

Properties of CO₂ and CH₄ fluxes across water–air interface at the Three Gorges Reservoir, the mainstream of Yangtze River from Zhutuo to Wanzhou, China

Yu Qin^{a,*}, Zhengmian Liu^a, Zhe Li^b, Boxiao Yang^a

^aKey Laboratory of Hydraulic and Waterway Engineering of the Ministry of Education, Chongqing Jiaotong University, Chongqing, 400074, China, email: qinyu54001@163.com (Y. Qin)

^bKey Laboratory of Reservoir Environment, Chongqing Institute of Green and Intelligence Technology, Chinese Academy of Sciences, Chongqing 400714, China

Received 22 October 2018; Accepted 15 January 2019

ABSTRACT

The Three Gorges Reservoir is one of the most important hydraulic projects of the Yangtze River in China, so it is vital to monitor p(CO₂), p(CH₄) and CO₂, CH₄ fluxes in water–air interface in a long term. Five monitoring sites (Zhutuo, Mudong, Fulin, Zhongxian and Wanzhou) were chosen from the mainstreams of the Yangtze River in this study. CO₂ and CH₄ were monitored monthly for period of 1 year from May of 2016. Results indicated that in the mainstream of the Yangtze River p(CO₂) and CO₂ fluxes were 1,246.99–4,495.20 μatm and (41.29 ± 4.46) mmol m⁻² d⁻¹, respectively. The p(CH₄) and CH₄ fluxes were 21.63–588.28 μatm and (0.168 ± 0.028) mmol m⁻² d⁻¹. The p(CH₄) had a positive correlation with water temperature, while negative correlation with dissolved oxygen (DO). The p(CO₂) also had a significant positive correlation with water temperature, but negative correlation with conductivity, DO, pH and wind speed. Water–air CH₄ and CO₂ fluxes mainly impacted by p(CH₄), p(CO₂), water temperature, DO, conductivity and pH.

Keywords: Three Gorges Reservoir; CO₂; CH₄; Fluxes of air–water interface; Environmental factors

* Corresponding author.