

论文

太湖沉积物中微生物多样性垂向分布特征

- 1 内生金属矿床成矿机制研究国家重点实验室, 南京大学 地球科学与工程学院, 江苏 南京 210093
- 2 污染控制与资源化研究国家重点实验室, 南京大学 环境学院, 江苏 南京 210093

摘要:

运用化学分析方法和PCR-DGGE技术,从沉积物化学及分子生物学角度对太湖沉积物理化性质(pH、Eh)、营养盐及微生物多样性的垂向分布及相关性进行研究。结果表明:沉积物上覆水接触界面处于轻度还原状态,在表层8-0 cm左右以下,Eh随沉积深度的增加迅速下降,还原性逐渐增强,到15-0~22-5 cm深度区间内,Eh值基本稳定,还原性最强,之后随深度的进一步增加,Eh呈“之”型缓慢升高。沉积物pH随深度的增加先降低后缓慢升高,pH在整个剖面上变化幅度不大,在7-2~7-6变动。沉积物中含有丰富的营养盐,总氮(TN)、总磷(TP)最高含量分数和有机质(OM)的最高百分比分别为2-436 mg/g、0-731 mg/g和3-817%,其剖面特征表明,沉积物表层TN和OM远高于底层,其含量随深度增加而降低。TP随着沉积深度的增加呈“之”型缓慢减少。不同深度沉积物的微生物群落呈现出明显的空间分布多样性差异,不同深度沉积物的微生物群落结构之间的相似性和动态性存在差异。多元相关分析结果显示,TN与OM显著相关,理化指标、营养盐中任一指标含量与微生物群落多样性指标之间存在相关性,但不显著,微生物多样性是营养盐及环境物理、化学和生物等多方面共同作用的结果。

关键词: 微生物多样性;沉积物;垂向分布;变性梯度凝胶电泳(DGGE);16S rDNA

Vertical distribution of the microbial community in modern lacustrine sediments of Taihu Lake.

- 1 State Key Laboratory for Mineral Deposit Research, School of Earth Sciences and Engineering, Nanjing University, Nanjing 210093, China
- 2 State Key Laboratory of Pollution Control and Resource Reuse, School of the Environment, Nanjing University, Nanjing 210093, China

Abstract:

The paper studies the physicochemical characteristics, nutritions and the microbial community diversity of sediment core samples in the Taihu Lake with fumigation digestion and PCR-DGGE analysis. The results indicated that the water-sediment interface was in a state of mild reduction. Below the surface of sediments, Eh decreased rapidly with the increase in depth, and it is under the anaerobic condition except the top 8-0 cm layer of the sediment; in the depth ranging from 15-0 to 22-5 cm, the Eh value is basically stable. Further increasing the depth of sediment layers, the Eh value increased in the “z” style. The pH value decreased first and then slowly increased with the increase in the depth of sediment layers; the pH value changed slightly in the profile of sediments and ranged from 7-2 to 7-6. The TN, TP and OM concentrations in sediments are high, and their maximum concentrations reached 2-436 mg/g, 0-731 mg/g and 3-817%, respectively. Their vertical profiles showed that the TN and OM concentrations decreased with the increase in the depth of sediment layers. The TP concentration slowly decreased with the increase in the depth of sediment layers in the “z” style. There are prominent differences in microbial diversity spatially; the comparability and the dynamic characteristics of community structures between different sediment samples at different depth are different. In order to test the correlation of the parameters, the properties of the sediment samples were analyzed by correlating all the depth of the samples with pH, Eh, OM, TN, TP and the Shannon-Weaver index (H'). The little significant correlation at the  $\alpha = 0.05$  level was observed between the environmental parameters. However, the TN concentration and the percentage of organic matter(OM) are significantly correlated. The microbial diversity is jointly affected by the nutrient, the physical, chemical and biological characteristics, etc.

Keywords:

microbial diversity; sediment; vertical distribution; denaturing gradient gel electrophoresis (DGGE); 16S rDNA

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通讯作者:

作者简介:赵兴青(1974—),女,博士后,主要研究领域为环境生物学和地质微生物。 E-mail:nju\_zhaoxq@163.com

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