

Supplementary material 3. Hf isotopes values

Location	Sample	Rock type	Grain #	t (Ma)	$^{176}\text{Yb}/^{177}\text{Hf}$	$^{176}\text{Lu}/^{177}\text{Hf}$	$^{176}\text{Hf}/^{177}\text{Hf}$	$\epsilon_{\text{Hf}}(t)$	2 σ	$f_{\text{Lu/Hf}}$
Adamello	MAT2	Hornblende	Zrn1	40.1	0.007755	0.000458	0.283010	7.9	0.9	-0.99
Adamello	MAT2	Hornblende	Zrn1	40.5	0.093328	0.003920	0.283071	10.0	1.3	-0.88
Adamello	MAT2	Hornblende	Zrn2	39.9	0.042286	0.002245	0.283178	13.8	1.1	-0.93
Adamello	MAT2	Hornblende	Zrn3	40.7	0.137935	0.006514	0.283022	8.2	1.3	-0.80
Adamello	MAT2	Hornblende	Zrn3	41.3	0.014229	0.000746	0.283029	8.6	1.2	-0.98
Adamello	MAT2	Hornblende	Zrn4	40.2	0.129855	0.006707	0.283019	8.1	1.4	-0.80
Adamello	MAT2	Hornblende	Zrn4	40.8	0.016076	0.000947	0.283001	7.6	1.1	-0.97
Adamello	MAT2	Hornblende	Zrn5	41.6	0.152878	0.007419	0.283144	12.5	1.5	-0.78
Adamello	MAT2	Hornblende	Zrn6	40.7	0.195504	0.008968	0.283024	8.2	1.8	-0.73
Adamello	MAT2	Hornblende	Zrn7	40.0	0.014957	0.000812	0.283094	10.9	0.8	-0.98
Adamello	MAT2	Hornblende	Zrn8	44.2	0.012324	0.000689	0.283048	9.3	0.7	-0.98
Adamello	MAT2	Hornblende	Zrn8	40.6	0.108055	0.005481	0.283132	12.1	1.0	-0.83
Adamello	MAT2	Hornblende	Zrn9	41.4	0.034671	0.001628	0.283092	10.8	1.0	-0.95
Adamello	MAT2	Hornblende	Zrn9	41.4	0.020711	0.001163	0.283017	8.2	1.1	-0.96
Adamello	MAT2	Hornblende	Zrn10	41.7	0.119224	0.005239	0.283153	12.9	1.2	-0.84
Adamello	MAT2	Hornblende	Zrn10	41.7	0.030384	0.001495	0.283022	8.3	1.4	-0.95
Adamello	MAT2	Hornblende	Zrn12	41.6	0.024841	0.001359	0.283143	12.6	1.1	-0.96
Adamello	MAT2	Hornblende	Zrn14	44.1	0.023129	0.001286	0.283040	9.0	0.7	-0.96
Adamello	MAT2	Hornblende	Zrn14	43.3	0.132783	0.005785	0.283198	14.4	1.1	-0.83
Adamello	MAT2	Hornblende	Zrn15	42.7	0.106892	0.004582	0.283027	8.4	1.4	-0.86
Adamello	MAT2	Hornblende	Zrn15	52.6	0.009740	0.000572	0.283077	10.3	1.2	-0.98
Adamello	MAT2	Hornblende	Zrn16	41.6	0.026340	0.001387	0.283041	9.0	0.7	-0.96
Adamello	MAT2	Hornblende	Zrn18	40.1	0.065954	0.003528	0.282946	5.6	0.9	-0.89
Adamello	MAT2	Hornblende	Zrn18	39.4	0.010749	0.000600	0.283006	7.8	0.8	-0.98
Adamello	MAT2	Hornblende	Zrn34	42.2	0.097927	0.005341	0.283135	12.2	1.1	-0.84
Adamello	MAT2	Hornblende	Zrn34	41.7	0.031953	0.001644	0.283036	8.8	0.8	-0.95
Adamello	MAT2	Hornblende	Zrn37	44.6	0.103324	0.004407	0.283067	9.8	0.9	-0.87
Adamello	MAT2	Hornblende	Zrn38	41.4	0.017128	0.000900	0.283039	9.0	0.9	-0.97
Adamello	MAT2	Hornblende	Zrn38	44.1	0.020446	0.001206	0.283050	9.3	0.8	-0.96
Adamello	MAT2	Hornblende	Zrn40	41.8	0.092965	0.004938	0.283060	9.6	1.0	-0.85
Adamello	MAT2	Hornblende	Zrn43	48.5	0.021738	0.001178	0.283045	9.1	0.9	-0.96
Adamello	MAT2	Hornblende	Zrn43	42.7	0.043437	0.002535	0.283076	10.2	1.1	-0.92
Adamello	MAT2	Hornblende	Zrn46	41.2	0.026304	0.001510	0.283027	8.5	1.4	-0.95
Adamello	MAT2	Hornblende	Zrn46	41.7	0.026393	0.001501	0.283042	9.1	1.5	-0.95
Adamello	MAT2	Hornblende	Zrn46	42.9	0.039338	0.001966	0.283053	9.4	1.3	-0.94
Adamello	MAT2	Hornblende	Zrn46	39.1	0.029951	0.001549	0.283053	9.4	1.2	-0.95
Adamello	MAT3	Hornblende	Zrn1	37.0	0.043711	0.002568	0.283074	10.2	1.2	-0.92
Adamello	MAT3	Hornblende	Zrn2	43.6	0.087006	0.003951	0.283055	9.4	1.0	-0.88
Adamello	MAT3	Hornblende	Zrn2	40.7	0.016572	0.000859	0.283010	7.9	0.8	-0.97
Adamello	MAT3	Hornblende	Zrn3	40.3	0.037996	0.001754	0.283072	10.1	1.2	-0.95
Adamello	MAT3	Hornblende	Zrn3	44.7	0.012625	0.000743	0.283049	9.3	0.8	-0.98
Adamello	MAT3	Hornblende	Zrn4	45.6	0.031272	0.001652	0.283074	10.2	1.8	-0.95
Adamello	MAT3	Hornblende	Zrn4	45.6	0.034841	0.001798	0.283081	10.4	0.8	-0.95
Adamello	MAT3	Hornblende	Zrn5	50.6	0.092752	0.004944	0.283023	8.2	1.0	-0.85
Adamello	MAT3	Hornblende	Zrn5	34.6	0.112098	0.005210	0.283020	8.2	1.0	-0.84
Adamello	MAT3	Hornblende	Zrn6	42.2	0.017293	0.000967	0.283020	8.3	0.8	-0.97
Adamello	MAT3	Hornblende	Zrn7	49.3	0.106666	0.004653	0.283184	13.9	1.1	-0.86
Adamello	MAT3	Hornblende	Zrn7	44.0	0.037711	0.002005	0.283005	7.7	0.7	-0.94
Adamello	MAT3	Hornblende	Zrn8	48.7	0.013493	0.000704	0.283053	9.4	1.3	-0.98
Adamello	MAT3	Hornblende	Zrn8	38.9	0.016794	0.000865	0.282985	7.0	0.8	-0.97
Adamello	MAT3	Hornblende	Zrn9	37.4	0.105315	0.005192	0.283040	8.9	1.3	-0.84
Adamello	MAT3	Hornblende	Zrn9	53.2	0.012103	0.000600	0.283080	10.4	1.0	-0.98
Adamello	MAT3	Hornblende	Zrn10	44.5	0.057418	0.002673	0.283062	9.7	1.0	-0.92
Adamello	MAT3	Hornblende	Zrn10	41.8	0.018512	0.001119	0.282975	6.7	1.7	-0.97
Adamello	MAT3	Hornblende	Zrn11	40.4	0.079754	0.003614	0.283053	9.4	1.1	-0.89
Adamello	MAT3	Hornblende	Zrn11	50.3	0.026438	0.001505	0.283058	9.6	0.9	-0.95
Adamello	MAT3	Hornblende	Zrn12	51.6	0.092865	0.004226	0.283015	8.0	1.2	-0.87
Adamello	MAT3	Hornblende	Zrn12	42.9	0.049716	0.002354	0.282976	6.7	1.0	-0.93
Adamello	MAT3	Hornblende	Zrn13	42.8	0.036030	0.001793	0.283058	9.6	1.0	-0.95
Adamello	MAT3	Hornblende	Zrn13	39.5	0.033161	0.001715	0.282979	6.8	1.0	-0.95
Adamello	MAT3	Hornblende	Zrn16	39.6	0.085260	0.004059	0.283137	12.3	1.0	-0.88
Adamello	MAT3	Hornblende	Zrn17	50.5	0.055100	0.002648	0.283065	9.8	1.0	-0.92
Adamello	MAT3	Hornblende	Zrn17	51.9	0.054013	0.002631	0.283086	10.6	1.1	-0.92
Adamello	MAT3	Hornblende	Zrn18	44.0	0.049488	0.002349	0.282996	7.4	1.0	-0.93
Adamello	MAT3	Hornblende	Zrn18	39.3	0.036536	0.001703	0.283011	8.0	0.9	-0.95

Adamello	MAT3	Hornblendite	Zrn20	50.3	0.134355	0.006163	0.283008	7.7	1.1	-0.81
Adamello	MAT3	Hornblendite	Zrn20	49.7	0.010441	0.000542	0.282980	6.9	1.1	-0.98
Adamello	MAT3	Hornblendite	Zrn22	45.7	0.015926	0.000911	0.283009	7.9	0.7	-0.97
Adamello	MAT3	Hornblendite	Zrn25	43.6	0.119702	0.005360	0.283007	7.7	1.1	-0.84
Adamello	MAT3	Hornblendite	Zrn25	43.6	0.014666	0.000794	0.283044	9.1	0.7	-0.98
Adamello	MAT3	Hornblendite	Zrn26	47.0	0.138856	0.006338	0.283050	9.2	1.2	-0.81
Adamello	MAT3	Hornblendite	Zrn26	41.6	0.049949	0.002556	0.283071	10.1	1.1	-0.92
Adamello	MAT3	Hornblendite	Zrn28	48.0	0.040678	0.002229	0.283041	9.0	0.9	-0.93
Adamello	MAT4	Amph-gabbro	Zrn5	44.6	0.100774	0.004639	0.282968	6.3	1.0	-0.86
Adamello	MAT4	Amph-gabbro	Zrn6	45.3	0.023848	0.001136	0.282946	5.6	1.2	-0.97
Adamello	MAT4	Amph-gabbro	Zrn6	44.8	0.017191	0.000831	0.282981	6.9	1.3	-0.97
Adamello	MAT4	Amph-gabbro	Zrn7	39.4	0.036598	0.002013	0.283095	10.9	2.1	-0.94
Adamello	MAT4	Amph-gabbro	Zrn7	42.4	0.026145	0.001535	0.283063	9.8	1.4	-0.95
Adamello	MAT4	Amph-gabbro	Zrn8	43.3	0.101592	0.004683	0.283060	9.6	1.2	-0.86
Adamello	MAT4	Amph-gabbro	Zrn8	41.3	0.019994	0.000922	0.282997	7.5	1.0	-0.97
Adamello	MAT4	Amph-gabbro	Zrn9	42.0	0.013228	0.000681	0.282943	5.6	1.2	-0.98
Adamello	MAT4	Amph-gabbro	Zrn9	43.0	0.079759	0.003750	0.282937	5.3	1.2	-0.89
Adamello	MAT4	Amph-gabbro	Zrn10	40.8	0.083650	0.004375	0.282973	6.5	1.2	-0.87
Adamello	MAT4	Amph-gabbro	Zrn10	42.8	0.003891	0.000227	0.283014	8.1	1.1	-0.99
Adamello	MAT4	Amph-gabbro	Zrn11	39.9	0.051938	0.002617	0.283015	8.0	1.3	-0.92
Adamello	MAT4	Amph-gabbro	Zrn11	42.2	0.041755	0.001882	0.283047	9.2	1.0	-0.94
Adamello	MAT4	Amph-gabbro	Zrn12	41.1	0.049000	0.002225	0.283055	9.5	1.2	-0.93
Adamello	MAT4	Amph-gabbro	Zrn13	41.2	0.062150	0.003038	0.282976	6.7	1.0	-0.91
Adamello	MAT4	Amph-gabbro	Zrn14	40.9	0.080871	0.004276	0.283026	8.4	1.2	-0.87
Adamello	MAT4	Amph-gabbro	Zrn14	41.4	0.050489	0.002791	0.282981	6.8	1.4	-0.92
Adamello	MAT4	Amph-gabbro	Zrn15	39.5	0.030186	0.001631	0.283052	9.4	1.2	-0.95
Adamello	MAT4	Amph-gabbro	Zrn15	41.0	0.020994	0.001246	0.283005	7.8	1.1	-0.96
Adamello	MAT4	Amph-gabbro	Zrn15	41.0	1.200000	0.002188	0.283015	8.1	1.1	-0.93
Adamello	MAT4	Amph-gabbro	Zrn16	41.2	0.091946	0.004297	0.283003	7.6	1.3	-0.87
Adamello	MAT4	Amph-gabbro	Zrn16	40.8	0.032005	0.001572	0.282996	7.4	1.2	-0.95
Adamello	MAT4	Amph-gabbro	Zrn17	42.0	0.046508	0.002081	0.283002	7.6	1.6	-0.94
Adamello	MAT4	Amph-gabbro	Zrn17	41.3	0.026482	0.001300	0.282978	6.8	1.2	-0.96
Adamello	MAT4	Amph-gabbro	Zrn18	40.7	0.059764	0.002979	0.283071	10.0	1.4	-0.91
Adamello	MAT4	Amph-gabbro	Zrn18	38.7	0.032137	0.001425	0.283017	8.2	1.2	-0.96
Adamello	MAT4	Amph-gabbro	Zrn19	44.1	0.062059	0.003229	0.282974	6.6	1.6	-0.90
Adamello	MAT4	Amph-gabbro	Zrn19	46.3	0.018413	0.001031	0.282993	7.3	1.1	-0.97
Adamello	MAT4	Amph-gabbro	Zrn20	41.8	0.084761	0.004978	0.283040	8.9	1.5	-0.85
Adamello	MAT4	Amph-gabbro	Zrn20	49.5	0.062129	0.003184	0.283013	7.9	1.5	-0.90
Adamello	MAT4	Amph-gabbro	Zrn20	39.6	0.009712	0.000535	0.282977	6.8	1.2	-0.98
Adamello	MAT4	Amph-gabbro	Zrn21	45.9	0.028519	0.001548	0.283013	8.0	1.3	-0.95
Adamello	MAT4	Amph-gabbro	Zrn21	40.2	0.060968	0.003302	0.282975	6.6	1.0	-0.90
Adamello	MAT4	Amph-gabbro	Zrn24	43.1	0.012564	0.000658	0.282988	7.2	1.0	-0.98
Adamello	MAT4	Amph-gabbro	Zrn24	42.7	0.026620	0.001278	0.283038	8.9	1.0	-0.96
Adamello	MAT4	Amph-gabbro	Zrn25	41.2	0.035373	0.001624	0.282978	6.8	1.2	-0.95
Adamello	MAT4	Amph-gabbro	Zrn25	42.9	0.020873	0.001040	0.282975	6.7	0.9	-0.97
Adamello	MAT4	Amph-gabbro	Zrn25	41.2	0.028067	0.001430	0.283019	8.2	1.1	-0.96
Adamello	MAT4	Amph-gabbro	Zrn26	43.2	0.047059	0.002306	0.283027	8.5	1.2	-0.93
Adamello	MAT4	Amph-gabbro	Zrn26	45.5	0.040797	0.001966	0.282973	6.6	1.1	-0.94
Bergell	VS01	Amph-diorite	Zrn1	30.7	0.031663	0.000933	0.282859	2.6	0.6	-0.97
Bergell	VS01	Amph-diorite	Zrn2	31.2	0.036170	0.001190	0.282877	3.2	0.7	-0.96
Bergell	VS01	Amph-diorite	Zrn3	29.5	0.074490	0.002981	0.282844	2.0	1.2	-0.91
Bergell	VS01	Amph-diorite	Zrn4	31.0	0.042351	0.001687	0.282886	3.5	0.9	-0.95
Bergell	VS01	Amph-diorite	Zrn5	29.2	0.046236	0.001827	0.282841	1.9	0.6	-0.94
Bergell	VS01	Amph-diorite	Zrn6	30.8	0.016647	0.000579	0.282881	3.4	0.7	-0.98
Bergell	VS01	Amph-diorite	Zrn7	29.1	0.088806	0.002700	0.282846	2.1	0.8	-0.92
Bergell	VS01	Amph-diorite	Zrn8	31.0	0.025759	0.000884	0.282821	1.3	0.7	-0.97
Bergell	VS01	Amph-diorite	Zrn9	30.7	0.041542	0.001629	0.282835	1.7	0.6	-0.95
Bergell	VS01	Amph-diorite	Zrn10	30.1	0.024515	0.000815	0.282864	2.8	0.6	-0.98
Bergell	VS01	Amph-diorite	Zrn11	30.9	0.027562	0.001361	0.282900	4.0	0.6	-0.96
Bergell	VS01	Amph-diorite	Zrn12	31.3	0.025593	0.000829	0.282865	2.8	0.6	-0.98
Bergell	VS01	Amph-diorite	Zrn13	30.5	0.097980	0.002957	0.282912	4.4	0.7	-0.91
Bergell	VS01	Amph-diorite	Zrn14	30.9	0.061694	0.001909	0.282879	3.3	0.6	-0.94
Bergell	VS01	Amph-diorite	Zrn15	30.2	0.062055	0.002197	0.282894	3.8	0.7	-0.93
Bergell	VS01	Amph-diorite	Zrn16	31.7	0.020565	0.000765	0.282863	2.7	0.6	-0.98
Bergell	VS01	Amph-diorite	Zrn17	30.0	0.009277	0.000363	0.282845	2.1	0.5	-0.99
Bergell	VS01	Amph-diorite	Zrn18	31.4	0.051878	0.001570	0.282898	4.0	0.7	-0.95
Bergell	VS01	Amph-diorite	Zrn19	31.0	0.011143	0.000412	0.282860	2.6	0.5	-0.99
Bergell	VS01	Amph-diorite	Zrn20	31.0	0.026220	0.000878	0.282851	2.3	0.6	-0.97
Bergell	VS01	Amph-diorite	Zrn21	32.9	0.019427	0.000775	0.282856	2.5	1.0	-0.98
Bergell	VS04	Amph-diorite	Zrn1	29.8	0.021744	0.000733	0.282872	3.1	0.9	-0.98

Bergell	VS04	Amph-diorite	Zrn2	30.9	0.025735	0.000879	0.282848	2.2	0.6	-0.97
Bergell	VS04	Amph-diorite	Zrn3	29.7	0.037360	0.001200	0.282882	3.4	0.6	-0.96
Bergell	VS04	Amph-diorite	Zrn4	31.0	0.049037	0.001556	0.282846	2.1	0.6	-0.95
Bergell	VS04	Amph-diorite	Zrn5	30.7	0.026535	0.000829	0.282898	4.0	0.6	-0.98
Bergell	VS04	Amph-diorite	Zrn6	30.3	0.031689	0.001060	0.282861	2.7	0.5	-0.97
Bergell	VS04	Amph-diorite	Zrn7	32.5	0.016020	0.000517	0.282879	3.3	0.5	-0.98
Bergell	VS04	Amph-diorite	Zrn8	30.9	0.015730	0.000532	0.282832	1.7	0.5	-0.98
Bergell	VS04	Amph-diorite	Zrn9	30.8	0.041333	0.001314	0.282884	3.5	0.7	-0.96
Bergell	VS04	Amph-diorite	Zrn10	30.9	0.039347	0.001257	0.282889	3.7	0.7	-0.96
Bergell	VS04	Amph-diorite	Zrn11	30.6	0.058039	0.001826	0.282859	2.6	0.7	-0.94
Bergell	VS04	Amph-diorite	Zrn12	29.4	0.034721	0.001426	0.282860	2.6	0.6	-0.96
Bergell	VS04	Amph-diorite	Zrn13	31.1	0.027920	0.000893	0.282893	3.8	0.5	-0.97
Bergell	VS04	Amph-diorite	Zrn14	29.8	0.025242	0.000934	0.282854	2.4	0.6	-0.97
Bergell	VS04	Amph-diorite	Zrn15	30.5	0.047701	0.001659	0.282864	2.8	0.5	-0.95
Bergell	VS04	Amph-diorite	Zrn16	30.0	0.028306	0.000960	0.282860	2.6	0.6	-0.97
Bergell	VS04	Amph-diorite	Zrn17	30.1	0.040070	0.001274	0.282866	2.9	0.6	-0.96
Bergell	VS04	Amph-diorite	Zrn18	30.5	0.119645	0.004709	0.282866	2.8	0.6	-0.86
Bergell	VS04	Amph-diorite	Zrn19	31.7	0.083407	0.002571	0.282833	1.6	0.6	-0.92
Bergell	VS04	Amph-diorite	Zrn20	30.9	0.072289	0.002883	0.282856	2.5	0.6	-0.91
Bergell	VS04	Amph-diorite	Zrn21	29.2	0.046140	0.002091	0.282831	1.6	0.5	-0.94
Bergell	VS17	Amph-gabbro	Zrn1	30.4	0.025130	0.000785	0.282903	4.2	0.6	-0.98
Bergell	VS17	Amph-gabbro	Zrn2	30.6	0.023388	0.000787	0.282880	3.3	0.5	-0.98
Bergell	VS17	Amph-gabbro	Zrn3	30.9	0.034123	0.001236	0.282871	3.0	0.4	-0.96
Bergell	VS17	Amph-gabbro	Zrn4	31.4	0.032369	0.001165	0.282876	3.2	0.5	-0.96
Bergell	VS17	Amph-gabbro	Zrn5	32.6	0.019076	0.000606	0.282882	3.4	0.5	-0.98
Bergell	VS17	Amph-gabbro	Zrn6	31.4	0.109095	0.004457	0.282925	4.9	0.7	-0.87
Bergell	VS17	Amph-gabbro	Zrn7	31.6	0.064112	0.001887	0.282943	5.5	0.6	-0.94
Bergell	VS17	Amph-gabbro	Zrn8	31.3	0.035712	0.001213	0.282879	3.3	0.5	-0.96
Bergell	VS17	Amph-gabbro	Zrn9	31.8	0.055832	0.002322	0.282911	4.4	0.6	-0.93
Bergell	VS17	Amph-gabbro	Zrn10	31.1	0.065237	0.002033	0.282915	4.6	0.6	-0.94
Bergell	VS17	Amph-gabbro	Zrn11	31.2	0.064337	0.002639	0.282886	3.5	0.7	-0.92
Bergell	VS17	Amph-gabbro	Zrn12	31.3	0.077810	0.002361	0.282921	4.8	0.7	-0.93
Bergell	VS17	Amph-gabbro	Zrn13	30.9	0.029337	0.001055	0.282866	2.9	0.6	-0.97
Bergell	VS17	Amph-gabbro	Zrn14	31.8	0.029306	0.000970	0.282835	1.7	0.6	-0.97
Bergell	VS17	Amph-gabbro	Zrn15	31.3	0.019626	0.000648	0.282890	3.7	0.5	-0.98
Bergell	VS17	Amph-gabbro	Zrn16	32.1	0.028238	0.000849	0.282889	3.6	0.5	-0.97
Bergell	VS17	Amph-gabbro	Zrn17	31.1	0.051210	0.001536	0.282891	3.7	0.6	-0.95
Bergell	VS17	Amph-gabbro	Zrn18	31.6	0.042003	0.001557	0.282850	2.3	0.6	-0.95
Bergell	VS17	Amph-gabbro	Zrn19	31.0	0.084920	0.002929	0.282895	3.8	0.5	-0.91
Bergell	VS17	Amph-gabbro	Zrn20	32.5	0.051003	0.001744	0.282920	4.7	0.5	-0.95
Bergell	VS17	Amph-gabbro	Zrn21	33.8	0.030510	0.001033	0.282914	4.5	0.8	-0.97