

Study on the carbon fluxes and their influencing factors in a large reservoir

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The water environment and water ecological of the Three Gorges Reservoir after impoundment have received widespread attention across various scientific communities, and the potential carbon emissions cannot be ignored. Although a lot of research about it has been conducted, the results are not enough to understand the characteristics and mechanism of carbon cycling in the Three Gorges Reservoir. Here, we studied the carbon flux across water-air interface in the mainstream and tributaries of the Three Gorges Reservoir with in-situ monitoring and laboratory simulation from 2015-2017. The CH₄ flux ranged from 0.036 to 0.248 mg/(m²·h), which is lower than that of other reservoirs. The fluxes of carbon dioxide across the water-air interface appeared an obvious different characteristic of monthly variation in main stream and tributaries. Main stream and CaoTang River performed for "carbon source" of carbon dioxide, and Zhuyi River showed source and sink alternately. The results also indicated that the fluxes of carbon dioxide of CaoTang River across the water-air interface appeared an obvious characteristic of diurnal variation at different water levels. The overall carbon dioxide showed "absorb by day and emit at night" in the initial impoundment period, however emitted all day in dry seasons. Environmental factors such as dissolved oxygen, water temperature, wind speed, water level and nutrient concentration play a key role in carbon emission. Based on the bubble flux of methane, our result also suggested that in summer, the contribution of bubbles to carbon flux cannot be ignored in some area of tributary.