Supporting Information

Pu and ^{137}Cs in Yangtze River estuary sediments: Distribution and source identification

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TABLE 1S. Locations of the sampling stations and the grain size distributions in surface sediment from the Yangtze River estuary and its upper basin.

Stations	Long. (° E)	Lat. (° N)	Clay[a] (%)	Silt[a] (%)	Sand[a] (%)
A2	122.00	32.50	14.85	66.38	18.75
A5	123.00	32.50	13.71	39.75	46.53
A7	124.00	32.50	10.29	30.74	58.96
B3	122.50	32.00	7.42	25.63	66.94
B7	124.00	32.00	7.79	31.19	61.01
C2	122.25	31.50	15.13	70.97	13.89
C3	122.50	31.50	17.64	36.62	45.73
D2	122.25	31.00	28.29	69.02	2.67
D5	123.00	31.00	23.14	54.16	22.68
D7	123.50	31.00	8.20	24.61	67.18
E3	122.50	30.50	21.96	76.34	1.69
E7	123.50	30.50	7.34	16.62	76.02
E8	124.00	30.50	11.71	30.39	57.89
F3	123.00	30.00	13.68	26.65	59.66
F6	124.00	30.00	10.62	25.47	63.90
G2	122.50	29.50	27.90	70.62	1.46
G5	124.00	29.50	18.39	44.23	37.37
H3	122.50	29.00	31.09	68.42	0.47
H4	123.00	29.00	27.58	55.16	17.25
H6	124.00	29.00	14.75	30.92	54.31
XT[b]	111.25	30.50	7.85	60.59	31.56
ZJ2[b]	112.01	30.30	17.87	70.40	11.74
DT[b]	117.70	30.85	17.77	64.65	17.58
XLJ4[b]	121.00	31.80	21.80	67.24	10.96
R1[c]	--	--	--	--	--
R2[c]	--	--	--	--	--
S-18[d]	122.50	31.00	26.66	70.17	3.17
S-SC07[e]	122.23	31.00	--	--	--

[a]Diameter ranges: clay particles, 0.02μm to 64μm; silt particles, 64μm to 128μm; sand particles, 128μm to 2000μm. [b]Surface sediment of the upper basin of the Yangtze River. [c]Surface sediment of the upper basin of the Yangtze River, cited from Tims et al. (1S). [d]Surface sample of core 18. [e]Surface sample of core SC 07, cited from Tims et al. (1S).

TABLE 2S. The vertical distributions of ^{137}Cs activity, $^{239+240}Pu$ activity and $^{240}Pu/^{239}Pu$ atom ratio of core 18 from the Yangtze River estuary.

Depth (cm)	^{137}Cs activity (mBq/g)	$^{239+240}Pu$ activity (mBq/g)	$^{240}Pu/^{239}Pu$ atom ratio
1	4.358±1.282	0.188±0.008	0.230±0.019
11	5.522±0.157	0.221±0.007	0.190±0.015
21	7.379±1.266	0.196±0.011	0.217±0.019
31	8.651±1.231	0.224±0.015	0.200±0.023
41	5.185±1.134	0.216±0.013	0.211±0.027
51	8.147±1.264	0.376±0.010	0.219±0.009
61	10.662±1.311	0.384±0.009	0.215±0.012
71	6.866±1.931	0.345±0.009	0.224±0.013
81	11.315±1.288	0.429±0.009	0.222±0.011
91	7.569±1.167	0.342±0.009	0.220±0.011
101	7.401±1.272	0.639±0.016	0.227±0.008
111	11.712±1.256	0.442±0.013	0.217±0.014
121	15.851±1.341	0.446±0.020	0.215±0.022
131	10.917±1.209	1.031±0.017	0.229±0.005
135	14.348±1.359	0.704±0.014	0.225±0.009
137	13.796±1.380	0.749±0.015	0.226±0.011
139	14.480±1.289	0.786±0.017	0.224±0.010
141	19.553±1.326	0.909±0.017	0.225±0.009
143	16.556±1.284	0.755±0.024	0.213±0.012
145	15.971±1.373	–	–
147	16.841±1.343	0.608±0.017	0.220±0.012
149	13.537±1.385	0.649±0.014	0.224±0.008
151	10.414±1.240	0.718±0.015	0.224±0.006
153	13.452±1.241	0.823±0.021	0.219±0.010
155	10.003±1.169	0.639±0.020	0.210±0.011
157	11.112±1.508	–	–
161	8.683±1.331	0.462±0.010	0.207±0.012
163	10.240±1.427	–	–
165	8.962±1.561	–	–
167	9.957±1.135	0.711±0.015	0.235±0.008
169	14.018±1.402	0.949±0.027	0.247±0.012
171	8.198±1.195	1.115±0.032	0.253±0.012
175	9.280±1.532	1.257±0.042	0.244±0.007
179	9.175±1.442	–	–
181	12.563±1.124	0.971±0.043	0.236±0.009
183	12.174±1.516	–	–
185	6.633±1.178	0.593±0.021	0.227±0.011
187	5.515±1.222	0.516±0.012	0.250±0.009
189	5.869±1.447	–	–
191	3.787±1.175	0.764±0.017	0.273±0.008
195	5.221±1.347	0.516±0.015	0.304±0.017

199	4.607±1.005	–	–
201	0.991±1.110	0.345±0.013	0.319±0.022
211	0.000±0.000	0.013±0.003	–
221	0.211±0.005	0.005±0.005	–
231	0.000±0.000	0.006±0.001	–

* ^{137}Cs activity was corrected to Sept. 1, 2006. The limit of detection (LOD) of the γ–spectroscopy system is 0.8 mBq/g.

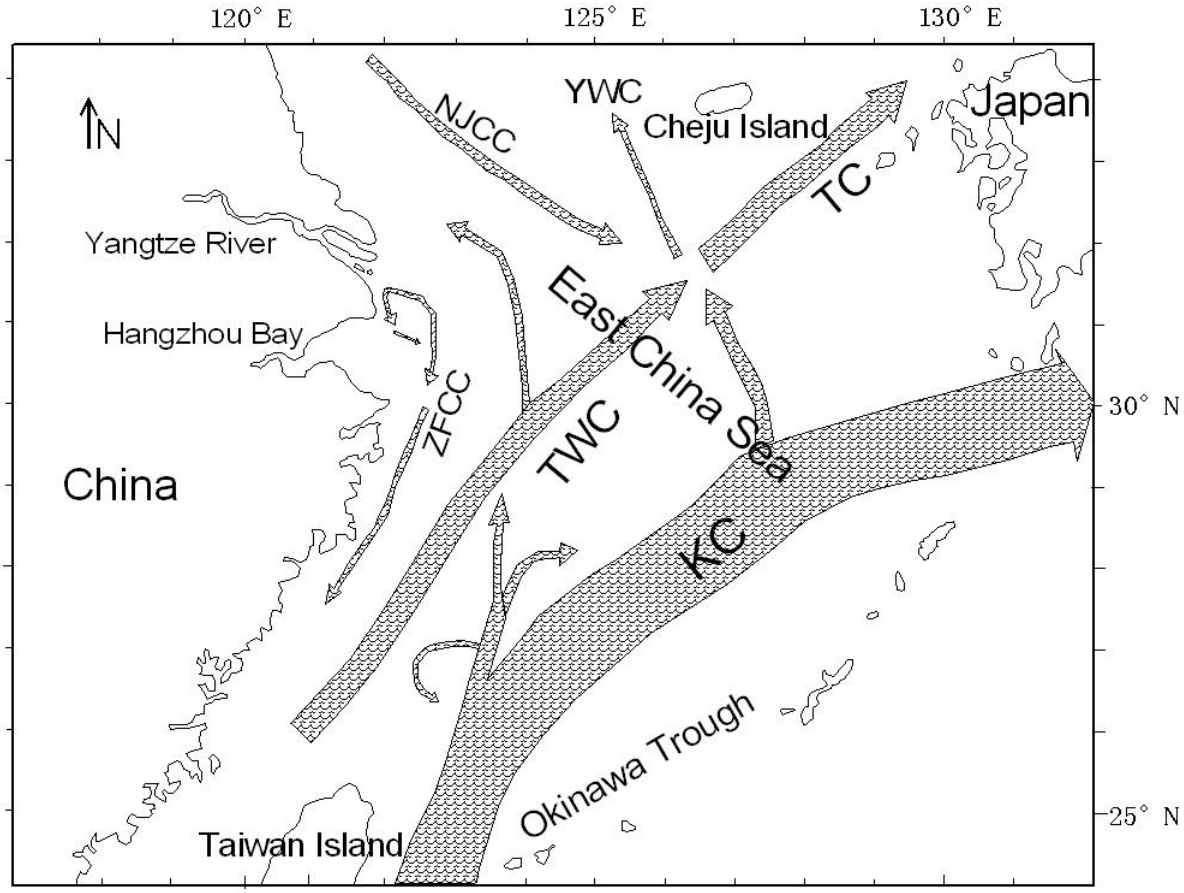

FIGURE 1S. Map of the Yangtze River estuary and adjoining coastal or shelf circulation patterns (redrawn from Su and Huh (2S), and Gao and Wang (3S)). Abbreviations in the figure are as follows: KC, the Kuroshio; TWC, the Taiwan Warm Current; TC, the Tsushima Current; ZFCC, the Zhejiang-Fujian Coastal Current; NJCC, the Northern Jiangsu Coastal Current; YWC, the Yellow Sea Warm Current.

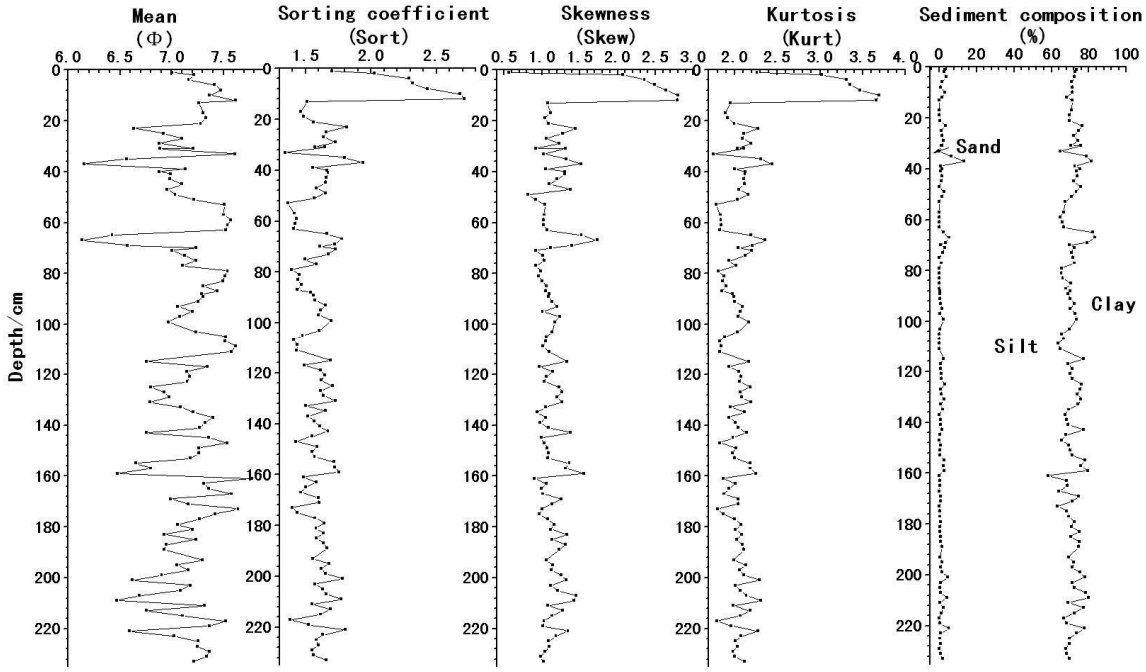

FIGURE 2S. The grain size distribution profiles of core 18. Medium sorted, highly skewed and kurtotic distributions imply that the sediment exist in different grain sizes, and mainly contained coarse particles. No correlation between the grain size distribution and the activities of ^{137}Cs and $^{239+240}Pu$ was observed. The sediment texture and grain size of the core revealed that the upper part of the sediment cores (0-12cm) was frequently influenced by changes in the short-term hydrodynamic environment, while the lower part indicated seasonal fluctuations of grain size distribution caused by the riverine inputs, which is consistent with previous work (Zhang et al. 4S).

Information on the two end-member mixing model

A simple two end-member mixing model (Krey et al., (5S)) was used to evaluate the relative contribution of plutonium isotopes in the Yangtze River estuary.

$$\frac{(Pu)_P}{(Pu)_G}=\frac{(R_G\text{-}R)(1+3.66R_P)}{(R\text{-}R_P)(1+3.66R_G)} \qquad (1)$$

Where (Pu) is the activity of $^{239+240}$Pu and subscripts P and G refer to the PPG close-in fallout and global fallout, respectively; R is the inventory-weighted mean ^{240}Pu/^{239}Pu atom ratio (0.24) we measured for the core sediment samples; R_G is the ^{240}Pu/^{239}Pu atom ratio of global fallout (0.18); and R_P is the PPG-derived ^{240}Pu/^{239}Pu atom ratios (ranging from 0.33-0.36).

References

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