Xu, X., et al., 2020, Permian plume-strengthened Tarim lithosphere controls the Cenozoic deformation pattern of the Himalayan-Tibetan orogen: Geology, v.49, https://doi.org/10.1130/G47961.1

SUPPLEMENTAL MATERIAL

Appendix-Data Supplement

DATABASE

Aeromagnetic surveys within and around Tarim Basin have been carried out by the China Aero Geophysical Survey and Remote Sensing Center for Natural Resources (AGRS) (Fig. S1A), China Geological Survey, aiming to petroleum and mineral exploration. Total aeromagnetic data used in this study originated from the data set of the China Mainland Aeromagnetic Map (e.g. Xiong et al., 2013; Xiong et al., 2016a, 2016b), of which the details are presented in the READ-Me file. The high-resolution aeromagnetic data set with a 1 km × 1 km grid could be used for research purposes via the application in the China Geological Survey Geocloud Database (http://geocloud.cgs.gov.cn/), or digitized from the high-resolution aeromagnetic map of the China mainland (Xiong et al., 2013).

MAGNETIC DATA PROCESSING

The aeromagnetic data and EMGA2 has been merged by the Geosoft Oasis Montaj Software (https://www.geosoft.com/products/oasis-montaj). The total aeromagnetic anomaly has been processed first by differential reduction to pole (Fig. 2) (Arkani-Hamed, 1988, 2007), and then by the analytical signal (Fig. S3) (e.g. Nabighian, 1984; Roest et al., 1992), which have been all integrated into the AGRS-Geoprobe Software. Such data-processing software could be approved to use by the AGRS, from http://www.agrs.cn/cgzt/xxcp/448.htm.

The final grid was filtered by differential reduction to pole (Fig. S2) (Arkani-Hamed, 2007), which allowed us to locate the magnetic signal directly above the causative bodies and improve interpretations. Analytical signal transformation (Roest et al., 1992) further enhanced the expression of the linear magnetic anomalies (Figs. S3, S4). The method, equivalent to total magnetic gradient, was used to delineate the magnetic signals and boundaries at very high resolutions (Ferris et al., 1998). This technique separates short-wavelength magnetic anomalies, such as mafic dikes, from the long-wavelength anomalies generally related to deep magnetic bodies, including crystalline basement.

MAGNETIC SUSCEPTIBILITIES

The magnetic susceptibilities of the rocks are all measured in field surveys and on the drill-cores (Fig. S1B)) (Xiong et al., 2016c). More details are presented in the Table S1.

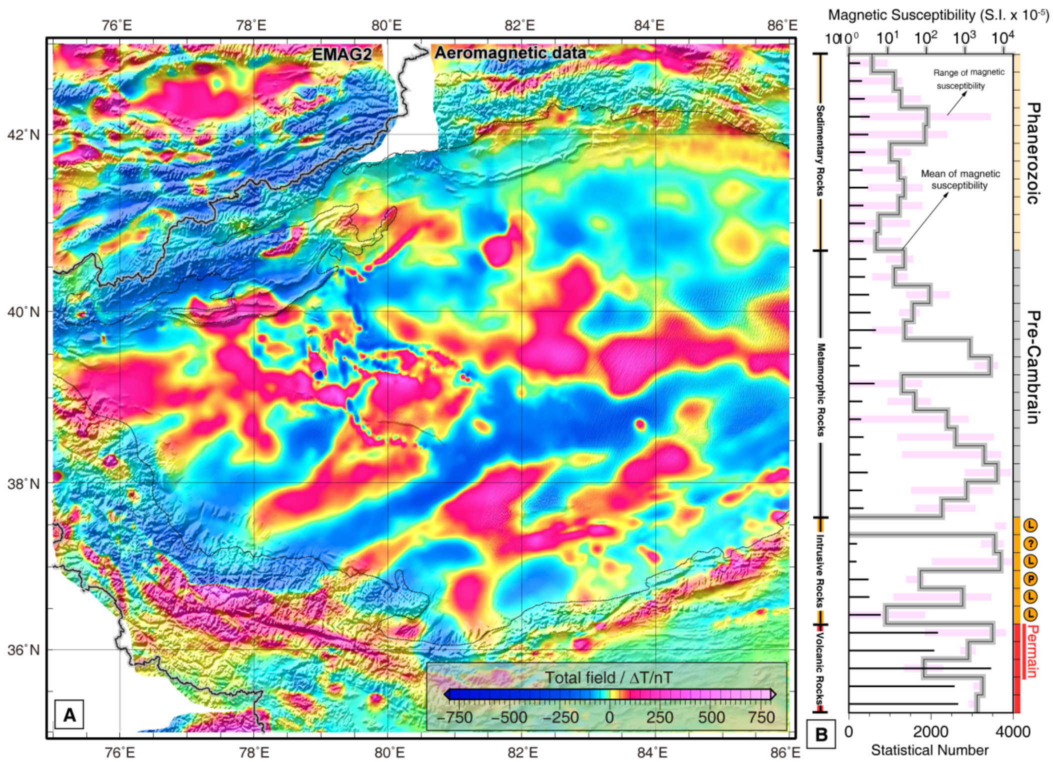

Figure S1. (A) New regional magnetic anomaly image with EMAG2 (Maus et al., 2009) and aeromagnetic datasets merged together along the black-gray line, overlain on hillshade DEM. (B) Statistics of magnetic susceptibility measurements of common rock types within and around Tarim Basin (Xiong et al, 2016c) (See data sources in Table S1). P, Proterozoic; L, Late Paleozoic; ?, uncertainty of the period of the measured rock in the field.

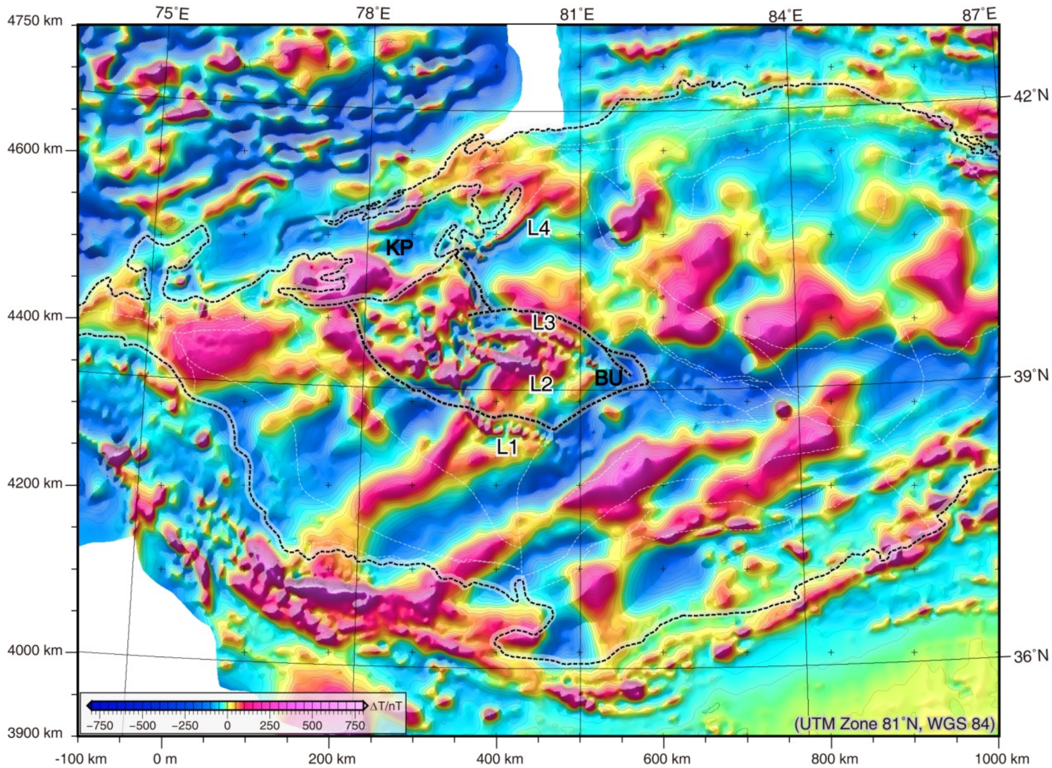

Figure S2. Differential reduction to pole map of the aeromagnetic anomalies; 20 nT contour interval. The warm red and cool blue colors depict magnetic highs and lows, respectively. Note the cross-cutting positive magnetic lineament, L1-L4. KP-Keping, BU-Bachu Uplift.

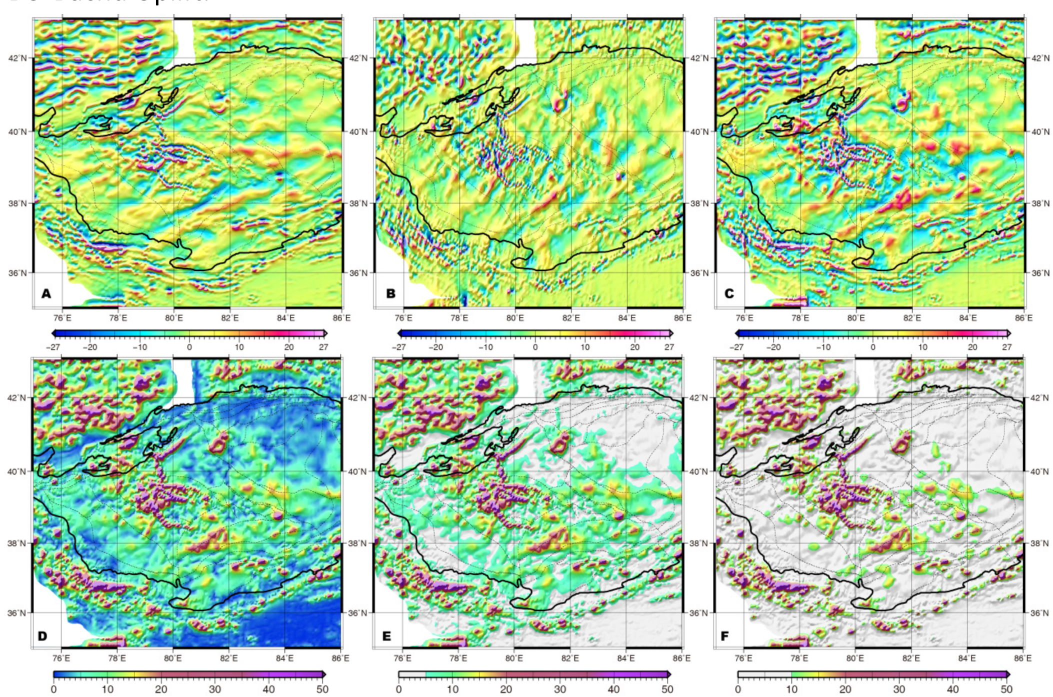

Figure S3. Processed results of analytic signal of the aeromagnetic anomalies. (A) horizontal-X, (B) horizontal-Y and (C) vertical-Z derivatives are calculated from the total field aeromagnetic anomaly of differential reduction to pole (Figure S3). The maps of analytic signal with different color-value ranges, (D) 0–50 nT/km, (E) 5–50 nT/km, (F) 10–50 nT/km. The locations of the maxima and the shape of this signal can then be used to find magnetic body edges.

REFERENCES CITED IN APPENDIX-DATA SUPPLEMENT

Arkani-Hamed, J., 1988, Differential reduction-to-the-pole of regional magnetic anomalies: Geophysics, v. 53, p. 1592-1600.

Arkani-Hamed, J., 2007, Differential reduction to the pole: revisited: Geophysics, v. 72, p. 13-20.

Ferris, J., Johnson, A. and Storey, B., 1998, Form and extent of the Dufek intrusion, Antarctica, from newly compiled aeromagnetic data: Earth and Planetary Science Letters, v. 154, p.185-202.

Maus, S., Barckhausen, U., Berkenbosch, H., Bournas, N., et al., 2009, EMAG2: A 2–arc min resolution Earth Magnetic Anomaly Grid compiled from satellite, airborne, and marine magnetic measurements: Geochemistry, Geophysics, Geosystems, v. 10.

Nabighian, M. N., 1984, Toward a three-dimensional automatic interpretation of potential field data via generalized Hilbert transforms: Fundamental relations: Geophysics, v. 49, p. 780-786.

Roest, W. R., Verhoef, J., and Pilkington, M., 1992, Magnetic interpretation using the 3-D analytic signal: Geophysics, v. 57, p. 116-125.

Xiong, S. Q., Fan, Z.G., Zhang, H.R., et al., 2013, Aeromagnetic Series Map of China's Mainland and its Specification: Beijing, Geological Publishing House, scale: 1: 5,000,000.

Xiong, S. Q., Tong, J., Ding, Y. Y., and Li, Z. K., 2016a, Aeromagnetic data and geological structure of continental China: A review: Applied Geophysics, v. 13, p. 227-237.

Xiong, S.Q., Yang, H., Ding, Y.Y., Li, Z.K., and Li, W., 2016b, Distribution of igneous rocks in China revealed by aeromagnetic data: Journal of Asian Earth Sciences, v. 129, p, 231-242.

Xiong, S.Q., Ding, Y.Y., Li, Z.K., et al., 2016c, Aeromagnetic data and geological structure of continental China: Beijing, Geological Publishing House, p. 39-41

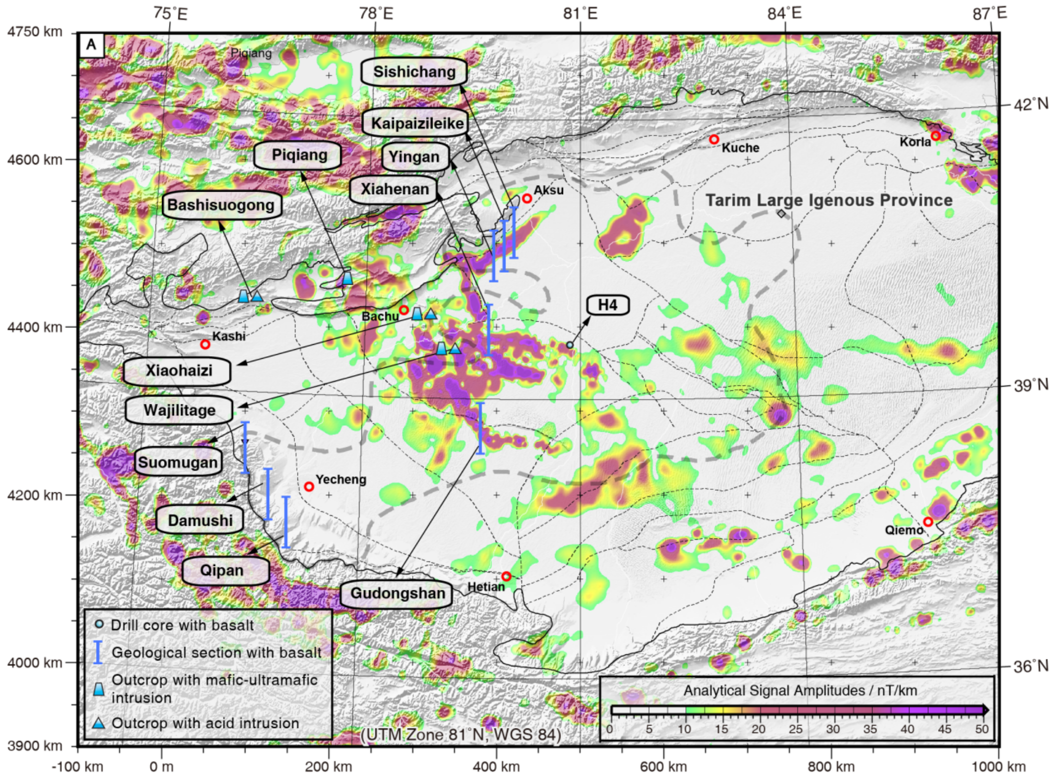

Figure S4. Correlation between the geophysical lineaments and geological observations, such as geological section, drill core and outcrops within and around the Tarim large igneous province. Data sources: Piqiang (e.g. Zhang et al., 2016); Bashisuogong (e.g. Ma et al., 2016); Xiaohaizi (e.g. Wei et al., 2014a, 2014b); Wajilitage (e.g. Shangguan et al., 2015; Zhang et al., 2016); Yingan (e.g. Wei et al., 2014a, 2014b); Kaipaizileike (e.g. Zhang et al., 2010); Xiahenan (e.g. Li et al., 2011; Zou et al., 2015; Wei et al., 2014); Qimugan (e.g. Li et al., 2013); Damushi (e.g. Li et al., 2008); Qipan (e.g. Yang et al., 2006); Gudongshan (e.g. Pan et al., 2011); H4 (e.g. Yu et al., 2011).

REFERENCES CITED IN FIGURE S3

Li, H. Y., Huang, X. L., Li, W. X., Cao, J., He, P. L., and Xu, Y. G., 2013, Age and geochemistry of the Early Permian basalts from Qimugan in the southwestern Tarim basin: Acta Petrologica Sinica, v. 29, p. 3353-3368.

Li, Z., Chen, H., Song, B., Li, Y., Yang, S., and Yu, X., 2011, Temporal evolution of the Permian large igneous province in Tarim Basin in northwestern China: Journal of Asian Earth Sciences, v. 42, p. 917-927.

Li, Z.L., Shufeng, Yang, S.F., Chen, H.L., Langmuir, C.H., Yu, X., Lin, X.B., and Li, Y.Q., 2008, Chronology and geochemistry of Taxinan basalts from the Tarim basin: evidence for Permian plume magmatism: Acta Petrologica Sinica, v. 24, p. 959-970.

Ma, Y., Zhang, Z., Huang, H., Santosh, M., and Cheng, Z., 2016, Petrogenesis of the Bashisuogong bimodal igneous complex in southwest Tianshan Mountains, China: implications for the Tarim Large Igneous Province: Lithos, v. 264, p. 509-523.

Pan, J. W., Li, H. B., Sun, Z. M., Si, J. L., Pei, J. L., and Zhang, L. J., 2011, Geochemistry and possible age of Gudongshan volcanic rocks, Tarim Basin: Geology In China, v. 38, p. 829-837 (in Chinese with English abstract).

Shangguan, S., Peate, I. U., Tian, W., and Xu, Y., 2016, Re-evaluating the geochronology of the Permian Tarim magmatic province: implications for temporal evolution of magmatism: Journal of the Geological Society, v. 173, p. 228-239.

Wei, X., Xu, Y. G., Feng, Y. X., and Zhao, J. X., 2014a, Plume-lithosphere interaction in the generation of the Tarim large igneous province, NW China: geochronological and geochemical constraints: American Journal of Science, v. 314, p. 314-356.

Wei, X., Xu, Y. G., Zhang, C. L., Zhao, J. X., and Feng, Y. X., 2014b, Petrology and Sr–Nd isotopic disequilibrium of the Xiaohaizi intrusion, NW China: genesis of layered intrusions in the Tarim large igneous province: Journal of Petrology, v. 55(12), p. 2567-2598.

Yang, S. F., Li, Z. L., Chen, H. L., Chen, W., and Yu, X., 2006, ^{40}Ar-^{39}Ar dating of basalts from Tarim Basin, NW China and its implication to a Permian thermal tectonic event: Journal of Zhejiang University-Science A, v. 7, p. 320-324.

Yu, X., Yang, S. F., Chen, H. L., Chen, Z. Q., Li, Z. L., Batt, G. E., and Li, Y. Q. (2011). Permian flood basalts from the Tarim Basin, Northwest China: SHRIMP zircon U–Pb dating and geochemical characteristics: Gondwana Research, v. 20, p. 485-497.

Zhang, Y., Liu, J., and Guo, Z., 2010, Permian basaltic rocks in the Tarim basin, NW China: implications for plume–lithosphere interaction: Gondwana Research, v. 18, p. 596-610.

Zhang, D., Zhang, Z., Mao, J., Huang, H., and Cheng, Z., 2016, Zircon U–Pb ages and Hf–O isotopic signatures of the Wajilitag and Puchang Fe–Ti oxide–bearing intrusive complexes: constraints on their source characteristics and temporal–spatial evolution of the Tarim large igneous province: Gondwana Research, v. 37, p. 71-85.

Zou, S. Y., Li, Z. L., Song, B., Ernst, R. E., Li, Y. Q., Ren, Z. Y., ... and Song, X. Y., 2015, Zircon U–Pb dating, geochemistry and Sr–Nd–Pb–Hf isotopes of the Wajilitag alkali mafic dikes, and associated diorite and syenitic rocks: Implications for magmatic evolution of the Tarim large igneous province: Lithos, v. 212, p. 428-442.

Appendix-Schematic restoration of the plume head

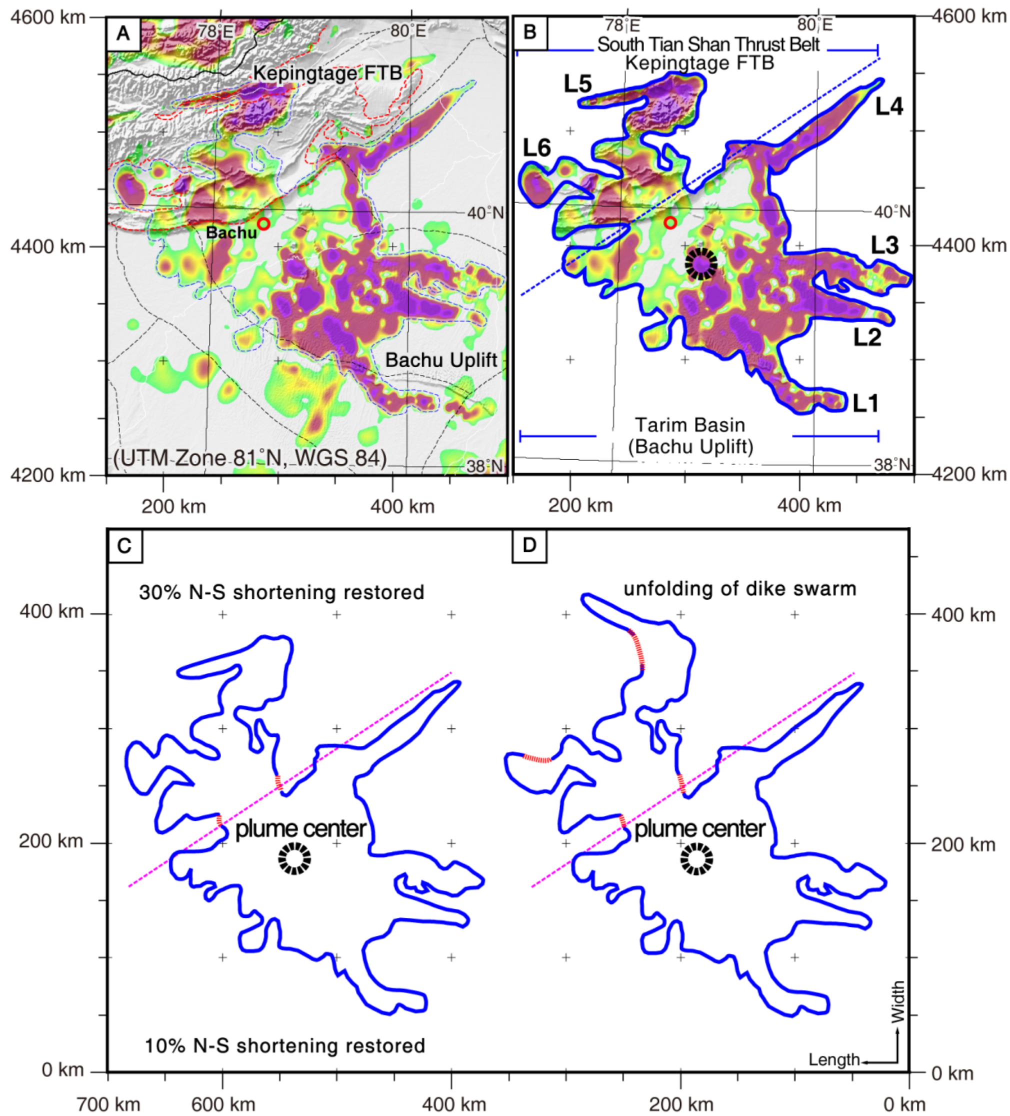

Figure S5. (A) Spatial distribution of the radial linear anomalies. (B) Original morphology and geometry of the imaged plume head, showing radial anomalies (L1-L6), and subdivision of Kepingtage fold-thrust belt (FTB) and Bachu Uplift domains. (C) Outline of plume features and (D) restored geometry, as discussed above. Red dashed lines along plume outline represent schematically restored boundaries with unfolding and strain reconstruction.

The geometry of the Tarim plume head and its radial dikes was restored to account for minor Cenozoic shortening in the Kepingtage FTB and Bachu Uplift regions (Fig. S5). The plume head and radial dike swarm were divided into two parts, as shown in Fig. S5A and S5B, with the northwest domain deformed in the Kepingtage FTB and the southeast domain deformed in Bachu Uplift region. Radial anomalies L5 and L6 are in the Kepingtage FTB domain, and L1-L4 are in the Bachu

Uplift domain. The outlined of the imaged plume features were restored according to published estimates of Cenozoic shortening strain. We note that this is not a rigorous exercise, but provides insight into a plausible pre-Cenozoic geometry of the imaged plume structures.

Balanced and restored cross sections across the Kepingtage FTB suggest 20-30% shortening strain (Fig. S5C) (e.g., Yin et al., 1998; Allen et al., 1999). The Kepingtage FTB is thin-skinned and the southern extent of thrusting appears does not deform the man center of the remnant plume head. The Kepingtage FTB domain in the northwest was stretched to account for this shortening. L5 and L6 anomalies appeared folded compared to L1-L4 anomalies, and they were subsequently unfolded schematically. The Bachu Uplift region has less Cenozoic shortening strain, estimated at ~10% (Fig. S5C) (Allen et al., 1999; Laborde et al., 2019), and this region was stretched to account for this deformation. Figure S5D schematically shows a plausible outline of the pre-Cenozoic Permian plume in the Tarim Basin.

REFERENCES CITTED IN CURRENT APPENDIX

Allen, M. B., Vincent, S. J., and Wheeler, P. J., 1999, Late Cenozoic tectonics of the Kepingtage thrust zone: interactions of the Tien Shan and Tarim Basin, northwest China: Tectonics, v. 18, no. 4, p. 639-654.

Laborde, A., Barrier, L., Simoes, M., Li, H., Coudroy, T., Van Der Woerd, J., and Tapponnier, P., 2019, Cenozoic deformation of the Tarim Basin and surrounding ranges (Xinjiang, China): A regional overview: Earth-Science Reviews, v. 197, p. 1-35

Yin, A., Nie, S., Craig, P., Harrison, T. M., Ryerson, F. J., Xianglin, Q., and Geng, Y., 1998, Late Cenozoic tectonic evolution of the southern Chinese Tian Shan: Tectonics, v. 17, no. 1, p. 1-27.

Appendix-Geochemical feature of magmatic rocks

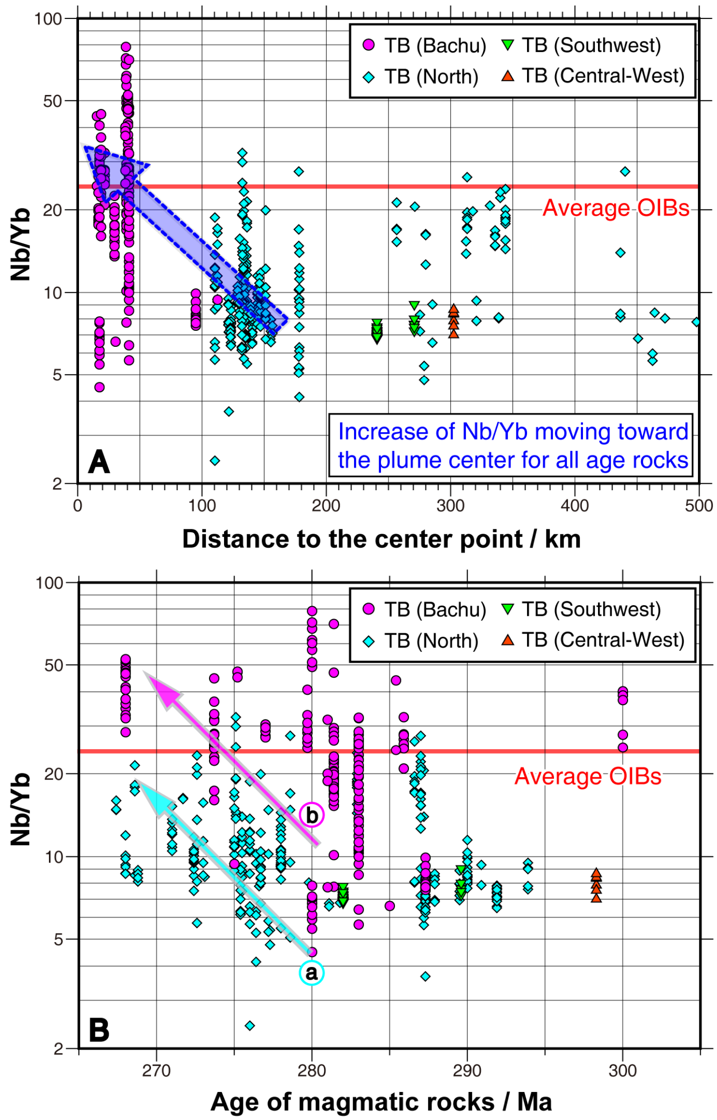

Figure S6. Plots showing compiled Nb/Yb for 300-268 Ma magmatic rocks within and around Tarim Basin versus (A) distance to mantle plume head (km) (See data sources in Table S3), and (B) age (See data sources in Table S2). Circled a., A general increase in Nb/Yb going younger in time; circled b., A general trend toward greater Nb/Yb with younging time. OIBs—oceanic island basalts (average values from Sun and McDonough, 1989).

REFERENCES CITTED IN CURRENT APPENDIX

Sun, S.S., McDonough, W.F. 1989. Chemical and isotopic systematics of oceanic basalts: implications for mantle composition and processes: Geological Society, London, Special Publications, v. 42, p. 313-345.

Appendix-Rheological profiles

The rheology and strength of the crust and upper mantle can be described by a rheological profile or yield strength envelope (e.g., Bürgmann and Dresen, 2008). A variety of factors influence lithospheric strength, and we highlight the following key factors that would have influenced the Tarim lithosphere during the plume impingement process: dehydration, chemical depletion, mafic intrusion/underplating, and mantle thickening (Fig. 3; Fig. S7).

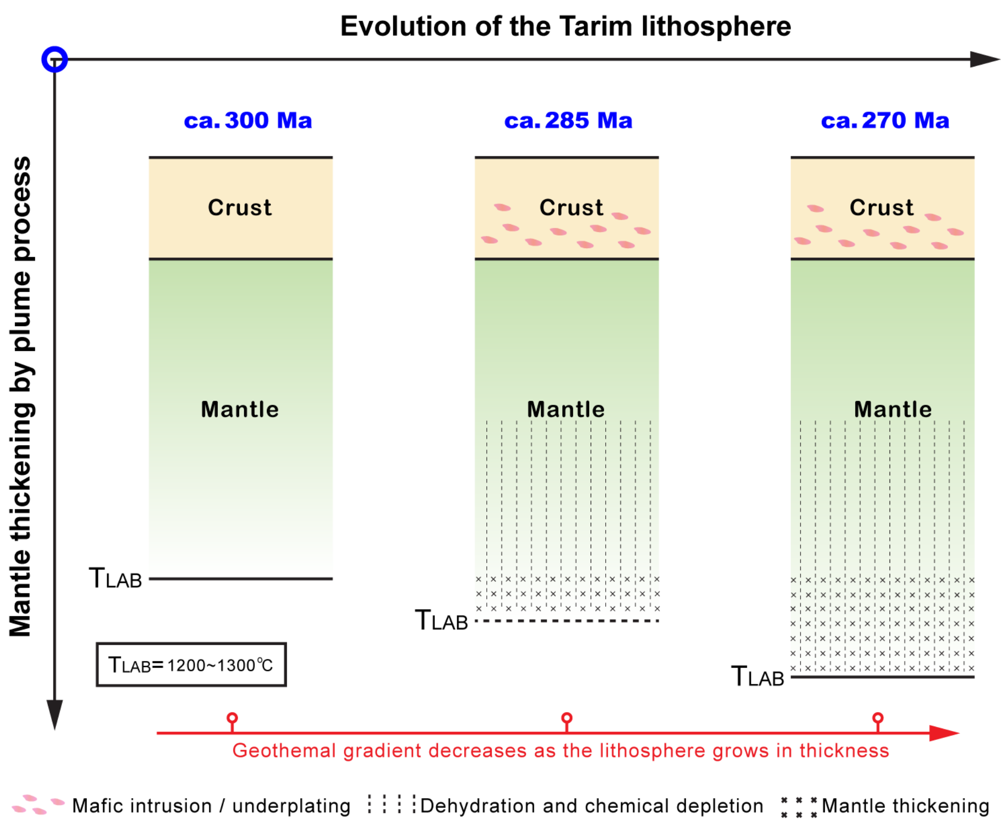

Figure S7. Key factors that could influence the would influenced the Tarim lithosphere during the plume impingement process: dehydration, chemical depletion, mafic intrusion/underplating.

We qualitatively present a rheological evolution following the interpreted geological evolution of the Tarim lithosphere during the Permian plume event. In the most general sense (e.g., Hirth and Kohlstedt, 2003), the strength of the lower crust and upper mantle is described by a power law relationship:

$$\dot{\varepsilon} = A\,\sigma^n\,f_{H_2O}\exp\left(-\frac{E}{RT}\right)$$

where $\dot{\varepsilon}$ is strain rate, A is a material constant, σ^n is stress with stress exponent n, f_{H_2O} is water fugacity, E is activation energy, R is the gas constant, and T is absolute temperature. The middle and lower crust are usually modeled with experimentally derived constraints for quartzite (wet or dry) and diabase rock types, respectively, whereas the upper mantle is approximated by olivine or dunite.

Crustal rheology and strength: mafic intrusion / underplating

According to geological observations and numerical experiments, crustal strength should increase by adding mafic material as the intrusive magmas cool (Carter and Tsenn, 1987; Ranalli and Murphy, 1987; Wilks and Carter, 1990; Anders et al., 1989; Liu and Furlong, 1994; Bürgmann and Dresen, 2008). In Fig. 3C, the red curves in the rheological profiles represent strength increase due to mafic rock addition to the lower crust via intrusions or underplating. There is time dependence on this strengthening, such that after initial mafic rock addition, the crust may be thermally weakened by the heat associated with the intrusion. However, after 10s of Myr, the sills should have cooled conductively and will represent strengthened crust due to the addition of stronger rock (e.g., diabase composition compared to more granite average crust) (e.g., Liu and Furlong, 1994). Given that Cenozoic Himalayan-Tibetan orogeny was 100s Myr after the Permian plume event, any added mafic rocks would only strengthen the crust.

Upper mantle rheology and strength: dehydration and chemical depletion

For the upper lithospheric mantle, olivine or dunite compositions are used for strength quantification. Plume impingement drives elevated temperatures and high degrees of melting that would lead to chemical depletion (e.g., Fe relative to Mg components) and dehydration (i.e., reduced water content), which should all result in increased viscosity and strength (Chopra and Paterson, 1984; Hirth and Kohlstedt, 1996, 2003; Lee et al., 2001, 2011; Bürgmann and Dresen, 2008). The less dense mantle keel would form immediately during the plume evolution, and be thicker and stronger as shown in Fig. 3.

Upper mantle rheology and strength: Mantle thickening and thermal gradient of the lithosphere

The rheological profiles in Fig. 3 assume that the base of the lithosphere has a fixed temperature, T_{LAB}. This may be 1200-1300°C (e.g., Rudnick et al., 1998). As the mantle lithosphere thickens due to the aforementioned processes related to the Permian plume event, the lithospheric geothermal gradient decreases (Fig. S7). Therefore, a natural consequence of thickening mantle lithosphere is lower lithospheric heatflux. The blue curves in Fig. 3 schematically connect the surface temperature T_s with T_{LAB}.

REFERENCES CITTED IN CURRENT APPENDIX

Anders, M. H., Geissman, J. W., Piety, L. A., and Sullivan, J. T., 1989, Parabolic distribution of circumeastern Snake River Plain seismicity and latest Quaternary faulting: Migratory pattern and association with the Yellowstone hotspot: Journal of Geophysical Research: Solid Earth, v. 94(B2), p. 1589-1621.

Bürgmann, R., & Dresen, G., 2008, Rheology of the lower crust and upper mantle: Evidence from rock mechanics, geodesy, and field observations: Annual Review of Earth and Planetary Sciences, v. 36, p. 531-567.

Carter, N. L. and Tsenn, M. C., 1987, Flow properties of continental lithosphere: Tectonophysics,v. 136, p. 27-63.

Chopra, P. N., & Paterson, M. S., 1984, The role of water in the deformation of dunite: Journal of Geophysical Research: Solid Earth, v. 89, p. 7861-7876.

Hirth G. and Kohlstedt D. L., 1996, Water in the oceanic upper mantle: implications for rheology, melt extraction and the evolution of the lithosphere: Earth and Planetary Science Letters, v. 144, p. 93-108.

Hirth, G., and Kohlstedf, D., 2003, Rheology of the upper mantle and the mantle wedge: A view from the experimentalists: Geophysical Monograph-American Geophysical Union, v. 138, p. 83-106.

Liu, M., and Furlong, K. P., 1994, Intrusion and underplating of mafic magmas: Thermal-rheological effects and implications for Tertiary tectonomagmatism in the North American Cordillera: Tectonophysics,v. 237, p. 175-187.

Lee, C. T., Yin, Q., Rudnick, R. L., Jacobsen, S. B., 2001, Preservation of ancient and fertile lithospheric mantle beneath the southwestern United States: Nature, v. 411, p. 69-73.

Lee, C. T. A., Luffi, P., Chin, E. J., 2011, Building and destroying continental mantle. Annual Review of Earth and Planetary Sciences, v. 39, p. 59-90.

Ranalli, G. and Murphy, D. C., 1987, Rheological stratification of the lithosphere, Tectonophysics, v. 132, p. 281-295.

Rudnick, R. L., McDonough, W. F., O'Connell, R. J., 1998, Thermal structure, thickness and composition of continental lithosphere: Chemical Geology, v. 145, p. 395-411.

Wilks, K. R., & Carter, N. L., 1990, Rheology of some continental lower crustal rocks: Tectonophysics, v. 182, p. 57-77.

Table S1. Measured magnetic susceptibilities of four types of rocks within and around the Tarim Basin.

Rock type	Lithology	Period	Magnetic susceptibility / $k \times 10^{-5}$ SI		Mean	Region*
			Number	Range		
Sedimentary Rock	sandstone, mudstone	Cenozoic	276	0 - 10	4	field / well
	sandstone, mudstone	Cretaceous	317	0 - 24	15	field / well
	conglomerate, sandstone, mudstone	Jurassic	385	0 - 74	22	field / well
	conglomerate, fine-sandstone, mudstone	Triassic	506	2 - 4700	108	field / well
	sandstone, mudstone	Permian	472	0 - 360	94	field / well
	sandstone, carbonatite, mudstone	Carboniferous	397	0 - 41	12	field / well
	sand conglomerate, fin-conglomerate	Devonian	336	0 - 29	20	field / well
	sandstone, mudstone	Silurian	467	3 - 82	27	field / well
	mudstone, carbonatite	Ordodvician	354	0 - 81	20	field / well
	limestone, dolomite	Cambrian	392	0 - 38	6	field / well
Metamorphic Rock	metamorphic rock (?)	Neoproterozoic	358	1 - 23	5	T1 Well
	metamorphic rock, sandstone	Pre- Neoproterozoic	426	9 - 47	27	T103 Well
	mixed granitic gneiss	Pre- Neoproterozoic	391	4 - 34	15	QM1 Well
	chino metamorphic rock	Pre- Neoproterozoic	496	30 - 411	126	YH2 Well
	metamorphic rock (?)	Pre- Neoproterozoic	527	20 - 68	46	C2 Well
	celadon killas	Pre- Neoproterozoic	663	4 - 45	28	YH6 Well
	granitic gneiss	Archean	306	N/A*	1390	field

Rock type	Lithology	Period	Magnetic susceptibility / $k \times 10^{-5}$ SI		Mean	Region*
			Number	Range		
Metamorphic Rock	iron-bearing quartzite	Early Proterozoic	257	1760 - 7176	4580	field
	schist (various type)	Early Proterozoic	624	0 - 80	24	field
	amphogneiss	Late Archean	324	10 - 135	51	Keluketage
	plagiocase amphogneiss	Late Archean	297	0 - 1280	350	Keluketage
	granitic gneiss	Late Archean	361	18 - 5700	587	Keluketage
	phlogopite diopsidite	Late Archean	285	24 - 8900	3187	Keluketage
	pyrogenic carbonate	Late Archean	462	1000 - 15600	6839	Keluketage
	phlogopite	Late Archean	324	41 - 5400	1125	Keluketage
	diopsidite	Late Archean	357	53 - 1900	258	Keluketage
Intrusive Rock	graniton	Late Paleozoic	201	6000 - 12000	N/A*	field
	diabase	?*	197	2630 - 10300	6018	field
	ultramafic rock	Late Paleozoic	189	140 - 16800	8480	field
	diorite	Proterozoic	482	30 - 90	71	field
	diorite	Late Paleozoic	497	14 - 4900	886	field
	granite	Late Paleozoic	775	0 - 95	9	field
Volcanic Rock	basalt	Permian	2165	93 - 11700	5300	field / well
	trachyte	Permian	2081	770 - 1900	1255	field / well
	rhyolite	Permian	3463	27 - 270	88	field / well

Rock type	Lithology	Period	Magnetic susceptibility / $k \times 10^{-5}$ SI		Mean	Region*
			Number	Range		
Volcanic Rock	andesite	Devonian	2576	1650 - 3480	2927	field / well
	volcanite (various type)	Late Cambrian-Early Ordodvician	2657	1280 - 2530	2085	field / well

Notes:

Region* — Location of measured rock of magnetic susceptibility;

N/A* — No value, because of the loss of original data;

?* — Uncertainty of the period of the measured rock in the field;

? — Estimated lithology of the measured rock in the field;

REFERENCES CITED IN TABLE S1.

Xiong, S.Q., Ding, Y.Y., Li, Z.K., et al., 2016, Aeromagnetic data and geological structure of continental China: Beijing, Geological Publishing House, p. 39-41.

Table S2. Compilation of radiometric crystallization ages of magmatic rocks within Tarim Basin

No.	Tectonic region	Geologic Unit	Sample No.	Sample lithology	Long.	Lati.	Dating Method	Age (Ma)	Error (Ma)	References

No.	Tectonic region	Geologic Unit	Sample No.	Sample lithology	Long.	Lati.	Dating Method	Age (Ma)	Error (Ma)	References
1	N Tarim	Felsic volcanics from drillhole	Shun-1	Dacite	84	39.25	LA-ICP-MS zircon U-Pb	286	4	(Li et al., 2007)
2	N Tarim	Felsic volcanics from drillhole	YM16-3	Rhyolite	81.92	41.06	40Ar/39Ar	266.9	1.7	(Liu et al., 2012)
3	N Tarim	Felsic volcanics from drillhole	MN1-1	Rhyolite	81.583	40.867	LA-ICP-MS zircon U-Pb	271.7	2.2	(Tian et al., 2010)
4	N Tarim	Felsic volcanics from drillhole	S99	Dacite	83.852	40.963	LA-ICP-MS zircon U-Pb	273.1	3.2	(Yu et al., 2011a)
5	N Tarim	Felsic volcanics from drillhole	S114	Dacite	84.317	40.759	LA-ICP-MS zircon U-Pb	276.6	2.7	(Yu et al., 2011a)
6	N Tarim	Felsic volcanics from drillhole	NK1-1	Rhyolitic intrusion	81.3	41.233	LA-ICP-MS zircon U-Pb	277.3	2.5	(Tian et al., 2010)
7	N Tarim	Felsic volcanics from drillhole	S79-3	Dacite	84.041	40.638	LA-ICP-MS zircon U-Pb	279.8	3	(Yu et al., 2011a)
8	N Tarim	Felsic volcanics from drillhole	S102-1	Dacite	83.755	40.741	LA-ICP-MS zircon U-Pb	281.8	3	(Yu et al., 2011a)
9	N Tarim	Felsic volcanics from drillhole	YM16-1	Rhyolitic intrusion	82.167	41.283	LA-ICP-MS zircon U-Pb	282.9	2.5	(Tian et al., 2010)
10	N Tarim	Felsic volcanics from drillhole	YM5-8	Rhyolite	81.867	41.117	LA-ICP-MS zircon U-Pb	286.6	3.3	(Tian et al., 2010)
11	N Tarim	Felsic volcanics from drillhole	HA2-5379	Trachydacite	83.346	41.334	Cameca zircon U-Pb	287.2	2	(Shangguan et al., 2016)
12	N Tarim	Felsic volcanics from drillhole	HA2	Rhyolite	83.06	41.29	Cameca zircon U-Pb	287.3	2	(Liu et al., 2014)
13	N Tarim	Felsic volcanics from drillhole	YM30-1	Rhyolite	81.8	41.35	LA-ICP-MS zircon U-Pb	290.9	4.1	(Tian et al., 2010)
14	N Tarim	Keping flood basalt (Kupukuziman Fm)	DWG07-1	Basalt	79.478	40.679	Whole-rock 40Ar/39Ar	274.8	2.4	(Zhang et al., 2010b)
15	N Tarim	Keping flood basalt (Kupukuziman Fm)	JA01	Basalt	79.772	40.76	SHRIMP zircon U-Pb	279	4.5	(Chen et al., 2010)
16	N Tarim	Keping flood basalt	LT24D	Tuff	79.84	40.825	LA-ICP-MS zircon U-Pb	281.1	3.4	(Han et al., 2019)
17	N Tarim	Keping flood basalt (Kupukuziman Fm)	LKC07-1	Basalt	79.866	40.827	Whole-rock 40Ar/39Ar	282.9	1.6	(Zhang et al., 2010b)
18	N Tarim	Keping flood basalt	YG-2	Basalt	79.685	40.685	Whole-rock 40Ar/39Ar	287.3	4	(Wei et al., 2014)
19	N Tarim	Keping flood basalt	YG-14	Basalt	79.685	40.688	Whole-rock 40Ar/39Ar	287.9	3.1	(Wei et al., 2014)
20	N Tarim	Keping flood basalt	Yg08	Basalt	79.527	40.654	SHRIMP zircon U-Pb	288.9	2	(Yu et al., 2011b)

No.	Tectonic region	Geologic Unit	Sample No.	Sample lithology	Long.	Lati.	Dating Method	Age (Ma)	Error (Ma)	References
21	N Tarim	Keping flood basalt	Yg01	Basalt	79.529	40.654	SHRIMP zircon U-Pb	289.5	2	(Yu et al., 2011b)
22	N Tarim	Keping flood basalt	KP-02	Basalt	79.43	40.69	LA-ICP-MS zircon U-Pb	291.9	2.2	(Zhang et al., 2012)
23	N Tarim	Keping flood basalt	KP-03	Basalt	79.429	40.69	LA-ICP-MS zircon U-Pb	291.9	4.5	(Zhang et al., 2012)
24	N Tarim	Keping flood basalt	KP-04	Basalt	79.428	40.69	LA-ICP-MS zircon U-Pb	293.9	4.6	(Zhang et al., 2012)
25	N Tarim	Keping flood basalt	JB09-09	Tuff	79.53	40.67	LA-ICP-MS zircon U-Pb	290.9	1.3	(Tian et al., 2018)
26	N Tarim	Basalt from drillhole	YT6-3	Basalt	81.983	41.383	40Ar/39Ar	267.4	3	(Liu et al., 2012)
27	N Tarim	Keping flood basalt (Kupukuziman Fm)	DWG07-4	Basalt	79.48	40.679	Whole-rock 40Ar/39Ar	271.9	3.7	(Zhang et al., 2010b)
28	N Tarim	Keping flood basalt	?	Basalt	79.51	40.67	40Ar/39Ar	278.5	1.4	(Chen et al., 1997)
29	N Tarim	Basalt from drillhole	YT6-1	Basalt	81.983	41.383	40Ar/39Ar	261.1	4.9	(Liu et al., 2012)
30	N Tarim	Gabbro in Kepingtage	04-B07	Gabbro	79.63	40.75	LA-ICP-MS zircon U-Pb	274	15	(Li et al., 2007)
31	N Tarim	Tuff in Kepingtage	04-B04	Tuff	79.63	40.75	LA-ICP-MS zircon U-Pb	291	10	(Li et al., 2007)
32	N Tarim	Keping flood basalt	04-B03	Basalt	79.63	40.75	LA-ICP-MS zircon U-Pb	275	13	(Li et al., 2007)
33	NW Tarim (Bachu)	Syenite in Bachu	T33	Quartz syenite	78.852	39.745	SHRIMP zircon U-Pb	273	3.7	(Chen et al., 2010)
34	NW Tarim (Bachu)	Syenite in Bachu	BC03	Quartz syenite	78.807	39.751	LA-ICP-MS zircon U-Pb	273.7	1.5	(Zhang et al., 2008)
35	NW Tarim (Bachu)	Syenite in Bachu	XH-13	Quartz syenite	78.8	39.767	SHRIMP zircon U-Pb	277	4	(Yang et al., 2006a)
36	NW Tarim (Bachu)	Syenite in Bachu	04-B32	Syenite	78.8	39.205	LA-ICP-MS zircon U-Pb	281	4	(Li et al., 2007)
37	NW Tarim (Bachu)	Syenite in Bachu	04-B30	Syenite	78.8	39.2	LA-ICP-MS zircon U-Pb	282	3	(Li et al., 2007)
38	NW Tarim (Bachu)	Syenite in Bachu	Sgt0503-1a	Quartz syenite	78.82	39.76	SHRIMP zircon U-Pb	284.3	2.8	(Li et al., 2011)
39	NW Tarim (Bachu)	Syenite in Bachu	04XJ-78	Syenite	78.85	39.785	SHRIMP zircon U-Pb	285.9	2.6	(Sun et al., 2008)
40	NW Tarim (Bachu)	Syenite in Bachu	WJL050710	Diorite	78.946	39.544	LA-ICP-MS zircon U-Pb	275.2	1.2	(Zou et al., 2015)

No.	Tectonic region	Geologic Unit	Sample No.	Sample lithology	Long.	Lati.	Dating Method	Age (Ma)	Error (Ma)	References
41	NW Tarim (Bachu)	Syenite in Bachu	Xhz-9	Syenite	78.8	39.77	Cameca zircon U-Pb	279.7	2	(Wei and Xu, 2011)
42	NW Tarim (Bachu)	Mafic intrusion in Bachu	04-B15	Diabase	78.75	39.35	LA-ICP-MS zircon U-Pb	272	6	(Li et al., 2007)
43	NW Tarim (Bachu)	Mafic intrusion in Bachu	WJL081907	Mafic dyke	78.937	39.535	SHRIMP zircon U-Pb	281.4	1.7	(Zou et al., 2015)
44	NW Tarim (Bachu)	Mafic intrusion in Bachu	DW27	Gabbro	78.935	39.535	LA-ICP-MS zircon U-Pb	282.4	1.4	(Zhang et al., 2016)
45	NW Tarim (Bachu)	Mafic intrusion in Bachu	D44	Metagabbro	78.932	39.55	LA-ICP-MS zircon U-Pb	283.3	0.9	(Zhang et al., 2016)
46	NW Tarim (Bachu)	Carbonatite in Bachu	Mn	Carbonatite	78.95	39.58	Cameca monazite Th-Pb	266	5.3	(Song et al., 2017)
47	NW Tarim (Bachu)	Clinopyroxenite in Bachu	DW24	Clinopyroxenite	78.934	39.533	Cameca zircon U-Pb	281.3	2.2	(Zhang et al., 2016)
48	NW Tarim (Bachu)	Clinopyroxenite in Bachu	W08	Olivine clinopyroxenite	78.934	39.533	Cameca zircon U-Pb	283	2.1	(Shangguan et al., 2016)
49	NW Tarim (Bachu)	Clinopyroxenite in Bachu	D53	Clinopyroxenite	78.934	39.534	LA-ICP-MS zircon U-Pb	284.2	2.8	(Zhang et al., 2016)
50	NW Tarim (Bachu)	Kimberlite in Bachu	DW31-4	Kimberlitic rock	78.935	39.566	Cameca perovskite U-Pb	299.8	4.3	(Zhang et al., 2013)
51	NW Tarim (Bachu)	Kimberlite in Bachu	DW21-4	Kimberlitic rock	78.926	39.57	Cameca baddeleyite U-P	300.5	4.4	(Zhang et al., 2013)
52	NW Tarim (Bachu)	Kimberlite in Bachu	DW21-1	Kimberlitic rock	78.924	39.57	Cameca baddeleyite U-P	300.8	4.7	(Zhang et al., 2013)
81	NW Tarim (Bachu)	Nephelinite in Wajilitage	CZG-1	Nephelinite	78.95	39.557	Cameca rutile U-Pb	268	30	(Cheng et al., 2015)
82	NW Tarim (Bachu)	Diabase in Tangwangcheng	TWC07-1	Diabase	78.81	40.02	Whole-rock 40Ar/39Ar	262.3	4.1	(Zhang et al., 2010b)
83	NW Tarim (Bachu)	Diabase in Xiaohaizi	XHZ07-7	Diabase	78.628	39.663	Whole-rock 40Ar/39Ar	285.4	8.5	(Zhang et al., 2010b)
53	NW Tarim (Piqiang)	Gabbro in Piqiang	2010HLJ028	Lecuogabbro	77.633	40.443	LA-ICP-MS zircon U-Pb	261.7	1.8	(Zhang and Zou, 2013)
54	NW Tarim (Piqiang)	Gabbro in Piqiang	2010HLJ026	Gabbro	77.632	40.445	LA-ICP-MS zircon U-Pb	262.3	2.1	(Zhang and Zou, 2013)
55	NW Tarim (Piqiang)	Gabbro in Piqiang	9-1K	Gabbro	77.64	40.45	Plagioclase 40Ar/39Ar	265.5	1.2	(Zhou et al., 2010)
56	NW Tarim (Piqiang)	Gabbro in Piqiang	PC-1	Gabbro	77.633	40.443	Cameca zircon U-Pb	273.3	2	(Zhang et al., 2016)

No.	Tectonic region	Geologic Unit	Sample No.	Sample lithology	Long.	Lati.	Dating Method	Age (Ma)	Error (Ma)	References
57	NW Tarim (Piqiang)	Gabbro in Piqiang	D56-7	Gabbro	77.634	40.442	Cameca zircon U-Pb	273.5	2.2	(Zhang et al., 2016)
58	NW Tarim (Piqiang)	Gabbro in Piqiang	D58	Gabbro	77.634	40.443	LA-ICP-MS zircon U-Pb	275.1	1.1	(Zhang et al., 2016)
59	NW Tarim (Piqiang)	Gabbro in Piqiang	NPC-13	Gabbro	77.609	40.437	Cameca zircon U-Pb	275.3	1.9	(Zhang et al., 2016)
60	NW Tarim (Piqiang)	Gabbro in Piqiang	08KT01	Gabbro	77.636	40.412	SHRIMP zircon U-Pb	276	4	(Zhang et al., 2010a)
61	NW Tarim (Piqiang)	Halajun granite pluton I	08KT02	Granite	77.4	40.455	SHRIMP zircon U-Pb	278	3	(Zhang et al., 2010a)
62	NW Tarim (Piqiang)	Halajun granite pluton I	HL16	Granite	77.36	40.49	LA-ICP-MS zircon U-Pb	273	2	(Su et al., 2019)
63	NW Tarim (Piqiang)	Halajun granite pluton I	?	Granite	77.326	40.478	LA-ICP-MS zircon U-Pb	275.4	2.8	(Luo et al., 2010)
64	NW Tarim (Piqiang)	Halajun granite pluton I	T08-1	Granite	77.325	40.479	LA-ICP-MS zircon U-Pb	275.1	6.2	(Liu et al., 2013)
65	NW Tarim (Piqiang)	Halajun granite pluton II	HL1	Granite	77.152	40.272	LA-ICP-MS zircon U-Pb	268	1	(Su et al., 2019)
66	NW Tarim (Piqiang)	Halajun granite pluton II	08KT03	Granite	77.133	40.267	SHRIMP zircon U-Pb	278	3	(Zhang et al., 2010a)
67	NW Tarim (Piqiang)	Halajun granite pluton II	T13-2	Granite	77.166	40.263	LA-ICP-MS zircon U-Pb	276.5	1.6	(Liu et al., 2013)
68	NW Tarim (Piqiang)	Halajun granite pluton II	YT-HH-7	Granite	77.147	40.283	LA-ICP-MS zircon U-Pb	272.7	1.1	(Huang et al., 2012)
69	NW Tarim (Piqiang)	Halajun granite pluton II	T14-1	Granite	77.136	40.242	LA-ICP-MS zircon U-Pb	277	2.1	(Liu et al., 2013)
70	NW Tarim (Piqiang)	Halajun granite pluton III	2010HLJ III-1	Monzonitic granite	77.178	40.354	LA-ICP-MS zircon U-Pb	268.6	1.5	(Zhang and Zou, 2013)
71	NW Tarim (Piqiang)	Halajun granite pluton IV	2010HLJ IV-3	Monzonitic granite	77.147	40.371	LA-ICP-MS zircon U-Pb	268.8	1.7	(Zhang and Zou, 2013)
72	NW Tarim (Piqiang)	Halajun granite pluton V	2010HLJ V-2	Monzonitic granite	77.214	40.357	LA-ICP-MS zircon U-Pb	271	2.2	(Zhang and Zou, 2013)
73	NW Tarim (Piqiang)	Halajun granite pluton V	T10-1	Granite	77.211	40.355	LA-ICP-MS zircon U-Pb	272.6	4.6	(Liu et al., 2013)
74	NW Tarim (Piqiang)	Kezile granite pluton	09KZ05	Biotite granite	77.07	40.41	LA-ICP-MS zircon U-Pb	272.4	1.1	(Zhang and Zou, 2013)
75	NW Tarim (Piqiang)	Kezile granite pluton	HL9	Granite	77.081	40.412	LA-ICP-MS zircon U-Pb	275	1	(Su et al., 2019)
76	NW Tarim (Piqiang)	Guerlale granite pluton	09GL07	Biotite granite	77.105	40.532	LA-ICP-MS zircon U-Pb	276.7	0.9	(Zhang and Zou, 2013)

No.	Tectonic region	Geologic Unit	Sample No.	Sample lithology	Long.	Lati.	Dating Method	Age (Ma)	Error (Ma)	References
77	NW Tarim (Piqiang)	Bashisuogong plutonic complex	BSSG-SZ	Quartz syenite	76.55	40.09	LA-ICP-MS zircon U-Pb	275.5	2	(Ma et al., 2016)
78	NW Tarim (Piqiang)	Bashisuogong plutonic complex	BSSG-HC	Gabbro	76.552	40.09	LA-ICP-MS zircon U-Pb	276.4	1.1	(Ma et al., 2016)
79	NW Tarim (Piqiang)	Bashisuogong plutonic complex	BSSG-HL	Diabase	76.554	40.09	LA-ICP-MS zircon U-Pb	277.2	0.9	(Ma et al., 2016)
80	NW Tarim (Piqiang)	Bashisuogong plutonic complex	BSSG-JH	Alkaline granite	76.556	40.09	LA-ICP-MS zircon U-Pb	278.6	1.9	(Ma et al., 2016)
84	SW Tarim	SW Tarim flood basalt	QMG1106	Sandstones#	76.583	38.02	LA-ICP-MS zircon U-Pb	284	4	(Li et al., 2013)
85	SW Tarim	SW Tarim flood basalt	QMG1112	Sandstones#	76.583	38.02	LA-ICP-MS zircon U-Pb	278	9	(Li et al., 2013)
86	SW Tarim	SW Tarim flood basalt	Txn25-21	Basalt	76.75	37.84	K-Ar	289.6	5.6	(Li et al., 2008)
87	SW Tarim	SW Tarim flood basalt	Txn25-21	Basalt	76.75	37.84	40Ar/39Ar	290.1	3.5	(Yang et al., 2006b)
88	SW Tarim	SW Tarim flood basalt	?	Basalt	76.6976	37.5215	K-Ar	292.4	0.5	(Liu and Li, 1991)
89	SW Tarim	SW Tarim flood basalt	Y8-y-4	Basalt	76.6976	37.5215	LA-ICP-MS zircon U-Pb	298.3	2.8	(Shao et al., 2015)
90	SW Tarim	SW Tarim flood basalt	GD07-9	Basalt	76.6976	37.5215	K-Ar	277.35	3.83	(Pan et al., 2011)
91	SW Tarim	SW Tarim flood basalt	GD07-17	Basalt	76.6976	37.5215	K-Ar	291.5	3.91	(Pan et al., 2011)

Notes:

? — No sample number, because of the loss of original data;

— Sedimentary strata overlain or underlain the basalt;

REFERENCES CITED IN TABLE S2.

Chen, H.L., Yang, S.F., Dong, C.W., Jia, C.Z., Wei, G.Q., and Wang, Z.G., 1997, Confirmation of Permian basite zone in Tarim Basin and its tectonic significance: Geochimica, v. 26, p. 77-87.

Chen, M.M., Tian, W., Zhang, Z.L., Pan, W.Q., and Song, Y., 2010, Geochronology of the Permian basic-intermediate-acidic magma suite from Tarim, Northwest China and its geological implications: Acta Petrologica Sinica, v. 26, p. 559-572.

Cheng, Z.G., Zhang, Z.C., Hou, T., Santosh, M., Zhang, D.Y., and Ke, S., 2015, Petrogenesis of nephelinites from the Tarim Large Igneous Province, NW China: Implications for mantle source characteristics and plume-lithosphere interaction: Lithos, v. 220, p. 164-178.

Han, Y.G., Zhao, G.C., Cawood, P.A., Sun, M., Liu, Q., and Yao, J., 2019, Plume-modified collision orogeny: The Tarim–western Tianshan example in Central Asia: Geology, v.47, p.1001-1005.

Li, H.Y., Huang, X.L., Li, W.X., Cao, J., He, P.L., and Xu, Y.G., 2013, Age and geochemistry of the Early Permian basalts from Qimugan in the southwestern Tarim basin: Acta Petrologica Sinica, v. 29, p. 3353-3368, https://doi.org/1000-0569/2013/029(10)-3353-68.

Li, Y., Su, W., Kong, P., Qian, Y.X., Zhang, K.Y., Zhang, M.L., Chen, Y., Cai, X.Y., and You, D.H., 2007, Zircon U-Pb ages of the early Permian magmatic rocks in the Tazhong-Bachu region, Tarim basin by LA-ICP-MS: Acta Petrologica Sinica, v. 23, p. 1097-1107.

Li, Z.L., Shufeng, Yang, S.F., Chen, H.L., Langmuir, C.H., Yu, X., Lin, X.B., and Li, Y.Q., 2008, Chronology and geochemistry of Taxinan basalts from the Tarim basin: evidence for Permian plume magmatism: Acta Petrologica Sinica, v. 24, p. 959-970, https://doi.org/1000-0569/2008/024(05)-0595-70.

Li, Z.L., Chen, H.L., Song, B., Li, Y.Q., Yang, S.F., and Yu, X., 2011, Temporal evolution of the Permian large igneous province in Tarim Basin in northwestern China: Journal of Asian Earth Sciences, v. 42, p. 917-927. Lin, L., Qian, Q., Wang, Y.L., Gao, J., Jiang, T., and Liu, X., 2015, Gabbroic pluton in the Dahalajunshan formation volcanic rocks from northern Zhaosu, western Tianshan: age, geochemistry and geological implications: Acta Petrologica Sinica, v. 31, p. 1749-1760.

Liu, B., Chen, Z.L., Ren, R., Han, B.F., and Su, L., 2013, Timing of the South Tianshan suture zone: New evidence of zircon ages from the granitic plutons in Kokshal area: Geological Bulletin of China, v. 32, p. 1371-1384.

Liu, H.Q., Xu, Y.G., Tian, W., Zhong, Y.T., Mundil, R., Li, X.H., Yang, Y.H., Luo, Z.Y., and Shangguan, S.M., 2014, Origin of two types of rhyolites in the Tarim Large Igneous Province: Consequences of incubation and melting of a mantle plume: Lithos, v. 204, p. 59-72.

Liu, J.Q., Li, W.M., 1991, Petrological characteristics and ages of basalt in north Tarim, *in* Jia, R.X., ed., Research of petroleum Geology of Northern Tarim Basin in China: Stratigraphy and sedimentary (I), Beijing, Chinese University of Geoscience Press, p. 194-201.

Liu, Y.L., Hu, X.F., Huang, Z.B., Wu, G.Y., Zheng, D.M., Shen, Y.M., Zhao, Y., and Li, Y.J., 2012, 40Ar-39Ar geochronology and geochemistry of the volcanic rocks from the west segment of Tabei uplift, Tarim Basin: Acta Petrologica Sinica, v. 28, p. 2423-2434.

Ma, Y., Zhang, Z.C., Huang, H., Santosh, M., and Cheng, Z.G., 2016, Petrogenesis of the Bashisuogong bimodal igneous complex in southwest Tianshan Mountains, China: Implications for the Tarim Large Igneous Province: Lithos, v. 264, p. 509-523.

Pan, J.W., Li, H.B., Sun, Z.M., Si, J.L., Pei, J.L., and Zhang, L.J., et al., 2011, Geochemistry and possible age of Gudongshan volcanic rocks, Tarim Basin: Geology In China, v. 38, p. 829-837.

Shangguan, S.M., Peate, I.U., Tian, W., and Xu, Y.G., 2016, Re-evaluating the geochronology of the Permian Tarim magmatic province: implications for temporal evolution of magmatism: Journal of the Geological Society, v. 173, p. 228-239.

Shao, T.Q., Zhu, Y.F., Jin, L.Y., Zhu, Z.X., Li, P., and Liu X., 2015, Zircon U-Pb dating and geochemical of basalts in Qipan Country of Northwest Tarim Basin: Chinese Journal of Geology, v. 50, p. 1120-1133.

Song, W.L., Xu, C., Chakhmouradian, A.R., Kynicky, J., Huang, K.J., and Zhang, Z.L., 2017, Carbonatites of Tarim (NW China): First evidence of crustal contribution in carbonatites from a large igneous province: Lithos, v. 282-283, p. 1-9.

Su, Y.P., Zheng, J.P., Liang, L.L., Dai, H.K., Zhao, J.H., Chen, M., Ping, X.Q., Liu, Z.Q., and Wang, J., 2019, Derivation of A1-type granites by partial melting of newly underplated rocks related with the Tarim mantle plume: Geological Magazine, p. in press.

Sun, L.H., Wang, Y.J., Fan, W.M., and Zi, J.W., 2008, A further discussion of the petrogenesis and tectonic implication of the Mazhashan syenites in the Bachu area: Journal of Jilin University (Earth Science Edition), v. 38, p. 8-20.

Tian, W., Campbell, I.H., Allen, C.M., Guan, P., Pan, W., Chen, M., Yu, H., and Zhu, W., 2010, The Tarim picrite-basalt-rhyolite suite, a Permian flood basalt from northwest China with contrasting rhyolites produced by fractional crystallization and anatexis: Contributions to Mineralogy and Petrology, v. 160, p. 407-425.

Tian, W., Wang, L., Pan, L., and Gong, M.Y., 2018, A giant felsic pyroclastic flow eruption in the Tarim Flood Basalt Province: Acta Petrologica Sinica, v. 34, p. 63-74.

Wei, X., Xu, Y.-G., Feng, Y.-X., and Zhao, J.-X., 2014, Plume-lithosphere interaction in the generation of the Tarim large igneous province, NW China: Geochronological and geochemical constraints: American Journal of Science, v. 314, p. 314-356.

Wei, X., and Xu, Y.G., 2011, Petrogenesis of Xiaohaizi syenite complex from Bachu area, Tarim: Acta Petrologica Sinica, v. 27, p. 2984-3004.

Yang, S.F., Li, Z.L., Chen, H.L., Xiao, W.J., Yu, X., Lin, X.B., and Shi, X.G., 2006a, Discovery of a Permian quartz syenitic porphyritic dyke from the Tarim basin and its tectonic implications: Acta Petrologica Sinica, v. 22, p. 1405-1412.

Yang, S.F., Li, Z.L., Chen, H.L., Chen, W., and Yu, X., 2006b, ^{40}Ar-^{39}Ar dating of basalts from Tarim Basin, NW China and its implication to a Permian thermal tectonic event: Journal of Zhejiang University-Science A, v. 7, p. 320-324.

Yu, J.C., Mo, X.X., Dong, G.C., Yu, X.H., Xing, F.C., Li, Y., and Huang, X.K., 2011a, Felsic volcanic rocks from northern Tarim, NW China: Zircon U-Pb dating and geochemical characteristics: Acta Petrologica Sinica, v. 27, p. 2184-2194.

Yu, X., Yang, S.F., Chen, H.L., Chen, Z.Q., Li, Z.L., Batt, G.E., and Li, Y.Q., 2011b, Permian flood basalts from the Tarim Basin, Northwest China: SHRIMP zircon U-Pb dating and geochemical characteristics: Gondwana Research, v. 20, p. 485-497.

Zhang, C.L., Li, X.H., Li, Z.X., Ye, H.M., and Li, C.N., 2008, A Permian layered intrusive complex in the western Tarim Block, northwestern China: Product of a ca. 275-Ma mantle plume?: The Journal of Geology, v. 116, p. 269-287.

Zhang, C.L., Xu, Y.G., Li, Z.X., Wang, H.Y., and Ye, H.M., 2010a, Diverse Permian magmatism in the Tarim Block, NW China: Genetically linked to the Permian Tarim mantle plume?: Lithos, v. 119, p. 537-552.

Zhang, Y.T., Liu, J.Q., and Guo, Z.F., 2010b, Permian basaltic rocks in the Tarim basin, NW China: Implications for plume-lithosphere interaction: Gondwana Research, v. 18, p. 596-610.

Zhang, C.L., and Zou, H.B., 2013, Permian A-type granites in Tarim and western part of Central Asian Orogenic Belt (CAOB): genetically related to a common Permian mantle plume?: Lithos, v. 172-173, p. 47-60.

Zhang, D.Y., Zhou, T.F., Yuan, F., Jowitt, S.M., Fan, Y., and Liu, S., 2012a, Source, evolution and emplacement of Permian Tarim Basalts: Evidence from U-Pb dating, Sr-Nd-Pb-Hf isotope systematics and whole rock geochemistry of basalts from the Keping area, Xinjiang Uygur Autonomous region, northwest China: Journal of Asian Earth Sciences, v. 49, p. 175-190.

Zhang, D.Y., Zhang, Z.C., Mao, J.W., Huang, H., and Cheng, Z.G., 2016a, Zircon U-Pb ages and Hf-O isotopic signatures of the Wajilitag and Puchang Fe-Ti oxide-bearing intrusive complexes: Constraints on their source characteristics and temporal-spatial evolution of the Tarim large igneous province: Gondwana Research, v. 37, p. 71-85.

Zhang, D.Y., Zhang, Z.C., Santosh, M., Cheng, Z., He, H., and Kang, J., 2013, Perovskite and baddeleyite from kimberlitic intrusions in the Tarim large igneous province signal the onset of an end-Carboniferous mantle plume: Earth and Planetary Science Letters, v. 361, p. 238-248.

Zhou, L.X., Hu, S.L., Wang, L.G., Li, Y.J., Huang, Z.B., Zhu, H.Y., Zhao, Y., and Liu, Y.L., 2010, The age of Piqiang gabbroid, NW margin of Tarim Basin, NW China: Chinese Journal of Geology, v. 45, p. 1057-1065. Zhu, Y.F., Chen, J., Xue, Y.X., Feng, W.Y., and Jiang, J.Y., 2018, Spinel and orthopyroxene exsolved from clinopyroxene in the Haladala pluton in the middle Tianshan (Xinjiang, China): Mineralogy and Petrology, v. 112, p. 465-479.

Zou, S.Y., Li, Z.L., Song, B., Ernst, R.E., Li, Y.Q., Ren, Z.Y., Yang, S.F., Chen, H.L., Xu, Y.G., and Song, X.Y., 2015, Zircon U-Pb dating, geochemistry and Sr-Nd-Pb-Hf isotopes of the Wajilitag alkali mafic dikes, and associated diorite and syenitic rocks: Implications for magmatic evolution of the Tarim large igneous province: Lithos, v. 212, p. 428-442.

Table S3. Compilation of elements data for aged magmatic rocks within the Tarim Basin

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^t$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
1	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-2	Rhyolite	(Liu et al., 2014)	78.6	0.22	10.2	2.48	0.01	0.16	0.07	0.68	5.73	0.01	1.32	514	22.2	37.3	5.6	154	10.5	1199	31.5	21.9	276	387	8.2	1.2	18.7805	0.5580	17.6712	0.5144
2	1	Volcanic rocks	287	Estimated**	81.33	40.78	257	SL1-6	Rhyolite	(Tian et al., 2010)	70.9	0.22	13.4	2.62	0.02	0.18	2.22	1.92	4.78	0.01	3.5	143	41	15.7	3.1	86.2	5.01	496	13.6	8.82	77.8	188	5.05	0.71	17.0693	1.1080	21.3152	0.8359
3	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-1	Rhyolite	(Tian et al., 2010)	77.29	0.21	10.58	3.79	0.02	0.04	0.44	2.49	3.96	0	0.92	159	15.7	31.1	4.94	129	7.93	891	24.6	18	101	173	6.45	0.83	20.0000	1.2772	9.6111	0.7801
4	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-2	Rhyolite	(Tian et al., 2010)	79.37	0.22	10.28	2.29	0.17	0.13	0.17	0.43	4.7	0	2.02	169	20.3	34.6	5.19	116	7.99	962	25.5	15.8	114	212	6.52	0.86	17.7914	1.0175	13.4177	0.6260
5	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-1	Volcanic rock	(Liu et al., 2012)	76.96	0.19	10.37	3.26	0.01	0.07	0.34	2.11	5.44	0.01	0.64	351	26.8	45.6	13	163	12.6	1402	38.1		172	310	8.8	1.23	18.5227	0.9477		0.6238
6	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-2	Volcanic rock	(Liu et al., 2012)	76.76	0.19	10.59	3.46	0.01	0.04	0.41	2.73	4.65	0.01	0.86	271	40.7	39.2	16.1	158	12.1	1392	37.2		160	296	8.29	1.19	19.0591	0.9875		0.6762
7	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-3	Volcanic rock	(Liu et al., 2012)	76.42	0.21	10.65	3.83	0.01	0.08	0.09	2.56	4.87	0.01	0.72	285	27.7	46.3	9.6	174	13.3	1444	39.2		176	331	9.56	1.38	18.2008	0.9886		0.6533
8	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-4	Volcanic rock	(Liu et al., 2012)	73.37	0.21	10.46	6.67	0.02	0.21	0.11	2.01	4.96	0.01	1.46	292	36.1	42.9	5.75	215	12.2	1379	37.8		148	272	9.03	1.31	23.8095	1.4527		0.9145
9	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-5	Volcanic rock	(Liu et al., 2012)	76.67	0.21	10.81	2.65	0.01	0.12	0.09	2.71	4.99	0.01	1.12	278	33.6	49.6	8.69	155	13.4	1417	38.7		185	335	10	1.46	15.5000	0.8378		0.5484
10	1	Volcanic rocks	282.9	(Tian et al., 2010)	82.17	41.28	344	YM16-6	Volcanic rock	(Liu et al., 2012)	75.3	0.21	10.4	4.78	0.05	0.29	0.13	2.4	4.54	0.01	1.32	242	35.5	50.8	8.97	151	13.6	1484	40.1		188	328	10.5	1.56	14.3810	0.8032		0.5237
11	1	Volcanic rocks	287.2	(Shangguan et al., 2016)	83.35	41.33	437	HA1	Rhyolite	(Liu et al., 2014)	71.79	0.47	14.06	2.46	0.04	0.11	1.15	3.46	5.23	0.13	0.58	158	144	16.2	2.9	41.8	2.9	458	11.3	21.9	91.3	183	3	0.5	13.9333	0.4578	8.3562	0.3684
12	1	Volcanic rocks	277.3	(Tian et al., 2010)	81.30	41.23	279	NK1-3	Rhyolite	(Liu et al., 2014)	76.72	0.36	11.92	0.94		0.13	0.38	1.89	5.97	0.08	1.12	184	73.9	20.7	3	26.4	1.8	433	10.2	23.8	78	157	4.9	0.7	5.3878	0.3385	6.5966	0.2227
13	1	Volcanic rocks	287.2	(Shangguan et al., 2016)	83.35	41.33	437	HA2-1	Dacite	(Liu et al., 2014)	66.34	0.63	14.96	4.88	0.1	0.41	2.25	3.83	4.97	0.19	0.92	135	154	14.2	2.9	45.4	2.7	633	14.7	22.8	83.3	168	5.6	0.9	8.1071	0.5450	7.3684	0.4474
14	1	Volcanic rocks	287.2	(Shangguan et al., 2016)	83.35	41.33	437	HA2-2	Dacite	(Liu et al., 2014)	65.78	0.6	14.67	5.33	0.12	0.37	2.46	3.51	5.02	0.18	1.45	140	212	14	3	45.2	2.7	591	14.1	23.9	80.6	162	5.4	0.8	8.3704	0.5608	6.7782	0.4560
15	1	Volcanic rocks	287.2	(Shangguan et al., 2016)	83.86	40.87	463	YX1	Dacite	(Liu et al., 2014)	68.15	0.63	14.04	4.5	0.08	0.42	2.17	3.07	5.12	0.19	1.13	213	139	23.1	5.5	29.2	2.1	467	11.6	35.4	84	168	5.2	0.8	5.6154	0.3476	4.7458	0.2247
16	1	Volcanic rocks	287.2	(Shangguan et al., 2016)	83.86	40.87	463	YX2	Dacite	(Liu et al., 2014)	67.09	0.7	13.91	5.43	0.09	0.56	2.19	2.91	4.89	0.21	1.52	199	136	21.6	5.4	30.5	2.1	518	12.4	32.4	78.1	158	5.1	0.8	5.9804	0.3905	4.8765	0.2517
17	1	Volcanic rocks	287.2	(Shangguan et al., 2016)	81.48	40.85	271	SX1	Dacite	(Liu et al., 2014)	63.77	0.91	16.59	5.55	0.04	0.41	0.94	4.7	4.96	0.27	1.35	95.5	232	9.7	1.5	53.5	3.6	451	10.1	13.5	70.4	143	2.6	0.4	20.5769	0.7599	10.5926	0.6939
18	1	Volcanic rocks	287	Estimated*	81.58	40.87	280	MN1	Rhyolite	(Liu et al., 2014)	74.62	0.21	12.55	1.66	0.01	0.22	0.74	0.63	8.03	0.01	0.8	162	33.8	11.1	2.4	70.7	5.1	647	15.1	8.2	143	255	5.6	0.8	12.6250	0.4944	31.0976	0.6014
19	1	Volcanic rocks	271.7	(Tian et al., 2010)	81.58	40.87	280	MN1-1	Rhyolite	(Tian et al., 2010)	75.52	0.43	12.4	0.68	0.02	0.01	0.6	1.99	6.98	0.03	1.12	366	34	11	2.6	81.2	5.2	665	17	6.49	90.1	164	4.98	0.7	16.3052	0.9012	25.2696	0.8742
20	1	Volcanic rocks	271.7	(Tian et al., 2010)	81.58	40.87	280	MN1-2	Rhyolite	(Tian et al., 2010)	76.61	0.36	12.17	0.5	0.02	0.01	0.45	1.84	6.7	0.04	1.09	367	29.4	12.6	3.11	81.4	5.3	584	15	6.14	99.4	188	5.02	0.73	16.2151	0.8189	30.6189	0.7796
21	1	Volcanic rocks	277.3	(Tian et al., 2010)	81.30	41.23	279	NK1-2	Rhyolite	(Tian et al., 2010)	70.48	0.39	15.46	1.98	0.01	0.07	0.49	2.39	5.8	0.06	2.57	328	111	14.8	2.09	24.9	1.66	492	12.8	18.6	51.9	97.7	5.22	0.86	4.7701	0.4798	5.2527	0.3045
22	1	Volcanic rocks	290.9	(Tian et al., 2010)	81.80	41.35	321	YM30-1	Rhyolite	(Tian et al., 2010)	75.26	0.63	10.59	3.45	0.03	1.05	1.96	3.48	1.24	0.09	1.97	57.2	698	10.9	2.21	26.7	1.58	263	6.96	14	45.5	86.7	2.87	0.44	9.3031	0.5868	6.1929	0.4063
23	1	Volcanic rocks	290.9	(Tian et al., 2010)	81.80	41.35	321	YM30-2	Rhyolite	(Tian et al., 2010)	74.23	0.69	10.67	3.78	0.04	1.14	2.08	3.47	1.48	0.11	2.05	61.2	691	16.2	3.12	29.4	1.91	314	8.74	10.3	50.4	103	3.74	0.56	7.8610	0.5833	10.0000	0.3487
24	1	Volcanic rocks	286.6	(Tian et al., 2010)	81.87	41.12	313	YM5-8	Dacite	(Tian et al., 2010)	64.98	0.69	14.22	6	0.2	0.57	0.59	4.1	4.1	0.09	4.27	70	25.4	11.9	2.27	85.2	5.37	500	11.6	9.05	73.5	149	3.24	0.47	26.2963	1.1592	16.4641	0.9764
25	1	Volcanic rocks	287	Estimated*	81.33	41.30	285	YT8-1	Rhyolite	(Tian et al., 2010)	74.39	0.36	13.42	1.28	0.01	0.12	0.77	2.44	4.73	0.06	2.17	124	72.2	15.8	2.74	20.9	1.3	320	8.94	18.5	38.1	64.6	2.31	0.33	9.0476	0.5486	3.4919	0.2887
26	1	Volcanic rocks	287	Estimated*	81.33	41.30	285	YT8-2	Rhyolite	(Tian et al., 2010)	75.19	0.35	13.07	1.55	0.02	0.14	0.68	2.34	4.73	0.06	1.64	124	64.7	15.2	2.63	20.6	1.3	298	8.48	16.6	33	57.6	3.15	0.44	6.5397	0.6242	3.4699	0.3117
27	1	Volcanic rocks	276.6	(Yu et al., 2011a)	84.32	40.76	498	S114	Dacite	(Yu et al., 2011a)	67.19	0.66	13.66	6.3	0.06	0.8	2.12	3.38	4.87	0.2	0.88	146	125	17.6	4.76	32.8	1.98	482	11.7	68.6	50.1	102	4.21	0.64	7.7910	0.6547	1.4869	0.3744
28	1	Volcanic rocks	273.1	(Yu et al., 2011a)	83.85	40.96	464	S99	Dacite	(Yu et al., 2011a)	66.42	0.5	14.71	6.11	0.06	1.26	1.54	3.64	4.43	0.16	1.44	93.4	95.3	13.4	3.64	42.2	2.53	537	13.4	30.5	42.4	92.7	5	0.75	8.4400	0.9953	3.0393	0.6000
29	1	Volcanic rocks	279.8	(Yu et al., 2011a)	84.04	40.64	472	S79-3	Dacite	(Yu et al., 2011a)	68.21	0.6	13.62	5.62	0.05	1.18	1.64	3.3	4.63	0.18	1.02	151	129	17.8	4.39	32.1	2	431	10.8	69.7	59.7	115	3.99	0.58	8.0451	0.5377	1.6499	0.3337
30	1	Volcanic rocks	281.8	(Yu et al., 2011a)	83.76	40.74	451	S102-1	Dacite	(Yu et al., 2011a)	67.37	0.61	13.56	7.02	0.1	1.09	1.72	3.17	3.99	0.19	1.52	102	96.9	16.7	3.97	31.7	2.02	460	11.5	100	47.5	99.5	4.67	0.69	6.7880	0.6674	0.9950	0.3815
31	1	Volcanic rocks	287	Estimated*	81.98	41.45	340	DH12-1	Dolerite	(Tian et al., 2010)	40.61	2.74	12.71	13.1	0.14	11.26	6.05	2.4	1.56	0.39	8.74	38	392	3.83	0.95	39.4	2.29	183	4.66	2.94	29.3	59.9	1.78	0.26	22.1348	1.3447	20.3741	1.2606
32	1	Volcanic rocks	287	Estimated*	81.98	41.45	340	DH12-2	Dolerite	(Tian et al., 2010)	41.42	2.37	11.19	14.5	0.08	8.16	9.46	2.39	2.11	0.39	7.65	31.5	502	3.12	1.06	36.7	2.05	165	4.34	3.43	29.9	62.2	1.58	0.24	23.2278	1.2274	18.1341	1.2878
33	1	Volcanic rocks	287	Estimated*	81.33	40.78	257	SL1-2	Basalt	(Tian et al., 2010)	50.09	1.94	14.29	10.71	0.11	3.56	8.71	2.31	1.29	0.34	6.4	18.6	420	3.51	0.8	37.9	2.11	233	5.83	5.21	30.1	65.2	2.24	0.31	16.9196	1.2591	12.5144	1.2497
34	1	Volcanic rocks	287	Estimated*	81.33	40.78	257	SL1-3	Basalt	(Tian et al., 2010)	45.28	2.13	14.29	11.36	0.25	4.78	10.11	3.51	0.46	0.33	7.26	5.37	389	2.56	0.55	28.2	1.51	180	4.42	5.26	25.2	54.5	1.84	0.26	15.3261	1.1190	10.3612	1.1899
35	1	Volcanic rocks	287	Estimated*	81.33	40.78	257	SL1-4	Basalt	(Tian et al., 2010)	47.96	2.45	14.31	10.93	0.18	7.44	9.46	2.53	1.39	0.36	2.68	21.9	487	3.29	0.59	27.9	1.47	162	3.93	3.73	28.8	58.1	1.31	0.18	21.2977	0.9688	15.5764	0.9714
36	1	Volcanic rocks	287	Estimated*	83.20	41.67	440	YH5-1	Picrite	(Tian et al., 2010)	43.09	2.28	10.32	12.44	0.08	14.46	6.28	1.23	1.31	0.51	7.68	16.2	697	5.07	1.03	40.1	2.52	192	4.32	2.79	41.9	84.4	1.45	0.18	27.6552	0.9570	30.2509	0.9325
37	1	Volcanic rocks	287	Estimated*	82.17	41.02	332	YM201-1	Dolerite	(Tian et al., 2010)	47.51	2.88	13.12	12.6	0.16	5.71	10.66	2.08	1.19	0.4	3.43	13.8	300	3.81	0.8	34.9	1.91	205	5.04	4.45	31.1	72.9	1.68	0.21	20.7738	1.1222	16.3820	1.0866
38	1	Volcanic rocks	286.6	(Tian et al., 2010)	81.87	41.12	313	YM5-1	Basalt	(Tian et al., 2010)	48.11	2.46	10.24	11.36	0.19	8.25	9.97	2.06	0.64	0.26	6.19	19.5	360	3.58	0.78	26.6	1.48	176	4.36	2.57	29.1	63.1	1.54	0.2	17.2727	0.9141	24.5525	0.8833
39	1	Volcanic rocks	286.6	(Tian et al., 2010)	81.87	41.12	313	YM5-4	Basalt	(Tian et al., 2010)	48.26	2.89	12.8	13.56	0.21	8.95	8.43	2.61	0.38	0.33	1.34	10.3	355	4.59	1.03	31.6	1.84	203	4.85	3.07	34.1	72.7	1.61	0.22	19.6273	0.9267	23.6808	0.8561
40	1	Volcanic rocks	286.6	(Tian et al., 2010)	81.87	41.12	313	YM5-5	Basalt	(Tian et al., 2010)	44.44	2.62	11.67	11.51	0.25	7.53	10.05	2.22	1.08	0.3	8.03	32	563	3.54	0.81	30.9	1.81	200	4.79	3.05	34	70.5	1.65	0.22	18.7273	0.9088	23.1148	0.9546
41	1	Volcanic rocks	286.6	(Tian et al., 2010)	81.87	41.12	313	YM5-6	Basalt	(Tian et al., 2010)	43.77	2.81	11.81	11.76	0.21	6.23	9.96	2.72	0.97	0.33	9.16	25.4	410	3.59	1.02	31.5	1.97	206	5.61	2.95	33.2	71.9	1.85	0.24	17.0270	0.9488	24.3729	0.9779
42	1	Volcanic rocks	286.6	(Tian et al., 2010)	81.87	41.12	313	YM5-9	Basalt	(Tian et al., 2010)	45	2.54	11.59	12.41	0.19	8.29	8.88	2.1	0.27	0.28	8.22	7.52	316	3.82	0.78	28.9	1.57	185	4.54	2.96	31.7	67.1	1.57	0.23	18.4076	0.9117	22.6689	0.8901
43	1	Volcanic rocks	287	Estimated*	81.78	41.32	318	YM8-4	Basalt	(Tian et al., 2010)	46.19	2.93	13.36	11.88	0.32	7.63	10.96	2.1	0.82	0.37	3.19	12.4	328	3.41	0.53	26.5	1.52	140	4.2	1.61	23.4	48.2	1.34	0.19	19.7761	1.1325	29.9379	1.0054
44	1	Volcanic rocks	287	Estimated*	81.98	41.38	336	YT6-1	Basalt	(Tian et al., 2010)	46.08	3.05	14.73	13.42	0.2	5.8	9.08	2.5	1.62	0.4	2.86	26.3	435	4.3	0.96	28.6	1.65	168	4.99	3.42	27.8	55.5	1.77	0.23	16.1582	1.0288	16.2281	0.8866
45	1	Volcanic rocks	287	Estimated*	81.98	41.38	336	YT6-2	Basalt	(Tian et al., 2010)	48.19	2.87	13.44	12.39	0.15	4.49	6.43	5.09	1.76	0.39	4.59	22.8	236	4.07	0.45	28.4	1.7	167	4.75	3.1	25.3	52.2	1.69	0.22	16.8047	1.1225	16.8387	0.9485
46	1	Volcanic rocks	267.4	(Liu et al., 2012)	81.98	41.38	336	YT6-1	Volcanic rock	(Liu et al., 2012)	49.72	2.62	12.89	12.13	0.21	5.46	7.96	2.77	1.49	0.4	3.82	32.5	491	4.92	1.25	33.1	2.26	220	6.09		36.3	72.7	2.07	0.32	15.9903	0.9118		0.8394
47	1	Volcanic rocks	267.4	(Liu et al., 2012)	81.98	41.38	336	YT6-2	Volcanic rock	(Liu et al., 2012)	47.29	2.64	13.28	12.64	0.18	5.71	6.01	5.32	1.72	0.42	4.27	25.7	237	4.93	0.38	33.3	2.29	222	6.22		38.1	74.2	2.25	0.33	14.8000	0.8740		0.8235
48	1	Volcanic rocks	267.4	(Liu et al., 2012)	81.98	41.38	336	YT6-3	Volcanic rock	(Liu et al., 2012)	47.52	2.96	12.86	13.48	0.17	6.41	5.54	4.69	1.95	0.45	3.34	36.1	485	5.49	0.85	36.8	2.55	246	6.94		40.8	81.1	2.48	0.36	14.8387	0.9020		0.8334
49	1	Volcanic rocks	287	Estimated*	81.44	41.00	275	YD-1	Volcanic rock	(Liu et al., 2012)	44.66	2.82	11.18	18.16	0.1	4.52	6.8	0.99	1.11	0.52	9.07	21.3	174	2.4	0.74	21.4	1.46	170	4.83		21.9	47.6	2.97	0.44	7.2054	0.9772		1.0004
50	1	Volcanic rocks	287	Estimated*	81.44	41.00	275	YD-2	Volcanic rock	(Liu et al., 2012)	47.04	3.36	13.06	15.61	0.09	3.08	6.97	1.76	1.13	0.63	7.35	17.9	263	2.91	0.82	25.2	1.73	198	5.72		25	52.7	3.04	0.45	8.2895	1.0080		1.0013
51	1	Volcanic rocks	286.6	(Tian et al., 2010)	82.06	41.33	339	S99-1	Basaltic rock	(Zhang et al., 2010b)	41.92	3.81	13.82	18.08	0.2	5.72	6.82	3.95	0.64	1.25	4.57	7.59	232	4.26	0.91	30.2	1.98	312	7.63	6.68	42.5	90.3	3.75	0.57	8.0533	0.7106	13.5180	0.7607
52	1	Volcanic rocks	286.6	(Tian et al., 2010)	82.06	41.33	339	S99-5	Basaltic rock	(Zhang et al., 2010b)	42.01	4.59	15.39	18.63	0.3	3.25	9.02	3.12	0.89	1.38	2.16	8.35	411	4.21	0.94	33.2	2.1	355	8.04	5.96	45.8	97.2	4.1	0.62	8.0976	0.7249	16.3087	0.8103
53	1	Volcanic rocks	287	Estimated*	81.67	41.37	313	YT1-1	Picrite	(Tian et al., 2010)	42.23	1.86	7.59	13.55	0.17	16.77	8.4	0.99	0.52	0.21	7.37	10.6	162	2.21	0.46	16.1	1.02	99.5	2.92	1.48	14.5	29.5	1.05	0.15	15.3333	1.1103	19.9324	0.9639
54	1	Volcanic rocks	287	Estimated*	81.67	41.37	313	YT1-2	Picrite	(Tian et al., 2010)	41.5	1.84	7.53	13.89	0.17	16.3	8.8	1.04	0.66	0.19	7.75	10.7	173	2.02	0.45	15.8	1.03	98.8	2.99	1.8	14.3	29.4	1.14	0.15	13.8596	1.1049	16.3333	0.9963
55	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT01	Basalt	(Zhang et al., 2010a)	44.48	4.02	14	17	0.2	7.83	5.73	3.45	1.3	0.97	0.43	23.6	352	3.61	0.82	26.1	1.86	289	7.61		35	81	3.63	0.6	7.1901	0.7457		0.7870
56	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT02	Basalt	(Zhang et al., 2010a)	44.45	4.02	14.03	17.01	0.2	7.98	5.73	2.9	1.42	1.01	0.75	23.4	328	3.58	0.78	25.3	1.7	276	6.48		35.1	80	3.31	0.56	7.6435	0.7208		0.7649
57	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT04	Basalt	(Zhang et al., 2010a)	44.1	4	14.23	17.04	0.2	7.93	5.85	3.19	1.34	0.95	0.67	23	420	3.38	0.81	25	1.8	282	7.04		35	80.9	3.57	0.6	7.0028	0.7143		0.7790
58	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT05	Basalt	(Zhang et al., 2010a)	44.35	3.98	14.16	16.96	0.2	7.92	5.84	3.12	1.39	0.95	0.7	24.4	352	3.55	0.8	25.9	1.81	286	6.84		35.8	82.4	3.5	0.55	7.4000	0.7235		0.7787
60	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT07	Basalt	(Zhang et al., 2010a)	44.31	3.95	14.28	16.94	0.19	7.82	5.9	3.16	1.34	0.94	0.74	22.2	334	3.34	0.74	24.9	1.64	262	6.33		33.5	76.2	3.18	0.51	7.8302	0.7433		0.7978
61	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT08	Basalt	(Zhang et al., 2010a)	47.31	4.07	13.02	16.23	0.2	7.99	4.45	3.12	1.45	0.99	0.79	15.8	310	5.08	1.03	24	1.59	293	7.27		39.4	88.9	3.64	0.57	6.5934	0.6091		0.5749
62	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT09	Basalt	(Zhang et al., 2010a)	47.17	4.02	13.08	16.24	0.21	8.05	4.68	3.05	1.54	0.95	0.61	23.6	484	3.02	0.73	24.9	1.66	280	6.13		35.7	77.3	3.48	0.53	7.1552	0.6975		0.8128
63	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT10	Basalt	(Zhang et al., 2010a)	45.12	3.74	14.24	15.53	0.18	8.43	6.19	2.91	1.26	0.73	1.22	23.8	298	3.31	0.78	22	1.51	239	6.13		29.7	68.4	3.38	0.54	6.5089	0.7407		0.7520
64	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT11	Basalt	(Zhang et al., 2010a)	44.69	3.72	14.47	15.56	0.18	8.45	5.64	2.92	1.23	0.71	1.99	23.4	303	3.18	0.77	22.1	1.52	241	5.81		28.9	66.4	3.18	0.52	6.9497	0.7647		0.7813

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^T$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
65	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.72	40.73	141	08KT12	Basalt	(Zhang et al., 2010a)	44.38	3.99	14.17	17.05	0.19	7.91	5.81	3.16	1.36	0.95	0.62	24.3	355	3.36	0.77	25.7	1.75	283	7		34.7	79.5	3.61	0.58	7.1191	0.7406		0.8067
66	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.72	40.73	141	08KT13	Basalt	(Zhang et al., 2010a)	49.32	3.41	11.22	17.14	0.18	6.12	3.67	3.87	0.97	0.62	3.15	17.8	191	5.27	1.37	24.5	1.7	243	6.18		32	73.6	3.08	0.51	7.9545	0.7656		0.6394
67	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.72	40.73	141	08KT14	Basalt	(Zhang et al., 2010a)	51.24	3.25	10.59	17.44	0.16	5.26	3.35	4.22	1.04	0.56	2.6	16.5	164	5.12	1.56	23.5	1.67	224	5.85		31.9	69.2	2.87	0.47	8.1882	0.7367		0.6232
68	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.72	40.73	141	08KT15	Basalt	(Zhang et al., 2010a)	50.37	3.55	11.91	18.15	0.13	4	3.72	4.39	0.71	0.62	2.17	12.9	183	5.15	1.45	25	1.72	249	6.14		29.9	69.2	3.05	0.49	8.1967	0.8361		0.6828
69	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQI-02	Basalt	(Zhou et al., 2009)	44.44	3.57	14.9	15.85	0.18	6.29	7.89	3.06	1.26	0.87	1.69	29.9	522	3.16	0.84	28.6	1.41	291	6.33	5.46	36.1	70	2.9	0.48	9.8621	0.7922	12.8205	0.9075
70	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQI-05	Basalt	(Zhou et al., 2009)	43.82	3.93	14.29	16.37	0.19	5.43	7.99	3.22	1.49	0.97	2.22	33.2	443	3.69	0.94	36.5	1.72	321	7.67	6.65	41.2	82	3.65	0.61	10.0000	0.8859	12.3308	1.0033
71	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ2-01	Basalt	(Zhou et al., 2009)	44.32	3.89	14.74	16.36	0.19	5.42	8.08	2.94	1.51	0.98	1.47	22.7	493	3.41	0.99	31.4	1.48	285	6.82	8.82	38.6	75	3.45	0.53	9.1014	0.8135	8.5034	0.9276
72	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ2-06	Basalt	(Zhou et al., 2009)	44.11	3.8	14.73	16.14	0.19	5.61	7.88	2.66	1.8	0.97	1.68	23.7	848	3.38	0.87	29.3	1.53	266	6.7	6.63	37.9	71	3.64	0.6	8.0495	0.7731	10.7089	0.8774
73	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ3-3	Basalt	(Zhou et al., 2009)	45.12	3.8	15.03	14.96	0.2	5.83	8.53	2.72	1.22	0.96	1.34	28.5	480	2.95	0.85	29.3	1.5	296	6.51	5.56	37.8	69	3.47	0.55	8.4438	0.7751	12.4101	0.9404
74	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ3-8	Basalt	(Zhou et al., 2009)	44.8	3.74	15.03	15.14	0.2	6.39	8.34	2.87	1.19	0.94	1.37	25.9	529	2.97	0.76	30.2	1.51	284	6.49	6.7	35.2	67	3.57	0.56	8.4594	0.8580	10.0000	1.0010
75	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ3-10	Basalt	(Zhou et al., 2009)	45.03	3.46	15.72	14.26	0.19	6.99	7.96	2.59	1.04	0.87	1.94	22.8	428	3.18	0.71	27	1.54	307	6.38	6.14	35.9	65	3.41	0.54	7.9179	0.7521	10.5863	0.8564
76	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ4-2	Basalt	(Zhou et al., 2009)	43.55	4.13	15.6	15.92	0.15	3.62	9.52	3.3	1.22	0.99	2.01	22.9	462	3.07	0.69	29	1.41	270	6.16	4.98	35.1	65	3.45	0.53	8.4058	0.8262	13.0522	0.9468
77	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ5-2	Basalt	(Zhou et al., 2009)	43.26	3.69	15.19	13.23	0.25	2.66	8.04	5.06	1.28	0.94	5.91	20.2	1112	2.88	0.62	27.4	1.47	280	6.52	4.75	35.1	64	3.2	0.5	8.5625	0.7806	13.4737	0.9236
78	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ6-2	Basalt	(Zhou et al., 2009)	46.71	3.89	17.14	12.75	0.13	3.46	8.98	3.21	1.26	0.99	1.28	24.9	447	2.99	0.73	30.5	1.52	277	6.84	5.31	35.7	70	3.46	0.54	8.8150	0.8543	13.1827	1.0005
79	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ7-2	Basalt	(Zhou et al., 2009)	44.81	3.92	15.8	14.73	0.13	2.05	7.7	4.89	1.39	1.05	3.88	17.4	1190	3.7	0.93	31.7	1.56	299	6.85	7.82	42.1	80	3.84	0.58	8.2552	0.7530	10.2302	0.8608
80	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ7-4	Basalt	(Zhou et al., 2009)	41.42	3.35	14.61	12.34	0.26	2.17	11.01	4.42	2.11	0.85	7.28	32.1	702	3.04	0.55	25.5	1.37	259	6.17	5.49	34.5	60	3.13	0.48	8.1470	0.7391	10.9290	0.8439
81	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ8-2	Basalt	(Zhou et al., 2009)	47.6	3.73	14.39	13.4	0.2	5.82	8.45	2.88	1.37	0.91	0.86	26.6	326	4.88	0.99	31	2.08	296	7.87	6.92	47.4	99	3.63	0.57	8.5399	0.6540	14.3064	0.6908
82	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQ8-8	Basalt	(Zhou et al., 2009)	44.76	3.68	15.23	14.92	0.19	6.63	7.93	2.6	1.13	0.92	1.91	18.1	322	3.31	0.82	30.7	1.82	276	6.42	4.66	40.5	81	3.21	0.52	9.5639	0.7580	17.3820	0.8987
83	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQY1-2	Basalt	(Zhou et al., 2009)	44.59	4.15	13.96	15.93	0.21	6.08	7.72	2.63	1.37	1.21	1.77	29.5	334	3.84	0.86	38.7	2.36	357	8.69	6.24	49.7	101	3.75	0.58	10.3200	0.7787	16.1859	0.9494
84	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQY2-2	Basalt	(Zhou et al., 2009)	45.56	3.94	14.36	15.46	0.21	6.26	7.96	2.77	1.32	1.08	1.46	26.9	378	3.99	0.92	39	2.17	337	8.14	5.62	46.8	100	3.4	0.56	11.4706	0.8333	17.7936	0.9673
85	1	Volcanic rocks	290	Estimated*	79.72	40.78	145	AQY4-4	Basalt	(Zhou et al., 2009)	47.31	3.82	14.34	13.21	0.24	5.81	9.49	3.1	0.89	0.87	0.85	11.2	422	4.14	0.99	28.5	1.74	280	6.93	5.73	45.4	89	3.72	0.56	7.6613	0.6278	15.5323	0.7046
86	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-1	Basalt	(Wei et al., 2014)	46.27	4.14	13.16	16.78	0.21	4.21	7.86	3.28	1.46	1.3	0.86	19	341	4.25	0.98	31.8	1.76	356	7.63	6.97	43.5	98.3	3.86	0.57	8.2383	0.7310	14.1033	0.7927
87	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-2	Basalt	(Wei et al., 2014)	46.57	4.21	13.19	17.11	0.21	4.57	7.79	3.1	1.47	1.28	0.02	13.9	359	4.16	0.97	31.3	1.76	349	7.53	6.9	43.1	97.2	3.8	0.57	8.2368	0.7262	14.0870	0.7922
88	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-3	Basalt	(Wei et al., 2014)	44.93	4.14	13.52	16.84	0.2	5.27	7.47	3.08	1.48	1.15	1.42	23.7	307	3.47	0.86	30.4	1.73	325	6.99	5.72	39.2	89	3.69	0.55	8.2385	0.7755	15.5594	0.8834
89	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-5	Basalt	(Wei et al., 2014)	46.68	4.02	13.59	16.46	0.19	4.81	7.79	3.32	1.58	1.1		30.4	361	3.9	0.94	30.7	1.71	371	7.61	6.56	40.8	92.2	3.83	0.57	8.0157	0.7525	14.0549	0.8248
90	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-6	Basalt	(Wei et al., 2014)	46.16	4.16	13.1	17.36	0.22	4.85	7.8	2.74	1.48	1.3	0.86	21.1	360	4.24	0.99	31.7	1.74	354	7.7	7.06	43.5	98.3	3.9	0.58	8.1282	0.7287	13.9235	0.7911
91	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-7	Basalt	(Wei et al., 2014)	45.41	3.93	14.52	16.09	0.18	4.98	8.13	2.63	1.3	0.96	1.4	21.8	353	2.96	0.7	26.5	1.5	284	6.21	5.37	33.8	76.3	3.39	0.5	7.8171	0.7840	14.2086	0.8979
92	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-10	Basalt	(Wei et al., 2014)	47.87	3.83	13.6	15.62	0.19	4.67	8.53	2.51	1.55	0.82	0.35	29	331	3.68	0.89	23.9	1.28	283	6.34	6.48	34.3	76.2	3.52	0.52	6.7898	0.6968	11.7593	0.7210
93	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-11	Basalt	(Wei et al., 2014)	47.18	3.81	13.56	15.34	0.18	5.12	8.39	2.46	1.47	0.82	1.2	28.2	315	3.52	0.87	24.7	1.4	278	6.26	6.21	33.4	74.4	3.5	0.52	7.0571	0.7395	11.9807	0.7721
94	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-12	Basalt	(Wei et al., 2014)	46.74	3.73	13.63	15.57	0.19	5.39	8.4	2.48	1.4	0.77	1.22	26.8	307	3.36	0.84	23.7	1.31	269	6.1	5.69	31.7	70.6	3.39	0.5	6.9912	0.7476	12.4077	0.7783
95	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.69	40.69	135	YG-13	Basalt	(Wei et al., 2014)	46.8	3.71	13.7	15.28	0.18	5.59	8.4	2.4	1.39	0.78	1.31	26	319	3.26	0.81	20.9	0.98	261	5.91	5.53	31	69.4	3.34	0.5	6.2575	0.6742	12.5497	0.7046
96	1	Kaipaizileike Formation	287.9	(Wei et al., 2014)	79.69	40.69	135	YG-14	Basalt	(Wei et al., 2014)	46.44	3.72	13.84	15.38	0.16	5.48	8.39	2.65	1.35	0.77	1.35	24	309	3.2	0.82	23.5	1.36	262	5.93	5.77	31.4	70.3	3.39	0.5	6.9322	0.7484	12.1837	0.7946
97	1	Kaipaizileike Formation	287.9	(Wei et al., 2014)	79.69	40.69	135	YG-15	Basalt	(Wei et al., 2014)	46.14	3.73	13.58	15.79	0.2	5.76	8.4	2.59	1.36	0.8	1.69	27.2	309	3.34	0.86	23.9	1.32	274	6.16	5.52	32.3	72.2	3.5	0.52	6.8286	0.7399	13.0797	0.7799
98	1	Kaipaizileike Formation	287.9	(Wei et al., 2014)	79.69	40.69	135	YG-19	Basalt	(Wei et al., 2014)	43.88	4.93	12.95	18.48	0.22	4.68	7.5	2.6	1.67	1.44	1.12	31.8	289	4.27	1.08	37.5	2.08	400	8.51	6.74	48.6	111	4.43	0.66	8.4650	0.7716	16.4688	0.8823
99	1	Kaipaizileike Formation	287.9	(Wei et al., 2014)	79.69	40.69	135	YG-20	Basalt	(Wei et al., 2014)	44.01	5.06	12.64	18.68	0.23	4.48	7.53	2.49	1.75	1.49	1.11	31.9	296	4.31	1.09	39.4	2.21	410	8.76	7.15	49.3	113	4.55	0.68	8.6593	0.7992	15.8042	0.9161
100	1	Kaipaizileike Formation	287.9	(Wei et al., 2014)	79.69	40.69	135	YG-21	Basalt	(Wei et al., 2014)	43.74	3.97	13.72	15.83	0.18	4.97	7.46	6.26	1.42	1.05	0.91	25.1	347	3.35	0.84	29.1	1.68	315	6.77	5.53	37.7	85.1	3.53	0.53	8.2436	0.7719	15.3888	0.8776
101	1	Kaipaizileike Formation	287.9	(Wei et al., 2014)	79.69	40.69	135	YG-22	Basalt	(Wei et al., 2014)	45.02	3.89	14.26	16.36	0.18	5.4	8.01	3.43	1.33	0.93	0.71	24.5	336	3.11	0.79	26.7	1.49	294	6.4	5.22	33.6	75.8	3.36	0.5	7.9464	0.7946	14.5211	0.8852
102	1	Kupukuziman Formation	289.5	(Yu et al., 2011b)	79.84	40.83	155	SSC21-5	Basalt	(Yu et al., 2011b)	46.4	3.16	14.59	16.12	0.22	4.13	6.57	3.23	1.89	0.62	3.67	36.8	283	7.47	1.8	26.2	1.72	286	6.85		39.3	85	3.78	0.58	6.9312	0.6667		0.5183
103	1	Kupukuziman Formation	289.5	(Yu et al., 2011b)	79.84	40.83	155	SSC21-17	Basalt	(Yu et al., 2011b)	48.99	3.13	13.64	16.39	0.21	3.55	8.72	2.96	0.6	0.6	1.74	16.9	633	5.92	1.44	23	1.46	232	5.45		33.4	73.1	3.19	0.48	7.2100	0.6886		0.5544
104	1	Kupukuziman Formation	289.5	(Yu et al., 2011b)	79.84	40.83	155	SSC22-5	Basalt	(Yu et al., 2011b)	46.46	3.66	13.24	17.97	0.23	3.59	8.51	3.8	1.29	0.66	0.93	23.8	384	5.6	1.45	27.8	1.82	279	6.71		36	82.7	3.51	0.57	7.9202	0.7722		0.6636
105	1	Kupukuziman Formation	289.5	(Yu et al., 2011b)	79.84	40.83	155	SSC22-11	Basalt	(Yu et al., 2011b)	45.13	3.53	13.16	17.37	0.27	3.02	10.27	2.46	1.01	0.67	3.37	17	454	5.57	1.61	27.4	1.8	284	6.61		36.4	82	3.44	0.55	7.9651	0.7527		0.6522
106	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-8i	Basalt	(Yu et al., 2011b)	44.51	3.75	14.52	16.66	0.21	6.18	7.84	3.22	1.16	0.9	0.65	21.3	343	3.04	0.73	23.3	1.54	258	6.3		32.1	68.8	3.21	0.49	7.2586	0.7259		0.7994
107	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-8d	Basalt	(Yu et al., 2011b)	44.92	3.65	12.58	18.65	0.28	3.47	7.77	3.02	1.42	1.68	2	16.6	482	5.59	1.29	36.5	2.31	421	10.4		56	120	5.09	0.76	7.1709	0.6518		0.6992
108	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-7f	Basalt	(Yu et al., 2011b)	41.62	4.9	13.09	19.42	0.27	3.13	8.72	3.21	1.53	1.49	2.2	25.2	351	4.23	1.03	33.9	2.24	353	8.68		48.3	103	4.4	0.68	7.7045	0.7019		0.8038
109	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-7a	Basalt	(Yu et al., 2011b)	41.06	5.04	12.44	19.44	0.26	5.19	7.21	2.98	1.49	1.48	2.82	23.9	309	4.66	0.75	36.8	2.46	381	9.7		50.6	110	4.57	0.7	8.0525	0.7273		0.8122
110	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-6c	Basalt	(Yu et al., 2011b)	44.41	4.12	13.68	17.16	0.22	5.87	7.42	2.86	1.39	1.13	1.28	25.7	330	3.87	0.91	28.3	1.86	307	7.51		39.5	85.1	3.64	0.54	7.7747	0.7165		0.7758
111	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-6b	Basalt	(Yu et al., 2011b)	44.72	4.13	13.99	16.8	0.21	4.97	8.17	2.95	1.31	1.09	1.17	22.6	382	3.53	0.83	26	1.73	272	6.82		36.3	78.2	3.4	0.52	7.6471	0.7163		0.7785
112	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-5f	Basalt	(Yu et al., 2011b)	44.83	3.93	13.82	16.76	0.21	5.95	7.65	2.89	1.34	0.99	1.03	25.3	330	3.49	0.83	25.6	1.69	291	7.19		35	73.3	3.27	0.49	7.8287	0.7314		0.7850
113	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-5c	Basalt	(Yu et al., 2011b)	46.38	3.89	13.73	16.38	0.21	5.26	8.29	3.15	0.91	1.08	0.38	21.5	393	3.83	0.9	26.2	1.7	294	7.45		39.2	82	3.82	0.57	6.8586	0.6684		0.7247
114	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-4k	Basalt	(Yu et al., 2011b)	44.28	3.89	14.65	16.34	0.19	5.52	8.42	2.91	1.18	0.84	1.27	21.7	366	2.75	0.71	24	1.59	272	6.53		30.9	66.2	3.23	0.49	7.4303	0.7767		0.8824
115	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-4a	Basalt	(Yu et al., 2011b)	41.41	3.31	15.05	13.29	0.31	3.55	10.05	3.69	2.31	0.76	6.52	21.3	990	2.67	0.38	19.6	1.32	224	5.78		28.1	61.2	2.99	0.46	6.5552	0.6975		0.7669
116	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-3b	Basalt	(Yu et al., 2011b)	45.26	3.66	14.12	16.06	0.21	6.4	8.55	2.96	1.17	0.71	0.38	23.5	315	3.12	0.8	21.7	1.48	237	6.16		29.1	62.4	3.38	0.51	6.4201	0.7457		0.7719
117	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	YG-1a	Basalt	(Yu et al., 2011b)	46.15	3.8	14.05	14.14	0.19	5.58	8.42	2.8	1.32	0.78	2.2	25.7	347	3.58	0.9	23.4	1.58	261	6.86		32.5	68.1	3.67	0.54	6.3760	0.7200		0.7352
118	1	Kupukuziman Formation	289.5	(Yu et al., 2011b)	79.53	40.65	123	Yg01	Basalt	(Li et al., 2012)	50.39	2.9	13.36	14.96	0.26	3.08	7.73	3.21	1.52	0.57	1.96	33.6	369	6.83	1.65	24.2	1.53	250	6.18	10.3	37.4	76.2	3.24	0.49	7.4691	0.6471	7.3981	0.5132
119	1	Kupukuziman Formation	289.5	(Yu et al., 2011b)	79.53	40.65	123	Yg04	Basalt	(Li et al., 2012)	46.54	3.81	13.24	18.38	0.24	3.95	7.94	2.99	1.79	0.72	0.34	38.1	334	5.96	1.47	28.9	1.85	283	6.68	6.85	37.7	79	3.25	0.5	8.8923	0.7666	11.5328	0.6534
120	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.53	40.65	123	Yg07	Basalt	(Li et al., 2012)	41.49	4.05	14.51	17.42	0.22	4.36	7.3	3.91	2.29	0.71	3.5	27.8	932	3.04	0.42	25.7	1.67	288	6.5	5.11	29.4	67.1	2.98	0.46	8.6242	0.8741	13.1311	0.9213
121	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.43	40.69	122	KP-01	Basalt	(Zhang et al., 2012a)	48.15	3.92	13.61	18.76	0.23	3.53	8.05	3.07	1.21	0.77	0.78	18.5	438	6.14	1.52	28.7	1.94	290	7.57	10.3	39.8	80.7	3.74	0.56	7.6738	0.7211	7.8350	0.6222
122	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.43	40.69	122	KP-02	Basalt	(Zhang et al., 2012a)	47.73	3.95	14.4	16.72	0.22	3.17	5.84	4.54	1.65	0.78	2.32	33.1	273	6.4	1.71	31	2.09	308	8.17	10.3	41.7	83.7	4	0.6	7.7500	0.7434	8.1262	0.6431
123	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.43	40.69	122	KP-03	Basalt	(Zhang et al., 2012a)	46.82	3.88	14.06	18.39	0.23	3.61	4.32	4.98	1.58	0.82	2.66	23	250	6.8	1.59	31.6	2.07	314	8.48	11.2	43.5	87.1	4.07	0.61	7.7641	0.7264	7.7768	0.6227
124	1	Kupukuziman Formation	293.9	(Zhang et al., 2012a)	79.43	40.69	121	KP-04	Andesite	(Zhang et al., 2012a)	59.72	2.97	9.88	16.58	0.17	2.41	3.07	3.51	0.46	0.57	2.48	7.05	80.2	4.96	2.61	22	1.44	214	5.99	5.97	30.3	57.8	2.32	0.34	9.4828	0.7261	9.6817	0.6082
125	1	Kupukuziman Formation	293.9	(Zhang et al., 2012a)	79.43	40.69	121	KP-05	Basalt	(Zhang et al., 2012a)	46.11	3.71	13.51	18.43	0.27	3.93	8.04	2.91	1.13	0.65	1.81	19.4	399	6.1	1.3	29.6	1.72	293	6.5	9.8	37.6	78.7	3.26	0.55	9.0798	0.7872	8.0306	0.6624
126	1	Kupukuziman Formation	293.9	(Zhang et al., 2012a)	79.43	40.69	121	KP-06	Basalt	(Zhang et al., 2012a)	48.34	3.25	14.04	16.55	0.22	3.83	8.01	3.41	0.64	0.58	2.72	16.9	687	6.3	1.3	24.7	1.47	242	5.7	8.8	36.2	74.7	3.25	0.47	7.6000	0.6823	8.4886	0.5543
127	1	Kupukuziman Formation	293.9	(Zhang et al., 2012a)	79.43	40.69	121	KP-09	Basalt	(Zhang et al., 2012a)	47.95	4.18	13.59	18.58	0.22	3.8	7.89	2.89	1.06	0.77	1.1	29	591	6.12	1.5	28.8	1.94	291	7.63	9.35	40.1	80.9	3.69	0.56	7.8049	0.7182	8.6524	0.6231
128	1	Kupukuziman Formation	293.9	(Zhang et al., 2012a)	79.43	40.69	121	KP-10	Andesite	(Zhang et al., 2012a)	55.05	3.58	13.1	14.38	0.1	2.02	3.77	5.43	1.02	0.62	2.46	12	104	5.78	2	26.9	1.77	269	7.22	6.15	33.6	68.7	2.99	0.45	8.9967	0.8006	11.1707	0.6542
129	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.43	40.69	121	K-01	Basalt	(Zhang et al., 2012a)	50.16	3.16	10.64	20.49	0.32	4.32	4.02	2.83	1.29	1.55	2.88	12.5	131	4.85	1.17	30.7	1.92	262	8.85	8.19	48.7	76.7	4.3	0.66	7.1395	0.6304	9.3651	0.6770

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^t$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
130	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.43	40.69	121	K-02	Picritic basalt	(Zhang et al., 2012a)	43.65	4.15	14	15.69	0.26	3.04	8	3.48	1.45	1.75	5.07	19.2	438	6.3	1.2	19.4	0.83	442	9.6	9.1	64.2	139	5.31	0.87	3.6535	0.3022	15.2747	0.3269
131	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.43	40.69	121	K-03	Basalt	(Zhang et al., 2012a)	45.89	4.26	12.64	20.4	0.26	3.73	7.58	2.87	1.93	1.89	0.74	39.9	334	6.52	1.38	38.1	2.39	442	11	10.2	59.8	128	5.31	0.8	7.1751	0.6371	12.5490	0.6540
132	1	Kaipaizileike Formation	287.3	(Wei et al., 2014)	79.43	40.69	121	K-05	Basalt	(Zhang et al., 2012a)	50.41	2.32	13.6	14.13	0.17	4.74	7.33	3.02	0.82	0.28	3.15	19.2	405	2.8	0.6	17	1.03	188	4.4	4.1	21.7	46.1	2.19	0.34	7.7626	0.7834	11.2439	0.7392
133	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.48	40.68	123	DWG07-1	Basaltic rock	(Zhang et al., 2010b)	47.97	3.69	13.21	17.96	0.25	4.12	7.99	3.16	1.62	0.7	0.5	31.8	359	6.55	1.65	28.5	1.94	284	7.64	9.25	39.9	79.5	3.84	0.57	7.4219	0.7143	8.5946	0.5975
134	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.48	40.68	123	DWG07-2	Basaltic rock	(Zhang et al., 2010b)	48.39	3.51	13.22	17.98	0.25	4.13	7.97	3.02	1.29	0.68	0.46	17.9	591	6.77	1.75	28.2	1.93	282	7.54	8.46	40.1	79.2	3.85	0.58	7.3247	0.7032	9.3617	0.5801
135	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.48	40.68	123	DWG07-3	Basaltic rock	(Zhang et al., 2010b)	47.81	3.65	13.21	18.47	0.26	4.14	7.65	2.93	1.31	0.71	0.62	16.6	472	6.26	1.44	28.1	1.92	277	7.53	9.44	39	77	3.95	0.57	7.1139	0.7205	8.1568	0.6095
136	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.48	40.68	123	DWG07-4	Basaltic rock	(Zhang et al., 2010b)	47.85	2.93	13.66	17.34	0.2	5.61	8.57	2.59	0.87	0.32	0.92	18.8	354	2.47	0.6	19.8	1.36	201	6.01	4.2	22.3	48.8	2.88	0.41	6.8750	0.8879	11.6190	0.9042
137	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.87	40.83	157	LKC07-1	Basaltic rock	(Zhang et al., 2010b)	46.55	3.52	12.98	18.65	0.26	3.82	8.28	3.04	1.45	0.7	1.42	22.9	317	6.52	1.54	28.6	1.96	282	7.76	9.55	40	79.9	4.01	0.59	7.1322	0.7150	8.3665	0.6002
138	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.87	40.83	157	LKC07-2	Basaltic rock	(Zhang et al., 2010b)	47.52	3.79	13.39	18.62	0.27	4.18	8.07	3.06	1.28	0.71	0.66	20.7	353	6.3	1.44	27.7	1.91	279	7.32	9.1	38.9	78.7	3.66	0.56	7.5683	0.7121	8.6484	0.5997
139	1	Kupukuziman Formation	291.9	(Zhang et al., 2012a)	79.87	40.83	157	LKC07-3	Basaltic rock	(Zhang et al., 2010b)	50.67	2.79	13.05	14.96	0.21	3.25	7.64	3.48	1.19	0.57	2.42	20.8	499	7.62	1.75	24.4	1.61	247	6.9	17.5	38.6	76.7	3.45	0.52	7.0725	0.6321	4.3829	0.4822
140	1	Volcanic rocks	281.1	(Han et al., 2019)	79.84	40.83	155	LT24A	Basalt	(Han et al., 2019)	50.48	2.93	13.39	14.58	0.22	3.41	7.69	3.42	0.85	0.74	1.37	26.1	502	7.46	1.7	23.6	1.67	258	7.12	10.8	37.9	84.2	3.5	0.54	6.7429	0.6227	7.7963	0.4757
141	1	Volcanic rocks	281.1	(Han et al., 2019)	79.85	40.82	155	LT25B	Basalt	(Han et al., 2019)	47.68	3.54	13.53	16.92	0.23	3.49	7.98	2.92	1.66	0.72	0.91	26.7	330	5.71	1.31	24.2	1.85	260	6.96	7.31	34.2	76.8	3.68	0.59	6.5761	0.7076	10.5062	0.5869
142	1	Bashisuogong plutonic c	276.4	(Ma et al., 2016)	76.55	40.09	178	BSSG2-1	Gabbro	(Ma et al., 2016)	47.54	2.69	16.75	13.95	0.16	3.69	8.12	4.33	0.91	1.4	0.15	13.5	970	2.01	0.5	12	0.83	113	3.06	5.92	31.9	71	1.96	0.31	6.1224	0.3762	11.9932	0.5079
143	1	Bashisuogong plutonic c	276.4	(Ma et al., 2016)	76.55	40.09	178	BSSG2-2	Gabbro	(Ma et al., 2016)	52.87	0.81	15.22	6.57	0.12	4.95	13.76	3.24	0.85	0.39	0.97	18.5	658	2.11	0.47	6.69	0.52	110	3.32	7.09	19.2	41.6	1.62	0.28	4.1296	0.3484	5.8674	0.3562
144	1	Bashisuogong plutonic c	276.4	(Ma et al., 2016)	76.55	40.09	178	BSSG2-3	Gabbro	(Ma et al., 2016)	52.89	1.88	15.61	11.58	0.21	2.3	5.82	4.83	2.33	0.93	0.33	39.6	598	3.41	1.21	20.9	1.32	206	5.41	11.5	50	106	3.31	0.53	6.3142	0.4180	9.2174	0.5425
145	1	Bashisuogong plutonic c	276.4	(Ma et al., 2016)	76.55	40.09	178	BSSG2-4	Gabbro	(Ma et al., 2016)	51.77	2.01	16.27	12.43	0.22	2.73	6.66	4.89	1.71	1.01	0.27	23.1	709	2.16	0.64	14.6	0.9	144	3.93	8.81	42.1	89.4	2.77	0.41	5.2708	0.3468	10.1476	0.5189
146	1	Bashisuogong plutonic c	276.4	(Ma et al., 2016)	76.55	40.09	178	BSSG2-5	Gabbro	(Ma et al., 2016)	51.94	1.9	15.92	12.44	0.22	2.71	6.58	4.82	1.87	1.02	0.07	28.3	697	2.95	0.83	18.4	1.11	179	4.69	9.31	47.2	101	3.01	0.5	6.1130	0.3898	10.8485	0.5285
147	1	Bashisuogong plutonic c	276.4	(Ma et al., 2016)	76.55	40.09	178	BSSG2-6	Gabbro	(Ma et al., 2016)	46.16	2.9	15.31	16.8	0.2	5.28	6.75	4.08	1.2	0.51	0.81	19.8	492	2.19	0.64	22.9	1.5	218	5.82	3.58	26.8	57.8	2.43	0.37	9.4239	0.8545	16.1453	1.0131
148	1	Bashisuogong plutonic c	276.4	(Ma et al., 2016)	76.55	40.09	178	BSSG-HC	Gabbro	(Ma et al., 2016)	48.82	2.67	16.05	14.33	0.26	3.51	5.92	5.09	1.49	1.05	0.94	24.6	625	4.33	1.21	43.6	2.72	391	8.98	7.51	55	119	4.28	0.62	10.1869	0.7927	15.8455	0.9575
149	1	Bashisuogong plutonic c	277.2	(Ma et al., 2016)	76.55	40.09	178	BSSG-6	Diabase dyke	(Ma et al., 2016)	50.35	2.65	14.17	14.07	0.22	3.14	6.66	4.44	2.2	0.87	0.15	66	508	7.03	1.96	37.3	2.33	261	6.57	11.3	48.6	101	3.65	0.52	10.2192	0.7675	8.9381	0.6839
150	1	Bashisuogong plutonic c	277.2	(Ma et al., 2016)	76.55	40.09	178	BSSG-7	Diabase dyke	(Ma et al., 2016)	46.37	1.54	15.23	12.92	0.19	7.5	10.98	2.69	0.86	0.17	1.01	58.4	336	1.03	0.31	9.06	0.58	77	2.16	11.1	10.1	22.1	1.7	0.23	5.3294	0.8970	1.9910	0.9520
151	1	Bashisuogong plutonic c	277.2	(Ma et al., 2016)	76.55	40.09	178	BSSG-14	Diabase dyke	(Ma et al., 2016)	49.92	2.76	14.51	13.01	0.18	4.18	7.95	4.22	1.74	0.43	0.31	55	521	8.03	1.72	46.3	2.95	289	7.18	10.9	40.8	82.2	3.13	0.46	14.7923	1.1348	7.5413	0.8669
152	1	Bashisuogong plutonic c	277.2	(Ma et al., 2016)	76.55	40.09	178	BSSG-HL	Diabase dyke	(Ma et al., 2016)	44.53	3.82	14.35	14.02	0.16	7.02	10.15	2.83	1.53	0.25	1.01	9.37	747	1.18	0.32	12.4	0.87	79.8	2.09	3.88	26.5	61	2.13	0.29	5.8216	0.4679	15.7216	0.7515
153	1	Bashisuogong plutonic c	278.6	(Ma et al., 2016)	76.56	40.09	178	BSSG-1	Alkali_granite	(Ma et al., 2016)	72.71	0.3	12.23	4.06	0.09	0.06	0.52	3.6	5.93	0.01	0.49	327	8.99	23.8	3.59	100	4.98	873	24.1	28.4	123	213	10.5	1.67	9.5238	0.8130	7.5000	0.6264
154	1	Bashisuogong plutonic c	278.6	(Ma et al., 2016)	76.56	40.09	178	BSSG-2	Alkali_granite	(Ma et al., 2016)	74.6	0.11	11.57	2.84	0.05	0.07	0.39	4.01	4.83	0.01	0.39	450	7.2	28.4	10.5	157	9.49	1441	38.6	60.5	95.2	157	9.26	1.33	16.9546	1.6492	2.5950	1.0233
155	1	Bashisuogong plutonic c	278.6	(Ma et al., 2016)	76.56	40.09	178	BSSG-5	Alkali_granite	(Ma et al., 2016)	76.12	0.09	12.04	0.99	0.01	0.07	0.57	3.86	5.04	0.01	0.37	211	11.1	28.6	6.59	107	8.04	859	23.6	12.8	145	222	3.87	0.54	27.6486	0.7379	17.3438	0.5631
156	1	Bashisuogong plutonic c	278.6	(Ma et al., 2016)	76.56	40.09	178	BSSG-9	Alkali_granite	(Ma et al., 2016)	71.31	0.28	13.52	3.89	0.05	0.16	0.67	4.82	4.97	0.03	0.1	135	27	17.1	3.06	72.3	4.31	717	17.2	11.2	106	169	4.89	0.77	14.7853	0.6821	15.0893	0.5756
157	1	Bashisuogong plutonic c	278.6	(Ma et al., 2016)	76.56	40.09	178	BSSG-JH	Alkali granite	(Ma et al., 2016)	69.3	0.34	13.68	3.85	0.07	0.22	1.49	4.24	5.62	0.08	0.37	162	35.3	48.3	10.6	63.5	5.19	1175	30.6	15.2	166	254	12.5	1.72	5.0800	0.3825	16.7105	0.2404
158	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-SZ	Quartz syenite	(Ma et al., 2016)	60.92	0.71	14.61	8.99	0.22	0.26	2.7	5.09	5.34	0.13	0.07	111	25.7	6.09	1.78	49.3	2.51	321	4.79	23.2	35.5	64.1	4.41	0.79	11.1791	1.3887	2.7629	1.1364
159	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-4	Quartz syenite	(Ma et al., 2016)	62.54	0.81	15.58	6.71	0.14	0.29	1.89	4.99	6.06	0.07	0.08	136	89.3	6.92	1.94	42.8	1.95	426	7.11	27.3	37.2	63.6	3.07	0.47	13.9414	1.1505	2.3297	0.9041
160	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-10	Quartz syenite	(Ma et al., 2016)	60.07	0.81	15.73	8.29	0.21	0.48	2.53	5.4	5.32	0.2	0.14	87.3	79.9	3.56	1.28	36	2.27	278	6.1	16.4	28.4	59.3	3.06	0.51	11.7647	1.2676	3.6159	1.2134
161	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-12	Quartz syenite	(Ma et al., 2016)	64.42	0.57	15.29	6.71	0.14	0.37	2.17	5.06	4.76	0.16	0.11	86.9	61.5	10.4	1.87	40.5	3.25	266	8.35	13.5	37.8	71	5.43	0.77	7.4586	1.0714	5.2593	0.6923
162	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-13	Quartz syenite	(Ma et al., 2016)	63.9	0.64	14.8	7.17	0.17	0.35	2.1	4.91	5	0.16	0.07	107	40.3	5.44	1.21	67.8	3.17	571	5.91	15.2	33	65.3	5.53	0.82	12.2604	2.0545	4.2961	1.7150
163	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-15	Quartz syenite	(Ma et al., 2016)	61.47	0.69	16.1	7.11	0.18	0.42	2.49	5.31	5.65	0.14	0.2	102	57.8	3.6	1.34	30.7	1.87	299	3.52	14.7	23.5	48.7	3.32	0.53	9.2470	1.3064	3.3129	1.1312
164	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-16	Quartz syenite	(Ma et al., 2016)	62	0.74	14.94	8.23	0.18	0.31	2.43	5.16	5.55	0.16	0.39	98	29.8	6.68	1.73	42.4	2.48	268	7.37	17	35.9	71.8	4.11	0.7	10.3163	1.1811	4.2235	0.9280
165	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-17	Quartz syenite	(Ma et al., 2016)	60.79	0.85	16.78	6.42	0.14	0.57	2.73	5.73	5.04	0.28	0.27	69.8	169	3.35	0.9	17.7	0.99	256	3.2	15.9	25	55.4	2.11	0.33	8.3886	0.7080	3.4843	0.6555
166	1	Bashisuogong plutonic c	275.5	(Ma et al., 2016)	76.55	40.09	178	BSSG-19	Quartz syenite	(Ma et al., 2016)	61.2	0.7	15.4	8.36	0.2	0.39	2.8	5.38	5.53	0.2	0.22	85.6	28.6	3.93	1.07	23.9	1.56	290	3.63	13.6	25.1	50.9	2.7	0.46	8.8519	0.9522	3.7426	0.8156
167	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ01	Granite	(Zhang & Zou, 2013)	74.82	0.22	12.55	1.91	0.03	0.24	0.82	3.51	5.26	0.03	0.49	309	43.9	54.2	7.06	46.1	5.11	298	8.92	25.8	66.8	118	4.48	0.7	10.2902	0.6901	4.5736	0.2597
168	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ02	Granite	(Zhang & Zou, 2013)	72.69	0.28	13.8	2.31	0.03	0.35	1.1	3.64	5.22	0.05	0.39	283	97.8	41.6	6.45	37.3	4.16	276	8.18	22.4	63.3	110	4.39	0.65	8.4966	0.5893	4.9107	0.2464
169	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ03	Granite	(Zhang & Zou, 2013)	76.34	0.15	12.13	1.43	0.02	0.17	0.63	3.33	5.08	0.02	0.54	348	24.3	61.2	12.7	39.9	5.09	194	7.33	25.7	82.5	136	4.44	0.71	8.9865	0.4836	5.2918	0.1903
170	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ04	Granite	(Zhang & Zou, 2013)	71.6	0.36	13.55	3.05	0.06	0.49	1.41	3.54	5.13	0.08	0.6	256	101	38.6	5.4	30.3	3.17	290	8.44	49.3	62.4	112	4.04	0.63	7.5000	0.4856	2.2718	0.2092
171	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ05	Granite	(Zhang & Zou, 2013)	70.14	0.38	13.91	2.99	0.05	0.58	1.55	3.77	5.11	0.08	1.23	280	99.2	35.4	4.73	31.8	2.95	315	8.52	24.1	60.9	107	3.35	0.55	9.4925	0.5222	4.4398	0.2321
172	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ06	Granite	(Zhang & Zou, 2013)	74.77	0.21	12.63	1.87	0.02	0.26	0.72	3.41	5.36	0.03	0.54	304	36.9	54.4	9.54	43.8	4.57	255	8.11	18.5	100	166	3.71	0.58	11.8059	0.4380	8.9730	0.2013
173	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ07	Granite	(Zhang & Zou, 2013)	74.27	0.22	12.91	1.87	0.02	0.28	0.78	3.4	5.5	0.03	0.57	319	54.8	50	10.3	41.1	4.95	255	7.75	20.1	62.9	109	4.3	0.67	9.5581	0.6534	5.4229	0.2484
174	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ08	Granite	(Zhang & Zou, 2013)	73.44	0.23	13.12	1.92	0.01	0.27	0.64	3.61	5.79	0.04	0.8	287	62.2	44.8	7.34	42.5	4.26	311	8.79	6.08	58	99.1	4.21	0.67	10.0950	0.7328	16.2993	0.2826
175	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ09	Granite	(Zhang & Zou, 2013)	76.45	0.14	12.03	1.38	0.01	0.17	0.64	3.32	5.13	0.02	0.55	300	32	56.9	10.6	46.4	6.49	206	7.38	20.8	55.6	98.2	4.78	0.73	9.7071	0.8345	4.7212	0.2796
176	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ10	Granite	(Zhang & Zou, 2013)	73	0.24	13.18	2.14	0.03	0.34	0.91	3.6	5.51	0.04	0.77	296	54.6	43.3	8.81	45.8	4.93	292	8.8	16.8	71.3	124	4.31	0.69	10.6265	0.6424	7.3810	0.2794
177	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ11	Granite	(Zhang & Zou, 2013)	73.57	0.26	13.29	1.54	0.02	0.29	1	3.65	5.49	0.04	0.67	257	55	36.2	7.24	41	4.5	298	8.83	30	69.9	121	3.99	0.63	10.2757	0.5866	4.0333	0.2762
178	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ12	Granite	(Zhang & Zou, 2013)	73.03	0.25	13.5	1.95	0.03	0.31	0.93	3.59	5.64	0.04	0.52	280	87.1	46.6	8.28	37.5	3.62	303	9.32	22.9	52.2	93.4	3.59	0.57	10.4457	0.7184	4.0786	0.2577
179	1	Kezile pluton	272.4	(Zhang & Zou, 2013)	77.07	40.41	147	09KZ13	Granite	(Zhang & Zou, 2013)	75.95	0.13	12.22	1.03	0.02	0.2	0.65	3.41	5.55	0.01	0.68	304	34.2	43.9	7.14	37.1	6.45	137	5.27	22.5	48.6	85.3	3.8	0.58	9.7632	0.7634	3.7911	0.2722
180	1	Kezile pluton	275	(Su et al., 2019)	77.08	40.41	146	HL-9	Granite	(Su et al., 2019)	73.3	0.23	13.39	1.51	0.02	0.15	1.43	3.61	5.26	0.03	0.63	233	119	39.9	7.09	34.3	3.69	285	8.5	20.2	41.3	72.1	3.37	0.52	10.1780	0.8305	3.5693	0.2864
181	1	Kezile pluton	275	(Su et al., 2019)	77.08	40.41	146	HL-10	Granite	(Su et al., 2019)	73.91	0.26	13.23	1.4	0.03	0.21	1.26	3.37	5.45	0.04	0.56	231	128	33.4	5.21	37.5	3.66	255	7.4	17.6	55	102	3.32	0.48	11.2952	0.6818	5.7955	0.2965
182	1	Kezile pluton	275	(Su et al., 2019)	77.08	40.41	146	HL-13	Granite	(Su et al., 2019)	74.4	0.25	12.93	0.66	0.02	0.27	2.01	3.44	4.73	0.03	0.92	194	213	39.8	6.78	38.5	4.33	232	7.33	13.7	39.6	72.8	3.56	0.46	10.8146	0.9722	5.3139	0.3287
183	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL01	Granite	(Zhang & Zou, 2013)	77.77	0.11	11.55	1.2	0.01	0.07	0.25	3.35	4.43	0.03	0.64	188	24	26.3	3.66	42.4	3.65	157	6.52	13.1	57.3	112	4.73	0.68	8.9641	0.7400	8.5496	0.3702
184	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL02	Granite	(Zhang & Zou, 2013)	73.49	0.24	13.35	1.85	0.03	0.26	0.86	3.4	5.44	0.05	0.41	283	72.8	39.5	4.5	34.7	3.47	260	8.13	24.8	66.3	118	3.78	0.54	9.1799	0.5234	4.7581	0.2298
185	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL05	Granite	(Zhang & Zou, 2013)	75.25	0.2	12.61	1.63	0.02	0.21	0.64	3.11	5.3	0.04	0.38	300	40.9	41.6	6.24	42.3	4.48	196	6.5	25.7	51.9	93.1	3.46	0.52	12.2254	0.8150	3.6226	0.3085
186	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL06	Granite	(Zhang & Zou, 2013)	65.97	0.23	16.8	3.29	0.08	0.17	1.08	5.88	5.45	0.06	0.38	320	22.5	20	4.41	41.3	5.32	123	5.71	18.7	60.2	124	4.96	0.69	8.3266	0.6860	6.6310	0.4034
187	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL07	Granite	(Zhang & Zou, 2013)	76.75	0.12	11.94	1.36	0.01	0.1	0.46	3.34	4.84	0.04	0.43	130	56.9	14.4	1.53	66.7	4.18	614	10.3	12.2	65.1	114	3.34	0.54	19.9701	1.0246	9.3443	0.7383
188	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL08	Granite	(Zhang & Zou, 2013)	76.46	0.1	12.41	0.99	0.02	0.14	0.17	3.4	5.1	0.02	0.61	254	23.6	27	3.3	46.7	4.15	187	7.48	16.2	68.6	138	5.13	0.73	9.1033	0.6808	8.5185	0.3678
189	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL09	Granite	(Zhang & Zou, 2013)	74.07	0.24	12.8	1.8	0.02	0.25	0.66	3.32	5.63	0.06	0.53	287	61.5	46.3	5	38	3.81	321	8.99	22.2	49.1	86	3.64	0.53	10.4396	0.7739	3.8739	0.2701
190	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL10	Granite	(Zhang & Zou, 2013)	75.82	0.12	12.22	1.4	0.02	0.1	0.52	3.51	5.17	0.04	0.47	263	26.8	27.9	3.18	46.5	4.25	187	7.73	18	77.5	155	5.2	0.73	8.9423	0.6000	8.6111	0.3389
191	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL12	Granite	(Zhang & Zou, 2013)	73.66	0.2	12.71	1.96	0.03	0.28	0.73	3.21	5.43	0.03	1.57	371	50	50.3	5.46	42.4	5.68	248	7.96	13.5	58.4	103	6.28	0.98	6.7516	0.7260	7.6296	0.2651
192	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL13	Granite	(Zhang & Zou, 2013)	73.85	0.2	12.82	2.19	0.02	0.25	1	3.17	4.94	0.03	1.31	368	45.6	47.4	4.9	45.4	5.77	227	7.24	20.8	139	264	5.71	0.91	7.9510	0.3266	12.6923	0.1896
193	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL15	Granite	(Zhang & Zou, 2013)	74.3	0.2	12.83	1.76	0.05	0.31	0.83	3.41	5.24	0.03	0.86	340	49.4	52.9	8.18	45.2	5.61	245	8	28.2	70.1	123	5.64	0.88	8.0142	0.6448	4.3617	0.2516
194	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL16	Granite	(Zhang & Zou, 2013)	74.05	0.19	12.82	1.86	0.02	0.29	0.93	3.38	5.2	0.03	1.04	351	50.2	50.7	7.1	48.1	5.88	206	6.48	27.8	103	179	4.94	0.77	9.7368	0.4670	6.4388	0.2256

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^t$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
195	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL17	Granite	(Zhang & Zou, 2013)	74.11	0.19	12.73	1.97	0.05	0.32	0.68	3.2	5.49	0.03	1.05	383	53.5	51.3	6.34	48.9	6.11	242	8.01	40.7	77.6	138	6.1	0.93	8.0164	0.6302	3.3907	0.2627
196	1	Guerlale pluton	276.7	(Zhang & Zou, 2013)	77.11	40.53	151	09GL18	Granite	(Zhang & Zou, 2013)	73.81	0.19	12.6	2.14	0.02	0.27	0.94	3.4	5.17	0.03	1.24	379	39.5	54.4	6.16	49.4	5.98	249	8.04	20.5	79.5	140	5.89	0.95	8.3871	0.6214	6.8293	0.2546
204	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.13	40.27	136	08KT03-1	K-feldspar granite	(Zhang et al., 2010a)	77.67	0.04	12.07	0.42	0.01	0.05	0.53	3.73	4.85	0.01	0.42	447	6.23	41.1	5.9	82.4	6.99	234	13.1		56	115	8.82	1.4	9.3424	1.4714		0.5821
205	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.13	40.27	136	08KT03-2	K-feldspar granite	(Zhang et al., 2010a)	77.88	0.04	12.09	0.26	0.01	0.05	0.59	3.79	4.72		0.38	441	8.59	41.7	9.32	115	9.17	164	9.51		64.7	137	8.93	1.38	12.8779	1.7774		0.7504
206	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.13	40.27	136	08KT03-3	K-feldspar granite	(Zhang et al., 2010a)	77.81	0.05	12.04	0.4	0.01	0.08	0.52	3.6	4.88		0.43	412	7.31	40.1	7.32	97.5	7.81	176	9		61.7	130	7.78	1.19	12.5321	1.5802		0.6643
207	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.13	40.27	136	08KT03-4	K-feldspar granite	(Zhang et al., 2010a)	76.76	0.06	12.17	1.15	0.01	0.07	0.57	3.76	4.83		0.43	456	7.34	53.9	7.62	143	8.34	202	11.1		65.5	141	11.9	1.83	12.0168	2.1832		0.8157
208	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.13	40.27	136	08KT03-5	K-feldspar granite	(Zhang et al., 2010a)	77.99	0.05	12.18	0.49	0.01	0.08	0.47	3.5	4.59		0.46	416	7.49	41.8	9.94	116	9.74	206	11.3		53.1	113	8.04	1.28	14.4279	2.1846		0.8345
209	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.13	40.27	136	08KT03-6	K-feldspar granite	(Zhang et al., 2010a)	77.24	0.05	12.01	0.77	0.02	0.05	0.52	3.7	4.86		0.58	456	5.15	44	7.79	105	8.76	210	12		64.9	140	9.88	1.5	10.6275	1.6179		0.6659
210	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.13	40.27	136	08KT03-7	K-feldspar granite	(Zhang et al., 2010a)	78.22	0.03	12	0.21	0.01	0.07	0.49	3.61	4.7	0.01	0.48	443	7.84	45	9.34	108	8.85	178	10.3		49.6	104	7.94	1.26	13.6020	2.1774		0.7748
211	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.13	40.27	136	08KT03-8	K-feldspar granite	(Zhang et al., 2010a)	77.02	0.04	12.42	0.7	0.01	0.07	0.53	3.58	5		0.45	470	6.29	42.9	5.97	92.1	7.67	172	9.16		59	127	8.85	1.38	10.4068	1.5610		0.6204
212	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.12	40.26	136	HLJ2-1A	Granite	(Cao et al., 2013)	77.15	0.05	12.12	0.74	0.01	0.03	0.59	3.72	4.61		0.42	338	2.78	23.5	6.57	37.7	3.46	156	9.77		29.2	59.9	6.89	0.96	5.4717	1.2911		0.4878
213	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.12	40.26	136	HLJ2-2A	Granite	(Cao et al., 2013)	76.29	0.08	12.31	1.12	0.01	0.03	0.69	3.95	4.5	0.01	0.47	358	4.61	66.8	7.96	118	8.65	202	12.9		85.7	174	11.4	1.64	10.3509	1.3769		0.5286
214	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.12	40.26	136	HLJ2-1B	Granite	(Cao et al., 2013)	76.23	0.05	12.03	1.41	0.01	0.04	0.59	3.72	4.58		0.78	415	8.57	44.1	9.1	113	7.65	181	9.8		42.9	96.4	9.75	1.39	11.5897	2.6340		0.8805
215	1	Halajun granite pluton-II	278	(Zhang et al., 2010a)	77.12	40.26	136	HLJ2-2B	Granite	(Cao et al., 2013)	76.29	0.08	12.37	0.99	0.01	0.04	0.68	3.97	4.55	0.01	0.42	345	4.65	69.8	8	106	7.87	210	13.2		86.3	170	11.4	1.62	9.2982	1.2283		0.4629
216	1	Halajun granite pluton-II	268	(Su et al., 2019)	77.15	40.27	134	HL-1	Granite	(Su et al., 2019)	73	0.27	13.49	2.83	0.05	0.16	1.06	3.78	5.36	0.03	0.21	192	88	16.8	2.95	72.4	4.12	330	9.65	18.2	63.5	129	6.06	0.87	11.9472	1.1402	7.0879	0.7513
217	1	Halajun granite pluton-II	268	(Su et al., 2019)	77.15	40.27	134	HL-3	Granite	(Su et al., 2019)	72.34	0.18	14.01	1.93	0.03	0.12	0.91	3.85	5.88	0.03	0.26	185	94.8	16	2.98	44.4	3.07	247	7.23	18.2	66.7	125	4.4	0.59	10.0909	0.6657	6.8681	0.4606
218	1	Halajun granite pluton-II	268	(Su et al., 2019)	77.15	40.27	134	HL-5	Granite	(Su et al., 2019)	70.95	0.47	12.84	3.81	0.07	0.57	1.69	3.31	4.82	0.1	1.57	203	93.6	34.2	2.97	40.6	3.38	327	9.37	28.1	64.4	115	4.36	0.62	9.3119	0.6304	4.0925	0.2932
219	1	Halajun granite pluton-II	268	(Su et al., 2019)	77.15	40.27	134	HL-6	Granite	(Su et al., 2019)	75.26	0.15	12.29	1.84	0.03	0.08	0.65	3.28	5.58	0.02	0.43	257	47.2	16.6	4.11	52.7	3.64	246	8.51	21.2	62	129	6.07	0.84	8.6820	0.8500	6.0849	0.5567
220	1	Halajun granite pluton-II	268	(Su et al., 2019)	77.15	40.27	134	HL-7	Granite	(Su et al., 2019)	73.35	0.24	13.51	1.88	0.03	0.26	0.98	3.71	5.34	0.04	0.67	238	80.3	31.3	4.25	29.8	3.59	195	6.07	26.7	42	73.8	3.26	0.42	9.1411	0.7095	2.7640	0.2786
221	1	Halajun granite pluton-II	268	(Su et al., 2019)	77.15	40.27	134	HL-8	Granite	(Su et al., 2019)	71.91	0.36	13.34	3.06	0.07	0.43	1.45	3.52	4.99	0.08	0.69	246	103	28.2	4.7	32.6	3.18	275	8.3	45.8	57.1	103	3.76	0.53	8.6702	0.5709	2.2489	0.2753
222	1	Halajun granite pluton-II	268	(Su et al., 2019)	77.15	40.27	134	HL-21	Granite	(Su et al., 2019)	80.46	0.1	10.35	1.07	0.01	0.04	0.49	2.85	4.51	0.01	0.37	228	20.8	35.3	6.46	74.5	4.45	243	8.95	22.1	76.2	144	7.58	1.02	9.8285	0.9777	6.5158	0.4868
223	1	Halajun granite pluton-III	268.6	(Zhang & Zou, 2013)	77.18	40.35	136	2010HLJIII-1	Granite	(Zhang & Zou, 2013)	62.25	0.44	15.71	5.72	0.12	1.01	2.41	4.71	5.28	0.1	2.07	258	118	28.7	5.67	92.2	6.53	640	13.6	19.4	130	231	5.15	0.81	17.9029	0.7092	11.9072	0.5116
224	1	Halajun granite pluton-III	268.6	(Zhang & Zou, 2013)	77.18	40.35	136	2010HLJIII-2	Granite	(Zhang & Zou, 2013)	62.69	0.45	15.67	5.95	0.07	0.84	1.63	3.68	6.94	0.11	1.79	306	130	33.9		87.4	5.78	629	12.6	328	126	225	4.81	0.76	18.1705	0.6937	0.6860	0.4532
225	1	Halajun granite pluton-III	268.6	(Zhang & Zou, 2013)	77.18	40.35	136	2010HLJIII-3	Granite	(Zhang & Zou, 2013)	60.29	0.68	15.37	7.52	0.14	1.2	2.6	3.75	6.18	0.13	1.91	305	124	45.6		114	6.96	611	12.1	30	118	216	5.32	0.82	21.4286	0.9661	7.2000	0.5267
226	1	Halajun granite pluton-III	268.6	(Zhang & Zou, 2013)	77.18	40.35	136	2010HLJIII-4	Granite	(Zhang & Zou, 2013)	61.22	0.08	17.68	3.68	0.03	0.53	1.34	3.78	9.45	0.03	2	412	145	26.2		40.8	4.99	841	18.3	120	101	177	4.78	0.78	8.5356	0.4040	1.4750	0.2688
227	1	Halajun granite pluton-III	268.6	(Zhang & Zou, 2013)	77.18	40.35	136	2010HLJIII-5	Granite	(Zhang & Zou, 2013)	62.37	0.46	15.82	5.35	0.09	0.92	2.35	3.6	7.07	0.11	1.68	329	146	33.1		85	6.04	651	13.4	26.4	106	196	4.93	0.79	17.2414	0.8019	7.4242	0.4864
228	1	Halajun granite pluton-IV	268.8	(Zhang & Zou, 2013)	77.15	40.37	139	2010HLJIV-1	Granite	(Zhang & Zou, 2013)	73.8	0.19	12.7	1.85	0.09	0.24	0.87	3.29	5.41	0.03	1.4	385	62.7	49	4.84	42.9	5.59	241	7.5	13.1	21	39	5.28	0.83	8.1250	2.0429	2.9771	0.4533
229	1	Halajun granite pluton-IV	268.8	(Zhang & Zou, 2013)	77.15	40.37	139	2010HLJIV-2	Granite	(Zhang & Zou, 2013)	73.75	0.19	12.75	1.91	0.02	0.24	0.85	3.34	5.39	0.03	1.35	366	42.7	31.8	5.12	40	4.84	217	7.24	12.1	26.1	44.6	4.49	0.7	8.9087	1.5326	3.6860	0.4706
230	1	Halajun granite pluton-IV	268.8	(Zhang & Zou, 2013)	77.15	40.37	139	2010HLJIV-3	Granite	(Zhang & Zou, 2013)	73.76	0.2	12.77	1.59	0.01	0.28	0.94	3.15	5.33	0.03	1.72	370	44.8	47.2	4.76	51.6	7.46	257	8.75	11.6	34.3	62.7	5.95	0.92	8.6723	1.5044	5.4052	0.4346
231	1	Halajun granite pluton-IV	268.8	(Zhang & Zou, 2013)	77.15	40.37	139	2010HLJIV-4	Granite	(Zhang & Zou, 2013)	73.66	0.2	12.7	2.52	0.01	0.35	0.52	3.08	5.48	0.03	1.24	370	45.4	47.8	4.98	44.7	5.88	246	7.94	18.8	31.1	55.7	5.35	0.85	8.3551	1.4373	2.9628	0.3929
232	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-1	Granite	(Zhang & Zou, 2013)	76.38	0.08	12.35	0.63	0.01	0.1	0.76	3.05	5.17	0.02	0.87	444	15.6	47.1	15.9	148	10.8	234	11.5	14.7	97.6	186	13.7	1.98	10.8029	1.5164	12.6531	0.7398
233	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-2	Granite	(Zhang & Zou, 2013)	75.72	0.09	12.3	1.75	0.02	0.06	0.66	3.53	4.65	0.02	0.64	465	8.87	50.9	5.33	152	11.1	237	11.7	9.55	142	273	14.5	2.07	10.4828	1.0704	28.5864	0.6060
234	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-3	Granite	(Zhang & Zou, 2013)	76.56	0.07	12.1	1.27	0.02	0.05	0.6	3.5	4.59	0.01	0.63	413	11.4	44.9	15.6	178	14.2	221	10.8	16.8	160	308	11.7	1.7	15.2137	1.1125	18.3333	0.7118
235	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-4	Granite	(Zhang & Zou, 2013)	76.25	0.08	12.12	1.41	0.02	0.05	0.64	3.42	4.8	0.02	0.58	469	6.3	51.3	7.14	153	17.3	216	10.9	14.6	123	253	13.8	1.99	11.0870	1.2439	17.3288	0.6528
236	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-5	Granite	(Zhang & Zou, 2013)	76.08	0.08	12.23	1.38	0.01	0.06	0.67	3.43	4.8	0.02	0.64	495	9.22	54.7	7.22	174	17	208	10.2	15.1	113	227	13.9	1.97	12.5180	1.5398	15.0331	0.7501
237	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-6	Granite	(Zhang & Zou, 2013)	76.31	0.08	12.16	1.15	0.01	0.05	0.77	3.28	4.85	0.02	0.72	497	8.7	50.6	7.66	184	19.5	240	12.7	18.6	140	258	15.3	2.2	12.0261	1.3143	13.8710	0.7409
238	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-7	Granite	(Zhang & Zou, 2013)	75.47	0.07	12.28	1.54	0.02	0.05	0.67	3.42	4.89	0.02	0.97	446	9.66	47.7	11.6	168	17.9	199	9.65	15.3	134	245	12.7	1.82	13.2283	1.2537	16.0131	0.7122
239	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-8	Granite	(Zhang & Zou, 2013)	75.96	0.07	12.24	1.42	0.02	0.05	0.65	3.4	4.91	0.02	0.66	584	4.9	61.4	7.52	206	22.3	214	11.9	11.5	106	217	16.9	2.46	12.1893	1.9434	18.8696	0.8654
240	1	Halajun granite pluton-V	271	(Zhang & Zou, 2013)	77.21	40.36	134	09HLJV-9	Granite	(Zhang & Zou, 2013)	76.09	0.07	12.11	1.38	0.02	0.05	0.66	3.28	4.98	0.02	0.74	571	6.73	49.8	4.59	183	15.4	206	11.2	11.9	141	254	13.4	1.99	13.6567	1.2979	21.3445	0.7402
241	1	Tamu intrusion	272.6	(Liu et al., 2013)	77.21	40.36	134	TM-YT-2	Granite	(Huang et al., 2012)	75.83	0.08	11.87	0.21		0.22	1.11	1.9	6.76	0	1.41	352	39.8	30.4	13.1	132	2.25	237	11.8		43.3	102	6.66	0.98	19.8198	3.0485		1.2331
242	1	Tamu intrusion	272.6	(Liu et al., 2013)	77.21	40.36	134	TM-YT-4	Granite	(Huang et al., 2012)	75.86	0.06	12.22	0.2		0.21	0.97	2.41	5.73	0	1.43	274	24.1	18	11.7	96.8	1.42	186	9.96		18.2	71.6	4.16	0.62	23.2692	5.3187		1.8126
243	1	Tamu intrusion	272.6	(Liu et al., 2013)	77.21	40.36	134	TM-YT-8	Granite	(Huang et al., 2012)	76.46	0.07	12.06	0.57		0.06	0.94	3.26	5	0	1.18	375	13.6	50.6	7.13	123	3.03	256	13.5		113	237	11.1	1.59	11.0811	1.0885		0.5513
244	1	Tamu intrusion	272.6	(Liu et al., 2013)	77.21	40.36	134	TM-YT-10	Granite	(Huang et al., 2012)	75.71	0.08	12.57	0.46		0.06	1.08	3.19	5.47	0	0.99	346	23.7	43.2	6.99	87.5	3.52	245	12.3		95.7	181	10.8	1.55	8.1019	0.9143		0.4612
245	1	Tamu intrusion	272.6	(Liu et al., 2013)	77.21	40.36	134	TM-YT-11	Granite	(Huang et al., 2012)	74.64	0.09	11.81	0.44		0.05	2.6	2.34	5.74	0	1.69	363	28.7	51.8	9.97	136	6.72	243	12.2		118	236	23.8	3.41	5.7143	1.1525		0.5896
246	1	Tamu intrusion	272.6	(Liu et al., 2013)	77.21	40.36	134	TM-YT-14	Granite	(Huang et al., 2012)	75.26	0.09	11.76	2.02		0.02	0.64	3.35	5.26	0	0.67	418	19.3	37.4	5.49	101	2.33	184	9.84		64.5	171	4.78	0.67	21.1297	1.5659		0.6970
247	1	Tamu intrusion	272.6	(Liu et al., 2013)	77.21	40.36	134	TM-YT-16	Granite	(Huang et al., 2012)	75.48	0.08	12.34	0.76		0.03	1.22	2.93	5.92	0	1.16	325	28.8	57.1	13.1	128	3.82	316	15.4		31.4	78.5	9.41	1.29	13.6026	4.0764		1.0245
248	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-03	K-feldspar granite	(Huang et al., 2010)	76.42	0.06	12.29	1.73	0.02	0.03	0.6	3.67	4.75	0.01	0.58	569	3.21	34.7	6.93	201	12.6	291	17.8	16.1	25.6	70.6	6.22	0.99	32.3151	7.8516	4.3851	2.2856
249	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-04	K-feldspar granite	(Huang et al., 2010)	77.15	0.05	12.27	1.32	0.02	0.03	0.48	4.03	4.3	0.01	0.54	531	3.68	48.3	4.49	158	8.69	202	12.3	17.2	41.3	78.2	11.2	1.72	14.1071	3.8257	4.5465	1.1990
250	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-08	K-feldspar granite	(Huang et al., 2010)	78.05	0.04	11.46	1.07	0.06	0.11	0.79	3.31	4.54	0.01	1.02	385	13.8	30	8.85	134	7.66	220	10.9	31.3	54.3	96.7	9.25	1.35	14.4865	2.4678	3.0895	1.1252
251	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-09	K-feldspar granite	(Huang et al., 2010)	75.96	0.05	12.08	1.38	0.03	0.06	0.61	3.69	4.71	0.01	0.88	391	5.64	23.4	13.6	123	7.73	229	12.1	97.9	50.7	88.2	6.45	0.97	19.0698	2.4260	0.9009	1.2103
252	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-12	K-feldspar granite	(Huang et al., 2010)	76.5	0.05	12	1.92	0.01	0.13	0.53	3.18	4.9	0.01	0.74	469	13.1	34	4.11	135	8.51	250	12.9	21.8	56.3	95.9	7	1.06	19.2857	2.3979	4.3991	1.0458
253	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-14	K-feldspar granite	(Huang et al., 2010)	77.05	0.05	11.82	0.96	0.01	0.17	0.93	3.08	4.88	0.01	1.06	418	12.9	58.4	3.79	134	7.37	179	10.3	12.2	107	208	9.76	1.47	13.7295	1.2523	17.0492	0.5745
254	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-18	K-feldspar granite	(Huang et al., 2010)	76.65	0.05	11.99	1.38	0.01	0.12	0.56	3.16	4.96	0.01	0.78	412	8.69	25.2	5.29	145	9.65	238	12.9	15.6	50.5	72.5	5.77	0.86	25.1300	2.8713	4.6474	1.3776
255	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-20	K-feldspar granite	(Huang et al., 2010)	75.52	0.05	12.45	0.98		0.05	0.95	3.49	5.23	0.01	0.96	261	8.61	25.1	5.51	60.6	4.06	364	15.6	4.15	92.8	156	6.58	1.04	9.2097	0.6530	37.5904	0.4256
256	1	Huoshibulake granite plu	275.1	(Liu et al., 2013)	77.33	40.48	132	YTHS-21	K-feldspar granite	(Huang et al., 2010)	76.71	0.05	12.01	1.32	0.01	0.08	0.54	3.78	4.56	0.01	0.64	376	3.35	18.2	5.33	162	7.39	263	13.5	5.5	35	46.9	5.43	0.83	29.8343	4.6286	8.5273	2.1754
257	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN93	K-feldspar granite	(Luo et al., 2010)	76.87	0.06	11.97	1.1	0.02	0.04	0.47	3.66	4.65	0.01	0.71	300	6.86	29.8	8.8	61.9	6.27	141	7.28	23.2	52.7	104	7.13	1.05	8.6816	1.1746	4.4828	0.5294
258	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN94	K-feldspar granite	(Luo et al., 2010)	77.3	0.06	11.82	1.18	0.01		0.49	3.55	4.71	0.01	0.42	279	6.23	31.7	7	52.6	5.66	151	7.65	18	51.4	129	8.55	1.14	6.1520	1.0233	7.1667	0.4416
259	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN95	K-feldspar granite	(Luo et al., 2010)	76.57	0.09	11.84	1.51	0.03	0.03	0.52	3.55	4.63	0.01	0.87	292	6.26	39.7	9.38	61.4	5.67	194	9.63	14	69.9	175	10	1.33	6.1400	0.8784	12.5000	0.3950
260	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN96	K-feldspar granite	(Luo et al., 2010)	76.06	0.07	12.4	2.01	0.03	0.04	0.66	3.69	4.99	0.01	0.46	374	2.9	78.4	14.9	103	6.7	105	6.32	24.3	54.8	126	13.1	1.78	7.8626	1.8796	5.1852	0.5326
261	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN98	K-feldspar granite	(Luo et al., 2010)	76.95	0.06	11.84	1.07	0.01	0.03	0.49	3.69	4.8	0.01	0.6	286	4.48	33.3	10.9	49.8	4.96	150	8.09	21.5	72.9	149	7.86	1.08	6.3359	0.6831	6.9302	0.3426
262	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN99	K-feldspar granite	(Luo et al., 2010)	75.85	0.09	12.23	1.77	0.02	0.04	0.48	3.67	4.72	0.01	1.11	320	6	33.3	9.94	84.3	8.38	207	10.7	20.5	67.2	135	9.39	1.29	8.9776	1.2545	6.5854	0.6040
263	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN100	K-feldspar granite	(Luo et al., 2010)	76.47	0.07	12.16	1.34	0.02	0.03	0.44	3.7	4.73	0.01	1.02	280	6.15	32.7	7.65	52.3	4.41	179	8.46	20.9	54.6	127	7.48	1.01	6.9920	0.9579	6.0766	0.4195
264	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN101	K-feldspar granite	(Luo et al., 2010)	77.48	0.07	11.45	1.16	0.02	0.02	0.5	3.5	4.47	0.01	0.92	267	5.19	26.6	9.28	41.3	3.27	150	7.03	19.2	51.4	111	6.57	0.9	6.2861	0.8035	5.7813	0.3786
265	1	Huoshibulake granite plu	275.4	(Luo et al., 2010)	77.33	40.48	132	06TXN102	K-feldspar granite	(Luo et al., 2010)	75.41	0.06	12.06	1.84	0.03	0.03	0.71	3.44	5.05	0.01	1.1	349	3.8	44.1	11.7	95.6	7.96	158	8.74	28	51	120	12.7	1.75	7.5276	1.8745	4.2857	0.6832
266	1	Halajun granite pluton-I	273	(Su et al., 2019)	77.36	40.49	131	HL-15	Granite	(Su et al., 2019)	75.81	0.07	12.12	1.38	0.01	0.11	0.66	3.78	4.75		0.85	474	16	52.8	5.19	173	10.4	248	15	11.9	71.1	130	11	1.57	15.7273	2.4332	10.9244	0.9570

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^t$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
267	1	Halajun granite pluton-I	273	(Su et al., 2019)	77.36	40.49	131	HL-16	Granite	(Su et al., 2019)	76.21	0.13	12.42	1.15	0.01	0.05	0.58	3.6	5.19	0.01	0.45	343	19.6	37.9	6.79	60.9	5.77	186	7.91	27	93.6	185	6.42	0.89	9.4860	0.6506	6.8519	0.3465
268	1	Halajun granite pluton-I	273	(Su et al., 2019)	77.36	40.49	131	HL-18	Granite	(Su et al., 2019)	76.17	0.07	12.05	1.29	0.02	0.03	0.62	3.64	5.02	0.01	0.66	330	8.81	32.7	7.95	73.3	5.95	125	6.81	12.2	47.8	96.5	8.59	1.17	8.5332	1.5335	7.9098	0.6284
269	1	Halajun granite pluton-I	273	(Su et al., 2019)	77.36	40.49	131	HL-19	Granite	(Su et al., 2019)	75.94	0.08	12.16	1.44	0.01	0.03	0.61	3.97	4.7	0.01	0.58	464	8.5	41.5	33.9	130	9.22	209	11.6	17.4	71.3	142	11.4	1.5	11.4035	1.8233	8.1609	0.8100
270	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.39	40.49	129	08KT02-1	K-feldspar granite	(Zhang et al., 2010a)	71.86	0.19	14.6	1.91	0.03	0.15	1.2	4.33	5.3	0.02	0.15	170	88.7	17.6	2.83	44.7	3.04	367	10.6		48.1	104	4.86	0.74	9.1975	0.9293		0.5207
271	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.39	40.49	129	08KT02-2	K-feldspar granite	(Zhang et al., 2010a)	71.7	0.17	14.7	1.74	0.03	0.14	1.14	4.15	5.72	0.02	0.21	190	97.8	20.6	2.35	44.2	3.17	183	5.61		86.2	176	4.59	0.71	9.6296	0.5128		0.3555
272	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.39	40.49	129	08KT02-3	K-feldspar granite	(Zhang et al., 2010a)	73.22	0.16	14.44	1.47	0.03	0.15	1	3.73	5.35	0.02	0.21	183	93.5	20.3	2.44	40.7	2.93	243	7.22		96.2	194	4.13	0.65	9.8547	0.4231		0.3121
273	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.39	40.49	129	08KT02-4	K-feldspar granite	(Zhang et al., 2010a)	74.24	0.19	13.36	1.76	0.03	0.15	0.96	3.64	5.19	0.03	0.24	177	87.6	26.6	3.98	52.6	4.07	314	9.81		108	211	5.54	0.87	9.4946	0.4870		0.3326
274	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.39	40.49	129	08KT02-5	K-feldspar granite	(Zhang et al., 2010a)	72.89	0.17	13.16	1.62	0.03	0.15	0.89	3.44	5.25	0.02	2.2	197	77.9	17.1	3.46	50.2	3.81	266	8.1		42.6	102	4.78	0.75	10.5021	1.1784		0.6304
275	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.39	40.49	129	08KT02-6	K-feldspar granite	(Zhang et al., 2010a)	72.7	0.17	13.94	1.75	0.03	0.15	1.01	3.86	5.83	0.02	0.29	207	80.4	12.8	5.64	59.1	4.51	172	5.5		52.4	108	5.81	0.99	10.1721	1.1279		0.7734
276	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.39	40.49	129	08KT02-7	K-feldspar granite	(Zhang et al., 2010a)	75.23	0.28	12.02	2.73	0.05	0.18	1.15	3.4	4.56	0.04	0.2	151	75.9	27.4	3.8	69.3	4.71	367	11.9		78.4	174	7.5	1.17	9.2400	0.8839		0.5068
277	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.36	40.48	130	HLJ1-1A	Granite	(Cao et al., 2013)	72.44	0.23	13.82	2.33	0.04	0.15	1.01	3.67	5.45	0.03	0.29	196	89	24.8	5.34	68.4	6.06	286	10.2		101	193	7.57	1.08	9.0357	0.6772		0.4632
278	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.36	40.48	130	HLJ1-2A	Granite	(Cao et al., 2013)	72.57	0.2	13.83	2.11	0.04	0.13	0.96	3.65	5.72	0.02	0.22	182	97.1	16.6	2.66	49	3.24	249	7.77		52.1	105	5.09	0.72	9.6267	0.9405		0.5647
279	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.36	40.48	130	HLJ1-1B	Granite	(Cao et al., 2013)	72.39	0.22	13.87	2.23	0.04	0.16	1.01	3.69	5.47	0.02	0.3	201	89.1	22.5	3.69	55.6	5.48	373	12.9		102	195	6.75	0.99	8.2370	0.5451		0.3934
280	1	Halajun granite pluton-I	278	(Zhang et al., 2010a)	77.36	40.48	130	HLJ1-2B	Granite	(Cao et al., 2013)	72.62	0.2	14	2.02	0.04	0.15	0.95	3.62	5.64	0.02	0.16	176	93.8	15.2	2.49	44.9	2.96	290	9.18		49.7	101	4.9	0.7	9.1633	0.9034		0.5537
281	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-1	Gabbro	(Zhang et al., 2010a)	43.63	2.22	17.38	15.39	0.12	6.28	11.65	2.23	0.26	0.02	0.33	2.79	491	0.26	0.06	2.7	0.21	22	0.76		2.62	6.08	0.41	0.07	6.5854	1.0305		1.1087
282	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-2	Gabbro	(Zhang et al., 2010a)	50.75	0.62	24.33	5.52	0.05	2.73	11.19	3.52	0.35	0.02	0.33	3.07	653	0.22	0.06	1.88	0.12	11.2	0.33		2.91	6.07	0.18	0.03	10.4444	0.6460		0.7963
283	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-3	Gabbro	(Zhang et al., 2010a)	47.72	2.65	15.91	14.89	0.17	4.9	10.02	2.91	0.42	0.31	0.31	5.62	527	0.75	0.33	24.8	1.52	56.3	1.57		16.5	40	1.81	0.29	13.7017	1.5030		2.3893
284	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-5	Gabbro	(Zhang et al., 2010a)	40.63	3.17	12.27	21.62	0.18	9.63	10.8	1.62	0.25	0.03	0.55	3.22	310	0.47	0.09	3.92	0.3	35.2	1.22		3.81	9.37	0.69	0.1	5.6812	1.0289		0.9928
285	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-6	Gabbro	(Zhang et al., 2010a)	51.89	2.33	14.06	14.06	0.16	4.13	7.21	3.01	1.83	0.25	0.71	44.6	369	5.47	1.12	24.5	1.75	215	5.7		26.5	57.8	2.32	0.37	10.5603	0.9245		0.6897
286	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-8	Olv.-bearing gabbro	(Zhang et al., 2010a)	39.08	2.77	7.77	25.04	0.24	14.02	10.41	1.01	0.11	0.01	0.73	1.43	235	0.13	0.07	1.45	0.13	18.5	0.69		1.65	4.55	0.6	0.1	2.4167	0.8788		1.0611
287	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-9	Gabbro	(Zhang et al., 2010a)	44.97	3.37	14.71	16.18	0.16	5.6	11.83	2.36	0.4	0.06	0.04	4.29	415	0.49	0.1	7.35	0.52	51.2	1.53		5.71	14	1.17	0.17	6.2821	1.2872		1.4893
288	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-10	Gabbro	(Zhang et al., 2010a)	48.43	2.53	16.23	14.1	0.16	4.71	9.75	2.9	0.61	0.28	0.1	12.1	502	1.5	0.33	21.9	1.48	57.9	1.64		15.5	36.5	1.78	0.27	12.3034	1.4129		1.5393
289	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-11	Gabbro	(Zhang et al., 2010a)	44.55	5.57	11.74	19.81	0.22	5.27	9.66	2.57	0.67	0.12	0.49	14.2	384	2.15	0.42	43.1	2.9	168	4.4		13.4	33.1	2.3	0.37	18.7391	3.2164		2.7215
290	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-12	Gabbro	(Zhang et al., 2010a)	44.58	3.82	16.1	16.28	0.14	4.23	10.74	2.94	0.57	0.1	0.08	7.59	491	0.86	0.19	9.71	0.62	62.4	1.96		7.67	18.3	1.12	0.18	8.6696	1.2660		1.2814
291	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-13	Gabbro	(Zhang et al., 2010a)	47.33	2.75	15.43	15.68	0.18	4.89	9.69	2.87	0.55	0.4	0.15	9.72	506	1.21	0.3	23.3	1.5	46.9	1.45		18.1	43.2	1.91	0.29	12.1990	1.2873		1.6874
292	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-14	Diabase/dolerite	(Zhang et al., 2010a)	51.56	2.28	14.13	13.87	0.14	4.24	7.06	3.4	1.6	0.28	1.09	42	322	5.51	1.17	26.5	1.87	221	5.74		27.1	60.8	2.39	0.37	11.0879	0.9779		0.7350
293	1	Piqiang plutonic complex	276	(Zhang et al., 2010a)	77.62	40.45	110	08KT01-15	Diabase/dolerite	(Zhang et al., 2010a)	52.18	2.85	13.91	14.29	0.19	3.5	6.91	3.17	1.91	0.37	0.39	50.6	391	6.45	1.49	32.8	2.37	259	6.58		32.4	72.4	2.87	0.45	11.4286	1.0123		0.7690
294	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1117	Dioritic dike	(Cao et al., 2013)	52.79	1.83	17.44	8.47	0.14	4.1	7.96	3.3	1.48	0.32	1.56	56.8	559	4.05	1.88	22.1	2.32	59.2	1.92		17.2	34.2	1.34	0.21	16.4925	1.2849		0.8974
295	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1212	Dioritic dike	(Cao et al., 2013)	53.5	2.5	14.02	13.7	0.18	2.94	6.41	3.02	2.19	0.52	0.44	67.2	366	7.52	1.57	36.5	2.62	323	8.46		42.2	88.9	3.37	0.5	10.8309	0.8649		0.6944
296	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1205	Dioritic dike	(Cao et al., 2013)	54.92	1.68	15.26	13.16	0.19	1.65	5.41	3.83	2.37	0.42	0.52	31.5	398	6.08	1.64	45.9	1.75	658	16.3		46.7	98	4	0.6	11.4750	0.9829		0.9232
297	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1114	Dioritic dike	(Cao et al., 2013)	56.19	1.99	19.26	5.69	0.09	2.12	6.86	4.27	1.46	0.32	1.12	41.7	662	4.17	2.05	24.2	2.85	97.3	2.94		16.1	34.8	1.62	0.24	14.9383	1.5031		1.0010
298	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1112	Dioritic dike	(Cao et al., 2013)	57.03	2.31	19.24	2.67	0.04	1.45	7.09	5.01	2.79	0.16	1.59	48.3	755	7.33	6.82	38.8	4.05	89.4	2.95		32.7	59.5	2.27	0.34	17.0925	1.1865		0.8494
299	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1113	Dioritic dike	(Cao et al., 2013)	59.42	1.3	19.04	2.26	0.03	1.56	6.45	5.13	2.59	0.17	1.42	61.6	940	7.56	6.05	31.9	3.31	85.8	2.92		32.7	63.1	2.93	0.42	10.8874	0.9755		0.6876
300	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1126	Granitic dike	(Cao et al., 2013)	64.39	0.65	15.29	5.8	0.11	0.65	2.04	3.75	6.35	0.14	0.25	197	116	10.8	4.09	73.2	4.66	673	17.3		56.2	125	7.76	1.21	9.4330	1.3025		1.0070
301	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1124	Granitic dike	(Cao et al., 2013)	68.97	0.24	15.65	2.43	0.04	0.22	1.18	3.93	6.45	0.03	0.29	183	108	10.6	2.45	40.8	3.07	303	9.31		46.8	91.5	4.35	0.62	9.3793	0.8718		0.6208
302	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1125	Granitic dike	(Cao et al., 2013)	69.83	0.21	15.54	2.05	0.04	0.18	1.23	4.03	5.98	0.02	0.31	163	111	10.6	2.62	38	2.68	337	10.2		31.2	64.6	4.11	0.6	9.2457	1.2179		0.7082
303	1	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1123	Granitic dike	(Cao et al., 2013)	70.95	0.24	14.52	2.29	0.04	0.19	1.03	3.53	6.31	0.03	0.29	168	104	14.7	2.04	41.5	2.98	303	9.66		57.7	117	4.67	0.69	8.8865	0.7192		0.4829
304	2	Piqiang plutonic complex	275	Estimated*	77.61	40.47	113	PQ1202B	Granitic dike	(Cao et al., 2013)	74.33	0.18	13.23	1.83	0.03	0.2	1	3.02	5.41	0.02	0.19	179	94.8	25.2	3.61	23.1	2.9	172	6.48		55	99.2	2.46	0.36	9.3902	0.4200		0.2103
305	2	Mazha syenite intrusion	285.9	(Sun et al., 2008a)	78.85	39.79	21	04XJ-73	Syenite	(Sun et al., 2008a)	64.15	0.7	16.85	4.83	0.15	0.67	2.02	6.08	4.4	0.19	0.6	60.8	404	10.8	2.49	76.8	4.57	346	8.04	9.52	75.1	149	2.74	0.44	28.0292	1.0226	15.6513	0.9140
306	2	Mazha syenite intrusion	285.9	(Sun et al., 2008a)	78.85	39.79	21	04XJ-77	Syenite	(Sun et al., 2008a)	65.28	0.54	17.13	3.79	0.12	0.38	1.46	5.82	5.21	0.11	0.94	75.8	216	8.56	2.36	58.5	3.68	311	7.44	11.6	52.8	104	2.18	0.34	26.8349	1.1080	8.9655	0.9326
307	2	Mazha syenite intrusion	285.9	(Sun et al., 2008a)	78.85	39.79	21	04XJ-79	Syenite	(Sun et al., 2008a)	65.14	0.56	16.9	4.23	0.11	0.43	1.64	5.74	5.02	0.11	0.99	75.4	225	10.2	2.49	49.4	3.44	386	8.71	9.91	60.4	117	2.36	0.37	20.9322	0.8179	11.8063	0.6745
308	2	Mazha syenite intrusion	285.9	(Sun et al., 2008a)	78.85	39.79	21	04XJ-82	Syenite	(Sun et al., 2008a)	62.98	0.77	18.22	4.06	0.09	0.69	2.78	5.82	4.26	0.18	1.48	56.1	657	7.88	1.62	49.8	2.92	424	8.43	18.7	62.3	112	1.54	0.25	32.3377	0.7994	5.9893	0.7618
309	2	Mazha syenite intrusion	285.9	(Sun et al., 2008a)	78.85	39.79	21	04XJ-84	Syenite	(Sun et al., 2008a)	65.48	0.47	17.61	3.17	0.08	0.3	1.47	5.83	5.39	0.08	0.95	56.8	205	7.64	1.66	46.9	2.85	237	5.63	12.4	53.1	102	1.69	0.27	27.7515	0.8832	8.2258	0.7892
310	2	Mazha syenite intrusion	285.9	(Sun et al., 2008a)	78.85	39.79	21	04XJ-88	Syenite	(Sun et al., 2008a)	65.14	0.54	17.28	3.74	0.12	0.39	1.88	5.8	4.84	0.09	1.35	58.4	277	7.89	1.91	47.4	2.95	243	6.07	10.8	54.4	109	1.88	0.28	25.2128	0.8713	10.0926	0.7754
311	2	Layered intrusive comple	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-1	Syenite	(Zhang et al., 2008)	61.42	0.54	19.59	3.54	0.07	0.59	2.46	6.22	4.33	0.12	1.28	56	638	7.44	1.72	47.9	2.68	337	7.2		60.2	103	1.51	0.22	31.7219	0.7957		0.7671
312	2	Layered intrusive comple	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-6	Syenite	(Zhang et al., 2008)	60.62	0.75	18.33	5.17	0.15	0.89	2.36	6.31	4.2	0.24	0.37	66.3	599	5.96	1.74	61	3.16	466	10.1		73.5	146	2.44	0.34	25.0000	0.8299		0.9878
313	2	Layered intrusive comple	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-10	Syenite	(Zhang et al., 2008)	56.23	1.46	17.34	8	0.14	2.17	4.2	5.64	3.59	0.6	0.78	50.2	776	8.52	1.58	53.2	3.52	297	7.86		65.5	128	2.31	0.34	23.0303	0.8122		0.7633
314	2	Syenite intrusion	279.7	(Wei & Xu, 2011)	78.80	39.77	17	Xhz-1b	Syenite	(Wei & Xu, 2011)	60.9	0.91	16.29	7.01	0.23	0.83	2.73	6.86	3.52	0.22	0.21	35.3	483	4.18	1.01	69.3	3.58	675	14.8	5.55	65.9	145	2.79	0.42	24.8387	1.0516	26.1261	1.4151
315	2	Syenite intrusion	279.7	(Wei & Xu, 2011)	78.80	39.77	17	Xhz-3-1	Syenite	(Wei & Xu, 2011)	62.02	0.89	16.71	6.65	0.21	0.66	2.58	6.05	3.52	0.19	0.24	38.6	503	3.97	1.12	76	3.96	697	16	5.81	59.3	131	2.68	0.42	28.3582	1.2816	22.5473	1.6788
316	2	Syenite intrusion	279.7	(Wei & Xu, 2011)	78.80	39.77	17	Xhz-4	Syenite	(Wei & Xu, 2011)	61.82	0.96	16.4	7.25	0.23	0.69	2.73	5.66	3.56	0.21	0.21	39	496	4.46	1.18	75.9	3.99	725	16.2	5.51	63.8	141	2.91	0.42	26.0825	1.1897	25.5898	1.5250
317	2	Syenite intrusion	279.7	(Wei & Xu, 2011)	78.80	39.77	17	Xhz-5a	Syenite	(Wei & Xu, 2011)	61.48	1.02	16.47	7.28	0.24	0.72	2.72	5.82	3.51	0.22	0.23	36.2	500	3.78	1.02	82	4.2	771	17.2	5.46	60.9	138	2.82	0.44	29.0780	1.3465	25.2747	1.8317
318	2	Syenite intrusion	279.7	(Wei & Xu, 2011)	78.80	39.77	17	Xhz-6	Syenite	(Wei & Xu, 2011)	62.02	0.83	16.69	6.28	0.21	0.62	2.49	6.27	3.63	0.19	0.5	38.4	488	4.2	1.08	73.7	3.78	704	15.8	5.55	60.3	132	2.73	0.4	26.9963	1.2222	23.7838	1.5696
319	2	Syenite intrusion	279.7	(Wei & Xu, 2011)	78.80	39.77	17	Xhz-9	Syenite	(Wei & Xu, 2011)	62.89	0.64	18.97	2.9	0.05	0.73	2.3	6.61	4.07	0.11	0.64	73.2	950	10.9	2.85	84.9	4.22	363	8.3	41.1	75.6	139	2.09	0.31	40.6220	1.1230	3.3820	1.0024
320	2	Syenite intrusion	279.7	(Wei & Xu, 2011)	78.80	39.77	17	Xhz-10	Syenite	(Wei & Xu, 2011)	60.02	1.17	17.9	5.42	0.09	1.56	3.81	5.54	3.47	0.34	0.4	73.5	870	10.5	2.47	69.4	4.26	557	13.3	12	75.8	145	2.11	0.31	32.8910	0.9156	12.0833	0.8337
321	2	Mazha syenite intrusion	285.9	(Sun et al., 2008a)	78.85	39.79	21	04XJ-86	Syenite	(Sun et al., 2008a)	65.42	0.52	17.03	3.72	0.11	0.37	1.51	5.7	5.44	0.09	1.11	64.4	147	8.92	2.01	52.8	3.11	276	6.61	8.82	68.1	136	2.05	0.31	25.7561	0.7753	15.4195	0.7261
322	2	Layered intrusive comple	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-4	Syenite	(Zhang et al., 2008)	63.97	0.42	17.69	3.66	0.11	0.36	1.15	6.05	5.53	0.06	0.42	84.8	170	14.3	3.13	68.6	4.41	614	13.5		82.2	156	2.61	0.38	26.2835	0.8345		0.6781
323	2	Layered intrusive comple	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-7	Syenite	(Zhang et al., 2008)	62.29	0.56	18.21	4.13	0.1	0.58	2.08	6.22	4.64	0.12	0.79	62.4	525	8.68	1.94	52.1	3.39	591	12.6		55	106	2.04	0.31	25.5392	0.9473		0.8082
324	2	Layered intrusive comple	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-8	Syenite	(Zhang et al., 2008)	62.24	0.6	18.01	4.41	0.12	0.67	2.18	6.1	4.58	0.14	0.65	64.9	493	8.67	1.68	49.5	3.17	529	11.8		64.4	121	2.22	0.34	22.2973	0.7686		0.7100
325	2	Layered intrusive comple	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-9	Syenite	(Zhang et al., 2008)	59.85	0.88	18.36	5.71	0.15	1.16	3.42	6.08	3.47	0.31	0.2	88.7	736	7.76	2.86	75.1	4.58	323	7.97		95.9	177	2.38	0.34	31.5546	0.7831		0.9330
326	2	Layered intrusive comple	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-11	Syenite	(Zhang et al., 2008)	56.46	1.37	17.77	8.06	0.14	1.83	5.61	5.37	2.63	0.59	0.19	57.2	894	11.7	2.46	89.4	5.93	447	11.7		81.9	163	3.61	0.52	24.7645	1.0916		0.9788
327	2	Syenite intrusion	279.7	(Wei & Xu, 2011)	78.80	39.77	17	Xhz-1a	Syenite	(Wei & Xu, 2011)	58.59	1.42	16.98	6.91	0.14	2.01	4.11	5.21	3.56	0.44	0.34	77.3	767	12.1	2.44	86.7	5	646	16.1	10.4	83.8	168	2.82	0.4	30.7447	1.0346	16.1538	0.9228
328	2	Wajilitag intrusion	280	Estimated*	78.94	39.56	39	WJL070201	Aeg.-neph. syenite	(Zou et al., 2015)	52.82	1.11	19.47	5.76	0.22	1.09	3.79	9.06	4.16	0.25	1.98	90.6	2855	40.4	8.78	242	9.49	1153	22	30	182	323	4.26	0.62	56.8075	1.3297	10.7667	0.9565
329	2	Wajilitag intrusion	280	Estimated*	78.94	39.56	39	WJL070202	Aeg.-neph. syenite	(Zou et al., 2015)	52.14	0.88	19.81	5.44	0.19	0.91	3.42	9.26	4.55	0.2	2.78	96.9	2726	44.3	7.58	190	5.77	917	16.8	53.6	209	348	3.86	0.56	49.2228	0.9091	6.4925	0.6692
330	2	Wajilitag intrusion	280	Estimated*	78.94	39.56	39	WJL070203	Aeg.-neph. syenite	(Zou et al., 2015)	51.93	0.69	20.15	6.6	0.16	0.74	2.58	9.42	4.85	0.13	2.33	130	1955	31.1	5.25	128	3.65	627	11.3	22.9	139	218	2.5	0.38	51.2000	0.9209	9.5197	0.6598
331	2	Wajilitag intrusion	280	Estimated*	78.94	39.56	39	WJL070204	Aeg.-neph. syenite	(Zou et al., 2015)	53.97	0.66	21.12	4.41	0.15	0.67	2.24	8.91	5.11	0.11	2.23	141	1698	11.3	3.2	122	3.58	699	13.2	14.1	86.2	146	1.98	0.34	61.6162	1.4153	10.3546	1.3248

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^t$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
332	2	Wajilitag intrusion	280	Estimated*	78.94	39.57	39	WJL050605-1	Syenite porphyry	(Zou et al., 2015)	55.39	0.75	19.73	4.75	0.26	0.61	1.92	5.95	5.73	0.19	4.45	83.3	1918	38.1	7.72	315	13	1533	28.4	127	135	253	4.64	0.67	67.8879	2.3333	1.9921	1.4886
333	2	Wajilitag intrusion	280	Estimated*	78.94	39.57	39	WJL050605-2	Syenite porphyry	(Zou et al., 2015)	54.61	0.74	19.36	5.04	0.25	0.6	2.44	6.74	4.74	0.18	5.09	66.7	1228	38.4	13.2	309	13.1	1591	28.7	175	148	261	3.92	0.57	78.8265	2.0878	1.4914	1.3892
334	2	Wajilitag intrusion	280	Estimated*	78.94	39.57	39	WJL050605-3	Syenite porphyry	(Zou et al., 2015)	55.05	0.77	19.54	4.32	0.2	0.65	2.08	7.17	4.38	0.19	5.51	55.5	906	43.9	4.33	377	13.7	1576	27.8	29.2	156	277	6.27	0.94	60.1276	2.4167	9.4863	1.5440
335	2	Wajilitag intrusion	280	Estimated*	78.94	39.57	39	WJL050605-4	Syenite porphyry	(Zou et al., 2015)	54.74	0.73	19.4	5.88	0.19	0.49	1.9	6.32	5.44	0.19	4.44	78.2	1167	45.5	8.71	307	12.6	1176	21.9	44.2	151	259	4.29	0.62	71.5618	2.0331	5.8597	1.2553
336	2	Wajilitag intrusion	281.4	(Zou et al., 2015)	78.94	39.54	41	WJL070603	Alkali mafic rock(syenite?)	(Zou et al., 2015)	56.71	0.41	20.48	3.22	0.19	0.34	1.65	10.5	3.83	0.05	2.15	106	1425	46.5	13.2	272	5.65	1431	21.5	36	183	278	3.85	0.59	70.6494	1.4863	7.7222	0.9993
337	2	Wajilitag intrusion	281.4	(Zou et al., 2015)	78.94	39.54	41	WJL081907	Alkali mafic rock(syenite?)	(Zou et al., 2015)	57.05	0.45	20.59	3.26	0.18	0.6	1.66	10.18	3.81	0.06	1.68	97.9	1922	47.8	10.4	280	6.29	1431	21.9	26	176	282	3.97	0.61	70.5290	1.5909	10.8462	1.0346
338	2	Mazha syenite intrusion	285.9	(Sun et al., 2008a)	78.85	39.79	21	04XJ-75	Syenite	(Sun et al., 2008a)	67.29	0.4	16.79	3.69	0.04	0.08	0.54	5.15	5.8	0.06	0.85	78.2	49	12.5	2.24	55.8	3.52	332	7.38	7.64	86.3	170	2.25	0.34	24.8000	0.6466	22.2513	0.5758
339	2	Syenite intrusion	277	(Yang et al., 2006)	78.80	39.77	18	Xhzn4-4	Quartz syenite porphyry	(Yang et al., 2006)	67.08	0.3	14.77	3.95	0.12	0.38	1.13	5.79	4.4	0.01	1.26	109	283	27.9		163	10.4	1007	24.8		147	298	5.9	0.8	27.6271	1.1088		0.8626
340	2	Syenite intrusion	277	(Yang et al., 2006)	78.80	39.77	18	Xhzn4-5	Quartz syenite porphyry	(Yang et al., 2006)	67.49	0.31	14.83	4.18	0.13	0.44	1.11	5.92	4.69	0.01	1.16	108	56.9	26.8		158	9.9	1001	24.1		144	300	5.8	0.8	27.2414	1.0972		0.8620
341	2	Syenite intrusion	277	(Yang et al., 2006)	78.80	39.77	18	Xhzn4-6	Quartz syenite porphyry	(Yang et al., 2006)	67.71	0.3	14.93	4.17	0.16	0.4	1.13	5.58	4.5		1.15	107	53.1	26.4		161	10.4	987	23.7		131	272	5.6	0.8	28.7500	1.2290		0.9279
342	2	Syenite intrusion	277	(Yang et al., 2006)	78.80	39.77	18	Xhzn4-7	Quartz syenite porphyry	(Yang et al., 2006)	66.52	0.3	14.92	5.17	0.14	0.32	0.72	5.63	4.79	0.01	0.85	108	40	24		155	8.9	1000	22.3		133	277	5.1	0.7	30.3922	1.1654		0.9298
343	2	Syenite intrusion	277	(Yang et al., 2006)	78.80	39.77	18	Xhzn4-8	Quartz syenite porphyry	(Yang et al., 2006)	67.54	0.3	15	4.26	0.15	0.46	0.56	5.77	4.63		1	94.9	38.6	24.5		148	8.8	920	21.3		124	260	5	0.7	29.6000	1.1935		0.9101
344	2	Syenite intrusion	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-2	Quartz syenite	(Zhang et al., 2008)	68.7	0.08	17.1	2.05	0.01	0.01	0.28	6.08	5.71	0.01	0.39	92.9	16.8	10	1.94	55.9	3.57	340	8.26		43.1	85	2.14	0.31	26.1215	1.2970		0.9126
345	2	Syenite intrusion	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-3	Quartz syenite	(Zhang et al., 2008)	68.48	0.11	17.11	2.05	0.1	0.01	0.08	6.3	5.66	0.02	0.33	94	24.6	15.9	3.97	84.6	5.24	564	14.9		71.6	139	3.01	0.41	28.1063	1.1816		0.8498
346	2	Syenite intrusion	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-5	Quartz syenite	(Zhang et al., 2008)	67.87	0.34	14.49	5.13	0.17	0.16	0.77	5.41	4.79	0.03	0.46	144	78.8	31.2	12.4	210	15.3	1349	34.6		178	335	6.7	0.99	31.3433	1.1798		0.9551
347	2	Volcanic rocks	285	(Zhang et al., 2010b)	78.81	40.02	30	TWC07-1	Diabase	(Zhang et al., 2010b)	44.58	2.43	15.54	15.93	0.2	8.64	7.95	2.65	1.01	0.5	1.14	18.5	377	2.36	0.59	15.7	1.07	165	4.25	5.15	21.9	45.6	2.38	0.37	6.5966	0.7169	8.8544	0.7402
348	2	Volcanic rocks	285.4	(Zhang et al., 2010b)	78.63	39.66	15	XHZ07-5	Basaltic rock	(Zhang et al., 2010b)	46.29	3.25	12.62	14.88	0.15	6.01	7.59	3.93	2.93	0.78	1.84	95.2	981	21.2	4.9	88.5	6.34	608	14.6	9.63	76.5	164	2.01	0.27	44.0299	1.1569	17.0301	0.7448
349	2	Volcanic rocks	285.4	(Zhang et al., 2010b)	78.63	39.66	15	XHZ07-7	Basaltic rock	(Zhang et al., 2010b)	48.05	3.52	14.16	13.39	0.21	4.11	8.72	3.12	1.68	0.76	2.56	59	736	8.6	2.11	65.9	4.48	413	10.8	20.9	64	136	2.69	0.37	24.4981	1.0297	6.5072	0.9520
350	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	Xhn12-6	Basalt	(Yu et al., 2017)	45	4.06	12.03	20.4	0.22	3.03	6.54	2.16	4.48	1.31	0.76	76.8	284	5.1	1	33.1	2	433	9.4		43.6	106	4.2	0.7	7.8810	0.7592		0.7523
351	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	Xhn14-1	Basalt	(Yu et al., 2017)	41.29	5.11	16.81	19.48	0.47	4.71	4.63	3.01	0.52	1.97	2	4.5	369	5.1	1.5	37.5	2.1	443	9.6		54.3	123	4.5	0.7	8.3333	0.6906		0.7637
352	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	Xhn14-3	Basalt	(Yu et al., 2017)	43.66	4.06	13.54	12.44	0.27	2.53	12.07	2.24	0.89	1.63	6.91	14.8	381	5.1	1.3	36.7	2.1	431	9.3		54.9	119	3.7	0.6	9.9189	0.6685		0.7433
353	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	Xhn13-3	Basalt	(Yu et al., 2017)	49.96	3.99	12.86	11.94	0.33	1.96	8.98	2.53	1.32	1.58	4.53	25.5	334	5.1	1.4	36.4	2.1	436	9.5		53.1	118	4.2	0.7	8.6667	0.6855		0.7497
354	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	XHN01	Basalt	(Yu et al., 2017)	46.6	4.22	13.41	12.75	0.21	3.3	8.54	2.48	0.96	1.62	5.77	16	437	5.1	1.6	37.8	1.8	493	9.5		55.2	123	4.1	0.6	9.2195	0.6848		0.7635
355	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	XHN03	Basalt	(Yu et al., 2017)	46.67	4.16	12.64	17.58	0.24	4.55	7.47	2.77	1.75	1.34	0.36	24.4	341	4.9	1.1	33.5	1.8	404	8.2		46.8	105	4.1	0.6	8.1707	0.7158		0.7498
356	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	Xhn15-1	Basalt	(Yu et al., 2017)	45.99	4.32	12.88	17.24	0.2	4.09	7.81	2.7	1.86	1.32	1.09	37.1	325	4.8	1.1	31.4	1.9	373	8		44.5	100	3.9	0.6	8.0513	0.7056		0.7282
357	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	Xhn16-2	Basalt	(Yu et al., 2017)	45.18	4.08	13.72	16.78	0.22	4.88	8.81	2.57	1.12	1.26	1.41	20.3	506	4.3	1	30.3	1.9	348	7.6		42.8	97.9	4	0.6	7.5750	0.7079		0.7570
358	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	XHN04	Basalt	(Yu et al., 2017)	45.16	3.92	14.08	16.83	0.21	5.47	8.32	2.78	1.35	0.91	0.5	24.1	354	3	0.8	28.7	1.6	292	6.2		32.2	71.9	3.3	0.5	8.6970	0.8913		0.9897
359	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	XHN05	Basalt	(Yu et al., 2017)	44.49	4.09	14.24	15	0.25	4.9	8.94	2.72	1.46	1	2.56	26.4	361	3.7	0.8	28.6	1.6	303	6.5		39.8	84.2	3.6	0.6	7.9444	0.7186		0.7988
360	2	Volcanic rocks	287.3	(Wei et al., 2014)	79.70	39.71	95	XHN06	Basalt	(Yu et al., 2017)	46.16	3.72	13.71	15.71	0.2	5.91	8.38	2.72	1.45	0.73	0.84	27.8	498	3.3	0.8	25.5	1.5	270	6		29.6	66.2	3.3	0.5	7.7273	0.8615		0.8745
361	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT13-1	Diabase/dolerite	(Zhang et al., 2010a)	44.6	4.05	14.04	17.21	0.2	5.74	8.06	2.88	1.61	0.97	0.15	34	388	3.15	0.72	25.8	1.66	281	6.53		33.5	76.8	3.32	0.54	7.7711	0.7701		0.8512
362	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT16-1	Diabase/dolerite	(Zhang et al., 2010a)	47.2	3.59	14.95	13.9	0.18	4.92	7.68	3.52	2.01	0.71	0.82	36.9	700	6.97	1.72	57.1	2.47	366	8.32		54.8	117	1.94	0.29	29.4330	1.0420		0.9902
363	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT16-2	Diabase/dolerite	(Zhang et al., 2010a)	43.79	3.87	13.65	15.7	0.19	4.64	9.11	2.51	1.42	0.45	4.31	33.1	593	4.12	1.03	47.3	3.06	264	6.37		36	81.4	2.11	0.31	22.4171	1.3139		1.3163
364	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT16-3	Diabase/dolerite	(Zhang et al., 2010a)	47.68	3.41	14.26	13.9	0.17	4.15	8.06	3	1.91	0.48	2.56	37.3	646	4.94	1.09	40.2	2.63	274	6.65		39.1	86.7	2.25	0.35	17.8667	1.0281		0.9803
365	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT17-1	Diabase/dolerite	(Zhang et al., 2010a)	44.79	4.02	13.21	16.7	0.17	5.54	9.22	2.29	1.13	0.41	2.08	21.7	534	3.5	0.82	35	2.35	239	5.83		30	69.3	1.95	0.29	17.9487	1.1667		1.1576
366	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT18-1	Diabase/dolerite	(Zhang et al., 2010a)	51.14	2.59	16.05	10.89	0.14	3.16	6.89	3.98	2.25	0.51	1.94	44.7	618	4.7	1	36	2.36	270	6.54		39.1	86.3	2.13	0.33	16.9014	0.9207		0.9000
367	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT18-9	Diabase/dolerite	(Zhang et al., 2010a)	42.29	5.15	13.04	17.22	0.2	6.07	8.01	2.2	2.96	0.39	2.01	63.6	633	3.64	0.96	39.8	2.54	251	6.19		33	75	1.8	0.27	22.1111	1.2061		1.2308
368	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT19-1	Diabase/dolerite	(Zhang et al., 2010a)	45.72	4.01	13.34	15.76	0.19	4.59	9.11	2.96	1.07	0.53	2.32	27.1	572	4.54	1.03	52.2	3.15	299	7		39.6	89.8	2.39	0.35	21.8410	1.3182		1.3195
369	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT19-2	Diabase/dolerite	(Zhang et al., 2010a)	44.49	3.83	12.43	15.66	0.15	5.59	8.81	2.9	1.92	0.45	3.33	39.8	642	3.89	1	44.4	2.85	270	6.57		36.1	83.6	2.1	0.31	21.1429	1.2299		1.2699
370	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT19-3	Diabase/dolerite	(Zhang et al., 2010a)	45.21	3.81	14.22	14.38	0.19	4.88	9.09	3.61	1.42	0.63	2.05	22.7	672	4.01	1.2	45.6	2.94	278	6.62		42.5	96.4	2.33	0.34	19.5708	1.0729		1.1838
371	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT19-4	Diabase/dolerite	(Zhang et al., 2010a)	44.87	3.98	13.52	15.12	0.17	5.14	9.3	3.45	1.37	0.5	2.16	27.3	729	3.64	0.94	43.7	2.62	266	6.33		35.7	81	2.27	0.34	19.2511	1.2241		1.2993
372	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT19-5	Diabase/dolerite	(Zhang et al., 2010a)	42.35	5.22	13.15	16.1	0.17	5.69	7.69	2.69	2.73	0.45	3.3	50.5	455	4.02	1.06	18.7	1.24	249	6.33		35.8	80.7	1.85	0.29	10.1081	0.5223		0.5283
373	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT20-1	Diabase/dolerite	(Zhang et al., 2010a)	46.27	3.12	14.68	12.1	0.18	3.79	6.5	5.86	0.88	0.7	5.73	22.9	637	8.7	2.6	61.1	3.79	388	8.88		67.2	147	2.14	0.32	28.5514	0.9092		0.8564
374	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT20-2	Diabase/dolerite	(Zhang et al., 2010a)	47.99	2.15	16.94	7.64	0.05	2.7	6.49	3.54	6.36	0.48	5.2	137	1607	13.9	2.83	133	8.22	624	11		103	207	2.83	0.41	46.9965	1.2913		1.1913
375	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT20-3	Diabase/dolerite	(Zhang et al., 2010a)	41.89	4.89	12.4	15.45	0.15	4.61	8.2	2.81	3.05	0.76	5.38	78.1	806	6.71	1.6	65.6	4.3	443	9.86		60.1	133	2.37	0.35	27.6793	1.0915		1.1071
376	2	Hypabyssal rock	281.4	(Zou et al., 2015)	78.95	39.57	39	08KT21-1	Diabase/dolerite	(Zhang et al., 2010a)	44.78	3.63	13.67	14.69	0.16	5.41	9.83	2.94	2.02	0.47	1.92	28.2	750	3.35	0.82	38.5	2.44	251	6.04		32.4	74.6	2.2	0.33	17.5000	1.1883		1.2525
377	2	Diorite intrusion	275.2	(Zou et al., 2015)	78.95	39.54	41	WJL050710	Diorite	(Zou et al., 2015)	55.61	1.73	16.37	8.98	0.15	2.87	4.42	5.14	3.38	0.48	0.42	40.7	701	10.2	2.68	96.2	5.45	183	5.12	23.7	56.4	128	2.04	0.3	47.1569	1.7057	5.4008	1.3594
378	2	Diorite intrusion	275.2	(Zou et al., 2015)	78.95	39.54	41	WJL050711	Diorite	(Zou et al., 2015)	57.27	1.4	17.03	7.04	0.1	2.21	3.88	5.57	4.09	0.35	0.6	64.2	557	11.2	2.61	78	4.32	195	5.25	20.9	49.9	103	1.65	0.24	47.2727	1.5631	4.9282	1.1182
379	2	Diorite intrusion	275.2	(Zou et al., 2015)	78.95	39.54	41	WJL050712	Diorite	(Zou et al., 2015)	54.52	1.74	17.1	8.61	0.14	2.94	5.04	5.08	3.26	0.63	0.47	26.2	940	8.02	2.27	88.8	5.21	154	4.53	17.9	54.8	133	1.97	0.28	45.0761	1.6204	7.4302	1.4356
380	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ34	Mafic dike	(Zhou et al., 2009)	47.67	3.41	14.48	13.56	0.19	4.74	7.86	3.48	1.78	0.72	1.8	60.6	659	4.09	2.25	69	4.9	342	10.2	42.5	49	107	3.07	0.43	22.4756	1.4082	2.5176	1.6519
381	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ36	Mafic dike	(Zhou et al., 2009)	47.68	3.2	15.07	13.42	0.38	4.54	8.08	3.33	1.39	0.66	2.1	49.7	724	3.69	2.58	62	4.42	362	9.72	50.2	49	109	3.03	0.42	20.4620	1.2653	2.1713	1.5627
382	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ37	Mafic dike	(Zhou et al., 2009)	49.93	2.44	16.17	10.4	0.17	3.79	6.61	4.63	2.03	0.52	3.2	33.7	606	7.24	1.86	44	3.17	325	9.06	5.9	49	105	2.87	0.41	15.3310	0.8980	17.7966	0.7917
383	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ40	Mafic dike	(Zhou et al., 2009)	49.91	2.46	16.45	10.59	0.17	3.81	7.13	4.78	1.49	0.5	2.67	24.5	609	5.97	1.68	43	2.93	317	8.24	4.77	46	100	2.81	0.41	15.3025	0.9348	20.9644	0.8794
384	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ44	Mafic dike	(Zhou et al., 2009)	50.66	2.49	16.4	10.67	0.17	3.75	6.67	4.71	1.84	0.52	2.03	39.9	588	6.28	1.43	46	2.84	318	8.2	4.58	49	108	2.65	0.38	17.3585	0.9388	23.5808	0.8887
385	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ45	Mafic dike	(Zhou et al., 2009)	54.11	1.73	16.55	8.92	0.14	2.82	5.02	5.5	2.1	0.62	2.43	44	432	8.21	1.9	58	3.54	417	10.4	5.51	63	127	3.29	0.48	17.6292	0.9206	23.0490	0.8643
386	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ47	Mafic dike	(Zhou et al., 2009)	46.79	3.12	14.34	14.23	0.18	5.67	6.91	4.22	0.2	0.56	3.63	6	557	3.73	1.24	42	2.52	297	6.84	25.8	39	88	2.54	0.35	16.5354	1.0769	3.4109	1.1802
387	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ49	Mafic dike	(Zhou et al., 2009)	45.66	2.6	13.22	13.23	0.18	7.94	9.55	3.38	0.31	0.45	3.11	10.1	654	3.33	0.91	33.9	2.08	242	5.47	2.41	32.1	72.5	2.13	0.29	15.9155	1.0561	30.0830	1.1113
388	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ51	Mafic dike	(Zhou et al., 2009)	47.33	3.27	14.21	13.91	0.2	4.8	6.84	4.36	1.71	0.61	2.43	26.7	517	3.74	1.57	44.4	2.69	327	7.46	3.5	41.9	101	2.65	0.36	16.7547	1.0597	28.8571	1.2021
389	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ53	Mafic dike	(Zhou et al., 2009)	46.78	3.24	14.84	13.77	0.2	4.82	7.47	4.96	0.12	0.64	2.94	1.8	564	4.14	1.94	45.6	2.81	338	7.85	11.4	46.5	104	2.76	0.39	16.5217	0.9806	9.1228	1.1139
390	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ54	Mafic dike	(Zhou et al., 2009)	46.76	3.32	14.27	14.22	0.2	5.08	7.39	4.46	1.02	0.6	2.69	15	434	3.45	1.41	44	2.62	320	7.14	3.05	37.3	94	2.25	0.32	19.5556	1.1796	30.8197	1.3146
391	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ55	Mafic dike	(Zhou et al., 2009)	46.71	3.29	14.22	14.15	0.2	4.95	7.81	4.42	1.01	0.59	2.62	15.4	482	3.44	1.21	42.2	2.49	311	7.05	2.43	38.5	93	2.4	0.35	17.5833	1.0961	38.2716	1.2428
392	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ57	Mafic dike	(Zhou et al., 2009)	45.98	3.26	14.12	14.4	0.18	5.38	7.95	4.48	0.63	0.5	3.09	12.8	403	3.88	1.11	40.5	2.4	286	6.57	3.82	37.4	87	2.13	0.29	19.0141	1.0829	22.7749	1.1395
393	2	Mafic dike	281.4	(Zou et al., 2015)	78.93	39.72	30	XHZ60	Mafic dike	(Zhou et al., 2009)	49.24	2.93	15.06	12.33	0.19	4.25	6.86	4.77	0.85	0.56	2.89	14.4	533	5.58	1.33	49.3	2.96	338	7.54	7.56	48.9	109	2.49	0.33	19.7992	1.0082	14.4180	1.0115
394	2	Mafic dike	281.4	(Zou et al., 2015)	78.79	39.82	16	BC-0	Mafic dike	(Wei et al., 2014)	49.84	2.95	14.82	11.82	0.15	3.51	6.85	3.18	1.82	0.54	4.22	46.9	576	5.59	1.34	45.3	2.69	305	7.13	5.04	46.2	99.1	2.47	0.35	18.3401	0.9805	19.6627	0.9554
395	2	Mafic dike	281.4	(Zou et al., 2015)	78.79	39.82	16	BC-2	Mafic dike	(Wei et al., 2014)	45.7	3.77	14.36	15.11	0.17	4.39	8.77	3.21	1.22	0.45	2.43	29.3	592	4.02	1.1	48.1	2.83	255	6.17	3.81	35.1	77	2.08	0.29	23.1250	1.3704	20.2100	1.3724
396	2	Mafic dike	281.4	(Zou et al., 2015)	78.79	39.82	16	BC-3	Mafic dike	(Wei et al., 2014)	49.02	3.34	14.53	13.43	0.16	3.85	7.89	2.65	2.2	0.46	2.06	43.9	681	4.93	1.2	41.9	2.5	275	6.54	4.39	38.5	83.3	2.23	0.31	18.7892	1.0883	18.9749	1.0308

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^t$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
397	2	Mafic dike	281.4	(Zou et al., 2015)	78.79	39.82	16	BC-4	Mafic dike	(Wei et al., 2014)	44.09	3.94	13.23	16.62	0.16	5.18	9.6	2.29	0.95	0.38	3.12	18.1	494	3.18	0.88	37.3	2.25	218	5.35	3.81	28.2	62.2	1.84	0.25	20.2717	1.3227	16.3255	1.3350
398	2	Mafic dike	281.4	(Zou et al., 2015)	78.79	39.82	16	BC-5	Mafic dike	(Wei et al., 2014)	44.9	4.58	14.08	15.36	0.19	4.88	7.69	3.42	1.26	0.54	2.62	21.9	581	4.79	1.3	57.3	3.42	299	6.89	3.8	43.5	95.1	2.16	0.29	26.5278	1.3172	25.0263	1.3454
399	2	Mafic dike	281.4	(Zou et al., 2015)	78.79	39.82	16	BC-6	Mafic dike	(Wei et al., 2014)	45.74	3.96	3	15.99	0.17	5.14	9.46	1.91	0.99	0.41	2.84	21.6	504	3.54	0.94	36.9	2.22	233	5.68	3.55	30.5	67.5	2.05	0.28	18.0000	1.2098	19.0141	1.2036
400	2	Mafic dike	281.4	(Zou et al., 2015)	78.79	39.82	16	BC-9	Mafic dike	(Wei et al., 2014)	49.3	3.4	12.95	13.15	0.16	3.84	8.24	2.38	1.88	0.53	2.43	44.8	699	6.3	1.36	45.5	3.03	318	8.2	6.08	47.3	99.2	2.29	0.33	19.8690	0.9619	16.3158	0.8933
401	2	Mafic dike	281.4	(Zou et al., 2015)	78.79	39.82	16	BC-12	Mafic dike	(Wei et al., 2014)	49.48	3.15	14.28	11.68	0.15	3.54	7.25	3.71	2.37	0.55	1.78	50.1	760	4.57	1.2	46	2.72	298	7.03	4.23	44.4	96.5	2.61	0.37	17.6245	1.0360	22.8132	1.0945
407	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1101	Gabbro	(Cao et al., 2014)	46.04	4.15	15.1	12.41	0.16	5.63	10.12	3.18	1.58	0.89	0.27	34.6	1131	5.25	1.27	46.9	3.33	286	6.89		60.4	127	2	0.28	23.4500	0.7765		0.8926
408	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1102	Gabbro	(Cao et al., 2014)	44.37	4.94	12.49	16.32	0.19	6.03	10.69	2.46	1.32	0.76		32	874	5.17	1.29	54.7	3.71	258	6.69		46.3	99.2	2.16	0.31	25.3241	1.1814		1.1983
409	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1103	Gabbro	(Cao et al., 2014)	43.27	5.39	10.43	16.28	0.19	7.93	11.28	2.06	1.72	0.61	0.38	51.3	583	5.57	1.37	67.6	4.81	359	9.71		46.4	103	2.57	0.37	26.3035	1.4569		1.4251
410	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1104	Gabbro	(Cao et al., 2014)	43.87	4.65	11.69	16.11	0.2	7.16	11.18	2.35	1.38	0.62	0.32	33.9	744	4.32	1.25	44	2.99	267	7.2		39.3	87.5	1.95	0.27	22.5641	1.1196		1.1445
411	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1105	Gabbro	(Cao et al., 2014)	50.01	2.94	18.1	9.68	0.13	3.47	8.58	3.96	1.65	0.44	0.57	34.3	1276	6.19	1.51	50.6	3.25	331	8.07		53.5	107	1.82	0.27	27.8022	0.9458		0.9424
412	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1106	Gabbro	(Cao et al., 2014)	46.02	3.84	14.59	14.05	0.16	5.34	10.2	3	1.41	0.85	0.05	30.8	1101	4.54	1.13	49.9	3.35	262	6.7		69.5	140	2.35	0.33	21.2340	0.7180		0.9521
413	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1107	Gabbro	(Cao et al., 2014)	49.53	2.92	18.62	10.27	0.15	3.23	7.55	4.41	1.57	0.51	0.77	39.9	1226	5.9	1.44	49.7	3.35	262	6.51		53.6	106	1.55	0.23	32.0645	0.9272		0.9472
414	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1108	Gabbro	(Cao et al., 2014)	47.94	3.89	13.57	14.52	0.19	4.82	7.83	3.25	2.35	0.71	0.45	51.1	972	5.29	1.3	61.2	4.18	305	7.77		59.8	129	2.31	0.34	26.4935	1.0234		1.1662
415	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1109	Gabbro	(Cao et al., 2014)	45.87	4.15	12.91	15.81	0.19	5.15	9.24	2.76	2	0.82	0.64	48.1	875	7.71	1.68	57.5	3.99	321	8.69		66.8	143	2.57	0.37	22.3735	0.8608		0.8587
416	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1110	Gabbro	(Cao et al., 2014)	51.23	2.38	18.91	8.96	0.12	2.98	6.9	4.37	2.21	0.54	0.93	42.7	1124	8.05	1.76	45	3.05	300	7.71		52.1	106	1.82	0.26	24.7253	0.8637		0.7447
417	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1111	Gabbro	(Cao et al., 2014)	50.58	2.55	18.69	9.46	0.13	3.07	7.18	4.28	2.15	0.63	0.8	41.8	1161	5.94	1.38	46.2	2.97	318	7.86		53	105	1.8	0.26	25.6667	0.8717		0.8825
418	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1112	Gabbro	(Cao et al., 2014)	50.01	2.98	18.03	9.92	0.14	3.29	8.06	4.33	1.54	0.65	0.57	32	1350	5.65	1.34	47.5	3.13	257	6.18		48.6	99.2	1.66	0.24	28.6145	0.9774		0.9715
419	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1114A	Gabbro	(Cao et al., 2014)	50.55	2.38	19.04	8.96	0.12	2.94	7.34	4.29	2.16	0.54	1.22	44	1130	7.19	1.36	41.7	2.82	233	5.47		49.3	99	1.55	0.22	26.9032	0.8458		0.7507
420	2	Mafic intrusion	283	(Zhang et al., 2016)	78.94	39.54	41	BC1114B	Gabbro	(Cao et al., 2014)	45.76	4.25	12.72	16.17	0.21	5.24	8.56	2.8	2.01	0.91	0.9	48.5	868	5.77	1.27	57.2	3.71	298	7.67		70.7	150	2.71	0.38	21.1070	0.8091		0.9598
421	2	Mafic dike	281	(Zou et al., 2015)	78.80	39.77	18	XHZ-8	Diabase	(Wei & Xu, 2013)	46.55	3.56	14.47	14.17	0.24	4.42	6.64	3.5	3.33	1.02	1.61	122	840	8.44	2.2	66	3.87	396	9.9		114	220	2.09	0.27	31.5789	0.5789		0.7211
422	2	Mafic dike	281	(Zou et al., 2015)	78.80	39.77	18	XHZ-10	Diabase	(Wei & Xu, 2013)	60.35	1.45	15.27	7.68	0.15	3.4	2.09	2.54	3.56	0.21	3.02	74.6	366	9.85	1.73	18.4	1.31	232	6.26		43.4	88.9	2.38	0.36	7.7311	0.4240		0.3016
423	2	Mafic dike	281	(Zou et al., 2015)	78.80	39.77	18	XHZ-13	Diabase	(Wei & Xu, 2013)	45.68	3.8	13.45	14.74	0.16	4.76	8.67	2.18	1.41	0.52	4.2	22.9	615	4.69	1.13	44.1	3.01	270	7.27		39.2	84.7	2.2	0.31	20.0455	1.1250		1.1023
424	2	Mafic dike	281	(Zou et al., 2015)	78.80	39.77	18	XHZ-14	Diabase	(Wei & Xu, 2013)	50.3	3.13	16.08	12.08	0.16	3.5	8.97	3.34	1.4	0.46	0.19	34.8	673	4.67	1.14	42.9	2.81	279	7.13		40.5	88.1	2.28	0.33	18.8158	1.0593		1.0572
425	2	Ultramafic dike	283	Estimated*	78.93	39.72	30	XHZ62	Ultramafic dike	(Zhou et al., 2009)	42.99	1.59	6.63	14.57	0.16	18.73	9.93	0.82	0.17	0.16	4.13	8.5	180	1.3	0.34	14.6	0.94	110	2.77	1.29	12.2	29	0.99	0.13	14.7475	1.1967	22.4806	1.2425
426	2	Ultramafic dike	283	Estimated*	78.93	39.72	30	XHZ63	Ultramafic dike	(Zhou et al., 2009)	42.89	1.63	6.56	14.67	0.15	18.77	10.04	0.74	0.16	0.16	4.07	9.4	208	1.34	0.34	14.2	0.89	107	2.59	1.22	12.7	29	1.05	0.13	13.5238	1.1181	23.7705	1.1666
427	2	Ultramafic dike	283	Estimated*	78.93	39.72	30	XHZ64	Ultramafic dike	(Zhou et al., 2009)	43.02	1.57	6.3	14.97	0.15	19.55	9.92	0.71	0.17	0.15	3.44	9.7	180	1.24	0.31	13.1	0.84	96	2.52	1.22	11.7	27	0.95	0.13	13.7895	1.1197	22.1311	1.1656
428	2	Ultramafic dike	283	Estimated*	78.93	39.72	30	XHZ65	Ultramafic dike	(Zhou et al., 2009)	43.21	1.6	6.64	14.32	0.16	18.17	10.32	0.71	0.16	0.16	4.17	8	182	1.4	0.38	14.9	0.95	111	2.81	1.24	12.5	29	1.01	0.14	14.7525	1.1920	23.3871	1.2072
429	2	Intrusive Complex	273.7	(Zhang et al., 2008)	78.81	39.75	19	05BH-12	Gabbro	(Zhang et al., 2008)	51.27	2.37	13.98	15.48	0.4	2.68	6.26	4.54	1.89	1.01	0.3	24.2	811	4.29	1.01	68.1	4.21	205	5.64		96	225	3.92	0.57	17.3724	0.7094		1.1373
430	2	Intrusive Complex	273.7	(Zhang et al., 2008)	78.81	39.75	19	Wp-59	Olivine pyroxenite	(Zhang et al., 2008)	42.72	3.99	4.85	17.09	0.19	13.61	15.66	0.71	0.81	0.13	1.29	7.8	265	11.3	1.1	37.5	2.5	211	6		17.2	45.5	1.02	0.15	36.7647	2.1802		0.9116
431	2	Intrusive Complex	273.7	(Zhang et al., 2008)	78.81	39.75	19	Wp-60	Pyroxenite	(Zhang et al., 2008)	38.56	5.43	6.08	22.69	0.22	10.53	13.95	1.08	0.48	0.31	1.14	9.6	334	15.3	2	58.1	3.8	268	8.6		27.7	69.7	1.3	0.19	44.6923	2.0975		0.9565
432	2	Intrusive Complex	273.7	(Zhang et al., 2008)	78.81	39.75	19	Wp-63	Nepheline aeg. syenite	(Zhang et al., 2008)	58.3	1.19	16.68	6.11	0.15	1.78	3.48	6.53	4.07	0.26	0.85	168	1464	19.8	1.8	57.7	3.7	479	11.2		92.3	159	2.07	0.32	27.8744	0.6251		0.4574
433	2	Intrusive Complex	273.7	(Zhang et al., 2008)	78.81	39.75	19	Wp-73	Olivine-bearing gabbro	(Zhang et al., 2008)	43.75	4.08	10.62	15.5	0.19	9.92	10.31	2.98	1.58	0.77	1.01	38.3	814	16.4	1.5	58.6	3.7	369	9.2		56.3	133	1.77	0.26	33.1073	1.0409		0.6536
434	2	Intrusive Complex	273.7	(Zhang et al., 2008)	78.81	39.75	19	Wp-75	Olivine-bearing gabbro	(Zhang et al., 2008)	45.52	3.35	14.28	12.75	0.21	5.54	7.4	5.41	1.2	0.79	1.85	20.5	1134	11.7	1.1	59.5	3.9	420	10.1		57.2	138	2.28	0.35	26.0965	1.0402		0.7795
435	2	Intrusive Complex	273.7	(Zhang et al., 2008)	78.81	39.75	19	W13	Diabase	(Zhang et al., 2008)	46.74	2.91	10.11	15.17	0.15	8.85	9.46	2.29	0.16	0.47	3.44	20.4	439	4.13	0.82	28.4	1.95	225	5.37		25.6	51.6	1.77	0.25	16.0452	1.1094		0.9361
436	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-12	Nephelinite	(Cheng et al., 2015)	39.78	4.36	11.57	15.36	0.29	7.98	10.18	5.14	2.57	1.41	0.44	77.5	2487	22.7	5.47	246	14.1	1043	19.6	7.05	213	393	5.24	0.7	46.9466	1.1549	55.7447	1.1990
437	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-13	Nephelinite	(Cheng et al., 2015)	39.82	4.32	11.61	15.3	0.29	8.05	10.18	5.21	2.57	1.39	0.38	77.8	2366	22.5	5.61	241	13.5	1014	18.6	7.58	198	367	4.92	0.69	48.9837	1.2172	48.4169	1.2237
438	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-15	Nephelinite	(Cheng et al., 2015)	39.74	4.36	11.52	15.42	0.29	8.48	10.15	4.86	2.63	1.37	0.4	76.5	2312	22.4	5.55	235	13.6	995	19.1	8.32	201	374	4.96	0.67	47.3790	1.1692	44.9519	1.1870
439	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-16	Nephelinite	(Cheng et al., 2015)	39.88	4.24	11.48	15.27	0.33	7.95	10.16	4.87	2.58	1.42	1.08	87.6	2616	25.2	5.77	262	14.6	1058	19.2	7.89	214	392	5.15	0.7	50.8738	1.2243	49.6831	1.2092
440	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-20	Nephelinite	(Cheng et al., 2015)	39.79	4.33	11.32	15.61	0.28	8.66	10.13	4.76	2.63	1.35	0.44	73.6	2270	21.3	5.3	229	13	964	18.6	7.3	194	361	4.79	0.64	47.8079	1.1804	49.4521	1.2074
441	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-22	Nephelinite	(Cheng et al., 2015)	40.45	4.14	11.31	15.29	0.28	8.82	9.79	4.75	2.65	1.18	0.7	67.6	2209	14.5	3.28	181	10.6	691	14.1	4.75	170	312	4.35	0.56	41.6092	1.0647	65.6842	1.2356
442	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	DW18-3	Nephelinite	(Cheng et al., 2015)	39.81	4.45	10.89	15.82	0.27	8.99	10.58	4.32	2.5	1.31	0.56	74.3	2018	18.4	4.49	196	11	881	16.6	6.51	169	316	4.32	0.56	45.3704	1.1598	48.5407	1.1912
443	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	DW18-4	Nephelinite	(Cheng et al., 2015)	40.35	4.29	11.41	15.35	0.29	8.05	10.22	5.07	2.52	1.4	0.54	78.4	2484	21.9	5.34	242	13.7	1017	18.7	8.27	203	376	5.16	0.68	46.8992	1.1921	45.4655	1.2301
444	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	DW18-13	Nephelinite	(Cheng et al., 2015)	40.05	4.33	11.19	15.56	0.29	8.43	10.29	4.82	2.6	1.35	0.56	79.3	2321	21	5.11	231	13.2	981	18.3	7.7	191	356	4.96	0.63	46.5726	1.2094	46.2338	1.2362
445	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	DW18-14	Nephelinite	(Cheng et al., 2015)	39.69	4.38	10.93	15.83	0.28	8.96	10.47	4.42	2.46	1.34	0.8	70	2213	19.5	4.75	213	12.1	939	17.8	6.98	184	346	4.57	0.61	46.6083	1.1576	49.5702	1.2052
446	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	NB-7	Nephelinite	(Cheng et al., 2015)	39.53	4.34	11.28	15.22	0.3	8.12	10.82	4.81	2.33	1.48	1.1	66.1	2232	20.6	4.89	167	10.7	803	18.5	7.01	179	347	4.81	0.68	34.7193	0.9330	49.5007	0.9321
447	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	Np-24	Nephelinite	(Cheng et al., 2015)	39.68	4.26	10.92	15.22	0.26	9.41	10.85	4.35	2.12	1.26	1.06	57.1	1760	15.5	3.46	126	8.23	656	15	5.03	140	289	3.84	0.53	32.8125	0.9000	57.4553	0.9167
448	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	BT-11	Nephelinite	(Cheng et al., 2015)	39.87	4.26	11.22	15.19	0.32	7.77	10.34	5.52	2.47	1.4	0.95	72.9	2466	23.5	6.16	204	12.7	867	21.2	8.83	193	361	5.64	0.78	36.1702	1.0570	40.8834	1.0266
449	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-16	Nephelinite	(Cheng et al., 2015)	40.19	4.27	11.13	15.22	0.31	7.5	10.34	4.86	2.59	1.4	1.59	88.7	2459	27.8	6.86	221	13.6	731	18.7	8.66	179	356	5.32	0.68	41.5414	1.2346	41.1085	1.0618
450	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-17	Nephelinite	(Cheng et al., 2015)	40.23	4.38	11.04	15.59	0.3	7.81	10.52	3.61	2.85	1.38	1.73	84.6	2332	23.3	6.21	205	12.5	712	17.5	8.36	165	325	5.05	0.65	40.5941	1.2424	38.8756	1.1206
451	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-14	Nephelinite	(Cheng et al., 2015)	39.99	4.38	10.74	15.64	0.29	8.45	10.65	4.65	2.48	1.33	0.72	69.3	2012	21	5.57	179	11.2	709	17.1	7.6	157	315	4.76	0.62	37.6050	1.1401	41.4474	1.0566
452	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	BT-3	Nephelinite	(Cheng et al., 2015)	38.65	5.01	10.78	16.55	0.28	7.93	12.19	4.09	2.4	1.49	0.48	60.6	1736	15.7	3.67	125	8.58	704	18.1	4.4	150	302	4.39	0.58	28.4738	0.8333	68.6364	0.8730
453	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	Np-4	Nephelinite	(Cheng et al., 2015)	39.15	3.87	14.47	13.44	0.31	5.24	10.4	6.65	2.74	1.97	1.09	73	2625	18.8	4.65	165	10.6	799	17.2	7.69	209	371	5.15	0.69	32.0388	0.7895	48.2445	0.8921
454	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	DW-18-7	Nephelinite	(Cheng et al., 2015)	40.54	4.09	12.37	14.43	0.33	6.31	9.74	6.53	2.69	1.51	0.86	82.1	3172	28.9	7.27	330	18.2	1302	22.7	11	258	466	6.33	0.83	52.1327	1.2791	42.3636	1.2952
455	2	Wajilitage nephelinite	268	(Cheng et al., 2015)	78.95	39.56	40	D46-10	Nephelinite	(Cheng et al., 2015)	39.97	4.05	12.49	14.27	0.35	5.96	9.69	7.56	2.36	1.56	1.22	86.8	3278	30.8	7.48	346	19.6	1299	22.4	11	263	462	6.59	0.85	52.5038	1.3156	42.0000	1.3029
456	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1115	Clinopyroxenite,coarse-grained	(Cao et al., 2014)	44	3.25	5.72	17.69	0.2	14.27	13	0.99	0.57	0.13		16	283	2.09	0.64	19.8	1.43	176	5.01		17.8	42.7	1.3	0.19	15.2308	1.1124		1.1002
457	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1116	Clinopyroxenite,coarse-grained	(Cao et al., 2014)	45.88	3.62	7.63	13.75	0.18	12.39	14.64	1.15	0.42	0.11		11.5	413	1.69	0.45	18.6	1.41	151	4.31		13.9	33.9	1.16	0.16	16.0345	1.3381		1.3007
458	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1117	Clinopyroxenite,coarse-grained	(Cao et al., 2014)	44.63	3.69	7.72	16.5	0.19	12.1	12.14	1.38	0.96	0.28		22.9	424	3.33	0.84	31.4	2.16	235	5.85		27.5	60.9	1.46	0.22	21.5068	1.1418		1.1121
459	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1118	Clinopyroxenite,coarse-grained	(Cao et al., 2014)	45.77	3.81	7.85	13.81	0.17	12.16	14.34	1.23	0.47	0.12		12.7	438	1.97	0.51	20.4	1.53	164	4.61		15	36.1	1.17	0.18	17.4359	1.3600		1.2719
460	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1119	Clinopyroxenite,coarse-grained	(Cao et al., 2014)	46.29	3.59	7.68	14.01	0.18	12.26	14.06	1.17	0.43	0.11		11.2	411	1.93	0.55	18.3	1.4	153	4.35		14.1	33.2	1.12	0.16	16.3393	1.2979		1.1889
461	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1123	Oxide clinopyroxenite	(Cao et al., 2014)	33	8.61	3.94	28.48	0.2	10.97	14.88	0.25	0.01	0.01		0.24	75.7	0.06	0.02	9.66	0.84	93.6	3.36		3.92	14.7	1.03	0.14	9.3786	2.4643		6.7508
462	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1124	Oxide clinopyroxenite	(Cao et al., 2014)	33	8.58	3.86	27.94	0.21	11.24	15.1	0.32	0.03	0.01		0.37	79.3	0.07	0.03	12.6	1.07	89	3.42		3.79	14.3	0.97	0.14	12.9897	3.3245		8.2909
463	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1125	Oxide clinopyroxenite	(Cao et al., 2014)	33.82	8.32	3.8	26.7	0.22	10.69	14.96	0.25	0.01		0.69	0.29	80.8	0.07	0.02	6.55	0.45	94.3	3.38		4.16	15.5	1.02	0.15	6.4216	1.5745		4.1138
464	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1126	Oxide clinopyroxenite	(Cao et al., 2014)	34.5	7.7	3.95	25.74	0.19	11.4	15.95	0.33	0.04	0.01		0.37	83	0.1	0.03	10.1	0.95	91.1	3.29		4.03	14.6	0.96	0.14	10.5208	2.5062		5.3922
465	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1127	Oxide clinopyroxenite	(Cao et al., 2014)	34.55	7.86	4.05	26.06	0.2	11.28	15.45	0.3	0.04	0.01		1.08	81.1	0.14	0.03	10.6	1.07	92.9	3.45		4.37	15.6	1.03	0.14	10.2913	2.4256		4.5930
466	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1128	Oxide clinopyroxenite	(Cao et al., 2014)	33.44	8.33	3.99	27.76	0.2	11.02	15.24	0.29	0.02	0.01		0.3	90.3	0.09	0.03	12.8	1.2	105	3.75		4.31	15.2	1.07	0.15	11.9626	2.9698		6.9654

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^t$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
467	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1129	Oxide clinopyroxenite	(Cao et al., 2014)	33.61	8.33	3.99	27.67	0.2	11.09	15.25	0.27	0.02	0.01		0.28	76.8	0.08	0.02	11.5	1.1	90.9	3.35		3.98	14.7	0.97	0.14	11.8557	2.8894		6.9073
468	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1130	Oxide clinopyroxenite	(Cao et al., 2014)	33.96	8.15	3.92	27.17	0.2	11.03	15.31	0.29	0.02	0.01		0.39	85.9	0.09	0.02	11.8	1.12	90.8	3.32		3.97	14.1	0.95	0.14	12.4211	2.9723		6.6906
469	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1131	Oxide clinopyroxenite	(Cao et al., 2014)	34.68	7.59	4.09	25.78	0.2	11.49	15.7	0.36	0.06	0.02		0.82	87.6	0.27	0.05	10.2	0.95	94.5	3.23		4.24	15.3	0.97	0.14	10.5155	2.4057		3.2310
470	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1138	Oxide clinopyroxenite	(Cao et al., 2014)	34.72	7.81	3.92	25.85	0.2	11.71	15.61	0.27	0.02	0.01		0.45	86.3	0.11	0.02	10.6	0.92	91.3	3.37		4.08	14.5	1	0.14	10.6000	2.5980		5.3626
471	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1139	Oxide clinopyroxenite	(Cao et al., 2014)	33.85	7.25	3.92	25.78	0.2	11.4	16.08	0.3	0.03	0.01	0.72	0.57	117	0.27	0.02	9.6	0.85	86.8	3.11		4.02	14.4	1.02	0.14	9.4118	2.3881		3.1230
472	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1140	Oxide clinopyroxenite	(Cao et al., 2014)	34.89	7.75	3.93	25.86	0.2	11.59	15.68	0.27	0.01	0.01		0.24	86.7	0.07	0.02	10.9	1.03	92.8	3.32		3.94	14.8	1.02	0.14	10.6863	2.7665		7.0344
473	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1142	Oxide clinopyroxenite	(Cao et al., 2014)	32.68	9.7	3.51	28.25	0.17	10.71	14.81	0.27	0.03	0.01		1.27	72.4	0.08	0.07	4.07	0.23	82.2	2.87		3.03	10.8	0.72	0.1	5.6528	1.3432		2.8017
474	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1146	Oxide clinopyroxenite	(Cao et al., 2014)	33.3	8.65	4.04	26.8	0.18	10.97	15.23	0.31	0.07	0.01		4.72	75.2	0.36	1.31	9.51	0.79	93.9	3.54		3.94	13.3	0.88	0.12	10.8068	2.4137		2.7063
475	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1149	Oxide clinopyroxenite	(Cao et al., 2014)	35.5	7.64	4.07	25.25	0.2	10.94	15.57	0.3	0.02	0.01	0.01	0.43	90.6	0.07	0.02	11.5	1.08	102	3.62		4.71	17.6	1.15	0.16	10.0000	2.4416		6.7879
476	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1137A	Clinopyroxenite,fine-grained	(Cao et al., 2014)	36.11	7.6	3.78	24.51	0.21	11.1	15.75	0.28	0.01	0.01	0.08	0.52	99.1	0.1	0.02	10.7	1.01	89.4	3.28		4.03	15	0.95	0.14	11.2632	2.6551		5.7125
477	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1137B	Clinopyroxenite,fine-grained	(Cao et al., 2014)	35.89	7.35	3.92	24.49	0.2	11.49	15.9	0.3	0.03	0.01		0.55	119	0.19	0.02	13.3	0.99	91.8	3.23		3.95	14	0.99	0.14	13.4343	3.3671		5.2032
478	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1141	Clinopyroxenite,fine-grained	(Cao et al., 2014)	36.36	7.25	4.44	24.29	0.22	10.92	15.39	0.48	0.12	0.04		2.18	164	0.3	0.07	38	1.2	108	3.63		8.51	33.1	1.18	0.17	32.2034	4.4653		8.0604
479	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1147	Clinopyroxenite,fine-grained	(Cao et al., 2014)	36.5	7.79	3.9	23.63	0.19	10.99	15.91	0.3	0.03	0.01	0.26	0.44	89.4	0.1	0.05	10.3	0.81	110	3.88		4.96	18.2	1.2	0.17	8.5833	2.0766		4.9567
480	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1148	Clinopyroxenite,fine-grained	(Cao et al., 2014)	36.67	7.21	3.93	24.38	0.18	11.07	15.71	0.32	0.04	0.01		7.13	581	0.4	0.37	24.6	1.81	163	4.79		19.2	45.4	1.26	0.18	19.5238	1.2813		3.0085
481	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1171	Olivine clinopyroxenite	(Cao et al., 2014)	42.67	3.68	7.08	17.12	0.2	14.1	12.84	1.24	0.5	0.48		12.3	696	2.19	0.57	25.5	1.8	193	5.12		34.8	78.4	1.47	0.21	17.3469	0.7328		0.9900
482	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1172	Olivine clinopyroxenite	(Cao et al., 2014)	44.82	4.04	12.41	15.16	0.19	7.44	10.59	2.76	1.28	0.84	0.01	29.4	1181	4.37	1.15	56.8	4.18	279	7.32		59.4	127	2.2	0.31	25.8182	0.9562		1.1948
483	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1173	Olivine clinopyroxenite	(Cao et al., 2014)	41.76	4.98	8.16	17.61	0.17	11.08	14.02	1.29	0.34	0.2		7.69	614	1.51	0.39	25.4	1.84	169	4.69		20.1	46.4	1.29	0.17	19.6899	1.2637		1.5626
484	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1174	Olivine clinopyroxenite	(Cao et al., 2014)	42.51	3.72	6.88	17.28	0.2	14.42	12.85	1.23	0.4	0.45		9.27	669	1.89	0.51	24.9	1.79	181	4.98		31.8	69.2	1.36	0.19	18.3088	0.7830		1.0886
485	2	Wajilitag intrusive comple	283	(Shangguan et al., 2016)	78.94	39.54	41	BC1175	Olivine clinopyroxenite	(Cao et al., 2014)	41.46	5.16	7.31	18.3	0.17	11.2	14.53	1.09	0.35	0.15		8.67	546	1.52	0.4	25.6	1.88	169	4.94		18.2	43.8	1.24	0.18	20.6452	1.4066		1.6496
486	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-1	Olivine clinopyroxenite	(Cao et al., 2017)	39.4	2.8	6.2	21.7	0.23	17.9	9.94	0.67	0.13	0.04	0.53	2.18	217	0.27	0.95	4.47	0.36	39.5	1.37	1.27	3.62	9.35	0.57	0.08	7.8421	1.2348	7.3622	1.5324
487	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-2	Olivine clinopyroxenite	(Cao et al., 2017)	39.3	2.17	6.46	20.5	0.23	19.8	9.03	0.57	0.09	0.05	1.38	1.48	225	0.2	0.85	2.79	0.24	30.8	1.14	2.22	3.18	8.49	0.51	0.07	5.4706	0.8774	3.8243	1.1857
488	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-3	Olivine clinopyroxenite	(Cao et al., 2017)	38.7	2.39	6.08	21.1	0.24	19.8	8.98	0.53	0.12	0.05	1.63	6.07	200	0.22	4.32	3.61	0.29	33.5	1.19	1.08	4.71	11	0.52	0.08	6.9423	0.7665	10.1852	1.2019
489	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-4	Olivine clinopyroxenite	(Cao et al., 2017)	42.2	1.96	7.39	17.9	0.21	18	10.6	1.01	0.19	0.14		4	303	0.76	3.94	5.67	0.42	60.7	1.88	1.34	10.1	23.4	0.84	0.12	6.7500	0.5614	17.4627	0.6936
490	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-5	Olivine clinopyroxenite	(Cao et al., 2017)	39.3	1.99	5.56	21.3	0.24	22	8.33	0.52	0.14	0.03	0.19	3.51	202	0.25	0.03	3.47	0.26	32.8	1.18	1.72	3.48	8.81	0.49	0.07	7.0816	0.9971	5.1221	1.2609
491	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-6	Olivine clinopyroxenite	(Cao et al., 2017)	39.7	2.4	7.73	20.4	0.21	18.2	9.99	0.72	0.1	0.04	0.01	1.74	296	0.17	0.51	3.13	0.24	33.1	1.19	1.22	3.97	9.95	0.53	0.08	5.9057	0.7884	8.1557	1.2913
492	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-7	Olivine clinopyroxenite	(Cao et al., 2017)	39.6	2.49	6.29	21.2	0.22	19.4	9.97	0.63	0.1	0.03		1.82	217	0.17	5.23	4.07	0.32	37.9	1.29	0.95	4.17	10.5	0.57	0.08	7.1404	0.9760	11.0526	1.6383
493	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-8	Olivine clinopyroxenite	(Cao et al., 2017)	39.5	2.84	6.99	21.5	0.21	17.6	10.4	0.7	0.13	0.02		3.04	248	0.47	3.09	3.74	0.31	39.4	1.44	0.73	4.07	10.2	0.61	0.09	6.1311	0.9189	13.9726	0.9165
494	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-9	Olivine clinopyroxenite	(Cao et al., 2017)	38.2	3.12	7.12	23.1	0.21	17.1	10.4	0.59	0.06	0.02		0.93	257	0.08	0.94	2.29	0.19	31	1.17	0.97	2.4	6.77	0.51	0.07	4.4902	0.9542	6.9794	1.7713
495	2	Mazha intrusion	280	Estimated*	78.80	39.80	17	ZK4602-10	Olivine clinopyroxenite	(Cao et al., 2017)	35	2.56	6.15	28.3	0.22	17.4	8.52	0.43	0.3	0.02	0.66	13	197	0.18	0.85	2.82	0.24	36	1.24	1.93	2.89	7.49	0.43	0.06	6.5581	0.9758	3.8808	1.3251
496	2	Bachu Kimberlite	300	(Zhang et al., 2013)	78.93	39.57	38	W10-51	Kimberlitic rock	(Jiang et al., 2004)	39.84	1.48	3.18	10.8	0.14	15.63	19.51	1.47	0.42	0.97	6.68	8.92	1191	16.9	3.55	102	3.88	544	7.68		130	257	4.09	0.46	24.9389	0.7846		0.7375
497	2	Bachu Kimberlite	300	(Zhang et al., 2013)	78.93	39.57	38	W10-11	Kimberlitic rock	(Jiang et al., 2004)	35.19	2.15	4.48	14.85	0.19	16.52	13.13	1.09	0.69	2.09	8.82	14.2	1134	50.9	9.32	149	5.52	438	7.99		306	602	5.34	0.58	27.9026	0.4869		0.4046
498	2	Bachu Kimberlite	300	(Zhang et al., 2013)	78.93	39.57	38	W10-12	Kimberlitic rock	(Jiang et al., 2004)	34.66	2.37	4.29	15.82	0.2	18.78	11.09	1.01	0.73	1.98	8.24	44.7	1413	55.2	8.76	179	6.17	500	9		329	668	4.49	0.59	39.8664	0.5441		0.4502
499	2	Bachu Kimberlite	300	(Zhang et al., 2013)	78.93	39.57	38	W10-22	Kimberlitic rock	(Jiang et al., 2004)	31.82	1.75	3.41	15.72	0.21	21.52	14.35	0.1	1.09	1.95	7.18	26.2	1143	33.8	6.47	143	4.32	401	6.04		204	441	3.56	0.39	40.1685	0.7010		0.5837
500	2	Bachu Kimberlite	300	(Zhang et al., 2013)	78.93	39.57	38	W10-52	Kimberlitic rock	(Jiang et al., 2004)	34.35	2.04	4.21	13.86	0.18	20.82	12.55	1.06	0.69	1.82	8.81	1.92	1705	23.8	7.29	157	5.8	539	8.37		187	356	4.05	0.43	38.7654	0.8396		0.7976
501	2	Bachu Kimberlite	300	(Zhang et al., 2013)	78.93	39.57	38	wjl5-7b	Kimberlitic rock	(Li et al., 2010)	31.25	2.09	4.32	12.8	0.2	16.69	18.93	1.32	1.26	2.65	7.87	30.1	1676	23.6	7.68	124	7.28	413	9.08	21.4	212	449	3.32	0.42	37.3494	0.5849	20.9813	0.5941
509	3	Damusi Formation	289.6	(Li et al., 2008)	76.75	37.84	271	Txn25-21*	Basalt	(Li et al., 2008)	45.21	4.29	14.6	14.84	0.26	3.8	8.77	2.63	1.45	1.25	1.45	27.8	404.2	4.2	1	29.7	1.3	393.3	7.9	8.1	44.7	98.8	4.1	0.6	7.2439	0.6644	12.1975	0.7346
510	3	Damusi Formation	289.6	(Li et al., 2008)	76.75	37.84	271	Txn25-8*	Basalt	(Li et al., 2008)	45	4.22	13.79	15.29	0.18	4.41	8.26	2.75	1.46	1.2	1.48	30.2	364.2	4.1	0.9	34.3	1.8	384.6	7.7	7.4	42.4	93.7	3.8	0.6	9.0263	0.8090	12.6622	0.8817
511	3	Damusi Formation	289.6	(Li et al., 2008)	76.75	37.84	271	Txn25-5	Basalt	(Li et al., 2008)	44.85	4.41	14.48	14.55	0.17	4.32	8.64	2.81	1.43	1.22	1.91	28.8	642.1	4.1	N	30.5	1.9	339.4	7.6	N	42.4	92.3	4	0.6	7.6250	0.7193		0.7840
512	3	Damusi Formation	289.6	(Li et al., 2008)	76.75	37.84	271	Txn25-8*	Basalt	(Li et al., 2008)	45	4.22	13.79	15.29	0.18	4.41	8.26	2.75	1.46	1.2	1.48	30.4	339.7	4.3	N	30.7	2	342.5	7.9	N	42.1	92.6	4	0.6	7.6750	0.7292		0.7733
513	3	Damusi Formation	289.6	(Li et al., 2008)	76.75	37.84	271	Txn25-11	Basalt	(Li et al., 2008)	45.28	4.22	13.99	14.94	0.2	4.78	8.19	2.62	1.46	1.2	1.4	27.5	304.3	4	N	29.6	1.7	330.1	7	N	38.6	89.1	3.7	0.6	8.0000	0.7668		0.8074
514	3	Damusi Formation	289.6	(Li et al., 2008)	76.75	37.84	271	Txn25-21	Basalt	(Li et al., 2008)	45.21	4.29	14.6	14.84	0.26	3.8	8.77	2.63	1.45	1.25	1.45	27.7	404.2	4.3	N	31.3	1.9	348.4	7.8	N	42.5	93.6	4.1	0.7	7.6341	0.7365		0.7847
515	3	Damusi Formation	289.6	(Li et al., 2008)	76.75	37.84	271	Txn26-3	Basalt	(Li et al., 2008)	46.19	4.64	13.47	14	0.23	3.58	8.84	2.83	1.72	1.57	1.43	35.3	323.6	4.8	N	35.9	2.2	402.5	9.1	N	51.1	114.1	4.8	0.8	7.4792	0.7025		0.7769
516	3	Damusi Formation	289.6	(Li et al., 2008)	76.75	37.84	271	Txn26-7	Basalt	(Li et al., 2008)	45.22	4.36	14.55	13.75	0.16	4.2	8.66	2.56	1.47	1.17	1.93	29.5	431	4.3	N	32.8	2	370.9	8.2	N	43.6	93.8	4.1	0.7	8.0000	0.7523		0.8119
517	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1102a	Basalt	(Li et al., 2013)	48.07	4.46	13.29	14.98	0.1	4.25	4.63	3.34	1.49	0.98	3.84	25.5	196	4.62	1.28	24.2	1.64	289	7.64	5.03	36.9	82.5	3.57	0.52	6.7787	0.6558	16.4016	0.6282
518	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1102b	Basalt	(Li et al., 2013)	48.09	4.42	13.29	15.18	0.1	4.28	4.55	3.33	1.43	1	3.78	24.2	198	4.67	1.39	24.5	1.63	287	7.74	5.3	37.3	85.8	3.55	0.53	6.9014	0.6568	16.1887	0.6291
519	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1103a	Basalt	(Li et al., 2013)	42.98	4.75	14.69	18.27	0.17	4.08	4.34	3.7	1.27	1.01	4.21	18.8	325	4.92	1.03	27.5	1.83	315	8.27	7.08	40.3	90.8	3.78	0.55	7.2751	0.6824	12.8249	0.6619
520	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1104a	Basalt	(Li et al., 2013)	41.82	4.6	14.53	19.01	0.13	5.6	4.32	3.85	0.06	1.03	4.53	0.9	49	5.66	1.12	26.5	1.8	313	8.14	34.l7	38.9	88.5	3.76	0.56	7.0479	0.6812		0.6053
521	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1104b	Basalt	(Li et al., 2013)	45.65	3.23	10.87	15.54	0.14	2.02	9.95	4.14	0.81	0.78	6.51	8.9	232	4.11	0.87	19.2	1.3	231	6.18	4.98	32.6	69.4	2.81	0.43	6.8327	0.5890	13.9357	0.5622
522	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1104c	Basalt	(Li et al., 2013)	52.08	2.78	9.82	9.99	0.12	1.37	11.23	3.92	0.12	0.69	7.61	3	307	3.63	0.84	16.7	1.17	201	5.35	5.28	27.9	62.4	2.32	0.34	7.1983	0.5986	11.8182	0.5624
523	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1105a	Basalt	(Li et al., 2013)	44.53	4.21	13.62	16.56	0.17	4.03	8.93	2.58	1.86	0.95	1.99	42.8	464	4	0.89	25.7	1.53	284	6.7	4.76	35.3	80.4	3.43	0.51	7.4927	0.7280	16.8908	0.7330
524	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1105b	Basalt	(Li et al., 2013)	45.92	4.15	13.27	16.36	0.2	4	6.67	3	2.72	0.92	2.2	6l.6	621	4.4	0.91	24.1	1.65	279	7.58	4.83	35.7	78.2	3.5	0.51	6.8857	0.6751	16.1905	0.6517
525	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1105c	Basalt	(Li et al., 2013)	44.47	4.21	13.68	16.5	0.l8	4.03	8.85	2.51	1.93	0.95	2.1	39.8	486	4.17	0.93	24.5	1.6	282	7.26	6.19	35.4	78.2	3.5	0.52	7.0000	0.6921	12.6333	0.6834
526	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1108a	Basalt	(Li et al., 2013)	47.82	4.49	13.87	16.61	0.36	3.77	4.36	2.47	1.77	0.98	2.92	33.2	328	4.61	0.96	24.8	1.73	291	7.82	7.33	35.1	77	3.58	0.54	6.9274	0.7066	10.5048	0.6608
527	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1108b	Basalt	(Li et al., 2013)	47.69	3.18	12.3	8.21	0.14	2.5	11.59	4.39	1.05	0.77	7.92	12.2	178	4.29	0.91	21.2	1.25	222	6.O4	3.95	28.8	66.1	2.72	0.41	7.7941	0.7361	16.7342	0.6464
528	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1109a	Basalt	(Li et al., 2013)	45.72	4.18	12.75	16.84	0.21	4.7	6.42	3.38	1.75	0.91	2.56	35.4	501	3.93	0.85	23.5	1.51	269	7.03	4.65	34.O	76.3	3.36	0.5	6.9940		16.4086	
529	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1109b	Basalt	(Li et al., 2013)	N	N	N	N	N	N	N	N	N	N	N	40.1	483	3.97	0.87	22.7	1.43	274	6.37	6.69	34	74.9	3.34	0.5	6.7964	0.6676	11.1958	0.6622
530	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1110a	Basalt	(Li et al., 2013)	50.29	4.3	13.58	10.84	0.11	3.64	7.4	3.36	2.23	1.04	2.59	34.8	280	4.83	1.06	25.7	1.66	306	7.8	7.91	41.8	92.7	3.61	0.53	7.1191	0.6148	11.7193	0.6130
531	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1110b	Basalt	(Li et al., 2013)	57.07	3.44	11.73	9	0.13	2.53	5.93	4.54	0.26	0.81	3.99	2.9	166	4.45	1.21	20.2	1.31	220	6.1	7.58	29.5	65.3	2.73	0.41	7.3993	0.6847	8.6148	0.5975
532	3	Qipan Formation	282	(Li et al., 2013)	76.41	38.46	241	QMG1111b	Basalt	(Li et al., 2013)	45.1	4.21	13.39	15.31	0.22	4.19	8.57	2.45	2.34	1.01	2.61	37.9	306	4.75	1.04	24.9	1.66	301	7.85	5.26	39.7	86.8	3.6	0.55	6.9167	0.6272	16.5019	0.6145
533	4	Gudongshan Section	298.3	（Shao et al., 2015）	76.70	37.52	303	Y8-1	Basalt	（Shao et al., 2015）	44.8	4.06	13.75	16.6	0.2	5.52	7.18	3.04	1.46	1.24	1.54	30.9	345	4.1	N	30.7	1.67	331	8.2	N	41	91.4	3.9	0.61	7.8718	0.7488		0.8025
534	4	Gudongshan Section	298.3	（Shao et al., 2015）	76.70	37.52	303	Y8-2	Basalt	（Shao et al., 2015）	45.2	4.38	14.25	16.3	0.15	4.91	7.6	2.92	1.4	1.28	1.85	24	328	3.9	N	28	1.61	304	7.4	N	41.5	91.2	4	0.61	7.0000	0.6747		0.7459
535	4	Gudongshan Section	298.3	（Shao et al., 2015）	76.70	37.52	303	Y8-3	Basalt	（Shao et al., 2015）	45.3	4.12	14	16.68	0.19	5.23	7.45	3.03	1.44	1.24	1.1	25.6	341	3.9	N	32	1.83	327	7.9	N	41.5	91.2	3.85	0.59	8.3117	0.7711		0.8525
536	4	Gudongshan Section	298.3	（Shao et al., 2015）	76.70	37.52	303	Y8-4	Basalt	（Shao et al., 2015）	45.4	4.07	13.85	16.79	0.22	5.23	7.43	3.1	1.48	1.25	0.94	26.8	373	4.1	N	33	1.85	333	8.1	N	42.6	93.8	3.97	0.59	8.3123	0.7746		0.8463
537	4	Gudongshan Section	298.3	（Shao et al., 2015）	76.70	37.52	303	Y8-5	Basalt	（Shao et al., 2015）	44.8	4.17	13.75	16.74	0.2	5.41	7.25	3.06	1.45	1.24	1.8	30.9	333	3.9	N	32.5	1.81	325	7.9	N	41.5	92.8	3.88	0.58	8.3763	0.7831		0.8658
538	4	Gudongshan Section	298.3	（Shao et al., 2015）	76.70	37.52	303	Y8-6	Basalt	（Shao et al., 2015）	45.3	4.14	13.85	16.73	0.18	5.24	7.43	3.05	1.47	1.27	1.16	28.5	367	4.4	N	35.7	1.99	360	8.8	N	42.8	94.3	4.13	0.58	8.6441	0.8341		0.8817

NO.	Region	Geologic unit	Age/Ma	Ref. for ages	Long.	lati.	Distance/km	Sample name	Sample lithology	Ref. for elements	SiO_2	TiO_2	Al_2O_3	$Fe_2O_3^t$	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Rb	Sr	Th	U	Nb	Ta	Zr	Hf	Pb	La	Ce	Yb	Lu	Nb/Yb	Nb/La	Ce/Pb	Nb*
539	4	Gudongshan Section	298.3	（Shao et al., 2015）	76.70	37.52	303	Y8-7	Basalt	（Shao et al., 2015）	45.2	4.07	13.8	16.77	0.2	5.22	7.76	2.95	1.29	1.27	0.85	16.4	381	4.1	N	30.1	1.67	327	7.9	N	41.7	92.8	3.99	0.58	7.5439	0.7218		0.7802

Notes:

Ref.	—	Reference;
Estimated*	—	Age of magmatic rocks estimated by Han et al. (2019).
Distance / km	—	The distance from the sample points to plume head (294.447 km, 4410.079 km). The projected coordinate system is UTM Zone 81°N (WGS 84).
region	—	1, Tarim Basin (Bachu); 2, Tarim Basin (North); 3, Tarim Basin (Southwest); 4, Tarim Basin (Central-West).
Nb*	—	Nb anomaly, (Nb/0.713)/√[(Th/0.085)×(La/0.687)], normalized by the Primitive Mantle (Sun and McDonough, 1989).

REFERENCES CITED IN TABLE S2.

Cao, J., Xu, Y.G., Xing, C.M., Huang, X.L., and Li, H.Y., 2013, Origin of the Early Permian granitic plutons from the Piqiang region in the northern Tarim Block: Implications for the origin of A-type granites of the Tarim large igneous province: Acta Petrologica Sinica, v. 29, p. 3336-3352.

Cao, J., Wang, C.Y., Xing, C.-M., and Xu, Y.-G., 2014, Origin of the early Permian Wajilitag igneous complex and associated Fe–Ti oxide mineralization in the Tarim large igneous province, NW China: Journal of Asian Earth Sciences, v. 84, p. 51-68.

Cao, J., Tao, J.H., and Wang, X., 2017a, SHRIMP zircon U-Pb ages of the Wajilitag igneous complex: Constraints on the origin of A-type granitoids in the Tarim large igneous province, NW China: Acta Geologica Sinica (English Edition), v. 91, p. 2318-2320.

Chen, G.W., Deng, T., Liu, R., Xia, H., and Liu, Q., 2015, Geochemistry of bimodal volcanic rocks in Permian Taerdetao formation in Awulale area of western Tianshan, Xinjiang: Acta Petrologica Sinica, v. 31, p. 105-118.

Cheng, Z.G., Zhang, Z.C., Hou, T., Santosh, M., Zhang, D.Y., and Ke, S., 2015, Petrogenesis of nephelinites from the Tarim Large Igneous Province, NW China: Implications for mantle source characteristics and plume–lithosphere interaction: Lithos, v. 220, p. 164-178.

Han, Y.G., Zhao, G.C., Cawood, P.A., Sun, M., Liu, Q., and Yao, J., 2019, Plume-modified collision orogeny: The Tarim–western Tianshan example in Central Asia: Geology, v.47, p.1001-1005.

Huang, H., Zhang, Z.C., Zhang, S., and Zhang, D.Y., 2010, Petrology and geochemistry of the Huoshibulake alkali feldspar granite pluton in Southwest Tianshan Mountains, Xinjiang: implications for petrogenesis, tectonic setting and mineralization: Acta Petrologica Et Mineralogica, v. 29, p. 707-718.

Huang, H., Zhang, Z.C., Kusky, T., Santosh, M., Zhang, S., Zhang, D.Y., Liu, J.L., and Zhao, Z.D., 2012, Continental vertical growth in the transitional zone between South Tianshan and Tarim, western Xinjiang, NW China: Insight from the Permian Halajun A1-type granitic magmatism: Lithos, v. 155, p. 49-66.

Jiang, C.Y., Zhang, P.B., Lu, D.R., and Bai, K.Y., 2004, Petrogenesis and magma source of the ultramafic rocks at Wajilitag region, western Tarim Plate in Xinjiang: Acta Petrologica Sinica, v. 20, p. 1433-1444.

Li, Z.L., Shufeng, Yang, S.F., Chen, H.L., Langmuir, C.H., Yu, X., Lin, X.B., and Li, Y.Q., 2008, Chronology and geochemistry of Taxinan basalts from the Tarim basin: evidence for Permian plume magmatism: Acta Petrologica Sinica, v. 24, p. 959-970.

Li, N.B., Niu, H.C., Shan, Q., Jiang, Y.H., Zeng, L.J., Yang, W.B., and Pei, Z.J., 2013, Zircon U-Pb geochronology and geochemistry of post-collisional granitic porphyry from Yuantoushan, Nileke, Xinjiang: Acta Petrologica Sinica, v. 29, p. 3402-3412.

Li, H.Y., Huang, X.L., Li, W.X., Cao, J., He, P.L., and Xu, Y.G., 2013, Age and geochemistry of the Early Permian basalts from Qimugan in the southwestern Tarim basin: Acta Petrologica Sinica, v. 29, p. 3353-3368.

Li, Y.Q., Li, Z.L., Sun, Y.L., Chen, H.L., Yang, S.F., and Yu, X., 2010, PGE and geochemistry of Wajilitag ultramafic cryptoexplosive brecciated rocks from Tarim Basin: Implications for petrogenesis: Acta Petrologica Sinica, v. 26, p. 3307-3318.

Li, Y.Q., Li, Z.-L., Sun, Y.-L., Santosh, M., Langmuir, C.H., Chen, H.-L., Yang, S.-F., Chen, Z.-X., and Yu, X., 2012, Platinum-group elements and geochemical characteristics of the Permian continental flood basalts in the Tarim Basin, northwest China: Implications for the evolution of the Tarim Large Igneous Province: Chemical Geology, v. 328, p. 278-289.

Liu, B., Chen, Z.L., Ren, R., Han, B.F., and Su, L., 2013, Timing of the South Tianshan suture zone: New evidence of zircon ages from the granitic plutons in Kokshal area: Geological Bulletin of China, v. 32, p. 1371-1384.

Liu, Y.L., Hu, X.F., Huang, Z.B., Wu, G.Y., Zheng, D.M., Shen, Y.M., Zhao, Y., and Li, Y.J., 2012, ^{40}Ar-^{39}Ar geochronology and geochemistry of the volcanic rocks from the west segment of Tabei uplift, Tarim Basin: Acta Petrologica Sinica, v. 28, p. 2423-2434.

Liu, H.Q., Xu, Y.G., Tian, W., Zhong, Y.T., Mundil, R., Li, X.H., Yang, Y.H., Luo, Z.Y., and Shangguan, S.M., 2014, Origin of two types of rhyolites in the Tarim Large Igneous Province: Consequences of incubation and melting of a mantle plume: Lithos, v. 204, p. 59-72.

Luo, J.H., Zhang, J.Y., Wang, C., Che, Z.C., and Liu, L., 2010, Early Permian post-collisional granitoid magmatism on the northwestern margin of Tarim Basin and its tectonic significance: Chinese Journal of Geology, v. 45, p. 66-79.

Ma, Y., Zhang, Z.C., Huang, H., Santosh, M., and Cheng, Z.G., 2016, Petrogenesis of the Bashisuogong bimodal igneous complex in southwest Tianshan Mountains, China: Implications for the Tarim Large Igneous Province: Lithos, v. 264, p. 509-523.

Shangguan, S.M., Peate, I.U., Tian, W., and Xu, Y.G., 2016, Re-evaluating the geochronology of the Permian Tarim magmatic province: implications for temporal evolution of magmatism: Journal of the Geological Society, v. 173, p. 228-239.

Shao, T.Q., Zhu, Y.F., Jin, L.Y., Zhu, Z.X., Li, P., and Liu X., 2015, Zircon U-Pb dating and geochemical of basalts in Qipan Country of Northwest Tarim Basin: Chinese Journal of Geology, v. 50, p. 1120-1133.

Su, Y.P., Zheng, J.P., Liang, L.L., Dai, H.K., Zhao, J.H., Chen, M., Ping, X.Q., Liu, Z.Q., and Wang, J., 2019, Derivation of A1-type granites by partial melting of newly underplated rocks related with the Tarim mantle plume: Geological Magazine, p. in press.

Sun, L.H., Wang, Y.J., Fan, W.M., and Zi, J.W., 2008, A further discussion of the petrogenesis and tectonic implication of the Mazhashan syenites in the Bachu area: Journal of Jilin University (Earth Science Edition), v. 38, p. 8-20.

Sun, S.S., McDonough, W.F. 1989. Chemical and isotopic systematics of oceanic basalts: implications for mantle composition and processes. Geological Society, London, Special Publications, 42: 313-345.

Tian, W., Campbell, I.H., Allen, C.M., Guan, P., Pan, W., Chen, M., Yu, H., and Zhu, W., 2010, The Tarim picrite-basalt-rhyolite suite, a Permian flood basalt from northwest China with contrasting rhyolites produced by fractional crystallization and anatexis: Contributions to Mineralogy and Petrology, v. 160, p. 407-425.

Wei, X., and Xu, Y.G., 2011, Petrogenesis of Xiaohaizi syenite complex from Bachu area, Tarim: Acta Petrologica Sinica, v. 27, p. 2984-3004.

Wei, X., and Xu, Y.G., 2013, Petrogenesis of the mafic dykes from Bachu and implications for the magma evolution of the Tarim large igneous province, NW China: Acta Petrologica Sinica, v. 29, p. 3323-3335.

Wei, X., Xu, Y.-G., Feng, Y.-X., and Zhao, J.-X., 2014, Plume-lithosphere interaction in the generation of the Tarim large igneous province, NW China: Geochronological and geochemical constraints: American Journal of Science, v. 314, p. 314-356.

Yang, S.F., Li, Z.L., Chen, H.L., Xiao, W.J., Yu, X., Lin, X.B., and Shi, X.G., 2006, Discovery of a Permian quartz syenitic porphyritic dyke from the Tarim basin and its tectonic implications: Acta Petrologica Sinica, v. 22, p. 1405-1412.

Yu, J.C., Mo, X.X., Dong, G.C., Yu, X.H., Xing, F.C., Li, Y., and Huang, X.K., 2011a, Felsic volcanic rocks from northern Tarim, NW China: Zircon U-Pb dating and geochemical characteristics: Acta Petrologica Sinica, v. 27, p. 2184-2194.

Yu, X., Yang, S.F., Chen, H.L., Chen, Z.Q., Li, Z.L., Batt, G.E., and Li, Y.Q., 2011b, Permian flood basalts from the Tarim Basin, Northwest China: SHRIMP zircon U-Pb dating and geochemical characteristics: Gondwana Research, v. 20, p. 485-497.

Yu, X., Yang, S.F., Chen, H.L., Li, Z.L., Li, Y.Q., and Qiu, Z.L., 2017, Petrogeochemical characteristics and geological implications of layered basalts from Xiahenan area, Tarim Basin: Acta Petrologica Sinica, v. 33, p. 1729-1740.

Zhang, C.L., and Zou, H.B., 2013, Permian A-type granites in Tarim and western part of Central Asian Orogenic Belt (CAOB): genetically related to a common Permian mantle plume?: Lithos, v. 172-173, p. 47-60.

Zhang, C.L., Li, X.H., Li, Z.X., Ye, H.M., and Li, C.N., 2008, A Permian layered intrusive complex in the western Tarim Block, northwestern China: Product of a ca. 275 - Ma mantle plume?: The Journal of Geology, v. 116, p. 269-287.

Zhang, C.L., Xu, Y.G., Li, Z.X., Wang, H.Y., and Ye, H.M., 2010a, Diverse Permian magmatism in the Tarim Block, NW China: Genetically linked to the Permian Tarim mantle plume?: Lithos, v. 119, p. 537-552.

Zhang, Y.T., Liu, J.Q., and Guo, Z.F., 2010b, Permian basaltic rocks in the Tarim basin, NW China: Implications for plume-lithosphere interaction: Gondwana Research, v. 18, p. 596-610.

Zhang, D.Y., Zhang, Z.C., Mao, J.W., Huang, H., and Cheng, Z.G., 2016, Zircon U-Pb ages and Hf-O isotopic signatures of the Wajilitag and Puchang Fe-Ti oxide-bearing intrusive complexes: Constraints on their source characteristics and temporal-spatial evolution of the Tarim large igneous province: Gondwana Research, v. 37, p. 71-85.

Zhang, D.Y., Zhang, Z.C., Santosh, M., Cheng, Z., He, H., and Kang, J., 2013, Perovskite and baddeleyite from kimberlitic intrusions in the Tarim large igneous province signal the onset of an end-Carboniferous mantle plume: Earth and Planetary Science Letters, v. 361, p. 238-248.

Zhang, D.Y., Zhou, T.F., Yuan, F., Jowitt, S.M., Fan, Y., and Liu, S., 2012a, Source, evolution and emplacement of Permian Tarim Basalts: Evidence from U-Pb dating, Sr-Nd-Pb-Hf isotope systematics and whole rock geochemistry of basalts from the Keping area, Xinjiang Uygur Autonomous region, northwest China: Journal of Asian Earth Sciences, v. 49, p. 175-190.

Zhang, X., Tian, J.Q., Gao, J., Klemd, R., Dong, L.H., Fan, J.J., Jiang, T., Hu, C.J., and Qian, Q., 2012b, Geochronology and geochemistry of granitoid rocks from the Zhibo syngenetic volcanogenic iron ore deposit in the Western Tianshan Mountains (NW-China): Constraints on the age of mineralization and tectonic setting: Gondwana Research, v. 22, p. 585-596.

Zhou, M.-F., Zhao, J.H., Jiang, C.Y., Gao, J.F., Wang, W., and Yang, S.H., 2009, OIB-like, heterogeneous mantle sources of Permian basaltic magmatism in the western Tarim Basin, NW China: implications for a possible Permian large igneous province: Lithos, v. 113, p. 583-594.

Zou, S.Y., Li, Z.L., Song, B., Ernst, R.E., Li, Y.Q., Ren, Z.Y., Yang, S.F., Chen, H.L., Xu, Y.G., and Song, X.Y., 2015, Zircon U-Pb dating, geochemistry and Sr-Nd-Pb-Hf isotopes of the Wajilitag alkali mafic dikes, and associated diorite and syenitic rocks: Implications for magmatic evolution of the Tarim large igneous province: Lithos, v. 212, p. 428-442.