Eddy Covariance measurement on Lake Taihu

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Motivation of the research

• As a big shallow lake (~2m depth & ~2460 km²), Lake Taihu should have significant effect on regional weather processes and climate change.

• The surface parameterization in weather forecasting model was not validated due to the lack of detailed measurement.

• Algae bloom is a big environmental problem for Lake Taihu and the basin, but the meteorological and ecological mechanisms controlling the algae bloom were not clearly identified.

• As a powerful tool in land ecosystem research, only a few papers reports the use of eddy covariance method in lake ecosystem.
Temperature increased and wind speed decreased in the past 50 years.

Similar trends were found in almost all the land meteorology site.
Buoy
Eddy covariance
In-lake platform
Microwave radar/Lidar
Surface Met station
Ship-borne isotope measurement
Helicopter profiling
Our Experimental Site
EC and microclimate measurement at Taihu site

AC

datalogger

raingauge

EC

microclimate

water temp
EC system

South

Southeast

3.57m
Microclimate system

- Total radiation
- Temp and humidity
- Solar power
- Wind speed and direction
Water temp
Water temp

- Water surface
- 50cm
- 100cm
- 20cm
Good fetch: wind direction 90°~270°, 48%
Energy budget

Monthly Bowen ratio

<table>
<thead>
<tr>
<th>Month</th>
<th>Bowen Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>0.25</td>
</tr>
<tr>
<td>July</td>
<td>0.19</td>
</tr>
<tr>
<td>August</td>
<td>0.17</td>
</tr>
<tr>
<td>September</td>
<td>0.30</td>
</tr>
<tr>
<td>October</td>
<td>0.17</td>
</tr>
<tr>
<td>November</td>
<td>0.18</td>
</tr>
</tbody>
</table>
Lake-land CO₂ exchange

![Graph showing Lake-land CO₂ exchange](image-url)
Solar angle and cloudiness are the main drivers of albedo variations. We need to identify the effect of water quality on water surface albedo.
Water temperature

![Water temperature graph]

- **DOY of 2010**: Days of the year in 2010.
- **Temperature, deg C**: Water temperature in degrees Celsius at different depths:
  - 20cm depth
  - 50cm depth
  - 100cm depth
  - 150cm depth
  - Lake bottom
Net radiation site