

Supplement of Biogeosciences, 12, 6045–6058, 2015
<http://www.biogeosciences.net/12/6045/2015/>
doi:10.5194/bg-12-6045-2015-supplement
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Supplement of

Interdecadal changes in intensity of the oxygen minimum zone off Concepción, Chile ($\sim 36^\circ$ S), over the last century

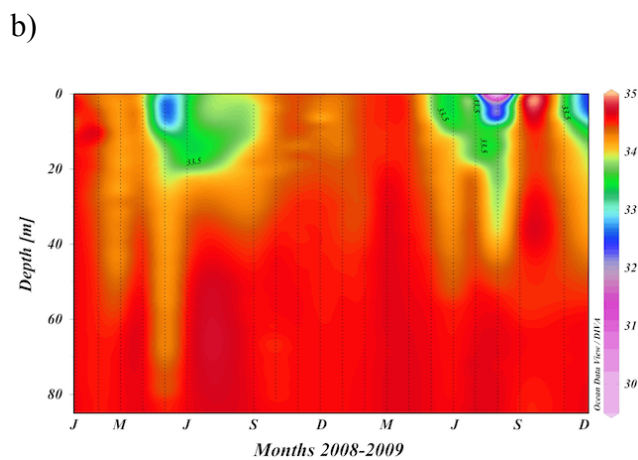
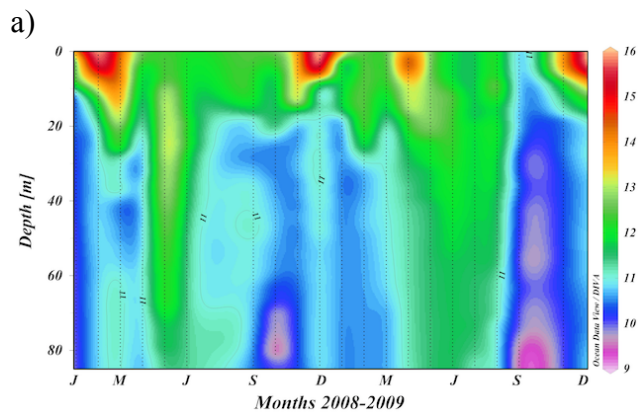
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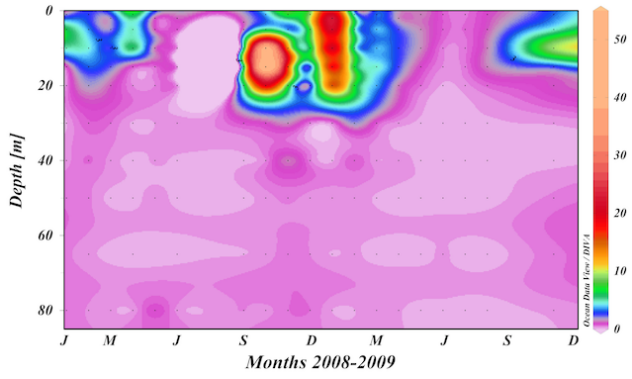
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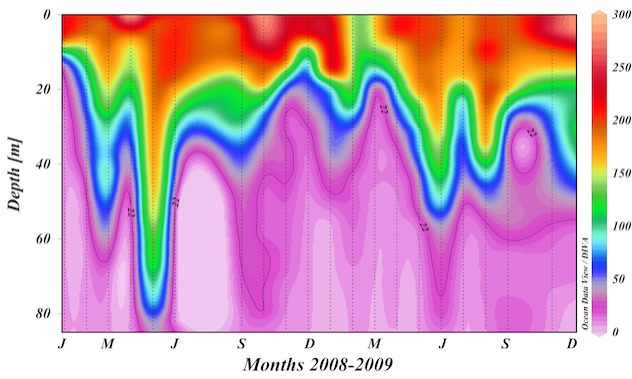
Figure S1: Oceanographic variability in the water column off Concepción (36°S) from January 2008 to December 2009: a) temperature (°C); b) salinity (psu); c) chlorophyll (mg m^{-3}); d) dissolved O_2 (μM); and e) redox potential and organic carbon content in the sediment core recovered from Station18 in February 2009 (austral summer). Data collected by the Center for Oceanographic Research in the eastern South Pacific at the Oceanographic Time Series Station 18 (www.copas.udec.cl/eng/research/serie/). Data for Fig. 2e was provided by Dr. R Quiñones.



c)



d)



e)

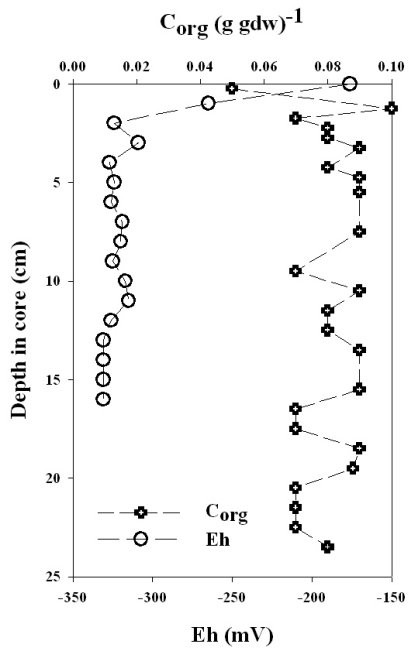


Figure S2: Spearman correlations plots between excess Mo, Cd and U (ppm)

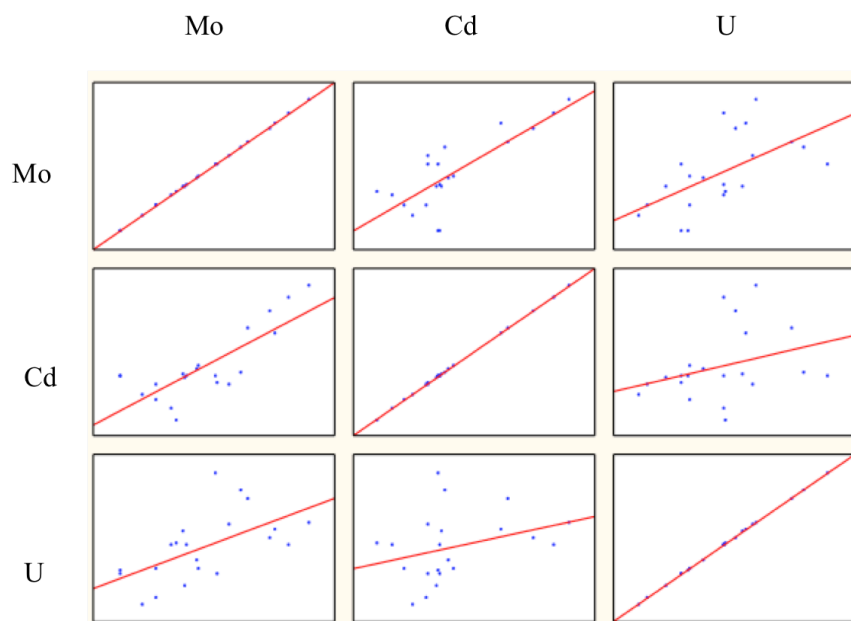


Figure S3: Spearman correlations plots between sterols ($\mu\text{g g (C}_{\text{org}})^{-1}$), U (ppm) and PDO (index)

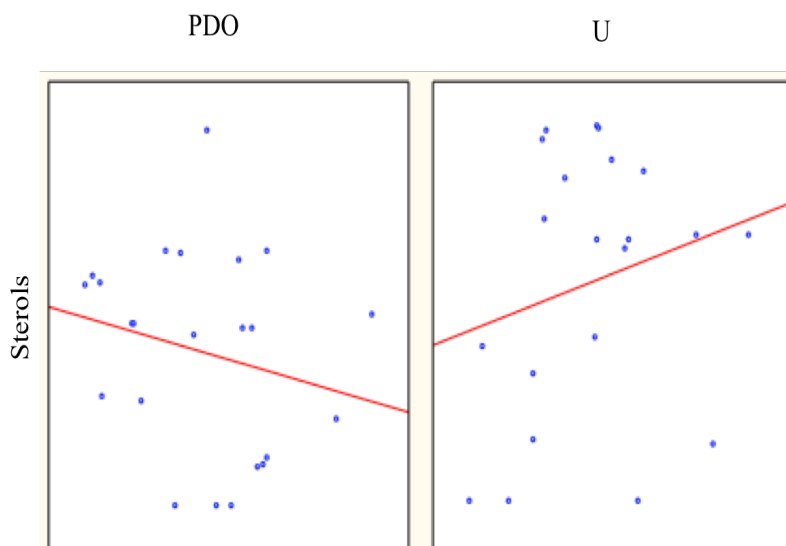


Figure S4: Spearman correlations plots between GDGTs ($\mu\text{g g (C}_{\text{org}})^{-1}$), U (ppm) and PDO index

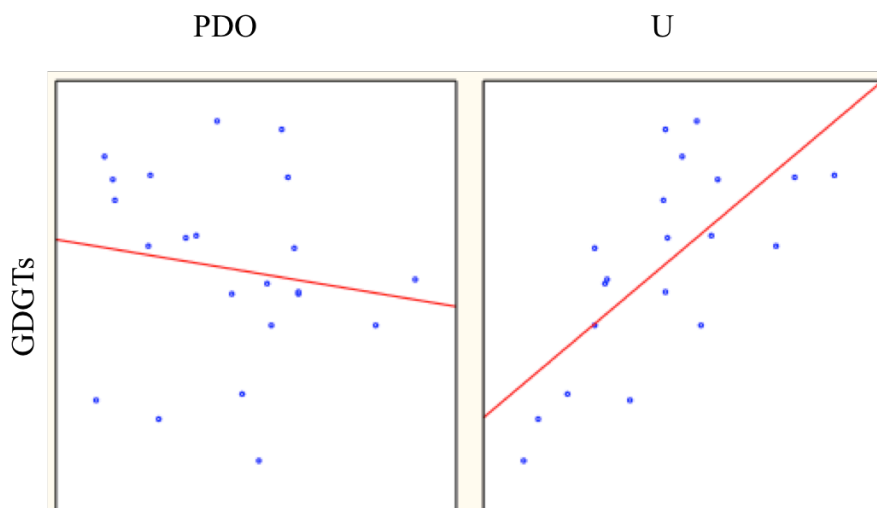


Figure S5: Representative GC-MS chromatograms of m/z 191 of A) aliphatic hydrocarbons, and B) TMS-derivatized alcohols from shelf sediments off Concepción. Numbers as in Table 1, and S and R are epimers in the hopane series.

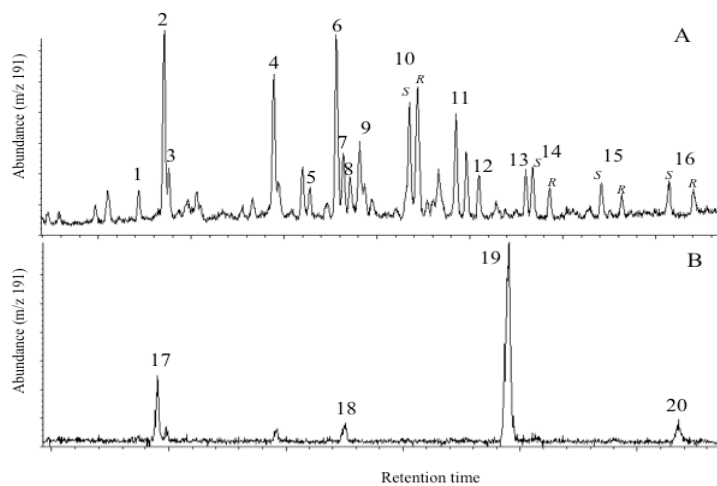


Figure S6: Spearman correlations plots between C₂₇-TNH ($\mu\text{g g (C}_{\text{org}})^{-1}$), Cd (ppm), U (ppm), and PDO (index)

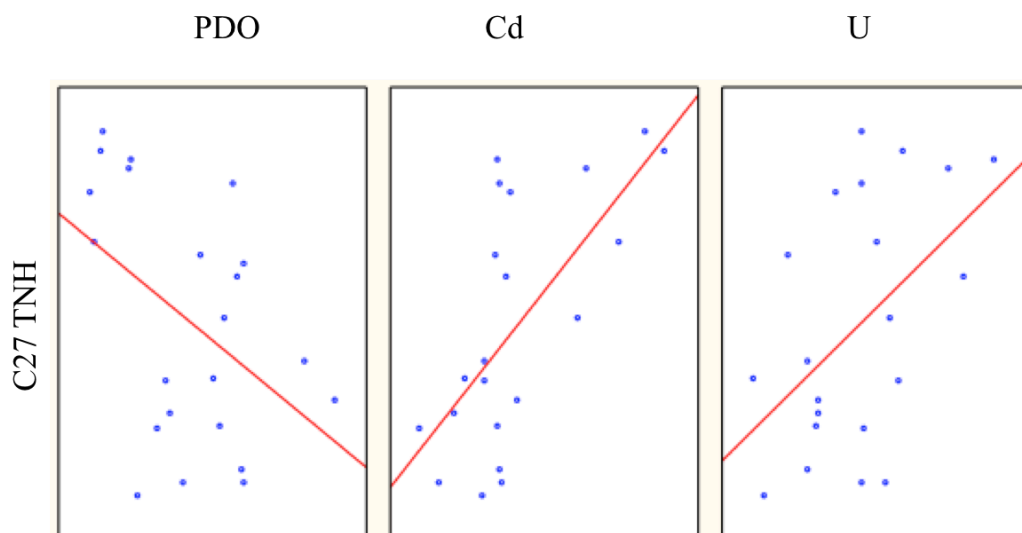


Figure S7: Spearman correlations plots between C₃₁ hopanol ($\mu\text{g g (C}_{\text{org}})^{-1}$), Mo (ppm), Cd (ppm) and PDO (index)

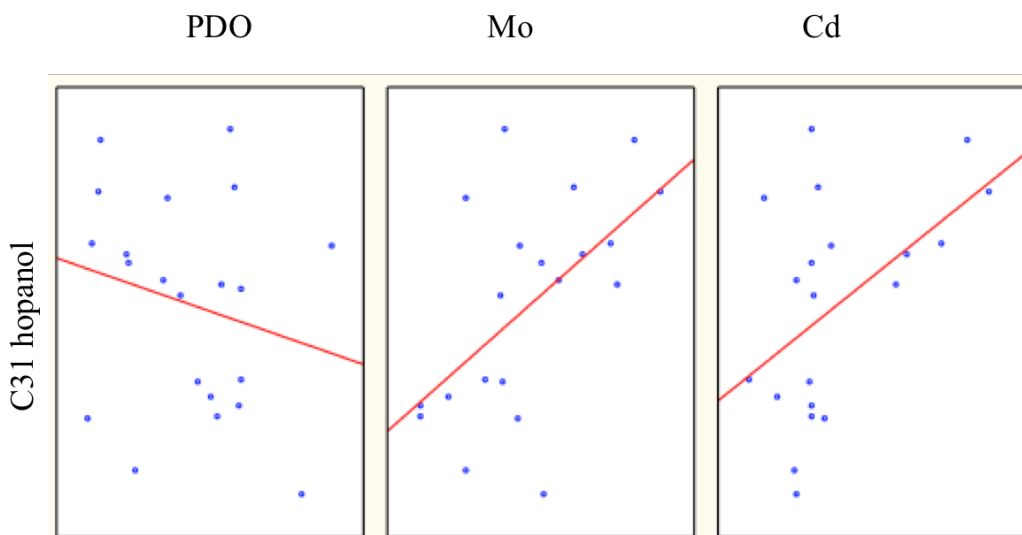


Figure S8: Spearman correlations plots between C₃₂ hopanol ($\mu\text{g g (C}_{\text{org}})^{-1}$), Cd (ppm), U (ppm) and PDO (index value)

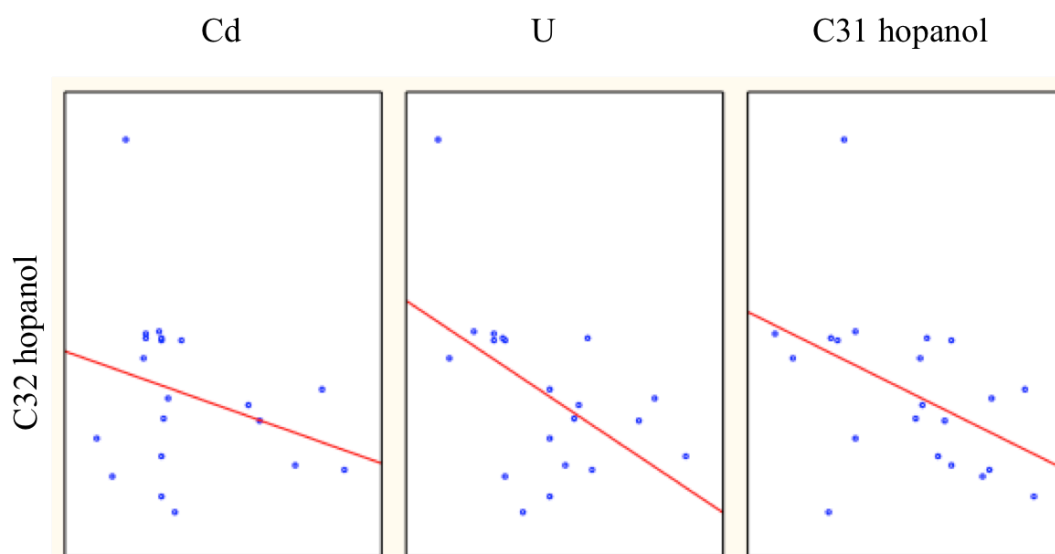


Figure S9: Spearman correlations plots between MAGEs ($\mu\text{g g (C}_{\text{org}})^{-1}$), Mo (ppm), Cd (ppm), U (ppm) and PDO (index)

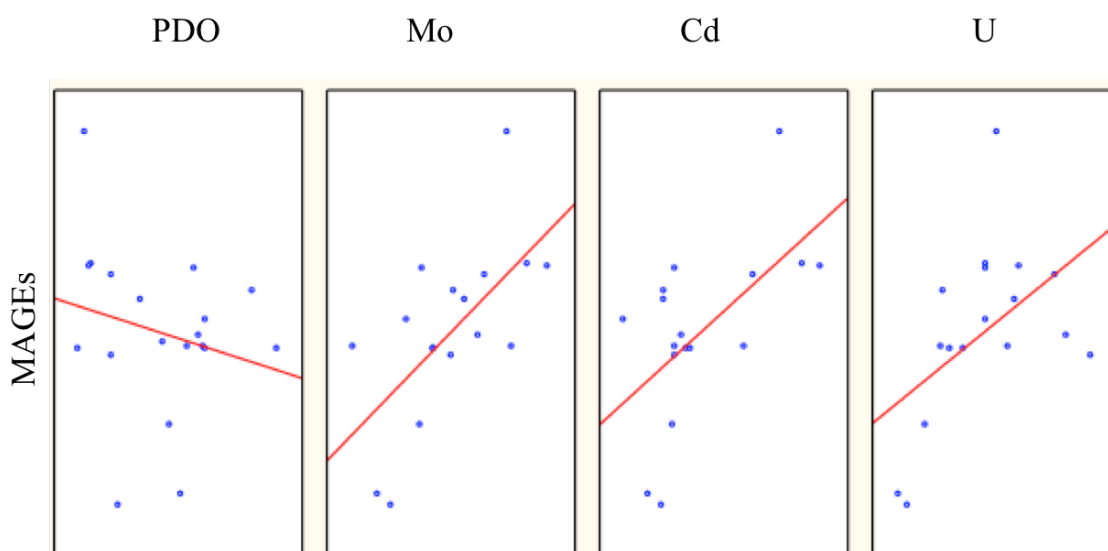


Figure S10: Spearman correlations plots between PDO (index) and lipid biomarkers ($\mu\text{g g (C}_{\text{org}})^{-1}$) used in this study

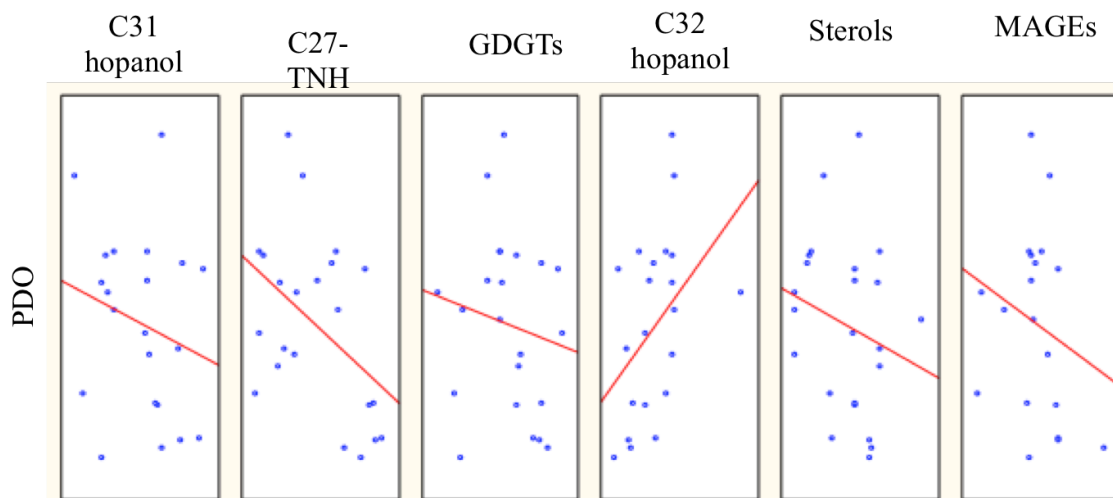


Table S1: $^{210}\text{Pb}_{\text{xs}}$ inventories and calculated ages (CE: common era) for core 04032009 from Oceanographic Time Series Station 18 (Center for Oceanographic Research in the eastern South Pacific). Radiocarbon control points from core VG06-2 (Muñoz et al., 2012), collected at same location (Station 18), are listed considering local reservoir correction ΔR of 137 ± 164 years off Valparaíso, Chile (33°S).

Mid point depth (cm)	Total Inventory (dpm cm ²)	Age (yr)	Years	Corrected ages (CE)
0.25	48.28 ± 0.05	1.5 ± 0.1	2009	2009.0
0.75	46.08 ± 0.07	2.0 ± 0.1	2007	2007.5
1.25	43.28 ± 0.09	1.9 ± 0.1	2005	2005.5
1.75	40.74 ± 0.09	2.0 ± 0.1	2004	2003.5
2.25	38.28 ± 0.07	2.2 ± 0.1	2002	2001.5
2.75	35.76 ± 0.05	2.5 ± 0.1	1999	1999.3
3.25	33.05 ± 0.05	2.6 ± 0.1	1997	1996.8
3.75	30.50 ± 0.05	2.3 ± 0.1	1994	1992.4
4.25	28.43 ± 0.05	3.0 ± 0.1	1992	1989.3
4.75	25.86 ± 0.07	3.2 ± 0.1	1989	1986.2
5.5	23.44 ± 0.08	6.5 ± 0.1	1986	1981.5
6.5	19.16 ± 0.08	4.7 ± 0.1	1979	1975.5
7.5	16.56 ± 0.07	7.2 ± 0.2	1974	1969.4
8.5	13.24 ± 0.06	5.7 ± 0.2	1967	1963.4
9.5	11.10 ± 0.05	5.6 ± 0.2	1962	1957.4
10.5	9.33 ± 0.05	5.5 ± 0.2	1956	1951.3
11.5	7.86 ± 0.05	5.9 ± 0.2	1950	1945.1
12.5	6.54 ± 0.05	6.2 ± 0.3	1944	1938.9
13.5	5.40 ± 0.05	7.8 ± 0.3	1938	1932.5
14.5	4.24 ± 0.04	8.0 ± 0.4	1931	1925.9
15.5	3.31 ± 0.04	8.6 ± 0.6	1923	1919.2
16.5	2.54 ± 0.05	9.9 ± 0.8	1914	1912.2
17.5	1.87 ± 0.05	12.1 ± 0.8	1904	1905.0
18.5	1.29 ± 0.03	14.1 ± 1.3	1802	1897.4
19.5	0.83 ± 0.03	16.9 ± 2.0	1878	1889.6
20.5	0.49 ± 0.03	23.6 ± 5.1	1861	1881.4
21.5	0.24 ± 0.04	88.1 ± 50.2	1838	1872.8
Core depth (cm)	NOSAM Accession #	^{14}C age (yrs BP)	Calendar age (cal yr BP)	
43	OS-66613	850 ± 85	344 ± 159	
56	OS-66616	1480 ± 80	881 ± 180	
81	OS-66622	2820 ± 120	2414 ± 252	

Table S2: Average metal/Al ratio^a from the Itata and BíoBio rivers discharging to shelf off Concepción

Element	Me/Al x10 ⁻⁴
Mo	0.165 ± 0.009
Cd	0.062 ± 0.0001
U	0.165 ± 0.021

^aJ. Muratli, 2012 personal communication

Table S3: Excess metals inventory of shelf off Concepción

Excess metals			
Core section			
depth (cm)	Mo (mg/g)	Cd (mg/g)	U (mg/g)
0-0.5	4.40	1.19	2.13
0.5-1	3.33	0.96	0.98
1-1.5	3.37	0.97	0.96
1.5-2	3.63	1.06	1.11
2-2.5	2.49	0.83	1.17
2.5-3	4.17	1.12	1.48
3-3.5	4.57	1.02	1.47
3.5-4	4.09	1.00	1.98
4-4.5	4.77	1.07	1.77
4.5-5	6.31	1.13	1.75
5-6	4.97	1.46	1.58
6-7	4.98	1.06	3.04
7-8	5.84	1.52	2.92
9-10	5.21	1.17	3.96
10-11	6.11	1.84	2.50
11-12	5.74	1.72	2.72
12-13	5.34	1.56	3.77
13-14	6.49	1.94	3.10
14-15	6.91	2.15	2.31
15-16	4.74	1.13	4.43
16-17	4.18	1.13	2.53
17-18	4.41	1.22	1.88
18-19	3.91	0.84	2.49
20-21	6.25	1.13	1.84
21-22	4.00	0.75	2.54
22-23	4.13	1.15	2.83
23-24	3.62	0.92	1.89
24-25	3.90	0.70	2.59
25-26	6.83	2.05	1.68
26-27	4.81	1.24	2.31
27-28	6.45	1.89	1.87
28-29	5.96	1.32	2.71