

Table S1. Hydrographic data and size-fractionated Fe speciation data in this study. * Negative value was calculated from the equation $(C-\alpha_{FeL}) = D-\alpha_{FeL} - S-\alpha_{FeL}$. All dissolved Fe data in this study is cited from Nishioka et al. (2020) (<https://www.pnas.org/content/117/23/12665>).

Station	Depth (m)	Potential temperature (°C)	Salinity	σ_θ	Chl- <i>a</i> (µg/L)	NO ₃ ⁻ /NO ₂ ⁻ (µmol/L)	SiO ₂ (µmol/L)	PO ₄ (µmol/L)	DO (µmol/L)	D-Fe (nM)	External Fe (nM)	Internal Fe (nM)	D-L (nM)	Log D-K' _{FeL}	D-Fe' (pM)	D- α_{FeL}	S-Fe (nM)	C-Fe (nM)	S-L (nM)	Log S-K' _{FeL}	S-Fe' (pM)	S- α_{FeL}	C- α_{FeL}	C-Fe' (pM)	
CL2 (47°N, 160°E)	10	6.716	32.852	25.77	0.34	16.71	37.0	1.54	334.4	0.06	0	0.06	2.10 ± 0.25	10.9 ± 0.2	0.42	144									
	16	5.873	32.866	25.88	1.04	16.48	38.2	1.51	347.7	0.07	0	0.07													
	25	5.665	32.870	25.91	0.63	16.44	39.0	1.54	347.9	<0.038	0	<0.038					0.04	0							
	50	2.919	32.947	26.25	0.62	21.05	42.2	1.78	348.7	0.04	0	0.04	2.46 ± 0.61	11.1 ± 0.5	0.11	312	0.09	0	1.33 ± 0.40	10.6 ± 0.5	1.8	49	263	0	
	99	1.743	33.009	26.40	0.09	24.19	45.0	1.95	324.1	0.09	0	0.09	2.18 ± 0.50	12.3 ± 0.6	0.02	4365	0.07	0.02	1.73 ± 0.56	12.2 ± 1.1	0.0	2627	1738	0	
	149	3.397	33.736	26.84	0.03	44.03	92.7	3.02	60.5	0.56	0	0.56					0.04	0.52							
	198	3.490	33.869	26.94	0.01	45.57	102.4	3.11	33.3	0.72	0	0.72	2.34 ± 0.40	12.4 ± 0.5	0.18	3889	0.51	0.21	1.92 ± 0.29	12.3 ± 0.3	0.2	2942	947	0.0	
	397	3.420	34.147	27.17		44.95	126.8	3.08	17.4	0.88	0.08	0.80	5.96 ± 0.44	10.3 ± 0.1	9.21	95	0.62	0.26	1.71 ± 0.42	12.3 ± 0.7	0.3	2226	0*	8.9	
	545	3.211	34.253	27.27		45.01	138.3	3.09	13.9	0.97	0.16	0.80					0.68	0.29	2.15 ± 0.47	12.2 ± 0.7	0.3	2560			
	595	3.136	34.276	27.29		44.97	141.0	3.08	14.8	1.01	0.21	0.80	4.91 ± 0.76	10.7 ± 0.3	5.01	200	0.64	0.37	3.22 ± 0.64	11.4 ± 0.5	0.9	695	0*	4.1	
	791	2.747	34.367	27.40		44.7	152.9	3.08	16.2	1.00	0.20	0.80					0.80	0.20							
	989	2.433	34.436	27.48		44.57	163.1	3.07	21.3	1.14	0.34	0.80	5.24 ± 0.92	10.5 ± 0.2	9.76	116	0.76	0.38	2.41 ± 0.40	12.1 ± 0.5	0.3	2221	0*	9.4	
	1237	2.111	34.503	27.57		43.91	171.0	3.01	34.5	1.09	0.30	0.78					0.84	0.25							
	1481	1.872	34.552	27.62		42.97	175.4	2.96	49.7	1.13	0.36	0.77					0.74	0.40							
	1974	1.519	34.615	27.70		40.96	174.4	2.81	84.2	1.01	0.28	0.73	3.51 ± 0.56	12.3 ± 0.3	0.22	4654	0.83	0.19	2.61 ± 0.62	11.6 ± 0.5	1.1	779	3876	0	
	2464	1.435	34.650	27.73		39.07	168.2	2.67	114	0.97	0.28	0.69					0.60	0.37							
	2954	1.293	34.669	27.76		37.64	162.6	2.57	134.8	0.81	0.15	0.67					0.60	0.22	3.13 ± 0.75	10.7 ± 0.4	4.4	133			
	3443	1.200	34.680	27.77		36.84	158.5	2.5	147.5	0.69	0.04	0.65					0.54	0.15							
	3929	1.133	34.687	27.79		36.3	156.2	2.46	156	0.65	0.01	0.64	5.02 ± 0.75	10.5 ± 0.2	4.74	135	0.45	0.19							
	4416	1.099	34.691	27.79		35.77	155.7	2.44	160.6	0.53	0	0.53					0.39	0.14							
4904	1.082	34.693	27.79		35.73	155.5	2.42	163	0.45	0	0.45	3.47 ± 0.31	10.8 ± 0.2	2.28	195	0.36	0.09	3.72 ± 1.00	10.9 ± 0.6	1.3	273	0*	1.0		
5169	1.076	34.693	27.79		35.71	154.5	2.42	164.2	0.42	0	0.42					0.30	0.12								
CL5 (47°N, 170°W)	10	8.991	32.700	25.32	0.33	14.27	27.5	1.41	309.4	0.09	0	0.09	2.12 ± 0.51	11.4 ± 0.6	0.19	455									
	25	7.857	32.724	25.51	0.50	14.11	27.4	1.39	318.8	0.08	0	0.08													
	34	7.502	32.726	25.56	0.53	14.37	27.5	1.41	318.9	0.07	0	0.07	2.63 ± 0.61	10.6 ± 0.3	0.69	100									
	50	6.373	32.749	25.73	0.55	15.43	28.8	1.48	319.4	0.08	0	0.08	3.00 ± 0.63	10.6 ± 0.4	0.62	127									
	100	4.120	32.898	26.10	0.04	21.46	37.4	1.78	296.8	0.07	0	0.07	2.47 ± 0.38	10.9 ± 0.3	0.35	209									
	149	3.646	33.615	26.72	0.01	33.67	68.4	2.44	153.3	0.40	0	0.40													
	198	3.636	33.761	26.84	0.01	37.28	80.2	2.66	113.9	0.49	0	0.49	2.47 ± 0.46	11.4 ± 0.5	0.90	545									
	397	3.784	34.035	27.04		41.97	106.3	2.94	50.9	0.60	0	0.60	3.16 ± 0.50	11.9 ± 0.3	0.32	1897									
	594	3.450	34.203	27.21		43.66	127.1	3.04	27.1	0.78	0	0.78													
	664	3.315	34.244	27.25		43.89	133.3	3.07	24.8	0.85	0.05	0.80	2.87 ± 0.36	12.4 ± 0.4	0.17	4851									
	792	3.149	34.302	27.31		43.7	139.4	3.06	27.4	0.84	0.05	0.80													
	989	2.757	34.387	27.42		43.89	152.1	3.07	27.7	0.85	0.05	0.80	4.48 ± 0.82	10.8 ± 0.3	3.45	246									
	1236	2.422	34.460	27.50		43.7	162.7	3.06	32.6	1.05	0.25	0.80													
	1483	2.163	34.517	27.57		43.43	169.5	3.03	40.3	0.86	0.07	0.79													
	1975	1.789	34.591	27.66		42.06	175.2	2.92	65.6	0.81	0.05	0.76	4.75 ± 0.45	10.8 ± 0.2	3.15	255									
	2465	1.519	34.636	27.72		40.1	175.3	2.79	95.3	0.74	0.02	0.73													
	2955	1.349	34.661	27.75		38.73	170.7	2.68	123	0.72	0.02	0.70	2.52 ± 0.51	12.1 ± 0.8	0.30	2427									
	3443	1.230	34.676	27.77		37.41	167.0	2.59	137.3	0.69	0.02	0.67													
	3930	1.153	34.685	27.78		36.56	165.3	2.53	149.3	0.63	0	0.63	5.65 ± 1.00	10.5 ± 0.3	4.04	155									
	4416	1.120	34.690	27.79		36.27	167.1	2.5	154	0.60	0	0.60													
4901	1.114	34.691	27.79		36.27	168.2	2.49	154.7	0.58	0	0.58	3.65 ± 0.67	10.8 ± 0.3	2.77	208										
5492	1.105	34.692	27.79		35.95	167.0	2.49	157.1	0.61	0	0.61	4.19 ± 0.73	10.9 ± 0.3	2.19	278										
CL16 (50°N, 145°W)	10	12.182	32.368	24.51	0.52	8.65	17.3	0.98	291.3	0.06	0	0.06	2.39 ± 0.48	12.2 ± 0.6	0.01	3871	0.08	0							
	12	11.711	32.390	24.62	0.58	8.95	17.4	1	296.2	0.05	0	0.05													
	25	11.359	32.397	24.69	0.48	9.76	17.7	1.06	300.9	0.07	0	0.07													
	50	6.479	32.514	25.53	0.18	12.53	19.3	1.25	321.5	0.05	0	0.05	2.01 ± 0.31	11.0 ± 0.3	0.27	191	0.05	0.02							
	99	5.581	33.009	26.03	0.09	19.59	28.4	1.56	261.6	0.09	0	0.09	2.06 ± 0.19	11.0 ± 0.2	0.43	202	0.07	0.02	1.92 ± 0.35	10.8 ± 0.4	0.7	106	96	0	
	149	5.834	33.810	26.63	0.02	26.9	45.9	1.91	189.6	0.17	0	0.17					0.15	0.02							
	199	5.372	33.845	26.72	0.01	31.11	58.3	2.19	152.5	0.21	0	0.21	3.24 ± 0.70	10.8 ± 0.4	1.01	205	0.18	0.03							
	396	4.268	33.985	26.95		40.07	88.7	2.82	71	0.35	0	0.35					0.08	0.27	2.94 ± 0.68	11.4 ± 0.6	0.4	626			
	594	3.745	34.175	27.16		42.94	115.7	3	31.8	0.50	0	0.50	3.62 ± 0.84	11.0 ± 0.4	1.74	285	0.35	0.15							
	792	3.323	34.284	27.28		43.8	132.8	3.07	22	0.57	0	0.57													