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Supplemental Data: Effects of physical mixing on the attenuation of polycyclic aromatic hydrocarbons in estuarine sediments.

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Abstract

To examine the role of physical disturbance on the long-term preservation of polycyclic aromatic hydrocarbons (PAHs) in sediments, cores were collected from two sites removed from point sources of PAHs and representing contrasting seabed mixing regimes. Although ΣPAH concentrations in sediments over the past 50 years were not significantly different between the two sites, several PAH isomer ratios were significantly different ($p<0.05$) between the two sites. Downcore changes in PAH isomer ratios resulted from preferential losses of the more linear PAH isomers. Thus, episodic, intense seabed mixing contributes to more efficient removal of selected PAHs. However, PAHs are still sufficiently stable relative to mixing events that historical PAH profiles can be used to reconstruct major resuspension events.

Keywords: redox; sediment; PAH; attenuation, x-radiographs; ^{210}Pb; ^{137}Cs; isomer ratios; shape parameter; York River, VA

The following data consist of individual polycyclic aromatic hydrocarbon concentrations (ng g^{-1}) in sediment core samples collected from the York River, VA, POD and LY study sites. Surface samples (<0.5 cm) were collected in March 2000; core samples were collected and sectioned in August (POD) and October (LY) of 1999. These data elaborate upon results presented in the above-mentioned manuscript published in the special edition of *Organic Geochemistry*, highlighting contributions to the International Meeting of Organic Geochemistry in 2001.

POD PAHs. Individual PAH concentrations at POD for box core (BC) and Kasten core (KC) intervals analyzed.

	surface (<0.5 cm)	BC 0-2	BC 2-4	BC 4-6	BC 6-8	BC 8-10	BC 12-14	BC 16-18	KC 20-22	KC 28-30	KC 32-34	KC 34-36
fluorene	5.9	7.9	9.9	11.0	12.0	9.8	6.7	6.9	3.9	7.8	6.2	5.5
1-methylfluorene	2.3	3.7	4.9	5.1	5.2	4.9	3.5	3.9	2.2	3.8	3.2	3.0
phenanthrene	32.2	40.6	41.0	38.1	37.1	37.4	27.4	34.2	29.2	47.5	49.7	43.6
anthracene	6.4	10.4	11.1	10.9	10.4	9.4	8.1	9.3	6.1	11.8	10.9	9.6
2-methylphenanthrene	9.2	10.1	17.2	15.4	27.1	19.5	14.1	15.4	8.3	13.8	9.7	10.3
2-methylanthracene	2.0	2.8	4.1	4.2	2.1	3.9	5.9	4.0	1.6	5.4	11.1	2.5
1-methylanthracene	8.2	9.5	12.1	11.9	20.4	13.5	10.3	9.4	6.8	10.6	2.9	8.2
1-methylphenanthrene	7.9	8.8	15.7	15.7	31.2	18.5	16.5	13.3	6.5	12.1	9.3	8.6
9-methylanthacene	nd**	nd	nd	nd	nd	nd	4.5	nd	nd	4.2	10.3	nd
fluoranthene	63.8	132.1	113.3	88.0	76.7	77.4	67.4	58.3	50.5	74.6	99.3	84.8
pyrene	59.6	123.1	104.8	104.5	91.0	95.1	78.5	89.0	73.3	141.2	143.0	119.7
benz(a)anthracene	24.1	43.0	45.0	43.5	39.8	38.2	34.5	40.1	23.8	56.6	54.0	47.1
chrysene	22.8	33.2	32.6	36.7	29.3	30.0	22.0	29.8	16.3	37.8	38.0	33.7
benz(b)fluoranthene	59.7	103.3	85.6	81.7	74.7	72.0	69.7	73.9	67.7	113.0	126.8	116.6
benz(k)fluoranthene	21.1	29.7	28.3	27.3	24.0	22.7	21.0	24.5	20.4	33.9	36.2	33.8
benzo(e)pyrene	39.9	58.1	44.4	45.8	39.1	38.8	36.6	40.7	41.7	59.2	76.4	69.2
benzo(a)pyrene	28.0	44.4	40.3	39.7	35.5	35.0	34.2	38.0	26.3	54.5	55.3	50.6
indeno(123cd)pyrene	37.7	20.3	41.0	40.7	38.8	36.0	36.2	37.4	43.7	59.2	71.0	66.2
benz(ghi)perylene	29.7	43.4	38.1	36.8	35.0	33.2	33.6	34.7	30.1	54.3	50.2	49.8
dibenz(ah)anthracene	0.0	16.6	10.7	9.8	8.7	8.5	8.3	8.8	9.5	18.1	16.3	15.2
	460.5	741.2	700.0	666.9	638.0	604.0	538.8	571.4	467.8	819.3	879.9	778.0

	KC 36-38	KC 40-42	KC 44-46	KC 48-50	KC 53-55	KC 58-60	KC 78-80	KC 98-100	KC 128-130	KC 170-172	KC 190-192	KC 250-252
fluorene	4.9	5.5	5.6	3.4	2.7	2.2	2.1	1.6	2.4	2.3	2.5	3.0
1-methylfluorene	2.9	4.4	3.0	1.9	1.3	1.2	1.0	0.8	1.1	1.0	1.0	1.3
phenanthrene	33.5	35.9	41.2	23.1	12.4	7.6	4.5	3.7	5.4	5.7	5.0	6.6
anthracene	8.3	7.3	8.2	5.2	3.0	2.2	1.6	1.3	1.9	2.0	1.9	2.4
2-methylphenanthrene	12.0	12.0	11.8	6.8	3.3	2.0	1.3	1.1	1.4	1.3	1.4	1.6
2-methylanthracene	3.4	2.2	2.5	1.7	0.9	0.8	0.7	0.6	0.7	0.6	0.7	0.8
1-methylanthracene	8.0	10.2	10.4	6.3	3.0	1.7	1.0	0.8	1.3	1.2	1.0	1.5
1-methylphenanthrene	10.0	9.1	9.7	5.9	3.2	2.0	1.6	1.3	1.6	1.7	1.7	2.0
9-methylanthacene	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
fluoranthene	63.1	76.0	61.7	41.9	21.4	11.7	7.5	5.6	7.9	6.9	7.3	9.3
pyrene	103.3	102.9	94.6	58.5	27.4	12.0	5.6	4.2	6.7	6.3	6.2	8.2
benz(a)anthracene	47.9	34.8	34.8	23.9	10.3	4.4	1.8	1.5	1.7	1.7	2.0	2.2
chrysene	29.2	26.1	25.7	18.6	7.5	3.8	1.7	1.4	1.9	1.8	1.9	2.7
benz(b)fluoranthene	85.3	94.3	95.1	57.0	27.9	11.6	5.1	4.3	5.9	5.7	5.7	7.6
benz(k)fluoranthene	26.3	27.3	29.7	18.3	8.4	3.1	1.1	0.9	1.3	1.3	1.2	1.8
benzo(e)pyrene	45.7	58.5	60.3	36.4	17.4	6.5	2.2	2.0	2.9	2.6	3.7	3.7
benzo(a)pyrene	43.3	36.8	39.8	26.3	11.1	3.9	1.3	1.2	1.1	1.1	1.1	1.6
indeno(123cd)pyrene	48.6	54.5	53.3	33.5	16.6	6.5	2.7	2.3	3.1	2.3	2.9	3.8
benz(ghi)perylene	42.8	39.4	44.0	28.4	14.6	6.0	2.6	2.2	2.9	2.5	2.8	3.4
dibenz(ah)anthracene	12.0	10.9	10.6	6.9	3.4	nq	0.6	0.5	nq	nq	0.6	nq
* nq=not quantifiable	630.5	647.9	641.9	403.9	196.1	89.2	45.9	37.0	51.1	47.9	50.7	63.5

** nd=not detectable

LY PAHs. Individual PAH concentrations (ng g^{-1}) at LY for surface grab samples, box core (BC) and Kasten core (KC) samples analzyed.

	surface (<0.5 cm)	BC 0-2	BC 2-4	BC 6-8	BC 8-10	BC 10-12	BC 12-14	BC 18-20	BC 26-28	KC 16-18
fluorene	2.5	6.3	6.1	6.9	6.3	6.5	7.2	7.1	7.9	5.8
1-methylfluorene	2.2	3.9	3.5	4.1	1.8	3.8	4.2	4.1	4.6	3.5
phenanthrene	22.8	35.1	32.5	36.4	35.8	31.9	33.8	31.2	36.1	28.9
anthracene	0.0	10.3	9.4	11.8	9.6	9.0	11.6	10.4	12.1	11.2
2-methylphenanthrene	9.4	14.7	12.6	16.4	13.1	12.7	16.6	15.0	14.6	11.5
2-methylanthracene	1.4	4.1	2.8	4.5	2.6	2.6	4.6	3.6	5.0	3.1
1-methylanthracene	7.7	10.8	10.6	10.8	10.5	10.5	11.2	10.1	10.7	10.1
1-methylphenanthrene	6.6	11.2	8.9	12.4	8.9	9.0	12.4	11.3	12.6	8.9
9-methylanthacene	2.8	0.0	nd	nd	nd	nd	0.0	0.0	0.0	nd
fluoranthene	35.8	71.5	80.7	85.7	82.8	72.9	80.8	70.6	86.3	63.9
pyrene	35.2	85.1	80.6	93.3	80.8	71.9	77.3	68.7	83.3	62.9
benz(a)anthracene	14.9	44.5	33.0	56.7	31.1	29.4	42.7	33.4	42.8	29.2
chrysene	16.5	38.0	30.2	60.1	27.1	26.3	35.4	28.3	32.6	26.7
benz(b)fluoranthene	38.3	68.3	80.5	79.8	80.1	78.0	74.4	62.6	73.7	63.9
benz(k)fluoranthene	14.7	23.9	27.2	28.5	26.0	25.4	26.1	21.7	24.9	21.3
benzo(e)pyrene	25.4	36.1	46.9	42.4	47.4	45.0	39.4	33.2	39.2	39.1
benzo(a)pyrene	21.2	45.6	41.5	52.8	38.7	37.0	45.4	37.0	44.7	37.1
indeno(123cd)pyrene	29.8	45.3	68.5	53.6	72.9	70.4	49.0	41.9	48.5	49.1
benz(ghi)perylene	23.8	40.4	39.5	47.3	41.7	37.1	42.9	37.6	43.3	39.8
dibenz(ah)anthracene	nd	12.6	12.4	14.2	12.7	12.2	14.1	10.3	11.4	9.9
	310.8	607.9	627.5	717.7	630.0	591.5	629.2	538.2	634.2	526.0

	KC 32-34	KC 63-65	KC 98-100	KC 128-130	KC 148-150	KC 190-192
fluorene	7.6	7.6	4.6	2.7	1.3	1.5
1-methylfluorene	5.4	4.2	1.9	1.2	0.7	0.8
phenanthrene	37.9	47.4	25.2	10.7	4.4	5.1
anthracene	11.3	13.1	6.8	3.3	1.6	2.0
2-methylphenanthrene	16.7	16.8	7.5	3.3	1.6	2.1
2-methylanthracene	4.1	4.9	2.3	1.0	0.4	0.6
1-methylanthracene	12.9	12.3	5.1	2.3	1.3	1.1
1-methylphenanthrene	14.4	14.1	7.4	3.7	1.9	2.5
9-methylanthacene	0.0	0.0	0.0	0.0	nd	0.0
fluoranthene	104.4	83.6	54.6	17.1	4.4	5.2
pyrene	108.1	114.2	67.1	18.8	3.7	3.9
benz(a)anthracene	42.6	45.5	28.9	8.3	1.8	2.3
chrysene	34.3	37.2	21.4	6.4	1.6	2.3
benz(b)fluoranthene	88.4	84.6	57.9	20.6	6.9	6.2
benz(k)fluoranthene	27.8	28.5	19.2	6.4	1.7	1.7
benzo(e)pyrene	45.7	42.6	26.2	8.9	2.9	2.5
benzo(a)pyrene	42.0	44.3	27.9	8.7	1.3	1.9
indeno(123cd)pyrene	52.9	5.9	36.5	14.7	4.4	3.9
benz(ghi)perylene	41.8	5.0	28.0	11.2	3.2	3.3
dibenz(ah)anthracene	13.6	4.3	7.2	2.5	0.6	nd
* nq=not quantifiable	712.0					
** nd=not detectable						