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# Assessment of spatio-temporal variability of greenhouse gas (GHG) emission from Xiangjiaba reservoir in the upper Yangtze River

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Xiangjiaba hydropower station is the third biggest hydropower station in China, which was firstly impounded at October 2012, and rose to highest water level 380 meters (below 270 meters downstream of the dam) at September 2013. Xiangjiaba reservoir was a typical canyon-channel-reservoir in southwest of China in subtropical zone. Two sections located upstream of the dam (UPXJB) and one section located downstream of the dam (DWXJB) were monitored each month before the impoundment. $CO_2$ and $CH_4$ flux in 30 sections (23 sections in mainstream, 4 sections in tributaries, 2 sections in river bay and 1 section under the dam) for Xiangjiaba reservoir were monitored 14 times from 2014 to 2016. Three consecutive 24-hour observations were located at the midstream of the reservoir. Compared to many reservoirs especially in tropical zones, the GHG emission level in Xiangjiaba reservoir was relatively lower in initial impoundment. The results showed that $CH_4$ emission rates were significant higher in backwater area (tributary and bay) than in mainstream area (channel); $CO_2$ emission rates were significant higher in mainstream area than in backwater area. It also suggested that $CO_2$ and $CH_4$ emission rate in Xiangjiaba reservoir were mainly affected by water-air surface characters, such as wind speed, water temperature and air temperature. The total annual flux was accumulated from mainstream, tributaries and bays according to the annual variation water surface investigated from multi-temporal remoting sensing images.