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基于SOM和多元分析的滇池沉积物污染特征空间模式研究

### Spatial pattern analysis for sediments in Lake Dianchi based on SOM and multivariate statistics

关键词: [沉积物](#) [多元统计](#) [自组织映射神经网络](#) [空间模式](#) [监测点位优化](#) [滇池](#)

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作者 单位

李发荣 昆明市环境监测中心,昆明 650028

杨永辉 北京大学环境科学与工程学院,水沙科学教育部重点实验室,北京 100871

王翠榆 北京大学环境科学与工程学院,水沙科学教育部重点实验室,北京 100871

高伟 北京大学环境科学与工程学院,水沙科学教育部重点实验室,北京 100871

郭怀成 北京大学环境科学与工程学院,水沙科学教育部重点实验室,北京 100871

何咏 昆明市滇池北岸水环境综合治理工程建设管理局,昆明 650021

周丰 北京大学城市与环境学院,地表过程分析与模拟教育部重点实验室,北京 100871

摘要: 联合运用层次聚类分析(HCA)、判别分析(DA)和自组织映射神经网络(SOM)3种数值方法,对滇池2008—2010年17个底泥监测点位(10个常规点位及7个新增点位)9种污染物进行空间差异性和相似性分析,并评价各指标在空间的分布特征及监测点代表性.结果表明:滇池沉积物整体污染程度为草海>外海中部及南部>外海北部,As、Hg、Pb、Cd、Cu和Zn污染最严重的点位是断桥;草海中心的凯氏氮污染最严重,其他指标污染水平仅次于断桥;Cr和TP污染最严重的点位是新增点位盘龙江2;海埂是全局污染最轻的点位.现有的常规监测点位对整体污染特征的代表性较弱,建议取消劣质最低的白鱼口、观音山西、观音山东和罗家营站点;考虑污染特征和监测点位空间分布的均匀性,建议将盘龙江2、海埂和马料河设为常规监测点位.

**Abstract:** Three multivariate statistical techniques, i.e. hierarchical cluster analysis (HCA), discriminant analysis (DA) and self-organizing maps (SOM), were applied for spatial pattern analysis of sediments in Lake Dianchi of southwestern China. The dataset of nine pollutants was observed and collected for 17 monitoring sites from 2008 to 2010, including 10 current and 7 additional monitoring stations. The results demonstrated that the holistic pollution level was the highest in Caohai, followed by central and southern Waihai and northern Waihai. Duanqiao site had the highest concentration of As, Hg, Pb, Cd, Cu and Zn, while Caohai Zhongxin site had the second highest concentration of these pollutants and highest concentration of Total Kjeldahl Nitrogen (TKN). Panlongjiang II site had the highest concentration of Cr and TP. In comparison, Haigeng site is the cleanest among all the monitoring sites. However, the current monitoring stations were unable to reveal the spatial heterogeneity and homogeneity of sediment pollution level. Two suggestions were proposed to optimize the spatial location of the monitoring sites, including (a) removing four sites in the current monitoring system, i.e. Baiyukou, Guanyinshanxi, Guanyinshandong and Luojiaying, and (b) adding three monitoring stations into the monitoring network, i.e. Panlongjiang II, Haigeng and Maliaohu.

**Key words:** [Sediment](#) [multivariate statistics](#) [self-organizing maps](#) [spatial pattern](#) [monitoring network optimization](#) [Lake Dianchi](#)

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主办单位：中国科学院生态环境研究中心

单位地址：北京市海淀区双清路18号 邮编：100085

服务热线：010-62941073 传真：010-62941073 Email: [hjkxxb@rcees.ac.cn](mailto:hjkxxb@rcees.ac.cn)

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