

**Hf-O isotope systematics of zircons from the Taitao Granitoids:
Implications for slab-melting material**

**Kazue Suzuki^{1*}, Yusuke Sawaki^{1*}, Tsuyoshi Iizuka², Kouki Kitajima³, Kentaro
Hattori⁴, Takafumi Hirata⁴, and Ryo Anma⁵**

*¹ Department of Earth Science and Astronomy, Graduate School of Arts and Sciences,
The University of Tokyo, 3-8-1 Komaba, Meguro-ku, Tokyo, Japan.*

*²Department of Earth and Planetary Sciences, The University of Tokyo, 7-3-1, Hongo,
Bunkyo-ku, Tokyo, Japan.*

*³WiscSIMS, Department of Geoscience, University of Wisconsin, 1215, W. Dayton St.,
Madison, WI 53706, USA*

*⁴Geochemical Research Center, Graduate School of Science, The University of Tokyo,
7-3-1, Hongo, Bunkyo-ku, Tokyo, Japan.*

*⁵Graduate School of Technology, Industrial and Social Sciences, Tokushima University,
2-24, Shinkura-cho, Tokushima, 770-8501, Japan*

Corresponding Author:

***Tel.: +81 3 5454 6364, Fax: +81 3 5454 8244, E-mail: y-sawaki@ea.c.u-tokyo.ac.jp**

Abstract

Slab-melting is considered to have played an important role in the formation of continental crust. The combination of oxygen (O) and hafnium (Hf) isotope signatures can provide key information relating to the melting components during slab-melting. To reveal the melting components, we used SIMS and LA-ICP-MS to determine O isotope ratios at 220 spots and Hf isotope ratios at 61 spots in zircons from five plutons in the Taitao Peninsula, where slab-melting occurred at ca. 4–5 Ma. In addition, we measured whole-rock Hf–O isotope ratios in 11 rocks that were intruded by the granitoids. The zircon $\delta^{18}\text{O}$ values of the Seno Hoppner pluton ($5.37 \pm 0.44\text{‰}$) are identical to those of mantle-equilibrated zircons, whereas those of the other four plutons are relatively high (6.09–6.53‰). The $\epsilon_{\text{Hf}}(t)$ values of zircons in the granitoids are negatively correlated with $\delta^{18}\text{O}$, and they fell along the mixing line between a juvenile component and sedimentary rocks. Therefore, the Hf–O profiles can be attributed to mixing of juvenile granitoid magma and the sedimentary rocks, the amount of which was likely minimal in the Seno Hoppner pluton. As such, the $\delta^{18}\text{O}$ values of the Seno Hoppner pluton could best reflect the juvenile component. In view of the $\delta^{18}\text{O}$ variation in whole-rock samples of the Taitao ophiolite, the melting of hydrothermally altered basalt and dolerite is considered responsible for the juvenile magma generation. This further implies that juvenile granitoid magmas can be generated by the melting of the upper half of subducted oceanic crusts.

Keywords

slab-melting, ridge-subduction, oxygen isotope, hafnium isotope, Taitao granitoids.

1. Introduction

Revealing generation process of granitoid magma is critical to understanding the mechanism of continental crust formation. Melting of subducting crust—slab-melting—is an important model for the formation of granitoid. This process was first proposed with robust foundations in the Adak Island in Aleutians by Kay (1978). Slab-melting is suggested to have mainly occurred in the Archean owing to the high temperature of subducting oceanic crust at that time (e.g., Martin, 1986; 1999), but subduction of hot oceanic crust has occurred locally even at present (Defant and Drummond, 1990; Nelson and Forsythe, 1989; Iwamori, 2000). For example, it is suggested that post-Oligocene adakite was formed during slab-melting, because the rock mainly exists at localities where young (< 25 M.y.) and hot oceanic crust is subducting (Defant and Drummond, 1990). In addition, in the absence of high rates of shear heating, fluid-absent partial melting of subducting oceanic crust would occur during subduction of slab younger than 2–5 M.y. (Peacock et al., 1994). As another example, it is suggested that the Cretaceous granitoids in southwestern Japan were also formed by Kula–Pacific ridge subduction (e.g., Uyeda and Miyashiro, 1974; Kinoshita, 1999). Although various models have been proposed for the magma production during subduction of slab (e.g., Kay and Kay, 2002), it is considered that slab-melting may have played an important role in granitoid formation in the post-Archean.

The detailed mechanisms of slab-melting are not completely understood; in particular, it is still uncertain which part of the slab is melted. The upper part of the slab is composed of gabbro, doleritic dike, basaltic lava, and overlying sediments. Because these components have different oxygen (O) isotope ratios (e.g., Gregory and Taylor, 1981; Kempton et al., 1991; Lécuyer and Gruau, 1996), O isotopic data for whole rocks

and minerals have often been used to constrain the nature of the protolith that was melted to form igneous rock (e.g., Matsuhisa, 1979; Lackey et al., 2008). Previous works have reported the O isotope ratios ($\delta^{18}\text{O}$) of adakite lavas, which possibly contain melt from subducted oceanic crust, to identify their source rocks in the Andean Austral Volcanic Zone (Stern and Kilian, 1996), the Western and Central Aleutians, the Andes, Panama, Fiji, Kamchatka, Setouchi, and the Cascades (Bindeman et al., 2005). The combination of $\delta^{18}\text{O}$ value, trace element composition, and other isotopic signatures in these lavas implies that the $\delta^{18}\text{O}$ value of end-member adakitic melt without involvement of sediment melt is identical to, or slightly higher than, that of mantle peridotite ($\delta^{18}\text{O} = 5.5 \pm 0.2\text{‰}$) (Mattey et al., 1994; Eiler, 2001). Bindeman et al. (2005) proposed three possible mechanisms to account for the $\delta^{18}\text{O}$ value: (i) whole melting of the subducting oceanic crust, (ii) interaction of slab melt with mantle peridotite during magma ascent, and (iii) partial melting of mafic lower crust that was transported deeper by delamination or subduction–erosion. Because a possibility remains that the adakite magmas interacted with mantle during ascent, the adakites may not reflect the $\delta^{18}\text{O}$ value of the initial melt itself from subducted oceanic crust.

To circumvent this problem, we focused on the Taitao granitoids in western Chile (Fig. 1). It has been suggested that these granitoids were formed by slab-melting owing to ~5 Ma spreading ridge subduction (e.g., Anma et al., 2009), and a seismic study suggested that there is no mantle wedge in western Chile (Behrmann et al., 1994). Therefore, it is expected that the $\delta^{18}\text{O}$ values of the Taitao granitoids more directly reflect those of the initial magma generated by slab-melting. Moreover, at the Taitao peninsula, the candidates for the protolith of the Taitao granitoids crop out well as the Taitao ophiolite, a fragment of the subducted spreading ridge (Forsythe and Nelson,

1985; Nelson et al., 1993; Bourgois et al., 2016). Accordingly, an O isotopic study of the Taitao granitoids and ophiolite potentially provides new insights into the melted portion within the oceanic crust.

One major challenge in estimating the O isotope composition of initial slab melt for the Taitao granitoids is assessing the contamination of melts by sediments. The Taitao granitoids intruded into the sedimentary rocks of the pre-Jurassic basement. The strontium (Sr) isotope ratios of the granitoids indicate contamination by the sediments during its formation (Kaeding et al., 1990; Shin et al., 2015). Because clastic sediments and pelagic clays commonly have high $\delta^{18}\text{O}$ values (10–20‰ and 15–25‰, respectively; Eiler, 2001), the $\delta^{18}\text{O}$ value of primary granitoid magma should change owing to the involvement of these sediments.

The O isotope ratios of non-metamict zircons ($\delta^{18}\text{O}_{\text{Zrc}}$) reflect the $\delta^{18}\text{O}$ value of the protolith rather than the whole-rock $\delta^{18}\text{O}$ ($\delta^{18}\text{O}_{\text{WR}}$) values, because the $\delta^{18}\text{O}_{\text{WR}}$ value is usually modified by subsolidus processes (e.g., Matsuhisa, 1979; Taylor and Sheppard, 1986; Eiler, 2001; Lackey et al., 2008; Eiler et al., 2000; Ito et al., 2003). On the other hand, the $\delta^{18}\text{O}_{\text{Zrc}}$ value is highly resistant to post-crystallization modification and nearly constant irrespective of SiO_2 content (Valley et al., 1994; Lackey et al., 2008; Cherniak and Watson, 2003). Hafnium (Hf) isotopic compositions of zircon can also be used to evaluate the degree of sediment contamination (e.g., Kemp et al., 2007), because clastic sediments generally have distinct Hf isotopic compositions (low $^{176}\text{Hf}/^{177}\text{Hf}$ ratios). Therefore, we performed *in situ* O and Hf isotope analyses on zircons from the Taitao granitoids. In addition, in order to constrain the source rocks of the granitoids, we measured whole-rock O–Hf isotope ratios of rocks in the Taitao ophiolite and the pre-Jurassic basement. The combination of Hf and O systematics enabled us to

constrain the protoliths of the Taitao granitoids, which provided further information relating to the dominant melting component within subducted oceanic crust.

2. Geology

2-1. Geological setting of the Taitao granitoid

The westernmost part of the Taitao peninsula is composed of pre-Jurassic meta-sedimentary rocks (the Los Chonos complex), the Taitao ophiolite, and the Taitao granitoids. The Taitao granitoids are exposed ~50 km southeast of the Chile triple junction, where the spreading center of the Chile ridge between the Nazca plate and Antarctic plate is subducting beneath the South American plate (Fig. 1). Geophysical studies have indicated that spreading centers subducted repeatedly almost at the same location (the offshore area of the Taitao peninsula) at around 6 Ma, 3 Ma, and at present (Cande and Leslie, 1986; Forsythe et al., 1986; Guivel et al., 1999). On the basis of spatial and temporal correlations between the granitoids and subducted ridges, the Taitao granitoids are considered to be formed as a result of the ridge subduction (Forsythe et al., 1986). The Taitao granitoids are distributed around the Taitao ophiolite and include four main bodies and an intrusion: the Estero Cono, the Seno Hoppner, the Cabo Raper, and the Tres Montes plutons and a small intrusive body in the Bahia Barrientos (Fig. 2). The compositions of these granitoids range from tonalite, through trondhjemite and granodiorite, to granite (e.g., Kon et al., 2013). Crystallization ages of the Tres Montes pluton (5.70 ± 0.25 Ma), the Seno Hoppner pluton ($5.17\text{--}5.09 \pm 0.09$ Ma), the Estero Cono pluton (5.12 ± 0.09 Ma), the Bahia Barrientos intrusion (4.88 ± 0.07 Ma), and the Cabo Raper pluton ($3.84\text{--}3.97$ Ma) were determined by SHRIMP U–Pb dating of zircon (Hervé et al. 2003; Anma et al., 2009). Zircon fission track dating

for the Estero Cono pluton and Bahia Barrientos intrusion yielded ages of 3.49 Ma and 3.47 Ma, respectively (Hervé et al. 2003). It is widely accepted that rare earth element (REE) abundances in granitoids are useful for investigating the depth of granitoid magma genesis (Martin, 1986; Defant and Drummond, 1990). As such, the heavy rare earth element (HREE)-depleted composition ($4 < Yb_N < 9$) and moderately fractionated REE pattern ($[La/Yb]_N \leq 10$) in the Cabo Raper pluton, together with its isotopic signatures ($I_{Sr} \sim 0.7045$, $\epsilon_{Nd} \sim +1.5$), have been used to argue for magma generation by partial melting of garnet-bearing altered mafic igneous rocks (Bourgois et al., 1996). However, their Sr contents and $[La/Yb]_N$ values are lower than those of typical HREE-depleted Archean Tonalite–Trondhjemite–Granodiorite (TTG), which are also considered to be generated in the garnet stability field. Furthermore, granitoids from the Cabo Raper, Estero Cono, and Seno Hoppner plutons show high Y (10–50 ppm) and Yb contents ($8 < Yb_N < 35$), low Sr/Y ratios ($1 < Sr/Y < 20$), and moderately low La/Yb ratios ($5 < [La/Yb]_N < 20$) (Kon et al., 2013). These chemical compositions are more similar to those of post-Archean granitoids and island arc Andesite–Dacite–Rhyolite (ADR) rather than those of Archean TTG and adakite. This suggests that the granitic magma was generated by partial melting within the stability field of plagioclase rather than garnet. In view of their compositions together with depth of subducting oceanic crust near the Chile triple junction (Couch et al., 1981; Bangs et al., 1992; Cahill and Isacks, 1992), Kon and colleagues (2013) concluded that the granitoid magma was generated by slab-melting at < 30 km depth.

Based on radiogenic Sr and non-radiogenic Nd isotope ratios ($^{87}Sr/^{86}Sr = 0.70435\text{--}0.70497$, $^{143}Nd/^{144}Nd = 0.51271\text{--}0.51288$), Kaeding et al. (1990) suggested that the Cabo Raper pluton, Bahia Barrientos intrusion, and Seno Hoppner pluton

involved ~15%, ~15%, and ~10% sediments, respectively, during either magma generation or ascent. Shin et al. (2015) also suggested 5–10% incorporation of sedimentary rocks into the Seno Hoppner pluton. Based on Sr and Nd isotopic data from the Taitao granitoids ($^{87}\text{Sr}/^{86}\text{Sr} = 0.70408\text{--}0.70818$, $^{143}\text{Nd}/^{144}\text{Nd} = 0.51244\text{--}0.51283$), the Taitao ophiolite, and the basement rocks, these workers further indicated that more abundant sedimentary rocks were involved in the Cabo Raper, Estero Cono, and Tres Montes plutons and the Bahia Barrientos intrusion as compared with the Seno Hoppner pluton.

We analyzed Hf–O isotope ratios and chemical compositions in zircons separated from three tonalites from the Cabo Raper pluton, two trondhjemites from the Seno Hoppner pluton, one tonalite from the Estero Cono pluton, one tonalite from the Bahia Barrientos intrusion, and one granite from the Tres Montes pluton (Table S1). Sampling localities are shown in figure 2.

2-2. Geological setting of the Taitao ophiolite

The Taitao ophiolite consists of sedimentary rocks, pillow lava/sheet flows, rhyolites, sheeted doleritic dikes, gabbros, and ultramafic rocks (Fig. 2; Forsythe et al., 1986; Nelson et al., 1993; Bourgois et al., 1993, 2016; Guivel et al., 1999; Veloso et al., 2005; Anma et al., 2006; Shibuya et al., 2007). The ophiolite contains a complete sequence of oceanic crust, but the internal structure of the ophiolite is complex because of many thrusts and folds (Veloso et al., 2005). Volcanic sequences (pillow lava/sheet flows) are separated into two bodies: the main volcanic unit (MVU) in the northern region and the Chile margin unit (CMU) in the eastern region of the ophiolite. The sheeted dikes, gabbros, and ultramafic rocks are partially intruded by the Taitao

granitoids. Based on the metamorphic zone boundaries subparallel to the internal lithologic boundaries, it is considered that the Taitao ophiolite suffered seafloor hydrothermal metamorphism at a mid-ocean ridge (Shibuya et al., 2007).

Whole-rock K–Ar ages from the MVU and CMU range from 4.6 Ma to 2.5 Ma (Mpodozis et al., 1985). Anma and Orihashi (2013) recently reported zircon U–Pb ages of the CMU ranging from 5.2 Ma at the Southern Taitao Ridge off-shore the Taitao peninsula to 4.9 Ma in the northern part. Anma et al. (2006) presented zircon SHRIMP U–Pb ages of 5.66–5.59 Ma for the gabbros and 5.19 Ma for the sheeted dikes. Based on these ages, they concluded that ridge subduction took place since 6 Ma.

In this study, we selected samples for whole-rock Hf–O analyses (based on metamorphic temperatures calculated by Shibuya et al. (2007) to cover the entire section of oceanic crust (Table S1). We selected two lavas in the MVU (TPH342 and TPH347), and their metamorphic temperatures were estimated to be *ca.* 200 °C and *ca.* 200–350 °C, respectively. We further selected a dolerite (TPE110) whose metamorphic temperature was estimated to be 347–375 °C. A gabbro (TPE73) and a pyroxenite (TPE30) were selected, because they were located close to the metamorphic temperature-constrained gabbro (TPE72; 550 °C) and peridotite (TPE014; 750–850 °C). Four sedimentary rocks in the MVU and two sedimentary rocks in the pre-Jurassic basement rocks were chosen to cover the variations in rock type.

2-3. Petrography of the Taitao granitoids

Representative photographs of rock specimens and thin sections of the granitoids are shown in figure 3. The granitoids displayed equigranular textures and mainly consisted of plagioclase, quartz, biotite, K-feldspar, and hornblende with minor amounts

of muscovite (Figs. 3B, C, and D), and modal abundance in each sample is summarized in table S1. Chlorite and actinolite were observed as secondary minerals, and accessory minerals were magnetite, ilmenite, zircon, and apatite. Samples TPE90, TPE88, and TPB56 from the Cabo Raper pluton, TPD116 from the Seno Hoppner pluton, TPE135 from the Estero Cono pluton, and TPB243 from the Bahia Barrientos intrusion were composed of medium- to coarse-grained minerals, and their average lengths were *ca.* 1 mm (e.g., Fig. 3C). Sample TPG171, a microtrondhjemite dike which intruded into hornfels of the Seno Hoppner pluton, is composed of relatively fine-grained minerals with average lengths of *ca.* 400 μm (Figs. 3A and B). The sample contained aggregates of fine-grained hornblende and plagioclase ($\sim 10\text{--}200\ \mu\text{m}$, Fig. 3B). Sample TPH75 was collected from a leucocratic granitic dike which was formed during the intrusion of syn-plutonic melanocratic dike into the Tres Montes pluton. The granite is composed of medium-grained minerals ($\sim 1\ \text{mm}$) with fine-grained quartz that exhibits a mosaic texture (Fig. 3D).

A normative An–Ab–Or diagram (after Barker, 1979) for selected granitoids is shown in figure 4 (analytical methods and whole-rock compositions of the granitoids are given in the supplementary file). As seen in previous studies (e.g., Anma et al. 2009; Kon et al., 2013), samples from the Bahia Barrientos intrusion and Cabo Raper and Estero Cono plutons plotted within the tonalite field. Samples from the Seno Hoppner pluton plotted within the trondhjemite field (Fig. 4). The composition of TPD116 coincided with samples from the Seno Hoppner pluton, as reported in previous studies (e.g., Anma et al., 2009; Kon et al., 2013). On the other hand, sample TPG171 is K-poor, and its chemical composition is different from that of any other Taitao granitoids. Sample TPH75 from the Tres Montes pluton is plotted on the boundary between the granite and quartz monzonite

fields; it also had a composition distinct from other granitoids (Fig. 4).

2-4. Petrography of the rocks in the Taitao Ophiolite and pre-Jurassic basement

Representative photographs of thin sections of the nine samples from the Taitao Ophiolite and two samples from pre-Jurassic basement rocks are shown in figure 3. The lavas in the MVU (TPH342 and TPH347) are composed of fine-grained plagioclase, clinopyroxene, quartz, and glass, and they include chlorite, epidote, prehnite, and laumontite as alteration minerals (Shibuya et al., 2007; Fig. 3E). Almost all plagioclase grains in the lavas showed a hollow crystal structure. The dolerite (TPE110) shows an aphyric texture composed of fine-grained minerals, and igneous clinopyroxene still partly remains (Fig. 3F). As alteration minerals, chlorite, plagioclase, epidote, actinolite, hornblende, and carbonate are included (Shibuya et al., 2007). The gabbro (TPE73) is composed of coarse-grained olivine, orthopyroxene, clinopyroxene, plagioclase and subordinate amounts of magnetite and ilmenite (Fig. 3G). The coarse-grained pyroxenite (TPE30) is composed of clinopyroxene, olivine, plagioclase, magnetite, and picotite. Serpentine and chlorite were observed as alteration minerals in the gabbro and pyroxenite. The existence of hydrous minerals in the lavas, dolerite, gabbro, and pyroxenite suggests that these samples underwent hydrothermal alteration.

A representative photograph of the sedimentary rocks from the pre-Jurassic basements (TPB252) is shown in figure 3H. The sedimentary rocks mainly consist of quartz, feldspar, muscovite, and biotite of visible ($> 20 \mu\text{m}$) sizes. The mosaic texture observed in TPH75 from the Tres Montes pluton is similar to the texture of TPB252 (Figs. 3D and 3H).

3. Sample preparation and analytical procedures

Detailed analytical procedures for whole-rock major element composition analysis, zircon U–Pb dating, and REE concentrations in zircon are provided in the supplementary file and table S2. In the following paragraphs, we introduce analytical methods for O and Hf isotope ratio measurements.

3-1. Zircon separation and observation techniques

Zircon grains were extracted from three tonalites of the Cabo Raper pluton, two trondhjemites of the Seno Hoppner pluton, one tonalite of the Estero Cono pluton, one tonalite of the Bahia Barrientos intrusion, and one granite of the Tres Montes pluton by standard crushing, panning, and magnetic separation techniques. The grains were mounted in 25-mm epoxy disks with chips of KIM-5 standard zircon (Valley et al., 1998; Valley, 2003) and polished until the midsections of the grains were exposed. The internal structures of the zircons and the presence of inclusions were assessed using transmitted and reflected light optical microscopy and cathodoluminescence (CL) imaging. The CL images were acquired using a Hitachi S-3400N scanning electron microscope (Hitachi High Tech. Corp., Japan) with a Chroma CL2 sensor (Gatan, Inc., USA) at the Tokyo Institute of Technology. Before *in situ* analyses, we described the internal textures of the zircons as rim, magmatic core, and inherited core, and selected the analytical spots. We conducted U–Pb dating (Table 1), trace element analysis (Table S3), and O and Hf isotope analyses (Tables 2 and 3) on the zircons.

3-2. *In situ* O isotope analysis

Before O isotope analysis, the epoxy mounts were washed with de-ionized water and

ethanol in an ultrasonic bath. The mounts were dried in N₂ gas and a vacuum oven prior to coating with Au for SIMS O isotope analysis. The O isotope ratios were determined using a CAMECA IMS-1280 at the WiscSIMS Laboratory in the University of Wisconsin–Madison, following the procedures reported by Kita et al. (2009) and Valley and Kita (2009). *In situ* O isotopes were analyzed using a 2.0–2.2 nA primary Cs⁺ beam with a ~10 μm spot size. Secondary ¹⁶O and ¹⁸O ions were measured simultaneously using two Faraday cup detectors. KIM-5 zircon ($\delta^{18}\text{O} = 5.09\text{‰}$ relative to Vienna standard mean ocean water (VSMOW); Valley, 2003) was used as a standard, and the average value of eight standard analyses bracketing each 10 analyses of unknowns was used to correct for instrumental bias. The precision of each analysis (*ca.* 0.3‰ on average) was estimated based on 2 standard deviations (SD) of the reproducibility of the bracketing standard analyses. The O isotope ratios are reported using standard per mil notation ($\delta^{18}\text{O}_{\text{Zrc}}$) relative to VSMOW (Table 2). During the O isotope analysis, we monitored ¹⁶OH/¹⁶O values for each zircon standards and samples to evaluate influence of metamict. The ¹⁶OH/¹⁶O values in the samples are very low as well as KIM-5 (Table S4).

3-3. *In situ* Hf isotope analysis

We measured Hf isotope ratios at the same spots used for the O isotope analysis (Fig. 5) using a LSX-213 G2+ laser ablation system (Teledyne CETAC) coupled with a Neptune Plus multicollector inductively coupled plasma mass spectrometer (MC-ICP-MS; Thermo Fisher Scientific) at the University of Tokyo. Data were acquired from ~40 μm ablation pits with a laser repetition rate of 4 Hz and ~60 s ablation times. He gas was used as a carrier gas to promote sample transport efficiency and minimize the

red deposition of sample aerosol around the ablation pit. Furthermore, ~5 mL/min N₂ was mixed into the carrier gas to enhance signal intensity (Iizuka and Hirata, 2005). Instrumental mass bias and isobaric interferences of Yb and Lu on Hf were corrected following the data reduction protocols of Iizuka and Hirata (2005). Mud Tank zircon was chosen for normalization of the isotope ratios. The analytical errors combine the internal run errors (2 standard errors [SE]) and the reproducibility of the Mud Tank standard zircon analyses (2 SD), added in quadrature. To evaluate the accuracy and precision of our data acquisition, we performed repeated analyses of the zircon standards R33 and FC-1. Data obtained during the course of this study yielded mean initial ¹⁷⁶Hf/¹⁷⁷Hf of 0.282742 ± 69 (2 SD, n = 28) for R33. These results are in good agreement with the initial ¹⁷⁶Hf/¹⁷⁷Hf ratios determined by wet analysis using MC-ICP-MS (0.282767 ± 18 for R33; Fisher et al., 2014). More detailed analytical procedures are given by Iizuka et al. (2013). Hf isotopic value of zircon is reported as εHf(t) based on its ²³⁸U–²⁰⁶Pb age.

3-4. Whole-rock O isotope analysis

Powdered 11 samples prepared from ophiolite body, sediments, basement rocks (Table S1), and standard powders (2–3 mg) were loaded into individual nickel pins. The loaded pins were placed in a sample tray within an airlock chamber and evacuated for 2–3 h (to <10⁻³ torr). Samples and standards were then individually transferred for each analysis through a gate valve to an evacuated analysis chamber for laser fluorination. After the gate valve was closed (isolating unreacted samples in the airlock chamber), BrF₅ was introduced into a U-shaped trap immersed in liquid nitrogen (–196 °C), and then both the U-shaped trap and the analysis chamber were again evacuated. The analysis

chamber was isolated from the vacuum line, and the BrF_5 was liberated by heating the U-shaped trap. The remaining steps, including laser heating, sample gas purification, conversion to CO_2 , and O isotopic measurement, were identical to standard laser fluorination procedures (Valley et al., 1995; Spicuzza et al., 1998). O isotopic measurement was performed on a triple-collecting Finnigan/MAT 251 mass spectrometer (Thermo Fisher Scientific) at the University of Wisconsin–Madison.

3-5. Whole-rock Hf isotope analysis

The 11 rocks collected from the ophiolite body, sediments, and basement rocks were prepared for whole-rock Hf isotope measurement (Table S1). Thin (~1 cm thick) rock chips weighing about 20–70 g were cut from fresh samples. The chips were washed with distilled water using an ultrasonic device, dried completely at 120 °C, and then crushed using a stainless mortar, an agate ball mill, and an agate mortar. Next, 20–200 mg samples of the powders were decomposed with concentrated $\text{HF} + \text{HNO}_3$ in sealed Teflon beakers at ~200 °C. The decomposed samples were converted to a soluble form by repeated evaporation with concentrated $\text{HNO}_3 + \text{HClO}_4$, followed by re-dissolution in 6 N HCl at 120 °C. Chemical separation of Hf was performed by a two-step ion exchange procedure. In the first separation step, 0.05 mL of Bio-Rad anion exchange resin (AG1-X8; 200–400 mesh) was loaded into the column. As such, matrix elements were removed, and Hf was recovered with 6 N HCl . Hf was further purified in the second step using 0.1 mL of Eichrom Ln-spec resin (100–150 μm); the Hf was recovered with 0.5 N HNO_3 and 0.2 N HF . The purified Hf fractions were evaporated and dissolved in 2 mL of 0.5 N HNO_3 with a trace amount of HF for isotope analysis. Procedural Hf blanks were 2–6 pg.

The Hf isotopic measurements were performed on a Neptune Plus MC-ICP-MS attached to an Aridus II desolvating nebulizer (CETAC Technologies) at the University of Tokyo. The instrument was equipped with high-transmission jet sample and X-skimmer cones, resulting in a typical sensitivity of 3500–4000 V/ppm for Hf with a sample introduction rate of ~150 $\mu\text{L}/\text{min}$. Nine Faraday cups were set to monitor the isotopes ^{172}Yb , ^{174}Hf , ^{175}Lu , ^{176}Hf , ^{177}Hf , ^{178}Hf , ^{179}Hf , ^{180}Hf , and ^{182}W . Owing to the column chemistry, efficient separation of Hf was achieved, with interferences from Yb, Lu, and W found to be trivial. Data were acquired in the static mode over 60 cycles using an integration time of 8.4 s. Instrumental mass bias was corrected by normalizing the measured $^{179}\text{Hf}/^{177}\text{Hf}$ to 0.7325 using an exponential law. Mass bias corrected $^{176}\text{Hf}/^{177}\text{Hf}$ ratios were further normalized to the reference value of 0.282160 for the JMC-475 standard (Blichert-Toft et al., 1997). Analytical uncertainties in the Hf isotope ratios combined the internal precisions (2 SE) and the reproducibility (2 SD) of the JMC-Hf 475, added in quadrature (Table 3). The chondritic parameters reported by Iizuka et al. (2015) were used to calculate ϵHf values.

4. Results

4-1. Zircon morphology and CL images

Representative CL images of analyzed zircons are shown in figure 5. Zircons in the Taitao granitoids typically displayed euhedral shapes with dimensions generally ranging from 50×50 to $100 \times 200 \mu\text{m}$; they are colorless, pink, or orange. Zircons in samples from the Bahia Barrientos intrusion (TPB243), Tres Montes (TPH75), and Seno Hoppner (TPD116) plutons are smaller than those from other plutonic bodies. In general, zircon grains exhibited coherent core-to-rim textures, such as oscillatory zoning (e.g., TPE56-3

and TPB243 in Fig. 5) and/or sector zoning (e.g., TPG171-14 and TPD116-8 in Fig. 5). On the other hand, some zircon grains show incoherent textures at their cores (e.g., TPE56-2 and TPH75-7 in Fig. 5). Hereafter, we describe the coherent cores in oscillatory zoning or sector zoning as “magmatic core” and the incoherent cores as “inherited core” (Tables 1–3).

Inherited cores are observed in the zircons from granitoids in the Cabo Raper, Estero Cono, Tres Montes plutons and the Bahia Barrientos intrusion (Figs. 5A–F). The Tres Montes pluton had the highest percentage of zircons, including inherited cores, among the Taitao granitoids (Fig. 5F). This observation is consistent with that of Anma et al. (2009). The optical nature of the inherited cores differed depending on the sample. Specifically, inherited cores in TPH75-6 and TPB243-18 showed as pale violet in CL images, whereas their surrounding rims showed as light blue (Figs. 5E and F). The brightness of inherited cores in zircons from TPE56-11 was darker than that of their rims (Fig. 5A). On the other hand, the differences in color and brightness between inherited cores and their rims in some zircons separated from TPE88, TPE90, and TPE135 (for example, TPE88-15, TPE88-8, and TPE90-36; Figs. 5B and C) are obscure.

Zircons in the microtrondhjemite dike (TPG171) from the Seno Hoppner pluton displayed a large homogeneous zone, which formed an angular shape, within their core (Fig. 5G). These cores are mantled by rims showing fine oscillatory zoning. On the other hand, such large homogeneous cores are rare in zircon grains from another trondhjemite from the Seno Hoppner pluton (TPD116). Instead, most grains displayed fine oscillatory zoning from core to rim (Fig. 5H). We considered both of these cores as magmatic cores.

4-2. REE composition and U–Pb age

The REE compositions of the zircons are shown in table S3, and CI chondrite-normalized REE patterns are shown in figure S2. All zircons displayed HREE-enriched patterns, which are common in igneous zircon (e.g., Hoskin and Ireland, 2000). Almost all zircons displayed a positive Ce anomaly and negative Eu anomaly, the latter reflecting the degree of fractional crystallization of plagioclase before zircon formation (e.g., Hoskin and Schaltegger, 2003). In REE concentrations, no significant variations are observed between magmatic core, rim, and inherited core (Fig. S2). The observed variation in zircon Yb/Sm ratio for the Seno Hoppner pluton is relatively small, compared with those for the Cabo Raper pluton and Bahia Barrientos intrusion (Table S3).

The U–Pb ages of zircons are shown in table 1. The Th/U ratios of most zircons fall within the range of typical Th/U ratios of igneous zircons (> 0.5 ; Hoskin and Schaltegger, 2003). The obtained ^{238}U – ^{206}Pb ages from magmatic cores and rims in zircons from the Cabo Raper (4.1 ± 1.2 Ma), Estero Cono (5.1 ± 0.7 Ma), Tres Montes (5.5 ± 1.3 Ma), and Seno Hoppner plutons (5.3 ± 0.9 Ma) and the Bahia Barrientos intrusion (4.9 ± 0.7 Ma) are similar to those reported in previous work (3.84–5.70 Ma; Anma et al., 2006). The ages of inherited cores in the zircons from the Cabo Raper and Tres Montes plutons varied from 3.2 to 1515.2 Ma (Fig. 5 and Table 1). On the other hand, the ages of inherited cores in the zircons from the Estero Cono pluton ranged from 4.4 to 5.6 Ma, which is similar to those of their surrounding rims and magmatic cores.

4-3. O isotope ratios of zircons

The O isotope compositions of the zircons are shown in table 2 and figure 6. The

$\delta^{18}\text{O}_{\text{Zrc}}$ values of magmatic cores and rims in the zircons ranged from 4.9‰ to 6.9‰, with mean values of the individual plutons as follows (Fig. 6): Tres Montes ($6.53 \pm 0.60\text{‰}$, 2SD), Bahia Barrientos ($6.46 \pm 0.51\text{‰}$), Cabo Raper ($6.17 \pm 0.54\text{‰}$), Estero Cono ($6.09 \pm 0.41\text{‰}$), and Seno Hoppner ($5.37 \pm 0.44\text{‰}$). Almost all $\delta^{18}\text{O}_{\text{Zrc}}$ values from the Seno Hoppner pluton are identical to those of mantle-equilibrated zircons ($5.3\text{‰} \pm 0.6\text{‰}$; Valley et al., 1998) within analytical uncertainty, whereas most zircons from the other four plutons exhibited *ca.* 1‰ higher $\delta^{18}\text{O}_{\text{Zrc}}$ values compared with mantle-equilibrated zircons.

Except for the Seno Hoppner pluton, inherited cores are observed in zircons from four plutonic bodies (Fig. 5). The $\delta^{18}\text{O}$ values in the inherited cores ranged from 5.0‰ to 8.3‰ (Table 2). The distribution patterns of the $\delta^{18}\text{O}$ values varied between the four plutons (Fig. 6). The Tres Montes and Cabo Raper plutons included inherited cores exhibiting higher $\delta^{18}\text{O}$ values (7.22–8.32‰) than those of their magmatic cores and rims. Single inherited cores in both the Bahia Barrientos intrusion and Cabo Raper pluton showed mantle-like $\delta^{18}\text{O}$ values (4.99‰ and 5.19‰, respectively), which are lower than those of their magmatic cores and rims. In contrast, the range of $\delta^{18}\text{O}$ values for inherited cores in zircons from the Estero Cono pluton is equivalent to that from their magmatic cores and rims (Fig. 6).

4-4. Zircon Hf isotope ratio

The measured zircon Hf isotope ratios are listed in table 3. They are also plotted as a function of $\delta^{18}\text{O}$ value in figure 7, together with the results of whole-rock analyses. Data from inherited cores are not included in figure 7. The $\varepsilon\text{Hf}(t)$ values of all zircons from the Taitao granitoids ranged from 0.86 to 9.15. The observed zircon Hf isotopic

values are negatively correlated with the zircon $\delta^{18}\text{O}$ values, and these data sets are distributed between those of the sedimentary rocks and dolerite-gabbro-pyroxenite in the Taitao ophiolite. The microtrondhjemite (TPG171) in the Seno Hoppner pluton, which included zircons exhibiting mantle-like $\delta^{18}\text{O}$ values, exhibited higher zircon $\epsilon\text{Hf}(t)$ values (7.45 ± 1.61), compared with other granitoids that include zircons having elevated $\delta^{18}\text{O}$ values (from 3.51 to 7.16; Table 3). The $\epsilon\text{Hf}(t)$ values of all zircons from the Seno Hoppner pluton are within the range of mid-ocean ridge basalts reported by Andres et al. (2004) (from 3.47 to 23.16; these values were recalculated by using the chondritic parameters of Iizuka et al. (2015)).

4-5. Whole-rock O isotope ratios

Whole-rock major element composition is shown in tables 4 and S5 and figure 4. The results of whole-rock O isotopic analysis on 11 samples that were exposed around the Taitao granitoids are shown in table 4. The $\delta^{18}\text{O}_{\text{WR}}$ values of the sedimentary rocks (8.32–10.70‰), altered basalts (8.00–8.34‰), and gabbro (6.11‰) within the ophiolite, and the sedimentary rocks in the basement (7.91–11.29‰) are elevated compared with the mantle values (5.4–5.8‰; Ionov et al., 1994). On the other hand, the dolerite and pyroxenite within the ophiolite showed lower $\delta^{18}\text{O}_{\text{WR}}$ values (4.40‰ and 4.85‰, respectively) compared with the mantle values.

4-6. Whole-rock Hf isotope ratios

The results of whole-rock Hf isotope analysis are shown in table 4. The pyroxenite in the ophiolite showed the highest ϵHf value (19.10 ± 0.27). The ϵHf values of the gabbro (15.02 ± 0.51), dolerite (13.73 ± 0.41), and altered basalts (9.78–12.82) are also

within the range of juvenile continental crust (Iizuka et al., 2017). Except for one of the altered basalts (TPH 342), these ϵ_{Hf} values are similar to those of N-MORB (12.9–23.9; Andres et al., 2004). On the other hand, the ϵ_{Hf} values from the sedimentary rocks within the ophiolite body (−7.10 to 1.25) and the sedimentary rocks in the basement (−1.44 to 0.47) are clearly lower than those of mafic–ultramafic rocks.

5. Discussion

5-1. Protoliths of the Taitao granitoids

The combination of $\delta^{18}\text{O}_{\text{Zrc}}$ and Hf isotope ratios for zircon enabled us to estimate the magmatic protolith (e.g., Kemp et al., 2007; Li et al., 2010). The $\delta^{18}\text{O}_{\text{Zrc}}$ value is nearly constant during the crystal fractionation process (Valley et al., 1994; Lackey et al., 2008), and the $\delta^{18}\text{O}$ value of non-metamict zircon is resistant to later alteration by meteoric water (e.g., Cherniak and Watson, 2003; Page et al., 2007a), contrary to the $\delta^{18}\text{O}_{\text{WR}}$ value (e.g., Matsuhisa, 1979; Taylor and Sheppard, 1986; Eiler et al., 2000; Eiler, 2001; Ito et al., 2003; Lackey et al., 2008). For this reason, the $\delta^{18}\text{O}_{\text{Zrc}}$ value is more suitable than the $\delta^{18}\text{O}_{\text{WR}}$ value for estimating the protolith of granitoids. Because the zircons in the Taitao granitoids are young (*ca.* 4–6 Ma; Table 1) and not metamict (Fig. 5), the influence of later alteration processes on the $\delta^{18}\text{O}_{\text{Zrc}}$ and $\epsilon_{\text{Hf}}(t)$ values was likely minor (Wang et al., 2014; Valley et al., 2015). Moreover, we determined the $\delta^{18}\text{O}_{\text{WR}}$ and whole-rock ϵ_{Hf} values of possible protoliths of the Taitao granitoids. Because Hf is fluid-immobile, the whole-rock Hf isotope ratio would not have been significantly changed by later alteration processes. On the other hand, the $\delta^{18}\text{O}_{\text{WR}}$ value is more labile than the Hf isotope ratio. The sequence of the Taitao ophiolite serves as a record of seafloor metamorphism (Shibuya et al., 2007). The petrological study indicates that

dehydration during emplacement of the Taitao ophiolite was likely minor, implying that the $\delta^{18}\text{O}_{\text{WR}}$ values in the rocks did not change significantly at this time. Because reaction between rocks and meteoric water at the surface decreased the whole-rock O isotope ratio, the $\delta^{18}\text{O}_{\text{WR}}$ values in this study are regarded as the lower limit of the O isotope ratios of the whole-rock samples.

The $\delta^{18}\text{O}_{\text{Zrc}}$ values from the Tres Montes, Cabo Raper, Bahia Barrientos, and Estero Cono plutons are identical to, or slightly higher than, those of mantle-equilibrated zircons ($5.3 \pm 0.6\text{‰}$; Valley et al., 1998; 2005; Page et al., 2007b; Table 2, Fig. 6). Among the rocks surrounding the Taitao granitoids, sedimentary rocks (from 7.9 to 11.3‰) and altered basalts (from 8.0 to 8.3‰) showed elevated $\delta^{18}\text{O}_{\text{WR}}$ values (Table 4). Therefore, the slightly elevated $\delta^{18}\text{O}_{\text{Zrc}}$ values of these four plutons suggest the involvement of (i) sedimentary rocks and/or (ii) altered basalts in the generation of the granitoid magma. The $\epsilon_{\text{Hf}}(t)$ values of zircons from the Taitao granitoids are negatively correlated with the $\delta^{18}\text{O}_{\text{Zrc}}$ values (Fig. 7). This distribution pattern is better explained on the basis of mixing with the sedimentary rocks than with the altered basalts, thereby suggesting the contribution of sedimentary rocks to some of the Taitao granitoids. This view is consistent with the previous works which have noted the contamination of the granitoid magma by sedimentary rocks based on Nd-Sr isotope ratios (Kaeding et al., 1990; Shin et al., 2015). Anma and Orihashi (2013) suggested that igneous rocks including Taitao granitoids show evidence for incorporation of subducted sediments rather than sediment within the basement, based on age distribution of detrital and xenocrystic zircons. Because subducting oceanic crust was young, volume of pelagic sediment on the crust was likely much smaller than that of trench-fill sediment. Thus,

we consider that the trench-fill sediment accounted for a large portion of the assimilated sediments.

Inherited cores, viewed by CL, are found in zircons from the Tres Montes, Bahia Barrientos, Cabo Raper, and Estero Cono plutons (Fig. 5). The $\delta^{18}\text{O}$ values of the inherited cores of zircons range from 5.0 to 8.3‰, some of which are higher than the $\delta^{18}\text{O}$ range of the magmatic core and rim (Table 2; Fig. 6). In addition, the U–Pb ages of the inherited cores are up to ~1500 m.y. older than those of the magmatic core and rim (Table 1). These data also suggest assimilation of zircons from sedimentary rocks during formation of the four plutons. The magmatic core and rim of zircons from the Tres Montes pluton showed the highest mean $\delta^{18}\text{O}$ value ($6.53 \pm 0.60\text{‰}$; Figs. 6 and 7) and the lowest mean $\varepsilon\text{Hf}(t)$ value (3.51 ± 3.42 ; Table 3 and Fig. 7) among the five analyzed plutons. Inherited zircons are found most frequently in the Tres Montes pluton (Fig. 6), as reported in previous studies (Anma et al., 2009, Shin et al., 2015). The mosaic texture observed in the Tres Montes pluton (Fig. 3D) also suggests contamination by the sedimentary rocks such as TPB252. These lines of evidence suggest that the parental magma of the Tres Montes pluton was contaminated by sedimentary rocks more significantly than those of the other plutons. The result is consistent with the Sr–Nd isotope ratios of the Tres Montes pluton (Shin et al., 2015). The nature of CL images of the inherited core differed depending on the sample (Fig. 5). This difference may result from variation in the source rock of the zircon and/or variation in the melting temperature when the inherited zircons were included.

Unlike the other plutons, almost all $\delta^{18}\text{O}_{\text{Zrc}}$ values from the Seno Hoppner pluton are identical to those of the mantle-equilibrated zircon (Figs. 6 and 7; Valley et al., 1998; 2005; Page et al., 2007b). In addition, all $\varepsilon\text{Hf}(t)$ values of zircons in the Seno

Hoppner pluton are within the range of mid-ocean ridge basalts (3.47–23.16; Andres et al., 2004). Taking into consideration the fact that inherited cores are not observed in zircons from the Seno Hoppner pluton (Fig. 5), it is considered that the parental magma of the Seno Hoppner pluton involved minor sedimentary rocks during emplacement and that its Hf–O isotope ratios were little influenced by sedimentary rocks. Based on the minor amount of inherited zircon, previous studies have also suggested that the Seno Hoppner and Cabo Raper plutons were formed from rather juvenile granitoid magma (Anma et al., 2009; Kon et al. 2013). The Sr–Nd isotopic data in previous studies suggested minor (5–10%) contamination of sedimentary rocks in the Seno Hoppner pluton compared with other plutons (~10–30%; Kaeding et al., 1990; Shin et al., 2015). Smaller variation in zircon Yb/Sm ratio for the Seno Hoppner pluton than those for the Cabo Raper pluton and Bahia Barrientos intrusion (Table S3) also supports the minor contamination of sedimentary rocks in the Seno Hoppner pluton. These results imply that juvenile granitoid magmas generated by slab-melting have Hf and O isotope compositions similar to those of the upper mantle.

5-2. Implications for slab-melting components

The O and Hf isotopic data for the Taitao granitoids, Taitao ophiolite, and sedimentary rocks in the pre-Jurassic basement indicate that the Taitao granitoids were generated by the mixing of juvenile components that had higher ϵ_{Hf} values and sedimentary components that had elevated $\delta^{18}\text{O}$ and lower ϵ_{Hf} values (Fig. 7). There are two candidates for the juvenile component: partial melting of (i) a parent rock that had a mantle-like $\delta^{18}\text{O}$ value and/or (ii) several types of rocks, at least one of which had a lower $\delta^{18}\text{O}$ value. Based on the geological setting (Fig. 2), the most plausible candidate

for the juvenile component of the Taitao granitoids is subducted oceanic crust. Oceanic crust formed in an oceanic environment commonly suffers seafloor metamorphism, and O isotope ratios of rocks in the oceanic crust are overprinted depending on the reaction temperature, from higher $\delta^{18}\text{O}$ values at the surface to lower $\delta^{18}\text{O}$ values in deeper portions of the crust (e.g., Gregory and Taylor, 1981). Indeed, within the Taitao ophiolite, altered basalts exhibited higher $\delta^{18}\text{O}_{\text{WR}}$ values (up to 8.34‰), and dolerite had a lower $\delta^{18}\text{O}_{\text{WR}}$ value (4.40‰; Table 4 and Fig. 7) compared with the mantle $\delta^{18}\text{O}$ value. In general, because the water content of oceanic crust decreases from surface basalt to deeper gabbro, basalt should be more readily melted than gabbro in subducted oceanic crust. Therefore, it is unlikely that the mantle-like $\delta^{18}\text{O}_{\text{Zrc}}$ values of the Taitao granitoids resulted solely from partial melting of a parent rock that had a mantle-like $\delta^{18}\text{O}$ value. Rather, we argue that the slab-melting generated in the Taitao granitoids extended from surface basalt with a higher $\delta^{18}\text{O}_{\text{WR}}$ value to deeper dolerite with a lower $\delta^{18}\text{O}_{\text{WR}}$ value (Fig. 8), resulting in the generation of granitoid magma with a mantle-like O isotope signature (Fig. 7). Therefore, partial melting of (ii) several types of rocks, at least one of which had a lower $\delta^{18}\text{O}$ value (in this case, dolerite), is the most likely process to create the juvenile component. Thermodynamic calculations have indicated that the dolerite, including TPE110, was at *ca.* 2–4 km depth in the oceanic crust (Shibuya et al., 2007). Thus, the Taitao granitoids would have been generated by partial melting of at least the upper half of the subducted oceanic crust.

The melting depth of the subducted oceanic crust was estimated numerically in a previous study. Iwamori (2000) calculated the temperature and H_2O distributions of subducted oceanic crust to constrain the timing of melting and metamorphism in such a subducted oceanic and the overlying arc crust. In a case where the subduction velocity

is 6.3 cm/yr, melting could occur when young (–2.5 to 10 m.y. relative to the timing of ridge subduction) oceanic crust subducts. This subduction velocity and timing of melting could be similar to those of the formation process of the Taitao granitoids. This calculation further suggests that melting of the uppermost and the lowermost parts in the subducted oceanic crust could occur in 0.5 m.y. However, Iwamori (2000) assumed that 7-km thick subducted oceanic crust homogeneously contained 6 wt.% H₂O, initially. If the water content decreased with depth, as seen in modern oceanic crust (e.g., Stakes and O’Neil, 1982; Ito and Clayton, 1983), the melting of the lowermost part in the subducted oceanic crust would be inhibited in practice. In this regard, the prediction based on numerical modeling is consistent with our suggestion that the melting of the upper half of the subducted oceanic crust occurs beneath the Taitao peninsula (Fig. 8).

5-3. Implications for Archean granitoids

The major formation process of the Archean granitoids is considered to be different from that of the post-Archean granitoids. Slab-melting at depth of garnet stability field is the most plausible process to account for the chemical compositions of the Archean TTGs (Martin, 1986; 1999). In this case, most slab-melts would have ascended through the mantle after generation, and they should have interacted with the surrounding mantle to some extent. This interaction might have caused an exchange of oxygen isotopes between the TTG melts and the mantle peridotite (Bindeman et al., 2005) and modified the initial O isotopic value of the TTG melt. TTG melts that highly reacted with mantle peridotite would become melts having the composition of the sanukitoid series (Martin et al., 2009) or adakite. If the initial TTG melts reacted with mantle peridotite sufficiently to equilibrate O isotope ratio, the composition of the reacted melt

would have likely become markedly different from that of TTG. In turn, the $\delta^{18}\text{O}_{\text{Zrc}}$ value of TTG formed by the slab-melting process is nearly unchanged during magma ascent, and it would preserve the O isotope ratio of the initial TTG melt.

Some previous works have reported $\delta^{18}\text{O}_{\text{Zrc}}$ values of Archean granitoids (e.g., King et al., 1998; Valley et al., 2005; Van Kranendonk et al., 2015). The $\delta^{18}\text{O}_{\text{Zrc}}$ values of TTG with ages of 2670–2740 Ma in the Superior Province range from 4.67 to 6.28‰, with an average value of $5.48 \pm 0.78\text{‰}$ (2 SD) (King et al., 1998). King et al. (1998) suggested that recycling of high $\delta^{18}\text{O}$ sources, such as sedimentary and supracrustal rocks, was not predominant in the main crustal growth events of the Superior Province. The $\delta^{18}\text{O}_{\text{Zrc}}$ values of monzogranites in the Pilbara Craton, whose ages are 3030–3090 Ma, range from 4.87 to 7.07‰, with an average value of $6.2 \pm 1.3\text{‰}$ (Van Kranendonk et al., 2015). Valley et al. (2005) indicated that none of Archean magmatic zircon have $\delta^{18}\text{O}$ values higher than 7.5‰. The Archean O isotopic variation is narrower than those observed in Proterozoic granitoids in the Grenville Province (6.80–13.51‰; Valley et al., 1994; Peck et al., 2004) and Phanerozoic granitoids in the Sierra Nevada Batholith (4.21–8.70‰; Lackey et al., 2008). The $\delta^{18}\text{O}_{\text{Zrc}}$ values of the Seno Hoppner pluton ($5.37 \pm 0.44\text{‰}$, Fig. 6) are similar to those of TTGs reported by King et al. (1998), which offers further insight into the mechanism of Archean granitoid genesis. In view of the above discussion, the mantle-like $\delta^{18}\text{O}_{\text{Zrc}}$ values of the Archean granitoids (e.g., King et al., 1998; Valley et al., 2005) may reflect melting of at least the altered dolerite sequence, if these granitoids were formed by melting of the subducted slab. This is because the involvement of altered basalt and cover sediments increases the $\delta^{18}\text{O}$ value of parent granitoid magma. From this perspective, partial melting of subducted oceanic slab reached the upper half during the Archean, although this model is valid only if we

assume that the Archean granitoid was generated by slab-melting processes and that the suite of O isotope ratios within the subducted oceanic crust was similar to the modern equivalent (e.g., Gregory and Taylor, 1981; this study).

6. Conclusion

We analyzed the O isotope ratios of 220 spots and Hf isotope ratios of 61 spots on zircons separated from eight granitoids of five plutons in the Taitao Peninsula (the Cabo Raper, Seno Hoppner, Estero Cono, Bahia Barrientos, and Tres Montes plutons). We further measured Hf–O isotope ratios of 11 whole-rock samples from the ophiolite body (basalts, dolerite, gabbro, pyroxenite, mudstone, sandstones, and conglomerate) and basement rocks (mudstones), which are intruded by the granitoids.

The $\delta^{18}\text{O}_{\text{Zrc}}$ values of the granitoids are negatively correlated with the zircon $\epsilon\text{Hf}(t)$ values, and the Hf and O isotopic data sets of sedimentary rocks around the granitoids are an extension of the correlation curve. The $\epsilon\text{Hf}(t)$ values of the zircons from the Seno Hoppner pluton are within the range of mid-ocean ridge basalts. Therefore, this distribution pattern in the Hf–O isotopic cross-plot can be explained by partial melting of juvenile oceanic crust and involvement of sedimentary rocks. The $\delta^{18}\text{O}_{\text{Zrc}}$ values of the Seno Hoppner pluton ($5.37 \pm 0.44\text{‰}$) are identical to those of mantle-equilibrated zircons, whereas those of the other four plutons are relatively high (6.09–6.53‰). The latter finding indicates that the four plutons included more sedimentary rocks as their parent rocks during their magma emplacements (compared with the Seno Hoppner pluton), which is consistent with the microscopic observations and age frequency distribution of U–Pb ages of the inherited zircons in this study. Our data indicate that in terms of Hf and O isotope ratios, juvenile granitoid magmas generated by slab-melting

have compositions similar to those of the upper oceanic crust, if the granitoids involved few sedimentary rocks as their source rocks. To account for the mantle-like $\delta^{18}\text{O}_{\text{Zrc}}$ values of the Seno Hoppner pluton, it is necessary that partial melting of the oceanic crust reached the altered dolerite sequence.

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9. Figure captions

Figure 1. Tectonic map of the southwestern margin of South America (modified after Kon et al., 2013). The spreading center of the Chile ridge system between the Nazca and Antarctic plates subducts beneath the South American plate. The locations of the Chile ridge system at present, 3 Ma, and 6 Ma are shown in black and gray bars. The convergent rates of the Nazca plate and Antarctic plate are 9 cm/yr and 2 cm/yr, respectively. DFZ: Darwin fracture zone, GFZ: Guamblin fracture zone, TFZ: Taitao

fracture zone, TMFZ: Tres Montes fracture zone.

Figure 2. Geological map of the Taitao Peninsula (modified after Anma et al., 2006). CR: Cabo Raper pluton, EC: Estero Cono pluton, SH: Seno Hoppner pluton, TM: Tres Montes pluton, BB: Bahia Barrientos intrusion, MVU: Main Volcanic Unit, CMU: Chile Margin Unit.

Figure 3. (A) Representative photograph of microtrondhjemite (TPG171) in the Seno Hoppner pluton. (B–D) Representative microscopic photographs of the Taitao granitoids: microtrondhjemite (TPG171) in the Seno Hoppner pluton (B), tonalite (TPE90) in the Cabo Raper pluton (C), and granite (TPH75) in the Tres Montes pluton (D). (E–H) Representative microscopic photographs of rocks constituting the Taitao ophiolite and basement: basaltic lava (TPH342) in the MVU (E), dolerite (TPE110) in the ophiolite (F), gabbro (TPE73) in the ophiolite (G), and mudstone (TPB252) in the basement (H).

Figure 4. Normative An–Ab–Or diagram (after Barker (1979)). Gray areas indicate compositions of the Taitao granitoids, as reported by Kaeding et al. (1990); Bourgois et al. (1996); Guivel et al. (1999); Anma et al. (2009); Kon et al. (2013); and Shin et al. (2015).

Figure 5. Cathodoluminescence images of zircons separated from the Taitao granitoids with analytical spots with SIMS and LA-ICP-MS. Zircons from the granitoids show euhedral shapes and display oscillatory zoning and sector zoning. Some zircons

include inherited cores (see text for the details). Scale bars are 100 μm .

Figure 6. Frequency diagrams of O isotope ratios in zircons. Data for the magmatic cores and rims are represented by black squares, whereas data from inherited cores are expressed as open symbols. Gray area corresponds to the range of O isotope values of mantle, as deduced from zircons in kimberlite (Valley et al., 1998).

Figure 7. Whole-rock and zircon Hf–O diagram. The Hf–O isotope ratios of zircons of the Taitao granitoids are shown as filled circles. Values of $\delta^{18}\text{O}$ (whole rock) in the Taitao ophiolite and the pre-Jurassic basement rocks are shown as filled squares and filled triangles, respectively. Mantle values from whole rocks (Ionov et al., 1994) and zircons (Valley et al., 1998) are also shown as black and gray bars, respectively. WR: whole rock, Zr: zircon.

Figure 8. Schematic model showing the formation of the Taitao granitoids (modified after Kon, 2009). Partial melting of the upper half of oceanic crust involves altered basalt (higher $\delta^{18}\text{O}$ and higher ϵHf component) and dolerite (lower $\delta^{18}\text{O}$ and higher ϵHf component) sequences, generating juvenile granitoid magma with a mantle-like $\delta^{18}\text{O}$ value. The granitoid magma that intrudes into sedimentary rocks (higher $\delta^{18}\text{O}$ and lower ϵHf component) creates mixing between the surrounding sedimentary rocks and the juvenile granitoid magma (Fig. 7).

**Supplementary Information for “Hf-O isotope systematics of zircons from the
Taitao Granitoid: Implications for slab-melting”**

-Detailed methods and results for whole rock and zircon analyses-
(The supplementary information includes 2 figure and 5 tables.)

**Kazue Suzuki, Yusuke Sawaki*, Tsuyoshi Iizuka, Kouki Kitajima, Kentaro Hattori,
Takafumi Hirata, and Ryo Anma**

S1. Analytical method

S1-1. Whole rock major element composition

3 granitoids samples and 11 volcano-sedimentary rocks collected from Taitao ophiolite body, sediments, and pre-Jurassic basement rocks were prepared for whole rock chemistry. Thin (~1 cm thick) rock chips weighing about 20 g were cut from fresh parts of the samples. The chips were washed with distilled water using an ultrasonic device, dried completely at 120 °C, and then crushed using a tungsten-carbide mill and an agate-ball mill. H₂O(-) and loss on ignition (LOI) of rock powders were determined at 110 °C and 950 °C (over 6 hours), respectively.

Major element compositions (Si, Ti, Al, Fe, Mn, Mg, Ca, Na, K, and P) were determined using fused glass discs with X-ray fluorescence spectrometer (XRF; RIX 2100, RIGAKU) at the Tokyo Institute of Technology, Japan. Glass discs were prepared with lithium tetraborate flux (Li₂B₄O₇) in a dilution ratio of 1:10 at 1050 °C. The accelerating voltage was 50 kV and current was 50 mA during the XRF analysis. Calibration methods using GSJ standards are after Machida et al. (2008). The repeated analyses of the same standard indicate that reproducibility of this analysis was better than 1%, except for Na and P (< 5%).

24

25 **S1-2. In-situ U-Pb dating and trace element analysis for zircon**

26 We conducted zircon trace element analysis and U-Pb dating on the spots same as the O
27 isotope analysis. Trace element concentrations and U-Pb ratios in zircons were determined with
28 laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS). The ICP-MS
29 (Thermo Scientific iCAP-Q, Kyoto University) is connected with the laser ablation system (ESI
30 New Wave Research ArF Excimer laser ablation system (NWR193) operating at 193 nm
31 wavelength). Mixed gas of He and Ar was used as a carrier gas to improve the sample transport
32 efficiency from the sample cell to the MS, as well as to prevent sample deposition around the
33 ablation pit (Eggins et al., 1998). In this study, charcoal filter was used onto the Ar carrier gas to
34 reduce the mass spectrometric interferences on ^{204}Pb by ^{204}Hg (Hirata et al., 2005). Residual
35 contribution of ^{204}Hg was corrected by subtracting the signal intensity of ^{204}Hg estimated from
36 signal intensity of ^{202}Hg . Signal smoothing device was also adopted between the sample cell and
37 the torch, which improves the stability of the signal intensity (Tunheng and Hirata, 2004).

38 The analytical conditions are presented in table S2. Operational settings such as Ar-He gas
39 flow rate, lens biases, and mass resolution were optimized to maximize the intensity of the ^{29}Si
40 signal obtained by laser ablation of NIST 610 with the $^{232}\text{Th}^{16}\text{O}^+ / ^{232}\text{Th}^+$ ratio < 1%. All
41 measurements were carried out with peak-jumping mode. The 91500 (Wiedenbeck et al., 2004)
42 and OD-3 (Iwano et al., 2013) zircons were used as primary and secondary standards to correct
43 the effects of U-Pb fractionation and mass discrimination of the mass spectrometer. NIST 610
44 and 612 glasses (Pearce et al., 1997) were used as standards for calibration of the trace element
45 concentrations. We monitored ^{204}Pb throughout the isotopic analysis, and excluded U-Pb ages of

zircons accompanied with clearly higher ^{204}Pb abundances than the gas blank from data presented in table 1.

S2. Result

S2-1. Whole rock major element composition

Whole-rock chemical compositions of the Taitao granitoids and other rocks, that constitute the Taitao ophiolite body and the pre-Jurassic basement, are shown in tables 4 and S5 and figures 4 and S1. The newly analyzed granitoids from 3 plutons (TPB243, TPH75, and TPG171) range in SiO_2 and MgO contents between 64.71 and 75.24 wt.% and 0.61 to 2.37 wt.%, respectively (Fig. S5). The 3 granitoids belong to calc-alkaline series, and are characterized by low aluminum saturation index (< 1.11 ; Table S5). Among samples used in this study, TPG171 in the Seno Hoppner pluton has the lowest K content (0.32 wt.%), whereas TPH75 in the Tres Montes pluton has the highest K content (4.06 wt.%). $\text{K}_2\text{O}/\text{Na}_2\text{O}$ ratio of TPH75 (1.32), a granite in the Tres Montes pluton, is relatively higher than those of other analyzed granitoids by the previous works (Kaeding et al., 1990; Kon et al., 2013; Shin et al., 2015), but is within the range of typical calc-alkaline rocks compiled in Kon et al. (2013).

The mafic rocks from the Taitao ophiolite have basaltic to basaltic-andesitic compositions and are meta-aluminous (Table 4). Compositions of the mafic rocks are plotted near the boundary between calc-alkaline and tholeiitic series, and are almost similar to those reported in the previous work (Fig. S1; Shin et al., 2015). The pyroxenite (TPE30) shows relatively higher MgO and CaO content, and lower Al_2O_3 , MnO , Na_2O , TiO_2 , and Fe_2O_3 content than the other mafic rocks. The former reflects clinopyroxene-rich mineral assemblage of the pyroxenite. The

analyzed sediments range in SiO₂ and Al₂O₃ contents between 62.82 and 73.32 wt.% and 13.03 to 17.79 wt.%, respectively (Table 4).

S2-2. Trace element composition

The U–Pb age and Th/U ratio of zircon are shown in table 1. REE and Hf concentrations in the zircons are presented in Table S3, and CI chondrite-normalized REE patterns are shown in Fig. S2. The detailed characteristics are given in section 4-2 of the main text.

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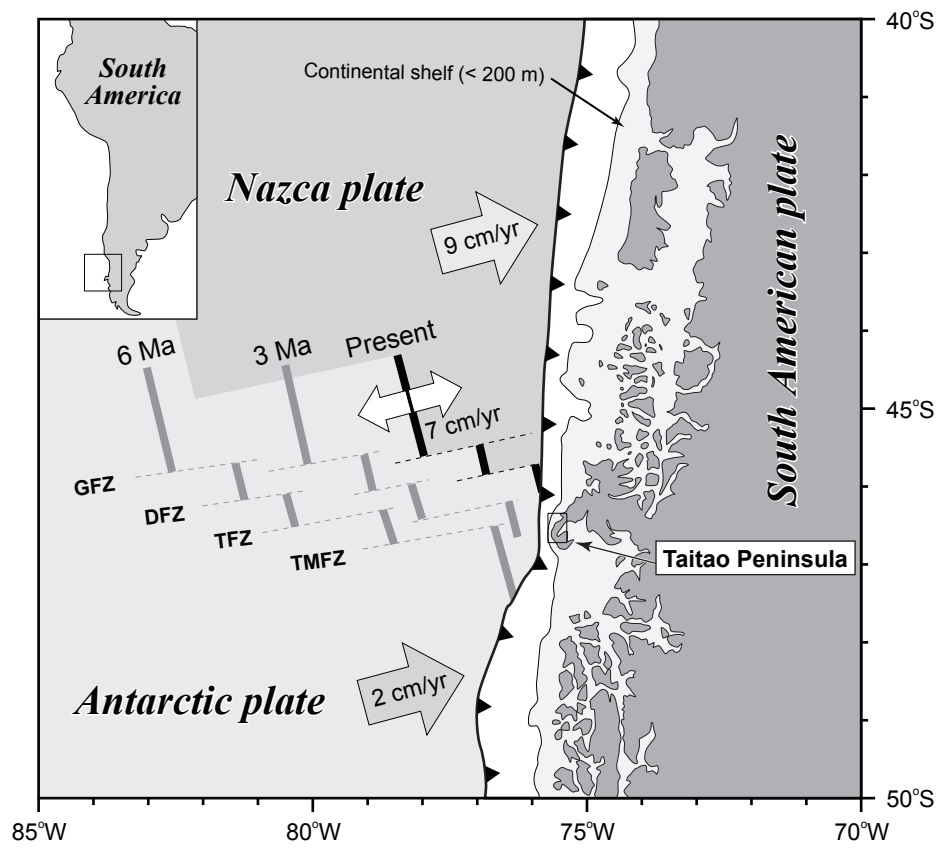
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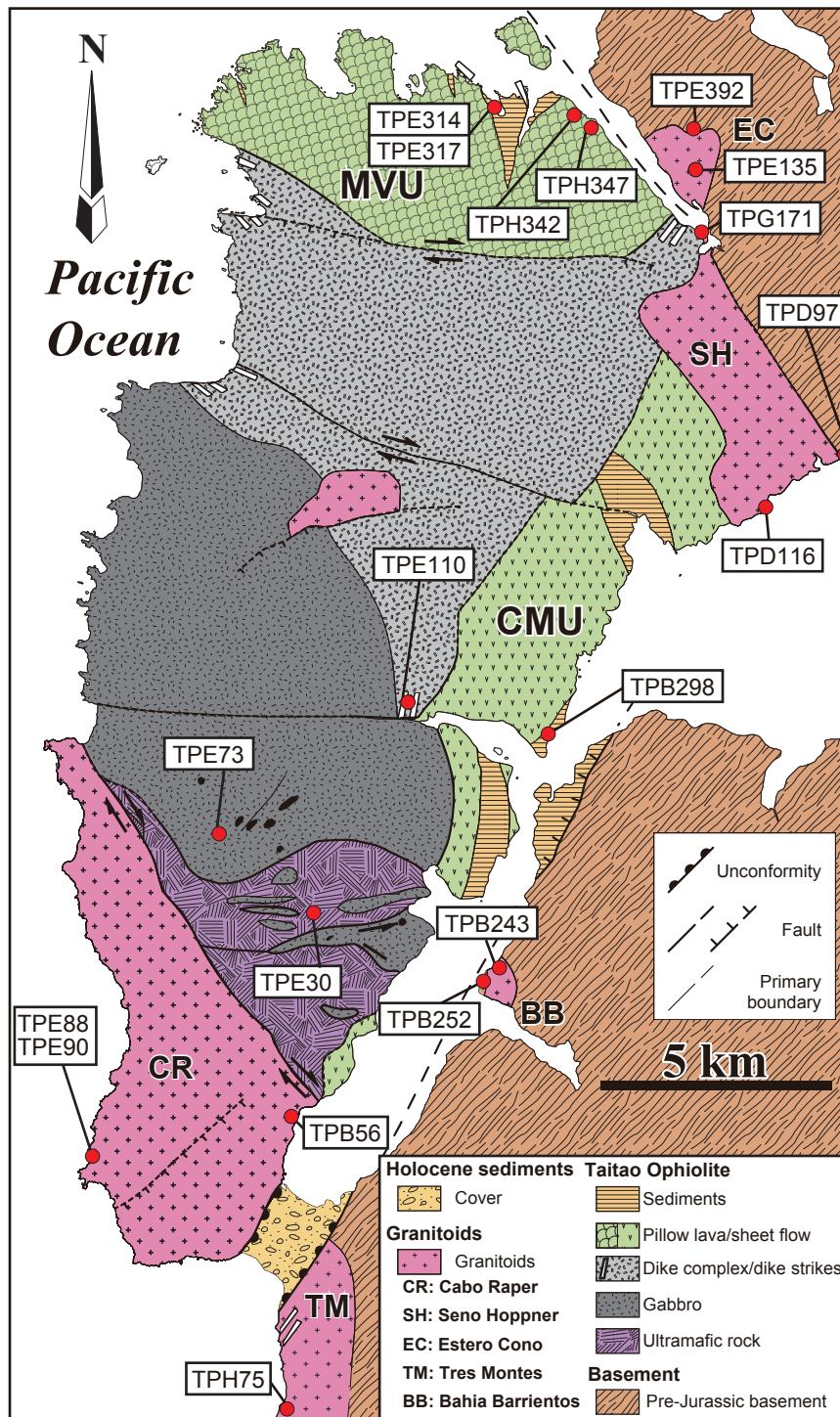
Figure Captions

Figure S1. Harker's variation diagrams for the Taitao ophiolite and the Taitao granitoids. SiO₂ vs K₂O diagram shows subdivision of the analyzed rocks by K₂O content. Dark gray and light gray areas correspond to the ranges of mafic rocks in the Taitao ophiolite and the Taitao granitoids, respectively (data from Shin et al., 2015).

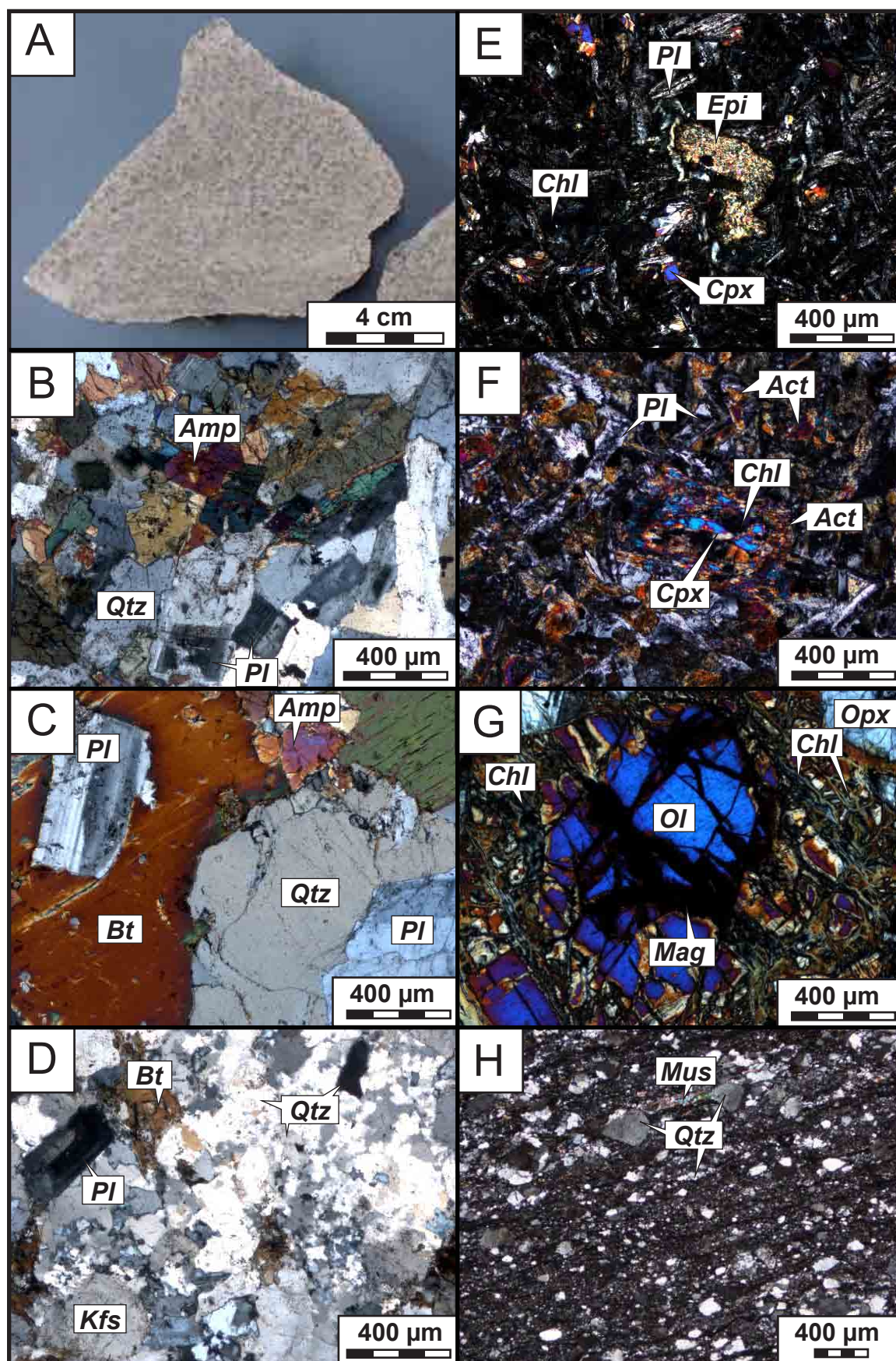
Figure S2. Chondrite-normalized REE patterns of zircons from each pluton. Black lines represent data from rim and normal core. Pink line represent data from inherited core. Gray region shows REE patterns of zircons from Cabo Raper pluton in this study. Chondrite data are from McDonough and Sun (1995).



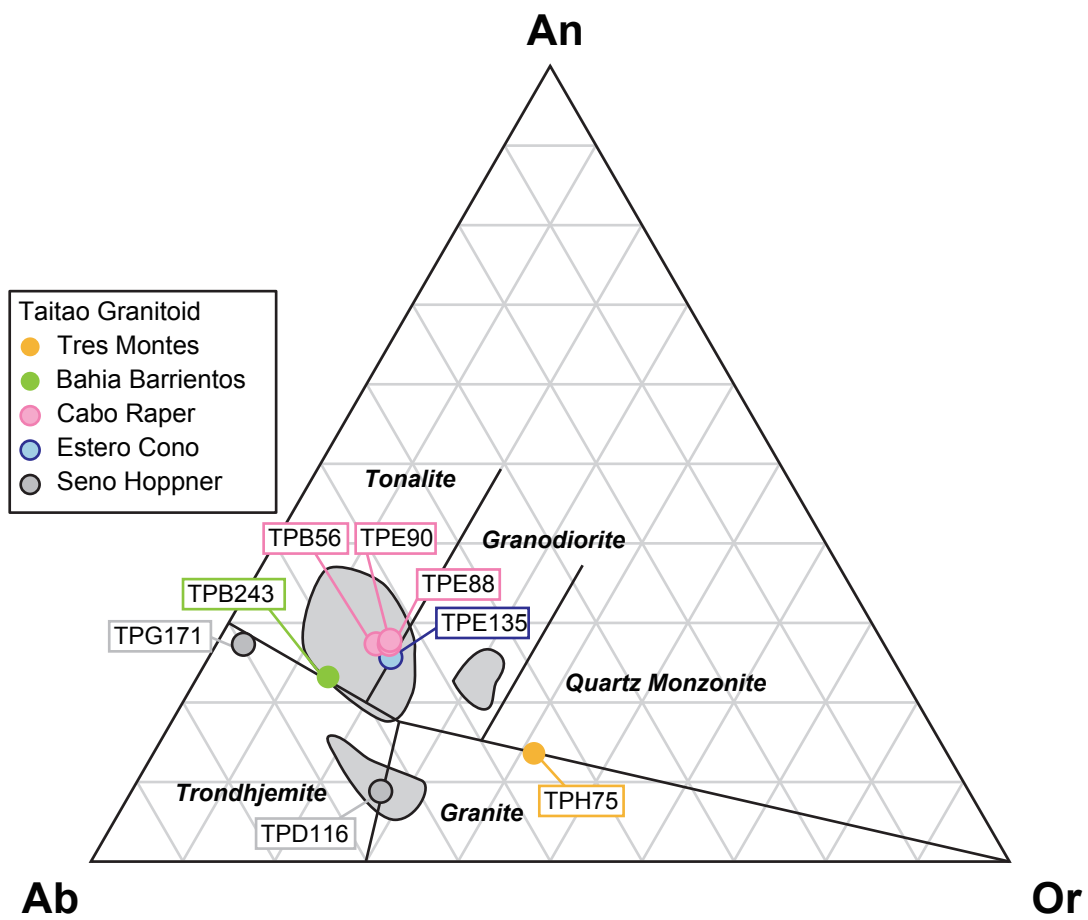
Suzuki et al. Fig. 1



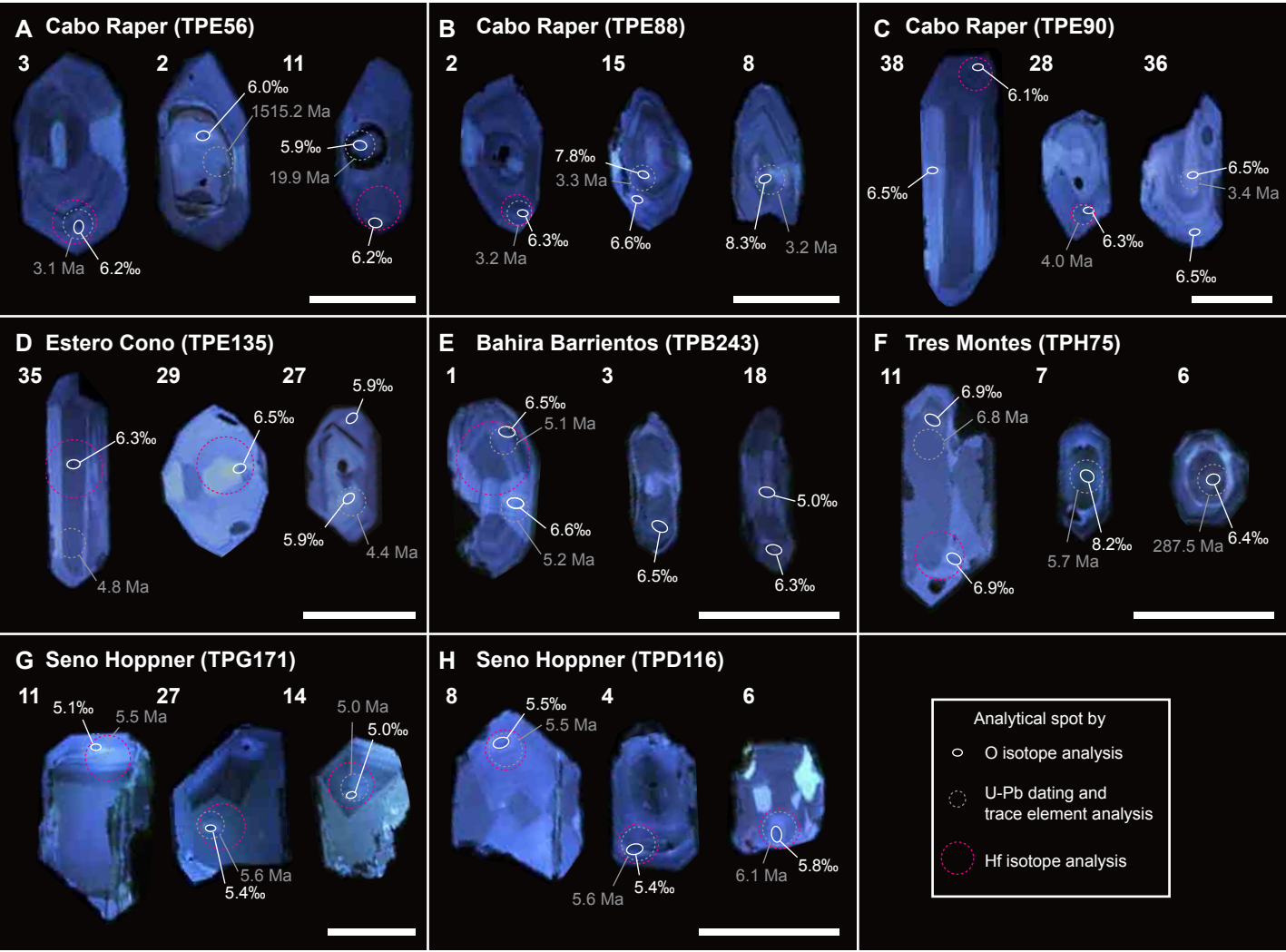
Suzuki et al. Fig. 2



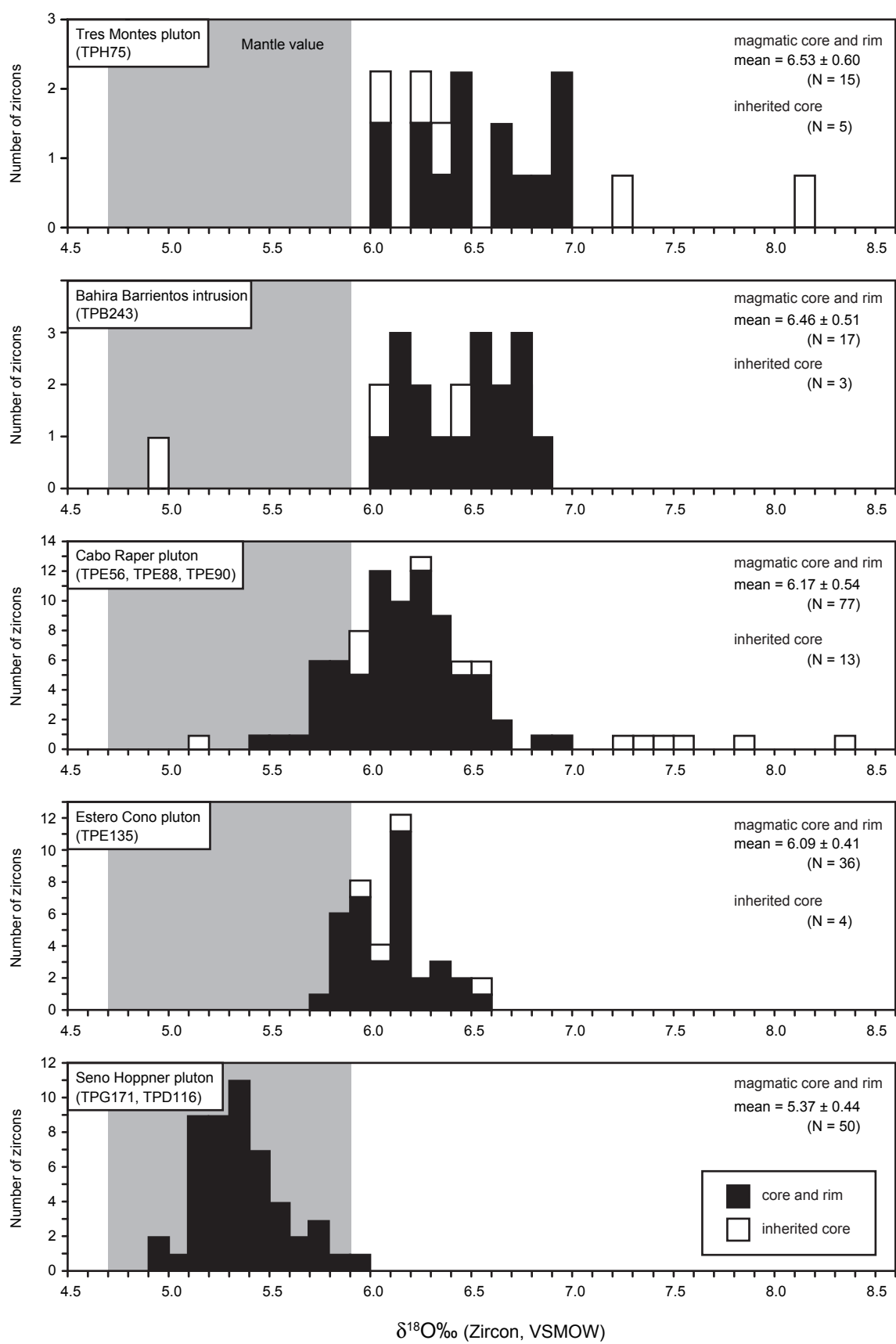
Suzuki et al. Fig. 3



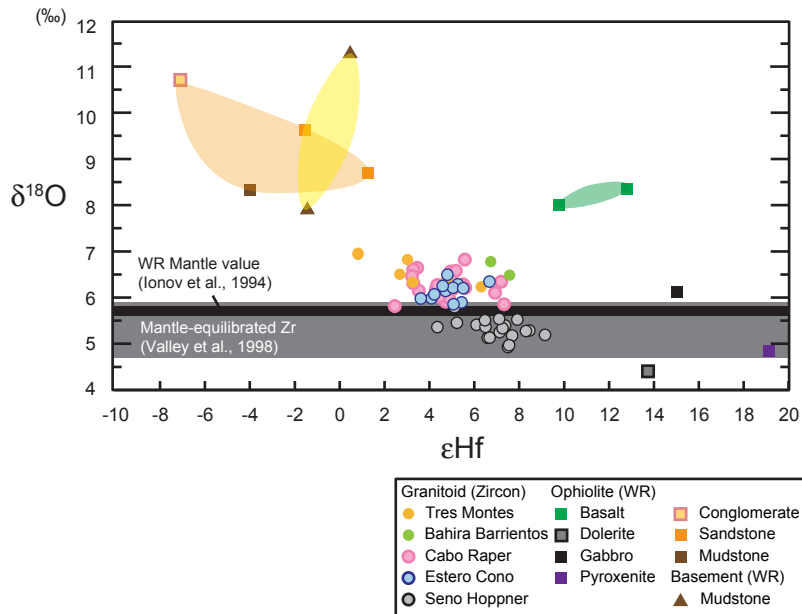
Suzuki et al. Fig. 4



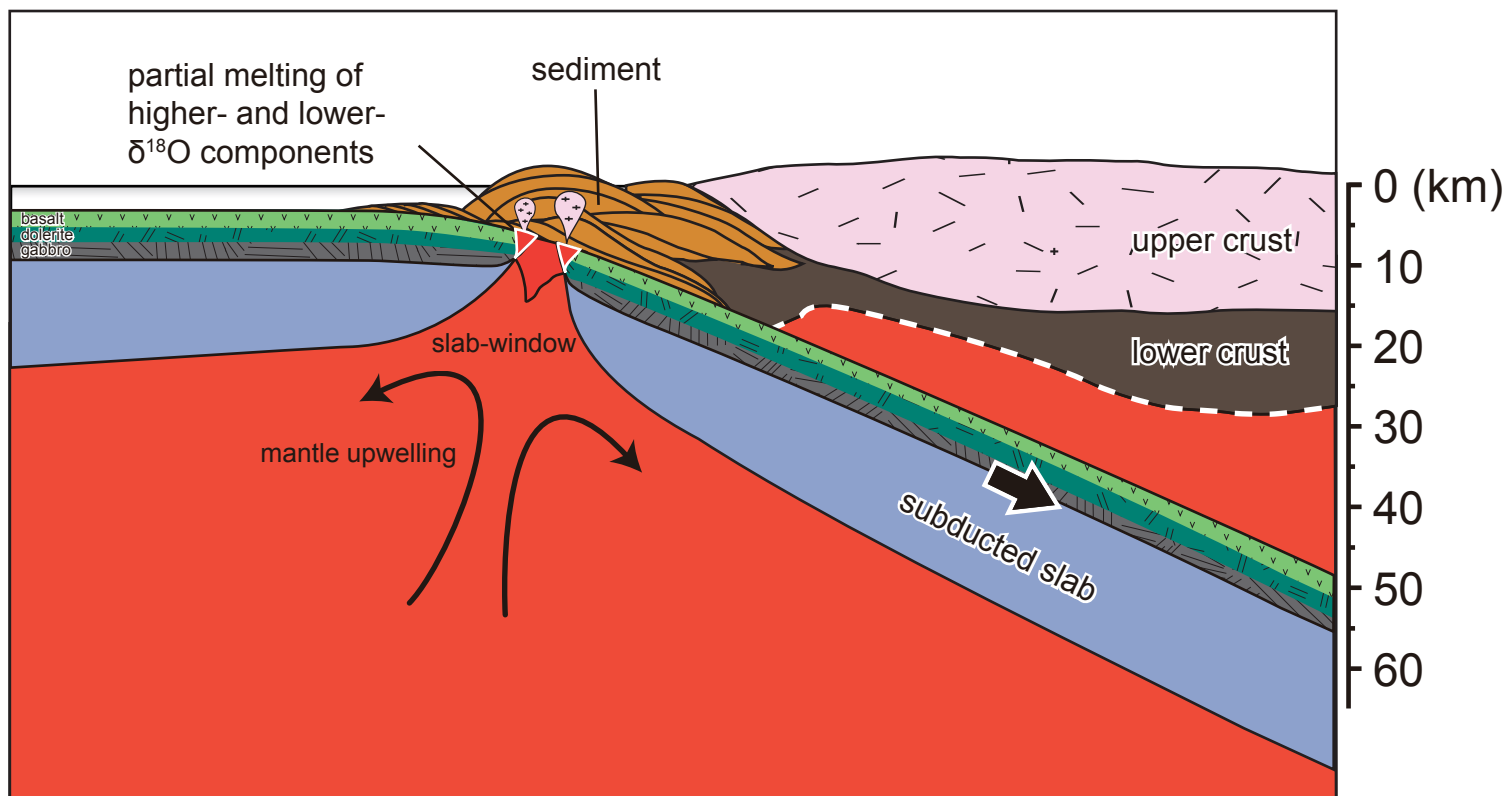
Suzuki et al. Fig. 5



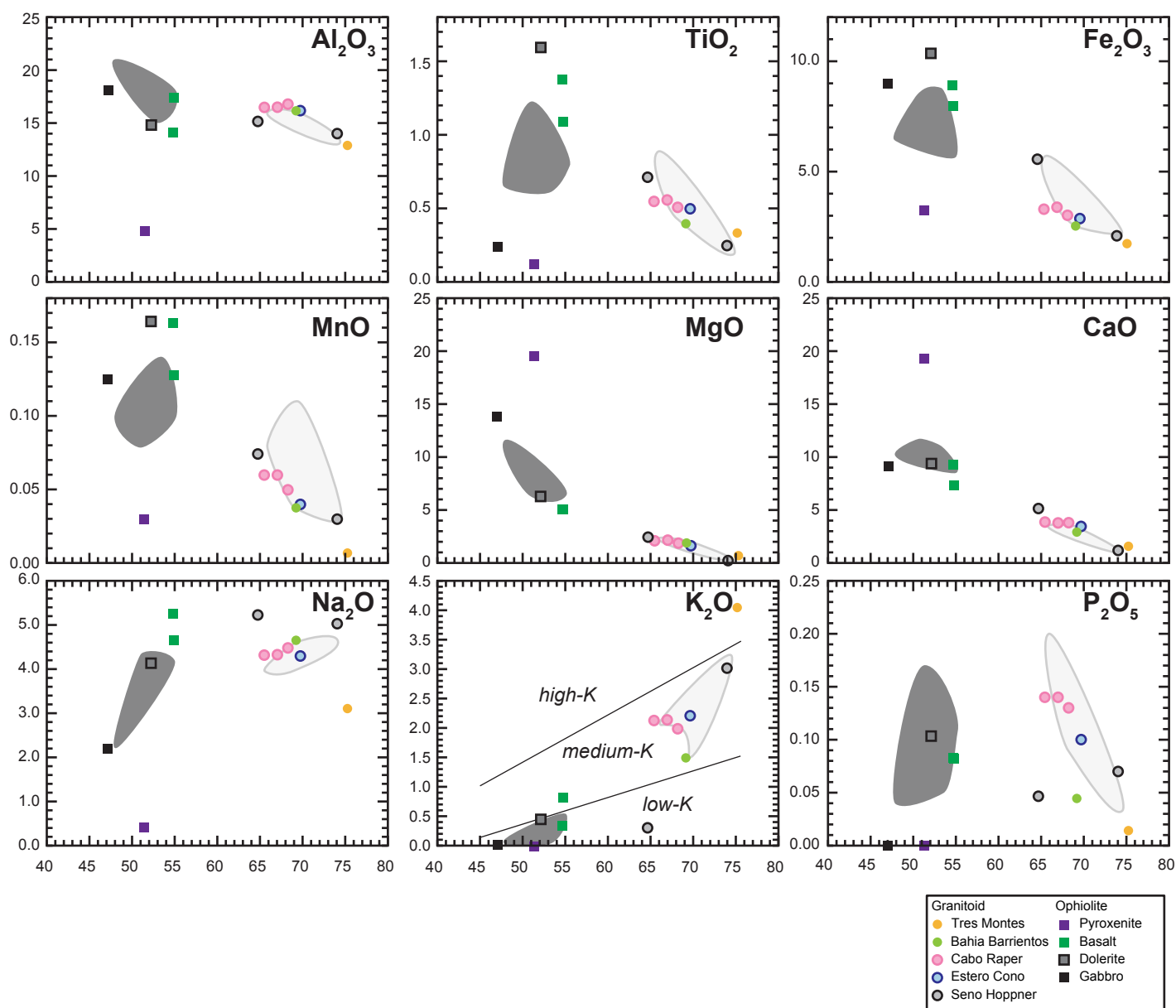
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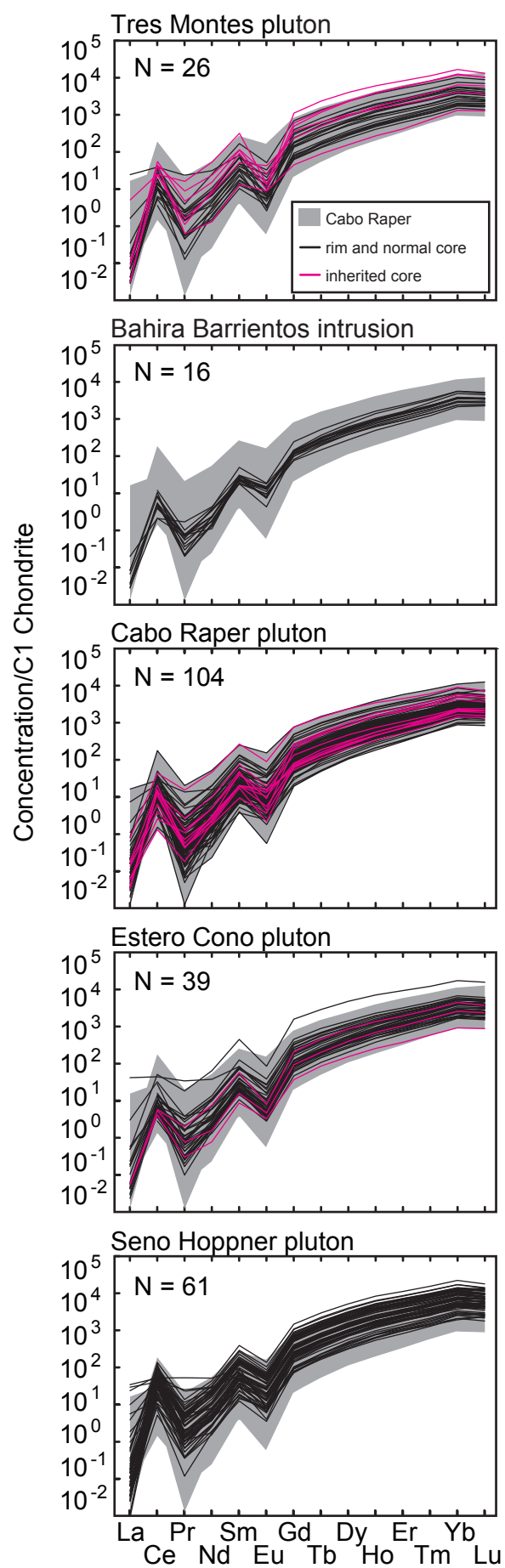
Suzuki et al. Fig. 7



Suzuki et al. Fig. 8



Suzuki et al. Fig. S1



Suzuki et al. Fig. S2

Table 1. LA-ICP-MS U-Pb isotopic analytical data for zircons from Taitao granitoids.

Sample No.	Analysis No.	Texture	$^{206}\text{Pb}/^{238}\text{U}$	$^{207}\text{Pb}/^{235}\text{U}$	RHO	$^{206}\text{Pb}/^{238}\text{U}$ Age (Ma)	2 SE	$^{207}\text{Pb}/^{235}\text{U}$ Age (Ma)	2 SE	U (ppm)	Th (ppm)	Th/U	Analysis sequence
Cabo Raper Pluton													
TPB56	2b	inherited core	0.26496 ± 0.00465	4.22640 ± 0.23621	0.31	1515.2 ± 23.7		1679.2 ± 47.0		56	44	1.3	1
	3-2	rim	0.00049 ± 0.00006	b.d.1* ±		3.1 ± 0.4		±		270	141	1.9	1
	4-2	rim	0.00049 ± 0.00008	b.d.1* ±		3.1 ± 0.5		±		129	62	2.1	1
	6-2	inherited core	0.00070 ± 0.00007	b.d.1* ±		4.5 ± 0.4		±		257	193	1.3	1
	7-2	rim	0.00058 ± 0.00005	0.00101 ± 0.00083	0.11	3.7 ± 0.3		1.0 ± 0.8		339	204	1.7	1
	11a-2	inherited core	0.00309 ± 0.00013	0.02248 ± 0.00414	0.22	19.9 ± 0.8		22.6 ± 4.1		349	227	1.5	1
	13-2	rim	0.00059 ± 0.00007	b.d.1* ±		3.8 ± 0.4		±		218	79	2.7	1
	14-2	inherited core	0.00054 ± 0.00004	0.00361 ± 0.00131	0.21	3.5 ± 0.3		3.7 ± 1.3		536	602	0.9	1
	16-2	rim	0.00062 ± 0.00006	0.00860 ± 0.00269	0.29	4.0 ± 0.4		8.7 ± 2.7		304	200	1.5	1
	17-2	rim	0.00061 ± 0.00008	0.00979 ± 0.00401	0.31	3.9 ± 0.5		9.9 ± 4.0		159	79	2.0	1
	18-2	rim	0.00063 ± 0.00011	0.00360 ± 0.00315	0.20	4.1 ± 0.7		3.7 ± 3.2		83	29	2.9	1
	19a-2	inherited core	0.00323 ± 0.00026	0.01543 ± 0.00684	0.18	20.8 ± 1.7		15.5 ± 6.9		81	37	2.2	1
	19b-2	rim	0.00056 ± 0.00009	0.00323 ± 0.00275	0.20	3.6 ± 0.6		3.3 ± 2.8		106	27	3.9	1
	21-2	rim	0.00057 ± 0.00008	0.01466 ± 0.00562	0.37	3.7 ± 0.5		14.8 ± 5.6		135	75	1.8	1
	22-2	rim	0.00073 ± 0.00007	b.d.1* ±		4.7 ± 0.5		±		218	95	2.3	1
	23-2	rim	0.00067 ± 0.00007	0.00826 ± 0.00310	0.28	4.3 ± 0.4		8.3 ± 3.1		215	78	2.8	1
	25-2	magmatic core	0.00068 ± 0.00006	0.00580 ± 0.00226	0.24	4.4 ± 0.4		5.9 ± 2.3		269	156	1.7	1
	26-2	magmatic core	0.00098 ± 0.00007	0.00857 ± 0.00260	0.24	6.3 ± 0.5		8.7 ± 2.6		305	289	1.1	1
	28-2	magmatic core	0.00073 ± 0.00006	0.00280 ± 0.00137	0.16	4.7 ± 0.4		2.8 ± 1.4		332	353	0.9	1
	29b-2	rim	0.00063 ± 0.00007	0.00430 ± 0.00215	0.21	4.0 ± 0.4		4.4 ± 2.2		216	59	3.6	1
	31	rim	0.00053 ± 0.00007	0.00733 ± 0.00326	0.30	3.4 ± 0.5		7.4 ± 3.3		177	63	0.4	2
	33	rim	0.00073 ± 0.00009	0.00407 ± 0.00239	0.20	4.7 ± 0.6		4.1 ± 2.4		164	72	0.4	2
	34	rim	0.00057 ± 0.00006	0.00440 ± 0.00206	0.24	3.6 ± 0.4		4.5 ± 2.1		247	188	0.8	2
	35	magmatic core	0.00075 ± 0.00009	0.00936 ± 0.00383	0.29	4.9 ± 0.6		9.5 ± 3.9		161	84	0.5	2
	36	rim	0.00050 ± 0.00006	0.00315 ± 0.00162	0.22	3.2 ± 0.4		3.2 ± 1.6		279	267	1.0	2
	37	magmatic core	0.00079 ± 0.00008	0.00404 ± 0.00206	0.20	5.1 ± 0.5		4.1 ± 2.1		218	83	0.4	2
	38	magmatic core	0.00062 ± 0.00008	0.00564 ± 0.00295	0.25	4.0 ± 0.5		5.7 ± 3.0		156	106	0.7	2
	39	rim	0.00072 ± 0.00009	0.01140 ± 0.00438	0.34	4.6 ± 0.6		11.5 ± 4.4		176	69	0.4	2
TPE88	1-2	rim	0.00049 ± 0.00006	0.01123 ± 0.00391	0.35	3.2 ± 0.4		11.3 ± 3.9		239	135	1.8	1
	2-2	rim	0.00050 ± 0.00005	0.00535 ± 0.00192	0.26	3.2 ± 0.3		5.4 ± 1.9		412	290	1.4	1
	3-2	magmatic core	0.00059 ± 0.00005	0.00230 ± 0.00116	0.16	3.8 ± 0.3		2.3 ± 1.2		436	399	1.1	1
	4-2	rim	0.00085 ± 0.00014	b.d.1* ±		5.5 ± 0.9		±		81	30	2.7	1
	5a-2	rim	0.00068 ± 0.00007	0.00017 ± 0.00041	0.04	4.4 ± 0.5		0.2 ± 0.4		241	131	1.8	1
	7-2	magmatic core	0.00052 ± 0.00007	0.00603 ± 0.00288	0.27	3.4 ± 0.4		6.1 ± 2.9		206	137	1.5	1
	8-2	inherited core	0.00050 ± 0.00006	0.00729 ± 0.00302	0.30	3.2 ± 0.4		7.4 ± 3.0		237	106	2.2	1
	10-2	rim	0.00073 ± 0.00007	0.00122 ± 0.00115	0.11	4.7 ± 0.5		1.2 ± 1.2		230	134	1.7	1
	11-2	magmatic core	0.00052 ± 0.00006	0.00180 ± 0.00134	0.16	3.3 ± 0.4		1.8 ± 1.4		236	146	1.6	1
	12-2	rim	0.00072 ± 0.00010	0.00028 ± 0.00070	0.05	4.7 ± 0.6		0.3 ± 0.7		141	54	2.6	1
	15a-2	magmatic core	0.00052 ± 0.00005	0.00433 ± 0.00162	0.23	3.3 ± 0.3		4.4 ± 1.6		454	155	2.9	1
	16-2	rim	0.00063 ± 0.00004	0.00476 ± 0.00146	0.23	4.0 ± 0.3		4.8 ± 1.5		556	629	0.9	1
	18-2	inherited core	0.00270 ± 0.00010	0.02416 ± 0.00362	0.25	17.4 ± 0.6		24.2 ± 3.6		486	284	1.7	1
	19-2	magmatic core	0.00054 ± 0.00006	0.00626 ± 0.00279	0.27	3.4 ± 0.4		6.3 ± 2.8		209	110	1.9	1
	21	inherited core	0.01132 ± 0.00039	0.07988 ± 0.01228	0.22	72.6 ± 2.5		78.0 ± 11.6		136	78	1.7	1
	22	rim	0.00064 ± 0.00007	0.00172 ± 0.00127	0.14	4.1 ± 0.4		1.7 ± 1.3		248	209	1.2	1
	23	rim	0.00069 ± 0.00009	0.00889 ± 0.00399	0.28	4.5 ± 0.6		9.0 ± 4.0		148	64	2.3	1
	24	rim	0.00061 ± 0.00007	0.00219 ± 0.00162	0.16	3.9 ± 0.5		2.2 ± 1.6		195	122	1.6	1
	25	inherited core	0.00309 ± 0.00022	0.03760 ± 0.00972	0.28	19.9 ± 1.4		37.5 ± 9.6		106	99	1.1	1
	26	rim	0.00072 ± 0.00006	0.00145 ± 0.00106	0.12	4.6 ± 0.4		1.5 ± 1.1		293	154	1.9	1
	27	magmatic core	0.00079 ± 0.00009	0.00412 ± 0.00251	0.19	5.1 ± 0.6		4.2 ± 2.5		181	70	2.6	1
	28	magmatic core	0.00066 ± 0.00008	0.00355 ± 0.00216	0.19	4.3 ± 0.5		3.6 ± 2.2		211	165	1.3	1
	29	rim	0.00076 ± 0.00008	0.00352 ± 0.00214	0.18	4.9 ± 0.5		3.6 ± 2.2		212	160	1.3	1
	30	rim	0.00057 ± 0.00005	0.00959 ± 0.00281	0.32	3.7 ± 0.3		9.7 ± 2.8		398	238	1.7	1
	31	magmatic core	0.00068 ± 0.00004	0.00269 ± 0.00099	0.17	4.4 ± 0.3		2.7 ± 1.0		753	933	0.8	1
	32	magmatic core	0.00070 ± 0.00008	0.00207 ± 0.00153	0.15	4.5 ± 0.5		2.1 ± 1.6		237	107	2.2	1
	33	magmatic core	0.00056 ± 0.00006	0.00179 ± 0.00133	0.15	3.6 ± 0.4		1.8 ± 1.3		274	171	1.6	1
	34	rim	0.00066 ± 0.00007	0.00160 ± 0.00118	0.13	4.3 ± 0.4		1.6 ± 1.2		306	141	2.2	1
	35	magmatic core	0.00062 ± 0.00005	0.00129 ± 0.00077	0.13	4.0 ± 0.3		1.3 ± 0.8		578	562	1.0	1
	36	rim	0.00070 ± 0.00007	0.00370 ± 0.00195	0.19	4.5 ± 0.5		3.8 ± 2.0		271	118	2.3	1
	37	magmatic core	0.00066 ± 0.00005	0.00806 ± 0.00234	0.28	4.2 ± 0.3		8.2 ± 2.4		377	365	1.0	2
	38	rim	0.00065 ± 0.00007	0.00688 ± 0.00295	0.26	4.2 ± 0.5		7.0 ± 3.0		195	97	0.5	2
	39	rim	0.00060 ± 0.00004	0.00630 ± 0.00165	0.26	3.9 ± 0.3		6.4 ± 1.7		583	661	1.1	2
	40	magmatic core	0.00060 ± 0.00005	0.00396 ± 0.00166	0.21	3.9 ± 0.3		4.0 ± 1.7		339	254	0.7	2
	41	magmatic core	0.00055 ± 0.00007	0.00366 ± 0.00211	0.21	3.5 ± 0.4		3.7 ± 2.1		193	102	0.5	2
	42	magmatic core	0.00074 ± 0.00007	0.00723 ± 0.00287	0.25	4.7 ± 0.5		7.3 ± 2.9		215	152	0.7	2
	43	rim	0.00065 ± 0.00006	0.00284 ± 0.00161	0.18	4.2 ± 0.4		2.9 ± 1.6		249	102	0.4	2
	44	rim	0.00066 ± 0.00005	0.00422 ± 0.00164	0.21	4.2 ± 0.3		4.3 ± 1.7		368	106	0.3	2
TPE90	4a-2	magmatic core	0.00064 ± 0.00009	0.00352 ± 0.00249	0.19	4.1 ± 0.6		3.6 ± 2.5		154	91	1.7	1
	7-2	rim	0.00060 ± 0.00008	0.00797 ± 0.00351	0.28	3.9 ± 0.5		8.1 ± 3.5		193	97	2.0	1
	8-2	rim	0.00056 ± 0.00008	0.00029 ± 0.00071	0.06	3.6 ± 0.5		0.3 ± 0.7		144	75	1.9	1
	10b	rim	0.00052 ± 0.00008	b.d.1* ±		3.3 ± 0.5		±		169	87	1.9	1
	11c	rim	0.00061 ± 0.00007	b.d.1* ±		4.0 ± 0.5		±		202	91	2.2	1
	13-2	rim	0.00046 ± 0.00006	0.00143 ± 0.00135	0.15	3.0 ± 0.4		1.4 ± 1.4		204	88	2.3	1
	15-2	rim	0.00057 ± 0.00008	0.00361 ± 0.00256	0.21	3.7 ± 0.5		3.7 ± 2.6		150	113	1.3	1

16c-2	rim	0.00053 ± 0.00006	0.00958 ± 0.00340	0.32	3.4 ± 0.4	9.7 ± 3.4	265	207	1.3	1	
20a-2	inherited core	0.00066 ± 0.00007	0.00508 ± 0.00225	0.23	4.2 ± 0.4	5.1 ± 2.3	296	144	2.1	1	
20c	rim	0.00072 ± 0.00009	0.01180 ± 0.00493	0.31	4.6 ± 0.6	11.9 ± 5.0	152	102	1.5	1	
22b-2	rim	0.00063 ± 0.00009	0.00656 ± 0.00364	0.26	4.1 ± 0.6	6.6 ± 3.7	150	67	2.2	1	
26-2	rim	0.00069 ± 0.00007	0.00702 ± 0.00256	0.26	4.4 ± 0.4	7.1 ± 2.6	326	353	0.9	1	
28-2	rim	0.00062 ± 0.00007	0.01247 ± 0.00401	0.34	4.0 ± 0.4	12.6 ± 4.0	268	143	1.9	1	
30-2	rim	0.00070 ± 0.00011	0.01044 ± 0.00530	0.30	4.5 ± 0.7	10.5 ± 5.3	119	45	2.6	1	
31a-2	magmatic core	0.00073 ± 0.00010	0.00315 ± 0.00245	0.17	4.7 ± 0.6	3.2 ± 2.5	146	87	1.7	1	
31b-2	rim	0.00065 ± 0.00009	0.00668 ± 0.00371	0.26	4.2 ± 0.6	6.8 ± 3.7	147	69	2.1	1	
33-2	rim	0.00058 ± 0.00007	0.00545 ± 0.00267	0.25	3.7 ± 0.5	5.5 ± 2.7	228	157	1.5	1	
34-2	rim	0.00062 ± 0.00009	0.01582 ± 0.00630	0.37	4.0 ± 0.6	15.9 ± 6.3	145	62	2.3	1	
36b-2	inherited core	0.00053 ± 0.00009	0.00373 ± 0.00296	0.22	3.4 ± 0.6	3.8 ± 3.0	123	35	3.5	1	
41	magmatic core	0.00065 ± 0.00004	0.00357 ± 0.00118	0.20	4.2 ± 0.3	3.6 ± 1.2	570	552	1.0	1	
42	rim	0.00072 ± 0.00006	0.00443 ± 0.00190	0.21	4.7 ± 0.4	4.5 ± 1.9	276	124	2.2	1	
43	rim	0.00060 ± 0.00007	0.00190 ± 0.00137	0.15	3.9 ± 0.4	1.9 ± 1.4	215	87	2.5	1	
44	rim	0.00057 ± 0.00007	b.d.1* ±		3.6 ± 0.4	±	198	103	1.9	1	
45	magmatic core	0.00056 ± 0.00007	0.00262 ± 0.00191	0.18	3.6 ± 0.5	2.7 ± 1.9	156	117	1.3	1	
46	core	0.00055 ± 0.00008	0.01275 ± 0.00525	0.36	3.5 ± 0.5	12.9 ± 5.3	128	66	1.9	1	
47	rim	0.00054 ± 0.00007	0.01249 ± 0.00460	0.36	3.5 ± 0.5	12.6 ± 4.6	163	75	2.2	1	
48	rim	0.00071 ± 0.00006	0.01387 ± 0.00365	0.34	4.6 ± 0.4	14.0 ± 3.7	279	130	2.1	1	
49	rim	0.00052 ± 0.00005	0.00722 ± 0.00214	0.30	3.3 ± 0.3	7.3 ± 2.2	395	143	2.8	1	
50	rim	0.00087 ± 0.00012	0.02569 ± 0.00934	0.39	5.6 ± 0.8	25.8 ± 9.3	87	36	2.4	1	
51	rim	0.00067 ± 0.00007	0.00747 ± 0.00279	0.28	4.3 ± 0.5	7.6 ± 2.8	240	159	0.7	2	
54	magmatic core	0.00063 ± 0.00007	0.00313 ± 0.00172	0.20	4.1 ± 0.4	3.2 ± 1.7	239	174	0.7	2	
57	magmatic core	0.00067 ± 0.00004	0.00529 ± 0.00115	0.29	4.3 ± 0.3	5.4 ± 1.2	1010	1606	1.6	2	
59	rim	0.00062 ± 0.00008	0.00931 ± 0.00405	0.31	4.0 ± 0.5	9.4 ± 4.1	148	105	0.7	2	
60	rim	0.00072 ± 0.00007	0.00974 ± 0.00295	0.31	4.7 ± 0.4	9.8 ± 3.0	291	150	0.5	2	
63	rim	0.00063 ± 0.00010	0.00213 ± 0.00148	0.24	4.0 ± 0.7	2.2 ± 1.5	235	68	0.3	2	
64	rim	0.00057 ± 0.00010	0.00606 ± 0.00272	0.37	3.7 ± 0.6	6.1 ± 2.7	229	106	0.5	2	
Cabo Raper Pluton					Average for magmatic core and rim		4.1 ± 1.2				
Estero Cono Pluton											
TPB135	4-2	magmatic core	0.00078 ± 0.00006	0.00212 ± 0.00118	0.14	5.0 ± 0.4	2.1 ± 1.2	485	251	1.9	1
	5a-2	magmatic core	0.00082 ± 0.00009	0.01517 ± 0.00509	0.33	5.3 ± 0.6	15.3 ± 5.1	230	132	1.7	1
	5b-2	rim	0.00088 ± 0.00008	0.00545 ± 0.00247	0.21	5.6 ± 0.5	5.5 ± 2.5	301	148	2.0	1
	7-2	rim	0.00081 ± 0.00009	0.01226 ± 0.00445	0.30	5.2 ± 0.6	12.4 ± 4.5	235	76	3.1	1
	8-2	rim	0.00081 ± 0.00005	0.00388 ± 0.00140	0.18	5.2 ± 0.3	3.9 ± 1.4	661	431	1.5	1
	9-2	rim	0.00076 ± 0.00006	0.00547 ± 0.00189	0.22	4.9 ± 0.4	5.5 ± 1.9	526	273	1.9	1
	10-2	rim	0.00086 ± 0.00006	0.00787 ± 0.00240	0.25	5.5 ± 0.4	8.0 ± 2.4	483	234	2.1	1
	11-2	rim	0.00074 ± 0.00007	0.00234 ± 0.00157	0.15	4.7 ± 0.5	2.4 ± 1.6	307	154	2.0	1
	12a-2	magmatic core	0.00083 ± 0.00006	0.00733 ± 0.00230	0.24	5.3 ± 0.4	7.4 ± 2.3	453	260	1.7	1
	14b	magmatic core	0.00084 ± 0.00007	0.00792 ± 0.00275	0.25	5.4 ± 0.5	8.0 ± 2.8	346	266	1.3	1
	17-2	rim	0.00078 ± 0.00005	0.00581 ± 0.00156	0.22	5.0 ± 0.3	5.9 ± 1.6	771	799	1.0	1
	18-2	rim	0.00086 ± 0.00005	0.00971 ± 0.00213	0.27	5.5 ± 0.3	9.8 ± 2.1	729	434	1.7	1
	19-2	rim	0.00073 ± 0.00004	0.00559 ± 0.00131	0.23	4.7 ± 0.2	5.7 ± 1.3	1060	1030	1.0	1
	20-2	magmatic core	0.00080 ± 0.00006	0.00965 ± 0.00267	0.27	5.2 ± 0.4	9.7 ± 2.7	464	153	3.0	1
	21-2	rim	0.00072 ± 0.00006	0.00031 ± 0.00044	0.06	4.7 ± 0.4	0.3 ± 0.5	461	250	1.8	1
	23a-2	magmatic core	0.00066 ± 0.00005	0.00326 ± 0.00144	0.18	4.3 ± 0.3	3.3 ± 1.5	487	244	2.0	1
	27b-2	inherited core	0.00068 ± 0.00011	0.01466 ± 0.00669	0.35	4.4 ± 0.7	14.8 ± 6.7	133	58	2.3	1
	30-2	magmatic core	0.00090 ± 0.00007	0.00530 ± 0.00217	0.20	5.8 ± 0.5	5.4 ± 2.2	354	242	1.5	1
	35b	magmatic core	0.00075 ± 0.00008	0.00164 ± 0.00136	0.12	4.8 ± 0.5	1.7 ± 1.4	265	183	1.4	1
	38-2	inherited core	0.00074 ± 0.00006	0.00897 ± 0.00258	0.28	4.8 ± 0.4	9.1 ± 2.6	493	244	2.0	1
	41	magmatic core	0.00084 ± 0.00006	0.00396 ± 0.00164	0.18	5.4 ± 0.4	4.0 ± 1.7	433	289	1.5	1
	42	rim	0.00078 ± 0.00006	0.00507 ± 0.00197	0.21	5.0 ± 0.4	5.1 ± 2.0	393	164	2.4	1
	43	inherited core	0.00087 ± 0.00008	0.01392 ± 0.00385	0.31	5.6 ± 0.5	14.0 ± 3.9	321	201	1.6	1
	44	magmatic core	0.00083 ± 0.00009	0.00165 ± 0.00149	0.12	5.4 ± 0.6	1.7 ± 1.5	209	88	2.4	1
	46	magmatic core	0.00075 ± 0.00009	0.00350 ± 0.00241	0.18	4.8 ± 0.6	3.5 ± 2.4	177	87	2.0	1
	47	magmatic core	0.00081 ± 0.00008	0.00498 ± 0.00252	0.21	5.2 ± 0.5	5.0 ± 2.6	234	153	1.5	1
	48	magmatic core	0.00077 ± 0.00007	0.00606 ± 0.00256	0.23	4.9 ± 0.5	6.1 ± 2.6	283	109	2.6	1
	49	rim	0.00074 ± 0.00007	0.00685 ± 0.00254	0.25	4.8 ± 0.4	6.9 ± 2.6	331	109	3.0	1
	50	magmatic core	0.00073 ± 0.00007	0.00329 ± 0.00165	0.18	4.7 ± 0.4	3.3 ± 1.7	355	181	2.0	1
	51	magmatic core	0.00071 ± 0.00006	0.00623 ± 0.00224	0.24	4.5 ± 0.4	6.3 ± 2.3	410	141	2.9	1
	52	rim	0.00069 ± 0.00007	0.00889 ± 0.00311	0.28	4.5 ± 0.4	9.0 ± 3.1	320	99	3.2	1
	53	magmatic core	0.00074 ± 0.00007	0.01208 ± 0.00352	0.31	4.8 ± 0.4	12.2 ± 3.5	355	234	1.5	1
	54	magmatic core	0.00073 ± 0.00003	0.00607 ± 0.00113	0.25	4.7 ± 0.2	6.1 ± 1.1	1610	1945	0.8	1
	56	rim	0.00089 ± 0.00008	0.00326 ± 0.00170	0.17	5.7 ± 0.5	3.3 ± 1.7	245	125	0.5	2
	60	rim	0.00087 ± 0.00007	0.00521 ± 0.00195	0.22	5.6 ± 0.5	5.3 ± 2.0	310	160	0.5	2
	61	rim	0.00079 ± 0.00005	0.00443 ± 0.00101	0.26	5.1 ± 0.3	4.5 ± 1.0	1007	873	0.9	2
	62	rim	0.00079 ± 0.00006	0.00709 ± 0.00187	0.28	5.1 ± 0.4	7.2 ± 1.9	486	295	0.6	2
	64	magmatic core	0.00082 ± 0.00010	0.00856 ± 0.00351	0.30	5.3 ± 0.7	8.7 ± 3.5	179	91	0.5	2
	65	magmatic core	0.00079 ± 0.00009	0.00460 ± 0.00222	0.24	5.1 ± 0.6	4.7 ± 2.2	232	83	0.4	2
Estero Cono Pluton					Average for magmatic core and rim		5.1 ± 0.7				
Bahia Barrientos Intrusion											
TPB243	1a-2	rim	0.00078 ± 0.00005	0.00105 ± 0.00070	0.10	5.1 ± 0.3	1.1 ± 0.7	597	182	3.3	1
	1b-2	rim	0.00081 ± 0.00007	0.00566 ± 0.00232	0.22	5.2 ± 0.5	5.7 ± 2.3	435	135	3.2	1
	6a-2	rim	0.00070 ± 0.00005	0.00654 ± 0.00170	0.25	4.5 ± 0.3	6.6 ± 1.7	711	176	4.0	1
	6b-2	rim	0.00073 ± 0.00003	0.00462 ± 0.00090	0.22	4.7 ± 0.2	4.7 ± 0.9	1761	610	2.9	1
	9-2	rim	0.00077 ± 0.00004	0.00226 ± 0.00081	0.15	5.0 ± 0.3	2.3 ± 0.8	989	315	3.1	1

	10b-1	rim	0.00077 ± 0.00005	0.00225 ± 0.00100	0.15	5.0 ± 0.3	2.3 ± 1.0	636	231	2.8	1
	10c	rim	0.00074 ± 0.00004	0.00436 ± 0.00125	0.21	4.8 ± 0.3	4.4 ± 1.3	1160	514	2.3	1
	11-2	rim	0.00077 ± 0.00005	0.00584 ± 0.00165	0.23	4.9 ± 0.3	5.9 ± 1.7	659	301	2.2	1
	12-2	rim	0.00085 ± 0.00006	0.00342 ± 0.00141	0.17	5.5 ± 0.4	3.5 ± 1.4	497	174	2.9	1
	17-2	magmatic core	0.00067 ± 0.00005	0.00595 ± 0.00168	0.25	4.3 ± 0.3	6.0 ± 1.7	912	248	3.7	1
	22	rim	0.00077 ± 0.00005	0.00662 ± 0.00170	0.25	5.0 ± 0.3	6.7 ± 1.7	986	435	2.3	1
	23	magmatic core	0.00079 ± 0.00005	0.00265 ± 0.00106	0.16	5.1 ± 0.3	2.7 ± 1.1	931	423	2.2	1
	25	rim	0.00072 ± 0.00003	0.00443 ± 0.00091	0.22	4.6 ± 0.2	4.5 ± 0.9	2311	990	2.3	1
	26	magmatic core	0.00081 ± 0.00007	0.00286 ± 0.00154	0.16	5.2 ± 0.5	2.9 ± 1.6	473	180	2.6	1
	27	magmatic core	0.00073 ± 0.00005	0.00391 ± 0.00126	0.20	4.7 ± 0.3	4.0 ± 1.3	1008	397	2.5	1
	28	rim	0.00067 ± 0.00004	0.00486 ± 0.00124	0.23	4.3 ± 0.3	4.9 ± 1.3	1343	802	1.7	1
Bahia Barrientos Intrusion			Average for magmatic core and rim			4.9 ± 0.7					
Tres Montes Pluton											
TPH75	1-2	magmatic core	0.00089 ± 0.00008	0.00307 ± 0.00165	0.16	5.7 ± 0.5	3.1 ± 1.7	404	161	2.5	1
	2b	magmatic core	0.00081 ± 0.00013	0.00970 ± 0.00552	0.28	5.2 ± 0.8	9.8 ± 5.6	105	69	1.5	1
	3c	rim	0.00086 ± 0.00006	0.00476 ± 0.00180	0.20	5.6 ± 0.4	4.8 ± 1.8	448	501	0.9	1
	3d	magmatic core	0.00085 ± 0.00005	0.00488 ± 0.00145	0.20	5.5 ± 0.3	4.9 ± 1.5	877	875	1.0	1
	5-2	rim	0.00100 ± 0.00010	0.00939 ± 0.00390	0.25	6.4 ± 0.7	9.5 ± 3.9	197	136	1.5	1
	7-2	inherited core	0.00089 ± 0.00004	0.00785 ± 0.00119	0.26	5.7 ± 0.2	7.9 ± 1.2	1865	1888	1.0	1
	11b	magmatic core	0.00105 ± 0.00012	0.00941 ± 0.00423	0.24	6.8 ± 0.7	9.5 ± 4.3	167	137	1.2	1
	13b	magmatic core	0.00076 ± 0.00007	0.01160 ± 0.00351	0.31	4.9 ± 0.5	11.7 ± 3.5	328	364	0.9	1
	15-2	magmatic core	0.00084 ± 0.00010	0.01676 ± 0.00618	0.34	5.4 ± 0.7	16.9 ± 6.2	160	137	1.2	1
	16-2	inherited core	0.00091 ± 0.00003	0.00524 ± 0.00090	0.22	5.9 ± 0.2	5.3 ± 0.9	2050	1232	1.7	1
	18-2	rim	0.00088 ± 0.00006	0.00821 ± 0.00205	0.25	5.7 ± 0.4	8.3 ± 2.1	633	442	1.4	1
	19b	inherited core	0.00085 ± 0.00003	0.00327 ± 0.00074	0.18	5.5 ± 0.2	3.3 ± 0.8	2239	1840	1.2	1
	21	magmatic core	0.00097 ± 0.00006	0.00345 ± 0.00122	0.16	6.2 ± 0.4	3.5 ± 1.2	847	974	0.9	1
	22	magmatic core	0.00085 ± 0.00009	0.01319 ± 0.00452	0.31	5.5 ± 0.6	13.3 ± 4.5	273	190	1.4	1
	23	magmatic core	0.00087 ± 0.00004	0.00425 ± 0.00107	0.19	5.6 ± 0.3	4.3 ± 1.1	1403	945	1.5	1
	24	rim	0.00079 ± 0.00009	0.00734 ± 0.00331	0.25	5.1 ± 0.6	7.4 ± 3.3	261	166	1.6	1
	25	rim	0.00065 ± 0.00010	0.00511 ± 0.00332	0.23	4.2 ± 0.6	5.2 ± 3.4	176	109	1.6	1
	26	inherited core	0.01577 ± 0.00039	0.09905 ± 0.00957	0.26	100.9 ± 2.5	95.9 ± 8.9	561	385	1.5	1
	27	inherited core	0.09295 ± 0.00173	0.77240 ± 0.04220	0.34	573.0 ± 10.2	581.1 ± 24.5	1657	715	2.3	1
	28	magmatic core	0.00086 ± 0.00006	0.00619 ± 0.00183	0.23	5.5 ± 0.4	6.3 ± 1.8	599	542	1.1	1
	29	rim	0.00090 ± 0.00008	0.00266 ± 0.00162	0.15	5.8 ± 0.5	2.7 ± 1.6	308	200	1.5	1
	30	magmatic core	0.00105 ± 0.00012	0.01911 ± 0.00689	0.33	6.8 ± 0.8	19.2 ± 6.9	149	117	1.3	1
	31	rim	0.00072 ± 0.00009	0.01019 ± 0.00430	0.29	4.6 ± 0.6	10.3 ± 4.3	194	112	1.7	1
	32	magmatic core	0.00085 ± 0.00007	0.00862 ± 0.00260	0.26	5.5 ± 0.4	8.7 ± 2.6	430	297	1.4	1
	33	rim	0.00075 ± 0.00007	0.00657 ± 0.00250	0.24	4.9 ± 0.4	6.7 ± 2.5	344	356	1.0	1
Tres Montes Pluton			Average for magmatic core and rim			5.5 ± 1.3					
Seno Hoppner Pluton											
TPG171	1b-2	magmatic core	0.00088 ± 0.00004	0.00639 ± 0.00126	0.23	5.7 ± 0.3	6.5 ± 1.3	1221	1615	0.8	1
	3-2	magmatic core	0.00074 ± 0.00004	0.00432 ± 0.00129	0.20	4.8 ± 0.3	4.4 ± 1.3	737	815	0.9	1
	4-2	magmatic core	0.00089 ± 0.00004	0.00411 ± 0.00097	0.19	5.7 ± 0.3	4.2 ± 1.0	1043	1394	0.7	1
	8-2	magmatic core	0.00089 ± 0.00005	0.00662 ± 0.00169	0.23	5.7 ± 0.3	6.7 ± 1.7	580	567	1.0	1
	9-2	magmatic core	0.00077 ± 0.00005	0.00953 ± 0.00200	0.29	5.0 ± 0.3	9.6 ± 2.0	637	603	1.1	1
	11-2	rim	0.00085 ± 0.00008	0.00853 ± 0.00303	0.26	5.5 ± 0.5	8.6 ± 3.1	240	171	1.4	1
	12-2	magmatic core	0.00085 ± 0.00006	0.00382 ± 0.00138	0.18	5.5 ± 0.4	3.9 ± 1.4	479	462	1.0	1
	13-2	magmatic core	0.00087 ± 0.00004	0.00338 ± 0.00100	0.17	5.6 ± 0.3	3.4 ± 1.0	804	1122	0.7	1
	14-2	magmatic core	0.00078 ± 0.00005	0.00236 ± 0.00090	0.15	5.0 ± 0.3	2.4 ± 0.9	680	826	0.8	1
	15b	magmatic core	0.00089 ± 0.00004	0.00491 ± 0.00100	0.21	5.7 ± 0.2	5.0 ± 1.0	1192	1556	0.8	1
	16b	rim	0.00086 ± 0.00005	0.00585 ± 0.00153	0.22	5.5 ± 0.3	5.9 ± 1.5	618	631	1.0	1
	19b	magmatic core	0.00078 ± 0.00004	0.00316 ± 0.00090	0.17	5.0 ± 0.2	3.2 ± 0.9	1089	1354	0.8	1
	20-2	magmatic core	0.00082 ± 0.00004	0.00455 ± 0.00110	0.20	5.3 ± 0.3	4.6 ± 1.1	1095	1303	0.8	1
	21a-2	magmatic core	0.00082 ± 0.00004	0.00733 ± 0.00162	0.24	5.3 ± 0.3	7.4 ± 1.6	855	898	1.0	1
	22-2	magmatic core	0.00090 ± 0.00005	0.00646 ± 0.00150	0.22	5.8 ± 0.3	6.5 ± 1.5	851	870	1.0	1
	23a-2	magmatic core	0.00086 ± 0.00004	0.00762 ± 0.00130	0.26	5.6 ± 0.2	7.7 ± 1.3	1149	1686	0.7	1
	24-2	magmatic core	0.00080 ± 0.00003	0.00576 ± 0.00103	0.23	5.2 ± 0.2	5.8 ± 1.0	1669	2658	0.6	1
	25-2	rim	0.00091 ± 0.00005	0.00783 ± 0.00192	0.24	5.9 ± 0.3	7.9 ± 1.9	637	511	1.2	1
	26-2	rim	0.00085 ± 0.00004	0.00697 ± 0.00136	0.24	5.5 ± 0.3	7.1 ± 1.4	1157	1644	0.7	1
	27-2	magmatic core	0.00087 ± 0.00005	0.00723 ± 0.00159	0.24	5.6 ± 0.3	7.3 ± 1.6	867	885	1.0	1
	31	magmatic core	0.00088 ± 0.00004	0.00634 ± 0.00103	0.26	5.6 ± 0.2	6.4 ± 1.0	2326	2687	0.9	1
	32	magmatic core	0.00085 ± 0.00004	0.00477 ± 0.00108	0.22	5.5 ± 0.3	4.8 ± 1.1	1513	1953	0.8	1
	33	rim	0.00093 ± 0.00005	0.00591 ± 0.00147	0.23	6.0 ± 0.3	6.0 ± 1.5	1001	972	1.0	1
	34	magmatic core	0.00081 ± 0.00004	0.00706 ± 0.00138	0.26	5.3 ± 0.3	7.1 ± 1.4	1439	1656	0.9	1
	35	rim	0.00086 ± 0.00005	0.00535 ± 0.00130	0.23	5.5 ± 0.3	5.4 ± 1.3	1166	974	1.2	1
	36	magmatic core	0.00090 ± 0.00005	0.00725 ± 0.00174	0.25	5.8 ± 0.3	7.3 ± 1.8	906	781	1.2	1
	37	magmatic core	0.00084 ± 0.00004	0.00541 ± 0.00123	0.23	5.4 ± 0.3	5.5 ± 1.2	1334	1515	0.9	1
	38	rim	0.00081 ± 0.00006	0.00623 ± 0.00184	0.24	5.2 ± 0.4	6.3 ± 1.9	687	461	1.5	1
	39	magmatic core	0.00076 ± 0.00006	0.00501 ± 0.00167	0.22	4.9 ± 0.4	5.1 ± 1.7	658	521	1.3	1
	40	magmatic core	0.00087 ± 0.00005	0.00629 ± 0.00150	0.24	5.6 ± 0.3	6.4 ± 1.5	1044	983	1.1	1
	41	magmatic core	0.00085 ± 0.00005	0.00939 ± 0.00158	0.33	5.5 ± 0.3	9.5 ± 1.6	1049	1326	1.3	2
	42	magmatic core	0.00074 ± 0.00006	0.00870 ± 0.00236	0.29	4.8 ± 0.4	8.8 ± 2.4	418	282	0.7	2
	43	rim	0.00070 ± 0.00005	0.00699 ± 0.00193	0.28	4.5 ± 0.3	7.1 ± 2.0	488	456	0.9	2
	44	magmatic core	0.00083 ± 0.00006	0.00493 ± 0.00154	0.23	5.4 ± 0.4	5.0 ± 1.6	511	454	0.9	2
	45	magmatic core	0.00074 ± 0.00005	0.00404 ± 0.00116	0.22	4.8 ± 0.3	4.1 ± 1.2	733	843	1.1	2
	46	magmatic core	0.00083 ± 0.00005	0.00897 ± 0.00163	0.32	5.4 ± 0.3	9.1 ± 1.6	926	1191	1.3	2
	47	rim	0.00076 ± 0.00005	0.00593 ± 0.00148	0.26	4.9 ± 0.3	6.0 ± 1.5	688	752	1.1	2

	48	magmatic core	0.00076 ± 0.00005	0.00429 ± 0.00140	0.22	4.9 ± 0.4	4.3 ± 1.4	536	472	0.9	2
	49	magmatic core	0.00087 ± 0.00008	0.00306 ± 0.00173	0.17	5.6 ± 0.5	3.1 ± 1.7	242	191	0.8	2
TPD116	4-2	rim	0.00086 ± 0.00005	0.00693 ± 0.00160	0.24	5.6 ± 0.3	7.0 ± 1.6	777	494	1.6	1
	6-2	rim	0.00094 ± 0.00007	0.00089 ± 0.00080	0.08	6.1 ± 0.5	0.9 ± 0.8	358	224	1.6	1
	8-2	magmatic core	0.00086 ± 0.00009	0.00252 ± 0.00172	0.15	5.5 ± 0.5	2.6 ± 1.7	226	130	1.7	1
	9-2	rim	0.00078 ± 0.00005	0.01080 ± 0.00234	0.30	5.0 ± 0.3	10.9 ± 2.4	616	348	1.8	1
	10-2	rim	0.00078 ± 0.00004	0.00148 ± 0.00065	0.12	5.0 ± 0.3	1.5 ± 0.7	902	602	1.5	1
	12-2	rim	0.00081 ± 0.00005	0.00431 ± 0.00128	0.20	5.2 ± 0.3	4.4 ± 1.3	721	423	1.7	1
	13-2	rim	0.00077 ± 0.00007	0.00861 ± 0.00307	0.27	5.0 ± 0.5	8.7 ± 3.1	272	123	2.2	1
	15-2	rim	0.00088 ± 0.00006	0.00452 ± 0.00144	0.20	5.7 ± 0.4	4.6 ± 1.5	820	613	1.3	1
	17-2	rim	0.00083 ± 0.00004	0.00607 ± 0.00119	0.25	5.3 ± 0.3	6.1 ± 1.2	1730	2034	0.9	1
	18-2	magmatic core	0.00077 ± 0.00005	0.00406 ± 0.00139	0.20	5.0 ± 0.3	4.1 ± 1.4	577	400	1.4	1
	19-2	rim	0.00083 ± 0.00006	0.01193 ± 0.00302	0.30	5.3 ± 0.4	12.0 ± 3.0	409	215	1.9	1
	21	magmatic core	0.00078 ± 0.00007	0.00671 ± 0.00255	0.24	5.0 ± 0.5	6.8 ± 2.6	400	237	1.7	1
	22	rim	0.00076 ± 0.00006	0.00460 ± 0.00162	0.21	4.9 ± 0.4	4.7 ± 1.6	658	352	1.9	1
	23	rim	0.00078 ± 0.00007	0.00627 ± 0.00254	0.24	5.0 ± 0.5	6.4 ± 2.6	374	199	1.9	1
	24	magmatic core	0.00113 ± 0.00008	0.03783 ± 0.00619	0.42	7.3 ± 0.5	37.7 ± 6.1	555	262	2.1	1
	25	magmatic core	0.00087 ± 0.00005	0.00708 ± 0.00152	0.26	5.6 ± 0.3	7.2 ± 1.5	1243	972	1.3	1
	26	rim	0.00074 ± 0.00007	0.00155 ± 0.00114	0.13	4.8 ± 0.4	1.6 ± 1.2	421	204	2.1	1
	27	rim	0.00082 ± 0.00005	0.00464 ± 0.00132	0.22	5.3 ± 0.3	4.7 ± 1.3	1018	437	2.3	1
	28	rim	0.00070 ± 0.00009	0.00466 ± 0.00126	0.50	4.5 ± 0.6	4.7 ± 1.3	917	996	1.1	2
	29	rim	0.00071 ± 0.00011	0.00731 ± 0.00274	0.41	4.6 ± 0.7	7.4 ± 2.8	281	108	0.4	2
	30	magmatic core	0.00074 ± 0.00010	0.00664 ± 0.00200	0.47	4.8 ± 0.7	6.7 ± 2.0	510	435	0.9	2
	31	rim	0.00074 ± 0.00012	0.01047 ± 0.00383	0.44	4.8 ± 0.8	10.6 ± 3.9	217	112	0.5	2
Seno Hoppner Pluton			Average for magmatic core and rim			5.3 ± 0.9					

* b.d.l. means below detection limit.

Table 2. Oxygen isotope ratios of zircons in the Taitao granitoids measured with SIMS.

Analysis Number	$\delta^{18}\text{O}$ (Zrc)	2 SD	Texture*	Analysis Number	$\delta^{18}\text{O}$ (Zrc)	2 SD	Texture*	Analysis Number	$\delta^{18}\text{O}$ (Zrc)	2 SD	Texture*	Analysis Number	$\delta^{18}\text{O}$ (Zrc)	2 SD	Texture*	Analysis Number	$\delta^{18}\text{O}$ (Zrc)	2 SD	Texture*	Analysis Number	$\delta^{18}\text{O}$ (Zrc)	2 SD	Texture*	Analysis Number	$\delta^{18}\text{O}$ (Zrc)	2 SD	Texture*				
Cabo Raper Pluton								Estero Cono Pluton				Bahia Barrientos Intrusion				Tres Montes Pluton				Seno Hoppner Pluton											
TPB56				TPE88				TPE90				TPE135				TPB243				TPH75				TPG171				TPD116			
1.0	6.0	0.1	rim	1-1	6.3	0.1	rim	1	6.2	0.3	core	1-1	6.3	0.1	core	1a-1	6.5	0.2	rim	1-1	6.6	0.2	rim	1a-1	5.4	0.2	core	1	5.4	0.2	rim
2a	6.0	0.1	Inherited	2-1	6.3	0.1	rim	2	6.3	0.3	rim	2	6.1	0.1	rim	1b-1	6.6	0.2	rim	2-1	6.4	0.2	rim	1b-1	5.5	0.2	core	2	5.5	0.2	rim
3-1	6.2	0.1	rim	3-1	6.2	0.1	core	3	5.8	0.3	rim	3-1	6.0	0.1	core	3	6.5	0.2	Inherited	3a-1	6.5	0.2	core	3-1	5.4	0.2	core	3	5.5	0.2	core
4-1	6.4	0.1	rim	4-1	6.6	0.1	rim	4a-1	6.3	0.3	core	4-1	5.8	0.1	core	4	6.0	0.2	Inherited	3b	6.1	0.2	rim	4-1	5.4	0.2	core	4-1	5.4	0.2	rim
5	6.0	0.1	rim	5a-1	6.2	0.1	rim	4b	6.6	0.3	rim	5a-1	6.6	0.1	core	5a	6.2	0.2	rim	5-1	6.3	0.2	rim	5	5.3	0.2	core	5-1	5.3	0.2	rim
6-1	6.5	0.1	Inherited	5b	6.8	0.1	core	6	6.0	0.3	Inherited	5b-1	6.2	0.1	rim	5b	6.5	0.3	core	6-1	6.4	0.2	Inherited	6	5.2	0.2	rim	6-1	5.8	0.2	rim
7-1	6.0	0.1	rim	7-1	6.4	0.1	core	7-1	6.2	0.3	rim	7-1	6.0	0.1	rim	6a-1	6.8	0.2	rim	7-1	8.1	0.2	Inherited	7-1	5.2	0.2	rim	7	5.6	0.2	rim
8.0	5.7	0.1	rim	8-1	8.3	0.1	Inherited	8-1	6.4	0.3	rim	8-1	5.7	0.1	rim	6b-1	6.3	0.2	rim	8	7.2	0.2	Inherited	8-1	5.3	0.2	rim	8-1	5.5	0.2	core
9.0	5.8	0.1	core	9-1	6.1	0.1	core	9	5.9	0.3	rim	9-1	5.9	0.1	rim	8	6.2	0.2	core	9	6.6	0.2	core	9-1	5.1	0.2	core	9-1	5.3	0.2	rim
10.0	5.9	0.1	rim	10-1	6.1	0.1	rim	10a	6.1	0.3	rim	10-1	6.1	0.1	rim	9-1	6.8	0.2	rim	10	6.9	0.2	core	10-1	4.9	0.2	rim	10-1	5.4	0.2	rim
11a-1	5.9	0.3	Inherited	11-1	5.9	0.4	core	11a	7.3	0.3	Inherited	11-1	6.1	0.2	rim	10a-1	6.8	0.2	rim	11a	6.9	0.2	core	11-1	5.1	0.3	rim	11	5.3	0.3	rim
11b-1	6.2	0.3	rim	12-1	6.2	0.4	rim	11b	5.7	0.3	rim	12a-1	6.1	0.2	rim	11-1	6.4	0.3	rim	11c-1	6.9	0.2	rim	12-1	5.2	0.3	core	12-1	5.2	0.3	rim
13-1	6.0	0.3	rim	13	6.0	0.4	core	13-1	5.9	0.3	rim	12b-1	6.2	0.2	core	12-1	6.2	0.3	rim	13a-1	6.2	0.2	core	13	5.2	0.3	core	13-1	5.9	0.3	rim
14-1	6.2	0.3	Inherited	14	6.4	0.4	rim	14	5.6	0.3	rim	14a-1	5.8	0.2	core	14	6.6	0.3	core	14-1	6.8	0.2	core	14-1	5.0	0.3	core	14	5.3	0.3	rim
15-1	6.2	0.3	rim	15a-1	7.8	0.4	Inherited	15-1	6.0	0.3	rim	15	6.6	0.2	Inherited	15	6.0	0.3	core	15-1	6.0	0.2	core	15a-1	5.3	0.3	core	15-1	5.7	0.3	rim
16-1	6.0	0.3	rim	15b	6.5	0.4	rim	16a	7.4	0.3	Inherited	16	6.2	0.2	rim	16	6.5	0.3	core	16-1	6.1	0.2	Inherited	16a	5.1	0.3	core	16	5.7	0.3	rim
17-1	6.1	0.3	rim	16-1	6.4	0.4	rim	16b	6.2	0.3	rim	17-1	6.0	0.2	rim	17-1	6.8	0.3	core	17	6.7	0.2	core	17	5.2	0.3	core	17-1	5.5	0.3	rim
18-1	6.0	0.3	rim	18a-1	6.6	0.4	Inherited	16c-1	5.9	0.3	rim	18-1	5.9	0.2	rim	18a	6.3	0.3	rim	18-1	6.3	0.2	rim	18	5.3	0.3	core	18-1	5.2	0.3	core
19a-1	5.2	0.3	Inherited	18b	6.5	0.4	rim	19	5.7	0.3	core	19-1	5.8	0.2	rim	18b	5.0	0.3	Inherited	19a	6.2	0.2	Inherited	19a	5.5	0.3	rim	19-1	6.0	0.3	rim
19b-1	6.6	0.3	rim	19-1	6.3	0.4	core	20a-1	7.3	0.3	Inherited	20-1	6.2	0.2	core	20	6.5	0.3	rim	20	6.5	0.2	rim	20-1	5.6	0.3	core	20	5.7	0.3	rim
21-1	6.0	0.2	rim					20b	7.0	0.2	rim	21-1	5.9	0.4	rim					21a-1	5.5	0.2	core	21a-1	5.5	0.2	core				
22-1	6.3	0.2	rim					22a	6.1	0.2	rim	22	6.1	0.4	Inherited					22-1	5.3	0.2	core	22-1	5.3	0.2	core				
23-1	6.0	0.2	rim					22b-1	6.6	0.2	rim	23a-1	6.0	0.4	core					23a-1	5.2	0.2	core	23a-1	5.2	0.2	core				
24.0	6.2	0.2	rim					24	5.7	0.2	core	23b	6.4	0.4	rim					24	5.2	0.2	core	24	5.2	0.2	core				
25-1	5.9	0.2	core					25	6.2	0.2	rim	25a-1	6.1	0.4	core					25-1	5.4	0.2	rim	25-1	5.4	0.2	rim				
26-1	6.2	0.2	core					26-1	6.4	0.2	rim	25b	6.1	0.4	rim					26-1	5.2	0.2	rim	26-1	5.2	0.2	rim				
27.0	6.3	0.2	core					27-1	6.4	0.2	rim	27a	5.9	0.4	rim					27-1	5.4	0.2	core	27-1	5.4	0.2	core				
28-1	5.8	0.2	core					28-1	6.3	0.2	rim	27b-1	5.9	0.4	Inherited					28	5.3	0.2	core	28	5.3	0.2	core				
29a	5.5	0.2	core					29-1	6.5	0.2	core	29-1	6.5	0.4	core					29-1	5.2	0.2	core	29-1	5.2	0.2	core				
29b-1	5.8	0.2	rim					30-1	6.3	0.2	rim	30-1	5.8	0.4	core					30	5.2	0.2	core	30	5.2	0.2	core				
								31a-1	6.1	0.3	core	31	6.3	0.4	rim																
								31b-1	6.2	0.3	rim	32	6.5	0.4	core																
								33-1	5.8	0.3	rim	33	6.2	0.4	core																
								34-1	6.4	0.3	rim	34	5.9	0.4	core																
								35	6.3	0.3	core	35a-1	6.3	0.4	core																
								36a	6.5	0.3	rim	36a	6.1	0.4	rim																
								36b-1	7.6	0.3	Inherited	36b-1	6.2	0.4	core																
								38a	6.5	0.3	rim	38-1	6.1	0.4	Inherited																
								38b-1	6.1	0.3	rim	39	6.1	0.4	core																
								40-1	6.2	0.3	rim	40-1	6.0	0.4	core																
Average for core and rim				Average for core and rim				Average for core and rim				Average for core and rim				Average for core and rim				Average for core and rim				Average for core and rim							
6.05 0.48				6.31 0.45				6.18 0.61				6.09 0.41				6.46 0.51				6.53 0.60				5.26 0.31				5.52 0.41			

* 'Core' and 'rim' refers to the relative position of the analysis site within the crystal. "Core" means magmatic core, whereas "Inherited" means inherited core.

Table 3. Hafnium isotope ratios of zircons in the Taitao granitoids.

Analysis No.	¹⁷⁶ Yb/ ¹⁷⁷ Hf	2 SE	¹⁷⁶ Lu/ ¹⁷⁷ Hf	2 SE	¹⁷⁶ Hf/ ¹⁷⁷ Hf* ¹	2 SE	εHf(t)	2 SE* ²	Texture	Spot size (μm)
Cabo Raper Pluton										
TPB56										
3-3	0.027919 ± 857		0.000974 ± 54		0.282952 ± 30		5.61 ± 1.08		rim	40
11b-2	0.024270 ± 571		0.000769 ± 20		0.282936 ± 28		5.05 ± 0.98		rim	40
14-3	0.139821 ± 2194		0.003701 ± 50		0.282877 ± 40		2.96 ± 1.41		inherited core	40
21-3	0.033553 ± 471		0.001044 ± 14		0.282931 ± 28		4.89 ± 1.00		rim	40
22-3	0.042573 ± 1265		0.001275 ± 46		0.282949 ± 26		5.52 ± 0.93		rim	40
23-3	0.026613 ± 377		0.000820 ± 18		0.282919 ± 30		4.47 ± 1.07		rim	40
28-3	0.056546 ± 5670		0.001649 ± 155		0.283000 ± 28		7.33 ± 0.99		magmatic core	40
40	0.033862 ± 292		0.001051 ± 5		0.282767 ± 33		-0.90 ± 1.17		inherited core	40
Average for magmatic core and rim							5.48 ± 1.83			
TPE88										
1-3	0.042817 ± 1208		0.001323 ± 27		0.282917 ± 43		4.38 ± 1.53		rim	20
2-3	0.023090 ± 1024		0.000822 ± 33		0.282997 ± 58		7.21 ± 2.06		rim	20
4-3	0.045207 ± 2300		0.001345 ± 55		0.282940 ± 52		5.20 ± 1.85		rim	20
5a-3	0.034957 ± 647		0.001109 ± 24		0.282951 ± 50		5.60 ± 1.77		rim	20
7-3	0.042850 ± 3292		0.001256 ± 64		0.282885 ± 62		3.25 ± 2.20		magmatic core	30
9-2	0.049372 ± 3165		0.001513 ± 76		0.282989 ± 48		6.94 ± 1.70		magmatic core	20
11-3	0.044634 ± 1782		0.001349 ± 39		0.282927 ± 32		4.74 ± 1.19		rim	30
12-3	0.022712 ± 1706		0.000716 ± 54		0.282915 ± 26		4.32 ± 0.93		rim	40
Average for magmatic core and rim							5.20 ± 2.51			
TPE90										
4a-3	0.032527 ± 262		0.000977 ± 8		0.282887 ± 70		3.31 ± 2.49		magmatic core	20
22b-2	0.024599 ± 152		0.000805 ± 17		0.282892 ± 25		3.49 ± 0.87		rim	40
27-2	0.026052 ± 807		0.000846 ± 33		0.282935 ± 38		5.01 ± 1.34		rim	20
28-3	0.037532 ± 2294		0.001179 ± 58		0.282925 ± 49		4.66 ± 1.74		rim	20
29-2	0.061163 ± 7182		0.001786 ± 206		0.282933 ± 34		4.97 ± 1.20		magmatic core	40
30-2	0.026160 ± 896		0.000825 ± 37		0.282936 ± 46		5.05 ± 1.62		rim	30
33-3	0.028783 ± 1238		0.000898 ± 32		0.282863 ± 47		2.49 ± 1.65		rim	20
38b-2	0.038411 ± 842		0.001215 ± 23		0.282894 ± 28		3.56 ± 0.98		rim	40
Average for magmatic core and rim							4.07 ± 1.83			
Estero Cono Pluton										
TPE135										
1-2	0.061662 ± 5384		0.001776 ± 159		0.282943 ± 25		5.29 ± 0.87		magmatic core	40
3-2	0.089654 ± 779		0.002540 ± 23		0.282910 ± 24		4.12 ± 0.84		magmatic core	40
5b-3	0.061219 ± 2189		0.001779 ± 61		0.282924 ± 28		4.62 ± 0.99		magmatic core	40
12b-2	0.076352 ± 2687		0.002257 ± 97		0.282949 ± 30		5.53 ± 1.05		magmatic core	40
14b-2	0.053258 ± 3099		0.001565 ± 91		0.282937 ± 27		5.09 ± 0.97		magmatic core	40
21-3	0.035461 ± 422		0.001037 ± 13		0.282947 ± 23		5.45 ± 0.81		rim	40
25a-2	0.040933 ± 1679		0.001240 ± 43		0.282927 ± 25		4.75 ± 0.87		rim	40
29-2	0.030930 ± 291		0.000952 ± 13		0.282929 ± 30		4.83 ± 1.07		magmatic core	40
35a-2	0.039589 ± 1142		0.001202 ± 54		0.282982 ± 40		6.69 ± 1.42		magmatic core	40
36b-2	0.095017 ± 4445		0.002697 ± 127		0.282936 ± 27		5.07 ± 0.95		rim	40
38-3	0.066749 ± 4375		0.002198 ± 201		0.282913 ± 31		4.24 ± 1.10		magmatic core	40
40-2	0.061995 ± 2123		0.001776 ± 50		0.282896 ± 28		3.65 ± 0.98		magmatic core	40
Average for magmatic core and rim							4.95 ± 1.51			
Bahia Barrientos Intrusion										
TPB243										
1a-3	0.051471 ± 3524		0.001630 ± 84		0.283007 ± 28		7.58 ± 1.00		magmatic core	40
10b-2	0.049551 ± 1250		0.001582 ± 24		0.282984 ± 35		6.75 ± 1.25		rim	30
Average for magmatic core and rim							7.16 ± 0.83			
Tres Montes Pluton										
TPH75										
2a-2	0.031727 ± 229		0.000965 ± 29		0.282929 ± 30		4.81 ± 1.07		rim	40

3a-2	0.049712 ± 1171	0.001427 ± 24	0.282870 ± 31	2.71 ± 1.08	magmatic core	40
5-3	0.035145 ± 1758	0.001043 ± 45	0.282886 ± 35	3.29 ± 1.23	rim	40
11c-2	0.065974 ± 1841	0.001900 ± 66	0.282817 ± 41	0.86 ± 1.43	rim	20
13a-2	0.084114 ± 3351	0.002408 ± 86	0.282972 ± 34	6.32 ± 1.20	magmatic core	40
14-2	0.112777 ± 3150	0.003917 ± 99	0.282879 ± 64	3.06 ± 2.26	magmatic core	30

Average for magmatic core and rim 3.51 ± 3.42

Seno Hoppner Pluton

TPG171

1a-2	0.211101 ± 2856	0.005828 ± 37	0.282977 ± 38	6.51 ± 1.35	magmatic core	40
7-2	0.123086 ± 4666	0.003529 ± 107	0.283011 ± 29	7.70 ± 1.02	rim	40
8-3	0.191111 ± 435	0.005196 ± 16	0.283032 ± 33	8.46 ± 1.17	magmatic core	40
9-3	0.147895 ± 1344	0.004127 ± 33	0.282980 ± 36	6.61 ± 1.26	magmatic core	40
10-2	0.175597 ± 2769	0.004858 ± 39	0.283005 ± 30	7.51 ± 1.06	magmatic core	40
11-3	0.096262 ± 5106	0.002719 ± 155	0.282982 ± 34	6.69 ± 1.19	rim	40
12-3	0.165611 ± 3007	0.004625 ± 86	0.283052 ± 32	9.15 ± 1.12	magmatic core	40
14-3	0.139767 ± 1108	0.003895 ± 28	0.283007 ± 30	7.56 ± 1.06	magmatic core	40
15a-2	0.160166 ± 6083	0.004391 ± 125	0.282999 ± 30	7.27 ± 1.07	magmatic core	40
21b	0.179303 ± 1203	0.005022 ± 16	0.283017 ± 37	7.92 ± 1.31	magmatic core	40
22-3	0.153961 ± 2429	0.004260 ± 72	0.283028 ± 29	8.30 ± 1.01	magmatic core	40
23b	0.299838 ± 2285	0.007846 ± 50	0.282995 ± 37	7.15 ± 1.31	magmatic core	40
25-3	0.111076 ± 1463	0.003212 ± 46	0.283002 ± 35	7.38 ± 1.25	rim	40
27-3	0.168620 ± 7360	0.004636 ± 221	0.282966 ± 53	6.11 ± 1.88	magmatic core	40

Average for magmatic core and rim 7.45 ± 1.61

TPD116

4-3	0.034825 ± 615	0.001100 ± 23	0.282941 ± 47	5.24 ± 1.67	rim	20
6-3	0.047598 ± 2792	0.001400 ± 65	0.282939 ± 51	5.15 ± 1.79	rim	20
8-3	0.023317 ± 1068	0.000830 ± 35	0.282994 ± 57	7.12 ± 2.00	rim	20

Average for rim 5.84 ± 1.81

*¹ The ¹⁷⁶Hf/¹⁷⁷Hf ratios are reported relative to 0.282163 in JMC-475 (Blichert-Toft et al. 1997).

*² Errors in Hf isotopic ratios are 2SE of the mean and include within-run statistics and reproducibility of standard analyses.

Table 4. Major element compositions and Hf-O isotope ratios for the Taitao Ophiolite, sediment and basement rocks.

Unit	Taitao Ophiolite					Sediment				Basement	
	MVU		TPE 110 dolerite	TPE 73 gabbro	TPE 30 pyroxenite	TPB 252 mudstone	TPB 298 sandstone	TPH 317 sandstone	TPH 314 conglomerate	TPE 392 mudstone	TPD 97 mudstone
Sample No. rock	TPH 347 basalt	TPH 342 basalt									
SiO ₂ (wt.%)	54.75	54.82	52.19	47.13	51.39	73.32	63.70	62.82	67.55	62.84	67.98
TiO ₂ (wt.%)	1.38	1.09	1.60	0.24	0.12	0.51	0.84	0.77	0.58	0.83	0.80
Al ₂ O ₃ (wt.%)	14.11	17.49	14.86	18.15	4.67	13.03	16.35	16.04	14.17	17.79	15.78
Fe ₂ O ₃ (wt.%)	8.86	7.93	10.30	8.94	3.21	3.95	6.13	6.62	4.81	6.88	5.57
MnO (wt.%)	0.16	0.13	0.16	0.12	0.03	0.06	0.06	0.09	0.08	0.10	0.08
MgO (wt.%)	5.00	5.00	6.26	13.86	19.61	1.62	2.77	3.54	2.07	2.65	2.10
CaO (wt.%)	9.28	7.39	9.39	9.10	19.28	2.41	3.88	2.57	4.07	2.27	0.86
Na ₂ O (wt.%)	5.23	4.62	4.11	2.17	0.41	3.40	3.41	3.68	3.19	3.07	2.76
K ₂ O (wt.%)	0.34	0.83	0.46	0.03	b.d.l.* ¹	1.06	2.29	3.15	2.54	3.13	3.14
P ₂ O ₅ (wt.%)	0.08	0.08	0.10	b.d.l.* ¹	b.d.l.* ¹	0.04	0.09	0.07	0.07	0.10	0.09
Total (wt.%)	99.20	99.39	99.43	99.76	98.72	99.40	99.52	99.34	99.12	99.67	99.14
K ₂ O/Na ₂ O	0.07	0.18	0.11	0.01	b.d.l.* ¹						
K ₂ O+Na ₂ O	5.57	5.44	4.56	2.21	0.41						
ASI* ²	0.55	0.80	0.61	0.90	0.13						
δ ¹⁸ O ±2 SD (‰)	8.34 ± 0.12	8.00 ± 0.12	4.40 ± 0.12	6.11 ± 0.12	4.85 ± 0.12	8.32 ± 0.12	9.63 ± 0.12	8.70 ± 0.12	10.70 ± 0.12	7.91 ± 0.12	11.29 ± 0.12
¹⁷⁶ Yb/ ¹⁷⁷ Hf	0.000008	0.000004	0.000019	0.000002	0.000019	0.000001	b.d.l.	b.d.l.	0.000001	b.d.l.	0.000012
¹⁷⁶ Lu/ ¹⁷⁷ Hf* ³	0.000001	b.d.l.	b.d.l.	b.d.l.	0.000005	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.000001
¹⁷⁶ Hf/ ¹⁷⁷ Hf	0.283155	0.283070	0.283181	0.283218	0.283333	0.282680	0.282749	0.282828	0.282592	0.282752	0.282806
2 SE* ⁴	0.000007	0.000007	0.000012	0.000014	0.000008	0.000013	0.000014	0.000011	0.000010	0.000011	0.000011
εHf	12.82	9.78	13.73	15.02	19.10	-4.00	-1.55	1.25	-7.10	-1.44	0.47
2 SE* ⁴	0.23	0.23	0.41	0.51	0.27	0.45	0.51	0.40	0.36	0.37	0.39

*¹ b.d.l. means below detection limit.*² ASI means aluminum index.*³ The ¹⁷⁶Hf/¹⁷⁷Hf ratios are reported relative to 0.282160 in JMC-475 (Blichert-Toft et al., 1997).

Table S1. Summary of sample information including GPS position and mineral assemblage.

Sample No.	Rock	Pluton/Unit	GPS position		Igneous minerals / primary minerals * ¹										Alteration minerals * ²										Accessory minerals * ³	Analysis performed in this study										
			S°	'	"	W°	'	"	Qz	Pl	Kfs	Ms	Bi	Hbl	Opx	Cpx	Ol	Serp	Chl	Prh	Lmt	Epi	Act	Hbl		Pl	Car	WR major composition	zircon U-Pb age	zircon O isotope	zircon Hf isotope	zircon REE	WR O isotope	WR Hf isotope		
Granitoids * ⁴	TPB56	Tonalite	Cabo Raper				25.4	44.8	9.1		18.5	1.2														Ilm, Zrn, Ap		Table 1	Tables 2, S4	Table 3		Table S3				
	TPE88	Tonalite	Cabo Raper				34.1	39.4	8.7	0.4	13.4	3.2						0.4								Mag, Ilm, Zrn, Ap		Table 1	Tables 2, S4	Table 3		Table S3				
	TPE90	Tonalite	Cabo Raper				22.9	47.7	10.5	0.8	15.4	2.0						0.8				< 0.2				Mag, Ilm, Zrn, Ap		Table 1	Tables 2, S4	Table 3		Table S3				
	TPE135	Tonalite	Estero Cono				34.7	44.4	12.4	0.2	7.7							0.4								Mag, Zrn, Ap		Table 1	Tables 2, S4	Table 3		Table S3				
	TPB243	Tonalite	Bahia Barrientos				29.2	48.7	8.1	4.1	8.3							1.6								Mag, Zrn	Table S5	Table 1	Tables 2, S4	Table 3		Table S3				
	TPH75	Granite	Tres Montes				53.1	23.7	14.0		9.1															Mag, Zrn	Table S5	Table 1	Tables 2, S4	Table 3		Table S3				
	TPG171	Trondhjemite	Seno Hoppner	46	37	4	75	27	30	13.0	61.5	3.7	0.2	0.2	10.3				9.3				0.8				Mag, Zrn	Table S5	Table 1	Tables 2, S4	Table 3		Table S3			
	TPD116	Trondhjemite	Seno Hoppner				29.6	45.6	18.7	0.2	5.9	<0.2															Mag, Zrn		Table 1	Tables 2, S4	Table 3		Table S3			
Mafic rocks	TPH347	Basalt	Ophiolite/MVU	46	35	50	75	29	20	○								○	○	○	○												Table 4		Table 4	Table 4
	TPH342	Basalt	Ophiolite/MVU	46	35	47	75	29	27	○								○	○	○	○												Table 4		Table 4	Table 4
	TPE110	Dolerite	Ophiolite															○				○	○	○	○								Table 4		Table 4	Table 4
	TPE73	Gabbro	Ophiolite	46	44	5	75	35	52		○							○	○	○	○					Mag, Ilm		Table 4					Table 4	Table 4		
	TPE30	Pyroxenite	Ophiolite								○							○	○	○						Mag, Hc		Table 4					Table 4	Table 4		
Sedimentary rocks	TPB252	Mudstone	Ophiolite/Sediment				○	○	○	○	○																						Table 4		Table 4	Table 4
	TPB298	Sandstone	Ophiolite/Sediment				○	○	○	○	○																						Table 4		Table 4	Table 4
	TPH317	Sandstone	Ophiolite/Sediment				○	○	○	○	○																						Table 4		Table 4	Table 4
	TPH314	Conglomerate	Ophiolite/Sediment				○	○	○	○	○																						Table 4		Table 4	Table 4
	TPE392	Mudstone	Basement				○	○	○	○	○																						Table 4		Table 4	Table 4
	TPD97	Mudstone	Basement				○	○	○	○	○																						Table 4		Table 4	Table 4

*1 Qz: quartz. Pl: plagioclase. Kfs: K-feldspar. Ms: muscovite. Bt: biotite. Hbl: hornblende. Opx: orthopyroxene. Cpx: clinopyroxene. Ol: olivine.

*2 Serp: serpentine. Chl: chlorite. Prh: prehnite. Lmt: laumontite. Epi: epidote. Act: actinolite. Hbl: hornblende. Pl: Ca-plagioclase. Car: carbonate.

*3 Mag: magnetite. Ilm: ilmenite. Spn: sphene. Zrc: zircon. Ap: apatite. Hc: Hercynite (picotite in this study).

*4 Numbers in minerals represent modal abundance of the mineral.

Table S2. Details of instruments and operation procedures of LA-ICP-MS analysis.

ICP-mass spectrometer

Instrument: iCAP-Q (Thermo Fisher)

ICP Incident Power: 1550 W

He carrier gas: 0.6-0.7 L/min.

Ar make-up gas: 0.8-0.9 L/min.

Scanning mode: Peak jump

Analysis mode: Standard mode

Monitored isotopes

Monitored signals: ^{29}Si (ISTD), ^{139}La , ^{140}Ce , ^{141}Pr , ^{146}Nd , ^{147}Sm , ^{153}Eu , ^{157}Gd , ^{159}Tb , ^{163}Dy , ^{165}Ho , ^{166}Er , ^{169}Tm , ^{172}Yb , ^{175}Lu , ^{178}Hf , ^{202}Hg , ^{204}Pb , ^{206}Pb , ^{207}Pb , ^{208}Pb , ^{232}Th , ^{238}U

Dwell time: 100 ms for ^{29}Si , ^{206}Pb , ^{207}Pb ;
50 ms for ^{232}Th , ^{238}U ;
20 ms for others

Number of Sweep: 10

Laser system

Instrument: New Wave Research NWR193 (Fremont, CA 94538, USA)

Laser type: ArF Excimer laser

Pulse duration: 5 ns

Wavelength: 193 nm

Repetition rate: 10 Hz

Typical fluence: 4.5-5.5 J/cm²

Crater diameter: 20 μm or 25 μm

Table S3. Trace element composition of zircons in the Taitao Granitoids through LA-ICP-MS.

Sample No.	Texture	La ^{*1}	Ce	Pr ^{*1}	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Th	U	Eu/Eu ^{*2}	Ce/Ce ^{*3}	Yb/Sm	Analysis sequence
Cabo Raper Pluton																						
TPB56																						
2b	inherited core	0.01	12.64	0.04	1.02	3.00	0.90	10.75	4.05	50.5	18.4	84.2	20.7	231.5	33.5	7216	33.5	47.5	0.43	84.54	77.3	1
3-2	rim	b.d.l.	6.62	0.05	1.14	2.27	0.27	12.28	4.95	63.5	24.3	107.6	28.1	304.7	41.8	8668	115.1	245.8	0.12	n.a.	134.2	1
4-2	rim	b.d.l.	6.73	0.01	0.56	1.87	0.14	10.21	4.37	52.9	20.6	91.4	22.6	232.7	35.6	8570	61.0	140.9	0.08	n.a.	124.7	1
6-2	inherited core	0.01	7.79	0.25	4.55	10.93	1.07	46.85	17.97	209.6	82.8	320.5	71.8	682.4	88.0	7993	161.4	238.3	0.12	9.39	62.4	1
7-2	rim	0.01	10.31	0.10	1.38	4.31	0.95	26.71	9.90	136.4	51.9	235.4	54.2	564.7	76.3	7289	144.7	268.3	0.21	29.27	131.0	1
11a-2	inherited core	0.04	9.39	0.05	1.30	3.02	0.75	13.11	4.80	60.7	24.5	118.2	31.6	379.0	58.9	8819	180.6	309.3	0.31	41.05	125.3	1
13-2	rim	0.01	5.18	0.01	0.30	1.48	0.27	9.11	3.75	53.3	21.8	103.4	27.8	316.0	46.4	8788	62.2	190.2	0.17	103.19	212.8	1
14-2	inherited core	0.18	26.70	1.41	21.25	39.28	5.02	151.79	50.99	576.1	188.7	714.8	148.5	1456.1	178.5	6590	549.0	543.1	0.17	5.47	37.1	1
16-2	rim	3.81	16.91	1.25	7.15	3.72	0.21	14.25	5.40	71.4	27.0	120.9	29.7	312.9	43.1	6904	140.2	252.4	0.18	115.08	84.2	1
17-2	rim	b.d.l.	6.17	0.04	0.60	1.49	0.35	9.09	4.11	54.5	20.6	96.2	22.9	245.6	35.7	6622	55.8	132.4	0.20	n.a.	165.2	1
18-2	rim	0.01	3.05	0.00	0.30	0.54	0.13	3.91	1.74	25.7	9.9	49.5	13.3	141.4	20.5	8124	19.8	67.7	0.18	13.30	263.4	1
19a-2	inherited core	b.d.l.	6.57	0.04	0.81	1.38	0.21	12.12	4.98	63.3	25.2	114.9	28.0	323.1	46.1	9612	43.3	106.8	0.11	n.a.	234.4	1
19b-2	rim	b.d.l.	1.90	0.01	0.10	0.59	0.03	3.82	1.84	27.0	11.5	54.1	13.4	151.3	24.2	10478	31.4	136.3	0.05	n.a.	258.1	1
21-2	rim	b.d.l.	5.91	0.02	1.01	1.78	0.30	10.63	4.12	53.7	20.3	89.4	21.9	228.6	30.6	6289	57.3	122.3	0.20	n.a.	128.4	1
22-2	rim	0.01	8.32	0.04	0.99	2.91	0.42	12.83	5.52	78.3	30.6	152.6	37.5	408.2	59.0	7047	74.2	200.9	0.22	54.97	140.0	1
23-2	rim	0.02	4.41	0.03	0.56	1.17	0.14	6.46	2.55	33.4	13.8	68.2	17.5	197.6	28.7	7918	51.6	168.4	0.08	1.87	168.9	1
25-2	magmatic core	b.d.l.	6.94	0.12	2.34	5.05	0.60	26.17	10.30	124.2	46.9	200.3	48.2	483.4	67.2	6317	103.6	211.0	0.16	n.a.	95.7	1
26-2	magmatic core	0.03	11.09	0.21	4.07	7.31	1.26	41.74	14.94	177.0	65.0	268.6	58.2	614.7	80.6	6205	189.2	236.5	0.18	59.72	84.1	1
28-2	magmatic core	0.04	12.24	0.26	6.84	16.31	2.89	82.13	30.12	363.2	124.6	517.4	109.5	1068.5	139.4	5742	235.9	262.3	0.54	43.76	65.5	1
29b-2	rim	b.d.l.	2.29	0.01	0.20	0.76	0.13	4.38	1.86	27.5	11.3	52.6	13.6	163.0	25.0	8678	37.8	163.0	1.01	n.a.	213.1	1
31	rim	0.11	4.74	0.07	0.62	1.35	0.10	6.50	2.86	37.1	15.6	75.9	18.1	194.7	36.7	10190	56.7	165.3	0.08	12.71	144.6	2
33	rim	0.04	5.63	0.02	0.30	1.35	0.28	8.68	3.64	51.2	21.5	101.5	24.5	243.8	49.3	9213	61.2	145.5	0.19	52.48	180.3	2
34	rim	0.08	11.28	0.13	2.84	6.93	1.00	34.45	12.54	148.8	54.2	234.3	49.3	456.7	83.5	8403	159.5	217.3	0.16	21.60	66.0	2
35	magmatic core	b.d.l.	6.79	0.04	0.81	2.85	0.33	13.45	4.72	63.8	25.7	117.9	25.4	263.2	48.7	8420	72.8	144.7	0.13	n.a.	92.2	2
36	rim	0.02	14.30	0.28	4.99	9.93	1.85	51.94	18.81	216.0	79.2	333.9	67.1	607.9	107.3	7730	237.3	256.9	0.20	14.80	61.2	2
37	magmatic core	b.d.l.	6.84	0.01	0.56	2.14	0.58	14.27	6.13	86.4	37.0	180.2	41.9	427.7	80.9	8368	73.9	201.5	0.24	n.a.	199.4	2
38	magmatic core	0.25	7.91	0.16	2.38	5.54	0.79	28.11	10.25	115.9	42.5	183.8	37.1	361.2	63.7	7752	96.6	147.9	0.16	9.39	65.3	2
39	rim	0.00	4.00	0.02	0.28	1.18	0.16	9.40	3.53	50.9	20.7	101.1	24.2	248.4	49.9	9983	54.7	143.5	0.10	48.31	211.0	2
Average and 2SD for Yb/Sm ratio of magmatic core and rim 143 ± 124																						
TPB88																						
1-2	rim	b.d.l.	9.06	0.12	2.35	5.30	0.32	24.18	10.37	130.9	51.2	230.6	54.8	590.9	82.8	8352	130.7	245.9	0.07	n.a.	111.5	1
2-2	rim	0.01	9.69	0.05	1.84	3.60	0.32	20.15	7.40	95.0	36.5	163.9	39.4	423.9	56.3	8534	267.8	404.0	0.09	53.07	117.8	1
3-2	magmatic core	0.04	20.63	0.25	5.30	12.76	2.09	64.17	22.76	284.5	100.7	406.4	94.1	915.4	124.7	7871	349.8	405.6	0.18	23.46	71.7	1
4-2	rim	0.02	2.89	0.02	0.87	1.31	0.24	12.66	5.32	76.7	30.2	137.9	33.6	367.0	54.3	8757	40.8	115.6	0.12	33.32	281.0	1
5a-2	rim	b.d.l.	10.01	0.03	1.32	4.06	0.43	21.37	8.29	104.7	44.2	199.7	48.3	513.8	78.0	8759	160.7	314.6	0.11	n.a.	126.6	1
7-2	magmatic core	b.d.l.	6.81	0.17	3.44	8.04	0.76	38.41	13.86	168.4	60.9	245.4	55.2	563.4	76.1	8285	135.4	217.2	0.11	n.a.	70.1	1
8-2	inherited core	0.01	1.56	0.10	2.25	7.20	0.24	38.79	16.94	208.8	82.3	349.3	79.1	818.0	113.4	8399	141.3	334.8	0.03	4.41	113.7	1
10-2	rim	b.d.l.	9.41	0.03	0.89	3.21	0.42	16.19	7.86	97.3	37.6	177.9	43.1	451.3	65.2	9457	168.5	307.6	0.14	n.a.	140.4	1
11-2	magmatic core	b.d.l.	6.67	0.04	1.20	4.18	0.60	22.87	8.37	109.4	38.7	168.4	38.2	403.1	55.2	7310	97.2	187.8	0.15	n.a.	96.5	1
12-2	rim	0.01	5.69	0.03	0.35	3.19	0.27	16.00	7.19	89.1	37.4	178.5	43.6	486.5	68.6	8737	67.9	187.6	0.09	46.39	152.4	1
15a-2	magmatic core	b.d.l.	1.90	0.10	1.67	5.89	0.25	32.85	13.27	182.5	74.3	322.7	79.3	827.4	109.6	7957	143.0	444.7	0.04	n.a.	140.5	1
16-2	rim	b.d.l.	19.50	0.10	1.96	5.01	0.62	30.51	12.07	152.6	56.6	235.1	54.1	555.3	74.1	7574	662.6	699.8	0.12	n.a.	110.7	1
18-2	inherited core	0.04	3.87	0.04	1.12	2.95	0.31	13.89	5.08	68.3	25.2	113.5	25.9	267.6	37.8	7149	257.9	527.3	0.12	21.50	90.7	1

19-2	magmatic core	0.02	4.47	0.04	1.21	3.18	0.43	19.23	7.40	94.1	34.8	158.4	36.6	386.2	55.5	6935	85.4	195.1	0.13	26.99	121.5	1
21	inherited core	b.d.l.	7.76	0.04	1.43	2.90	0.58	15.99	6.76	80.2	30.7	138.9	33.5	348.4	51.3	6307	90.6	188.8	0.20	n.a.	120.2	1
22	rim	b.d.l.	10.89	0.06	1.35	3.47	0.62	19.49	7.76	105.2	40.4	186.4	41.8	439.5	61.7	6655	218.1	309.4	0.18	n.a.	126.5	1
23	rim	0.01	5.40	0.08	0.55	2.61	0.34	14.53	5.93	84.7	31.4	138.8	34.1	363.6	53.4	7429	67.3	184.7	0.13	19.74	139.4	1
24	rim	b.d.l.	7.35	0.04	0.70	2.14	0.28	13.13	5.20	69.2	27.7	123.8	32.4	352.3	53.7	7130	119.6	227.6	0.12	n.a.	164.3	1
25	inherited core	0.01	8.73	0.12	2.26	5.68	0.84	26.54	9.42	115.8	40.5	172.4	38.6	376.6	51.9	6979	74.7	94.9	0.17	21.60	66.3	1
26	rim	0.01	8.37	0.01	0.83	2.89	0.38	13.30	5.55	80.1	30.3	141.9	35.7	401.5	55.9	6903	103.2	235.8	0.16	231.17	138.7	1
27	magmatic core	0.01	5.38	b.d.l.	0.74	2.28	0.46	16.40	6.48	82.5	31.3	148.2	37.3	413.9	57.6	9432	56.7	152.6	0.17	n.a.	181.3	1
28	magmatic core	0.05	8.17	0.12	3.21	5.85	1.38	29.94	10.62	135.2	45.9	196.5	45.7	491.7	69.8	8947	138.8	182.8	0.26	17.27	84.1	1
29	rim	0.04	9.05	0.27	3.73	9.80	2.05	46.46	16.73	183.1	66.1	267.1	59.5	614.3	84.6	9245	146.5	200.2	0.24	9.53	62.7	1
30	rim	1.71	13.28	0.45	3.39	3.60	0.38	20.02	8.92	113.8	44.2	193.0	45.8	481.3	67.0	10373	211.1	365.1	0.11	3.57	133.8	1
31	magmatic core	b.d.l.	23.72	0.10	2.18	7.51	1.29	46.34	17.81	226.9	84.9	365.6	81.5	813.4	112.7	9358	772.1	643.8	0.16	n.a.	108.4	1
32	magmatic core	b.d.l.	8.58	0.07	1.30	3.22	0.48	17.34	7.39	100.1	39.8	189.3	45.4	516.6	73.4	9179	84.6	194.2	0.16	n.a.	160.4	1
33	magmatic core	b.d.l.	7.95	0.06	1.99	5.20	0.47	28.59	10.85	132.8	48.4	214.6	48.3	505.9	73.5	10764	144.5	238.6	0.09	n.a.	97.2	1
34	rim	0.01	6.84	0.03	1.17	3.98	0.42	20.14	7.80	110.3	44.0	193.2	47.3	500.2	70.3	9495	114.4	256.0	0.12	57.63	125.6	1
35	magmatic core	0.05	17.54	0.25	5.93	13.89	1.99	70.35	25.38	292.9	105.4	426.6	94.6	986.3	134.7	9676	451.5	479.2	0.16	19.96	71.0	1
36	rim	0.01	6.69	0.03	0.93	1.72	0.34	14.35	5.65	75.0	28.3	127.4	31.7	346.1	50.0	10430	93.4	220.6	0.14	57.81	201.7	1
37	magmatic core	0.05	8.85	0.11	1.68	4.07	0.34	26.41	9.94	129.2	51.1	244.9	51.7	501.7	93.9	8488	315.4	348.2	0.08	20.71	123.2	2
38	rim	0.01	7.29	0.04	0.63	1.99	0.36	14.10	5.42	74.3	32.1	153.7	35.6	356.7	69.0	8001	82.6	177.6	0.15	55.88	179.1	2
39	rim	0.05	30.11	0.57	9.25	19.96	2.94	95.31	34.80	390.9	138.5	573.6	115.3	1020.2	187.4	7618	569.1	537.6	0.17	15.36	51.1	2
40	magmatic core	0.05	9.74	0.13	2.73	7.32	0.57	32.76	12.97	156.9	59.7	266.3	56.9	527.8	95.7	8489	213.1	304.8	0.09	19.43	72.1	2
41	magmatic core	0.02	5.10	0.08	1.60	4.02	0.52	20.77	8.31	106.5	40.3	179.2	39.4	365.3	69.5	8140	83.7	169.7	0.14	18.35	91.0	2
42	magmatic core	0.02	3.52	0.22	2.97	5.42	0.23	33.42	12.29	137.6	50.1	208.1	43.4	403.8	70.5	10061	131.4	199.2	0.04	4.78	74.5	2
43	rim	b.d.l.	6.94	0.01	0.86	2.93	0.26	14.84	6.45	83.3	34.5	172.4	39.3	396.6	77.0	8564	88.7	231.1	0.10	n.a.	135.2	2
44	rim	0.00	4.65	0.05	0.61	2.28	0.36	16.36	7.08	106.1	41.4	191.7	45.1	480.4	82.2	8300	91.4	340.7	0.13	26.88	210.8	2

Average and 2SD for Yb/Sm ratio of magmatic core and rim 126 ± 96

TPE90

4a-2	magmatic core	0.15	8.47	0.05	1.87	3.19	0.51	23.83	8.89	116.4	44.0	186.5	46.7	491.5	70.7	11126	129.2	228.5	0.13	23.39	154.2	1
7-2	rim	0.05	6.49	0.02	0.58	2.33	0.31	11.69	5.42	73.0	29.0	129.6	31.0	330.5	51.3	10645	117.2	244.1	0.15	50.52	141.6	1
8-2	rim	b.d.l.	7.23	0.07	0.50	2.40	0.34	16.90	6.15	85.2	29.6	144.7	33.3	349.5	54.9	10294	104.9	212.2	0.12	n.a.	145.9	1
10b	rim	0.01	8.59	0.06	1.41	3.21	0.42	20.06	7.15	97.3	37.7	170.1	42.8	458.4	70.1	9900	109.3	221.3	0.12	40.35	142.9	1
11c	rim	b.d.l.	9.09	0.06	0.82	3.28	0.51	14.01	6.39	84.2	34.0	170.9	44.5	501.6	77.5	10172	101.5	235.2	0.19	n.a.	153.0	1
13-2	rim	b.d.l.	8.64	0.01	0.72	1.63	0.40	16.96	7.10	95.2	38.8	184.8	46.0	500.0	77.7	10277	103.0	250.2	0.15	n.a.	306.5	1
15-2	rim	0.02	8.80	0.11	3.71	8.40	1.28	37.64	12.68	155.7	57.7	259.0	59.2	620.2	93.8	10006	161.1	223.9	0.19	22.62	73.8	1
16c-2	rim	b.d.l.	13.82	0.07	1.81	5.14	0.54	25.46	9.89	127.4	51.8	229.9	54.5	604.2	85.6	10343	298.1	400.1	0.12	n.a.	117.5	1
20a-2	inherited core	0.03	2.45	0.07	1.27	6.48	0.50	53.41	19.64	251.6	98.9	409.3	92.1	929.5	128.6	7742	157.8	366.2	0.06	9.38	143.6	1
20b-2	rim	b.d.l.	8.99	0.02	1.88	2.31	0.41	13.53	5.10	69.3	26.5	128.0	32.0	348.1	52.4	9888	138.0	215.2	0.17	n.a.	150.8	1
22b-2	rim	b.d.l.	7.40	0.02	0.98	1.79	0.13	11.28	4.23	56.6	22.7	103.1	26.2	290.8	43.7	8795	75.0	188.7	0.07	n.a.	162.2	1
26-2	rim	b.d.l.	16.16	0.05	1.25	3.54	0.63	21.70	8.18	107.7	38.6	173.5	40.4	430.0	61.0	8439	378.6	396.2	0.17	n.a.	121.3	1
28-2	rim	b.d.l.	9.36	0.03	0.84	3.37	0.31	21.76	8.61	114.6	49.2	206.5	48.6	540.2	80.0	8215	162.1	344.3	0.08	n.a.	160.4	1
30-2	rim	b.d.l.	4.65	b.d.l.	0.99	1.62	0.18	9.18	4.48	55.4	22.1	106.3	26.7	292.9	44.5	8153	51.2	152.1	0.11	n.a.	180.3	1
31a-2	magmatic core	0.05	8.47	0.08	1.00	3.21	0.33	18.04	7.17	88.3	32.1	151.5	35.6	390.3	55.0	7924	91.1	173.4	0.10	26.81	121.7	1
31b-2	rim	b.d.l.	6.98	0.03	0.36	1.09	0.22	8.53	3.77	49.8	20.2	97.5	24.0	274.2	41.2	9349	80.1	194.5	0.15	n.a.	251.8	1
33-2	rim	b.d.l.	11.97	0.09	0.53	2.28	0.32	12.76	5.19	77.7	29.6	135.9	33.6	391.3	55.0	8971	183.7	302.8	0.14	n.a.	171.4	1
34-2	rim	b.d.l.	7.42	0.02	0.36	1.00	0.34	12.94	5.81	72.6	30.1	139.7	35.2	386.9	60.4	9218	73.4	193.4	0.17	n.a.	387.2	1
36b-2	inherited core	0.01	0.81	0.02	0.89	2.56	0.12	15.13	5.69	76.2	30.4	137.6	30.6	339.4	51.2	8230	42.4	168.6	0.05	11.01	132.4	1
40-2	rim	b.d.l.	9.17	0.01	1.00	1.88	0.33	21.17	7.73	112.3	43.3	198.0	49.4	546.6	81.5	10613	170.8	346.4	0.10	n.a.	291.3	1

41	magmatic core	0.04	22.54	0.52	8.87	19.36	2.29	97.04	36.58	417.0	144.4	606.4	132.2	1366.8	175.2	9938	529.2	595.3	0.13	12.69	70.6	1
42	rim	0.00	8.67	0.04	1.33	3.36	0.43	23.25	8.39	111.4	48.1	215.0	52.6	562.4	82.9	10716	119.1	287.9	0.11	58.73	167.5	1
43	rim	0.01	7.64	0.04	0.21	1.75	0.50	14.17	6.13	75.3	31.5	146.2	37.8	449.8	67.0	11116	82.7	222.7	0.21	56.53	257.0	1
44	rim	0.01	9.40	0.09	1.20	3.04	0.48	17.98	6.71	89.8	35.6	169.3	42.4	474.7	69.3	10064	100.3	209.7	0.15	30.90	156.4	1
45	magmatic core	0.07	4.62	0.27	3.26	4.39	1.92	26.18	8.96	103.6	38.8	171.7	42.4	453.5	67.7	8853	112.1	162.2	0.42	4.73	103.3	1
46	magmatic core	0.06	6.48	0.05	0.53	2.54	0.64	11.82	4.86	64.1	24.5	120.3	30.1	339.6	49.5	9657	64.2	135.6	0.30	28.18	133.7	1
47	rim	0.00	7.66	0.01	0.81	1.97	0.43	10.62	4.11	55.2	23.1	113.2	29.2	329.1	50.4	11610	75.2	178.1	0.23	189.64	166.8	1
48	rim	0.00	9.20	0.03	0.63	2.25	0.29	17.19	7.18	97.9	38.5	175.9	45.2	524.4	72.3	11475	127.6	298.3	0.10	96.42	233.5	1
49	rim	0.00	5.09	0.06	1.88	4.26	0.30	27.74	11.87	164.8	64.9	296.0	70.2	785.5	107.6	11380	162.0	486.7	0.06	24.62	184.6	1
50	rim	0.00	6.25	0.00	0.47	1.00	0.23	5.64	3.28	41.9	17.2	88.1	20.7	252.1	38.7	12296	44.1	116.0	0.23	431.79	253.0	1
51	rim	0.48	10.65	0.22	1.33	1.54	0.36	11.26	4.35	54.9	23.2	108.1	24.4	251.4	47.6	9396	135.8	227.2	0.19	7.93	162.8	2
54	magmatic core	0.01	3.97	0.18	3.16	6.21	0.70	30.61	12.11	136.6	51.9	221.7	47.4	439.4	78.9	8633	145.9	221.9	0.13	6.51	70.7	2
57	magmatic core	0.19	107.73	1.85	23.59	36.95	8.57	151.80	53.68	586.6	212.4	921.1	193.3	1786.3	311.2	6804	1352.1	942.6	0.30	16.90	48.3	2
59	rim	b.d.l.	6.22	0.09	1.04	3.87	0.65	19.30	7.31	84.8	33.1	150.2	32.4	314.3	58.2	8803	86.4	134.2	0.19	n.a.	81.2	2
60	rim	b.d.l.	9.22	0.06	1.14	2.03	0.17	14.47	5.96	80.3	35.6	175.1	39.2	405.3	79.2	9097	127.9	274.7	0.07	n.a.	199.4	2
61	rim	0.00	9.38	0.07	2.05	3.83	0.58	21.98	7.86	92.1	36.6	169.5	38.8	375.4	72.0	9061	113.6	251.5	0.15	39.16	98.0	2
63	rim	0.02	0.91	0.03	0.82	2.61	0.13	17.47	7.28	101.4	41.0	187.7	41.7	404.8	78.1	8494	55.8	198.2	0.04	6.75	155.4	2
64	rim	b.d.l.	7.35	0.05	0.93	2.89	0.27	18.68	7.07	89.3	35.9	178.1	38.9	383.1	74.6	8376	85.6	189.8	0.08	n.a.	132.8	2

Average and 2SD for Yb/Sm ratio of magmatic core and rin 164 ± 144

Estero Cono Pluton

TPE135

4-2	magmatic core	0.02	5.57	0.05	1.03	2.99	0.22	18.24	7.23	103.1	40.6	181.1	45.8	460.5	64.2	5480	109.5	247.5	0.07	30.31	153.8	1
5a-2	magmatic core	0.01	2.58	0.04	1.31	2.74	0.31	17.43	6.58	82.5	31.1	130.6	31.5	312.6	44.6	5042	52.9	107.6	0.10	17.14	114.0	1
5b-2	rim	0.01	3.58	0.02	0.79	2.38	0.19	12.92	5.31	65.6	26.2	117.1	27.9	283.4	40.0	5701	57.9	137.8	0.09	37.53	119.2	1
7-2	rim	b.d.l.	1.75	0.03	0.62	1.57	0.16	9.26	3.89	50.2	20.7	99.9	24.5	268.3	37.5	4791	30.7	110.2	0.10	n.a.	170.4	1
8-2	rim	b.d.l.	7.96	0.04	0.93	3.69	0.41	20.37	7.83	99.9	38.3	173.9	38.6	393.8	55.1	5601	170.8	306.2	0.11	n.a.	106.7	1
9-2	rim	b.d.l.	7.61	0.06	1.01	3.38	0.29	19.70	7.52	97.2	36.2	159.9	37.6	364.1	49.9	6024	113.2	254.8	0.08	n.a.	107.8	1
10-2	rim	0.01	4.07	0.01	0.70	2.55	0.27	16.90	6.28	86.7	36.8	160.1	39.3	419.2	58.3	5384	107.0	257.4	0.09	104.17	164.4	1
11-2	rim	b.d.l.	3.26	0.02	0.79	2.33	0.21	12.14	5.22	67.2	26.9	124.4	28.0	300.9	42.4	5100	71.9	167.1	0.10	n.a.	129.2	1
12a-2	magmatic core	0.01	5.84	0.07	1.90	6.11	0.55	38.58	15.05	199.1	81.3	365.4	83.2	903.9	128.6	8218	239.7	415.8	0.08	23.63	147.9	1
14b	magmatic core	0.05	6.49	0.35	6.24	18.60	2.17	90.17	32.29	351.6	125.1	509.2	112.1	1089.4	150.2	8373	243.8	316.7	0.13	5.28	58.6	1
17-2	rim	b.d.l.	9.76	0.15	1.86	4.28	0.79	35.77	14.41	176.9	70.0	294.0	64.4	646.4	90.5	7892	515.1	495.1	0.13	n.a.	151.1	1
18-2	rim	9.94	27.19	3.19	17.30	12.43	0.89	53.55	19.93	239.2	86.9	369.6	85.5	882.4	122.9	9669	264.7	443.4	0.09	1.16	71.0	1
19-2	rim	b.d.l.	17.36	0.09	1.85	5.65	0.63	46.55	17.17	215.8	78.4	330.4	71.0	716.2	100.4	9764	697.0	715.1	0.08	n.a.	126.9	1
20-2	magmatic core	b.d.l.	3.79	0.07	1.05	4.09	0.29	23.48	8.87	127.1	50.9	239.2	56.4	615.0	92.8	8894	100.0	301.4	0.07	n.a.	150.4	1
21-2	rim	0.01	3.61	0.03	1.00	2.68	0.17	15.49	6.69	87.0	32.1	144.9	34.1	360.6	51.7	8790	149.4	274.4	0.06	32.37	134.8	1
23a-2	magmatic core	b.d.l.	8.02	0.03	0.83	2.98	0.31	19.78	8.26	107.5	44.1	201.2	48.0	499.6	74.6	9539	155.9	310.0	0.09	n.a.	167.7	1
27b-2	inherited core	0.01	2.56	0.03	0.36	1.29	0.19	7.43	3.13	38.2	14.2	60.8	14.9	150.5	22.0	5182	21.7	58.5	0.14	23.62	116.8	1
30-2	magmatic core	0.04	6.53	0.29	5.03	11.30	1.56	75.06	25.17	297.7	106.7	425.0	92.6	902.2	128.3	8870	214.4	313.0	0.12	6.48	79.9	1
35b	magmatic core	0.12	4.02	0.15	3.23	8.31	0.93	48.02	17.05	194.0	66.4	272.6	63.4	615.6	86.9	9051	173.2	249.6	0.11	6.08	74.1	1
38-2	inherited core	0.01	3.35	0.07	0.73	2.34	0.26	18.83	7.35	100.0	38.7	170.6	41.2	421.3	58.9	5102	95.6	225.8	0.09	13.27	179.7	1
41	magmatic core	0.06	8.41	0.25	4.53	11.04	1.23	63.93	24.66	288.4	106.4	447.1	97.4	981.3	132.8	9974	264.6	412.6	0.11	9.38	88.8	1
42	rim	0.02	5.40	0.08	1.67	4.46	0.43	24.53	10.74	137.1	59.8	276.3	65.5	678.8	99.3	8988	145.1	361.0	0.10	17.97	152.1	1
43	inherited core	b.d.l.	3.56	0.19	3.52	8.51	0.45	41.80	16.70	215.3	75.6	315.0	71.3	730.4	93.0	9444	163.6	272.0	0.06	n.a.	85.9	1
44	magmatic core	b.d.l.	2.37	0.10	1.52	4.46	0.37	19.05	8.14	107.0	40.6	181.3	43.8	446.9	60.0	9159	70.5	174.6	0.11	n.a.	100.2	1
46	magmatic core	0.01	2.50	0.07	2.82	4.91	0.33	23.20	8.98	120.1	44.8	195.7	45.1	456.3	64.7	9391	77.9	165.2	0.08	9.88	92.9	1
47	magmatic core	0.01	4.49	0.14	4.87	10.42	1.49	54.88	21.21	225.5	79.2	325.9	73.7	763.5	100.4	8486	143.1	227.6	0.15	9.54	73.3	1
48	magmatic core	b.d.l.	4.02	0.02	0.81	3.31	0.44	24.45	9.40	130.0	51.9	256.6	60.5	651.9	93.4	8490	103.3	278.3	0.11	n.a.	196.8	1

49	rim	b.d.l.	4.61	0.06	0.90	2.97	0.33	20.43	8.90	126.0	49.7	242.3	58.2	640.7	92.2	9757	99.1	313.3	0.10	n.a.	215.9	1
50	magmatic core	0.01	4.12	0.20	2.75	7.48	0.58	41.31	16.11	207.8	74.4	353.2	78.2	828.5	118.0	8401	165.8	338.4	0.08	6.16	110.8	1
51	magmatic core	b.d.l.	3.48	0.03	0.89	2.87	0.24	20.93	8.25	108.6	45.5	216.2	51.2	547.5	80.0	9183	90.8	266.8	0.07	n.a.	190.5	1
52	rim	b.d.l.	2.78	0.02	0.91	2.43	0.23	18.31	7.49	102.3	42.0	188.1	48.0	502.9	75.5	9665	69.1	225.1	0.08	n.a.	207.2	1
53	magmatic core	0.04	4.51	0.30	5.32	12.41	1.12	67.06	23.62	264.0	96.1	389.1	85.6	825.6	119.9	8583	189.0	290.0	0.09	4.30	66.5	1
54	magmatic core	0.12	31.49	1.70	29.66	66.58	4.81	315.96	104.57	1181.9	389.1	1497.8	300.0	2800.3	384.6	8231	1390.5	1165.3	0.08	5.47	42.1	1
56	rim	0.01	2.89	0.07	0.83	2.77	0.25	14.13	5.91	72.9	30.8	139.9	30.6	279.3	56.2	8301	106.9	232.6	0.10	12.16	100.9	2
60	rim	b.d.l.	5.91	0.03	1.13	3.10	0.25	19.34	8.72	112.3	47.1	214.5	46.7	464.0	83.8	8837	132.6	285.4	0.08	n.a.	149.6	2
61	rim	0.72	19.82	0.36	2.67	4.53	0.33	34.99	13.75	176.0	70.4	318.9	66.8	615.0	113.0	9155	702.2	901.8	0.06	9.42	135.7	2
62	rim	b.d.l.	8.94	0.15	1.53	5.00	0.49	30.52	12.40	158.3	64.7	304.1	65.2	639.8	118.6	9606	243.5	446.1	0.09	n.a.	128.0	2
64	magmatic core	0.14	3.23	0.11	1.40	3.14	0.33	20.00	7.02	91.4	35.4	157.2	33.5	313.4	61.3	8352	73.1	149.9	0.10	6.08	99.9	2
65	magmatic core	b.d.l.	2.22	0.03	1.16	2.13	0.25	16.41	6.45	87.7	36.7	174.5	40.1	375.0	73.1	8044	67.4	195.5	0.09	n.a.	175.9	2

Average and 2SD for Yb/Sm ratio of magmatic core and rin 127 ± 88

Bahia Barrientos Intrusion

TPB243

1a-2	rim	0.01	3.32	0.02	1.11	3.30	0.47	19.41	8.93	119.9	47.2	217.4	51.7	592.6	85.7	8739	136.4	471.0	0.14	41.64	179.5	1
1b-2	rim	0.01	1.31	0.07	1.60	2.65	0.54	14.96	5.28	66.7	26.7	123.6	29.9	339.9	55.0	6710	58.2	192.0	0.20	5.83	128.1	1
6a-2	rim	b.d.l.	3.09	0.05	0.82	2.65	0.24	22.21	8.88	120.2	50.7	221.9	55.1	599.7	85.5	11255	126.4	538.2	0.07	n.a.	226.5	1
6b-2	rim	0.02	5.14	0.03	0.59	3.70	0.42	26.05	11.53	150.5	56.4	249.7	67.5	769.7	108.0	12936	420.2	1280.5	0.09	37.18	207.8	1
9-2	rim	0.02	6.40	0.02	0.70	4.09	0.71	28.61	13.05	180.3	75.4	335.1	79.8	872.6	118.3	10564	220.0	729.1	0.15	71.58	213.2	1
10b-1	rim	b.d.l.	2.75	0.04	1.03	4.38	0.77	27.78	10.91	126.4	51.3	222.1	54.5	611.2	88.5	7796	153.6	446.9	0.16	n.a.	139.5	1
10c	rim	0.01	3.09	0.03	0.85	3.43	0.81	21.94	8.52	104.8	40.6	184.0	44.9	472.4	73.3	6815	206.5	477.2	0.22	30.88	137.8	1
11-2	rim	0.01	3.34	0.02	0.63	3.39	0.62	26.06	10.44	141.7	52.4	230.6	53.8	596.5	81.7	9134	205.3	474.4	0.14	45.93	175.7	1
12-2	rim	b.d.l.	2.57	0.06	1.74	3.11	0.73	26.73	10.57	134.3	51.4	227.8	56.6	587.2	84.3	8563	120.2	363.7	0.17	n.a.	188.6	1
17-2	magmatic core	b.d.l.	2.38	0.07	0.78	2.87	0.53	16.06	6.96	93.0	37.0	163.6	40.3	441.8	66.9	7983	99.9	376.2	0.19	n.a.	154.2	1
22	rim	b.d.l.	4.70	0.06	1.08	3.72	0.43	25.93	10.71	134.8	51.4	239.0	56.7	570.9	88.7	8658	272.8	633.1	0.10	n.a.	153.7	1
23	magmatic core	b.d.l.	3.28	0.07	1.09	4.51	0.42	23.73	9.56	111.3	43.7	191.4	44.7	475.8	68.3	7179	169.5	381.9	0.10	n.a.	105.5	1
25	rim	b.d.l.	7.30	0.09	1.90	7.34	1.04	47.98	18.53	230.1	88.0	372.6	85.6	885.8	126.3	7688	398.2	951.0	0.13	n.a.	120.7	1
26	magmatic core	0.05	1.28	0.16	1.98	4.48	1.00	22.93	7.95	93.5	33.6	145.6	34.9	382.7	59.6	6327	74.0	199.2	0.25	2.21	85.4	1
27	magmatic core	0.02	2.50	0.07	1.56	3.58	0.75	26.25	10.49	125.0	49.2	214.0	50.1	552.5	83.8	6358	153.9	400.1	0.17	9.71	154.2	1
28	rim	b.d.l.	5.17	0.07	0.51	3.99	0.84	19.67	7.32	93.7	34.5	147.2	35.3	374.0	55.6	7555	333.4	571.6	0.24	n.a.	93.7	1

Average and 2SD for Yb/Sm ratio of magmatic core and rin 154 ± 84

Tres Montes Pluton

TPH75

1-2	magmatic core	b.d.l.	2.19	0.02	1.40	4.62	0.14	26.57	10.04	135.7	51.4	216.8	49.9	527.8	72.2	8990	80.4	202.8	0.03	n.a.	114.4	1
2b	magmatic core	0.02	3.23	0.05	0.68	1.87	0.31	12.37	4.68	58.6	22.4	100.6	23.2	243.8	34.0	7506	38.3	64.3	0.15	17.35	130.1	1
3c	rim	0.02	16.77	0.21	4.03	10.64	1.16	47.96	18.65	230.5	83.5	355.3	81.1	778.2	104.0	8245	286.9	280.7	0.13	23.00	73.1	1
3d	magmatic core	0.01	26.68	0.13	2.12	4.80	0.41	34.40	13.19	173.1	68.1	299.3	69.1	709.5	95.1	10103	465.6	469.0	0.07	61.80	147.7	1
5-2	rim	0.01	6.87	0.04	0.81	2.42	0.35	13.48	5.80	75.7	30.2	130.3	30.2	317.2	43.7	7746	76.3	121.4	0.15	44.98	131.3	1
6-2	inherited core	0.01	25.45	0.06	0.59	1.91	0.48	8.66	3.12	37.3	14.3	64.4	17.7	205.7	30.4	9092	403.2	584.4	0.31	130.65	107.6	1
7-2	inherited core	1.17	14.75	1.44	23.40	45.13	0.75	214.48	81.67	956.1	318.0	1278.8	268.0	2584.4	311.1	7619	1038.2	1121.9	0.02	2.35	57.3	1
11-2	magmatic core	0.01	3.89	0.21	3.03	6.05	0.94	36.17	13.27	158.3	53.0	220.1	48.7	496.7	63.5	6894	72.0	96.1	0.15	5.57	82.1	1
13b	magmatic core	0.04	8.13	0.25	4.91	10.39	1.83	64.42	22.87	280.8	101.8	419.2	91.8	902.8	115.2	6513	191.9	188.9	0.17	9.32	86.9	1
15-2	magmatic core	0.02	3.54	0.18	3.17	7.05	1.40	35.85	13.04	161.3	54.1	224.9	49.6	488.0	64.3	6568	72.5	92.8	0.22	5.79	69.2	1
16-2	inherited core	0.01	14.62	0.10	4.02	13.13	0.52	94.88	40.85	542.6	207.2	873.5	195.1	1942.7	241.1	8706	711.8	1296.0	0.03	43.25	148.0	1
18-2	rim	0.04	8.85	0.23	4.22	10.23	0.35	58.56	22.60	290.0	108.8	440.0	101.7	926.4	129.3	8250	276.6	433.1	0.03	11.05	90.5	1
19b	inherited core	0.02	32.51	0.42	6.82	16.06	0.70	116.30	44.80	565.6	203.5	887.9	193.0	1860.8	243.9	9639	989.1	1210.1	0.04	22.80	115.9	1
21	magmatic core	0.03	21.49	0.36	11.44	24.97	2.90	139.14	49.59	581.2	204.3	850.6	179.0	1652.7	221.3	8256	571.5	499.9	0.12	17.49	66.2	1
22	magmatic core	0.01	6.99	0.01	0.91	2.14	0.30	16.57	5.67	75.8	28.3	131.9	30.8	308.7	47.0	9764	125.6	181.8	0.11	137.98	144.6	1

23	magmatic core	b.d.l.	19.32	0.14	3.67	10.46	0.17	79.23	29.65	365.9	137.2	568.2	125.7	1228.1	174.4	10576	686.3	1024.2	0.01	n.a.	117.4	1
24	rim	0.01	6.01	0.04	1.30	2.60	0.38	15.15	6.05	72.2	28.2	121.9	27.7	281.5	40.1	8611	74.2	117.3	0.14	41.76	108.4	1
25	rim	0.08	5.99	0.06	0.61	1.52	0.20	13.07	4.96	68.7	26.2	118.5	27.6	295.0	42.6	8982	51.4	83.4	0.09	20.44	194.2	1
26	inherited core	b.d.l.	14.32	0.14	3.41	7.32	2.33	45.30	17.36	224.0	86.4	396.5	92.7	991.3	141.9	8157	182.4	267.0	0.30	n.a.	135.4	1
27	inherited core	0.03	25.75	0.80	10.52	16.47	1.39	68.95	22.54	241.3	76.7	302.1	64.7	635.8	85.8	8006	336.5	783.5	0.11	9.66	38.6	1
28	magmatic core	b.d.l.	11.41	0.05	1.93	5.27	0.46	29.72	11.90	168.1	65.1	285.4	63.2	613.3	82.7	9905	371.0	415.5	0.09	n.a.	116.4	1
29	rim	0.01	11.44	0.05	1.09	3.30	0.26	18.56	6.94	92.3	36.0	158.7	36.4	380.8	56.3	12084	157.1	245.2	0.08	63.87	115.3	1
30	magmatic core	0.01	6.65	0.13	2.38	5.17	0.73	28.00	10.28	126.7	45.6	192.0	42.9	431.5	59.3	9037	71.9	92.5	0.15	15.02	83.5	1
31	rim	0.38	6.78	0.17	1.61	3.66	0.20	14.67	6.38	82.4	31.4	143.0	34.2	337.0	51.1	9721	71.6	125.6	0.07	6.50	92.0	1
32	magmatic core	5.77	23.76	2.19	14.22	12.06	0.59	47.40	19.70	238.5	89.6	383.3	86.4	864.7	117.4	9480	210.8	309.2	0.07	1.62	71.7	1
33	rim	0.02	9.15	0.15	3.40	7.03	0.67	36.77	15.49	185.0	73.0	301.1	65.4	648.2	88.7	9001	261.8	256.1	0.10	17.72	92.2	1

Average and 2SD for Yb/Sm ratio of magmatic core and rim 106 ± 64

Seno Hoppner Pluton

TPG171

1b-2	magmatic core	0.08	55.18	0.79	14.60	39.56	4.80	209.21	75.60	913.9	334.0	1330.1	288.2	2706.7	336.9	5932	890.4	771.0	0.85	38.35	68.4	1
3-2	magmatic core	0.04	29.28	0.42	10.33	22.92	2.73	123.52	42.84	530.7	187.7	774.8	166.9	1586.2	197.2	5973	432.7	448.4	0.80	37.57	69.2	1
4-2	magmatic core	0.13	62.88	0.90	16.78	42.94	5.84	214.56	81.28	981.0	345.0	1372.2	294.3	2757.1	347.0	6843	953.9	813.0	0.43	23.90	64.2	1
8-2	magmatic core	0.01	26.30	0.50	10.16	21.50	3.81	130.99	47.70	593.6	209.3	847.9	192.1	1793.9	229.4	6281	405.9	472.5	0.69	67.71	83.4	1
9-2	magmatic core	b.d.l.	28.70	0.06	2.33	7.63	1.40	59.84	23.32	308.0	111.7	472.0	107.5	1067.2	138.3	7025	429.1	516.5	0.16	n.a.	139.9	1
11-2	rim	b.d.l.	10.77	0.05	1.28	2.75	0.33	20.36	8.28	118.9	48.2	203.5	48.9	501.0	65.8	8271	149.0	239.0	0.14	n.a.	181.9	1
12-2	magmatic core	0.03	27.01	0.36	8.37	23.18	3.09	122.24	48.82	590.5	224.3	889.5	201.2	1957.5	248.0	6925	384.4	453.8	0.15	64.46	84.5	1
13-2	magmatic core	0.02	50.15	0.54	9.13	24.41	3.71	147.42	56.60	713.8	251.4	1025.7	225.2	2215.6	282.8	6716	1056.6	862.5	0.15	17.85	90.8	1
14-2	magmatic core	0.01	35.95	0.13	2.90	10.14	1.71	74.56	29.25	394.0	141.1	580.8	131.5	1285.9	172.0	7089	776.1	727.1	0.14	144.50	126.8	1
15b	magmatic core	0.01	69.07	0.32	5.28	18.23	2.90	111.98	46.26	554.1	201.1	828.1	187.8	1776.4	227.4	6546	1135.8	990.8	0.17	15.95	97.5	1
16b	rim	0.06	29.81	0.48	9.13	22.96	3.40	126.70	47.69	596.7	211.6	838.3	187.9	1783.1	229.7	6579	439.0	490.2	0.15	20.10	77.7	1
19b	magmatic core	0.02	38.64	0.31	6.30	17.00	2.48	98.81	39.13	503.4	181.4	749.2	166.3	1576.9	205.6	5579	701.1	645.9	0.13	20.33	92.8	1
20-2	magmatic core	0.01	31.83	0.17	3.11	10.75	1.46	63.06	25.03	315.4	119.3	500.5	114.4	1093.0	142.6	6466	676.5	650.9	0.17	12.51	101.7	1
21a-2	magmatic core	b.d.l.	31.01	0.57	9.08	23.64	3.19	132.15	49.78	599.7	224.0	900.2	192.9	1883.6	232.7	5994	490.9	535.2	0.13	n.a.	79.7	1
22-2	magmatic core	0.04	28.17	0.40	7.40	19.38	2.56	105.83	39.13	489.8	179.1	742.3	161.8	1555.3	196.7	6605	453.6	508.2	0.13	53.82	80.2	1
23a-2	magmatic core	0.14	83.30	1.25	19.89	57.71	7.72	290.25	106.35	1269.7	452.5	1776.7	378.2	3574.7	438.1	6360	1270.7	986.7	0.15	27.72	61.9	1
24-2	magmatic core	b.d.l.	50.81	0.24	4.82	12.43	2.20	101.46	36.60	456.1	163.4	696.3	149.3	1459.5	194.5	5673	1364.4	980.8	0.14	n.a.	117.4	1
25-2	rim	0.01	24.38	0.13	2.12	7.82	0.98	47.36	18.59	252.6	99.0	415.2	92.9	957.5	125.5	6544	267.2	381.5	0.14	16.51	122.5	1
26-2	rim	0.01	36.20	0.17	3.77	9.08	1.55	70.91	26.19	335.2	124.1	520.3	114.2	1094.8	145.5	6580	831.6	670.1	0.14	20.44	120.6	1
27-2	magmatic core	0.05	30.39	0.45	9.56	24.36	3.44	135.29	49.24	596.3	220.0	906.4	193.3	1914.2	237.7	6075	477.1	535.3	0.13	63.93	78.6	1
31	magmatic core	0.03	73.65	0.26	5.12	19.72	3.09	139.81	52.23	648.9	230.5	953.8	209.0	2088.7	275.0	6645	1172.1	1036.6	0.13	81.58	105.9	1
32	magmatic core	0.02	33.84	0.16	3.39	9.81	1.50	65.41	25.70	331.9	118.7	504.7	114.2	1115.4	144.1	7679	876.2	693.8	0.13	62.78	113.7	1
33	rim	0.02	23.71	0.13	2.27	6.71	1.01	49.18	19.36	253.8	97.9	406.5	94.6	895.1	127.2	7497	426.1	448.0	0.12	53.56	133.5	1
34	magmatic core	0.02	39.59	0.51	12.06	27.77	3.87	167.14	60.28	726.3	267.4	1101.9	234.3	2237.7	296.2	6837	717.9	637.2	0.13	23.27	80.6	1
35	rim	0.02	31.23	0.12	2.56	7.66	1.41	65.25	25.11	329.4	124.6	529.6	116.4	1194.6	166.5	7074	416.7	509.7	0.13	75.82	155.9	1
36	magmatic core	0.03	23.80	0.32	4.97	13.11	2.08	75.14	29.27	362.2	133.9	568.2	123.8	1204.0	166.3	7809	348.4	413.3	0.16	22.01	91.9	1
37	magmatic core	0.03	41.59	0.71	13.88	33.47	4.18	178.27	63.53	782.6	288.8	1151.8	246.1	2285.7	309.2	7350	688.6	619.6	0.13	17.45	68.3	1
38	rim	b.d.l.	19.53	0.08	2.00	5.28	0.79	40.91	16.72	213.7	83.0	361.4	81.0	816.4	111.3	7532	205.0	312.2	0.12	n.a.	154.5	1
39	magmatic core	0.03	13.23	0.25	5.19	14.43	2.05	80.58	30.32	373.8	138.2	563.6	128.9	1252.9	169.5	6610	227.2	293.0	0.15	15.38	86.8	1
40	magmatic core	0.07	25.20	0.42	8.11	21.32	2.76	122.08	44.44	539.0	196.0	805.2	172.8	1642.9	222.7	6750	421.7	457.7	0.13	16.92	77.1	1
41	magmatic core	0.16	61.69	0.65	10.64	27.64	3.64	161.58	62.49	749.5	274.2	1150.7	233.6	2030.1	338.4	7203	1057.0	868.5	0.13	26.05	73.5	2
42	magmatic core	0.01	21.50	0.09	1.80	5.67	0.91	41.35	17.18	217.2	84.2	372.3	81.7	749.0	129.3	8175	249.0	382.8	0.13	66.77	132.2	2
43	rim	0.02	24.88	0.10	1.72	7.28	1.08	50.90	19.73	247.7	95.4	422.8	90.6	793.6	135.8	8118	428.1	475.0	0.13	72.77	109.0	2
44	magmatic core	0.00	29.46	0.14	3.08	9.07	1.44	63.62	24.28	306.7	118.7	530.1	112.0	1054.7	174.5	7344	419.7	490.2	0.13	61.77	116.2	2

	45	magmatic core	0.04	44.67	0.69	10.62	25.23	3.17	148.55	55.63	666.2	246.4	1043.7	207.7	1797.0	306.3	8251	754.2	681.2	0.12	19.17	71.2	2
	46	magmatic core	0.03	57.84	0.41	9.74	20.52	2.78	140.20	54.01	664.5	249.9	1089.9	218.1	1967.0	328.4	7855	1048.1	846.0	0.12	41.19	95.9	2
	47	rim	0.01	37.27	0.17	2.99	9.28	1.60	70.55	27.40	345.5	136.5	588.7	120.4	1098.1	187.5	7695	655.6	622.3	0.14	63.35	118.4	2
	48	magmatic core	0.05	26.44	0.40	8.00	18.70	2.65	112.90	43.06	514.6	193.4	820.2	164.9	1503.0	247.5	7175	427.4	503.6	0.14	18.96	80.4	2
	49	magmatic core	0.01	15.49	0.24	4.45	10.63	1.39	67.22	23.90	296.6	113.3	478.1	97.6	954.9	156.7	7365	219.8	288.3	0.12	19.35	89.8	2
	Average and 2SD for Yb/Sm ratio of magmatic core and rin																					100 ± 56	
TPD116	4-2	rim	5.57	36.31	2.10	12.85	11.15	0.49	46.16	17.82	234.4	89.7	362.6	85.4	826.4	110.8	8725	362.5	631.5	0.10	57.86	74.1	1
	6-2	rim	0.02	5.29	0.03	1.26	3.57	0.38	20.47	8.30	112.3	41.8	183.6	43.4	447.4	61.9	7302	154.2	272.3	0.08	9.60	125.3	1
	8-2	magmatic core	0.01	3.17	0.03	0.70	2.13	0.46	15.24	5.93	77.3	29.6	130.2	31.6	336.3	43.9	7320	88.2	169.7	0.12	22.73	157.7	1
	9-2	rim	0.01	12.51	0.06	1.29	4.48	0.50	28.31	12.15	169.9	63.3	281.5	64.5	663.9	85.7	8545	236.2	462.5	0.18	133.65	148.1	1
	10-2	rim	0.91	23.95	0.40	3.74	6.89	0.57	43.33	17.10	216.3	83.4	348.3	81.8	807.4	106.8	8677	398.8	662.3	0.05	57.62	117.1	1
	12-2	rim	b.d.l.	18.06	0.10	2.00	6.58	0.35	41.19	17.11	227.0	83.6	350.7	80.0	813.4	104.3	8381	278.1	525.2	0.73	n.a.	123.7	1
	13-2	rim	b.d.l.	4.33	0.01	0.78	2.27	0.42	14.08	6.52	90.5	34.8	153.8	36.0	405.3	53.1	7504	82.2	202.0	0.09	n.a.	178.9	1
	15-2	rim	0.01	12.16	0.14	2.95	9.95	1.14	53.17	20.00	253.0	91.0	391.0	83.3	864.3	114.3	7464	253.3	364.9	0.12	26.07	86.8	1
	17-2	rim	0.32	24.39	0.18	2.48	7.40	0.88	46.46	17.80	224.0	85.8	358.5	76.7	762.5	105.0	7047	873.8	800.3	0.11	24.56	103.0	1
	18-2	magmatic core	0.01	8.72	0.11	1.69	5.36	0.70	34.07	13.84	184.1	68.7	299.6	69.2	716.0	95.3	7254	269.3	430.9	0.06	67.98	133.5	1
	19-2	rim	6.91	24.87	2.33	13.52	8.88	0.71	39.30	14.77	187.0	70.3	304.7	70.5	723.4	95.4	8429	155.6	327.2	0.18	26.53	81.5	1
	21	magmatic core	b.d.l.	4.93	0.06	1.32	3.37	0.47	18.05	8.13	106.1	42.5	197.2	44.4	467.4	68.7	6811	135.6	247.0	0.15	n.a.	138.6	1
	22	rim	0.02	10.09	0.11	1.85	4.51	0.49	34.95	14.31	184.3	75.6	321.6	72.1	722.1	103.4	8091	181.8	366.6	0.08	25.76	160.1	1
	23	rim	0.44	6.58	0.19	1.95	2.50	0.42	19.21	7.22	99.9	41.0	169.2	39.7	423.2	63.0	7482	120.4	243.5	0.13	5.41	169.0	1
	24	magmatic core	8.15	31.68	4.87	23.35	13.90	0.46	36.35	14.18	176.7	68.5	290.6	62.0	678.6	93.7	8075	136.2	311.1	0.06	1.19	48.8	1
	25	magmatic core	2.35	25.81	1.06	11.24	19.99	1.97	106.98	38.71	453.6	166.3	671.8	139.5	1430.0	179.5	7235	403.1	555.1	0.10	3.94	71.5	1
	26	rim	1.32	7.77	0.52	3.44	5.00	0.50	27.48	10.55	137.9	53.5	235.0	52.6	537.8	73.2	7877	93.6	207.9	0.10	2.28	107.5	1
	27	rim	0.01	20.11	0.04	1.15	4.38	0.22	30.74	12.89	184.7	77.6	361.8	83.8	861.5	122.2	8824	201.8	506.7	0.04	156.42	196.5	1
	28	rim	0.00	18.35	0.08	2.44	8.61	1.05	51.11	20.34	241.8	92.5	391.1	79.5	727.2	124.1	7001	863.0	814.1	0.12	71.98	84.5	2
	29	rim	0.01	6.46	0.03	0.88	1.85	0.20	15.89	6.38	81.5	33.3	155.6	33.6	307.5	57.1	7979	90.6	242.5	0.08	52.67	166.4	2
	30	magmatic core	0.01	9.54	0.12	1.92	4.62	0.75	39.10	15.38	195.0	73.4	319.7	66.2	599.5	108.5	7975	376.4	452.2	0.12	22.92	129.9	2
	31	rim	0.23	5.51	0.10	0.79	2.81	0.37	17.96	6.89	91.5	35.5	168.1	36.4	333.3	60.0	7736	99.4	197.8	0.12	8.82	118.5	2
	Average and 2SD for Yb/Sm ratio of magmatic core and rin																					124 ± 78	

A unit of concentration is ppm.

*1 b.d.l. means below detection limit.

2 $Eu/Eu^ = EuN / (SmN + GdN) / 2$

3 $Ce/Ce^ = CeN / (LaN + PrN) / 2$. n.a. means "not analyzed because of lack of La data.

Table S4. $\delta^{18}\text{O}$ values and $^{16}\text{OH}/^{16}\text{O}$ ratios of standard zircons and zircons in the Taitao Granitoids measured by SIMS.

Comment	Analysis No.	$\delta^{18}\text{O}$ ‰ VSMOW	2SD (ext.)	$\delta^{18}\text{O}$ ‰ measured	2SE (int.)	$^{16}\text{OH}/^{16}\text{O}$	$^{16}\text{OH}/^{16}\text{O}$ background corrected
Taitao KIM-5 g1				5.36	0.21	6.7.E-04	
Taitao KIM-5 g2				5.21	0.20	6.8.E-04	
Taitao KIM-5 g3				5.29	0.28	7.1.E-04	
Taitao KIM-5 g4				5.38	0.25	7.0.E-04	
average and 2SD				5.31	0.15		
TPE90-1	1	6.15	0.32	6.50	0.17	7.7.E-04	-1.9.E-06
TPE90-2	2	6.34	0.32	6.68	0.26	7.3.E-04	-4.6.E-05
TPE90-3	3	5.75	0.32	6.10	0.21	7.6.E-04	-1.5.E-05
TPE90-4	4a-1	6.30	0.32	6.64	0.22	7.6.E-04	-1.5.E-05
TPE90-5	4b	6.59	0.32	6.94	0.19	7.7.E-04	-2.6.E-06
TPE90-6	6	5.95	0.32	6.30	0.25	9.2.E-04	1.5.E-04
TPE90-7	7-1	6.17	0.32	6.52	0.24	7.7.E-04	-3.2.E-07
TPE90-8	8-1	6.40	0.32	6.74	0.22	7.9.E-04	1.3.E-05
TPE90-9	9	5.92	0.32	6.27	0.18	7.8.E-04	8.7.E-06
TPE90-10	10a	6.05	0.32	6.40	0.20	8.4.E-04	6.5.E-05
Taitao KIM-5 g1				5.58	0.29	8.5.E-04	
Taitao KIM-5 g1				5.50	0.20	8.3.E-04	
Taitao KIM-5 g1				5.47	0.24	8.5.E-04	
Taitao KIM-5 g1				5.69	0.27	9.0.E-04	
average and 2SD				5.56	0.20	8.6.E-04	
bracket average and 2SD		5.09		5.43	0.32	7.7.E-04	
TPE88-1	1-1	6.26	0.14	6.75	0.24	8.6.E-04	-8.5.E-06
TPE88-2	2-1	6.32	0.14	6.82	0.25	8.2.E-04	-5.6.E-05
TPE88-3	3-1	6.22	0.14	6.71	0.25	8.6.E-04	-7.8.E-06
TPE88-4	4-1	6.56	0.14	7.05	0.24	8.2.E-04	-5.1.E-05
TPE88-5	5a-1	6.21	0.14	6.70	0.23	8.4.E-04	-3.4.E-05
TPE88-6	5b	6.80	0.14	7.30	0.17	8.4.E-04	-3.5.E-05
TPE88-7	7-1	6.45	0.14	6.94	0.25	9.7.E-04	9.9.E-05
TPE88-8	8-1	8.32	0.14	8.81	0.30	8.7.E-04	-2.1.E-06
TPE88-9	9-1	6.09	0.14	6.58	0.20	9.0.E-04	2.6.E-05
TPE88-10	10-1	6.07	0.14	6.57	0.28	8.6.E-04	-1.2.E-05
Taitao KIM-5 g1				5.58	0.25	9.0.E-04	
Taitao KIM-5 g1				5.61	0.16	8.7.E-04	
Taitao KIM-5 g1				5.61	0.23	8.8.E-04	
Taitao KIM-5 g1				5.62	0.34	8.9.E-04	
average and 2SD				5.60	0.04	8.9.E-04	
bracket average and 2SD		5.09		5.58	0.14	8.7.E-04	
TPB56-1	1	6.01	0.14	6.48	0.25	8.2.E-04	-5.7.E-05
TPB56-2	2a	5.99	0.14	6.47	0.31	8.2.E-04	-6.0.E-05
TPB56-3	3-1	6.19	0.14	6.66	0.26	8.4.E-04	-4.1.E-05
TPB56-4	4-1	6.45	0.14	6.92	0.25	8.3.E-04	-5.2.E-05
TPB56-5	5	6.03	0.14	6.51	0.19	8.4.E-04	-4.3.E-05
TPB56-6	6-1	6.47	0.14	6.95	0.28	9.6.E-04	8.0.E-05
TPB56-7	7-1	6.01	0.14	6.48	0.25	9.1.E-04	3.0.E-05
TPB56-8	8	5.70	0.14	6.17	0.31	8.5.E-04	-3.5.E-05
TPB56-9	9	5.80	0.14	6.27	0.25	9.9.E-04	1.1.E-04
TPB56-10	10	5.94	0.14	6.41	0.23	8.4.E-04	-4.1.E-05

Taitao KIM-5 g1				5.43	0.26	8.8.E-04	
Taitao KIM-5 g1				5.50	0.27	8.7.E-04	
Taitao KIM-5 g1				5.63	0.28	8.7.E-04	
Taitao KIM-5 g1				5.52	0.22	8.8.E-04	
average and 2SD				5.52	0.16	8.7.E-04	
bracket average and 2SD		5.09		5.56	0.14	8.8.E-04	
TPG171-1	1a-1	5.35	0.24	5.75	0.26	1.0.E-03	1.5.E-04
TPG171-2	1b-1	5.50	0.24	5.89	0.28	1.4.E-03	5.6.E-04
TPG171-3	3-1	5.38	0.24	5.77	0.23	1.3.E-03	4.3.E-04
TPG171-4	4-1	5.42	0.24	5.82	0.22	1.3.E-03	4.6.E-04
TPG171-5	5	5.35	0.24	5.74	0.26	1.0.E-03	1.2.E-04
TPG171-6	6	5.18	0.24	5.58	0.19	8.8.E-04	-4.5.E-06
TPG171-7	7-1	5.16	0.24	5.56	0.23	9.0.E-04	2.1.E-05
TPG171-8	8-1	5.27	0.24	5.67	0.24	9.9.E-04	1.1.E-04
TPG171-9	9-1	5.12	0.24	5.51	0.24	9.6.E-04	7.6.E-05
TPG171-10	10-1	4.92	0.24	5.31	0.22	1.2.E-03	3.7.E-04
Taitao KIM-5 g1				5.66	0.24	8.7.E-04	
Taitao KIM-5 g1				5.44	0.22	9.0.E-04	
Taitao KIM-5 g1				5.40	0.29	8.9.E-04	
Taitao KIM-5 g1				5.30	0.23	8.9.E-04	
average and 2SD				5.45	0.31	8.9.E-04	
bracket average and 2SD		5.09		5.48	0.24	8.8.E-04	
TPD116-1	1	5.44	0.22	5.78	0.26	8.0.E-04	-7.0.E-05
TPD116-2	2	5.51	0.22	5.86	0.26	8.6.E-04	-1.6.E-05
TPD116-3	3	5.50	0.22	5.84	0.25	1.1.E-03	1.8.E-04
TPD116-4	4-1	5.44	0.22	5.78	0.28	9.3.E-04	5.9.E-05
TPD116-5	5-1	5.35	0.22	5.69	0.20	9.0.E-04	2.9.E-05
TPD116-6	6-1	5.78	0.22	6.12	0.24	8.7.E-04	-3.3.E-06
TPD116-7	7	5.63	0.22	5.97	0.25	8.9.E-04	1.0.E-05
TPD116-8	8-1	5.52	0.22	5.86	0.22	8.5.E-04	-2.3.E-05
TPD116-9	9-1	5.35	0.22	5.69	0.24	8.8.E-04	8.4.E-06
TPD116-10	10-1	5.40	0.22	5.74	0.21	9.1.E-04	3.5.E-05
Taitao KIM-5 g1				5.41	0.27	8.5.E-04	
Taitao KIM-5 g1				5.41	0.23	8.6.E-04	
Taitao KIM-5 g1				5.33	0.28	8.5.E-04	
Taitao KIM-5 g1				5.50	0.22	8.9.E-04	
average and 2SD				5.41	0.14	8.6.E-04	
bracket average and 2SD		5.09		5.43	0.22	8.7.E-04	
TPB243-1	1a-1	6.47	0.17	6.78	0.19	8.9.E-04	4.8.E-05
TPB243-2	1b-1	6.63	0.17	6.94	0.31	8.2.E-04	-3.1.E-05
TPB243-3	3	6.45	0.17	6.77	0.25	9.3.E-04	8.3.E-05
TPB243-4	4	6.04	0.17	6.36	0.29	8.9.E-04	4.0.E-05
TPB243-5	5a	6.19	0.17	6.51	0.21	8.3.E-04	-1.6.E-05
TPB243-6	6a-1	6.85	0.17	7.16	0.23	8.8.E-04	3.3.E-05
TPB243-7	6b-1	6.29	0.17	6.61	0.25	8.4.E-04	-5.8.E-06
TPB243-8	8	6.18	0.17	6.49	0.16	9.8.E-04	1.3.E-04
TPB243-9	9-1	6.79	0.17	7.10	0.24	8.9.E-04	3.9.E-05
TPB243-10	10a-1	6.76	0.17	7.08	0.25	8.4.E-04	-8.7.E-06
Taitao KIM-5 g1				5.27	0.23	8.3.E-04	
Taitao KIM-5 g1				5.47	0.29	8.3.E-04	
Taitao KIM-5 g1				5.51	0.28	8.2.E-04	

Taitao KIM-5 g1				5.33	0.21	8.4.E-04	
average and 2SD				5.39	0.22	8.3.E-04	
bracket average and 2SD		5.09		5.40	0.17	8.5.E-04	
TPH75-1	1-1	6.61	0.18	6.95	0.18	8.5.E-04	2.0.E-05
TPH75-2	2-1	6.41	0.18	6.75	0.16	7.8.E-04	-5.0.E-05
TPH75-3	3a-1	6.49	0.18	6.83	0.29	8.9.E-04	6.0.E-05
TPH75-4	3b	6.10	0.18	6.43	0.25	1.0.E-03	1.8.E-04
TPH75-5	5-1	6.31	0.18	6.65	0.24	8.1.E-04	-2.3.E-05
TPH75-6	6-1	6.36	0.18	6.70	0.26	7.9.E-04	-3.8.E-05
TPH75-7	7-1	8.15	0.18	8.48	0.21	1.1.E-03	2.9.E-04
TPH75-8	8	7.22	0.18	7.55	0.25	7.8.E-04	-4.8.E-05
TPH75-9	9	6.64	0.18	6.98	0.20	7.9.E-04	-3.7.E-05
TPH75-10	10	6.92	0.18	7.26	0.29	8.8.E-04	5.4.E-05
Taitao KIM-5 g1				5.48	0.27	8.3.E-04	
Taitao KIM-5 g1				5.50	0.29	8.4.E-04	
Taitao KIM-5 g1				5.36	0.22	8.3.E-04	
Taitao KIM-5 g1				5.48	0.28	8.3.E-04	
average and 2SD				5.46	0.13	8.3.E-04	
bracket average and 2SD		5.09		5.42	0.18	8.3.E-04	
TPE135-1	1-1	6.27	0.13	6.65	0.26	8.5.E-04	3.2.E-05
TPE135-2	2	6.12	0.13	6.50	0.23	8.1.E-04	-1.2.E-05
TPE135-3	3-1	5.97	0.13	6.35	0.24	1.0.E-03	2.0.E-04
TPE135-4	4-1	5.82	0.13	6.21	0.29	8.7.E-04	5.0.E-05
TPE135-5	5a-1	6.57	0.13	6.95	0.27	7.9.E-04	-3.3.E-05
TPE135-6	5b-1	6.24	0.13	6.62	0.26	8.2.E-04	1.8.E-06
TPE135-7	7-1	6.05	0.13	6.43	0.26	8.1.E-04	-8.8.E-06
TPE135-8	8-1	5.73	0.13	6.11	0.21	8.4.E-04	1.8.E-05
TPE135-9	9-1	5.95	0.13	6.33	0.20	8.3.E-04	1.3.E-05
TPE135-10	10-1	6.10	0.13	6.48	0.25	8.0.E-04	-1.9.E-05
Taitao KIM-5 g1				5.43	0.25	8.0.E-04	
Taitao KIM-5 g1				5.43	0.23	8.1.E-04	
Taitao KIM-5 g1				5.53	0.18	8.1.E-04	
Taitao KIM-5 g1				5.56	0.20	8.0.E-04	
average and 2SD				5.49	0.13	8.0.E-04	
bracket average and 2SD		5.09		5.47	0.13	8.2.E-04	
TPE135-11	11-1	6.06	0.19	6.42	0.23	8.0.E-04	9.9.E-07
TPE135-12	12a-1	6.13	0.19	6.49	0.18	8.4.E-04	3.5.E-05
TPE135-13	12b-1	6.19	0.19	6.55	0.23	8.0.E-04	-3.8.E-06
TPE135-14	14a-1	5.84	0.19	6.20	0.20	1.0.E-03	2.1.E-04
TPE135-15	15	6.58	0.19	6.94	0.23	8.2.E-04	2.0.E-05
TPE135-16	16	6.15	0.19	6.51	0.21	8.2.E-04	1.9.E-05
TPE135-17	17-1	5.98	0.19	6.35	0.20	8.3.E-04	2.9.E-05
TPE135-18	18-1	5.85	0.19	6.21	0.24	8.6.E-04	5.9.E-05
TPE135-19	19-1	5.82	0.19	6.18	0.20	8.2.E-04	2.5.E-05
TPE135-20	20-1	6.20	0.19	6.56	0.29	8.3.E-04	2.7.E-05
Taitao KIM-5 g1				5.36	0.18	7.9.E-04	
Taitao KIM-5 g1				5.56	0.25	8.0.E-04	
Taitao KIM-5 g1				5.46	0.24	8.1.E-04	
Taitao KIM-5 g1				5.29	0.28	7.9.E-04	
average and 2SD				5.42	0.23	8.0.E-04	
bracket average and 2SD		5.09		5.45	0.19	8.0.E-04	

TPE135-21	21-1	5.88	0.43	6.39	0.19	7.6.E-04	-2.6.E-05
TPE135-22	22	6.10	0.43	6.61	0.25	1.2.E-03	3.7.E-04
TPE135-23	23a-1	5.95	0.43	6.46	0.23	7.7.E-04	-1.2.E-05
TPE135-24	23b	6.36	0.43	6.86	0.23	8.3.E-04	4.3.E-05
TPE135-25	25a-1	6.13	0.43	6.64	0.23	7.6.E-04	-2.3.E-05
TPE135-26	25b	6.08	0.43	6.58	0.26	7.3.E-04	-5.2.E-05
TPE135-27	27a	5.95	0.43	6.45	0.27	7.8.E-04	-8.5.E-06
TPE135-28	27b-1	5.92	0.43	6.42	0.29	7.5.E-04	-3.2.E-05
TPE135-29	29-1	6.48	0.43	6.99	0.24	7.8.E-04	-4.0.E-06
TPE135-30	30-1	5.81	0.43	6.31	0.25	8.6.E-04	7.5.E-05

Taitao KIM-5 g1				5.72	0.26	7.7.E-04	
Taitao KIM-5 g1				5.83	0.30	7.8.E-04	
Taitao KIM-5 g1				5.90	0.25	7.7.E-04	
Taitao KIM-5 g1				5.65	0.23	7.8.E-04	
average and 2SD				5.77	0.22	7.7.E-04	
bracket average and 2SD		5.09		5.59	0.43	7.9.E-04	

TPE90-11	11a	7.34	0.29	7.91	0.25	8.0.E-04	2.1.E-05
TPE90-12	11b	5.75	0.29	6.32	0.28	7.3.E-04	-5.0.E-05
TPE90-13	13-1	5.88	0.29	6.46	0.21	7.6.E-04	-1.9.E-05
TPE90-14	14	5.58	0.29	6.15	0.30	7.5.E-04	-3.2.E-05
TPE90-15	15-1	5.97	0.29	6.54	0.26	8.0.E-04	1.3.E-05
TPE90-16	16a	7.45	0.29	8.02	0.25	9.3.E-04	1.5.E-04
TPE90-17	16b	6.16	0.29	6.73	0.25	7.4.E-04	-4.4.E-05
TPE90-18	16c-1	5.85	0.29	6.43	0.26	7.5.E-04	-3.2.E-05
TPE90-19	19	5.71	0.29	6.29	0.26	1.1.E-03	2.9.E-04
TPE90-20	20a-1	7.29	0.29	7.86	0.29	8.6.E-04	7.4.E-05

Taitao KIM-5 g1				5.66	0.19	8.1.E-04	
Taitao KIM-5 g1				5.52	0.27	7.8.E-04	
Taitao KIM-5 g1				5.51	0.19	7.9.E-04	
Taitao KIM-5 g1				5.54	0.27	7.8.E-04	
average and 2SD				5.56	0.14	7.9.E-04	
bracket average and 2SD		5.09		5.66	0.29	7.8.E-04	

Taitao KIM-5 g1				5.24	0.26	6.2.E-04	
Taitao KIM-5 g2				5.23	0.29	6.0.E-04	
Taitao KIM-5 g3				5.29	0.26	5.8.E-04	
Taitao KIM-5 g4				5.24	0.22	5.8.E-04	
average and 2SD				5.25	0.05		

TPE90-21	20b	6.96	0.18	7.09	0.30	6.6.E-04	5.8.E-05
TPE90-22	22a	6.15	0.18	6.29	0.29	5.7.E-04	-2.6.E-05
TPE90-23	22b-1	6.63	0.18	6.77	0.28	5.7.E-04	-2.8.E-05
TPE90-24	24	5.74	0.18	5.88	0.26	5.7.E-04	-2.7.E-05
TPE90-25	25	6.22	0.18	6.36	0.23	5.8.E-04	-2.5.E-05
TPE90-26	26-1	6.39	0.18	6.52	0.30	5.8.E-04	-2.3.E-05
TPE90-27	27-1	6.36	0.18	6.50	0.23	5.6.E-04	-3.8.E-05
TPE90-28	28-1	6.26	0.18	6.40	0.25	6.0.E-04	-5.4.E-06
TPE90-29	29-1	6.55	0.18	6.69	0.26	5.8.E-04	-2.0.E-05
TPE90-30	30-1	6.27	0.18	6.41	0.30	5.8.E-04	-1.6.E-05

Taitao KIM-5 g2				5.14	0.25	6.0.E-04	
Taitao KIM-5 g2				5.18	0.26	6.2.E-04	
Taitao KIM-5 g2				5.39	0.25	6.3.E-04	

Taitao KIM-5 g2				5.11	0.24	5.9.E-04	
average and 2SD				5.20	0.25	6.1.E-04	
bracket average and 2SD	5.09			5.23	0.18	6.0.E-04	
TPE88-11	11-1	5.90	0.36	6.13	0.24	5.9.E-04	-1.9.E-05
TPE88-12	12-1	6.17	0.36	6.41	0.22	5.9.E-04	-1.9.E-05
TPE88-13	13	6.03	0.36	6.27	0.22	6.5.E-04	4.4.E-05
TPE88-14	14	6.41	0.36	6.65	0.28	5.7.E-04	-3.8.E-05
TPE88-15	15a-1	7.82	0.36	8.06	0.32	6.1.E-04	4.2.E-06
TPE88-16	16-1	6.38	0.36	6.62	0.23	5.9.E-04	-1.2.E-05
TPE88-17	15b	6.55	0.36	6.78	0.22	6.1.E-04	2.0.E-06
TPE88-18	18a-1	6.57	0.36	6.81	0.22	5.7.E-04	-3.4.E-05
TPE88-19	19-1	6.31	0.36	6.55	0.23	5.5.E-04	-5.5.E-05
TPE88-20	18b	6.47	0.36	6.71	0.25	6.4.E-04	3.2.E-05
Taitao KIM-5 g2				5.45	0.24	6.1.E-04	
Taitao KIM-5 g2				5.53	0.33	6.0.E-04	
Taitao KIM-5 g2				5.58	0.17	6.1.E-04	
Taitao KIM-5 g2				5.25	0.28	6.0.E-04	
average and 2SD				5.45	0.29	6.1.E-04	
bracket average and 2SD	5.09			5.33	0.36	6.1.E-04	
TPB56-11	11a-1	5.90	0.31	6.31	0.27	5.7.E-04	-3.9.E-05
TPB56-12	11b-1	6.17	0.31	6.57	0.31	5.9.E-04	-2.0.E-05
TPB56-13	13-1	6.04	0.31	6.44	0.24	5.6.E-04	-4.4.E-05
TPB56-14	14-1	6.21	0.31	6.62	0.24	8.4.E-04	2.3.E-04
TPB56-15	15-1	6.22	0.31	6.63	0.26	5.5.E-04	-5.4.E-05
TPB56-16	16-1	6.04	0.31	6.44	0.25	6.0.E-04	-1.1.E-05
TPB56-17	17-1	6.06	0.31	6.46	0.31	5.9.E-04	-2.1.E-05
TPB56-18	18-1	5.99	0.31	6.39	0.24	5.7.E-04	-3.6.E-05
TPB56-19	19a-1	5.19	0.31	5.59	0.25	5.7.E-04	-3.3.E-05
TPB56-20	19b-1	6.62	0.31	7.02	0.26	5.8.E-04	-3.1.E-05
Taitao KIM-5 g2				5.54	0.31	6.0.E-04	
Taitao KIM-5 g2				5.61	0.26	6.0.E-04	
Taitao KIM-5 g2				5.69	0.18	6.4.E-04	
Taitao KIM-5 g2				5.29	0.19	5.9.E-04	
average and 2SD				5.53	0.35	6.1.E-04	
bracket average and 2SD	5.09			5.49	0.31	6.1.E-04	
TPG 171-11	11-1	5.12	0.31	5.51	0.30	5.9.E-04	-1.4.E-05
TPG 171-12	12-1	5.18	0.31	5.57	0.23	9.0.E-04	2.9.E-04
TPG 171-13	13	5.23	0.31	5.62	0.30	9.2.E-04	3.2.E-04
TPG 171-14	14-1	4.96	0.31	5.35	0.23	7.2.E-04	1.1.E-04
TPG 171-15	15a-1	5.32	0.31	5.72	0.29	7.5.E-04	1.5.E-04
TPG 171-16	16a	5.06	0.31	5.45	0.23	1.1.E-03	4.5.E-04
TPG 171-17	17	5.19	0.31	5.58	0.23	7.1.E-04	1.0.E-04
TPG 171-18	18	5.25	0.31	5.64	0.22	9.5.E-04	3.5.E-04
TPG 171-19	19a	5.47	0.31	5.86	0.38	6.4.E-04	3.9.E-05
TPG 171-20	20-1	5.58	0.31	5.97	0.21	7.1.E-04	1.0.E-04
Taitao KIM-5 g2				5.44	0.24	5.9.E-04	
Taitao KIM-5 g2				5.61	0.29	6.0.E-04	
Taitao KIM-5 g2				5.30	0.25	6.1.E-04	
Taitao KIM-5 g2				5.36	0.25	6.0.E-04	
average and 2SD				5.43	0.27	6.0.E-04	
bracket average and 2SD	5.09			5.48	0.31	6.0.E-04	

TPD116-11	11	5.35	0.27	5.71	0.16	6.2.E-04	2.8.E-05
TPD116-12	12-1	5.24	0.27	5.60	0.24	6.5.E-04	5.1.E-05
TPD116-13	13-1	5.86	0.27	6.22	0.21	5.8.E-04	-1.8.E-05
TPD116-14	14	5.29	0.27	5.65	0.25	5.9.E-04	-6.6.E-06
TPD116-15	15-1	5.70	0.27	6.06	0.23	6.3.E-04	4.0.E-05
TPD116-16	16	5.67	0.27	6.03	0.29	5.3.E-04	-6.9.E-05
TPD116-17	17-1	5.50	0.27	5.86	0.25	6.3.E-04	3.2.E-05
TPD116-18	18-1	5.23	0.27	5.59	0.25	6.6.E-04	6.6.E-05
TPD116-19	19-1	5.96	0.27	6.32	0.34	6.2.E-04	2.6.E-05
TPD116-20	20	5.72	0.27	6.08	0.25	6.2.E-04	2.4.E-05

Taitao KIM-5 g2				5.62	0.26	5.9.E-04	
Taitao KIM-5 g2				5.48	0.14	5.8.E-04	
Taitao KIM-5 g2				5.25	0.26	6.0.E-04	
Taitao KIM-5 g2				5.53	0.24	5.8.E-04	
average and 2SD				5.47	0.31	5.9.E-04	
bracket average and 2SD		5.09		5.45	0.27	5.9.E-04	

TPB243-11	11-1	6.36	0.26	6.71	0.21	5.8.E-04	-5.0.E-06
TPB243-12	12-1	6.15	0.26	6.50	0.26	6.2.E-04	2.6.E-05
TPB243-13	5b	6.53	0.26	6.88	0.27	5.9.E-04	-1.5.E-06
TPB243-14	14	6.61	0.26	6.96	0.23	5.8.E-04	-9.9.E-06
TPB243-15	15	6.01	0.26	6.36	0.24	6.4.E-04	4.5.E-05
TPB243-16	16	6.51	0.26	6.87	0.27	5.8.E-04	-5.5.E-06
TPB243-17	17-1	6.79	0.26	7.15	0.29	5.9.E-04	-1.4.E-06
TPB243-18	18a	6.25	0.26	6.60	0.28	6.8.E-04	8.8.E-05
TPB243-19	18b	4.99	0.26	5.35	0.23	6.5.E-04	5.6.E-05
TPB243-20	20	6.50	0.26	6.85	0.24	5.9.E-04	-4.2.E-06

Taitao KIM-5 g2				5.53	0.22	5.8.E-04	
Taitao KIM-5 g2				5.45	0.23	5.8.E-04	
Taitao KIM-5 g2				5.31	0.25	5.9.E-04	
Taitao KIM-5 g2				5.26	0.29	5.8.E-04	
Taitao KIM-5 g2				5.65	0.23	6.0.E-04	
Taitao KIM-5 g2				5.50	0.25	5.9.E-04	
average and 2SD				5.45	0.29	5.9.E-04	
bracket average and 2SD		5.09		5.44	0.26	5.9.E-04	

TPH75-11	11a	6.92	0.23	7.27	0.24	6.3.E-04	4.5.E-05
TPH75-12	11c-1	6.94	0.23	7.29	0.21	5.7.E-04	-1.3.E-05
TPH75-13	13a-1	6.22	0.23	6.57	0.24	7.3.E-04	1.4.E-04
TPH75-14	14-1	6.80	0.23	7.15	0.27	6.7.E-04	8.7.E-05
TPH75-15	15-1	6.04	0.23	6.38	0.19	6.2.E-04	3.7.E-05
TPH75-16	16-1	6.07	0.23	6.41	0.18	6.4.E-04	5.6.E-05
TPH75-17	17	6.73	0.23	7.07	0.18	5.9.E-04	1.4.E-06
TPH75-18	18-1	6.26	0.23	6.60	0.21	5.6.E-04	-2.3.E-05
TPH75-19	19a	6.24	0.23	6.59	0.21	7.6.E-04	1.7.E-04
TPH75-20	20	6.49	0.23	6.84	0.18	6.0.E-04	1.8.E-05

Taitao KIM-5 g2				5.45	0.24	5.8.E-04	
Taitao KIM-5 g2				5.39	0.28	5.8.E-04	
Taitao KIM-5 g2				5.33	0.20	5.8.E-04	
Taitao KIM-5 g2				5.49	0.22	5.9.E-04	
average and 2SD				5.41	0.14	5.8.E-04	
bracket average and 2SD		5.09		5.44	0.23	5.9.E-04	

TPG171-21	21a-1	5.51	0.19	5.79	0.25	9.1.E-04	3.3.E-04
TPG171-22	22-1	5.27	0.19	5.55	0.23	9.2.E-04	3.4.E-04
TPG171-23	23a-1	5.24	0.19	5.52	0.22	1.3.E-03	6.8.E-04
TPG171-24	24	5.24	0.19	5.52	0.19	8.0.E-04	2.2.E-04
TPG171-25	25-1	5.38	0.19	5.66	0.21	6.5.E-04	7.0.E-05
TPG171-26	26-1	5.15	0.19	5.43	0.30	7.5.E-04	1.7.E-04
TPG171-27	27-1	5.40	0.19	5.68	0.32	9.5.E-04	3.7.E-04
TPG171-28	28	5.32	0.19	5.60	0.22	8.5.E-04	2.8.E-04
TPG171-29	29-1	5.16	0.19	5.44	0.22	6.8.E-04	1.0.E-04
TPG171-30	30	5.16	0.19	5.44	0.24	1.0.E-03	4.2.E-04
Taitao KIM-5 g2				5.47	0.29	5.7.E-04	
Taitao KIM-5 g2				5.29	0.24	5.8.E-04	
Taitao KIM-5 g2				5.25	0.22	5.8.E-04	
Taitao KIM-5 g2				5.29	0.33	5.7.E-04	
average and 2SD				5.32	0.20	5.8.E-04	
bracket average and 2SD		5.09		5.37	0.19	5.8.E-04	
TPE90-31	31a-1	6.09	0.29	6.40	0.27	5.4.E-04	-2.9.E-05
TPE90-32	31b-1	6.23	0.29	6.54	0.30	5.3.E-04	-4.2.E-05
TPE90-33	33-1	5.80	0.29	6.12	0.19	5.5.E-04	-2.7.E-05
TPE90-34	34-1	6.38	0.29	6.70	0.28	5.6.E-04	-1.7.E-05
TPE90-35	35	6.32	0.29	6.63	0.27	5.5.E-04	-2.7.E-05
TPE90-36	36a	6.50	0.29	6.82	0.27	5.4.E-04	-2.8.E-05
TPE90-37	36b-1	7.58	0.29	7.89	0.27	5.2.E-04	-5.4.E-05
TPE90-38	38a	6.49	0.29	6.81	0.34	5.1.E-04	-6.0.E-05
TPE90-39	38b-1	6.13	0.29	6.45	0.28	5.6.E-04	-1.5.E-05
TPE90-40	40-1	6.19	0.29	6.51	0.23	5.6.E-04	-1.6.E-05
Taitao KIM-5 g2				5.65	0.27	5.7.E-04	
Taitao KIM-5 g2				5.38	0.29	5.7.E-04	
Taitao KIM-5 g2				5.35	0.30	5.6.E-04	
Taitao KIM-5 g2				5.55	0.27	5.8.E-04	
average and 2SD				5.48	0.29	5.7.E-04	
bracket average and 2SD		5.09		5.40	0.29	5.7.E-04	
TPB56-21	21-1	5.98	0.23	6.41	0.33	5.2.E-04	-5.4.E-05
TPB56-22	22-1	6.27	0.23	6.70	0.27	6.1.E-04	4.1.E-05
TPB56-23	23-1	6.00	0.23	6.44	0.32	5.2.E-04	-5.4.E-05
TPB56-24	24	6.19	0.23	6.62	0.22	5.4.E-04	-3.4.E-05
TPB56-25	25-1	5.88	0.23	6.32	0.24	5.5.E-04	-2.8.E-05
TPB56-26	26-1	6.22	0.23	6.65	0.25	5.6.E-04	-1.3.E-05
TPB56-27	27	6.27	0.23	6.70	0.29	5.6.E-04	-1.4.E-05
TPB56-28	28-1	5.84	0.23	6.27	0.29	7.5.E-04	1.8.E-04
TPB56-29	29a	5.46	0.23	5.89	0.19	5.5.E-04	-2.1.E-05
TPB56-30	29b-1	5.78	0.23	6.21	0.34	5.4.E-04	-3.1.E-05
Taitao KIM-5 g2				5.47	0.21	5.7.E-04	
Taitao KIM-5 g2				5.58	0.22	5.5.E-04	
Taitao KIM-5 g2				5.65	0.26	5.9.E-04	
Taitao KIM-5 g2				5.54	0.30	6.0.E-04	
average and 2SD				5.56	0.15	5.8.E-04	
bracket average and 2SD		5.09		5.52	0.23	5.7.E-04	
TPE135-31	31	6.35	0.36	6.77	0.28	5.9.E-04	2.2.E-05
TPE135-32	32	6.48	0.36	6.90	0.21	5.9.E-04	2.7.E-05
TPE135-33	33	6.16	0.36	6.58	0.14	5.6.E-04	-4.0.E-06

TPE135-34	34	5.94	0.36	6.36	0.20	5.8.E-04	1.1.E-05
TPE135-35	35a-1	6.33	0.36	6.75	0.23	5.9.E-04	2.4.E-05
TPE135-36	36a	6.14	0.36	6.56	0.23	5.6.E-04	-5.9.E-06
TPE135-37	36b-1	6.20	0.36	6.62	0.24	4.9.E-04	-7.9.E-05
TPE135-38	38-1	6.06	0.36	6.48	0.20	6.1.E-04	4.3.E-05
TPE135-39	39	6.13	0.36	6.55	0.24	5.8.E-04	1.6.E-05
TPE135-40	40-1	5.97	0.36	6.38	0.25	6.0.E-04	3.1.E-05
Taitao KIM-5 g2				5.65	0.27	5.7.E-04	
Taitao KIM-5 g2				5.31	0.28	5.6.E-04	
Taitao KIM-5 g2				5.68	0.18	5.5.E-04	
Taitao KIM-5 g2				5.18	0.23	5.5.E-04	
average and 2SD				5.46	0.50	5.6.E-04	
bracket average and 2SD		5.09		5.51	0.36	5.7.E-04	

¹⁶OH/¹⁶O background corrected' is provided by subtracting the average ¹⁶OH/¹⁶O value for the KIM-5 that bracket each analysis.

Table S5. Major and trace element compositions for the Taitao Granitoids.

Pluton	Cabo Raper			Estero Cono	Bahia Barrientos	Tres Montes	Seno Hoppner	
Sample No.	TPB56	TPE88	TPE90	TPE135	TPB243	TPH75	TPG 171	TPD116
Reference	Kon et al. (2013)	Kon (2009)	Kon (2009)	Kon (2009)	This study	This study	This study	Kon (2009)
		Kon et al. (2013)	Kon et al. (2013)	Kon et al. (2013)				Kon et al. (2013)
SiO ₂ (wt.%)	68.25	67.01	65.48	69.71	69.21	75.24	64.71	74.04
TiO ₂ (wt.%)	0.51	0.56	0.55	0.50	0.40	0.34	0.71	0.25
Al ₂ O ₃ (wt.%)	16.86	16.56	16.54	16.23	16.21	12.91	15.21	14.04
Fe ₂ O ₃ (wt.%)	3.00	3.36	3.27	2.85	2.52	1.72	5.52	2.07
MnO (wt.%)	0.05	0.06	0.06	0.04	0.04	0.01	0.07	0.03
MgO (wt.%)	1.81	2.09	2.02	1.55	1.83	0.61	2.37	0.15
CaO (wt.%)	3.85	3.82	3.90	3.50	2.96	1.63	5.17	1.23
Na ₂ O (wt.%)	4.45	4.30	4.29	4.27	4.62	3.08	5.20	5.00
K ₂ O (wt.%)	2.00	2.15	2.14	2.22	1.50	4.06	0.32	3.03
P ₂ O ₅ (wt.%)	0.13	0.14	0.14	0.10	0.04	0.01	0.05	0.07
Total (wt.%)	100.91	100.05	98.39	100.97	99.34	99.61	99.34	99.91
K ₂ O/Na ₂ O	0.45	0.50	0.50	0.52	0.32	1.32	0.06	0.61
K ₂ O+Na ₂ O	6.45	6.45	6.43	6.49	6.13	7.14	5.51	8.03
ASI*	1.02	1.01	1.00	1.03	1.11	1.04	0.83	1.02
Ga	16.8	16.8	16.3	13.9				15.5
Rb	76.9	83.9	75.4	89.1				132.4
Sr	304.9	283.1	290.1	169.3				54.6
Y	15.4	13.6	13.6	22.4				41.2
Zr	154.8	139.7	136.6	194.9				241.3
Nb	7.2	7.9	7.8	6.8				8.4
Ba	380.8	434.9	443.4	437.4				479.0
La	23.4	20.8	19.2	21.4				46.9
Ce	44.9	41.3	39.7	41.4				97.1
Pr	5.0	4.3	4.2	4.9				11.4
Nd	18.1	16.2	16.1	17.1				45.7
Sm	3.8	3.3	3.4	3.4				10.9
Eu	1.1	0.9	0.9	0.8				1.0
Gd	3.2	2.8	3.0	3.5				10.6
Tb	0.6	0.5	0.5	0.7				1.7
Dy	2.9	2.5	2.5	4.5				8.4
Ho	0.6	0.6	0.6	0.9				1.9
Er	1.7	1.5	1.5	2.5				4.8
Tm	0.3	0.2	0.2	0.5				0.7
Yb	1.8	1.7	1.8	3.1				4.7
Lu	0.3	0.2	0.2	0.4				0.6
Hf	4.1	5.2	6.6	5.1				6.4
Pb		9.5	9.2	11.4				12.4
Th	7.6	6.7	6.2	9.0				12.5
U	1.9	1.0	1.3	2.4				2.5
Sr/Y	19.8	20.8	21.3	7.6				1.3
La/Y	1.5	1.5	1.4	1.0				1.1
La/Yb	13.0	12.2	10.7	6.9				10.0

The units of trace elements are ppm.