

Table 3. Bulk Rock Major-Element and Trace-Element Compositions of the Gabbroic Rocks From the South Wall of the Atlantis Massif^a

Sample	3639-1003	3647-1345	3867-1558	3867-1603	3876-1117	3646-1328	3867-1254	3646-1138	D4-6	3873-1544	3649-1257	3876-1215	3867-1607	D4-5	3880-1349	D3-38	3647-1323	
Depth, m	1648	1661	748	748	869	2043	843	2393		797	1188	798	751		819		1755	
Type	Gabbro	Gabbro	Gabbro	Gabbro	Gabbro	Gabbro	Gabbro	Gabbro	Micro gabbro	Micro gabbro	Gabbro-norite	Gabbro-norite	Pyroxenite	Pyroxenite	Olivine-gabbro-norite	Fe-Ti gabbro	Fe-Ti gabbro	Fe-Ti gabbro
Description	Plagio. neoblasts	Plagio. neoblasts	High-T	High-T	High-T	Plagio. neoblasts	Prehnite, zeolite veins			High-T	Plagio. neoblasts	Low-T (prehnite, zeolite)		High-T and Low-T	High-T amphi		Plagio. neoblasts	
<i>Major Elements, weight %</i>																		
SiO ₂	51.74	55.19	49.06	49.69	52.36	46.63	47.90	49.76	48.64	44.01	50.32	59.31	42.43	46.88	33.09	32.11	46.63	
TiO ₂	0.636	0.374	0.612	0.310	0.270	0.309	0.466	1.030	1.296	1.012	1.108	0.437	0.350	1.858	7.910	3.931	3.819	
Al ₂ O ₃	15.92	15.35	15.69	18.34	16.65	15.89	15.10	14.83	14.34	17.70	15.83	6.38	14.93	6.95	6.25	13.70	9.43	
Fe ₂ O ₃	8.53	6.54	6.40	4.78	4.72	10.02	5.54	10.32	10.68	8.65	8.34	3.65	7.07	9.70	25.04	16.12	17.20	
MnO	0.152	0.103	0.065	0.040	0.080	0.523	0.066	0.166	0.142	0.089	0.119	0.077	0.090	0.195	0.330	0.153	0.461	
MgO	9.21	7.96	11.97	10.52	9.81	12.08	11.39	8.56	8.16	11.58	8.79	15.29	17.74	21.12	8.95	15.77	9.10	
CaO	10.88	9.63	8.60	10.26	11.29	6.96	11.30	12.05	11.81	5.41	11.92	9.33	9.18	8.83	11.54	6.91	8.02	
Na ₂ O	2.69	4.08	2.99	3.00	3.25	3.11	1.88	2.19	2.07	3.35	2.90	1.19	1.14	1.19	1.06	1.10	2.66	
K ₂ O	<d.l.	0.08	0.60	0.22	<d.l.	0.04	1.13	0.06	0.06	0.10	0.07	0.09	0.18	0.04	<d.l.	0.08	0.08	
P ₂ O ₅	0.03	0.02	<d.l.	<d.l.	<d.l.	0.01	0.04	0.07	0.12	0.13	0.04	0.01	<d.l.	0.02	1.73	2.50	1.07	
LOI*	0.19	0.66	3.40	2.63	1.42	4.53	4.38	0.76	1.69	6.91	0.45	2.95	6.71	3.46	2.57	6.30	1.42	
Total	99.95	99.98	99.39	99.79	99.85	100.09	99.18	99.80	99.00	98.94	99.88	98.71	99.82	100.26	98.47	98.67	99.87	
CO ₂ , wt%	0.004	0.008	0.010	0.004	0.003	0.539	0.006	0.004	0.579	0.329	0.017	0.04	0.002	0.074		0.02	0.018	
Density, g/cm ³												2.79	2.88					
<i>Trace Elements, ppm</i>																		
V	157	143	273	151	172	124	222	243	268	200	189	134	221	161	452	116	264	
Cr	137	83	74	57	210	197	113	249	162	89	506	1810	83	1050	40	27	202	
Co	36	31	47	35	33	44	38	51	47	31	41	28	47	41	73	74	59	
Ni	186	134	310	274	277	274	209	135	110	220	207	445	601	501	309	891	255	
Cu	28	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	76	<d.l.	25	35	<d.l.	<d.l.	<d.l.	56	<d.l.	106	
Zn	59	39	<d.l.	<d.l.	<d.l.	141	<d.l.	89	66	61	44	<d.l.	<d.l.	<d.l.	126	<d.l.	68	
Ga	14	17	13	14	14	14	12	15	15	18	15	8	15	9	27	20	18	
Rb	3	<d.l.	3	1	<d.l.	<d.l.	6	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	1.80	<d.l.	1	<d.l.	<d.l.	
Sr	97	115	120	139	119	80	137	66	143	124	112	10	13	17	50	49	77	
Y	15.5	85.6	14.3	8.3	14.3	8.6	14.8	25.3	31.2	13.6	17.5	35	13	47	192	121	73	
Zr	19	45	10	12	11	11	15	47	79	15	16	130	8	78	132	77	57	
Nb	10.0	6.9	<d.l.	<d.l.	0.3	5.2	0.9	7.4	4.7	0.4	4.0	1.09	<d.l.	2.18	13.5	5.0	6.24	
Cs	<d.l.	<d.l.	<d.l.			<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	
Ba	10	18	219	112	5	4	164	4	6	14	7	5.1	3.6	<d.l.	5	<d.l.	13.1	
La	0.71	6.60	0.67	0.82	0.92	0.42	1.00	1.42	2.58	0.84	1.01	1.13	1.08	3.70	11.00	33.17	8.16	
Ce	2.28	22.55	2.07	2.23	3.19	1.55	2.97	4.82	8.04	2.19	3.30	4.70	3.48	15.69	42.20	93.05	26.12	





Table 3. (continued)

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Depth, m	1648	1661	748	748	869	2043	843	2393		797	1188	798	751		819		1755
Type	Gabbro	Gabbro	Gabbro	Gabbro	Gabbro	Gabbro	Gabbrro	Micro gabbro	Micro gabbro	Gabbro-norite	Gabbro-norite	Pyroxenite	Pyroxenite	Olivine-gabbro-norite	Fe-Ti gabbro	Fe-Ti gabbro	Fe-Ti gabbro
Description	Plagio. neoblasts	Plagio. neoblasts	High-T	High-T	High-T	Plagio. neoblasts	Prehnite, zeolite veins			High-T	Plagio. neoblasts	Low-T (prehnite, zeolite)		High-T and Low-T	High-T amphi		Plagio. neoblasts
Pr	0.43	4.04	0.34	0.35	0.58	0.29	0.51	0.88	1.27	0.37	0.58	0.92	0.59	2.83	8.70	13.42	4.26
Nd	2.80	23.66	2.20	1.84	3.08	1.64	3.08	5.56	8.01	2.36	3.71	5.85	3.11	16.51	54.40	70.24	24.00
Sm	1.34	9.03	1.14	0.69	1.18	0.68	1.30	2.41	3.17	1.15	1.63	2.59	1.16	6.13	21.80	20.63	8.94
Eu	0.903	1.000	0.657	0.492	0.460	0.389	0.655	0.940	1.135	1.261	0.925	0.61	0.607	2.617	4.990	4.502	2.709
Gd	2.11	11.95	1.95	1.01	1.64	0.99	1.92	3.57	4.27	1.80	2.45	4.15	1.61	8.34	29.00	26.62	12.84
Tb	0.43	2.36	0.42	0.20	0.32	0.22	0.42	0.71	0.86	0.39	0.49	0.89	0.31	1.52	5.05	4.12	2.22
Dy	2.87	14.97	2.88	1.37	2.23	1.50	2.69	4.67	5.66	2.69	3.28	6.03	2.15	9.69	32.20	24.33	14.66
Ho	0.64	3.26	0.60	0.29	0.48	0.34	0.55	1.00	1.19	0.58	0.73	1.28	0.46	2.04	6.54	4.86	2.85
Er	1.88	9.45	1.90	0.88	1.48	1.04	1.80	2.96	3.80	1.75	2.09	4.06	1.38	6.11	17.60	13.66	8.65
Tm	0.283	1.352	0.279	0.131	0.228	0.165	0.281	0.445	0.556	0.258	0.315	0.59	0.206	0.857	2.420	1.714	1.223
Yb	1.81	8.45	1.72	0.91	1.55	1.07	1.64	2.76	3.33	1.66	2.00	3.45	1.38	5.15	15.30	9.09	7.35
Lu	0.290	1.230	0.259	0.144	0.240	0.172	0.237	0.434	0.469	0.250	0.312	0.49	0.22	0.77	2.230	1.27	1.07
Hf	0.70	2.10	0.55	0.34	0.42	0.51	0.80	1.49	2.31	0.63	0.80	3.65	0.32	3.10	4.4	2.8	2.31
Ta	0.21	0.14	<d.l.	0.01	0.03	0.05	<d.l.	0.13	0.13	<d.l.	0.09	0.06	<d.l.	0.15	0.92	0.15	0.40
Pb	<d.l.	<d.l.	<d.l.			<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.	<d.l.
Th	0.11	0.33	<d.l.	0.01	0.04	<d.l.	<d.l.	0.08	0.23	<d.l.	<d.l.	<d.l.	0.01	0.13	0.07	0.34	0.28
U	0.02	0.11	0.01	<d.l.	0.02	0.03	0.01	0.14	0.10	0.05	0.03	0.02	0.02	0.03	0.37	0.10	0.16
[La/Yb] _N	0.27	0.53	0.26	0.61	0.40	0.27	0.41	0.35	0.53	0.34	0.34	0.22	0.53	0.49	0.49	2.48	0.75
Eu/Eu*	1.63	0.29	1.33	1.80	1.01	1.44	1.26	0.97	0.94	2.67	1.41	0.56	1.35	1.12	0.60	0.59	0.77
[La/Sm] _N	0.33	0.46	0.36	0.74	0.49	0.38	0.48	0.37	0.51	0.46	0.39	0.27	0.58	0.38	0.32	1.00	0.57
[Gd/Yb] _N	0.94	1.14	0.91	0.90	0.86	0.75	0.95	1.05	1.04	0.88	0.99	0.98	0.94	1.31	1.53	2.37	1.41
[Dy/Er] _N	0.99	1.03	0.99	1.01	0.98	0.94	0.97	1.03	0.97	1.00	1.02	0.97	1.01	1.03	1.19	1.16	1.10

^a Notes: <d.l., below detection limit; LOI, loss on ignition; Eu/Eu*, Eu_N/(Sm_N*Gd_N)^{1/2}; Eu_N, Sm_N, and Gd_N are the chondrite-normalized concentrations of Eu, Sm, and Gd, respectively. Plagio., plagioclase.