Distribution, enrichment and transport of polycyclic aromatic hydrocarbons in *Spartina alterniflora* marshes of a tidal flat in northern Beibu Gulf, China

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1. BACKGROUNG

- **Polycyclic aromatic hydrocarbons (PAHs)** are ubiquitous and carcinogenic pollutants originated from both anthropogenic and natural processes.
- Tidal wetlands in China are increasing threatened by the PAHs exposure through oil spills, ship traffic, wastewater and industrial discharge and atmospheric deposition.
- Due to *Spartina alterniflora* unique survival and dispersal mechanism, it has **become the most invasive alien species in coastal wetlands**, which seriously affects the ecological balance.

2. SURVEY REGION

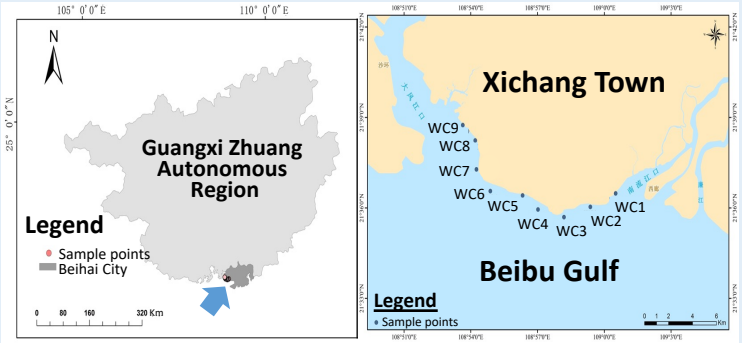

Fig. 1. Schematic diagram of the sampling point

- **All except WC2:** two soil samples and two plant samples of *S. alterniflora* were collected.
- **WC1, WC3-WC9**: collected one soil covered with *S. alterniflora*, one soil sample with mudflats and one plant sample of *S. alterniflora.*

3. RESULTS

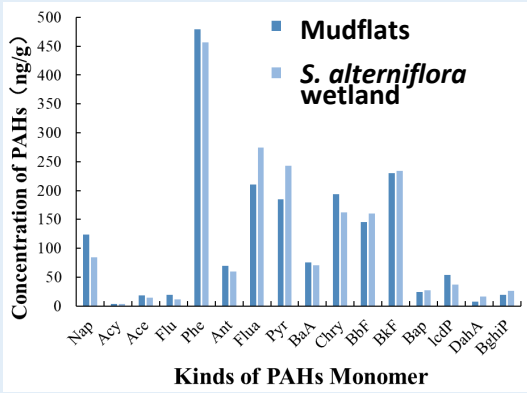

Fig. 2. Concentration distribution of 16 types of PAHs in sediments and wetland of *S. alterniflora*

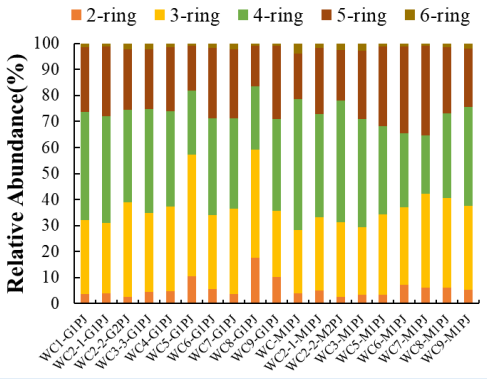

Fig. 3. Composition of PAHs in the sediment samples

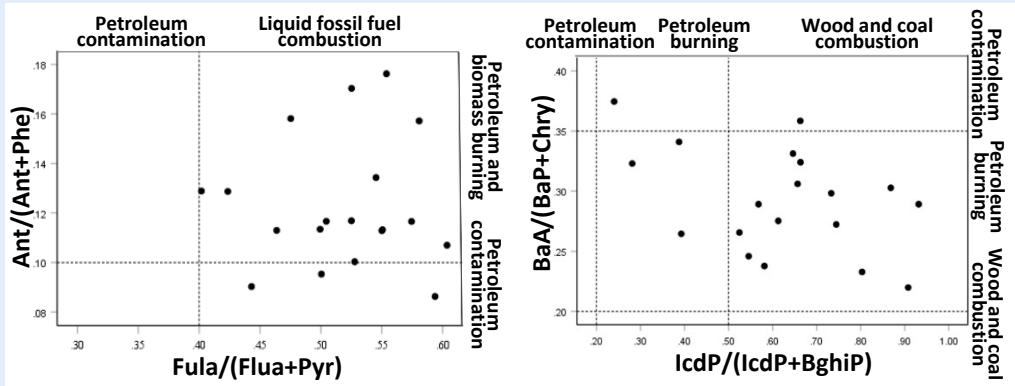

Fig. 4. Isomer ratio method to identify sources of PAHs in sediments

- The **detection rate** among sediment samples was 99.7%, and the **total content** was 135.0 - 394.8 ng/g (Fig. 2) ; the structural composition is mainly **high molecular weights** (Fig. 3).
- The source analysis showed that they were mainly **generated from biomass combustion and petroleum sources**.

Table 1. Quality benchmark evaluation table of 12 types of PAHs in the soil of Xichang tidal flat. (ERL- effect range low; ERM- effect range medium).

Compounds	ERL (ng/g)	ERM (ng/g)	Max (ng/g)	Mean (ng/g)
Nap	160	2100	28.67	10.95
Acy	16	500	0.73	0.36
Ace	44	640	3.91	1.70
Flu	19	540	2.98	1.59
Phe	240	1500	81.58	49.27
Ant	85.3	1100	10.76	6.80
Flua	600	5100	90.38	25.54
Pyr	665	2600	66.96	22.49
BaA	261	1600	19.28	7.67
Chry	384	2800	43.72	18.73
BaP	430	1600	6.38	2.71
DahA	63.4	260	7.05	1.25
Σ_{12}PAHs	4022	44792	423.17	185.62

- The maximum and average values of the 12 types of PAHs in the study area **did not exceed the ERL**, indicating that the ecological risk of the western tidal flats was **at a low level**.

Table 2. Enrichment factor (BCF) of PAHs with different ring numbers in sediments and transport factor to root PAHs

	Enrichment Factor			Transport Factor	
Rings	Root	Stems	Leaf	Stems	Leaf
2	2.99	2.00	1.45	0.79	0.57
3	2.26	1.86	1.83	1.19	1.12
4	0.89	0.89	0.88	1.28	1.28
5	0.63	0.44	0.22	0.85	0.76
6	0.78	0.58	0.47	2.40	0.75

- The enrichment of PAHs in *S. alterniflora* is mainly **concentrated in the roots**; The **stem** produced a good transport mechanism for the 6-ring PAHs in the roots of *S. alterniflora* .