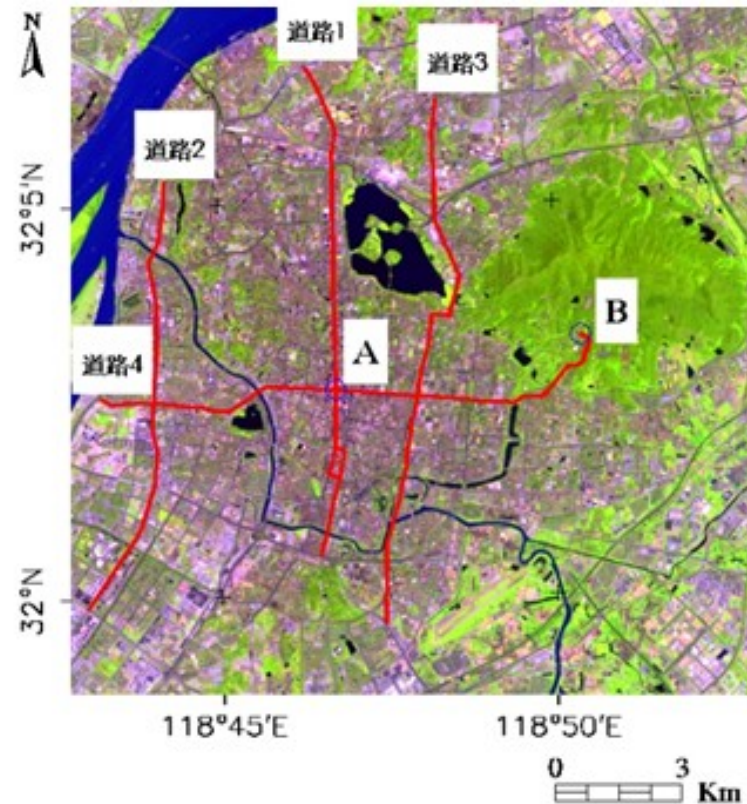




耶鲁大学-南京信息工程大学大气环境中

Yale-NUIST Center on Atmospheric Environment

Quantitative interpretation of street-level CO₂ spatial and temporal patterns in Nanjing



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2014.01.17

◆ Outline

- Spatial and temporal patterns

Average, Max and Min values: Roads Time periods

Frequency distributions: Weekdays Weekends

Diurnal variation of four roads: Weekdays Weekends

Diurnal variation of XJK and ZSL

- Impact Factors

Wind

True speed: Roads Time periods

- Discussion and summary

- Next work

◆ spatial and temporal patterns

Average, Max and Min values

Tab.1. Average, Max and Min values of CO₂ concentrations (ppm) of four roads

Road↵	Weekdays' CO ₂ concentration (ppm) ↵			Weekends' CO ₂ concentration (ppm) ↵		
	Average ↵	Min↵	Max↵	Average ↵	Min↵	Max↵
Road 1↵	465±55↵	398↵	1270↵	481±55↵	403↵	1276↵
Road 2↵	443±44↵	395↵	958↵	454±53↵	394↵	1012↵
Road 3↵	463±53↵	382↵	1403↵	466±57↵	387↵	1123↵
Road 4↵	459±51↵	386↵	1003↵	467±50↵	399↵	873↵

Tab.2. Average, Max and Min values of CO₂ concentrations (ppm) of five time periods

Time↵	Weekdays' CO ₂ concentration (ppm) ↵			Weekends' CO ₂ concentration (ppm) ↵		
	Average ↵	Min↵	Average ↵	Min↵	Average ↵	Min↵
06:00↵	443±32↵	402↵	855↵	437 ±29↵	399↵	820↵
07:30↵	485 ±62↵	386↵	1403↵	477 ±51↵	392↵	950↵
11:30↵	446 ± 42↵	382↵	839↵	465 ±50↵	387↵	997↵
17:00↵	/↵	/↵	/↵	485 ±63↵	401↵	1056↵
17:30↵	466 ± 56↵	395↵	1270↵	477 ±63↵	414↵	1276↵
18:00↵	/↵	/↵	/↵	483 ±61↵	398↵	937↵
22:00↵	435 ±34↵	395↵	931↵	459 ±41↵	387↵	749↵

Frequency distributions

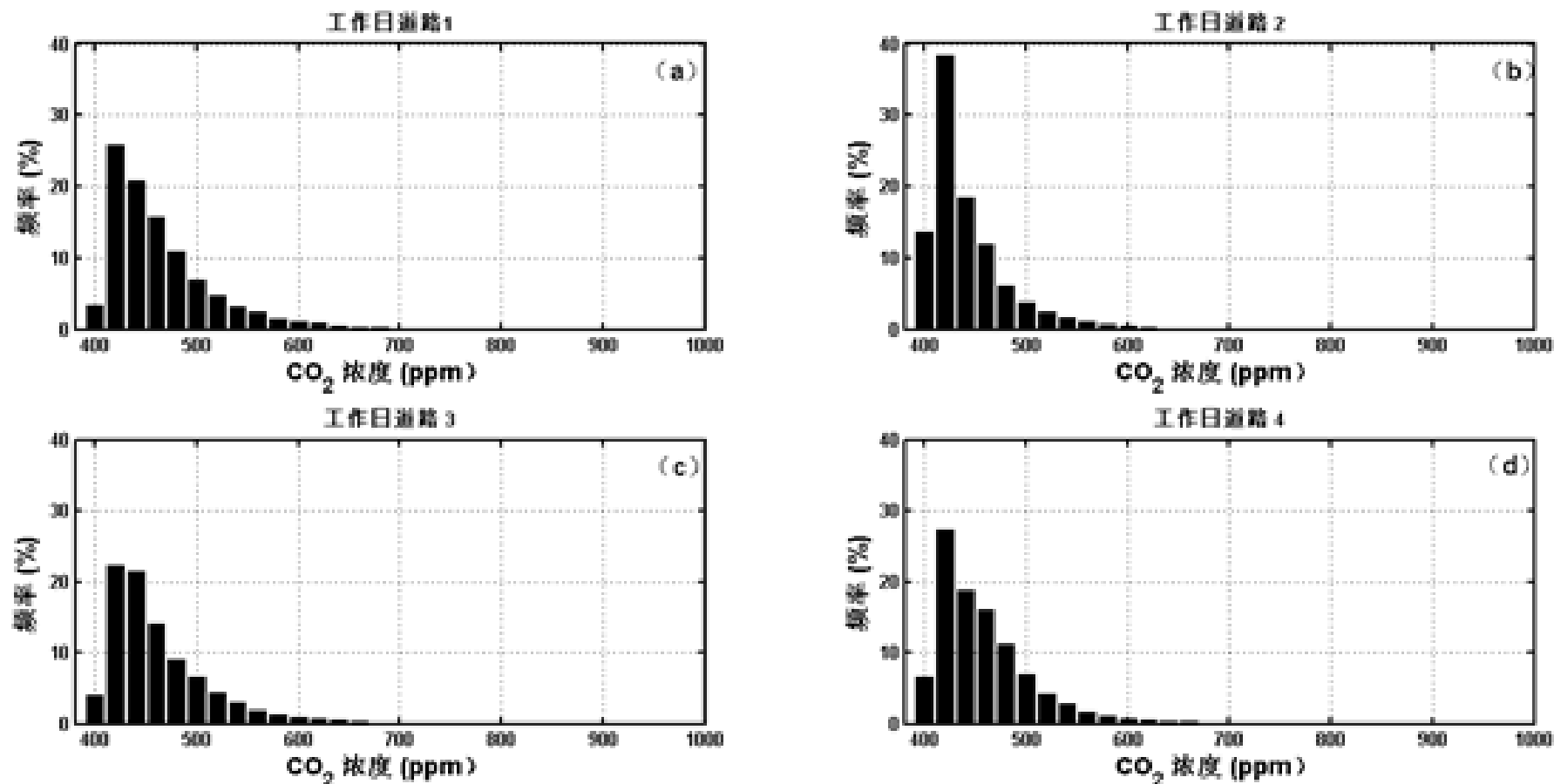


Fig.1. Frequency distributions of CO₂ concentrations (ppm) for each road on weekdays.
(The figure excludes the values over 1000 ppm)

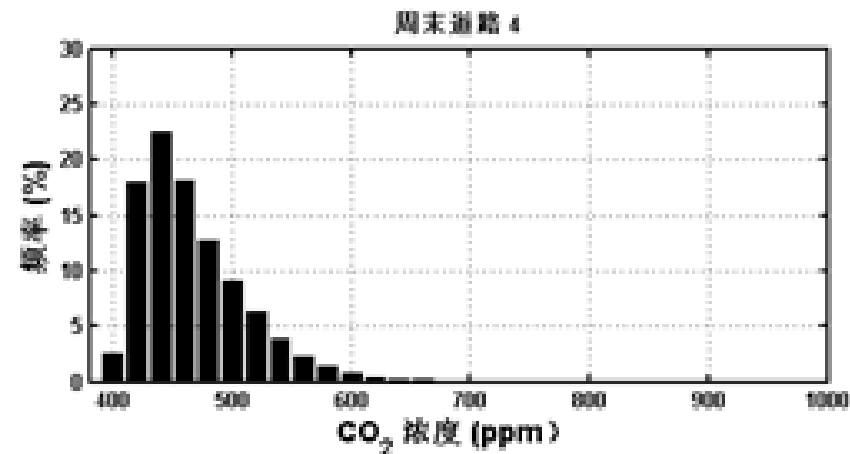
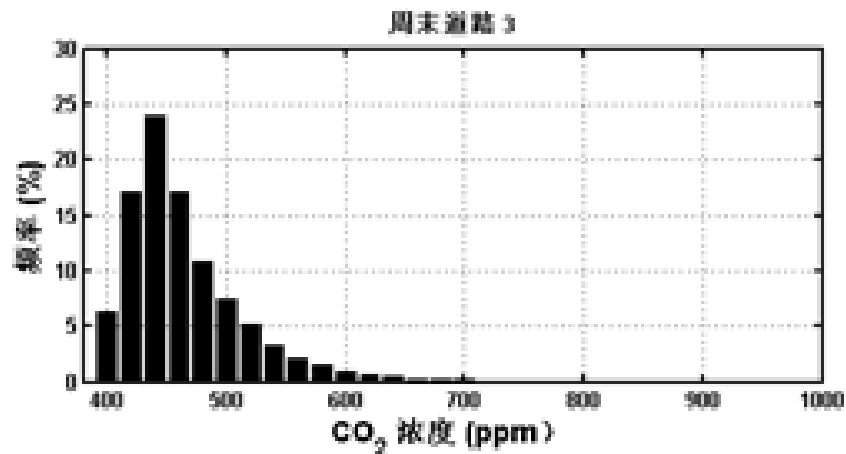
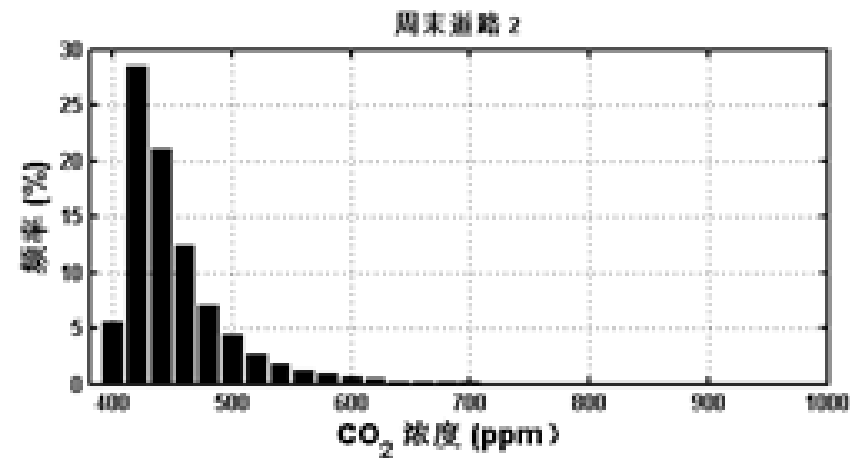
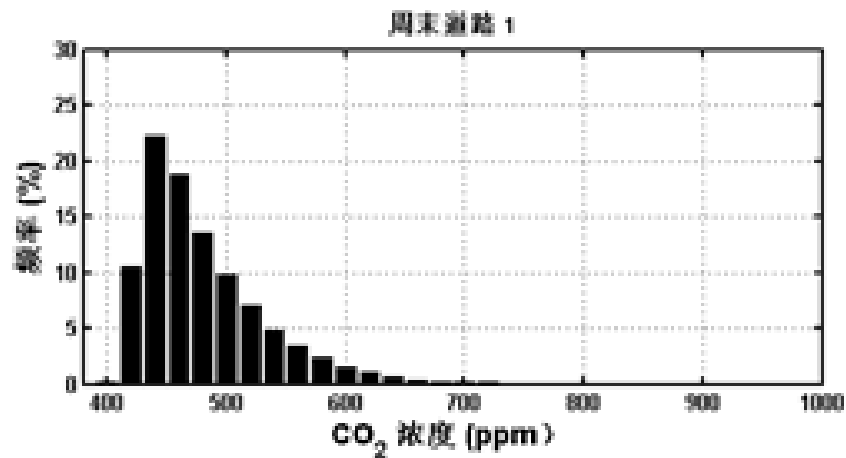


Fig.2. Frequency distributions of CO₂ concentrations (ppm) for each road at weekends.
(The figure excludes the values over 1000 ppm)

Diurnal variation of four roads

6月17日

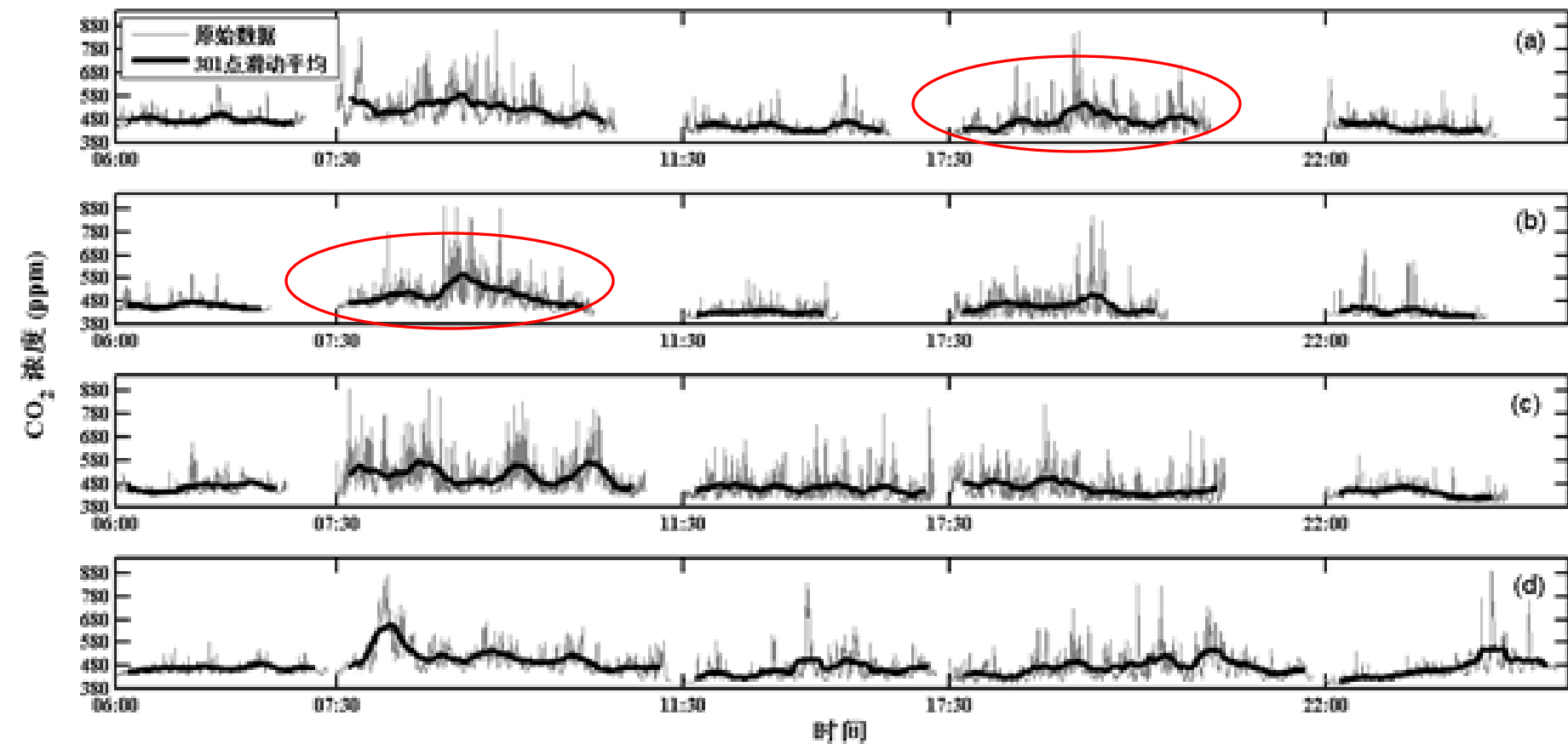


Fig.3. Diurnal variation of CO₂ concentrations (ppm) of four roads in June 17th (weekdays)
(a,b,c,d represents Road 1, Road 2, Road 3, Road 4 respectively;
And the figure excludes the values over 900 ppm.)

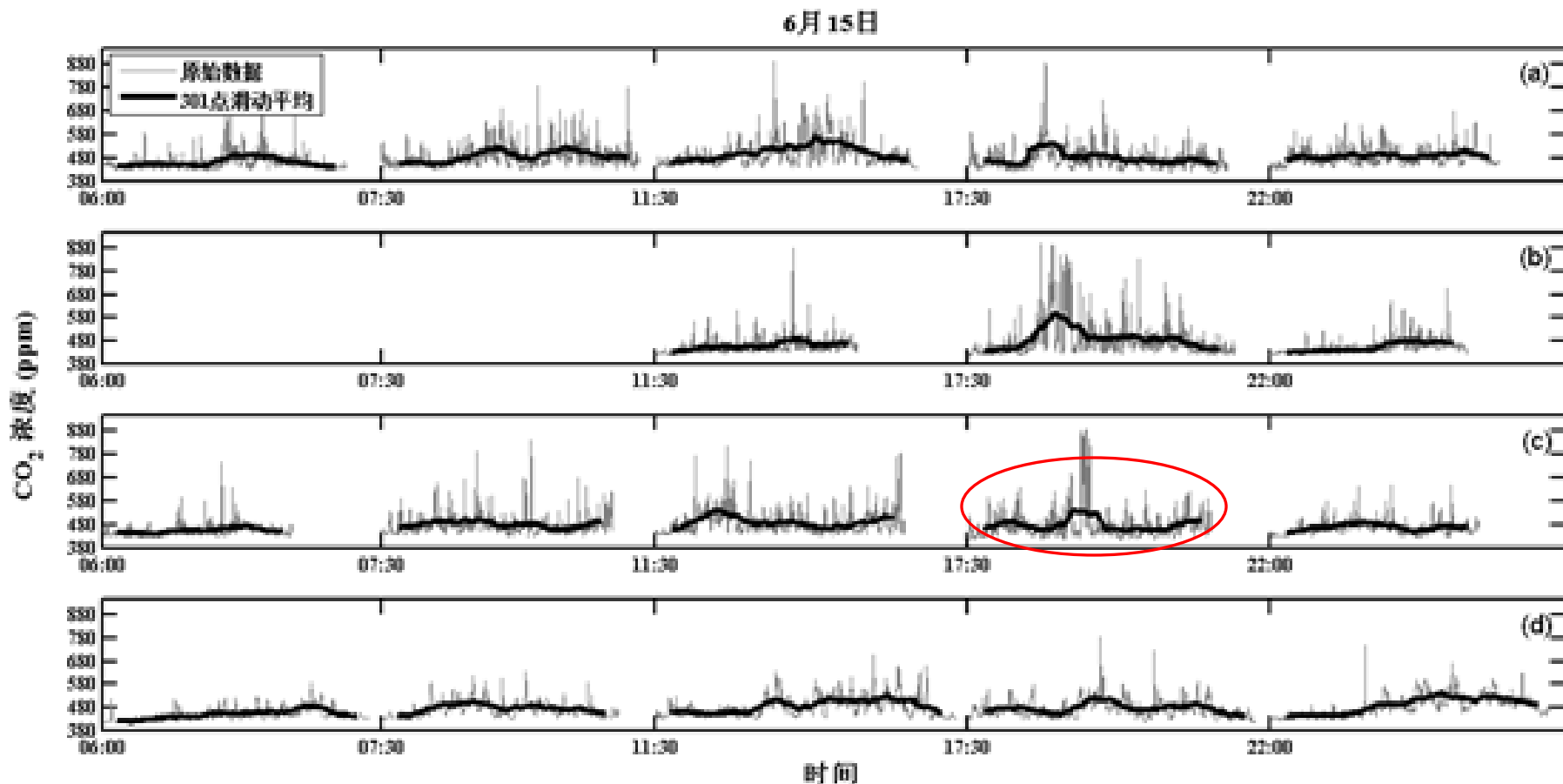


Fig.4. Diurnal variation of CO₂ concentrations (ppm) of four roads in June 15th (weekends)
 (a,b,c,d represents Road 1, Road 2, Road 3, Road 4 respectively;
 And the figure excludes the values over 900 ppm.)

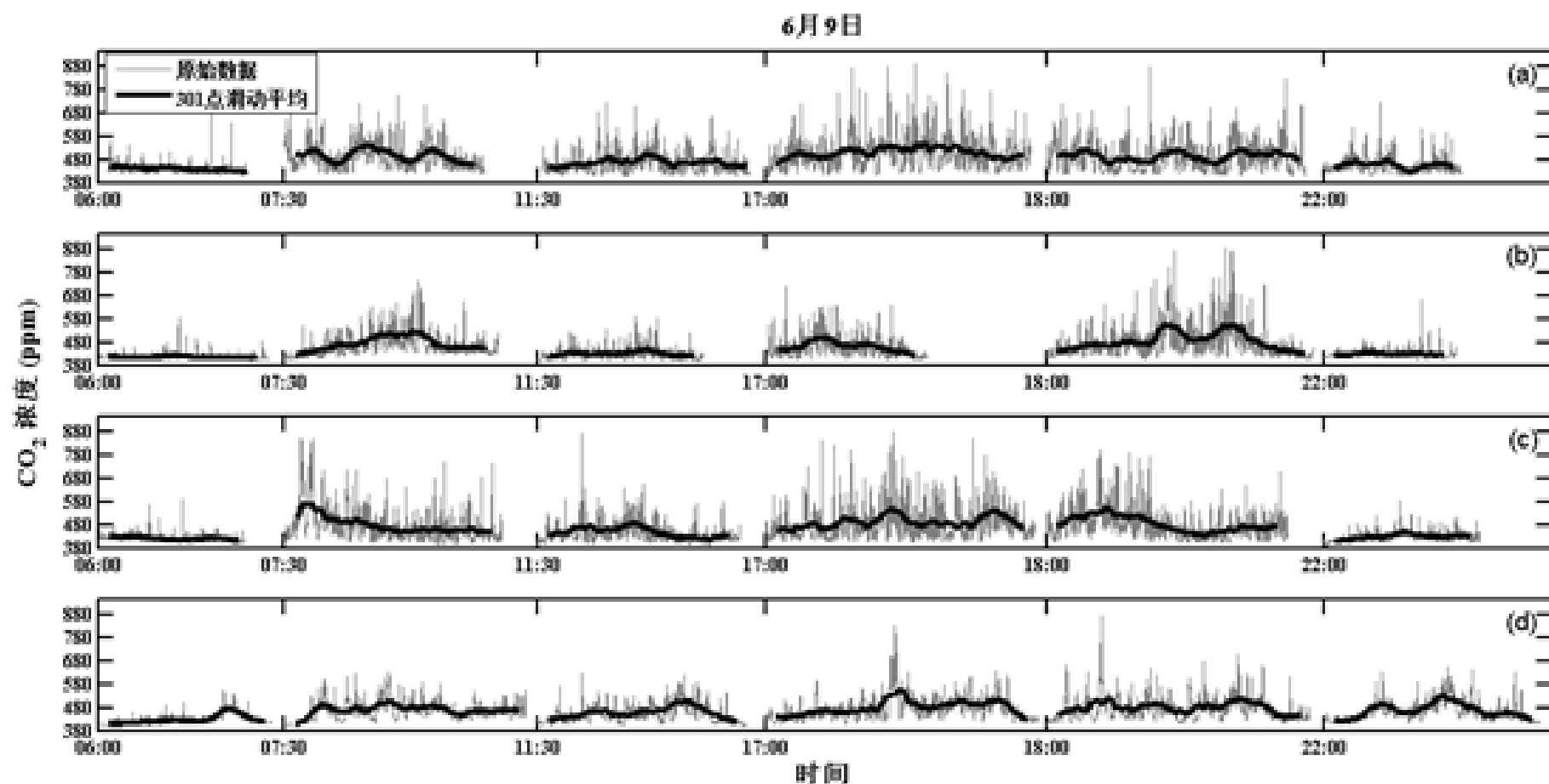


Fig.5. Diurnal variation of CO₂ concentrations (ppm) of four roads in June 9th (weekends)
(a,b,c,d represents Road 1, Road 2, Road 3, Road 4 respectively;
And the figure excludes the values over 900 ppm.)

Diurnal variation of XJK and ZSL

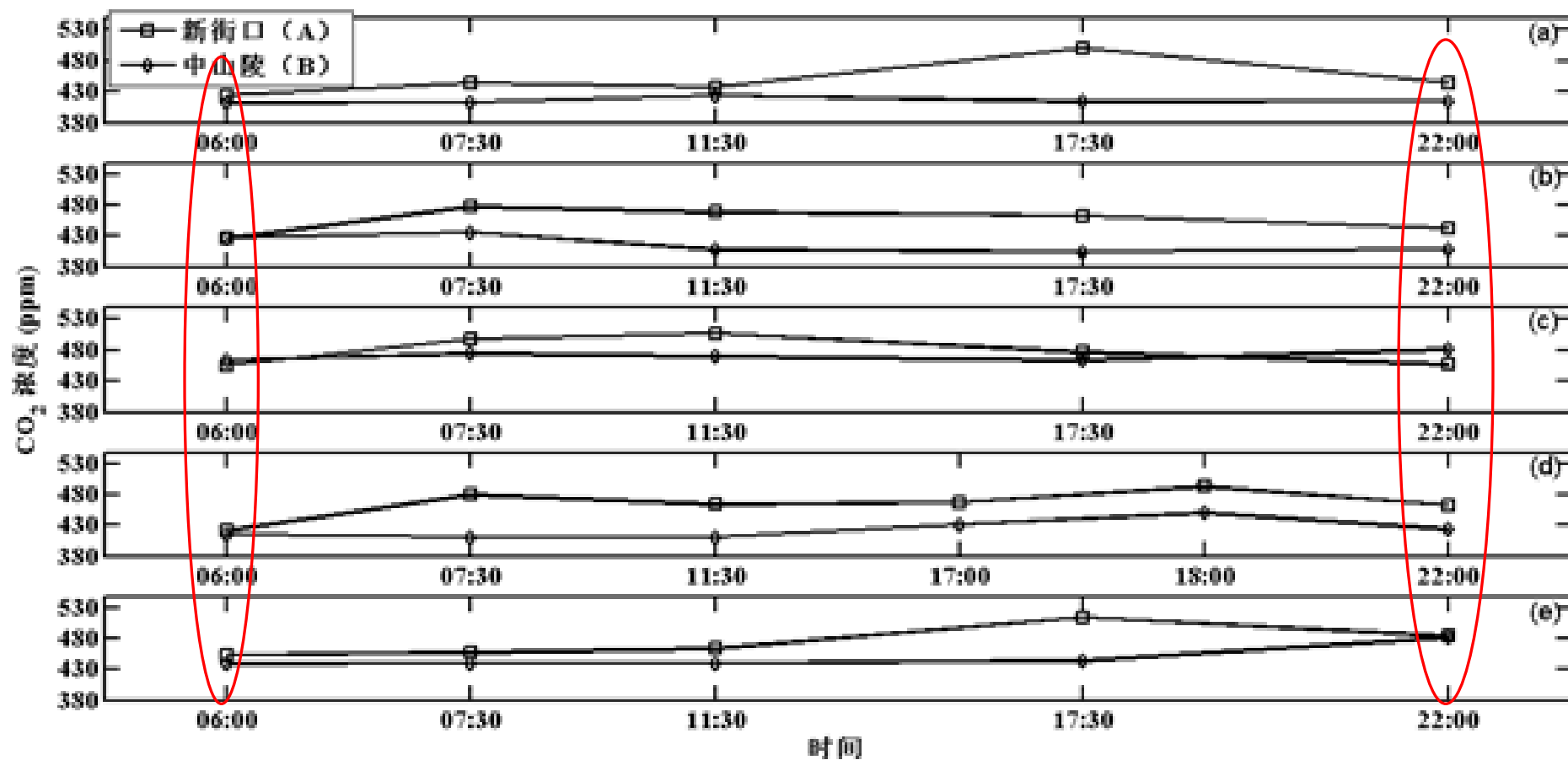


Fig.6. Diurnal variation of CO₂ concentrations (ppm) of XJK(A) and ZSL(B).
(a,b,c,d,e represents 0606, 0614, 0617, 0609, 0615 respectively.)

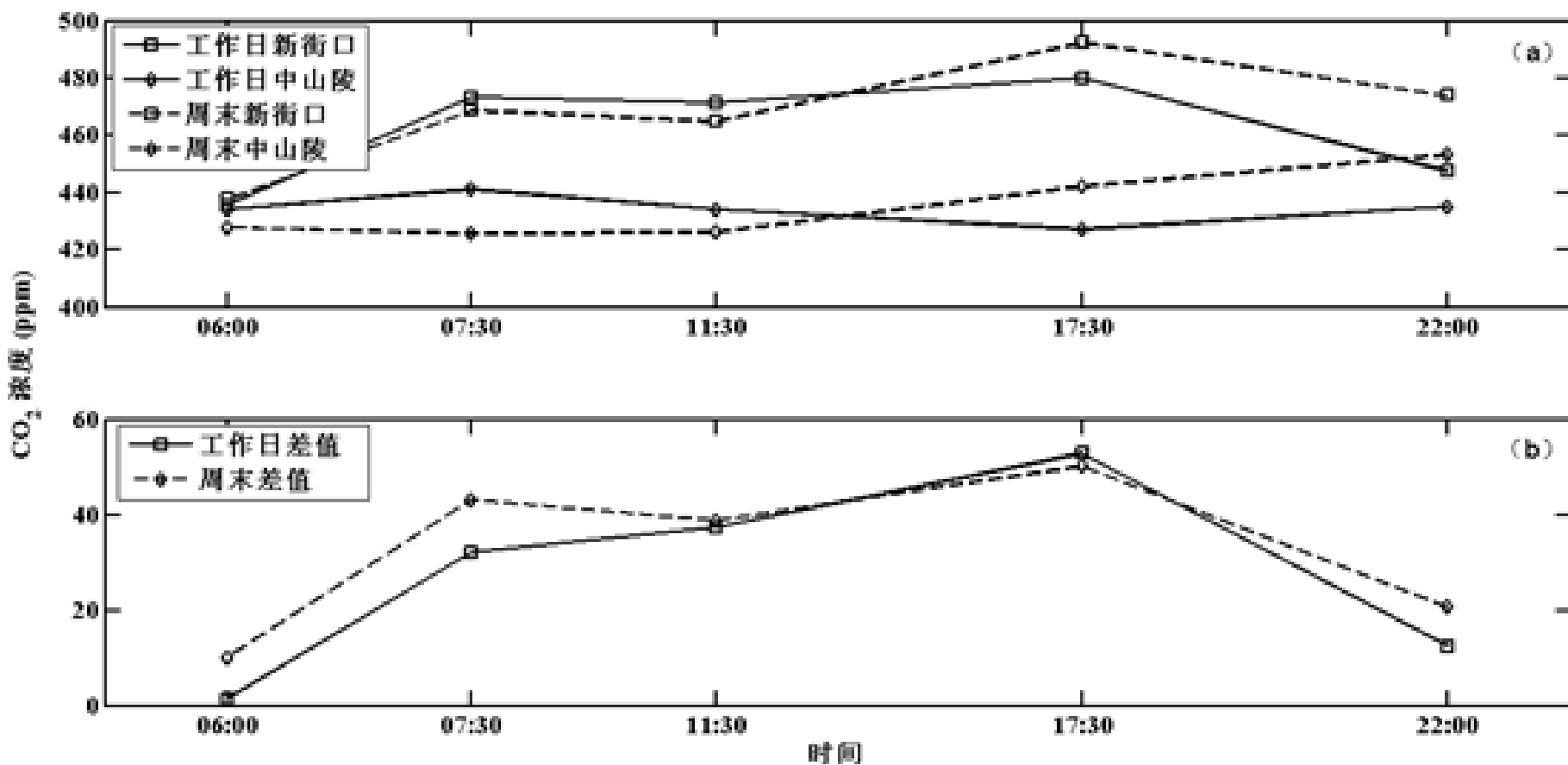


Fig.7. Diurnal variations of CO₂ concentrations of XJK and ZSL and the D-value of these two sites during the week.



Impact Factor

Wind

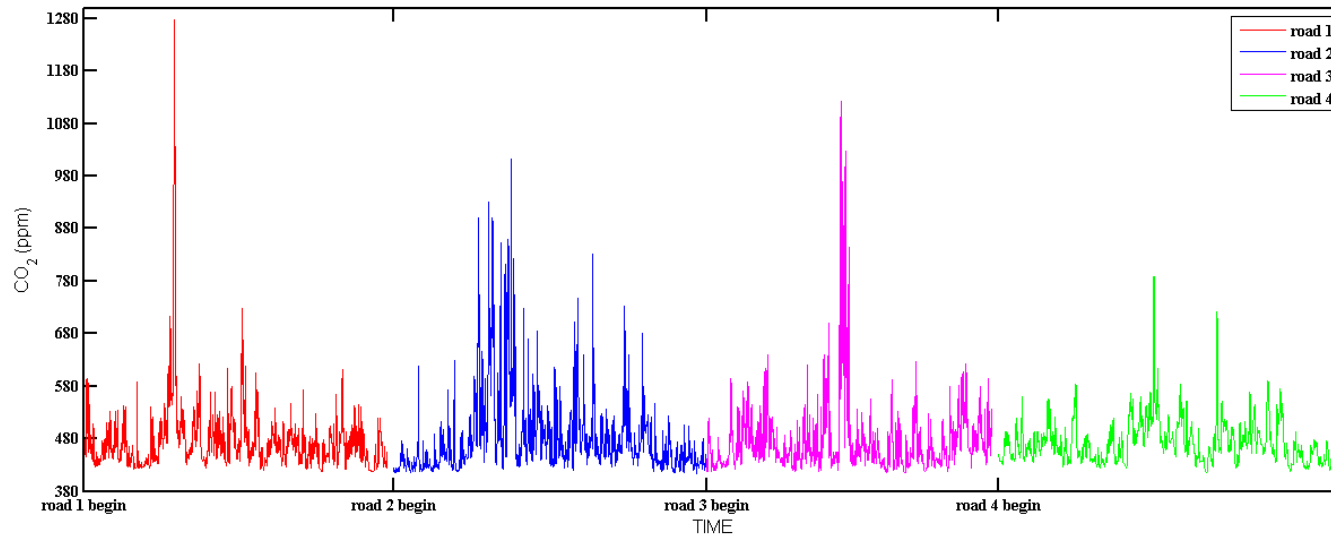


Fig.8.
The CO₂
Concentration of
four roads when
blowed the east
wind.

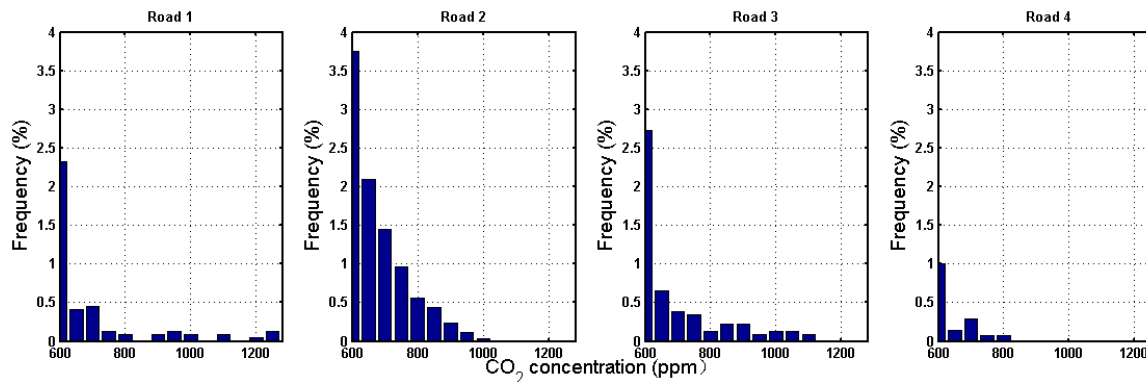


Fig.9. Frequency
distributions of CO₂
concentrations for each
road when blown the east
wind.
(The figure excludes the
values below 600 ppm.)

True speed

Tab.3. The relationship between true speed(m/s) and CO₂ concentration(ppm) of four roads.

	R ²	F	P
Road 1	0.3078	10.6713	0.0033
Road 2	0.3093	9.8512	0.0048
Road 3	0.4630	19.8292	0.0002
Road 4	0.1918	5.6942	0.0253
Total	0.2791	38.3209	1.37E-08

Tab.4. The relationship between true speed(m/s) and CO₂ concentration(ppm) of five time periods.

↵	R ² ↵	F↵	P↵
06:00↵	0.0887↵	1.5573↵	0.2300↵
07:30↵	0.0536↵	0.9624↵	0.3403↵
11:30↵	0.2433↵	5.7879↵	0.0271↵
17:30↵	0.0184↵	0.3379↵	0.5683↵
22:00↵	0.0741↵	1.4402↵	0.2457↵

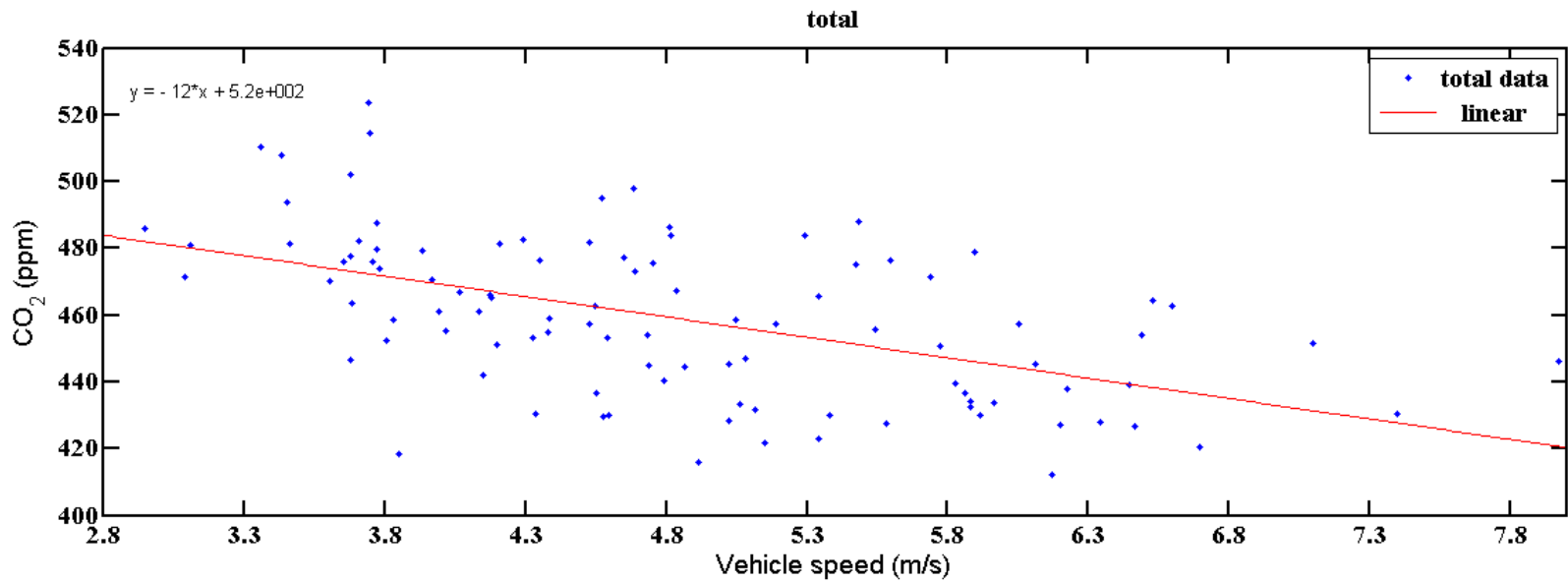


Fig.10. The relationship between true speed(m/s) and CO₂ concentration(ppm) .

◆ Discussion and summary

- CO₂ concentrations of each road had obvious variation in a week.
- CO₂ concentrations of each period had obvious variation in a week.
- Different roads had certain differences in frequency distributions in a week.
- CO₂ concentrations showed obvious diurnal variation.
- The CO₂ concentrations are affected by many factors, such as wind directions and traffic which make a difference most.

◆ Next work

- Understand the relationship between CO₂ concentration and NDVI around the roads.
- Process the data taken in 2013 winter's experiment and compare it with the 2013 summer's data.



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Thank You