

1 **Supplementary Material for the ACP manuscript “CO₂ and its
2 correlation with CO at a rural site near Beijing: implications for
3 combustion efficiency in China”**

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8 **S. 1 Estimates of urban respiration on dCO₂/dCO**

9 Human respiration per day = 1 kg CO₂ d⁻¹, or 0.023 kmol CO₂ d⁻¹
10 [<http://cdiac.ornl.gov/pns/faq.html>]

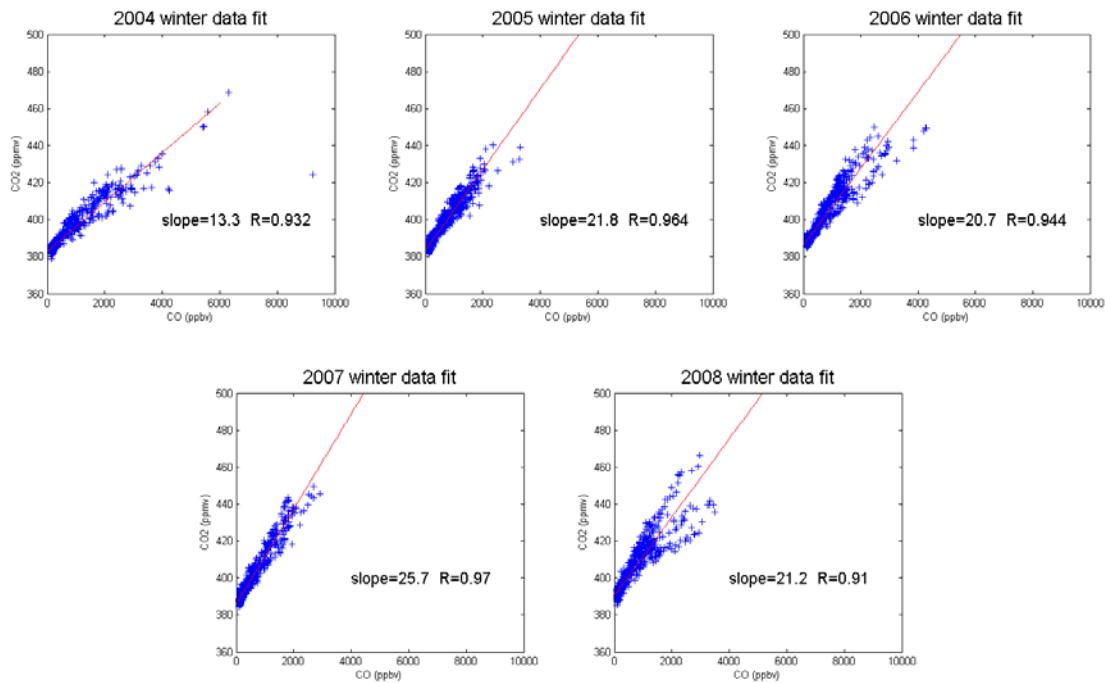
11 Per capita fossil fuel consumption in China = 1.1 MgC yr⁻¹, or 0.25 kmol CO₂
12 d⁻¹ [Marland et al., 2007].

13 Ratio of respiratory C to fossil fuel C = 0.023/0.25 = 0.09 mol/mol.

14 That is, for Beijing urban areas, for every mol fuel C consumed, there is 0.09
15 mol respiratory CO₂.

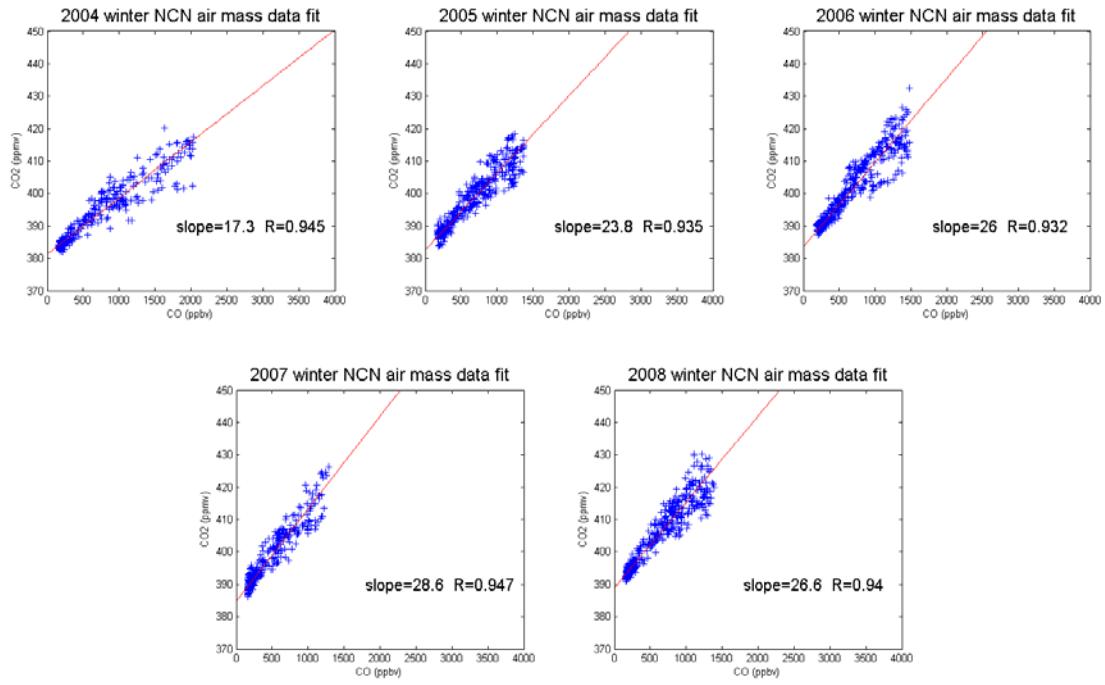
16 Combustion sources over China have a CO₂/CO emission ratio of 21 mol/mol
17 [Zhang et al., 2009; Gregg et al., 2008]. That is, for every mole of fuel C consumed,
18 there is 0.9545 mole of CO₂ emitted and 0.045 mole CO emitted. Adding the 0.09 mol
19 of respiratory CO₂ associated with every mol of fuel C consumption, the overall
20 ‘bottom-up’ CO₂ to CO ratio for Beijing urban area is (0.09+0.95)/0.045 = 23
21 mol/mol. Compared with the CO₂/CO ratio of 21 mol/mol from combustion sources,
22 respiration in dense urban area is small (~10%) but not negligible contribution to
23 budget.

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25 **S.2. CO₂-CO scatter plots for individual winters (2004-2008)**



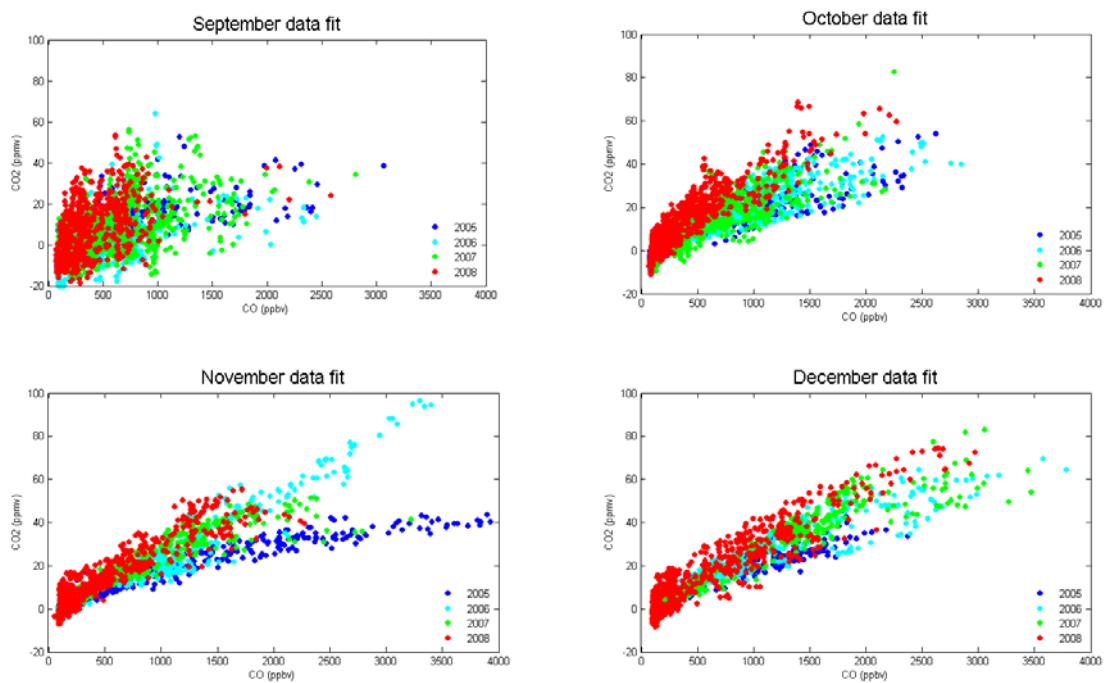
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2 S.3. CO₂-CO scatter plots for NCN air masses in individual winters (2004-2008)



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4 S.4. Monthly CO₂-CO scatter plots for September – December, 2005-2008.



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2 Note: CO₂ data shown in the plots are de-trended (i.e., taking out the annual increases)

1 **References:**

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