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南四湖南阳湖区河口与湖心沉积物重金属形态对比研究

Comparison of sediment heavy metal fractions at estuary and center of Nanyang Zone from Nansi Lake, China关键词: [重金属](#) [形态分析](#) [风险评价](#) [相关性分析](#) [理化性质](#) [沉积物](#) [南四湖](#)基金项目: [国家自然科学基金\(No.21207058.41303061\)](#); [山东省科技发展计划项目\(No.2013GSF11701\)](#)

作者 单位

张智慧 1. 山东省水土保持与环境保育重点实验室, 临沂大学资源环境学院, 临沂 276005; 2. 山东师范大学人口·资源与环境学院, 济南 250014

李宝 山东省水土保持与环境保育重点实验室, 临沂大学资源环境学院, 临沂 276005

梁仁君 山东省水土保持与环境保育重点实验室, 临沂大学资源环境学院, 临沂 276005

摘要: 湖泊河口区与湖心区沉积条件不同,沉积物重金属等内源污染物的分布亦可能存在较大区别。为比较河口区与湖心区沉积物重金属赋存形态的空间差异,利用柱状沉积物采样器在南四湖南阳湖区湖心和河口分别获取原位柱状沉积物,在比较分析沉积物孔隙度、有机质、粒度及典型重金属(Cu、Pb、Cd、Cr、Hg)各形态垂向分布特征的基础上,对其相关性进行分析,并对表层(0~4 cm)沉积物重金属污染程度及潜在生态风险进行评价。结果表明,除Cd外,河口区沉积物Cu、Pb、Cr、Hg含量较湖心区高,泗河为南阳湖区重金属污染物的来源之一,沉积物重金属各形态含量在垂向分布上规律性不明显,且均主要以残渣晶格结合态存在,5种重金属元素中,Hg残渣晶格结合态所占比重最小(约30%),具有较高的迁移性,存在相对较大的生态风险。地积累指数法和潜在生态危害指数法研究表明,河口区与湖心区表层沉积物均受Hg及Cd的污染较重,Pb、Cu、Cr污染较轻,潜在生态危害指数法所得污染级别较地积累指数法高。相关性分析表明,沉积物Cu、Pb、Cd、Cr、Hg总量、可交换态、有机物及硫化物结合态、残渣晶格结合态含量与沉积物孔隙度、有机质相关系数多为正值,同粒度相关系数多为负值,同碳酸盐结合态和铁锰氧化物结合态的相关系数各异,无明显规律。

Abstract: The distribution of internal pollutant such as sediment heavy metal may have large difference due to the heterogeneity of sedimentary between estuary and central of the lake. In order to compare the difference of sediment heavy metal fractions from different hydrodynamic action areas, intact in situ sediment cores were collected by core sampler from the center and estuary of Nanyang Zone from Nansi Lake. The inter-relationship of metal fractions and their correlation with sediment physicochemical properties was studied. Besides, the recent pollution level and potential ecological risk of heavy metals in surface layer of sediment were also evaluated. Results showed that except Cd, contents of Cu, Pb, Cr and Hg from estuary sediments were higher than those from sediments in the center, due much to the fact that Sihe River is one of the main pollution sources of heavy metals. The vertical distributions of metal fractions did not have similar distribution patterns, and the contents of residual forms were the highest. Among the five types of heavy metals, the content of residual fraction of Hg was the lowest, accounting for 30% of total content with higher mobility and ecological risk. The results from the geoaccumulation index and the potential ecological risk index both indicated that Hg and Cd from surface 0~4 cm sediment layer at estuary and center of Nanyang Zone had high risk, while Cu, Pb and Cr had low risk, and the pollution levels from potential ecological risk index were higher than those from the geoaccumulation index. Correlation analysis showed that most correlation coefficients of the total content, exchangeable form content, organic and sulfide binding form content and residual form of Cu, Pb, Cd, Cr, Hg in sediments with sediment porosity and organic matter were positive and negative with grain size of sediment, while the carbonate binding form and Fe-Mn oxides binding form with them were in any size, reflecting no significantly laws.

Key words: [heavy metals](#) [fraction analysis](#) [risk assessment](#) [correlation analysis](#) [physicochemical property](#) [sediment](#) [Nansi Lake](#)

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