

Comparison of the water vapor gradient over lake Taihu measured with two different instruments

**Reported by Li Hanchao
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Outline

- 1 Material and Methods
- 2 Results

Material and Methods

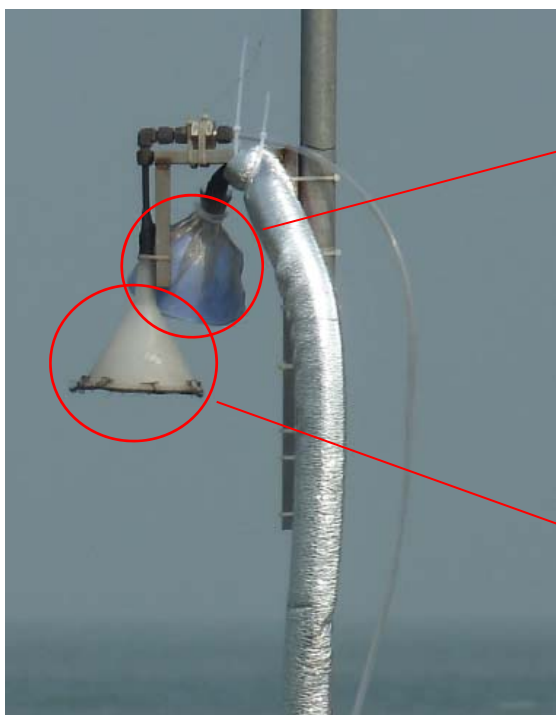


Fig.1 Gradient observation device



Fig.2 Water Vapor Isotope Analyzer



Fig.3 CH₄ CO₂ and H₂O gas analyzer

Sampling system

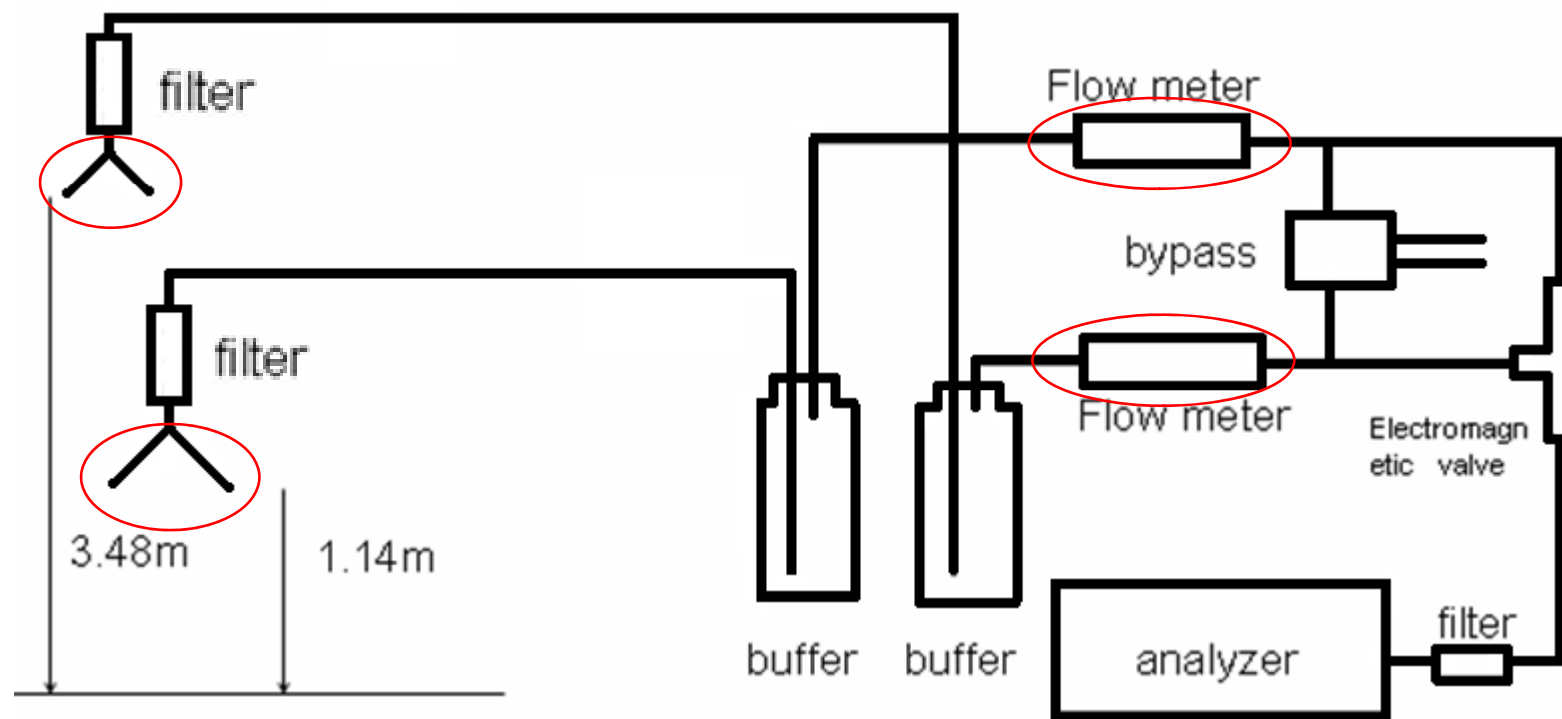


Fig.4



The differences between two instruments

- 1 The intakes are little difference.
- 2 The flow rate of flow meters are 1.5L/min and 2L/min.
- 3 LGR calibrate itself every 3 hour , while picarro do not.
- 4 Switching time is 30s for LGR and 60s for picarro.
- 5 LGR`s Optical cavity size is larger than picarro`s.

Results

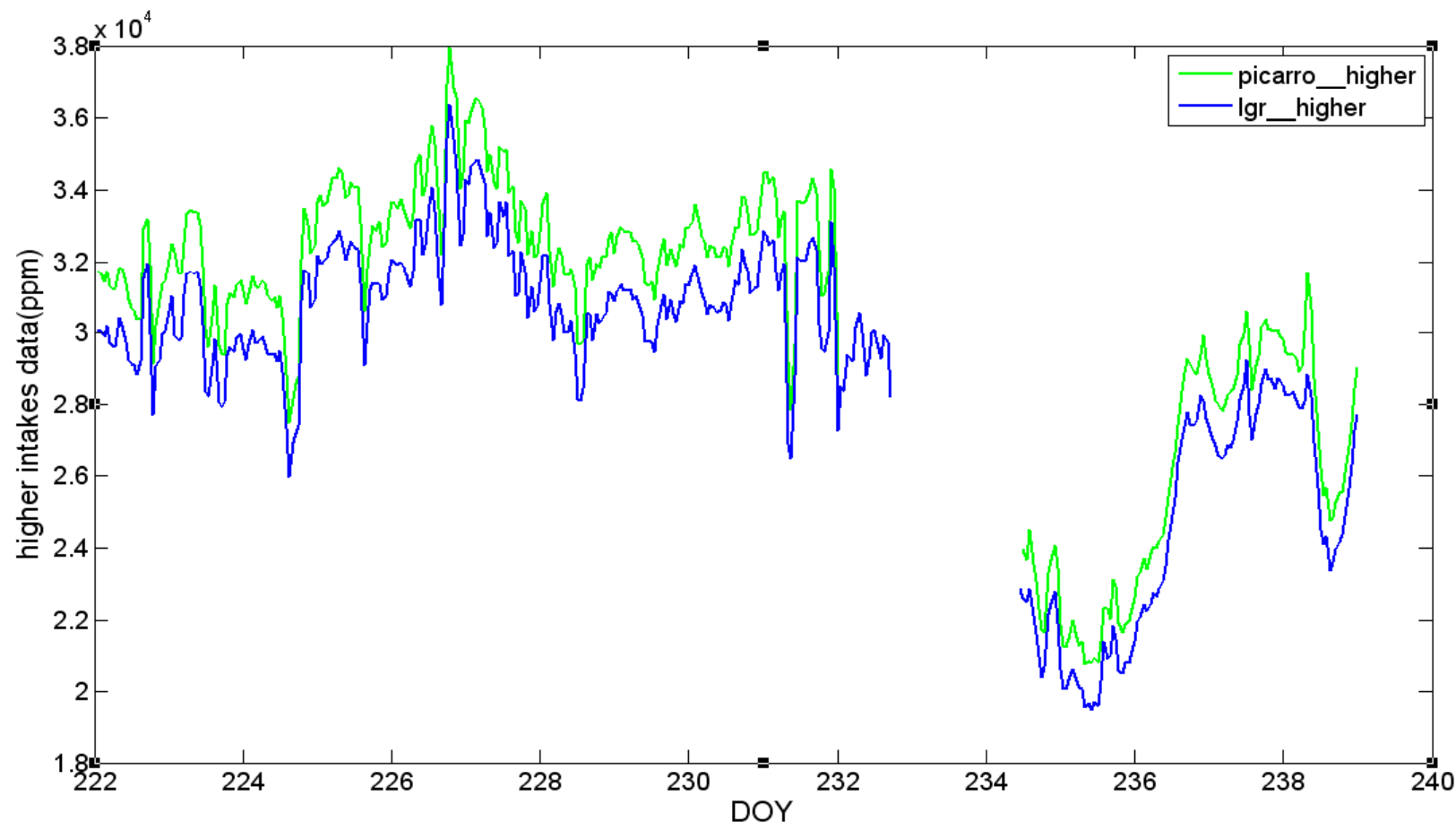


Fig.5 Higher intakes H₂O mixing ratio comparison.

Trend is in good agreement , with mean difference about 1570ppm

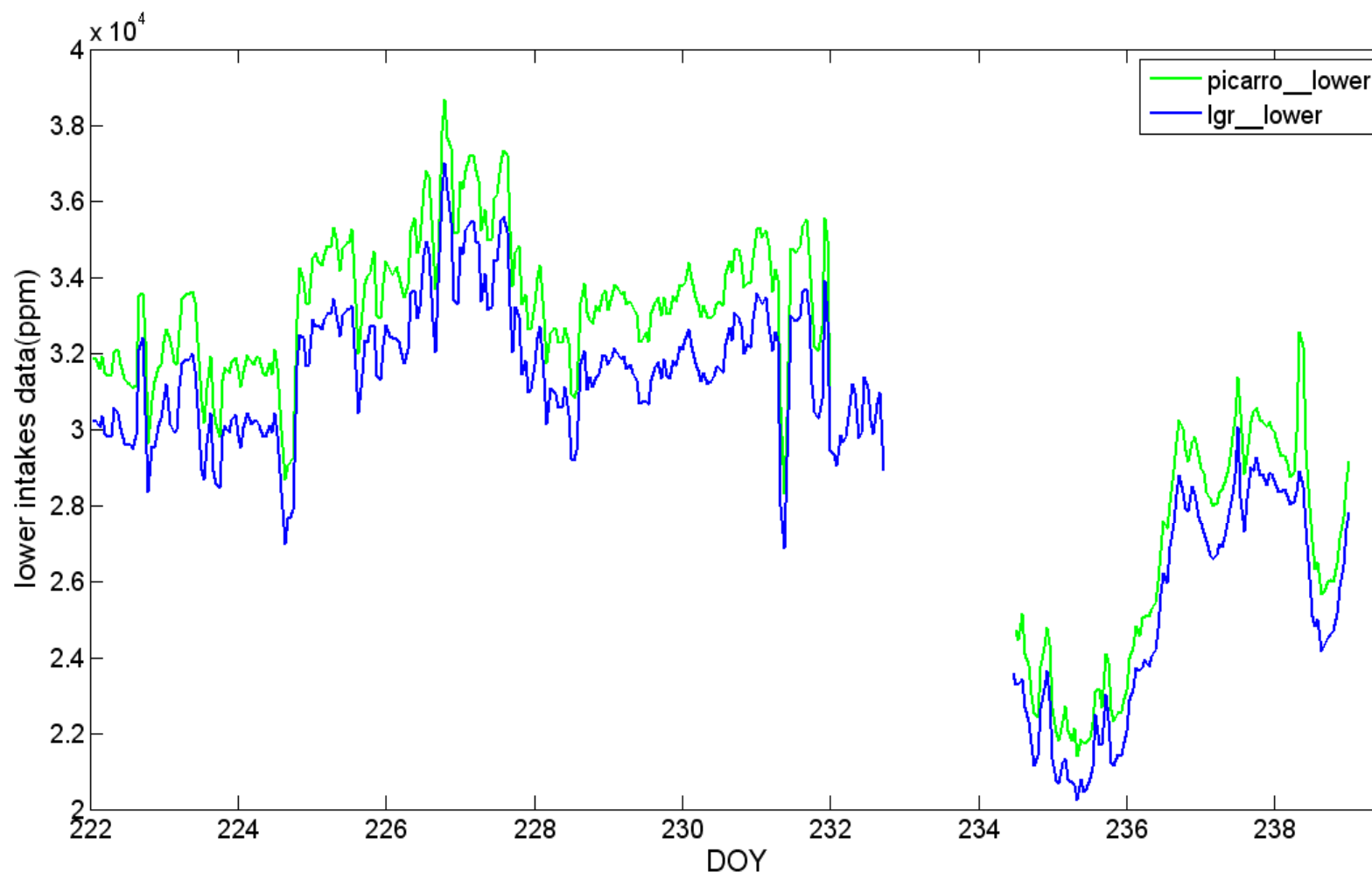


Fig.6 Lower intakes H₂O mixing ratio comparison

Trend is in good agreement, with mean difference about 1520ppm

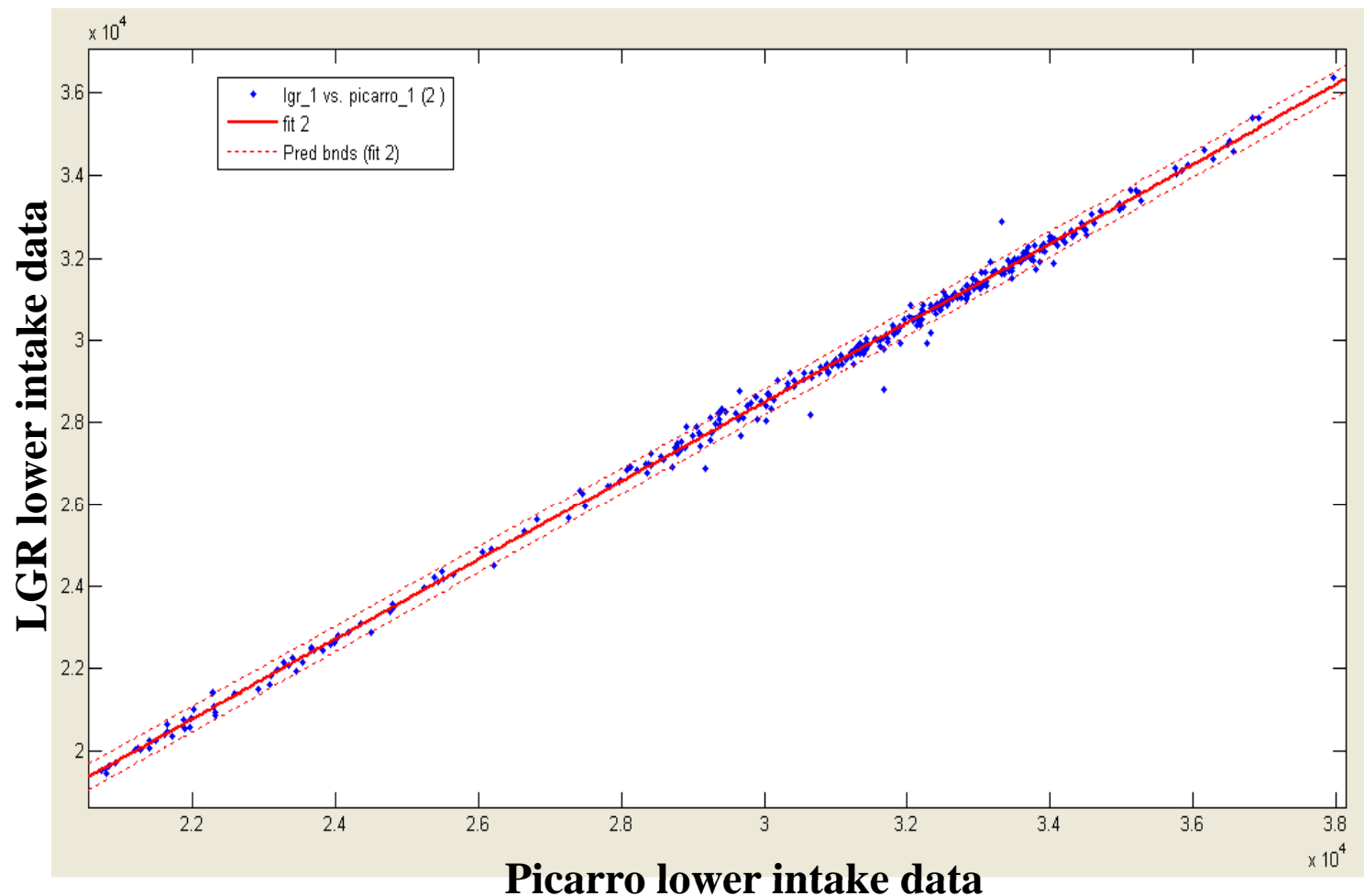


Fig.7 H₂O mixing ratio linear polynomial of lower intakes

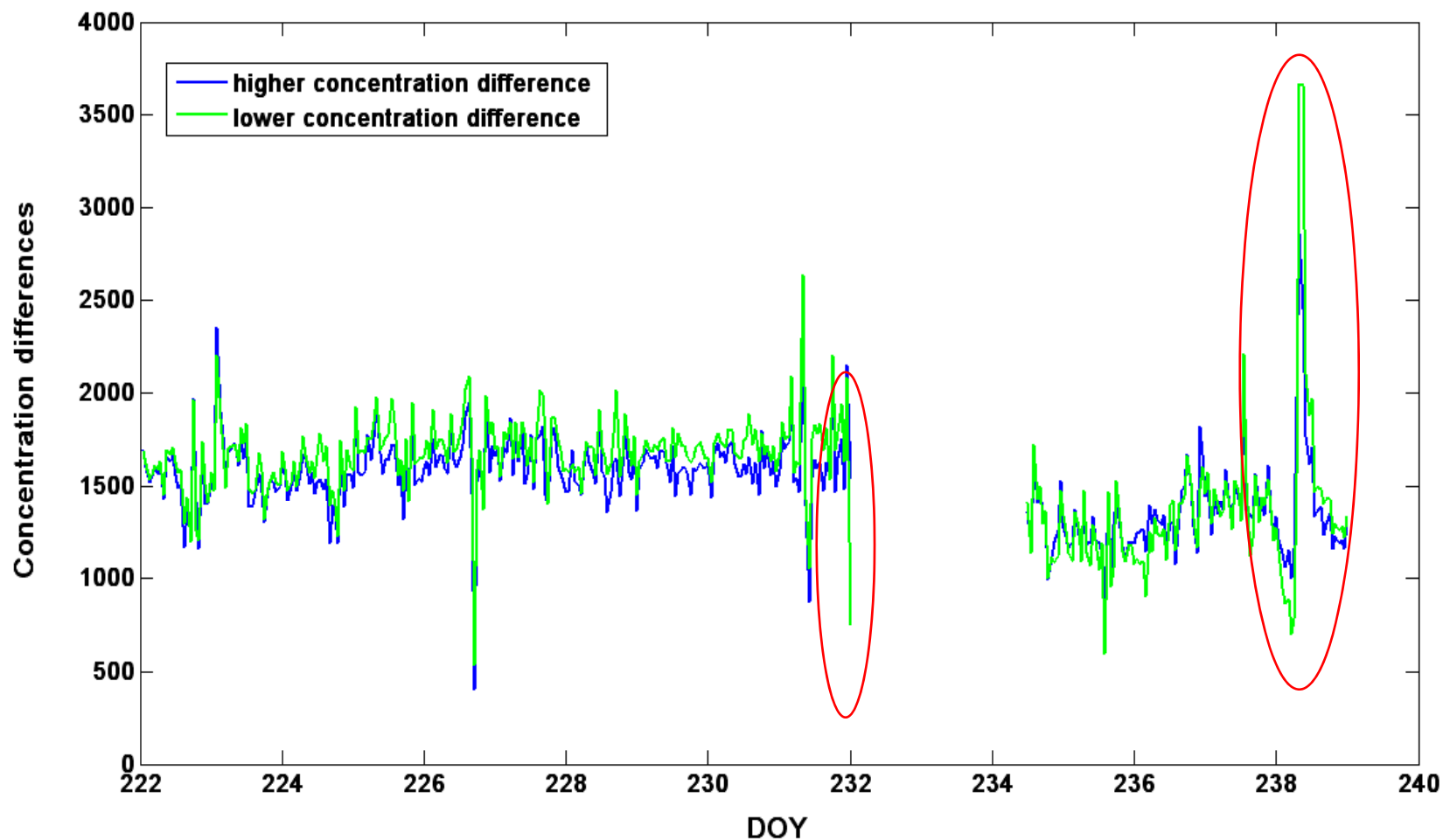


Fig.8 Concentration difference

The picarro data are closer to EC data

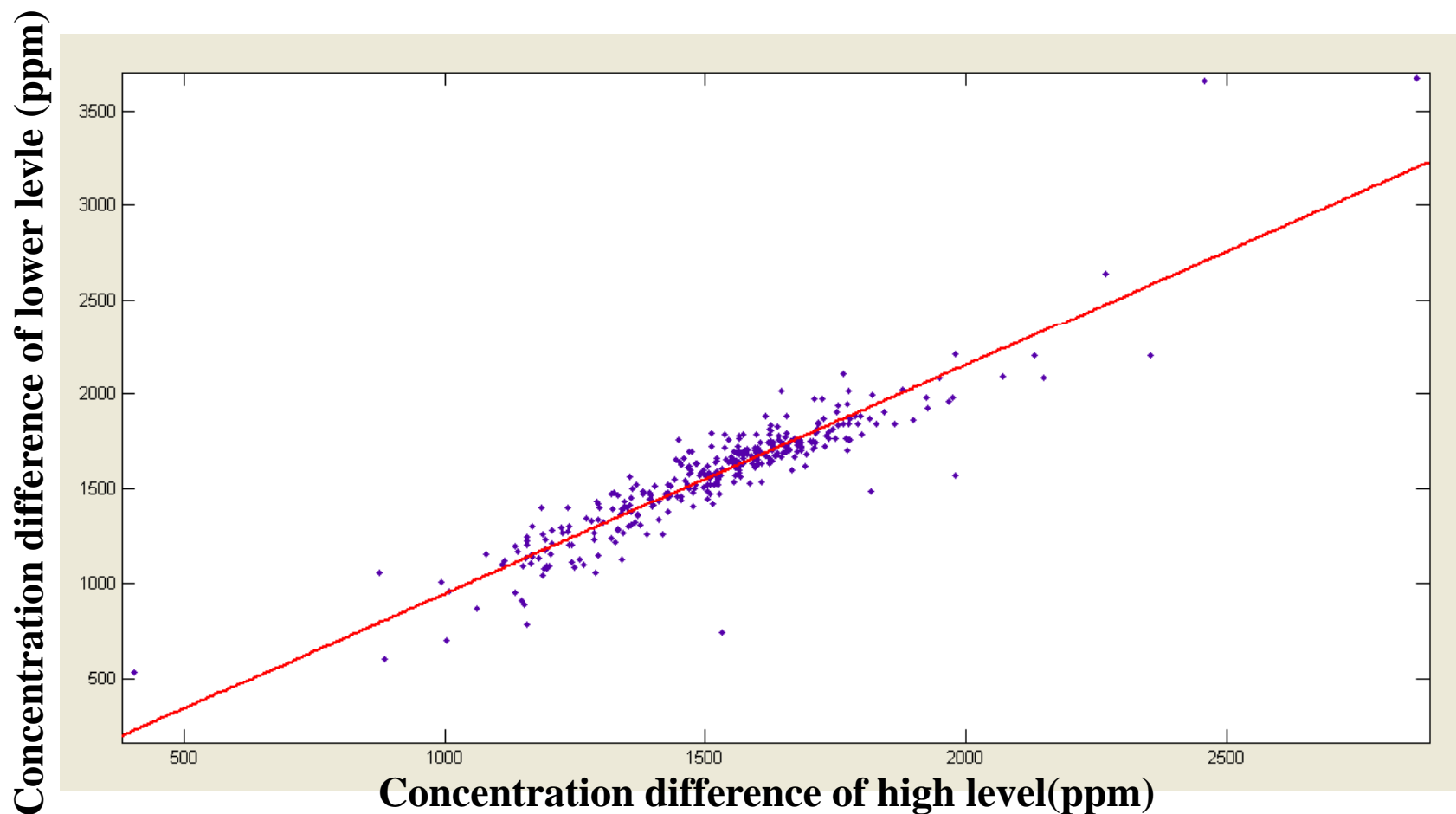


Fig.9 Linear polynomial for the concentration differences of two intakes.

For understanding of sampling measurement differences are consistent



1. Two instruments can capture the same signal.
2. Capture signal strength nuances.
3. If picarro data as the standard

$$x = \frac{P_h - L_h}{P_h} * 100\% = 5.0\%$$

P_h : picarro data from higher intake.

L_h : LGR data from higher intake.

4. Lower data have the same result.

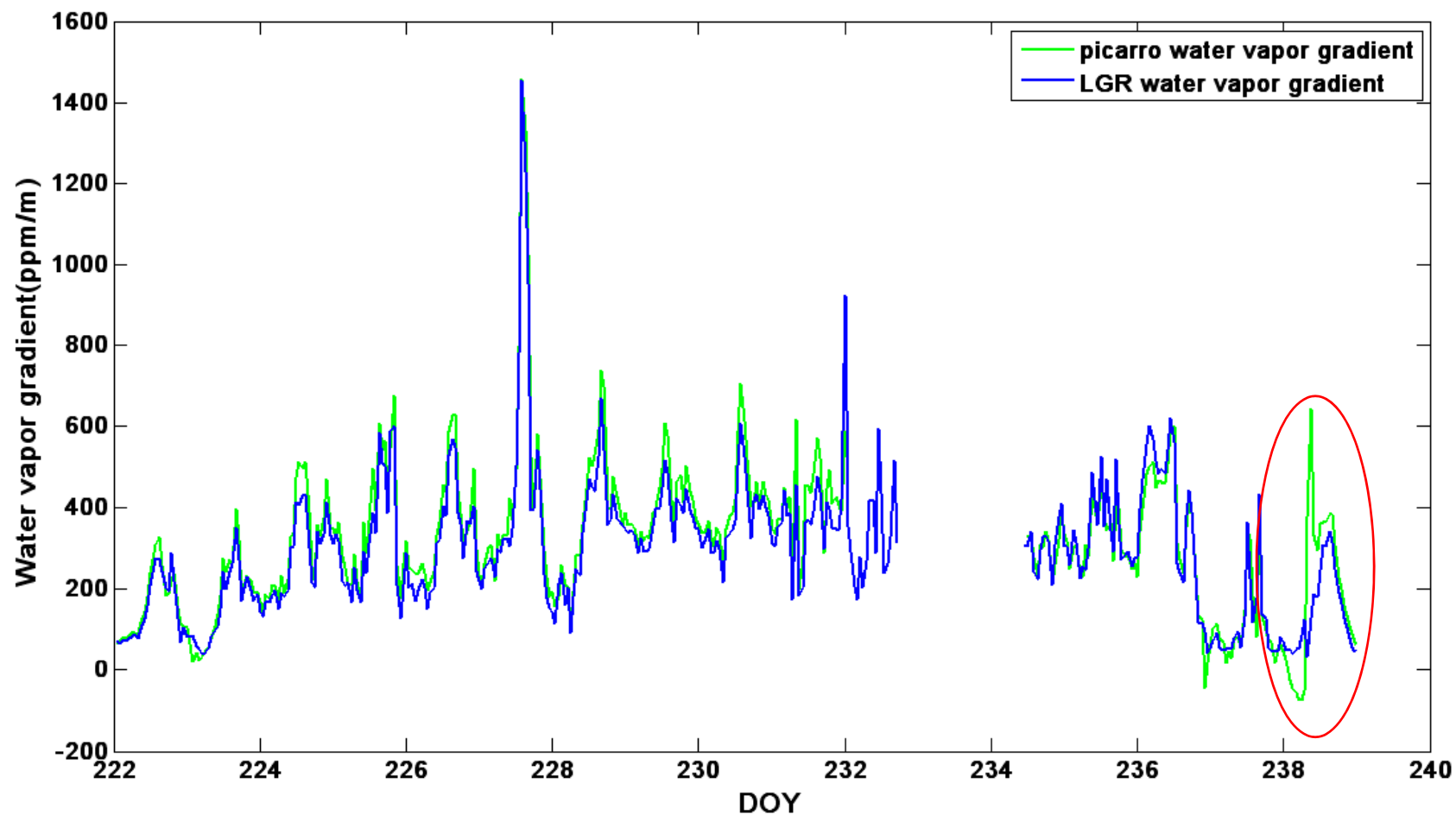


Fig.8 Water vapor gradient. The effect seems very good

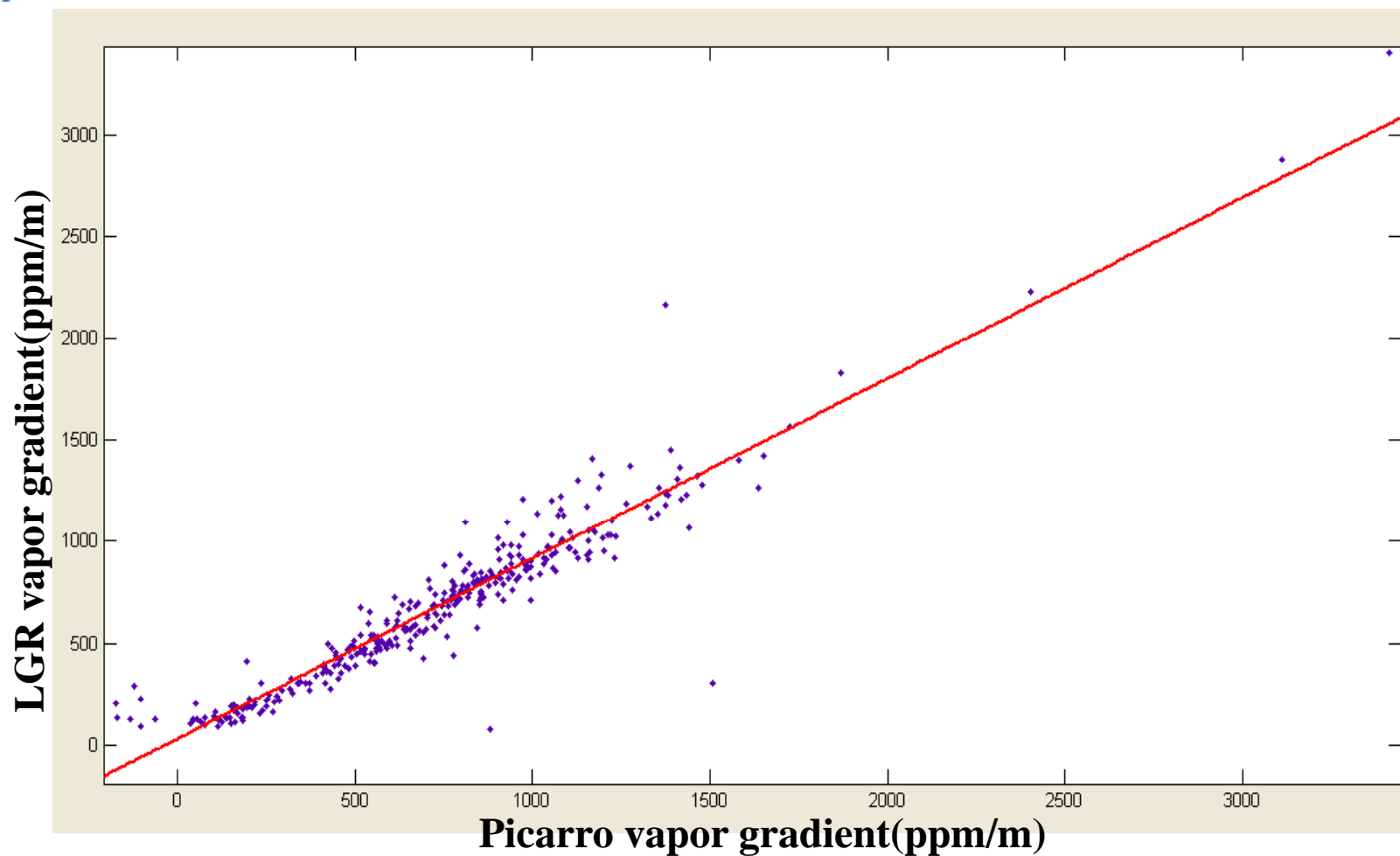


Fig.9 linear polynomial of water vapor gradient between the two instruments (R-square: 0.8984)

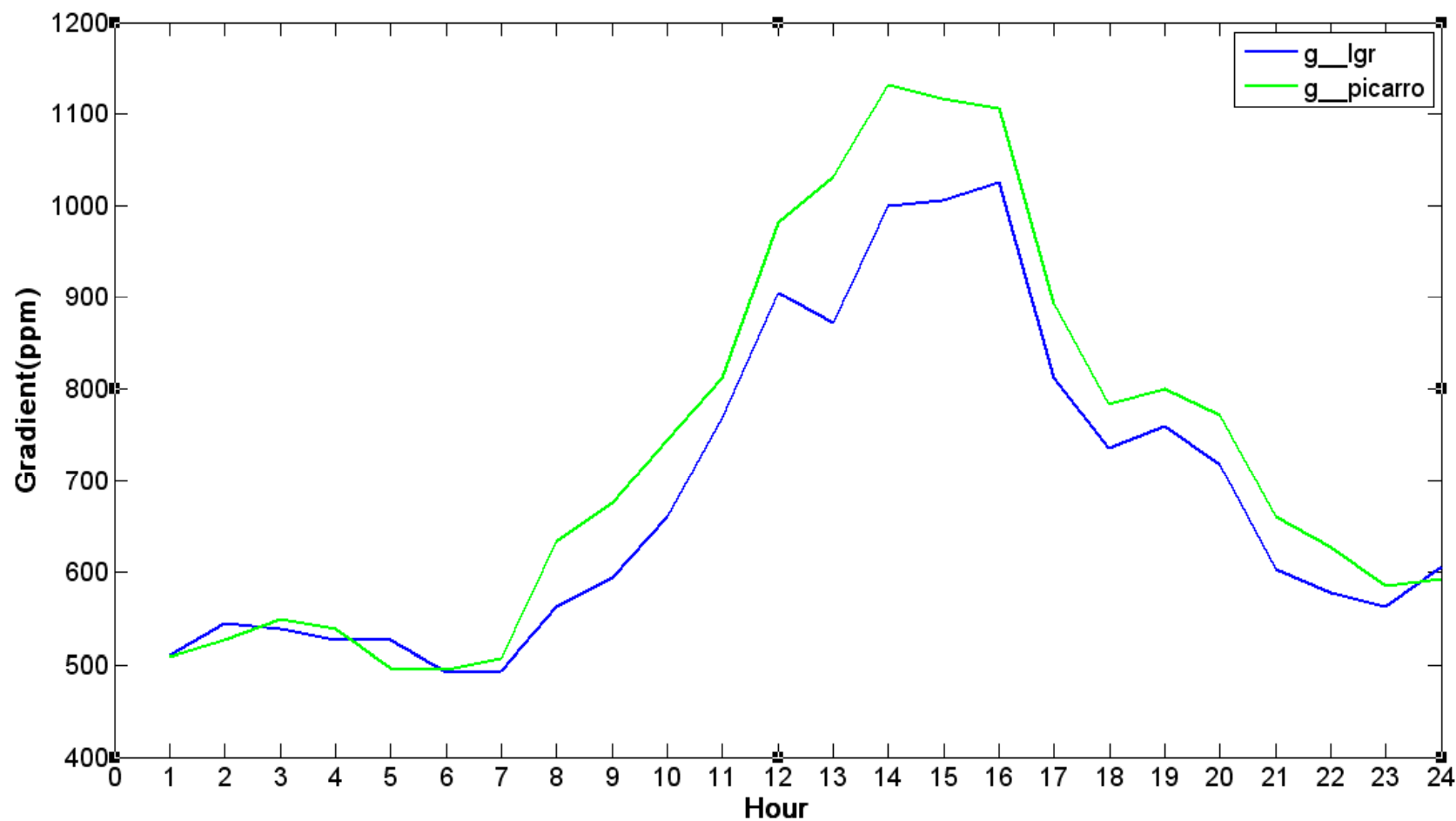


Fig.10 water vapor gradient daily fractions

Results

- 1.The water vapor gradient measurement result of picarro is larger than the result of LGR.
- 2.Trend of both mixing ratio and gradient variation of the two instruments are the same.
- 3.The picarro data seems more stabilize.
- 4.There may be a systematic error about 1500ppm or measured value 5% .

Yale 耶鲁大学-南京信息工程大学大气环境中心



Yale-NUIST Center on Atmospheric Environment

Thank you !