## 1 Supplementary material for

- 2
- 3 The trend of the oxidants in boreal forest over 2007-2018: comprehensive modelling study with long-
- 4 term measurements at SMEAR II, Finland

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|             | ooth             | <b>a</b> rth     | orth             | a oth                   |        | N/    |
|-------------|------------------|------------------|------------------|-------------------------|--------|-------|
| <b>SO</b> ₂ | 90"              | 75"              | 25"              | 10"                     | Median | Mean  |
| 2007        | 10.41            | 24.93            | 68.77            | 78.90                   | 50.41  | 0.00  |
| 2008        | 6.85             | 15.89            | 65.21            | 78.08                   | 39.45  | 0.00  |
| 2009        | 6.03             | 21.64            | 63.01            | 75.62                   | 43.56  | 0.00  |
| 2010        | 2.19             | 8.77             | 37.26            | 49.59                   | 20.82  | 0.00  |
| 2011        | 7.67             | 17.81            | 44.38            | 53.97                   | 32.88  | 0.00  |
| 2012        | 13.97            | 24.38            | 55.07            | 69.32                   | 39.73  | 0.00  |
| 2013        | 12.05            | 24.66            | 60.27            | 72.05                   | 43.56  | 0.00  |
| 2014        | 19.45            | 37.26            | 73.42            | 81.92                   | 58.36  | 0.00  |
| 2015        | 22.19            | 35.89            | 68.49            | 79.73                   | 53.70  | 0.00  |
| 2016        | 34.52            | 55.62            | 88.77            | 91.51                   | 79.18  | 0.00  |
| 2017        | 48.49            | 68.77            | 95.89            | 98.36                   | 88.22  | 0.00  |
| 2018        | 27.40            | 45.75            | 77.53            | 83.29                   | 62.47  | 0.00  |
| NO          | 90 <sup>th</sup> | 75 <sup>th</sup> | 25 <sup>th</sup> | <b>10</b> <sup>th</sup> | Median | Mean  |
| 2007        | 44.38            | 72.60            | 100.00           | 100.00                  | 99.45  | 67.12 |
| 2008        | 41.37            | 72.33            | 100.00           | 100.00                  | 98.63  | 70.41 |
| 2009        | 48.49            | 82.74            | 100.00           | 100.00                  | 99.73  | 72.05 |
| 2010        | 35.62            | 68.49            | 100.00           | 100.00                  | 98.08  | 62.47 |
| 2011        | 31.78            | 61.37            | 100.00           | 100.00                  | 96.71  | 59.18 |
| 2012        | 41.64            | 73.70            | 100.00           | 100.00                  | 98.63  | 67.67 |
| 2013        | 53.70            | 78.08            | 100.00           | 100.00                  | 100.00 | 75.07 |
| 2014        | 46.03            | 77.53            | 100.00           | 100.00                  | 99.18  | 72.88 |
| 2015        | 44.66            | 76.99            | 99.73            | 100.00                  | 99.73  | 75.62 |
| 2016        | 33.97            | 64.66            | 99.73            | 100.00                  | 94.52  | 63.01 |
| 2017        | 49.04            | 80.00            | 99.73            | 100.00                  | 98.36  | 77.81 |
| 2018        | 35.89            | 67.67            | 99.73            | 100.00                  | 98.36  | 63.56 |

<sup>6</sup> 

<sup>7</sup> Table S1: The percentages of the 90<sup>th</sup>, 75<sup>th</sup>, 25<sup>th</sup>, 10<sup>th</sup> percentiles, median and mean values of daily data

<sup>8</sup> under the limit of detection at SMEAR II for SO2 and NO for years 2007-2018.



11 Figure S1: NO<sub>2</sub> measurements from 2003-2018 at the SMEAR II



15 Figure S2: Data and trend of selected parameters from SMEAR II for the years 2007-2018.





Figure S3: Modelled and measured monthly median monoterpene fluxes at SMEAR II for the years

**20** 2010-2013. Error bars represent the  $25^{th}$  -  $75^{th}$  percentile, 'x' is shown when the  $25^{th}$  percentile is

21 negative.



Figure S4: Plot A and B show the diurnal cycle of measured and modelled OH concentrations for two
campaigns in 2007 and 2010, respectively. Plot C provides the scatter plot for all data points during
the 2 campaigns.



30 Figure S5: Plot A shows the diurnal cycle of measured and modelled H<sub>2</sub>SO<sub>4</sub> concentrations for years
31 2016-2018. Plot B provides the scatter plot for all data points during the 3 years.