Supporting Information

Tracking the fate of particle associated Fukushima cesium in the ocean off Japan

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Analytical details

Conversion factors for major flux components

The concentration of organic matter (OM) was estimated as follows:

$$OM\ (\%) = POC / 0.36 \quad (1)$$

where POC is concentration of organic carbon and the constant of 0.36 is the conversion coefficient estimated from the traditional stoichiometric formulation for the composition of marine algae [$(CH_2O)_{106}(NH_3)_{16}(H_3PO_4)$] based on Redfield et al[1]; Richards[2]; and Honda et al.[3].

Based on crustal ratios[4], concentrations of biogenic opal ($SiO_2 \cdot 0.4H_2O$) and lithogenic materials (LM) were estimated with the following equations:

$$Opal\ (\%) = (Si - 3.42Al) \times 67.2/28 \quad (2)$$

$$LM\ (\%) = Al \times 100/8 \quad (3)$$

CaCO3 was estimated with PIC as follows:

$$CaCO_3\ (\%) = PIC \times 100/12 \quad (4)$$

Radionuclides

Gamma efficiencies were determined from mixed standards spiked with ^{226}Ra, ^{238}U, ^{235}U, ^{134}Cs and ^{137}Cs (Eckert & Ziegler Isotope Products, EG-ML) and covering a range of volumes and densities. Activities for ^{134}Cs were calculated using the average of the 604 and 795 keV energy peaks. The ^{134}Cs activity was corrected for cascade summing (43–49%). The errors on ^{134}Cs, ^{137}Cs and ^{210}Pb were propagated from the one sigma counting error plus errors due to calibration. In the case of excess ^{210}Pb, the error also includes an uncertainty from the difference between total and supported ^{210}Pb activities and their associated errors.

Sediment inventories and radionuclide ratios

For radionuclide inventories at F1, sediment cores of 10 and 18 cm length were collected in July 2012 and May 2013, respectively, and sectioned every 0.5 cm for the first 2 cm and in 1-2 cm increments for the rest of the core length. Bulk density was estimated with wet/dry weights. $^{210}Pb_{ex}$, ^{137}Cs, and ^{134}Cs inventories for each layer were calculated using layer thickness, bulk density, and activity, and then decay-corrected as detailed in the previous section.

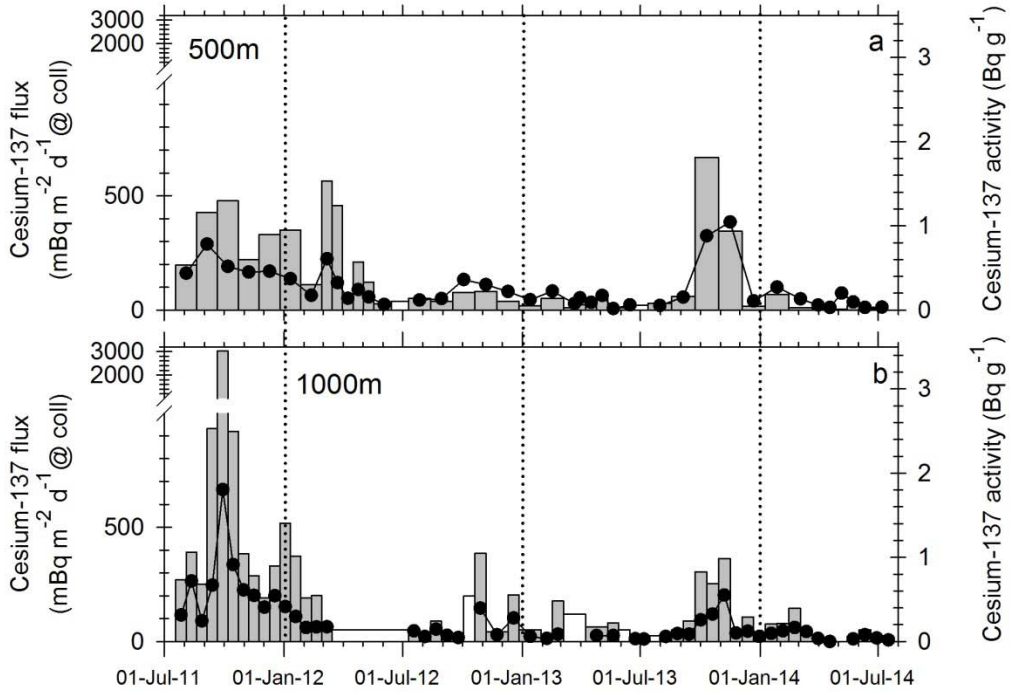

Figure S1. Three year record of ^{137}Cs flux at time of sampling at a) 500m and b) 1000m shown activity flux (gray bars = measured; white bars are missing samples) in units of mBq m^{-2} d^{-1} (left Y-axis) and specific activity (filled circles and line) in units of Bq g^{-1}.

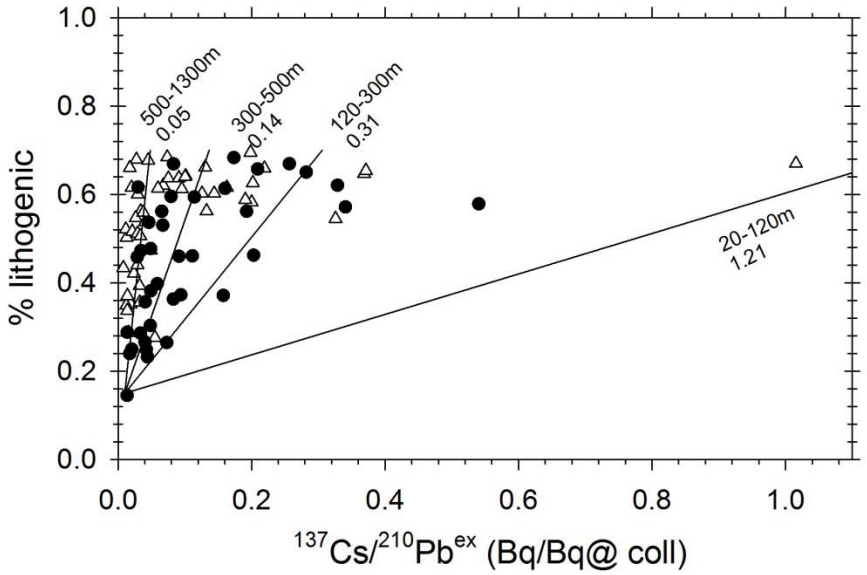

Figure S2. Percent lithogenic fraction vs. $^{137}Cs/^{210}Pb_{ex}$ activity ratio at time of sampling (@ coll) for 500 m (filled circles) and 1000 m (open triangles) at F1. Lines are drawn to show mixing trends between different end-member $^{137}C/^{210}Pb_{ex}$ ratios using % lithogenic variations to model fraction transported from lateral input sources. See text for details.

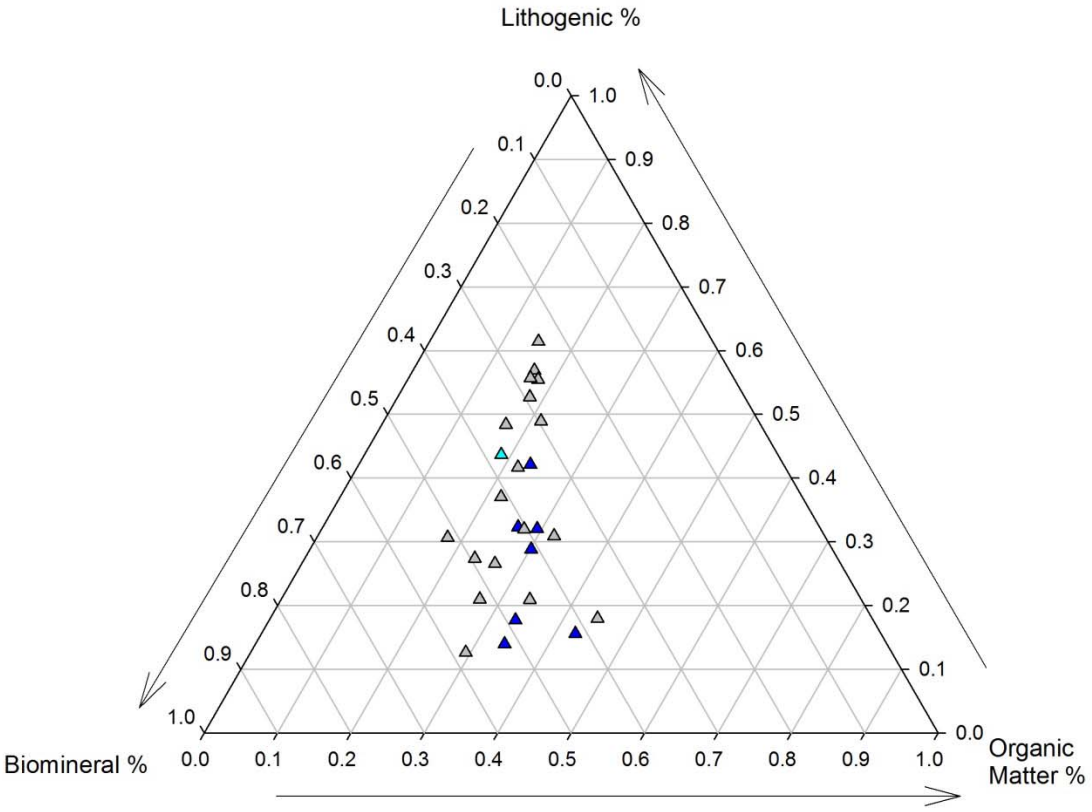

Figure S3. Ternary plot with percent by mass of lithogenic, biomineral and organic matter fractions for FS1 (data from Otosaka et al.[5]). Arrows along the 3 axes point to 100% of a given fraction. Triangles are for a single trap at 870 m. Symbols are color coded by ^{137}Cs activity using the same scale as for trap F1 (Fig. 5): red > 0.5 Bq g^{-1}; cyan 0.3-0.5 Bq g^{-1}; blue 0.1-0.3 Bq g^{-1}; gray <0.1 Bq g^{-1}.

Supplemental Table S1: Compositional and Isotopic Data From Sediment Traps (500 m and 1000 m) at Location F1

500 m Trap

Cup #	Opening Date	Days Open	Mass Flux ($mg\ m^{-2}\ d^{-1}$)	% $CaCO_3$	% Biogenic Silica	% Lithogenic	% Organic Matter	^{137}Cs Flux ($mBq\ m^{-2}\ d^{-1}$)	^{134}Cs Flux ($mBq\ m^{-2}\ d^{-1}$)	$^{210}Pb\ Flux_{ex}$ ($mBq\ m^{-2}\ d^{-1}$)	^{137}Cs Activity ($Bq\ g^{-1}$)	^{134}Cs Activity ($Bq\ g^{-1}$)	$^{210}Pb_{ex}$ Activity ($Bq\ g^{-1}$)	^{214}Pb Activity ($Bq\ g^{-1}$)	$^{134}Cs/^{137}Cs$ ($Bq\ Bq^{-1}$)	NOTES
Year 1 ---------- Deployment 7/18/2011 ---------- 36°27.1'N 141°27.2'E ---------- Total Depth = 1301 m																
1	7/19/2011	32	454	9.4%	25.0%	46.2%	19.4%	198 ± 10	185 ± 7	0.98 ± 0.05	0.44	0.41	2.15	0.05	1.03 ± 0.06	
2	8/20/2011	32	546	4.4%	19.9%	57.1%	18.5%	427 ± 21	381 ± 14	1.25 ± 0.06	0.78	0.70	2.30	0.04	1.02 ± 0.06	
3	9/21/2011	32	926	5.4%	15.4%	65.0%	14.2%	479 ± 24	439 ± 16	1.70 ± 0.08	0.52	0.47	1.83	0.03	1.07 ± 0.07	
4	10/23/2011	32	490	4.2%	12.6%	68.3%	14.9%	221 ± 11	187 ± 7	1.27 ± 0.06	0.45	0.38	2.60	0.05	1.02 ± 0.06	
5	11/24/2011	32	717	5.3%	12.7%	65.7%	16.3%	331 ± 17	276 ± 10	1.58 ± 0.08	0.46	0.38	2.21	0.04	1.03 ± 0.06	
6	12/26/2011	32	940	5.8%	25.4%	56.2%	12.7%	350 ± 18	321 ± 11	1.82 ± 0.09	0.37	0.34	1.93	0.03	1.17 ± 0.07	
7	1/27/2012	32	639	5.7%	16.3%	66.9%	11.2%	112 ± 6	86 ± 3	1.34 ± 0.07	0.17	0.13	2.10	0.03	1.01 ± 0.06	
8	2/28/2012	16	930	5.4%	16.3%	66.9%	11.4%	566 ± 29	465 ± 18	2.20 ± 0.12	0.61	0.50	2.37	0.03	1.10 ± 0.07	
9	3/15/2012	16	1413	5.3%	21.9%	61.4%	11.5%	458 ± 23	344 ± 13	2.86 ± 0.14	0.32	0.24	2.02	0.03	1.01 ± 0.06	
10	3/31/2012	16	463	5.7%	26.3%	53.0%	14.9%	65 ± 3	41 ± 2	0.97 ± 0.05	0.14	0.09	2.09	0.04	0.87 ± 0.06	
11	4/16/2012	16	867	3.7%	40.0%	37.1%	19.2%	210 ± 11	152 ± 6	1.33 ± 0.07	0.24	0.18	1.54	0.04	1.01 ± 0.06	
12	5/2/2012	16	783	3.8%	38.9%	37.2%	20.1%	122 ± 6	81 ± 3	1.29 ± 0.07	0.16	0.10	1.65	0.04	0.94 ± 0.06	
13	5/18/2012	32	410	4.6%	47.4%	23.2%	24.8%	27 ± 1	15 ± 1	0.61 ± 0.03	0.07	0.04	1.50	0.04	0.79 ± 0.06	
Year 1 ---------- Closure 6/19/2012 ---------- Recovery 7/7/2012																
Year 2 ---------- Deployment 7/9/2012 ---------- 36°28.5'N 141°28.6'E ---------- Total Depth = 1300 m																
1	7/10/2012	34	426	8.6%	38.5%	30.3%	22.6%	51 ± 3	23 ± 1	1.05 ± 0.05	0.12	0.05	2.46	0.08	0.68 ± 0.05	
2	8/13/2012	34	282	13.9%	26.1%	38.2%	21.8%	38 ± 2	14 ± 1	0.78 ± 0.04	0.14	0.05	2.77	0.06	0.58 ± 0.04	
3	9/16/2012	34	213	18.3%	19.3%	46.1%	16.3%	77 ± 4	33 ± 1	0.69 ± 0.03	0.36	0.15	3.25	0.07	0.68 ± 0.04	
4	10/20/2012	34	274	13.8%	21.1%	46.0%	19.1%	82 ± 4	32 ± 1	0.90 ± 0.04	0.30	0.12	3.30	0.06	0.64 ± 0.04	
5	11/23/2012	34	176	12.0%	16.0%	56.1%	15.8%	39 ± 2	16 ± 1	0.59 ± 0.03	0.22	0.09	3.36	0.04	0.70 ± 0.05	
6	12/27/2012	34	158	9.8%	19.9%	53.7%	16.6%	19 ± 1	8 ± 0.4	0.42 ± 0.02	0.12	0.05	2.63	0.04	0.75 ± 0.06	
7	1/30/2013	34	230	7.3%	22.3%	59.4%	11.0%	52 ± 3	23 ± 1	0.45 ± 0.02	0.22	0.10	1.97	0.04	0.81 ± 0.05	
8	3/5/2013	34	124	4.4%	49.5%	26.5%	19.5%	9 ± 1	3 ± 0.3	0.24 ± 0.01	0.08	0.03	1.90	0.04	0.61 ± 0.06	
9	3/22/2013	17	153	6.6%	42.3%	26.4%	24.7%	22 ± 1	7 ± 1	0.30 ± 0.02	0.14	0.04	1.98	0.04	0.57 ± 0.06	
10	4/8/2013	17	347	5.9%	38.0%	35.6%	20.5%	31 ± 2	16 ± 1	0.77 ± 0.04	0.09	0.04	2.22	0.04	0.94 ± 0.09	
11	4/25/2013	17	331	4.8%	40.0%	36.3%	18.9%	57 ± 3	23 ± 1	0.69 ± 0.04	0.17	0.07	2.07	0.06	0.76 ± 0.06	
12	5/12/2013	17	61	5.6%	44.0%	14.5%	35.9%	1 ± 0.2	BD	0.07 ± ####	0.02	BD	1.20	0.05	BD	
13	5/29/2013	34	188	5.9%	28.4%	45.8%	19.9%	11 ± 1	4 ± 0.3	0.40 ± 0.02	0.06	0.02	2.13	0.06	0.73 ± 0.06	
Year 2 ---------- Closure 7/2/2013 ---------- Recovery 7/11/2013																
Year 3 ---------- Deployment 7/12/2013 ---------- 36°28.5'N 141°28.5'E ---------- Total Depth = 1298 m																
1	7/13/2013	36	548	8.4%	15.6%	61.6%	14.4%	30 ± 2	14 ± 1	0.99 ± 0.05	0.05	0.03	1.80	0.04	0.98 ± 0.08	
2	8/18/2013	36	384	9.6%	28.1%	39.7%	22.6%	59 ± 3	26 ± 1	1.00 ± 0.05	0.15	0.07	2.61	0.03	0.93 ± 0.06	
3	9/23/2013	36	759	6.3%	15.7%	62.0%	16.0%	668 ± 34	305 ± 12	2.03 ± 0.10	0.88	0.40	2.68	0.03	1.00 ± 0.06	
4	10/29/2013	36	331	12.8%	13.2%	57.9%	16.2%	346 ± 17	149 ± 6	0.64 ± 0.03	1.05	0.45	1.93	0.03	0.97 ± 0.06	
5	12/4/2013	36	145	8.7%	24.5%	47.2%	19.7%	16 ± 1	5 ± 0.4	0.46 ± 0.02	0.11	0.04	3.17	0.04	0.79 ± 0.08	
6	1/9/2014	36	247	6.4%	17.1%	59.5%	16.9%	67 ± 3	25 ± 1	0.85 ± 0.04	0.27	0.10	3.43	0.02	0.90 ± 0.06	
7	2/14/2014	36	87	5.4%	25.8%	47.7%	21.0%	11 ± 1	4 ± 0.2	0.24 ± 0.01	0.13	0.05	2.71	0.04	0.89 ± 0.06	
8	3/22/2014	18	397	8.2%	49.4%	24.9%	17.4%	23 ± 1	9 ± 1	1.13 ± 0.06	0.06	0.02	2.86	0.05	0.94 ± 0.10	
9	4/9/2014	18	187	4.4%	48.3%	23.9%	23.3%	6 ± 1	BD	0.34 ± 0.02	0.03	BD	1.78	0.05	BD	
10	4/27/2014	18	18	18.6%	17.5%	33.2%	30.7%	4 ± 1	BD	BD	0.20	BD	BD	BD	BD	
11	5/15/2014	18	224	9.5%	39.1%	24.9%	26.6%	21 ± 1	6 ± 1	0.50 ± 0.03	0.09	0.03	2.23	0.05	0.80 ± 0.09	
12	6/2/2014	18	106	7.7%	33.1%	28.8%	30.4%	3 ± 0.4	BD	0.23 ± 0.01	0.03	BD	2.18	0.09	BD	
13	6/20/2014	34	154	12.6%	30.6%	28.6%	28.3%	5 ± 0.4	2 ± 0.1	0.16 ± 0.01	0.03	0.01	1.04	0.07	0.89 ± 0.10	
Year 3 ---------- Closure 7/26/2014 ---------- Recovery 10/19/2014																

NOTES: BD signifies below detection (see radionuclide analyes text for more infomation). All isotope fluxes and activities are decayed to collection except the $^{134}Cs/^{137}Cs$ ratios, which are decay-corrected to the date of maximum seawater concentrations at the FDNPP (6 April, 2011; Buesseler et al., 2011)

1000 m Trap																	
Cup #	Opening Date	Days Open	Mass Flux ($mg\ m^{-2}\ d^{-1}$)	% $CaCO_3$	% Biogenic Silica	% Lithogenic	% Organic Matter	^{137}Cs Flux ($mBq\ m^{-2}\ d^{-1}$)	^{134}Cs Flux ($mBq\ m^{-2}\ d^{-1}$)	^{210}Pb Flux ($mBq\ m^{-2}\ d^{-1}$)	^{137}Cs Activity ($Bq\ g^{-1}$)	^{134}Cs Activity ($Bq\ g^{-1}$)	$^{210}Pb_{ex}$ Activity ($Bq\ g^{-1}$)	^{214}Pb Activity ($Bq\ g^{-1}$)	$^{134}Cs/^{137}Cs$ ($Bq\ Bq^{-1}$)	NOTES
Year 1 ---------- Deployment 7/18/2011 ---------- 36°27.1'N 141°27.2'E ---------- Total Depth = 1301 m																	
1	7/19/2011	16	858	7.6%	20.9%	58.3%	13.3%	270 ± 14	250 ± 9	1.35 ± 0.07	0.31	0.29	1.57	0.04	1.02 ± 0.06	
2	8/4/2011	16	545	7.4%	24.3%	54.5%	13.7%	391 ± 20	325 ± 12	1.20 ± 0.06	0.72	0.60	2.21	0.05	0.93 ± 0.06	
3	8/20/2011	16	1025	4.5%	22.0%	60.2%	13.3%	251 ± 13	212 ± 8	2.00 ± 0.10	0.24	0.21	1.95	0.05	0.95 ± 0.06	
4	9/5/2011	16	1392	4.6%	17.1%	64.7%	13.6%	931 ± 47	890 ± 32	2.53 ± 0.13	0.67	0.64	1.82	0.04	1.10 ± 0.07	
5	9/21/2011	16	1678	3.9%	16.5%	67.0%	12.6%	3026 ± 158	2820 ± 100	2.98 ± 0.15	1.80	1.68	1.78	0.04	1.08 ± 0.07	
6	10/7/2011	16	1007	5.7%	16.0%	65.4%	12.9%	920 ± 46	786 ± 29	2.48 ± 0.12	0.91	0.78	2.46	0.04	1.01 ± 0.06	
7	10/23/2011	16	630	7.0%	19.5%	58.8%	14.7%	385 ± 19	316 ± 11	2.02 ± 0.10	0.61	0.50	3.21	0.06	0.98 ± 0.06	
8	11/8/2011	16	526	5.8%	16.5%	61.6%	16.2%	288 ± 15	218 ± 8	1.77 ± 0.09	0.55	0.41	3.36	0.07	0.92 ± 0.06	
9	11/24/2011	16	467	5.7%	14.7%	66.2%	13.5%	190 ± 10	129 ± 5	1.46 ± 0.07	0.41	0.28	3.12	0.06	0.83 ± 0.05	
10	12/10/2011	16	610	6.7%	17.8%	62.6%	12.9%	331 ± 18	242 ± 12	1.64 ± 0.09	0.54	0.40	2.69	0.08	0.91 ± 0.07	
11	12/26/2011	16	1249	4.5%	14.6%	69.5%	11.3%	517 ± 26	435 ± 16	2.61 ± 0.13	0.41	0.35	2.09	0.04	1.06 ± 0.07	
12	1/11/2012	16	1262	5.1%	26.9%	56.2%	11.8%	374 ± 19	309 ± 11	2.82 ± 0.14	0.30	0.24	2.24	0.04	1.06 ± 0.07	
13	1/27/2012	16	1150	5.5%	21.6%	62.0%	10.9%	191 ± 10	150 ± 5	2.82 ± 0.14	0.17	0.13	2.45	0.04	1.02 ± 0.06	
14	2/12/2012	16	1163	5.4%	16.0%	68.4%	10.2%	201 ± 10	139 ± 5	2.73 ± 0.14	0.17	0.12	2.35	0.04	0.91 ± 0.06	
15	2/28/2012	16	395	4.6%	20.8%	63.7%	11.0%	68 ± 4	38 ± 2	0.91 ± 0.05	0.17	0.10	2.30	0.05	0.74 ± 0.05	Cups 16-21 failed
Year 1 ---------- Closure 6/19/2012 ---------- Recovery 7/7/2012																	
Year 2 ---------- Deployment 7/9/2012 ---------- 36°28.5'N 141°28.6'E ---------- Total Depth = 1300 m																	
1	7/10/2012	17	273	11.6%	39.6%	27.6%	21.2%	34 ± 2	21 ± 1	0.62 ± 0.03	0.13	0.08	2.28	0.08	0.90 ± 0.07	
2	7/27/2012	17	457	9.5%	35.2%	35.2%	20.2%	27 ± 2	13 ± 1	1.42 ± 0.07	0.06	0.03	3.12	0.08	0.75 ± 0.09	
3	8/13/2012	17	610	8.4%	27.5%	47.3%	16.8%	89 ± 5	51 ± 2	1.82 ± 0.09	0.15	0.08	2.98	0.07	0.88 ± 0.06	
4	8/30/2012	17	353	12.7%	27.3%	42.1%	17.8%	25 ± 2	13 ± 1	1.07 ± 0.05	0.07	0.04	3.04	0.06	0.81 ± 0.08	
5	9/16/2012	17	270	16.1%	30.8%	34.9%	18.2%	12 ± 1	6 ± 1	1.02 ± 0.05	0.05	0.02	3.76	0.10	0.72 ± 0.08	
6	10/3/2012	17														Lost Bottle
7	10/20/2012	17	975	8.3%	18.8%	60.3%	12.7%	386 ± 20	200 ± 8	2.68 ± 0.14	0.40	0.21	2.75	0.05	0.85 ± 0.06	
8	11/6/2012	34	522	8.7%	18.3%	60.1%	13.0%	42 ± 2	23 ± 1	1.42 ± 0.07	0.08	0.04	2.73	0.06	0.91 ± 0.06	
9	12/10/2012	17	729	7.7%	16.8%	63.7%	11.8%	204 ± 10	118 ± 5	2.24 ± 0.11	0.28	0.16	3.07	0.05	0.99 ± 0.06	
10	12/27/2012	34	851	5.1%	16.2%	67.9%	10.8%	51 ± 3	29 ± 2	1.86 ± 0.09	0.06	0.03	2.18	0.04	0.98 ± 0.08	
11	1/30/2013	17	578	6.8%	16.9%	66.0%	10.3%	21 ± 1	10 ± 1	1.21 ± 0.06	0.04	0.02	2.08	0.04	0.81 ± 0.09	
12	2/16/2013	17	2044	3.6%	18.7%	67.7%	9.9%	178 ± 10	94 ± 5	3.94 ± 0.20	0.09	0.05	1.93	0.03	0.96 ± 0.07	
13	3/5/2013	34														Lost Bottle
14	4/8/2013	34	883	4.3%	37.8%	44.1%	13.8%	63 ± 3	32 ± 2	2.18 ± 0.11	0.07	0.04	2.47	0.05	0.96 ± 0.07	
15	5/12/2013	17	1162	3.9%	40.7%	39.3%	16.0%	82 ± 5	41 ± 3	2.54 ± 0.13	0.07	0.04	2.18	0.06	0.98 ± 0.09	
16	5/29/2013	17														Lost Bottle
17	6/15/2013	17	645	5.1%	30.3%	50.3%	14.3%	20 ± 1	6 ± 1	1.58 ± 0.08	0.03	0.01	2.45	0.08	0.60 ± 0.10	
18	7/2/2013	9.6	1056	5.0%	28.8%	52.1%	14.0%	30 ± 2	9 ± 2	2.59 ± 0.13	0.03	0.01	2.45	0.07	0.59 ± 0.13	Open for Recovery
Year 2 ---------- Closure 7/11/2013 ---------- Recovery 7/11/2013																	
Year 3 ---------- Deployment 7/12/2013 ---------- 36°28.5'N 141°28.5'E ---------- Total Depth = 1298 m																	
1	7/13/2013	18														Lost Bottle
2	7/31/2013	18	326	10.6%	20.5%	51.6%	17.3%	19 ± 1	10 ± 1	0.90 ± 0.05	0.06	0.03	2.77	0.08	1.03 ± 0.09	
3	8/18/2013	18	540	8.1%	22.8%	51.2%	17.9%	50 ± 3	22 ± 1	1.74 ± 0.09	0.09	0.04	3.22	0.07	0.91 ± 0.06	
4	9/5/2013	18	1038	5.5%	22.7%	56.2%	15.5%	90 ± 5	48 ± 2	2.68 ± 0.13	0.09	0.05	2.58	0.05	1.15 ± 0.07	
5	9/23/2013	18	1195	4.5%	18.6%	61.2%	15.7%	305 ± 15	151 ± 6	3.20 ± 0.16	0.26	0.13	2.68	0.05	1.08 ± 0.07	
6	10/11/2013	18	776	5.9%	15.5%	64.2%	14.4%	252 ± 13	108 ± 4	2.50 ± 0.12	0.32	0.14	3.22	0.05	0.95 ± 0.06	
7	10/29/2013	18	659	10.4%	9.4%	65.9%	14.3%	363 ± 18	152 ± 6	1.66 ± 0.09	0.55	0.23	2.51	0.04	0.94 ± 0.06	
8	11/16/2013	18	391	12.2%	18.1%	54.7%	15.0%	39 ± 2	18 ± 1	1.49 ± 0.07	0.10	0.05	3.82	0.06	1.05 ± 0.07	
9	12/4/2013	18	876	7.2%	24.7%	53.8%	14.4%	106 ± 6	44 ± 2	2.62 ± 0.13	0.12	0.05	3.00	0.05	0.97 ± 0.07	
10	12/22/2013	18	559	7.1%	18.6%	61.5%	12.8%	34 ± 2	9 ± 2	1.69 ± 0.08	0.06	0.02	3.03	0.06	0.62 ± 0.12	
11	1/9/2014	18	805	6.3%	17.1%	64.0%	12.6%	76 ± 4	32 ± 1	0.76 ± 0.07	0.09	0.04	0.94	0.05	0.99 ± 0.07	
12	1/27/2014	18	634	8.3%	23.0%	55.9%	12.9%	80 ± 4	30 ± 1	2.11 ± 0.10	0.13	0.05	3.33	0.06	0.92 ± 0.06	
13	2/14/2014	18	878	5.6%	21.3%	61.4%	11.8%	145 ± 7	65 ± 3	2.43 ± 0.12	0.16	0.07	2.76	0.04	1.11 ± 0.07	
14	3/4/2014	18	283	8.7%	25.8%	50.5%	15.0%	34 ± 2	12 ± 1	1.01 ± 0.05	0.12	0.04	3.57	0.07	0.90 ± 0.08	
15	3/22/2014	18	487	7.0%	43.3%	33.7%	16.0%	17 ± 1	7 ± 1	1.25 ± 0.07	0.04	0.01	2.58	0.06	0.97 ± 0.14	
16	4/9/2014	18	30	4.9%	52.0%	25.2%	17.9%	BD	BD	0.05 ± 0.01	0.15	BD	1.70	0.04	BD	
17	4/27/2014	18	10	22.4%	33.5%	26.2%	18.0%									No Isotope Sample
18	5/15/2014	18	717	5.2%	39.2%	37.1%	18.5%	22 ± 2	9 ± 1	1.61 ± 0.09	0.03	0.01	2.25	0.06	1.04 ± 0.14	
19	6/2/2014	18	645	6.0%	40.7%	35.6%	17.7%	52 ± 3	17 ± 1	1.60 ± 0.08	0.08	0.03	2.47	0.09	0.91 ± 0.07	
20	6/20/2014	18	350	18.9%	30.6%	28.7%	21.8%	14 ± 1	6 ± 1	0.91 ± 0.05	0.04	0.02	2.61	0.06	1.05 ± 0.12	
21	7/8/2014	18	360	8.3%	30.3%	43.4%	18.0%	6 ± 1	BD	0.83 ± 0.04	0.02	BD	2.30	0.07	BD	
Year 3 ---------- Closure 7/26/2014 ---------- Recovery 10/19/2014																	

Supplemental Table S2: Comparison of Annual Isotope Fluxes from Sediment Trap F1 and Underlying Sediment Cores

Collection Method	Location	Sampling Depth (m)	Sampling Period	$^{210}Pb_{ex}$ Flux (Bq m^{-2} yr^{-1})	Calculated $^{210}Pb_{ex}$ Inventory (Bq m^{-2})	^{137}Cs Flux (Bq m^{-2} yr^{-1})	^{134}Cs Flux (Bq m^{-2} yr^{-1})
Sediment Trap	F1	500	2011-2012	500 ± 30	16,000 ± 800	92 ± 5	98 ± 4
			2012-2013	210 ± 10	6,800 ± 300	15 ± 0.8	11 ± 0.5
			2013-2014	270 ± 10	8,500 ± 400	44 ± 2	46 ± 2
		3-Year Average ($^{210}Pb_{ex}$) or 2-Year Total (Cs)			**10,500**	**110**	**110**
		1000	2011-2012	600 ± 30	19,100 ± 1000	140 ± 7	143 ± 5
			2012-2013	720 ± 40	23,100 ± 1200	32 ± 2	30 ± 2
			2013-2014	580 ± 30	18,500 ± 1000	31 ± 2	33 ± 1
		3-Year Average ($^{210}Pb_{ex}$) or 2-Year Total (Cs)			**20,200**	**170**	**170**
					$^{210}Pb_{ex}$ Inventory (Bq m^{-2})	^{137}Cs Inventory (Bq m^{-2})	^{134}Cs Inventory (Bq m^{-2})
Sediment Cores	Core 5	1300	7/7/2012		15,400 ± 500	220 ± 10	190 ± 10
	Core 6	1260	5/22/2013		16,800 ± 500	370 ± 10	280 ± 20
			Average Total Inventory		**16,100 ± 700**	**300 ± 80**	**240 ± 50**

NOTES: $^{210}Pb_{ex}$ is decay-corrected to the collection date and all cesium data is decay-corrected to the date of maximum concentrations at the FDNPP (6 April, 2011; Buesseler et al., 2011). Fluxes are adjusted for one year periods starting on opening date as in Table S1. Sediment data from Black and Buesseler, 2014

Supplemental Table S3: Comparison between Sediment Traps

Trap	Depth (m)	Mass Flux (mg m^{-2} d^{-1})	% $CaCO_3$	% Biogenic Silica	% Lithogenic	% Organic Matter	^{137}Cs Flux (mBq m^{-2} d^{-1})	^{134}Cs Flux (mBq m^{-2} d^{-1})	$^{210}Pb_{ex}$ Flux (mBq m^{-2} d^{-1})	$^{137}Cs/^{210}Pb_{ex}$ (Bq Bq^{-1})	Trap Dates
F1	500	482	7.8%	30.1%	51.0%	19.6%	160 ± 8	166 ± 7	1.02 ± 0.05	0.15 ± 0.01	7/19/2011 to 6/15/2013
F1	1000	838	7.3%	24.6%	61.7%	14.9%	340 ± 20	330 ± 10	2.00 ± 0.1	0.17 ± 0.01	8/4/2011 to 7/2/2013
FS1	875	419	12.0%	28.0%	35.0%	26.0%	31 ± 2	32 ± 3	0.98 ± 0.02	0.03 ± 0.002	8/5/2011 to 6/22/2013

NOTES: Percentages and fluxes are averages for the ovelapping time period of close to two years when these traps were deployed at the same time.

References for supplemental text

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