

Characterizing Spatiotemporal Variations Of Chromophoric Dissolved Organic Matter In Headwater Catchment Of A Key Drinking Water Source In China

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Abstract

Natural surface drinking water sources with the increasing chromophoric dissolved organic matter (CDOM) have profound influences on the aquatic environment and drinking water safety. Here, this study investigated the spatiotemporal variations of CDOM in Fengshuba Reservoir and its catchments in China. Twenty-four surface water samples, 45 water samples (including surface water, middle water, and bottom water), and 15 pore water samples were collected from rivers, reservoir, and sediment of the reservoir, respectively. Then, three fluorescent components, namely two humic-like components (C1 and C2) and a tryptophan-like component (C3), were identified from the excitation-emission matrix coupled with parallel factor analysis (EEM-PARAFAC) for all samples. For spatial distributions, the levels of CDOM and two humic-like components in the reservoir were significantly lower than those in the upstream rivers ($p < 0.01$), indicating that the reservoir may act as a reactor to partly reduce the levels of exogenous input including CDOM and humic-like matters from the surrounding catchment. For temporal variations, the mean levels of CDOM and three fluorescent components did not significantly change in rivers, suggesting that perennial anthropic activity maybe an important factor impacting the concentration and composition of river CDOM but not the precipitation and runoff. However, these mean values of CDOM for the bulk waters of the reservoir changed markedly along with seasonal variations, indicating that the hydrological processes in the reservoir could control the quality and quantity of CDOM. The different correlations between the fluorescent components and primary water parameters in the river, reservoir, and pore water samples further suggest that the reservoir is an important factor regulating the migration and transformation of FDOM along with the variations of different environmental gradients.

Keywords

Drinking water sources Fengshuba Reservoir CDOM FDOM EEM-PARAFAC Hydrological processes

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