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天然存在的碳、氮稳定同位素在生态系统研究中的应用

@蔡德陵$国家海洋局第一海洋研究所!山东青岛266061 @张淑芳$国家海洋局第一海洋研究所!山东青岛266061,青岛海洋大学化学化工学院,山东青岛266003 @张经$青岛海洋大学化学化工学院!山东青岛266003,华东师范大学河口与海岸国家重点实验室,上海200062

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摘要 简要介绍稳定碳、氮同位素在生态系统领域中关于系统的碳源、能量流动、营养结构、污染物的生物放大作用 ,对系统稳定性变化的应用研究作了较为系统的论述 ,并对稳定碳、氮同位素在赤潮研究、环境污染治理、生态动力学建模及有机分子化合物系列示踪技术等方面的应用提出展望。

关键词 质谱学 生物地球化学 稳定碳、氮同位素研究 生态系统 营养结构 能量流动 环境污染

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Esosystem Tropic Dynamics Studies as Traced by Natural Carbon and Nitrogen Stable Isotopes

CAI De-ling 1, ZHANG Shu-fang

Abstract The key scientific problems of ecosystem studies concerned with applications of carbon and nitrogen stable isotope tracers are systematically discussed.These stable isotope tracers may be usedto elucidate major energy path ways carbon sources and cycling in the ecosystems. The traditional approach of determining trophic levels is the dietary analysis, but gut content are ofter ground beyond recongnition by the gastric mill of animals. Contributions of energy sources to crays fish in the Jacks Fork River, Missouri OSA, determined using the stable isotope mixing model are similar to results of gut-content analysis uncorrected for different food types. Comparing with gut-analysis method, stable nitrogen analysis does not require estimates of assimilation efficiency, integrates resource use over loger time periods, and is less tedious, particularly when working with small organisms. Stable nitrogen isotope compositions are commonly used to represent the trophic structure of aquatic system from high arctic to tropical marine food webs. Adult lake trout, a top pelagic predator, from a series of lakes has been found that their δ 15 N values vary from 0.75% to 1.75%, a surprisingly wide range for one species. The length of the food chain can explain this variation, supporting the idea that δ 15 N is a food-web descriptor. Recent studies have shown that the use of δ 15 N analysis to characteristic trophic relationships can be useful for tracing bioconta minants in food webs. The PCBs biomagnification within a food web can be assessed quantitatively using the measurement of δ 15 N values and PCBs concnetration.Furthermore, the authors propose the application of the stable isotopes in brown tide, environmental pollution, establishing ecological dynamics model and molecular tracers.

Key words biogeochemistry study on carbon and nitrogen stable isotopes ecosystem trophic structure energy flow environmental pollution

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