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长江口启东—崇明岛航道沉积物中多环芳烃分布来源及生态风险评价

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Distribution Characteristics, Sources and Ecological Risk Assessment of Polycyclic Aromatic Hydrocarbons in Waterway Sediments from Qidong and Chongming Island of Yangtze River Estuary

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英文关键词: waterway sediment polycyclic aromatic hydrocarbons distribution sources ecological risk Yangtze River Estuary

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中文摘要:

近年来我国长江河口有关沉积物中多环芳烃（PAHs）污染的研究主要集中在长江口近海及上海主城区滨岸等区域，而长江口航道则鲜有报道。本文在长江口启东—崇明岛航道区域采集表层（0~20 cm）沉积物样品，利用加速溶剂萃取技术提取，用高效液相色谱-荧光检测器对14种PAHs进行测定，研究其分布特征、环境来源和潜在的生态风险。研究结果显示，PAHs在所有沉积物样品中均有不同程度的检出，浓度范围为83.43~5206.97 ng/g，平均值736.95 ng/g。就PAHs单体而言，含量较高的是2~4环污染物，其中菲的含量最高，占各点位PAHs总量的9.04%~24.06%；其次为荧蒽和芘；具有高致癌性的苯并（a）芘在各个点位均能检出，占PAHs总量的0.94%~10.68%。与国内外类似河口和近海海域相比，本研究区PAHs处于中等污染水平。利用比值法解析PAHs的来源，菲/蒽（Phe/Ant）<10且荧蒽/芘（Fla/Pyr）≥1的点位占所有采样点位的56.25%，表明区域内PAHs的主要来源是化石燃料的高温燃烧；位于航运码头附近采样点位的PAHs以石油源为主，部分点位呈化石燃料源和石油源混合污染特征。对照风险效应低值（ERL）和风险效应中值（ERM）进行初步风险评价，表明研究区域部分采样点位的PAHs具有潜在的生态风险。

英文摘要:

Recent researches of PAHs in sediment mainly were focused on offshore areas of Yangtze River estuary and coastal areas nearby Shanghai. However, there were few reports about the PAHs in waterway sediment from Qidong and Chongming Island. Surface waterway sediment samples (0-20 cm) were collected from Qidong and Chongming Island. Followed by extraction using accelerated solvent extraction techniques, then 14 PAHs were measured by means of HPLC-FLD in order to discuss and assess the distribution characteristics, possible sources and ecological risks of PAHs, respectively. The results showed that 14 PAHs could be detected in varying degrees for all sampling sites, Total concentrations of PAHs ranged from 83.43 to 5206.97ng/g with a mean concentration of 736.95 ng/g. 2,3,4-ring PAHs dominated in waterway sediment samples, and phenanthrene was the most abundant individual compound, accounting for 9.04% to 24.06% of total concentrations of PAHs, followed by fluoranthene and pyrene. The percentage of benzo[a]pyrene with high carcinogenicity in all samples was from 0.94% to 10.68%. Compared with other similar regions of the world, PAHs in waterway sediments from Qidong and Chongming Island of Yangtze River estuary were at moderate level. The sources of PAHs were apportioned using ratio analysis. Places with Phe(phenanthrene)/Ant(anthracene)<10 and Fla(fluoranthene)/Pyr (pyrene)≥1 accounted for 56.25% of all sampling sites, indicated that PAHs in the studying areas mainly derived from combustion of fuel oil. Oil spill was another important source for some sampling sites located nearby harbours and wharfs. Some sites presented combined pollution characteristics. Comparing with ERL and ERM values for environment risk evaluation, some sampling sites of this area possessed a potential combined ecological risk to local organisms caused by PAHs.

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