

Supplementary Table 2 Major (wt%) and trace elements (ppm) data for the Early-Middle Ordovician volcanic rocks within the Xing'an Massif

Sample	14DX2-1	14DX2-5	14DX2-6	14DX2-7	14DX8-1	14DX8-3	14DX8-4	14DX8-7
Age	473 Ma				463 Ma			
SiO <sub>2</sub>	47.25	47.47	47.05	47.02	58.73	59.75	61.59	56.6
TiO <sub>2</sub>	2.01	2.01	2.01	2.06	0.96	0.95	0.85	1.01
Al <sub>2</sub> O <sub>3</sub>	16.33	16.5	16.57	16.7	16.1	15.79	16.01	16.26
Fe <sub>2</sub> O <sub>3</sub>	10.02	9.89	10.2	9.61	8.65	8.4	7.64	9.38
MnO	0.15	0.15	0.16	0.16	0.19	0.17	0.15	0.2
MgO	6.49	6.43	6.56	6.55	2.45	2.16	1.65	2.57
CaO	7.12	7.06	7.05	7.12	3.64	4.17	2.8	4.57
Na <sub>2</sub> O	3.33	3.31	3.26	3.3	3.3	4.36	3.43	3.85
K <sub>2</sub> O	1.81	1.75	1.72	1.8	3.3	2.46	3.43	3.49
P <sub>2</sub> O <sub>5</sub>	0.67	0.67	0.69	0.67	0.42	0.38	0.37	0.36
LOI	4.40	4.64	4.5	4.56	2.3	1.16	2.08	1.76
Total	99.58	99.88	99.77	99.55	100.04	99.75	100.00	100.05
Na <sub>2</sub> O/K <sub>2</sub> O	1.84	1.89	1.90	1.83	1.00	1.77	1.00	1.10
Mg <sup>#</sup>	54	54	53	55	34	31	28	33
Sc	21.3	21.6	21.9	13.3	20.7	21.1	18.9	24.4
V	180	184	182	182	102	130	102	173
Cr	181	185	201	190	6.24	12.8	8.35	7.52
Co	37.8	37.3	40.0	38.8	9.45	10.7	9.23	16.2
Ni	131	129	142	137	2.98	5.03	3.43	4.73
Ga	19.1	19.5	19.7	19.3	19.9	20.0	19.0	19.9
Rb	23.3	22.2	22.2	22.7	88.5	55.5	81.8	74.4
Sr	1176	1081	1169	1145	340	236	390	311
Y	30.7	29.3	30.6	28.7	43.9	38.3	39.3	35.4
Zr	330	324	330	333	182	152	161	143
Nb	14.4	14.2	14.4	14.5	5.22	4.35	4.58	4.10
Ba	1260	600	976	1142	443	492	351	361
La	30.8	30.4	31.6	28.1	18.2	17.9	19.5	14.6
Ce	69.2	69.3	70.9	67.6	40.7	39.7	42.3	34.2
Pr	8.79	8.83	9.19	8.75	6.21	6.09	6.16	5.18
Nd	37.4	37.1	38.9	36.5	28.4	27.4	27.6	23.8
Sm	7.79	7.77	8.32	7.65	7.38	7.00	7.02	6.05
Eu	2.34	2.35	2.45	2.26	1.83	1.84	1.89	1.68
Gd	6.78	6.69	7.10	6.79	7.41	6.75	6.76	6.15
Tb	1.02	1.00	1.04	0.98	1.24	1.12	1.09	1.00
Dy	5.59	5.60	5.84	5.51	7.79	6.80	6.85	6.33
Ho	1.06	1.04	1.09	1.03	1.55	1.38	1.39	1.26
Er	2.77	2.76	2.87	2.85	4.51	4.06	4.05	3.73
Tm	0.40	0.40	0.41	0.41	0.72	0.61	0.62	0.56
Yb	2.53	2.44	2.52	2.52	4.62	3.94	4.10	3.61
Lu	0.36	0.36	0.37	0.35	0.69	0.60	0.63	0.54
Hf	6.68	6.82	6.93	6.90	5.09	4.23	4.55	3.99
Ta	0.93	0.88	0.91	0.89	0.34	0.26	0.28	0.25
Pb	8.34	7.58	6.79	7.31	6.86	11.0	7.87	13.4
Th	2.24	2.24	2.22	1.94	8.16	6.65	7.17	6.17
U	0.79	0.76	0.76	0.80	2.91	2.27	2.55	2.12
δEu	0.96	0.97	0.95	0.94	0.75	0.81	0.83	0.83
REE	177	176	183	171	131	125	130	109
Σ LREE/Σ HREE	7.62	7.69	7.60	7.38	3.60	3.95	4.10	3.69
(La/Yb) <sub>N</sub>	8.19	8.41	8.45	7.52	2.66	3.06	3.20	2.72

LOI: Loss on ignition; Mg<sup>#</sup> = 100 Mg<sup>2+</sup>/(Mg<sup>2+</sup>+TFe<sup>2+</sup>) HREE=Gd+Tb+Dy+Ho+Er+Tm+Yb+Lu;  
 δEu=(Eu)cn/[(Gd)cn+(Sm)cn]/2; (La/Yb)<sub>N</sub>=(La/0.687)/(Yb/0.493)

Continued Supplementary Table 2

Sample	detection limits (ppt)	AGV-2	AGV-2 (Ref)	BHVO-2	BHVO-2 (Ref)	BCR-2	BCR-2 (Ref)	RGM-2	RGM-2 (Ref)
Sc	9.51	12.7	13.0	31.7	33.3	33.3	33.0	4.77	4.40
V	29.4	117	120	322	415	415	416	12.4	13.0
Cr	7.52	15.5	16.0	287	15.3	15.3	16.5	3.28	5.90
Co	3.07	15.6	16.0	45.1	37.4	37.4	37.0	2.00	2.00
Ni	20.9	19.0	20.0	127	12.8	12.8	13.0	2.35	5.20
Ga	1.89	20.7	20.0	21.8	22.3	22.3	23.0	16.5	16.5
Rb	2.95	68.6	66.3	8.97	45.2	45.2	46.9	150	150
Sr	3.82	659	661	398	338	338	340	108	108
Y	0.96	19.5	20.0	26.1	37.5	37.5	37.0	23.0	23.2
Zr	10.8	229	230	170	183	183	184	224	220
Nb	1.28	14.1	14.5	18.6	12.4	12.4	12.6	9.31	9.30
Ba	7.79	1124	1130	124	676	676	677	825	810
La	1.11	39.6	37.9	15.2	24.8	24.8	24.9	22.5	24.0
Ce	0.70	69.1	68.6	38.0	53.1	53.1	52.9	45.9	47.0
Pr	0.19	8.01	7.84	5.35	6.72	6.72	6.70	5.18	5.36
Nd	0.65	30.4	30.5	24.7	28.6	28.6	28.7	19.0	19.0
Sm	1.18	5.59	5.49	6.20	6.69	6.69	6.58	3.98	4.30
Eu	0.27	1.53	1.54	2.11	1.98	1.98	1.96	0.61	0.66
Gd	0.48	4.61	4.52	6.29	6.71	6.71	6.75	3.60	3.70
Tb	0.21	0.64	0.64	0.97	1.08	1.08	1.07	0.61	0.66
Dy	0.63	3.60	3.47	5.46	6.55	6.55	6.41	3.73	4.10
Ho	0.18	0.68	0.65	1.00	1.28	1.28	1.28	0.77	0.82
Er	0.43	1.81	1.81	2.57	3.68	3.68	3.66	2.31	2.35
Tm	0.06	0.26	0.26	0.35	0.53	0.53	0.54	0.37	0.37
Yb	0.60	1.67	1.62	2.03	3.44	3.44	3.38	2.47	2.60
Lu	0.16	0.24	0.25	0.28	0.51	0.51	0.50	0.39	0.40
Hf	0.77	5.22	5.00	4.50	4.94	4.94	4.90	5.84	6.20
Ta	0.26	0.86	0.87	1.18	0.79	0.79	0.78	0.91	0.95
Pb	2.28	13.2	13.2	1.87	10.8	10.8	11.0	19.2	19.3
Th	0.32	6.30	6.10	1.26	6.04	6.04	5.70	14.6	15.1
U	0.14	1.92	1.86	0.43	1.72	1.72	1.69	5.68	5.80