

Performance evaluation of a carbon dioxide measurement system for urban applications

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Outline

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- 3 Results
- 4 Following work

Introduction

We want to observe CO₂ changes in Nanjing by LI - 840. The instrument has the advantages of light weight, small and inexpensive. It's disadvantage is that measurement is not accurate .

We need to make sure the instruments in best performance before starting the experiments.

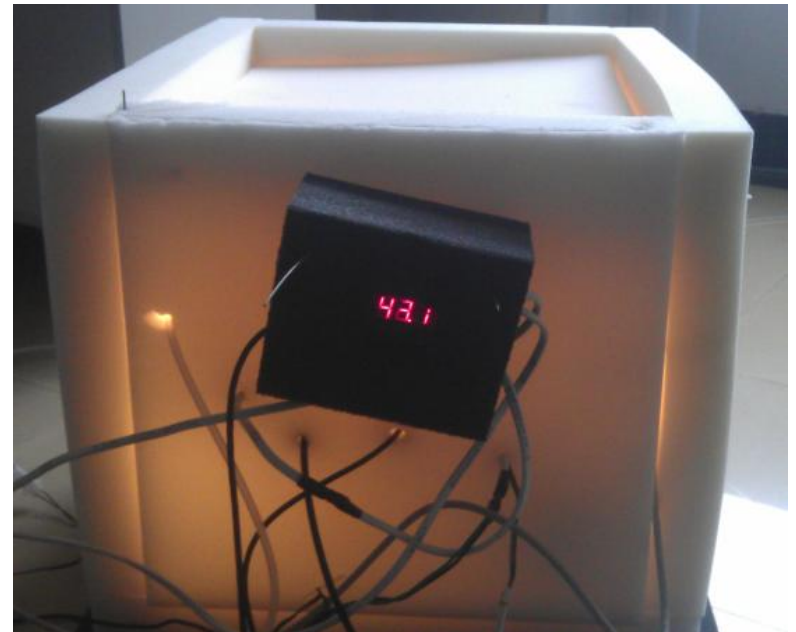
We did the test from December 13th to 28th and March 3rd to now, the text is unfinished. LI-840 was send was sent to repair from December 13th to February 27th .

Material and Methods

1. Temperature control

Temperature is one of the key factors affecting the measurements. The instrument has it's own heating system, but the temperature is not constant for influenced by the environment temperature.

So we made a thermostat (constant temperature box).





2. Calibration

- 1) Water vapor and CO₂ zero calibration by pure nitrogen(99.999%).
- 2) CO₂ calibrated by national primary standard gas (491ppm) .
- 3) The saturated vapor of 10°C calibrated by dew point generator

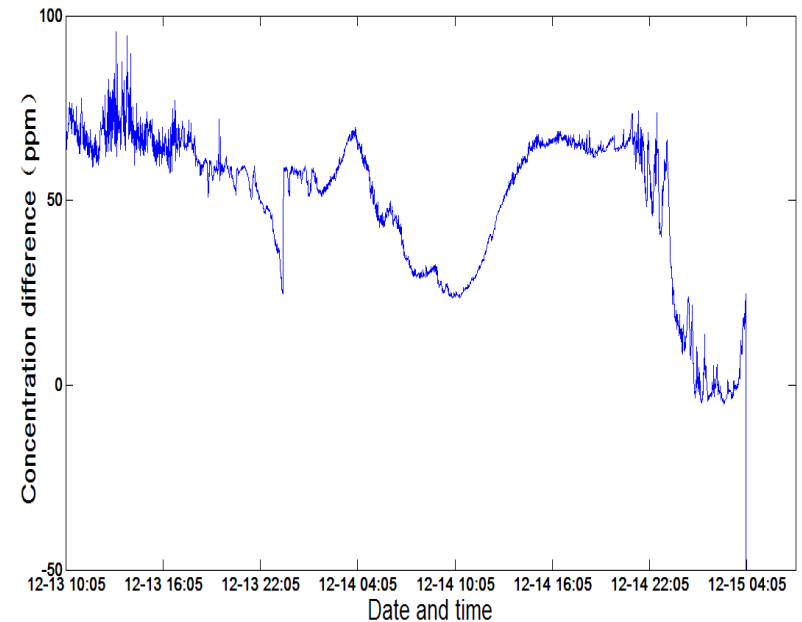
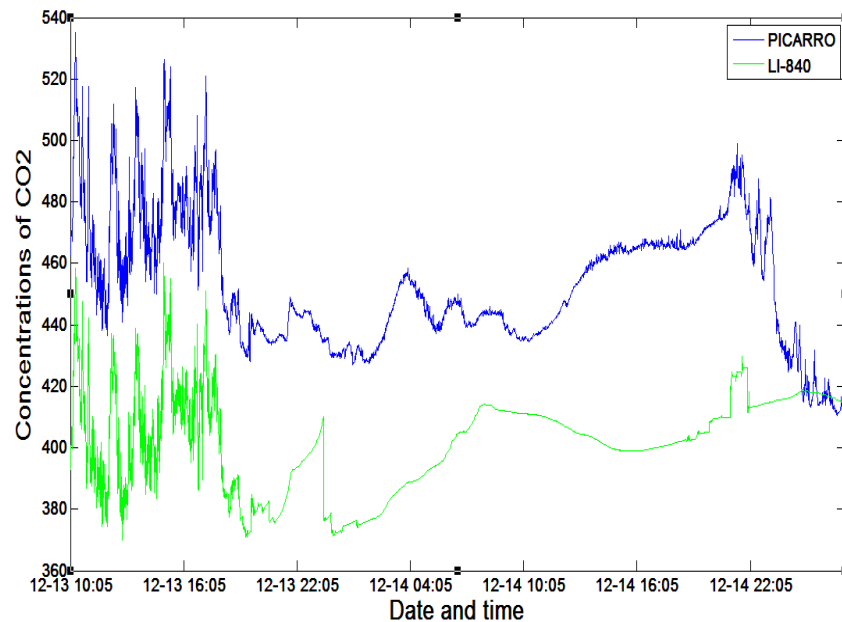
3. Observation and Comparison

The concentration of atmospheric CO₂ observed by LI-840 and Picarro G1101i at the same location concurrently, then we compare the data obtained by the two instrument, using data of Picarro G1101i as the standard.



Results

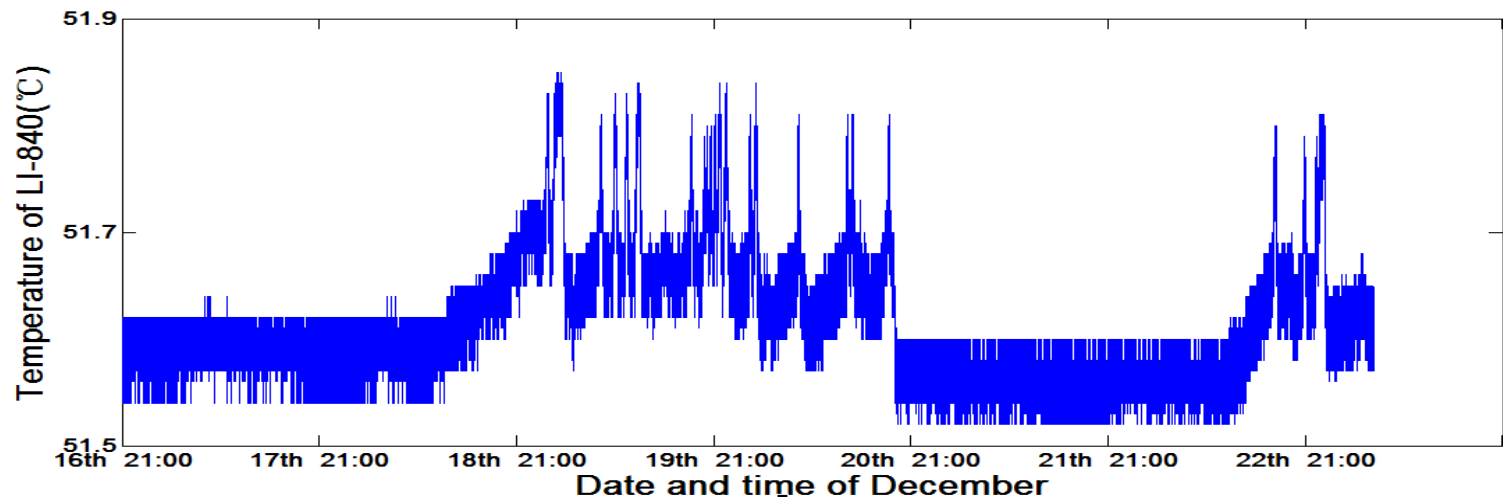
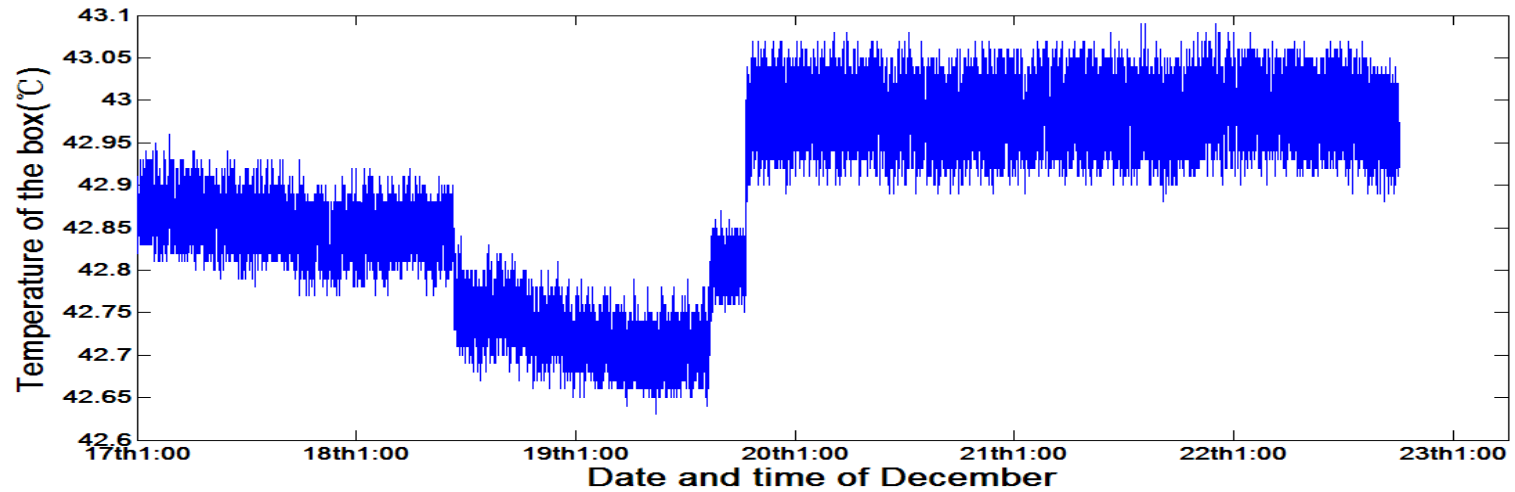
Before calibration



In order to understand the original state of the instrument, before the calibration ,we compared the data of the two instrument. The result is bad.

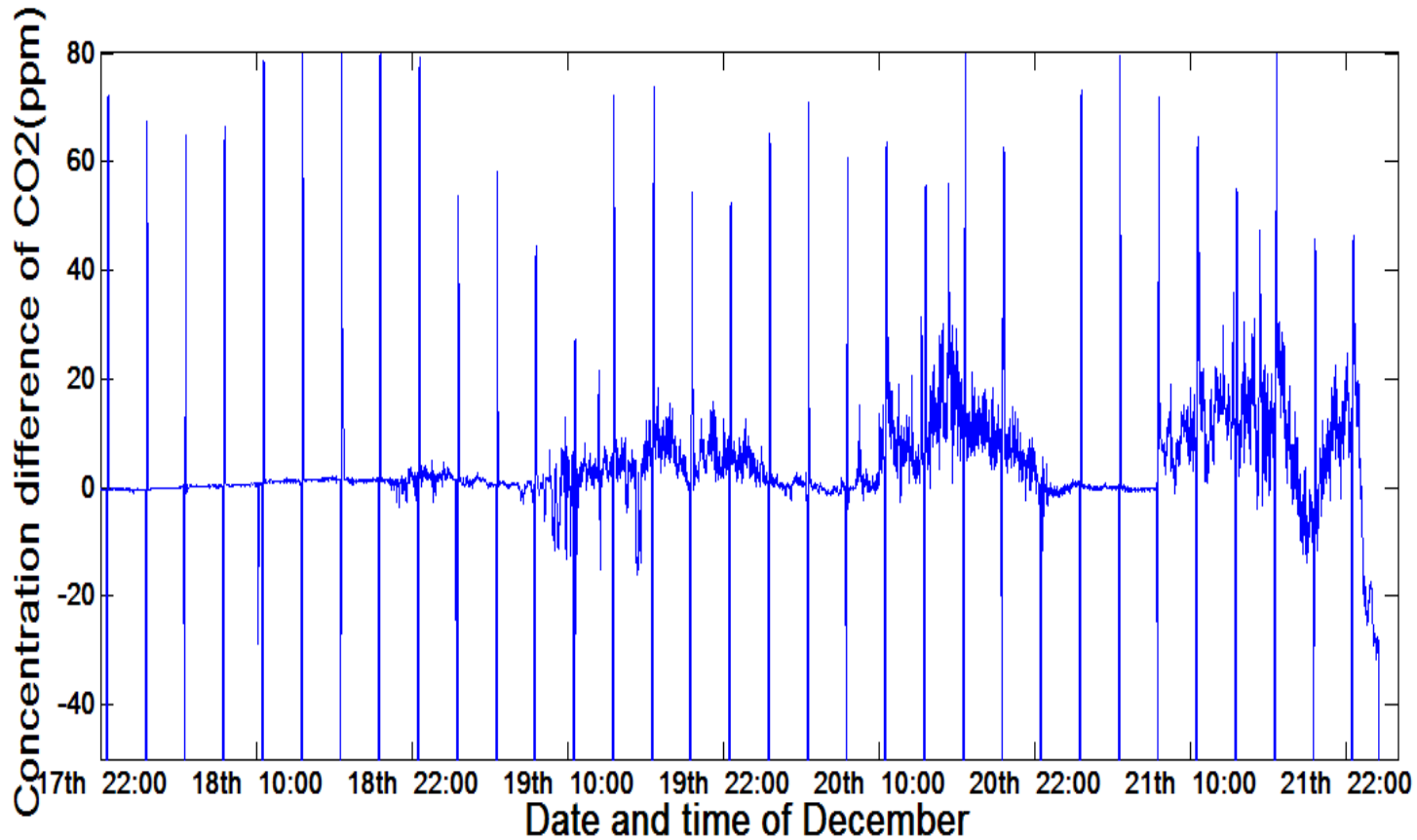


After calibrate CO₂(Dec 17th-Dec 22th 2012)



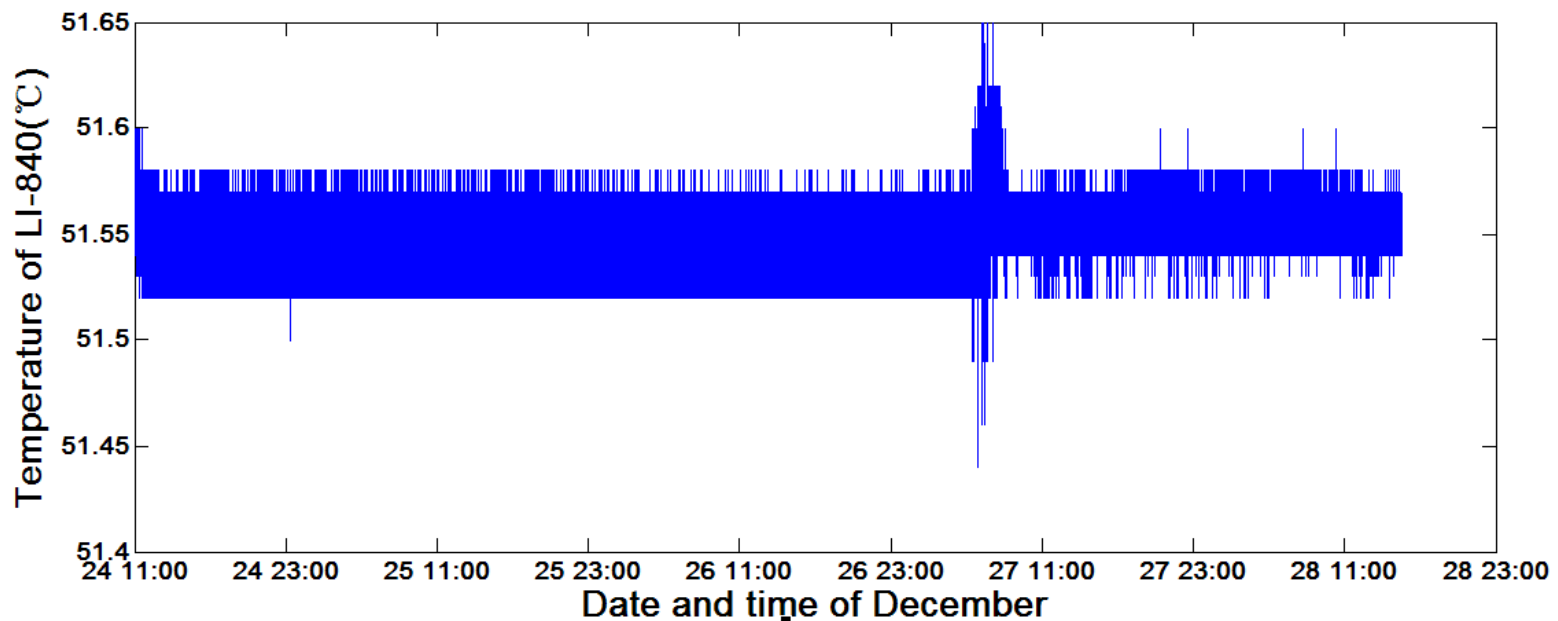


After calibrate CO₂(Dec 17th-Dec 22th 2012)



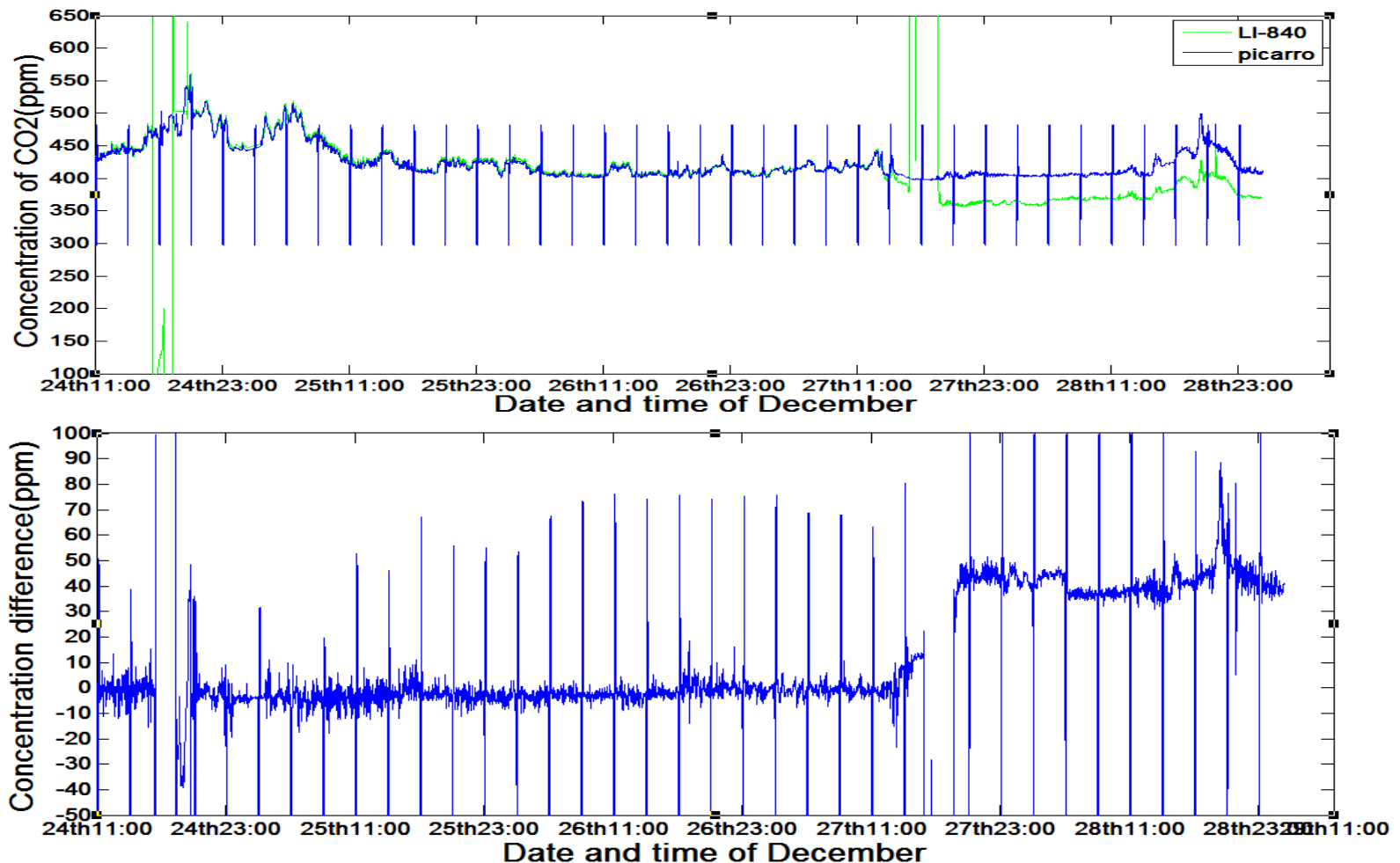


After calibrate CO₂(Dec 24th-Dec 28th 2012)



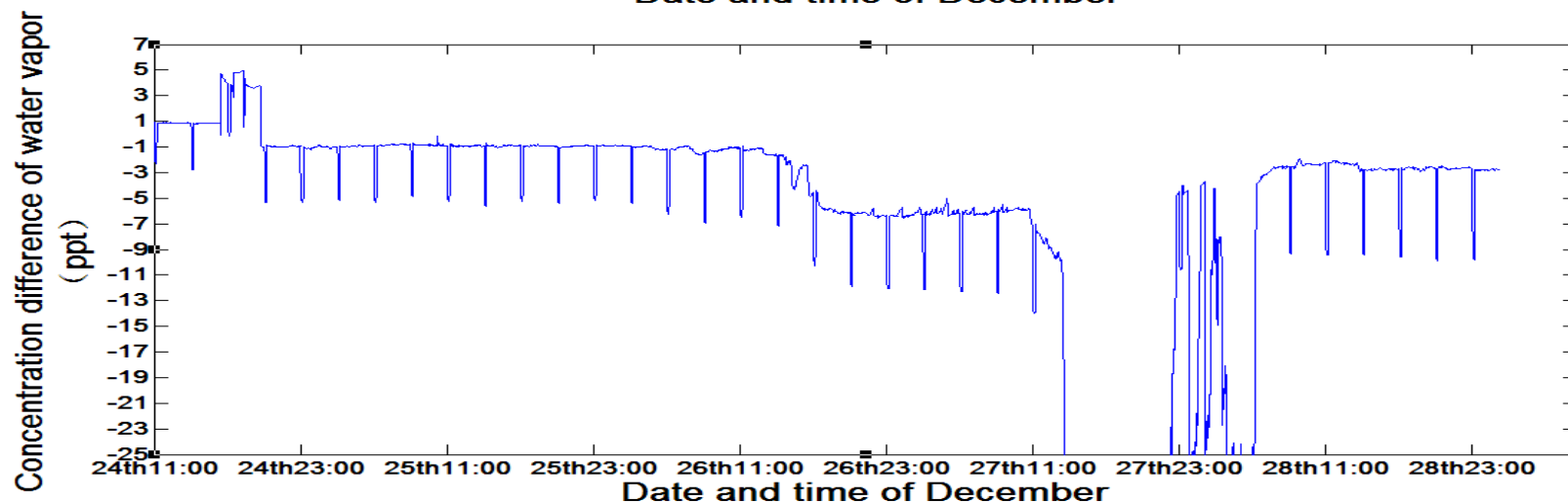
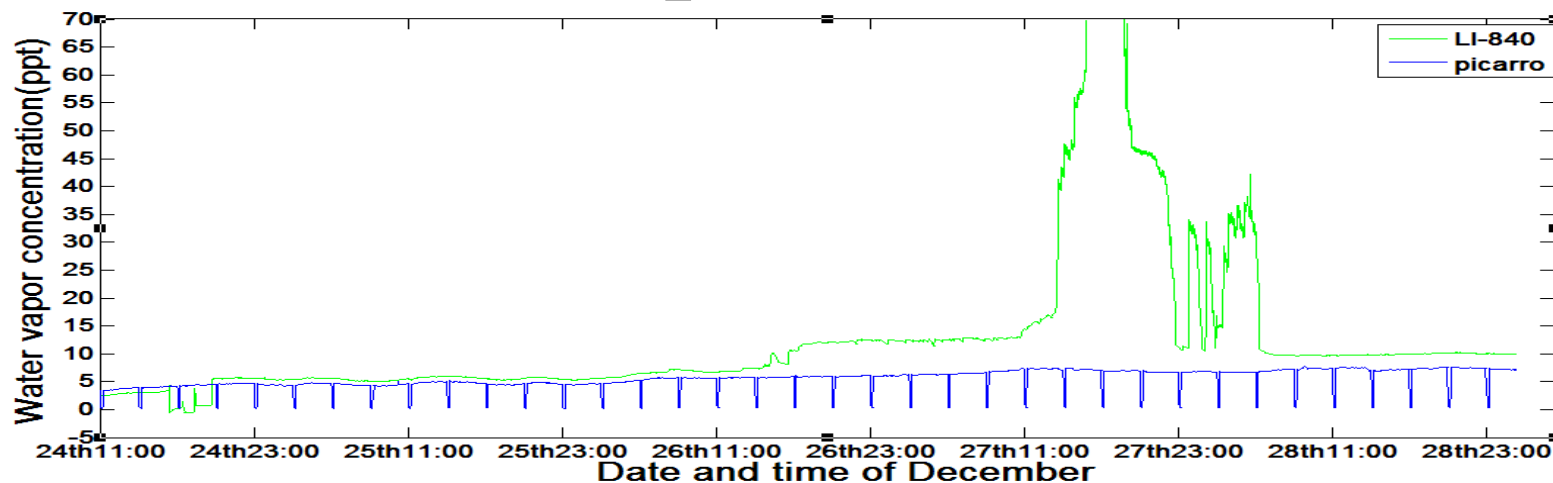
The temperature of the constant temperature box was changed from 42.1 °C to 35 °C .

After calibrate CO₂(Dec 24th-Dec 28th 2012)

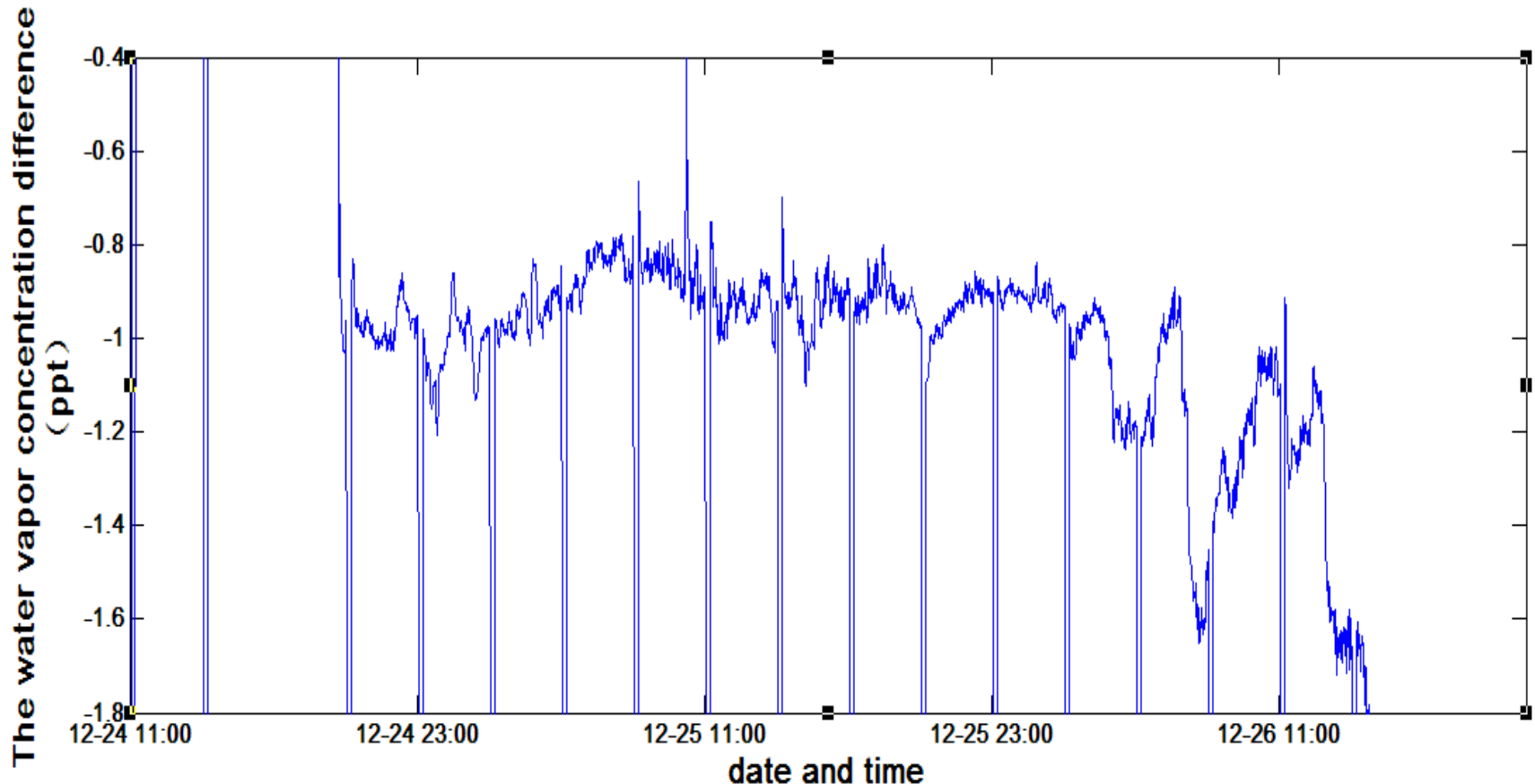




After calibrate CO₂(Dec 24th-Dec 28th 2012)

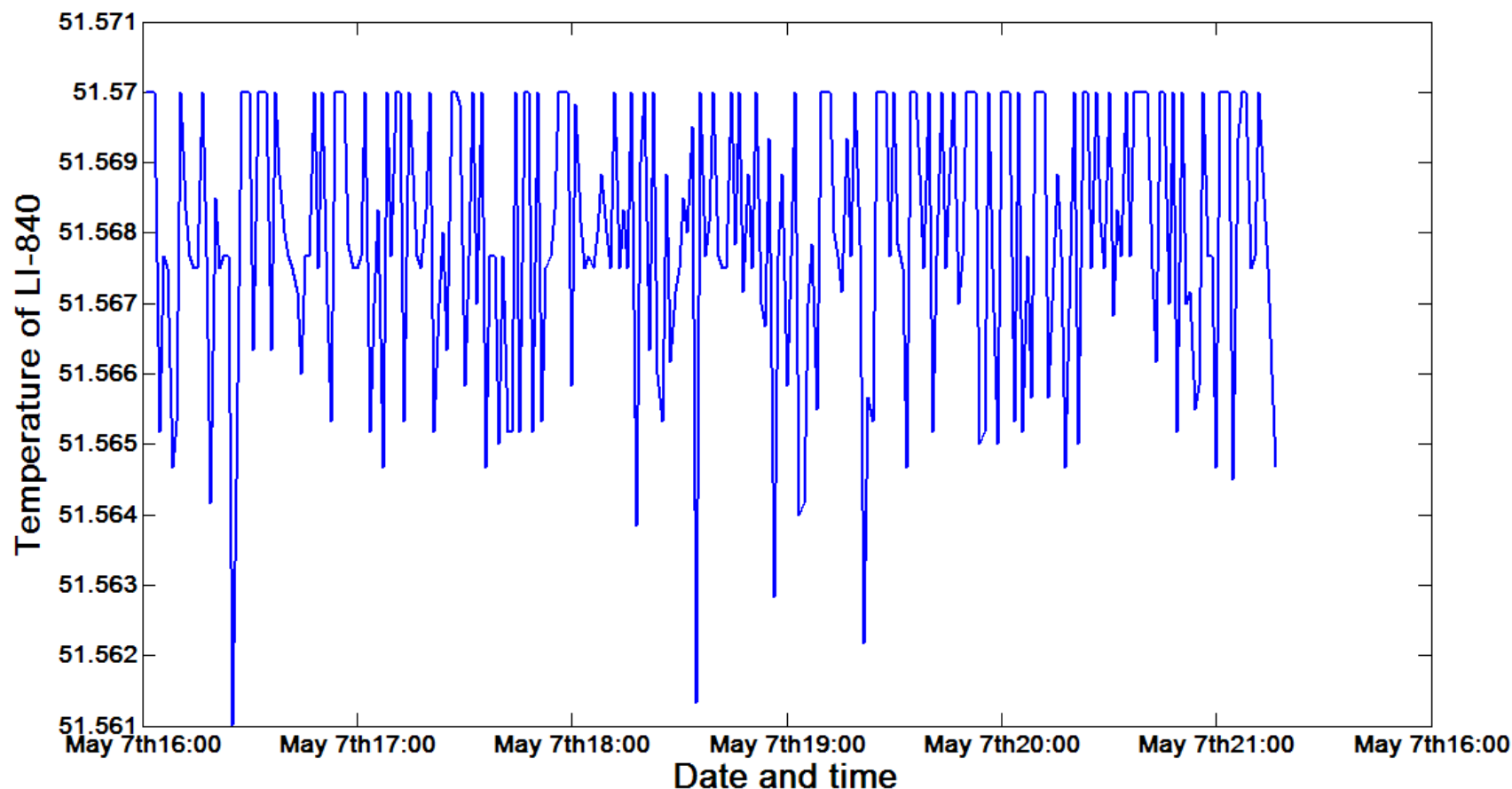


After calibrate CO₂(Dec 24th-Dec 28th 2012)



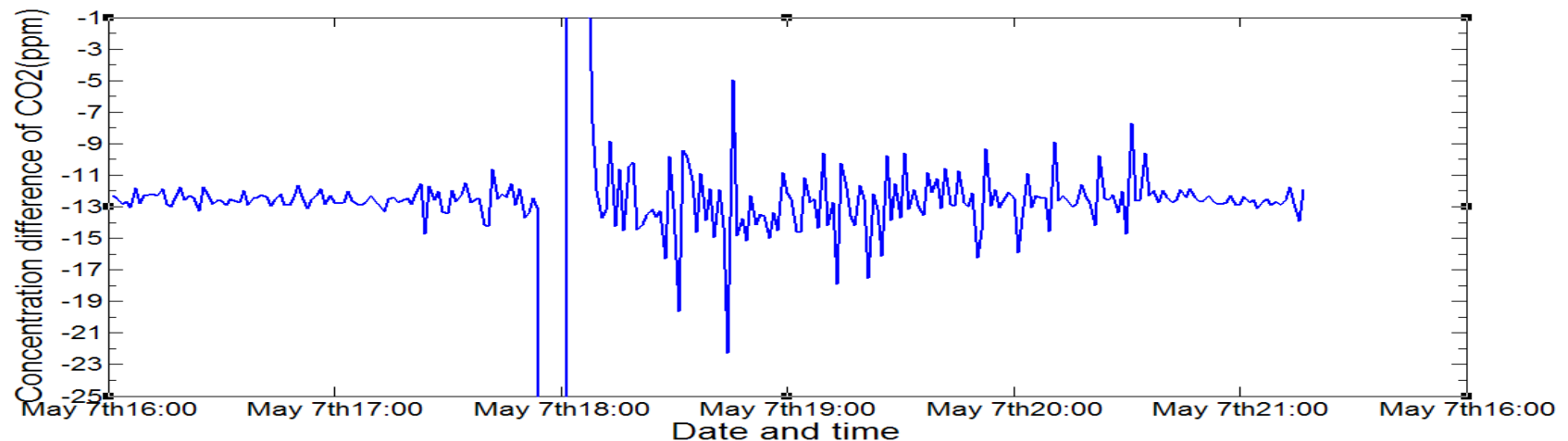
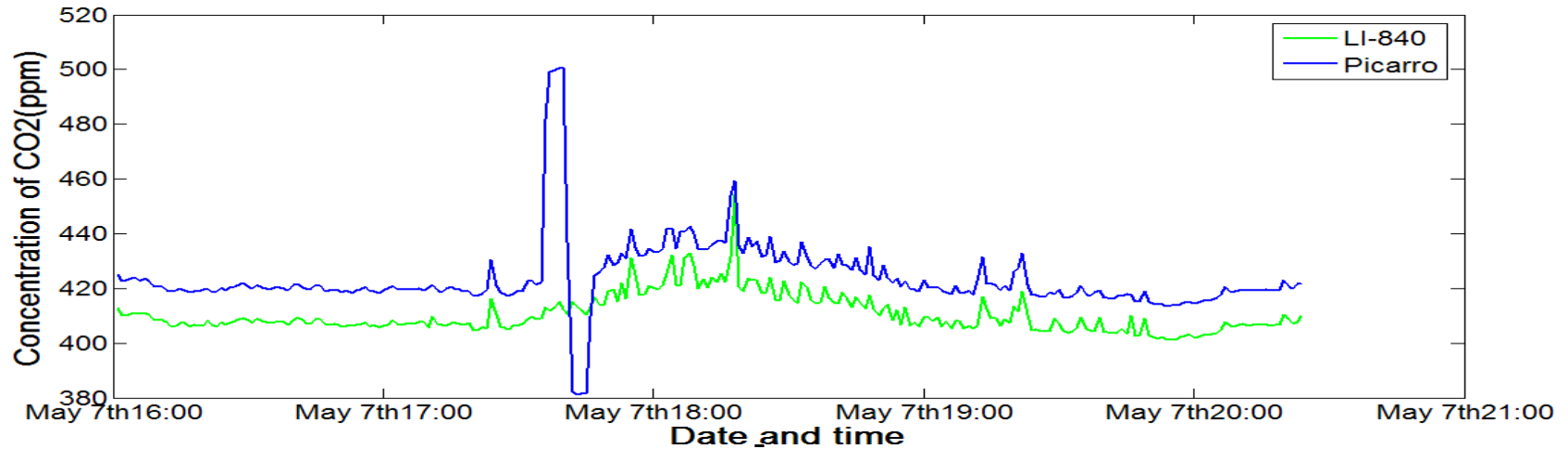


After calibrate CO₂ and water vapor(May 7th 2013)



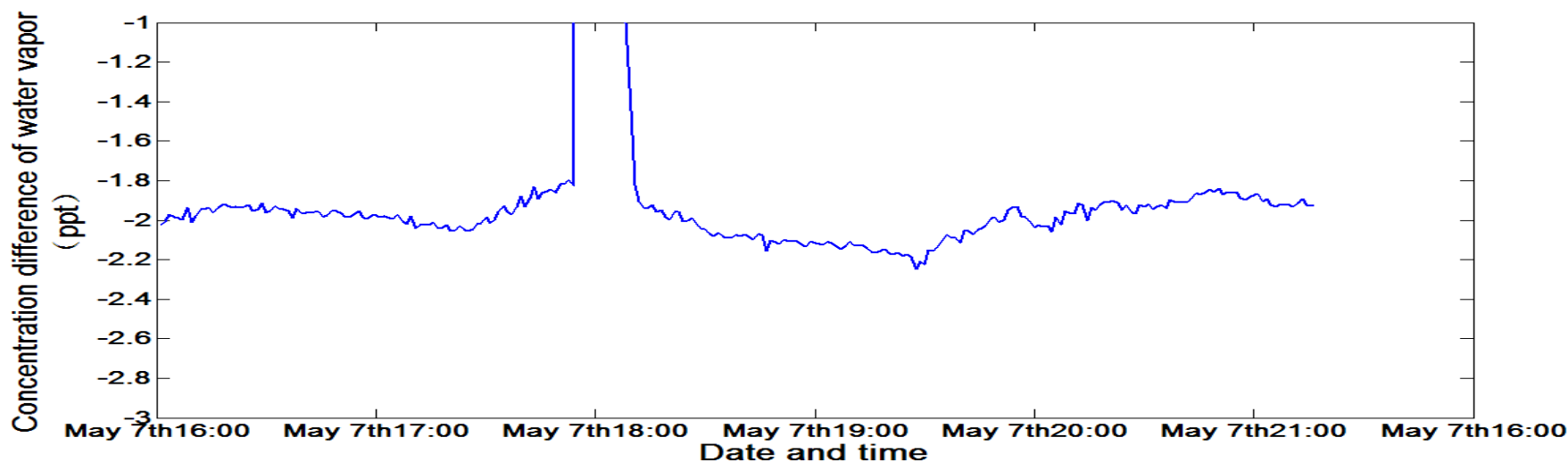
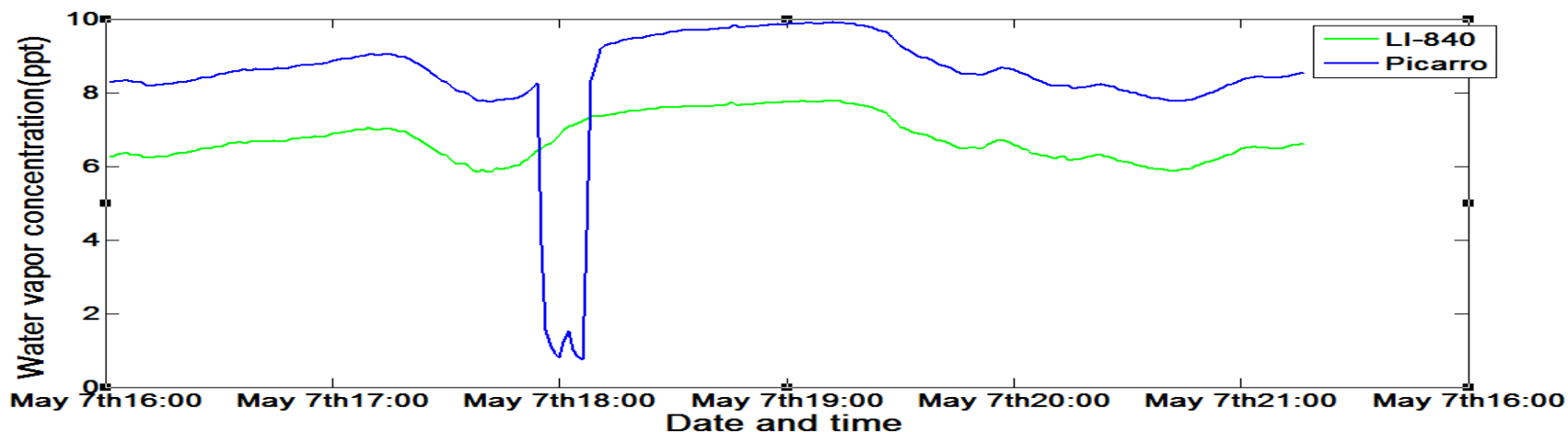


After calibrate CO₂ and water vapor(May 7th 2013)





After calibrate CO₂ and water vapor(May 7th 2013)



Following work

The next step is to find the reason mainly instrument for measuring unstable and improvement.

What we have learned

1. The experimental operation need to be very careful, a tiny mistake may cause serious consequences.
2. Calibration is necessary
3. Keep instruments in best performance is not easy.
4. Don't be afraid of failure and don't give up easily.

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Thank you