

Interactive comment on “Simultaneous measurement of NO and NO₂ by dual-channel cavity ring down spectroscopy technique” by Renzhi Hu et al.

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Thanks for the reviewer's questions. The manuscript will be revised following the reviewer's suggestions.

1. Could authors provide more test data on-road measurements of vehicle NO₂/NO_x emissions? And if possible, the on-road intercomparisons will be meaningful for the validation of the method and instrument.

Reply: The intercomparison between the CRDS instrument with NO analyzer for NO measurements and the intercomparison between the CRDS instrument with CEAS

C1

instrument for NO₂ measurements have been done to valid the accuracy of the instrument in the paper, so we don't provide other data on road measurements of vehicle NO₂/NO_x emissions. Based on the reviewer's suggestions, we performed another measurement of vehicle emissions on road. NO analyzer (42i), O₃ analyzer (49i) and the CRDS instruments were placed in a car and were powered by three batteries. Ambient air was pumped through an inlet fixed on the roof of the car and then was divided into three lines to the instruments, respectively. Fig. 1 illustrates the 4-hour drive around Hefei, the drive track involve highway, urban and suburban area and is colored with respect to the measured NO and NO₂. Vehicle speeds varied greatly on the three different road types and vehicle speed is around 100km/h on highway. Influenced by the vehicle emissions, the NO_x plumes on urban roads are higher than those on suburban roads and highway. Fig.2 shows the time series of NO₂, NO and O₃. O₃ and NO showed a significant negative correlation and O₃ can be titrated by NO quickly. Fig.3 shows the NO data measured by CRDS and CL analyzer (42i), (a) is the raw data for the CRDS instrument and (b) is the data with time resolution of is 1 min for the CRDS instrument. The good agreement between the two instruments proves that the CRDS instrument can be applied for fast vehicle NO_x emissions.

It will be helpful if someone can review and make some corrections the English writing. page 1, line 23: " Too much NO_x are" too much is how much? "are" to "is" page 2, line 55 "too much high"

Reply: Since the questions above are about the English expression and grammar mistakes, the revisions will be done in the final version.

page 15, table 1: it will be better to convert the detection limits of all different measurements to an unified unit such as "ppt/1s(1sigma)

Reply: The suggestion will be followed in the revised manuscript.

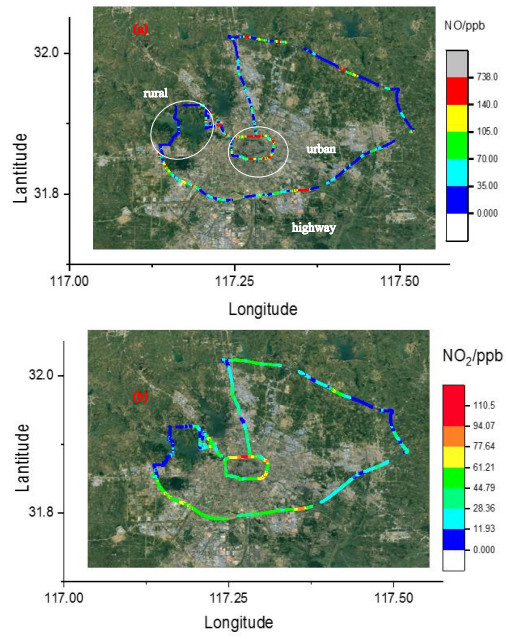


Fig.1.The 4-h drive around Hefei, China, colored by the measured NO (a) and NO₂ (b) concentrations, respectively.

Fig. 1.

C3

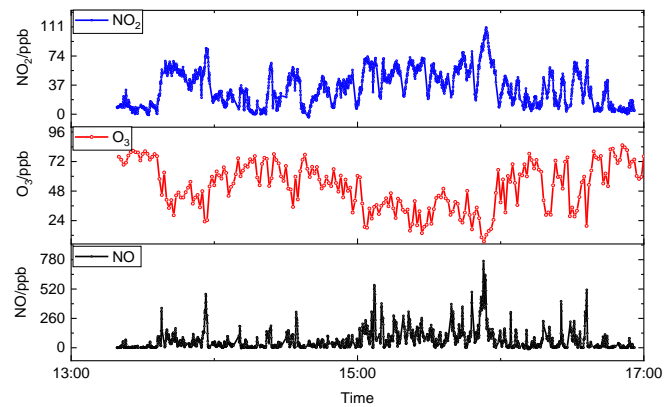


Fig.2. Results of the NO₂、NO and O₃ concentrations around Hefei, China.

Fig. 2.

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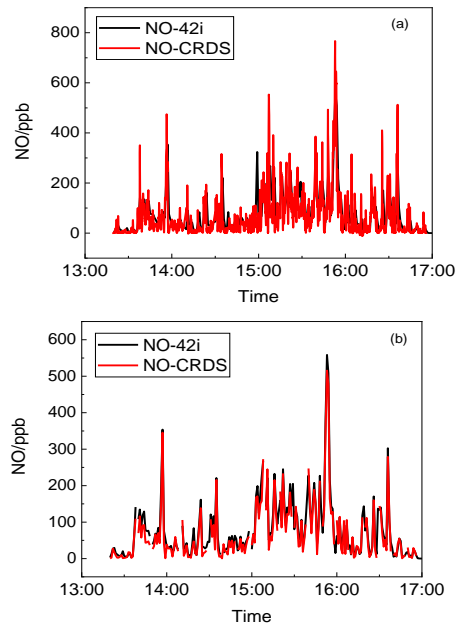


Fig.3. Time series of NO by CRDS instrument and CL analyzer (42i). (a) is the raw data for the CRDS instrument; (b) is the data with time resolution of is 1 min for the CRDS instrument.

Fig. 3.