The Tower Hill Formation is within Robinson and Goldsmith's (1991) Nashua subbelt, but occurs along the Clinton-Newbury fault zone adjacent to the contact with the Nashoba terrane and will be discussed separately.

The metamorphic grade of the sedimentary rocks of the Merrimack belt in central Massachusetts varies from lower greenschist facies in the southeast to upper amphibolite facies in the northwest (Thompson and Norton 1968; Zen *et al.* 1983; Goldsmith 1991b; Robinson and Goldsmith 1991; Lyons *et al.* 1997). The Merrimack belt has been intruded by a series of Silurian to Devonian granitic to dioritic plutons (Gore 1976; Zen *et al.* 1983; Zartman and Naylor 1984; Robinson and Goldsmith 1991; Wones and Goldsmith 1991; Zartman and Marvin 1991; Bothner *et al.* 1993, 2009; Fargo and Bothner 1995; Lyons *et al.* 1997; Watts *et al.* 2000; Wintsch *et al.* 2007; Walsh *et al.* 2013a, b, 2015, 2021; Charnock 2015) and is deformed by at least four generations of folds, including large recumbent folds (Peck 1975, 1976; Hepburn 1976; Robinson 1978, 1981; Goldstein 1992, 1994; Goldsmith 1991b; Hussey and Bothner 1993; Kopera and Walsh 2014; Kuiper *et al.* 2014). Deformation and metamorphism in the Merrimack belt resulted from Acadian, Neoacadian and/or Alleghanian events (Zen *et al.* 1983; Goldstein 1994; Attenoukon *et al.* 2006; Attenoukon 2009; Kuiper *et al.* 2014; Kopera and Walsh 2014).

METHODS

All samples were processed and minerals separated in the mineral separation laboratory in the Department of Earth and Environmental Sciences at Boston College using standard mineral separation methods. Approximately 150 to 200 zircon grains per sample (if present) were selected by picking all grains from random splits and were then mounted in epoxy. All mounts were then polished with a Struers Labo-Pol 5 in order to expose the inner cores of the zircon grains. Zircon grains were imaged using back-scattered electron (BSE) and cathodoluminescence (CL) image analysis at either the Massachusetts Institute of Technology in Cambridge, Massachusetts, or at the Bruneau Centre for Research and Innovation at Memorial University in St. John's, Newfoundland, Canada. The carbon coating was removed by polishing and the surfaces of the grain mounts were cleaned with dilute nitric acid prior to further analysis.

U–Pb analysis was carried out using laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS) on a Finnigan ELEMENT XR double focusing magnetic-sector field ICPMS connected to a Geolas 193 nm excimer laser at the INCO Innovation Centre at Memorial University in St. John's, Newfoundland (Bennett and Tubrett 2010). Zircon cores and occasionally rims were targeted, based on the CL and BSE images. A 10 μm laser beam was rastered over each selection and sampled a 40×40 μm square spot. For grains less than ~50 μm, or for small zones, the raster was set to 30×30 μm. Laser energy was set at 5 (for Nashoba terrane) or 6 (for Merrimack belt) J/cm^3, the scan velocity was 10 μm/s, and the laser repetition was set at 8 Hz. Once material was ablated from each grain it was nebulized and introduced into the ELEMENT XR using a mixed Ar-He carrier gas (Bennett and Tubrett 2010). A standard tracer solution was also nebulized with the sample material and included a mixture of natural Tl (^{205}Tl/^{203}Tl = 2.3871), ^{209}Bi, and enriched ^{233}U, and ^{237}Np (ca. 1 ppb), in a Ar-He carrier gas, this was used to correct for instrumental mass bias (Košler *et al.* 2002).

Standards PL, 91500, and 02123 were used for reference and quality control purposes (Slama *et al.* 2008; Bennett and Tubrett 2010). Each of the three zircon standards were analyzed for every six unknowns. Measurements were taken for each grain using time-resolved data acquisitions that were roughly 120–205 seconds long. Prior to measurements taken of ablated material, data were acquired for the Ar-He gas and tracer solution for approximately 20–30 seconds (Bennett and Tubrett 2010). Elemental masses measured during the time-resolved measurements included: 204(Hg), 203(Tl), 205(Tl), 206(Pb), 207(Pb), 209(Bi), 232(Th), 233(U), 237(Np), 238(U), 249(233U16O), 253(^{237}Np^{16}O) and 254(^{238}U^{16}O) (Bennett and Tubrett 2010). Data correction and reduction was carried out by Mike Tubrett and Wilfredo Diegor at Memorial University of Newfoundland. Raw data were corrected for dead time (20 ns) of the electron multiplier using the Excel spreadsheet-based program LAMdate (Košler *et al.* 2002, 2008). Data reduction included correction for gas blank, laser-induced elemental fractionation (cf. Sylvester and Ghaderi 1997), and instrument mass bias (cf. Horn *et al.* 2000; Košler *et al.* 2002). There was no common Pb correction. Ages of the unknowns were calculated using LAMdate (Košler *et al.* 2002, 2008) with Isoplot v. 2.06 of Ludwig (1999).

Where possible, approximately 150–200 grains, mostly randomly selected, ensuring representation of various grain sizes and morphologies, were analyzed per sample to provide a strong statistical representation, following Vermeesch's (2004) recommendation that at least 117 grains must be analyzed to be sure that no fraction comprising more than .05 of the population is missed at the 95% confidence level. Concordia diagrams and relative probability plots were made using Isoplot v. 3.7 (Ludwig 2008). Data with a <0.05 probability of concordance, or with a 1σ error for ^{206}Pb/^{238}U or ^{207}Pb/^{206}Pb ages greater than 10% of the calculated age were excluded from further analysis. Zircon with Th/U ratios <0.1 were considered to have a metamorphic origin (Hoskin and Schaltegger 2003; Rubatto 2017; Yakymchuk *et al.* 2018). If concordant metamorphic grains were present that were older than the youngest igneous-detrital age populations (see below) they were included in the detrital zircon analysis as detrital zircon grains derived from a metamorphic source. The grains younger than the youngest igneous-detrital age populations (Nashoba terrane units only) are plotted and discussed separately. Zircon morphologies were analyzed using transmitted light, BSE and CL images, and compared with age populations. No clear relationships between ages and morphologies emerged. Details can be found in Loan (2011) and Sorota (2013).

Concordia age has recently become the recommended way to report detrital zircon data because it is a mathematical combination of multiple ratios and makes optimal use of all U/Pb and Pb/Pb ratios (Ludwig 1998; Pollock *et al.* 2009). However, we report ^{206}Pb/^{238}U ages for zircon <800 Ma and ^{207}Pb/^{206}Pb ages for zircon >800 Ma to be consistent with most previous U–Pb detrital zircon studies in the Appalachians. The difference between one method and the other is minimal for data in this study. Uncertainties are reported at the 1σ confidence level. Zircon grains with a probability of concordance less than 0.05, based on 2σ uncertainty, were considered discordant and not used for data interpretation (cf. Košler and Sylvester 2003).

The youngest age population for each sample was determined by taking the weighted average of the ^{206}Pb/^{238}U ages for a population of the youngest 3–10 zircon grains with a >0.05 probability of concordance based on 2σ uncertainty. These analyses excluded overgrowths and had Th/U ratios >0.1, and therefore are unlikely to represent metamorphism. Youngest grains were selected to be re-analyzed using CA-TIMS at the Massachusetts Institute of Technology, to improve precision and avoid the effects of Pb-loss (Mattinson 2005; Condon and Bowring 2011). About 3 or 4 grains per sample were selected, but only 13 grains survived sample preparation including chemical annealing. A mixed ^{205}Pb-^{233}U-^{235}U tracer solution (spike) was used. Details of zircon pretreatment, dissolution, and U and Pb chemical extraction procedures are described in Ramezani *et al.* (2007). U and Pb isotopic measurements were performed on a VG Sector-54 multicollector TIMS. Pb and U were loaded together on a single Re filament in a silica gel–phosphoric acid mixture (Gerstenberger and Haase 1997). Pb isotopes were measured by peak-hopping using a single Daly photomultiplier detector, and U isotopic measurements were made in static mode using multiple Faraday collectors. Details of fractionation and blank corrections are given in Table 1. Data reduction, age calculation, and the generation of concordia plots were carried out using the method of McLean *et al.* (2011), and the statistical reduction and plotting program REDUX (Bowring *et al.* 2011).

SAMPLE DESCRIPTIONS AND RESULTS

Nashoba terrane

Sample descriptions and LA-ICPMS detrital zircon results

Sample locations and LA-ICPMS data are presented in Appendix Tables A1 and A2, respectively. Rock unit and sample descriptions, and data for detrital zircon based on the criteria outlined above are presented in this section (Fig. 4). Data from metamorphic zircon are discussed separately below.

The Marlboro Formation occurs in the southeastern Nashoba terrane (Fig. 2). It is composed largely of hornblende-plagioclase amphibolite, but it also contains felsic granofels, gneiss and metasedimentary rocks that commonly include rusty weathering sillimanite-bearing schist (Bell and Alvord 1976; DiNitto *et al.* 1984; Goldsmith 1991a; Kopera *et al.* 2006). The amphibolites include rocks with basaltic and basaltic-andesite compositions with inferred arc, MORB and alkalic signatures. Whole-rock major and trace-element geochemistry and Sm–Nd isotopes indicate that they formed in a primitive volcanic arc/back-arc setting (DiNitto *et al.* 1984, Goldsmith 1991a, Kay *et al.* 2017) with minimal crustal contamination (Kay *et al.* 2009, 2017; Walsh *et al.* 2015, 2021). This arc has been interpreted to be the source for the majority of the metasedimentary rocks in the Nashoba terrane (Hepburn and Munn 1984, Goldsmith 1991a, Kay *et al.* 2017).

Zircon in metasedimentary rocks of the Marlboro Formation is rare, and commonly metamict. In order to obtain enough grains for a statistical representation, the Marlboro Formation was sampled in four different locations (Fig. 2; Loan 2011). Of the approximately 150 kg of rock processed, a total of only 9 zircon grains yielded concordant data. The data were combined as one sample, MLMRC (Table A2). Sample MLMR1 is from a rusty weathering, black to dark-grey garnet-muscovite-biotite-quartz (± sillimanite) schist interlayered with a biotite-quartz-hornblende-plagioclase amphibolite. Garnet and sillimanite are present in thin layers within the schist and the unit is locally mylonitic. The sample was collected from the pelitic layers only and yielded four concordant analyses. Sample MLMR2 is from a silvery to dark-grey, rusty weathering, fine-grained garnet-biotite-muscovite-quartz schist. It resulted in one concordant analysis. Sample MLMR5 showed two distinct layers in hand specimen: (1) a muscovite-rich schistose layer and (2) a coarser-grained quartz-rich layer with larger, black, quartz crystals. Black quartz forms due to radiation damage (Klein and Hurlbut 1993). The radiation damage extended to the zircons, resulting in rusty, amorphous, highly metamict grains that gave no concordant data. Sample MLMR6 is from a rusty, heavily weathered garnet-bearing schist that yielded four concordant analyses.

The youngest detrital zircon analysis from the combined Marlboro Formation samples yielded a $^{206}Pb/^{238}U$ age of 470 ± 46 Ma. Sample MLMR6 contained the oldest grain found in the Nashoba terrane with a core of ~3.36 Ga and a rim of ~2.58 Ga. The relative probability plot of the Marlboro Formation shows a peak in age at ~532 Ma and a minor peak at ~642 Ma (Fig. 4a).

The Shawsheen Gneiss (Fig. 2) is separated from the Nashoba Formation by the Fish Brook Gneiss and the Assabet River fault zone (Zen *et al.* 1983; Goldsmith 1991a). It is generally quartz-plagioclase-muscovite-biotite schist to paragneiss, which is interpreted to have been derived from the detritus of volcanic rocks of intermediate to mafic composition (Olszewski 1980). Sample MLSG1 is a medium-grained garnet-plagioclase-muscovite-biotite-quartz (± sillimanite) schist to gneiss collected from multiple locations around an industrial park to ensure that a statistical representation of detrital zircon was analyzed.

The Shawsheen Gneiss was previously dated by Olszewski (1980) using U–Pb analyses of zircon on multiple-grain fractions. The resulting discordia chord yielded 2042 ± 52 Ma upper and 517 ± 16 Ma lower intercept ages, but because these are based on only three zircon fractions (Olszewski 1980), the interpretation may not be accurate. Sample MLSG1 yielded 100 concordant detrital zircon analyses. The weighted average $^{206}Pb/^{238}U$ age of the three youngest detrital zircon analyses is 470 ± 22 Ma (MSWD = 0.26). The main age population in the sample is ~562 Ma, and a minor population exists at ~646 Ma (Fig. 4b). In addition, there are small age clusters at ~2.1–2.0 Ga, ~1.8–1.3 Ga and ~1.1 Ga, and a single grain at ~2.4 Ga.

The Nashoba Formation occupies about one-third of the Nashoba terrane and is composed largely of biotite-feldspar gneiss and biotite ± sillimanite schist with subordinate calc-silicate gneiss, impure feldspathic quartzite and pelitic schist (Bell and Alvord 1976; Zen *et al.* 1983; Hepburn and Munn 1984; Goldsmith 1991a). Hornblende amphibolite dominates the Boxford Member (Bell and Alvord 1976) along the eastern margin of the formation. The Nashoba Formation is metamorphosed in the sillimanite and sillimanite - K-feldspar zones. Samples of the gneiss, schist and calc-silicate gneiss were analyzed.

The Nashoba Formation gneiss (sample MLNB1; Fig. 2) is from a garnet-biotite-muscovite-plagioclase-quartz- (± sillimanite) gneiss. The unit contained interbedded layers of mylonitic gneiss with a few ~4 cm thick strongly sheared quartz veins. Areas with large quartz inclusions were not used. The sample yielded 84 concordant detrital zircon analyses.

Table 1. CA-TIMS data with LA-ICPMS dates for comparison (see Appendix A2).

	Composition			*Isotopic Ratios*								*Dates [Ma]*						*ICP Dates [Ma]*		
Fraction	Th/ U [(a)]	Pb* [(b)] [pg]	Pb*/ Pbc [(d)]	^{206}Pb/ ^{204}Pb [(e)]	^{207}Pb/ ^{235}U [(f)]	±2σ [%]	^{206}Pb/ ^{238}U [(f,g)]	±2σ [%]	Corr. coef.	^{207}Pb/ ^{206}Pb [(f,g)]	±2σ [%]	^{206}Pb/ ^{238}U	±2σ [abs.]	^{207}Pb/ ^{235}U [(h)]	±2σ [abs.]	^{207}Pb/ ^{206}Pb [(g,h)]	±2σ [abs.]	^{206}Pb/ ^{238}U	±2σ [abs.]	Analysis number
Sample MLNB1 - Nashoba Formation Gneiss																				
z002 (mr02a06)	0.34	1.5	196.07	12145.5	0.583	0.21	0.075	0.16	0.82	0.0565	0.12	465.9	0.7	466.5	0.8	469	3	480	13	mr02a06
Sample KSKTI - Kittery Formation																				
z5 (mr18b11)	0.21	3.1	11	742	0.57	0.98	0.074	0.16	0.55	0.0562	0.9	461.31	0.71	461.1	3.6	460	20	410	10	mr18b11
z21 mr18b19)	0.71	2.9	6	354	0.60	1.9	0.076	0.25	0.64	0.0568	1.7	473.40	1.10	475	7.1	482	38	417	16	mr18b19
z22 (mr17b32)	1.41	38.3	72	3538	0.53	0.32	0.070	0.11	0.52	0.0557	0.28	434.26	0.46	435	1.1	438.7	6.2	416	11	mr17b32
z50 (mr18a14)	0.85	3.5	8	480	0.53	1.2	0.069	0.16	0.58	0.0556	1.1	432.19	0.68	433	4.2	437	24	409	20	mr18a14
Sample KSBWI - Berwick Formation																				
BE48 (mr04b29)	0.02	0.3	43.17	2934.1	0.651	0.35	0.078	0.10	0.12	0.0602	0.35	486.35	0.47	508.9	1.4	611	8	414	8	mr04b29
Sample KSOKI - Oakdale Formation																				
L44 (mr16a24)	0.47	0.4	49.05	2944.1	0.544	0.39	0.070	0.10	0.38	0.0568	0.36	433.70	0.41	441.4	1.4	482	8	436	8	mr16a24
M21 (mr16b23)	0.64	0.5	33.93	1960.1	0.526	0.58	0.068	0.15	0.36	0.0559	0.54	425.53	0.64	429.2	2.0	449	12	409	17	mr16b23
M77 (mr16b112)	0.37	0.8	10.43	657.3	0.612	1.72	0.077	0.17	0.38	0.0576	1.66	478.68	0.78	484.9	6.6	514	36	432	19	mr16b112
Sample KSPXIII - Paxton Formation																				
BE23 (se08b31)	1.03	0.4	12.05	645.4	0.552	1.90	0.071	0.37	0.35	0.0565	1.80	441.73	1.60	446.4	6.9	471	40	425	7	se08b31
BE34 (au26a47)	0.45	0. 4	21.18	1290.6	0.531	0.88	0.069	0.20	0.13	0.0560	0.88	429.16	0.82	432.6	3.1	451	20	412	18	au26a47
Sample KSWSI - Worcester Formation																				
z23 (mr02a38)	0.32	0.6	46.93	2931.3	0.614	0.46	0.078	0.27	0.62	0.0572	0.36	483.52	1.25	486.1	1.8	498	8	454	9	mr02a38
z83 (mr02a117)	0.37	0.3	6.2	397.7	0.620	2.95	0.078	1.08	0.42	0.0574	2.69	486. 29	5.04	490	11.5	507	59	436	17	mr02a117

Blank: ^{206}Pb/^{204}Pb = 18.15 ± 0.48; ^{207}Pb/^{204}Pb = 15.306 ± 0.29; ^{208}Pb/^{204}Pb = 37.11 ± 0.88;

Mass fractionation correction of 0.25%/amu ± 0.02%/amu (atomic mass unit) was applied to all single collector Daly analyses.

(a) Th contents calculated from radiogenic ^{208}Pb and the ^{207}Pb/^{206}Pb date of the sample, assuming concordance between U-Th and Pb systems.

(b) Total mass of radiogenic Pb.

(c) Total mass of common Pb.

(d) Ratio of radiogenic Pb (including ^{208}Pb) to common Pb.

(e) Measured ratio corrected for fractionation and spike contribution only.

(f) Measured ratios corrected for fractionation, tracer, blank, common Pb is lab blank, U blank = 0.1 pg

(g) Corrected for Initial Th/U disequilibrium using radiogenic ^{208}Pb and Th/U [magma] = 2.8

(h) Isotopic dates calculated using the decay constants λ_{238} = 1.55125E-10/yr, λ235 = 9.8485E-10/yr (Jaffey et al. 1971), and for the ^{238}U/^{235}U = 137.818 ± 0.045 (Hiess et al., 2012)

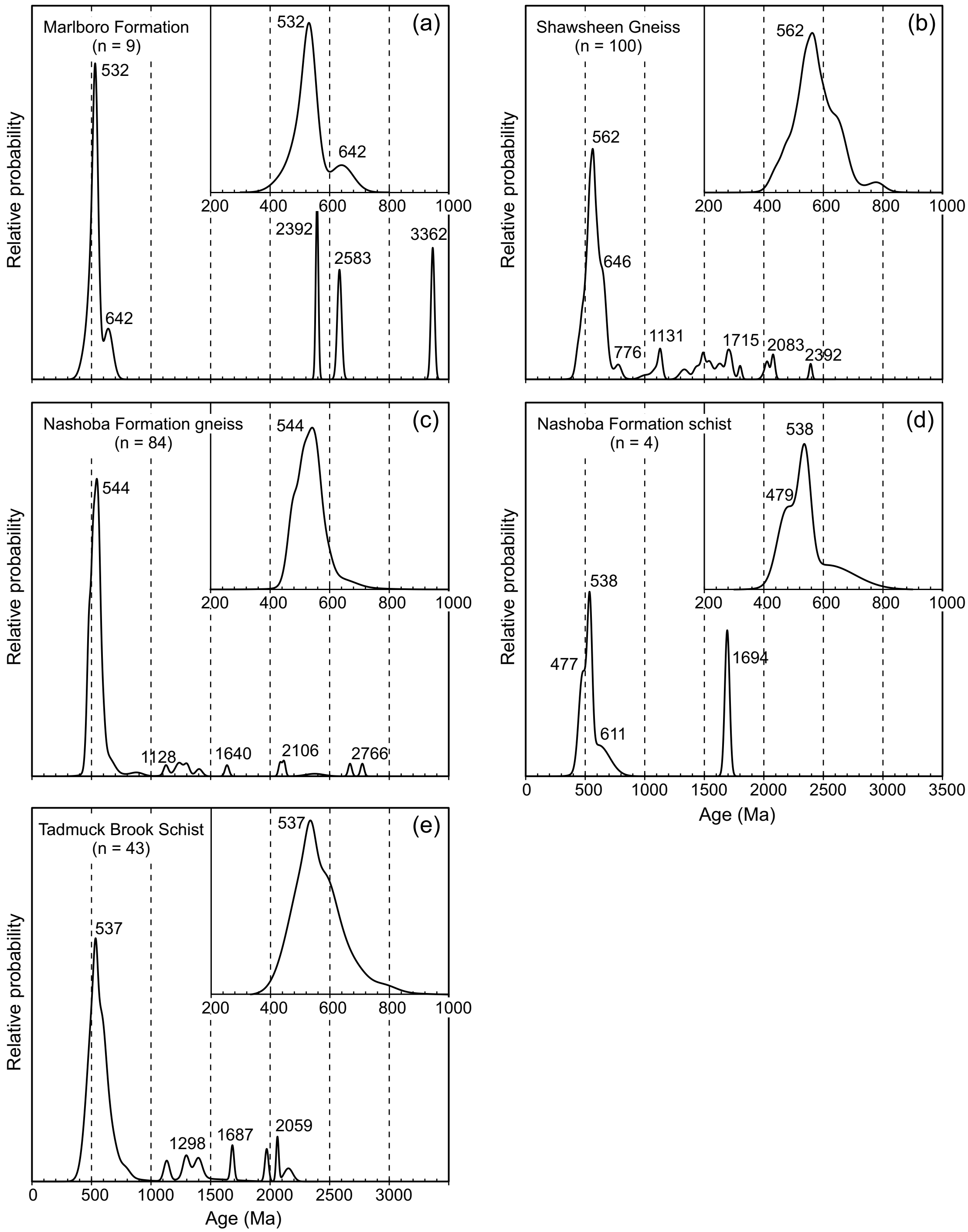


Figure 4. Relative probability plots for LA-ICPMS U–Pb detrital zircon data ($^{206}Pb/^{238}U$ ages for zircon <800 Ma and $^{207}Pb/^{206}Pb$ ages for zircon >800 Ma) for units of the Nashoba terrane. Inset figures show $^{206}Pb/^{238}U$ ages for zircon <800 Ma only. Peaks determined using Isoplot. Data are shown in Table A2.

The three youngest grains yielded a weighted average $^{206}Pb/^{238}U$ age of 462 ± 20 Ma (MSWD = 0.061). The major age population is ~544 Ma (Fig. 4c). In addition, there are a few ~2.8–2.6 Ga, ~2.4 Ga, ~2.1 Ga, ~1.6 Ga, ~1.4–1.1 Ga zircons.

The Nashoba Formation schist (sample MLNS1; Fig. 2) is a garnet-muscovite-biotite-quartz- (± sillimanite) schist. Of the abundant schistose units in the Nashoba terrane this sample was selected because of its minimal quartz vein inclusions. However, the sample yielded only 4 concordant detrital zircon analyses, the other 118 concordant analyses being interpreted as metamorphic (Fig. 4d). The youngest detrital zircon in the Nashoba Formation schist yielded a $^{206}Pb/^{238}U$ age of 477 ± 32 Ma. Two remaining detrital grains yielded $^{206}Pb/^{238}U$ ages of 538 ± 20 Ma, 611 ± 94 Ma, and one a $^{207}Pb/^{206}Pb$ age of 1694 ± 32 Ma.

The Nashoba Formation calc-silicate gneiss outcrop (sample MLBM1; Fig. 2) includes rock types ranging from rusty garnet-bearing schist to calc-silicate gneiss and amphibolite. The calc-silicate gneiss sampled contains diopside, actinolite, phlogopitic biotite, and abundant titanite. It likely formed from original more dolomitic layers (Hepburn and Munn 1984). The unit is deformed by a shear zone separating the more calcareous layers of the outcrop from the schistose layers. Samples were taken away from the shear zone and included a mixture of calc-silicate rocks with and without the micaceous lenses. No detrital zircon was found and all zircon analyzed is interpreted to be of metamorphic or carbonate fluid/hydrothermal origin as discussed below.

The Tadmuck Brook Schist is a rusty-weathering micaceous schist with thin quartzose layers that lies along the northwestern boundary of the Nashoba terrane (Fig. 2) adjacent to the Clinton-Newbury fault zone. The metamorphic grade increases from greenschist facies in the NW to upper amphibolite facies in the SE within the ~1 km thick unit (Jerden and Hepburn 1996; Jerden 1997). It has been uncertain whether the Tadmuck Brook Schist is part of the Nashoba terrane or of the Merrimack belt (Goldsmith 1991a). Sample (MLTMBC; Fig. 2) is from a sillimanite-bearing sulfidic mica schist in the high-grade (southeastern) member and contains thin quartz-rich layers. The Tadmuck Brook Schist has unique mineralogy as it is the only unit that contains scheelite, a fluorescent tungsten-bearing mineral that is commonly associated with high-temperature hydrothermal veins and contact metamorphism in skarns (Klein and Dutrow 2007). The unit also contains abundant titanite. This sample yielded 47 concordant detrital zircon analyses. Due to the small grain size, all the zircons in this sample were ablated using a 30×30 µm square raster, which led to increased uncertainty. The youngest three detrital zircon analyses yielded a weighted average of $^{206}Pb/^{238}U$ ages of 462 ± 47 Ma (MSWD = 0.049). The sample had a major ~537 Ma age peak, and scattered ~2.2–1.9 Ga, ~1.7 Ga and ~1.4–1.1 Ga ages (Fig. 4e).

CA-TIMS zircon analysis

Youngest zircon grains of selected samples were re-dated using CA-TIMS methods (Table 1) with the purpose to better constrain the maximum depositional age of the formations. While three or four grains per sample were selected for analysis, not all survived sample preparation and chemical abrasion. Only one grain remained from the Nashoba terrane, sample MLNB1 from the Nashoba Formation gneiss. Its $^{206}Pb/^{238}U$ CA-TIMS age is 465.9 ± 0.7 Ma, which is within error of the weighted average of $^{206}Pb/^{238}U$ LA-ICPMS ages of 462 ± 20 Ma for the three youngest grains from this sample (Table A2; see above).

Metamorphic zircon

Nashoba terrane samples from the five formations other than the calc-silicate gneiss contained 159 zircons interpreted as metamorphic per the criteria listed above (Fig. 5). They range from ~454 Ma to 324 Ma, with the results for the individual formations as follows: Marlboro Formation, ~443–324 Ma (weighted average of $^{206}Pb/^{238}U$ ages of 396 ± 20 Ma, n = 10, MSWD = 1.6); Shawsheen Gneiss, 422 ± 19 Ma (n = 5, MSWD = 0.27); Nashoba Formation gneiss ~454–353 Ma (or weighted average age of 408 ± 13 Ma, n = 22, MSWD = 5.6); Nashoba Formation schist ~433–327 Ma (or weighted average age of 377.2 ± 4.4 Ma, n = 118, MSWD = 1.9); and Tadmuck Brook Schist 433 ± 33 Ma (n = 4, MSWD = 0.031) (cf. Table A2).

The calc-silicate gneiss (MLMB1) yielded 61 $^{206}Pb/^{238}U$ zircon ages of ~434–310 Ma (or weighted average age of 354.4 ± 5.9 Ma, n = 61, MSWD = 2.2; Fig. 5f). Fifty-three of these zircon analyses gave Th/U ratios <0.20, with only one Th/U ratio below 0.10, and 9 analyses gave ratios of 0.20–0.37. These Th/U ratios are higher than the typical <0.1 ratio for metamorphic zircon (Rubatto 2017; Yakymchuk *et al.* 2018). The calc-silicate gneiss is within the stratified succession of the Nashoba terrane, is gradational with the rest of the Nashoba Formation and is similarly metamorphosed under upper amphibolite facies conditions. There is no field evidence to suggest that it is much younger than the other Nashoba terrane rocks. Furthermore, while Th/U ratios >0.1 are not typical for metamorphic zircon, they are not uncommon (Rubatto 2017; Yakymchuk *et al.* 2018). Yakymchuk *et al.* (2018) conclude that "igneous zircon rarely has Th/U < 0.1 and metamorphic zircon can have values ranging from <0.01 to >10." For these reasons, the ages of zircons in the calc-silicate gneiss are interpreted as metamorphic, likely having formed in the presence of fluids.

Thus, we interpret metamorphic zircon in the Nashoba terrane to have grown between ~433 Ma and ~356 Ma, based on the weighted averages of $^{206}Pb/^{238}U$ ages. The Marlboro Formation, Shawsheen Gneiss, Nashoba Formation Gneiss and Tadmuck Brook Schist generally record older metamorphic zircon ages (weighted average age of 408.0 ± 8.8 Ma, n = 41, MSWD = 3.5) while zircon growth continued until somewhat later in the Nashoba Formation schist and especially the calc-silicate gneiss (weighted combined average age of 368.4 ± 4.0 Ma, n = 180, MSWD = 3.8).

Merrimack belt

Sample descriptions and LA-ICPMS detrital zircon

The six formations analyzed from the Merrimack belt are presented below in a general NE to SW order (Fig. 2). The Eliot Formation consists of thinly layered grey to green phyllite, calcareous feldspathic metasiltstone and quartzite, quartz-mica schist, and calc-silicate gneiss (Lyons *et al.* 1997; Hussey *et al.* 2010, 2016). It has been interpreted as Silurian–Ordovician based on correlation with parts of the Casco Bay Group in Maine (Hussey *et al.* 2010). Sample KSELI from SE New Hampshire (Fig. 2) consists of generally thin-bedded alternations of tan-grey weathering, turbiditic calcareous quartzite and silvery dark phyllite (Fargo and

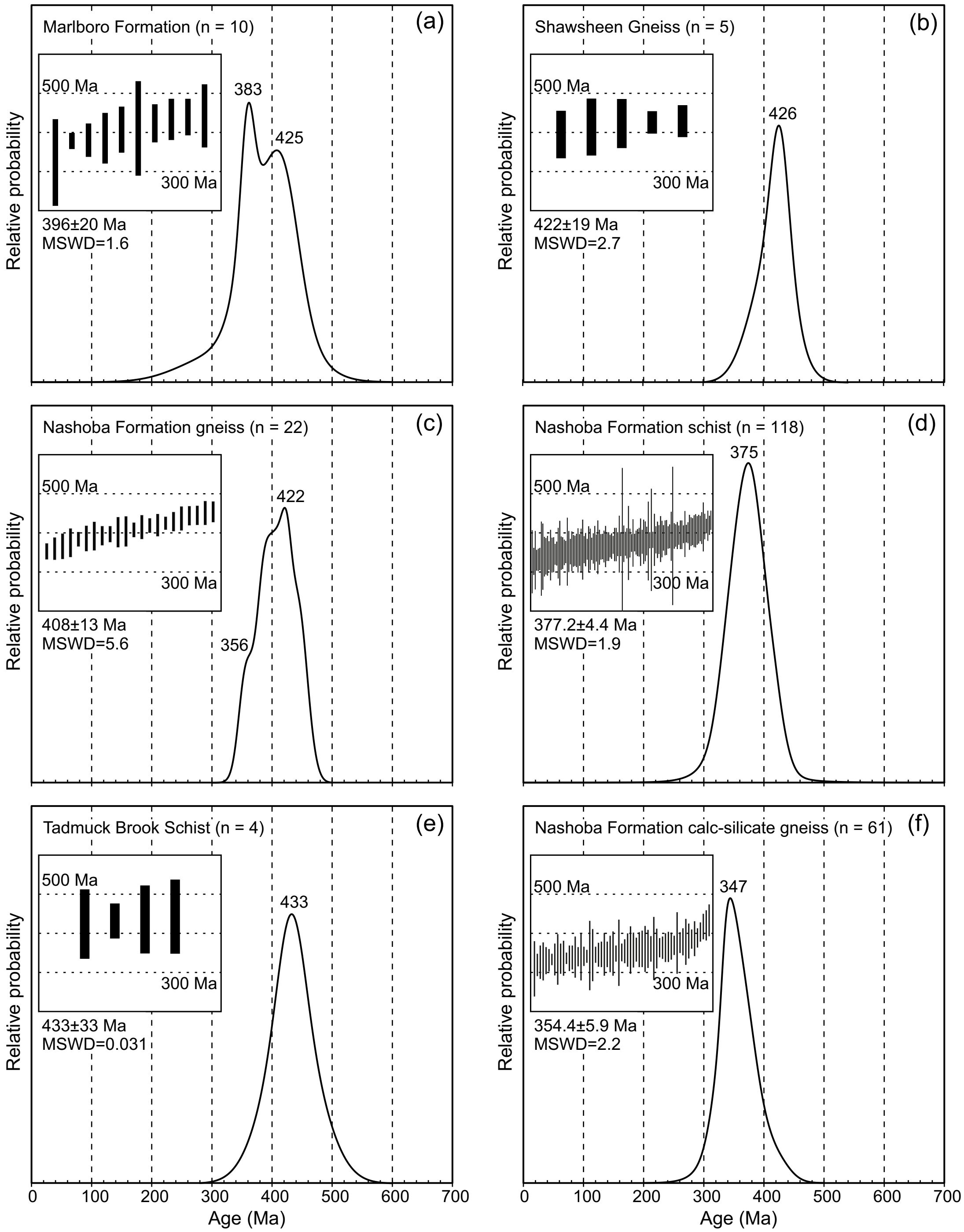


Figure 5. Relative probability plots for $^{206}Pb/^{238}U$ ages of metamorphic zircon for units of the Nashoba terrane. Inset figures show float bar charts and weighted averages of $^{206}Pb/^{238}U$ ages with 2 σ uncertainties. Data are shown in Table A2.

Bothner 1995). Quartz veins were avoided during sample collection and removed prior to crushing. The sample yielded 119 concordant analyses. The weighted average of the $^{206}Pb/^{238}U$ ages of the four youngest detrital zircon grains is 409 ± 19 Ma (MSWD = 0.046). The major population peaks at ~446 Ma (Fig. 6a). Two grains are ~2.9 Ga and ~2.7 Ga and other ages spread between ~1.9 Ga and ~512 Ma.

The Kittery Formation consists of feldspathic and calcareous, ankeritic metaturbidite successions and minor fine-grained metasiltstone and feldspathic quartzite (Robinson and Goldsmith 1991; Bothner and Hussey 1999; Hussey *et al.* 1984, 2010, 2016). The fine-grained, thinly bedded to laminated rocks and thicker quartzitic beds contain cross lamination and other primary sedimentary structures (Hussey *et al.* 1984, 2010, 2016). Several paleocurrent indicators in the Kittery Formation in New Hampshire suggest a source to the southeast (Rickerich 1983, 1984; Hussey *et al.* 1984). Sample KSKTI (Fig. 2) was taken from an outcrop in SE New Hampshire, immediately across the Piscataqua River from the type locality in Maine (Katz 1917; Bothner and Hussey 1999) and is a tan weathering, grey to purplish, massive, fine-grained, feldspathic quartzite and quartzitic phyllite. It yielded 101 concordant analyses. The weighted average of $^{206}Pb/^{238}U$ ages of the four youngest detrital zircon grains is 413 ± 13 Ma (MSWD = 0.089). The main age group is ~461 Ma, and older populations are ~2.8 Ga, ~1.8– 1.0 Ga, and ~769 and 543 Ma (Fig, 6b).

The Berwick Formation is composed primarily of thin to thick tabular and lenticular beds of calcareous metasiltstone, biotite-rich metasiltstone, purplish biotite-quartz-feldspar granofels, and fine-grained metasandstone (Robinson and Goldsmith 1991; Fargo and Bothner 1995; Hussey *et al.* 2016). Some layers contain actinolite were metamorphosed to the greenschist facies, while at higher metamorphic grade, diopside, hornblende, and plagioclase are common (Robinson and Goldsmith 1991). Most of the Berwick Formation is in the garnet zone, although portions reach the sillimanite zone (Zen *et al.* 1983; Robinson and Goldsmith 1991; Hussey *et al.* 2016). Sample KSBWI, taken from NE Massachusetts (Fig. 2) consists of a fine-grained, light-grey to purplish-grey calcareous metasiltstone with beds a few cm to 1 m thick and interbeds of a dark-grey micaceous phyllite. It yielded 133 concordant analyses. The five youngest zircon grains provided a weighted average of $^{206}Pb/^{238}U$ ages of 409 ± 12 Ma (MSWD = 0.27). Zircon yielded a main age peak at 443 Ma, a few analyses at ~2.8–2.7 Ga and ~2.3 Ga and small populations between ~1.8 Ga and ~1.0 Ga and at ~634 Ma (Fig. 6d).

The Oakdale Formation is a thick unit composed of interlayered brownish-grey to light-grey ankeritic metasiltstone, green-grey to purplish-grey impure quartzite, muscovite schist, and greenish-grey, grey, and dark brown calcareous phyllite (Grew 1973; Hepburn 1976; Peck 1976; Zen *et al.* 1983; Robinson and Goldsmith 1991). Sample KSOKI (Fig. 2) is from the type area in east-central Massachusetts (Emerson 1917; Hepburn 1976; Robinson and Goldsmith 1991) and consists of a grey weathering, light-grey quartz-rich phyllite and micaceous phyllite, interbedded with tan to grey-green weathering beds of metasiltstone and impure quartzite. It yielded 108 concordant zircon analyses. The youngest detrital zircon age population of the four youngest grains is 431 ± 12 Ma (weighted average $^{206}Pb/^{238}U$ age, MSWD = 0.69) and the main age peak is ~451 Ma (Fig. 6c). One analysis is ~2.7 Ga, and other ages show a continuous spread between ~2.0 Ga and the main age population.

The Worcester Formation, also called Worcester Phyllite, is a turbidite succession composed of grey and dark-grey carbonaceous slate, well foliated micaceous phyllite or schist containing andalusite, including chiastolite, interbedded with layers a few centimetres to one metre thick of impure quartzite, calc-silicate or metasiltstone (Grew 1973; Hepburn 1976; Peck 1976; Robinson and Goldsmith 1991). Sample KSWSI (Fig. 2) was taken largely from turbiditic sandy layers in a grey-weathering, light-grey, fine-grained turbidite with fissile phyllite interlayered with metasandstone and siltstone layers that range from a few cm to ~0.5 m thick. The sample yielded 138 concordant analyses. The weighted average of $^{206}Pb/^{238}U$ ages of the four youngest grains is 436 ± 9 Ma (MSWD = 0.89). The main age group is ~470 Ma. One grain is ~2.2 Ga, and other populations are between ~2.0 Ga and ~950 Ma, and ~800–470 Ma (Fig. 6e).

The Paxton Formation contains several sub-lithologies (Robinson and Goldsmith 1991). In the area of our study it is composed predominantly of grey-weathering, slabby, quartz-plagioclase-biotite granofels and well-layered purplish biotite granofels with calcic plagioclase (Robinson *et al.* 1982; Robinson and Goldsmith 1991). Sample KSPXIII from east-central Massachusetts (Fig. 2), is composed of a greenschist grade (garnet zone or lower at the locality sampled) laminated, slabby, quartz-rich, purple-grey granofels to schist. It yielded 113 concordant analyses. The youngest detrital zircon age population for the Paxton Formation is 426 ± 6 Ma (MSWD = 0.56) based on the weighted average of the $^{206}Pb/^{238}U$ ages of the ten youngest grains. The main peak is ~463 Ma with a smaller peak at ~431 Ma. Two analyses are ~2.6 Ga and most other analyses are between ~1.8–0.9 Ga with a few grains between ~700 and ~528 Ma (Fig. 6f).

CA-TIMS zircon analyses

Youngest zircon grains of selected samples from the Merrimack belt were re-dated using CA-TIMS methods (Table 1; Fig. 7), but as with the Nashoba terrane samples above, not all survived the processing. All CA-TIMS data for the Merrimack belt were within error of, or older (some much older, see below) than the LA-ICPMS data (Tables 1, A2). The youngest CA-TIMS $^{206}Pb/^{238}U$ ages from five grains from the Kittery, Paxton and Oakdale formations ranged from 434 Ma to 425 Ma.

Tower Hill Formation

The Tower Hill Formation is a relatively thin unit (up to ~130 m thick) along the Clinton-Newbury fault zone (Fig. 2). It is light-grey to buff and consists of massive orthoquartzite beds and subordinate dark-grey phyllite or mica-schist containing biotite, and locally garnet porphyroblasts (Grew 1970, 1973; Peck 1976; Hepburn 1976). However, in places it includes successions of phyllite reaching 65 m in thickness (Robinson and Goldsmith 1991). It is located along the Clinton-Newbury fault and its position in the stratigraphy and potential affinity with the Merrimack belt or Nashoba terrane are unclear (see Robinson and Goldsmith 1991). At the location of sample KSTHI (Fig. 2) in Berlin, Massachusetts it consists of fine-grained, light to dark-grey, massive quartzite. The youngest detrital zircon age population within the 106 concordant analyses is 513 ± 15 Ma (MSWD = 1.01) based on the weighted average of $^{206}Pb/^{238}U$ ages of three grains. One analysis (mr12a30) yielded a $^{206}Pb/^{238}U$ age of 463 ± 9 Ma but is not part of a population. The main population is ~630 Ma with a satellite peak at ~530 Ma and a continuum of ages exists from there tapering off to ~1.8 Ga (Fig. 6g). Three grains are ~2.9 Ga and ~2.1 Ga.

DISCUSSION

Nashoba terrane

Age of deposition

Based on the LA-ICPMS results, the youngest detrital zircon population of all samples of the Nashoba terrane combined is 466 ± 13 Ma (MSWD = 0.12, n = 11). Given this, and taking the errors into account, the maximum ages of the Nashoba terrane metasedimentary rocks could range from Early to Late Ordovician. If the higher precision but single CA-TIMS age of 465.9 ± 0.7 Ma (Table 1; Fig. 7) on grain mr02a06 of the Nashoba Formation gneiss (LA-ICPMS age of 480 ± 13 Ma) is representative, portions of the Nashoba Formation could have a maximum depositional age of early Middle Ordovician. Similar results were reported by Walsh *et al.* (2021) for two samples from the Nashoba Formation in southern Massachusetts and its correlative in Connecticut, the Tatnic Hill Formation, where detrital zircons gave an age of deposition between the ~485 Ma age of the youngest detrital zircon, and the ~435 Ma age of metamorphism. Because the 515 Ma granitic Grafton Gneiss cuts some of the mafic metaigneous rocks of the Marlboro Formation, and a ~500 Ma feldspathic granofels structurally overlies these (Walsh *et al.* 2009, 2011a, b, 2021), at least part of the Marlboro Formation is late Cambrian or older. The scarcity of detrital zircon in the metasedimentary rocks of the Marlboro Formation may indicate that they are primarily derived from the local, largely mafic, volcanic rocks of the Marlboro Formation. Thus, at least parts of the Marlboro Formation, and likely portions of the other Nashoba terrane units, are Cambrian, while other units, or parts of them, are Ordovician or younger.

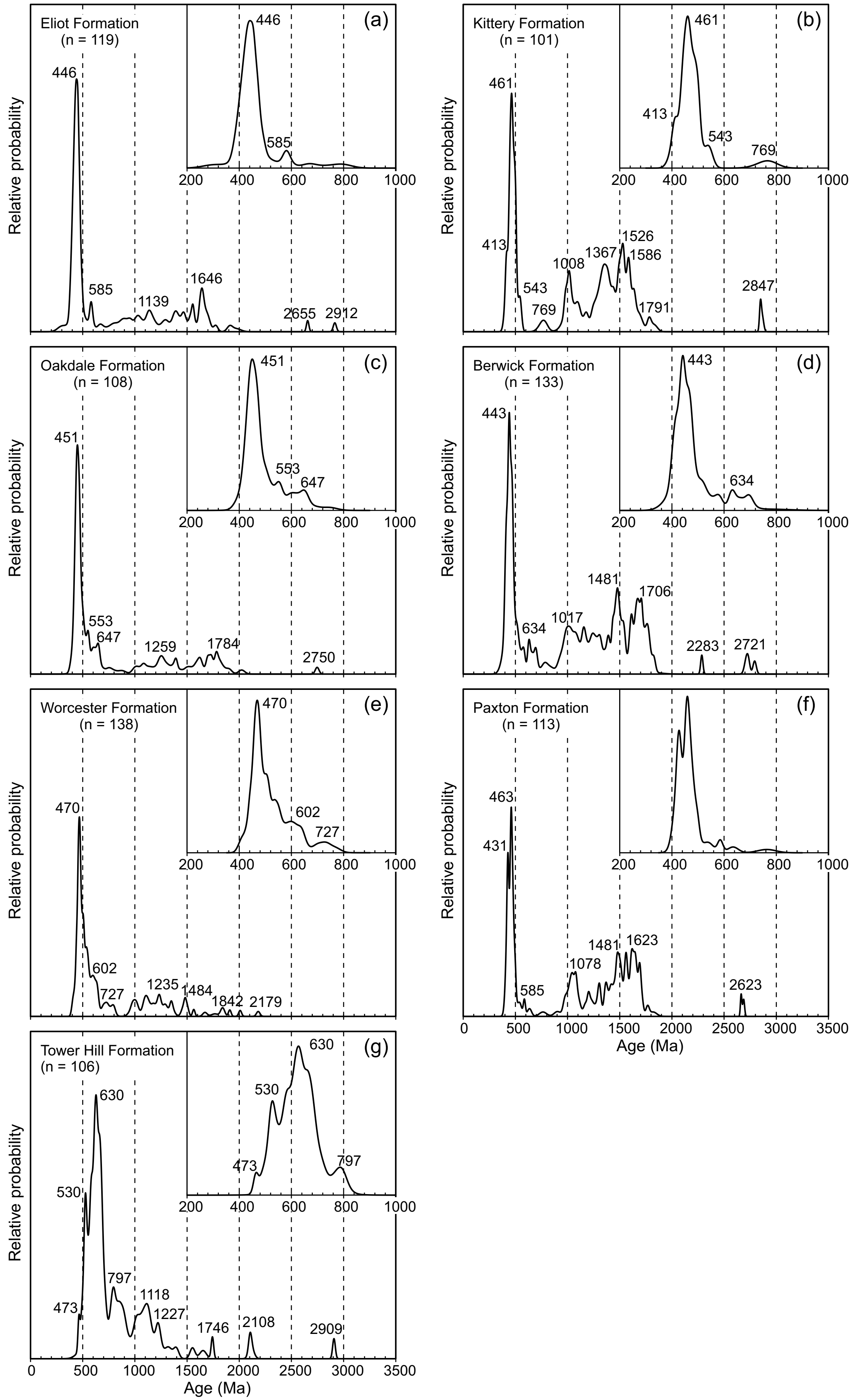
The Assabet River fault zone (Fig. 2) is a major fault zone within the Nashoba terrane, separating the Nashoba Formation and Tadmuck Brook Schist to the northwest from the Shawsheen Gneiss and Marlboro Formation to the southeast (Bell and Alvord 1976; Hepburn and DiNitto 1978; Zen *et al.* 1983; Goldsmith 1991a, b; Kopera *et al.* 2006). To determine the significance of this fault zone, samples from the northwestern and southeastern Nashoba terrane were plotted separately in Figs. 8a and b. Samples from both sides show very similar patterns with a significant ~560–540 Ma detrital zircon age population and minor Mesoproterozoic and Paleoproterozoic populations. Archean grains are rare in both. The similarity of these data indicates that there is no significant difference in detrital age populations across the Assabet River fault zone and that it thus does not represent a terrane boundary. The combined Nashoba terrane data are plotted in Fig. 8c. The similarity of the detrital zircon age distribution in the Tadmuck Brook schist (Fig. 4e) to that of the other units of the Nashoba terrane, and its difference from the distributions in the Merrimack belt (Figs. 6, 8f) indicates that it is part of the Nashoba terrane.

Provenance and correlations

The Nashoba terrane has been interpreted as a primitive arc/back-arc complex (Hepburn *et al.* 1995; Kay *et al.* 2009, 2011, 2017; Walsh *et al.* 2011b, 2015, 2021). Archean and Proterozoic detrital zircon and Mesoproterozoic depleted mantle Sm/Nd model ages (Kay *et al.* 2017) suggest that this complex formed on older crustal material. Paleoproterozoic and Mesoproterozoic detrital zircon in the metasedimentary rock samples support this, and similar youngest zircon age populations and provenance in all four units of the Nashoba terrane indicate that they all formed as part of the same early Paleozoic arc/back-arc complex.

Both Avalonia and at least part of Ganderia experienced active ~650–590 Ma magmatism (e.g., Murphy *et al.* 2004; Fyffe *et al.* 2009; Satkoski *et al.* 2010; Thompson *et al.* 1996, 2007, 2010; Pollock *et al.* 2009; van Staal *et al.* 2009, 2020; Barr *et al.* 2012, 2019). For Ganderia, this abundant arc magmatism continued until the Cambrian, whereas in Avalonia it ceased or greatly decreased by ~565 Ma as Avalonia became a stable platform (Barr *et al.* 2003a; Murphy *et al.* 2004; Samson *et al.* 2005; Rogers *et al.* 2006; Hibbard *et al.* 2007; van Staal *et al.* 2009, 2020; van Staal and Barr 2012). Detrital zircon age populations from the metasedimentary units of the Nashoba terrane are generally consistent with those from the Ediacaran–early Silurian Ganderian rocks from Newfoundland, New Brunswick and east-central Maine (Fig. 9b; e.g., White and Barr 1996; Barr *et al.* 2003b, 2019; Valverde-Vaquero *et al.* 2006b, Pollock *et al.* 2007, 2009; Schulz *et al.* 2008; Fyffe *et al.* 2009; Ludman *et al.* 2018). The large ~540 Ma detrital zircon age population in all units, and the smaller ~640 Ma age population with minor Mesoproterozoic and Paleoproterozoic populations suggest a Ganderian affinity (Barr *et al.* 2014; Rogers *et al.* 2006; Fyffe *et al.* 2009; Pollock *et al.* 2007, 2009). It is less consistent with Avalonia, which is characterized by a large ~640 Ma population and a smaller ~540 Ma population (Fig. 9c; cf. Keppie *et al.* 1998; Thompson and Bowring 2000; Barr *et al.* 2003b, 2012; Murphy *et al.* 2004; Pollock *et al.* 2009; Satkoski *et al.* 2010; Thompson *et al.* 2014). Strongly negative $\boldsymbol{\varepsilon}_{\mathrm{Nd}\,(500)}$ values and Paleoproterozoic model ages for the metasedimentary rocks in the Nashoba terrane (Kay *et al.* 2017) are also characteristic for Ganderian sedimentary rocks (Samson *et al.* 2000; Schofield and D'Lemos 2000;

Figure 6. (next page) Relative probability plots for LA-ICPMS U–Pb detrital zircon data for units of the Merrimack belt and Tower Hill Formation. Main figures show $^{206}Pb/^{238}U$ ages for zircon <800 Ma and $^{207}Pb/^{206}Pb$ ages for zircon >800 Ma, and inset figures show $^{206}Pb/^{238}U$ ages for zircon <800 Ma only. Data are shown in Table A2.


Eliot Formation
(n = 119)
(a)
446
585
1139
1646
2655
2912
Kittery Formation
(n = 101)
(b)
461
413
543
769
1008
1367
1526
1586
1791
2847
Oakdale Formation
(n = 108)
(c)
451
553
647
1259
1784
2750
Berwick Formation
(n = 133)
(d)
443
634
1017
1481
1706
2283
2721
Worcester Formation
(n = 138)
(e)
470
602
727
1235
1484
1842
2179
Paxton Formation
(n = 113)
(f)
463
431
585
1078
1481
1623
2623
Tower Hill Formation
(n = 106)
(g)
630
530
473
797
1118
1227
1746
2108
2909
Relative probability
Age (Ma)

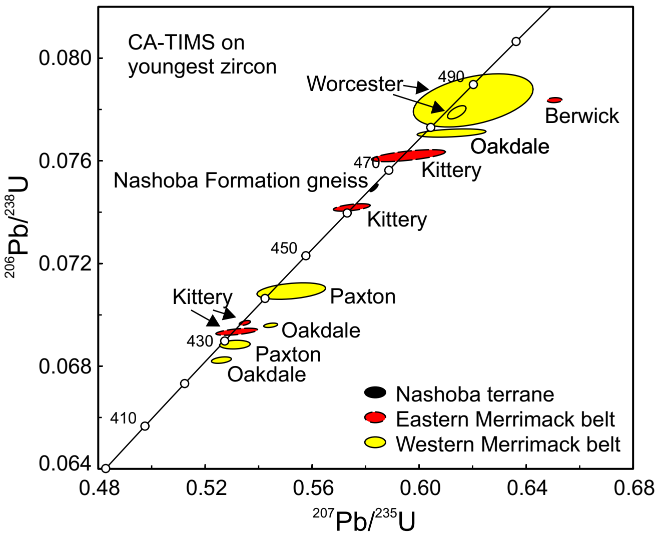


Figure 7. U–Pb CA-TIMS data for youngest zircon grains of the Nashoba Formation gneiss of the Nashoba terrane and for various units of the Merrimack belt. Data are shown in Table 1.

Rogers *et al.* 2006; Pollock *et al.* 2012) and not for typical Avalonian crust (Nance and Murphy 1996; Barr *et al.* 1998; Hibbard *et al.* 2007 Thompson *et al.* 2012). We therefore interpret the Nashoba terrane as having Ganderian affinity.

Ganderia is interpreted to have formed along the Iapetus ocean-facing Amazonian margin of Gondwana in the Neoproterozoic and rifted away in the middle Cambrian, opening the Rheic ocean behind it (Figs. 10a, b) (e.g., van Staal *et al.* 1996, 2009, 2012, 2020; Fyffe *et al.* 2009, 2011; Schulz *et al.* 2008; Pollock *et al.* 2012; Barr *et al.* 2014; van Staal and Barr 2012; Willner *et al.* 2014). Prior to rifting a ~550–528 Ma extensive arc complex developed on the Ganderian margin (Fyffe *et al.* 2011; van Staal and Barr 2012). It formed the basement to the ~515–485 Ma Penobscot arc/back-arc complex that developed on the leading edge of Ganderia as it moved into the Iapetus ocean (Fig. 10b) (Valverde-Vaquero *et al.* 2006a; Rogers *et al.* 2006; Murphy *et al.* 2006; van Staal *et al.* 2009; Fyffe *et al.* 2009, 2011; Zagorevski *et al.* 2007a, b, 2010; van Staal and Barr 2012). At ~486–478 Ma, the Penobscot arc and back-arc fragments consolidated outboard of Laurentia during the Penobscot orogeny (Fig. 10c) (Zagorevski *et al.* 2007b, 2010; van Staal *et al.* 2009; Johnson *et al.* 2009, 2012; van Staal and Barr 2012). Penobscot arc/back-arc rocks are found, south of Newfoundland, in the Brookville, New River and Annidale belts in New Brunswick, the Bras d'Or belt in Cape Breton Island, and the Ellsworth Formation and St. Croix terrane in eastern Maine and share many characteristics with the Nashoba terrane (White *et al.* 1994; Barr *et al.* 1998; Schulz *et al.* 2008; Johnson *et al.* 2009, 2012; Fyffe *et al.* 2011; van Staal and Barr 2012).

Shortly after the Penobscot orogeny, a second expansive arc/back-arc complex (Popelogan-Victoria cycle) formed from ~478–453 Ma on the remnants of the now consolidated Penobscot arc/back-arc deposits (Fig. 10d) (e.g., van Staal 1994; van Staal *et al.* 1998, 2016; Zagorevski *et al.* 2010; van Staal and Barr 2012; Wilson *et al.* 2017) and opened up the expansive Tetagouche and Exploits back-arc basins in Atlantic Canada – New England and in Newfoundland, respectively. These basins divided the Ganderian terrane into a separate active leading margin and a passive trailing margin (where the Nashoba terrane is located). The leading margin collided with Laurentia at about 455–450 Ma (Taconic phase 3 orogeny of van Staal *et al.* 2009). During the next ~20–25 myr the Tetagouche-Exploits basin gradually closed by west-directed subduction under Laurentia (Salinic orogenic cycle) (Figs. 10e, f) until the trailing margin of Ganderia collided with Laurentia in the terminal 426–420 Ma Salinic orogeny (Fig. 10g) (e.g., van Staal *et al.* 1998, 2003, 2008, 2012, 2016; Valverde-Vaquero *et al.* 2006a; Zagorevski *et al.* 2008; Fyffe *et al.* 2011; Zagorevski and van Staal 2011; van Staal and Barr 2012).

In the Nashoba terrane, igneous rocks of the ~540–500 Ma Marlboro Formation, the 515 Ma Grafton Gneiss and the 499 Ma Fish Brook Gneiss (Hepburn *et al.* 1995; Acaster and Bickford 1999; Walsh *et al.* 2011a, 2015, 2021) originated during the time of formation of the Cambrian Penobscot arc/back-arc complex (Figs. 10a, b) or its Ediacaran–Cambrian basement. An abundance of detrital zircon of that age in metasedimentary units of the Nashoba terrane reflects internal sources within the Penobscot arc/back-arc complex and its basement. Older zircon grains in the Nashoba terrane were eroded into the sedimentary basins from either Gondwanan (Amazonian) sources prior to the Cambrian rifting and drifting of Ganderia, or originated from reworked basement rocks beneath the Nashoba terrane. Such Proterozoic basement is exposed beneath Penobscot-cycle Ganderian rocks in the Brookville and New River terranes and on Grand Manan Island in New Brunswick (Johnson *et al.* 2009, 2012; Fyffe *et al.* 2009, 2011; Pollock *et al.* 2012; van Staal and Barr 2012; Fyffe 2014; Barr *et al.* 2019), the Bras d'Or terrane in Cape Breton Island (Barr *et al.* 1998; van Staal and Barr 2012) and the Islesboro block in coastal Maine (Reusch *et al.* 2018, 2021). The combined LA-ICPMS youngest detrital zircon age population of all samples from the Nashoba terrane (466 ± 13 Ma) and the single CA-TIMS age (465.9 ± 0.7 Ma) suggest that Ordovician metasedimentary rocks also exist in the terrane and may have formed during the Popelogan tectonic cycle (Fig. 10d).

Metamorphic zircon

The Nashoba terrane contains abundant metamorphic zircon grains. These show a significant spread of weighted average ages between ~433 Ma and ~356 Ma (Fig. 5) and primarily indicate zircon growth during the Acadian orogeny. Younger zircon ages, while showing scatter and large uncertainties, likely reflect growth and/or recrystallization that extended into the Neoacadian and Alleghanian orogenies. Metamorphic zircon formed prior to ~425 Ma may have originated during the earlier Salinic orogeny. Our ages are consistent with published ages of metamorphism in the

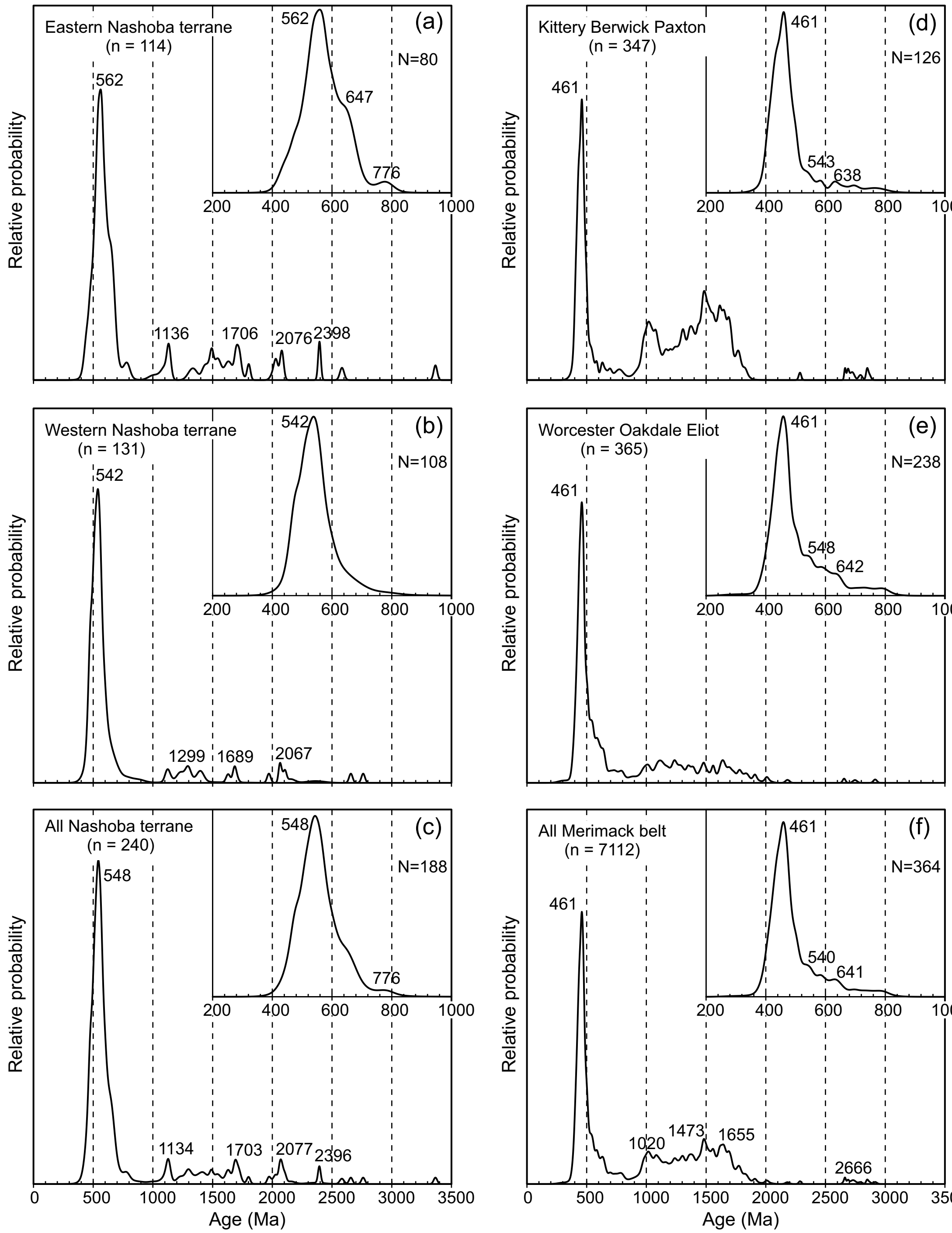


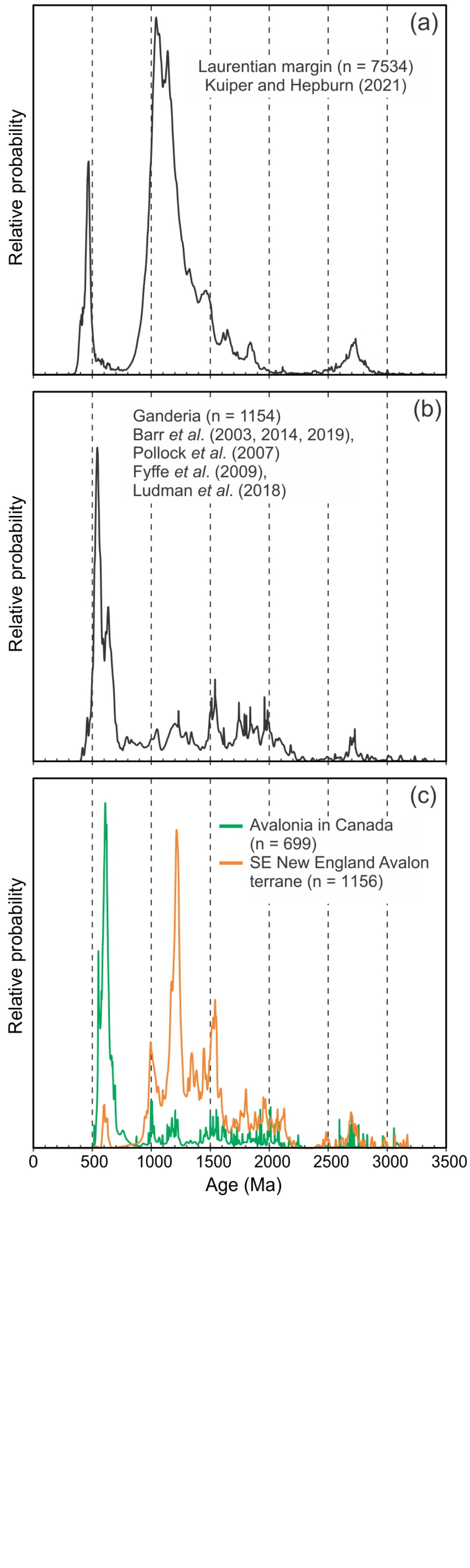
Figure 8. Relative probability plots for LA-ICPMS U–Pb detrital zircon data for the eastern, western and all Nashoba terrane (a-c), (d) combined Kittery, Berwick and Paxton formations, (e) combined Worcester, Oakdale and Eliot formations, (f) combined all Merrimack belt. See figures 4 and 6 for data for individual units and further explanation.

Nashoba terrane using various methods (Hepburn *et al.* 1995; Wintsch *et al.* 2007; Stroud *et al.* 2009; Walsh *et al.* 2013a, 2015, 2021; Buchanan *et al.* 2016a, b; Severson 2020). Because the precision of our ages is not higher than those reported previously, and because of consistency between the various data sets, we will not discuss the ages of metamorphism further.

Tower Hill Formation

Age of deposition and correlations

The youngest LA-ICPMS detrital zircon age population in the Tower Hill Formation is 513 ± 15 Ma (3 grains), considerably older than any of the six formations sampled from the Merrimack belt (Figs. 6, 8f). A single grain from this unit


(a)
Laurentian margin (n = 7534)
Kuiper and Hepburn (2021)
(b)
Ganderia (n = 1154)
Barr et al. (2003, 2014, 2019),
Pollock et al. (2007)
Fyffe et al. (2009),
Ludman et al. (2018)
(c)
Avalonia in Canada
(n = 699)
SE New England Avalon
terrane (n = 1156)
(d)
Kittery Formation (n = 45)
Wintsch et al. (2007)
(e)
Berwick Formation (n = 41)
Wintsch et al. (2007)
(f)
Hebron Formation (n = 146)
Wintsch et al. (2007)
(g)
Central Maine Basin (n = 669)
Bradley and O'Sullivan (2017)
Relative probability
0
500
1000
1500
2000
2500
3000
3500
Age (Ma)

(not included in the grouping at 513 Ma) has a LA-ICPMS $^{206}Pb/^{238}U$ age of 463 ± 9 Ma, which is within error of the youngest age population of the Nashoba terrane. However, the ~513 Ma population is older than any youngest populations in the metasedimentary rocks of the Nashoba terrane and other aspects of the zircon population in the Tower Hill Formation, such as the 630 Ma main age peak, are different from any of the other samples (Figs. 4, 8c). Of particular interest is the ~950–750 Ma age population that is not characteristic for known Avalonian or Ganderian rocks.

The 513 ± 15 Ma youngest age population of the Tower Hill Formation is similar to the maximum ages of deposition for Cambrian rocks found in several Ganderian terranes in New England and New Brunswick. These include the Ellsworth Formation of the Ellsworth terrane, the Calais Formation of the St. Croix terrane, and the Baskahegan Lake Formation of the Miramichi terrane (Fyffe *et al.* 2009). However, these formations do not show a large peak at ~630 Ma. Basement rocks (Martinon Fm.) below the Ganderian Brookville terrane and on Grand Manan Island in New Brunswick (Flagg Cove and Long Pond Bay Formations, Fyffe *et al.* 2009; Fyffe 2014; Barr *et al.* 2019) do show a Neoproterozoic peak of approximately this age. Rocks with both Cambrian youngest detrital zircon age populations and ~630 Ma peaks occur in some samples in the Moretown, Albee and Dead River formations of the Moretown terrane in western Massachusetts, Vermont, New Hampshire and western Maine (Karabinos *et al.* 2017) and the Ganderian Kedears Hill greywacke of North Islesboro, Maine (Reusch *et al.* 2018, 2021). However, because none of their detrital zircon signatures is similar to the Tower Hill formation, no specific correlations can be made. The detrital zircon ages do indicate that the Tower Hill Formation is not a part of the Merrimack belt stratigraphy and that the boundary between the Nashoba terrane and Merrimack belt is complex and likely incorporates exotic fault-bounded slices.

Merrimack belt

Age of deposition

The LA-ICPMS youngest detrital zircon populations for individual formations of the Merrimack belt in southeastern New Hampshire and Massachusetts range between 436 ± 9 Ma (Worcester Formation) and 409 ± 12 Ma (Berwick Formation). The CA-TIMS $^{206}Pb/^{238}U$ ages for the five youngest detrital zircon grains from the Merrimack belt samples are between 434 and 425 Ma. Three CA-TIMS ages from the Merrimack belt are within error of LA-ICPMS analyses that were used as part of the youngest populations (Tables 1, A2). These include two grains from the Oakdale Formation (mr16b23, LA-ICPMS: 409 ± 17 Ma, CA-TIMS: 425.53 ± 0.64 Ma and mr16a24 LA-ICPMS: 436 ± 8 Ma, CA-TIMS: 433.70 ± 0.41 Ma respectively) and grain au26a47 of the Paxton Formation (LA-ICPMS: 412 ± 18 Ma, CA-TIMS: 429.16 ± 0.82 Ma). The remainder of the CA-TIMS ages on grains from the youngest groups of zircons are older than the LA-ICPMS ages, up to ~30 myr for a grain from the Worcester Formation with a CA-TIMS age of 486 Ma (Table 1). This may reflect either unaccounted for Pb-loss in the LA-ICPMS analyses or the presence of older cores that survived chemical abrasion better than overgrowths prior to analysis. These older CA-TIMS ages are not interpreted as reflecting the ages of the youngest zircon populations.

The CA-TIMS ages for the three youngest detrital zircons in the Oakdale and Paxton formations (434–426 Ma) are consistent with the 429 ± 5 Ma LA-ICPMS youngest detrital zircon age population (MSWD = 0.82, n = 18) for the three formations in the central Massachusetts portion of the belt (Worcester, Oakdale, and Paxton formations). The Worcester Formation is intruded by a 424 ± 3 Ma phase of the Ayer granodiorite at Eddy Pond, near Auburn, Massachusetts (U–Pb secondary ion mass spectrometry (SIMS) zircon data; Walsh *et al.* 2013a; Walsh and Merschat 2015), and the Oakdale Formation is intruded by the 420.1 ± 0.1 Ma Clinton facies of the Ayer granodiorite (U–Pb CA-TIMS zircon data; Charnock 2015). Therefore, the ages of these two formations are constrained between ~434 Ma and ~420 Ma (late Llandovery to Pridoli).

The combined youngest detrital zircon age population for the Kittery, Eliot and Berwick formations in the northeastern part of the sample area is 411 ± 8 Ma (MSWD = 0.14, n = 13). The LA-ICPMS weighted average of $^{206}Pb/^{238}U$ ages of the four youngest detrital zircon grains from the Eliot Formation is 409 ± 19 (MSWD = 0.046), of the four youngest grains from the Kittery Formation is 413 ± 13 Ma (MSWD = 0.089), and of the five youngest detrital zircon grains from the Berwick Formation is 409 ± 12 Ma (MSWD = 0.27). Two grains from the Kittery Formation youngest population yielded CA-TIMS ages of 432 Ma and 434 Ma (Table 1). The previously folded and regionally metamorphosed Kittery and Eliot formations are intruded in SE New Hampshire by the 418 ± 1 Ma Newburyport quartz diorite and the 407.4 ± 0.5 Ma Exeter diorite (U–Pb ID-TIMS and CA-TIMS zircon data; Bothner *et al.* 1993, 2009; Hussey and Bothner 1993; Fargo and Bothner 1995; Wintsch *et al.* 2007). The Berwick Formation was intruded by the 407 ± 4 Ma Devens Long Pond facies of the Aver Granite in Westford, Massachusetts (U–Pb SHRIMP, Walsh *et al.* 2013b, 2021). This indicates that at least the Kittery and Eliot formations must be older

Figure 9. (previous page) Relative probability plots for (a) Laurentia, (b) Ganderia, (c) Avalonia, compiled by Severson *et al.* (in press), from Keppie *et al.* (1998); Barr *et al.* (2003b); Murphy *et al.* (2004); Hepburn *et al.* (2008); Pollock *et al.* (2009); Satkoski *et al.* (2010); Thompson *et al.* (2012); Willner *et al.* (2013); Henderson *et al.* (2016); Barr *et al.* (2019); Kuiper *et al.* (in press). (d, e, f) Kittery Berwick and Hebron formations of Wintsch *et al.* (2007), and (g) the Central Maine basin of Bradley and O'Sullivan (2017).

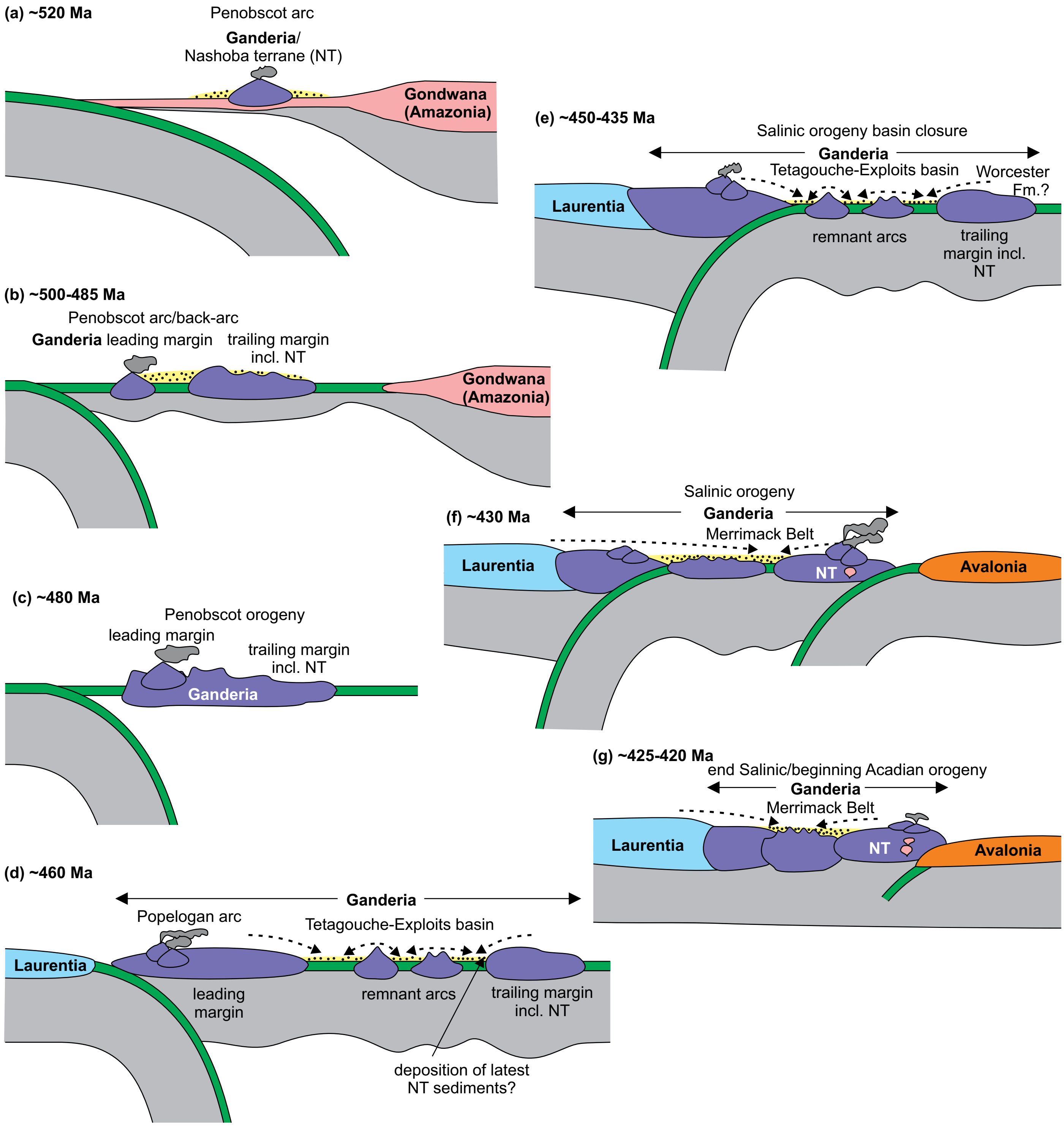


Figure 10. Simplified schematic diagrams showing the suggested development of the Nashoba terrane and Merrimack belt through time. Variation and movement of terranes along strike is not represented. Dashed arrows indicate sedimentary source areas.

than 418 Ma and that the LA-ICPMS youngest average detrital zircon age for these formations is inconsistently young.

Based on the LA-ICPMS and CA-TIMS data and the dated intrusive rocks, the Merrimack belt units in Massachusetts and SE NH are interpreted to have been deposited between ~434 Ma and ~420 Ma. However, since the Berwick and Paxton formations are not intruded by any pre-407 Ma dated igneous rocks in the area their minimum age limit is not well constrained, and they could be somewhat younger.

Correlations and changes in provenance through time

In Massachusetts and SE New Hampshire, the Merrimack belt rocks have ages of deposition between ~434 and ~420 Ma, large Middle to Late Ordovician zircon populations, smaller ~500–800 Ma populations, significant Mesoproterozoic populations, and scattered Archean grains. The Mesoproterozoic populations are much more prominent in the Kittery, Berwick and Paxton formations than in the Eliot, Oakdale, and Worcester formations (Figs. 6, 8d, e). While both Laurentia and Gondwana are potential viable sources for Mesoproterozoic zircon (e.g., Murphy *et al.* 2004; Fyffe *et al.* 2009; Pollock *et al.* 2009; Barr *et al.* 2019; Figs. 9a, b), Laurentia is a better source for ~1.2–1.0 Ga zircon (e.g., Cawood and Nemchin 2001; Hibbard *et al.* 2007; Waldron *et al.* 2014, 2018; Dokken *et al.* 2018; Severson 2020; Kuiper and Hepburn 2021). Furthermore, ~2.2–2.0 Ga zircons are largely absent in Laurentia, while Gondwana provides some zircon of this age, and Neoproterozoic zircon is characteristic for Gondwana, but not for Laurentia (Figs. 9a, b; Pollock *et al.* 2007; Waldron *et al.* 2009, 2014; Severson 2020). In the Merrimack belt samples the detrital zircon signatures of the Kittery, Berwick and Paxton formations show a Mesoproterozoic population, including a prominent 1.2–1.0 Ga population, no ~2.2–2.0 Ga grains and minor Neoproterozoic zircon, indicating evidence of Laurentian input. In contrast, the Eliot, Oakdale, and Worcester formations have a much smaller Mesoproterozoic population, three ~2.2–2.0 Ga grains and abundant Neoproterozoic zircon (Figs. 6, 8d, e), indicating Gondwanan but not Laurentian input.

In south-central Maine, Cartwright *et al.* (2019) concluded that detrital zircon in the older rocks of the Fredericton trough (Llandovery Appleton Ridge Formation and Ghent Phyllite; Figs. 1, 3) have a Gondwanan source and no evidence of Laurentian sediment input, similar to the Llandovery Digdeguash Formation of the Kingsclear Group, southeast of the Fredericton fault (northern extent of the Norumbega fault system; Fig. 1) in southern New Brunswick (Dokken *et al.* 2018). However, the overlying Wenlock–Ludlow Flume Ridge Formation in the eastern Fredericton trough in New Brunswick and the Llandovery Hayes Brook and Wenlock–Ludlow Burtts Corner formations northwest of the Fredericton fault contain detrital zircon with Mesoproterozoic Laurentian input (Dokken *et al.* 2018). Likewise, rocks deposited in the Central Maine basin (Vassalboro Group) contain mixed Gondwanan and Laurentian detrital zircon signatures with Mesoproterozoic Laurentian input to its eastern structural margin in central Maine (Cartwright *et al.* 2019). Thus, rocks that contain a Laurentian detrital zircon signature were either deposited in a more westerly location, i.e., in the Central Maine basin or western portion of the Fredericton trough, or else are younger deposits in the eastern Fredericton trough.

In the Merrimack belt in Massachusetts and SE New Hampshire the Worcester, Oakdale and Eliot formations, with minor Laurentian Mesoproterozoic detrital zircon likely correlate with the early Silurian deposits in the Fredericton trough in Maine and New Brunswick. The mixed detrital zircon source of the Kittery Formation with the presence of Laurentian detrital Mesoproterozoic input is consistent with the younger Silurian rocks in the Fredericton trough in New Brunswick (Dokken 2018) and the interpretation of Hussey *et al.* (2010) and Wintsch *et al.* (2007) that it represents the youngest deposit in the Merrimack Group in SE Maine and New Hampshire. The Paxton and Berwick formations (Figs. 6d, f) also have mixed Gondwanan and Laurentian detrital zircon signatures. Hussey *et al.* (2010, 2016; cf. Wintsch *et al.* 2007) place the Berwick Formation stratigraphically above the Kittery and Eliot formations in SE Maine and New Hampshire and interpret it as part of the Central Maine basin. The similar lithologies of the Paxton and Berwick formations, their similar detrital zircon signatures including Laurentian 1.2–1.0 detrital zircons, and the fact that neither is known to be crosscut by late Silurian–Early Devonian plutons support their potential correlation (Robinson and Goldsmith 1991). Thus, the Paxton and Berwick formations are interpreted to be the youngest rocks of those sampled in the Merrimack belt in SE New Hampshire and Massachusetts, consistent with interpretations by Hussey *et al.* (2010, 2016; cf. Wintsch *et al.* 2007) and further suggesting that the Paxton Formation was likely deposited in the Central Maine basin or its equivalent in Massachusetts.

Dokken *et al.* (2018) and Cartwright *et al.* (2019) propose that Laurentian detrital material only reached the eastern Fredericton trough by the middle Silurian and that a barrier existed between Laurentian margin and Gondwanan sources prior to this time (see also Ludman *et al.* 2018). A similar barrier may have existed during the deposition of the Worcester, Oakdale and Eliot formations, which was not present during deposition of the Kittery, Paxton and Berwick formations.

Our detrital zircon age populations for the Kittery and Berwick formations are generally similar to those based on the SHRIMP U–Pb analysis of Wintsch *et al.* (2007; Figs. 9d, e). Although minor differences exist in the sizes of the populations, these may be a result of differences in the number of analyses. Wintsch *et al.* (2007) correlated the Berwick Formation in Maine with the Hebron Formation in Connecticut. The Hebron Formation has a zircon age distribution (Fig. 9f) similar to the Berwick Formation, although the Hebron Formation contains a relatively larger ~1.2–1.0 Ga Laurentian population. This may be a result of local provenance differences, e.g., a higher local input from a Grenville source. Alternatively, it may indicate that the Hebron Formation, where sampled, is somewhat younger than the Berwick Formation, resulting in an increased Laurentian signal. The similarity of the detrital zircon distributions in the Berwick, Paxton and Hebron formations to those of samples from the Central Maine basin (Fig. 9g; Bradley and O'Sullivan 2017) indicate that they all were likely deposited in the Central Maine basin or its equivalent in Massachusetts and Connecticut.

Potential source areas and tectonic synthesis

The Merrimack belt in Massachusetts and SE New Hampshire, the Merribuckfred basin and eastern portion of the Central Maine basin in Maine and New Brunswick all show a mix of Gondwanan and Laurentian sources. Here we briefly summarize the spatial and temporal differences in sources for the Merribuckfred and Central Maine basins, from north to south, so as to better identify the sources for Merrimack belt. Ludman *et al.* (2018, 2019) interpret the rocks in the Fredericton trough in eastern Maine to have originated largely from Gondwanan sources, either from emergent basement highlands underlain by Ganderian rocks such as in the Miramichi terrane, or by Wenlock–Ludlow time, from arc sources to the east as Avalonia approached and docked with the trailing edge of Ganderia. Such arc sources are present in the Coastal Volcanic belt in eastern Maine and the Kingston belt in New Brunswick (Fig. 1; Gates and Moench 1981; Seaman *et al.* 1999, 2019; Barr *et al.* 2002; Van Wagoner *et al.* 2002; Piñán-Llamas and Hepburn 2013; Ludman *et al.* 2017, 2018). In southern coastal Maine, Hussey *et al.* (2010) interpreted the Llandovery Bucksport and Appleton Ridge formations in the Fredericton trough to have Gondwanan sources and to have been deposited between a western Ganderian Ordovician arc (present in the Casco Bay and Falmouth-Brunswick Groups; Fig. 1) and the eastern trailing margin of Ganderia. Similarly, late Ordovician (?) to early Silurian deposits in the eastern Fredericton trough in New Brunswick (Dokken *et al.* 2018) and in south-central Maine (Cartwright *et al.* 2019) show only Gondwanan sources. However, younger deposits in the Kingsclear Group in the eastern Fredericton trough in southern New Brunswick and those in the western Fredericton trough (Fig. 3) include Laurentian detrital zircon material (Dokken *et al.* 2018).

The majority of the zircon in the Merrimack belt in Massachusetts and SE New Hampshire (Figs. 6, 8f) has Gondwanan affinity and most formed during the ~478–453 Ma Popelogan-Victoria volcanic arc/back-arc cycle that included the opening of the broad Tetagouche-Exploits back-arc basin (Fig. 10d; e.g., Valverde-Vaquero *et al.* 2006a; Fyffe *et al.* 2009; Johnson *et al.* 2009; Zagorevski *et al.* 2007a, 2010; van Staal and Barr 2012; Wilson *et al.* 2015; van Staal *et al.* 2016). Input of zircons into the Merrimack belt during the existence of the Tetagouche-Exploits back-arc basin likely came from erosion of emergent local highlands underlain by Ganderian Ordovician rocks, such as in the Miramichi and St. Croix terranes in eastern Maine and New Brunswick (Fig. 10e; Fyffe 1995; Fyffe *et al.* 2009, 2011; Ludman *et al.* 2017, 2018) and in the Casco Bay and Falmouth-Brunswick Groups in south-central and coastal southern Maine (West *et al.* 2003, 2004, 2008; Gerbi and West 2007; Hussey 2010, West and Hussey 2016, Hussey and West 2018). Input of Laurentian-derived zircons to the eastern portions of the trailing margin of Ganderia during this time was probably minor as the Tetagouche-Exploits basin and perhaps these highlands formed a barrier to Laurentian zircon transport (Fig. 10e), but was more prominent to the west in the Central Maine basin (Bradley and O'Sullivan 2017; Cartwright *et al.* 2019).

The boundary between the Merribuckfred and Central Maine basins in New England has been interpreted as the line of closure of the Tetagouche-Exploits basin (the Dog Bay line in Newfoundland) during the Salinic orogeny (Reusch and van Staal 2012). During the closure of this basin, it is likely that the younger Silurian deposits in the Merrimack belt (Kittery, Berwick and Paxton formations) received increasing amounts of Laurentian detritus (Fig. 10f). By the middle Silurian, when the Tetagouche-Exploits basin was closing, the oceanic crust between the approaching Avalonia and Ganderia was subducting below the trailing margin of Ganderia (Fig. 10f). The Silurian volcanic arc formed at this time is represented in Massachusets by the Newbury Volcanic Complex (Shride 1976a, b; Zen *et al.* 1983) along the northeastern boundary of the Nashoba terrane (Fig. 2). Avalonia collided by ~425 Ma (Fig. 10g; e.g., Fyffe *et al.* 1999; Bradley *et al.* 2000; van Staal *et al.* 2009; van Staal and Barr 2012; Piñán-Llamas and Hepburn 2013; Wilson *et al.* 2017). Paleocurrent directions in the Kittery Formation in the Merrimack belt suggest that some of the youngest detritus was sourced east of the belt (Rickerich 1983, 1984; Hussey *et al.* 1984). Thus, middle to late Silurian detrital zircon in the Merrimack belt could have been derived from the Salinic orogen and Laurentian margin to the west and/or from arc volcanism and orogenesis related to the approach and collision of Avalonia to the east (Figs. 10f, g). As the Acadian orogenic front advanced westward, earlier deposits to the east were uplifted and likely provided reworked detritus for younger, more westerly, deposits in the Central Maine basin (Bradley *et al.* 2000; Hussey *et al.* 2010; Bradley and O'Sullivan 2017; Ludman *et al.* 2018).

SUMMARY

Nashoba terrane

Detrital zircon from five units in the Nashoba terrane in eastern Massachusetts have similar U–Pb LA-ICPMS age patterns with main age peaks between ~560 and ~540 Ma and an average peak for all Nashoba terrane samples at 548 Ma. The Shawsheen Gneiss and Marlboro Formation have small peaks at ~640 Ma and all samples have input between ~1.1 and 1.7 Ga, scattered grains between ~2.0 and 2.1 Ga and a few grains at ~2.4 Ga. One sample from the Marlboro Formation has a detrital core with an Archean age of 3.36 Ga. Populations of youngest detrital zircons ranged from 470 ± 22 Ma to 462 ± 20 Ma with an average of 466 ± 13 Ma. CA-TIMS analysis of one grain from the youngest population of the Nashoba Formation gneiss gave a $^{206}Pb/^{238}U$ age of 465.9 ± 0.7 Ma. The similarity of the zircon detrital pattern of the Tadmuck Brook schist to that of the other units indicates that it is part of the Nashoba terrane.

The strong ~540 Ma peak in the detrital zircon abundance with a much smaller ~640 Ma peak indicates that the Nashoba terrane is a part of Ganderia, a conclusion that is consistent with earlier work (e.g., Hepburn 2004; Walsh *et al.* 2011b, 2013a, 2021; Kay *et al.* 2017). The large input of ~540 Ma zircons indicates that most of the detrital input was from local sources formed during the Cambrian Penobscot orogenic cycle and its Ediacaran basement.

Metamorphic zircon is common in the Nashoba terrane and yielded an approximately continuous spectrum of ages from ~440 Ma to ~335 Ma, consistent with previous studies.

Tower Hill Formation

The Tower Hill Formation lies along the terrane bounding Clinton-Newbury fault zone and has significantly different detrital zircon abundances than either the Nashoba terrane or Merrimack belt metasedimentary rocks. The main population is ~630 Ma, with a continuum of ages from that age to ~1.8 Ga and three grains at ~2.9 Ga and ~2.1 Ga. The youngest detrital zircon population is 513 ± 15 Ma based on the weighted average of three grains. Zircon data from the Tower Hill Formation indicates that it is different from the rocks of the Merrimack belt and Nashoba terrane, suggesting that the boundary between the Nashoba terrane and Merrimack basin is complex.

Merrimack belt

Metasedimentary rocks of the Merrimack belt in Massachusetts and SE New Hampshire yielded large Ordovician zircon populations (average peaks at 443–460 Ma), smaller 500–800 Ma populations and scattered Archean grains. Some units (Worcester, Oakdale and Eliot formations) show only Gondwanan provenance, while three units (Kittery, Paxton and Berwick formations) include a minor, but significant Mesoproterozoic Laurentian provenance input. This may indicate that these formations are younger than the others and/or were deposited in a more westerly position in the equivalent of the Central Maine basin. All units were deposited between ~435 and ~420 Ma based on youngest LA-ICPMS and CA-TIMS zircon populations and the ages of crosscutting plutons. The majority of the sedimentary material was derived from Ordovician Ganderian arcs and basement, or reworked arc material, due to the expansion and contraction of the Tetagouche-Exploits basin during the Popelogan/Victoria arc/back-arc cycle and Salinic orogeny. Late Silurian deposits in the Merrimack basin originated from input of both Laurentian material from the west and arc and orogenic sources to the east as the seaway between Ganderia and Avalonia closed by subduction under the trailing edge of Ganderia and the beginning of Acadian orogenesis.

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APPENDIX

Sample Locations and LA-ICPMS U-Pb zircon data

Table A1. Sample locations.

Unit name	Sample number	Coordinates	Location description
Nashoba terrane			
Marlboro Formation	MLMR1	42°19'56.21"N, 71°36'01.70"W	Hayes Memorial Drive, Marlborough, MA.
	MLMR2	42°20'49.35"N, 71°32'52.56"W	Main St. in Marlborough, MA. This is the type- locality of Marlboro Formation schist (Emerson, 1917).
	MLMR5	42°23'45.65"N, 71°28'24.11"W	Massachusetts Fire Fighting Academy in Stowe, MA.
	MLMR6	42°21'35.19"N, 71°31'30.10"W	From a small outcrop in a housing development in Marlborough, MA. The unit was located along strike with the Main St. exposures.
Shawsheen Gneiss	MLSG1	42°31'34.98"N, 71°15'17.17"W	Fresh exposures adjacent to the parking lot of an industrial park at 900 Middlesex Turnpike in Billerica, MA. The samples were collected at multiple locations around the industrial park to ensure a statistical representation of detrital zircon populations across layers.
Nashoba Formation	MLNB1	42°19'50.51"N, 71°40'15.87"W	Fresh exposure due to blasting for a new housing development at Church St. Village, Northboro, MA.
	MLBM1	42°22'50.87"N, 71°38'43.12"W	From the spillway of a flood control dam in Berlin, MA.
	MLNS1	42°20'25.45"N, 71°39'48.17"W	Green Street, Northboro, MA.
Tadmuck Brook Schist	MLTMBC	42°31'55.27"N, 71°31'30.25"W	A combination of several samples taken within 50 m along one continuous road outcrop in Littleton, MA.
Merrimack belt			
Kittery Formation	KSKTI	43°5'12.1"N, 070°46' 06.2" W	Stop 1 of the 1995 NEIGC field trip guide, trip II (Fargo and Bothner, 1995). Located on Michael Succi Drive, Portsmouth, NH, near the National Gypsum Plant.
Eliot Formation	KSELI	43°8'53.9"N, 070°58' 38.9"W	Stop 5, trip A2, NEIGC field trip guide, 1995, p. A2-9 (Fargo and Bothner, 1995). Located at Lee Five Corners, Lee, NH at the intersections of Route 155 and Route 4.
Berwick Formation	KSBWI	43°10'51.3"N, 070°56'51.2"W	Located at the MSPCA/Nevins Farm on Route 28, Methuen, MA near the rear of the property next to a storage facility.
Oakdale Formation	KSOKI	42°23'47.5"N, 071°47'03.9"W	Stop 2, trip F2, NEIGC field trip guide, 1976, p. 373 (Hepburn, 1976). Located in West Boylston, MA along a set of railroad tracks about 150 meters west of Prescott St.
Worcester Formation	KSWSI	42°22'14.4"N, 071°44'53.1"W	Stop 1, trip F-2, NEIGC field trip guide, 1976, p. 372 (Hepburn, 1976). Located on the shore of the Wachusett reservoir on the east side of Shalon Point in Boylston, MA.
Paxton Formation	KSPXIII	42°31'12.5"N, 071°46'22.40"W	Located at Barrett Park, located off Chestnut St., Leominster, MA. The outcrop was located along the edge of the parking lot near the information center of the park.
Tower Hill Formation	KSTHI	42°20'59.1"N, 071°44'23.67"W	Located directly behind the Boylston Fire Station off of Main St., Boylston, MA on Diamond Hill.

Table A2. LA-ICPMS data.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
NASHOBA ERRANE																									
Marlboro Formation (MLMRC)																									
mr04a20	0.442	0.031	0.047	0.004	0.67	0.068	0.001	372	22	293	27	857	23	34	353	43	0.00	0.014							
mr04a19	0.508	0.038	0.058	0.005	0.59	0.063	0.001	417	26	361	31	719	29	50	401	50	0.03	0.023							
mr04a24	0.519	0.015	0.063	0.001	0.37	0.062	0.000	424	10	397	8	666	16	60	406	15	0.01	0.008							
mr04a28	3.142	0.310	0.189	0.017	0.46	0.110	0.002	1443	76	1115	93	1796	25	62	1296	153	0.00	0.455							
mr04a34	5.856	0.301	0.318	0.011	0.34	0.126	0.002	1955	45	1778	55	2044	23	87	1885	83	0.00	0.207							
mr04a33	5.980	0.272	0.318	0.012	0.41	0.129	0.001	1973	40	1780	58	2083	17	85	1927	78	0.00	0.620							
mr04a26	0.452	0.078	0.052	0.009	0.50	0.055	0.001	379	55	324	55	415	50	78	350	96	0.32	0.033			324	55			
mr04a16	0.481	0.015	0.061	0.002	0.46	0.058	0.000	399	10	379	10	525	14	72	389	18	0.07	0.011			379	10			
mr04a35	0.497	0.048	0.061	0.003	0.30	0.055	0.001	410	33	381	21	428	53	89	387	40	0.39	0.035			381	21			
mr04a10	0.529	0.044	0.062	0.005	0.52	0.062	0.000	431	29	386	32	660	16	58	412	53	0.14	0.006			386	32			
mr04a08	0.542	0.033	0.065	0.005	0.61	0.061	0.001	440	22	408	29	639	20	64	435	43	0.18	0.086			408	29			
mr04a14	0.586	0.095	0.066	0.010	0.46	0.065	0.001	468	61	411	60	771	26	53	437	105	0.36	0.111			411	60			
se14a97	0.507	0.080	0.068	0.004	0.18	0.060	0.003	417	54	424	24	617	96	69	423	46	0.89	0.023			424	24			
mr04a31	0.562	0.053	0.070	0.004	0.32	0.060	0.001	453	35	434	26	594	44	73	439	47	0.61	0.611			434	26			1
mr04a09	0.531	0.028	0.071	0.004	0.52	0.056	0.000	432	19	440	23	453	20	97	434	35	0.73	0.005			440	23			
mr04a17	0.598	0.055	0.071	0.007	0.51	0.062	0.001	476	35	443	40	665	24	67	464	65	0.39	0.039			443	40			
mr04a06	0.589	0.061	0.076	0.008	0.48	0.058	0.002	470	39	470	46	515	93	91	470	72	1.00	0.182	470	46					
se14a99	0.755	0.092	0.081	0.005	0.25	0.063	0.003	571	53	504	29	715	87	70	514	56	0.22	2.968	504	29					
mr04a05	0.715	0.033	0.086	0.003	0.39	0.059	0.001	548	19	529	18	551	41	96	537	31	0.37	0.889	529	18					
mr04a27	0.784	0.052	0.086	0.005	0.41	0.060	0.001	588	30	531	28	586	29	91	555	49	0.07	0.922	531	28					
mr04a07	0.793	0.062	0.088	0.004	0.27	0.068	0.001	593	35	545	22	879	37	62	555	42	0.20	0.871	545	22					
se14a98	0.898	0.084	0.104	0.007	0.34	0.062	0.001	651	45	640	39	679	23	94	644	68	0.83	0.240	640	39					
mr04a32	10.966	0.283	0.466	0.010	0.42	0.154	0.001	2520	24	2467	45	2393	11	103	2516	48	0.19	0.364	2393	11					
se14a95	12.946	0.337	0.511	0.013	0.49	0.172	0.002	2676	25	2661	56	2581	18	103	2676	49	0.77	0.595	2581	18					
se14a94	30.084	0.955	0.745	0.020	0.42	0.280	0.003	3490	31	3588	73	3364	15	107	3490	62	0.14	0.356	3364	15					
Shawsheen gneiss (MLSG1)																									
mr05a31	0.509	0.025	0.054	0.002	0.33	0.072	0.001	418	16	338	10	980	29	34	352	20	0.00	0.322							
mr06a120	0.788	0.039	0.069	0.003	0.45	0.083	0.001	590	22	428	18	1260	24	34	467	34	0.00	1.083							
mr05a10	0.799	0.033	0.078	0.003	0.44	0.071	0.001	597	19	486	17	963	31	50	527	31	0.00	0.621							
mr06a77	0.845	0.084	0.083	0.005	0.28	0.072	0.002	622	46	512	27	995	67	51	528	52	0.02	0.534							
mr05a39	0.750	0.023	0.083	0.002	0.35	0.064	0.001	568	13	515	11	737	25	70	532	20	0.00	0.326							
mr06a66	0.788	0.031	0.086	0.002	0.35	0.065	0.001	590	17	530	14	787	30	67	548	25	0.00	0.762							
se13a72	1.002	0.047	0.086	0.003	0.38	0.074	0.001	705	24	533	19	1047	38	51	571	35	0.00	0.189							
mr06a141	0.859	0.062	0.087	0.004	0.30	0.071	0.002	630	34	535	22	964	46	55	554	43	0.01	0.622							
mr06a89	1.068	0.090	0.088	0.003	0.20	0.084	0.003	738	44	541	18	1297	58	42	551	35	0.00	0.262							
se13a79	1.132	0.044	0.089	0.003	0.37	0.080	0.001	769	21	547	15	1197	25	46	582	29	0.00	0.333							
mr05a13	1.076	0.037	0.090	0.002	0.37	0.086	0.001	742	18	558	14	1340	21	42	596	26	0.00	0.153							
mr06a76	0.904	0.076	0.091	0.012	0.76	0.063	0.001	654	41	561	69	712	42	79	676	77	0.04	0.875							
mr06a81	2.014	0.134	0.092	0.003	0.28	0.151	0.004	1120	45	567	20	2353	43	24	562	40	0.00	1.099							
se13a70	1.094	0.145	0.095	0.010	0.41	0.079	0.001	750	70	583	60	1163	20	50	632	111	0.02	0.216							
se13a78	0.875	0.034	0.097	0.001	0.20	0.060	0.001	638	18	600	9	591	30	102	604	17	0.04	0.735							
mr06a69	0.925	0.041	0.099	0.003	0.32	0.066	0.001	665	22	606	16	822	30	74	622	30	0.01	0.652							
mr06a58	1.720	0.119	0.124	0.007	0.39	0.098	0.001	1016	44	751	38	1590	21	47	817	72	0.00	0.212							
mr05a20	1.713	0.095	0.145	0.004	0.27	0.083	0.001	1013	35	872	24	1274	27	68	901	46	0.00	0.066							
se13a76	1.904	0.160	0.154	0.007	0.29	0.090	0.002	1083	56	922	42	1424	34	65	960	77	0.01	0.445							
se13a81	2.107	0.108	0.174	0.008	0.43	0.080	0.001	1151	35	1033	42	1187	21	87	1105	66	0.00	0.207							
se13a62	2.458	0.120	0.175	0.007	0.41	0.099	0.001	1260	35	1042	38	1613	16	65	1147	65	0.00	0.348							
mr06a108	2.737	0.252	0.179	0.010	0.30	0.117	0.001	1339	68	1064	54	1913	19	56	1126	101	0.00	0.163							
mr06a55	2.788	0.255	0.195	0.014	0.39	0.100	0.001	1352	68	1148	75	1621	20	71	1249	124	0.01	0.328							
mr05a12	3.239	0.121	0.202	0.008	0.54	0.109	0.001	1467	29	1188	43	1787	20	66	1417	59	0.00	0.379							
mr06a105	3.077	0.089	0.214	0.005	0.43	0.100	0.001	1427	22	1248	28	1631	19	77	1364	43	0.00	0.418							
mr06a109	3.791	0.304	0.237	0.015	0.40	0.114	0.002	1591	64	1371	78	1859	25	74	1499	123	0.01	0.555							
se13a68	4.713	0.135	0.264	0.006	0.40	0.120	0.001	1770	24	1509	31	1952	13	77	1672	47	0.00	0.333							
mr06a67	4.670	0.204	0.289	0.010	0.40	0.113	0.001	1762	37	1637	50	1856	19	88	1727	70	0.01	0.764							
se13a77	12.450	0.290	0.439	0.010	0.49	0.187	0.001	2639	22	2345	45	2720	7	86	2635	44	0.00	0.331							
mr06a155	0.545	0.050	0.063	0.005	0.43	0.062	0.001	442	33	395	30	666	33	59	414	53	0.17	0.044			395	30			
mr06a71	0.604	0.135	0.066	0.006	0.20	0.081	0.002	480	85	414	36	1213	42	34	419	71	0.45	0.049			414	36			
se13a67	0.493	0.084	0.068	0.005	0.22	0.059	0.001	407	57	423	31	570	52	74	420	59	0.78	0.120			423	31			
mr05a27	0.550	0.023	0.068	0.002	0.42	0.058	0.001	445	15	426	14	534	20	80	435	25	0.24	0.007			426	14			
mr06a128	0.587	0.064	0.069	0.003	0.22	0.068	0.002	469	41	429	20	881	50	49	433	38	0.34	0.019			429	20			
mr06a130	0.610	0.048	0.071	0.004	0.32	0.064	0.001	483	30	441	21	757	37	58	452	40	0.17	0.125	441	21					2
se13a69	0.710	0.084	0.072	0.004	0.21	0.070	0.002	545	50	446	22	941	54	47	454	42	0.06	0.193	446	22					2
mr05a29	0.582	0.052	0.073	0.005	0.36	0.060	0.001	466	33	452	28	613	28	74	457	50	0.69	0.342	452	28					
mr06a41	0.624	0.065	0.074	0.005	0.33	0.061	0.001	492	41	458	30	631	42	73	467	55	0.42	0.062	458	30					3
mr04a87	0.532	0.056	0.075	0.004	0.28	0.058	0.001	433	37	468	27	524	47	89	457	49	0.37	0.624	468	27					
se13a56	0.593	0.035	0.076	0.002	0.24	0.059	0.001	473	22	474	13	566	43	84	474	25	0.96	0.113	474	13					
se13a57	0.554	0.040	0.078	0.003	0.25	0.058	0.001	448	26	484	17	523	46	93	475	31	0.18	0.537	484	17					
mr06a47	0.620	0.054	0.080	0.005	0.34	0.054	0.001	490	34	494	28	384	48	129	492	50	0.91	0.362	494	28					
se13a60	0.633	0.147	0.080	0.012	0.32	0.059	0.001	498	91	497	70	549	43	91	498	127	1.00	0.582	497	70					
mr05a48	0.616	0.057	0.081	0.003	0.23	0.060	0.001	487	36	503	21	616	52	82	500	39	0.67	0.306	503	21					
se13a71	0.650	0.059	0.081	0.004	0.26	0.059	0.001	508	36	505	23	555	51	91	505	43	0.92	1.096	505	23					
mr06a119	0.741	0.086	0.082	0.003	0.15	0.077	0.002	563	50	508	17	1117	52	45	511	33	0.29	0.108	508	17					
mr06a140	0.686	0.044	0.082	0.003	0.25	0.060	0.001	530	27	510	16	612	50	83	514	30	0.47	0.731	510	16					
mr06a137	0.695	0.035	0.083	0.003	0.40	0.056	0.001	536	21	516	20	449	35	115	525	34	0.37	0.528	516	20					
mr06a85	0.712	0.082	0.084	0.009	0.48	0.059	0.001	546	49	517	55	563	46	92	535	88	0.59	0.406	517	55					
mr05a18	0.762	0.061	0.085	0.004	0.28	0.059	0.001	575	35	526	23	553	49	95	536	42	0.18	0.929	526	23					
mr05a51	0.682	0.045	0.085	0.003	0.27	0.061	0.001	528	27	526	18	633	42	83	527	34	0.96	0.580	526	18					
mr06a111	0.746	0.041	0.086	0.003	0.30	0.067	0.001	566	24	530	17	825	43	64	539	31	0.15	0.585	530	17					
mr06a117	0.703	0.023	0.087	0.002	0.33	0.058	0.001	541	14	535	11	531	26	101	537	20	0.70	0.597	535	11					
mr06a100	0.684	0.042	0.087	0.004	0.34	0.058	0.001	529	25	536	21	525	34	102	534	37	0.79	0.789	536	21					
mr06a75	0.779	0.074	0.087	0.006	0.35	0.063	0.002	585	42	538	34	716	54	75	553	62	0.29	0.744	538	34					
mr06a139	0.731	0.040	0.087	0.003	0.31	0.060	0.001	557	24	540	18	606	41	89	545	32	0.49	0.655	540	18					
mr06a126	0.705	0.076	0.088	0.006	0.31	0.062	0.001	542	45	542	35	671	45	81	542	63	1.00	0.656	542	35					
mr06a131	0.748	0.039	0.088	0.003	0.37	0.061	0.001	567	22	543	20	632	36	86	552	35	0.32	0.599	543	20					
mr06a65	0.760	0.025	0.088	0.002	0.36	0.060	0.001	574	14	544	12	600	26	91	555	22	0.05	0.886	544	12					
mr06a97	0.750	0.060	0.089	0.004	0.29	0.061	0.002	568	35	548	24	654	54	84	553	44	0.58	0.772	548	24					
mr05a30	0.654	0.052	0.089	0.004	0.27	0.058	0.001	511	32	550	23	537	47	102	538	41	0.25	0.560	550	23					
mr06a149	0.702	0.077	0.089	0.004	0.23	0.064	0.002	540	46	550	26	754	50	73	548	50	0.83	1.559	550	26					
mr06a118	0.726	0.067	0.089	0.004	0.25	0.062	0.001	554	39	551	24	670	51	82	552	45	0.94	0.337	551	24					
mr06a56	0.823	0.088	0.089	0.006	0.30	0.070	0.001	610	49	552	34	916	43	60	566	63	0.26	0.633	552	34					
mr06a96	0.699	0.050	0.090	0.003	0.23	0.060	0.001	538	30	556	18	591	50	94	553	33	0.57	0.651	556	18					
mr04a90	0.827	0.116	0.091	0.005	0.19	0.080	0.003	612	65	559	28	1196	65	47	564	54	0.43	0.839	559	28					
mr06a125	0.732	0.074	0.091	0.005	0.26	0.063	0.002	558	44	561	28	693	67	81	560	52	0.94	0.608	561	28					
mr05a32	0.752	0.039	0.091	0.002	0.25	0.063	0.001	569	23	562	14	695	44	81	564	26	0.76	0.383	562	14					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
mr06a99	0.817	0.046	0.091	0.003	0.32	0.065	0.001	607	26	563	19	784	29	72	575	36	0.11	0.551	563	19					
se13a80	0.804	0.048	0.091	0.003	0.26	0.062	0.001	599	27	563	17	685	39	82	570	32	0.20	0.688	563	17					
mr06a50	0.795	0.032	0.092	0.002	0.30	0.062	0.001	594	18	564	13	675	32	84	573	24	0.12	0.631	564	13					
mr04a89	0.724	0.072	0.091	0.005	0.27	0.061	0.002	553	43	564	29	623	57	91	561	54	0.81	0.618	564	29					
mr06a51	0.747	0.070	0.093	0.003	0.18	0.060	0.002	566	41	571	19	604	66	95	570	36	0.92	0.724	571	19					
mr05a53	0.864	0.064	0.093	0.003	0.20	0.071	0.002	632	35	572	16	958	55	60	578	32	0.10	1.059	572	16					
mr06a48	0.740	0.058	0.093	0.004	0.25	0.062	0.002	562	34	573	21	660	64	87	570	40	0.77	0.818	573	21					
mr05a43	0.743	0.037	0.093	0.003	0.27	0.059	0.001	564	22	574	15	561	40	102	572	27	0.65	0.487	574	15					
mr06a156	0.810	0.050	0.093	0.003	0.29	0.061	0.001	603	28	576	20	628	42	92	583	37	0.37	0.565	576	20					
mr06a135	0.799	0.060	0.093	0.003	0.22	0.067	0.002	596	34	576	18	824	55	70	579	35	0.57	0.610	576	18					
mr05a21	0.741	0.038	0.094	0.002	0.23	0.060	0.001	563	22	579	13	608	41	95	576	24	0.49	0.461	579	13					
mr06a59	0.774	0.067	0.094	0.004	0.27	0.060	0.002	582	38	581	26	602	60	97	581	47	0.98	1.541	581	26					
mr06a60	0.770	0.069	0.095	0.008	0.50	0.053	0.002	580	40	584	50	318	71	184	581	75	0.92	0.444	584	50					
mr06a46	0.844	0.069	0.096	0.007	0.42	0.063	0.001	621	38	591	39	698	42	85	606	66	0.46	0.722	591	39					
mr05a08	0.802	0.025	0.097	0.002	0.31	0.061	0.001	598	14	597	11	626	18	95	597	20	0.96	1.087	597	11					
mr05a42	0.824	0.028	0.097	0.003	0.40	0.061	0.001	610	15	599	15	650	18	92	604	26	0.51	0.644	599	15					
mr06a15	0.806	0.029	0.099	0.002	0.33	0.058	0.001	600	16	606	14	534	32	113	604	24	0.72	0.300	606	14					
mr06a148	0.733	0.064	0.099	0.005	0.29	0.054	0.002	559	38	607	29	366	66	166	590	52	0.23	0.509	607	29					
mr06a88	0.940	0.089	0.100	0.010	0.52	0.065	0.001	673	47	613	57	788	44	78	654	89	0.25	0.769	613	57					
mr05a49	0.902	0.060	0.100	0.004	0.33	0.069	0.001	653	32	615	26	901	44	68	627	46	0.27	0.343	615	26					
mr05a37	0.758	0.036	0.100	0.003	0.27	0.059	0.001	573	21	616	15	551	34	112	603	27	0.05	0.391	616	15					
mr05a50	0.910	0.055	0.101	0.004	0.30	0.067	0.002	657	29	619	21	841	47	74	629	39	0.21	0.682	619	21					
mr06a151	0.887	0.069	0.101	0.004	0.29	0.065	0.001	645	37	620	26	787	39	79	626	48	0.52	0.894	620	26					
mr06a136	0.857	0.073	0.101	0.006	0.32	0.061	0.002	628	40	621	33	640	66	97	624	58	0.86	0.880	621	33					
mr06a95	0.868	0.035	0.101	0.003	0.33	0.061	0.001	635	19	622	16	637	30	98	626	28	0.53	0.851	622	16					
mr05a38	0.863	0.086	0.103	0.009	0.45	0.060	0.001	632	47	633	54	600	48	106	632	85	0.99	0.472	633	54					
mr06a57	0.800	0.051	0.104	0.004	0.27	0.058	0.001	597	29	639	21	538	41	119	626	37	0.16	0.560	639	21					
mr06a147	0.900	0.034	0.105	0.003	0.43	0.060	0.001	652	18	641	19	596	23	108	647	32	0.59	0.470	641	19					
mr05a58	0.839	0.034	0.105	0.003	0.29	0.060	0.001	619	19	645	15	604	26	107	636	26	0.20	0.789	645	15					
mr06a145	0.906	0.050	0.107	0.004	0.32	0.061	0.001	655	27	653	22	647	41	101	654	39	0.96	0.797	653	22					
mr06a127	0.898	0.042	0.107	0.003	0.31	0.062	0.001	651	23	654	18	664	34	98	653	32	0.90	0.134	654	18					
mr06a146	0.933	0.111	0.107	0.005	0.21	0.069	0.002	669	58	656	31	892	52	74	658	58	0.82	0.162	656	31					
mr06a86	0.988	0.049	0.108	0.004	0.33	0.061	0.001	698	25	663	21	650	45	102	675	37	0.19	0.710	663	21					
mr06a110	0.981	0.080	0.109	0.011	0.61	0.061	0.001	694	41	669	64	630	28	106	693	82	0.62	0.278	669	64					
mr05a07	0.888	0.039	0.110	0.003	0.31	0.061	0.001	645	21	670	17	623	31	108	661	30	0.26	0.847	670	17					
mr06a157	0.980	0.054	0.110	0.003	0.28	0.064	0.001	694	28	672	20	732	38	92	678	36	0.46	0.074	672	20					
mr05a52	0.904	0.055	0.113	0.004	0.27	0.064	0.001	654	29	689	22	737	48	93	678	39	0.26	0.636	689	22					
mr05a47	1.236	0.214	0.114	0.015	0.37	0.085	0.001	817	97	693	85	1311	26	53	735	153	0.24	0.203	693	85					
mr06a79	1.238	0.092	0.126	0.006	0.35	0.072	0.002	818	42	764	37	985	54	78	785	65	0.24	0.205	764	37					
mr06a129	1.238	0.056	0.129	0.004	0.35	0.066	0.001	818	25	782	23	800	31	98	797	40	0.20	0.215	782	23					
mr05a40	1.369	0.160	0.149	0.008	0.22	0.073	0.002	876	68	897	44	1005	45	89	892	80	0.77	0.601	1005	45					
mr06a68	1.664	0.136	0.153	0.010	0.40	0.076	0.001	995	52	918	55	1084	32	85	958	91	0.19	0.144	1084	32					
mr06a106	1.808	0.102	0.167	0.008	0.43	0.077	0.001	1048	37	994	45	1111	27	89	1029	68	0.21	0.160	1111	27					
mr06a49	1.956	0.099	0.180	0.007	0.41	0.078	0.001	1101	34	1067	41	1138	16	94	1089	62	0.42	0.307	1138	16					
mr06a80	2.212	0.178	0.189	0.012	0.41	0.085	0.001	1185	56	1118	67	1315	34	85	1160	103	0.33	0.542	1315	34					
mr06a45	2.360	0.193	0.192	0.012	0.37	0.086	0.001	1231	58	1132	62	1347	33	84	1183	102	0.15	0.260	1347	33					
mr06a116	2.147	0.050	0.194	0.004	0.42	0.077	0.001	1164	16	1145	21	1126	14	102	1158	30	0.36	0.331	1126	14					
mr05a41	2.742	0.139	0.215	0.008	0.38	0.095	0.001	1340	38	1253	44	1536	25	82	1305	69	0.06	0.204	1536	25					
mr06a70	3.389	0.297	0.230	0.017	0.41	0.104	0.001	1502	69	1336	87	1702	25	78	1442	131	0.05	0.298	1702	25					
mr05a33	3.274	0.188	0.240	0.016	0.57	0.093	0.001	1475	45	1387	82	1486	28	93	1476	89	0.18	0.495	1486	28					
se13a59	2.973	0.178	0.252	0.013	0.43	0.098	0.002	1401	46	1448	67	1581	40	92	1409	88	0.45	0.198	1581	40					
mr05a28	3.269	0.093	0.256	0.007	0.45	0.090	0.001	1474	22	1471	34	1426	22	103	1473	43	0.94	1.670	1426	22					
mr05a17	3.287	0.071	0.257	0.005	0.41	0.093	0.001	1478	17	1476	23	1490	14	99	1477	32	0.92	0.295	1490	14					
mr05a59	3.078	0.251	0.259	0.013	0.32	0.092	0.001	1427	62	1487	69	1464	27	102	1452	105	0.44	0.217	1464	27					
mr06a61	3.920	0.158	0.272	0.010	0.44	0.101	0.001	1618	33	1550	49	1648	22	94	1605	64	0.14	0.480	1648	22					
mr05a57	3.760	0.142	0.278	0.007	0.34	0.100	0.001	1584	30	1584	36	1618	22	98	1584	54	0.99	0.539	1618	22					
mr06a78	3.718	0.121	0.280	0.006	0.36	0.096	0.001	1575	26	1590	33	1544	26	103	1580	47	0.66	0.639	1544	26					
mr06a101	4.418	0.135	0.299	0.008	0.44	0.104	0.001	1716	25	1687	40	1694	14	100	1712	50	0.44	0.920	1694	14					
mr05a23	4.399	0.113	0.303	0.006	0.39	0.105	0.001	1712	21	1708	30	1721	15	99	1711	40	0.89	0.341	1721	15					
mr05a22	4.311	0.151	0.307	0.008	0.39	0.105	0.002	1696	29	1726	41	1720	31	100	1702	54	0.45	0.317	1720	31					
mr06a115	5.410	0.427	0.316	0.020	0.41	0.125	0.001	1886	68	1772	100	2029	16	87	1861	132	0.23	0.112	2029	16					
se13a61	5.491	0.090	0.350	0.005	0.44	0.110	0.001	1899	14	1934	24	1800	14	107	1902	28	0.12	0.053	1800	14					
mr06a138	6.420	0.301	0.350	0.017	0.51	0.124	0.002	2035	41	1937	79	2013	25	96	2033	82	0.15	1.131	2013	25					
mr04a88	6.377	0.347	0.365	0.015	0.38	0.128	0.001	2029	48	2007	71	2073	14	97	2025	92	0.75	1.028	2073	14					
mr05a09	7.283	0.186	0.402	0.009	0.45	0.129	0.001	2147	23	2176	43	2082	15	105	2148	45	0.44	0.836	2082	15					
mr06a107	9.912	0.292	0.444	0.012	0.44	0.154	0.001	2427	27	2367	51	2392	12	99	2423	54	0.20	0.289	2392	12					
Nashoba Formation gneiss (MLNB1)																									
mr06a10	0.685	0.044	0.074	0.003	0.27	0.073	0.001	530	26	460	15	1021	33	45	471	29	0.01	0.191							
mr02a46	0.815	0.092	0.080	0.004	0.19	0.075	0.003	605	52	495	21	1066	89	46	502	41	0.04	0.119							
mr06a04	0.805	0.057	0.083	0.004	0.33	0.073	0.002	599	32	516	23	1001	46	52	535	43	0.01	1.503							
mr04a45	0.720	0.025	0.084	0.002	0.34	0.059	0.001	551	15	518	12	583	33	89	528	21	0.03	0.575							
mr02a59	0.783	0.045	0.086	0.004	0.37	0.065	0.001	587	26	531	21	788	43	67	550	39	0.04	0.108							
mr02a77	0.849	0.040	0.087	0.002	0.25	0.069	0.001	624	22	538	12	908	35	59	550	24	0.00	0.183							
mr02a60	1.097	0.064	0.089	0.003	0.32	0.082	0.002	752	31	551	20	1257	42	44	578	39	0.00	0.973							
mr02a63	1.554	0.106	0.090	0.002	0.20	0.118	0.003	952	42	556	15	1923	47	29	560	29	0.00	1.006							
mr02a68	0.840	0.048	0.090	0.003	0.28	0.062	0.001	619	26	557	17	687	41	81	570	32	0.03	0.014							
mr04a55	1.702	0.197	0.091	0.003	0.14	0.161	0.004	1009	74	563	17	2467	42	23	564	35	0.00	1.836							
mr04a72	0.598	0.053	0.091	0.003	0.21	0.054	0.001	476	34	563	20	385	51	146	542	37	0.01	0.625							
mr02a61	2.347	0.270	0.092	0.003	0.14	0.237	0.004	1227	82	569	17	3098	30	18	566	35	0.00	0.278							
mr04a70	0.646	0.051	0.093	0.003	0.22	0.062	0.001	506	31	576	19	674	40	85	559	35	0.03	0.569							
mr02a69	0.931	0.041	0.096	0.003	0.40	0.067	0.001	668	21	593	20	836	32	71	622	35	0.00	1.314							
mr04a40	1.000	0.057	0.103	0.006	0.47	0.069	0.001	704	29	634	32	910	31	70	674	53	0.03	0.291							
mr06a38	1.840	0.377	0.106	0.014	0.33	0.128	0.003	1060	135	652	83	2070	35	31	673	164	0.01	0.089							
mr02a43	1.616	0.087	0.119	0.005	0.36	0.092	0.001	976	34	727	27	1460	23	50	779	51	0.00	0.178							
mr02a05	1.435	0.178	0.121	0.010	0.35	0.082	0.002	904	74	739	60	1239	37	60	783	111	0.04	0.203							
mr02a72	2.026	0.162	0.155	0.009	0.36	0.087	0.001	1124	54	928	49	1363	28	68	995	88	0.00	0.528							
mr02a50	1.134	0.126	0.163	0.018	0.50	0.085	0.005	769	60	972	100	1325	109	73	781	118	0.02	0.391							
mr06a40	3.041	0.263	0.172	0.012	0.41	0.130	0.001	1418	66	1021	67	2098	12	49	1141	122	0.00	0.222							
mr06a16	3.134	0.239	0.201	0.012	0.40	0.115	0.001	1441	59	1179	66	1875	19	63	1307	110	0.00	0.150							
mr02a62	3.684	0.307	0.208	0.014	0.41	0.103	0.002	1568	67	1219	75	1680	31	73	1376	128	0.00	0.239							
mr04a76	5.491	0.445	0.299	0.018	0.38	0.141	0.002	1899	70	1684	90	2244	20	75	1822	134	0.02	0.379							
mr02a82	5.549	0.195	0.307	0.010	0.47	0.127	0.001	1908	30	1727	50	2054	15	84	1885	61	0.00	0.462							
mr04a60	5.371	0.179	0.316	0.009	0.43	0.124	0.001	1880	28	1768	44	2012	13	88	1859	56	0.01	0.873							
mr02a09	3.704	0.214	0.321	0.015	0.41	0.095	0.003	1572	46	1793	74	1531	56	117	1600	88	0.00	0.400							
mr04a69	6.427	0.311	0.339	0.012	0.38	0.145	0.001	2036	43	1880	60	2292	15	82	1993	82	0.01	0.402							
mr02a22	0.422	0.021	0.056	0.002	0.28	0.054	0.001	358	15	353	10	383	36	92	354	18	0.78	0.014			353	10			

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
mr02a14	0.449	0.036	0.057	0.002	0.25	0.058	0.001	376	25	360	14	523	46	69	363	27	0.52	0.024			360	14			
mr02a19	0.422	0.033	0.058	0.003	0.30	0.053	0.001	357	23	366	16	312	41	117	364	30	0.72	0.021			366	16			
mr02a15	0.491	0.031	0.060	0.003	0.39	0.056	0.001	405	21	375	18	463	34	81	385	32	0.17	0.019			375	18			
mr04a43	0.459	0.015	0.061	0.001	0.36	0.054	0.001	384	10	384	9	372	28	103	384	15	0.99	0.008			384	9			
mr06a09	0.507	0.023	0.062	0.003	0.49	0.055	0.001	416	15	386	16	415	28	93	403	28	0.06	0.037			386	16			
mr02a44	0.506	0.035	0.063	0.003	0.34	0.057	0.001	416	23	392	18	507	38	77	399	33	0.33	0.157			392	18			
mr02a23	0.519	0.032	0.063	0.002	0.25	0.058	0.001	424	21	393	12	511	44	77	398	23	0.15	0.013			393	12			
mr04a50	0.477	0.016	0.063	0.002	0.38	0.054	0.001	396	11	397	10	390	25	102	397	17	0.95	0.007			397	10			
mr04a46	0.505	0.027	0.064	0.003	0.45	0.056	0.001	415	18	402	19	454	31	89	409	31	0.50	0.029			402	19			
mr06a08	0.472	0.032	0.065	0.003	0.35	0.052	0.001	393	22	404	19	277	47	146	400	33	0.64	0.016			404	19			
mr06a29	0.486	0.021	0.065	0.002	0.27	0.056	0.001	402	15	408	9	470	34	87	406	18	0.71	0.034			408	9			
mr04a64	0.496	0.022	0.067	0.003	0.42	0.055	0.001	409	15	415	15	425	23	98	412	26	0.68	0.030			415	15			
mr02a07	0.485	0.019	0.067	0.001	0.28	0.054	0.001	401	13	419	9	385	29	109	414	16	0.19	0.008			419	9			
mr02a37	0.498	0.023	0.067	0.002	0.38	0.053	0.001	410	16	420	14	343	22	122	416	25	0.55	0.005			420	14			
mr06a28	0.518	0.015	0.068	0.001	0.33	0.055	0.001	424	10	425	8	396	23	107	425	14	0.88	0.184			425	8			
mr02a40	0.491	0.031	0.069	0.002	0.23	0.058	0.001	406	21	429	12	534	39	80	425	23	0.28	0.089			429	12			
mr06a34	0.550	0.028	0.070	0.003	0.35	0.055	0.001	445	19	437	15	428	32	102	440	27	0.69	0.022			437	15			
mr02a17	0.581	0.028	0.071	0.002	0.30	0.057	0.001	465	18	444	12	489	41	91	449	22	0.26	0.408			444	12			
mr02a67	0.575	0.037	0.072	0.002	0.21	0.063	0.001	461	24	445	12	718	41	62	447	23	0.51	0.032			445	12			
mr02a08	0.538	0.034	0.073	0.002	0.27	0.057	0.001	437	22	451	15	492	43	92	448	27	0.54	0.027			451	15			
mr02a79	0.679	0.115	0.073	0.002	0.09	0.113	0.004	526	69	454	13	1846	57	25	455	26	0.31	0.037			454	13			
mr06a25	0.556	0.030	0.074	0.002	0.31	0.055	0.001	449	20	458	15	405	38	113	455	27	0.67	0.175	458	15					
mr06a39	0.607	0.025	0.074	0.002	0.40	0.058	0.001	482	16	463	15	513	31	90	471	26	0.26	0.439	463	15					
mr04a87	0.532	0.056	0.075	0.004	0.28	0.058	0.001	433	37	468	27	524	47	89	457	49	0.37	0.624	468	27					
mr06a17	0.582	0.025	0.076	0.002	0.33	0.053	0.001	466	16	471	13	339	41	139	469	23	0.76	0.289	471	13					
mr02a31	0.618	0.048	0.077	0.002	0.21	0.061	0.001	488	30	476	15	641	49	74	478	29	0.69	0.208	476	15					
mr06a19	0.564	0.047	0.077	0.004	0.31	0.055	0.001	454	31	477	24	414	54	115	469	43	0.47	0.643	477	24					
mr02a34	0.608	0.037	0.077	0.002	0.20	0.061	0.001	482	23	477	11	657	49	73	478	22	0.82	0.050	477	11					
mr02a06	0.580	0.026	0.077	0.002	0.32	0.057	0.001	464	17	480	13	477	36	101	475	24	0.39	0.445	480	13			465.9	0.7	
mr06a20	0.664	0.034	0.077	0.003	0.37	0.059	0.001	517	20	481	17	556	38	87	494	31	0.09	0.174	481	17					
mr06a07	0.620	0.069	0.078	0.004	0.21	0.056	0.001	490	43	483	21	444	46	109	484	41	0.87	0.591	483	21					
mr02a18	0.661	0.044	0.078	0.003	0.31	0.065	0.001	515	27	484	19	769	44	63	491	35	0.26	0.372	484	19					
mr05a68	0.668	0.036	0.080	0.003	0.36	0.059	0.001	519	22	495	19	578	26	86	504	33	0.30	0.180	495	19					
mr02a10	0.691	0.051	0.080	0.004	0.33	0.062	0.001	534	31	497	23	661	26	75	508	42	0.26	0.081	497	23					
mr04a52	0.607	0.026	0.080	0.003	0.42	0.055	0.001	482	16	499	17	428	25	117	490	28	0.34	1.101	499	17					
mr05a82	0.669	0.034	0.081	0.004	0.44	0.061	0.001	520	21	501	22	622	30	81	511	36	0.40	0.097	501	22					
mr02a49	0.644	0.050	0.081	0.004	0.36	0.057	0.002	505	31	503	27	494	65	102	504	47	0.96	0.028	503	27					
mr06a14	0.671	0.024	0.081	0.002	0.30	0.059	0.001	521	15	504	11	584	25	86	509	19	0.27	1.068	504	11					
mr02a35	0.693	0.063	0.081	0.005	0.31	0.060	0.001	535	38	504	27	586	46	86	512	50	0.43	0.027	504	27					
mr05a87	0.725	0.051	0.082	0.004	0.35	0.061	0.001	554	30	509	24	647	44	79	523	44	0.16	0.245	509	24					
mr02a45	0.734	0.153	0.082	0.014	0.41	0.063	0.002	559	89	510	84	720	60	71	531	146	0.61	0.049	510	84					
mr05a89	0.662	0.031	0.082	0.003	0.36	0.058	0.001	516	19	511	17	526	26	97	513	30	0.80	1.366	511	17					
mr04a62	0.658	0.045	0.083	0.004	0.34	0.060	0.001	513	28	512	23	614	34	83	513	41	0.97	0.724	512	23					
mr04a44	0.625	0.023	0.083	0.002	0.37	0.056	0.001	493	14	513	13	464	24	111	504	23	0.21	0.869	513	13					
mr02a58	0.626	0.030	0.083	0.002	0.30	0.056	0.001	494	19	514	14	452	46	114	508	26	0.30	0.090	514	14					
mr05a79	0.633	0.039	0.083	0.003	0.25	0.057	0.002	498	25	515	15	494	59	104	511	28	0.50	0.608	515	15					
mr05a91	0.665	0.041	0.083	0.004	0.36	0.058	0.001	518	25	516	22	514	30	100	517	39	0.95	0.763	516	22					
mr02a85	0.664	0.047	0.083	0.003	0.27	0.057	0.002	517	29	516	19	497	61	104	516	35	0.97	0.220	516	19					
mr06a26	0.697	0.027	0.083	0.003	0.41	0.057	0.001	537	16	517	16	487	29	106	526	27	0.25	0.365	517	16					
mr05a81	0.585	0.073	0.084	0.005	0.22	0.057	0.002	468	47	519	28	508	68	102	508	52	0.29	1.054	519	28					
mr02a32	0.689	0.029	0.085	0.002	0.34	0.056	0.001	532	17	524	14	462	32	113	527	25	0.65	1.074	524	14					
mr02a80	0.753	0.055	0.085	0.003	0.28	0.071	0.001	570	32	527	20	952	35	55	536	38	0.20	0.321	527	20					
mr04a71	0.635	0.044	0.086	0.004	0.36	0.057	0.001	499	27	531	26	508	30	105	516	43	0.29	1.120	531	26					
mr02a78	0.708	0.023	0.086	0.002	0.41	0.058	0.001	544	13	531	13	537	22	99	537	22	0.36	2.266	531	13					
mr02a13	0.718	0.069	0.086	0.005	0.32	0.061	0.001	550	41	532	31	627	30	85	537	57	0.68	0.929	532	31					
mr04a68	0.679	0.041	0.086	0.004	0.37	0.060	0.001	526	25	532	23	600	19	89	529	39	0.85	0.784	532	23					
mr06a35	0.671	0.045	0.086	0.003	0.30	0.057	0.001	522	27	534	21	494	34	108	530	37	0.67	1.175	534	21					
mr02a42	0.636	0.064	0.086	0.004	0.25	0.059	0.001	500	40	535	26	577	49	93	526	47	0.40	1.040	535	26					
mr06a36	0.689	0.041	0.087	0.004	0.37	0.057	0.001	532	24	535	22	503	22	106	534	39	0.90	0.695	535	22					
mr06a30	0.693	0.031	0.087	0.002	0.26	0.061	0.001	535	19	538	12	650	37	83	537	23	0.86	0.084	538	12					
mr05a70	0.652	0.059	0.087	0.004	0.26	0.058	0.001	510	36	539	24	536	30	101	531	44	0.44	0.806	539	24					
mr02a24	0.716	0.047	0.087	0.003	0.27	0.058	0.002	548	28	539	18	522	65	103	541	34	0.74	0.806	539	18					
mr05a69	0.650	0.086	0.087	0.006	0.26	0.057	0.001	509	53	540	36	505	57	107	532	65	0.57	0.786	540	36					
mr04a61	0.760	0.036	0.087	0.003	0.42	0.064	0.001	574	21	541	21	736	17	74	557	35	0.13	0.040	541	21					
mr04a54	0.697	0.026	0.088	0.003	0.42	0.059	0.000	537	16	543	16	567	16	96	540	27	0.70	1.869	543	16					
mr04a77	0.706	0.026	0.088	0.002	0.30	0.060	0.001	542	15	544	11	601	26	91	543	21	0.92	0.674	544	11					
mr05a92	0.762	0.029	0.088	0.002	0.32	0.059	0.001	575	17	546	13	572	36	95	555	24	0.10	1.006	546	13					
mr05a78	0.701	0.038	0.089	0.003	0.28	0.057	0.001	539	23	551	16	503	40	110	548	29	0.64	0.880	551	16					
mr06a24	0.738	0.045	0.089	0.003	0.29	0.057	0.002	561	26	551	18	509	64	108	554	34	0.72	0.631	551	18					
mr05a71	0.672	0.054	0.089	0.004	0.25	0.060	0.001	522	33	552	21	591	38	93	545	39	0.37	0.882	552	21					
mr05a90	0.739	0.031	0.090	0.003	0.35	0.060	0.001	562	18	553	15	591	34	94	556	27	0.65	1.129	553	15					
mr02a76	0.763	0.037	0.090	0.003	0.37	0.066	0.002	576	21	556	19	798	48	70	564	33	0.39	0.654	556	19					
mr04a58	0.722	0.025	0.090	0.002	0.33	0.057	0.001	552	15	558	12	501	36	111	556	22	0.69	2.240	558	12					
mr04a80	0.778	0.036	0.091	0.002	0.21	0.068	0.001	585	21	559	10	866	35	65	562	20	0.22	0.515	559	10					
mr04a90	0.827	0.116	0.091	0.005	0.19	0.080	0.003	612	65	559	28	1196	65	47	564	54	0.43	0.839	559	28					
mr06a06	0.698	0.046	0.091	0.003	0.26	0.060	0.001	538	27	559	18	590	43	95	553	33	0.46	0.433	559	18					
mr02a36	0.683	0.054	0.091	0.004	0.28	0.056	0.001	529	33	562	24	471	55	119	552	43	0.33	1.760	562	24					
mr02a33	0.732	0.042	0.091	0.003	0.24	0.059	0.001	558	25	564	15	559	47	101	563	28	0.80	0.319	564	15					
mr04a89	0.724	0.072	0.091	0.005	0.27	0.061	0.002	553	43	564	29	623	57	91	561	54	0.81	0.618	564	29					
mr06a05	0.956	0.127	0.092	0.006	0.23	0.081	0.002	681	66	566	33	1226	42	46	578	65	0.10	0.371	566	33					
mr02a25	0.726	0.029	0.093	0.002	0.26	0.057	0.001	554	17	572	11	509	38	112	567	20	0.33	0.781	572	11					
mr04a78	0.674	0.101	0.093	0.005	0.18	0.066	0.002	523	61	572	29	813	71	70	565	56	0.43	0.796	572	29					
mr02a86	0.740	0.041	0.094	0.003	0.27	0.058	0.001	562	24	577	17	526	45	110	573	30	0.55	1.024	577	17					
mr04a63	0.848	0.200	0.095	0.007	0.17	0.074	0.002	624	110	586	44	1043	55	56	589	86	0.74	1.003	586	44					
mr04a41	0.757	0.026	0.096	0.003	0.38	0.059	0.001	572	15	588	15	557	21	106	581	25	0.34	0.640	588	15					
mr05a67	0.800	0.033	0.097	0.004	0.46	0.060	0.001	597	19	595	22	616	29	97	596	34	0.96	1.085	595	22					
mr05a88	0.801	0.050	0.097	0.003	0.22	0.065	0.001	598	28	598	16	762	47	78	598	29	0.99	0.761	598	16					
mr04a81	0.996	0.142	0.100	0.009	0.31	0.086	0.002	702	72	616	51	1347	35	46	636	95	0.26	0.229	616	51					
mr06a37	0.815	0.107	0.101	0.008	0.31	0.066	0.001	605	60	623	48	808	28	77	616	85	0.79	0.268	623	48					
mr05a77	0.755	0.106	0.102	0.007	0.25	0.059	0.001	571	61	624	41	570	38	109	610	75	0.41	0.396	624	41					
mr04a51	0.973	0.101	0.110	0.006	0.28	0.069	0.002	690	52	671	37	897	50	75	676	68	0.72	0.650	671	37					
mr02a26	0.914	0.149	0.115	0.014	0.38	0.063	0.003	659	79	703	82	711	101	99	679	133	0.62	0.450	703	82					
mr02a54	1.225	0.107	0.141	0.014	0.57	0.081	0.004	812	49	853	79	1214	88	70	814	98	0.54	0.273	1214	88					
mr06a18	1.581	0.119	0.145	0.006	0.29	0.081	0.001	963	47	874	36	1226	27	71	900	66	0.08	0.139	1226	27					
mr02a55	1.595	0.084	0.167	0.005	0.31	0.068	0.002	968	33	993	30	877	53	113	982	50	0.51	0.590	877	53					
mr04a67	1.983	0.134	0.205	0.009	0.34	0.077	0.001	1110	46	1201	50	1119	19	107	1146	77	0.10	0.366	1119	19					
mr05a80	2.574	0.093	0.222	0.006	0.35	0.084	0.001	1293	26	1291	29	1295	21	100	1292	46	0.94	0.371	1295	21					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	Rho	^{207}Pb/ ^{206}Pb	±1σ	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/^{238}U	±1σ	^{207}Pb/ ^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238} U	±2σ	notes
mr02a87	2.693	0.197	0.228	0.013	0.40	0.082	0.002	1326	54	1322	71	1243	40	106	1325	101	0.95	0.201	1243	40					
mr02a16	2.986	0.105	0.235	0.006	0.34	0.089	0.001	1404	27	1360	30	1396	27	97	1385	46	0.18	0.315	1396	27					
mr04a42	3.279	0.215	0.250	0.012	0.37	0.100	0.001	1476	51	1439	63	1629	17	88	1463	93	0.57	0.272	1629	17					
mr04a88	6.377	0.347	0.365	0.015	0.38	0.128	0.001	2029	48	2007	71	2073	14	97	2025	92	0.75	1.028	2073	14					
mr04a82	6.915	0.166	0.379	0.009	0.49	0.130	0.001	2101	21	2073	42	2105	13	98	2100	43	0.45	0.950	2105	13					
mr02a52	8.364	0.784	0.451	0.044	0.52	0.151	0.007	2271	85	2402	196	2361	76	102	2264	170	0.44	0.176	2361	76					
mr02a41	12.920	0.336	0.507	0.011	0.43	0.180	0.002	2674	25	2644	49	2656	15	100	2673	49	0.50	0.846	2656	15					
mr04a49	13.550	0.895	0.534	0.020	0.28	0.192	0.002	2718	62	2757	84	2759	15	100	2730	112	0.66	0.898	2759	15					
Nashoba Formation schist (MLNS1)																									
se10a263	0.469	0.034	0.054	0.003	0.41	0.058	0.001	390	23	336	19	548	37	61	353	35	0.02	0.012							
se10a264	0.496	0.044	0.054	0.005	0.56	0.057	0.001	409	30	339	33	500	40	68	379	56	0.02	0.011							
se10a246	0.587	0.036	0.055	0.004	0.62	0.063	0.001	469	23	346	26	715	43	48	416	45	0.00	0.010							
se10a239	0.543	0.021	0.056	0.002	0.37	0.061	0.001	440	14	353	10	633	32	56	371	19	0.00	0.019							
se10a235	0.485	0.030	0.057	0.004	0.54	0.055	0.001	402	20	356	23	406	28	88	383	38	0.03	0.017							
se10a243	0.550	0.034	0.057	0.005	0.70	0.059	0.001	445	22	357	30	572	39	62	439	45	0.00	0.009							
se14a45	0.486	0.023	0.057	0.002	0.45	0.054	0.001	402	16	360	15	381	22	94	378	27	0.01	0.011							
se10a176	0.642	0.024	0.059	0.003	0.68	0.064	0.001	503	15	372	18	750	21	50	470	29	0.00	0.050							
se13a10	0.497	0.023	0.060	0.003	0.48	0.055	0.001	410	15	373	16	392	22	95	392	27	0.02	0.006							
se13a11	0.495	0.019	0.061	0.002	0.39	0.055	0.001	408	13	379	11	403	24	94	389	19	0.03	0.011							
se14a35	0.532	0.029	0.062	0.002	0.35	0.058	0.001	433	19	385	14	540	35	71	398	27	0.02	0.021							
se10a172	0.645	0.045	0.062	0.003	0.31	0.070	0.001	505	28	386	16	938	39	41	401	32	0.00	0.023							
se10a256	0.547	0.033	0.062	0.003	0.43	0.059	0.001	443	22	388	19	584	32	66	408	35	0.01	0.020							
se10a216	0.566	0.039	0.063	0.003	0.38	0.060	0.001	455	25	394	20	594	40	66	412	37	0.02	0.047							
se10a168	0.643	0.040	0.064	0.003	0.42	0.064	0.002	504	25	399	20	742	52	54	428	38	0.00	0.010							
se14a19	0.752	0.034	0.064	0.003	0.48	0.072	0.002	570	20	403	17	986	46	41	447	33	0.00	0.302							
se13a19	0.596	0.027	0.069	0.002	0.39	0.059	0.001	475	17	430	15	565	29	76	446	26	0.01	0.470							
se10a199	0.646	0.046	0.070	0.003	0.28	0.063	0.001	506	28	439	17	703	45	62	450	32	0.02	0.061							
se10a253	0.467	0.069	0.052	0.006	0.42	0.060	0.001	389	48	327	40	605	35	54	346	73	0.20	0.013			327	40			
se10a258	0.387	0.039	0.052	0.003	0.27	0.058	0.002	332	29	328	17	511	75	64	329	32	0.89	0.015			328	17			
se10a219	0.486	0.078	0.053	0.006	0.36	0.064	0.002	402	53	331	37	740	51	45	345	70	0.18	0.018			331	37			
se14a50	0.377	0.031	0.053	0.002	0.24	0.053	0.001	324	23	331	13	338	48	98	330	24	0.77	0.005			331	13			
se14a15	0.405	0.021	0.053	0.002	0.40	0.053	0.001	345	15	332	14	349	33	95	337	24	0.41	0.113			332	14			
se14a34	0.424	0.031	0.053	0.002	0.30	0.055	0.001	359	22	334	14	402	37	83	339	27	0.27	0.008			334	14			
se10a218	0.494	0.088	0.053	0.008	0.40	0.064	0.001	407	60	335	47	727	44	46	354	87	0.23	0.017			335	47			
se10a224	0.468	0.066	0.054	0.007	0.46	0.058	0.001	390	46	340	42	511	38	67	361	76	0.29	0.010			340	42			
se10a255	0.413	0.048	0.054	0.004	0.33	0.055	0.001	351	34	340	25	425	40	80	343	46	0.74	0.014			340	25			
se10a177	0.477	0.076	0.054	0.004	0.22	0.066	0.002	396	52	341	23	807	48	42	346	45	0.30	0.012			341	23			
se10a203	0.396	0.047	0.054	0.004	0.31	0.051	0.001	339	34	342	25	257	50	133	341	45	0.93	0.017			342	25			
se14a46	0.458	0.029	0.055	0.003	0.42	0.055	0.001	383	21	343	18	428	38	80	358	32	0.06	0.014			343	18			
se10a175	0.492	0.070	0.055	0.005	0.34	0.059	0.001	406	48	344	32	553	51	62	357	61	0.21	0.019			344	32			
se14a77	0.437	0.041	0.055	0.004	0.34	0.055	0.001	368	29	344	22	403	39	85	350	40	0.42	0.012			344	22			
se10a178	0.378	0.064	0.055	0.004	0.19	0.056	0.001	326	47	345	22	459	45	75	343	42	0.68	0.011			345	22			
se10a213	0.412	0.037	0.055	0.002	0.21	0.058	0.001	351	26	346	13	515	46	67	347	25	0.87	0.027			346	13			
se10a198	0.403	0.035	0.055	0.002	0.25	0.055	0.001	344	25	348	15	419	38	83	347	28	0.88	0.016			348	15			
se10a237	0.468	0.042	0.056	0.005	0.52	0.054	0.001	390	29	349	32	375	38	93	373	53	0.17	0.016			349	32			
se10a207	0.443	0.068	0.056	0.007	0.39	0.054	0.001	372	48	349	41	374	41	93	357	74	0.63	0.013			349	41			
se14a07	0.429	0.040	0.056	0.003	0.33	0.055	0.001	362	28	349	21	392	28	89	353	38	0.65	0.028			349	21			
se14a17	0.401	0.045	0.056	0.003	0.26	0.058	0.001	342	33	349	20	513	43	68	348	37	0.83	0.015			349	20			
se14a48	0.422	0.032	0.056	0.003	0.31	0.052	0.001	358	23	351	16	304	52	115	353	30	0.79	0.007			351	16			
se10a223	0.421	0.028	0.056	0.002	0.30	0.052	0.001	357	20	352	14	295	40	119	353	26	0.83	0.012			352	14			
se14a75	0.450	0.068	0.056	0.007	0.42	0.054	0.001	378	47	353	43	352	40	100	363	76	0.61	0.011			353	43			
se14a69	0.399	0.060	0.056	0.004	0.26	0.055	0.001	341	43	353	26	405	45	87	351	49	0.78	0.016			353	26			
se14a25	0.408	0.047	0.056	0.003	0.20	0.058	0.001	348	34	353	16	537	47	66	352	31	0.87	0.017			353	16			
se10a265	0.431	0.043	0.057	0.004	0.37	0.053	0.001	364	30	354	25	314	33	113	358	45	0.76	0.012			354	25			
se14a68	0.456	0.036	0.057	0.003	0.36	0.056	0.001	381	25	355	20	442	32	80	363	36	0.32	0.010			355	20			
se14a67	0.450	0.036	0.057	0.003	0.33	0.056	0.001	377	26	355	19	453	36	78	361	35	0.39	0.012			355	19			
se14a44	0.469	0.040	0.057	0.003	0.36	0.055	0.001	391	27	356	21	403	35	88	366	39	0.22	0.016			356	21			
se14a16	0.434	0.053	0.057	0.005	0.33	0.055	0.001	366	38	356	28	425	27	84	359	52	0.80	0.013			356	28			
se10a257	0.470	0.033	0.057	0.003	0.40	0.056	0.001	391	23	357	20	444	37	80	369	36	0.15	0.010			357	20			
se10a174	0.497	0.057	0.057	0.005	0.35	0.059	0.001	410	39	357	27	566	40	63	369	52	0.18	0.015			357	27			
se13a20	0.484	0.054	0.057	0.006	0.49	0.054	0.001	401	37	358	38	372	50	96	380	66	0.26	0.013			358	38			
se10a206	0.399	0.040	0.057	0.003	0.25	0.054	0.001	341	29	358	17	355	43	101	355	32	0.56	0.011			358	17			
se10a183	0.428	0.048	0.057	0.004	0.28	0.056	0.001	362	34	358	21	434	45	82	359	40	0.92	0.029			358	21			
se10a226	0.467	0.030	0.057	0.002	0.29	0.058	0.001	389	21	359	13	518	43	69	365	25	0.16	0.009			359	13			
se10a208	0.456	0.052	0.057	0.005	0.36	0.056	0.001	382	37	359	29	463	37	78	366	53	0.55	0.029			359	29			
se10a248	0.428	0.058	0.057	0.004	0.27	0.057	0.001	362	41	359	26	485	45	74	360	48	0.96	0.009			359	26			
se10a214	0.438	0.049	0.057	0.002	0.19	0.066	0.001	369	34	360	14	793	40	45	361	28	0.80	0.015			360	14			
se10a254	0.473	0.038	0.058	0.003	0.33	0.057	0.001	393	26	361	19	494	41	73	369	35	0.23	0.010			361	19			
se10a238	0.436	0.065	0.058	0.005	0.27	0.056	0.001	368	46	362	28	462	44	78	363	53	0.91	0.012			362	28			
se14a18	0.426	0.054	0.058	0.003	0.19	0.067	0.002	360	38	362	17	837	60	43	362	32	0.98	0.022			362	17			
se14a51	0.476	0.063	0.058	0.006	0.36	0.056	0.001	395	43	364	34	446	26	82	373	62	0.49	0.005			364	34			
se14a59	0.442	0.040	0.058	0.004	0.34	0.053	0.001	372	28	364	22	311	38	117	366	40	0.79	0.014			364	22			
se10a236	0.430	0.033	0.058	0.003	0.29	0.055	0.001	363	23	365	16	429	47	85	364	29	0.96	0.012			365	16			
se14a30	0.467	0.031	0.058	0.003	0.34	0.055	0.001	389	21	366	16	411	35	89	372	29	0.29	0.009			366	16			
se14a70	0.456	0.038	0.058	0.003	0.34	0.054	0.001	381	26	366	20	382	28	96	371	37	0.59	0.010			366	20			
se10a184	0.442	0.054	0.058	0.004	0.30	0.055	0.001	371	38	366	26	413	44	89	367	49	0.89	0.012			366	26			
se10a227	0.436	0.044	0.058	0.003	0.25	0.061	0.001	367	31	366	18	624	39	59	366	33	0.97	0.031			366	18			
se10a165	0.434	0.075	0.058	0.003	0.14	0.061	0.002	366	53	366	18	630	57	58	366	35	1.00	0.015			366	18			
se10a244	0.477	0.033	0.059	0.002	0.28	0.058	0.001	396	22	367	14	541	41	68	372	26	0.20	0.006			367	14			
se14a74	0.458	0.038	0.059	0.003	0.27	0.057	0.001	383	26	367	16	479	46	77	370	30	0.55	0.014			367	16			
se13a08	0.474	0.022	0.059	0.002	0.34	0.055	0.001	394	15	370	11	398	26	93	377	21	0.12	0.007			370	11			
se14a20	0.467	0.034	0.059	0.003	0.40	0.055	0.001	389	24	371	21	407	26	91	378	37	0.48	0.009			371	21			
se10a196	0.452	0.041	0.059	0.003	0.31	0.055	0.001	378	29	371	21	417	32	89	373	38	0.81	0.016			371	21			
se14a47	0.461	0.034	0.059	0.002	0.27	0.055	0.001	385	24	372	15	429	41	87	375	27	0.60	0.011			372	15			
se14a57	0.460	0.079	0.059	0.006	0.29	0.056	0.001	384	55	372	36	448	34	83	374	67	0.83	0.005			372	36			
se14a26	0.434	0.039	0.059	0.002	0.24	0.058	0.001	366	27	372	15	547	33	68	371	29	0.85	0.020			372	15			
se10a228	0.448	0.207	0.059	0.016	0.29	0.056	0.001	376	145	372	97	441	41	84	373	181	0.98	0.011			372	97			
se14a21	0.481	0.034	0.060	0.004	0.45	0.054	0.001	399	23	373	23	388	25	96	385	39	0.28	0.008			373	23			
se14a40	0.466	0.027	0.060	0.002	0.34	0.054	0.001	388	19	373	15	374	26	100	378	27	0.44	0.008			373	15			
se14a27	0.446	0.044	0.060	0.003	0.27	0.056	0.001	375	31	374	19	448	36	83	374	36	0.97	0.009			374	19			
se10a204	0.523	0.076	0.060	0.008	0.44	0.058	0.001	427	51	375	47	547	42	69	396	83	0.32	0.011			375	47			
se14a56	0.457	0.040	0.060	0.003	0.29	0.054	0.001	382	28	375	18	373	33	101	377	34	0.81	0.005			375	18			
se14a11	0.439	0.034	0.060	0.002	0.20	0.060	0.002	369	24	375	11	596	77	63	374	22	0.83	0.010			375	11			
se10a217	0.456	0.099	0.060	0.005	0.19	0.067	0.001	382	69	375	30	832	46	45	375	58	0.92	0.021			375	30			
se10a205	0.433	0.031	0.060	0.002	0.21	0.056	0.001	366	22	376	11	451	44	83	374	21	0.65	0.007			376	11			
se10a185	0.436	0.050	0.060	0.002	0.18	0.059	0.001	368	35	376	15	579	49	65	375	29	0.82	0.021			376	15			

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
se10a182	0.458	0.071	0.060	0.003	0.15	0.066	0.002	383	49	376	17	794	66	47	376	34	0.89	0.015			376	17			
se14a09	0.396	0.062	0.060	0.003	0.16	0.058	0.001	338	45	377	18	525	47	72	373	35	0.39	0.019			377	18			
se10a267	0.479	0.069	0.060	0.005	0.29	0.057	0.001	397	47	377	30	495	43	76	381	57	0.67	0.014			377	30			
se14a10	0.408	0.039	0.060	0.002	0.21	0.055	0.001	348	28	378	15	432	42	88	373	29	0.29	0.016			378	15			
se10a225	0.462	0.060	0.060	0.005	0.30	0.056	0.001	385	42	378	28	435	38	87	380	53	0.86	0.018			378	28			
se14a37	0.474	0.051	0.061	0.004	0.31	0.054	0.001	394	35	379	25	389	39	97	383	46	0.67	0.014			379	25			
se10a195	0.490	0.045	0.061	0.003	0.27	0.058	0.001	405	31	380	18	540	43	70	384	34	0.42	0.011			380	18			
se10a215	0.466	0.087	0.061	0.008	0.36	0.054	0.001	389	60	380	50	391	49	97	383	89	0.89	0.022			380	50			
se13a09	0.494	0.020	0.061	0.002	0.35	0.054	0.001	408	13	382	10	381	30	100	389	19	0.06	0.015			382	10			
se10a163	0.591	0.087	0.061	0.011	0.59	0.059	0.002	471	56	383	65	583	76	66	439	108	0.11	0.011			383	65			
se10a167	0.505	0.029	0.061	0.002	0.24	0.056	0.001	415	19	383	10	448	38	85	387	19	0.11	0.009			383	10			
se13a28	0.482	0.056	0.061	0.005	0.38	0.054	0.001	400	39	383	33	389	33	98	389	58	0.67	0.008			383	33			
se14a28	0.453	0.037	0.061	0.003	0.28	0.055	0.001	379	26	383	17	416	38	92	382	32	0.88	0.014			383	17			
se13a23	0.463	0.033	0.061	0.004	0.43	0.050	0.001	386	23	383	23	214	31	179	385	39	0.89	0.006			383	23			
se14a66	0.494	0.037	0.061	0.003	0.32	0.055	0.001	408	25	384	18	405	39	95	390	33	0.35	0.012			384	18			
se14a29	0.449	0.062	0.061	0.005	0.29	0.054	0.001	377	43	385	29	380	46	101	383	54	0.86	0.013			385	29			
se13a21	0.461	0.059	0.062	0.004	0.24	0.057	0.001	385	41	385	23	506	51	76	385	43	0.99	0.021			385	23			
se14a61	0.433	0.045	0.062	0.003	0.21	0.054	0.001	365	32	388	16	361	45	107	384	31	0.48	0.009			388	16			
se13a17	0.485	0.042	0.062	0.004	0.33	0.055	0.001	401	28	388	22	424	30	92	392	39	0.66	0.007			388	22			
se10a192	0.475	0.046	0.062	0.004	0.30	0.056	0.001	394	31	389	22	463	37	84	391	41	0.87	0.008			389	22			
se13a18	0.465	0.026	0.062	0.002	0.33	0.054	0.001	388	18	389	14	355	30	110	389	25	0.97	0.176			389	14			
se14a38	0.515	0.029	0.063	0.002	0.35	0.055	0.001	422	19	392	15	419	31	94	401	28	0.13	0.038			392	15			
se14a58	0.572	0.072	0.063	0.005	0.32	0.061	0.001	459	47	392	31	655	43	60	405	59	0.16	0.011			392	31			
se10a233	0.526	0.137	0.063	0.014	0.44	0.057	0.001	429	91	393	88	486	34	81	410	153	0.70	0.128			393	88			
se10a229	0.475	0.043	0.063	0.003	0.23	0.057	0.001	395	29	393	16	501	53	78	393	30	0.95	0.016			393	16			
se14a49	0.462	0.040	0.063	0.002	0.21	0.056	0.001	386	28	394	14	433	41	91	393	26	0.76	0.012			394	14			
se14a12	0.474	0.045	0.063	0.003	0.23	0.056	0.001	394	31	394	17	454	56	87	394	32	0.99	0.010			394	17			
se13a12	0.491	0.027	0.063	0.002	0.27	0.054	0.001	405	19	395	12	377	37	105	397	22	0.59	0.010			395	12			
se13a27	0.487	0.040	0.063	0.003	0.28	0.056	0.001	403	28	396	18	453	36	87	398	33	0.82	0.006			396	18			
se10a247	0.481	0.043	0.063	0.003	0.27	0.056	0.001	399	29	396	18	440	41	90	396	34	0.91	0.021			396	18			
se10a173	0.482	0.043	0.064	0.002	0.17	0.056	0.001	399	29	397	11	469	48	85	397	22	0.94	0.030			397	11			
se10a249	0.484	0.096	0.064	0.005	0.19	0.056	0.001	401	66	398	29	462	56	86	399	56	0.97	0.009			398	29			
se10a162	0.550	0.039	0.064	0.002	0.20	0.061	0.001	445	25	399	11	645	49	62	403	21	0.08	0.013			399	11			
se14a08	0.472	0.042	0.064	0.002	0.18	0.061	0.002	393	29	401	13	647	61	62	400	24	0.79	0.009			401	13			
se10a188	0.464	0.064	0.064	0.004	0.21	0.060	0.001	387	45	402	22	617	52	65	400	43	0.74	0.207			402	22			
se14a39	0.508	0.040	0.065	0.003	0.30	0.055	0.001	417	27	404	18	401	35	101	407	34	0.64	0.029			404	18			
se14a13	0.509	0.060	0.065	0.003	0.18	0.058	0.001	418	40	404	17	513	57	79	405	33	0.74	0.012			404	17			
se10a194	0.465	0.066	0.065	0.003	0.18	0.060	0.001	388	46	405	20	612	51	66	403	38	0.70	0.022			405	20			
se10a186	0.498	0.047	0.065	0.003	0.28	0.057	0.001	411	32	406	21	475	44	85	407	38	0.89	0.009			406	21			
se14a36	0.496	0.040	0.065	0.003	0.28	0.054	0.001	409	27	407	18	372	42	109	407	33	0.94	0.017			407	18			
se14a60	0.509	0.048	0.066	0.003	0.24	0.056	0.001	418	32	410	18	444	49	92	411	34	0.81	0.006			410	18			
se13a29	0.547	0.040	0.066	0.003	0.28	0.060	0.001	443	26	412	16	595	44	69	418	31	0.24	0.078			412	16			
se10a193	0.510	0.045	0.066	0.003	0.28	0.056	0.001	418	30	413	20	453	43	91	414	37	0.85	0.037			413	20			
se10a245	0.511	0.100	0.067	0.005	0.20	0.058	0.001	419	67	416	31	526	54	79	416	61	0.96	0.018			416	31			
se10a268	0.508	0.110	0.067	0.003	0.09	0.071	0.002	417	74	417	16	944	55	44	417	32	1.00	0.037			417	16			
se10a166	0.548	0.027	0.067	0.002	0.23	0.056	0.001	444	18	418	9	465	37	90	422	18	0.17	0.028			418	9			
se10a187	0.515	0.073	0.067	0.003	0.17	0.060	0.002	422	49	419	19	591	62	71	419	38	0.94	0.010			419	19			
se10a234	0.515	0.044	0.067	0.002	0.17	0.063	0.002	422	29	420	12	709	65	59	420	23	0.95	0.012			420	12			
se14a76	0.543	0.033	0.069	0.002	0.23	0.056	0.001	440	22	433	12	469	43	92	434	22	0.75	0.022			433	12			
se13a22	0.620	0.062	0.077	0.005	0.35	0.056	0.001	490	39	477	32	448	38	106	481	57	0.75	0.286	477	32					
se10a164	0.752	0.058	0.087	0.003	0.25	0.064	0.001	569	34	538	20	739	38	73	544	38	0.37	1.161	538	20					
se13a13	0.834	0.283	0.099	0.016	0.24	0.070	0.002	616	157	611	94	942	58	65	612	176	0.98	0.273	611	94					
se10a209	3.014	0.522	0.209	0.026	0.36	0.104	0.001	1411	132	1223	140	1692	20	72	1312	234	0.23	0.546	1692	20					
Nashoba Formation calc-silicate gneiss (MLBM1)																									
se10a112	0.476	0.030	0.056	0.004	0.63	0.054	0.001	396	21	350	27	366	25	96	388	41	0.03	0.140							
se10a139	0.494	0.024	0.058	0.002	0.41	0.057	0.001	408	17	365	14	475	30	77	380	26	0.01	0.310							
se13c111	0.629	0.023	0.067	0.002	0.36	0.060	0.001	496	14	420	11	589	29	71	440	20	0.00	0.140							
se10a109	0.682	0.030	0.077	0.002	0.35	0.062	0.001	528	18	478	14	662	26	72	493	26	0.01	0.240							
se13c114	1.086	0.057	0.105	0.004	0.40	0.069	0.001	747	28	641	25	894	23	72	681	45	0.00	0.100							
se10a153	0.396	0.054	0.049	0.006	0.43	0.053	0.001	339	39	310	35	344	34	90	321	63	0.47	0.180			310	35			
se13a45	0.393	0.022	0.051	0.002	0.39	0.054	0.001	336	16	320	14	387	24	83	326	25	0.34	0.150			320	14			
se10a143	0.411	0.038	0.052	0.003	0.35	0.056	0.001	349	27	327	21	464	35	70	333	38	0.42	0.160			327	21			
se10a130	0.393	0.052	0.052	0.004	0.28	0.056	0.001	337	38	329	24	455	36	72	331	45	0.85	0.180			329	24			
se10a120	0.389	0.040	0.053	0.003	0.26	0.056	0.001	334	29	331	17	436	47	76	332	32	0.93	0.290			331	17			
se13a98	0.384	0.029	0.053	0.002	0.29	0.053	0.001	330	21	332	14	322	38	103	332	26	0.93	0.180			332	14			
se13a43	0.411	0.012	0.053	0.001	0.35	0.054	0.001	349	8	334	7	361	26	93	339	12	0.08	0.160			334	7			
se10a133	0.429	0.034	0.053	0.003	0.39	0.055	0.001	362	24	334	20	406	31	82	344	37	0.27	0.190			334	20			
se13a97	0.433	0.058	0.053	0.005	0.37	0.056	0.001	365	41	334	32	437	49	76	344	58	0.46	0.200			334	32			
se10a111	0.414	0.038	0.054	0.003	0.32	0.055	0.001	352	28	336	19	427	32	79	340	36	0.59	0.150			336	19			
se10a142	0.426	0.036	0.054	0.004	0.39	0.054	0.001	361	26	337	22	388	27	87	346	40	0.38	0.220			337	22			
se13a46	0.407	0.017	0.054	0.001	0.25	0.055	0.001	347	12	337	7	425	30	79	338	13	0.42	0.230			337	7			
se13a96	0.413	0.033	0.054	0.003	0.30	0.055	0.001	351	24	337	16	431	34	78	340	30	0.55	0.130			337	16			
se10a131	0.404	0.029	0.054	0.002	0.30	0.054	0.001	345	21	339	15	382	34	89	341	27	0.80	0.140			339	15			
se10a102	0.413	0.046	0.054	0.004	0.36	0.054	0.001	351	33	340	26	371	33	92	343	47	0.74	0.150			340	26			
se13a41	0.427	0.016	0.054	0.002	0.50	0.053	0.000	361	11	341	12	348	19	98	353	20	0.09	0.110			341	12			
se13a91	0.430	0.049	0.054	0.005	0.40	0.055	0.001	363	35	341	30	401	36	85	349	53	0.54	0.140			341	30			
se10a152	0.437	0.022	0.055	0.002	0.34	0.054	0.001	368	16	342	12	379	30	90	349	21	0.11	0.140			342	12			
se13a39	0.416	0.015	0.054	0.001	0.33	0.055	0.001	353	11	342	8	400	23	86	345	15	0.33	0.150			342	8			
se13c101	0.413	0.080	0.055	0.007	0.34	0.054	0.001	351	58	344	44	392	29	88	346	80	0.91	0.120			344	44			
se10a100	0.401	0.092	0.055	0.005	0.22	0.059	0.002	342	67	345	33	559	56	62	345	64	0.96	0.170			345	33			
se13a40	0.427	0.016	0.055	0.002	0.37	0.056	0.001	361	12	346	10	436	21	79	351	17	0.20	0.150			346	10			
se10a119	0.404	0.031	0.055	0.002	0.29	0.055	0.001	345	23	346	15	425	41	81	346	28	0.94	0.190			346	15			
se13c113	0.431	0.024	0.055	0.003	0.41	0.053	0.001	364	17	347	16	338	24	103	354	28	0.36	0.170			347	16			
se10a151	0.428	0.049	0.055	0.004	0.35	0.054	0.001	362	35	347	27	385	31	90	352	49	0.69	0.140			347	27			
se10a104	0.391	0.053	0.055	0.003	0.17	0.057	0.001	335	39	347	16	505	53	69	346	31	0.77	0.220			347	16			
se10a129	0.421	0.039	0.055	0.004	0.38	0.053	0.001	357	28	348	23	338	23	103	351	42	0.76	0.130			348	23			
se10a124	0.430	0.050	0.056	0.005	0.36	0.055	0.001	363	36	349	28	416	31	84	354	52	0.71	0.170			349	28			
se13a42	0.409	0.020	0.056	0.002	0.31	0.053	0.001	348	15	349	10	327	24	107	349	19	0.93	0.190			349	10			
se13c112	0.423	0.078	0.056	0.007	0.34	0.054	0.001	359	56	351	42	384	39	91	353	77	0.89	0.140			351	42			
se13a44	0.449	0.027	0.056	0.002	0.27	0.060	0.001	376	19	352	11	619	22	57	356	21	0.20	0.150			352	11			
se13a94	0.426	0.029	0.057	0.002	0.32	0.055	0.001	361	21	355	15	407	30	87	357	28	0.81	0.090			355	15			
se13c107	0.474	0.027	0.057	0.003	0.54	0.053	0.001	394	18	358	21	346	26	103	381	35	0.06	0.100			358	21			
se10a149	0.453	0.054	0.057	0.005	0.36	0.055	0.001	379	38	358	30	402	42	89	365	54	0.59	0.200			358	30			
se13c115	0.443	0.043	0.057	0.004	0.33	0.055	0.001	373	30	358	22	426	34	84	362	41	0.63	0.130			358	22			
se10a144	0.473	0.026	0.057	0.003	0.40	0.056	0.001	393	18	359	15	440	30	82	371	28	0.07	0.140			359	15			
se13c116	0.447	0.037	0.057	0.004	0.38	0.054	0.001	375	26	359	22	358	37	100	365	39	0.54	0.140			359	22			

Table A2. Continued.

Sample/ Analysis	Measured Isotopic Ratios: $^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	Calculated Ages (Ma): $^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	Detrital (Ma): For Prob Dens plots age	±1σ	Metamorphic (Ma): For Prob Dens plots age	±1σ	CA-TIMS (Ma): $^{206}Pb/^{238}U$	±2σ	notes
se10a138	0.489	0.035	0.058	0.004	0.46	0.057	0.001	404	24	361	23	482	21	75	380	40	0.07	0.170			361	23			
se10a103	0.483	0.048	0.058	0.005	0.42	0.057	0.001	400	33	361	29	504	43	72	376	52	0.24	0.140			361	29			
se10a134	0.452	0.047	0.058	0.004	0.33	0.056	0.001	379	33	361	24	466	26	77	365	44	0.60	0.200			361	24			
se10a118	0.437	0.031	0.058	0.003	0.31	0.054	0.001	368	22	361	16	385	32	94	363	29	0.74	0.140			361	16			
se10a110	0.456	0.076	0.058	0.007	0.35	0.055	0.001	382	53	362	40	421	27	86	368	74	0.72	0.150			362	40			
se10a132	0.443	0.055	0.058	0.004	0.29	0.055	0.001	372	39	362	25	411	34	88	365	47	0.80	0.150			362	25			
se10a108	0.458	0.024	0.058	0.002	0.32	0.054	0.001	383	17	364	12	389	27	94	368	22	0.28	0.150			364	12			
se13c102	0.454	0.025	0.058	0.002	0.35	0.054	0.001	380	18	364	14	389	36	94	369	25	0.39	0.160			364	14			
se10a98	0.444	0.033	0.058	0.003	0.35	0.053	0.001	373	23	364	18	338	31	108	367	33	0.69	0.120			364	18			
se13c117	0.463	0.028	0.058	0.003	0.43	0.053	0.001	387	20	366	19	328	28	112	375	32	0.30	0.120			366	19			
se13c105	0.468	0.027	0.059	0.003	0.42	0.053	0.001	390	19	368	17	320	36	115	377	30	0.27	0.130			368	17			
se10a99	0.444	0.023	0.059	0.002	0.31	0.056	0.001	373	16	370	12	451	30	82	371	22	0.84	0.160			370	12			
se10a123	0.464	0.073	0.060	0.006	0.34	0.056	0.001	387	51	376	39	436	31	86	379	71	0.83	0.120			376	39			
se10a141	0.482	0.020	0.060	0.002	0.41	0.055	0.001	399	14	377	13	397	29	95	386	22	0.13	0.190			377	13			
se10a113	0.505	0.030	0.061	0.003	0.39	0.057	0.001	415	20	379	17	502	25	75	391	31	0.09	0.370			379	17			
se13a92	0.461	0.053	0.061	0.005	0.34	0.054	0.001	385	37	379	29	383	40	99	381	53	0.88	0.150			379	29			
se10a128	0.480	0.037	0.061	0.004	0.39	0.055	0.001	398	25	381	22	404	28	94	388	39	0.51	0.130			381	22			
se10a150	0.483	0.021	0.062	0.002	0.35	0.054	0.001	400	14	386	12	385	24	100	391	21	0.36	0.120			386	12			
se13a93	0.475	0.047	0.062	0.004	0.30	0.056	0.001	395	33	387	22	468	33	83	389	41	0.82	0.100			387	22			
se10a114	0.486	0.026	0.062	0.002	0.31	0.057	0.002	402	18	389	12	500	82	78	392	23	0.48	0.120			389	12			
se10a101	0.527	0.026	0.065	0.002	0.31	0.056	0.001	430	17	404	12	451	30	90	410	22	0.15	0.110			404	12			
se10a140	0.557	0.032	0.067	0.003	0.35	0.057	0.001	450	21	418	16	483	25	87	428	29	0.14	0.150			418	16			
se10a122	0.575	0.036	0.067	0.003	0.38	0.058	0.001	461	23	421	19	513	30	82	434	35	0.09	0.130			421	19			
se13c103	0.591	0.037	0.070	0.003	0.38	0.056	0.001	472	24	434	20	455	40	95	447	36	0.13	0.160			434	20			
se10a121	0.657	0.034	0.081	0.004	0.43	0.056	0.001	513	21	500	21	453	26	110	506	36	0.56	0.200			500	21			4
Tadmuck Brook Schist (MLTMBC)																									
se10a52	0.775	0.169	0.057	0.012	0.49	0.078	0.001	583	96	359	74	1156	23	31	387	145	0.02	1.500							
se10a81	0.685	0.042	0.073	0.003	0.30	0.060	0.001	530	25	455	16	610	25	75	469	31	0.00	0.250							
se10a31	0.798	0.080	0.073	0.005	0.35	0.067	0.001	596	45	456	31	841	37	54	480	59	0.00	1.110							
se09b09	0.762	0.048	0.078	0.003	0.31	0.060	0.001	575	28	482	18	615	38	78	499	34	0.00	0.550							
se09b12	0.955	0.052	0.094	0.004	0.35	0.064	0.001	681	27	577	21	730	22	79	605	39	0.00	0.820							
se09b12	0.955	0.052	0.094	0.004	0.35	0.064	0.001	681	27	577	21	730	22	79	605	39	0.00	0.820							
se10a56	1.013	0.081	0.098	0.005	0.35	0.064	0.001	711	41	605	32	732	28	83	634	59	0.01	0.210							
se10a56	1.013	0.081	0.098	0.005	0.35	0.064	0.001	711	41	605	32	732	28	83	634	59	0.01	0.210							
se09b18	1.033	0.070	0.099	0.005	0.38	0.061	0.001	720	35	609	30	645	47	94	646	55	0.00	0.720							
se09b18	1.033	0.070	0.099	0.005	0.38	0.061	0.001	720	35	609	30	645	47	94	646	55	0.00	0.720							
se09b11	1.113	0.062	0.103	0.004	0.32	0.063	0.001	760	30	634	22	709	45	89	663	41	0.00	0.080							
se10a68	1.519	0.095	0.137	0.004	0.21	0.072	0.001	938	38	830	20	990	42	84	845	39	0.01	0.810							
se09b07	1.792	0.084	0.140	0.005	0.35	0.077	0.001	1043	31	844	26	1134	35	74	902	48	0.00	0.050							
se10a09	2.120	0.276	0.142	0.017	0.45	0.098	0.001	1155	90	856	94	1595	22	54	973	168	0.00	0.600							
se10a32	1.904	0.139	0.152	0.011	0.48	0.073	0.001	1083	49	914	60	1002	30	91	1019	94	0.00	0.160							
se10a80	1.982	0.113	0.166	0.006	0.34	0.074	0.001	1109	39	992	36	1048	24	95	1038	62	0.01	0.820							
se09b23	2.307	0.154	0.172	0.009	0.38	0.090	0.007	1214	47	1025	48	1434	157	71	1108	83	0.00	0.390							
se10a37	4.014	0.322	0.204	0.013	0.41	0.117	0.001	1637	65	1198	72	1911	13	63	1360	128	0.00	0.590							
se09b27	3.682	0.244	0.239	0.010	0.32	0.093	0.004	1568	53	1383	53	1489	80	93	1463	90	0.00	0.220							
se14a84	4.463	0.149	0.286	0.009	0.46	0.102	0.001	1724	28	1622	44	1658	24	98	1708	55	0.01	0.090							
se09b22	6.523	0.415	0.291	0.012	0.32	0.124	0.002	2049	56	1646	58	2018	24	82	1792	102	0.00	0.970							
se09b13	6.011	0.235	0.296	0.012	0.51	0.119	0.001	1977	34	1673	59	1943	16	86	1951	69	0.00	0.030							
se10a19	8.135	0.471	0.359	0.016	0.40	0.147	0.009	2246	52	1979	78	2315	110	85	2178	105	0.00	0.120							
se10a71	0.648	0.121	0.068	0.007	0.29	0.061	0.001	507	74	424	44	657	36	65	437	85	0.28	0.790			424	44			
se10a62	0.577	0.081	0.069	0.004	0.19	0.055	0.001	463	52	432	22	406	48	106	435	43	0.56	0.050			432	22			
se10a49	0.627	0.162	0.070	0.007	0.20	0.061	0.001	494	101	436	43	624	51	70	441	84	0.57	0.070			436	43			
se10a29	0.636	0.115	0.071	0.008	0.30	0.057	0.001	500	72	443	47	496	37	89	455	88	0.45	0.040			443	47			
se10a41	0.741	0.114	0.073	0.007	0.32	0.063	0.001	563	67	451	43	701	47	64	470	82	0.11	0.160	451	43					
se09b20	0.663	0.089	0.075	0.006	0.29	0.059	0.001	516	55	466	35	555	38	84	476	66	0.37	0.240	466	35					
se10a28	0.708	0.075	0.075	0.006	0.38	0.063	0.002	544	44	469	36	702	57	67	492	67	0.10	0.080	469	36					
se10a27	0.645	0.117	0.075	0.008	0.30	0.057	0.001	505	72	469	49	495	51	95	477	92	0.62	0.200	469	49					
se10a42	0.742	0.130	0.078	0.010	0.37	0.056	0.001	563	76	486	60	471	37	103	508	111	0.33	0.410	486	60					
se10a67	0.702	0.107	0.079	0.005	0.20	0.059	0.001	540	64	492	28	566	37	87	497	55	0.47	0.080	492	28					
se10a38	0.656	0.169	0.080	0.009	0.22	0.062	0.001	512	104	497	54	673	42	74	499	104	0.89	0.170	497	54					
se10a11	0.733	0.081	0.081	0.005	0.29	0.061	0.001	558	48	500	31	626	43	80	511	58	0.23	0.370	500	31					
se10a18	0.754	0.086	0.082	0.007	0.39	0.060	0.001	571	49	506	43	608	26	83	529	77	0.22	0.120	506	43					
se10a22	0.699	0.068	0.085	0.004	0.26	0.059	0.001	538	40	524	26	564	28	93	527	48	0.73	0.370	524	26					
se10a22	0.699	0.068	0.085	0.004	0.26	0.059	0.001	538	40	524	26	564	28	93	527	48	0.73	0.370	524	26					
se09b29	0.774	0.050	0.087	0.003	0.25	0.061	0.001	582	29	536	17	625	44	86	544	32	0.12	1.300	536	17					
se09b29	0.774	0.050	0.087	0.003	0.25	0.061	0.001	582	29	536	17	625	44	86	544	32	0.12	1.300	536	17					
se09b08	0.796	0.103	0.087	0.006	0.27	0.062	0.001	594	58	540	36	687	49	79	550	68	0.37	0.630	540	36					
se09b08	0.796	0.103	0.087	0.006	0.27	0.062	0.001	594	58	540	36	687	49	79	550	68	0.37	0.630	540	36					
se10a58	0.896	0.122	0.088	0.009	0.37	0.060	0.001	650	65	542	52	616	31	88	572	97	0.11	0.760	542	52					
se10a58	0.896	0.122	0.088	0.009	0.37	0.060	0.001	650	65	542	52	616	31	88	572	97	0.11	0.760	542	52					
se09b19	0.903	0.124	0.091	0.009	0.36	0.063	0.001	654	66	564	54	694	28	81	591	98	0.20	0.190	564	54					
se09b19	0.903	0.124	0.091	0.009	0.36	0.063	0.001	654	66	564	54	694	28	81	591	98	0.20	0.190	564	54					
se10a70	0.818	0.205	0.093	0.009	0.20	0.062	0.002	607	114	574	54	684	58	84	578	104	0.78	1.040	574	54					
se10a70	0.818	0.205	0.093	0.009	0.20	0.062	0.002	607	114	574	54	684	58	84	578	104	0.78	1.040	574	54					
se10a17	0.900	0.061	0.095	0.005	0.36	0.064	0.001	652	33	588	27	745	25	79	609	49	0.07	0.190	588	27					
se10a17	0.900	0.061	0.095	0.005	0.36	0.064	0.001	652	33	588	27	745	25	79	609	49	0.07	0.190	588	27					
se10a26	0.911	0.104	0.096	0.010	0.44	0.062	0.000	658	55	588	57	675	15	87	623	96	0.24	0.360	588	57					
se10a26	0.911	0.104	0.096	0.010	0.44	0.062	0.000	658	55	588	57	675	15	87	623	96	0.24	0.360	588	57					
se10a39	0.853	0.272	0.096	0.010	0.16	0.080	0.002	626	149	593	56	1187	55	50	596	110	0.83	0.360	593	56					
se10a39	0.853	0.272	0.096	0.010	0.16	0.080	0.002	626	149	593	56	1187	55	50	596	110	0.83	0.360	593	56					
se09b21	0.947	0.109	0.101	0.006	0.25	0.065	0.001	677	57	617	33	769	45	80	627	63	0.32	0.430	617	33					
se10a30	0.837	0.242	0.103	0.008	0.14	0.061	0.001	617	134	630	48	639	49	99	629	93	0.92	0.330	630	48					
se10a78	1.061	0.098	0.104	0.007	0.38	0.062	0.001	734	48	637	43	688	27	93	672	77	0.06	0.500	637	43					
se10a36	1.021	0.175	0.104	0.008	0.23	0.062	0.001	714	88	641	49	669	36	96	652	93	0.42	0.150	641	49					
se10a10	1.013	0.114	0.114	0.006	0.23	0.062	0.001	710	57	699	34	682	30	102	701	63	0.84	0.410	699	34					
se10a66	1.385	0.452	0.124	0.025	0.30	0.073	0.001	883	192	755	141	1023	32	74	786	263	0.54	0.610	755	141					
se10a13	1.360	0.101	0.128	0.008	0.40	0.067	0.001	872	43	776	44	851	42	91	821	74	0.05	0.340	776	44					
se09b10	1.818	0.152	0.156	0.007	0.27	0.086	0.003	1052	55	937	40	1347	68	70	966	73	0.06	0.410	1347	68					
se10a12	1.686	0.101	0.158	0.005	0.24	0.093	0.010	1003	38	944	25	1498	209	63	958	47	0.15	0.350	1498	209					
se10a60	2.399	0.249	0.181	0.012	0.31	0.084	0.001	1242	74	1073	64	1293	25	83	1128	115	0.05	0.220	1293	25					
se10a21	2.247	0.175	0.196	0.009	0.29	0.077	0.001	1196	55	1155	48	1131	24	102	1171	82	0.51	0.100	1131	24					
se10a51	2.942	0.494	0.218	0.017	0.24	0.089	0.001	1393	127	1271	92	1399	30	91	1302	168	0.39	0.510	1399	30					
se10a76	5.235	0.452	0.295	0.023	0.46	0.103	0.001	1858	74	1667	116	1682	14	99	1827	148	0.07	0.650	1682	14					
se10a59	7.097	0.608	0.354	0.022	0.36	0.121	0.001	2124	76	1955	104	1970	15	99	2071	146	0.11	0.020	1970	15					
se10a57	9.348	0.514	0.423	0.027	0.58	0.127	0.001	2373	50	2273	122	2060	11	110	2382	98	0.32	0.570	2060	11					
se09b17	8.606	0.318	0.424	0.015	0.46	0.134	0.003	2297	34	2279	66	2152	37	106	2297	67	0.75	0.180	2152	37					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	Rho	^{207}Pb/ ^{206}Pb	±1σ	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	^{207}Pb/ ^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238}U	±2σ	notes
MERRIMACK BELT																									
Kittery Formation (KSKTI)																									
mr17b17	0.550	0.017	0.067	0.001	0.28	0.055	0.001	445	11	419	7	417	26	101	424	13	0.03	0.793							
mr17b53	0.644	0.025	0.071	0.002	0.41	0.059	0.001	505	16	441	14	575	39	77	464	25	0.00	0.448							
mr18b48	0.835	0.039	0.076	0.002	0.33	0.066	0.001	617	21	470	14	803	39	59	492	27	0.00	0.258							
mr18a25	0.861	0.050	0.079	0.003	0.33	0.077	0.002	631	27	492	18	1115	42	44	516	35	0.00	0.129							
mr18b30	0.695	0.032	0.079	0.002	0.31	0.058	0.001	536	19	492	14	532	34	93	503	25	0.03	0.719							
mr17b57	0.711	0.030	0.080	0.002	0.27	0.063	0.001	545	18	494	11	724	35	68	503	21	0.00	0.235							
mr17a40	0.775	0.048	0.082	0.004	0.44	0.063	0.001	583	28	506	26	714	32	71	539	46	0.01	0.414							
mr17b37	0.793	0.041	0.087	0.002	0.27	0.063	0.001	593	23	540	14	702	35	77	550	27	0.03	0.315							
mr17b20	1.130	0.089	0.099	0.005	0.33	0.078	0.001	768	42	607	30	1158	24	52	639	57	0.00	0.217							
mr18a40	1.881	0.089	0.118	0.006	0.53	0.102	0.002	1074	32	717	34	1665	37	43	847	63	0.00	0.405							
mr17b29	2.015	0.094	0.157	0.005	0.31	0.092	0.002	1120	32	939	25	1461	32	64	988	46	0.00	0.709							
mr18b29	1.954	0.053	0.175	0.004	0.40	0.074	0.001	1100	18	1042	21	1050	20	99	1076	32	0.01	0.754							
mr18a30	2.622	0.245	0.176	0.012	0.35	0.104	0.001	1307	69	1046	63	1700	18	61	1129	114	0.00	0.431							
mr17a42	2.038	0.059	0.177	0.004	0.40	0.077	0.001	1128	20	1053	22	1132	22	93	1096	36	0.00	0.431							
mr17b28	1.439	0.090	0.179	0.008	0.34	0.074	0.002	905	37	1060	41	1050	50	101	964	62	0.00	1.216							
mr17a49	2.249	0.097	0.179	0.006	0.41	0.087	0.002	1197	30	1062	34	1349	39	79	1137	55	0.00	1.060							
mr17b33	2.682	0.192	0.195	0.010	0.34	0.099	0.003	1323	53	1151	51	1599	49	72	1221	89	0.00	0.392							
mr17b19	2.531	0.087	0.196	0.005	0.36	0.087	0.001	1281	25	1153	26	1364	21	85	1214	43	0.00	0.372							
mr18b23	2.495	0.151	0.198	0.009	0.39	0.088	0.001	1271	44	1164	50	1375	22	85	1225	79	0.04	0.326							
mr18b10	2.715	0.148	0.204	0.009	0.40	0.090	0.002	1332	41	1195	48	1418	34	84	1275	75	0.00	0.351							
mr18b40	2.593	0.098	0.209	0.005	0.33	0.088	0.001	1299	28	1223	28	1381	20	89	1259	46	0.02	0.200							
mr18a54	2.641	0.062	0.215	0.003	0.34	0.083	0.001	1312	17	1253	18	1259	20	99	1283	29	0.00	0.461							
mr18a23	5.218	1.062	0.231	0.014	0.15	0.197	0.006	1856	173	1339	76	2799	51	48	1359	150	0.02	0.606							
mr18a08	3.307	0.159	0.232	0.010	0.44	0.091	0.002	1483	38	1343	52	1440	39	93	1445	73	0.00	0.808							
mr18b31	2.946	0.066	0.233	0.004	0.40	0.086	0.001	1394	17	1348	22	1342	14	100	1380	32	0.03	0.368							
mr18a53	3.109	0.120	0.233	0.006	0.34	0.088	0.001	1435	30	1349	32	1374	22	98	1394	51	0.02	0.193							
mr18a47	3.348	0.107	0.234	0.005	0.36	0.096	0.001	1492	25	1355	28	1549	17	88	1430	45	0.00	0.528							
mr18a36	3.121	0.068	0.235	0.005	0.45	0.088	0.001	1438	17	1360	24	1382	14	98	1421	32	0.00	0.428							
mr18a57	3.104	0.091	0.238	0.005	0.38	0.090	0.001	1434	23	1376	28	1418	21	97	1413	41	0.04	0.531							
mr18b13	3.495	0.144	0.238	0.008	0.40	0.102	0.001	1526	33	1378	41	1670	17	83	1473	62	0.00	0.185							
mr18b27	3.250	0.121	0.239	0.006	0.34	0.093	0.001	1469	29	1384	31	1493	23	93	1429	50	0.01	0.362							
mr18b42	3.263	0.082	0.240	0.004	0.35	0.090	0.001	1472	20	1388	22	1422	18	98	1436	35	0.00	0.647							
mr18b50	3.468	0.066	0.241	0.004	0.44	0.095	0.001	1520	15	1390	21	1538	11	90	1487	29	0.00	0.171							
mr18a19	3.395	0.083	0.245	0.004	0.35	0.093	0.001	1503	19	1412	22	1491	18	95	1464	34	0.00	0.472							
mr17b22	3.319	0.105	0.246	0.005	0.30	0.094	0.001	1486	25	1416	24	1501	30	94	1448	40	0.02	0.343							
mr17b23	3.507	0.077	0.250	0.004	0.38	0.094	0.001	1529	17	1440	22	1511	13	95	1498	32	0.00	0.455							
mr17b13	3.329	0.080	0.251	0.004	0.33	0.091	0.001	1488	19	1441	20	1451	13	99	1467	32	0.04	0.278							
mr17b14	3.655	0.110	0.254	0.005	0.34	0.096	0.001	1562	24	1460	27	1541	22	95	1516	42	0.00	0.371							
mr18b45	3.856	0.097	0.264	0.005	0.38	0.100	0.001	1604	20	1510	26	1630	16	93	1573	38	0.00	1.991							
mr17b09	3.790	0.132	0.264	0.005	0.27	0.097	0.001	1591	28	1513	25	1560	23	97	1544	43	0.02	0.304							
mr17a11	4.020	0.121	0.266	0.007	0.45	0.098	0.001	1638	25	1519	37	1585	19	96	1615	48	0.00	0.726							
mr18a15	3.831	0.097	0.267	0.006	0.43	0.096	0.001	1599	20	1526	30	1557	17	98	1583	40	0.01	0.466							
mr18b39	3.963	0.105	0.269	0.005	0.37	0.098	0.001	1627	21	1538	27	1578	15	97	1595	40	0.00	0.692							
mr17b42	3.917	0.106	0.273	0.005	0.37	0.099	0.001	1617	22	1557	27	1597	18	97	1596	40	0.03	0.973							
mr18b07	4.140	0.119	0.275	0.006	0.36	0.102	0.001	1662	24	1565	28	1660	21	94	1625	43	0.00	0.453							
mr18b32	4.557	0.284	0.276	0.015	0.44	0.108	0.002	1741	52	1573	77	1763	31	89	1705	103	0.02	0.928							
mr17a29	4.102	0.137	0.277	0.006	0.34	0.105	0.001	1655	27	1576	32	1710	24	92	1623	49	0.02	0.988							
mr18a12	4.217	0.107	0.280	0.006	0.41	0.101	0.001	1677	21	1593	29	1642	17	97	1656	40	0.00	0.271							
mr17b21	4.168	0.108	0.281	0.006	0.43	0.099	0.001	1668	21	1595	32	1610	18	99	1653	42	0.01	0.742							
mr18a24	4.304	0.124	0.282	0.006	0.37	0.103	0.001	1694	24	1601	30	1675	17	96	1662	44	0.00	0.559							
mr17b60	4.580	0.157	0.283	0.006	0.32	0.107	0.001	1746	29	1607	31	1743	22	92	1679	50	0.00	0.496							
mr18a16	4.359	0.075	0.288	0.004	0.45	0.103	0.001	1705	14	1631	22	1684	13	97	1693	28	0.00	0.336							
mr18a35	4.455	0.106	0.289	0.006	0.42	0.101	0.001	1723	20	1634	29	1646	18	99	1704	38	0.00	1.295							
mr17a32	4.507	0.090	0.291	0.005	0.43	0.103	0.001	1732	17	1646	25	1682	14	98	1716	32	0.00	0.929							
mr18b44	4.518	0.095	0.294	0.005	0.41	0.105	0.001	1734	17	1661	25	1714	13	97	1717	34	0.00	0.369							
mr18a22	4.453	0.066	0.296	0.004	0.45	0.099	0.001	1722	12	1670	19	1600	10	104	1715	24	0.00	0.128							
mr18b43	5.622	0.112	0.319	0.005	0.40	0.114	0.001	1920	17	1784	25	1864	13	96	1887	34	0.00	0.238							
mr18a56	9.993	0.302	0.371	0.009	0.42	0.177	0.002	2434	28	2035	44	2627	16	77	2345	58	0.00	0.850							
mr18a50	9.992	0.277	0.394	0.009	0.39	0.168	0.001	2434	26	2139	40	2542	10	84	2366	52	0.00	0.406							
mr17a34	12.230	0.242	0.465	0.010	0.52	0.178	0.002	2622	19	2462	42	2635	14	93	2628	37	0.00	0.638							
mr18b34	0.546	0.035	0.064	0.003	0.34	0.057	0.001	442	23	401	17	475	37	84	412	31	0.08	0.783	401	17					
mr18a14	0.565	0.042	0.065	0.003	0.34	0.055	0.001	455	27	409	20	412	58	99	420	37	0.10	0.814	409	20			432.19	0.68	
mr18b11	0.463	0.027	0.066	0.002	0.21	0.056	0.001	387	19	410	10	472	35	87	406	19	0.22	0.653	410	10			461.31	0.71	
mr17b32	0.508	0.026	0.067	0.002	0.26	0.055	0.001	417	17	416	11	402	43	104	417	20	0.98	0.753	416	11			434.26	0.46	
mr18b19	0.522	0.033	0.067	0.003	0.31	0.056	0.001	426	22	417	16	452	34	92	420	29	0.68	0.738	417	16			473.4	1.1	
mr17a33	0.572	0.032	0.070	0.002	0.22	0.059	0.001	459	20	438	10	564	43	78	441	20	0.31	0.619	438	10					
mr18a20	0.526	0.027	0.070	0.002	0.24	0.055	0.001	429	18	438	10	393	49	111	436	20	0.66	0.376	438	10					
mr18b41	0.590	0.036	0.072	0.002	0.27	0.059	0.001	471	23	447	14	582	36	77	452	27	0.32	0.454	447	14					
mr17a31	0.578	0.033	0.072	0.002	0.21	0.056	0.001	463	21	447	10	449	47	100	449	20	0.46	1.006	447	10					
mr17b31	0.571	0.027	0.072	0.002	0.28	0.057	0.001	458	17	449	11	501	32	90	451	21	0.61	0.646	449	11					
mr17a10	0.552	0.054	0.072	0.002	0.17	0.063	0.001	446	35	449	14	719	46	62	448	27	0.95	0.798	449	14					
mr17b58	0.566	0.047	0.073	0.003	0.26	0.055	0.001	456	30	453	19	425	49	107	454	35	0.94	0.880	453	19					
mr18a42	0.563	0.024	0.073	0.002	0.33	0.055	0.001	454	16	456	13	420	44	109	455	22	0.87	0.383	456	13					
mr17b40	0.574	0.050	0.074	0.003	0.25	0.059	0.001	460	32	458	19	573	53	80	458	36	0.93	1.129	458	19					
mr18a09	0.579	0.023	0.074	0.002	0.32	0.055	0.001	464	15	459	12	403	31	114	460	21	0.77	0.063	459	12					
mr18b37	0.599	0.026	0.074	0.002	0.28	0.056	0.001	477	16	461	11	472	45	98	465	20	0.36	0.575	461	11					
mr18a55	0.623	0.028	0.075	0.002	0.33	0.056	0.001	491	17	463	13	471	42	98	472	24	0.12	0.520	463	13					
mr17a44	0.581	0.023	0.075	0.002	0.31	0.053	0.001	465	15	463	11	339	32	137	464	20	0.93	0.308	463	11					
mr17a51	0.581	0.031	0.075	0.002	0.31	0.053	0.001	465	20	464	15	323	39	144	464	27	0.98	0.580	464	15					
mr17a19	0.578	0.024	0.075	0.002	0.26	0.053	0.001	463	15	467	10	331	41	141	466	18	0.79	0.472	467	10					
mr18b12	0.542	0.025	0.076	0.003	0.38	0.049	0.001	440	16	470	16	149	48	315	455	27	0.09	0.453	470	16					
mr18a33	0.617	0.027	0.076	0.002	0.29	0.058	0.001	488	17	470	12	534	40	88	474	21	0.29	0.077	470	12					
mr17a21	0.580	0.042	0.077	0.003	0.26	0.060	0.002	464	27	476	17	596	56	80	474	32	0.67	0.695	476	17					
mr17a23	0.683	0.062	0.077	0.004	0.28	0.065	0.001	529	38	480	24	781	42	61	490	45	0.21	0.128	480	24					
mr17b43	0.632	0.027	0.078	0.002	0.29	0.057	0.001	497	17	481	12	494	32	97	485	21	0.36	0.519	481	12					
mr17a41	0.628	0.023	0.078	0.001	0.26	0.058	0.001	495	14	483	9	533	25	91	485	17	0.40	0.547	483	9					
mr17b44	0.643	0.022	0.079	0.002	0.29	0.059	0.001	504	14	490	9	555	31	88	493	17	0.32	0.216	490	9					
mr18a44	0.685	0.052	0.079	0.003	0.23	0.061	0.001	530	31	491	17	647	41	76	496	32	0.22	0.707	491	17					
mr17a09	0.637	0.016	0.079	0.001	0.38	0.056	0.000	501	10	492	9	442	15	111	496	16	0.39	0.234	492	9					
mr18b21	0.630	0.020	0.080	0.002	0.33	0.058	0.001	496	12	497	10	529	27	94	497	18	0.96	0.532	497	10					
mr17a07	0.645	0.016	0.081	0.001	0.29	0.057	0.001	506	10	502	7	474	22	106	503	13	0.75	0.460	502	7					
mr17a20	0.635	0.027	0.082	0.002	0.26	0.059	0.001	499	17	509	11	576	35	88	506	20	0.60	0.830	509	11					
mr17a28	0.671	0.051	0.083	0.004	0.33	0.059	0.001	522	31	514	25	552	31	93	516	44	0.81	0.170	514	25					
mr18a51	0.697	0.039	0.087	0.002	0.23	0.062	0.001	537	23	536	13	658	36	81	536	25	0.97	0.426	536	13					
mr18a21	0.662	0.051	0.089	0.002	0.18	0.058	0.001	516	31	548	14	530	50	103	544	28	0.30	0.406	548	14					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
mr17b41	1.209	0.090	0.123	0.007	0.37	0.069	0.001	805	42	749	39	904	22	83	773	67	0.23	0.098	749	39					
mr17b38	1.156	0.139	0.128	0.006	0.19	0.065	0.002	780	65	776	33	774	73	100	776	63	0.95	0.524	776	33					
mr17a39	1.677	0.075	0.159	0.005	0.36	0.072	0.000	1000	28	953	28	977	13	98	975	47	0.15	0.199	977	13					
mr17a12	1.663	0.076	0.160	0.004	0.25	0.077	0.001	995	29	956	21	1127	29	85	966	37	0.22	0.320	1127	29					
mr17b54	1.657	0.093	0.165	0.005	0.28	0.074	0.001	992	36	986	29	1038	39	95	988	51	0.86	0.668	1038	39					
mr17a38	1.751	0.041	0.168	0.003	0.35	0.073	0.001	1028	15	1001	15	1009	16	99	1014	25	0.13	0.521	1009	16					
mr18b38	1.784	0.077	0.170	0.005	0.32	0.073	0.001	1040	28	1012	26	1002	36	101	1024	44	0.38	1.435	1002	36					
mr18b24	1.845	0.071	0.171	0.004	0.33	0.074	0.001	1062	25	1016	24	1047	29	97	1036	40	0.10	0.418	1047	29					
mr18a26	1.652	0.163	0.171	0.006	0.18	0.072	0.002	990	62	1019	34	983	48	104	1014	64	0.65	0.417	983	48					
mr18b52	1.662	0.096	0.174	0.005	0.27	0.073	0.002	994	36	1033	29	1026	44	101	1019	51	0.33	0.799	1026	44					
mr17b39	1.827	0.053	0.180	0.004	0.40	0.073	0.001	1055	19	1066	23	1014	15	105	1059	34	0.65	0.259	1014	15					
mr18a43	2.038	0.088	0.183	0.004	0.26	0.083	0.002	1128	29	1083	23	1272	37	85	1097	40	0.16	0.453	1272	37					
mr17b30	2.104	0.104	0.188	0.006	0.32	0.079	0.001	1150	34	1113	32	1175	34	95	1129	54	0.34	0.460	1175	34					
mr17a18	1.900	0.176	0.189	0.010	0.30	0.072	0.002	1081	62	1116	57	977	53	114	1100	95	0.61	0.390	977	53					
mr17a22	2.140	0.067	0.191	0.004	0.30	0.076	0.001	1162	22	1125	19	1091	24	103	1140	33	0.13	0.098	1091	24					
mr18b28	2.316	0.067	0.201	0.004	0.32	0.079	0.001	1217	21	1179	20	1178	20	100	1197	33	0.11	0.490	1178	20					
mr17a50	2.030	0.099	0.203	0.005	0.28	0.073	0.001	1126	33	1190	29	1012	33	118	1162	49	0.09	0.804	1012	33					
mr18a13	2.144	0.069	0.203	0.004	0.31	0.076	0.001	1163	22	1190	21	1099	22	108	1177	35	0.30	0.124	1099	22					
mr17a17	2.593	0.114	0.211	0.006	0.34	0.084	0.002	1299	32	1234	33	1285	37	96	1266	54	0.09	0.559	1285	37					
mr17a48	2.556	0.084	0.211	0.005	0.37	0.082	0.001	1288	24	1235	27	1237	20	100	1266	42	0.07	0.445	1237	20					
mr18b51	2.767	0.191	0.214	0.009	0.31	0.087	0.001	1347	51	1250	49	1363	29	92	1291	83	0.10	0.183	1363	29					
mr17b24	2.640	0.182	0.215	0.008	0.27	0.087	0.001	1312	51	1254	42	1366	20	92	1275	74	0.31	0.191	1366	20					
mr18b17	2.555	0.117	0.215	0.006	0.28	0.084	0.001	1288	34	1254	30	1289	27	97	1268	50	0.38	0.171	1289	27					
mr17b10	2.767	0.110	0.221	0.006	0.32	0.089	0.001	1347	30	1286	29	1415	25	91	1314	48	0.08	0.882	1415	25					
mr17b08	2.700	0.178	0.221	0.009	0.32	0.086	0.001	1328	49	1287	49	1344	25	96	1307	81	0.47	0.380	1344	25					
mr17b51	2.705	0.106	0.224	0.005	0.31	0.085	0.001	1330	29	1303	28	1307	24	100	1316	47	0.43	0.550	1307	24					
mr18a29	2.866	0.457	0.224	0.018	0.25	0.090	0.002	1373	120	1305	93	1431	48	91	1326	165	0.61	0.205	1431	48					
mr18a46	2.829	0.129	0.226	0.006	0.29	0.088	0.001	1363	34	1314	32	1375	30	96	1335	53	0.21	0.124	1375	30					
mr17b50	2.881	0.088	0.228	0.005	0.34	0.085	0.001	1377	23	1325	25	1322	24	100	1354	40	0.06	0.645	1322	24					
mr17b52	2.889	0.113	0.230	0.005	0.30	0.090	0.001	1379	30	1335	29	1417	23	94	1356	48	0.21	0.548	1417	23					
mr17b27	2.852	0.081	0.232	0.004	0.30	0.086	0.001	1369	21	1343	21	1347	20	100	1355	34	0.28	0.452	1347	20					
mr18a41	2.801	0.112	0.232	0.006	0.31	0.083	0.001	1356	30	1347	30	1267	25	106	1351	48	0.79	0.473	1267	25					
mr18a32	2.889	0.115	0.235	0.005	0.26	0.090	0.001	1379	30	1360	26	1435	24	95	1367	44	0.57	0.369	1435	24					
mr17b34	3.426	0.453	0.238	0.026	0.41	0.102	0.004	1510	104	1378	136	1657	68	83	1468	199	0.32	0.395	1657	68					
mr18b22	3.267	0.166	0.239	0.008	0.34	0.096	0.002	1473	40	1382	43	1548	31	89	1431	69	0.06	0.864	1548	31					
mr17b59	2.836	0.151	0.241	0.007	0.27	0.097	0.002	1365	40	1390	36	1570	46	89	1379	59	0.58	0.080	1570	46					
mr18a34	3.167	0.088	0.243	0.005	0.33	0.095	0.001	1449	22	1400	23	1526	19	92	1427	37	0.06	0.503	1526	19					
mr18b18	3.352	0.169	0.243	0.008	0.32	0.098	0.001	1493	39	1402	40	1580	20	89	1446	66	0.05	0.874	1580	20					
mr18b09	3.121	0.073	0.243	0.003	0.28	0.088	0.001	1438	18	1402	17	1385	17	101	1417	28	0.09	0.284	1385	17					
mr17b07	3.225	0.121	0.245	0.007	0.37	0.092	0.001	1463	29	1414	36	1475	19	96	1446	53	0.18	0.286	1475	19					
mr17b18	3.360	0.141	0.255	0.007	0.31	0.093	0.001	1495	33	1463	34	1482	20	99	1480	55	0.42	0.703	1482	20					
mr17b11	3.272	0.101	0.255	0.004	0.27	0.088	0.001	1474	24	1464	22	1388	25	105	1469	37	0.71	0.401	1388	25					
mr17a27	3.251	0.108	0.257	0.006	0.38	0.086	0.001	1469	26	1474	33	1347	31	109	1471	47	0.90	0.598	1347	31					
mr18b49	3.915	0.228	0.262	0.016	0.53	0.098	0.001	1617	47	1501	83	1585	14	95	1612	95	0.10	0.120	1585	14					
mr18b14	3.455	0.096	0.263	0.005	0.37	0.091	0.001	1517	22	1505	27	1442	16	104	1513	40	0.68	0.467	1442	16					
mr17a14	3.517	0.179	0.264	0.007	0.27	0.098	0.002	1531	40	1510	37	1581	31	95	1519	62	0.65	1.017	1581	31					
mr17a13	3.631	0.069	0.266	0.004	0.39	0.093	0.001	1556	15	1522	20	1490	15	102	1547	28	0.09	0.456	1490	15					
mr18a11	3.291	0.083	0.267	0.005	0.41	0.086	0.001	1479	20	1528	28	1329	22	115	1490	37	0.07	0.373	1329	22					
mr17b49	3.656	0.091	0.269	0.005	0.38	0.094	0.001	1562	20	1533	26	1515	20	101	1553	37	0.27	0.307	1515	20					
mr17b47	3.796	0.076	0.271	0.005	0.45	0.095	0.001	1592	16	1548	25	1531	13	101	1585	32	0.05	0.068	1531	13					
mr18a10	3.920	0.112	0.274	0.006	0.37	0.100	0.001	1618	23	1562	29	1628	22	96	1599	43	0.06	1.057	1628	22					
mr17a30	4.164	0.302	0.276	0.011	0.28	0.112	0.002	1667	59	1572	57	1826	32	86	1614	95	0.18	0.980	1826	32					
mr17b48	3.922	0.105	0.281	0.006	0.39	0.097	0.001	1618	22	1597	29	1575	16	101	1613	41	0.46	0.828	1575	16					
mr18b08	3.876	0.148	0.281	0.006	0.28	0.104	0.001	1609	31	1597	30	1703	26	94	1603	49	0.76	0.263	1703	26					
mr17b12	4.038	0.109	0.282	0.006	0.39	0.098	0.001	1642	22	1601	30	1589	18	101	1631	41	0.16	0.483	1589	18					
mr18a52	3.906	0.094	0.282	0.004	0.32	0.093	0.001	1615	19	1603	22	1497	19	107	1610	34	0.62	0.319	1497	19					
mr18a31	3.964	0.094	0.283	0.006	0.42	0.094	0.001	1627	19	1605	28	1518	21	106	1623	37	0.42	0.376	1518	21					
mr17a43	3.899	0.138	0.284	0.006	0.31	0.095	0.002	1613	29	1614	31	1537	33	105	1614	48	0.99	0.657	1537	33					
mr17a47	3.959	0.146	0.287	0.008	0.36	0.095	0.001	1626	30	1628	38	1526	27	107	1627	54	0.95	0.451	1526	27					
mr17a24	4.256	0.138	0.288	0.007	0.35	0.103	0.001	1685	27	1630	33	1671	22	98	1665	49	0.11	0.545	1671	22					
mr18b33	4.196	0.090	0.288	0.005	0.42	0.101	0.001	1673	18	1634	26	1637	16	100	1665	34	0.11	0.410	1637	16					
mr18a45	4.270	0.101	0.300	0.005	0.34	0.095	0.001	1688	20	1690	24	1533	20	110	1688	35	0.93	0.344	1533	20					
mr18a58	4.599	0.128	0.301	0.007	0.40	0.100	0.001	1749	23	1694	33	1624	21	104	1736	45	0.09	0.481	1624	21					
mr17a08	5.117	0.148	0.330	0.006	0.30	0.109	0.001	1839	25	1838	28	1779	19	103	1839	42	0.98	0.329	1779	19					
mr17a37	18.059	0.420	0.580	0.011	0.40	0.205	0.002	2993	22	2949	44	2863	14	103	2990	45	0.28	0.353	2863	14					
mr18b20	18.985	0.269	0.617	0.009	0.51	0.202	0.001	3041	14	3099	36	2846	9	109	3037	27	0.06	0.320	2846	9					
Eliot Formation (KSELI)																									
mr10b72	0.539	0.026	0.063	0.002	0.27	0.063	0.001	438	17	394	10	694	26	57	401	19	0.01	0.935							
mr09b44	0.676	0.028	0.064	0.002	0.40	0.069	0.001	524	17	399	13	899	38	44	426	24	0.00	0.521							
mr09b51	0.588	0.023	0.067	0.002	0.33	0.058	0.001	470	15	420	11	526	28	80	432	20	0.00	0.446							
mr11a17	0.648	0.048	0.067	0.005	0.53	0.061	0.001	507	30	420	32	639	30	66	468	55	0.00	0.524							
mr09b100	0.598	0.037	0.068	0.004	0.47	0.056	0.001	476	23	422	23	462	40	91	448	40	0.02	0.440							
mr10b88	0.760	0.082	0.069	0.006	0.40	0.073	0.001	574	47	430	36	1027	26	42	461	69	0.00	0.484							
mr09b75	0.580	0.024	0.069	0.002	0.32	0.056	0.001	464	15	430	11	471	29	91	438	20	0.03	0.668							
mr10b106	0.912	0.031	0.069	0.003	0.57	0.073	0.001	658	17	432	16	1010	19	43	503	31	0.00	0.617							
mr10b32	0.660	0.037	0.069	0.005	0.58	0.062	0.001	515	23	432	27	676	26	64	487	44	0.00	1.057							
mr10b63	0.617	0.035	0.069	0.003	0.35	0.062	0.001	488	22	432	17	658	30	66	448	31	0.01	0.232							
mr10b61	0.684	0.030	0.070	0.002	0.27	0.067	0.001	529	18	438	10	836	31	52	451	20	0.00	0.633							
mr10b115	0.979	0.055	0.071	0.003	0.42	0.076	0.001	693	28	440	20	1082	33	41	468	40	0.00	0.426							
mr09b40	0.591	0.019	0.071	0.001	0.31	0.057	0.001	471	12	443	9	481	25	92	450	16	0.02	0.730							
mr09b22	0.642	0.019	0.072	0.002	0.37	0.056	0.001	504	11	445	9	449	38	99	463	17	0.00	0.080							
mr10b60	0.647	0.025	0.072	0.002	0.31	0.059	0.001	507	15	447	10	580	22	77	459	19	0.00	0.529							
mr10b39	0.632	0.020	0.072	0.002	0.35	0.058	0.001	497	12	448	10	523	28	86	463	18	0.00	0.834							
mr10a11	0.643	0.035	0.072	0.003	0.35	0.053	0.001	504	22	448	16	338	26	133	463	30	0.01	0.778							
mr10b37	0.649	0.032	0.072	0.002	0.29	0.062	0.001	508	20	449	12	662	23	68	460	23	0.00	0.087							
mr10b73	0.646	0.029	0.072	0.002	0.24	0.063	0.001	506	18	450	9	695	32	65	457	18	0.00	0.829							
mr09b45	0.698	0.021	0.073	0.002	0.50	0.061	0.001	537	12	451	13	652	20	69	495	22	0.00	0.258							
mr09b84	0.653	0.029	0.074	0.002	0.30	0.060	0.001	510	18	458	12	586	32	78	469	22	0.01	1.140							
mr10b62	0.667	0.026	0.075	0.002	0.33	0.060	0.001	519	16	469	12	589	31	80	482	22	0.00	0.407							
mr09b53	1.890	0.138	0.076	0.002	0.18	0.133	0.005	1077	48	472	12	2143	65	22	466	24	0.00	0.575							
mr10b65	0.666	0.028	0.076	0.002	0.29	0.062	0.001	518	17	472	11	690	34	68	482	21	0.01	0.576							
mr10b49	0.682	0.034	0.076	0.002	0.33	0.062	0.001	528	20	473	15	682	34	69	487	27	0.01	0.756							
mr10b08	0.821	0.043	0.080	0.002	0.23	0.067	0.002	609	24	495	11	840	53	59	506	22	0.00	0.818							
mr09b10	0.758	0.038	0.083	0.004	0.51	0.059	0.001	573	22	516	26	580	31	89	552	41	0.02	0.016							
mr10b89	1.560	0.078	0.085	0.004	0.44	0.110	0.002	954	31	525	22	1798	35	29	535	44	0.00	1.071							
mr10b81	0.960	0.053	0.089	0.004	0.44	0.069	0.001	683	27	551	25	898	30	61	600	46	0.00	0.617							

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	Rho	^{207}Pb/ ^{206}Pb	±1σ	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	^{207}Pb/ ^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238}U	±2σ	notes
mr10b117	1.090	0.171	0.091	0.014	0.48	0.080	0.001	748	83	563	81	1204	22	47	631	146	0.03	0.100							
mr10b101	0.957	0.044	0.094	0.003	0.40	0.061	0.001	682	23	577	21	623	27	93	615	37	0.00	0.655							
mr10b99	1.172	0.111	0.102	0.006	0.32	0.076	0.001	787	52	626	36	1093	25	57	657	69	0.00	0.186							
mr10b131	1.550	0.176	0.118	0.012	0.46	0.090	0.001	950	70	717	71	1420	22	50	808	127	0.00	0.160							
mr11a08	1.764	0.103	0.133	0.006	0.37	0.093	0.001	1032	38	802	32	1497	29	54	864	59	0.00	0.388							
mr10b55	2.180	0.100	0.147	0.008	0.55	0.087	0.001	1175	32	885	42	1365	25	65	1082	66	0.00	0.134							
mr10b96	1.853	0.111	0.159	0.006	0.31	0.075	0.001	1064	39	949	33	1073	22	88	987	59	0.01	0.795							
mr11a07	1.983	0.098	0.160	0.004	0.27	0.087	0.001	1110	33	957	24	1369	27	70	993	45	0.00	0.877							
mr10b38	1.701	0.060	0.160	0.003	0.30	0.073	0.001	1009	23	958	19	1009	28	95	976	33	0.04	0.407							
mr10b68	2.152	0.072	0.161	0.004	0.36	0.087	0.001	1166	23	965	21	1352	30	71	1035	38	0.00	0.532							
mr10b80	1.870	0.057	0.166	0.003	0.32	0.077	0.001	1070	20	990	18	1120	22	88	1020	31	0.00	0.011							
mr10b85	2.766	0.223	0.168	0.008	0.30	0.119	0.002	1346	60	1003	45	1941	30	52	1061	86	0.00	0.574							
mr10b69	1.917	0.068	0.169	0.004	0.30	0.076	0.001	1087	24	1007	20	1085	23	93	1034	35	0.00	0.219							
mr09b64	2.675	0.129	0.186	0.008	0.44	0.093	0.003	1322	36	1099	42	1486	52	74	1225	68	0.00	0.411							
mr10b54	2.594	0.194	0.190	0.011	0.40	0.092	0.001	1299	55	1119	62	1460	18	77	1214	101	0.01	0.279							
mr09b28	2.251	0.048	0.195	0.003	0.35	0.076	0.001	1197	15	1150	16	1094	18	105	1174	25	0.01	0.585							
mr09b74	2.555	0.090	0.205	0.005	0.33	0.082	0.001	1288	26	1202	26	1257	26	96	1242	43	0.00	0.222							
mr09b34	3.222	0.126	0.213	0.008	0.50	0.101	0.001	1462	30	1244	44	1642	22	76	1416	61	0.00	0.479							
mr10b40	2.998	0.090	0.216	0.006	0.43	0.092	0.001	1407	23	1263	29	1465	18	86	1359	44	0.00	0.312							
mr10b82	4.190	0.281	0.218	0.014	0.48	0.127	0.003	1672	55	1272	74	2062	40	62	1526	115	0.00	0.108							
mr10b70	3.094	0.135	0.220	0.010	0.50	0.092	0.001	1431	34	1281	51	1471	14	87	1407	67	0.00	0.324							
mr09b63	3.067	0.099	0.221	0.007	0.47	0.093	0.001	1425	25	1285	36	1496	11	86	1394	49	0.00	0.275							
mr09b58	3.039	0.085	0.226	0.006	0.44	0.087	0.001	1417	21	1316	30	1360	25	97	1392	42	0.00	0.735							
mr09b54	3.017	0.098	0.230	0.004	0.30	0.092	0.001	1412	25	1335	23	1457	19	92	1368	39	0.01	0.367							
mr10b30	3.341	0.118	0.231	0.006	0.37	0.099	0.001	1491	28	1340	31	1608	19	83	1423	50	0.00	0.546							
mr10b27	3.177	0.151	0.232	0.008	0.38	0.092	0.001	1452	37	1345	44	1463	18	92	1411	68	0.02	0.688							
mr10a09	3.392	0.197	0.232	0.009	0.33	0.089	0.001	1503	46	1347	47	1405	16	96	1420	78	0.00	0.381							
mr09b72	3.257	0.138	0.236	0.007	0.33	0.089	0.002	1471	33	1364	35	1405	35	97	1417	56	0.01	0.445							
mr10b111	4.727	0.318	0.243	0.017	0.53	0.111	0.001	1772	56	1401	90	1811	17	77	1716	117	0.00	0.243							
mr10c10	3.436	0.132	0.243	0.009	0.49	0.095	0.001	1513	30	1401	48	1521	15	92	1498	60	0.01	0.549							
mr10a20	3.847	0.209	0.243	0.009	0.34	0.093	0.001	1603	44	1403	47	1497	25	94	1500	78	0.00	0.517							
mr10b12	3.547	0.198	0.244	0.009	0.33	0.099	0.001	1538	44	1405	47	1609	20	87	1470	76	0.01	0.224							
mr10b84	3.530	0.094	0.247	0.006	0.45	0.093	0.001	1534	21	1421	31	1494	18	95	1510	41	0.00	0.301							
mr10b97	3.843	0.178	0.248	0.009	0.40	0.093	0.001	1602	37	1428	48	1495	14	95	1540	71	0.00	0.324							
mr10b21	3.585	0.113	0.249	0.006	0.38	0.095	0.001	1546	25	1435	30	1528	13	94	1504	46	0.00	0.590							
mr10b74	3.528	0.077	0.256	0.005	0.41	0.093	0.001	1533	17	1471	24	1496	11	98	1517	33	0.01	0.115							
mr09b83	3.755	0.153	0.257	0.007	0.34	0.099	0.002	1583	33	1474	36	1602	31	92	1533	57	0.01	0.747							
mr09b19	3.638	0.105	0.257	0.005	0.34	0.097	0.001	1558	23	1475	26	1571	24	94	1521	40	0.00	0.192							
mr09b98	4.005	0.165	0.258	0.010	0.48	0.102	0.001	1635	33	1481	52	1652	18	90	1612	67	0.00	1.100							
mr10b58	3.910	0.158	0.263	0.006	0.30	0.108	0.002	1616	33	1507	33	1759	28	86	1557	54	0.01	1.016							
mr09b18	3.743	0.076	0.265	0.005	0.44	0.097	0.001	1581	16	1516	24	1566	15	97	1568	32	0.00	0.274							
mr10b29	4.049	0.111	0.270	0.006	0.41	0.108	0.004	1644	22	1540	31	1760	67	87	1617	43	0.00	0.696							
mr10b103	4.281	0.239	0.271	0.008	0.26	0.109	0.001	1690	46	1543	40	1784	25	86	1595	70	0.01	0.606							
mr10b112	4.841	0.180	0.271	0.008	0.41	0.107	0.001	1792	31	1545	42	1752	14	88	1712	62	0.00	0.741							
mr11a20	4.034	0.150	0.273	0.008	0.38	0.104	0.001	1641	30	1555	38	1692	13	92	1612	56	0.03	0.654							
mr09b82	4.325	0.151	0.283	0.006	0.31	0.102	0.001	1698	29	1608	31	1664	25	97	1656	49	0.01	1.033							
mr10a13	6.484	0.829	0.287	0.021	0.28	0.153	0.002	2044	112	1625	103	2382	20	68	1739	188	0.00	0.142							
mr10b34	4.990	0.334	0.292	0.017	0.43	0.116	0.002	1818	57	1653	84	1895	25	87	1781	112	0.04	1.386							
mr09b73	4.533	0.101	0.296	0.005	0.42	0.103	0.001	1737	18	1669	27	1678	16	100	1723	36	0.01	0.691							
mr10a14	5.614	0.303	0.303	0.015	0.45	0.105	0.001	1918	46	1706	73	1709	14	100	1880	93	0.00	0.294							
mr09b31	6.426	0.168	0.348	0.008	0.42	0.123	0.001	2036	23	1926	37	1995	17	97	2018	46	0.00	0.259							
mr09b23	12.450	0.313	0.464	0.010	0.45	0.179	0.001	2639	24	2457	46	2643	14	93	2629	48	0.00	0.517							
mr10b17	13.379	0.330	0.499	0.009	0.35	0.189	0.001	2707	23	2610	37	2734	12	95	2688	45	0.01	0.124							
mr09b48	11.233	0.367	0.515	0.018	0.54	0.151	0.002	2543	30	2678	77	2353	21	114	2532	61	0.04	0.367							
mr09b33	14.537	0.266	0.522	0.007	0.38	0.191	0.001	2785	17	2706	31	2752	11	98	2775	34	0.01	0.137							
mr09b25	15.517	0.358	0.533	0.012	0.47	0.196	0.002	2848	22	2754	49	2793	15	99	2848	44	0.03	0.457							
mr11a10	0.332	0.081	0.047	0.006	0.28	0.064	0.001	291	62	293	38	737	27	40	293	72	0.97	0.207	293	38					
mr10a12	0.591	0.112	0.056	0.010	0.47	0.061	0.001	472	71	349	60	629	27	55	382	114	0.08	0.273	349	60					
mr10b122	0.434	0.024	0.061	0.002	0.30	0.052	0.001	366	17	384	12	307	25	125	379	22	0.29	0.365	384	12					
mr11a12	0.484	0.032	0.063	0.002	0.29	0.058	0.001	401	22	393	14	536	22	73	395	27	0.72	0.373	393	14					
mr10b83	0.531	0.037	0.065	0.003	0.36	0.056	0.001	432	24	403	19	461	24	87	412	35	0.24	0.309	403	19					
mr10c11	0.498	0.032	0.065	0.002	0.24	0.058	0.003	410	22	405	12	547	110	74	406	23	0.82	0.332	405	12					
mr10c14	0.494	0.054	0.065	0.003	0.20	0.064	0.001	407	36	405	17	749	35	54	405	33	0.95	0.835	405	17					
mr10b31	0.499	0.022	0.065	0.002	0.29	0.053	0.001	411	15	408	10	314	35	130	409	19	0.86	0.690	408	10					
mr10b135	0.510	0.038	0.066	0.004	0.39	0.054	0.001	418	26	409	23	355	29	115	413	41	0.73	0.390	409	23					
mr10b129	0.496	0.064	0.065	0.004	0.25	0.065	0.002	409	43	409	26	787	60	52	409	49	0.99	0.770	409	26					
mr10b108	0.535	0.037	0.066	0.003	0.28	0.054	0.001	435	24	411	15	374	37	110	416	29	0.34	0.661	411	15					
mr10b121	0.489	0.045	0.066	0.003	0.29	0.054	0.001	404	31	412	21	372	30	111	410	39	0.80	0.353	412	21					
mr10c07	0.534	0.059	0.067	0.004	0.26	0.057	0.001	434	39	416	23	493	35	84	420	44	0.66	0.557	416	23					
mr10b118	0.516	0.048	0.067	0.003	0.24	0.060	0.001	423	32	416	18	590	27	71	417	33	0.84	0.238	416	18					
mr09b07	0.497	0.027	0.068	0.002	0.21	0.057	0.001	410	18	421	9	493	37	85	420	17	0.53	0.506	421	9					
mr10a23	0.548	0.063	0.068	0.003	0.22	0.057	0.001	444	42	422	20	477	34	88	425	39	0.61	0.598	422	20					
mr09b69	0.542	0.041	0.068	0.003	0.29	0.057	0.001	440	27	423	18	484	35	88	427	33	0.55	0.737	423	18					
mr10b119	0.529	0.065	0.068	0.004	0.23	0.063	0.001	431	43	423	23	723	37	59	424	44	0.85	0.528	423	23					
mr09b94	0.508	0.084	0.068	0.005	0.21	0.059	0.002	417	56	423	28	580	56	73	422	54	0.92	0.756	423	28					
mr09b14	0.577	0.029	0.068	0.002	0.26	0.059	0.001	463	19	424	11	554	52	77	431	21	0.05	0.349	424	11					
mr10a22	0.589	0.062	0.068	0.003	0.19	0.060	0.001	470	40	425	16	610	38	70	428	32	0.26	0.534	425	16					
mr10b126	0.564	0.034	0.069	0.003	0.39	0.056	0.001	454	22	428	19	459	27	93	438	34	0.27	0.297	428	19					
mr09b11	0.513	0.019	0.069	0.002	0.30	0.052	0.001	421	12	428	9	302	34	142	426	17	0.57	0.392	428	9					
mr10b120	0.504	0.050	0.069	0.003	0.20	0.062	0.001	414	34	430	17	671	41	64	428	32	0.64	0.164	430	17					
mr10b18	0.540	0.046	0.069	0.003	0.23	0.056	0.001	438	30	432	16	452	42	95	433	31	0.83	0.911	432	16					
mr09b80	0.537	0.034	0.069	0.002	0.24	0.056	0.001	437	23	432	13	468	38	92	433	25	0.86	0.218	432	13					
mr10b20	0.605	0.071	0.069	0.010	0.59	0.056	0.001	480	45	433	58	469	43	92	470	88	0.32	0.648	433	58					
mr10b11	0.524	0.029	0.070	0.001	0.17	0.057	0.001	428	19	433	8	488	33	89	433	15	0.79	0.645	433	8					
mr10b10	0.582	0.032	0.070	0.002	0.31	0.058	0.001	466	20	437	14	542	22	81	444	26	0.17	0.009	437	14					
mr10b125	0.600	0.047	0.070	0.004	0.38	0.059	0.001	477	30	437	25	551	37	79	451	45	0.19	0.280	437	25					
mr09b49	0.576	0.016	0.071	0.001	0.33	0.055	0.001	462	10	441	8	418	22	105	447	14	0.05	0.465	441	8					
mr11a21	0.517	0.038	0.071	0.002	0.21	0.058	0.001	423	26	442	14	546	36	81	439	26	0.47	0.248	442	14					
mr10c12	0.547	0.045	0.071	0.003	0.26	0.058	0.001	443	29	442	18	547	29	81	443	34	0.99	0.424	442	18					
mr10b24	0.556	0.024	0.071	0.002	0.28	0.056	0.001	449	15	444	10	445	26	100	445	19	0.74	0.117	444	10					
mr10b79	0.570	0.168	0.071	0.006	0.15	0.062	0.001	458	109	444	38	668	35	66	445	74	0.90	0.317	444	38					
mr11a22	0.580	0.038	0.071	0.003	0.28	0.059	0.001	464	24	445	16	552	33	81	449	30	0.44	0.296	445	16					
mr10b136	0.553	0.181	0.071	0.014	0.31	0.056	0.001	447	119	445	87	447	41	100	445	159	0.99	0.128	445	87					
mr09b61	0.563	0.054	0.072	0.003	0.21	0.059	0.001	453	35	446	17	572	54	78	447	33	0.84	0.304	446	17					
mr09b35	0.557	0.029	0.072	0.002	0.22	0.056	0.001	449	19	446	10	454	39	98	446	19	0.85	0.405	446	10					
mr09b50	0.611	0.041	0.072	0.003	0.26	0.062	0.001	484	26	448	15	683	47	66	454	29	0.17	0.838	448	15					
mr09b21	0.595	0.024	0.072	0.002	0.30	0.059	0.001	474	15	449	10	565	31	79	455	19	0.11	0.695	449	10					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/^{235}U	±1σ	^{206}Pb/^{238}U	±1σ	Rho	^{207}Pb/^{206}Pb	±1σ	^{207}Pb/^{235}U	±1σ	^{206}Pb/^{238}U	±1σ	^{207}Pb/^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238}U	±2σ	notes
mr10b42	0.645	0.205	0.072	0.011	0.24	0.063	0.001	505	127	450	67	693	49	65	457	129	0.67	0.499	450	67					
mr10b51	0.560	0.086	0.072	0.003	0.16	0.056	0.001	452	56	450	21	432	41	104	450	41	0.97	0.377	450	21					
mr11a19	0.541	0.116	0.072	0.007	0.24	0.057	0.001	439	76	451	44	478	49	94	448	84	0.88	0.651	451	44					
mr10b110	0.742	0.198	0.073	0.010	0.26	0.070	0.001	563	116	452	62	921	37	49	464	120	0.36	0.352	452	62					
mr09b68	0.631	0.049	0.073	0.004	0.37	0.060	0.001	497	31	453	26	595	47	76	468	46	0.18	0.608	453	26					
mr10b33	0.583	0.018	0.073	0.001	0.26	0.056	0.001	466	11	453	7	465	21	97	455	13	0.25	0.606	453	7					
mr09b13	0.613	0.033	0.073	0.002	0.22	0.061	0.001	486	21	455	10	648	39	70	459	20	0.15	0.691	455	10					
mr09b55	0.562	0.044	0.073	0.003	0.22	0.061	0.001	453	29	455	15	631	50	72	454	29	0.96	0.810	455	15					
mr10b14	0.547	0.024	0.073	0.001	0.17	0.058	0.001	443	16	456	7	520	32	88	454	13	0.43	0.784	456	7					
mr10a19	0.612	0.058	0.073	0.003	0.21	0.057	0.001	485	37	456	18	490	41	93	459	34	0.45	0.323	456	18					
mr10b127	0.651	0.094	0.074	0.006	0.29	0.063	0.001	509	58	461	37	698	33	66	470	69	0.42	0.448	461	37					
mr09b09	0.574	0.024	0.074	0.001	0.23	0.058	0.001	460	16	463	9	520	34	89	462	17	0.90	0.293	463	9					
mr10b53	0.550	0.039	0.075	0.002	0.20	0.054	0.001	445	25	464	13	391	33	119	461	24	0.47	0.497	464	13					
mr09b93	0.604	0.055	0.075	0.003	0.24	0.065	0.001	480	35	464	20	762	43	61	467	37	0.67	0.166	464	20					
mr09b79	0.561	0.016	0.075	0.001	0.30	0.048	0.001	452	11	468	8	76	34	613	463	15	0.16	0.676	468	8					
mr10b45	0.610	0.025	0.076	0.001	0.22	0.057	0.001	484	16	471	8	479	30	98	473	16	0.44	0.245	471	8					
mr09b59	0.609	0.018	0.076	0.001	0.33	0.054	0.001	483	11	473	9	366	31	129	476	16	0.37	0.180	473	9					
mr09b99	0.565	0.082	0.077	0.005	0.21	0.053	0.001	455	53	481	28	334	64	144	477	53	0.63	0.643	481	28					
mr09b76	0.642	0.033	0.078	0.002	0.26	0.057	0.001	504	20	484	12	504	27	96	488	23	0.35	0.123	484	12					
mr09b65	0.613	0.029	0.079	0.002	0.23	0.057	0.001	486	18	490	10	506	35	97	489	19	0.82	0.308	490	10					
mr11a18	0.898	0.261	0.080	0.012	0.26	0.100	0.002	651	139	495	72	1615	30	31	509	140	0.29	0.361	495	72					
mr10b107	0.838	0.122	0.083	0.009	0.36	0.064	0.001	618	67	512	51	739	26	69	538	95	0.13	0.091	512	51					
mr11a14	0.746	0.134	0.085	0.008	0.25	0.067	0.001	566	78	523	45	851	40	61	530	86	0.60	0.569	523	45					
mr10b22	0.712	0.040	0.094	0.002	0.21	0.063	0.001	546	24	579	13	695	36	83	572	25	0.18	0.703	579	13					
mr09b38	0.821	0.029	0.095	0.002	0.36	0.060	0.001	609	16	583	14	591	34	99	593	25	0.15	0.748	583	14					
mr10b07	0.858	0.052	0.095	0.004	0.33	0.063	0.001	629	29	586	23	708	28	83	599	41	0.16	0.331	586	23					
mr09b41	0.922	0.054	0.109	0.004	0.35	0.057	0.002	664	28	667	26	502	58	133	666	44	0.90	0.896	667	26					
mr10b100	1.326	0.235	0.116	0.012	0.29	0.084	0.001	857	103	709	69	1297	28	55	737	131	0.18	0.322	709	69					
mr10a16	1.268	0.186	0.124	0.009	0.25	0.068	0.001	832	83	755	52	858	31	88	770	98	0.39	0.307	755	52					
mr09b62	1.206	0.152	0.132	0.006	0.18	0.082	0.002	803	70	799	33	1257	46	64	800	64	0.96	0.332	799	33					
mr09b43	1.176	0.149	0.134	0.007	0.20	0.075	0.002	790	69	811	39	1071	42	76	807	73	0.76	0.816	1071	42					
mr09b60	1.237	0.105	0.137	0.009	0.37	0.067	0.001	818	48	828	49	851	43	97	823	80	0.85	0.367	851	43					
mr09b08	1.397	0.072	0.142	0.006	0.42	0.069	0.001	888	31	854	34	903	32	95	874	55	0.35	0.457	903	32					
mr10b109	1.383	0.522	0.142	0.023	0.21	0.083	0.001	882	222	857	128	1271	31	67	862	240	0.92	0.156	1271	31					
mr09b42	1.388	0.074	0.145	0.004	0.26	0.071	0.001	884	32	872	23	960	27	91	875	41	0.73	0.595	960	27					
mr09b32	1.398	0.150	0.150	0.006	0.19	0.077	0.002	888	64	901	33	1134	39	79	899	63	0.85	0.336	1134	39					
mr09b52	1.565	0.062	0.153	0.004	0.33	0.071	0.001	957	24	919	22	955	27	96	934	38	0.17	0.820	955	27					
mr10b50	1.421	0.314	0.154	0.011	0.16	0.079	0.001	898	132	924	60	1168	35	79	920	114	0.85	0.253	1168	35					
mr10c08	1.411	0.149	0.157	0.005	0.16	0.089	0.002	893	63	939	29	1408	49	67	932	56	0.48	0.492	1408	49					
mr10c19	1.766	0.170	0.163	0.006	0.18	0.086	0.002	1033	62	972	32	1334	41	73	981	61	0.36	0.827	1334	41					
mr09b70	1.756	0.058	0.165	0.004	0.33	0.073	0.001	1029	21	983	20	1013	23	97	1003	34	0.06	0.386	1013	23					
mr10b71	1.721	0.086	0.165	0.006	0.36	0.074	0.001	1016	32	986	33	1031	32	96	1001	54	0.40	1.302	1031	32					
mr09b39	1.688	0.067	0.170	0.005	0.38	0.068	0.001	1004	25	1011	28	876	36	115	1007	44	0.81	0.695	876	36					
mr10b75	1.752	0.069	0.170	0.004	0.29	0.074	0.001	1028	25	1013	21	1041	27	97	1019	37	0.61	0.796	1041	27					
mr09b97	1.756	0.201	0.172	0.008	0.21	0.082	0.002	1029	74	1023	46	1237	41	83	1025	85	0.94	0.727	1237	41					
mr10a21	1.788	0.144	0.172	0.007	0.25	0.069	0.001	1041	53	1024	38	904	39	113	1029	68	0.76	0.692	904	39					
mr10b128	2.001	0.694	0.173	0.036	0.30	0.088	0.001	1116	235	1028	197	1384	28	74	1058	349	0.74	0.121	1384	28					
mr09b29	2.004	0.093	0.177	0.006	0.35	0.076	0.001	1117	31	1051	31	1094	37	96	1082	52	0.07	0.551	1094	37					
mr10b98	2.130	0.132	0.180	0.006	0.27	0.078	0.001	1158	43	1067	33	1143	25	93	1093	59	0.05	0.326	1143	25					
mr10b64	2.016	0.079	0.180	0.004	0.31	0.079	0.001	1121	26	1068	24	1178	30	91	1089	41	0.08	0.474	1178	30					
mr10b52	2.137	0.062	0.191	0.003	0.28	0.077	0.001	1161	20	1126	17	1129	22	100	1139	29	0.12	0.250	1129	22					
mr09b95	2.177	0.209	0.194	0.009	0.23	0.089	0.001	1174	67	1142	47	1415	27	81	1150	85	0.66	0.280	1415	27					
mr10a15	2.774	0.673	0.205	0.020	0.20	0.098	0.002	1349	181	1202	108	1583	40	76	1227	204	0.46	0.662	1583	40					
mr10b19	2.332	0.090	0.212	0.004	0.23	0.084	0.001	1222	27	1240	20	1299	26	95	1234	35	0.56	0.746	1299	26					
mr11a23	2.568	0.168	0.213	0.008	0.29	0.088	0.002	1292	48	1245	43	1388	39	90	1264	74	0.40	0.395	1388	39					
mr10c17	2.834	0.181	0.218	0.009	0.31	0.092	0.001	1365	48	1270	46	1466	23	87	1311	77	0.09	0.399	1466	23					
mr10a10	2.920	0.353	0.225	0.012	0.22	0.092	0.001	1387	91	1308	64	1466	30	89	1328	116	0.44	0.587	1466	30					
mr10b09	2.868	0.110	0.227	0.005	0.29	0.088	0.001	1373	29	1317	26	1385	24	95	1340	44	0.09	0.305	1385	24					
mr10c13	3.057	0.197	0.233	0.010	0.35	0.092	0.001	1422	49	1349	55	1470	20	92	1389	86	0.22	0.755	1470	20					
mr10b13	3.469	0.116	0.254	0.006	0.35	0.095	0.001	1520	26	1458	31	1523	20	96	1495	47	0.06	0.578	1523	20					
mr10b48	3.435	0.171	0.256	0.009	0.34	0.097	0.001	1512	39	1468	44	1567	17	94	1493	68	0.36	0.305	1567	17					
mr10b102	3.901	0.297	0.256	0.012	0.31	0.101	0.001	1614	61	1469	62	1642	24	89	1534	103	0.05	0.819	1642	24					
mr11a09	3.764	0.213	0.259	0.012	0.41	0.101	0.001	1585	45	1483	62	1647	13	90	1557	87	0.09	0.881	1647	13					
mr10b130	3.412	0.185	0.260	0.007	0.26	0.103	0.001	1507	42	1491	37	1672	20	89	1497	63	0.74	0.766	1672	20					
mr11a11	3.669	0.122	0.263	0.007	0.42	0.096	0.001	1565	27	1503	38	1555	11	97	1550	51	0.09	0.414	1555	11					
mr09b96	3.531	0.090	0.264	0.006	0.42	0.095	0.001	1534	20	1510	28	1538	16	98	1528	38	0.37	0.108	1538	16					
mr10b116	3.793	0.297	0.273	0.009	0.22	0.102	0.002	1591	63	1557	47	1668	34	93	1567	83	0.62	0.560	1668	34					
mr11a13	4.151	0.335	0.274	0.017	0.39	0.105	0.001	1664	66	1562	87	1709	22	91	1633	125	0.24	1.005	1709	22					
mr10c18	4.103	0.338	0.276	0.017	0.37	0.104	0.001	1655	67	1573	86	1693	22	93	1628	125	0.35	0.463	1693	22					
mr10b137	4.430	0.698	0.282	0.038	0.43	0.108	0.001	1718	130	1600	191	1773	21	90	1692	255	0.51	0.629	1773	21					
mr10b132	4.024	0.235	0.283	0.011	0.33	0.100	0.001	1639	47	1609	55	1623	17	99	1627	83	0.61	1.019	1623	17					
mr09b81	4.182	0.111	0.287	0.006	0.39	0.102	0.001	1671	22	1626	30	1656	17	98	1658	41	0.12	0.595	1656	17					
mr09b12	4.123	0.099	0.288	0.004	0.30	0.100	0.001	1659	20	1631	21	1629	17	100	1646	33	0.25	0.348	1629	17					
mr10b23	4.774	0.443	0.290	0.015	0.28	0.121	0.003	1780	78	1641	75	1970	44	83	1700	126	0.14	1.109	1970	44					
mr10b78	4.309	0.112	0.291	0.006	0.38	0.100	0.001	1695	21	1649	28	1630	16	101	1681	40	0.10	0.959	1630	16					
mr09b30	5.013	0.207	0.324	0.009	0.32	0.117	0.002	1822	35	1811	42	1908	26	95	1817	62	0.81	0.027	1908	26					
mr09b24	14.378	0.272	0.530	0.011	0.53	0.180	0.001	2775	18	2740	45	2654	12	103	2777	35	0.37	0.693	2654	12					
mr09b20	17.648	0.458	0.568	0.014	0.47	0.211	0.002	2971	25	2899	57	2914	15	99	2972	50	0.15	0.475	2914	15					
Berwick Formation (KSBWI)																									
mr05a72	0.572	0.022	0.068	0.002	0.31	0.058	0.001	459	14	427	10	522	35	82	435	18	0.03	0.979							
mr04b85	0.593	0.020	0.070	0.002	0.48	0.055	0.001	473	12	435	13	414	25	105	456	22	0.00	0.525							
mr04b89	0.599	0.018	0.070	0.002	0.40	0.056	0.001	476	11	438	10	463	21	95	453	18	0.00	0.552							
mr04b31	0.621	0.032	0.071	0.002	0.23	0.060	0.002	491	20	442	10	609	80	73	448	19	0.02	0.669							
mr04b86	0.651	0.027	0.075	0.002	0.36	0.058	0.001	509	17	468	14	514	32	91	481	25	0.02	0.425							
mr05a52	0.544	0.021	0.078	0.002	0.26	0.054	0.001	441	14	483	9	386	29	125	472	17	0.00	0.881							
mr04b80	0.841	0.031	0.086	0.002	0.36	0.063	0.001	620	17	529	13	702	36	75	555	25	0.00	0.492							
mr04b61	0.908	0.064	0.093	0.004	0.33	0.070	0.001	656	34	571	25	937	31	61	593	47	0.02	0.240							
mr04b21	1.142	0.090	0.107	0.006	0.38	0.069	0.001	773	43	653	38	907	22	72	694	68	0.01	0.327							
mr05a88	1.271	0.088	0.120	0.007	0.42	0.071	0.001	833	39	731	40	968	25	75	779	68	0.02	0.208							
mr05a66	1.398	0.091	0.121	0.010	0.66	0.079	0.001	888	39	738	60	1163	30	63	889	77	0.00	0.381							
mr05a24	1.722	0.084	0.146	0.006	0.40	0.076	0.001	1017	31	880	32	1090	36	81	942	54	0.00	1.668							
mr04b41	1.941	0.106	0.162	0.009	0.49	0.076	0.001	1095	37	970	48	1098	21	88	1061	72	0.00	0.175							
mr04b20	1.796	0.049	0.167	0.003	0.38	0.073	0.001	1044	18	993	19	1002	16	99	1021	31	0.01	0.470							
mr04b64	1.940	0.066	0.168	0.005	0.42	0.075	0.001	1095	23	999	27	1073	28	93	1056	42	0.00	0.970							
mr04b74	1.856	0.060	0.168	0.003	0.31	0.076	0.001	1066	21	1002	18	1090	27	92	1025	32	0.01	1.100							
mr04b93	2.048	0.057	0.174	0.004	0.43	0.078	0.001	1132	19	1032	22	1153	18	90	1094	35	0.00	0.480							

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	Rho	^{207}Pb/ ^{206}Pb	±1σ	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	^{207}Pb/ ^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238}U	±2σ	notes
mr05a125	1.352	0.161	0.178	0.007	0.18	0.072	0.002	868	70	1054	41	998	59	106	1005	73	0.01	0.415							
mr04b92	2.127	0.084	0.178	0.004	0.28	0.078	0.001	1158	27	1057	21	1136	28	93	1087	38	0.00	0.584							
mr05a114	2.358	0.093	0.178	0.005	0.32	0.083	0.002	1230	28	1058	25	1263	37	84	1116	45	0.00	0.527							
mr04b50	2.397	0.176	0.189	0.007	0.24	0.087	0.006	1242	53	1114	36	1367	133	81	1142	66	0.03	0.402							
mr05a137	2.571	0.207	0.192	0.014	0.45	0.095	0.001	1293	59	1131	75	1520	14	74	1238	114	0.02	0.441							
mr04b30	2.293	0.061	0.193	0.004	0.38	0.078	0.001	1210	19	1138	21	1151	20	99	1178	33	0.00	0.417							
mr05a25	2.459	0.078	0.195	0.005	0.41	0.085	0.001	1260	23	1150	27	1322	20	87	1216	42	0.00	0.863							
mr05a26	2.727	0.106	0.213	0.005	0.28	0.087	0.001	1336	29	1244	25	1365	29	91	1277	43	0.01	0.396							
mr05a10	2.831	0.122	0.215	0.008	0.42	0.089	0.001	1364	32	1257	41	1402	15	90	1328	61	0.01	0.391							
mr04b25	4.616	0.680	0.216	0.007	0.11	0.136	0.016	1752	123	1260	36	2176	206	58	1268	72	0.00	0.279							
mr05a20	2.782	0.060	0.217	0.004	0.47	0.085	0.001	1351	16	1266	23	1327	17	95	1334	32	0.00	0.446							
mr04b48	2.987	0.088	0.220	0.006	0.47	0.087	0.001	1404	22	1282	32	1365	25	94	1379	44	0.00	0.781							
mr05a22	2.835	0.084	0.223	0.005	0.41	0.086	0.001	1365	22	1297	29	1338	14	97	1344	42	0.02	0.582							
mr05a50	2.936	0.101	0.229	0.005	0.29	0.088	0.001	1391	26	1330	24	1390	22	96	1355	40	0.04	0.579							
mr05a120	3.630	0.151	0.235	0.006	0.31	0.101	0.003	1556	33	1358	31	1636	46	83	1433	54	0.00	0.438							
mr05a82	2.991	0.064	0.235	0.005	0.45	0.089	0.001	1405	16	1359	24	1397	12	97	1396	32	0.03	0.437							
mr09a21	3.173	0.105	0.239	0.005	0.31	0.089	0.001	1451	25	1379	25	1399	15	99	1412	41	0.02	0.394							
mr05a86	3.203	0.069	0.244	0.004	0.37	0.093	0.001	1458	17	1406	20	1479	12	95	1438	30	0.01	0.361							
mr04b15	3.268	0.081	0.244	0.004	0.36	0.092	0.001	1473	19	1407	23	1474	15	95	1447	35	0.01	0.525							
mr05a90	3.583	0.087	0.248	0.006	0.47	0.098	0.001	1546	19	1426	29	1591	21	90	1525	38	0.00	0.864							
mr05a77	3.339	0.085	0.249	0.005	0.41	0.093	0.001	1490	20	1431	27	1489	13	96	1474	38	0.02	0.446							
mr04b81	3.356	0.102	0.249	0.006	0.37	0.094	0.001	1494	24	1432	29	1503	15	95	1472	43	0.04	0.669							
mr05a11	3.627	0.051	0.256	0.003	0.44	0.093	0.001	1555	11	1468	16	1497	12	98	1536	22	0.00	0.565							
mr09a40	3.829	0.126	0.259	0.007	0.40	0.094	0.001	1599	26	1487	35	1507	13	99	1564	50	0.00	0.768							
mr04b32	9.834	1.295	0.261	0.009	0.13	0.198	0.025	2419	121	1493	45	2812	206	53	1498	91	0.00	0.376							
mr05a12	4.152	0.129	0.261	0.007	0.41	0.102	0.001	1665	25	1497	34	1656	20	90	1611	49	0.00	0.490							
mr05a21	3.886	0.127	0.266	0.005	0.28	0.102	0.001	1611	26	1522	25	1659	19	92	1559	41	0.00	0.284							
mr09a12	3.988	0.159	0.267	0.007	0.31	0.098	0.001	1632	32	1525	33	1590	20	96	1577	54	0.01	0.410							
mr05a94	3.906	0.101	0.268	0.006	0.43	0.101	0.002	1615	21	1532	31	1644	33	93	1597	41	0.00	0.086							
mr05a27	4.049	0.098	0.273	0.005	0.36	0.101	0.001	1644	20	1554	24	1647	15	94	1610	36	0.00	0.069							
mr04b78	4.078	0.091	0.273	0.006	0.50	0.101	0.001	1650	18	1557	31	1638	12	95	1643	37	0.00	0.327							
mr04b90	4.141	0.125	0.276	0.006	0.38	0.102	0.001	1662	25	1571	32	1652	18	95	1632	46	0.00	0.986							
mr05a83	4.139	0.103	0.276	0.005	0.37	0.103	0.001	1662	20	1573	26	1676	13	94	1631	38	0.00	0.617							
mr05a58	4.051	0.092	0.278	0.005	0.40	0.100	0.001	1645	18	1582	25	1629	14	97	1627	35	0.01	0.648							
mr05a14	4.224	0.083	0.279	0.005	0.46	0.101	0.001	1679	16	1586	25	1651	12	96	1664	32	0.00	0.527							
mr04b38	4.301	0.116	0.283	0.006	0.42	0.102	0.001	1694	22	1604	32	1656	13	97	1673	43	0.00	0.685							
mr04b46	4.898	0.237	0.286	0.009	0.32	0.128	0.002	1802	41	1622	45	2069	28	78	1713	72	0.00	1.076							
mr09a30	4.618	0.163	0.287	0.007	0.36	0.107	0.001	1753	29	1626	36	1748	15	93	1705	54	0.00	0.510							
mr09a33	3.762	0.154	0.297	0.007	0.29	0.092	0.002	1585	33	1679	35	1474	31	114	1624	54	0.02	0.803							
mr04b91	5.237	0.117	0.316	0.007	0.49	0.111	0.001	1859	19	1772	33	1819	11	97	1853	38	0.00	0.108							
mr04b13	5.587	0.109	0.327	0.005	0.43	0.114	0.001	1914	17	1822	27	1862	14	98	1899	33	0.00	0.530							
mr05a16	9.547	0.348	0.352	0.012	0.48	0.180	0.001	2392	34	1944	58	2649	13	73	2332	70	0.00	0.521							
mr05a32	11.294	0.365	0.444	0.013	0.45	0.177	0.002	2548	30	2368	58	2624	21	90	2538	61	0.00	1.021							
mr05a17	12.225	0.287	0.484	0.010	0.44	0.166	0.002	2622	22	2544	43	2520	17	101	2618	44	0.04	0.423							
mr09a35	0.549	0.094	0.063	0.006	0.28	0.061	0.001	444	62	396	37	648	46	61	405	71	0.45	0.328	396	37					
mr05a47	0.513	0.066	0.064	0.006	0.36	0.055	0.001	421	44	398	35	412	23	97	406	64	0.63	0.566	398	35					
mr09a39	0.489	0.024	0.064	0.002	0.26	0.054	0.001	404	16	402	10	359	25	112	402	18	0.86	0.989	402	10					
mr05a133	0.518	0.094	0.065	0.006	0.26	0.055	0.001	424	63	405	37	417	45	97	408	71	0.76	0.551	405	37					
mr09a34	0.473	0.020	0.065	0.002	0.31	0.052	0.001	393	13	406	10	288	54	141	402	18	0.35	0.273	406	10					
mr04b29	0.530	0.016	0.066	0.001	0.31	0.055	0.001	432	11	414	8	398	22	104	419	14	0.11	0.689	414	8			486.35	0.47	
mr05a118	0.519	0.058	0.066	0.003	0.23	0.059	0.001	425	39	414	21	568	30	73	416	40	0.79	0.807	414	21					
mr09a38	0.391	0.099	0.067	0.005	0.15	0.058	0.002	335	72	417	31	544	67	77	407	59	0.25	0.548	417	31					
mr09a11	0.498	0.094	0.067	0.005	0.21	0.054	0.001	411	64	419	32	373	39	112	418	62	0.89	1.280	419	32					
mr09a19	0.536	0.043	0.067	0.003	0.27	0.056	0.001	436	29	420	17	450	28	93	423	33	0.59	0.327	420	17					
mr09a10	0.528	0.039	0.067	0.003	0.27	0.054	0.001	430	26	420	17	383	30	110	422	31	0.70	0.523	420	17					
mr04b12	0.571	0.029	0.068	0.002	0.34	0.057	0.001	458	19	425	14	485	27	88	434	26	0.09	0.715	425	14					
mr04b59	0.523	0.027	0.069	0.002	0.30	0.056	0.001	427	18	432	13	452	42	95	430	23	0.82	1.233	432	13					
mr04b73	0.484	0.032	0.070	0.002	0.26	0.053	0.001	401	22	438	15	327	41	134	428	27	0.10	0.623	438	15					
mr04b10	0.552	0.028	0.070	0.002	0.22	0.058	0.001	446	18	438	10	548	25	80	439	18	0.67	0.965	438	10					
mr04b14	0.604	0.033	0.070	0.002	0.33	0.060	0.001	479	21	439	15	606	33	72	449	28	0.06	0.833	439	15					
mr05a146	0.530	0.033	0.070	0.002	0.27	0.055	0.001	432	22	439	14	418	42	105	437	26	0.74	0.369	439	14					
mr05a130	0.540	0.034	0.071	0.003	0.32	0.056	0.001	438	23	439	17	470	26	93	439	31	0.96	0.207	439	17					
mr05a46	0.510	0.019	0.071	0.001	0.27	0.054	0.001	419	13	440	9	358	24	123	435	16	0.11	0.465	440	9					
mr05a139	0.567	0.033	0.071	0.003	0.34	0.058	0.001	456	21	441	17	531	27	83	446	30	0.49	0.537	441	17					
mr05a37	0.597	0.038	0.071	0.002	0.24	0.055	0.001	476	24	442	13	424	39	104	447	25	0.17	0.919	442	13					
mr05a63	0.565	0.017	0.071	0.001	0.29	0.056	0.001	455	11	443	8	464	28	95	446	14	0.32	0.868	443	8					
mr05a113	0.562	0.042	0.072	0.003	0.27	0.057	0.001	453	27	446	17	494	29	90	448	32	0.82	0.586	446	17					
mr04b94	0.573	0.027	0.073	0.002	0.33	0.056	0.001	460	18	453	14	458	30	99	455	25	0.68	0.659	453	14					
mr04b40	0.603	0.030	0.073	0.002	0.32	0.058	0.001	479	19	454	14	517	33	88	461	25	0.21	0.646	454	14					
mr05a87	0.583	0.018	0.074	0.001	0.33	0.056	0.001	466	11	458	9	436	21	105	460	16	0.45	0.620	458	9					
mr09a15	0.604	0.116	0.074	0.006	0.21	0.063	0.001	480	73	463	37	709	44	65	465	70	0.82	0.713	463	37					
mr05a57	0.595	0.022	0.075	0.001	0.26	0.056	0.001	474	14	465	9	461	27	101	467	16	0.54	0.672	465	9					
mr04b75	0.608	0.025	0.076	0.002	0.25	0.057	0.001	483	16	471	9	486	26	97	473	18	0.46	0.507	471	9					
mr05a67	0.607	0.049	0.076	0.003	0.21	0.056	0.001	482	31	471	15	452	46	104	472	29	0.74	0.600	471	15					
mr04b35	0.641	0.023	0.076	0.002	0.34	0.057	0.001	503	14	474	11	494	22	96	483	21	0.05	0.474	474	11					
mr05a106	0.641	0.031	0.076	0.003	0.36	0.057	0.000	503	19	474	16	483	16	98	484	28	0.16	0.241	474	16					
mr05a119	0.623	0.078	0.076	0.004	0.21	0.065	0.001	492	49	474	24	783	45	61	476	46	0.72	0.486	474	24					
mr04b28	0.649	0.027	0.076	0.002	0.32	0.061	0.001	508	17	475	12	648	37	73	484	22	0.06	0.755	475	12					
mr05a108	0.559	0.047	0.077	0.003	0.26	0.056	0.004	451	31	478	20	444	177	108	471	37	0.41	0.811	478	20					
mr05a124	0.535	0.106	0.077	0.007	0.22	0.055	0.001	435	70	478	40	417	42	115	469	75	0.55	0.275	478	40					
mr05a70	0.582	0.045	0.078	0.004	0.29	0.054	0.001	466	29	481	21	356	47	135	477	38	0.60	0.789	481	21					
mr05a110	0.652	0.048	0.082	0.003	0.23	0.059	0.001	510	29	511	17	575	41	89	510	31	0.98	0.778	511	17					
mr04b79	0.603	0.034	0.084	0.003	0.27	0.053	0.001	479	22	517	15	341	35	152	506	27	0.09	0.663	517	15					
mr05a116	0.783	0.056	0.086	0.006	0.49	0.057	0.001	587	32	531	35	495	37	107	564	58	0.10	0.475	531	35					
mr05a91	0.673	0.079	0.088	0.005	0.22	0.058	0.001	523	48	545	27	517	42	105	540	51	0.66	0.757	545	27					
mr04b62	0.748	0.052	0.090	0.005	0.38	0.057	0.001	567	30	556	28	478	39	116	561	48	0.75	0.609	556	28					
mr04b34	0.731	0.040	0.094	0.002	0.23	0.056	0.001	557	24	581	14	437	30	133	576	26	0.32	0.727	581	14					
mr05a62	0.879	0.029	0.103	0.002	0.30	0.061	0.001	641	16	629	12	626	22	101	633	22	0.50	0.127	629	12					
mr04b96	0.861	0.035	0.103	0.003	0.30	0.060	0.001	631	19	631	15	588	43	107	631	26	0.99	0.435	631	15					
mr05a69	0.892	0.042	0.108	0.003	0.26	0.066	0.001	648	22	660	15	801	35	82	657	28	0.59	0.394	660	15					
mr05a78	0.940	0.050	0.114	0.004	0.33	0.064	0.001	673	26	693	24	742	45	93	685	40	0.48	0.605	693	24					
mr04b63	1.025	0.028	0.114	0.002	0.38	0.063	0.001	716	14	695	14	697	25	100	705	23	0.17	0.427	695	14					
mr05a127	1.146	0.200	0.124	0.015	0.36	0.068	0.001	775	94	756	89	873	23	87	764	151	0.85	0.184	756	89					
mr05a105	1.289	0.163	0.139	0.008	0.23	0.067	0.001	841	72	840	46	838	40	100	840	84	0.99	0.472	838	40					
mr04b95	1.445	0.065	0.147	0.006	0.47	0.070	0.001	908	27	883	35	923	24	96	901	52	0.45	0.354	923	24					
mr04b82	1.454	0.055	0.148	0.004	0.35	0.065	0.001	912	23	890	22	779	28	114	900	37	0.41	0.681	779	28					
mr04b33	1.610	0.105	0.154	0.005	0.25	0.074	0.001	974	41	926	28	1030	19	90	938	52	0.27	1.095	1030	19					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	Rho	^{207}Pb/ ^{206}Pb	±1σ	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/^{2} ^{38}U	±1σ	^{207}Pb/ ^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238} U	±2σ	notes
mr05a147	1.692	0.431	0.155	0.023	0.29	0.082	0.001	1005	163	927	126	1237	25	75	950	228	0.66	0.209	1237	25					
mr04b09	1.688	0.073	0.163	0.004	0.27	0.076	0.001	1004	28	973	21	1102	26	88	983	37	0.30	0.787	1102	26					
mr05a13	1.686	0.065	0.164	0.004	0.29	0.073	0.001	1003	25	978	20	1003	30	97	987	35	0.35	0.323	1003	30					
mr05a23	1.594	0.174	0.164	0.008	0.22	0.071	0.001	968	68	978	44	965	37	101	976	81	0.88	1.396	965	37					
mr05a81	1.661	0.056	0.165	0.004	0.32	0.073	0.001	994	21	986	20	1010	25	98	990	33	0.74	0.318	1010	25					
mr05a80	1.643	0.059	0.166	0.004	0.31	0.071	0.001	987	23	988	20	964	27	102	987	34	0.98	0.359	964	27					
mr09a18	1.537	0.131	0.167	0.005	0.16	0.079	0.002	945	52	997	26	1164	41	86	989	49	0.33	0.491	1164	41					
mr04b39	1.779	0.065	0.168	0.004	0.33	0.072	0.001	1038	24	1002	23	987	23	101	1018	38	0.18	0.342	987	23					
mr05a39	1.664	0.065	0.169	0.005	0.38	0.072	0.001	995	25	1006	28	981	32	103	1000	43	0.70	0.287	981	32					
mr05a31	1.832	0.104	0.174	0.009	0.46	0.076	0.002	1057	37	1036	50	1101	42	94	1052	71	0.65	0.571	1101	42					
mr05a79	1.699	0.079	0.177	0.005	0.28	0.073	0.001	1008	30	1049	26	1009	29	104	1032	44	0.22	0.605	1009	29					
mr05a89	1.873	0.046	0.179	0.003	0.35	0.075	0.001	1071	16	1061	16	1071	22	99	1066	27	0.56	0.272	1071	22					
mr09a29	1.849	0.247	0.180	0.011	0.24	0.075	0.003	1063	88	1065	62	1079	79	99	1065	112	0.98	12.698	1079	79					
mr05a51	2.002	0.079	0.180	0.005	0.36	0.076	0.001	1116	27	1068	28	1099	25	97	1093	45	0.12	0.566	1099	25					
mr04b68	2.027	0.098	0.180	0.004	0.24	0.079	0.001	1125	33	1069	23	1171	34	91	1084	42	0.12	0.624	1171	34					
mr04b57	1.923	0.064	0.182	0.004	0.33	0.075	0.001	1089	22	1077	22	1070	25	101	1083	36	0.63	0.386	1070	25					
mr05a135	1.854	0.090	0.183	0.005	0.28	0.079	0.001	1065	32	1081	27	1161	27	93	1075	47	0.65	0.344	1161	27					
mr04b53	2.050	0.079	0.185	0.005	0.34	0.074	0.001	1132	26	1093	27	1050	23	104	1112	44	0.20	1.003	1050	23					
mr05a144	2.107	0.105	0.186	0.006	0.34	0.082	0.001	1151	34	1102	35	1247	21	88	1126	57	0.22	0.417	1247	21					
mr04b23	2.117	0.080	0.188	0.005	0.33	0.081	0.001	1154	26	1110	25	1229	32	90	1130	42	0.14	0.295	1229	32					
mr05a42	2.130	0.055	0.193	0.004	0.39	0.078	0.001	1158	18	1139	21	1152	16	99	1151	32	0.36	0.077	1152	16					
mr05a41	2.284	0.149	0.199	0.009	0.34	0.084	0.001	1207	46	1167	48	1286	23	91	1188	78	0.46	0.178	1286	23					
mr04b24	2.294	0.064	0.199	0.003	0.30	0.081	0.001	1210	20	1170	18	1231	25	95	1187	31	0.07	0.380	1231	25					
mr05a40	2.067	0.068	0.200	0.004	0.28	0.079	0.001	1138	22	1177	20	1163	25	101	1161	33	0.12	0.595	1163	25					
mr05a30	2.425	0.124	0.202	0.006	0.29	0.087	0.001	1250	37	1189	32	1355	17	88	1212	55	0.14	0.284	1355	17					
mr09a22	2.679	0.534	0.203	0.029	0.36	0.089	0.001	1323	147	1189	157	1397	18	85	1256	258	0.44	0.080	1397	18					
mr09a24	2.329	0.186	0.204	0.009	0.29	0.080	0.001	1221	57	1198	51	1204	36	100	1208	86	0.72	0.379	1204	36					
mr05a128	2.332	0.177	0.211	0.008	0.24	0.088	0.002	1222	54	1236	42	1380	35	90	1231	73	0.81	1.003	1380	35					
mr04b18	2.552	0.088	0.215	0.004	0.29	0.083	0.001	1287	25	1254	23	1275	19	98	1268	39	0.25	0.303	1275	19					
mr04b72	2.632	0.121	0.215	0.007	0.35	0.085	0.001	1310	34	1257	37	1312	26	96	1286	58	0.19	0.805	1312	26					
mr04b67	2.785	0.112	0.229	0.006	0.32	0.085	0.001	1352	30	1330	31	1312	23	101	1341	50	0.55	0.487	1312	23					
mr09a08	2.745	0.204	0.235	0.007	0.20	0.105	0.003	1341	55	1362	36	1714	53	79	1356	66	0.73	0.313	1714	53					
mr09a31	2.945	0.165	0.236	0.007	0.26	0.091	0.001	1394	43	1365	36	1438	26	95	1376	62	0.55	0.467	1438	26					
mr05a56	2.971	0.088	0.237	0.005	0.35	0.093	0.001	1400	23	1372	25	1497	27	92	1389	39	0.30	0.652	1497	27					
mr05a107	3.247	0.294	0.239	0.019	0.44	0.088	0.001	1469	70	1384	99	1387	14	100	1448	136	0.36	0.378	1387	14					
mr05a126	3.472	0.388	0.243	0.018	0.33	0.108	0.001	1521	88	1400	93	1760	16	80	1460	152	0.26	0.999	1760	16					
mr05a92	3.204	0.114	0.243	0.009	0.50	0.095	0.001	1458	28	1401	45	1531	24	92	1452	55	0.14	0.927	1531	24					
mr09a13	3.161	0.145	0.244	0.006	0.26	0.091	0.001	1448	35	1408	30	1448	19	97	1424	52	0.33	0.029	1448	19					
mr05a138	3.166	0.201	0.244	0.010	0.31	0.096	0.001	1449	49	1409	50	1548	23	91	1429	81	0.49	1.167	1548	23					
mr05a141	3.304	0.123	0.245	0.007	0.38	0.095	0.001	1482	29	1412	35	1525	20	93	1456	53	0.06	0.632	1525	20					
mr05a49	3.058	0.093	0.246	0.004	0.25	0.090	0.002	1422	23	1418	19	1420	41	100	1420	33	0.87	0.612	1420	41					
mr04b49	3.195	0.077	0.251	0.006	0.46	0.085	0.001	1456	19	1444	29	1312	17	110	1454	37	0.64	0.325	1312	17					
mr04b60	3.396	0.121	0.253	0.007	0.38	0.092	0.001	1503	28	1453	36	1475	17	99	1487	52	0.16	0.362	1475	17					
mr05a43	3.443	0.171	0.253	0.006	0.23	0.095	0.005	1514	39	1455	29	1535	107	95	1473	52	0.18	0.297	1535	107					
mr05a109	3.336	0.213	0.256	0.010	0.31	0.093	0.001	1490	50	1467	51	1480	21	99	1479	82	0.71	0.249	1480	21					
mr05a33	3.352	0.114	0.257	0.006	0.36	0.093	0.001	1493	27	1473	32	1494	17	99	1486	48	0.55	1.014	1494	17					
mr04b11	3.447	0.091	0.258	0.006	0.41	0.090	0.000	1515	21	1482	29	1431	10	104	1507	39	0.23	0.076	1431	10					
mr04b58	3.530	0.098	0.262	0.005	0.34	0.092	0.001	1534	22	1499	26	1462	15	102	1520	39	0.20	0.344	1462	15					
mr05a76	3.550	0.068	0.264	0.005	0.51	0.093	0.001	1538	15	1512	26	1478	12	102	1537	30	0.23	0.347	1478	12					
mr05a117	3.816	0.166	0.266	0.010	0.42	0.096	0.001	1596	35	1521	50	1540	15	99	1578	68	0.11	0.307	1540	15					
mr05a53	3.551	0.082	0.268	0.005	0.38	0.093	0.001	1539	18	1529	24	1490	16	103	1536	34	0.69	0.310	1490	16					
mr05a145	3.569	0.158	0.269	0.007	0.31	0.099	0.001	1543	35	1536	38	1609	18	95	1540	59	0.87	0.239	1609	18					
mr04b83	3.907	0.141	0.272	0.006	0.30	0.102	0.001	1615	29	1550	30	1667	21	93	1583	49	0.06	0.952	1667	21					
mr05a61	3.520	0.078	0.275	0.005	0.41	0.091	0.001	1532	17	1567	25	1452	14	108	1539	33	0.14	0.211	1452	14					
mr05a140	3.947	0.131	0.278	0.007	0.37	0.102	0.001	1623	27	1579	34	1669	17	95	1609	50	0.20	0.300	1669	17					
mr05a36	3.832	0.120	0.279	0.005	0.29	0.101	0.001	1599	25	1585	25	1650	18	96	1592	40	0.63	0.820	1650	18					
mr09a09	4.555	0.364	0.285	0.014	0.31	0.105	0.001	1741	66	1616	71	1716	22	94	1680	114	0.13	1.037	1716	22					
mr05a129	4.115	0.175	0.286	0.009	0.36	0.104	0.001	1657	35	1623	44	1695	18	96	1646	64	0.45	1.187	1695	18					
mr04b08	4.160	0.120	0.287	0.006	0.34	0.094	0.001	1666	24	1628	28	1517	21	107	1652	42	0.20	0.352	1517	21					
mr05a115	4.458	0.223	0.289	0.012	0.40	0.102	0.001	1723	41	1637	58	1666	16	98	1701	80	0.12	0.524	1666	16					
mr05a123	4.237	0.160	0.289	0.010	0.46	0.099	0.001	1681	31	1637	50	1609	17	102	1675	61	0.32	0.595	1609	17					
mr09a32	4.255	0.183	0.289	0.008	0.30	0.103	0.001	1685	35	1639	38	1670	23	98	1663	60	0.29	0.301	1670	23					
mr05a38	4.321	0.160	0.290	0.006	0.29	0.109	0.001	1697	31	1644	31	1785	25	92	1671	50	0.15	0.997	1785	25					
mr05a68	4.115	0.068	0.291	0.004	0.42	0.099	0.001	1657	14	1646	20	1614	12	102	1655	26	0.56	0.402	1614	12					
mr05a59	4.154	0.097	0.293	0.005	0.38	0.098	0.001	1665	19	1657	26	1595	15	104	1663	36	0.76	0.999	1595	15					
mr04b84	4.432	0.194	0.295	0.008	0.29	0.107	0.001	1718	36	1665	38	1756	23	95	1692	60	0.23	0.913	1756	23					
mr05a104	4.506	0.242	0.295	0.011	0.35	0.104	0.001	1732	45	1666	55	1704	18	98	1708	81	0.25	0.491	1704	18					
mr05a134	4.178	0.371	0.299	0.017	0.32	0.101	0.001	1670	73	1685	83	1643	16	103	1676	125	0.86	0.198	1643	16					
mr05a48	4.754	0.226	0.305	0.007	0.24	0.108	0.006	1777	40	1714	35	1769	101	97	1738	59	0.18	0.875	1769	101					
mr09a25	4.702	0.158	0.305	0.006	0.31	0.103	0.001	1768	28	1716	31	1688	16	102	1745	48	0.15	0.665	1688	16					
mr05a73	4.582	0.185	0.308	0.010	0.40	0.106	0.001	1746	34	1732	49	1732	16	100	1743	64	0.77	0.735	1732	16					
mr05a136	4.709	0.382	0.309	0.018	0.37	0.109	0.001	1769	68	1733	91	1777	17	98	1759	127	0.70	0.410	1777	17					
mr05a103	4.170	0.265	0.309	0.011	0.29	0.100	0.002	1668	52	1734	55	1629	36	106	1697	85	0.30	2.027	1629	36					
mr05a71	4.668	0.073	0.312	0.004	0.43	0.105	0.001	1761	13	1749	21	1709	10	102	1759	26	0.50	0.129	1709	10					
mr09a14	4.593	0.223	0.314	0.009	0.29	0.107	0.002	1748	41	1758	43	1754	30	100	1753	67	0.84	0.610	1754	30					
mr05a15	5.324	0.121	0.328	0.006	0.39	0.112	0.001	1873	19	1828	28	1826	16	100	1862	37	0.10	0.293	1826	16					
mr04b22	9.897	0.163	0.462	0.006	0.41	0.145	0.001	2425	15	2449	28	2285	11	107	2427	30	0.36	0.995	2285	11					
mr04b51	13.868	0.409	0.522	0.014	0.46	0.186	0.002	2741	28	2706	60	2708	18	100	2740	56	0.51	1.773	2708	18					
mr05a60	13.999	0.431	0.527	0.015	0.46	0.188	0.002	2750	29	2727	63	2729	16	100	2750	58	0.69	0.615	2729	16					
mr05a93	14.782	0.348	0.540	0.012	0.46	0.196	0.002	2801	22	2784	49	2791	16	100	2801	45	0.69	1.198	2791	16					
Oakdale Formation (KSOKI)																									
mr16b63	0.555	0.022	0.065	0.002	0.31	0.058	0.001	449	14	408	10	522	38	78	417	18	0.01	0.828							
mr16b80	0.542	0.017	0.067	0.002	0.42	0.054	0.001	440	11	416	11	382	28	109	427	18	0.04	0.464							
mr16a39	0.375	0.031	0.067	0.003	0.25	0.048	0.001	323	23	419	17	79	52	527	387	29	0.00	1.203							
mr16b76	0.580	0.025	0.068	0.002	0.37	0.056	0.001	464	16	425	13	449	35	95	438	23	0.02	0.131							
mr16b93	0.693	0.023	0.068	0.002	0.43	0.062	0.001	535	14	426	12	664	34	64	459	22	0.00	0.475							
mr12c12	0.454	0.036	0.070	0.002	0.19	0.056	0.001	380	25	434	12	456	50	95	425	24	0.04	0.417							
mr16b94	0.647	0.031	0.070	0.002	0.28	0.064	0.001	507	19	436	11	736	37	59	447	21	0.00	0.201							
mr16a22	0.687	0.036	0.071	0.003	0.43	0.063	0.001	531	21	440	19	713	32	62	471	34	0.00	0.124							
mr16b71	0.609	0.021	0.072	0.001	0.29	0.060	0.001	483	13	450	9	592	29	76	457	17	0.02	0.391							
mr12c11	0.630	0.033	0.073	0.002	0.28	0.061	0.001	496	20	452	13	630	38	72	460	24	0.03	0.347							
mr16b101	0.739	0.048	0.073	0.003	0.34	0.071	0.002	562	28	455	19	966	46	47	477	37	0.00	0.883							
mr16b99	0.632	0.022	0.073	0.002	0.40	0.055	0.001	497	14	455	12	396	32	115	471	21	0.00	0.097							
mr12c34	0.630	0.021	0.073	0.001	0.30	0.059	0.001	496	13	456	9	560	28	82	465	17	0.00	0.103							
mr16b102	0.725	0.055	0.073	0.005	0.47	0.058	0.001	554	32	457	31	547	54	84	497	56	0.00	0.333							
mr16b120	0.476	0.038	0.074	0.003	0.23	0.052	0.001	395	26	461	17	292	46	158	444	31	0.02	0.297							

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
mr16a10	0.676	0.022	0.074	0.002	0.41	0.059	0.001	524	13	463	12	571	30	81	486	21	0.00	0.195							
mr16b42	0.675	0.036	0.074	0.003	0.35	0.068	0.002	523	22	463	16	864	53	54	479	30	0.01	0.872							
mr16b34	0.725	0.051	0.075	0.003	0.30	0.065	0.002	554	30	465	19	774	57	60	481	36	0.00	0.977							
mr16a32	0.505	0.018	0.075	0.002	0.30	0.047	0.001	415	12	467	10	71	34	655	448	17	0.00	0.166							
mr16a07	0.747	0.047	0.075	0.002	0.26	0.078	0.001	566	27	467	15	1146	35	41	479	28	0.00	0.764							
mr16a23	0.486	0.026	0.078	0.003	0.35	0.049	0.001	402	18	482	17	136	37	354	442	28	0.00	0.369							
mr16b31	0.667	0.020	0.078	0.002	0.40	0.058	0.001	519	12	485	11	522	29	93	499	20	0.01	0.670							
mr16b07	0.759	0.038	0.081	0.003	0.36	0.065	0.002	574	22	499	17	776	54	64	521	32	0.00	0.350							
mr16b29	0.738	0.025	0.084	0.002	0.38	0.061	0.001	561	14	521	13	639	30	81	536	22	0.01	0.127							
mr16b92	0.828	0.032	0.085	0.004	0.58	0.063	0.001	613	18	526	22	705	27	75	590	34	0.00	0.241							
mr16a13	0.884	0.029	0.089	0.003	0.55	0.065	0.001	643	16	548	19	766	25	71	612	30	0.00	0.116							
mr16b65	0.887	0.033	0.096	0.003	0.39	0.062	0.001	645	18	591	16	669	29	88	612	29	0.00	0.548							
mr16b62	1.028	0.050	0.099	0.003	0.31	0.076	0.001	718	25	609	18	1085	23	56	632	33	0.00	0.291							
mr16b84	1.137	0.040	0.102	0.004	0.53	0.070	0.001	771	19	627	22	938	29	67	715	36	0.00	0.172							
mr16b27	1.051	0.048	0.105	0.003	0.32	0.070	0.001	730	24	643	18	927	42	69	666	33	0.00	0.400							
mr16b21	1.072	0.054	0.108	0.004	0.41	0.066	0.001	740	26	663	26	813	46	82	698	45	0.01	0.532							
mr12c17	1.264	0.070	0.117	0.005	0.37	0.073	0.001	830	31	713	28	1018	24	70	753	49	0.00	0.047							
mr16c18	0.838	0.062	0.149	0.007	0.31	0.055	0.002	618	34	896	39	416	80	215	715	56	0.00	1.144							
mr16b14	1.855	0.060	0.155	0.004	0.41	0.076	0.001	1065	21	931	23	1108	29	84	999	38	0.00	0.169							
mr16a37	1.821	0.071	0.163	0.006	0.48	0.072	0.001	1053	26	976	34	991	21	98	1032	49	0.01	0.443							
mr16b82	1.874	0.048	0.165	0.003	0.36	0.078	0.001	1072	17	984	17	1146	21	86	1025	29	0.00	1.093							
mr16b13	1.898	0.048	0.172	0.003	0.36	0.073	0.001	1080	17	1023	17	1020	21	100	1051	29	0.00	0.100							
mr12c10	2.125	0.076	0.186	0.005	0.36	0.079	0.001	1157	25	1098	26	1171	24	94	1129	43	0.04	0.366							
mr16b19	2.331	0.109	0.188	0.007	0.41	0.081	0.001	1222	33	1112	39	1227	33	91	1177	61	0.01	0.515							
mr16b51	2.477	0.076	0.192	0.005	0.39	0.086	0.001	1265	22	1134	25	1332	18	85	1206	40	0.00	0.174							
mr16a14	2.761	0.202	0.195	0.012	0.42	0.097	0.001	1345	55	1149	65	1569	19	73	1262	104	0.00	0.371							
mr16b39	2.348	0.064	0.196	0.004	0.36	0.081	0.001	1227	20	1152	21	1232	21	94	1192	34	0.00	0.501							
mr12c31	4.342	0.488	0.203	0.016	0.34	0.150	0.002	1701	93	1190	84	2350	26	51	1285	160	0.00	0.236							
mr16b32	2.899	0.217	0.210	0.013	0.40	0.092	0.001	1382	57	1226	67	1475	15	83	1317	105	0.02	0.030							
mr16b41	2.788	0.095	0.210	0.005	0.38	0.092	0.001	1352	25	1228	29	1458	16	84	1298	46	0.00	0.491							
mr12c20	2.762	0.081	0.215	0.004	0.35	0.088	0.001	1345	22	1257	24	1385	20	91	1304	38	0.00	0.235							
mr16b47	2.849	0.073	0.222	0.005	0.44	0.085	0.001	1369	19	1294	26	1320	20	98	1349	37	0.00	0.556							
mr16b70	3.145	0.133	0.223	0.007	0.38	0.099	0.001	1444	33	1296	37	1605	24	81	1378	59	0.00	0.395							
mr16b69	3.406	0.161	0.224	0.008	0.39	0.100	0.001	1506	37	1305	43	1630	23	80	1416	69	0.00	0.505							
mr16b60	5.470	0.230	0.234	0.008	0.41	0.161	0.001	1896	36	1353	42	2465	15	55	1555	75	0.00	0.342							
mr16b73	3.319	0.087	0.237	0.005	0.43	0.094	0.001	1486	20	1373	28	1511	23	91	1455	40	0.00	0.594							
mr16b89	3.201	0.084	0.243	0.005	0.40	0.093	0.001	1457	20	1400	27	1484	17	94	1440	38	0.03	0.379							
mr12c23	3.782	0.159	0.253	0.008	0.40	0.103	0.002	1589	34	1453	43	1673	34	87	1542	64	0.00	0.971							
mr16b49	3.790	0.148	0.254	0.008	0.43	0.100	0.002	1591	31	1457	43	1625	33	90	1555	61	0.00	1.004							
mr16b96	3.711	0.195	0.255	0.009	0.32	0.104	0.001	1574	42	1462	44	1695	18	86	1518	72	0.03	0.681							
mr16b83	4.023	0.099	0.270	0.006	0.47	0.100	0.001	1639	20	1542	32	1617	15	95	1626	40	0.00	0.290							
mr16b75	4.152	0.163	0.272	0.007	0.34	0.105	0.002	1665	32	1550	36	1709	28	91	1614	57	0.00	0.212							
mr16b85	4.156	0.103	0.277	0.007	0.49	0.099	0.001	1665	20	1574	34	1607	15	98	1656	40	0.00	0.164							
mr16c24	3.391	0.205	0.295	0.007	0.19	0.101	0.002	1502	47	1666	34	1649	38	101	1608	58	0.00	0.212							
mr16b44	4.882	0.120	0.297	0.006	0.41	0.107	0.001	1799	21	1675	30	1745	18	96	1768	40	0.00	0.675							
mr16c09	3.713	0.208	0.314	0.010	0.29	0.099	0.002	1574	45	1759	49	1611	39	109	1646	72	0.00	1.018							
mr16a28	14.712	0.302	0.509	0.010	0.46	0.195	0.002	2797	20	2654	41	2785	14	95	2794	39	0.00	0.482							
mr16b119	0.473	0.020	0.062	0.003	0.49	0.047	0.001	393	14	389	16	61	43	637	392	25	0.78	0.530	389	16					
mr16b23	0.515	0.031	0.065	0.003	0.35	0.055	0.001	422	21	409	17	392	49	104	413	30	0.54	0.312	409	17			425.53	0.64	
mr12c44	0.543	0.048	0.066	0.002	0.20	0.065	0.002	441	31	413	14	765	50	54	416	27	0.39	0.429	413	14					
mr16b55	0.516	0.023	0.067	0.002	0.31	0.051	0.001	422	15	417	11	255	42	163	418	20	0.73	0.831	417	11					
mr12c32	0.524	0.047	0.068	0.004	0.29	0.053	0.001	428	31	424	21	349	44	121	425	40	0.90	0.326	424	21					
mr16a31	0.523	0.028	0.068	0.002	0.21	0.058	0.001	427	18	425	9	546	26	78	425	17	0.90	0.440	425	9					
mr16a33	0.522	0.033	0.068	0.002	0.24	0.058	0.001	426	22	427	12	536	27	80	427	23	0.97	1.322	427	12					
mr12c38	0.482	0.037	0.069	0.002	0.22	0.054	0.001	399	25	430	14	366	56	118	425	26	0.22	0.735	430	14					
mr16b112	0.449	0.053	0.069	0.003	0.19	0.056	0.001	376	37	432	19	439	50	98	423	35	0.14	0.320	432	19			478.68	0.78	
mr16b79	0.550	0.021	0.069	0.002	0.38	0.055	0.001	445	14	432	12	432	36	100	437	21	0.35	0.233	432	12					
mr16c12	0.494	0.049	0.070	0.003	0.20	0.059	0.001	408	33	436	17	576	47	76	432	32	0.41	0.496	436	17					
mr16a24	0.536	0.018	0.070	0.001	0.29	0.055	0.001	436	12	436	8	392	24	111	436	16	0.99	0.708	436	8			433.70	0.41	
mr16b24	0.553	0.024	0.070	0.002	0.30	0.054	0.001	447	16	438	11	390	36	112	441	21	0.60	0.094	438	11					
mr16b22	0.668	0.068	0.070	0.005	0.33	0.063	0.002	519	41	439	29	720	60	61	456	54	0.06	0.511	439	29					
mr16b125	0.522	0.041	0.070	0.003	0.28	0.054	0.001	427	27	439	19	370	36	118	435	34	0.67	0.241	439	19					
mr16b100	0.577	0.031	0.071	0.002	0.28	0.059	0.001	463	20	440	13	560	39	79	445	24	0.26	0.222	440	13					
mr16b53	0.566	0.027	0.071	0.002	0.31	0.056	0.001	455	18	440	13	467	39	94	444	23	0.42	0.391	440	13					
mr12c37	0.546	0.019	0.071	0.002	0.31	0.054	0.001	442	13	440	9	381	34	115	440	17	0.85	0.715	440	9					
mr16a18	0.614	0.036	0.072	0.003	0.34	0.060	0.001	486	23	445	17	587	28	76	456	31	0.08	0.732	445	17					
mr12c27	0.565	0.032	0.071	0.002	0.28	0.060	0.001	455	21	445	13	619	45	72	447	25	0.64	0.662	445	13					
mr16b72	0.582	0.019	0.072	0.001	0.31	0.057	0.001	466	12	446	8	488	25	91	451	16	0.10	0.415	446	8					
mr16b115	0.522	0.041	0.072	0.003	0.23	0.054	0.001	427	27	448	16	356	37	126	444	30	0.44	0.161	448	16					
mr16b86	0.558	0.026	0.072	0.002	0.25	0.056	0.001	450	17	449	10	472	34	95	449	19	0.94	0.196	449	10					
mr16c17	0.537	0.151	0.072	0.009	0.23	0.058	0.001	436	100	450	55	533	53	84	448	104	0.89	0.581	450	55					
mr16b121	0.487	0.041	0.073	0.002	0.18	0.056	0.001	403	28	452	13	468	33	96	444	26	0.08	0.072	452	13					
mr16a40	0.593	0.031	0.073	0.002	0.25	0.065	0.001	473	20	453	11	787	32	58	456	21	0.32	0.481	453	11					
mr12c14	0.614	0.026	0.073	0.002	0.31	0.057	0.001	486	16	454	11	491	39	92	462	21	0.06	0.303	454	11					
mr16b116	0.607	0.032	0.073	0.003	0.38	0.057	0.001	482	20	454	17	474	34	96	464	31	0.20	0.586	454	17					
mr12c19	0.587	0.050	0.073	0.004	0.29	0.062	0.002	469	32	454	21	667	61	68	458	40	0.66	1.336	454	21					
mr12c30	0.563	0.030	0.073	0.002	0.27	0.054	0.001	454	19	455	13	384	35	119	455	23	0.95	0.174	455	13					
mr16b95	0.553	0.020	0.073	0.002	0.33	0.052	0.001	447	13	457	11	305	36	150	453	19	0.49	0.204	457	11					
mr12c40	0.703	0.080	0.074	0.003	0.16	0.068	0.003	541	48	461	16	877	79	53	465	32	0.11	0.279	461	16					
mr12c43	0.583	0.052	0.074	0.003	0.24	0.061	0.001	467	34	461	19	622	50	74	462	36	0.86	0.487	461	19					
mr12c39	0.577	0.020	0.074	0.002	0.31	0.056	0.001	463	13	461	10	455	31	101	462	18	0.91	0.056	461	10					
mr16b111	0.541	0.033	0.075	0.002	0.20	0.059	0.001	439	22	465	11	578	34	80	461	21	0.26	0.123	465	11					
mr16b61	0.584	0.030	0.075	0.002	0.30	0.057	0.001	467	19	465	14	482	37	97	466	25	0.92	0.220	465	14					
mr16a29	0.585	0.062	0.075	0.004	0.27	0.061	0.001	468	40	465	25	626	32	74	466	47	0.95	0.162	465	25					
mr16b64	0.597	0.063	0.075	0.003	0.19	0.068	0.002	476	40	467	18	881	46	53	468	35	0.83	0.159	467	18					
mr16b103	0.595	0.028	0.075	0.002	0.33	0.055	0.001	474	18	468	14	393	40	119	470	25	0.73	0.851	468	14					
mr16b12	0.594	0.053	0.075	0.003	0.23	0.057	0.001	474	34	468	18	474	50	99	469	35	0.87	0.601	468	18					
mr12c42	0.590	0.037	0.075	0.002	0.22	0.065	0.002	471	24	468	12	779	51	60	469	24	0.91	0.130	468	12					
mr16a12	0.544	0.029	0.076	0.003	0.36	0.056	0.001	441	19	470	17	457	31	103	457	29	0.16	0.280	470	17					
mr16a30	0.540	0.052	0.076	0.002	0.14	0.061	0.002	438	34	471	12	657	52	72	469	24	0.34	0.261	471	12					
mr16b17	0.619	0.027	0.076	0.002	0.24	0.055	0.001	489	17	473	9	415	41	114	475	18	0.35	0.153	473	9					
mr16b38	0.577	0.029	0.076	0.002	0.23	0.058	0.001	463	18	473	10	543	41	87	471	20	0.58	0.415	473	10					
mr16a17	0.617	0.112	0.077	0.003	0.12	0.056	0.001	488	71	480	20	469	42	102	481	39	0.91	0.316	480	20					
mr16a11	0.601	0.056	0.079	0.002	0.14	0.066	0.002	478	35	488	12	805	52	61	487	24	0.78	0.307	488	12					
mr16b81	0.669	0.025	0.080	0.002	0.33	0.058	0.001	520	15	495	12	536	28	92	503	22	0.13	0.373	495	12					
mr16a19	0.621	0.024	0.081	0.002	0.33	0.053	0.001	491	15	501	12	344	26	146	498	21	0.50	0.107	501	12					
mr16b114	0.645	0.097	0.081	0.006	0.23	0.065	0.001	505	60	501	33	777	34	64	502	63	0.95	0.023	501	33					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	Rho	^{207}Pb/ ^{206}Pb	±1σ	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/^{2} ^{38}U	±1σ	^{207}Pb/ ^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238} U	±2σ	notes
mr12c18	0.678	0.037	0.082	0.003	0.30	0.055	0.001	526	22	510	16	429	44	119	515	30	0.51	0.516	510	16					
mr16a20	0.656	0.027	0.082	0.002	0.35	0.058	0.001	512	17	511	15	532	38	96	511	26	0.95	0.761	511	15					
mr16c08	0.539	0.079	0.084	0.005	0.21	0.055	0.001	438	52	517	31	418	55	124	499	58	0.14	0.525	517	31					
mr16b40	0.738	0.037	0.084	0.003	0.38	0.060	0.002	561	21	523	19	616	55	85	538	34	0.09	0.788	523	19					
mr16b91	0.771	0.055	0.086	0.004	0.34	0.064	0.001	581	31	531	25	757	29	70	546	45	0.13	0.149	531	25					
mr16a38	0.715	0.034	0.088	0.003	0.36	0.054	0.001	548	20	544	18	375	37	145	546	31	0.86	0.482	544	18					
mr16b28	0.728	0.047	0.089	0.003	0.27	0.062	0.001	555	28	551	18	686	44	80	552	34	0.89	0.479	551	18					
mr16b18	0.727	0.040	0.090	0.002	0.19	0.059	0.001	555	23	553	11	584	34	95	553	21	0.93	0.769	553	11					
mr16b59	0.804	0.036	0.090	0.003	0.36	0.061	0.001	599	20	557	17	631	25	88	572	31	0.05	0.507	557	17					
mr16b10	0.836	0.057	0.094	0.003	0.25	0.066	0.001	617	31	581	19	791	47	73	587	36	0.27	0.197	581	19					
mr16b66	0.848	0.036	0.096	0.002	0.27	0.065	0.001	624	20	594	13	779	31	76	601	25	0.15	0.851	594	13					
mr16b123	0.954	0.293	0.097	0.017	0.28	0.092	0.001	680	152	594	98	1459	26	41	611	186	0.59	0.350	594	98					
mr16c23	0.786	0.049	0.100	0.004	0.33	0.056	0.001	589	28	613	24	463	35	132	603	42	0.42	0.029	613	24					
mr16b74	0.816	0.046	0.100	0.003	0.22	0.063	0.001	606	26	614	15	703	41	87	613	28	0.75	1.100	614	15					
mr12c29	0.857	0.054	0.102	0.003	0.23	0.058	0.001	629	30	624	17	513	44	122	625	32	0.89	0.815	624	17					
mr16b54	0.897	0.040	0.106	0.003	0.28	0.062	0.001	650	21	647	15	661	33	98	648	27	0.88	0.253	647	15					
mr16b113	0.898	0.036	0.106	0.003	0.37	0.063	0.001	651	19	649	18	698	21	93	650	31	0.92	0.242	649	18					
mr16b52	0.901	0.029	0.107	0.002	0.36	0.058	0.001	652	15	653	14	542	33	121	653	24	0.95	0.004	653	14					
mr16b20	0.959	0.047	0.112	0.004	0.39	0.058	0.001	683	24	682	24	530	56	129	683	41	0.97	0.576	682	24					
mr16b33	1.122	0.094	0.122	0.005	0.24	0.067	0.001	764	45	745	29	834	40	89	749	53	0.68	0.570	745	29					
mr12c08	1.377	0.066	0.144	0.005	0.34	0.065	0.001	879	28	869	27	790	38	110	874	45	0.76	0.306	790	38					
mr16c20	1.396	0.116	0.150	0.007	0.29	0.075	0.002	887	49	899	40	1078	43	83	895	70	0.83	0.592	1078	43					
mr16b90	1.451	0.069	0.154	0.004	0.26	0.068	0.001	910	29	922	21	878	37	105	919	38	0.70	0.203	878	37					
mr16b11	1.655	0.076	0.166	0.004	0.29	0.072	0.001	992	29	988	24	997	28	99	989	42	0.90	0.738	997	28					
mr12c33	1.722	0.079	0.171	0.004	0.27	0.074	0.001	1017	29	1019	23	1031	32	99	1018	41	0.94	0.903	1031	32					
mr16b08	2.026	0.112	0.175	0.007	0.37	0.082	0.001	1124	38	1038	39	1255	27	83	1081	65	0.05	0.254	1255	27					
mr12c13	1.921	0.069	0.179	0.004	0.33	0.076	0.001	1089	24	1062	23	1083	21	98	1074	38	0.33	0.471	1083	21					
mr16b37	2.156	0.092	0.190	0.006	0.36	0.082	0.001	1167	30	1122	32	1234	25	91	1146	51	0.19	0.641	1234	25					
mr16b30	2.142	0.095	0.192	0.005	0.27	0.077	0.001	1162	31	1132	24	1129	27	100	1142	43	0.38	0.497	1129	27					
mr16b124	2.237	0.194	0.197	0.010	0.29	0.082	0.001	1193	61	1158	54	1257	28	92	1172	92	0.62	0.646	1257	28					
mr16b122	2.221	0.133	0.198	0.007	0.29	0.085	0.001	1188	42	1162	36	1311	24	89	1172	62	0.59	0.228	1311	24					
mr16b109	2.256	0.195	0.200	0.010	0.30	0.090	0.001	1199	61	1174	56	1425	29	82	1185	95	0.72	0.192	1425	29					
mr16a34	2.197	0.171	0.203	0.006	0.18	0.081	0.002	1180	54	1189	30	1222	44	97	1187	55	0.87	0.372	1222	44					
mr12c09	2.273	0.099	0.205	0.005	0.29	0.083	0.001	1204	31	1204	27	1274	27	95	1204	46	0.99	0.636	1274	27					
mr16b58	2.612	0.182	0.206	0.007	0.24	0.093	0.001	1304	51	1209	37	1496	29	81	1235	68	0.09	0.286	1496	29					
mr12c21	2.306	0.137	0.210	0.006	0.26	0.079	0.001	1214	42	1229	34	1177	30	104	1224	59	0.75	0.337	1177	30					
mr16c21	2.599	0.131	0.211	0.009	0.40	0.088	0.001	1300	37	1234	45	1375	21	90	1277	68	0.15	0.421	1375	21					
mr16c13	2.720	0.139	0.230	0.008	0.35	0.086	0.001	1334	38	1336	44	1344	27	99	1335	66	0.97	0.981	1344	27					
mr16c25	3.088	0.177	0.252	0.009	0.30	0.097	0.002	1430	44	1451	45	1560	35	93	1439	72	0.69	0.588	1560	35					
mr16a09	3.211	0.063	0.254	0.004	0.41	0.089	0.001	1460	15	1460	21	1394	14	105	1460	29	1.00	0.499	1394	14					
mr16c19	3.043	0.225	0.259	0.011	0.28	0.095	0.002	1418	56	1483	55	1532	43	97	1451	87	0.33	0.767	1532	43					
mr16c14	3.619	0.325	0.275	0.011	0.23	0.112	0.002	1554	71	1564	57	1835	33	85	1560	98	0.90	0.507	1835	33					
mr16c10	4.054	0.262	0.283	0.012	0.34	0.106	0.001	1645	53	1605	62	1723	25	93	1629	93	0.54	0.731	1723	25					
mr12c24	3.964	0.169	0.286	0.008	0.32	0.102	0.002	1627	35	1623	39	1655	28	98	1625	59	0.93	0.728	1655	28					
mr16b110	4.116	0.194	0.291	0.008	0.31	0.110	0.002	1657	38	1649	42	1794	31	92	1654	65	0.86	0.719	1794	31					
mr16c07	4.049	0.147	0.291	0.009	0.43	0.100	0.001	1644	30	1649	45	1619	26	102	1645	57	0.91	0.302	1619	26					
mr16c22	4.261	0.254	0.299	0.011	0.30	0.110	0.001	1686	49	1687	52	1791	24	94	1686	81	0.99	0.553	1791	24					
mr16a27	4.519	0.095	0.302	0.006	0.44	0.104	0.001	1734	17	1702	28	1694	15	100	1730	34	0.21	0.665	1694	15					
mr16a21	4.600	0.137	0.311	0.006	0.34	0.106	0.001	1749	25	1744	31	1734	15	101	1747	45	0.87	0.338	1734	15					
mr16b50	4.809	0.233	0.311	0.012	0.41	0.112	0.002	1787	41	1745	61	1826	39	96	1778	79	0.47	1.233	1826	39					
mr12c07	4.454	0.146	0.315	0.006	0.31	0.098	0.001	1722	27	1766	32	1592	22	111	1739	47	0.21	0.086	1592	22					
mr16b43	4.735	0.130	0.316	0.008	0.48	0.100	0.001	1773	23	1770	41	1625	18	109	1773	46	0.93	0.349	1625	18					
mr16c11	4.740	0.173	0.317	0.010	0.42	0.105	0.001	1774	31	1773	47	1710	19	104	1774	59	0.98	0.694	1710	19					
mr16a08	4.932	0.197	0.320	0.010	0.39	0.109	0.001	1808	34	1791	48	1778	14	101	1804	64	0.72	0.296	1778	14					
mr12c41	5.033	0.235	0.334	0.011	0.35	0.108	0.002	1825	40	1857	53	1772	40	105	1834	72	0.55	1.235	1772	40					
mr16b48	6.118	0.223	0.355	0.011	0.43	0.116	0.002	1993	32	1960	53	1903	27	103	1989	63	0.50	0.753	1903	27					
mr12c28	6.756	0.300	0.383	0.011	0.34	0.125	0.002	2080	39	2090	53	2022	30	103	2083	72	0.85	0.996	2022	30					
mr16b09	14.489	0.427	0.514	0.015	0.50	0.190	0.002	2782	28	2674	64	2745	18	97	2786	56	0.05	0.385	2745	18					
Worcester Formation (KSWSI)																									
mr04a08	0.626	0.014	0.070	0.001	0.41	0.058	0.001	494	9	434	8	519	20	84	456	14	0.00	0.680							
mr03a33	0.633	0.029	0.071	0.002	0.38	0.059	0.001	498	18	443	15	558	31	79	461	27	0.00	0.720							
mr03a69	0.607	0.021	0.073	0.002	0.37	0.057	0.000	482	13	451	11	500	18	90	462	20	0.03	0.220							
mr03a50	0.624	0.020	0.073	0.002	0.37	0.057	0.001	492	13	455	11	490	23	93	468	19	0.00	0.520							
mr04a18	0.607	0.017	0.074	0.001	0.36	0.056	0.000	482	11	458	9	469	17	98	466	16	0.04	0.110							
mr03a51	0.630	0.021	0.075	0.001	0.26	0.059	0.001	496	13	466	8	552	24	84	472	15	0.03	0.520							
mr03a99	0.632	0.017	0.076	0.001	0.34	0.057	0.000	497	10	473	8	476	18	99	481	15	0.03	0.300							
mr02a57	0.542	0.023	0.078	0.002	0.26	0.055	0.001	440	15	483	10	405	25	119	472	18	0.00	0.420							
mr03a59	0.674	0.019	0.079	0.002	0.36	0.057	0.001	523	11	488	9	503	20	97	499	17	0.00	0.480							
mr04a23	0.687	0.027	0.079	0.002	0.25	0.060	0.001	531	16	493	9	605	24	81	499	18	0.02	0.820							
mr04a28	0.711	0.028	0.081	0.002	0.37	0.058	0.001	546	17	499	14	544	27	92	515	25	0.01	1.190							
mr04a32	0.710	0.020	0.081	0.002	0.33	0.060	0.000	545	12	503	9	597	18	84	515	17	0.00	0.130							
mr02a150	0.770	0.053	0.082	0.003	0.28	0.064	0.001	580	30	505	19	756	41	67	519	35	0.02	0.620							
mr02a29	0.570	0.027	0.082	0.002	0.21	0.057	0.001	458	17	506	9	478	24	106	497	18	0.01	0.100							
mr03a90	0.736	0.016	0.086	0.002	0.42	0.058	0.000	560	10	531	9	545	14	97	545	16	0.00	0.530							
mr02a60	0.634	0.023	0.086	0.002	0.28	0.056	0.001	499	14	533	10	457	21	117	523	19	0.02	0.540							
mr03a76	0.803	0.030	0.091	0.003	0.38	0.059	0.001	599	17	561	15	583	20	96	576	26	0.04	0.780							
mr04a30	0.683	0.026	0.091	0.002	0.28	0.056	0.001	529	15	563	11	469	33	120	553	20	0.03	1.270							
mr02a49	0.972	0.072	0.093	0.006	0.42	0.078	0.001	689	37	571	34	1142	25	50	613	61	0.00	1.150							
mr03a61	0.856	0.027	0.097	0.002	0.32	0.060	0.001	628	15	594	11	620	25	96	605	21	0.03	0.530							
mr03a84	0.930	0.044	0.099	0.002	0.23	0.065	0.001	668	23	609	12	768	32	79	617	24	0.01	0.630							
mr04a09	0.933	0.031	0.099	0.002	0.30	0.065	0.001	669	17	611	12	770	25	79	625	22	0.00	0.490							
mr02a13	0.643	0.070	0.102	0.003	0.13	0.058	0.001	504	43	627	17	547	41	115	612	33	0.00	0.110							
mr03a103	1.337	0.084	0.117	0.006	0.40	0.077	0.001	862	36	714	34	1131	28	63	768	60	0.00	0.730							
mr02a139	1.478	0.096	0.119	0.007	0.44	0.082	0.001	921	39	726	39	1257	34	58	805	70	0.00	0.200							
mr03a80	1.234	0.041	0.125	0.003	0.42	0.065	0.001	816	18	759	20	774	23	98	790	32	0.01	0.440							
mr02a124	2.012	0.138	0.146	0.010	0.48	0.097	0.001	1120	46	880	54	1560	15	56	1006	90	0.00	0.660							
mr03a88	1.523	0.035	0.151	0.002	0.34	0.071	0.001	940	14	906	13	957	15	95	921	23	0.03	0.650							
mr03a57	1.718	0.062	0.161	0.004	0.31	0.073	0.001	1015	23	963	20	1021	26	94	983	35	0.04	1.740							
mr02a88	1.524	0.057	0.169	0.004	0.29	0.068	0.001	940	23	1005	20	858	22	117	977	34	0.01	1.210							
mr04a12	1.860	0.061	0.169	0.004	0.33	0.075	0.001	1067	22	1005	20	1073	28	94	1031	35	0.01	0.410							
mr02a73	1.589	0.059	0.172	0.004	0.29	0.070	0.001	966	23	1023	21	931	24	110	998	35	0.03	0.620							
mr02a89	1.432	0.134	0.173	0.007	0.21	0.070	0.001	902	56	1027	38	915	35	112	989	67	0.03	0.930							
mr02a22	2.259	0.102	0.182	0.005	0.33	0.088	0.001	1200	32	1078	29	1373	31	78	1125	51	0.00	0.220							
mr02a48	2.083	0.053	0.183	0.004	0.44	0.080	0.001	1143	17	1081	22	1201	15	90	1123	33	0.00	0.330							
mr03a68	2.097	0.064	0.186	0.004	0.35	0.077	0.001	1148	21	1098	21	1113	18	99	1123	35	0.04	0.380							
mr02a47	1.728	0.083	0.187	0.006	0.31	0.073	0.001	1019	31	1107	30	1004	27	110	1062	48	0.01	0.800							

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
mr03a64	2.261	0.041	0.191	0.003	0.42	0.079	0.001	1200	13	1128	16	1171	14	96	1176	24	0.00	0.690							
mr02a37	2.194	0.066	0.191	0.005	0.40	0.080	0.001	1179	21	1128	25	1198	15	94	1159	38	0.04	0.670							
mr02a80	2.352	0.065	0.220	0.004	0.30	0.083	0.001	1228	20	1282	19	1258	24	102	1255	31	0.02	0.360							
mr03a74	3.443	0.124	0.225	0.007	0.45	0.102	0.001	1514	28	1306	38	1669	13	78	1450	56	0.00	0.540							
mr03a41	3.346	0.225	0.231	0.011	0.36	0.103	0.002	1492	53	1338	59	1679	40	80	1420	94	0.02	0.120							
mr04a10	3.143	0.059	0.231	0.004	0.45	0.091	0.001	1443	15	1341	21	1440	14	93	1420	28	0.00	0.340							
mr02a21	2.518	0.086	0.237	0.004	0.23	0.083	0.001	1277	25	1369	19	1269	20	108	1335	33	0.00	0.130							
mr02a141	3.510	0.120	0.246	0.006	0.33	0.096	0.001	1530	27	1416	29	1553	21	91	1474	47	0.00	0.430							
mr02a54	2.682	0.091	0.253	0.006	0.35	0.080	0.001	1323	25	1456	31	1192	25	122	1364	44	0.00	0.520							
mr03a81	3.897	0.074	0.268	0.004	0.40	0.096	0.001	1613	15	1532	21	1549	15	99	1591	29	0.00	0.380							
mr03a104	4.680	0.167	0.276	0.007	0.38	0.120	0.001	1764	30	1569	37	1960	15	80	1689	57	0.00	0.820							
mr04a17	4.317	0.109	0.284	0.006	0.40	0.104	0.001	1697	21	1613	29	1690	16	95	1675	40	0.00	0.550							
mr03a55	4.493	0.089	0.290	0.005	0.40	0.104	0.001	1730	16	1641	23	1702	13	96	1707	31	0.00	0.790							
mr02a34	4.568	0.113	0.299	0.006	0.38	0.110	0.001	1743	21	1687	28	1797	10	94	1728	39	0.04	0.870							
mr03a98	5.771	0.105	0.322	0.006	0.48	0.121	0.001	1942	16	1799	28	1966	9	92	1930	32	0.00	0.930							
mr02a12	5.422	0.141	0.365	0.006	0.31	0.111	0.001	1888	22	2006	28	1818	17	110	1924	39	0.00	0.560							
mr02a119	0.494	0.026	0.064	0.002	0.28	0.058	0.001	408	17	399	11	527	22	76	401	21	0.64	0.900	399	11					
mr02a114	0.502	0.022	0.066	0.002	0.26	0.059	0.001	413	15	410	9	553	26	74	410	17	0.85	0.140	410	9					
mr02a146	0.543	0.020	0.068	0.002	0.31	0.056	0.001	440	13	424	9	447	23	95	428	17	0.25	0.140	424	9					
mr02a123	0.579	0.026	0.070	0.002	0.36	0.057	0.000	464	17	434	14	480	19	90	444	25	0.09	0.190	434	14					
mr02a142	0.541	0.021	0.070	0.002	0.29	0.058	0.001	439	14	435	9	532	25	82	436	17	0.77	0.450	435	9					
mr02a117	0.491	0.025	0.070	0.003	0.40	0.055	0.001	406	17	436	17	412	39	106	420	28	0.10	0.990	436	17			486. 29	5.04	
mr03a45	0.564	0.017	0.070	0.001	0.25	0.056	0.001	454	11	439	6	448	24	98	441	12	0.18	1.050	439	6					
mr02a63	0.514	0.025	0.071	0.002	0.24	0.055	0.001	421	17	444	10	423	28	105	439	19	0.18	0.500	444	10					
mr02a122	0.580	0.042	0.072	0.004	0.40	0.055	0.001	465	27	448	25	421	25	106	455	43	0.55	0.170	448	25					
mr02a84	0.535	0.017	0.072	0.001	0.29	0.055	0.000	435	12	450	8	417	18	108	446	15	0.21	0.130	450	8					
mr03a75	0.590	0.023	0.073	0.001	0.24	0.058	0.001	471	15	453	8	515	29	88	456	16	0.24	1.370	453	8					
mr02a38	0.548	0.022	0.073	0.002	0.27	0.058	0.001	444	14	454	9	538	22	84	451	17	0.49	0.840	454	9			483.52	1.25	
mr02a99	0.602	0.028	0.073	0.003	0.40	0.057	0.001	479	18	455	16	496	21	92	465	28	0.21	0.170	455	16					
mr03a30	0.584	0.034	0.073	0.002	0.30	0.058	0.001	467	22	456	15	527	21	87	459	28	0.64	0.370	456	15					
mr02a24	0.558	0.018	0.073	0.001	0.31	0.057	0.000	450	12	456	9	494	17	92	454	16	0.67	0.080	456	9					
mr02a107	0.607	0.023	0.073	0.002	0.41	0.057	0.001	481	14	457	13	487	25	94	467	23	0.10	0.380	457	13					
mr03a85	0.595	0.019	0.074	0.001	0.27	0.057	0.001	474	12	459	8	486	31	94	462	14	0.21	0.600	459	8					
mr03a91	0.585	0.015	0.074	0.001	0.25	0.056	0.000	468	9	460	6	447	18	103	462	11	0.42	0.080	460	6					
mr03a31	0.539	0.059	0.074	0.004	0.24	0.059	0.001	438	39	460	23	558	42	82	455	43	0.59	0.810	460	23					
mr02a67	0.560	0.037	0.074	0.003	0.26	0.056	0.001	451	24	461	15	437	25	105	459	29	0.71	0.770	461	15					
mr03a86	0.571	0.024	0.074	0.001	0.24	0.055	0.001	459	15	461	9	412	33	112	461	17	0.89	0.710	461	9					
mr02a62	0.546	0.039	0.074	0.003	0.24	0.056	0.001	442	26	462	15	468	31	99	458	29	0.46	0.590	462	15					
mr04a22	0.606	0.019	0.075	0.001	0.31	0.056	0.000	481	12	465	9	453	18	103	469	16	0.19	0.210	465	9					
mr02a113	0.623	0.040	0.075	0.003	0.30	0.060	0.001	492	25	466	17	586	35	79	472	32	0.31	0.430	466	17					
mr04a21	0.597	0.022	0.075	0.002	0.28	0.055	0.001	475	14	466	9	431	27	108	469	17	0.54	0.850	466	9					
mr03a70	0.609	0.024	0.075	0.002	0.28	0.057	0.000	483	15	467	10	504	19	93	471	18	0.30	0.280	467	10					
mr03a48	0.592	0.021	0.075	0.002	0.32	0.055	0.001	472	13	468	10	406	25	115	469	19	0.76	0.620	468	10					
mr03a26	0.649	0.034	0.075	0.003	0.40	0.058	0.001	508	21	469	19	536	27	88	485	33	0.08	0.770	469	19					
mr04a19	0.582	0.024	0.075	0.001	0.24	0.056	0.001	466	15	469	9	453	27	103	468	17	0.87	1.250	469	9					
mr02a58	0.567	0.019	0.076	0.001	0.27	0.057	0.000	456	13	470	8	492	19	96	467	16	0.27	0.140	470	8					
mr03a106	0.600	0.019	0.076	0.001	0.25	0.057	0.001	477	12	472	7	487	27	97	473	14	0.65	0.620	472	7					
mr02a109	0.622	0.020	0.076	0.002	0.38	0.057	0.001	491	13	475	11	494	21	96	482	20	0.22	0.620	475	11					
mr02a90	0.569	0.029	0.076	0.001	0.18	0.056	0.001	457	19	475	8	461	28	103	473	16	0.35	0.850	475	8					
mr03a79	0.604	0.022	0.076	0.002	0.36	0.055	0.000	480	14	475	12	424	20	112	476	21	0.72	0.130	475	12					
mr02a120	0.558	0.028	0.077	0.002	0.26	0.055	0.000	450	18	476	12	432	19	110	470	22	0.16	0.120	476	12					
mr02a28	0.579	0.023	0.077	0.001	0.24	0.058	0.001	464	15	476	9	539	26	88	474	16	0.41	0.520	476	9					
mr03a24	0.605	0.058	0.077	0.004	0.29	0.058	0.001	480	37	476	26	529	24	90	477	47	0.91	0.830	476	26					
mr02a64	0.553	0.030	0.077	0.002	0.22	0.058	0.001	447	20	477	11	517	28	92	471	21	0.14	0.590	477	11					
mr02a108	0.584	0.040	0.077	0.003	0.25	0.058	0.001	467	25	477	15	536	22	89	475	29	0.71	0.680	477	15					
mr02a16	0.596	0.034	0.077	0.002	0.27	0.058	0.001	475	21	477	14	525	26	91	476	26	0.91	0.410	477	14					
mr02a140	0.770	0.123	0.077	0.004	0.17	0.076	0.001	580	70	479	25	1083	39	44	484	49	0.17	0.550	479	25					
mr02a112	0.605	0.029	0.077	0.002	0.30	0.058	0.001	481	19	480	14	534	21	90	480	25	0.95	0.130	480	14					
mr03a56	0.656	0.025	0.078	0.002	0.37	0.058	0.001	512	16	483	13	514	24	94	493	24	0.07	0.260	483	13					
mr02a77	0.599	0.024	0.078	0.002	0.27	0.057	0.001	477	15	485	10	496	26	98	483	18	0.60	0.570	485	10					
mr02a79	0.609	0.055	0.079	0.003	0.24	0.059	0.001	483	35	487	21	580	32	84	487	39	0.90	0.670	487	21					
mr02a74	0.674	0.039	0.079	0.003	0.32	0.061	0.001	523	24	491	17	652	37	75	500	32	0.19	0.490	491	17					
mr02a97	0.576	0.035	0.080	0.002	0.21	0.057	0.001	462	22	494	12	489	51	101	489	22	0.15	0.540	494	12					
mr02a100	0.599	0.024	0.080	0.002	0.33	0.055	0.001	477	15	495	13	425	22	117	488	22	0.26	0.560	495	13					
mr03a46	0.642	0.025	0.080	0.001	0.20	0.058	0.001	504	15	498	8	534	28	93	499	14	0.72	0.990	498	8					
mr04a27	0.635	0.028	0.081	0.002	0.24	0.058	0.001	499	17	500	10	518	24	97	500	19	0.97	1.120	500	10					
mr03a21	0.670	0.048	0.081	0.003	0.27	0.060	0.001	521	29	504	18	596	41	84	507	34	0.56	1.100	504	18					
mr04a24	0.625	0.021	0.082	0.001	0.25	0.055	0.001	493	13	506	8	431	29	117	503	15	0.33	0.700	506	8					
mr02a41	0.634	0.027	0.082	0.002	0.27	0.057	0.001	499	17	506	11	505	22	100	504	20	0.70	0.120	506	11					
mr02a19	0.579	0.034	0.082	0.002	0.23	0.056	0.001	464	22	508	13	465	28	109	498	24	0.05	0.770	508	13					
mr02a104	0.619	0.022	0.082	0.002	0.26	0.056	0.001	490	14	509	9	453	22	112	504	17	0.17	0.530	509	9					
mr03a78	0.658	0.122	0.083	0.007	0.25	0.062	0.001	514	75	511	45	670	30	76	512	84	0.97	0.100	511	45					
mr02a98	0.647	0.018	0.083	0.001	0.29	0.059	0.001	507	11	513	8	553	21	93	512	15	0.57	1.050	513	8					
mr02a50	0.669	0.024	0.083	0.002	0.28	0.059	0.001	520	15	513	10	549	21	93	515	18	0.65	0.150	513	10					
mr02a59	0.702	0.038	0.085	0.003	0.35	0.059	0.001	540	22	524	19	578	24	91	530	33	0.49	0.290	524	19					
mr03a107	0.699	0.028	0.085	0.002	0.23	0.056	0.001	538	17	528	9	440	29	120	530	18	0.54	0.950	528	9					
mr02a144	0.702	0.054	0.086	0.003	0.23	0.058	0.001	540	32	529	18	539	37	98	531	34	0.74	1.000	529	18					
mr02a83	0.641	0.027	0.086	0.002	0.27	0.057	0.001	503	17	530	12	500	23	106	522	21	0.12	0.480	530	12					
mr02a23	0.676	0.020	0.086	0.002	0.29	0.058	0.001	524	12	531	9	535	22	99	529	16	0.59	0.710	531	9					
mr02a20	0.652	0.037	0.087	0.002	0.18	0.065	0.001	510	23	536	11	790	29	68	532	21	0.26	0.480	536	11					
mr04a20	0.766	0.061	0.088	0.003	0.23	0.056	0.003	578	35	545	19	457	120	119	550	36	0.37	0.920	545	19					
mr02a33	0.655	0.041	0.088	0.002	0.18	0.057	0.001	512	25	546	12	482	28	113	541	23	0.19	0.480	546	12					
mr03a71	0.692	0.033	0.088	0.002	0.23	0.054	0.001	534	20	546	11	380	43	144	544	22	0.54	0.590	546	11					
mr02a81	0.706	0.034	0.089	0.003	0.30	0.057	0.001	542	20	548	15	510	22	107	546	27	0.80	0.110	548	15					
mr02a70	0.699	0.023	0.089	0.002	0.29	0.059	0.001	538	14	549	10	551	24	100	546	18	0.46	0.590	549	10					
mr03a58	0.771	0.042	0.090	0.003	0.26	0.062	0.001	580	24	557	15	658	37	85	562	28	0.35	1.050	557	15					
mr03a44	0.886	0.095	0.091	0.006	0.33	0.069	0.001	644	51	561	38	896	24	63	582	70	0.12	0.130	561	38					
mr03a95	0.762	0.041	0.092	0.003	0.27	0.060	0.001	575	24	567	16	614	36	92	569	29	0.75	0.860	567	16					
mr02a31	0.812	0.061	0.092	0.004	0.25	0.063	0.001	604	34	569	21	717	33	79	576	39	0.33	0.570	569	21					
mr02a10	0.798	0.026	0.092	0.002	0.39	0.063	0.001	596	15	570	14	702	19	81	581	24	0.11	0.510	570	14					
mr03a96	0.819	0.041	0.095	0.002	0.25	0.062	0.001	607	23	588	14	658	41	89	592	27	0.41	0.870	588	14					
mr02a121	0.997	0.111	0.096	0.004	0.19	0.085	0.001	702	56	591	24	1307	33	45	600	46	0.06	1.250	591	24					
mr03a25	0.822	0.047	0.096	0.002	0.23	0.065	0.001	609	26	592	15	762	37	78	595	28	0.54	0.610	592	15					
mr03a60	0.812	0.033	0.097	0.003	0.39	0.056	0.001	604	19	597	18	470	25	127	600	30	0.73	0.310	597	18					
mr02a43	0.886	0.043	0.099	0.004	0.42	0.068	0.001	644	23	607	23	862	31	70	625	39	0.14	1.610	607	23					
mr03a77	0.873	0.057	0.099	0.003	0.26	0.062	0.001	637	31	607	20	662	35	92	614	37	0.35	1.510	607	20					
mr03a105	0.877	0.046	0.099	0.003	0.24	0.062	0.001	640	25	610	15	677	34	90	616	28	0.26	1.950	610	15					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
mr02a42	0.745	0.053	0.101	0.003	0.22	0.058	0.001	565	31	618	19	540	34	115	606	35	0.10	0.360	618	19					
mr02a44	0.766	0.070	0.101	0.003	0.18	0.059	0.001	578	40	619	20	579	35	107	613	37	0.31	0.580	619	20					
mr03a47	1.066	0.205	0.101	0.013	0.34	0.074	0.001	737	101	620	78	1052	27	59	650	144	0.27	0.520	620	78					
mr02a09	0.854	0.036	0.102	0.003	0.29	0.061	0.001	627	20	627	15	651	22	96	627	27	0.99	0.360	627	15					
mr02a71	0.808	0.047	0.104	0.003	0.25	0.059	0.001	601	27	637	17	567	34	112	628	32	0.20	0.410	637	17					
mr04a13	0.899	0.035	0.104	0.002	0.23	0.061	0.001	651	18	639	11	648	33	99	641	20	0.52	0.740	639	11					
mr03a54	0.898	0.036	0.106	0.002	0.29	0.061	0.001	651	19	649	14	630	23	103	649	26	0.91	0.220	649	14					
mr03a27	0.925	0.069	0.113	0.004	0.21	0.066	0.001	665	36	689	21	799	29	86	684	39	0.53	0.290	689	21					
mr02a40	0.991	0.047	0.115	0.003	0.28	0.065	0.001	699	24	704	18	769	28	92	703	32	0.84	0.350	704	18					
mr03a20	0.948	0.085	0.118	0.005	0.24	0.063	0.001	677	44	717	29	710	39	101	707	53	0.38	0.970	717	29					
mr04a31	1.143	0.043	0.120	0.003	0.31	0.065	0.001	774	20	732	16	776	19	94	745	29	0.06	0.410	732	16					
mr02a60	1.325	0.083	0.124	0.004	0.31	0.070	0.001	767	29	744	23	844	26	91	750	40	0.33	0.500	744	23					
mr03a87	1.221	0.053	0.127	0.004	0.32	0.067	0.001	810	24	771	20	836	30	92	785	36	0.14	0.790	771	20					
mr03a49	1.245	0.068	0.131	0.004	0.28	0.065	0.001	821	31	795	23	780	37	102	802	41	0.43	0.800	795	23					
mr04a29	1.223	0.046	0.132	0.003	0.29	0.063	0.001	811	21	797	16	704	31	113	801	29	0.52	0.540	797	16					
mr02a118	1.464	0.061	0.156	0.004	0.28	0.071	0.001	915	25	936	20	954	25	98	928	36	0.47	0.390	954	25					
mr04a07	1.651	0.090	0.158	0.005	0.30	0.073	0.001	990	35	947	29	1006	18	94	963	51	0.26	0.360	1006	18					
mr02a87	1.679	0.059	0.162	0.004	0.35	0.076	0.001	1001	23	967	22	1086	24	89	983	37	0.18	0.590	1086	24					
mr03a22	1.666	0.184	0.163	0.012	0.34	0.073	0.002	996	70	975	67	1020	57	96	984	112	0.79	0.470	1020	57					
mr03a23	1.748	0.266	0.164	0.018	0.36	0.076	0.001	1026	98	980	99	1090	21	90	1002	164	0.68	0.290	1090	21					
mr02a52	1.631	0.047	0.165	0.003	0.33	0.072	0.001	982	18	986	17	974	17	101	984	29	0.85	0.300	974	17					
mr02a17	1.779	0.104	0.167	0.008	0.43	0.085	0.001	1038	38	996	46	1314	28	76	1023	70	0.36	0.650	1314	28					
mr03a94	1.774	0.076	0.172	0.004	0.25	0.073	0.001	1036	28	1024	20	1024	19	100	1027	37	0.68	0.210	1024	19					
mr02a111	1.704	0.082	0.174	0.005	0.30	0.072	0.001	1010	31	1032	28	986	19	105	1022	47	0.53	0.330	986	19					
mr02a30	1.738	0.085	0.174	0.004	0.25	0.084	0.001	1023	31	1033	23	1297	30	80	1030	41	0.77	0.920	1297	30					
mr02a69	1.780	0.090	0.175	0.007	0.39	0.073	0.001	1038	33	1039	37	1009	22	103	1038	58	0.99	0.510	1009	22					
mr02a11	1.799	0.066	0.182	0.004	0.26	0.076	0.001	1045	24	1080	19	1097	22	98	1067	33	0.18	0.280	1097	22					
mr02a07	1.998	0.058	0.190	0.004	0.33	0.077	0.001	1115	20	1121	20	1111	21	101	1118	32	0.80	0.340	1111	21					
mr03a89	2.142	0.056	0.190	0.003	0.32	0.079	0.001	1162	18	1124	17	1172	17	96	1141	29	0.07	0.370	1172	17					
mr02a91	2.135	0.137	0.201	0.006	0.23	0.079	0.001	1160	44	1183	31	1162	30	102	1176	56	0.63	0.400	1162	30					
mr02a82	2.099	0.076	0.205	0.005	0.31	0.077	0.001	1148	25	1202	24	1118	23	107	1175	39	0.07	0.380	1118	23					
mr04a14	2.208	0.097	0.207	0.004	0.22	0.078	0.001	1184	31	1212	21	1141	20	106	1204	38	0.39	0.180	1141	20					
mr02a110	2.226	0.166	0.208	0.010	0.31	0.080	0.001	1189	52	1219	51	1189	19	103	1204	83	0.62	0.320	1189	19					
mr03a32	2.440	0.176	0.209	0.010	0.32	0.084	0.001	1254	52	1221	52	1290	18	95	1237	85	0.58	0.710	1290	18					
mr02a39	2.569	0.093	0.212	0.005	0.31	0.092	0.001	1292	26	1237	25	1468	17	84	1262	42	0.07	0.620	1468	17					
mr02a92	2.167	0.110	0.212	0.005	0.24	0.077	0.001	1171	35	1240	27	1117	24	111	1214	47	0.07	0.180	1117	24					
mr02a145	2.504	0.095	0.216	0.005	0.31	0.087	0.001	1273	28	1259	27	1367	25	92	1266	44	0.66	0.850	1367	25					
mr02a18	2.309	0.088	0.216	0.005	0.27	0.081	0.001	1215	27	1263	24	1219	19	104	1242	40	0.12	0.610	1219	19					
mr03a97	2.665	0.126	0.219	0.008	0.39	0.082	0.001	1319	35	1276	43	1245	26	102	1304	64	0.32	0.410	1245	26					
mr02a61	2.645	0.072	0.220	0.004	0.36	0.086	0.001	1313	20	1283	23	1347	13	95	1301	35	0.22	0.350	1347	13					
mr02a102	2.386	0.083	0.221	0.005	0.30	0.081	0.001	1238	25	1287	24	1232	17	105	1263	39	0.09	0.580	1232	17					
mr02a93	2.530	0.153	0.225	0.009	0.34	0.082	0.001	1281	44	1309	48	1235	15	106	1293	75	0.60	0.090	1235	15					
mr02a72	2.581	0.097	0.231	0.007	0.40	0.081	0.001	1295	27	1341	36	1222	26	110	1308	51	0.20	0.390	1222	26					
mr02a103	2.648	0.090	0.235	0.005	0.31	0.083	0.001	1314	25	1359	26	1265	28	107	1335	41	0.13	0.490	1265	28					
mr02a143	3.384	0.147	0.247	0.009	0.43	0.093	0.001	1501	34	1425	47	1481	11	96	1482	65	0.09	0.350	1481	11					
mr02a53	3.259	0.077	0.250	0.006	0.47	0.087	0.001	1471	18	1441	29	1353	18	107	1467	36	0.24	0.890	1353	18					
mr02a78	3.422	0.115	0.256	0.007	0.41	0.094	0.001	1510	26	1470	36	1503	14	98	1500	50	0.26	0.510	1503	14					
mr02a101	3.153	0.127	0.262	0.005	0.25	0.091	0.001	1446	31	1500	27	1455	19	103	1476	45	0.13	0.690	1455	19					
mr02a32	3.243	0.170	0.262	0.007	0.25	0.093	0.001	1467	41	1502	36	1489	18	101	1487	59	0.46	0.330	1489	18					
mr02a51	3.782	0.109	0.275	0.006	0.41	0.097	0.001	1589	23	1568	33	1563	12	100	1584	44	0.51	0.330	1563	12					
mr03a65	4.137	0.236	0.286	0.009	0.29	0.108	0.002	1662	47	1623	47	1765	33	92	1642	76	0.49	1.530	1765	33					
mr02a94	4.296	0.194	0.317	0.008	0.28	0.102	0.001	1693	37	1775	39	1670	21	106	1729	60	0.07	0.960	1670	21					
mr02a08	4.864	0.154	0.319	0.007	0.35	0.113	0.001	1796	27	1783	34	1847	18	97	1792	48	0.72	1.010	1847	18					
mr03a67	5.273	0.177	0.328	0.008	0.37	0.112	0.001	1865	29	1828	39	1832	18	100	1854	54	0.35	0.770	1832	18					
mr02a68	5.744	0.132	0.343	0.007	0.44	0.117	0.001	1938	20	1901	33	1908	13	100	1934	39	0.22	1.030	1908	13					
mr04a11	6.892	0.143	0.376	0.007	0.42	0.123	0.001	2098	18	2059	31	2007	14	103	2093	36	0.17	0.480	2007	14					
mr03a34	8.083	0.269	0.418	0.010	0.36	0.136	0.001	2240	30	2251	45	2180	17	103	2243	57	0.81	0.380	2180	17					
Paxton Formation (KSPXIII)																									
se09a12	0.581	0.020	0.067	0.001	0.30	0.059	0.001	465	13	417	9	555	29	75	427	16	0.00	0.458							
au26a39	0.675	0.025	0.076	0.002	0.31	0.059	0.001	524	15	471	10	564	32	84	483	19	0.00	0.169							
au26a21	0.644	0.019	0.076	0.001	0.30	0.058	0.001	505	12	473	8	538	24	88	480	15	0.01	0.140							
se09a17	0.797	0.035	0.088	0.002	0.31	0.061	0.001	595	20	544	15	651	28	84	557	27	0.01	0.585							
se09a18	2.219	0.112	0.171	0.007	0.38	0.091	0.001	1187	35	1016	36	1453	21	70	1093	62	0.00	0.737							
se09a60	1.896	0.054	0.172	0.005	0.48	0.080	0.001	1080	19	1023	26	1189	18	86	1066	37	0.02	0.271							
au26a51	2.017	0.061	0.176	0.004	0.36	0.077	0.001	1121	20	1045	21	1109	24	94	1083	35	0.00	0.421							
se08b40	1.954	0.045	0.177	0.003	0.40	0.078	0.001	1100	15	1053	18	1137	17	93	1082	28	0.01	0.801							
se07b07	2.279	0.079	0.194	0.005	0.38	0.084	0.001	1206	24	1145	28	1304	12	88	1180	44	0.04	0.265							
au26a24	2.723	0.094	0.195	0.005	0.39	0.094	0.001	1335	26	1151	29	1517	16	76	1247	47	0.00	0.272							
se09a49	2.340	0.076	0.196	0.005	0.39	0.087	0.001	1225	23	1152	27	1367	21	84	1195	42	0.01	0.448							
se09a45	2.463	0.091	0.197	0.005	0.38	0.088	0.001	1261	27	1162	30	1393	18	83	1216	47	0.00	0.349							
au26a34	2.895	0.127	0.214	0.007	0.39	0.092	0.001	1381	33	1249	39	1461	25	86	1326	61	0.00	0.630							
se09a11	2.927	0.065	0.224	0.004	0.41	0.089	0.001	1389	17	1301	22	1413	16	92	1361	32	0.00	0.610							
se07b23	3.027	0.091	0.233	0.006	0.43	0.092	0.001	1415	23	1350	31	1458	26	93	1398	44	0.03	0.674							
se09a20	3.159	0.046	0.235	0.003	0.45	0.091	0.000	1447	11	1361	16	1442	9	94	1428	22	0.00	0.390							
au26a48	3.602	0.190	0.240	0.010	0.38	0.092	0.001	1550	42	1384	50	1468	24	94	1481	78	0.00	0.112							
se07b08	3.513	0.088	0.247	0.005	0.41	0.101	0.001	1530	20	1424	26	1647	10	86	1498	38	0.00	0.304							
au26a31	3.448	0.079	0.251	0.004	0.38	0.092	0.001	1515	18	1443	23	1474	14	98	1491	33	0.00	0.698							
se09a64	3.728	0.114	0.252	0.012	0.79	0.102	0.001	1577	24	1449	63	1653	13	88	1615	39	0.00	0.138							
au26a53	3.467	0.080	0.253	0.005	0.44	0.093	0.001	1520	18	1455	26	1485	15	98	1506	35	0.01	0.394							
se09a50	4.016	0.108	0.270	0.006	0.44	0.104	0.001	1638	22	1542	33	1697	16	91	1619	43	0.00	0.744							
au26a49	4.173	0.116	0.274	0.007	0.43	0.101	0.001	1669	23	1561	33	1648	17	95	1646	44	0.00	0.542							
au26a42	3.958	0.074	0.275	0.004	0.42	0.099	0.001	1626	15	1567	22	1601	10	98	1613	29	0.00	0.738							
se09a57	4.898	0.120	0.288	0.006	0.42	0.120	0.001	1802	21	1629	30	1964	12	83	1760	41	0.00	0.189							
se09a10	4.336	0.097	0.289	0.005	0.37	0.103	0.001	1700	18	1636	24	1671	17	98	1679	34	0.01	0.704							
se08b29	4.355	0.062	0.294	0.003	0.41	0.105	0.000	1704	12	1663	17	1708	9	97	1695	23	0.01	0.479							
au26a32	5.012	0.139	0.314	0.006	0.35	0.107	0.001	1821	23	1760	30	1748	18	101	1800	43	0.04	0.470							
se08b28	9.334	0.301	0.375	0.011	0.47	0.179	0.001	2371	30	2052	53	2646	10	78	2339	60	0.00	0.673							
au26a62	11.667	0.252	0.437	0.008	0.44	0.183	0.001	2578	20	2337	37	2676	11	87	2557	41	0.00	0.579							
se09a08	12.934	0.258	0.481	0.009	0.46	0.183	0.001	2675	19	2531	38	2678	8	95	2670	38	0.00	1.163							
au26a08	0.512	0.028	0.065	0.002	0.27	0.057	0.001	420	19	405	12	479	34	84	408	22	0.44	0.472	405	12					
au26a47	0.508	0.061	0.066	0.003	0.19	0.057	0.001	417	41	412	18	479	56	86	412	35	0.89	0.763	412	18			429.16	0.82	
se09a13	0.530	0.019	0.066	0.001	0.31	0.055	0.001	432	12	414	9	415	26	100	418	16	0.17	0.643	414	9					
au26a57	0.541	0.025	0.066	0.002	0.32	0.054	0.001	439	17	415	12	380	42	109	421	22	0.15	0.905	415	12					
se08b31	0.520	0.014	0.068	0.001	0.34	0.055	0.000	425	9	425	7	427	19	100	425	13	0.98	0.522	425	7			441.73	1.60	
se07b14	0.535	0.025	0.068	0.002	0.27	0.056	0.001	435	16	426	10	443	31	96	428	19	0.58	0.804	426	10					
se07b15	0.531	0.021	0.068	0.002	0.29	0.056	0.001	433	14	427	9	445	20	96	428	17	0.69	0.622	427	9					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	Rho	^{207}Pb/ ^{206}Pb	±1σ	^{207}Pb/ ^{235}U	±1σ	^{206}Pb/ ^{238}U	±1σ	^{207}Pb/ ^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238}U	±2σ	notes
se07b13	0.548	0.013	0.069	0.002	0.46	0.055	0.001	444	9	428	9	430	25	100	437	15	0.11	0.948	428	9					
se09a34	0.538	0.019	0.069	0.001	0.26	0.056	0.001	437	12	428	8	470	27	91	430	14	0.49	0.489	428	8					
au26a61	0.526	0.024	0.069	0.002	0.26	0.056	0.001	429	16	428	10	464	22	92	428	18	0.93	0.630	428	10					
se08b34	0.533	0.012	0.070	0.001	0.34	0.056	0.000	434	8	435	7	444	18	98	435	12	0.85	0.913	435	7					
au26a52	0.558	0.029	0.072	0.002	0.33	0.055	0.001	450	19	445	15	415	21	107	447	27	0.82	0.524	445	15					
au26a64	0.596	0.030	0.072	0.002	0.27	0.061	0.001	475	19	448	12	622	40	72	453	22	0.16	0.932	448	12					
au26a60	0.583	0.037	0.072	0.003	0.37	0.056	0.001	466	24	450	21	454	46	99	456	37	0.51	0.518	450	21					
se08b14	0.557	0.037	0.072	0.002	0.24	0.056	0.001	450	24	450	14	462	43	98	450	26	0.98	0.416	450	14					
se07b12	0.610	0.083	0.073	0.003	0.16	0.061	0.001	484	52	454	19	656	35	69	456	37	0.58	0.546	454	19					
se09a14	0.574	0.022	0.073	0.001	0.26	0.055	0.001	460	14	455	9	414	28	110	456	16	0.72	0.840	455	9					
se09a63	0.598	0.020	0.074	0.002	0.34	0.057	0.001	476	13	457	10	510	23	90	463	18	0.17	0.589	457	10					
au26a33	0.581	0.049	0.073	0.003	0.23	0.058	0.001	465	32	457	17	518	37	88	458	33	0.81	0.139	457	17					
au26a12	0.596	0.020	0.074	0.001	0.27	0.056	0.001	475	13	458	8	465	26	99	462	15	0.21	0.431	458	8					
au26a17	0.602	0.046	0.074	0.003	0.28	0.061	0.001	478	29	458	19	624	30	73	462	35	0.49	0.149	458	19					
se09a52	0.596	0.020	0.074	0.002	0.35	0.057	0.001	474	13	459	10	489	22	94	464	18	0.25	0.365	459	10					
au26a19	0.612	0.022	0.074	0.002	0.29	0.058	0.001	485	14	460	9	526	22	87	466	18	0.09	0.600	460	9					
se09a46	0.544	0.024	0.075	0.002	0.25	0.056	0.001	441	16	463	10	434	31	107	459	18	0.16	0.082	463	10					
se08b30	0.547	0.031	0.075	0.002	0.24	0.056	0.001	443	20	463	12	442	41	105	459	23	0.33	0.747	463	12					
se08b17	0.562	0.023	0.074	0.002	0.30	0.056	0.000	453	15	463	11	446	20	104	460	20	0.54	0.234	463	11					
au26a63	0.617	0.032	0.075	0.002	0.24	0.060	0.001	488	20	468	11	615	39	76	471	21	0.33	0.522	468	11					
se09a21	0.584	0.015	0.075	0.001	0.38	0.056	0.000	467	10	469	9	440	17	106	468	15	0.86	0.008	469	9					
au26a13	0.625	0.029	0.077	0.002	0.28	0.058	0.001	493	18	479	12	544	41	88	482	22	0.45	0.670	479	12					
se09a22	0.660	0.103	0.077	0.007	0.28	0.066	0.001	515	63	479	41	809	26	59	486	77	0.58	0.175	479	41					
se07b19	0.638	0.021	0.077	0.001	0.29	0.059	0.001	501	13	481	9	578	32	83	485	16	0.14	0.834	481	9					
se07b11	0.639	0.025	0.077	0.002	0.27	0.058	0.001	502	16	481	10	535	23	90	485	18	0.19	0.075	481	10					
au26a09	0.669	0.035	0.079	0.002	0.27	0.062	0.001	520	21	490	13	691	38	71	496	24	0.16	0.820	490	13					
se09a67	0.646	0.030	0.079	0.003	0.36	0.058	0.001	506	19	492	16	544	34	90	497	28	0.49	0.583	492	16					
se08b12	0.647	0.016	0.080	0.001	0.31	0.057	0.001	507	10	499	8	508	20	98	501	14	0.47	0.541	499	8					
se08b11	0.596	0.142	0.085	0.006	0.14	0.063	0.002	474	90	528	35	714	53	74	523	67	0.55	0.103	528	35					
se09a28	0.725	0.051	0.088	0.003	0.25	0.061	0.001	553	30	541	18	647	28	84	543	34	0.69	0.081	541	18					
se09a09	0.815	0.027	0.095	0.002	0.26	0.062	0.001	605	15	586	10	677	25	87	591	18	0.23	1.340	586	10					
au26a11	0.918	0.049	0.103	0.003	0.31	0.063	0.001	661	26	635	20	697	24	91	643	36	0.34	0.021	635	20					
se08b21	1.145	0.054	0.126	0.006	0.52	0.064	0.001	775	26	764	35	752	18	102	773	50	0.71	0.064	764	35					
se08b19	1.536	0.054	0.149	0.005	0.46	0.082	0.001	945	21	895	27	1246	27	72	929	40	0.05	0.225	1246	27					
au26a30	1.534	0.053	0.150	0.003	0.28	0.072	0.001	944	21	899	16	989	26	91	913	29	0.05	0.387	989	26					
se07b24	1.561	0.065	0.156	0.004	0.28	0.073	0.001	955	26	932	20	1011	25	92	939	36	0.42	0.389	1011	25					
se07b25	1.565	0.079	0.156	0.004	0.28	0.075	0.001	957	31	933	24	1066	39	88	941	43	0.49	0.773	1066	39					
au26a41	1.552	0.065	0.158	0.004	0.30	0.069	0.001	951	26	945	22	902	32	105	948	38	0.84	0.440	902	32					
se09a07	1.642	0.057	0.159	0.003	0.27	0.073	0.001	987	22	953	16	1008	29	95	963	30	0.16	1.120	1008	29					
se07b28	1.695	0.044	0.164	0.004	0.46	0.072	0.001	1007	16	979	22	972	17	101	999	31	0.17	0.572	972	17					
au26a43	1.813	0.069	0.167	0.004	0.32	0.074	0.001	1050	25	996	22	1051	31	95	1017	39	0.05	0.337	1051	31					
se08b33	1.762	0.078	0.167	0.005	0.35	0.076	0.001	1032	29	996	29	1085	28	92	1013	48	0.28	0.335	1085	28					
se09a30	1.677	0.056	0.167	0.003	0.30	0.074	0.001	1000	21	996	18	1051	26	95	998	31	0.87	0.399	1051	26					
se09a61	1.743	0.060	0.172	0.004	0.35	0.074	0.001	1024	22	1023	23	1049	28	98	1024	37	0.96	0.755	1049	28					
au26a54	1.834	0.058	0.173	0.004	0.35	0.074	0.001	1058	21	1029	21	1033	21	100	1043	34	0.23	0.607	1033	21					
se09a43	1.767	0.045	0.175	0.003	0.35	0.074	0.001	1033	17	1041	17	1045	19	100	1037	28	0.68	0.583	1045	19					
se07b22	1.846	0.054	0.175	0.003	0.27	0.076	0.001	1062	19	1042	15	1103	23	94	1048	27	0.34	0.420	1103	23					
au26a58	1.960	0.105	0.176	0.006	0.30	0.076	0.001	1102	36	1046	31	1087	34	96	1067	55	0.16	0.384	1087	34					
se09a33	1.925	0.038	0.180	0.003	0.40	0.075	0.000	1090	13	1069	16	1079	11	99	1082	24	0.19	0.933	1079	11					
au26a14	1.983	0.134	0.180	0.007	0.29	0.080	0.001	1110	46	1069	38	1199	35	89	1083	66	0.42	0.732	1199	35					
se09a54	2.072	0.071	0.188	0.006	0.45	0.080	0.001	1140	23	1112	31	1200	12	93	1132	44	0.36	0.353	1200	12					
se08b41	2.182	0.063	0.199	0.004	0.35	0.079	0.001	1175	20	1167	22	1170	17	100	1172	35	0.75	0.285	1170	17					
se08b23	2.409	0.073	0.207	0.005	0.43	0.087	0.001	1245	22	1215	29	1361	23	89	1237	41	0.27	0.797	1361	23					
se09a27	2.360	0.052	0.210	0.003	0.35	0.081	0.001	1231	16	1231	18	1222	19	101	1231	27	0.99	0.699	1222	19					
se09a58	2.671	0.097	0.214	0.007	0.47	0.089	0.001	1321	27	1252	38	1406	14	89	1306	52	0.05	0.204	1406	14					
se07b10	2.588	0.095	0.217	0.007	0.43	0.084	0.001	1297	27	1267	36	1282	28	99	1290	51	0.39	0.853	1282	28					
se09a53	2.627	0.043	0.220	0.003	0.47	0.085	0.001	1308	12	1281	18	1305	13	98	1303	23	0.09	0.317	1305	13					
au26a67	2.704	0.076	0.222	0.004	0.35	0.085	0.001	1330	21	1293	23	1304	16	99	1313	36	0.14	0.718	1304	16					
au26a20	2.681	0.096	0.225	0.005	0.30	0.084	0.001	1323	26	1309	26	1300	22	101	1316	42	0.65	0.532	1300	22					
au26a27	2.877	0.066	0.230	0.003	0.31	0.087	0.001	1376	17	1337	17	1368	15	98	1355	28	0.05	0.394	1368	15					
au26a59	3.058	0.079	0.239	0.004	0.35	0.091	0.001	1422	20	1383	23	1453	16	95	1406	35	0.11	0.848	1453	16					
se08b22	2.943	0.046	0.241	0.003	0.41	0.088	0.001	1393	12	1393	16	1382	14	101	1393	22	1.00	0.460	1382	14					
se09a32	3.187	0.103	0.245	0.005	0.34	0.094	0.001	1454	25	1414	28	1501	23	94	1437	43	0.19	0.295	1501	23					
au26a50	3.133	0.058	0.246	0.003	0.37	0.087	0.001	1441	14	1417	17	1361	13	104	1432	26	0.19	0.453	1361	13					
se08a07	3.290	0.082	0.248	0.006	0.48	0.090	0.001	1479	19	1429	31	1424	18	100	1473	39	0.07	0.117	1424	18					
au26a28	2.982	0.150	0.249	0.006	0.22	0.091	0.001	1403	38	1431	28	1441	27	99	1422	50	0.50	0.354	1441	27					
se09a48	3.244	0.051	0.250	0.004	0.49	0.092	0.001	1468	12	1439	20	1472	12	98	1465	24	0.11	0.736	1472	12					
se09a29	3.158	0.062	0.251	0.003	0.32	0.090	0.001	1447	15	1443	16	1420	15	102	1445	25	0.83	0.401	1420	15					
se08b39	3.182	0.066	0.251	0.004	0.37	0.092	0.001	1453	16	1445	20	1473	11	98	1450	29	0.71	0.792	1473	11					
se09a44	3.372	0.089	0.252	0.007	0.50	0.094	0.001	1498	21	1447	34	1516	12	95	1493	41	0.09	0.275	1516	12					
se08b08	3.295	0.077	0.257	0.004	0.37	0.091	0.001	1480	18	1472	23	1450	14	102	1477	33	0.74	0.356	1450	14					
se09a47	3.406	0.079	0.259	0.006	0.51	0.093	0.001	1506	18	1487	31	1497	12	99	1505	36	0.49	0.110	1497	12					
se09a62	3.400	0.075	0.262	0.005	0.48	0.093	0.001	1504	17	1499	28	1482	14	101	1504	34	0.83	0.282	1482	14					
se08b37	3.481	0.184	0.262	0.006	0.20	0.103	0.001	1523	42	1501	28	1671	21	90	1507	51	0.63	0.727	1671	21					
se08a08	3.563	0.097	0.263	0.005	0.34	0.094	0.001	1541	22	1505	25	1507	24	100	1527	38	0.18	0.962	1507	24					
se08b10	3.521	0.066	0.263	0.004	0.40	0.097	0.001	1532	15	1507	20	1559	13	97	1525	28	0.20	0.482	1559	13					
se08b38	3.468	0.073	0.264	0.005	0.46	0.093	0.001	1520	17	1509	26	1492	15	101	1518	32	0.63	0.325	1492	15					
au26a37	3.554	0.097	0.266	0.004	0.30	0.094	0.001	1539	22	1520	22	1499	19	101	1530	35	0.47	0.581	1499	19					
au26a23	3.925	0.227	0.266	0.017	0.54	0.096	0.001	1619	47	1523	85	1558	24	98	1618	93	0.18	0.281	1558	24					
au26a18	3.952	0.195	0.267	0.012	0.46	0.099	0.001	1624	40	1525	62	1605	16	95	1608	79	0.07	0.331	1605	16					
se08b20	3.619	0.123	0.271	0.008	0.42	0.096	0.001	1554	27	1546	39	1541	23	100	1552	52	0.83	0.176	1541	23					
au26a38	3.451	0.192	0.274	0.008	0.27	0.098	0.002	1516	44	1559	41	1582	42	99	1539	67	0.40	0.965	1582	42					
se09a59	3.831	0.093	0.274	0.005	0.35	0.100	0.001	1599	19	1560	23	1632	17	96	1584	35	0.11	0.932	1632	17					
se08a10	3.607	0.082	0.274	0.004	0.33	0.096	0.001	1551	18	1561	21	1550	12	101	1555	31	0.65	0.299	1550	12					
se09a31	3.732	0.169	0.276	0.007	0.27	0.096	0.002	1578	36	1572	34	1556	42	101	1575	56	0.88	0.507	1556	42					
se08b18	3.753	0.146	0.277	0.008	0.35	0.097	0.001	1583	31	1578	38	1575	19	100	1581	56	0.90	0.625	1575	19					
se08b32	3.816	0.081	0.279	0.005	0.46	0.097	0.001	1596	17	1585	27	1563	11	101	1595	34	0.64	0.450	1563	11					
se07b20	4.029	0.080	0.282	0.004	0.36	0.101	0.001	1640	16	1599	20	1648	16	97	1626	29	0.05	0.263	1648	16					
se07b18	3.900	0.073	0.282	0.004	0.40	0.100	0.001	1614	15	1602	21	1620	13	99	1611	29	0.59	0.720	1620	13					
se08b09	4.147	0.085	0.285	0.005	0.44	0.104	0.001	1664	17	1617	26	1690	10	96	1656	33	0.05	0.339	1690	10					
se07b09	4.135	0.096	0.287	0.005	0.37	0.100	0.001	1661	19	1626	25	1624	14	100	1650	35	0.16	0.435	1624	14					
se08a11	4.041	0.082	0.287	0.004	0.37	0.100	0.001	1643	17	1629	22	1629	14	100	1639	31	0.53	0.847	1629	14					
au26a22	4.303	0.165	0.288	0.009	0.39	0.102	0.001	1694	32	1630	43	1667	16	98	1677	60	0.13	0.441	1667	16					
au26a44	4.184	0.070	0.289	0.004	0.40	0.099	0.001	1671	14	1638	19	1608	10	102	1663	26	0.08	0.399	1608	10					
se07b21	4.089	0.112	0.289	0.005	0.33	0.105	0.001	1652	22	1638	26	1710	16	96	1646	39	0.60	0.359	1710	16					
au26a29	4.137	0.111	0.289	0.005	0.35	0.103	0.001	1662	22	1639	27	1685	21	97	1654	40	0.42	0.953	1685	21					
au26a07	3.903	0.164	0.290	0.006	0.25	0.100	0.001	1614	34	1643	30	1620	25	101	1631	50	0.46	0.913	1620	25					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	^{207}Pb/^{235}U	±1σ	^{206}Pb/^{238}U	±1σ	Rho	^{207}Pb/^{206}Pb	±1σ	^{207}Pb/^{235}U	±1σ	^{206}Pb/^{238}U	±1σ	^{207}Pb/^{206}Pb	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	^{206}Pb/^{238}U	±2σ	notes
se09a24	4.157	0.060	0.293	0.004	0.46	0.101	0.001	1666	12	1657	19	1647	11	101	1665	23	0.63	0.282	1647	11					
se09a23	4.333	0.187	0.299	0.010	0.37	0.098	0.001	1700	36	1689	47	1582	20	107	1696	66	0.82	0.603	1582	20					
se08b27	4.225	0.071	0.301	0.003	0.34	0.102	0.001	1679	14	1697	17	1655	13	103	1685	25	0.30	1.270	1655	13					
au26a40	4.589	0.125	0.302	0.006	0.38	0.104	0.001	1747	23	1702	31	1698	21	100	1734	43	0.13	0.711	1698	21					
se08b07	4.418	0.074	0.305	0.005	0.48	0.104	0.001	1716	14	1716	24	1693	14	101	1716	27	0.98	0.576	1693	14					
au26a10	4.727	0.235	0.311	0.010	0.31	0.111	0.002	1772	42	1747	47	1819	35	96	1761	71	0.63	0.294	1819	35					
au26a68	4.985	0.125	0.315	0.005	0.35	0.108	0.001	1817	21	1763	27	1766	16	100	1798	39	0.06	0.911	1766	16					
se08a09	12.907	0.182	0.505	0.007	0.52	0.181	0.001	2673	13	2635	31	2662	7	99	2675	26	0.16	0.463	2662	7					
se08b24	13.554	0.235	0.526	0.008	0.44	0.184	0.001	2719	16	2723	34	2686	9	101	2719	33	0.89	0.475	2686	9					
Tower Hill Formation (KSTHI)																									
mr12a56	0.449	0.032	0.050	0.002	0.27	0.057	0.001	376	23	315	12	499	33	63	322	23	0.01	0.092							
mr11c81	0.753	0.052	0.081	0.004	0.36	0.065	0.002	570	30	503	24	778	49	65	523	43	0.03	1.089							
mr11b46	0.747	0.020	0.087	0.002	0.36	0.057	0.000	567	12	540	10	496	18	109	550	18	0.03	0.588							
mr12a59	0.841	0.059	0.088	0.003	0.26	0.061	0.001	620	33	542	19	654	37	83	555	37	0.02	0.473							
mr11c19	0.881	0.028	0.092	0.003	0.51	0.062	0.001	641	15	565	17	674	22	84	612	28	0.00	0.356							
mr11c79	0.849	0.036	0.094	0.002	0.23	0.067	0.001	624	20	581	11	846	36	69	588	21	0.03	0.516							
mr12b11	1.660	0.325	0.095	0.008	0.21	0.126	0.004	993	124	586	46	2045	53	29	591	92	0.01	1.607							
mr11b34	0.698	0.041	0.096	0.003	0.28	0.054	0.001	537	24	591	19	383	49	154	573	33	0.04	0.594							
mr11c14	0.877	0.022	0.097	0.002	0.41	0.061	0.000	639	12	596	12	635	17	94	616	20	0.00	0.177							
mr12b42	0.955	0.061	0.097	0.004	0.29	0.062	0.001	681	32	596	21	668	43	89	614	40	0.01	0.855							
mr12b20	1.236	0.139	0.097	0.006	0.27	0.080	0.002	817	63	597	35	1189	55	50	618	68	0.00	0.815							
mr12b56	0.944	0.040	0.098	0.002	0.27	0.061	0.001	675	21	603	13	652	30	92	617	25	0.00	0.978							
mr11b27	1.211	0.099	0.099	0.007	0.42	0.080	0.002	806	45	608	40	1190	38	51	664	74	0.00	1.139							
mr11b47	0.715	0.033	0.101	0.002	0.26	0.052	0.001	548	20	619	14	285	39	217	596	25	0.00	0.525							
mr12a63	1.016	0.065	0.102	0.003	0.26	0.068	0.005	712	33	625	20	868	159	72	640	38	0.01	0.702							
mr12a28	0.998	0.040	0.103	0.003	0.30	0.066	0.001	703	20	631	15	808	29	78	649	27	0.00	0.357							
mr11b45	0.981	0.048	0.104	0.003	0.34	0.064	0.001	694	25	639	20	748	32	85	658	36	0.04	0.208							
mr11b48	0.990	0.034	0.105	0.002	0.30	0.063	0.001	698	17	643	13	696	29	92	658	23	0.00	0.395							
mr11c78	0.995	0.023	0.105	0.002	0.42	0.062	0.000	701	12	646	12	682	17	95	673	20	0.00	0.574							
mr11c21	1.158	0.066	0.107	0.003	0.25	0.073	0.001	781	31	654	18	1015	38	64	672	34	0.00	0.836							
mr12b13	1.078	0.066	0.108	0.003	0.21	0.063	0.001	743	32	659	16	718	36	92	670	32	0.01	0.845							
mr12b39	1.090	0.061	0.108	0.003	0.27	0.063	0.001	748	29	664	19	699	27	95	681	36	0.01	0.073							
mr11c08	1.285	0.107	0.118	0.007	0.37	0.072	0.002	839	48	717	42	996	61	72	759	76	0.02	0.729							
mr12a65	1.251	0.077	0.120	0.004	0.25	0.068	0.001	824	35	730	21	879	28	83	747	41	0.01	0.194							
mr11b33	1.168	0.036	0.123	0.002	0.30	0.068	0.001	786	17	747	13	875	25	85	760	24	0.04	0.351							
mr12b37	1.341	0.091	0.124	0.005	0.29	0.068	0.001	864	40	751	28	862	25	87	777	53	0.01	0.616							
mr11c71	1.200	0.039	0.125	0.003	0.37	0.065	0.001	801	18	758	17	785	25	97	777	29	0.03	0.860							
mr12a66	1.396	0.101	0.129	0.006	0.31	0.065	0.001	887	43	782	33	775	27	101	810	60	0.02	0.356							
mr12b19	1.457	0.121	0.130	0.005	0.25	0.068	0.001	913	50	785	30	865	35	91	806	58	0.02	0.545							
mr12b12	1.661	0.062	0.136	0.004	0.36	0.071	0.001	994	24	822	21	945	31	87	879	38	0.00	0.522							
mr11c69	1.565	0.117	0.139	0.006	0.31	0.080	0.001	956	46	842	36	1200	19	70	874	66	0.02	0.131							
mr12b52	1.561	0.087	0.143	0.004	0.24	0.071	0.001	955	34	863	21	957	29	90	880	40	0.01	1.423							
mr11b22	1.243	0.038	0.147	0.003	0.32	0.061	0.001	820	17	887	16	637	31	139	855	27	0.00	0.303							
mr11c82	1.617	0.037	0.155	0.003	0.39	0.071	0.001	977	15	927	15	967	17	96	954	25	0.00	0.322							
mr11c70	1.798	0.075	0.158	0.006	0.43	0.075	0.001	1045	27	945	31	1057	27	89	1003	50	0.00	0.632							
mr11b21	1.820	0.085	0.160	0.005	0.35	0.077	0.001	1053	30	956	29	1128	28	85	997	50	0.00	0.100							
mr12b31	2.091	0.064	0.161	0.005	0.47	0.074	0.001	1146	21	964	26	1041	22	93	1076	41	0.00	0.106							
mr11b32	1.794	0.069	0.162	0.004	0.33	0.076	0.001	1043	25	967	23	1098	27	88	998	40	0.01	0.318							
mr11b38	1.845	0.094	0.163	0.008	0.45	0.074	0.001	1062	34	976	42	1036	20	94	1033	64	0.03	0.124							
mr12b27	2.188	0.172	0.166	0.009	0.34	0.080	0.001	1177	55	989	48	1186	30	83	1051	87	0.00	1.324							
mr11c62	1.834	0.056	0.168	0.004	0.37	0.076	0.001	1058	20	1001	21	1096	23	91	1030	34	0.01	0.392							
mr12b46	2.158	0.098	0.171	0.005	0.33	0.074	0.001	1168	31	1020	28	1043	25	98	1073	50	0.00	0.723							
mr12b10	2.315	0.143	0.177	0.007	0.30	0.079	0.001	1217	44	1053	36	1172	21	90	1101	65	0.00	0.340							
mr12a18	2.668	0.250	0.187	0.013	0.37	0.099	0.001	1320	69	1103	71	1602	18	69	1195	121	0.01	0.362							
mr12a33	2.181	0.058	0.190	0.004	0.43	0.079	0.001	1175	19	1120	24	1170	21	96	1158	35	0.02	0.381							
mr12a19	2.366	0.097	0.196	0.007	0.46	0.082	0.001	1232	29	1153	39	1242	24	93	1212	56	0.03	0.399							
mr12b50	2.760	0.154	0.200	0.009	0.39	0.087	0.001	1345	41	1175	46	1358	28	87	1264	75	0.00	0.209							
mr11b18	2.430	0.046	0.203	0.003	0.44	0.081	0.000	1251	14	1189	18	1213	12	98	1234	26	0.00	0.277							
mr11c49	2.944	0.265	0.203	0.016	0.43	0.096	0.001	1393	68	1189	84	1548	21	77	1312	131	0.01	0.349							
mr11c22	2.462	0.073	0.205	0.006	0.50	0.082	0.001	1261	21	1201	32	1234	16	97	1252	42	0.03	0.632							
mr11b51	2.530	0.095	0.206	0.005	0.34	0.084	0.001	1281	27	1206	28	1285	25	94	1242	46	0.02	0.322							
mr11b23	2.646	0.109	0.207	0.004	0.24	0.089	0.001	1313	30	1214	22	1401	27	87	1239	39	0.00	0.329							
mr11c28	3.518	0.182	0.216	0.009	0.41	0.112	0.001	1531	41	1258	48	1825	13	69	1402	78	0.00	0.270							
mr12a23	4.374	0.127	0.240	0.007	0.48	0.120	0.002	1707	24	1384	35	1950	24	71	1622	49	0.00	0.942							
mr12b23	3.993	0.267	0.246	0.013	0.38	0.094	0.001	1633	54	1420	65	1510	18	94	1542	102	0.00	0.625							
mr11b30	3.685	0.145	0.249	0.008	0.41	0.096	0.001	1568	31	1432	41	1539	29	93	1525	60	0.00	0.400							
mr12b49	4.005	0.224	0.249	0.008	0.28	0.110	0.002	1635	45	1435	40	1807	28	79	1502	70	0.00	0.416							
mr12a31	3.524	0.086	0.254	0.005	0.38	0.096	0.001	1533	19	1459	24	1540	18	95	1507	36	0.00	0.452							
mr11c07	3.960	0.096	0.262	0.005	0.41	0.100	0.001	1626	20	1500	27	1626	12	92	1591	38	0.00	0.197							
mr11c17	3.997	0.092	0.264	0.006	0.46	0.099	0.001	1634	19	1512	29	1603	17	94	1613	37	0.00	0.588							
mr11b52	3.764	0.090	0.268	0.005	0.36	0.094	0.001	1585	19	1529	23	1514	15	101	1565	35	0.02	0.289							
mr12b43	4.554	0.146	0.280	0.006	0.35	0.093	0.001	1741	27	1591	32	1484	18	107	1679	49	0.00	0.082							
mr11c24	5.020	0.119	0.282	0.005	0.40	0.122	0.001	1823	20	1599	27	1986	12	81	1747	39	0.00	0.172							
mr12a29	5.089	0.268	0.284	0.011	0.38	0.114	0.001	1834	45	1613	57	1868	19	86	1753	86	0.00	0.267							
mr11b13	4.356	0.146	0.287	0.008	0.39	0.104	0.002	1704	28	1625	38	1703	30	95	1682	53	0.03	0.933							
mr12a22	6.006	0.269	0.303	0.013	0.49	0.130	0.001	1977	39	1708	66	2097	12	81	1945	79	0.00	0.193							
mr11c32	5.325	0.183	0.309	0.008	0.35	0.123	0.001	1873	29	1738	37	2000	15	87	1824	55	0.00	0.357							
mr12b29	5.953	0.253	0.315	0.008	0.31	0.114	0.001	1969	37	1765	41	1865	19	95	1869	66	0.00	0.559							
mr11c11	5.416	0.121	0.321	0.006	0.43	0.114	0.001	1887	19	1795	30	1871	15	96	1871	38	0.00	0.747							
mr11c41	5.731	0.116	0.335	0.006	0.43	0.125	0.001	1936	18	1864	28	2024	11	92	1925	34	0.00	0.353							
mr11b31	6.113	0.119	0.336	0.006	0.45	0.125	0.001	1992	17	1867	29	2031	12	92	1978	34	0.00	0.277							
mr11c75	6.636	0.284	0.336	0.011	0.40	0.135	0.001	2064	38	1868	55	2166	15	86	2015	74	0.00	0.284							
mr11c20	6.326	0.136	0.343	0.006	0.43	0.124	0.001	2022	19	1902	30	2020	8	94	2003	37	0.00	0.265							
mr11c12	6.687	0.202	0.346	0.009	0.45	0.131	0.001	2071	27	1914	45	2109	19	91	2053	54	0.00	0.528							
mr12a06	6.548	0.171	0.347	0.008	0.46	0.128	0.001	2052	23	1921	40	2076	9	93	2040	46	0.00	0.173							
mr12a41	6.773	0.161	0.350	0.008	0.45	0.130	0.001	2082	21	1935	36	2097	12	92	2066	42	0.00	0.292							
mr12b47	6.451	0.244	0.352	0.007	0.26	0.117	0.002	2039	33	1942	33	1916	23	101	1987	54	0.02	0.355							
mr12b57	7.533	0.285	0.352	0.009	0.35	0.128	0.001	2177	34	1946	45	2065	16	94	2095	65	0.00	0.209							
mr11c61	6.516	0.113	0.356	0.007	0.54	0.123	0.001	2048	15	1965	32	2000	13	98	2051	30	0.00	0.219							
mr11b24	7.123	0.233	0.365	0.010	0.42	0.135	0.001	2127	29	2007	47	2166	16	93	2107	58	0.01	0.384							
mr12a60	8.156	0.282	0.366	0.010	0.39	0.128	0.001	2248	31	2009	46	2077	15	97	2187	62	0.00	0.140							
mr12a24	7.211	0.165	0.370	0.007	0.42	0.131	0.001	2138	20	2031	33	2112	12	96	2121	40	0.00	0.121							
mr12a25	7.379	0.158	0.376	0.007	0.43	0.131	0.001	2158	19	2057	32	2114	11	97	2145	38	0.00	0.229							
mr11c85	9.976	0.246	0.379	0.009	0.50	0.174	0.001	2433	23	2071	44	2600	11	80	2418	46	0.00	0.478							
mr11c84	10.003	0.391	0.414	0.010	0.32	0.165	0.001	2435	36	2233	47	2509	12	89	2362	68	0.00	0.476							
mr12b62	11.487	0.250	0.420	0.009	0.49	0.155	0.001	2564	20	2259	40	2402	12	94	2554	41	0.00	0.012							

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
mr12a39	11.176	0.233	0.455	0.009	0.45	0.162	0.002	2538	19	2418	38	2482	17	97	2532	39	0.00	0.441							
mr11c44	14.156	0.328	0.507	0.013	0.54	0.195	0.001	2760	22	2645	54	2783	8	95	2768	43	0.01	0.245							
mr12a30	0.576	0.020	0.074	0.001	0.29	0.057	0.001	462	13	463	9	472	28	98	463	16	0.94	0.501	463	9					
mr12b53	0.686	0.068	0.079	0.003	0.19	0.058	0.001	531	41	490	18	530	41	93	494	34	0.34	1.247	490	18					
mr11c23	0.661	0.035	0.080	0.002	0.28	0.060	0.001	515	21	497	14	601	24	83	501	26	0.40	0.957	497	14					
mr12b16	0.797	0.095	0.082	0.005	0.24	0.065	0.001	595	53	506	27	782	45	65	516	53	0.11	0.650	506	27					
mr11b11	0.690	0.031	0.083	0.002	0.30	0.057	0.001	533	19	517	13	476	28	108	521	24	0.40	1.403	517	13					
mr11c68	0.666	0.033	0.084	0.002	0.22	0.059	0.001	518	20	519	11	583	33	89	519	21	0.98	2.675	519	11					
mr11c83	0.715	0.023	0.085	0.002	0.31	0.057	0.001	547	14	526	10	509	24	103	532	18	0.13	0.484	526	10					
mr11c64	0.717	0.034	0.086	0.003	0.31	0.061	0.001	549	20	530	15	633	40	84	535	27	0.38	0.658	530	15					
mr12a42	0.705	0.039	0.086	0.002	0.24	0.059	0.001	542	24	530	14	576	31	92	532	26	0.62	0.985	530	14					
mr11b43	0.690	0.030	0.086	0.002	0.33	0.053	0.001	533	18	531	14	310	37	171	532	26	0.94	0.910	531	14					
mr11b07	0.700	0.036	0.088	0.003	0.33	0.058	0.001	539	22	543	18	546	45	100	542	31	0.85	1.041	543	18					
mr12a08	0.732	0.058	0.089	0.004	0.25	0.063	0.001	558	34	552	21	694	35	80	553	39	0.87	0.635	552	21					
mr12b30	0.835	0.074	0.090	0.003	0.21	0.063	0.001	617	41	555	20	707	33	78	562	39	0.15	0.266	555	20					
mr11c72	0.775	0.065	0.090	0.003	0.23	0.070	0.002	583	37	556	20	925	47	60	560	39	0.49	1.444	556	20					
mr11c38	0.740	0.072	0.090	0.006	0.31	0.061	0.001	563	42	557	33	640	42	87	558	59	0.89	0.824	557	33					
mr12a53	0.886	0.071	0.092	0.004	0.27	0.062	0.001	644	38	568	24	666	40	85	582	45	0.06	0.169	568	24					
mr12b08	0.832	0.057	0.092	0.003	0.21	0.058	0.001	614	32	570	16	537	54	106	575	30	0.17	1.365	570	16					
mr11c63	0.849	0.069	0.093	0.006	0.39	0.064	0.002	624	38	572	35	726	65	79	593	61	0.20	1.605	572	35					
mr11c73	0.765	0.028	0.094	0.002	0.26	0.058	0.001	577	16	578	11	535	32	108	578	20	0.96	0.373	578	11					
mr12b61	0.901	0.080	0.094	0.004	0.23	0.065	0.001	652	43	580	23	781	45	74	590	44	0.11	0.825	580	23					
mr11c27	0.791	0.041	0.095	0.002	0.23	0.062	0.001	592	23	583	13	660	29	88	584	25	0.70	0.369	583	13					
mr12b36	0.724	0.072	0.095	0.004	0.19	0.057	0.001	553	43	585	22	509	50	115	580	41	0.46	0.737	585	22					
mr11b17	0.845	0.032	0.096	0.002	0.29	0.062	0.001	622	17	593	12	680	25	87	601	23	0.12	0.946	593	12					
mr12b07	0.846	0.079	0.097	0.004	0.22	0.063	0.001	622	44	596	23	699	47	85	600	44	0.56	0.577	596	23					
mr11b54	0.761	0.044	0.097	0.004	0.31	0.056	0.001	574	25	597	21	468	44	127	588	36	0.41	0.776	597	21					
mr12b60	0.943	0.096	0.098	0.004	0.18	0.068	0.002	674	50	604	21	857	50	70	610	42	0.18	0.819	604	21					
mr12a09	0.832	0.032	0.098	0.003	0.38	0.059	0.001	615	18	605	17	578	24	105	610	29	0.61	0.844	605	17					
mr11b28	0.869	0.027	0.100	0.002	0.29	0.059	0.001	635	15	612	11	555	27	110	618	19	0.13	0.555	612	11					
mr11b29	0.845	0.037	0.101	0.002	0.28	0.059	0.001	622	20	617	14	562	32	110	619	26	0.83	0.613	617	14					
mr12b48	0.906	0.078	0.101	0.004	0.24	0.064	0.001	655	42	618	24	735	42	84	624	46	0.39	0.014	618	24					
mr11c54	0.751	0.077	0.101	0.004	0.18	0.062	0.001	569	45	619	22	674	39	92	611	42	0.27	0.314	619	22					
mr12a64	0.999	0.089	0.101	0.004	0.25	0.066	0.001	704	45	620	26	793	31	78	634	50	0.08	0.259	620	26					
mr11c65	0.914	0.037	0.101	0.002	0.27	0.064	0.001	659	19	621	13	733	38	85	629	24	0.06	0.424	621	13					
mr12b63	0.894	0.055	0.101	0.003	0.25	0.061	0.001	649	29	623	18	628	39	99	628	34	0.40	0.710	623	18					
mr11c31	0.943	0.045	0.102	0.003	0.28	0.065	0.001	674	23	627	16	782	36	80	638	30	0.06	0.616	627	16					
mr11c39	0.856	0.047	0.102	0.002	0.20	0.068	0.001	628	26	629	13	855	34	74	629	25	0.99	1.333	629	13					
mr11b19	0.932	0.038	0.103	0.003	0.32	0.061	0.001	669	20	633	16	639	26	99	644	28	0.10	1.137	633	16					
mr12b59	0.958	0.044	0.104	0.002	0.21	0.066	0.001	682	23	636	12	793	39	80	642	22	0.06	0.639	636	12					
mr12a55	0.829	0.073	0.104	0.003	0.18	0.063	0.002	613	40	636	19	694	62	92	633	36	0.57	0.595	636	19					
mr11c59	0.940	0.033	0.104	0.003	0.34	0.062	0.001	673	17	638	15	670	28	95	650	26	0.06	0.384	638	15					
mr12a54	1.029	0.087	0.104	0.004	0.25	0.066	0.001	718	43	641	26	793	28	81	654	49	0.09	0.381	641	26					
mr12b28	0.942	0.069	0.105	0.004	0.27	0.054	0.001	674	36	643	24	385	40	167	650	45	0.41	0.875	643	24					
mr11c60	0.860	0.058	0.106	0.004	0.28	0.063	0.001	630	32	647	23	722	45	90	642	42	0.63	1.072	647	23					
mr11c50	0.899	0.048	0.106	0.003	0.25	0.062	0.001	651	26	647	17	658	33	98	648	31	0.87	0.460	647	17					
mr12b41	0.959	0.651	0.107	0.020	0.14	0.061	0.001	683	337	653	118	639	51	102	655	232	0.93	0.159	653	118					
mr11c51	0.882	0.035	0.107	0.003	0.32	0.062	0.001	642	19	654	16	657	30	99	649	27	0.56	0.530	654	16					
mr12a38	0.966	0.033	0.108	0.002	0.27	0.060	0.001	686	17	660	11	612	30	108	667	21	0.14	0.525	660	11					
mr11b41	0.971	0.036	0.108	0.003	0.35	0.063	0.001	689	18	663	16	697	20	95	673	28	0.18	0.102	663	16					
mr11c13	0.945	0.040	0.108	0.003	0.30	0.060	0.001	675	21	663	16	611	31	109	667	28	0.56	0.858	663	16					
mr12a14	1.009	0.069	0.109	0.005	0.31	0.062	0.001	708	35	665	27	688	40	97	678	49	0.24	1.465	665	27					
mr12a05	0.935	0.043	0.109	0.002	0.24	0.064	0.001	670	23	668	14	736	28	91	668	26	0.91	0.757	668	14					
mr11c10	0.982	0.034	0.110	0.003	0.35	0.064	0.001	695	17	673	15	735	23	92	682	27	0.26	0.149	673	15					
mr11b10	0.917	0.037	0.111	0.003	0.37	0.057	0.001	661	20	676	19	504	32	134	669	32	0.48	0.683	676	19					
mr12a07	0.951	0.036	0.111	0.002	0.27	0.062	0.001	678	19	677	13	659	24	103	677	23	0.94	0.145	677	13					
mr11c43	0.977	0.026	0.112	0.002	0.37	0.062	0.001	692	13	685	13	665	22	103	688	22	0.64	0.485	685	13					
mr12a67	0.783	0.104	0.112	0.004	0.12	0.062	0.002	587	59	687	21	689	59	100	678	40	0.09	0.164	687	21					
mr11c45	0.902	0.049	0.114	0.004	0.29	0.059	0.001	653	26	694	21	576	42	121	679	37	0.14	0.729	694	21					
mr11c42	0.996	0.069	0.114	0.004	0.23	0.066	0.001	702	35	698	21	800	40	87	698	39	0.91	0.601	698	21					
mr11c74	1.038	0.050	0.115	0.003	0.28	0.065	0.001	723	25	703	18	780	29	90	709	33	0.46	1.234	703	18					
mr11c80	1.002	0.062	0.116	0.004	0.30	0.065	0.001	705	32	709	25	775	43	91	707	44	0.91	1.106	709	25					
mr12b58	1.068	0.077	0.119	0.003	0.18	0.067	0.001	738	38	723	17	840	44	86	725	33	0.71	0.572	723	17					
mr11c52	1.052	0.047	0.125	0.004	0.33	0.065	0.001	730	23	761	21	772	39	99	747	35	0.23	0.583	761	21					
mr12b17	1.358	0.103	0.129	0.005	0.24	0.068	0.001	871	45	783	27	881	31	89	798	50	0.06	0.716	783	27					
mr12a58	1.373	0.200	0.129	0.007	0.18	0.069	0.002	877	86	785	38	906	45	87	794	73	0.31	0.166	785	38					
mr12b18	1.259	0.137	0.129	0.004	0.15	0.070	0.001	828	61	785	24	923	37	85	789	47	0.50	0.421	785	24					
mr11c30	1.243	0.048	0.131	0.003	0.30	0.067	0.001	820	22	795	17	842	20	94	803	30	0.29	0.096	795	17					
mr12b33	1.324	0.104	0.132	0.004	0.18	0.079	0.002	856	46	801	22	1174	48	68	808	42	0.25	0.308	1174	48					
mr11b55	1.335	0.060	0.133	0.003	0.23	0.068	0.001	861	26	806	15	880	33	92	816	29	0.05	0.391	880	33					
mr11c35	1.222	0.058	0.135	0.004	0.32	0.067	0.001	811	27	814	23	842	22	97	812	40	0.92	0.198	842	22					
mr12b26	1.338	0.153	0.135	0.006	0.19	0.066	0.001	862	66	818	34	804	42	102	824	64	0.52	0.455	804	42					
mr12b51	1.977	0.515	0.136	0.022	0.32	0.096	0.001	1108	176	823	128	1551	24	53	871	245	0.15	0.145	1551	24					
mr11b56	1.323	0.106	0.136	0.006	0.28	0.073	0.002	856	46	825	35	1023	56	81	834	63	0.53	0.763	1023	56					
mr12a21	1.248	0.067	0.137	0.004	0.29	0.066	0.001	822	30	826	24	814	41	101	824	43	0.92	0.348	814	41					
mr11c18	1.386	0.055	0.138	0.004	0.33	0.069	0.001	883	23	834	20	886	29	94	853	36	0.05	0.226	886	29					
mr12a43	1.339	0.050	0.140	0.003	0.33	0.066	0.001	863	22	843	19	811	26	104	851	33	0.41	0.129	811	26					
mr11b42	1.350	0.124	0.141	0.007	0.28	0.076	0.002	867	54	850	41	1104	59	77	855	74	0.76	1.048	1104	59					
mr12a10	1.285	0.098	0.147	0.005	0.23	0.069	0.002	839	44	885	29	894	48	99	873	52	0.32	0.276	894	48					
mr12b32	1.672	0.177	0.148	0.009	0.28	0.075	0.001	998	67	888	49	1080	38	82	916	91	0.13	0.382	1080	38					
mr12a32	1.425	0.056	0.149	0.004	0.32	0.069	0.001	899	23	893	21	889	34	101	896	36	0.82	0.416	889	34					
mr11b09	1.317	0.058	0.149	0.004	0.32	0.061	0.001	853	25	897	24	650	29	138	877	39	0.12	0.366	650	29					
mr11b08	1.573	0.057	0.152	0.004	0.36	0.073	0.001	960	22	911	22	1017	28	89	933	37	0.05	0.953	1017	28					
mr12a52	1.408	0.145	0.156	0.005	0.16	0.067	0.001	892	61	933	29	849	46	110	927	55	0.52	0.742	849	46					
mr11c33	1.617	0.063	0.162	0.004	0.34	0.069	0.001	977	25	968	24	908	31	107	972	40	0.76	0.679	908	31					
mr12a34	1.690	0.062	0.168	0.004	0.33	0.071	0.001	1005	23	999	22	964	28	104	1002	37	0.84	0.291	964	28					
mr11c09	1.851	0.097	0.169	0.005	0.27	0.078	0.002	1064	35	1005	27	1135	39	89	1023	48	0.12	0.548	1135	39					
mr11b53	1.738	0.066	0.170	0.004	0.28	0.073	0.001	1023	24	1012	20	1008	24	100	1016	35	0.69	0.628	1008	24					
mr12a20	1.931	0.097	0.171	0.005	0.29	0.073	0.001	1092	34	1020	28	1020	33	100	1044	49	0.05	1.032	1020	33					
mr11b12	1.836	0.065	0.172	0.004	0.32	0.075	0.001	1059	23	1022	22	1065	29	96	1038	37	0.17	0.365	1065	29					
mr11c29	1.546	0.084	0.173	0.007	0.37	0.057	0.001	949	33	1026	38	477	47	215	978	57	0.05	0.332	477	47					
mr11c34	1.696	0.069	0.172	0.004	0.26	0.076	0.001	1007	26	1026	20	1098	27	93	1019	36	0.52	0.378	1098	27					
mr12a57	1.833	0.123	0.176	0.004	0.17	0.076	0.001	1057	44	1044	22	1108	29	94	1046	42	0.78	0.289	1108	29					
mr11b14	1.953	0.069	0.191	0.005	0.39	0.068	0.001	1099	24	1125	29	858	31	131	1108	43	0.37	0.870	858	31					
mr11b44	2.256	0.082	0.193	0.006	0.40	0.078	0.001	1199	26	1140	30	1141	32	100	1176	47	0.06	0.615	1141	32					
mr12a13	2.137	0.079	0.196	0.005	0.37	0.077	0.001	1161	26	1151	29	1129	23	102	1157	45	0.75	0.271	1129	23					
mr11c40	2.184	0.066	0.197	0.005	0.39	0.081	0.001	1176	21	1159	25	1216	19	95	1170	38	0.52	0.446	1216	19					

Table A2. Continued.

	Measured Isotopic Ratios							Calculated Ages (Ma)											Detrital (Ma)		Metamorphic (Ma)		CA-TIMS (Ma)		
Sample/ Analysis	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	Rho	$^{207}Pb/^{206}Pb$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{206}Pb$	±1σ	U-Pb/Pb-Pb concordancy (%)	Concordia age	±2σ	Probability of concordance	Th/U	For Prob Dens plots age	±1σ	For Prob Dens plots age	±1σ	$^{206}Pb/^{238}U$	±2σ	notes
mr11b37	2.123	0.098	0.200	0.005	0.28	0.075	0.001	1156	32	1177	28	1058	31	111	1169	47	0.56	0.282	1058	31					
mr12b21	2.160	0.163	0.203	0.006	0.20	0.083	0.002	1168	52	1191	32	1277	49	93	1186	59	0.68	0.796	1277	49					
mr12a40	2.455	0.155	0.206	0.007	0.25	0.080	0.002	1259	46	1210	35	1194	38	101	1225	63	0.33	0.283	1194	38					
mr11b20	2.451	0.070	0.211	0.004	0.32	0.082	0.001	1258	20	1232	20	1236	21	100	1245	33	0.28	0.314	1236	21					
mr12b09	2.683	0.132	0.215	0.006	0.28	0.085	0.001	1324	36	1257	31	1325	32	95	1282	54	0.11	0.246	1325	32					
mr12a35	3.823	0.242	0.259	0.012	0.37	0.102	0.002	1598	51	1484	63	1652	32	90	1555	94	0.08	1.241	1652	32					
mr11c53	3.383	0.225	0.264	0.010	0.30	0.089	0.001	1500	52	1508	53	1395	25	108	1504	84	0.90	0.106	1395	25					
mr11c58	4.776	0.126	0.327	0.007	0.39	0.107	0.001	1781	22	1825	33	1742	12	105	1789	42	0.16	0.195	1742	12					
mr12b40	8.309	0.612	0.394	0.017	0.29	0.131	0.002	2265	67	2143	79	2116	26	101	2214	119	0.16	0.486	2116	26					
mr11c55	7.647	0.171	0.410	0.008	0.44	0.130	0.001	2190	20	2216	37	2103	15	105	2192	40	0.45	0.276	2103	15					
mr12b38	18.029	1.144	0.599	0.033	0.44	0.210	0.002	2991	61	3025	134	2906	13	104	2992	122	0.78	0.109	2906	13					

Footnotes

Data in grey - probability of concordance <0.05

Data in red - interpreted as metamorphic, based on morphology and generally low Th/U

Data in blue - youngest detrital zircon age population

Data in black - all other detrtital zircon data

Notes

1. abundant cracks and an amorphous shaped core; included in metamorphic population despite high Th/U
2. relatively low probability of concordance
3. older age but low Th/U
4. excluded from weighted average in text and figure; reversely discordant outlier