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Supplementary Material for

Interannual variability of nitrogen oxides emissions from boreal fires in Siberia and Alaska during 1996–2011 as observed from space

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Introduction

This supplementary material provides 2 tables that summarize the monthly-based statistics of tropospheric NO2 enhancement correlations with Fire Radiative Power (FRP) for Siberian and Alaskan fires. The data in Table S1 and Table S2 is used to calculate Enhancement Ratio (ER) and Mass Emission Coefficient (MEC) for Siberia and Alaska, respectively.
### Table S1. Monthly-based statistics for correlations of tropospheric NO₂ enhancement with fire radiative power (FRP) for Siberia

| Year | Month | GOME                  | All-data | SCIAMACHY | All-data |
|------|-------|-----------------------|----------|-----------|----------|
|      |       | Slope | r²  | Slope | r² | Slope | r² | Slope | r² |
| 2001 | 4     | 4.71(2.34) | 0.76 | 2.38(0.19) | 0.42 |       |     |       |     |
|      | 5     | -0.32(0.72) | 0.17 | 1.19(0.27) | 0.09 |       |     |       |     |
|      | 6     | -0.45(0.81) | 0.50 | 0.19(0.25) | 0.00 |       |     |       |     |
|      | 7     | 1.31(0.56) | 0.85 | 0.99(0.21) | 0.09 |       |     |       |     |
|      | 8     | 0.15(0.15) | 0.67 | 0.05(0.16) | 0.00 |       |     |       |     |
|      | 9     | 0.62(0.71) | 0.51 | -0.35(0.22) | 0.01 |       |     |       |     |
| 2002 | 4     | 1.12(0.59) | 0.70 | 1.23(0.16) | 0.22 |       |     |       |     |
|      | 5     | -0.03(0.68) | 0.00 | 1.04(0.16) | 0.17 |       |     |       |     |
|      | 6     | 0.14(0.14) | 0.78 | 0.19(0.37) | 0.00 |       |     |       |     |
|      | 7     | 0.65(0.24) | 0.83 | 0.71(0.16) | 0.08 |       |     |       |     |
|      | 8     | 2.44(0.68) | 0.94 | 1.51(0.20) | 0.21 | 2.66(1.04) | 0.90 | 1.53(0.18) | 0.26 |
|      | 9     | -0.22(0.42) | 0.13 | 0.21(0.15) | 0.01 | 0.24(0.25) | 0.34 | 0.23(0.17) | 0.01 |
| 2003 | 4     | -0.04(0.68) | 0.00 | 0.85(0.10) | 0.25 | 1.03(1.08) | 0.34 | 0.64(0.11) | 0.13 |
|      | 5     | 0.34(0.67) | 0.13 | 0.63(0.17) | 0.06 | -0.18(1.14) | 0.01 | 0.82(0.16) | 0.11 |
|      | 6     | 0.41(0.79) | 0.21 | 0.50(0.21) | 0.03 | -0.12(0.45) | 0.07 | -0.06(0.15) | 0.00 |
|      | 7     |       |     |       |     | 0.12(0.39) | 0.07 | 0.32(0.14) | 0.02 |
|      | 8     |       |     |       |     | 0.23(0.19) | 0.74 | 0.17(0.30) | 0.00 |
|      | 9     |       |     |       |     | 0.23(0.56) | 0.60 | 0.24(0.68) | 0.00 |
| 2004 | 4     |       |     |       |     | -0.26(0.84) | 0.09 | 0.66(0.19) | 0.05 |
|      | 5     |       |     |       |     | 1.03(0.82) | 0.75 | 0.94(0.35) | 0.03 |
|      | 6     |       |     |       |     | 0.10(0.79) | 0.03 | 0.65(0.31) | 0.02 |
|      | 7     |       |     |       |     | -0.21(0.52) | 0.35 | -0.29(0.27) | 0.01 |
|      | 8     |       |     |       |     | 0.15(7.16) | 0.07 | 0.61(0.61) | 0.00 |
|      | 9     |       |     |       |     | -0.19(0.29) | 0.58 | -0.19(0.32) | 0.00 |
| 2005 | 4     |       |     |       |     | 0.10(0.25) | 0.10 | 0.54(0.10) | 0.13 |
|      | 5     |       |     |       |     | 0.29(0.94) | 0.09 | 0.57(0.20) | 0.04 |
|      | 6     |       |     |       |     | 0.52(1.20) | 0.63 | -0.50(0.43) | 0.01 |
|      | 7     |       |     |       |     | 1.06(1.02) | 0.46 | 0.67(0.18) | 0.06 |
|      | 8     |       |     |       |     | 0.35(1.60) | 0.09 | 0.16(0.27) | 0.00 |
|      | 9     |       |     |       |     | 0.50(0.31) | 0.83 | 0.64(0.22) | 0.04 |
| 2006 | 4     |       |     |       |     | 1.95(2.42) | 0.30 | 1.38(0.17) | 0.24 |
|      | 5     |       |     |       |     | 1.08(0.71) | 0.61 | 1.53(0.14) | 0.36 |
|      | 6     |       |     |       |     | 1.09(2.16) | 0.20 | 0.53(0.23) | 0.02 |
|      | 7     |       |     |       |     | 0.06(0.38) | 0.03 | 0.38(0.16) | 0.03 |
|      | 8     |       |     |       |     | 0.18(0.27) | 0.46 | 0.39(0.19) | 0.02 |
|      | 9     |       |     |       |     | 0.41(0.26) | 0.12 | -0.13(0.31) | 0.00 |
| 2007 | 4     |       |     |       |     | 2.84(1.56) | 0.77 | 1.72(0.16) | 0.35 |
|      | 5     |       |     |       |     | 1.08(0.58) | 0.82 | 1.28(0.18) | 0.20 |
|      | 6     |       |     |       |     | 0.26(0.29) | 0.38 | 0.19(0.18) | 0.01 |
|      | 7     |       |     |       |     | -0.28(0.37) | 0.37 | -0.05(0.17) | 0.00 |
|      | 8     |       |     |       |     | -0.10(0.66) | 0.02 | 0.55(0.18) | 0.04 |
|      | 9     |       |     |       |     | 1.47(0.80) | 0.92 | 0.67(0.26) | 0.03 |
| 2008 | 4     |       |     |       |     | 0.72(0.58) | 0.51 | 1.17(0.12) | 0.32 |
|      | 5     |       |     |       |     | 0.38(0.71) | 0.14 | 0.93(0.11) | 0.26 |
|      | 6     |       |     |       |     | 0.01(0.40) | 0.00 | 0.04(0.14) | 0.00 |
|      | 7     |       |     |       |     | 0.16(0.29) | 0.23 | 0.01(0.14) | 0.00 |
|      | 8     |       |     |       |     | -0.34(1.90) | 0.23 | 0.43(0.41) | 0.01 |
|      | 9     |       |     |       |     | -1.00(1.19) | 0.87 | -0.66(0.50) | 0.01 |
Table S2. Same as Table S1 but for Alaska

| Year | Month | GOME Binned-data | GOME All-data | SCIAMACHY Binned-data | SCIAMACHY All-data |
|------|-------|------------------|---------------|-----------------------|-------------------|
|      |       | Slope            | r'             | Slope                 | r'                |
| 2001 | 6     | NA               | NA             | -0.29 (1.88)          | 0.00              |
|      | 7     | 0.42 (1.04)      | 0.37           | 0.70 (0.47)           | 0.02              |
|      | 8     |                  |                |                       |                   |
| 2002 | 6     | 0.09 (0.31)      | 0.10           | 0.33 (0.26)           | 0.01              |
|      | 7     | -0.80 (1.02)     | 0.54           | 0.10 (0.36)           | 0.00              |
|      | 8     | 0.30 (0.54)      | 0.29           | 0.42 (0.22)           | 0.03              |
| 2003 | 6     | 0.46 (0.49)      | 0.54           | 0.63 (0.30)           | 0.04              |
|      | 7     |                  |                |                       |                   |
|      | 8     |                  |                |                       |                   |
| 2004 | 6     |                  |                |                       |                   |
|      | 7     |                  |                |                       |                   |
|      | 8     |                  |                |                       |                   |
| 2005 | 6     | -0.03 (0.62)     | 0.00           | 0.28 (0.13)           | 0.04              |
|      | 7     | 0.25 (0.27)      | 0.46           | 0.31 (0.11)           | 0.07              |
|      | 8     |                  |                |                       |                   |
| 2006 | 6     | 0.04 (1.47)      | 0.00           | 0.43 (0.37)           | 0.01              |
|      | 7     | 0.93 (1.90)      | 0.24           | 0.85 (0.21)           | 0.12              |
|      | 8     | -0.18 (0.83)     | 0.13           | -0.40 (0.38)          | 0.01              |
| 2007 | 6     | 0.07 (0.29)      | 0.10           | 0.05 (0.13)           | 0.00              |
|      | 7     | -0.05 (0.26)     | 0.06           | 0.30 (0.21)           | 0.02              |
|      | 8     |                  |                |                       |                   |
| 2008 | 6     | 0.02 (0.69)      | 0.00           | -0.03 (0.30)          | 0.00              |
|      | 7     | 0.30 (1.13)      | 0.40           | 0.45 (0.42)           | 0.01              |
|      | 8     | 1.04 (1.46)      | 0.99           | 0.39 (0.68)           | 0.00              |
| 2009 | 6     | -0.18 (0.76)     | 0.10           | 0.20 (0.32)           | 0.00              |
|      | 7     | 0.48 (0.47)      | 0.40           | 0.67 (0.13)           | 0.18              |
|      | 8     | 0.06 (0.26)      | 0.03           | 0.14 (0.11)           | 0.01              |

Unit of slope is $10^{13}$ molecules cm$^{-2}$ MW$^{-1}$. In parentheses are 95% confidence level; NA: Not available due to N = 1 or 2. Data in bold and grey-hatched cells are used for further calculations.
| Year | Month | Value 1 | Value 2 | Value 3 | Value 4 |
|------|-------|---------|---------|---------|---------|
| 2010 | 6     | -0.26(1.05) | 0.08    | 0.10(0.20) | 0.00    |
|      | 7     | -0.05(0.81) | 0.03    | 0.30(0.39) | 0.01    |
|      | 8     | -0.26(3.43) | 0.48    | 0.03(0.48) | 0.00    |
| 2011 | 6     | -0.03(0.67) | 0.00    | 0.15(0.24) | 0.00    |
|      | 7     | 0.06(0.66)  | 0.07    | 0.20(0.37) | 0.00    |
|      | 8     | -1.26(14.89)| 0.54    | -0.74(1.20)| 0.00    |

Unit of slope is $10^{-13}$ molecules cm$^{-2}$ MW$^{-1}$. In parentheses are 95% confidence level; NA: Not available due to $N = 1$ or 2. Data in bold and grey-hatched cells are used in further calculations.