Supplemental Tables S1–S8

Physical and hydrodynamic properties of deep sea mining-generated, abyssal sediment plumes in the Clarion Clipperton fracture zone (eastern-central Pacific)

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Table S1. Location and description of the nine sediment push cores used in this study.

Sample No. SO240	Working area	Date (day/month in 2015)	Latitude (N)	Longitude (W)	Water depth (m)	Topography	Nodule coverage[a]	Nodule abundance (kg m^{-2})
08 MUC	WA1	09/05	13°10.524'	118°06.708'	4289	close to seamount	small	12.6
14 MUC	WA1	11/05	13°10.528'	118°10.108'	4332	plain	large	14.8
18 MUC	WA1	12/05	13°07.109'	118°07.657'	4318	plain	none	-[b]
23 MUC	WA1	13/05	13°10.526'	118°08.186'	4305	plain	large	18.6
34 MUC	WA2	07/05	12°53.358'	118°24.569'	4287	plain	small	-
61 MUC	WA3	25/05	12°56.109'	119°08.871'	4293	ridges	none	-
68 MUC	WA3	27/05	12°40.307'	119°11.514'	4408	ridges	small	4.1
95 MUC	WA4	05/06	11°49.262'	117°13.197'	4150	plain	large	-
106 MUC	WA4	07/06	11°50.079'	116°32.900'	4351	close to seamount	none	-

[a] Small nodules are < 4 cm in size; large nodules are > 4 cm in size.
[b]Dash indicates that the nodule abundance was not calculated.

Table S2. Size class boundaries for particle size analysis.

Size class number [a]	Lower limit (µm)	Upper limit (µm)	Median (µm)	Size class number [A]	Lower limit (µm)	Upper limit (µm)	Median (µm)
1	1.90	2.25	2.07	22	61.6	72.7	66.9
2	2.25	2.65	2.44	23	72.7	85.7	78.9
3	2.65	3.13	2.88	24	85.7	101	93.1
4	3.13	3.69	3.40	25	101	119	110
5	3.69	4.35	4.01	26	119	141	130
6	4.35	5.14	4.73	27	141	166	153
7	5.14	6.06	5.58	28	166	196	181
8	6.06	7.15	6.59	29	196	232	213
9	7.15	8.44	7.77	30	232	273	252
10	8.44	9.96	9.17	31	273	322	297
11	9.96	11.8	10.8	32	322	381	350
12	11.8	13.9	12.8	33	381	451	416
13	13.9	16.0	15.1	34	451	533	492
14	16.0	19.3	17.8	35	533	631	582
15	19.3	22.8	21.0	36	631	747	689
16	22.8	26.9	24.8	37	747	884	815
17	26.9	31.8	29.2	38	884	1046	965
18	31.8	37.5	34.5	39	1046	1238	1142
19	37.5	44.2	40.7	40	1238	1465	1351
20	44.2	52.2	48.0	41	1465	1734	1599
21	52.2	61.6	56.7	42	1734	2051	1892

[a] Lower limit, upper limit and median in micrometers for size classes 1–32 (LISST-100X) and size classes 22–42 (camera). The two instruments are overlapping in 10 classes, 22–32.

Table S3. Linear relationship between the Digital Floc Camera and the LISST-100X.

Sample No. SO240	Slope	Intercept	R squared	P value	Bins used
08 MUC	0.000172	0.000941	0.496	$4.67\ 10^{-02}$	22–28
14 MUC	0.000824	0.000072	0.990	$1.76\ 10^{-09}$	22–31
18 MUC	0.000703	0.000298	0.955	$7.08\ 10^{-07}$	22–31
23 MUC	0.000568	0.000085	0.982	$1.62\ 10^{-08}$	22–31
34 MUC	0.000656	0.000117	0.986	$7.56\ 10^{-09}$	22–31
61 MUC	0.000196	0.000073	0.900	$1.75\ 10^{-05}$	22–31
68 MUC	0.000172	0.000451	0.584	$4.72\ 10^{-02}$	22–27
95 MUC	0.000731	0.000377	0.955	$7.40\ 10^{-07}$	22–31
106 MUC	0.001143	0.001255	0.859	$7.17\ 10^{-05}$	22–31

Table S4. Modelled equations and coefficients of settling velocity.

Sediment concentration (mg L^{-1})	G (s^{-1})	Name [(1)]	Asym	xmid	scal	Equation
35	0	W_s	876.27	765.86	247.43	$W_s = 876.27/(1 + e^{(765.86 - x)/247.43})$
		CIL	203.36	1164.1	–33.95	$W_s = 203.36/(1 + e^{(1164.10 - x)/-33.95})$
		CIH	2113.27	1023.2	251.57	$W_s = 2113.27/(1 + e^{(1023.25 - x)/251.57})$
		PIL	126.59	1193.5	–21.51	$W_s = 126.59/(1 + e^{(1193.50 - x)/-21.51})$
		PIH	2548.4	1135.8	343.28	$W_s = 2548.45/(1 + e^{(1135.88 - x)/343.28})$
105	0	W_s	418.22	739.11	287.21	$W_s = 418.22/(1 + e^{(739.11 - x)/287.21})$
		CIL	299.72	595.02	212.25	$W_s = 299.72/(1 + e^{(595.02 - x)/212.25})$
		CIH	599.22	928.53	355.41	$W_s = 599.22/(1 + e^{(928.53 - x)/355.41})$
		PIL	235.38	789.82	124.41	$W_s = 235.38/(1 + e^{(789.82 - x)/124.41})$
		PIH	705.37	849.29	521.91	$W_s = 705.37/(1 + e^{(849.29 - x)/521.91})$
175	0	W_s	198.93	500.55	252.59	$W_s = 198.93/(1 + e^{(500.55 - x)/252.59})$
		CIL	151.50	393.13	185.28	$W_s = 151.50/(1 + e^{(393.13 - x)/185.28})$
		CIH	257.90	619.53	304.03	$W_s = 257.90/(1 + e^{(619.53 - x)/304.03})$
		PIL	129.00	560.68	138.66	$W_s = 129.00/(1 + e^{(560.68 - x)/138.66})$
		PIH	279.05	470.04	370.78	$W_s = 279.05/(1 + e^{(470.04 - x)/370.78})$
500	0	W_s	171.26	426.55	170.07	$W_s = 171.26/(1 + e^{(426.55 - x)/170.07})$
		CIL	151.33	406.15	143.24	$W_s = 151.33/(1 + e^{(406.15 - x)/143.24})$
		CIH	192.66	449.81	196.18	$W_s = 192.66/(1 + e^{(449.81 - x)/196.18})$

		PIL	113.45	532.72	94.19	$W_s = 113.45/(1 + e^{(532.72 - x)/94.19})$
		PIH	230.13	318.94	241.00	$W_s = 230.13/(1 + e^{(318.94 - x)/241.00})$
105	2,4	W_s	251.81	333.85	106.44	$W_s = 251.81/(1 + e^{(333.85 - x)/106.44})$
		CIL	234.31	329.17	96.47	$W_s = 234.31/(1 + e^{(329.17 - x)/96.47})$
		CIH	269.61	338.78	116.14	$W_s = 269.61/(1 + e^{(338.78 - x)/116.14})$
		PIL	184.26	396.32	66.61	$W_s = 184.26/(1 + e^{(396.32 - x)/66.61})$
		PIH	319.72	266.37	145.54	$W_s = 319.72/(1 + e^{(266.37 - x)/145.54})$

Table S4. Continued

Sediment concentration (mg L^{-1})	G (s^{-1})	Name [(1)]	Asym	xmid	scal	Equation
175	2,4	W_s	239.78	337.89	166.17	$W_s = 239.78/(1 + e^{(337.89 - x)/166.17})$
		CIL	190.57	278.61	120.35	$W_s = 190.57/(1 + e^{(278.61 - x)/120.35})$
		CIH	294.08	398.85	199.76	$W_s = 294.08/(1 + e^{(398.85 - x)/199.76})$
		PIL	159.68	403.58	94.64	$W_s = 159.68/(1 + e^{(403.58 - x)/94.64})$
		PIH	322.36	276.99	228.76	$W_s = 322.36/(1 + e^{(276.99 - x)/228.76})$
500	2,4	W_s	212.99	367.49	107.04	$W_s = 212.99/(1 + e^{(367.49 - x)/107.04})$
		CIL	197.30	362.84	98.60	$W_s = 197.30/(1 + e^{(362.84 - x)/98.60})$
		CIH	228.91	372.33	115.20	$W_s = 228.91/(1 + e^{(372.33 - x)/115.20})$
		PIL	158.49	426.40	67.78	$W_s = 158.49/(1 + e^{(426.40 - x)/67.78})$
		PIH	268.12	302.03	148.95	$W_s = 268.12/(1 + e^{(302.03 - x)/148.95})$

[(1)] W_s, settling velocity; CIL, confidence interval lower limit; CIH, confidence interval higher limit; PIL, prediction interval lower limit; PIH, prediction interval higher limit.

Table S5. Descriptive statistics analysis of sediment particle size distributions.

Descriptive statistic	MUC sediment sample								
	106	**95**	**68**	**61**	**34**	**23**	**18**	**14**	**08**
Median (µm)	52	29	22	15	20	20	23	21	30
Mode (µm)	67	21	21	15	21	21	21	21	21
10% (µm)	9	6	4	4	5	5	5	5	5
90% (µm)	252	130	130	48	79	79	93	79	181
< 10 µm (%)	12	20	31	37	28	28	24	25	23
10–63 µm (%)	41	53	46	55	57	56	56	59	46
> 63 µm (%)	47	27	23	8	15	16	20	16	31

Table S6. Raw data of re-calculated median aggregate size (d_{50}) settling velocities.

Descriptive statistic	Differential settling (0 s^{-1}) by sediment concentration (mg L^{-1})				All shear rates (s^{-1})			
	35	105	175	500	0	2.4	5.7	10.4
Low whisker	27.64	25.57	20.42	27.01	17.18	7.04	13.02	31.77
Q 0.25	89.87	61.39	57.74	52.49	46.31	60.93	71.15	85.10
Q 0.5 (Median)	128.97	87.32	71.28	65.99	60.08	88.64	97.41	102.35
Mean	143.54	92.64	72.39	66.63	64.84	88.11	102.47	102.73
Q 0.75	177.43	111.00	89.30	81.20	75.96	111.44	129.99	120.92
High whisker	300.93	175.45	127.87	123.26	120.06	183.27	215.25	169.63

Table S7. Results of settling velocity statistical analysis of aggregates produced under differential settling.

	Kruskal-Wallis x^2= 145.268, df = 3, $p < 2.2e^{-16}$					
	z score			*p* value		
Sediment concentration (mg L^{-1})	35	105	175	35	105	175
105	6.13		3.50	2.68 10^{-09}		0.001
175	9.52	3.50		5.34 10^{-21}	0.001	
500	11.43	5.51	2.03	8.89 10^{-30}	1.07 10^{-07}	0.13

Table S8. Results of settling velocity statistical analysis of aggregates produced under turbulent shear.

	Kruskal-Wallis x^2= 411.468, df = 3, $p < 2.2e^{-16}$					
	z score			*p* value		
Shear rate (s^{-1})	0	2.4	5.7	0	2.4	5.7
2.4	−12.05		−5.39	6.10 10^{-33}		2.14 10^{-07}
5.7	−16.51	−5.39		1.01 10^{-60}	2.14 10^{-07}	
10.4	−18.91	−7.82	−2.21	3.02 10^{-79}	1.61 10^{-14}	0.08