## **Supporting Information**

## Cooke et al. 10.1073/pnas.0900517106



**Fig. S1.** Geochemical and organic matter profiles from core LY1. Significant increases in Hg are shaded and cannot be attributable to rapid increases in other sediment variables. Both within-lake primary production and total organic matter burial have been shown to influence the accumulation of Hg within lake sediments [Outridge PM, et al. (2007) *Environ Sci Tech* 41:5259–5265]. There is no correlation between Hg and Chl *a* ( $r^2 = 0.01$ ), and Hg and % LOI 550 ( $r^2 = -0.15$ ). The exception is an obvious large peak in both Hg and Chl *a* centered at *ca*. 1450 AD. However, similar Chl *a* concentrations (e.g., *ca*. 200 BC) yield no net increase in Hg, and no increase in Hg is noted in modern sediments when Chl *a* attains its highest levels (0.02 mg/g).



Fig. 52. Geochemical and organic matter profiles from core LY2. As observed at LY1, increases in Hg are shaded and cannot be attributable to rapid increases in other sediment variables.



Fig. S3. Geochemical and organic matter profiles from Negrilla. As with LY1 and LY2, increases in Hg are shaded and cannot be attributable to rapid increases in other sediment variables.



**Fig. S4.** Solid-phase Hg thermo-desorption curves of standard materials and selected sediment samples of the LY2 core. The Chavín and Colonial/Modern samples are from 80 and 8.5 cm depth respectively. The Colonial/Modern sample-peak lies between Hg<sup>0</sup> and cinnabar, indicating the presence of matrix-bound Hg, a fraction which is largely bound to organic matter, but may also include particulate-bound Hg (1). Cinnabar and Hg<sup>0</sup> standard samples were obtained from the Idrija mercury mine, Slovenia (2).

1. Biester H, Scholz C (1997) Determination of mercury binding forms in contaminated soils: mercury pyrolysis versus sequential extractions. Environ Sci Tech 31:233–239.

2. Biester H, Gosar M, Covelli S (2000) Mercury speciation in sediments affected by dumped mining residues in the drainage area of the Idrija mercury mine, Slovenia. Environ Sci Tech 34:3330–3336.

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Table S1. Down-core <sup>210</sup> Pb activities, calculated CRS sediment ages, and	nd CRS sediment accumulation rates for the three study cores
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Interval. cm     Brg -1     activity (1 m)     CBS age     Error age (1 m)     gm -*year-1     Error SAR (1 m)       1-4     0.73     0.07     0     367     19       1-4.3     0.53     0.07     0     367     19       1-4.3     0.53     0.03     1996     1     78     69       1-4.4     0.273     0.014     1994     1     63     99       5.4.5     0.255     0.010     1995     2     239     37       2-3.3     0.131     0.007     1954     1     613     44       6-4.5     0.255     0.010     1995     6     579     71       1-15.     0.127     0.007     1955     6     578     400       12-125     0.141     0.007     1955     6     579     71       12-125     0.141     0.007     1951     6     579     108       12-125     0.131     0.007     1951     6     279     11 <th>Depth</th> <th><sup>210</sup>Pb activity,</th> <th>Error <sup>210</sup>Pb</th> <th></th> <th></th> <th colspan="3">CRS sed. accum. rate,</th>	Depth	<sup>210</sup> Pb activity,	Error <sup>210</sup> Pb			CRS sed. accum. rate,		
Laguna Yanacocha 1 (Y1)     Laguna Yanacocha 1 (Y1)       1-15     0.573     0.015     2005     0     427     29       2-25     0.301     0.017     2002     1     777     70       3-15     0.258     0.013     1968     1     733     69       4-45     0.255     0.010     1969     1     613     44       6-5     0.255     0.010     1969     1     613     44       6-5     0.255     0.010     1968     2     259     37       7.75     0.191     0.008     1907     2     638     53       10.105     0.137     0.007     1956     6     579     71       12.125     0.141     0.007     1951     6     378     40       13.135     0.027     0.004     1910     2     312     69       14.145     0.076     0.005     1933     15     573     116       14.1455     0.077     0.030<	Interval, cm	Bq∙g <sup>−1</sup>	activity (1 $\sigma$ )	CRS age	Error age (1 $\sigma$ )	g·m <sup>−2</sup> ·year <sup>−1</sup>	Error SAR (1 $\sigma$ )	
0-050.6730.02120070367191-150.5230.0172002177772-2.50.0300.0172002178084.4.50.2730.0141944163495.4.50.1330.0081989268335.5.60.1330.0081989268377.7.50.1310.00719714737511-150.1250.00719516734012-1250.1310.00719516734012-1250.1370.00719516734012-1350.1410.00719516734012-1450.0210.0071951153734012-1450.0220.0033737612-1450.0230.00337404012-1450.0210.0031931102412-150.0220.031931102412-140.0232004031434012-150.0240.0319391102412-150.031193911024415-20.0320.03119451313131315-50.033194514194415-50.0311939 <td></td> <td></td> <td></td> <td>Laguna Yanaco</td> <td>ocha 1 (LY1)</td> <td></td> <td></td>				Laguna Yanaco	ocha 1 (LY1)			
1-1.50.5230.0162005044.2222-2.30.3010.01319981797703-3.50.2280.013199816.63994-3.50.2350.010199716.63995-3.50.1350.00019972593716-4.50.1370.000197525937110-10.50.1370.00719566.797111-11.50.1250.0071951637801812-12.50.4140.0071951637801813-13.50.6860.066194112321614-14.50.0760.0051933157331612-12.50.4140.007193153721614-14.50.0760.0051933157331612-12.50.4340.005193313131412-13.50.4340.0022004091412-14.50.4340.003194511024412-150.4340.01219341102412-150.4340.01219341102412-140.0540.013196411941412-150.0140.01219341102412-150.0240.0121937110	0–0.5	0.673	0.021	2007	0	367	19	
2.2.50.010.01720021773703.350.2550.01419981783694.4.50.2730.01419941613446-4.50.2550.010198522.9316-4.50.2550.010198526.03327.50.1310.0071971493759.430.1430.00719714767611-150.1250.00719596777111-150.1250.0071959677810811-15.50.0270.00619411257310811-15.50.0270.0041910223126912-1250.0370.0041910223126912-1250.0370.0041910223126912-1250.0370.0041910223126912-1250.0370.03119591107612-1250.0370.03119591107612-1250.0370.03119541107612-530.0380.031195421203112-540.0460.0319541107412-540.0470.0319301151413-540.0470.03193011515 <td>1–1.5</td> <td>0.529</td> <td>0.016</td> <td>2005</td> <td>0</td> <td>442</td> <td>22</td>	1–1.5	0.529	0.016	2005	0	442	22	
3.3.50.730.01319881783695.5.50.2550.010199016.53595.5.50.2550.010199016.53317.7.50.1310.0081980259539.5.50.1310.0071951677771.1.1.50.1370.00719516778401.1.1.50.1370.00719516778401.1.1.50.1370.0051933155731161.1.1.50.1270.0051933155731161.1.1.50.0270.0051933155731161.1.1.50.0270.0051933157731161.1.1.50.0270.0031910223731161.1.1.50.0270.0031910223731161.1.1.50.0270.00319331110761.2.2.50.0380.0320.0311102441.5.20.7540.03019861110241.5.40.5020.0111931110231311.5.40.0260.011193111024341.5.40.0260.0111931110231311.5.40.0260.0231932813313141.5.4	2–2.5	0.301	0.017	2002	1	737	70	
4.4.50.730.01419416.33595.4.50.2550.010198526.33376.4.30.1810.004197626.38338-4.30.1810.007197626.397110-1050.1370.007196556.427110-1050.1370.007196556.427110-1050.1370.007196556.427111-1250.1370.007196656.437111-1250.1370.006194112737311-1250.0060.006194112737311-1450.0720.0041910221126911-1450.0720.0041910221126911-1450.0720.0041910221126911-1450.0720.00419102311611611-1450.0720.00419101024411-150.0720.01519831102411-520.570.1910.00419542121211-540.560.005193381741341411-540.570.0041954213141411-540.560.005193381741343011-540.026 <t< td=""><td>3–3.5</td><td>0.258</td><td>0.013</td><td>1998</td><td>1</td><td>783</td><td>69</td></t<>	3–3.5	0.258	0.013	1998	1	783	69	
5-550.2550.01019901613447-7.50.1930.008198025293737-7.50.1930.00819802539329-8.50.1410.007197747317510-11.50.1370.007197747317511-11.50.1410.007195166.997111-11.50.0660.00619331573216611-11.50.0720.00519331573216611-11.50.0720.00519331573216611-11.50.0720.00519331573216611-11.50.0720.003100210010010011-11.50.0720.00310010010010011-120.0520.031091102412-20.50.0320.0319901102413-40.520.0319901102414-4.50.0520.0319901102415-40.0520.05193381331415-50.0510.05193981331415-60.0520.05193981331415-70.970.00419321213613615-70.970.00419321313 <t< td=""><td>4–4.5</td><td>0.273</td><td>0.014</td><td>1994</td><td>1</td><td>653</td><td>59</td></t<>	4–4.5	0.273	0.014	1994	1	653	59	
6-6.50.2550.01019852529377-750.1390.00419762638538-8.50.1310.007197147037310-10.50.1370.007195656427111-11.50.1240.007195965797111-15.50.1460.0051931129551614-14.50.0660.0051933159561614-14.50.0720.0041910223126114-14.50.0720.0041910223126120-20.50.0380.03166220-20.50.0380.03914425-30.6280.01619981102425-40.4580.0151983191425-50.3190.003195421331525-60.3160.003195421331425-70.1910.004195421343025-70.1910.004195421331419445-50.4340.012195481331343025-60.3160.00319598133143025-70.1910.004195421343025-70.1910.00319598133<	5–5.5	0.255	0.010	1990	1	613	44	
7.7.50.1930.008198026.83538.8.50.1430.00719714703759.9.50.1430.007197147037511-11.50.1230.007195662787111-11.50.1230.007195967784013-13.30.0860.00619411236510814-14.50.0770.005191023126916-15.50.0120.003191023126920-05.00.0120.003191023126920-05.00.0120.003191023126920-05.00.0120.003191764020-05.00.0120.00319174420-050.0120.00319174420-550.6440.00519831107625-50.7540.01219742894425-50.4440.00519454149925-50.4440.005194541499335-50.1350.0061945181331410-5-10.0550.031946184149911-5-10.0700.0041922151361415-170.4940.0031990111614 <t< td=""><td>6–6.5</td><td>0.255</td><td>0.010</td><td>1985</td><td>2</td><td>529</td><td>37</td></t<>	6–6.5	0.255	0.010	1985	2	529	37	
8-8.50.1810.004197629993210-10.50.1370.007196656427111-11.50.1270.007195965797112-12.50.1410.007195163784011-14.50.0760.00519331557311612-12.50.01410.0071931122351614-14.50.0760.00519331557311612-12.50.0380.031212121622-03.50.0380.0313107622-03.50.0320.03107622-03.50.0320.03107622-03.50.0320.04107622-03.50.0320.04107622-330.6220.01519831107622-330.6220.01519841107622-340.6220.01519842131425-40.1350.06619542131455-60.1350.064195421651455-70.1910.02195381741915-120.0760.02155161615-140.0520.041901241652815-150.0470.0215518161615-14	7–7.5	0.193	0.008	1980	2	638	53	
9-9.50.1430.007197147037511-10.50.1250.007195656427111-11.50.1250.0071950637840013-13.30.0660.00619411236310614-14.50.0750.0051910223126914-14.50.0720.003191022312690.70.50.0020.003191020312690.70.50.0320.003191020312690.70.50.0320.003191020312690.70.50.0320.003191763233140.75.10.7540.0331999197443.5.40.5620.0151983110763.5.40.5620.01519642133344.5.50.4340.0031946414995.5.60.3150.00619542133145.5.70.1310.0061952133143010.5.110.7070.0041923133143011.5.120.6550.0031916181333913.5.440.0520.0041910241343013.5.140.0520.0041919251901613.5.190.0420.0211939 <t< td=""><td>8–8.5</td><td>0.181</td><td>0.004</td><td>1976</td><td>2</td><td>599</td><td>32</td></t<>	8–8.5	0.181	0.004	1976	2	599	32	
10-105   0.137   0.007   1966   5   642   71     11-11.5   0.125   0.007   1959   6   578   40     13-13.5   0.066   0.005   1933   15   573   116     14-14.5   0.076   0.005   1933   15   573   116     14-14.5   0.072   0.004   1930   15   573   116     16-16.5   0.032   0.033   0.033   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116	9–9.5	0.143	0.007	1971	4	703	75	
11-1.50.1250.007195965797112-1.250.1410.0071951637840013-13.50.0660.00619411.258510814-14.50.0760.00519331.23126913-13.50.0320.0320.0323126920-20.50.0380.0320.034091420-20.50.0320.0370.037633415-20.750.0360.09914415-20.760.032200409142.5-30.6280.0151983110244.5-50.4340.012197428944.5-50.4340.012197428936.5-70.1910.0461934212055.5-60.3150.06619398174199.5-100.0960.0051932121652410.5-170.0460.003199625190483011.5-120.0570.03199025190483012.5-130.0470.03189029115281613.5-140.0270.0240.22190483014.5-170.0310.0221515161615.5-170.0470.0322004 </td <td>10–10.5</td> <td>0.137</td> <td>0.007</td> <td>1966</td> <td>5</td> <td>642</td> <td>71</td>	10–10.5	0.137	0.007	1966	5	642	71	
12-125     0.141     0.007     1951     6     378     4.0       13-135     0.066     0.005     1933     15     573     116       14-145     0.076     0.005     1933     15     573     116       15-165     0.052     0.03     0.03     116     16.05     16.05       0.040     0.037     0.032     0.03     116     16.05     16.05       0.51     0.050     0.032     2004     91     4     6       25-3     0.628     0.016     1998     1     107     6       25-4     0.562     0.015     1983     1     91     4       45-5     0.444     0.012     1974     2     89     4       55-6     0.315     0.006     1984     4     149     95       55-7     0.319     0.005     1932     8     133     14       105-11     0.070     0.006     1932     8     133     14	11–11.5	0.125	0.007	1959	6	579	71	
12-130.0860.00619411258510814-14.50.0760.00519331557311618-18.50.0720.0041910223126920-20.50.0380.030.031100120-20.50.0320.030.031107625-30.6280.01519981102445-50.4340.0121974289445-50.4340.0121974289455-60.3150.0661954210955-70.1910.00419542101955-60.3150.065193381741995-700.0960.00519321216524105-110.0700.00419231216524105-120.0500.0319992519048105-130.0490.0318902911528125-130.0410.02115281212125-140.0510.02115281213105-170.0410.0318902911528125-130.0410.02115281213125-140.0510.0240.021152815125-150.0470.032200412312614 </td <td>12–12.5</td> <td>0.141</td> <td>0.007</td> <td>1951</td> <td>6</td> <td>378</td> <td>40</td>	12–12.5	0.141	0.007	1951	6	378	40	
14-14.5     0.076     0.005     1933     15     5.73     116       16-16.5     0.072     0.003     9     9     9       18-18.5     0.052     0.003     9     9     9       20-20.5     0.032     0.003     9     9     9     9       0.51     1.050     0.052     2004     9     9     4       25-3     0.628     0.016     1990     1     107     6       25-4     0.562     0.015     1983     1     910     4       45-5     0.434     0.012     1974     2     89     4       55-6     0.135     0.006     1964     2     93     3       65-7     0.191     0.004     1953     13     14     19       95-10     0.096     0.005     1932     8     133     14       10-5-11     0.070     0.004     1923     12     15     28       105-11     0.070	13–13.5	0.086	0.006	1941	12	585	108	
18-16.5     0.072     0.004     1910     2.2     312     69       18-18.5     0.052     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     0.003     100     4     4     5.5     0.53     0.628     0.015     1983     1     107     6     5     5.5     0.33     0.006     1954     2     89     3     3     5     5.5     0.33     0.003     1946     2     120     5     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3	14–14.5	0.076	0.005	1933	15	573	116	
18-18.5     0.052     0.033       20-20.5     0.032     0.003       20-20.5     0.032     0.003       Lagura Yanacoha 2 (LY2)       Lagura Yanacoha 2 (LY2)	16-16.5	0.072	0.004	1910	22	312	69	
24-20.5     0.038     0.003       30-30.5     0.037     0.003       40-40.5     0.037     0.003       1.5-2     0.76     0.032     2004     0     91     4       1.5-2     0.76     0.030     1988     1     107     6       2.5-3     0.628     0.016     1990     1     102     4       4.5-5     0.434     0.012     1974     2     89     4       5.5-6     0.315     0.006     1964     2     93     3       5.5-7     0.191     0.004     1954     2     120     5       5.5-8     0.136     0.005     1939     8     174     19       9.5-10     0.007     0.004     1923     12     165     34       15.5-12     0.047     0.003     1916     18     133     14       15.5-13     0.047     0.003     1806     29     16     134     30       12.5-13     0.047	18-18.5	0.052	0.003					
30-30.5     0.032     0.003       Laguna Yanacoha 2 (U/2)       Siste a Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4"       Colspan="4">Colspan="4"     Colspan="4"       Colspan="4">Colspan="4"     Colspan="4"       Colspan="4"     Colspan="4"       Colspan="4"     Colspan="4"       Colspan="4"     Colspan="4"       Colspan="4"     Colspan="4"     Colspan="4"       Colspan="4"	20-20.5	0.038	0.003					
aba     biguna Yanacoha 2 (urc)a       0.5-1     1.060     0.032     2004     0     91     4       1.5-2     0.74     0.030     1998     1     1007     6       2.5-3     0.628     0.016     1990     1     102     4       3.5-4     0.628     0.015     1938     1     91     4       4.5-5     0.434     0.012     1974     2     89     4       5.5-6     0.315     0.006     1994     2     120     5       6.5-7     0.191     0.004     1954     2     120     5       5.59     0.005     1932     8     133     14       0.5-11     0.099     0.005     1932     8     133     14       10.5-11     0.090     0.004     1922     13     14     30       10.5-11     0.052     0.003     1990     24     135     32       10.5-11     0.024     0.003     1992     13 <td>30-30.5</td> <td>0.032</td> <td>0.003</td> <td></td> <td></td> <td></td> <td></td>	30-30.5	0.032	0.003					
0.5-1     1.660     0.032     2004     0     91     4       1.5-2     0.754     0.030     1998     1     107     6       2.5-3     0.628     0.015     1993     1     102     4       3.5-4     0.562     0.015     1993     1     91     4       4.5-5     0.434     0.006     1964     2     93     3       6.5-7     0.191     0.006     1993     8     174     19       9.5-10     0.096     0.005     1932     8     133     14       105-11     0.070     0.004     1932     12     165     24       11.5-12     0.055     0.003     1906     18     193     39       12.5-13     0.049     0.003     1901     24     134     30       14.5-15     0.047     0.003     1890     29     115     28       12.5-21     0.027     0.002     -     -     -     -	40-40.5	0.037	0.003	Laguna Yanaco	ocha 2 (LY2)			
1-5-20.7540.0301998110762.5-30.6280.0161990110244.5-50.4340.012197423945.5-60.3150.006196423336.5-70.1910.0041954212057.5-80.1280.005193981741995-100.0990.005193281331410.5-110.0700.0041923121652411.5-120.0550.0031916181333912.5-130.0490.0031909251004813.5-140.0520.0041901241343014.5-150.070.00220-3050.0240.0031800291152816.5-170.0340.00320-350.0240.00220-350.0240.00220-350.0510.0351995114310102-250.8400.0351992114310102-350.6780.02119951158126-650.8400.0351995115812163-350.6780.02119933216<	0 5–1	1 060	0.032	2004	0	91	4	
25-3     0.628     0.016     1990     1     102     4       35-4     0.662     0.015     1993     1     91     4       4.5-5     0.343     0.006     1994     2     93     3       6.5-7     0.191     0.006     1994     2     120     5       7.5-8     0.128     0.003     1946     4     149     9       9.5-10     0.099     0.005     1932     8     133     14       10.5-11     0.070     0.004     1923     12     165     24       11.5-12     0.055     0.003     1916     18     193     39       12.5-13     0.049     0.003     1890     29     115     28       16.5-17     0.034     0.003     1890     29     115     28       16.5-17     0.047     0.002     205     100     23     16       15.5-10     0.047     0.002     204     022     115     28 <	1 5-2	0 754	0.030	1998	1	107	6	
35.4   0.562   0.015   1983   1   91   4     45.55   0.134   0.012   1974   2   89   4     5.5-6   0.315   0.006   1964   2   93   3     6.5-7   0.191   0.004   1954   2   120   5     7.5-8   0.128   0.003   1946   4   149   9     9.5-10   0.099   0.005   1932   8   133   14     10.5-11   0.070   0.004   1923   12   165   24     11.5-12   0.055   0.003   1990   25   190   48     13.5-14   0.052   0.004   1901   24   134   30     14.5-15   0.047   0.003   1890   29   15   28     16.5-17   0.034   0.002   -   -   -   24     20.5-21   0.027   0.002   -   -   -   24     20.5-1   0.600   0.239   239   16   16     1-1.5 <td>2.5-3</td> <td>0.628</td> <td>0.016</td> <td>1990</td> <td>1</td> <td>102</td> <td>4</td>	2.5-3	0.628	0.016	1990	1	102	4	
4-5-5   0.434   0.012   1974   2   89   4     55-6   0.315   0.006   1964   2   93   3     6.5-7   0.191   0.004   1994   2   120   5     7.5-8   0.128   0.003   1946   4   149   9     9.5-9   0.066   0.005   1932   8   133   14     10.5-11   0.070   0.004   1923   12   165   24     11.5-12   0.055   0.003   1909   25   190   48     13.5-14   0.052   0.003   1890   29   115   28     16.5-17   0.034   0.003   1890   29   15   28     16.5-17   0.034   0.002   20   20   28   15   28     16.5-17   0.034   0.002   20   29   15   28   16     16.5-17   0.032   0.002   239   29   29   29   29   29   29   29   29   29   29	3.5-4	0.562	0.015	1983	1	91	4	
5.5-6   0.315   0.006   1964   2   93   3     6.5-7   0.191   0.004   1954   2   120   5     7.5-8   0.128   0.005   1939   8   174   19     8.5-9   0.096   0.005   1932   8   133   144     10.5-11   0.070   0.004   1923   12   165   24     11.5-12   0.055   0.003   1916   18   193   39     12.5-13   0.049   0.003   1909   25   100   48     13.5-14   0.052   0.004   1901   24   134   30     14.5-15   0.407   0.003   1909   29   115   28     16.5-17   0.341   0.002	4.5-5	0.434	0.012	1974	2	89	4	
65-7   0.191   0.004   1954   2   120   5     7.5-8   0.128   0.003   1946   4   149   9     9.5-10   0.096   0.005   1332   8   133   14     10.5-11   0.070   0.004   1923   12   165   24     11.5-12   0.055   0.003   1916   18   193   39     12.5-13   0.049   0.003   1909   25   190   48     13.5-14   0.052   0.004   1901   24   134   30     14.5-15   0.047   0.003   1890   29   115   28     16.5-17   0.034   0.002   28   115   28     0.53   0.024   0.02   29   115   29     2.5   0.600   0.22   2004   02   29   29     2.42.5   0.801   0.032   2004   234   18   14     1.5.5   0.871   0.032   2004   234   16   135     1.4.5	5.5-6	0.315	0.006	1964	2	93	3	
7.5-8   0.128   0.003   1946   4   199   9     8.5-9   0.096   0.005   1939   8   174   19     9.5-10   0.099   0.05   1932   8   133   14     10.5-11   0.070   0.004   1923   12   165   24     11.5-12   0.055   0.003   1916   18   193   39     12.5-13   0.049   0.003   1909   25   190   48     13.5-14   0.052   0.004   1901   24   134   30     14.5-15   0.047   0.003   1890   29   115   28     16.5-17   0.334   0.002	6.5–7	0.191	0.004	1954	2	120	5	
8.5-9   0.096   0.005   1939   8   174   19     9.5-10   0.099   0.005   1932   8   133   14     10.5-11   0.070   0.004   1923   12   165   24     11.5-12   0.055   0.003   1916   18   193   39     12.5-13   0.049   0.003   1990   25   190   48     13.5-14   0.052   0.004   1901   24   134   30     14.5-15   0.047   0.003   1890   29   115   28     0.521   0.021   0.02   15   28   29   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20   20 <td< td=""><td>7.5–8</td><td>0.128</td><td>0.003</td><td>1946</td><td>4</td><td>149</td><td>9</td></td<>	7.5–8	0.128	0.003	1946	4	149	9	
9.5-10   0.099   0.005   1932   8   133   14     10.5-11   0.070   0.004   1923   12   165   24     11.5-12   0.055   0.003   1909   25   190   48     13.5-14   0.052   0.004   1901   24   134   30     14.5-15   0.047   0.003   1890   29   115   28     16.5-17   0.034   0.002   15   28   14     20.5-21   0.027   0.002   15   28   16   145   16     20.5-21   0.021   0.002   145   16   16   16   16   16   16   16   16   16   16   17   16   17   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   16   <	8.5–9	0.096	0.005	1939	8	174	19	
105-11   0.070   0.004   1923   12   165   24     11.5-12   0.055   0.003   1916   18   193   39     13.5-14   0.052   0.004   1901   24   134   30     13.5-14   0.052   0.004   1901   24   134   30     14.5-15   0.047   0.003   1890   29   115   28     16.5-17   0.034   0.002   29   115   28     20.5-21   0.027   0.002   2003   145   16     20.5-21   0.027   0.002   2004   0   239   29     20.5-21   0.027   0.002   203   16   11.5   16     1-1.5   0.793   0.060   2006   239   29   22   204   10   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11   11 <td< td=""><td>9.5–10</td><td>0.099</td><td>0.005</td><td>1932</td><td>8</td><td>133</td><td>14</td></td<>	9.5–10	0.099	0.005	1932	8	133	14	
115-12   0.055   0.003   1916   18   193   39     125-13   0.049   0.003   1909   25   190   48     135-14   0.052   0.004   1901   24   134   30     145-15   0.047   0.003   1890   29   115   28     165-17   0.034   0.002   115   28   115   28     20-521   0.027   0.002   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   115   116   115   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116   116	10.5–11	0.070	0.004	1923	12	165	24	
125-13   0.049   0.003   1909   25   190   48     13.5-14   0.052   0.004   1901   24   134   30     14.5-15   0.047   0.003   1890   29   115   28     16.5-17   0.034   0.002   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -	11.5–12	0.055	0.003	1916	18	193	39	
13.5-140.0520.0041901241343014.5-150.0470.0031890291152816.5-170.0340.00211118.5-190.0310.00211120.5-210.0270.00211130-30.50.0240.00211140-40.50.0210.0021111.1.50.7930.66020660239292-2.50.8000.03220040233163-3.50.7110.03220021234184-4.50.8810.03419991171115-5.50.8510.03619951158126-6.50.6780.0211988112098-8.50.6780.021197932182010-10.50.4680.017197631681412-12.50.4030.017197631681412-12.50.4030.017197631681412-12.50.4030.017197631681412-12.50.4180.0121311991316-150.3350.019194881021318-18.50.2510.011193510941310-150.4180.012131 <td>12.5–13</td> <td>0.049</td> <td>0.003</td> <td>1909</td> <td>25</td> <td>190</td> <td>48</td>	12.5–13	0.049	0.003	1909	25	190	48	
145-15   0.07   0.03   1890   29   115   28     165-17   0.034   0.003   115   28     185-19   0.031   0.002   115   115     205-21   0.027   0.002   115   115   115     30-30.5   0.024   0.002   115   115   116     0-0-5   1.361   0.099   2008   0   145   16     1-1.5   0.793   0.060   2006   239   29   25     2-2.5   0.800   0.032   2004   0   223   16     3-3.5   0.711   0.032   2002   1   234   18     4-4.5   0.881   0.036   1995   1   158   12     5-5.5   0.840   0.035   1992   1   143   10     7-7.5   0.877   0.037   1988   1   120   9     8-8.5   0.678   0.017   1976   3   168   14     12-12.5   0.403   0.017   1976   3 <td>13.5–14</td> <td>0.052</td> <td>0.004</td> <td>1901</td> <td>24</td> <td>134</td> <td>30</td>	13.5–14	0.052	0.004	1901	24	134	30	
16.5-17   0.034   0.003     18.5-19   0.031   0.002     20.5-21   0.024   0.002     30-30.5   0.024   0.002     40-40.5   0.021   0.002     50-52   1.361   0.099   2008   0   145   16     1-1.5   0.793   0.060   206   0   239   29     2-2.5   0.800   0.032   2004   0   234   16     3-3.5   0.711   0.032   2002   1   234   18     4-4.5   0.881   0.034   1999   1   171   11     5-5.5   0.851   0.035   1992   1   143   10     7-7.5   0.877   0.037   1988   1   20   9     8-8.5   0.678   0.021   1983   2   137   9     9-9.5   0.400   0.015   1979   3   168   14     10-10.5   0.468   0.017   1969   4   157   15     14-14.5   0.400	14.5–15	0.047	0.003	1890	29	115	28	
18.5-19   0.031   0.002     20.5-21   0.027   0.002     40-40.5   0.021   0.002     Laguna Negrilla     0-0.5   1.361   0.099   2008   0   145   16     1-1.5   0.793   0.060   239   29   22     2-2.5   0.800   0.032   2004   0   223   16     3-3.5   0.711   0.032   2002   1   234   18     4-4.5   0.881   0.036   1995   1   171   11     5-5.5   0.851   0.035   1992   1   143   10     7-7.5   0.877   0.037   1988   1   120   9     9-9.5   0.400   0.015   1979   3   218   20     10-10.5   0.468   0.017   1969   4   157   15     14-14.5   0.400   0.018   1959   5   118   12     12-12.5   0.403   0.017   1969   4   157   15 <td< td=""><td>16.5–17</td><td>0.034</td><td>0.003</td><td></td><td></td><td></td><td></td></td<>	16.5–17	0.034	0.003					
20.5-21   0.027   0.002     30-30.5   0.024   0.002     40-40.5   0.021   0.002     Laguna Negrilla     0-0.5   1.361   0.099   2008   0   145   16     1-1.5   0.793   0.060   2006   0   239   29     2-2.5   0.800   0.032   2004   0   223   16     3-3.5   0.711   0.032   2002   1   234   18     4-4.5   0.881   0.036   1995   1   171   11     5-5.5   0.851   0.036   1995   1   158   12     6-6.5   0.840   0.035   1992   1   143   10     7-7.5   0.877   0.037   1988   1   120   9     8-8.5   0.678   0.021   1983   2   137   9     9-9.5   0.400   0.015   1979   3   218   157   15     10-10.5   0.468   0.017   1969   4   157   15<	18.5–19	0.031	0.002					
30-30.5   0.024   0.002     40-40.5   0.021   0.002     Laguna Negrilla     0-0.5   1.361   0.099   2008   0   145   16     1-1.5   0.793   0.060   2006   0   239   29     2-2.5   0.800   0.032   2004   0   223   16     3-3.5   0.711   0.032   2002   1   234   18     4-4.5   0.851   0.036   1995   1   171   11     5-5.5   0.851   0.036   1995   1   158   12     6-6.5   0.840   0.035   1992   1   143   10     7-7.5   0.877   0.037   1988   1   120   9     8-8.5   0.678   0.021   1983   2   137   9     9-9.5   0.400   0.015   1979   3   218   14     12-12.5   0.403   0.017   1969   4   157   15     14-14.5   0.403   0.018   1955	20.5–21	0.027	0.002					
40-40.5     0.021     0.002       Laguna Negrilla     0       0-0.5     1.361     0.099     2008     0     145     16       1-1.5     0.793     0.060     2006     0     239     29       2-2.5     0.800     0.032     2004     0     223     16       3-3.5     0.711     0.032     2002     1     234     18       4-4.5     0.881     0.034     1999     1     171     11       5-5.5     0.851     0.036     1995     1     158     12       6-6.5     0.840     0.035     1992     1     143     10       7-7.5     0.877     0.037     1988     1     120     9       8-8.5     0.678     0.021     1983     2     137     9       9-9.5     0.400     0.015     1979     3     168     14       12-12.5     0.403     0.017     1969     4     157     15	30–30.5	0.024	0.002					
0-0.5     1.361     0.099     2008     0     145     16       1-1.5     0.793     0.060     2006     0     239     29       2-2.5     0.800     0.032     2004     0     223     16       3-3.5     0.711     0.032     2002     1     234     18       4-4.5     0.881     0.036     1995     1     171     11       5-5.5     0.871     0.036     1995     1     158     12       6-6.5     0.840     0.035     1992     1     143     19       5-5.5     0.877     0.037     1988     1     120     9       8-8.5     0.678     0.021     1983     2     137     9       9-9.5     0.400     0.015     1979     3     218     20       10-10.5     0.468     0.017     1969     4     157     15       14-14.5     0.400     0.018     1959     5     118     12	40–40.5	0.021	0.002	Laguna N	ogrilla			
0-0.51.5010.09920060143161-1.50.7930.06020060239292-2.50.8000.03220040223163-3.50.7110.03220021234184-4.50.8810.03419991171115-5.50.8510.03619951158126-6.50.8400.03519921143107.7.50.8770.0371988112098-8.50.6780.0211983213799-9.50.4000.015197932182010-10.50.4680.017196941571514-14.50.4000.018195951181216-16.50.3350.019194881021318-18.50.2510.011193510941320-20.50.1890.012191319691422-22.50.0730.006188611416215125-25.50.0750.004187910712010130-30.50.0580.04157150150150	0.05	1 261	0.000		o	145	16	
1-1.30.7330.00020000233252-2.50.8000.03220040223183-3.50.7110.03220021234184-4.50.8810.03419991171115-5.50.8510.03619951158126-6.50.8400.03519921143107-7.50.8770.0371988112098-8.50.6780.0211983213799-9.50.4000.015197932182010-10.50.4680.017197631681412-12.50.4030.017196941571514-14.50.4000.018195951181216-16.50.3350.019194881021318-18.50.2510.011193510941320-20.50.1890.012191319691422-22.50.0730.006188611416215125-25.50.0750.004187910712010030-30.50.0580.004157100100100	0-0.5	0.702	0.099	2008	0	220	10	
2-3.5 $0.000$ $0.032$ $2004$ $0$ $225$ $215$ $10$ $3-3.5$ $0.711$ $0.032$ $2002$ $1$ $234$ $18$ $4-4.5$ $0.881$ $0.034$ $1999$ $1$ $171$ $11$ $5-5.5$ $0.851$ $0.036$ $1995$ $1$ $158$ $12$ $6-6.5$ $0.840$ $0.035$ $1992$ $1$ $143$ $10$ $7-7.5$ $0.877$ $0.037$ $1988$ $1$ $120$ $9$ $8-8.5$ $0.678$ $0.021$ $1983$ $2$ $137$ $9$ $9-9.5$ $0.400$ $0.015$ $1979$ $3$ $218$ $20$ $10-10.5$ $0.468$ $0.017$ $1969$ $4$ $157$ $15$ $14-14.5$ $0.400$ $0.018$ $1959$ $5$ $118$ $12$ $16-16.5$ $0.335$ $0.019$ $1948$ $8$ $102$ $13$ $20-20.5$ $0.189$ $0.012$ $1913$ $19$ $69$ $14$ $22-22.5$ $0.073$ $0.004$ $1879$ $107$ $120$ $100$ $30-30.5$ $0.058$ $0.004$ $1879$ $107$ $120$ $100$	2_25	0.795	0.000	2008	0	233	29	
4-4.50.8810.03419991171114-4.50.8810.03419991171115-5.50.8510.03619951158126-6.50.8400.03519921143107-7.50.8770.0371988112098-8.50.6780.0211983213799-9.50.4000.015197932182010-10.50.4680.017197631681412-12.50.4030.017196941571514-14.50.4000.018195951181216-16.50.3350.019194881021318-18.50.2510.011193510941320-20.50.1890.012191319691422-22.50.0730.006188611416215125-25.50.0580.0041879107120100	2-2.5	0.000	0.032	2004	1	225	10	
1.1.50.0510.0511.99511.11.11.15-5.50.8510.03619951158126-6.50.8400.03519921143107-7.50.8770.0371988112098-8.50.6780.0211983213799-9.50.4000.015197932182010-10.50.4680.017197631681412-12.50.4030.017196941571514-14.50.4000.018195951181216-16.50.3350.019194881021318-18.50.2510.011193510941320-20.50.1890.012191319691422-22.50.0730.006188611416215125-25.50.0750.004187910712010030-30.50.0580.00414162151	4_4 5	0.881	0.032	1999	1	171	10	
6-6.5   0.840   0.035   1992   1   143   10     7-7.5   0.877   0.037   1988   1   120   9     8-8.5   0.678   0.021   1983   2   137   9     9-9.5   0.400   0.015   1979   3   218   20     10-10.5   0.468   0.017   1976   3   168   14     12-12.5   0.403   0.017   1969   4   157   15     14-14.5   0.400   0.018   1959   5   118   12     16-16.5   0.335   0.019   1948   8   102   13     18-18.5   0.251   0.011   1935   10   94   13     20-20.5   0.189   0.012   1913   19   69   14     22-22.5   0.073   0.006   1886   114   162   151     25-25.5   0.075   0.004   1879   107   120   100     30-30.5   0.058   0.004   1879   107   120	5-5 5	0.851	0.036	1995	1	158	12	
7-7.5 0.877 0.037 1988 1 120 9   8-8.5 0.678 0.021 1983 2 137 9   9-9.5 0.400 0.015 1979 3 218 20   10-10.5 0.468 0.017 1976 3 168 14   12-12.5 0.403 0.017 1969 4 157 15   14-14.5 0.400 0.018 1959 5 118 12   16-16.5 0.335 0.019 1948 8 102 13   18-18.5 0.251 0.011 1935 10 94 13   20-20.5 0.189 0.012 1913 19 69 14   22-22.5 0.073 0.006 1886 114 162 151   25-25.5 0.075 0.004 1879 107 120 100	6-6.5	0.840	0.035	1992	1	143	10	
N.1     N.1 <td>7-7 5</td> <td>0.877</td> <td>0.037</td> <td>1988</td> <td>1</td> <td>120</td> <td>9</td>	7-7 5	0.877	0.037	1988	1	120	9	
9-9.5     0.400     0.015     1979     3     218     20       10-10.5     0.468     0.017     1976     3     168     14       12-12.5     0.403     0.017     1969     4     157     15       14-14.5     0.400     0.018     1959     5     118     12       16-16.5     0.335     0.019     1948     8     102     13       18-18.5     0.251     0.011     1935     10     94     13       20-20.5     0.189     0.012     1913     19     69     14       22-22.5     0.073     0.006     1886     114     162     151       25-25.5     0.075     0.004     1879     107     120     100       30-30.5     0.058     0.004     1879     107     120     100	8-8.5	0.678	0.021	1983	2	137	9	
10-10.5 0.468 0.017 1976 3 168 14   12-12.5 0.403 0.017 1969 4 157 15   14-14.5 0.400 0.018 1959 5 118 12   16-16.5 0.335 0.019 1948 8 102 13   18-18.5 0.251 0.011 1935 10 94 13   20-20.5 0.189 0.012 1913 19 69 14   22-22.5 0.073 0.006 1886 114 162 151   25-25.5 0.075 0.004 1879 107 120 100   30-30.5 0.058 0.004 1879 107 120 100	9-9.5	0.400	0.015	1979	3	218	20	
12-12.5 0.403 0.017 1969 4 157 15   14-14.5 0.400 0.018 1959 5 118 12   16-16.5 0.335 0.019 1948 8 102 13   18-18.5 0.251 0.011 1935 10 94 13   20-20.5 0.189 0.012 1913 19 69 14   22-22.5 0.073 0.006 1886 114 162 151   25-25.5 0.075 0.004 1879 107 120 100   30-30.5 0.058 0.004 147 162 151	10-10.5	0.468	0.017	1976	3	168	14	
14-14.5 0.400 0.018 1959 5 118 12   16-16.5 0.335 0.019 1948 8 102 13   18-18.5 0.251 0.011 1935 10 94 13   20-20.5 0.189 0.012 1913 19 69 14   22-22.5 0.073 0.006 1886 114 162 151   25-25.5 0.075 0.004 1879 107 120 100   30-30.5 0.058 0.004 1879 107 120 100	12-12.5	0.403	0.017	1969	- 4	157	15	
16-16.5     0.335     0.019     1948     8     102     13       18-18.5     0.251     0.011     1935     10     94     13       20-20.5     0.189     0.012     1913     19     69     14       22-22.5     0.073     0.006     1886     114     162     151       25-25.5     0.075     0.004     1879     107     120     100       30-30.5     0.058     0.004     1879     107     120     100	14–14.5	0.400	0.018	1959	5	118	12	
18-18.5 0.251 0.011 1935 10 94 13   20-20.5 0.189 0.012 1913 19 69 14   22-22.5 0.073 0.006 1886 114 162 151   25-25.5 0.075 0.004 1879 107 120 100   30-30.5 0.058 0.004 1879 107 120 100	16–16.5	0.335	0.019	1948	- 8	102	13	
20-20.5     0.189     0.012     1913     19     69     14       22-22.5     0.073     0.006     1886     114     162     151       25-25.5     0.075     0.004     1879     107     120     100       30-30.5     0.058     0.004     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1 <td>18–18.5</td> <td>0.251</td> <td>0.011</td> <td>1935</td> <td>10</td> <td>94</td> <td>13</td>	18–18.5	0.251	0.011	1935	10	94	13	
22-22.5     0.073     0.006     1886     114     162     151       25-25.5     0.075     0.004     1879     107     120     100       30-30.5     0.058     0.004     1879     107     120     100	20–20.5	0.189	0.012	1913	19	69	14	
25-25.5   0.075   0.004   1879   107   120   100     30-30.5   0.058   0.004   100   100   100	22–22.5	0.073	0.006	1886	114	162	151	
30–30.5 0.058 0.004	25–25.5	0.075	0.004	1879	107	120	100	
	30–30.5	0.058	0.004					
45-45.5 0.035 0.003	45–45.5	0.035	0.003					

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## Table S2. Table of radiocarbon determinations for the three study cores

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UCI ID	Lake	Depth, cm	Sample size, mg of C	<sup>14</sup> C age BP	2 $\sigma$ calibrated range	Median date
51338	LY1	45.5-46.5	0.10	$520 \pm 15$	1420–1450 AD	1435 AD
49762	LY1	60-60.5	0.21	$1020\pm20$	1020–1150 AD	1090 AD
44752	LY1	80-82	0.11	2175 ± 25	345–50 BC	145 BC
49764	LY1	90.5–91	0.18	$2460\pm20$	730–400 BC	475 BC
49763	LY1	95.5–96	0.11	$2675 \pm 25$	835–675 BC	800 BC
51339	LY2	36-37.5	0.04	1285 ± 30	690–885 AD	790 AD
49759	LY2	56-57.5	0.18	$2225\pm20$	360–115 BC	260 BC
49760	LY2	87.5-89.5	0.14	3390 ± 20	1690–1525 BC	1620 BC
51337	Negrilla	49.5–50	0.16	3170 ± 15	1450–1610 AD	1465 AD
56388	Negrilla	87.5-88	0.04	$2060\pm45$	165 BC–115 AD	10 BC
49765	Negrilla	112.5–114	0.05	$440\pm45$	1495–1260 BC	1390 BC

Table S3. Table of blank values, average relative standard deviations, and recoveries of standard reference materials associated with DMA80 measurement of Hg

	LY1	LY2	Negrilla
Blanks, ng/g ( <i>n</i> )	1.4 (25)	4.0 (14)	0.5 (24)
Duplicates, avg. % difference (n)	15% (14)	12% (10)	4% (20)
MESS-3, avg. % recovery (n)	101% (11)	100% (7)	97% (14)
PACS-2, avg. % recovery (n)	97% (11)	101% (6)	101% (11)

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