

Δ_{47} Analysis Report — T. Letulle, Jan 2020

Laboratoire des Sciences du Climat et de l'Environnement
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Number of analytical sessions	3
Number of samples (standards + unknowns)	32 (3 + 29)
Number of analyses (standards + unknowns)	127 (52+ 75)
Overall percentage of standard analyses	41 %
Nominal Δ_{47} of anchor ETH-1	0.2052 ‰
Nominal Δ_{47} of anchor ETH-2	0.2085 ‰
Nominal Δ_{47} of anchor ETH-3	0.6132 ‰
External reproducibility of $\delta^{13}\text{C}_{\text{VPDB}}$ measurements	7.3 ppm
External reproducibility of $\delta^{18}\text{O}_{\text{VSMOW}}$ measurements	21.5 ppm
External reproducibility of Δ_{47} measurements	8.8 ppm
Regression model degrees of freedom	89 ($t_{95\%} = 1.99$)

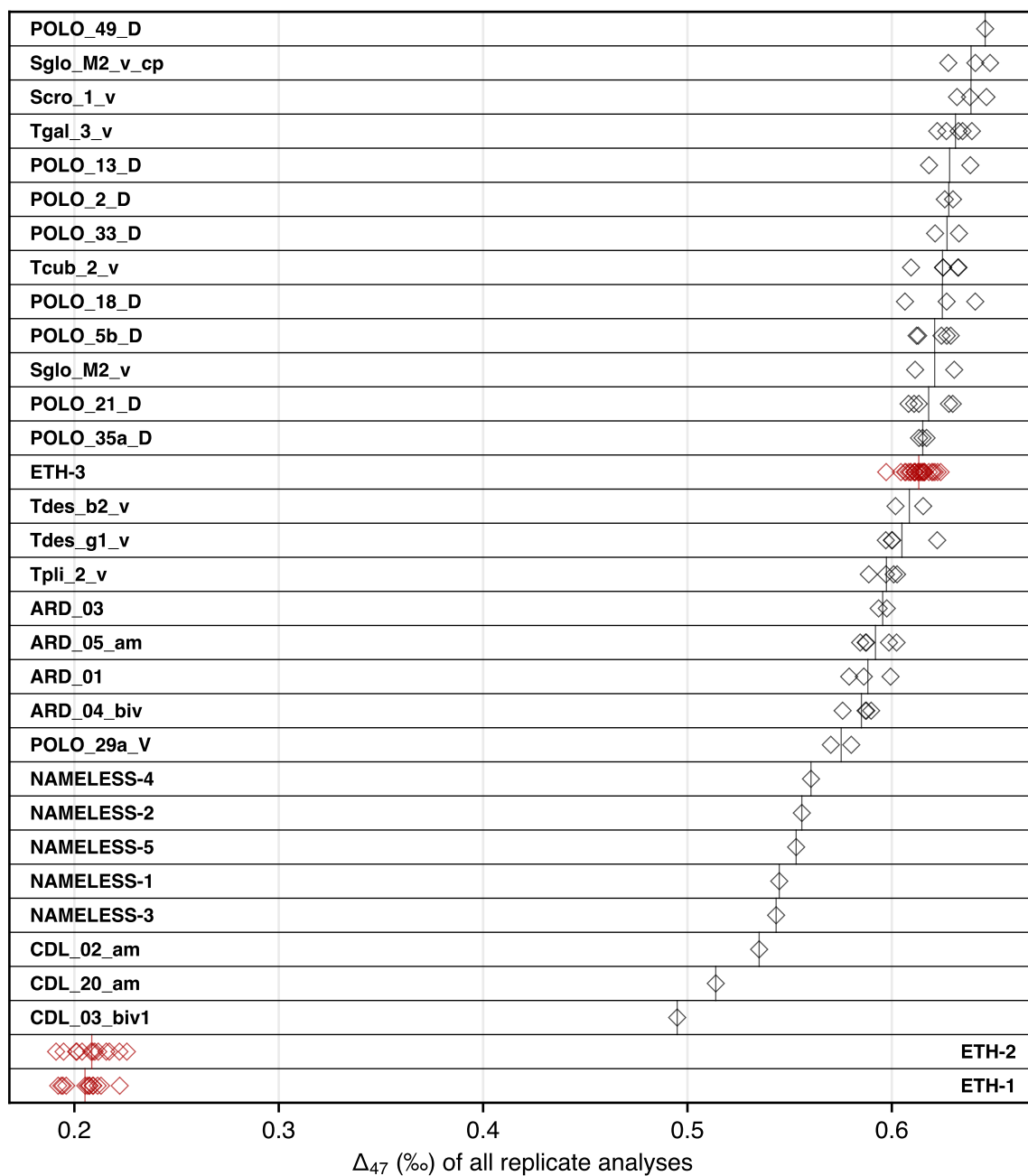
Analytical sessions

Session		2020-01a	2020-01b	2020-02a
N of anchor analyses		18	19	15
N of unknown analyses		25	34	16
Working gas $\delta^{13}\text{C}$	(‰ VPDB)	−3.86	−3.86	−3.86
Working gas $\delta^{18}\text{O}$	(‰ VSMOW)	35.07	35.08	35.06
Working gas Δ_{47}	(‰ ± SE)	0.955 ± 0.012	0.960 ± 0.013	0.954 ± 0.014
Scrambling factor (a)	(± SE)	0.859 ± 0.010	0.846 ± 0.010	0.845 ± 0.011
Compositional slope (b)	($\times 10^{-4}$ ± SE)	1.6 ± 1.7	1.5 ± 1.7	1.7 ± 1.9
Working gas offset (c)	(± SE)	-0.820 ± 0.004	-0.812 ± 0.005	-0.807 ± 0.005
$\delta^{13}\text{C}_{\text{VPDB}}$ repeatability	(ppm)	9.0	6.5	7.7
$\delta^{18}\text{O}_{\text{VSMOW}}$ repeatability	(ppm)	20.1	21.4	26.9
Δ_{47} repeatability	(ppm)	9.7	10.9	7.1

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} (I-CDES)			p-value (Levene)
						\pm SE	(\pm 95 %)	SD	
ETH-1	13	100	2.01	37.01	−2.21	0.2052		0.0088	
ETH-2	13	100	−10.17	19.88	−18.68	0.2085		0.0102	
ETH-3	26	97	1.71	37.46	−1.78	0.6132		0.0060	
ARD_01	3	87	2.82	37.49	−1.74	0.5883	\pm 0.0054	(\pm 0.0108)	0.38
ARD_03	2	99	2.46	36.64	−2.56	0.5955	\pm 0.0065	(\pm 0.0130)	0.0028
ARD_04_biv	4	99	2.75	36.83	−2.37	0.5851	\pm 0.0048	(\pm 0.0095)	0.0062
ARD_05_am	5	94	0.37	38.86	−0.42	0.5920	\pm 0.0043	(\pm 0.0085)	0.0079
CDL_02_am	1	80	1.65	34.93	−4.20	0.5351	\pm 0.0089	(\pm 0.0177)	
CDL_03_biv1	1	93	2.87	33.04	−6.02	0.4950	\pm 0.0089	(\pm 0.0177)	
CDL_20_am	1	98	0.63	35.28	−3.87	0.5139	\pm 0.0089	(\pm 0.0177)	
NAMELESS-1	1	99	4.03	37.71	−1.53	0.5449	\pm 0.0091	(\pm 0.0180)	
NAMELESS-2	1	100	4.27	36.53	−2.67	0.5560	\pm 0.0091	(\pm 0.0180)	
NAMELESS-3	1	101	2.41	36.36	−2.83	0.5434	\pm 0.0089	(\pm 0.0178)	
NAMELESS-4	1	100	3.51	36.93	−2.28	0.5604	\pm 0.0091	(\pm 0.0180)	
NAMELESS-5	1	100	3.08	36.98	−2.23	0.5532	\pm 0.0091	(\pm 0.0180)	
POLO_13_D	2	91	4.76	36.35	−2.84	0.6283	\pm 0.0066	(\pm 0.0131)	0.0143
POLO_18_D	3	86	4.23	36.90	−2.31	0.6247	\pm 0.0054	(\pm 0.0108)	0.0173
POLO_21_D	5	92	4.94	36.97	−2.24	0.6180	\pm 0.0045	(\pm 0.0088)	0.0101
POLO_29a_V	2	100	−1.21	24.53	−14.21	0.5752	\pm 0.0068	(\pm 0.0134)	0.0071
POLO_2_D	2	90	4.59	37.42	−1.81	0.6279	\pm 0.0065	(\pm 0.0129)	0.0028
POLO_33_D	2	81	4.19	36.85	−2.36	0.6270	\pm 0.0066	(\pm 0.0131)	0.0083
POLO_35a_D	3	95	3.75	37.51	−1.73	0.6151	\pm 0.0054	(\pm 0.0108)	0.0018
POLO_49_D	1	88	4.03	37.26	−1.96	0.6457	\pm 0.0091	(\pm 0.0182)	
POLO_5b_D	5	93	4.21	36.86	−2.35	0.6209	\pm 0.0043	(\pm 0.0086)	0.0079
Scro_1_v	3	98	2.74	41.49	2.11	0.6387	\pm 0.0055	(\pm 0.0109)	0.0072
Sglo_M2_v	2	98	2.82	40.26	0.93	0.6210	\pm 0.0066	(\pm 0.0131)	0.0135
Sglo_M2_v_cp	3	95	1.88	40.30	0.96	0.6388	\pm 0.0055	(\pm 0.0109)	0.0104
Tcub_2_v	5	97	1.76	40.49	1.14	0.6248	\pm 0.0043	(\pm 0.0086)	0.0094
Tdes_b2_v	2	98	2.59	39.61	0.30	0.6086	\pm 0.0066	(\pm 0.0131)	0.0096
Tdes_g1_v	4	98	2.70	39.53	0.22	0.6049	\pm 0.0048	(\pm 0.0095)	0.0117
Tgal_3_v	5	97	1.98	40.63	1.28	0.6312	\pm 0.0043	(\pm 0.0086)	0.0067
Tpli_2_v	4	98	2.77	39.48	0.18	0.5974	\pm 0.0047	(\pm 0.0094)	0.0062

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

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

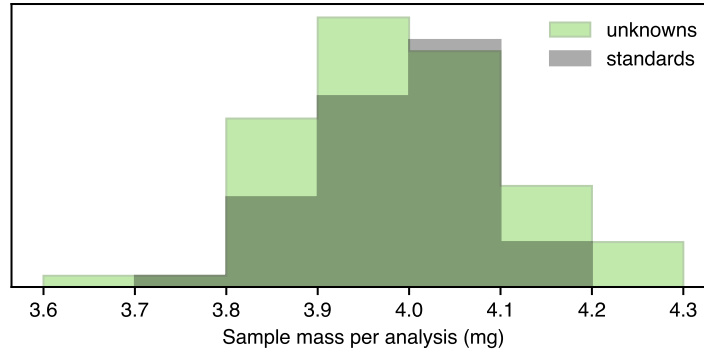


Methods

Carbonate samples were converted to CO₂ 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/cm³) and each batch of acid was used for 7 days. After cryogenic removal of water, the evolved CO₂ was helium-flushed at 25 mL/min 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 $\delta^{13}\text{C}$, $\delta^{18}\text{O}$, and “raw” Δ_{47} values as described by Daëron *et al.* [2016], using the IUPAC oxygen-17 correction parameters. The isotopic composition ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$) 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 ($N_f = 89$) 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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UID	Session	Sample	Mass (mg)	CO ₂ yield (if CaCO ₃)	δ45 (‰ WG)	δ46 (‰ WG)	δ47 (‰ WG)	δ48 (‰ WG)	δ49 (‰ WG)	δ ¹³ C _V PDB (‰)	δ ¹⁸ O _V SMOW (‰)	Δ ₄₇ ^{FW} (‰)	Δ ₄₇ ^{abs} (‰)
H31	2020-01a	ETH-3	3.96	0.97	5.229380	2.354502	7.434898	4.600521	3.670022	1.713	37.443	-0.285786	0.621067
H32	2020-01a	ETH-1	3.93	1.00	5.492236	1.899704	6.903910	3.543907	0.787546	2.015	36.979	-0.636351	0.213037
H33	2020-01a	ETH-3	4.06	0.97	5.243976	2.328544	7.411628	4.481111	0.195612	1.730	37.446	-0.298398	0.606389
H34	2020-01a	ETH-2	3.93	1.00	-6.324106	-14.349186	-21.184007	-28.631254	-1.009077	-10.164	19.875	-0.656618	0.194707
H35	2020-01a	ETH-3	4.00	0.97	5.238926	2.327536	7.415562	4.477489	-0.001853	1.724	37.471	-0.288325	0.618115
H36	2020-01a	ETH-1	4.02	1.01	5.496712	1.888976	6.894681	3.524397	0.113158	2.020	37.018	-0.639580	0.209280
H37	2020-01a	ETH-3	3.80	0.96	5.234893	2.345586	7.427352	4.659241	-0.726467	1.719	37.510	-0.290188	0.615944
H38	2020-01a	ETH-2	4.16	1.01	-6.332140	-14.372654	-21.209635	-28.719661	-0.715018	-10.172	19.889	-0.651055	0.201189
H39	2020-01a	ETH-3	4.05	0.98	5.235039	2.288551	7.363276	4.458984	-0.155262	1.722	37.466	-0.297994	0.606869
H40	2020-01a	CDL_20_am	4.06	0.98	4.157067	0.210115	4.116500	0.298864	-0.159996	0.633	35.280	-0.378410	0.513857
H41	2020-01a	CDL_02_am	4.30	0.80	5.081013	-0.120002	4.761912	-0.698592	-3.290252	1.645	34.933	-0.360072	0.535084
H42	2020-01a	POLO_5b_D	4.22	0.98	7.733319	1.979349	9.644612	3.902989	-0.175780	4.438	37.148	-0.293107	0.612131
H43	2020-01a	ETH-1	4.06	1.02	5.493345	1.852431	6.841542	3.503199	-0.272469	2.018	37.024	-0.653030	0.193631
H46	2020-01a	POLO_29a_V	3.90	0.99	2.088273	-9.977205	-7.997827	-19.780838	-0.898277	-1.223	24.550	-0.323419	0.580148
H47	2020-01a	ETH-3	3.94	0.96	5.221807	2.226302	7.295343	4.322222	0.168472	1.710	37.434	-0.290792	0.615266
H48	2020-01a	CDL_03_biv1	4.28	0.93	6.150569	-1.932411	4.037457	-3.929370	-0.069313	2.871	33.043	-0.394642	0.494973
H49	2020-01a	Tcub_2_v	3.86	0.97	5.367257	5.120339	10.314806	10.132025	-0.366806	1.758	40.494	-0.281868	0.625089
H50	2020-01a	Tgal_3_v	3.93	0.99	5.583632	5.219308	10.645298	10.314772	-0.148208	1.989	40.600	-0.273621	0.634628
H51	2020-01a	ETH-2	3.86	1.00	-6.333412	-14.426766	-21.254942	-28.747571	-0.966125	-10.171	19.883	-0.642054	0.211676
H52	2020-01a	Tdes_g1_v	3.98	0.98	6.197227	4.192619	10.233318	8.314966	-0.154788	2.692	39.519	-0.305963	0.597053
H53	2020-01a	Scro_1_v	3.93	0.99	6.302456	6.075382	12.235340	12.171358	0.036017	2.735	41.509	-0.275705	0.631904
H54	2020-01a	Sglo_M2_v	3.87	0.98	6.343685	4.884456	11.082006	9.600271	0.228981	2.824	40.252	-0.293505	0.611398
H55	2020-01a	ETH-1	3.92	1.00	5.482692	1.821585	6.811989	3.399438	-0.209843	2.007	37.022	-0.641189	0.207422
H56	2020-01a	ARD_05_am	4.16	0.96	4.004272	3.582709	7.351022	6.984979	-0.315510	0.341	38.887	-0.314900	0.587188
H57	2020-01a	NAMELESS-3	3.89	1.01	5.837459	1.195987	6.850735	2.275467	-0.230099	2.415	36.362	-0.352604	0.543387
H58	2020-01a	Tdes_b2_v	3.66	0.97	6.111168	4.282068	10.236766	8.453719	-1.421379	2.595	39.622	-0.301885	0.601800
H59	2020-01a	ETH-3	3.83	0.96	5.218319	2.224348	7.294083	4.336894	-1.166459	1.706	37.452	-0.286547	0.620208
H60	2020-01a	Sglo_M2_v_cp	3.98	0.95	5.471883	4.925764	10.233182	9.872784	-0.178755	1.879	40.306	-0.279680	0.627652
H61	2020-01a	Tcub_2_v	3.93	0.97	5.360898	5.094713	10.269265	10.025882	-0.208983	1.752	40.486	-0.295350	0.609401
H62	2020-01a	Tgal_3_v	3.92	0.97	5.572771	5.240830	10.659265	10.528332	0.085206	1.976	40.640	-0.269711	0.639178
H63	2020-01a	ETH-2	4.17	0.98	-6.337432	-14.439670	-21.262917	-28.739701	-0.838321	-10.175	19.886	-0.633161	0.222031
H64	2020-01a	Tdes_g1_v	3.97	0.97	6.202616	4.159092	10.227582	8.048309	-0.499348	2.699	39.499	-0.284346	0.622221
H65	2020-01a	Tpli_2_v	3.90	0.97	6.264711	4.125146	10.239817	8.151612	-0.269482	2.767	39.464	-0.302654	0.600904
H66	2020-01a	Scro_1_v	3.90	0.96	6.300678	6.037022	12.201028	11.958641	-0.262914	2.734	41.484	-0.270294	0.638210
H67	2020-01a	ETH-3	3.92	0.95	5.204875	2.202141	7.250125	4.340244	-0.776948	1.692	37.437	-0.294603	0.610838
H68	2020-01a	Sglo_M2_v	3.85	0.98	6.329393	4.892778	11.092059	9.693348	-0.696269	2.808	40.277	-0.277058	0.630543
H69	2020-01a	Sglo_M2_v_cp	3.92	0.94	5.470274	4.901250	10.218773	9.647108	-0.978592	1.878	40.289	-0.268312	0.640890
H70	2020-01a	Tdes_b2_v	3.78	0.99	6.107521	4.254748	10.217719	8.353614	-0.872706	2.592	39.606	-0.290258	0.615340
H71	2020-01a	ETH-1	3.84	0.99	5.482761	1.786736	6.775814	3.458653	-0.500960	2.009	37.002	-0.642986	0.205336
H72	2020-01a	POLO_18_D	4.07	0.85	7.834091	1.699313	9.484010	3.339842	-1.366844	4.557	36.904	-0.280501	0.626837
H73	2020-01a	POLO_35a_D	4.17	0.96	7.150719	2.290323	9.354581	4.508604	-0.421339	3.795	37.530	-0.288979	0.616990
H74	2020-01a	POLO_2_D	4.04	0.90	7.842463	2.159198	9.947638	4.160471	-1.367546	4.549	37.391	-0.281209	0.625925
H75	2020-01a	ETH-3	4.06	0.96	5.219372	2.199490	7.270029	4.365225	-0.419056	1.708	37.441	-0.287122	0.619543

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H77	2020-01b	ETH-3	4.03	0.97	5.240984	2.389667	7.461589	4.619952	0.152105	1.725	37.492	-0.305687	0.597227
H78	2020-01b	ETH-1	3.86	1.01	5.494515	1.901692	6.921617	3.665851	-0.133818	2.018	36.985	-0.623064	0.222180
H79	2020-01b	ETH-3	3.96	0.98	5.234846	2.322458	7.400663	4.544583	0.120332	1.721	37.443	-0.293946	0.611116
H80	2020-01b	ETH-2	4.01	1.01	-6.324919	-14.345273	-21.162390	-28.496715	-0.614753	-10.165	19.874	-0.637605	0.209968
H81	2020-01b	POLO_21_D	4.13	0.96	8.280626	1.883323	10.130608	3.623977	0.126526	5.034	36.995	-0.277716	0.629817
H82	2020-01b	POLO_33_D	4.10	0.82	7.468005	1.715345	9.126907	3.262489	0.013178	4.161	36.829	-0.275289	0.632862
H83	2020-01b	POLO_13_D	4.05	0.93	7.931895	1.276566	9.158874	2.357387	-0.444183	4.680	36.373	-0.287686	0.618204
H84	2020-01b	ETH-3	3.98	0.98	5.230761	2.297808	7.370555	4.668686	0.092534	1.717	37.466	-0.295461	0.609330
H85	2020-01b	NAMELESS-2	3.87	1.00	7.553792	1.407950	8.845334	2.757466	-0.020828	4.265	36.527	-0.340397	0.555955
H86	2020-01b	NAMELESS-4	3.97	1.00	6.869431	1.782750	8.513255	3.456253	0.400767	3.511	36.930	-0.336655	0.560437
H87	2020-01b	ARD_04_biv	4.03	0.97	5.996101	1.535651	7.389460	2.954214	0.055491	2.574	36.675	-0.313897	0.587536
H88	2020-01b	ETH-1	3.86	1.01	5.487166	1.834413	6.821880	3.423294	0.043408	2.012	36.996	-0.648540	0.192085
H89	2020-01b	Scro_2_v	3.89	0.98	5.371940	5.166644	10.372056	10.187687	0.022917	1.762	40.520	-0.275305	0.632624
H90	2020-01b	Tgal_3_v	3.88	0.99	5.573225	5.225660	10.639147	10.382262	0.203721	1.978	40.586	-0.275243	0.632649
H91	2020-01b	Tdes_g1_v	3.87	1.00	6.211754	4.228125	10.286623	8.278502	0.241133	2.707	39.534	-0.302858	0.600070
H92	2020-01b	ETH-3	4.07	0.96	5.225668	2.245720	7.326217	4.404226	0.250410	1.714	37.446	-0.283156	0.632883
H93	2020-01b	Tpli_2_v	3.98	0.98	6.268873	4.179784	10.295446	8.293243	-0.079424	2.770	39.490	-0.305355	0.597118
H94	2020-01b	Scro_1_v	3.95	0.99	6.307862	6.070215	12.248248	12.027533	0.418413	2.742	41.488	-0.263451	0.646303
H95	2020-01b	Sglo_M2_v_cp	3.98	0.97	5.477953	4.941603	10.272737	9.732341	-0.040093	1.886	40.300	-0.262256	0.648066
H96	2020-01b	ETH-2	4.00	0.99	-6.324215	-14.389167	-21.198644	-28.696962	-0.719287	-10.163	19.908	-0.631596	0.217076
H97	2020-01b	POLO_49_D	3.98	0.88	7.359771	2.067068	9.374402	4.091246	0.640679	4.031	37.263	-0.264413	0.625675
H98	2020-01b	POLO_sb_D	4.02	0.90	7.434795	1.234022	8.608447	2.368840	-0.055410	4.143	36.384	-0.282630	0.624277
H99	2020-01b	POLO_29a_V	3.94	1.01	2.109276	-10.011630	-8.017737	-19.906438	-0.800781	-1.198	24.518	-0.330918	0.570146
H100	2020-01b	ETH-3	3.98	0.97	5.218071	2.229789	7.291996	4.367927	-0.411883	1.706	37.445	-0.293701	0.611425
H101	2020-01b	Tcub_2_v	3.86	0.99	5.366486	5.104199	10.298229	10.053658	-0.226507	1.759	40.483	-0.281700	0.625078
H102	2020-01b	Tgal_3_v	3.95	0.95	5.562660	5.293866	10.690538	10.440899	-0.417995	1.964	40.684	-0.280261	0.626709
H103	2020-01b	Tdes_g1_v	3.98	0.96	6.205461	4.247372	10.299198	8.370787	-0.336472	2.699	39.578	-0.302802	0.600135
H104	2020-01b	ETH-1	3.92	0.98	5.482354	1.809552	6.804521	3.343658	-0.058165	2.008	37.006	-0.636454	0.206374
H105	2020-01b	Tpli_2_v	3.94	0.98	6.263773	4.151738	10.255241	8.232989	-0.251570	2.766	39.480	-0.312460	0.588727
H106	2020-01b	ARD_01	4.25	0.86	6.233646	2.269226	8.370743	4.319536	-1.113661	2.804	37.492	-0.303734	0.599375
H107	2020-01b	ARD_03	4.08	0.98	5.880459	1.460294	7.200584	2.832762	-0.217859	2.452	36.639	-0.308836	0.593551
H108	2020-01b	ETH-3	3.97	0.96	5.222462	2.235420	7.300115	4.460889	-0.428356	1.711	37.461	-0.295670	0.609096
H109	2020-01b	NAMELESS-5	4.06	1.00	6.469155	1.781312	8.092000	3.425557	-0.058908	3.077	36.979	-0.342851	0.553187
H110	2020-01b	NAMELESS-1	3.82	0.99	7.371427	2.479262	9.708636	4.868788	-0.489971	4.028	37.715	-0.349608	0.544914
H111	2020-01b	ARD_05_am	4.14	0.94	4.079110	3.568014	7.427606	7.014675	-0.089162	0.423	38.874	-0.301386	0.602317
H112	2020-01b	ETH-2	3.88	0.99	-6.332912	-14.423369	-21.233749	-28.431631	-1.029332	-10.171	19.892	-0.624320	0.225684
H113	2020-01b	POLO_18_D	4.04	0.89	7.487797	1.740022	9.178611	3.242384	-0.225466	4.182	36.936	-0.268543	0.640828
H114	2020-01b	POLO_35a_D	4.06	0.94	7.128144	2.295759	9.333776	4.499884	-0.414398	3.771	37.525	-0.291802	0.613308
H115	2020-01b	POLO_21_D	3.98	0.87	8.195199	1.766846	9.910667	3.419279	-0.221583	4.946	36.964	-0.293754	0.610899
H116	2020-01b	ETH-3	4.03	0.97	5.231519	2.242175	7.315424	4.539861	-0.510579	1.720	37.474	-0.296395	0.608236
H118	2020-01b	POLO_sb_D	4.00	0.93	7.540220	1.795048	9.277035	3.425094	-0.791283	4.236	36.998	-0.278697	0.628808
H119	2020-01b	POLO_2_D	3.95	0.91	7.925522	2.220205	10.097575	4.332055	-0.2029739	4.637	37.447	-0.277623	0.629932
H120	2020-01b	ETH-3	3.99	0.96	5.216773	2.209900	7.265046	4.269668	-0.142402	1.705	37.443	-0.299611	0.604441
H121	2020-01b	POLO_18_D	4.15	0.82	7.260061	1.661709	8.836322	3.143400	-1.044482	3.938	36.860	-0.297699	0.606425
H122	2020-01b	ARD_04_biv	4.04	0.99	6.427088	1.750549	8.049393	3.341033	0.067744	3.033	36.956	-0.311817	0.589877
H123	2020-01b	ARD_01	3.98	0.88	6.258758	2.248569	8.358991	4.305392	-1.374472	2.832	37.483	-0.320863	0.579130
H124	2020-01b	ETH-1	4.03	1.01	5.483790	1.785417	6.773323	3.279583	-0.293235	2.010	36.996	-0.645223	0.196015
H125	2020-01b	ETH-2	4.04	1.00	-6.341105	-14.448492	-21.295312	-28.682344	-1.053444	-10.179	19.875	-0.653633	0.191046
H126	2020-01b	ARD_05_am	4.00	0.95	4.039565	3.500412	7.316778	6.872302	-0.667387	0.382	38.812	-0.304540	0.598609
H127	2020-01b	POLO_35a_D	4.07	0.94	7.057358	2.229746	9.196702	4.246810	-0.551950	3.697	37.463	-0.290354	0.615044
H128	2020-01b	ETH-3	4.00	0.98	5.221772	2.246988	7.314135	4.471748	-0.262135	1.709	37.486	-0.292393	0.612967
H129	2020-01b	ETH-2	4.02	1.00	-6.336450	-14.434852	-21.266718	-28.747364	-0.808774	-10.174	19.891	-0.642864	0.203770
H130	2020-01b	ETH-3	3.97	0.98	5.214868	2.165290	7.224908	4.206955	-0.112020	1.705	37.401	-0.293742	0.611388
H131	2020-02a	ETH-1	4.08	1.00	5.491910	1.912792	6.911807	3.573034	-0.405747	2.017	36.982	-0.641014	0.194370
H132	2020-02a	ETH-3	4.04	0.98	5.231073	2.341840	7.422754	4.528560	-0.001345	1.719	37.445	-0.287158	0.612848
H133	2020-02a	ETH-2	3.96	1.01	-6.326737	-14.309524	-21.125944	-28.465904	-1.159931	-10.170	19.878	-0.634142	0.208218
H134	2020-02a	ETH-3	3.97	0.98	5.230422	2.331273	7.419776	4.601370	-0.129628	1.718	37.458	-0.279082	0.622403
H135	2020-02a	Tcub_2_v	3.86	0.96	5.357763	5.145657	10.341794	10.106267	-0.680537	1.751	40.445	-0.270182	0.632334
H136	2020-02a	Tgal_3_v	3.96	0.98	5.593548	5.312546	10.742659	10.488659	0.618243	2.000	40.630	-0.278650	0.622236
H137	2020-02a	Tpli_2_v	3.84	0.99	6.272760	4.238470	10.367643	8.395109	-0.254011	2.776	39.501	-0.295339	0.602571
H138	2020-02a	ETH-3	4.11	0.98	5.236538	2.342101	7.429351	4.609546	-0.154805	1.725	37.508	-0.286472	0.613659
H139	2020-02a	ETH-1	3.87	1.00	5.487019	1.867266	6.872710	3.599184	-0.324665	2.014	37.013	-0.630157	0.207221
H140	2020-02a	ETH-2	4.02	1.01	-6.317083	-14.326630	-21.138945	-28.525493	-0.828736	-10.159	19.922	-0.640381	0.200840
H141	2020-02a	ARD_01	4.09	0.88	6.246021	2.323729	8.431707	4.449026	-0.350992	2.819	37.503	-0.309425	0.586302
H142	2020-02a	ARD_03	4.11	1.00	5.884421	1.495868	7.248620	2.897229	0.055494	2.458	36.633	-0.300133	0.597536
H143	2020-02a	ARD_04_biv	4.00	0.98	5.929738	1.698720	7.487215	3.249716	-0.429008	2.500	36.851	-0.308880	0.587140
H144	2020-02a	ETH-3	4.05	0.96	5.223573	2.267517	7.344336	4.401775	-0.166645	1.713	37.457	-0.284399	0.616129
H145	2020-02a	POLO_13_D	4.05	0.88	8.069417	1.194117	9.241841	2.209444	-0.374694	4.836	36.319	-0.265238	0.638407
H146	2020-02a	POLO_33_D	4.11	0.80	7.513551	1.709762	9.163864	3.252346	-0.791192	4.214	36.868	-0.279817	0.621177
H147	2020-02a	ETH-1	3.88	1.00	5.489263	1.841241	6.852848	3.400449	-0.226788	2.017	37.016	-0.626646	0.211378
H148	2020-02a	POLO_21_D	3.99	0.93	8.357241	1.873116	10.186637	3.720746	-0.134838	5.122	37.045	-0.290602	0.608211
H149	2020-02a	POLO_sb_D	4.02	0.90	7.501074	1.709057	9.143208	3.416463	-0.304859	4.201	36.875	-0.286816	0.612902
H150	2020-02a	ARD_04_biv	4.14	1.00	6.288695	1.685220	7.835238	3.355182	0.106878	2.889	36.854	-0.318297	0.575930
H151	2020-02a	ETH-3	4.02	0.96									

