

Δ_{47} Analysis Report — N. Beaudoin

Laboratoire des Sciences du Climat et de l'Environnement
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Number of analytical sessions	3
Number of samples (standards + unknowns)	21 (3 + 18)
Number of analyses (standards + unknowns)	105 (59+ 46)
Overall percentage of standard analyses	56 %
Nominal Δ_{47} of standard ETH-1:	0.2580 ‰
Nominal Δ_{47} of standard ETH-2:	0.2560 ‰
Nominal Δ_{47} of standard ETH-3:	0.6910 ‰
External reproducibility of $\delta^{13}\text{C}_{\text{VPDB}}$ measurements	8.0 ppm
External reproducibility of $\delta^{18}\text{O}_{\text{VSMOW}}$ measurements	22.1 ppm
External reproducibility of Δ_{47} measurements	9.5 ppm
Regression model degrees of freedom	78 ($t_{95\%} = 1.99$)

Analytical sessions

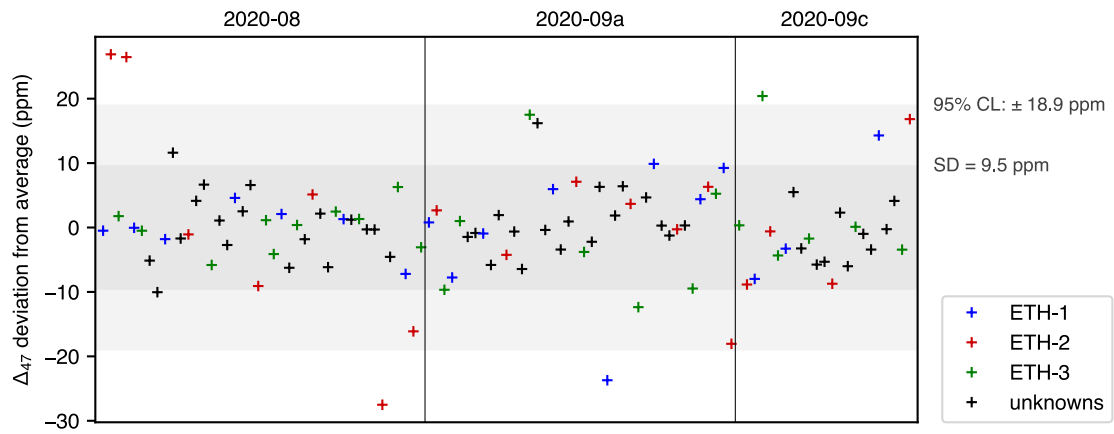
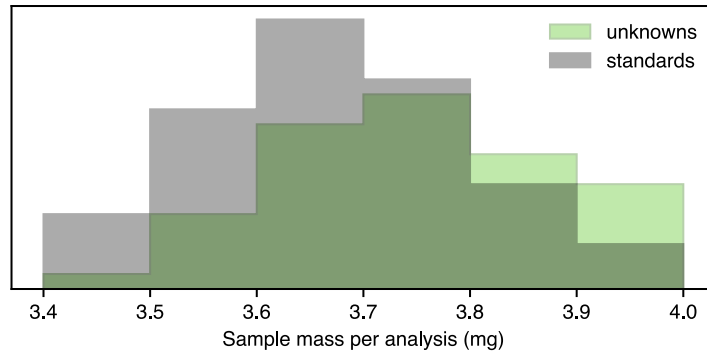
Session		2020-08	2020-09a	2020-09c
N of standard analyses		24	22	13
N of unknown analyses		18	18	10
Working gas $\delta^{13}\text{C}$	(‰ VPDB)	−3.77	−3.78	−3.78
Working gas $\delta^{18}\text{O}$	(‰ VSMOW)	35.16	35.15	35.11
Working gas Δ_{47}	(‰ ± SE)	1.057 ± 0.012	1.057 ± 0.013	1.044 ± 0.018
Scrambling factor (a)	(± SE)	0.906 ± 0.010	0.895 ± 0.010	0.907 ± 0.014
Compositional slope (b)	($\times 10^{-4}$ ± SE)	0.5 ± 1.6	0.3 ± 1.5	1.0 ± 2.2
Working gas offset (c)	(± SE)	-0.958 ± 0.005	-0.946 ± 0.005	-0.947 ± 0.007
$\delta^{13}\text{C}_{\text{VPDB}}$ repeatability	(ppm)	7.6	4.9	10.6
$\delta^{18}\text{O}_{\text{VSMOW}}$ repeatability	(ppm)	19.3	20.1	21.4
Δ_{47} repeatability	(ppm)	11.4	10.2	10.7

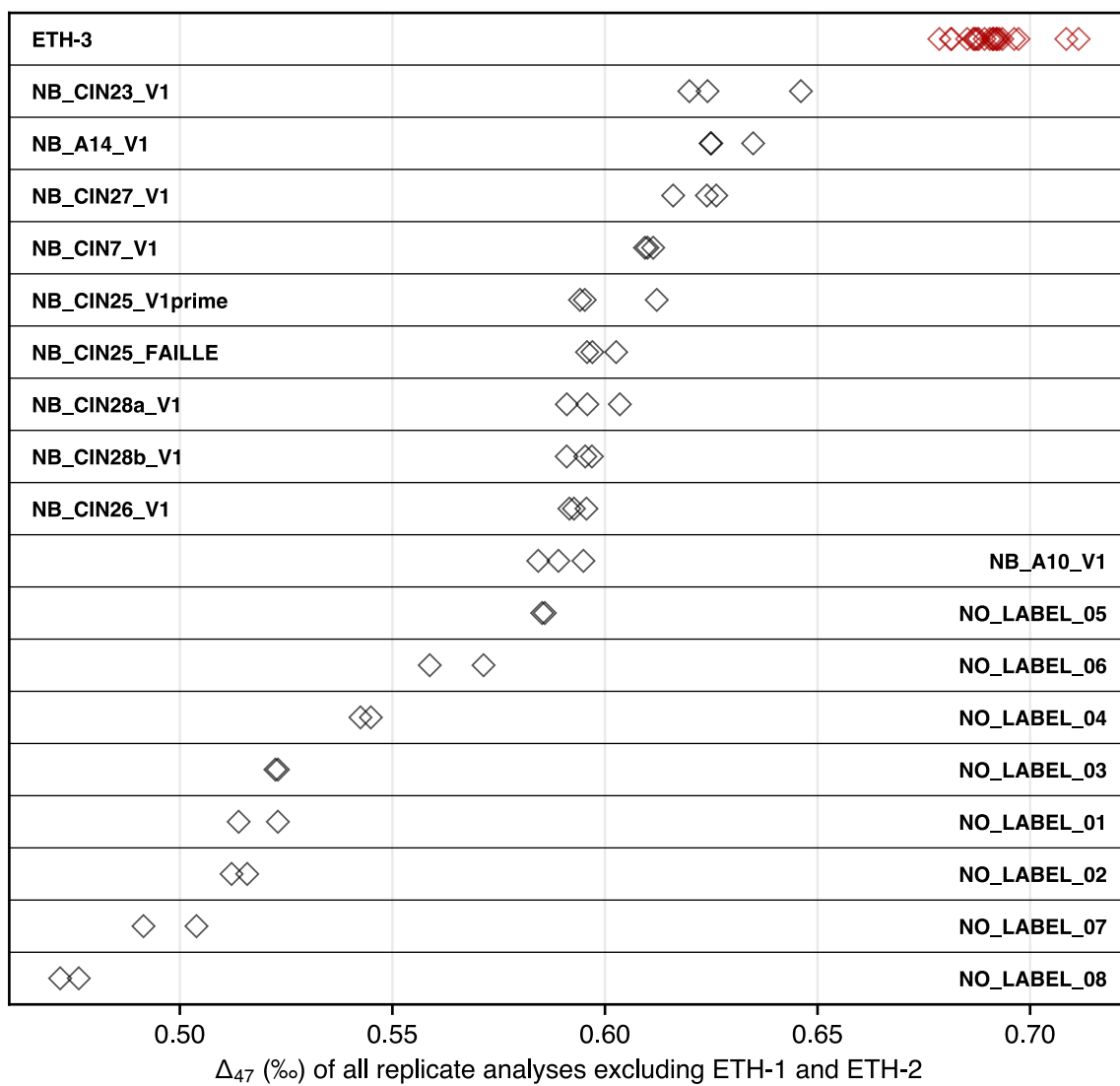
Sample	N	Yield (%)	$\delta^{13}\text{C}_{\text{VPDB}}$	$\delta^{18}\text{O}_{\text{VSMOW}}$ (CO ₂)	$\delta^{18}\text{O}_{\text{VPDB}}$ (calcite*)	Δ_{47}			p-value (Levene)
						\pm SE	(\pm 95 %)	SD	
ETH-1	18	100.5	2.05	37.05	-2.17	0.2580		0.0085	
ETH-2	18	99.5	-10.13	19.89	-18.68	0.2560		0.0142	
ETH-3	23	96.1	1.71	37.45	-1.78	0.6910		0.0075	
NB_A10_V1	3	97.4	2.58	35.83	-3.34	0.5894	\pm 0.0057	(\pm 0.0114)	0.649
NB_A14_V1	3	93.2	3.08	39.76	0.45	0.6283	\pm 0.0058	(\pm 0.0115)	0.616
NB_CIN23_V1	3	97.7	1.77	38.89	-0.40	0.6299	\pm 0.0058	(\pm 0.0115)	0.344
NB_CIN25_FAILLE	3	99.1	2.01	41.14	1.77	0.5985	\pm 0.0058	(\pm 0.0115)	0.405
NB_CIN25_V1prime	3	97.0	1.93	41.05	1.68	0.6006	\pm 0.0058	(\pm 0.0115)	0.792
NB_CIN26_V1	3	99.2	1.92	41.51	2.13	0.5933	\pm 0.0058	(\pm 0.0115)	0.262
NB_CIN27_V1	3	96.4	1.26	38.83	-0.45	0.6220	\pm 0.0058	(\pm 0.0115)	0.618
NB_CIN28a_V1	3	99.9	1.73	39.27	-0.03	0.5968	\pm 0.0057	(\pm 0.0114)	0.788
NB_CIN28b_V1	3	90.4	2.01	41.33	1.95	0.5944	\pm 0.0058	(\pm 0.0115)	0.354
NB_CIN7_V1	3	96.5	2.44	40.19	0.86	0.6103	\pm 0.0058	(\pm 0.0115)	0.185
NO_LABEL_01	2	95.2	2.15	33.75	-5.34	0.5184	\pm 0.0069	(\pm 0.0137)	0.0065
NO_LABEL_02	2	94.9	2.43	32.96	-6.10	0.5140	\pm 0.0069	(\pm 0.0137)	0.0026
NO_LABEL_03	2	95.5	2.65	33.64	-5.45	0.5228	\pm 0.0069	(\pm 0.0137)	0.0004
NO_LABEL_04	2	94.5	2.68	33.81	-5.28	0.5437	\pm 0.0069	(\pm 0.0138)	0.0017
NO_LABEL_05	2	78.0	0.04	35.89	-3.28	0.5855	\pm 0.0069	(\pm 0.0138)	0.0004
NO_LABEL_06	2	95.2	1.75	34.50	-4.62	0.5650	\pm 0.0069	(\pm 0.0138)	0.0089
NO_LABEL_07	2	97.8	2.72	32.77	-6.28	0.4976	\pm 0.0069	(\pm 0.0137)	0.0088
NO_LABEL_08	2	97.1	2.66	33.86	-5.23	0.4741	\pm 0.0069	(\pm 0.0137)	0.0031

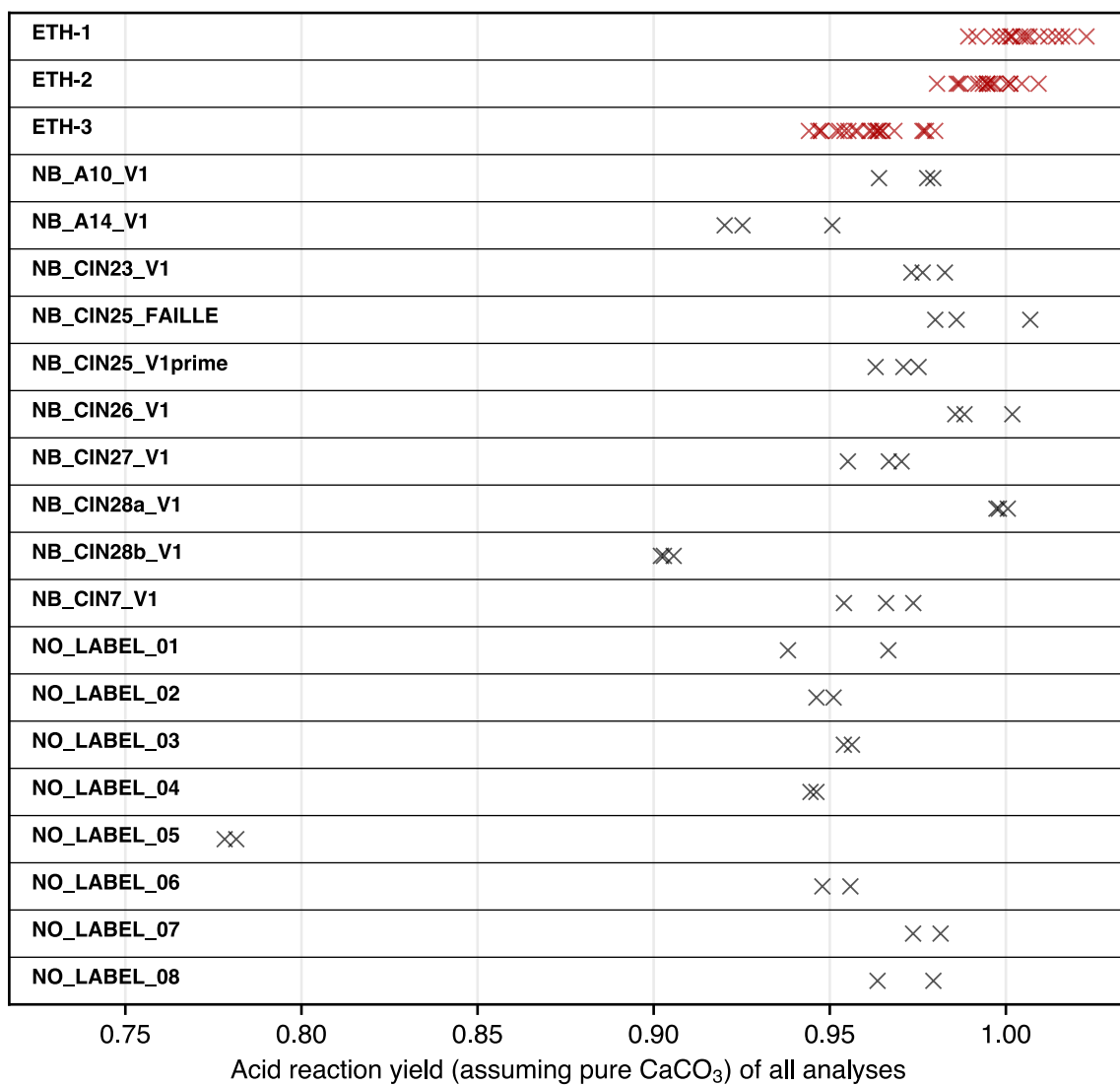
* computed assuming the sample is pure calcite; adjust accordingly for different mineralogies.

For example, for aragonite samples, $\delta^{18}\text{O}_{\text{arag}} = (1000 + \delta^{18}\text{O}_{\text{calcite}}) \times 1.00813 / {}^{18}\alpha_{\text{arag}} - 1000$

Sample	N	$\delta^{13}\text{C}_{\text{VPDB}}$	$\delta^{18}\text{O}_{\text{VPDB}}$	Δ_{47}	T_{47}
		(‰)	(‰, calcite)	(‰ \pm 1SE)	(°C, \pm 1SE)
NB_A10_V1	3	2.58	-3.34	0.5894 \pm 0.0057	52.9 \pm 2.2
NB_A14_V1	3	3.08	0.45	0.6283 \pm 0.0058	38.8 \pm 2.0
NB_CIN23_V1	3	1.77	-0.40	0.6299 \pm 0.0058	38.3 \pm 1.9
NB_CIN25_FAILLE	3	2.01	1.77	0.5985 \pm 0.0058	49.4 \pm 2.2
NB_CIN25_V1prime	3	1.93	1.68	0.6006 \pm 0.0058	48.7 \pm 2.1
NB_CIN26_V1	3	1.92	2.13	0.5933 \pm 0.0058	51.4 \pm 2.2
NB_CIN27_V1	3	1.26	-0.45	0.6220 \pm 0.0058	41.0 \pm 2.0
NB_CIN28a_V1	3	1.73	-0.03	0.5968 \pm 0.0057	50.0 \pm 2.2
NB_CIN28b_V1	3	2.01	1.95	0.5944 \pm 0.0058	51.0 \pm 2.2
NB_CIN7_V1	3	2.44	0.86	0.6103 \pm 0.0058	45.1 \pm 2.1







UID	Session	Sample	Mass (mg)	CO ₂ yield (if CaCO ₃)	δ45 (‰ WG)	δ46 (‰ WG)	δ47 (‰ WG)	δ48 (‰ WG)	δ49 (‰ WG)	Δ ₄₇ ^{raw} (‰)	Δ ₄₈ ^{ab} (‰)
H367	2020-08	ETH-1	3.59	1.00	5.528531	1.925474	6.878381	3.524230	0.931849	-0.724165	0.257508
H368	2020-08	ETH-2	3.57	1.00	-6.477421	-14.675544	-21.703548	-29.025750	0.094865	-0.702734	0.282884
H369	2020-08	ETH-3	3.58	0.96	5.223969	2.298445	7.329638	4.481268	0.725318	-0.329717	0.692768
H370	2020-08	ETH-2	3.53	0.99	-6.478699	-14.702052	-21.731104	-29.193395	0.216286	-0.703126	0.282452
H371	2020-08	ETH-1	3.55	1.00	5.525900	1.917222	6.867921	3.457606	0.618959	-0.723758	0.257958
H372	2020-08	ETH-3	3.57	0.96	5.232054	2.310000	7.347347	4.474052	0.644202	-0.331768	0.690503
H373	2020-08	NB_A10_V1	3.61	0.98	5.981830	0.722994	6.456086	1.329537	0.779461	-0.428057	0.584298
H374	2020-08	NB_CIN23_V1	3.70	0.98	5.311947	3.604778	8.644894	6.952187	1.395709	-0.395722	0.619849
H375	2020-08	ETH-1	3.76	1.02	5.527386	1.880301	6.831364	3.421852	1.607769	-0.725357	0.256196
H376	2020-08	NB_CIN25_V1prime	3.80	0.98	5.541863	5.779653	11.025450	11.417095	1.122045	-0.402539	0.612183
H377	2020-08	NB_CIN26_V1	3.67	1.00	5.557170	6.224578	11.462220	12.279870	1.473510	-0.421141	0.591629
H378	2020-08	ETH-2	3.67	1.00	-6.478932	-14.714344	-21.767756	-29.262868	0.051959	-0.728067	0.254931
H379	2020-08	NB_CIN27_V1	3.65	0.97	4.842941	3.571806	8.132632	6.963285	1.140672	-0.390015	0.626178
H380	2020-08	NB_CIN28a_V1	3.71	1.00	5.285433	3.989552	8.982698	7.751279	0.679634	-0.410523	0.603495
H381	2020-08	ETH-3	3.42	0.95	5.229322	2.238637	7.269144	4.378538	1.120824	-0.336593	0.685183
H382	2020-08	NB_CIN7_V1	3.90	0.97	6.006890	4.959945	10.696529	9.706857	2.582629	-0.403322	0.611339
H383	2020-08	NB_CIN25_FAILLE	3.64	0.98	5.621662	5.722232	11.036441	11.165945	0.971126	-0.417401	0.595782
H384	2020-08	ETH-1	3.68	1.01	5.528840	1.869804	6.828336	3.476914	1.217816	-0.719560	0.262594
H385	2020-08	NB_CIN28b_V1	3.74	0.91	5.625954	5.976110	11.296654	11.810001	1.346188	-0.416350	0.596925
H386	2020-08	NB_A14_V1	3.71	0.93	6.586202	4.453808	10.817748	8.782502	1.491565	-0.382007	0.634853
H387	2020-08	ETH-2	3.65	0.99	-6.481207	-14.751455	-21.813402	-29.317529	0.760936	-0.735332	0.246916
H388	2020-08	ETH-3	3.84	0.98	5.218250	2.247632	7.272935	4.274070	1.043423	-0.330293	0.692135
H389	2020-08	ETH-3	3.64	0.96	5.221677	2.212046	7.236515	4.228497	0.728895	-0.335057	0.686880
H392	2020-08	ETH-1	3.58	1.00	5.529122	1.822216	6.779322	3.383818	1.299062	-0.721828	0.260093
H394	2020-08	NO_LABEL_06	3.95	0.96	5.157366	-0.634975	4.240146	-1.349927	1.505617	-0.451301	0.558782
H395	2020-08	ETH-3	3.48	0.95	5.224293	2.205928	7.237290	4.197237	0.205965	-0.330972	0.691388
H396	2020-08	NO_LABEL_02	3.90	0.95	5.750395	-2.115059	3.345616	-4.370040	1.504252	-0.493589	0.512170
H398	2020-08	ETH-2	3.85	1.00	-6.479774	-14.774406	-21.821740	-29.289912	0.238859	-0.722451	0.261131
H399	2020-08	NO_LABEL_08	3.81	0.96	5.994022	-1.252867	4.416233	-2.624319	1.488860	-0.526105	0.476223
H400	2020-08	NO_LABEL_07	3.82	0.97	6.004967	-2.323296	3.382812	-4.887055	0.594974	-0.512365	0.491447
H401	2020-08	ETH-3	3.88	0.96	5.221665	2.191622	7.222341	4.275985	1.865612	-0.329083	0.693474
H404	2020-08	ETH-1	3.73	1.00	5.523331	1.810179	6.760725	3.294831	1.828492	-0.722545	0.259303
H406	2020-08	NO_LABEL_04	3.75	0.94	6.014420	-1.297000	4.456173	-2.830433	1.144365	-0.463838	0.544934
H407	2020-08	ETH-3	3.60	0.95	5.213029	2.181414	7.202273	4.318943	0.992264	-0.330129	0.692320
H408	2020-08	NO_LABEL_03	3.45	0.96	5.972498	-1.497959	4.193817	-3.175300	0.955249	-0.484202	0.522478
H409	2020-08	NO_LABEL_05	3.72	0.78	3.599401	0.658271	3.934122	1.041315	-1.136493	-0.427367	0.585212
H410	2020-08	ETH-2	3.81	0.99	-6.485631	-14.803922	-21.885458	-29.575739	1.705034	-0.752036	0.228488
H412	2020-08	NO_LABEL_01	3.53	0.94	5.501600	-1.384632	3.813053	-2.980995	0.304406	-0.492055	0.513835
H413	2020-08	ETH-3	3.62	0.95	5.197045	2.168440	7.177462	4.273793	0.748808	-0.325632	0.697285
H414	2020-08	ETH-1	3.64	0.99	5.520559	1.795695	6.735784	3.320186	2.233381	-0.730254	0.250798
H415	2020-08	ETH-2	3.74	0.99	-6.491912	-14.823483	-21.900825	-29.581452	0.427656	-0.741711	0.239883
H416	2020-08	ETH-3	3.63	0.94	5.200608	2.155785	7.160099	4.151914	0.645472	-0.334110	0.687930
H418	2020-09a	ETH-1	3.63	1.02	5.534701	1.933454	6.902714	3.687730	1.615078	-0.714169	0.258792
H419	2020-09a	ETH-2	3.75	1.01	-6.467538	-14.662715	-21.693192	-29.418866	0.248371	-0.715203	0.258661
H420	2020-09a	ETH-3	3.91	0.96	5.237480	2.278234	7.317435	4.364283	1.392821	-0.335869	0.681336
H421	2020-09a	ETH-1	3.74	1.00	5.531837	1.896492	6.855520	3.437363	1.623491	-0.721824	0.250243
H423	2020-09a	ETH-3	3.63	0.98	5.236510	2.291642	7.339302	4.491684	1.428155	-0.326321	0.692001
H424	2020-09a	NB_CIN25_FAILLE	3.97	0.99	5.629983	5.914993	11.241849	11.743723	0.956832	-0.411213	0.597037
H425	2020-09a	NB_CIN7_V1	3.90	0.95	6.008225	4.904086	10.645878	9.666258	0.495157	-0.400159	0.609405
H426	2020-09a	ETH-1	3.89	1.00	5.531983	1.876245	6.841823	3.552813	0.872241	-0.715713	0.257069
H427	2020-09a	NB_CIN28a_V1	3.71	1.00	5.319957	4.067486	9.089255	8.004497	1.417849	-0.416661	0.591028
H428	2020-09a	NB_CIN27_V1	3.53	0.96	4.842122	3.587947	8.150562	7.100483	0.853828	-0.387203	0.623967
H429	2020-09a	ETH-2	3.74	1.00	-6.471345	-14.737771	-21.776375	-29.609161	1.337068	-0.721386	0.251758
H430	2020-09a	NB_CIN26_V1	3.72	0.99	5.559045	6.162432	11.408877	12.216541	1.692812	-0.415085	0.592705
H431	2020-09a	NB_CIN25_V1prime	3.64	0.96	5.547772	5.710713	10.952030	11.254219	1.222634	-0.413826	0.594128
H432	2020-09a	ETH-3	3.95	0.96	5.229608	2.256918	7.312744	4.425102	0.736197	-0.311545	0.708506
H433	2020-09a	NB_CIN23_V1	3.71	0.98	5.337291	3.726363	8.819871	7.304245	0.106396	-0.367382	0.646083
H434	2020-09a	NB_A10_V1	3.88	0.96	5.988808	0.676709	6.427131	1.236085	1.413622	-0.418512	0.589057
H435	2020-09a	ETH-1	3.59	1.01	5.530872	1.839999	6.811074	3.385702	0.909847	-0.709547	0.263957
H436	2020-09a	NB_A14_V1	3.83	0.92	6.582674	4.451634	10.807567	8.736800	1.865783	-0.386335	0.624841
H437	2020-09a	NB_CIN28b_V1	3.96	0.90	5.642613	5.964643	11.302498	11.874758	1.902264	-0.412722	0.595349
H438	2020-09a	ETH-2	3.49	0.99	-6.474020	-14.700291	-21.732563	-29.560190	0.461794	-0.711227	0.263103
H441	2020-09a	ETH-3	3.79	0.95	5.225715	2.242726	7.275484	4.364911	0.593044	-0.330613	0.687209
H442	2020-09a	NO_LABEL_08	3.82	0.98	5.983813	-1.255736	4.405492	-2.746090	1.006202	-0.523507	0.471850
H443	2020-09a	NO_LABEL_07	3.74	0.98	6.019046	-2.300272	3.437664	-4.952028	0.769470	-0.494836	0.503910
H444	2020-09a	ETH-1	3.76	1.00	5.527480	1.835267	6.776135	3.418504	0.413772	-0.736107	0.234291
H445	2020-09a	NO_LABEL_02	3.78	0.95	5.743618	-2.142928	3.320561	-4.608614	1.138755	-0.484154	0.515846
H446	2020-09a	NO_LABEL_06	3.72	0.95	5.155866	-0.648722	4.242042	-1.608673	0.793496	-0.434358	0.571435
H447	2020-09a	ETH-2	3.57	1.00	-6.476093	-14.769780	-21.805508	-29.650523	0.384061	-0.714302	0.259671
H450	2020-09a	ETH-3	3.63	0.96	5.228613	2.196373	7.224945	4.285115	0.142452	-0.338287	0.678639
H451	2020-09a	NO_LABEL_01	3.53	0.97	5.510533	-1.373052	3.848134	-3.031685	1.383102	-0.477680	0.523058
H453	2020-09a	ETH-1	3.54	1.01	5.528507	1.824392	6.796746	3.437052	0.422213	-0.706037	0.267879
H454	2020-09a	NO_LABEL_03	3.63	0.95	5.973684	-1.472728	4.226564	-3.213277	1.766393	-0.477658	0.523069
H455	2020-09a	NO_LABEL_04	3.60	0.95	6.010884	-1.343504	4.410126	-2.923455	0.194144	-0.460274	0.542480
H456	2020-09a	ETH-2	3.66	1.00	-6.475609	-14.793128	-21.831268	-29.842550	0.072785	-0.717839	0.255721
H457	2020-09a	NO_LABEL_05	3.98	0.78	3.607357	0.692583	3.982109	1.185239	0.520920	-0.421463	0.585847
H459	2020-09a	ETH-3	3.91	0.95	5.223604	2.194413	7.220439	4.161880	1.405144	-0.335697	0.681532
H462	2020-09a	ETH-1	3.88	0.99	5.523988	1.802153	6.765158	3.311630	1.507836	-0.710948	0.262394
H465	2020-09a	ETH-2	3.51	0.99	-6.478721	-14.776407	-21.812326	-29.911796	-0.055433	-0.711932	0.262319
H468	2020-09a	ETH-3	3.50	0.97	5.212361	2.153957	7.182112	4.137852	1.341748	-0.322527	0.696245

UID	Session	Sample	Mass (mg)	CO ₂ yield (if CaCO ₃)	δ45 (‰ WG)	δ46 (‰ WG)	δ47 (‰ WG)	δ48 (‰ WG)	δ49 (‰ WG)	Δ ₄₇ ^{raw} (‰)	Δ ₄₇ ^{abs} (‰)
H469	2020-09a	ETH-1	3.64	1.00	5.527436	1.800339	6.771301	3.261717	-0.016391	-0.706606	0.267245
H470	2020-09a	ETH-2	3.65	0.99	-6.484409	-14.820607	-21.882605	-30.078989	0.395770	-0.733752	0.237949
H526	2020-09c	ETH-3	3.70	0.98	5.236622	2.319831	7.374463	4.523111	-0.650416	-0.319182	0.691337
H527	2020-09c	ETH-2	3.50	0.99	-6.461478	-14.670482	-21.704264	-30.247894	-0.482993	-0.725055	0.247154
H528	2020-09c	ETH-1	3.66	1.01	5.508815	1.863335	6.801203	3.590568	-0.147512	-0.719613	0.250024
H529	2020-09c	ETH-3	3.81	0.98	5.218967	2.297286	7.352280	4.597594	-0.286086	-0.300975	0.711409
H530	2020-09c	ETH-2	3.67	0.99	-6.463877	-14.659110	-21.688277	-30.120804	-0.707788	-0.717575	0.255397
H531	2020-09c	ETH-3	3.74	0.96	5.209784	2.259127	7.282450	4.472123	-0.459082	-0.323434	0.686661
H532	2020-09c	ETH-1	3.66	1.02	5.533332	1.884829	6.852064	3.663437	1.331376	-0.715346	0.254722
H533	2020-09c	NB_A10_V1	3.93	0.98	5.983299	0.702605	6.458903	1.411789	0.977635	-0.406736	0.594931
H534	2020-09c	NB_A14_V1	3.98	0.95	6.596492	4.521981	10.898894	9.025886	1.553004	-0.379004	0.625012
H535	2020-09c	ETH-3	3.75	0.96	5.221385	2.257558	7.295291	4.545868	1.865920	-0.321054	0.689283
H536	2020-09c	NB_CIN23_V1	3.69	0.97	5.331160	3.604370	8.680217	7.178321	1.560920	-0.380023	0.624133
H537	2020-09c	NB_CIN25_V1prime	3.83	0.97	5.556693	5.688888	10.947631	11.359826	1.346501	-0.405996	0.595254
H538	2020-09c	ETH-2	3.71	1.00	-6.464537	-14.708946	-21.744812	-30.349591	2.277445	-0.724950	0.247274
H539	2020-09c	NB_CIN26_V1	3.62	0.99	5.565033	6.129442	11.392080	12.371515	1.901539	-0.405602	0.595640
H540	2020-09c	NB_CIN27_V1	3.64	0.97	4.855031	3.578407	8.154278	7.104954	1.677654	-0.387422	0.616034
H541	2020-09c	ETH-3	3.74	0.97	5.232322	2.258958	7.309650	4.447663	1.686285	-0.319396	0.691109
H542	2020-09c	NB_CIN28a_V1	3.77	1.00	5.302514	3.975935	8.991848	7.992846	0.960578	-0.405649	0.595852
H543	2020-09c	NB_CIN28b_V1	3.59	0.90	5.632578	5.989850	11.319926	12.069001	1.584480	-0.409828	0.590990
H544	2020-09c	ETH-1	3.69	1.01	5.534326	1.828767	6.813753	3.530096	1.723684	-0.699410	0.272292
H545	2020-09c	NB_CIN7_V1	3.69	0.97	5.995719	4.827861	10.565126	9.616466	1.450980	-0.392659	0.609997
H546	2020-09c	NB_CIN25_FAILLE	3.93	1.01	5.639046	5.784199	11.134036	11.737260	1.884114	-0.399291	0.602625
H547	2020-09c	ETH-3	3.74	0.96	5.233196	2.246712	7.295213	4.396743	1.941511	-0.322612	0.687566
H548	2020-09c	ETH-2	3.78	0.98	-6.456484	-14.662393	-21.668489	-30.149274	0.705186	-0.701761	0.272826

