

Speciation, Migration and Transformation of Phosphorus and Nitrogen in Lake Chaohu: Effects on the Algae Bloom and Burial

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Understanding nitrogen (N) and phosphorus (P) cycling is critical for the management of eutrophic lakes. However, previous studies mainly focus on dissolved phases of N and P but overlook the particulate forms, which is usually associated with suspended particle matter (SPM). In this study, we chose a local eutrophic lake Chaohu and sampled the major inflowing river water and lake water from 14 sites over a 12-month period from 2023 to 2024. Our speciation analyses show that particulate phases of N and P remained relatively high all over the year. Dissolved phases of N and P varied largely with time: dissolved inorganic phases predominated at the algae bloom stage, but shifted to dissolved organic phases at the decay stage. Our calculated apparent distribution coefficients (K_d) denote that the particulate reactivity of N and P was stronger in the lake water than river. The seasonal algae bloom dynamics in Lake Chaohu are controlled by two key processes, including elevated riverine inputs and SPM-mediated amplification of internal nutrient regeneration. Overall, SPM may play a critical role in the biogeochemical cycling of N and P and in the development of algae growth and future water quality management should pay more attention on the monitoring of SPM.