

Key role of continental margin sediments in the oceanic mass balance of Zn and Zn isotopes

Little et al.

Table DR1. Summary of data and data sources reported in Figure 1

	Mean $\delta^{66}\text{Zn}$	1SD	Range (min, max)	n	Reference sources
Lithogenic	0.27	0.07	-	50	Maréchal et al. (2000); Sivry et al. (2008); Viers et al. (2007); Chen et al. (2009, 2014); Sonke et al. (2008); Dong et al. (2013); Little et al. (2014); Thapalia et al. (2014)
Seawater (deep)	0.49	0.07	-	116	Bermin et al. (2006); Boyle et al., 2012; Zhao et al. (2014); Conway et al. (2014), Conway and John (2015)
Rivers	0.33	-	0.21, 0.58	32	Discharge, [Zn]-weighted mean of data in Little et al. (2014)
Aeolian dust	0.32	0.14	0.08, 0.54	30	Maréchal et al. (2000); Dong et al. (2013); Little et al. (2014)
Hydrothermal fluids	-	-	-0.5, 0.24	21	End-member estimate of Conway and John (2015) and [Zn]-weighted mean of data in John et al. (2008)
Fe-Mn sediments	0.96	0.15	0.53, 1.23	69	Maréchal et al. (2000); Little et al. (2014)
Biogenic carbonate	1.07	0.14	0.81, 1.34	26	Pichat et al. (2003)
Opal	1.03	0.19	0.71, 1.47	20	Andersen et al. (2011)
Margin sediments	0.32	0.03	-	10	Peru margin: This study
	0.08	0.06	-	26	Mexican and California margins: This study

Figure DR1. Site locations plotted superimposed on average sea surface PO₄ concentrations ($\mu\text{mol kg}^{-1}$). Phosphate data from the 2009 World Ocean Atlas (Garcia et al., 2010). Image plotted using ODV software (Schlitzer, R., Ocean Data View, odv.awi.de, 2015)

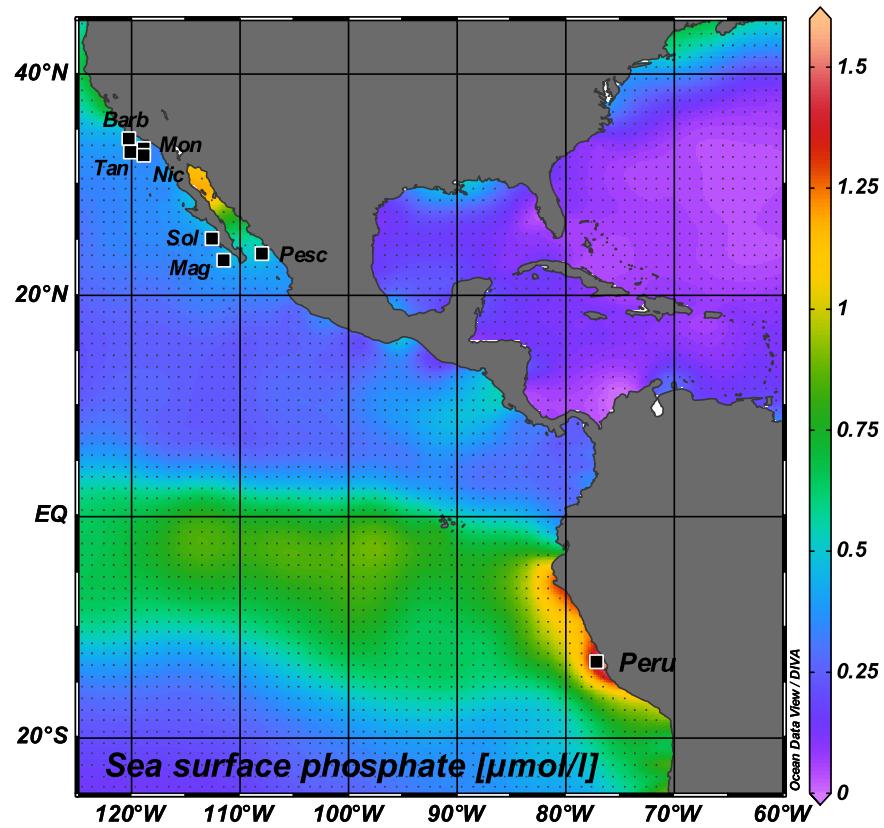


Table DR2. Results.

Site	Depth cm	C _{org} wt%	Total S wt%	Al wt%	Zn/Al ($\times 10^{-4}$)	Zn _{XS}	$\delta^{66}\text{Zn}_{\text{bulk}}$	X _{lith}	2SD	$\delta^{66}\text{Zn}_{\text{auth}}$	2SD
Santa Barbara	1.3	3.01	0.53	6.63	15.5	47.3	0.11	0.54	0.13	-0.10	0.25
	8.3	1.50	0.62	5.97	15.3	41.5	0.05	0.55	0.13	-0.23	0.28
	41	2.93	0.68	6.32	15.1	42.3	0.12	0.56	0.13	-0.07	0.26
Santa Monica	1.5	5.73	0.48	5.39	24.7	87.6	0.10	0.34	0.08	0.02	0.12
	3.5	5.23	0.23	6.21	18.7	64.0	0.14	0.45	0.11	0.03	0.17
	7.5	4.19	0.28	6.17	17.8	58.6	0.12	0.47	0.11	-0.01	0.18
	20	4.50	0.31	6.14	18.2	60.1	0.15	0.46	0.11	0.05	0.18
San Nicolas	2.8	4.92	0.41	4.81	28.7	97.7	0.14	0.29	0.07	0.09	0.11
	4.3	4.85	0.40	5.13	28.7	104.0	0.14	0.29	0.07	0.08	0.11
	14.5	4.25	nd	4.75	20.3	56.5	0.14	0.41	0.10	0.04	0.15
	33	4.41	0.44	5.11	34.8	135.0	0.15	0.24	0.06	0.12	0.09
Tanner Basin	1.5	6.69	0.33	3.29	38.3	98.5	0.10	0.22	0.05	0.05	0.09
	3.5	6.35	0.36	3.33	39.3	103.2	0.06	0.21	0.05	0.01	0.09
	7.5	5.96	0.35	2.96	36.3	82.5	0.02	0.23	0.06	-0.06	0.09
	13.5	4.31	0.16	3.75	28.1	73.8	0.08	0.30	0.07	0.00	0.11
Pescadero	2.5	3.55	0.49	6.47	14.4	39.2	0.02	0.58	0.14	-0.35	0.35
	11.5	3.45	0.44	7.05	14.7	44.3	-0.05	0.57	0.14	-0.51	0.37
	23	3.07	0.38	7.35	15.0	48.3	-0.02	0.56	0.13	-0.40	0.33
	31	3.62	0.58	6.92	14.6	43.2	0.02	0.57	0.14	-0.34	0.33
Soledad	1.5	6.47	0.54	4.12	15.7	29.9	0.01	0.54	0.13	-0.31	0.28
	11.5	6.39	0.59	4.39	15.1	29.3	0.00	0.56	0.13	-0.36	0.31
	21	6.66	0.78	4.13	16.3	32.6	0.03	0.52	0.12	-0.24	0.25
	31	6.23	0.61	4.53	15.1	30.6	0.05	0.56	0.13	-0.23	0.28
Magdalena	0.5	10.03	0.85	2.46	41.3	81.2	0.11	0.20	0.05	0.07	0.08
	4.5	11.71	0.64	2.50	45.9	93.7	0.12	0.18	0.04	0.09	0.08
	6.5	12.68	0.66	2.41	46.6	92.2	0.13	0.18	0.04	0.10	0.08
Peru	0.5	15.50	1.38	2.68	35.5	72.7	0.34	0.24	0.06	0.36	0.09
	1.0	16.00	1.37	2.83	32.1	67.1	0.33	0.26	0.06	0.34	0.10
	1.7	15.70	1.44	2.87	32.2	68.1	0.28	0.26	0.06	0.29	0.10
	2.4	15.40	1.54	3.01	30.5	66.6	0.32	0.28	0.07	0.34	0.10
	4.8	14.50	1.45	2.92	31.2	66.5	0.36	0.27	0.06	0.39	0.10
	8.2	12.80	1.35	2.61	30.6	58.1	0.34	0.27	0.07	0.36	0.10
	15.0	11.70	1.18	2.53	26.6	46.1	0.28	0.32	0.08	0.29	0.11
	15.7	12.10	1.14	2.85	24.2	45.2	0.32	0.35	0.08	0.34	0.12
	18.4	14.40	1.30	3.61	23.1	53.2	0.29	0.36	0.09	0.30	0.13
	19.1	14.80	1.29	3.56	24.6	57.9	0.36	0.34	0.08	0.41	0.12
<u>Site averages</u>											
Santa Barbara	-	2.48	0.61	6.31	15.3	43.7	0.09	0.55	0.13	-0.13	0.26
Santa Monica	-	4.91	0.32	5.98	19.9	67.6	0.13	0.43	0.10	0.02	0.16
San Nicolas	-	4.61	0.41	4.95	28.1	98.3	0.14	0.30	0.07	0.09	0.11
Tanner Basin	-	5.83	0.30	3.33	35.5	89.5	0.07	0.24	0.06	0.00	0.09
Pescadero	-	3.42	0.47	6.95	14.7	43.7	-0.01	0.57	0.14	-0.40	0.34
Soledad	-	6.44	0.63	4.29	15.5	30.6	0.02	0.54	0.13	-0.29	0.28
Magdalena	-	11.47	0.72	2.46	44.6	89.0	0.12	0.19	0.04	0.08	0.08
Peru	-	14.29	nd	2.95	29.1	60.2	0.32	0.29	0.07	0.34	0.10

nd: not done.

Figure DR2. Uncertainty on calculated $\delta^{66}\text{Zn}_{\text{auth}}$ values (represented as calculated 2SD) increases as a function of the lithogenic fraction in the sediment (calculated X_{lith}). See text for details of calculations.

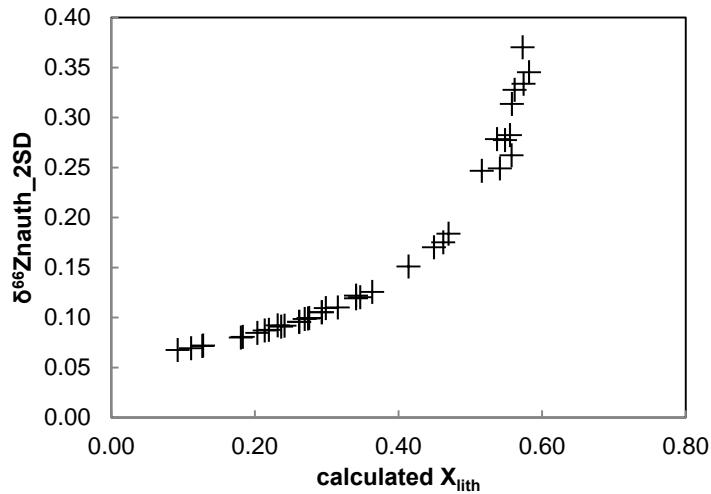
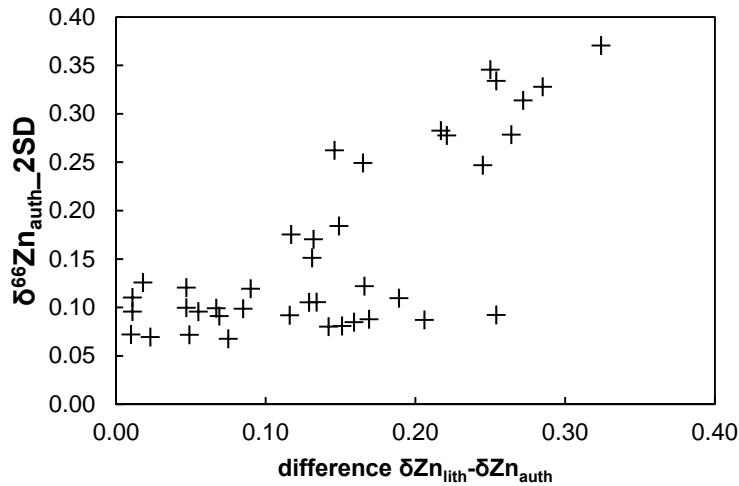


Figure DR3. A secondary effect on the uncertainty on calculated $\delta^{66}\text{Zn}_{\text{auth}}$ values is the initial difference between $\delta^{66}\text{Zn}_{\text{lith}}$ and $\delta^{66}\text{Zn}_{\text{bulk}}$. The greater this difference, the larger the uncertainty on $\delta^{66}\text{Zn}_{\text{auth}}$ values.



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