

Supporting Materials for

**Change of iron species and iron solubility in
Asian dust during the long-range transport
from western China to Japan**

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Summary of the number in Supplementary Information

- the number of pages: 7 (including this sheet)
- the number of figures: 4
- the number of table: 3

Table S1. Sampling sites and periods.

Station	Location	Latitude (N), Longitude (E)	Height (meters above S. L.)	Sampling Period (low-volume)	Sampling Period (high-volume)
Aksu	The Aksu Water Budget Experiment Station, Chinese Academy of Science	40°37′, 80°44′	7	15–21 March, 2002	15–18 March, 2002
Qingdao	Ocean University of China	36°07′, 120°33′	80	20–23 March, 2002	
Tsukuba	Geological Survey of Japan	36°06′, 140°14′	44	20–31 March, 2002	20–26 March, 2002

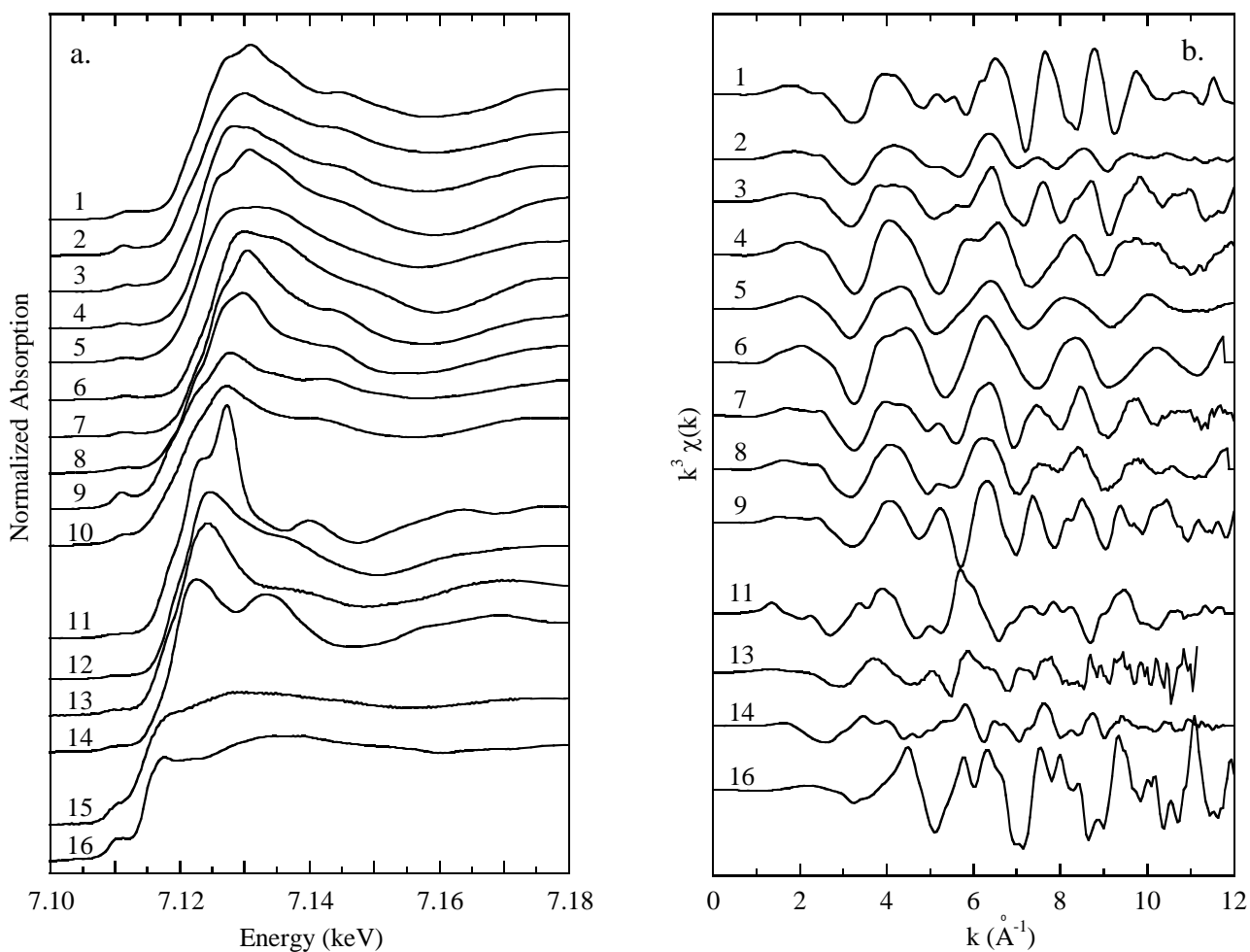


Figure S1. (a) Normalized Fe K-edge XANES and (b) normalized k^3 -weighted EXAFS spectra for various reference materials. 1 hematite (α - Fe_2O_3); 2 ferrihydrite; 3 goethite (α - FeOOH); 4 Fe(III) oxalate; 5 Fe(III) citrate; 6 Fe(III) sulfate; 7 smectite (SWy-2); 8 illite (IMt-1); 9 magnetite (Fe_3O_4); 10 Fe (II) oxide; 11 chlorite (CCa-2); 12 Fe(II) sulfate; 13 fayalite (Fe_2SiO_4); 14 siderite (FeCO_3); 15 pyrrhotite (Fe_7S_8); 16 pyrite (FeS_2). SWy-2, IMt-1, and CCa-2 were obtained from the Source Clays Repository of the Clay Mineral Society.

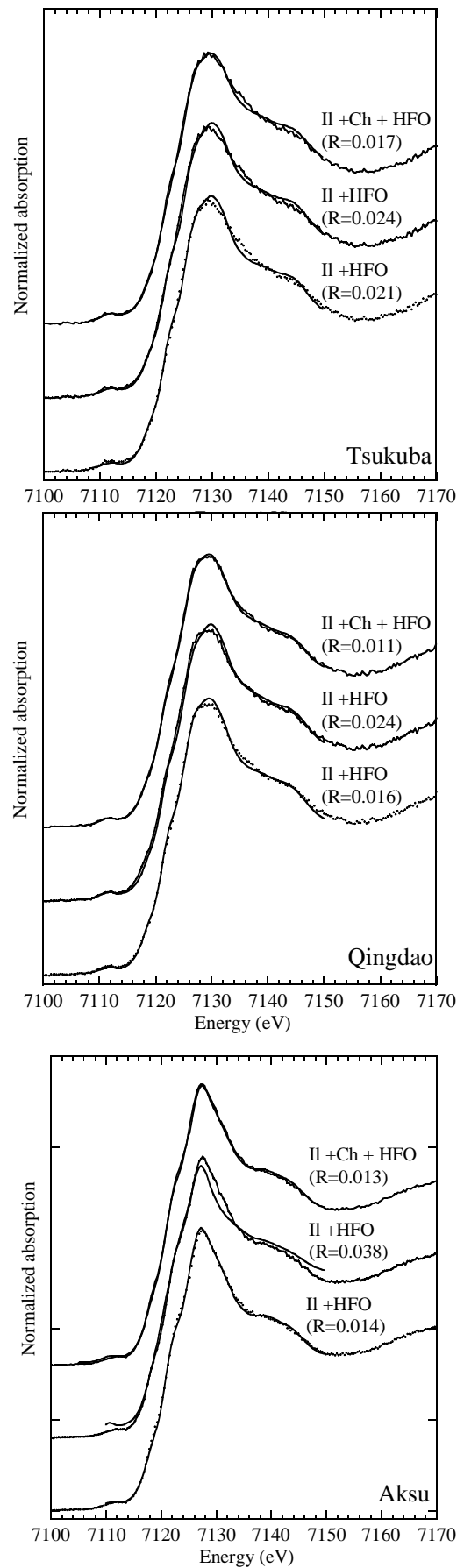


Figure S2. Examples of fitting of XANES spectra for aerosols collected in Aksu, Qingdao, and Tsukuba, showing that three components are needed to fit the spectra. II: illite; Ch: chlorite; HFO: ferrihydrite.

Table S2. Results of Fe speciation (mol%) in aerosols by fitting of XANES and EXAFS spectra (FY mode) with the R values. The results for XANES measured in CEY mode are also presented.

Aksu, FY mode					Aksu, CEY mode				
Stage	Illite	Chlorite	Ferrihydrite	R value (%)	Stage	Illite	Chlorite	Ferrihydrite	R value (%)
0	72.3±7.4	22.0±1.6	5.6±7.6	1.0	0	75.8±5.3	17.9±1.0	6.3±5.4	1.9
	54.3±2.9	35.5±1.2	10.2±3.1	5.1					
1	62.4±5.4	27.2±0.8	10.4±5.4	1.3	1	66.2±5.8	17.5±1.4	16.3±6.0	0.9
	61.8±5.7	25.0±2.4	13.2±6.2	9.0					
2	63.9±6.6	29.3±1.4	6.8±6.8	1.7	2	70.5±5.3	17.4±1.2	12.1±5.4	1.1
	37.7±2.9	31.0±1.2	31.2±3.1	5.2					
3	70.5±4.5	23.5±1.0	6.0±4.6	1.2	3	71.9±3.7	24.1±0.9	4.1±3.8	4.8
	59.3±3.0	28.0±1.3	12.7±3.3	7.3					
4	72.3±4.4	23.0±0.7	4.6±4.5	1.3	4	72.2±9.4	18.9±2.0	8.8±4.6	0.9
	56.6±2.6	30.0±1.1	13.4±2.8	5.7					
Qingdao, FY mode					Qingdao, CEY mode				
Stage	Illite	Chlorite	Ferrihydrite	R value (%)	Stage	Illite	Chlorite	Ferrihydrite	R value (%)
0	54.3±5.1	18.4±0.6	27.3±5.1	1.4	0	60.7±8.6	3.9±0.7	36.3±5.4	3.3
	65.7±3.7	10.1±1.5	24.2±4.0	8.2					
1	67.0±4.8	14.4±0.6	18.6±4.8	1.2	1	63±3.9	0	37±3.9	2.9
2	63.8±4.5	17.6±0.5	18.6±4.5	1.5	2	60.1±8.7	4.4±0.7	35.5±8.7	2.6
	69.2±5.4	7.6±2.3	23.2±5.8	6.9					
3	68.7±4.5	9.8±0.5	21.5±4.5	1.4	3	75.6±6.8	5.4±6.8	19±6.8	5.6
4	73.4±6.7	12.1±0.8	14.5±6.8	1.5	4	69.0±3.4	0	31.0±3.4	3.3
	75.7±4.1	10.8±1.7	13.5±4.5	9.3					
Tsukuba, FY mode					Tsukuba, CEY mode				
Stage	Illite	Chlorite	Ferrihydrite	R value (%)	Stage	Illite	Chlorite	Ferrihydrite	R value (%)
0	58.3±5.8	9.2±0.9	32.6±5.9	1.9	0	49.7±6.9	3.8±0.6	46.4±6.9	2.7
	69.6±4.8	1.0±2.0	29.4±5.2	10.0					
1	74.0±5.8	4.6±1.0	21.3±5.8	1.8	1	50.7±5.7	4.0±0.5	45.3±5.7	1.3
2	61.8±6.2	9.7±1.0	28.9±6.3	1.9	2	58.4±0	4.4±0.7	41.6±0	2.2
	57.9±4.7	4.1±2.0	37.9±5.1	8.4					
3	65.9±5.0	6.4±0.8	27.7±5.0	1.7	3	64.1±4.0	0	35.9±4.0	5.6
4	69.3±5.7	8.5±0.9	22.2±5.8	2.3	4	65.3±3.4	3.8±1.0	30.9±11.7	5.4
	75.7±4.1	1.8±1.7	22.5±4.5	9.3					

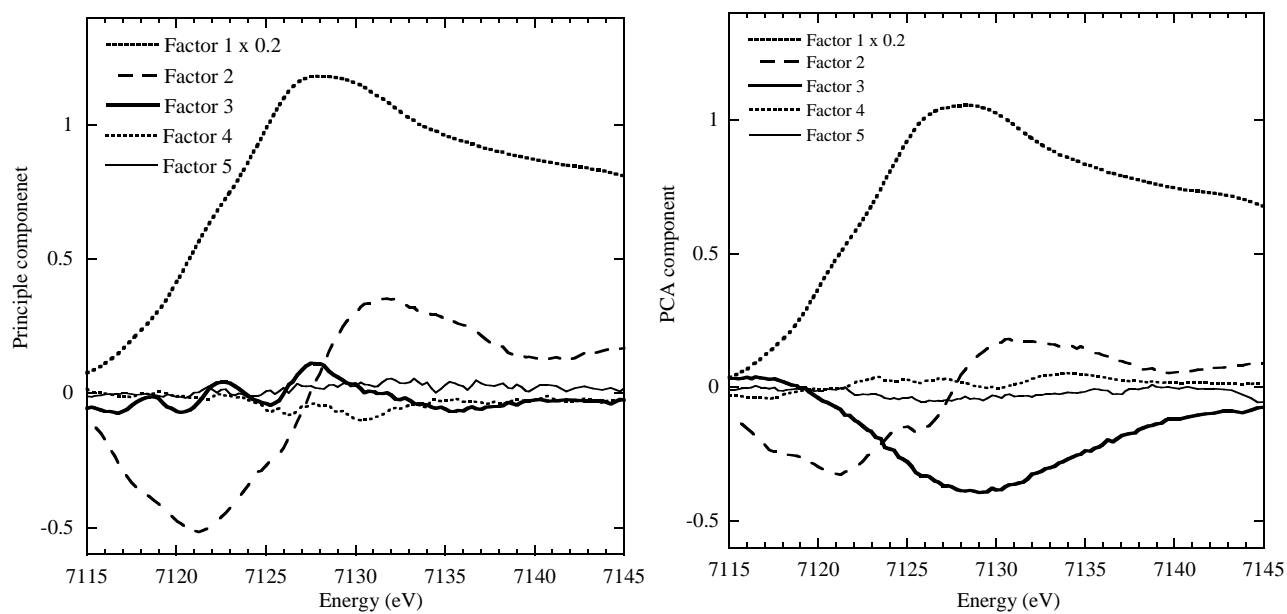


Figure S3. Abstract components of absorbance, obtained from experimental XANES spectra for Fe in aerosols in FY and CEY mode using PCA, suggesting that three or four end members are necessary to the original spectra.

Table S3. PCA analysis of all the XANES spectra in fluorescence mode.

Component	Eignevalues	Variance	Cumulative variance
1	14.891915	0.992794	0.992794
2	0.104224	0.006948	0.999743
3	0.001834	0.000122	0.999865
4	0.000603	0.00004	0.999905
5	0.000389	0.000026	0.999931
6	0.000252	0.000017	0.999948
7	0.000161	0.000011	0.999959
8	0.000152	0.00001	0.999969

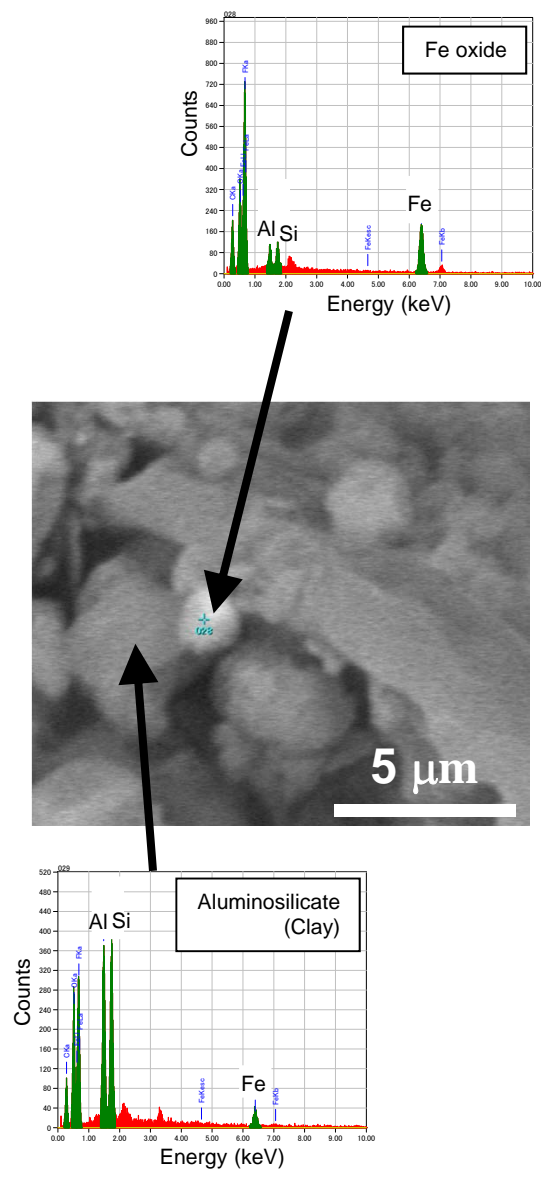


Figure S4. SEM image of aerosol particles collected on stage 1 in Tsukuba in the dust period. Small particle of Fe oxide is associated with clay particles.