**Continuous Measurement of Atmospheric CO2 and CH4 Fluxes to Aid Forecast of Algal Occurrence 通过动态连续监测 $CO_2$ 和 $CH_4$ 通量预测太湖蓝藻水华爆发**

**Sponsor**: Natural Science Foundation of Jiangsu Province, China

**Period**: 2011-2014

**Funding Level**: RMB 120,000

**PI**: Wei Xiao

Even though the eutrophication and algae bloom in lakes are severe environmental problems in China and even the whole world, the mechanisms controlling the algae bloom is still not clear. Based on the eddy covariance methodand the wavelength scanned cavity ringdown spectroscopy system, the lake-atmosphere $CO_2$ and $CH_4$ exchanges in representative regions of Lake Taihu will be monitored continuously, together with the measurement of micrometeorological factors (air temperature, humidity, wind speed, wind direction, precipitation and radiation) and lake temperature (water temperature at different depth and sediment temperature). The following issues will be pursued: (1) to analyze the special and temporal variations of lake-atmosphere $CO_2$ and $CH_4$ fluxes; (2) to investigate the correlation between the fluxes and the algae activity; and (3) to identify the environmental factors controlling the algae bloom. The ultimate goal of this study is to establish a model to forecast the outbreak algae bloom and provide meteorological and ecological references to the research on algae bloom.

湖泊富营养化和蓝藻水华发生是我国乃至全球面临的一个重要的环境问题，但是人们对蓝藻水华发生的控制机制尚不清楚。本项目拟采用涡度相关系统和波长扫描光腔衰荡光谱技术，对太湖上代表性区域的湖气间 $CO_2$ 和 $CH_4$ 通量进行连续动态监测，并同步观测气象因子（温度、湿度、风速、风向、降水和辐射）和水体温度（不同深度的水温和底泥温度），研究太湖与大气之间 $CO_2$ 和 $CH_4$ 通量的时间和空间变化特征，分析 $CO_2$ 和 $CH_4$ 通量与蓝藻生命活动之间的联系，确定控制蓝藻水华爆发的主要环境因子，建立蓝藻水华爆发的早期预警模型，为蓝藻水华爆发机制的研究提供气象学和生态学方面的理论依据。