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Supplemental Material

Figure S1. (A) Zr/Nb vs. SiO_2 , (B) Ce/Pb vs. SiO_2 and (C) $(^{87}\text{Sr}/^{86}\text{Sr})_i$ vs. Rb/Sr for the Chaganuoer ferrobaltic samples.

Figure S2. (A) $\text{Fe}^{3+}/\Sigma\text{Fe}$ vs. FeO^T , (B) $\text{Fe}^{3+}/\Sigma\text{Fe}$ vs. LOI, and (C) $\delta^{56}\text{Fe}$ vs. FeO^T for the Chaganuoer ferrobaltic and dacitic samples.

Table S1. Selected major and trace element contents for the Chaganuoer ferrobaltic and dacitic samples.

Table S2. EPMA data for major mineral phases in the Chaganuoer ferrobaltic and dacite.

Supplementary materials for

Extremely Low $\delta^{56}\text{Fe}$ in Arc Tholeiites Linked to Ferrocarbonate Recycling:
Implications for Fe Enrichment in the Awulale Arc, Central Asia

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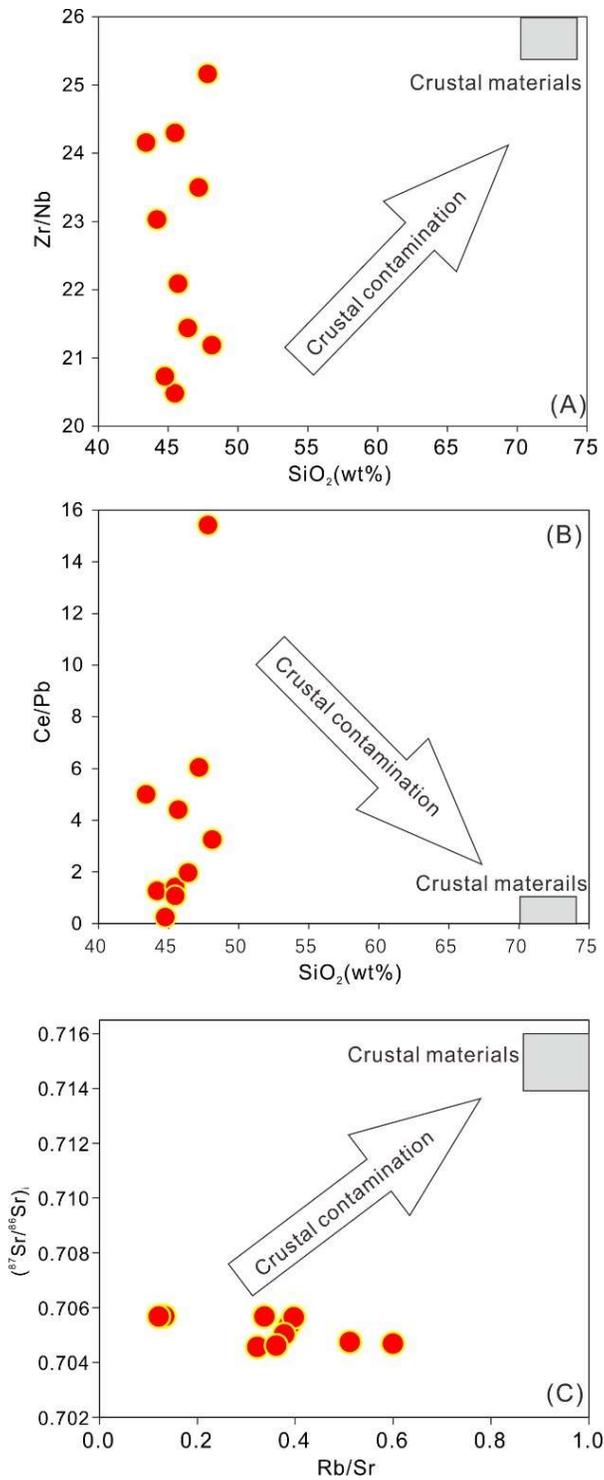


Figure S1. (A) Zr/Nb vs. SiO₂, (B) Ce/Pb vs. SiO₂ and (C) (⁸⁷Sr/⁸⁶Sr)_i vs. Rb/Sr for the Chaganguoer ferrobasic samples. Compositions of the crustal materials refer to Feng et al. (2010).

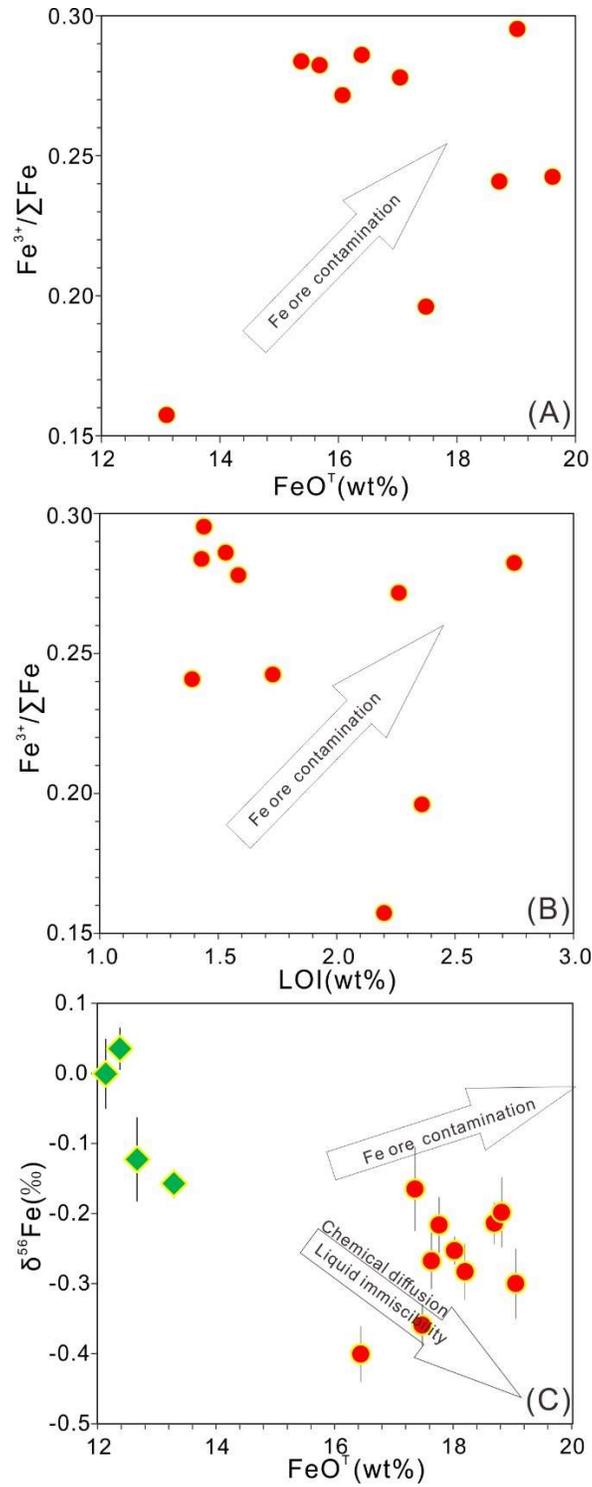


Figure S2. (A) $\text{Fe}^{3+}/\Sigma\text{Fe}$ vs. FeO^{T} , (B) $\text{Fe}^{3+}/\Sigma\text{Fe}$ vs. LOI, and (C) $\delta^{56}\text{Fe}$ vs. FeO^{T} for the Chaganguoer ferrobasaltic and dacitic samples. Red circles and green diamonds refer to ferrobasaltic and dacitic samples, respectively.

Table S1 Selected major (wt%) and trace element (ppm) contents for the Chagangnuoer ferrobaltic and dacitic samples, referring to *Li et al. (2015)* and *Niu et al. (2011)*.

Sample	9CGB-3	9CGB-4	9CGB-8	9CGB-9	7CGB-10	7CGB-11	7CGB-13	7CGB-14	11CG21-3	11CG21-4	9CG1B	9CG1C	CGB-79	CGB-211	CGB-475
							<i>Ferrobalt</i>						<i>Dacite</i>		
SiO ₂	44.19	48.12	45.70	47.82	45.48	47.19	44.77	46.40	45.49	43.42	68.40	69.00	61.05	60.07	65.70
TiO ₂	0.89	1.13	0.98	0.82	1.26	0.77	1.25	1.06	0.84	0.70	0.38	0.38	0.61	0.68	0.44
FeO ^T	19.61	13.10	18.71	15.37	16.39	16.07	17.04	15.68	17.48	19.02	2.95	2.36	3.68	5.22	2.14
Fe ₂ O ₃ ^T	21.79	14.56	20.79	17.08	18.21	17.86	18.93	17.42	19.42	21.13	3.28	2.62	4.09	5.80	2.38
MnO	0.47	0.55	0.39	0.45	0.42	0.51	0.48	0.50	0.66	0.55	0.12	0.12	0.15	0.18	0.08
MgO	6.70	6.22	6.13	6.07	5.63	5.73	5.63	6.63	7.38	7.61	1.44	1.27	1.90	2.84	2.57
LOI	1.73	2.20	1.39	1.43	1.53	2.26	1.59	2.75	2.36	1.44	1.03	1.23	0.65	1.07	1.53
Ti	5340	6780	5880	4920	7389	4632	7455	6325	4570	4452	2280	2280	3469	3895	2535
Rb	36.1	71.5	37.4	22.6	57.5	57.8	57.5	72.5	12.1	30.7	79.1	99.2	134	88.1	198
Sr	93.2	180	111	171	178	153	159	142	100	51.2	69.4	155	93.9	92.1	259
Y	13.6	20.1	12.2	27.5	19.3	18.3	18.1	17.4	14.9	14.9	27.9	24.9	16.9	17.5	27.7
Zr	65.4	100	80.4	86.3	97.84	75.63	100	83.4	62.2	59.9	142	144	119	115	157
Nb	2.84	4.72	3.64	3.43	4.78	3.22	4.83	3.89	2.56	2.48	5.02	5.11	4.44	4.44	6.62
Ba	476	1545	730	202	290	1377	311	1131	233	373	681	656	819	568	505
La	2.32	3.71	3.63	36.4	2.80	5.20	2.18	3.39	2.16	2.10	15.1	10.7	10.3	6.07	38.7
Ce	5.81	12.4	11.1	69.7	11.7	13.6	8.83	14.8	8.01	9.15	32.3	24.3	22.8	15.9	73.1
Pr	0.92	2.01	1.68	7.85	2.14	2.20	1.68	2.69	1.37	1.67	3.87	3.06	2.96	2.36	8.69
Nd	4.73	9.51	7.72	28.5	10.5	10.4	8.63	12.5	6.66	8.33	15.1	11.9	12.1	10.2	31.8
Sm	1.51	2.83	1.86	5.53	2.95	2.78	2.62	3.13	1.84	2.29	3.57	2.74	2.77	2.44	6.59
Eu	0.27	0.55	0.51	2.32	0.54	0.69	0.44	0.74	0.37	0.48	0.96	0.58	0.64	0.68	1.76

Gd	1.77	3.06	2.08	6.09	3.09	3.06	2.86	3.19	2.12	2.52	4.21	3.32	2.91	2.64	6.26
Tb	0.35	0.58	0.37	0.93	0.57	0.55	0.53	0.53	0.39	0.43	0.81	0.62	0.53	0.49	1.01
Dy	2.21	3.54	2.03	4.85	3.46	3.43	3.29	3.23	2.51	2.70	4.71	3.90	3.28	3.03	5.64
Ho	0.47	0.73	0.44	1.02	0.72	0.72	0.67	0.67	0.58	0.59	1.05	0.90	0.67	0.65	1.06
Er	1.38	2.02	1.29	2.82	2.03	2.05	1.84	1.93	1.59	1.49	3.02	2.77	1.89	1.88	2.79
Tm	0.21	0.29	0.19	0.39	0.27	0.30	0.26	0.27	0.26	0.22	0.46	0.45	0.28	0.29	0.41
Yb	1.33	1.94	1.21	2.31	1.83	1.97	1.66	1.74	1.65	1.48	3.02	2.95	1.85	1.97	2.41
Lu	0.21	0.32	0.23	0.37	0.27	0.30	0.26	0.28	0.25	0.23	0.47	0.47	0.29	0.32	0.36
Hf	1.74	2.62	2.11	2.32	2.73	2.37	2.80	2.46	1.80	1.71	4.21	4.14	3.49	3.26	4.32
Ta	0.21	0.31	0.24	0.33	0.35	0.27	0.35	0.30	0.21	0.19	0.47	0.51	0.37	0.35	0.54
Pb	4.59	3.81	2.52	4.52	8.27	2.25	3.52	7.54	7.49	1.83	17.2	21.9	23.9	1.83	36.4

Table S2 EPMA data for major mineral phases in the Chagangnuoer ferrobasalt and dacite.**Ferrobasalt:**

Mineral types	Oxide compositions (wt%)											
	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	Cl	F	Total
Hornblende	39.62	4.97	11.86	13.65	0.14	12.30	11.40	2.62	0.63	0.01	0.10	97.24
Hornblende	39.24	5.02	12.36	13.88	0.13	12.05	11.54	2.55	0.70	0.02	0.13	97.55
Hornblende	40.17	4.22	11.95	13.40	0.17	12.53	11.70	2.55	0.71	0.02	0.07	97.43
Hornblende	40.59	4.12	11.70	13.28	0.15	12.68	11.71	2.54	0.66	0.00	0.08	97.47
Hornblende	39.48	4.89	11.93	13.74	0.14	12.21	11.67	2.59	0.64	0.01	0.04	97.32
Hornblende	39.04	5.08	12.14	14.13	0.14	12.07	11.28	2.59	0.72	0.01	0.12	97.25
	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	Cr ₂ O ₃	P ₂ O ₅	Total
Clinopyroxene	49.23	1.24	4.92	6.16	0.03	14.23	23.11	0.45	0.00	0.63	0.00	100.00
Clinopyroxene	49.25	1.21	4.96	6.18	0.03	13.99	23.07	0.43	0.02	0.61	0.00	99.73
Clinopyroxene	47.47	1.94	6.59	7.40	0.01	13.60	22.02	0.46	0.00	0.39	0.05	99.93
Clinopyroxene	48.97	1.33	5.36	6.83	0.01	14.03	22.76	0.43	0.00	0.39	0.04	100.15
Clinopyroxene	51.59	0.69	2.62	5.82	0.05	16.10	22.57	0.30	0.01	0.40	0.02	100.17
Clinopyroxene	51.62	0.72	2.81	5.85	0.04	16.19	22.26	0.35	0.00	0.30	0.04	100.18
	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MnO	MgO	CaO	ZnO	Cr ₂ O ₃	V ₂ O ₃	Total	
Magnetite	0.12	10.41	2.09	77.77	0.11	0.02	0.03	0.20	0.03	0.15	90.80	
Magnetite	0.11	10.13	1.81	79.11	0.11	0.00	0.05	0.18	0.02	0.14	91.55	
Magnetite	0.13	10.57	2.13	77.89	0.11	0.02	0.08	0.19	0.01	0.20	91.21	
Magnetite	0.09	10.50	2.44	77.79	0.09	0.02	0.05	0.23	0.01	0.18	91.30	
Magnetite	0.11	9.96	2.62	78.06	0.12	0.02	0.02	0.16	0.03	0.17	91.15	
Magnetite	0.16	9.83	0.40	81.92	0.11	0.07	0.00	0.00	0.00	0.16	92.50	
Magnetite	0.11	10.27	2.55	77.75	0.12	0.01	0.06	0.15	0.05	0.16	91.12	

Magnetite	0.10	11.02	2.94	76.20	0.10	0.03	0.18	0.32	0.02	0.24	91.05
	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	Total		
Plagioclase	52.66	0.01	28.23	0.36	0.01	12.40	4.43	0.06	98.16		
Plagioclase	60.21	0.04	24.81	0.47	0.04	6.70	6.83	1.00	100.10		
Plagioclase	69.61	0.04	20.81	0.22	0.03	2.74	7.54	1.11	102.10		
Plagioclase	69.23	0.00	19.37	0.25	0.01	1.24	9.30	0.14	99.54		
Plagioclase	68.89	0.01	21.12	0.55	0.12	0.82	6.67	1.50	99.67		
K-feldspar	67.81	0.04	18.21	0.19	0.01	0.26	1.05	14.15	101.73		
K-feldspar	67.07	0.01	19.45	0.21	0.03	0.21	1.54	14.37	102.89		
K-feldspar	62.41	0.05	23.33	0.86	0.39	0.85	1.30	11.02	100.22		

Dacite:

Mineral types	Oxide compositions (wt%)											
	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	Cl	F	Total
Hornblende	46.97	2.41	7.83	12.73	0.11	14.09	12.23	0.55	0.52	0.02	0.15	97.59
Hornblende	49.34	2.16	7.75	12.66	0.13	14.11	12.56	0.55	0.55	0.02	0.13	99.97
Hornblende	48.53	2.30	8.54	12.34	0.17	13.84	12.57	0.61	0.49	0.02	0.07	99.47
Hornblende	49.28	1.68	6.46	12.06	0.21	14.21	12.40	0.42	0.53	0.03	0.08	97.36
	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MnO	MgO	CaO	ZnO	Cr ₂ O ₃	V ₂ O ₃	Total	
Magnetite	0.66	0.04	0.19	92.73	0.09	0.03	0.15	0.04	0.01	0.10	94.02	
Magnetite	0.33	0.02	0.15	93.14	0.07	0.02	0.00	0.00	0.00	0.11	93.80	
Magnetite	0.22	0.05	0.05	92.65	0.07	0.02	0.00	0.04	0.02	0.12	93.23	
Magnetite	0.25	2.93	0.53	88.31	0.05	0.02	0.15	0.60	0.04	0.29	93.18	
Magnetite	0.70	0.08	0.26	92.12	0.10	0.03	0.11	0.00	0.02	0.10	93.51	
	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	Total			
Plagioclase	64.76	0.04	19.96	0.18	0.03	0.84	5.54	8.12	99.47			
Plagioclase	65.76	0.08	20.23	0.25	0.10	1.18	8.44	3.29	99.33			
Plagioclase	67.27	0.01	18.35	0.32	0.02	0.82	6.45	7.05	100.28			
K-feldspar	68.02	0.03	19.56	0.21	0.03	0.21	1.57	12.37	101.99			
K-feldspar	65.41	0.05	21.22	0.81	0.23	0.67	1.54	12.02	101.95			

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