

SUPPORTING INFORMATION

MANUSCRIPT TITLE Wavelength Dependence of Fe(II) Photoformation in the Water-Soluble Fraction of Aerosols Collected in Okinawa, Japan

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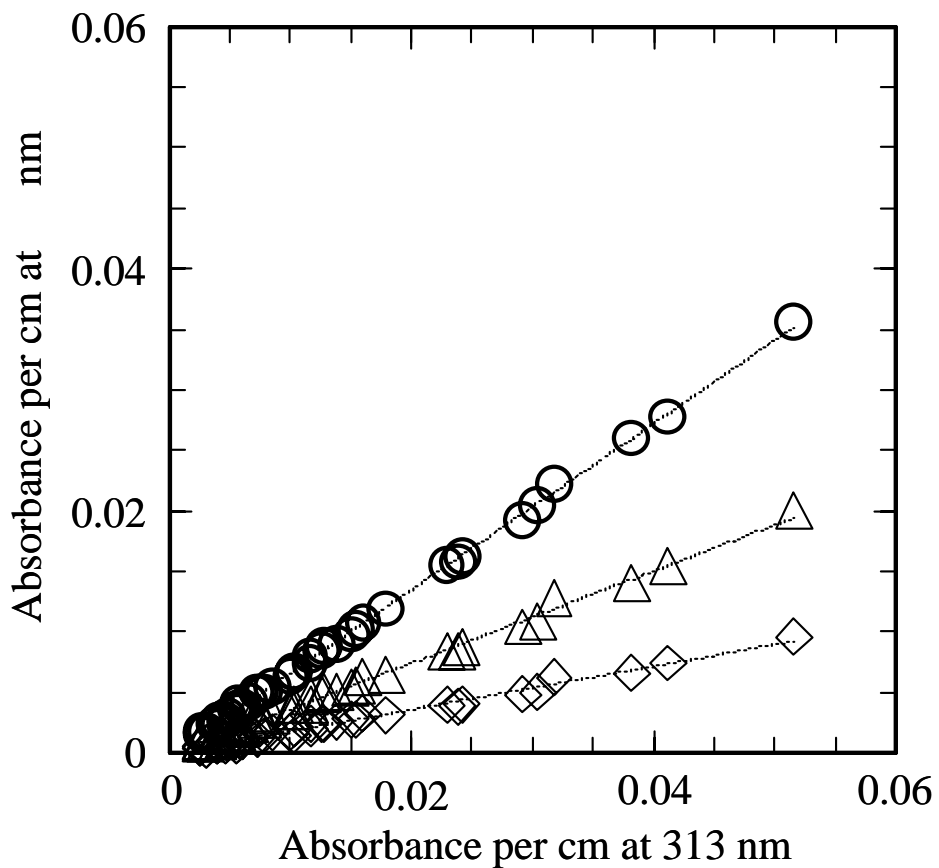


Figure S1. Absorbance of water-soluble fraction (WSF) solutions of aerosol particles collected in Okinawa, Japan at 334 nm (), 366 nm (), 405 nm (), respectively. A 5-cm quartz cell was used for absorbance measurements.

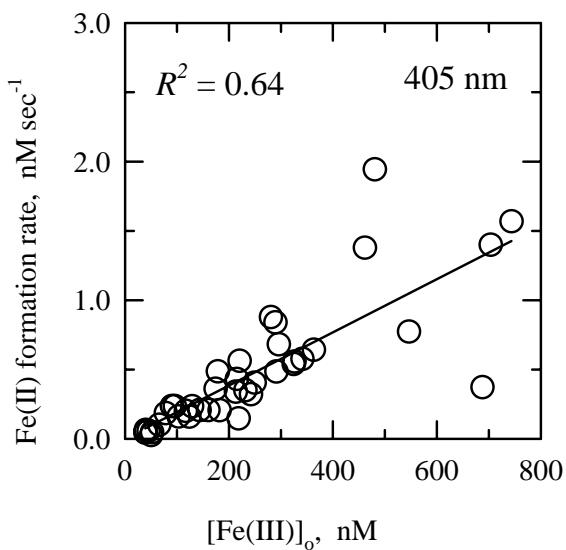
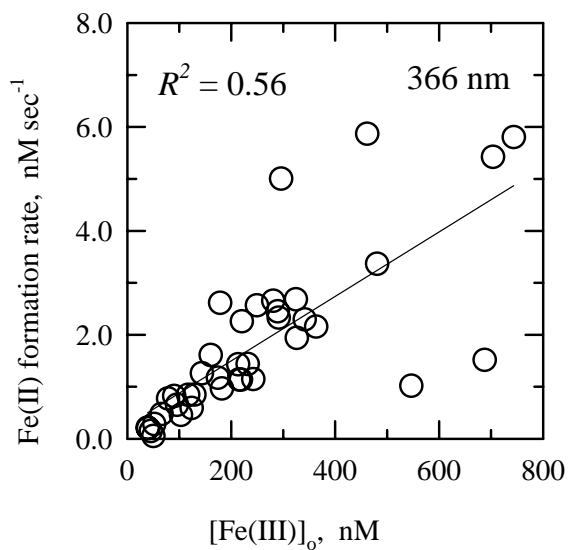
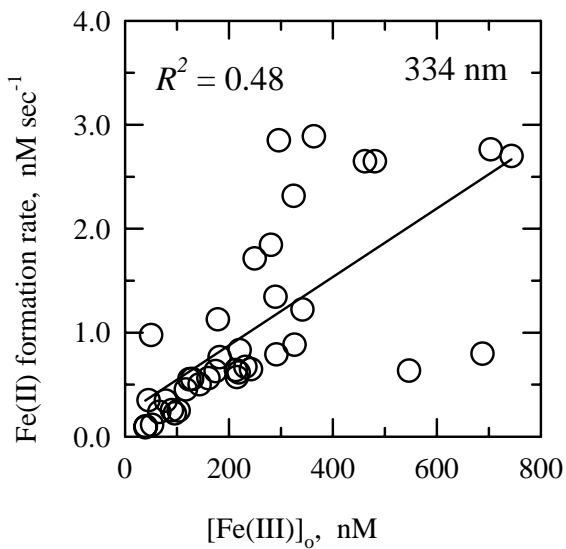
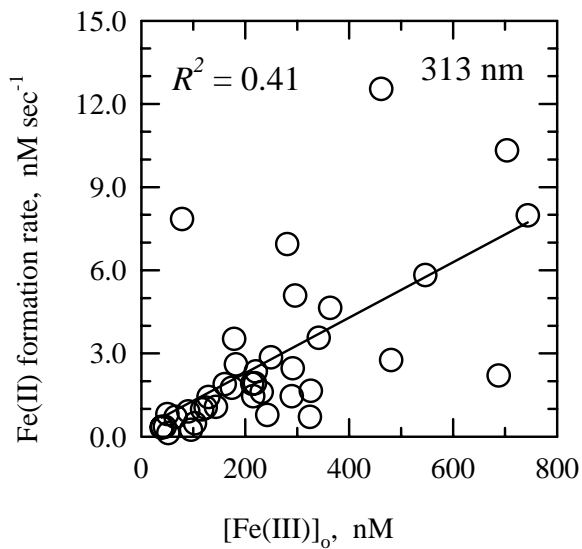


Figure S2. Relationship between $[\text{Fe(III)}]_0$, i.e. $([\text{TDFe}] - [\text{Fe(II)}]_0)$ and Fe(II) photoformation rates.

Table S1. Aerosol sample information

Sample name	Date of collection	Volume of air (m ³)	Aerosol mass (µg m ⁻³)	pH	WSFe (ng m ⁻³)	TDFe (nM)	[Fe(II)] ₀ (nM)	DOC (µM)	Major ions (µM)							
									Cl ⁻	NO ₂ ⁻	Br ⁻	NO ₃ ⁻	SO ₄ ²⁻	Na ⁺	Ca ²⁺	Mg ²⁺
CH050822-29H	Aug.22-29, 2005	5040	10.7	4.01	11.2	841	153	113	10.3	N.D.	N.D.	3.3	105.1	187.5	11.8	27.8
CH050829-05H	Aug.29-Sep.05, 2005	4304	32.3	4.70	4.4	258	39	71	883.0	N.D.	N.D.	13.4	175.3	1010.4	34.2	126.4
CH050919-25H	Sep.19-25, 2005	4571	19.8	3.71	18.7	1248	786	73	13.9	N.D.	N.D.	0.0	276.3	323.0	15.8	46.3
CH050925-03H	Sep.25-Oct.03, 2005	5850	25.7	3.91	2.6	223	44	156	872.4	N.D.	N.D.	67.9	159.1	1228.4	36.9	142.1
CH051003-10H	Oct.03-10, 2005	4924	16.6	5.37	1.7	125	86	87	311.1	N.D.	N.D.	34.2	95.4	523.3	15.8	71.7
CH051010-18H	Oct.10-18, 2005	5126	32.1	4.34	1.6	125	85	121	1146.8	N.D.	N.D.	48.8	130.8	1326.1	36.0	151.1
CH051018-24H	Oct.18-24, 2005	4971	38.4	4.68	5.6	405	192	309	1122.7	N.D.	N.D.	69.9	175.8	1422.2	47.4	159.0
CH051024-31H	Oct.24-31, 2005	5045	22.5	4.15	5.1	375	231	303	289.2	N.D.	N.D.	44.2	160.7	642.6	24.3	83.7
CH051031-07H	Oct.31-Nov.07, 2005	5103	91.7	4.19	6.0	438	278	185	329.9	N.D.	N.D.	40.6	149.8	646.9	25.4	84.5
CH051107-14H	Nov.07-14, 2005	5038	35.1	4.15	18.6	1353	610	349	78.0	N.D.	N.D.	18.0	263.5	574.7	51.3	81.0
CH051121-28H	Nov.21-28, 2005	3311	38.2	4.39	26.7	1347	1165	366	146.9	N.D.	N.D.	41.7	267.3	548.0	37.5	76.7
CH051128-05H	Nov.28-Dec.05, 2005	5802	32.0	3.91	11.8	1015	689	333	582.1	N.D.	N.D.	34.4	258.6	970.6	61.4	125.6
CH051205-12H	Dec.05-12, 2005	4998	25.2	4.34	4.1	308	205	130	628.4	N.D.	N.D.	21.9	147.1	894.4	36.6	114.9
CH051212-19H	Dec.12-19, 2005	4864	34.4	4.74	3.8	270	204	208	828.0	N.D.	N.D.	35.3	172.3	693.0	52.8	122.5
CH051219-26H	Dec.19-26, 2005	4266	33.7	4.42	5.5	345	293	232	438.0	N.D.	N.D.	48.8	155.4	1014.4	43.2	88.5
UR050527-03H	May27-Jun.03, 2005	4916	20.1	5.24	5.3	384	103	172	451.1	N.D.	N.D.	58.5	161.3	498.3	84.0	70.0
UR050603-11H	Jun.03-11, 2005	5831	20.4	4.88	9.7	833	353	233	118.8	N.D.	N.D.	22.5	324.6	491.7	75.1	76.6
UR050611-18H	Jun.11-18, 2005	5062	15.2	5.15	5.4	413	117	203	476.9	N.D.	N.D.	23.3	138.7	528.1	25.2	78.9
UR050618-27H	Jun.18-27, 2005	6239	20.2	4.77	5.1	479	155	230	809.2	N.D.	N.D.	33.5	205.2	836.4	56.1	111.4
UR050627-04H	Jun.27-Jul.04, 2005	5246	23.6	5.43	8.6	684	137	186	72.1	N.D.	N.D.	24.9	332.0	430.1	91.1	70.2
UR050718-25H	Jul.18-25, 2005	5027	26.5	6.31	7.0	534	171	164	216.1	N.D.	N.D.	65.7	253.2	309.1	166.4	55.7
UR050816-22H	Aug.16-22, 2005	4199	26.0	5.25	5.8	357	68	196	91.6	N.D.	N.D.	48.1	80.5	177.0	78.8	28.3
UR050822-29H	Aug.22-29, 2005	5065	21.9	5.29	2.2	158	62	192	30.6	N.D.	N.D.	32.5	67.0	167.9	9.2	25.8
UR050829-05H	Aug.29-Sep.05, 2005	3661	37.0	4.94	1.4	76	31	68	600.2	N.D.	N.D.	18.8	174.3	643.1	74.8	90.1
UR050905-12H	Sep.05-12, 2005	4425	26.5	5.63	0.8	54	4	105	747.5	N.D.	N.D.	46.6	79.9	727.2	77.9	91.7
UR050920-25H	Sep.20-25, 2005	4202	19.5	4.81	8.6	531	189	82	66.7	N.D.	N.D.	23.6	192.0	299.8	70.7	46.7
UR050925-03H	Sep.25-Oct.03, 2005	5081	23.6	5.38	1.3	94	15	141	478.3	N.D.	N.D.	54.2	128.9	670.1	78.0	89.9
UR051003-10H	Oct.03-10, 2005	5091	14.8	4.85	5.6	427	185	129	164.9	N.D.	N.D.	50.3	90.9	278.2	57.2	44.4
UR051010-17H	Oct.10-17, 2005	5674	30.3	4.89	3.1	249	126	190	895.4	N.D.	N.D.	86.9	135.2	1123.7	78.5	136.6
UR051017-24H	Oct.17-24, 2005	4985	29.7	4.85	6.6	495	204	258	561.5	N.D.	N.D.	86.3	159.7	889.3	72.2	114.2
UR051024-31H	Oct.24-31, 2005	5013	17.3	4.57	3.9	291	174	187	154.2	N.D.	N.D.	46.0	98.1	336.0	59.0	49.7
UR051031-07H	Oct.31-Nov.07, 2005	4378	20.1	4.28	8.2	576	361	326	142.9	N.D.	N.D.	59.8	128.9	359.2	61.6	52.1
UR051107-14H	Nov.07-14, 2005	4927	32.2	3.76	31.2	2316	1612	416	82.0	N.D.	N.D.	14.6	307.0	459.1	106.8	72.3
UR051114-21H	Nov.14-21, 2005	5075	27.3	4.72	10.0	505	284	255	498.2	N.D.	N.D.	82.5	149.9	569.4	79.1	99.8
UR051121-28H	Nov.21-28, 2005	3587	41.7	3.92	46.8	2516	2266	444	2.4	N.D.	N.D.	17.9	363.7	316.2	74.8	52.9
UR051128-05H	Nov.28-Dec.05, 2005	4439	34.8	5.01	5.9	393	162	185	553.9	N.D.	N.D.	35.1	162.8	739.6	85.0	101.3
UR051205-12H	Dec.05-12, 2005	5012	24.2	4.85	5.7	426	251	162	379.2	N.D.	N.D.	38.6	151.3	578.7	85.7	77.7
UR051212-19H	Dec.12-19, 2005	4864	43.2	5.24	5.8	412	282	310	487.8	N.D.	N.D.	90.8	210.7	777.6	101.3	102.4
UR051219-26H	Dec.19-26, 2005	4945	22.5	3.65	13.1	1106	1015	438	301.3	N.D.	N.D.	162.8	223.2	609.2	102.6	83.0
Mean		4876	28.4	4.68	8.6	589	343	213	411.9	N.D.	N.D.	44.8	179.8	636.4	61.1	85.2
S. D.		602	13.0	0.59	9.0	547	463	103	323.0	N.D.	N.D.	29.9	74.5	316.1	31.8	33.9
Control Sample		0	N.A.	3.66	N.A.	10	6.2	19.2	6.9	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.A. indicates not available.

N.D. indicates not detectable.

Table S2. Summary of initial rates, steady state Fe(II) concentrations, and apparent quantum yield values at 4 wavelengths

Sample name	Initial rate of Fe(II) photo-formation (nM sec ⁻¹)				Steady state Fe(II) concentration (nM)				Apparent quantum yield of Fe(II) photo-formation			
	313 nm	334 nm	366 nm	405 nm	313 nm	334 nm	366 nm	405 nm	313 nm	334 nm	366 nm	405 nm
CH050822-29H	2.2	0.8	1.5	0.4	757	717	817	656	0.019	0.020	0.013	0.007
CH050829-05H	1.9	0.6	1.1	0.1	356	359	353	374	0.033	0.036	0.019	0.006
CH050919-25H	12.5	2.6	5.9	1.4	440	394	466	445	0.199	0.147	0.132	0.158
CH050925-03H	3.5	1.1	2.6	0.5	404	390	390	611	0.042	0.051	0.047	0.019
CH051003-10H	0.3	0.1	0.2	0.0	493	543	405	354	0.006	0.006	0.005	0.003
CH051010-18H	0.4	0.1	0.2	0.1	236	175	209	198	0.004	0.004	0.004	0.002
CH051018-24H	1.9	0.6	1.4	0.3	119	96	121	83	0.010	0.009	0.008	0.004
CH051024-31H	1.1	0.5	1.3	0.2	51	51	68	64	0.005	0.004	0.010	0.002
CH051031-07H	1.9	0.6	1.6	0.2	64	53	17	10	0.013	0.012	0.012	0.003
CH051107-14H	8.0	2.7	5.8	1.6	407	398	419	378	0.021	0.018	0.016	0.009
CH051121-28H	2.6	0.8	1.0	0.2	76	75	87	71	0.006	0.005	0.002	0.001
CH051128-05H	1.7	0.9	1.9	0.6	316	314	323	303	0.003	0.005	0.004	0.003
CH051205-12H	0.5	0.3	0.5	0.2	215	214	225	205	0.003	0.004	0.003	0.003
CH051212-19H	0.7	0.2	0.5	0.1	423	408	437	389	0.002	0.002	0.001	0.001
CH051219-26H	0.1	0.1	0.3	0.0	262	261	277	264	0.000	0.001	0.001	0.000
UR050527-03H	6.9	1.8	2.7	0.9	489	493	536	498	0.050	0.043	0.020	0.014
UR050603-11H	2.8	2.6	3.4	1.9	2143	2117	2175	2057	0.009	0.030	0.011	0.019
UR050611-18H	5.1	2.8	5.0	0.7	465	469	474	438	0.053	0.110	0.059	0.026
UR050618-27H	0.7	2.3	2.7	0.5	2489	2434	2450	2437	0.006	0.077	0.028	0.016
UR050627-04H	5.8	0.6	1.0	0.8	299	291	312	290	0.050	0.016	0.009	0.018
UR050718-25H	4.6	2.9	2.2	0.6	366	377	387	352	0.027	0.054	0.013	0.011
UR050816-22H	1.4	1.3	2.5	0.8	372	372	377	360	0.006	0.017	0.010	0.008
UR050822-29H	0.2	0.2	0.7	0.2	1067	1063	1078	1066	0.002	0.006	0.006	0.005
UR050829-05H	0.4	0.3	0.1	0.1	687	562	731	502	0.004	0.015	0.002	0.002
UR050905-12H	0.8	1.0	0.1	0.0	244	205	228	210	0.005	0.020	0.000	0.000
UR050920-25H	3.6	1.2	2.3	0.6	155	112	99	78	0.023	0.024	0.015	0.011
UR050925-03H	7.8	0.3	0.8	0.2	1235	1200	1215	1197	0.062	0.009	0.007	0.004
UR051003-10H	0.8	0.6	1.1	0.3	208	199	210	192	0.006	0.020	0.013	0.012
UR051010-17H	1.0	0.6	0.6	0.2	112	112	112	107	0.005	0.009	0.003	0.002
UR051017-24H	2.5	0.8	2.3	0.5	115	113	123	111	0.012	0.009	0.025	0.007
UR051024-31H	1.0	0.5	0.8	0.2	341	332	355	325	0.003	0.003	0.005	0.001
UR051031-07H	1.5	0.6	1.1	0.4	326	320	340	318	0.007	0.006	0.011	0.005
UR051107-14H	10.3	2.8	5.4	1.4	414	413	433	393	0.020	0.014	0.010	0.005
UR051114-21H	2.4	0.8	2.3	0.6	1173	1135	1190	1098	0.009	0.010	0.010	0.005
UR051121-28H	2.9	1.7	2.6	0.4	1323	1301	1320	1300	0.005	0.007	0.004	0.001
UR051128-05H	1.6	0.7	1.4	0.3	886	886	886	853	0.006	0.006	0.005	0.005
UR051205-12H	1.8	0.6	1.2	0.4	267	262	277	257	0.007	0.006	0.004	0.006
UR051212-19H	1.4	0.6	0.8	0.2	238	251	255	246	0.002	0.002	0.001	0.001
UR051219-26H	0.9	0.3	0.8	0.2	325	314	308	303	0.001	0.001	0.001	0.001
Mean	2.8	1.0	1.8	0.5	522	507	525	497	0.019	0.021	0.014	0.010
S. D.	2.9	0.9	1.5	0.4	532	524	533	520	0.034	0.031	0.023	0.025