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Methane Flux Dynamics in a Submerged Aquatic Vegetation Zone in Lake Taihu

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1. Introduction

- As an important source of methane (CH_4) , global Lakes emit about 8-48Tg$CH_4$$yr^{-1}$ to the atmosphere. The CH_4 emission from global freshwater, represented CO_2 equivalent, may offset 25% of the terrestrial GHG sink (*Bastviken et al., 2004, 2011; Palma-Silva et al., 2013*).
- Currently, the tropical and northern mid-latitudes lakes may be hot spots of CH_4 emission which may contribute to the CH_4 increase again in the atmosphere from 2007 (*Kirschke et al., 2013, Nisbet et al., 2014*).

1. Introduction

- CH_4 is produced by organic carbon decomposed by methanogenic bacteria in anoxic environments. The productivity or biomass of vegetation in lakes can produce plentiful substrate for decomposition. And, the sediment is often good conditions for anoxic reaction (*Podgrajsek et al.,2013*).
- Under anthropogenic activities pressure, the eutrophication of global lakes is very severe. Changes of vegetation composition caused by eutrophication and climate changes may change the CH_4 emission in lakes.

1. Introduction

- Lake Taihu is a big and subtropical eutrophication shallow lake. The changes in vegetation type caused by eutrophication may result in the changes in temporal dynamic and spatial pattern of CH_4 emission.

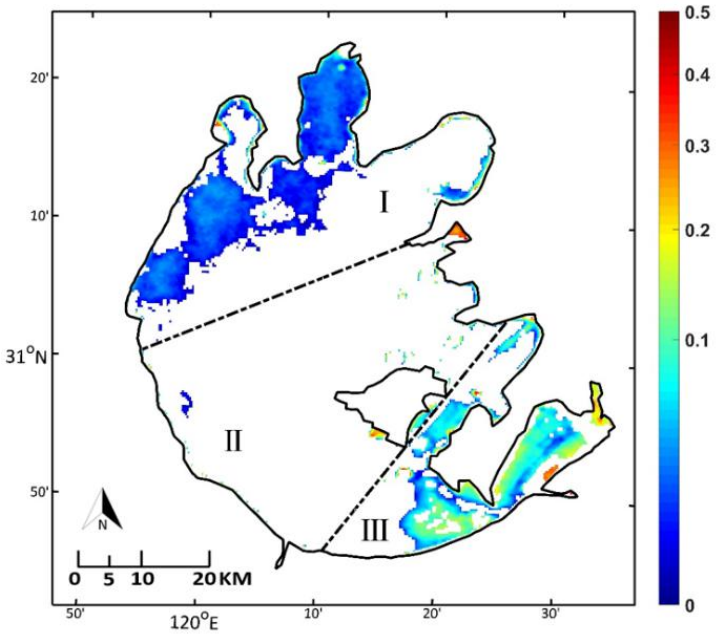


Figure 1 The spatial pattern of NDVI in Lake Taihu.

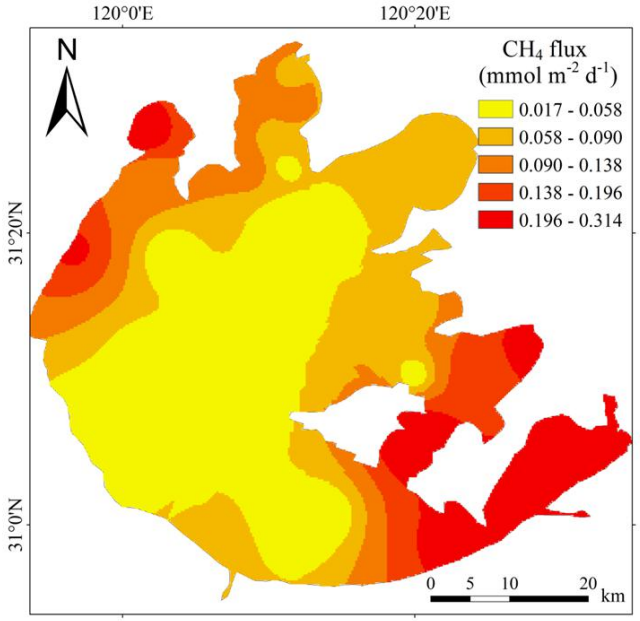


Figure 2 The spatial pattern of CH_4 flux (F_m) in Lake Taihu (Xiao, et al., 2017).

2. Objectives

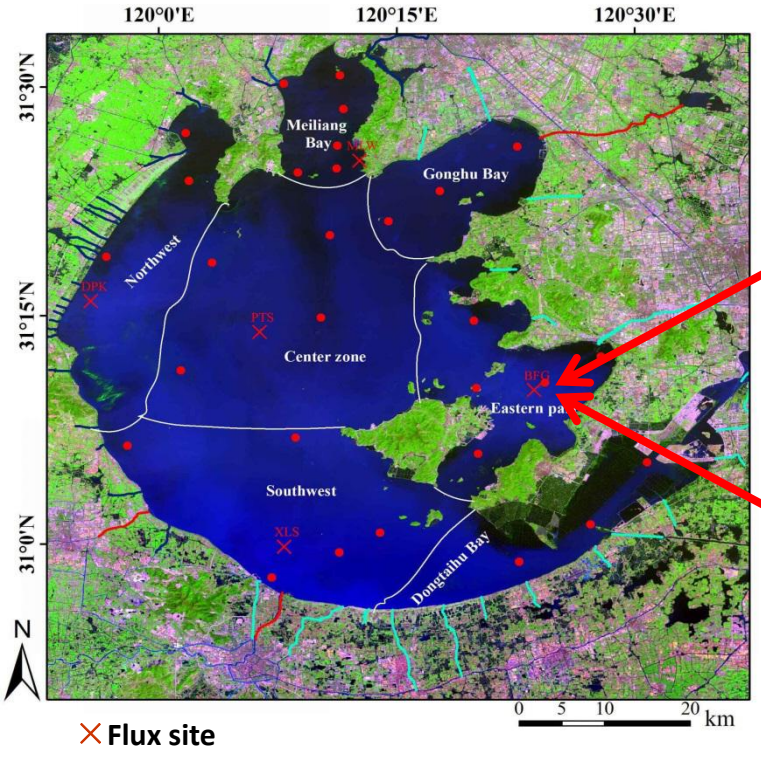
- To characterize the temporal dynamic of CH_4 flux in a submerged aquatic vegetation zone in Lake Taihu.

- To identify the impact factors of CH_4 flux temporal dynamics in a submerged aquatic vegetation zone in Lake Taihu.

3. Methods

3.1 Site and Measurements

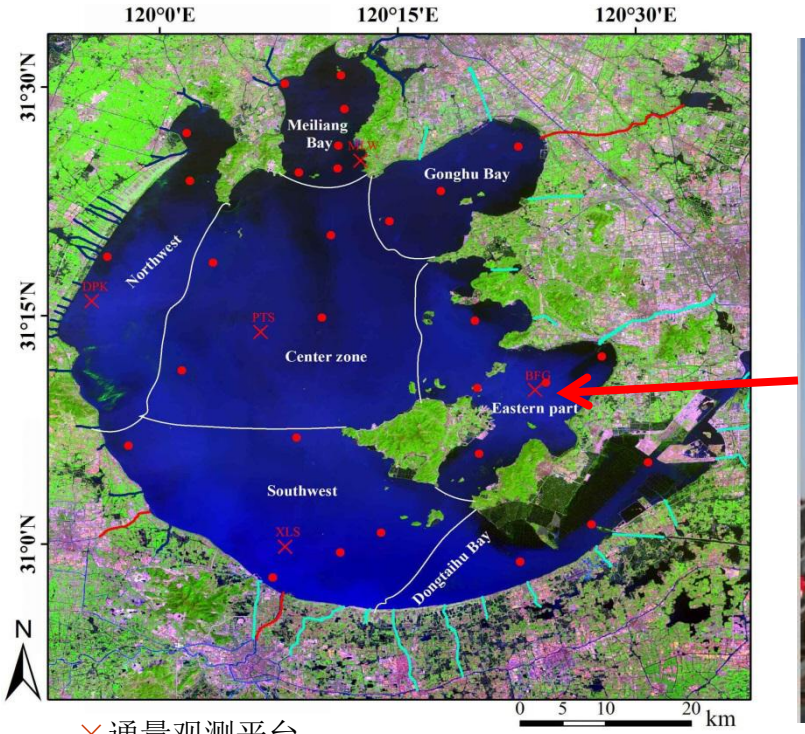
- Bifenggang (BFG) site is located in the east of Lake Taihu (31.17°N, 120.40°E), which belong to the Taihu Eddy Flux Network. Water depth is about 1.7m.



Main Species of vegetation: *Hydrilla verticillata* and *Potamogeton malaianus*.

3.1 Sites and Measurement

- The height of Eddy Covariance system (EC) is about 8.5m.
- And the direction of EC is 225°. The fetch is enough for EC measurement.



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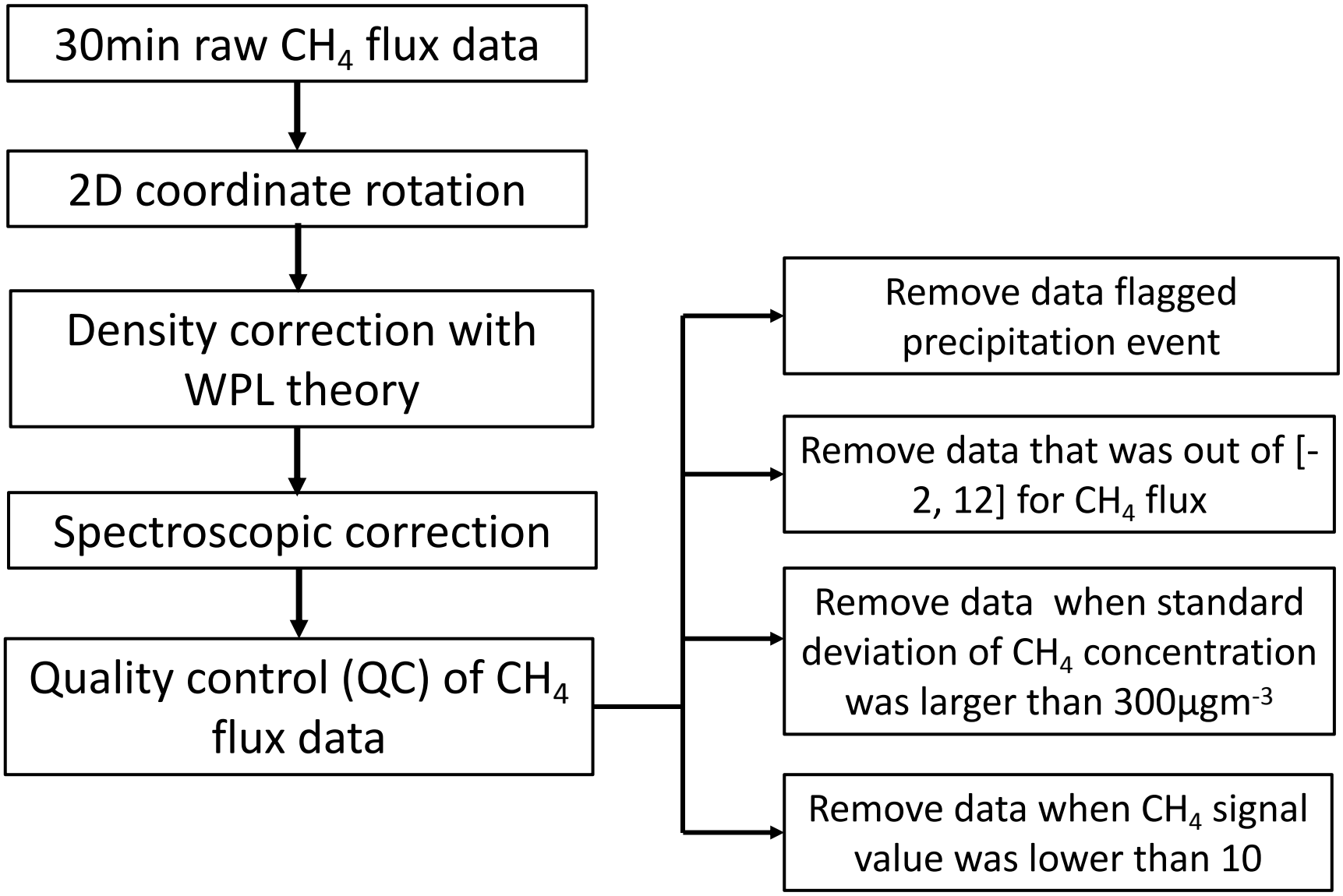
3.1 Sites and Measurement

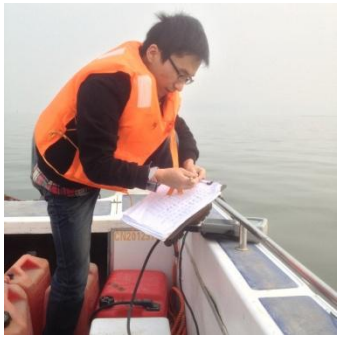
- The EC system was composed by three-dimensional sonic anemometer (Model CSAT3, Campbell Scientific Inc., Logan, UT, USA), an open-path infrared gas analyzer (Model EC150, Campbell Scientific Inc.), and an open-path CH4 gas analyzer (Model Li-7700, LI-COR Inc., Lincoln, NE, USA) for measure atmospheric H_2O, CO_2 , and CH_4 concentrations.
- The raw data was recorded at 10 Hz and block-averaged 30min intervals.

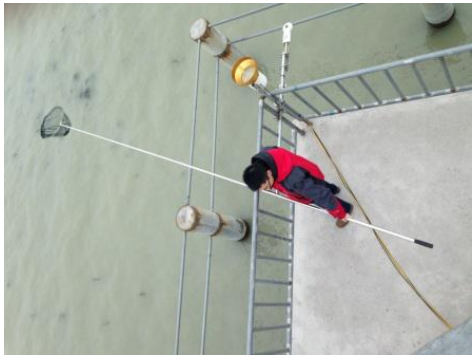
3.1 Sites and Measurement

- Micrometeorological factors, wind speed and direction, water temperature (20cm, 50cm, 100cm, 150cm, and sediment), air temperature, relative humidity, and four- way net radiation components were measured at the same time. All measurements were recorded at 30min interval.
- All flux data and micrometeorological factors data were used in this study from May 2014 to May 2017.

3.2 Flux data processing







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