Δ_{47} Analysis Report — LGB-2 & DVH-2

Laboratoire des Sciences du Climat et de l'Environnement
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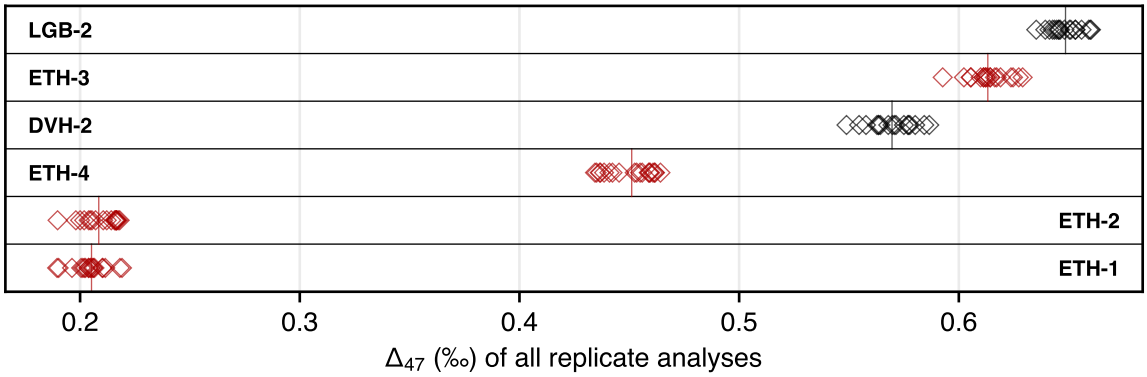
Number of analytical sessions	3
Number of samples (standards + unknowns)	6 (4 + 2)
Number of analyses (standards + unknowns)	112 (76+ 36)
Overall percentage of standard analyses	68 %
Nominal Δ_{47} of standard ETH-1:	0.2052 ‰
Nominal Δ_{47} of standard ETH-2:	0.2085 ‰
Nominal Δ_{47} of standard ETH-3:	0.6132 ‰
Nominal Δ_{47} of standard ETH-4:	0.4511 ‰
External reproducibility of $\delta^{13}C_{VPDB}$ measurements	5.6 ppm
External reproducibility of $\delta^{18}O_{VSMOW}$ measurements	17.2 ppm
External reproducibility of Δ_{47} measurements	9.1 ppm
Regression model degrees of freedom	101 ($t_{95\%} = 1.98$)

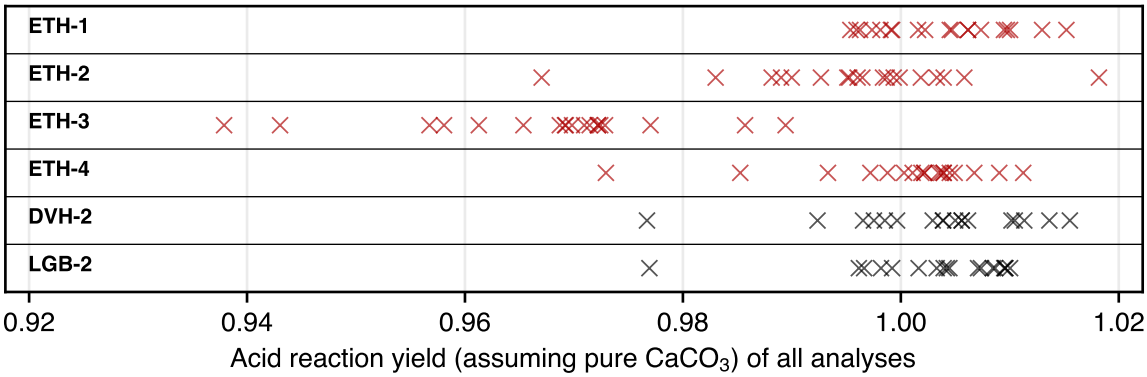
Analytical sessions

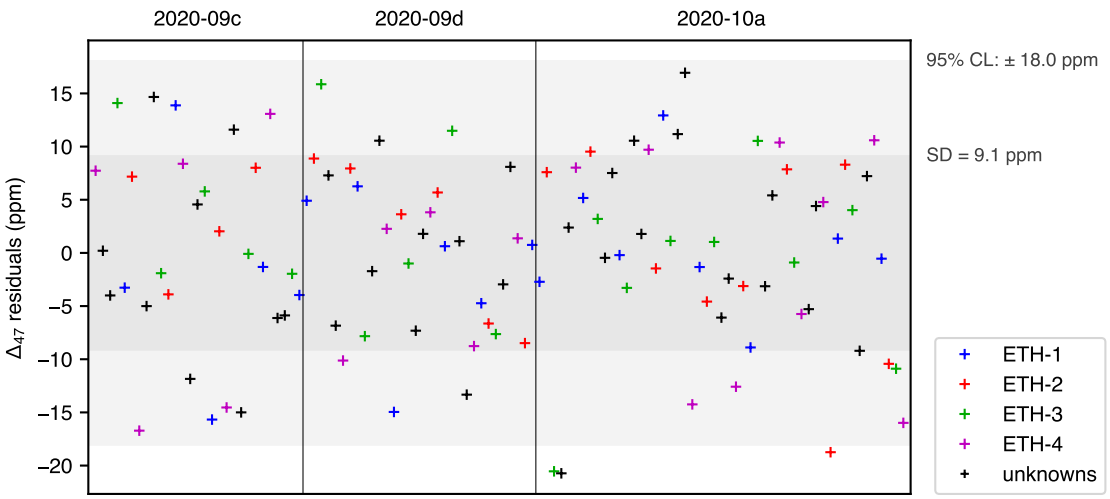
Session		**2020-09c**	**2020-09d**	**2020-10a**
N of standard analyses		19	22	35
N of unknown analyses		10	10	16
Working gas $\delta^{13}C$	(‰ VPDB)	−3.81	−3.81	−3.80
Working gas $\delta^{18}O$	(‰ VSMOW)	35.16	35.12	35.16
Working gas Δ_{47}	(‰ ± SE)	0.964 ± 0.011	0.961 ± 0.010	0.964 ± 0.009
Scrambling factor (*a*)	(± SE)	0.918 ± 0.010	0.924 ± 0.009	0.921 ± 0.008
Compositional slope (*b*)	($\times 10^{-4}$ ± SE)	0.5 ± 1.3	0.4 ± 1.2	0.3 ± 1.0
Working gas offset (*c*)	(± SE)	−0.885 ± 0.005	−0.888 ± 0.004	−0.888 ± 0.004
$\delta^{13}C_{VPDB}$ repeatability	(ppm)	3.2	5.0	7.2
$\delta^{18}O_{VSMOW}$ repeatability	(ppm)	13.6	18.6	18.2
Δ_{47} repeatability	(ppm)	10.0	8.2	9.4

Sample	N	Yield	$\delta^{13}C_{VPDB}$	$\delta^{18}O_{VSMOW}$	$\delta^{18}O_{VPDB}$	Δ_{47}				p-value
		(%)		(CO_2)	(calcite*)		± SE	(± 95 %)	SD	(Levene)
ETH-1	19	100	2.03	37.03	−2.19	0.2052			0.0077	
ETH-2	19	100	−10.17	19.88	−18.69	0.2085			0.0081	
ETH-3	19	97	1.70	37.44	−1.79	0.6132			0.0089	
ETH-4	19	100	−10.21	19.77	−18.79	0.4511			0.0106	
DVH-2	18	100	−1.97	22.88	−15.80	0.5696	± 0.0027	(± 0.0054)	0.0102	0.395
LGB-2	18	100	0.09	34.82	−4.31	0.6486	± 0.0030	(± 0.0059)	0.0072	0.744

* computed assuming the sample is pure calcite; adjust accordingly for different mineralogies. For example, for aragonite samples, $\delta^{18}O_{arag} = (1000 + \delta^{18}O_{calcite}) \times 1.00813 / {}^{18}\alpha_{arag} - 1000$






2020-09c
2020-09d
2020-10a
95% CL: ± 18.0 ppm
SD = 9.1 ppm
Δ47 residuals (ppm)
15
10
5
0
−5
−10
−15
−20
ETH-1
ETH-2
ETH-3
ETH-4
unknowns

Methods

Carbonate samples were converted to CO_2 by phosphoric acid reaction at 90 °C in a common, stirred acid bath for 15 minutes. Initial phosphoric acid concentration was 103 % (1.91 g/cm^3) and each batch of acid was used for 7 days. After cryogenic removal of water, the evolved CO_2 was helium-flushed at 25 mL/mn through a purification column packed with Porapak Q (50/80 mesh, 1 m length, 2.1 mm ID) and held at −20 °C, then quantitatively recollected by cryogenic trapping and transferred into an Isoprime 100 dual-inlet mass spectrometer equipped with six Faraday collectors (m/z 44–49). Each analysis took about 2.5 hours, during which analyte gas and working reference gas were allowed to flow from matching, 10 mL reservoirs into the source through deactivated fused silica capillaries (65 cm length, 110 μm ID). Every 20 minutes, gas pressures were adjusted to achieve m/z = 44 current of 80 nA, with differences between analyte gas and working gas generally below 0.1 nA. Pressure-dependent background current corrections were measured 12 times for each analysis. All background measurements from a given session are then used to determine a mass-specific relationship linking background intensity (Z_m), total m/z = 44 intensity (I_{44}), and time (t): $Z_m = a + bI_{44} + ct + dt^2$. Background-corrected ion current ratios (δ_{45} to δ_{49}) were converted to $\delta^{13}C$, $\delta^{18}O$, and "raw" Δ_{47} values as described by *Daëron et al.* [2016], using the IUPAC oxygen-17 correction parameters. The isotopic composition ($\delta^{13}C$, $\delta^{18}O$) of our working reference gas was computed based on the nominal isotopic composition of carbonate standard ETH-3 [*Bernasconi*, *Müller*, *et al.*, 2018] and an oxygen-18 acid fractionation factor of 1.00813 [*Kim et al.*, 2007]. Raw Δ_{47} values were then converted to the I-CDES Δ_{47} reference frame by comparison with four "ETH" carbonate standards [*Bernasconi*, *Daëron*, *et al.*, 2021] using a pooled regression approach [*Daëron*, 2021]. Full analytical errors are derived from the external reproducibility of unknowns and standards ($N_f = 101$) and conservatively account for the uncertainties in raw Δ_{47} measurements as well as those associated with the conversion to the "absolute" Δ_{47} reference frame.

References

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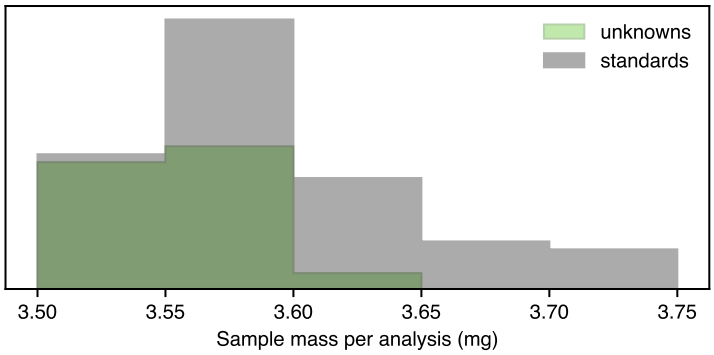
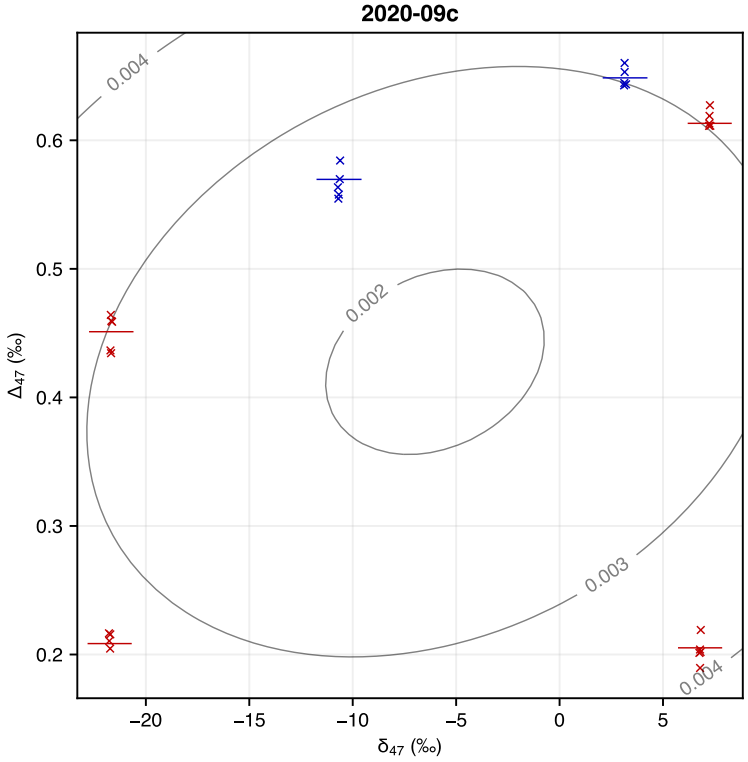
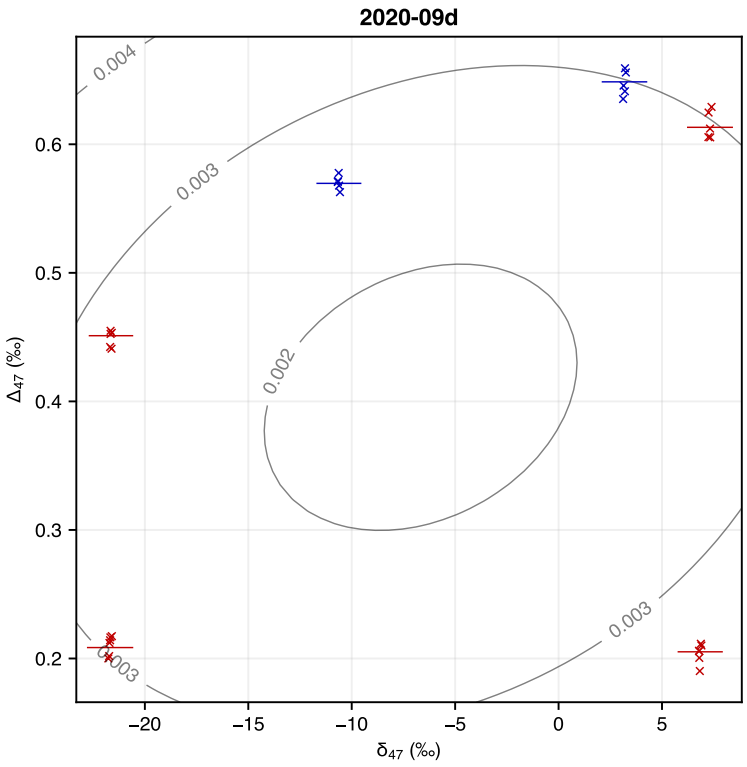

unknowns
standards
3.50
3.55
3.60
3.65
3.70
3.75
Sample mass per analysis (mg)

UID	Session	Sample	Mass (mg)	CO_2 yield (if $CaCO_3$)	δ45 (‰ WG)	δ46 (‰ WG)	δ47 (‰ WG)	δ48 (‰ WG)	δ49 (‰ WG)	$\delta^{13}C_{VPDB}$ (‰)	$\delta^{18}O_{VSMOW}$ (‰)	Δ_{47}^{raw} (‰)	Δ_{47}^{abs} (‰)
H549	2020-09c	ETH-4	3.53	1.00	−6.510224	−14.807766	−21.632782	−30.150786	0.529172	−10.214	19.777	−0.464541	0.458832
H550	2020-09c	DVH-2	3.56	1.01	1.305350	−11.795602	−10.625692	−24.191354	1.089773	−1.975	22.891	−0.362134	0.569801
H551	2020-09c	LGB-2	3.59	1.01	3.630665	−0.326395	3.130076	−0.743137	1.486598	0.083	34.788	−0.292836	0.644573
H552	2020-09c	ETH-3	3.73	0.96	5.231634	2.206592	7.268172	4.506534	2.129291	1.700	37.415	−0.308510	0.627293
H553	2020-09c	ETH-1	3.61	1.00	5.533536	1.831284	6.815740	3.544963	2.427718	2.036	37.028	−0.699107	0.201931
H554	2020-09c	ETH-2	3.57	1.00	−6.461539	−14.722615	−21.718755	−30.315113	1.552998	−10.166	19.879	−0.687816	0.215675
H555	2020-09c	ETH-4	3.58	1.00	−6.514042	−14.830654	−21.680982	−30.303935	0.253211	−10.218	19.770	−0.486991	0.434384
H556	2020-09c	LGB-2	3.54	1.00	3.698151	−0.311448	3.213489	−0.692663	2.516539	0.155	34.815	−0.293753	0.643570
H557	2020-09c	DVH-2	3.58	1.01	1.305338	−11.791812	−10.608830	−24.264023	1.895631	−1.975	22.910	−0.348854	0.584263
H558	2020-09c	ETH-3	3.65	0.97	5.235717	2.237544	7.288174	4.434026	1.520825	1.703	37.461	−0.323202	0.611292
H559	2020-09c	ETH-2	3.59	0.98	−6.465128	−14.717804	−21.727657	−30.242711	1.709697	−10.170	19.899	−0.697983	0.204602
H560	2020-09c	ETH-1	3.61	1.01	5.528167	1.831033	6.825808	3.498680	1.752321	2.031	37.045	−0.683362	0.219077
H561	2020-09c	ETH-4	3.60	0.99	−6.510481	−14.847017	−21.670781	−30.393946	2.165736	−10.213	19.767	−0.463943	0.459484
H562	2020-09c	DVH-2	3.53	1.02	1.304589	−11.829430	−10.670723	−24.242815	2.735339	−1.974	22.883	−0.373202	0.557750
H563	2020-09c	LGB-2	3.53	1.00	3.629273	−0.316292	3.146493	−0.670458	0.848075	0.081	34.827	−0.284978	0.653130
H564	2020-09c	ETH-3	3.74	0.97	5.225522	2.201135	7.248775	4.320778	2.013313	1.694	37.437	−0.316139	0.618986
H565	2020-09c	ETH-1	3.56	1.01	5.531908	1.821489	6.792903	3.570517	2.484165	2.035	37.045	−0.710497	0.189527
H566	2020-09c	ETH-2	3.55	1.00	−6.468320	−14.763715	−21.770387	−30.319458	0.917539	−10.171	19.865	−0.692540	0.210533
H567	2020-09c	ETH-4	3.55	1.00	−6.515690	−14.862529	−21.711818	−30.488517	2.488148	−10.218	19.763	−0.484991	0.436563
H568	2020-09c	LGB-2	3.55	1.01	3.602321	−0.297484	3.143738	−0.865490	1.172427	0.052	34.855	−0.278519	0.660164
H569	2020-09c	DVH-2	3.53	1.00	1.302390	−11.848985	−10.695078	−24.307638	1.578535	−1.976	22.875	−0.376094	0.554600
H570	2020-09c	ETH-3	3.72	0.97	5.226695	2.195347	7.238831	4.480024	1.852653	1.695	37.442	−0.321535	0.613110
H571	2020-09c	ETH-2	3.54	1.00	−6.469292	−14.781356	−21.783226	−30.478967	1.988949	−10.172	19.853	−0.687055	0.216507
H572	2020-09c	ETH-1	3.52	1.00	5.525761	1.810754	6.789224	3.427629	2.336545	2.029	37.044	−0.697318	0.203880
H573	2020-09c	ETH-4	3.58	1.00	−6.514356	−14.870724	−21.693647	−30.529361	0.887472	−10.217	19.764	−0.459636	0.464176
H574	2020-09c	DVH-2	3.54	1.00	1.296956	−11.871647	−10.714860	−24.408152	−0.095485	−1.981	22.861	−0.367946	0.563475
H575	2020-09c	LGB-2	3.60	1.01	3.636530	−0.340571	3.120407	−0.716852	2.263318	0.090	34.821	−0.294561	0.642694
H576	2020-09c	ETH-3	3.70	0.96	5.228513	2.184686	7.228444	4.448176	2.040461	1.697	37.439	−0.323254	0.611237
H577	2020-09c	ETH-1	3.61	1.00	5.524030	1.785583	6.760122	3.337710	1.003289	2.028	37.025	−0.699744	0.201239
H578	2020-09d	ETH-1	3.59	1.02	5.537215	1.912355	6.905251	3.658854	0.126586	2.035	36.997	−0.693539	0.210107
H579	2020-09d	ETH-2	3.56	1.01	−6.455487	−14.602548	−21.595634	−30.197747	−0.488478	−10.165	19.887	−0.688051	0.217376
H580	2020-09d	ETH-3	3.66	0.99	5.245223	2.318564	7.394992	4.647105	0.024745	1.708	37.452	−0.306396	0.629062
H581	2020-09d	LGB-2	3.57	1.01	3.649766	−0.233048	3.252929	−0.646144	0.293070	0.098	34.815	−0.281811	0.655862
H582	2020-09d	DVH-2	3.60	1.00	1.316267	−11.742608	−10.568642	−24.352268	−0.326841	−1.967	22.875	−0.368438	0.562757
H583	2020-09d	ETH-4	3.55	1.00	−6.505823	−14.773219	−21.611125	−30.392277	−0.334707	−10.212	19.753	−0.481440	0.440977
H584	2020-09d	ETH-2	3.52	0.99	−6.461868	−14.667227	−21.666100	−30.339104	−0.175890	−10.169	19.871	−0.688916	0.216443
H585	2020-09d	ETH-1	3.58	1.01	5.532518	1.887574	6.877173	3.575824	0.375978	2.031	37.045	−0.692289	0.211462
H586	2020-09d	ETH-3	3.62	0.97	5.241402	2.280570	7.331436	4.663715	0.439485	1.705	37.459	−0.328291	0.605369
H587	2020-09d	DVH-2	3.54	1.00	1.308495	−11.783056	−10.611698	−24.242918	−0.058519	−1.974	22.866	−0.363705	0.567880
H588	2020-09d	LGB-2	3.59	1.00	3.645788	−0.275503	3.209965	−0.686474	−0.423492	0.095	34.820	−0.278796	0.659127
H589	2020-09d	ETH-4	3.59	1.01	−6.505447	−14.771969	−21.598317	−30.455803	0.165406	−10.212	19.788	−0.469993	0.453365
H590	2020-09d	ETH-1	3.56	1.00	5.528022	1.862296	6.827796	3.538367	−0.317435	2.027	37.041	−0.711897	0.190244
H591	2020-09d	ETH-2	3.51	0.99	−6.464070	−14.707076	−21.711136	−30.362537	0.716833	−10.170	19.861	−0.692901	0.212132
H592	2020-09d	ETH-3	3.67	0.99	5.236021	2.269984	7.321776	4.640715	0.158513	1.700	37.471	−0.321975	0.612205
H593	2020-09d	LGB-2	3.56	1.01	3.673084	−0.290459	3.206788	−0.712065	0.649819	0.125	34.818	−0.295308	0.641257
H594	2020-09d	DVH-2	3.54	1.00	1.303212	−11.834002	−10.664026	−24.526210	0.590329	−1.978	22.837	−0.360464	0.571391
H595	2020-09d	ETH-4	3.56	1.00	−6.512744	−14.826790	−21.657851	−30.667830	−0.923265	−10.218	19.749	−0.468560	0.454919
H596	2020-09d	ETH-2	3.62	0.97	−6.463332	−14.678922	−21.681048	−30.360138	0.102523	−10.170	19.905	−0.691005	0.214184
H597	2020-09d	ETH-1	3.52	1.00	5.525071	1.820014	6.797478	3.536227	0.669232	2.026	37.016	−0.697497	0.205829
H598	2020-09d	ETH-3	3.62	0.97	5.220796	2.202918	7.251384	4.380228	0.372265	1.686	37.417	−0.310446	0.624686
H599	2020-09d	DVH-2	3.59	1.01	1.301306	−11.839034	−10.671555	−24.474282	−0.496345	−1.979	22.843	−0.361104	0.570698
H600	2020-09d	LGB-2	3.53	1.00	3.629752	−0.327163	3.120313	−0.875253	−0.624667	0.080	34.797	−0.300870	0.635242
H601	2020-09d	ETH-4	3.54	1.00	−6.511024	−14.838311	−21.678733	−30.642210	−0.804427	−10.215	19.750	−0.480188	0.442335
H602	2020-09d	ETH-1	3.58	1.01	5.528985	1.826144	6.802587	3.641285	0.208118	2.030	37.033	−0.702451	0.200468
H603	2020-09d	ETH-2	3.55	1.00	−6.464714	−14.713168	−21.727030	−30.400027	−1.074181	−10.171	19.882	−0.702394	0.201860
H604	2020-09d	ETH-3	3.62	0.97	5.226292	2.207639	7.243929	4.222861	−0.338647	1.692	37.432	−0.328114	0.605566
H605	2020-09d	LGB-2	3.58	1.00	3.643811	−0.329160	3.142457	−0.853721	−0.645068	0.095	34.804	−0.291285	0.645614
H606	2020-09d	DVH-2	3.57	1.00	1.305822	−11.807988	−10.629996	−24.417575	−0.882522	−1.976	22.888	−0.354642	0.577689
H607	2020-09d	ETH-4	3.58	1.00	−6.510532	−14.825593	−21.656648	−30.675476	−1.056144	−10.215	19.773	−0.470821	0.452471
H608	2020-09d	ETH-2	3.54	1.00	−6.467736	−14.747258	−21.765046	−30.661327	−0.352437	−10.173	19.856	−0.704099	0.200016
H609	2020-09d	ETH-1	3.53	1.00	5.526616	1.809708	6.789005	3.513705	−0.047660	2.028	37.028	−0.697383	0.205952
H610	2020-10a	ETH-1	3.56	1.01	5.532549	1.955567	6.935711	3.673954	−2.596983	2.040	37.036	−0.700903	0.202483
H611	2020-10a	ETH-2	3.52	1.02	−6.458895	−14.642972	−21.639804	−30.461428	−0.360795	−10.161	19.856	−0.689326	0.216093
H612	2020-10a	ETH-3	3.73	0.98	5.242480	2.313220	7.351489	4.504610	−0.661826	1.716	37.440	−0.341513	0.592660
H613	2020-10a	DVH-2	3.50	1.01	1.305339	−11.768726	−10.619359	−24.604206	−1.660673	−1.968	22.852	−0.382451	0.548869
H614	2020-10a	LGB-2	3.52	1.01	3.677916	−0.286551	3.223003	−0.875797	−1.038276	0.140	34.773	−0.287957	0.650957
H615	2020-10a	ETH-4	3.59	1.01	−6.508784	−14.767553	−21.592980	−30.565960	−0.393560	−10.209	19.781	−0.465482	0.459121
H616	2020-10a	ETH-1	3.57	1.01	5.524327	1.842806	6.823113	3.681627	−0.461099	2.035	36.997	−0.693644	0.210368
H617	2020-10a	ETH-2	3.59	1.00	−6.467188	−14.685428	−21.687931	−30.654356	−0.682956	−10.168	19.882	−0.687547	0.218026
H618	2020-10a	ETH-3	3.63	0.97	5.228615	2.271712	7.318171	4.445219	−1.033311	1.703	37.457	−0.319651	0.616398
H619	2020-10a	LGB-2	3.52	1.01	3.652558	−0.239082	3.241058	−0.671345	−0.160324	0.111	34.861	−0.290578	0.648110
H620	2020-10a	DVH-2	3.51	0.99	1.304415	−11.777415	−10.603106	−24.568939	−0.862272	−1.969	22.899	−0.356437	0.577112
H623	2020-10a	ETH-1	3.56	1.01	5.524569	1.855560	6.830978	3.554581	−0.618319	2.035	37.047	−0.698595	0.204993
H624	2020-10a	ETH-3	3.62	0.97	5.229219	2.218532	7.260226	4.618806	−0.085200	1.706	37.428	−0.325627	0.609912
H625	2020-10a	DVH-2	3.55	1.01	1.303002	−11.787979	−10.612177	−24.663485	−0.654095	−1.970	22.907	−0.353639	0.580149
H626	2020-10a	LGB-2	3.52	0.98	3.612404	−0.293040	3.148490	−0.793454	−1.229613	0.070	34.832	−0.288513	0.650357
H627	2020-10a	ETH-4	3.59	1.00	−6.502032	−14.799613	−21.615902	−30.822603	−0.294285	−10.201	19.807	−0.463931	0.460806
H628	2020-10a	ETH-2	3.53	0.99	−6.466836	−14.692095	−21.703989	−30.684633	−1.143411	−10.167	19.921	−0.697667	0.207039
H629	2020-10a	ETH-1	3.58	1.00	5.520424	1.826933	6.810601	3.534552	−0.197828	2.031	37.037	−0.686495	0.218130
H630	2020-10a	ETH-3	3.60	0.97	5.226470	2.242587	7.285251	4.431812	−0.588639	1.702	37.471	−0.321560	0.614327
H631	2020-10a	LGB-2	3.50	1.01	3.632969	−0.311241	3.160417	−0.789073	−0.125427	0.093	34.831	−0.279864	0.659746
H632	2020-10a	DVH-2	3.56	0.98	1.298529	−11.811501	−10.634069	−24.579105	−1.482706	−1.974	22.906	−0.347756	0.586538
H633	2020-10a	ETH-4	3.60	1.01	−6.511405	−14.830977	−21.677642	−30.962198	−0.938440	−10.210	19.795	−0.485993	0.436855
H634	2020-10a	ETH-1	3.55	1.00	5.519694	1.804704	6.774650	3.511015	−0.638216	2.031	37.030	−0.699629	0.203872
H635	2020-10a	ETH-2	3.54	1.00	−6.467665	−14.736293	−21.750785	−30.762201	−0.397019	−10.166	19.897	−0.700540	0.203922
H636	2020-10a	ETH-3	3.65	0.97	5.218155	2.175493	7.210266	4.310641	−0.123921	1.695	37.419	−0.321650	0.614231
H637	2020-10a	DVH-2	3.53	1.01	1.303572	−11.831780	−10.669880	−24.757960	−0.667261	−1.968	22.896	−0.368963	0.563514
H638	2020-10a	LGB-2	3.55	1.00	3.627098	−0.336822	3.116566	−0.852866	−0.433839	0.088	34.820	−0.292381	0.646158
H639	2020-10a	ETH-4	3.59	1.00	−6.518660	−14.868077	−21.719735	−30.950983	−0.240549	−10.216	19.767	−0.484463	0.438518
H640	2020-10a	ETH-2	3.55	1.00	−6.477988	−14.772574	−21.795374	−30.799359	−0.758855	−10.176	19.868	−0.699199	0.205380

UID	Session	Sample	Mass (mg)	CO_2 yield (if $CaCO_3$)	δ45 (‰ WG)	δ46 (‰ WG)	δ47 (‰ WG)	δ48 (‰ WG)	δ49 (‰ WG)	$\delta^{13}C_{VPDB}$ (‰)	$\delta^{18}O_{VSMOW}$ (‰)	Δ_{47}^{raw} (‰)	Δ_{47}^{abs} (‰)
H641	2020-10a	ETH-1	3.53	1.00	5.516252	1.788352	6.747919	3.454205	−0.109589	2.028	37.026	−0.706597	0.196308
H642	2020-10a	ETH-3	3.64	0.94	5.225713	2.206539	7.257580	4.396562	−1.085496	1.702	37.462	−0.312895	0.623735
H643	2020-10a	LGB-2	3.59	1.00	3.616443	−0.341946	3.099858	−0.853224	−0.145425	0.077	34.823	−0.293045	0.645437
H644	2020-10a	DVH-2	3.55	1.00	1.298057	−11.852316	−10.685241	−24.822203	−0.703626	−1.973	22.887	−0.358377	0.575009
H645	2020-10a	ETH-4	3.57	1.00	−6.518208	−14.880430	−21.710635	−31.079731	0.080367	−10.215	19.764	−0.463312	0.461481
H646	2020-10a	ETH-2	3.52	1.00	−6.473328	−14.764691	−21.773045	−31.048959	−0.449448	−10.171	19.886	−0.689085	0.216360
H647	2020-10a	ETH-3	3.62	0.97	5.222127	2.181394	7.218410	4.358154	−0.619736	1.699	37.443	−0.323430	0.612298
H648	2020-10a	ETH-4	3.59	1.00	−6.519390	−14.877375	−21.723391	−31.118875	−0.173233	−10.216	19.772	−0.478167	0.445354
H649	2020-10a	DVH-2	3.57	1.01	1.294257	−11.870220	−10.716492	−24.836185	−0.483831	−1.976	22.875	−0.368233	0.564309
H650	2020-10a	LGB-2	3.54	1.00	3.646725	−0.340563	3.139417	−0.927881	−0.435047	0.109	34.835	−0.286098	0.652979
H651	2020-10a	ETH-4	3.53	1.00	−6.517652	−14.857396	−21.692630	−31.156060	−0.320568	−10.215	19.797	−0.468470	0.455880
H652	2020-10a	ETH-2	3.58	1.00	−6.475480	−14.776517	−21.810761	−31.012601	−0.015817	−10.173	19.882	−0.713588	0.189758
H653	2020-10a	ETH-1	3.52	1.00	5.515617	1.763527	6.732236	3.408943	0.026852	2.029	37.018	−0.697166	0.206548
H654	2020-10a	ETH-2	3.54	1.00	−6.467506	−14.767988	−21.769954	−30.951659	−0.069631	−10.165	19.893	−0.688680	0.216799
H655	2020-10a	ETH-3	3.68	0.96	5.207206	2.163462	7.189838	4.279251	−0.463398	1.684	37.436	−0.318895	0.617223
H656	2020-10a	LGB-2	3.56	1.00	3.606419	−0.365537	3.060636	−0.794630	0.630412	0.067	34.817	−0.298639	0.639366
H657	2020-10a	DVH-2	3.56	1.00	1.293573	−11.880853	−10.716253	−25.105367	−0.519266	−1.977	22.875	−0.356710	0.576819
H658	2020-10a	ETH-4	3.57	0.99	−6.525434	−14.906905	−21.743635	−31.205247	−0.319452	−10.222	19.754	−0.463119	0.461692
H659	2020-10a	ETH-1	3.55	1.00	5.515215	1.753373	6.720034	3.320187	0.071257	2.028	37.015	−0.698906	0.204659
H660	2020-10a	ETH-2	3.58	0.99	−6.482778	−14.818288	−21.851455	−31.049533	−0.903483	−10.179	19.849	−0.705935	0.198069
H661	2020-10a	ETH-3	3.69	0.94	5.205862	2.156336	7.167568	4.139230	−0.971826	1.683	37.435	−0.332631	0.602311
H662	2020-10a	ETH-4	3.58	0.97	−6.525007	−14.878852	−21.739769	−31.253280	−1.584380	−10.222	19.788	−0.487596	0.435117




2020-09d
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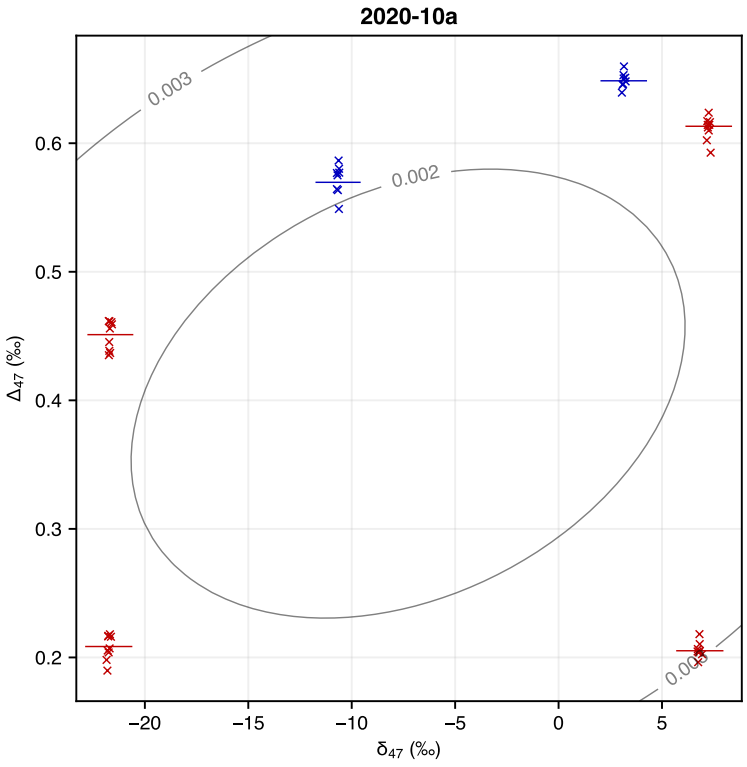
0.002
0.003
0.003
0.6
0.5
0.4
0.3
0.2
Δ47 (‰)
−20
−15
−10
−5
0
5
δ47 (‰)


2020-10a
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0.003
0.6
0.5
0.4
0.3
0.2
Δ47 (‰)
−20
−15
−10
−5
0
5
δ47 (‰)