Composition and Characters of Organic Pollutants in water and surface sediments of Chang Jiang Estuary

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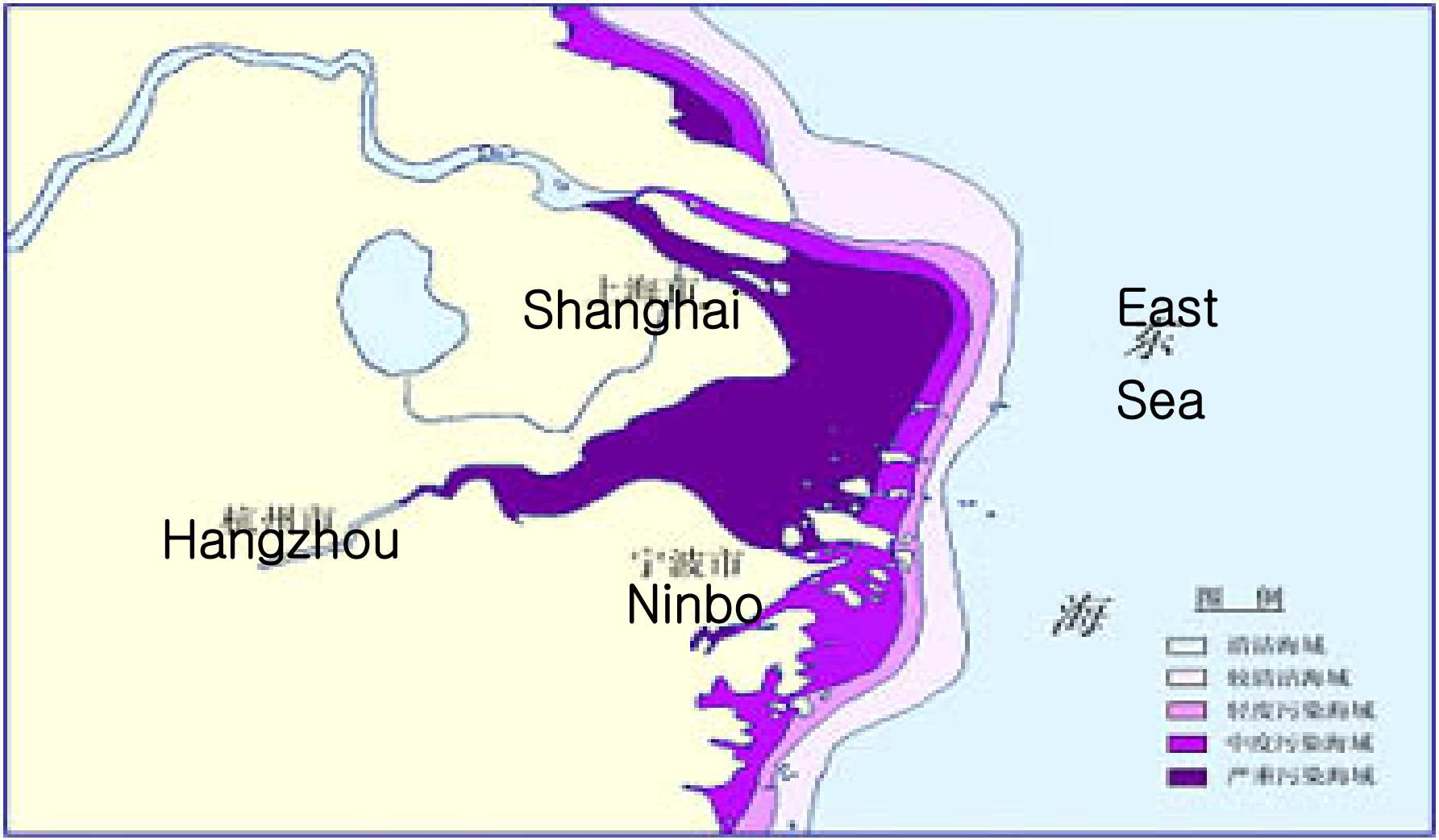
Background Introduction

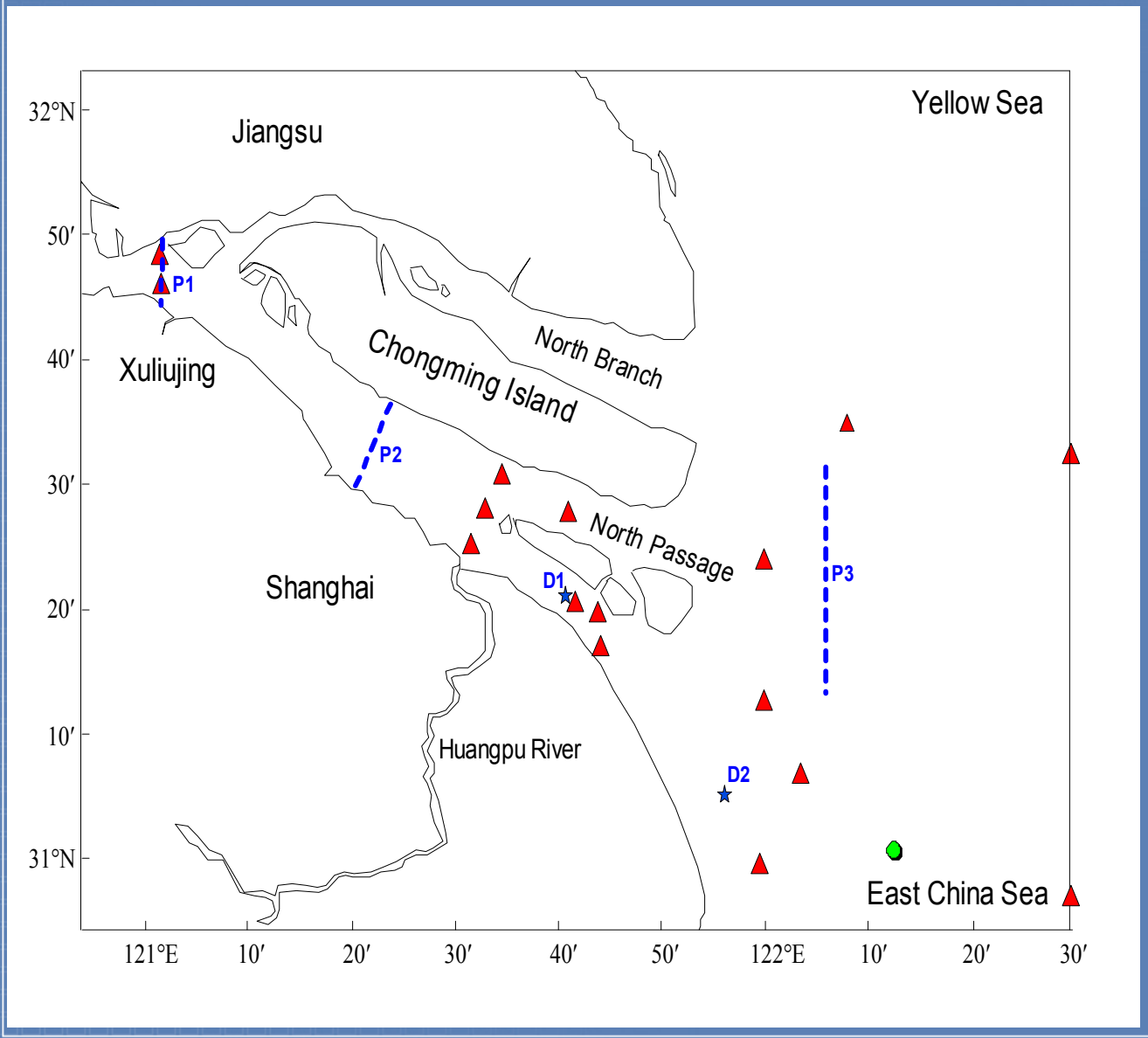
Figure of Present pollution State of Chang Jiang Estuary



长江口污染海域分布示意图

Chang Jiang Estuary is the biggest estuary of China coast

Study area:



Organic pollutants study

February, August 2004

September, November 2005

August 2006

Nutrients study

November 2003

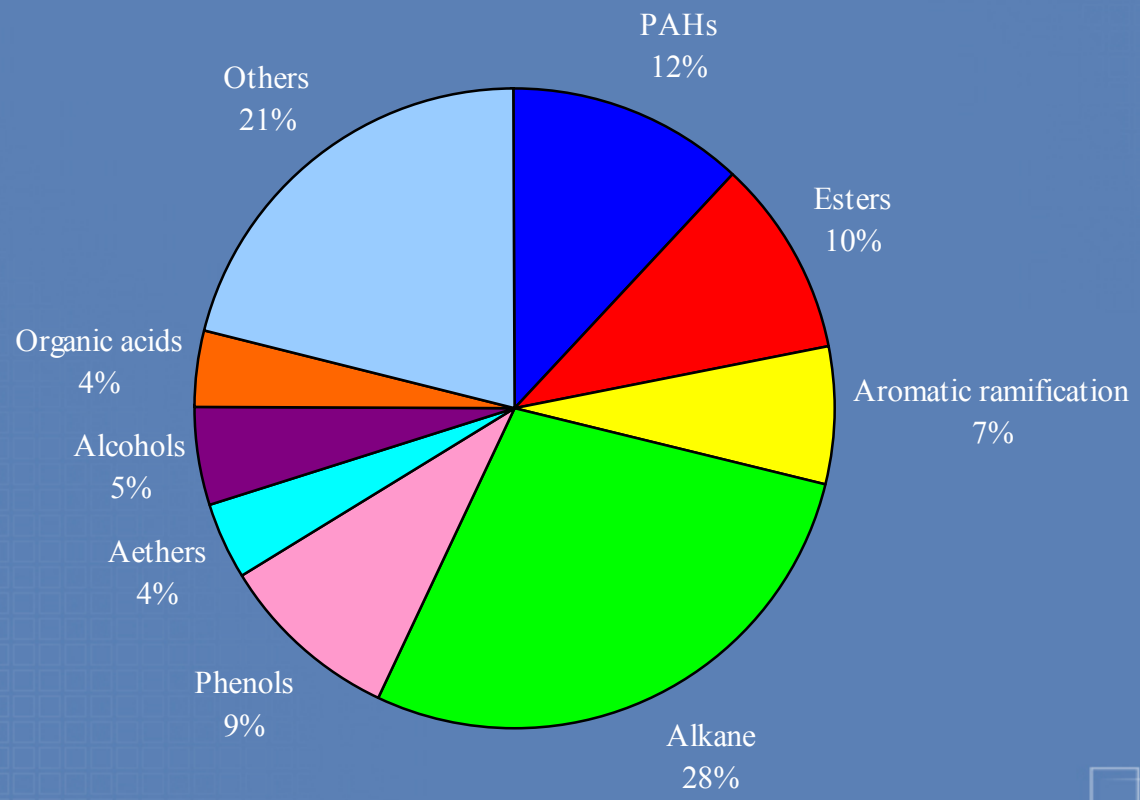
August 2004

Core sediments collection

October 2004,2007

Composition and characters of organic pollutants in water of Chang Jiang Estuary

Nine classes including 234 kinds of organic compounds were detected in the water of the Chang Jiang Estuary.



SVOCs in water of Chang Jiang Estuary

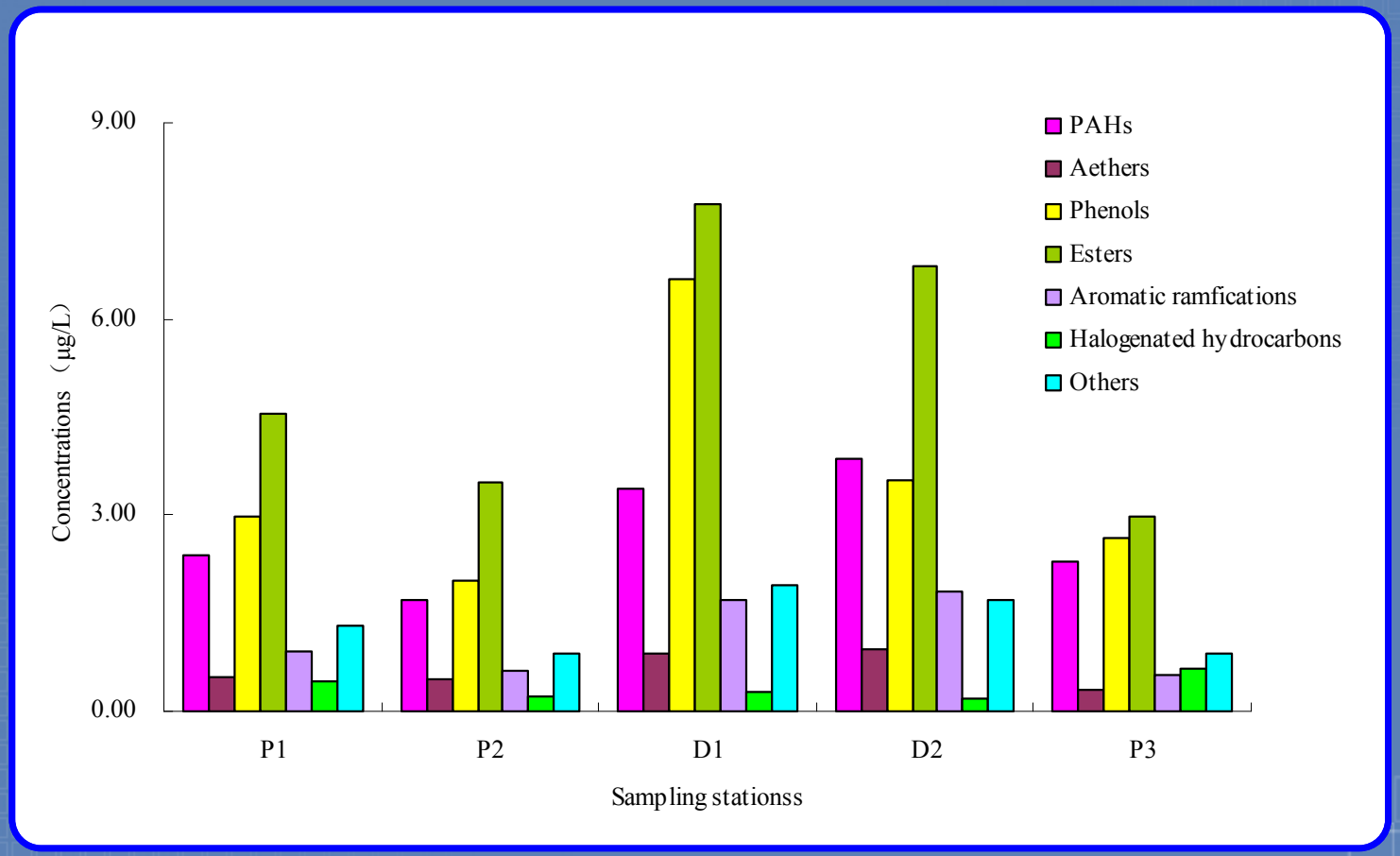
Classes	Numbers of deteted	Number of GB3838 priority-control	Numbers of EPA priority-control	Numbers of National priority-control
PAHs	14	1	13	6
Esters	5	2	5	3
Halogenated hydrocarbons	3	1	3	0
Aromatic ramfications	7	7	6	5
Phenols	13	2	8	4
Aethers	4	0	4	0
Others	6	0	2	1
Total	52	13	41	19

We should pay attention to the organic compounds (POPs) :

Chemicals	Average concentrations	PRC GB3838 Standards	USEPA priority-control	PRC priority-control
Benzo(a)pyrene	0.005	0.0028	*	*
Fluoranthene	0.15	/	*	*
Indeno(1,2,3-cd)pyrene	0.002		*	*
Benzo(ghi)perylene	0.008		*	*
Dimethyl phthalate	0.16		*	*
Di-n-octyl phthalate	1.6		*	*
Phenol	0.12		*	*
4-Nitrohenol	0.39		*	*
Benzo(b)fluoranthene	0.05		*（0.0038）	*
Benzo(k)fluoranthene	0.028		*（0.0038）	*
N-Nitrosodi-n-propylamine	0.014		*（0.005）	*

μ g/

Spatial variations of SVOCs in the water of the Chang Jiang Estuary



Brief summary:

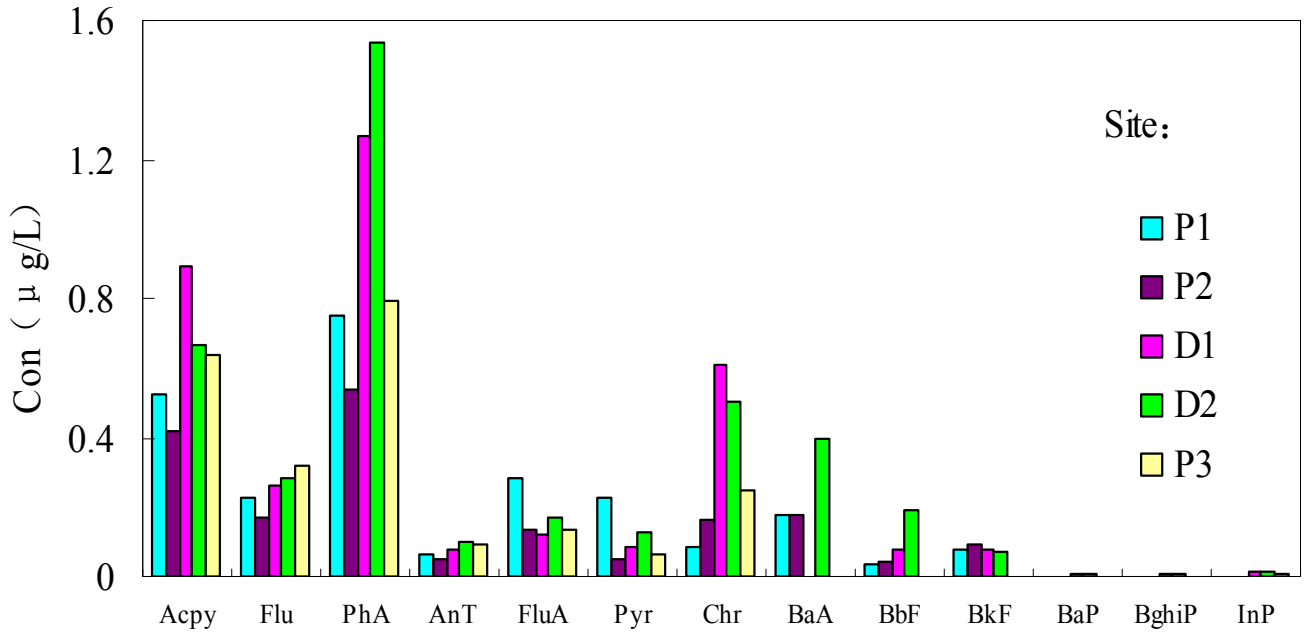
- 234 kinds of SVOCs in water from Chang Jiang Estuary were detected. There are 24 kinds of national priority-controlled organic substances, 48 kinds of EPA priority-controlled organic substances and 20 kinds of GB3838-2002 controlled organic substances among them.
- Concentrations of all the organic compounds are under the standards of GB3838 except Benzo (a) pyrene, which has the average concentration of 0.005μg/L, 1.78 times of the GB3838 standard value.
- Spatial distribution characteristics of SVOCs shows that discharge of industrial and domestic waste water from south harbor is one of the major reasons which affect the concentration of SVOCs in the Changjiang Estuary.

Polycyclic aromatic hydrocarbons (PAH) in water, surface sediments and core sediments of the Chang Jiang Estuary

16 Kinds of EPA priority-controlled PAHs:

PAHs	Abs.	molecular formula	Ring number	molecular weight	boiling point (℃)
Naphehalene	Nap	C10H8	2	128	218
Acenaphythyene	Acp	C12H10	3	154	279
Acenaphthylene	Acpy	C12H8	3	152	275
Fluorene	Flu	C13H10	3	166	295
Phenanthrene	PhA	C14H10	3	178	340
Anthracene	AnT	C14H10	3	178	342
Fluoranthene	FluA	C16H10	4	202	393
Pyrene	Pyr	C16H10	4	202	404
Chrysene	Chr	C18H12	4	228	448
Benzo(a)anthracene	BaA	C18H12	4	228	435
Benzo(b)fluoranthene	BbF	C20H12	5	252	393
Benzo(k)fluoranthene	BkF	C20H12	5	252	480
Benzo(a)pyrene	BaP	C20H12	5	252	496
Indeno(1,2,3,cd)pyrene	InP	C22H12	6	276	534
Dibenz(a,h)anthracene	BbA	C22H14	5	278	535
Benzo(ghi)perylene	BghiP	C22H12	6	276	542

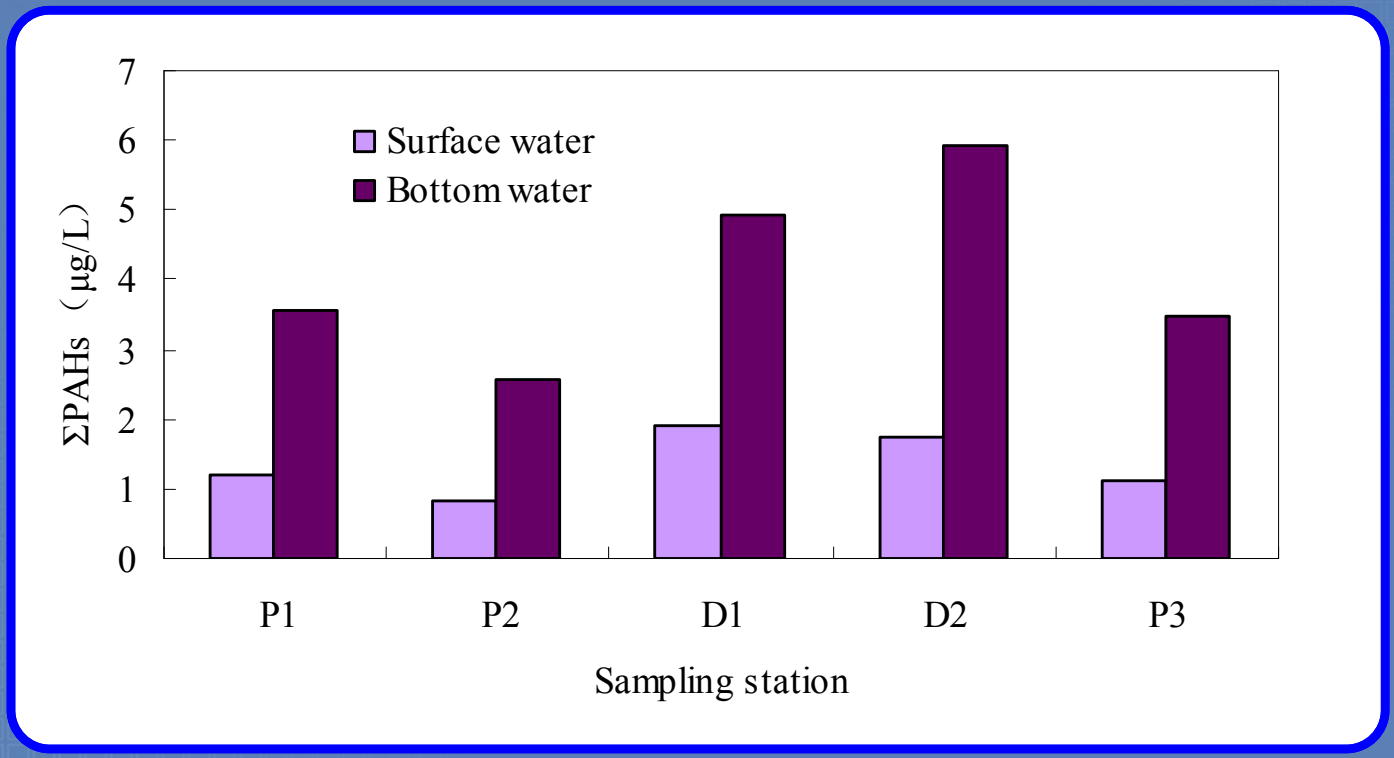
Composition and distribution of PAHs in the water of the Chang Jiang Estuary



Total PAHs：
0.82 ~ 5.94
μg/L

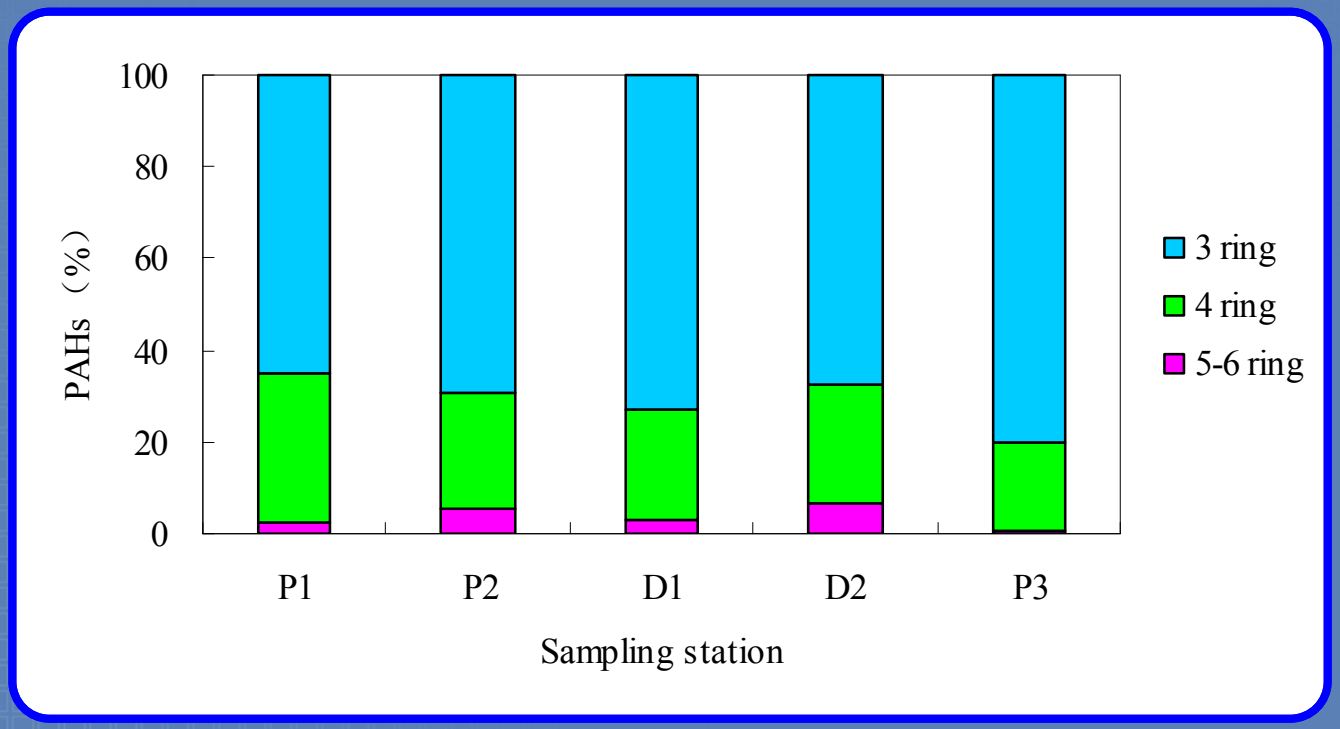
13 Kinds of US EPA priority-controlled PAHs were detected, with the higher concentrations of acenaphthylene, fluorene, phenanthrene, chrysene in the water of the Changjaing Estuary.

Comparison of PAHs concentrations in the surface and bottom water of the Chang Jiang Estuary



The concentrations of PAHs in the bottom water is much higher than those in the surface water of the Changjaing Esturay.

Concentration distribution of 3-ring, 4-ring and 5-6-ring PAHs in the water of the Chang Jiang Estuary



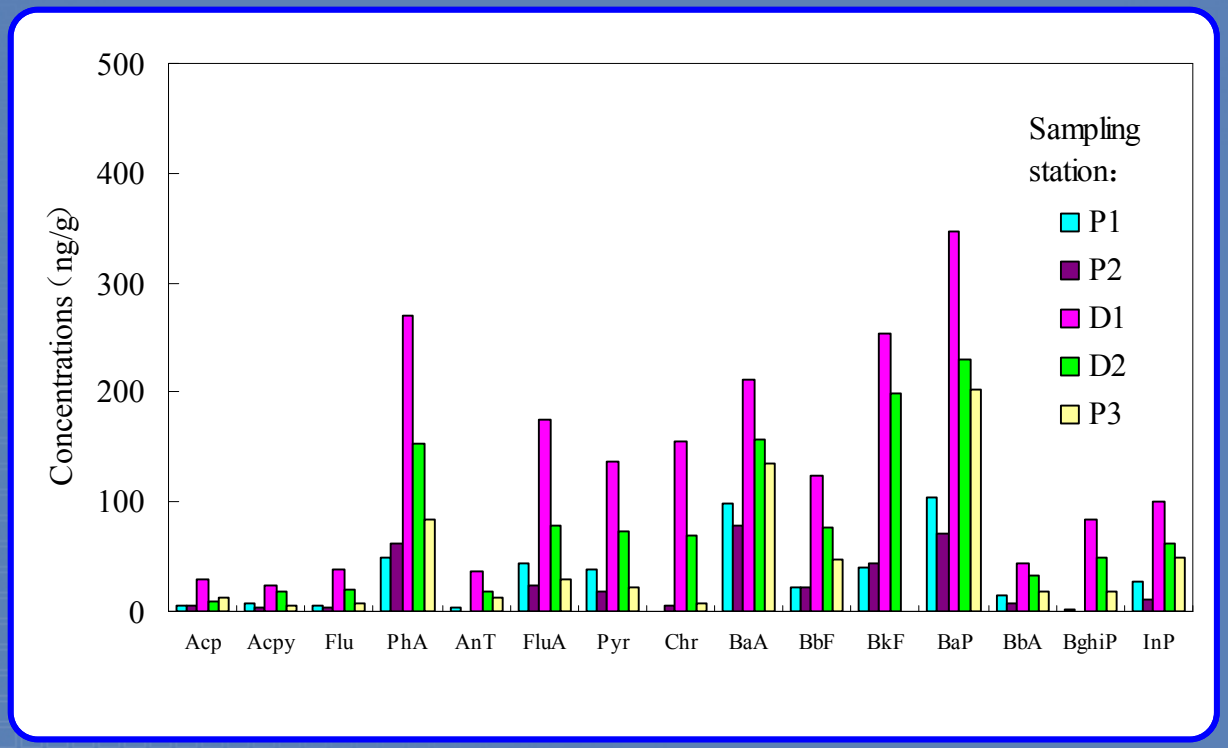
3 ring ~ 70%

4 ring ~ 25%

5,6 ring < 5%

3 Ring PAHs predominate in the water of the Chang Jiang Estuary.

Composition and distribution of PAHs in surface sediments of Chang Jiang Estuary

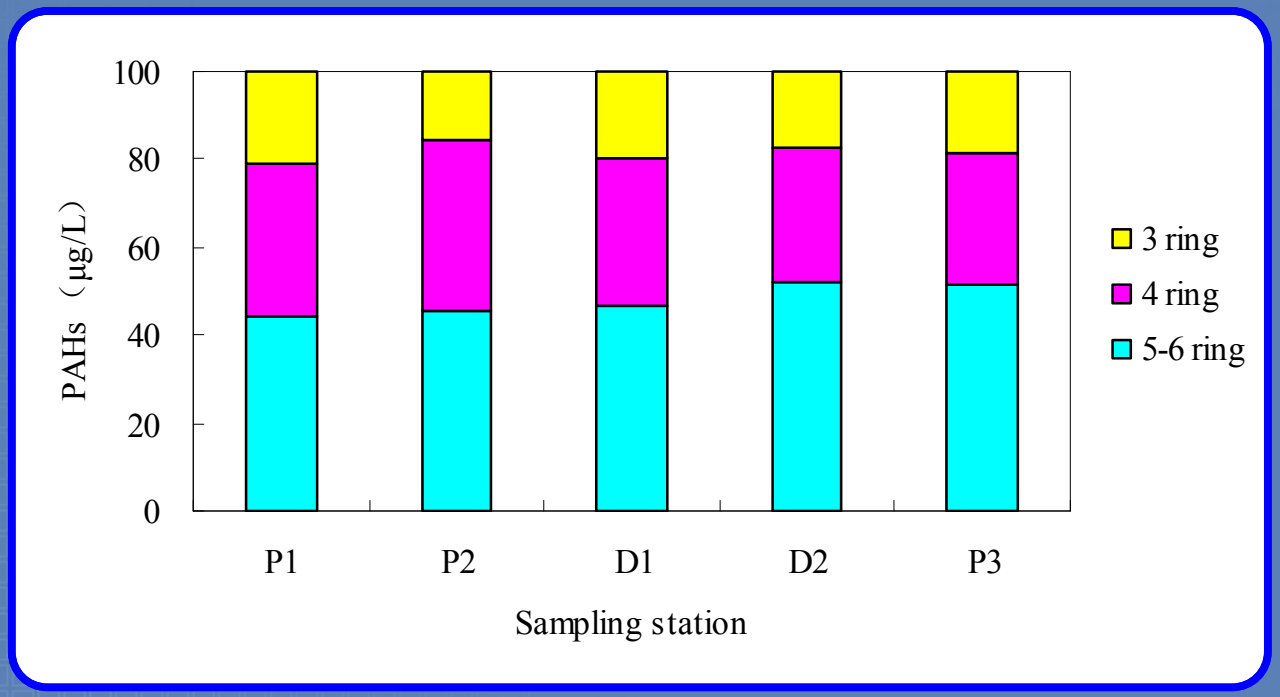


Total PAHs:

355.7～2480.9 ng/g

15 Kinds of EPA priority-controlled PAHs were detected, with the higher concent rations of phenanthrene, fluoranthene, pyrene, chrysene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene in the surface sediments of the Changjaing Estuary.

Concentration distribution of 3-ring, 4-ring and 5-6-ring PAHs in the surface sediments of the Chang Jiang Estuary



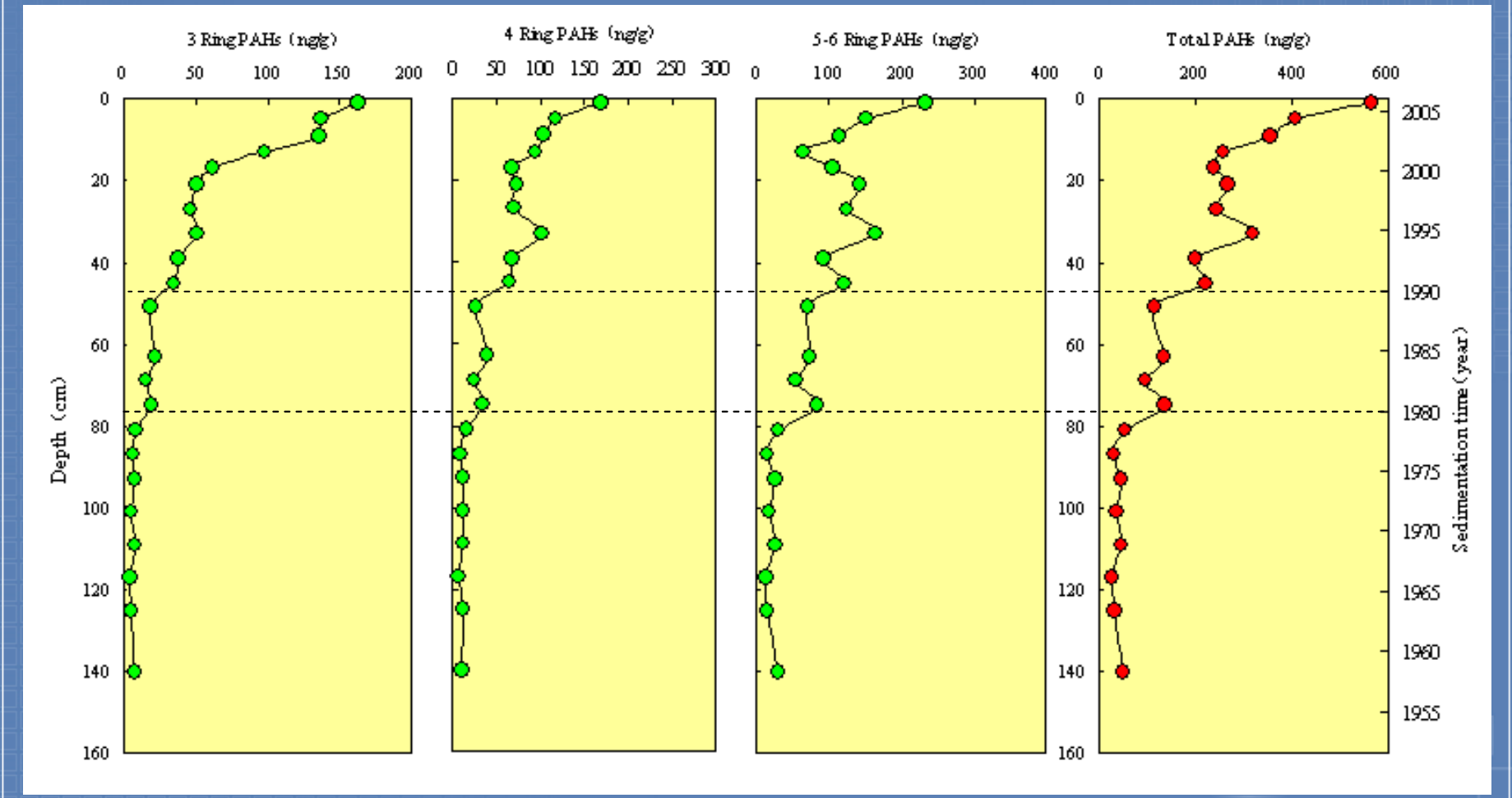
3 ring < 20%

4 ring ~ 30%

5,6 ring ~ 50%

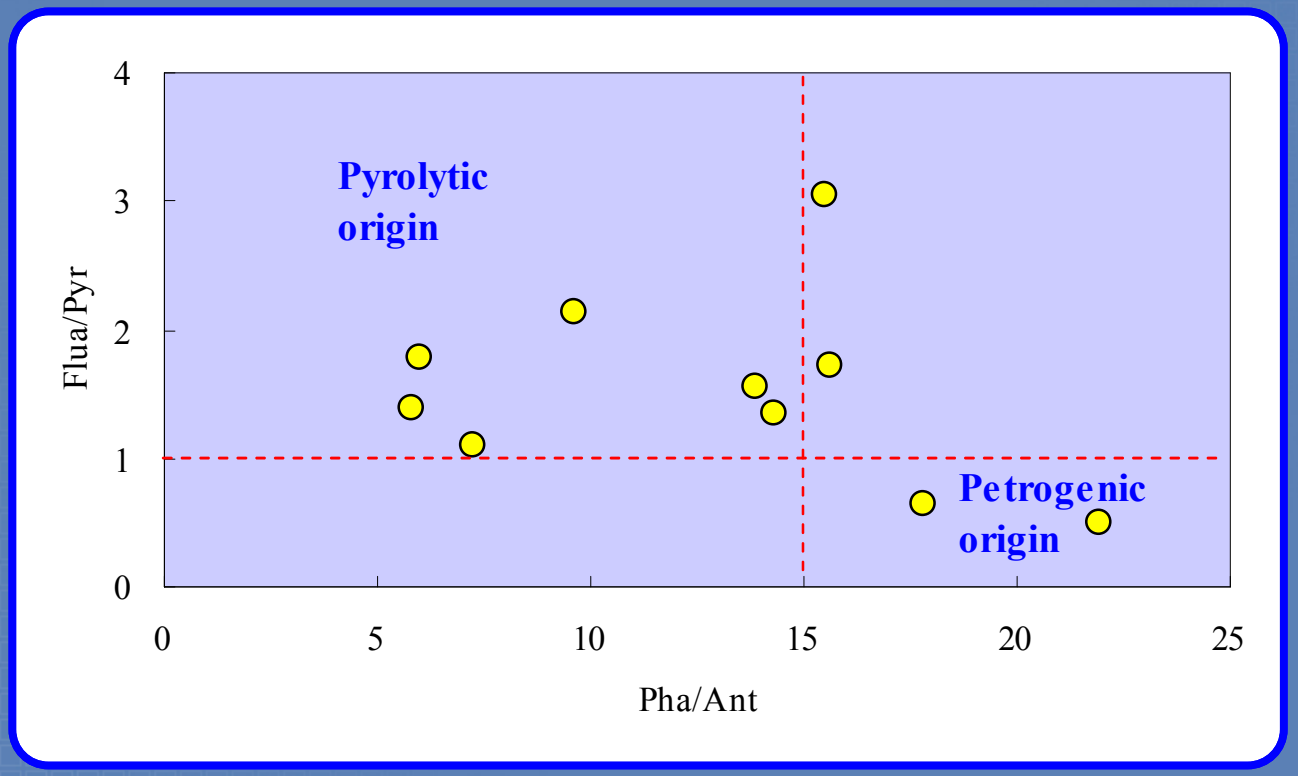
4-6 Ring PAHs predominate in the surface sediments of the Chang Jiang Estuary.

Vertical distributions of PAHs in the core sediments of the Chang Jiang Estuary



Sources Analysis of PAHs in Water and Ecological Risk Assessment of PAHs in Surface Sediments of the Chang Jiang Estuary

Sources of PAHs in the water of the Chang Jiang Estuary



PAHs in the water of the Chang Jiang Estuary originate mainly from pyrolyti c combustion, with less from petroleum sources.

Ecological risk assessment of PAHs in surface sediments of the Chang Jiang Estuary

PAHs	Guidelines		Multiples of superscale				
	ERL	ERM	P1	P2	D1	D2	P3
Acenaphythyene	44	640	0.11	0.14	0.67	0.22	0.28
Acenaphthylene	16	500	0.45	0.2	**1.43**	**1.18**	0.36
Fluorene	19	540	0.32	0.18	**2.03**	**1.06**	0.35
Phenanthrene	240	1500	0.21	0.25	**1.54**	0.64	0.35
Anthracene	85.3	1100	0.05	ND	0.43	0.22	0.16
Fluoranthene	600	5100	0.07	0.04	0.29	0.13	0.05
Pyrene	665	2600	0.06	0.03	0.28	0.11	0.03
Chrysene	384	2800	ND	0.01	0.4	0.18	0.02
Benzo(a)pyrene	261	1600	0.38	0.3	**1.2**	0.6	0.52
Benzo(ghi)perylene	430	1600	0.24	0.17	**1.04**	0.53	0.47
Dibenz(a,h)anthracene	63.4	260	0.22	0.12	0.7	0.52	0.3
Low-molecular weight PAHs	552	3160	0.13	0.13	0.9	0.4	0.22
High-molecular weight PAHs	1700	9600	0.23	0.17	1.17	0.61	0.31
ΣPAHs	4022	44792	0.12	0.09	0.62	0.31	0.16

Benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3,cd)pyrene were detected in all surface sediment samples of the Chang Jiang Estuary.

Brief summary:

- 13 Kinds of EPA priority-controlled PAHs were detected in the water of the Chang Jiang Estuary. The concentrations of PAHs in the bottom water were much higher than those in the surface water. Low-molecular weight PAHs predominated in the water of the Changjiang Estuary.

- 15 Kinds of EPA priority-controlled PAHs were detected in the surface sediments of the Chang Jiang Estuary. Different from the water, PAHs in th e surface sediments were mainly composed of high-molecular weight compounds.

- Serious adverse biological effects do not exist in the Changjiang Estuary. However, local sewage discharge may heighten the concentrations of some PAHs compounds, which brings the potential for adverse effects to living resources.


Thanks
谢谢！