Geochemistry, Geophysics, Geosystems

Supporting Information for

Preliminary Evidence of Transport-Limited Chemical Weathering and Element Immobility in the Ganges Tidal Delta Plain of Bangladesh

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Contents of this file

Figures S1 to S8

Introduction

Figures S1-S4 are maps of sites where samples were collected. Figures S5 – S9 present additional compositional information for water, extract, soil, and sediment samples. Table S1 includes results of quantitative powder x-ray diffraction analysis of clay minerals in four tidal channel sediment samples. Table S2 lists summary statistics for measured D(solid/water) values. Table S3 lists summary statistics for measured D(solid/extract) values.

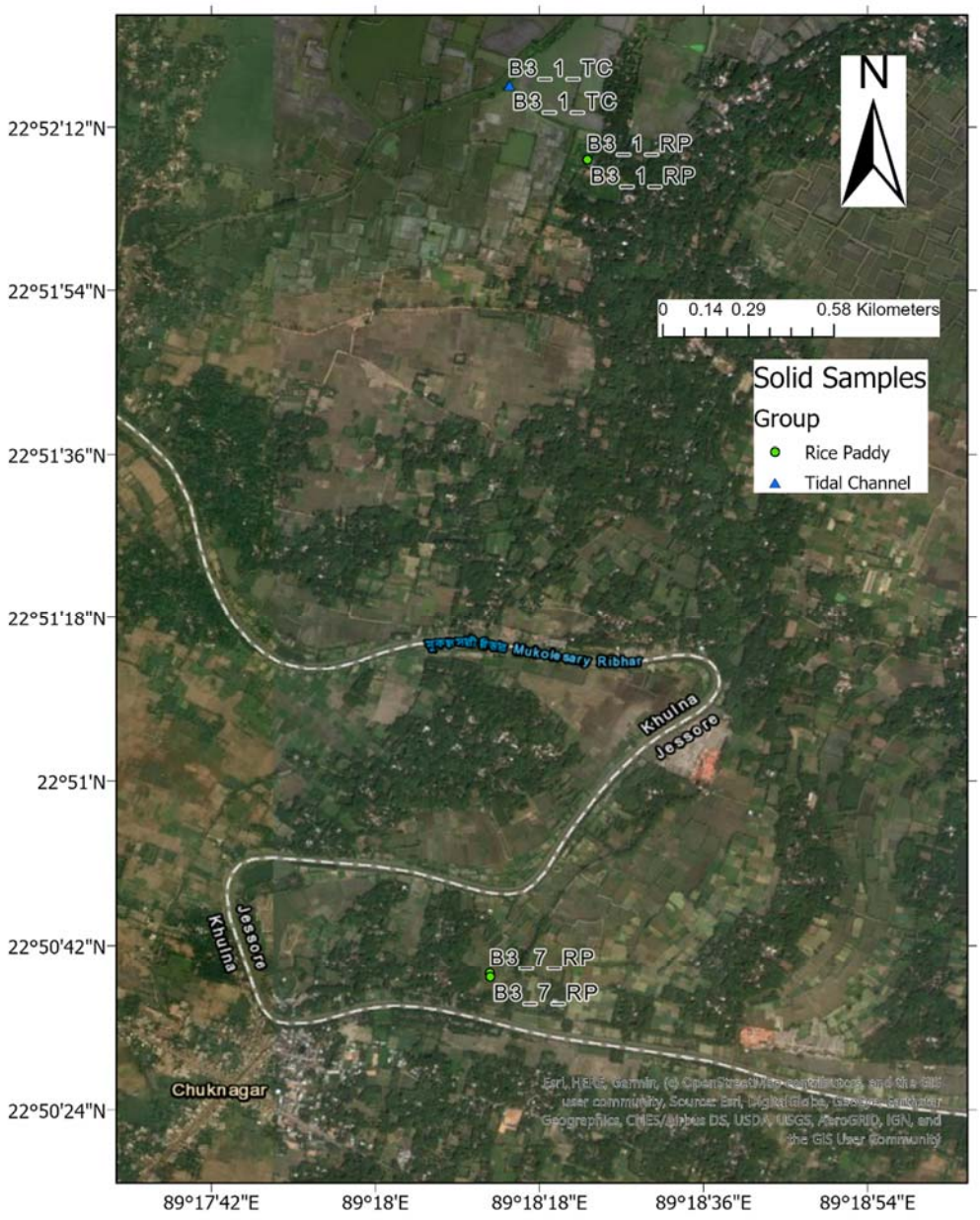

Figure S1. Map of site B3 showing locations of solid samples labeled as Site_Sample #_Sample type. Water samples were collected from the same locations. The sample types are RP rice paddy, TC tidal channel, and SB Sundarbans. GPS coordinates for each sample are in the Excel file at https://doi.org/10.17632/6z6bdxrkkb.1

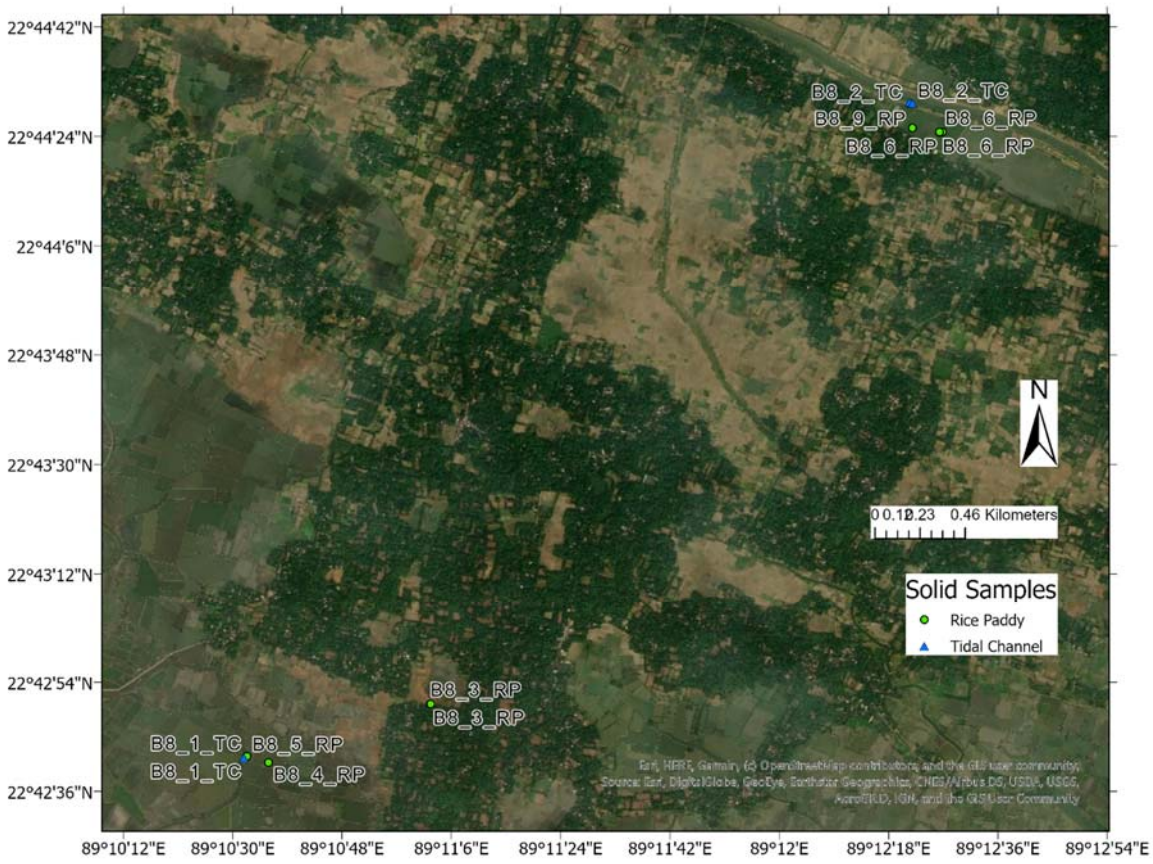

Figure S2. Map of site B8 showing locations of solid samples labeled as Site_Sample #_Sample type. Water samples were collected from the same locations. The sample types are RP rice paddy, TC tidal channel, and SB Sundarbans. GPS coordinates for each sample are in the Excel file at https://doi.org/10.17632/6z6bdxrkkb.1

Figure S3. Map of site B9 showing locations of solid samples labeled as Site_Sample #_Sample type. Water samples were collected from the same locations. The sample types are RP rice paddy, TC tidal channel, and SB Sundarbans. GPS coordinates for each sample are in the Excel file at https://doi.org/10.17632/6z6bdxrkkb.1

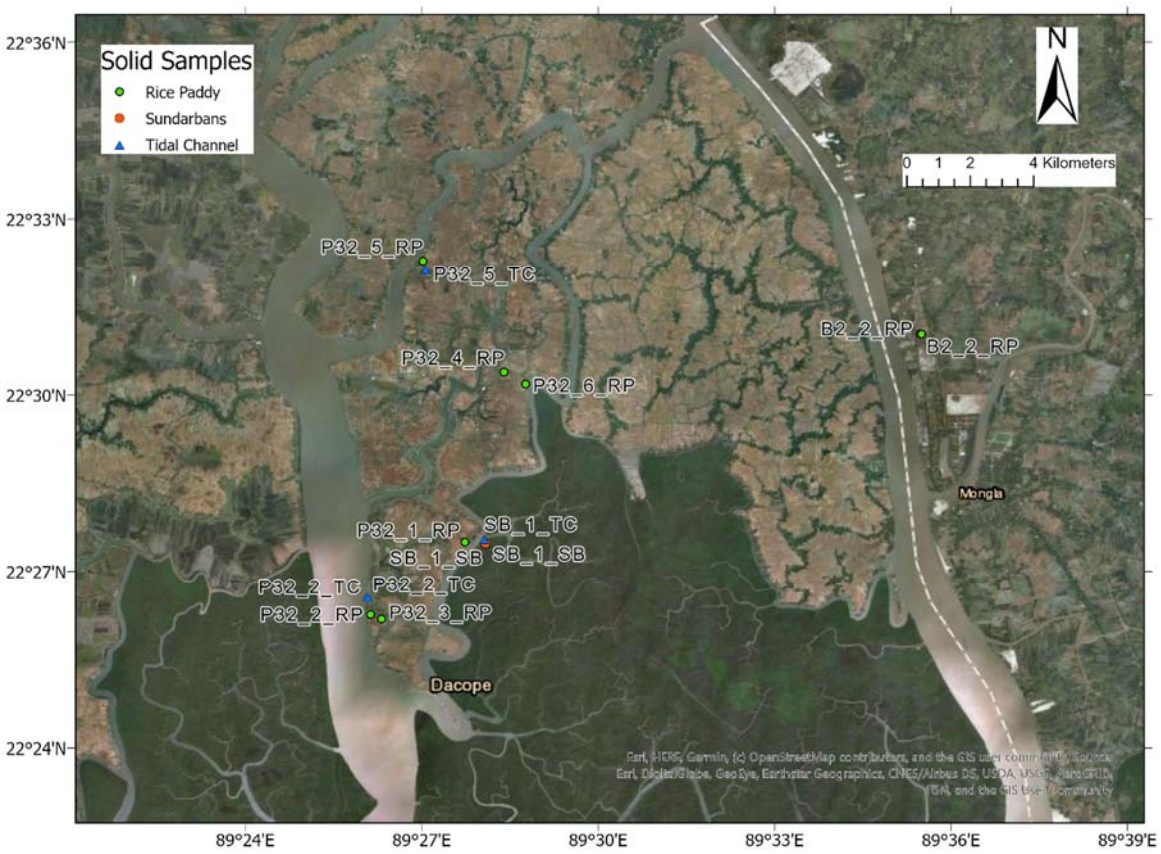

Figure S4. Map of sites B2, P32 (Polder 32), and SB (Sundarbans) showing locations of solid samples labeled as Site_Sample #_Sample type. Water samples were collected from the same locations. The sample types are RP rice paddy, TC tidal channel, and SB Sundarbans. GPS coordinates for each sample are in the Excel file at https://doi.org/10.17632/6z6bdxrkkb.1

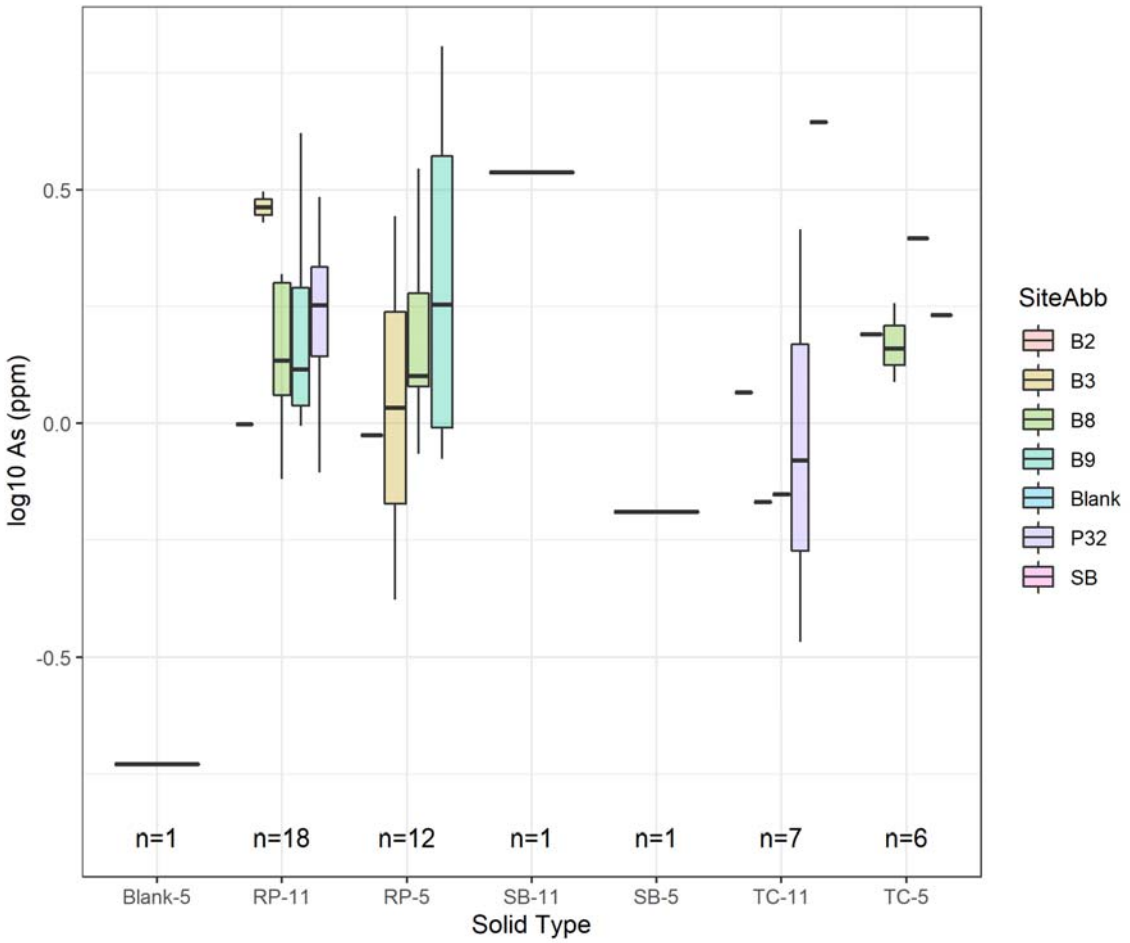

Figure S5. Boxplot of log_{10} As concentration in ppm of solid samples classified by group (rice paddy soil RP or tidal channel sediment TC), month (dry season May=5, wet season November=11), and site. Solid types are RP = rice paddy, SB = Sundarbans, and TC = tidal channel. Sample count=n.

Fig. S6. Map showing location of tidal channel sediment samples that were analyzed for clay mineralogy using powder x-ray diffraction (results in Table S1).

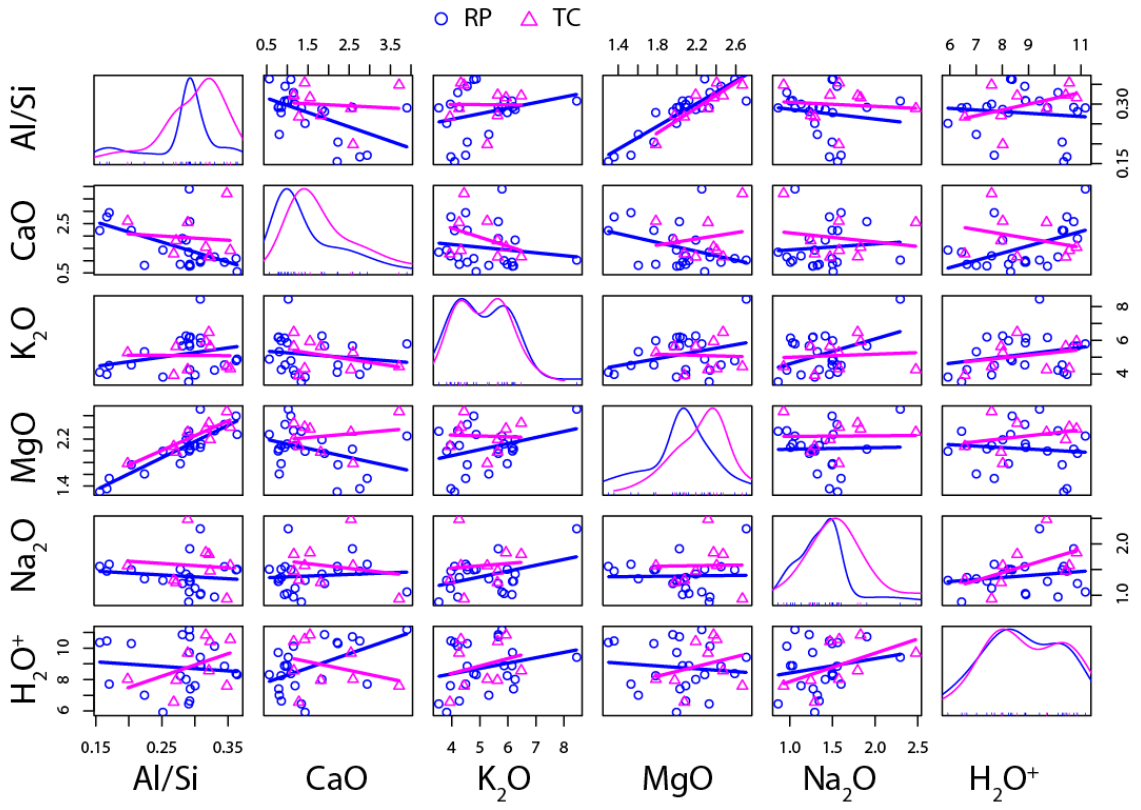

Figure S7. Scatterplot matrix of compositions of tidal channel sediment TC in pink and rice paddy soil RP compositions in blue from both wet and dry seasons. Distributions of measurements are shown in the center diagonal, and linear regressions of tidal channel sediment and rice paddy soil data are shown in each plot.

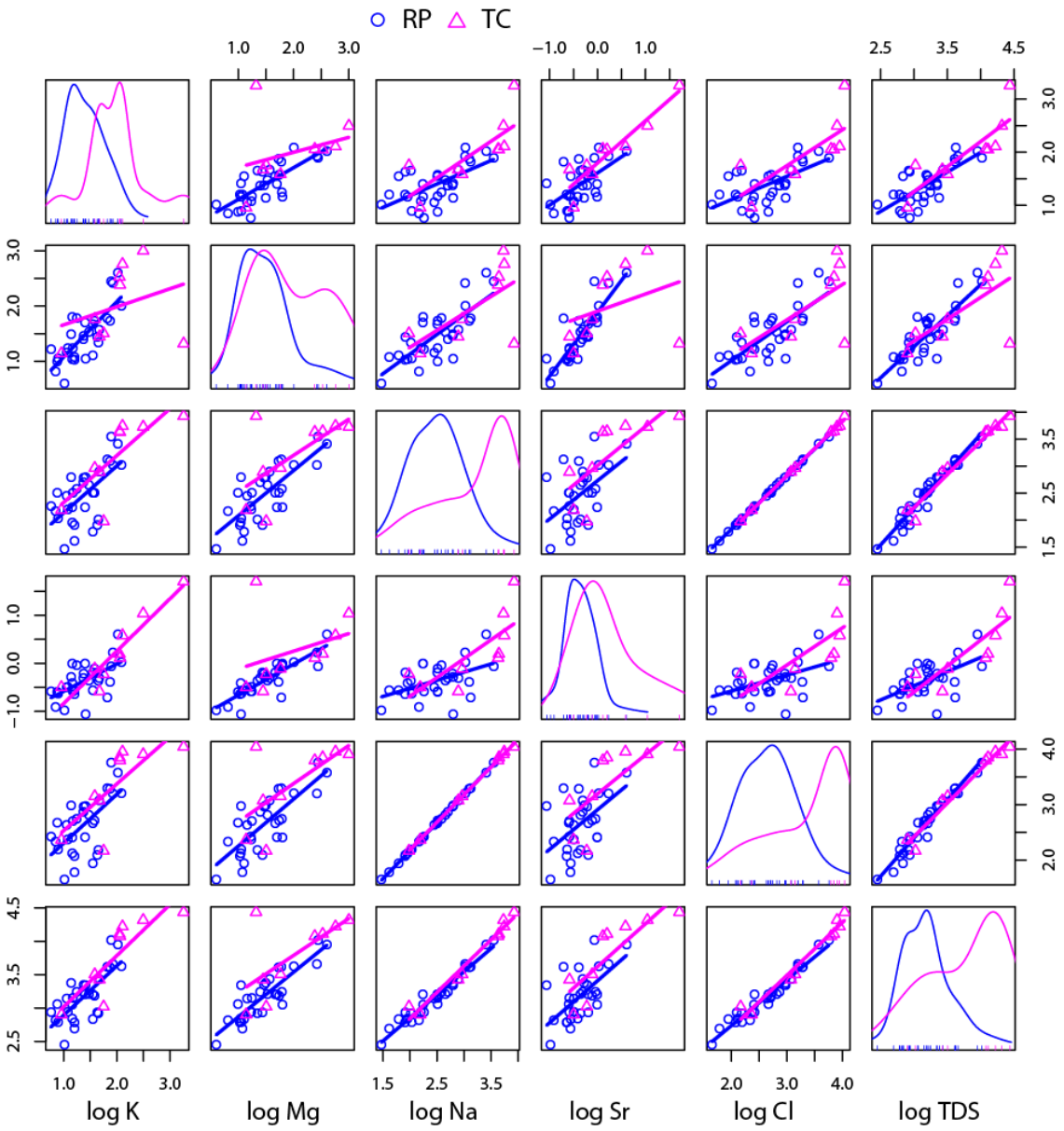

Figure S8. Scatterplot matrix of $\log_{10}$ concentrations of conservative species in extract solutions from rice paddy soils RP in pink and tidal channel sediment samples TC in blue from both wet and dry seasons. Distributions of measurements are shown in the center diagonal, and linear regressions of tidal channel sediment and rice paddy soil data are shown in each plot.

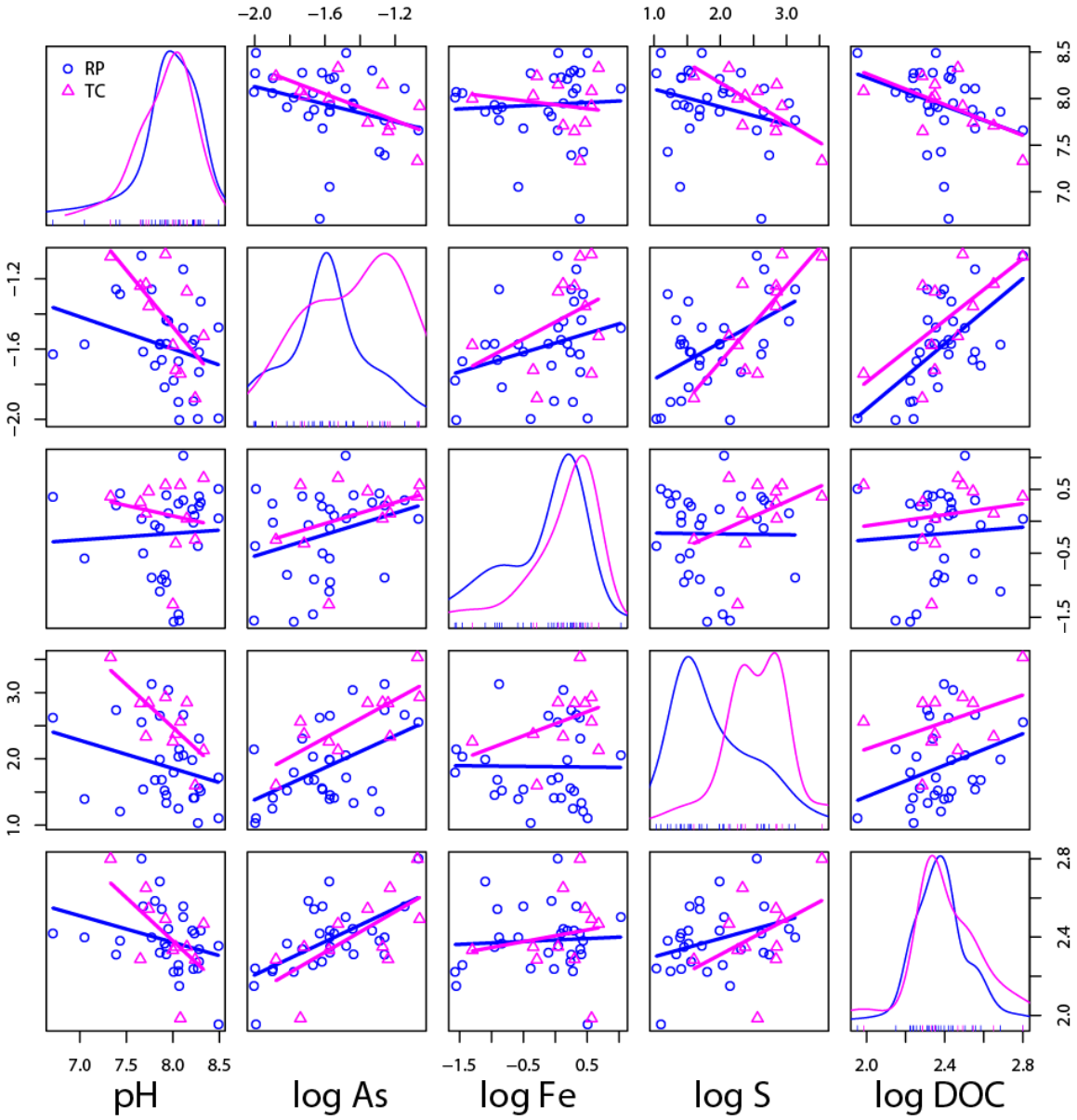

Figure S9. Scatterplot matrix of pH and $\log_{10}$ concentrations of nonconservative species in extract solutions from rice paddy soils RP and tidal channel sediment TC samples from both wet and dry seasons. Distributions of measurements are shown in the center diagonal, and linear regressions of tidal channel sediment and rice paddy soil data are shown in each plot.

Table S1: Quantitative powder XRD clay mineralogy results

3-R-I		Peak Position	Area	Area/MIF	% Composition
	Smectite (glycol)	5.2	0	0	0.00
	Illite (air)	8.8	20.9	5.225	49.41
	Kaolinite (air)	12.3	10.7		
	Chlorite (cook)	12.3	6.25	3.12625	29.56
	Kaolinite (difference)	12.3	4.45	2.22375	21.03
				10.575	100.00

5.1-R-I		Peak Position	Area	Area/MIF	% Composition
	Smectite (glycol)	5.2	0	0	0.00
	Illite (air)	8.8	14.8	3.7	44.79
	Kaolinite (air)	12.3	9.12		
	Chlorite (cook)	12.3	0	0	0.00
	Kaolinite (difference)	12.3	9.12	4.56	55.21
				8.26	100.00

8.7-I		Peak Position	Area	Area/MIF	% Composition
	Smectite (glycol)	5.2	0	0	0.00
	Illite (air)	8.8	31.1	7.775	51.58
	Kaolinite (air)	12.3	14.6		
	Chlorite (cook)	12.3	0	0	0.00
	Kaolinite (difference)	12.3	14.6	7.3	48.42
				15.075	100.00

8.9-R-I		Peak Position	Area	Area/MIF	% Composition
	Smectite (glycol)	5.2	0	0	0.00
	Illite (air)	8.8	29.7	7.425	52.38
	Kaolinite (air)	12.3	13.5		
	Chlorite (cook)	12.3	7.54	3.7719	26.61
	Kaolinite (difference)	12.3	5.96	2.9781	21.01
				14.175	100.00

Table S2: Summary statistics for measured D(solid/water) values

	n	mean	sd	median	min	max	range	skew	kurtosis
logKdAl	12	6.29	0.15	6.26	6.06	6.53	0.46	0.22	-1.06
logKdAs	12	2.86	0.67	3.01	1.35	3.97	2.62	-0.57	0.01
logKdBa	12	2.96	0.44	2.80	2.42	3.63	1.21	0.26	-1.68
logKdCa	12	2.12	0.29	2.13	1.68	2.68	1.00	0.28	-0.86
logKdCo	12	5.46	0.54	5.66	4.35	6.18	1.83	-0.99	-0.26
logKdCr	12	4.71	0.28	4.73	4.22	5.27	1.05	0.11	-0.67
logKdCu	12	4.21	0.26	4.16	3.80	4.78	0.97	0.65	-0.23
logKdFe	11	7.35	1.04	7.44	5.36	8.62	3.26	-0.59	-0.90
logKdK	12	3.52	0.36	3.52	3.01	4.04	1.03	-0.01	-1.57
logKdMg	12	2.49	0.30	2.45	2.12	2.97	0.85	0.41	-1.33
logKdMn	12	5.23	1.36	5.80	2.68	6.46	3.78	-0.90	-0.97
logKdMo	12	3.94	0.52	3.80	3.13	4.66	1.53	0.03	-1.71
logKdNa	12	1.48	0.47	1.39	1.02	2.58	1.56	0.98	-0.15
logKdNi	12	4.88	0.48	5.05	3.88	5.68	1.79	-0.49	-0.51
logKdP	8	4.70	1.00	4.75	2.97	5.95	2.98	-0.27	-1.26
logKdS	9	1.04	0.65	0.95	0.06	2.09	2.03	0.30	-1.19
logKdSb	12	3.42	0.65	3.62	2.02	4.22	2.19	-0.71	-0.79
logKdSe	2	2.51	0.83	2.51	1.92	3.10	1.18	0.00	-2.75
logKdSi	12	4.94	0.46	5.01	3.95	5.53	1.58	-1.00	-0.13
logKdSr	12	2.33	0.23	2.33	2.01	2.67	0.67	-0.01	-1.65
logKdV	12	4.56	0.48	4.68	3.57	5.17	1.60	-0.67	-0.82
logKdZn	12	3.60	0.48	3.42	3.28	4.63	1.35	1.47	0.36

Table S3: Summary statistics for measured D(solid/extract) values

	n	mean	sd	median	trimmed	min	max	range	skew	kurtosis
logKdAl	31	5.34	0.67	5.15	5.28	4.24	7.54	3.30	1.15	1.67
logKdAs	37	2.40	0.40	2.37	2.38	1.79	3.22	1.43	0.28	-0.83
logKdBa	37	4.38	0.31	4.37	4.38	3.81	4.96	1.14	-0.09	-1.15
logKdCa	30	2.52	0.69	2.54	2.59	0.60	3.67	3.06	-0.75	0.49
logKdCo	36	4.53	0.65	4.48	4.50	3.51	6.10	2.59	0.45	-0.57
logKdCr	34	4.37	0.54	4.36	4.32	3.38	6.60	3.22	1.85	5.98
logKdCu	34	3.08	0.69	3.16	3.09	1.83	4.18	2.35	-0.25	-1.17
logKdFe	36	5.16	0.66	5.04	5.13	4.04	6.69	2.66	0.46	-0.42
logKdK	37	3.64	0.53	3.61	3.66	2.03	4.51	2.48	-0.53	0.48
logKdMg	37	3.08	0.60	3.22	3.13	1.67	3.98	2.31	-0.74	-0.33
logKdMn	37	3.90	0.87	4.04	3.97	1.97	5.07	3.10	-0.59	-0.62
logKdMo	37	2.85	0.39	2.93	2.85	1.98	3.59	1.61	-0.24	-0.34
logKdNa	36	1.86	0.68	1.86	1.87	0.46	3.28	2.82	-0.20	-0.49
logKdNi	37	3.81	0.29	3.85	3.83	3.18	4.38	1.20	-0.49	-0.35
logKdP	23	3.75	0.43	3.73	3.71	3.16	4.85	1.69	0.76	0.13
logKdS	12	0.85	0.78	1.06	0.91	-0.68	1.77	2.45	-0.57	-1.01
logKdSb	37	2.28	0.48	2.45	2.33	1.12	2.95	1.84	-0.90	-0.24
logKdSe	8	1.50	0.55	1.68	1.50	0.53	2.19	1.66	-0.49	-1.28
logKdSi	25	4.91	0.22	4.92	4.91	4.50	5.35	0.85	0.03	-0.74
logKdSr	33	2.79	0.67	2.85	2.87	0.62	3.65	3.03	-1.30	1.68
logKdV	37	4.09	0.38	4.15	4.11	3.22	4.73	1.51	-0.42	-0.79
logKdZn	29	3.74	1.02	4.04	3.71	2.23	5.62	3.39	0.04	-1.34