It is challenging to measure CO₂ flux with open-path eddy covariance in a cold environment. The difficulty arises from low flux signals and measurement artifacts. One such artifact is sensor self-heating, which is known to degrade the quality of the CO₂ flux. The problem arises from the density correction algorithm that uses the temperature fluctuations measured outside the optical-path of its gas analyzer. In this study, we compared an integrated open-path eddy covariance system (IRGASON, Campbell Scientifi-c Inc., USA.) with a separated open-path system consisting of a sonic anemometer (Gill Windmaster Pro, Gill Instruments Ltd., UK) and a gas analyzer (LI-7500A, LI-COR Inc., USA).

Introduction

The experiment was conducted in a populus euphratica plantation forest in Yuli Country, Xinjiang Uygur Autonomous Region, China during the winter of 2013-2014.

Site and Instrument

The experiment was conducted in a populus euphratica plantation forest in Yuli Country, Xinjiang Uygur Autonomous Region, China during the winter of 2013-2014.

Geography

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Air temperature</th>
<th>Longitude</th>
<th>Annual precipitation</th>
<th>Elevation</th>
<th>Wind speed</th>
<th>Prevailing wind</th>
<th>Sunshine percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>40°26'02.27&quot; N</td>
<td>12 °C</td>
<td>88°01'36.20&quot; E</td>
<td>37.2 mm</td>
<td>843 m</td>
<td>2.4 m s⁻¹</td>
<td>NE, NW</td>
<td>68%</td>
</tr>
</tbody>
</table>

The temperature and vapor mixing ratio observed by IRGASON were in excellent agreement to those from the micrometeorological sensor.

Friction Velocity

More valid IRGASON measurements occurred when sensor heater was switched on, preventing condensation on its optical window.