

## Annex 5 Additional question 7 supporting evidence

<b>Table A5-1</b>	Population-weighted annual means of daily maximum running 8-hourly ozone concentration (in $\mu\text{g m}^{-3}$ ) for the OSRM runs undertaken for the Review of the Air Quality Strategy.
<b>Table A5-2</b>	Population-weighted annual mean of the difference (in $\mu\text{g m}^{-3}$ ) between the daily maximum running 8-hourly ozone concentration and $70 \mu\text{g m}^{-3}$ for the OSRM scenario runs undertaken for the Review of the Air Quality Strategy.
<b>Table A5-3</b>	Population-weighted annual mean of the difference (in $\mu\text{g m}^{-3}$ ) between the daily maximum running 8-hourly ozone concentration and $100 \mu\text{g m}^{-3}$ for the OSRM runs undertaken for the Review of the Air Quality Strategy.
<b>Table A5-4</b>	Population-weighted number of days when the daily maximum running 8-hourly ozone concentration exceeds $100 \mu\text{g m}^{-3}$ for the OSRM runs undertaken for the Review of the Air Quality Strategy.

**Table A5-1** Summary of the population-weighted annual means of daily maximum running 8-hourly ozone concentration (in  $\mu\text{g m}^{-3}$ ) for the OSRM runs undertaken for the Review of the Air Quality Strategy.

Run Description	Population-Weighted Annual Means of Daily Maximum Running 8 Hourly Ozone Concentration (in $\mu\text{g m}^{-3}$ )						
	All UK	Scotland	Wales	Northern Ireland	Inner London	Outer London	Rest of England
<b>2003 - Current Year</b>	65.14	69.79	73.21	73.96	58.52	59.13	64.75
<b>2010 - Base Case</b>	<b>69.96</b>	<b>73.03</b>	<b>76.73</b>	<b>76.42</b>	<b>65.30</b>	<b>65.51</b>	<b>69.65</b>
2010 - Measure A	70.00	73.04	76.76	76.43	65.35	65.56	69.69
2010 - Measure B	70.07	73.08	76.81	76.46	65.46	65.67	69.77
2010 - Measure B*	70.07	73.08	76.81	76.46	65.46	65.67	69.77
2010 - Measure C	70.08	73.09	76.81	76.46	65.48	65.68	69.77
2010 - Measure E	69.98	73.04	76.74	76.43	65.32	65.53	69.66
2010 - Measure J	70.00	73.05	76.75	76.44	65.39	65.58	69.68
2010 - Measures K & L	70.95	73.68	77.75	76.87	66.23	66.41	70.71
2010 - Measure L	69.96	73.03	76.73	76.42	65.30	65.51	69.65
2010 - Measure O	70.10	73.10	76.82	76.47	65.50	65.71	69.79
2010 - Measure P	70.08	73.09	76.81	76.46	65.48	65.68	69.77
2010 - Measure Q	70.10	73.10	76.82	76.47	65.50	65.71	69.79
2010 - Measures M & Q	70.07	73.08	76.79	76.45	65.48	65.69	69.77
2010 - Measure M	69.94	73.00	76.71	76.40	65.27	65.49	69.62
<b>2015 - Base Case</b>	<b>72.58</b>	<b>74.85</b>	<b>79.01</b>	<b>77.96</b>	<b>68.40</b>	<b>68.62</b>	<b>72.34</b>
2015 - Measure A	73.01	75.05	79.29	78.05	69.04	69.26	72.79
2015 - Measure B	73.57	75.29	79.63	78.16	69.88	70.11	73.37
2015 - Measure B*	73.60	75.30	79.64	78.16	69.93	70.16	73.40
2015 - Measure C	73.14	75.12	79.37	78.10	69.23	69.45	72.92
2015 - Measure E	72.63	74.89	79.05	77.98	68.48	68.71	72.40
2015 - Measure J	72.68	74.93	79.06	78.00	68.65	68.81	72.43
2015 - Measures K & L	73.62	75.51	80.07	78.40	69.47	69.64	73.45
2015 - Measure L	72.66	74.90	79.07	77.98	68.54	68.74	72.43
2015 - Measure O	73.19	75.15	79.40	78.11	69.31	69.53	72.97
2015 - Measure P	73.22	75.17	79.43	78.12	69.38	69.57	73.01
2015 - Measure Q	73.28	75.20	79.46	78.13	69.46	69.65	73.06
2015 - Measures M & Q	73.25	75.17	79.43	78.11	69.44	69.62	73.03
2015 - Measure M	72.55	74.82	78.98	77.94	68.37	68.60	72.31
<b>2020 - Base Case</b>	<b>74.72</b>	<b>76.46</b>	<b>81.16</b>	<b>79.39</b>	<b>70.62</b>	<b>70.88</b>	<b>74.57</b>
2020 - Measure A	75.53	76.76	81.61	79.50	71.87	72.14	75.40
2020 - Measure B	76.40	77.01	82.01	79.52	73.37	73.61	76.31
2020 - Measure B*	76.56	77.05	82.07	79.52	73.66	73.90	76.47
2020 - Measure C	75.57	76.78	81.64	79.51	71.94	72.20	75.45
2020 - Measure E	74.85	76.52	81.23	79.43	70.81	71.06	74.69
2020 - Measure J	74.90	76.58	81.24	79.45	71.06	71.20	74.72
2020 - Measures K & L	75.18	76.73	81.60	79.57	71.16	71.37	75.05
2020 - Measure L	74.82	76.51	81.22	79.41	70.78	71.01	74.66
2020 - Measure O	75.67	76.84	81.70	79.54	72.10	72.36	75.55
2020 - Measure P	75.66	76.83	81.70	79.53	72.11	72.33	75.54
2020 - Measure Q	75.76	76.88	81.76	79.56	72.27	72.49	75.64
2020 - Measures M & Q	75.73	76.85	81.73	79.54	72.24	72.45	75.61
2020 - Measure M	74.69	76.43	81.13	79.37	70.59	70.85	74.54

**Table A5-2** Summary of the population-weighted annual mean of the difference (in  $\mu\text{g m}^{-3}$ ) between the daily maximum running 8-hourly ozone concentration and  $70 \mu\text{g m}^{-3}$  for the OSRM scenario runs undertaken for the Review of the Air Quality Strategy.

Run Description	Population-Weighted Annual Mean of the Difference (in $\mu\text{g m}^{-3}$ ) between the Daily Maximum Running 8 Hourly Ozone Concentration and $70 \mu\text{g m}^{-3}$						
	All UK	Scotland	Wales	Northern Ireland	Inner London	Outer London	Rest of England
<b>2003 - Current Year</b>	9.14	9.63	13.38	11.51	6.77	6.93	9.09
<b>2010 - Base Case</b>	<b>11.10</b>	<b>11.10</b>	<b>15.07</b>	<b>12.73</b>	<b>9.26</b>	<b>9.31</b>	<b>11.08</b>
2010 - Measure A	11.12	11.10	15.08	12.73	9.28	9.33	11.09
2010 - Measure B	11.15	11.12	15.10	12.74	9.32	9.37	11.12
2010 - Measure B*	11.15	11.12	15.10	12.74	9.32	9.37	11.12
2010 - Measure C	11.16	11.13	15.11	12.75	9.34	9.39	11.13
2010 - Measure E	11.11	11.10	15.07	12.73	9.28	9.32	11.09
2010 - Measure J	11.12	11.11	15.08	12.74	9.30	9.34	11.09
2010 - Measures K & L	11.55	11.43	15.67	12.95	9.57	9.64	11.56
2010 - Measure L	11.10	11.10	15.07	12.73	9.26	9.31	11.08
2010 - Measure O	11.17	11.13	15.11	12.75	9.35	9.40	11.14
2010 - Measure P	11.16	11.13	15.11	12.75	9.34	9.39	11.13
2010 - Measure Q	11.17	11.13	15.11	12.75	9.35	9.40	11.14
2010 - Measures M & Q	11.15	11.12	15.09	12.73	9.34	9.39	11.12
2010 - Measure M	11.09	11.08	15.05	12.71	9.25	9.30	11.06
<b>2015 - Base Case</b>	<b>12.51</b>	<b>12.21</b>	<b>16.51</b>	<b>13.73</b>	<b>10.70</b>	<b>10.80</b>	<b>12.52</b>
2015 - Measure A	12.67	12.28	16.60	13.72	10.93	11.04	12.69
2015 - Measure B	12.88	12.36	16.71	13.71	11.23	11.38	12.91
2015 - Measure B*	12.89	12.36	16.71	13.71	11.25	11.39	12.92
2015 - Measure C	12.74	12.32	16.65	13.75	11.03	11.14	12.76
2015 - Measure E	12.54	12.23	16.53	13.74	10.75	10.85	12.56
2015 - Measure J	12.56	12.25	16.54	13.75	10.83	10.89	12.57
2015 - Measures K & L	13.01	12.56	17.16	13.93	11.13	11.22	13.05
2015 - Measure L	12.56	12.24	16.55	13.74	10.78	10.86	12.57
2015 - Measure O	12.76	12.34	16.67	13.75	11.07	11.18	12.79
2015 - Measure P	12.78	12.34	16.69	13.75	11.11	11.21	12.80
2015 - Measure Q	12.81	12.36	16.70	13.76	11.15	11.25	12.83
2015 - Measures M & Q	12.79	12.34	16.68	13.75	11.13	11.23	12.81
2015 - Measure M	12.49	12.19	16.49	13.71	10.69	10.79	12.50
<b>2020 - Base Case</b>	<b>13.82</b>	<b>13.29</b>	<b>18.02</b>	<b>14.73</b>	<b>11.87</b>	<b>12.03</b>	<b>13.88</b>
2020 - Measure A	14.11	13.35	18.13	14.66	12.33	12.54	14.18
2020 - Measure B	14.38	13.33	18.11	14.48	12.95	13.18	14.46
2020 - Measure B*	14.43	13.32	18.10	14.44	13.08	13.31	14.51
2020 - Measure C	14.13	13.37	18.15	14.67	12.37	12.58	14.20
2020 - Measure E	13.89	13.33	18.07	14.75	11.97	12.13	13.94
2020 - Measure J	13.90	13.36	18.07	14.76	12.10	12.20	13.95
2020 - Measures K & L	14.04	13.42	18.30	14.81	12.11	12.26	14.11
2020 - Measure L	13.87	13.32	18.06	14.74	11.95	12.09	13.93
2020 - Measure O	14.18	13.39	18.18	14.68	12.46	12.67	14.26
2020 - Measure P	14.18	13.38	18.18	14.67	12.46	12.65	14.25
2020 - Measure Q	14.23	13.41	18.21	14.69	12.55	12.74	14.30
2020 - Measures M & Q	14.21	13.39	18.18	14.67	12.53	12.72	14.28
2020 - Measure M	13.80	13.27	18.00	14.71	11.85	12.01	13.85

**Table A5-3** Summary of the population-weighted annual mean of the difference (in  $\mu\text{g m}^{-3}$ ) between the daily maximum running 8-hourly ozone concentration and  $100 \mu\text{g m}^{-3}$  for the OSRM runs undertaken for the Review of the Air Quality Strategy.

Run Description	Population-Weighted Annual Mean of the Difference (in $\mu\text{g m}^{-3}$ ) between the Daily Maximum Running 8 Hourly Ozone Concentration and $100 \mu\text{g m}^{-3}$						
	All UK	Scotland	Wales	Northern Ireland	Inner London	Outer London	Rest of England
<b>2003 - Current Year</b>	1.93	1.69	2.73	1.96	1.52	1.53	1.97
<b>2010 - Base Case</b>	<b>2.14</b>	<b>1.80</b>	<b>2.89</b>	<b>2.01</b>	<b>1.92</b>	<b>1.86</b>	<b>2.18</b>
2010 - Measure A	2.15	1.80	2.89	2.01	1.92	1.87	2.19
2010 - Measure B	2.16	1.80	2.90	2.01	1.93	1.88	2.20
2010 - Measure B*	2.16	1.80	2.90	2.01	1.93	1.88	2.20
2010 - Measure C	2.16	1.80	2.90	2.01	1.94	1.89	2.20
2010 - Measure E	2.15	1.80	2.89	2.01	1.92	1.87	2.19
2010 - Measure J	2.15	1.80	2.89	2.01	1.93	1.87	2.19
2010 - Measures K & L	2.30	1.90	3.11	2.09	2.02	1.97	2.36
2010 - Measure L	2.14	1.80	2.89	2.01	1.92	1.86	2.18
2010 - Measure O	2.16	1.81	2.90	2.01	1.94	1.89	2.20
2010 - Measure P	2.16	1.80	2.90	2.01	1.94	1.89	2.20
2010 - Measure Q	2.16	1.81	2.90	2.01	1.94	1.89	2.20
2010 - Measures M & Q	2.15	1.80	2.89	2.00	1.94	1.89	2.19
2010 - Measure M	2.14	1.79	2.88	2.00	1.92	1.86	2.18
<b>2015 - Base Case</b>	<b>2.50</b>	<b>2.06</b>	<b>3.34</b>	<b>2.29</b>	<b>2.28</b>	<b>2.23</b>	<b>2.55</b>
2015 - Measure A	2.55	2.08	3.38	2.30	2.34	2.28	2.60
2015 - Measure B	2.60	2.11	3.42	2.31	2.42	2.36	2.66
2015 - Measure B*	2.61	2.11	3.42	2.31	2.42	2.37	2.66
2015 - Measure C	2.57	2.09	3.39	2.30	2.37	2.31	2.62
2015 - Measure E	2.51	2.06	3.35	2.29	2.30	2.24	2.56
2015 - Measure J	2.52	2.07	3.35	2.29	2.32	2.25	2.56
2015 - Measures K & L	2.68	2.19	3.61	2.36	2.42	2.37	2.74
2015 - Measure L	2.52	2.07	3.35	2.29	2.30	2.25	2.57
2015 - Measure O	2.58	2.10	3.40	2.31	2.39	2.33	2.63
2015 - Measure P	2.58	2.10	3.41	2.31	2.40	2.34	2.63
2015 - Measure Q	2.59	2.10	3.41	2.31	2.41	2.35	2.64
2015 - Measures M & Q	2.58	2.09	3.40	2.30	2.41	2.34	2.63
2015 - Measure M	2.50	2.05	3.33	2.28	2.28	2.22	2.55
<b>2020 - Base Case</b>	<b>2.95</b>	<b>2.43</b>	<b>3.96</b>	<b>2.63</b>	<b>2.66</b>	<b>2.61</b>	<b>3.01</b>
2020 - Measure A	3.02	2.45	3.99	2.61	2.77	2.73	3.09
2020 - Measure B	3.08	2.43	3.97	2.53	2.92	2.91	3.15
2020 - Measure B*	3.09	2.42	3.95	2.50	2.95	2.95	3.15
2020 - Measure C	3.03	2.46	4.00	2.61	2.79	2.75	3.10
2020 - Measure E	2.97	2.45	3.97	2.64	2.69	2.64	3.03
2020 - Measure J	2.97	2.45	3.97	2.64	2.73	2.65	3.03
2020 - Measures K & L	3.03	2.49	4.07	2.65	2.74	2.68	3.10
2020 - Measure L	2.97	2.44	3.97	2.63	2.69	2.63	3.03
2020 - Measure O	3.05	2.47	4.01	2.62	2.82	2.78	3.11
2020 - Measure P	3.05	2.46	4.01	2.61	2.82	2.77	3.11
2020 - Measure Q	3.06	2.47	4.02	2.62	2.85	2.80	3.13
2020 - Measures M & Q	3.05	2.46	4.01	2.60	2.84	2.79	3.11
2020 - Measure M	2.94	2.42	3.94	2.62	2.65	2.60	3.00

**Table A5-4** Summary of the population-weighted number of days when the daily maximum running 8-hourly ozone concentration exceeds  $100 \mu\text{g m}^{-3}$  for the OSRM runs undertaken for the Review of the Air Quality Strategy.

Run Description	Population-Weighted Number of Days						
	when the Daily Maximum Running 8 Hourly Ozone Concentration exceeds $120 \mu\text{g m}^{-3}$						
	All UK	Scotland	Wales	Northern Ireland	Inner London	Outer London	Rest of England
<b>2003 - Current Year</b>	29.73	28.16	48.34	35.88	22.03	21.66	29.77
<b>2010 - Base Case</b>	<b>38.99</b>	<b>34.11</b>	<b>57.89</b>	<b>42.98</b>	<b>33.71</b>	<b>34.28</b>	<b>38.96</b>
2010 - Measure A	39.01	34.10	57.87	42.92	33.71	34.32	38.99
2010 - Measure B	39.15	34.24	57.97	42.93	33.71	34.37	39.16
2010 - Measure B*	39.15	34.24	57.97	42.93	33.71	34.37	39.16
2010 - Measure C	39.22	34.24	58.00	42.98	33.88	34.66	39.21
2010 - Measure E	39.01	34.11	57.91	43.03	33.71	34.28	38.98
2010 - Measure J	39.03	34.14	57.94	43.03	33.71	34.35	39.00
2010 - Measures K & L	41.06	35.64	61.50	43.70	35.50	35.80	41.12
2010 - Measure L	38.99	34.11	57.89	42.98	33.71	34.28	38.96
2010 - Measure O	39.25	34.25	58.10	42.89	33.88	34.66	39.24
2010 - Measure P	39.22	34.24	58.00	42.98	33.88	34.66	39.21
2010 - Measure Q	39.25	34.25	58.10	42.89	33.88	34.66	39.24
2010 - Measures M & Q	39.15	34.19	57.96	42.78	33.88	34.64	39.13
2010 - Measure M	38.92	34.03	57.74	42.92	33.71	34.19	38.89
<b>2015 - Base Case</b>	<b>47.23</b>	<b>41.27</b>	<b>66.84</b>	<b>49.00</b>	<b>44.09</b>	<b>43.20</b>	<b>47.17</b>
2015 - Measure A	47.84	41.66	67.27	47.85	45.39	43.97	47.83
2015 - Measure B	48.35	41.90	67.32	46.72	45.39	44.56	48.49
2015 - Measure B*	48.39	41.92	67.30	46.67	45.39	44.70	48.52
2015 - Measure C	48.11	41.96	67.46	47.79	45.90	44.41	48.08
2015 - Measure E	47.38	41.44	66.97	49.00	44.31	43.40	47.31
2015 - Measure J	47.44	41.55	67.04	49.09	44.75	43.56	47.32
2015 - Measures K & L	49.25	43.70	69.98	49.55	44.90	44.34	49.29
2015 - Measure L	47.41	41.48	67.11	48.98	44.31	43.37	47.34
2015 - Measure O	48.24	42.09	67.46	47.92	45.90	44.53	48.23
2015 - Measure P	48.33	42.22	67.65	47.77	45.90	44.76	48.30
2015 - Measure Q	48.44	42.32	67.77	47.91	46.18	44.78	48.42
2015 - Measures M & Q	48.33	42.13	67.61	47.79	45.90	44.68	48.32
2015 - Measure M	47.11	41.16	66.69	48.94	44.09	43.07	47.03
<b>2020 - Base Case</b>	<b>55.14</b>	<b>49.47</b>	<b>76.92</b>	<b>55.18</b>	<b>51.04</b>	<b>49.78</b>	<b>55.17</b>
2020 - Measure A	56.04	49.87	76.11	52.98	51.65	51.57	56.29
2020 - Measure B	56.74	49.35	75.05	49.41	52.25	52.90	57.36
2020 - Measure B*	56.77	49.23	74.63	48.87	52.19	53.01	57.46
2020 - Measure C	56.12	49.96	76.10	52.97	51.65	51.79	56.37
2020 - Measure E	55.43	49.81	77.07	55.16	51.05	50.12	55.49
2020 - Measure J	55.49	49.78	77.06	55.21	51.46	50.48	55.51
2020 - Measures K & L	56.11	50.60	78.07	55.14	51.38	50.39	56.22
2020 - Measure L	55.36	49.56	77.11	55.13	51.05	50.03	55.43
2020 - Measure O	56.36	50.07	76.28	52.96	51.65	52.19	56.63
2020 - Measure P	56.31	50.05	76.12	52.94	51.65	52.08	56.59
2020 - Measure Q	56.58	50.26	76.38	52.93	51.81	52.64	56.85
2020 - Measures M & Q	56.42	50.04	76.22	52.90	51.65	52.51	56.69
2020 - Measure M	55.03	49.34	76.79	55.12	51.04	49.78	55.04

## Abbreviations

<b>°C</b>	Degrees Celsius
<b>µg m<sup>-3</sup></b>	Micrograms per cubic metre of air
<b>A1 and A2</b>	Different scenarios in SRES
<b>ACCENT</b>	Atmospheric Composition Change: European Network of Excellence
<b>AMO</b>	Atlantic (Ocean) Multi-decadal Oscillation
<b>AOT40</b>	Accumulated dose over a threshold of 40 ppb
<b>AOT60</b>	Accumulated dose over a threshold of 60 ppb
<b>AQEG</b>	Air Quality Expert Group
<b>AQS</b>	Air Quality Standard
<b>AURN</b>	Automatic urban rural network
<b>B1 and B2</b>	Different scenarios in SRES
<b>BEIS</b>	Biogenic Emission Inventory System
<b>BERR</b>	Department for Business Enterprise and Regulatory Reform
<b>C</b>	Carbon
<b>CAFÉ</b>	Clean Air For Europe
<b>CH<sub>4</sub></b>	Methane
<b>CHIMERE</b>	A chemistry-transport model
<b>CIAM</b>	Centre for Integrated Assessment Modelling
<b>CLRTAP</b>	Convention on Long Range Transboundary Air Pollution
<b>CMAQ</b>	Community Multiscale Air Quality model
<b>CO</b>	Carbon monoxide
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>COMEAP</b>	Committee on the Medical Effects of Air Pollutants
<b>CORINAIR</b>	The air emissions section of CORINE
<b>CORINE</b>	CoORdination d'Information Environnementale
<b>CRI</b>	Common Representative Intermediates
<b>CTM</b>	Chemical transport model
<b>DAPPLE</b>	Dispersion of Air Pollution and its Penetration into the Local Environment
<b>Defra</b>	Department for Environment, Food and Rural Affairs
<b>DfT</b>	Department for Transport
<b>DTI</b>	Department for Trade and Industry
<b>EDGAR</b>	Emission Database for Global Atmospheric Research
<b>ELMO</b>	Edinburgh Lancaster Model for Ozone
<b>EMEP</b>	European Monitoring and Evaluation Programme - a Cooperative Programme under CLRTAP
<b>EU</b>	European Union
<b>EU25</b>	The 25 countries that were members of the European Union before Romania and Bulgaria joined on 1 January 2007
<b>EU27</b>	The 27 member countries of the European Union

<b>GCMs</b>	General Circulation Models
<b>GEIA</b>	Global Emission Inventory Activity
<b>GLOBEIS</b>	Global Biosphere Emissions And Interactions System
<b>HadCM3</b>	Hadley Centre Coupled Ocean Atmosphere Global Climate Model
<b>HARM</b>	Hull Acid Rain Model
<b>HNO3</b>	Nitric acid
<b>HONO</b>	Nitrous acid
<b>HTAP</b>	Hemispheric Transport of Air Pollution
<b>IDOP</b>	Integrated Downwind Ozone Potential
<b>IIASA</b>	International Institute for Applied Systems Analysis
<b>IIASA CLE</b>	Current Legislation
<b>IIASA MFR</b>	Maximum Technically Feasible Reduction
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>IS92a</b>	IPCC Emissions scenario
<b>KPa</b>	Kilopascal (unit of pressure)
<b>LAQN</b>	London Air Quality Network
<b>MCM</b>	Master Chemical Mechanism
<b>MOPITT</b>	Measurements Of Pollution In The Troposphere
<b>MSC-W</b>	Meteorological Synthesising Centre-West in Norway
<b>NAEI</b>	National Atmospheric Emission Inventory
<b>NAME</b>	Numerical Atmospheric Dispersion Modelling Environment
<b>NAS</b>	National Academy of Sciences
<b>NATAIR</b>	Improving and Applying Methods for the Calculation of Natural and Biogenic Emissions and Assessment of Impacts on Air Quality
<b>NEC</b>	National Emission Ceilings
<b>NECD</b>	National Emissions Ceiling Directive
<b>NEGTA</b>	The National Expert Group on Transboundary Air Pollution
<b>NERC</b>	Natural Environment Research Council
<b>NH<sub>3</sub></b>	Ammonia
<b>NMVOC</b>	Non-methane volatile organic compound
<b>NO</b>	Nitrogen monoxide, also termed nitric oxide
<b>NO<sub>2</sub></b>	Nitrogen dioxide
<b>NO<sub>x</sub></b>	Nitrogen oxides (NO + NO <sub>2</sub> )
<b>NO<sub>y</sub></b>	Total reactive nitrogen oxides
<b>NPP</b>	net primary productivity
<b>O<sub>3</sub></b>	Ozone
<b>OH</b>	Hydroxyl radical
<b>OSRM</b>	Ozone Source-receptor Model
<b>OX</b>	oxidant
<b>PAN</b>	Peroxyacetyl nitrate
<b>PCM</b>	Pollution Climate Models
<b>PELCOM</b>	Pan-European Land Use and Land Cover Monitoring

<b>PM</b>	Particulate matter
<b>PM<sub>10</sub></b>	Airborne particulate matter passing a sampling inlet with a 50% efficiency cut-off at 10 µm aerodynamic diameter and which transmits particles of below this size
<b>PM<sub>2.5</sub></b>	Airborne particulate matter passing a sampling inlet with a 50% efficiency cut-off at 2.5 µm aerodynamic diameter and which transmits particles of below this size
<b>POCP</b>	Ozone forming potential
<b>POET</b>	Global emissions inventory dataset
<b>PORG</b>	Photochemical Oxidant Review Group
<b>ppb</b>	Parts per billion (1,000,000,000)
<b>ppm</b>	Parts per million (1,000,000)
<b>PTM</b>	Photochemical trajectory model
<b>RAINS</b>	Regional Air Pollution and Simulation, model used by IIASA
<b>RETRO</b>	Global emissions inventory dataset
<b>SCR</b>	Selective Catalytic Reduction
<b>SLIMCAT</b>	three-dimensional off-line chemical transport model
<b>SO<sub>2</sub></b>	Sulphur dioxide
<b>SOMO35</b>	sum of means over 35 ppb
<b>SRES</b>	Special Report on Emission Scenarios
<b>SSTs</b>	Sea surface temperatures
<b>STOCHEM</b>	Three dimensional Lagrangian model of tropospheric chemistry
<b>TFMM</b>	Task Force on Measurement and Modelling
<b>TILDAS</b>	tunable infrared laser differential absorption spectroscopy
<b>TiO<sub>2</sub></b>	Titanium dioxide
<b>TM3</b>	Atmospheric chemistry and transport model
<b>TORCH</b>	Tropospheric organic chemistry experiment
<b>TROTREP</b>	Tropospheric ozone and precursors - Trends, budgets and policy
<b>UEP21</b>	BERR Energy Predictions
<b>UEP26</b>	BERR Energy Predictions
<b>UNCLOS</b>	UN Convention on the Law of the Sea
<b>UNECE</b>	United Nations Economic Commission for Europe
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>USEPA</b>	United States Environmental Protection Agency
<b>UTAQS</b>	Urban Tree Air Quality Score
<b>VOC</b>	Volatile organic compound
<b>WHO</b>	World Health Organisation
<b>WMO</b>	World Meteorological Organisation



## References

AEAT (2000). Costs and benefits for the UK of Complying with the EC National Emissions Ceilings and Ozone Directive and the UNECE multi-pollutant, multi-effect protocol. AEAT.

Amann, M., Asman, W., Bertok, I., Cofala, J., Heyes, C., Klimont, Z., Posch, M., Schöpp, W., Wagner, F. and Hettelingh, J.-P. (2006). Emission Control Scenarios that Meet the Environmental Objectives of the Thematic Strategy on Air Pollution. NEC Scenario Analysis Report Nr. 2, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.

Amann, M., Bertok, I., Cabala, R., Cofala, J., Heyes, C., Gyarmas, F., Klimont, Z., Schöpp, W. and Wagner, F. (2005b). Exploratory CAFÉ scenarios for further improvements of European air quality. International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.

Amann, M., Bertok, I., Cabala, R., Cofala, J., Heyes, C., Gyarmas, F., Klimont, Z., Schöpp, W. and Wagner, F. (2005c). A final set of scenarios for the Clean Air for Europe (CAFÉ) programme. International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.

Amann, M., Bertok, I., Cabala, R., Cofala, J., Heyes, C., Gyarmas, F., Klimont, Z., Schöpp, W. and Wagner, F. (2005d). A further emission control scenario for the Clean Air for Europe (CAFÉ) programme. International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.

Amann, M., Cofala, J., Heyes, C., Klimont, Z., Mechler, R., Posch, M. and Schöpp, W. (2005a). RAINS review 2004. The RAINS model. Documentation of the model approach prepared for the RAINS peer review 2004. International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.

AQEG (2004). Nitrogen dioxide in the United Kingdom. Report of the UK Air Quality Expert Group. Prepared for the Department for Environment Food and Rural Affairs, the Scottish Executive, the Welsh Assembly and the Department of the Environment in Northern Ireland. <http://www.defra.gov.uk/environment/airquality/aqeg/nitrogen-dioxide/index.htm>

AQEG (2005). Particulate matter in the United Kingdom. Report of the UK Air Quality Expert Group. Prepared for the Department for Environment Food and Rural Affairs, the Scottish Executive, the Welsh Assembly and the Department of the Environment in Northern Ireland. <http://www.defra.gov.uk/environment/airquality/publications/particulate-matter/index.htm>

AQEG (2007a). Trends in primary nitrogen dioxide in the UK. Report of the UK Air Quality Expert Group. Prepared for the Department for Environment Food and Rural Affairs, the Scottish Executive, the Welsh Assembly and the Department of the Environment in Northern Ireland. Defra publications, London, 2007. ISBN 978-0-85521-179-0. <http://www.defra.gov.uk/environment/airquality/publications/primaryno2-trends/index.htm>

AQEG (2007b). Air quality and climate change: a UK perspective. Report of the UK Air Quality Expert Group. Prepared for the Department for Environment Food and Rural Affairs, the Scottish Executive, the Welsh Assembly and the Department of the Environment in Northern Ireland. Defra publications, London. ISBN 0-85521-172-5. <http://www.defra.gov.uk/environment/airquality/publications/airqual-climatechange/index.htm>

Arneth, A., Schurgers, G., Hickler, T. and Miller, P.A. (2007). Effects of species composition, land surface cover, CO<sub>2</sub> concentration and climate on isoprene emissions from European forests. *Plant Biology*, doi:10.1055/s-2007-965247.

- Beck, B. (2002). Model evaluation and performance. *Encyclopaedia of Environmetrics*, **3**, 1275-1279. J. Wiley and Sons, New York.
- Bejan, I., Abd El Aal, Y., Barnes, I., Benter, T., Bohn, B., Wiesen, P. and Kleffmann, J. (2006). The photolysis of ortho-nitrophenols: a new gas phase source of HONO. *Physical Chemistry Chemical Physics*, **8** (17), 2028-2035.
- Borbon, A., Fontaine, H., Locoge, N., Veillerot, M. and Galloo, J.C. (2003). Developing receptor-oriented methods for non-methane hydrocarbon characterisation in urban air—Part I: source identification. *Atmospheric Environment*, **37**, 4051-4064.
- Bousquet, P., Ciais, P., Miller, J.B., Dlugokencky, E.J., Hauglustaine, D.A., Prigent, C., Van der Werf, G.R., Peylin, P., Brunke, E.G., Carouge, C., Langenfelds, R.L., Lathiere, J., Papa, F., Ramonet, M., Schmidt, M., Steele, L.P., Tyler, S.C. and White, J. (2006). Contribution of anthropogenic and natural sources to atmospheric methane variability. *Nature*, **443**, 439-443.
- Bower, J.S., Broughton, G.F.J., Stedman, J.R. and Williams, M.L. (1994). A Winter Smog Episode in the UK. *Atmospheric Environment*, **28**, 461-475.
- Britter, R. and Schatzmann, M. (2007). Model Evaluation Guidance and Protocol Document. COST Action 732. Distributed by the University of Hamburg, Meteorological Institute.
- Bush, T., Targa, J. and Stedman, J. (2005). UK Air Quality Modelling for Annual Reporting 2004 on Ambient Air Quality Assessment under Council Directives 96/62/EC and 2002/3/EC relating to Ozone in Ambient Air. Report to the Department for Environment, Food and Rural Affairs, the Scottish Executive, Welsh Assembly Government and the Department of the Environment in Northern Ireland. AEA Technology, National Environmental Technology Centre. Report AEAT/ENV/R/2053/Issue 1.
- Carslaw, D.C. (2005). On the changing seasonal cycles and trends of ozone at Mace Head, Ireland. *Atmospheric Chemistry and Physics*, **5**, 3441-3450.
- Centritto, M., Nascetti, P., Petrilli, L., Raschi, A. and Loreto, F. (2004). Profiles of isoprene emission and photosynthetic parameters in hybrid poplars exposed to free-air CO<sub>2</sub> enrichment. *Plant Cell and Environment*, **27**, 403-412.
- Clapp, L.J. and Jenkin, M.E. (2001). Analysis of the Relationship between Ambient Levels of O<sub>3</sub>, NO<sub>2</sub> and NO as a function of NO<sub>x</sub> in the UK. *Atmospheric Environment*, **35**, 6391-6405.
- Cofala, J., Amann, M., and Mechler, R. (2006). Scenarios of World Anthropogenic Emissions of Air Pollutants and Methane up to 2030. Interim Report IR-06-023. International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.  
[http://www.iiasa.ac.at/rains/global\\_emiss/Global%20emissions%20of%20air%20pollutants%20.pdf](http://www.iiasa.ac.at/rains/global_emiss/Global%20emissions%20of%20air%20pollutants%20.pdf)
- Collins, W.J., Derwent, R.G., Garnier, B., Johnson, C.E., Sanderson, M.G. and Stevenson, D.S. (2003). Effect of stratosphere-troposphere exchange on the future tropospheric ozone trend. *Journal of Geophysical Research*, **108** (D12), 8528.
- Collins, W.J., Sanderson, M.G., Manning, A.J., Redington, A.L. and Derwent, R.G. (2007). Global modelling of transboundary air pollution, Defra Contract No. CPEA7, [http://www.airquality.co.uk/archive/reports/cat05/0706271710\\_FINAL\\_REPORT\\_CPEA7.PDF](http://www.airquality.co.uk/archive/reports/cat05/0706271710_FINAL_REPORT_CPEA7.PDF)
- COMEAP (1998). Quantification of the Effects of Air Pollution on Health in the UK. Committee on the Medical Effects of Air Pollutants, Department of Health, London: The Stationery Office. Executive Summary available at <http://www.doh.gov.uk/comeap/state.htm>

Commission of the European Communities (2005). Proposal for a Directive of the European Parliament and of the Council on ambient air quality and cleaner air for Europe. Commission of the European Communities, COM(2005) 447 final, Brussels, Belgium.

CORINAIR (2002). EMEP/CORINAIR Emission Inventory Guidebook – 3rd Edition October 2002 Update. Technical report No 30. Chapter 11 on Other Sources and Sinks addresses Biogenic VOC Emissions. [http://reports.eea.europa.eu/EMEP\\_CORINAIR3/en/page002.html](http://reports.eea.europa.eu/EMEP_CORINAIR3/en/page002.html)

Coyle, M., Smith, R.I. and Stedman, J.R., Weston, K.J. and Fowler, D. (2002). Quantifying the spatial distribution of surface ozone concentration in the UK. *Atmospheric Environment*, **36**, 1013-1024.

Cuvelier, C., Thunis, P., Vautard, R., Amann, M., Bessagnet, B., Bedogni, M., Berkowicz, R., Brandt, J., Brocheton, F., Builtjes, P., Carnavale, C., Coppalle, C., Denby, B., Douros, G., Graf, A., Hellmuth, O., Hodzic, A., Honore, C., Jonson, J., Kerschbaumer, A., de Leeuw, F., Minguzzi, E., Moussiopoulos, N., Pertot, C., Philippe, C., Pirovano, G., Rouil, L., Sauter, F., Schaap, M., Stern, R., Tarrason, L., Vignati, E., Volta, L., White, L., Wind, P. and Zuber, A. (2007). CityDelta: A Model Intercomparison Study to Explore the Impact of Emission Reductions in European Cities in 2010. *Atmospheric Environment*, **41**, 189-207.

Defra (2006). An Economic Analysis to Inform the Air Quality Strategy Review Consultation. Third Report of the Interdepartmental Group on Costs and Benefits, Department for Environment, Food and Rural Affairs, The Scottish Executive, Welsh Assembly Government and The Department of the Environment for Northern Ireland.

Defra (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. <http://www.defra.gov.uk/environment/airquality/strategy/index.htm>

Dentener F., Stevenson, D., Cofala, J., Mechler, R., Amann, M., Bergamaschi, P., Raes, F. and Derwent, R. (2005). The impact of air pollutant and methane emission controls on tropospheric ozone and radiative forcing: CTM calculations for the period 1990–2030. *Atmospheric Chemistry and Physics*, **5**, 1731-1755.

Dentener, F., Stevenson, D., Ellingsen, K., van Noije, T., Schultz, M., Amann, M., Atherton, C., Bell, N., Bergmann, D., Bey, I., Bouwman, L., Butler, T., Cofala, J., Collins, B., Drevet, J., Doherty, R., Eickhout, B., Eskes, H., Fiore, A., Gauss, M., Hauglustaine, D., Horowitz, L., Isaksen, I.S.A., Josse, B., Lawrence, M., Krol, M., Lamarque, J.F., Montanaro, V., Muller, J.F., Peuch, V.H., Pitari, G., Pyle, J., Rast, S., Rodriguez, J., Sanderson, M., Savage, N.H., Shindell, D., Strahan, S., Szopa, S., Sudo, K., Van Dingenen, R., Wild, O. and Zeng, G. (2006). The global atmospheric environment for the next generation. *Environmental Science & Technology*, **40**, 3586-3594.

Derwent, R.G. (2008). New Directions: Prospects for regional ozone in north-west Europe. *Atmospheric Environment*, **42**, 1958-1960.

Derwent, R.G., Jenkin, M.E., Passant, N.R. and Pilling, M.J. (2007b). Photochemical ozone creation potentials (POCPs) for different emission sources of organic compounds under European conditions estimated with a Master Chemical Mechanism. *Atmospheric Environment*, **41**, 2570–2579.

Derwent, R.G., Jenkin, M.E., Passant, N.R. and Pilling, M.J. (2007c). Reactivity-based strategies for photochemical ozone control in Europe. *Environmental Science and Policy*, **10**, 445-453.

- Derwent, R.G., Jenkin, M.E. and Saunders, S.M. (1996). Photochemical Ozone Creation Potentials for a Large Number of Reactive hydrocarbons under European Conditions. *Atmospheric Environment*, **30**, 181-199.
- Derwent, R.G., Jenkin, M.E., Saunders, S.M., Pilling, M.J., Simmonds, P.G., Passant, N.R., Dollard, G.J., Dumitrean, P. and Kent, A. (2003). Photochemical ozone formation in north west Europe and its control. *Atmospheric Environment*, **37** (14): 1983-1991.
- Derwent, R.G., Middleton, D.R., Field, R.A., Goldstone, M.E., Lester, J.N. and Perry, R. (1995). Analysis and interpretation of air quality data from an urban roadside location in central London over the period from July 1991 to July 1992. *Atmospheric Environment*, **29** (8), 923-946.
- Derwent, R.G. and Nelson, N. (2003). Development of a Reactivity Index for the Control of the Emissions of Organic Compounds. EA R&D Technical Report P4-105 RC8309. <http://publications.environment-agency.gov.uk/pdf/SP4-105-TR-e-e.pdf>
- Derwent, R.G., Simmonds, P.G., O'Doherty, S., Stevenson, D.S., Collins, W.J., Sanderson, M.G., Johnson, C.E., Dentener, F., Cofala, J., Mechler, R. and Amann, M. (2006). External influences on Europe's air quality: Baseline methane, carbon monoxide and ozone from 1990 to 2030 at Mace Head, Ireland. *Atmospheric Environment*, **40**, 844-855.
- Derwent, R.G., Simmonds, P.G., Manning, A.J., and Spain, T.G. (2007a). Trends over a twenty year period from 1987 – 2006 in surface ozone at the atmospheric research station at Mace Head, Ireland. *Atmospheric Environment*, **41**, 9091-9098.
- Derwent, R.G., Stevenson, D.S., Doherty, R.M., Collins, W.J., Sanderson, M.G., Johnson, C.E., Cofala, J., Mechler, R., Amann, M. and Dentener, F.J. (2005). The Contribution from Shipping Emissions to Air Quality and Acid Deposition in Europe. *Ambio*, **34**, 54-59.
- Dollard, G.J., Dumitrean, P., Telling, S., Dixon, J. and Derwent, R.G. (2007). Observed trends in ambient concentrations of C2–C8 hydrocarbons in the United Kingdom over the period from 1993 to 2004. *Atmospheric Environment*, doi:10.1016/j.atmosenv.2006.11.020
- Donovan, R.G., Stewart, H.E., Owen, S.M., MacKenzie, A.R. and Hewitt, C.N. (2005). Development and Application of an Urban Tree Air Quality Score for Photochemical Pollution Episodes Using the Birmingham, United Kingdom, Area as a Case Study. *Environmental Science and Technology*, **39**, 6730-6738.
- Dore, C.J., Watterson, J.D., Goodwin, J.W.L., Murrells, T.P., Passant, N.R., Hobson, M.M., Baggott, S.L., Thistlewaite, G., Coleman, P.J., King, K.R., Adams, M. and Cumine, P. (2004). UK Emissions of Air Pollutants 1970-2002. AEAT/ENV/R/1933. ISBN 0954713648.
- Dore, C., Hayman, G., Scholefield, P., Hewitt, N., Winiwarter, W. and Kressler, F. (2003). Mapping of Biogenic VOC Emissions in England and Wales. Environment Agency R&D Technical Report E1-122/TR.
- Dunlea, E.J., Herndon, S.C., Nelson, D.D., Volkamer, R.M., San Martin, F., Sheehy, P.M., Zahniser, M.S., Shorter, J.H., Wormhoudt, J.C., Lamb, B.K., Allwine, E.J., Gaffney, J.S., Marley, N.A., Grutter, M., Marquez C., Blanco, S., Cardenas, B., Retama, A., Ramos Villegas, C.R., Kolb, C.E., Molina, L.T. and Molina, M.J. (2007). Evaluation of nitrogen dioxide chemiluminescence monitors in a polluted urban environment. *Atmospheric Chemistry and Physics*, **7**, 2691–2704.
- EEA (2000). COPERT III: Computer Programme to Calculate Emissions from Road Transport - Methodology and Emission Factors (Version 2.1). L. Ntziachristos and Z. Samaras, European Topic Centre on Air Emissions, European Environment Agency.

EEA (2007). Air pollution by Ozone in Europe in Summer 2006: Overview of Exceedances of EC ozone threshold values for April–September 2006. European Environment Agency, EEA Technical report No 5/2007.

Ellingsen, K., Gauss, M., Van Dingenen, R., Dentener, F.J., Emberson, L., Fiore, A.M., Schultz, M.G., Stevenson, D.S., Ashmore, M.R., Atherton, C.S., Bergmann, D.J., Bey, I., Butler, T., Drevet, J., Eskes, H., Hauglustaine, D.A., Isaksen, I.S.A., Horowitz, L.W., Krol, M., Lamarque, J.F., Lawrence, M.G., van Noije, T., Pyle, J., Rast, S., Rodriguez, J., Savage, N.H., Strahan, S., Sudo, K., Szopa, S. and Wild, O. (2008). Global ozone and air quality: a multi-model assessment of risks to human health and crops. *Atmospheric Chemistry and Physics Discussions*, **8**, 2163-2223.

Endresen, Ø., Sørsgard, E., Sundet, J.K., Dalsøren, S.B., Isaksen, I.S.A., Berglen, F. and Gravir, G. (2003). Emission from Sea Transportation and Environmental Impact. *Journal of Geophysical Research*, **108**, 4650.

Entec (2005). Service Contract on Ship Emissions: Assignment, Abatement and Market-based Instruments. Task 1 - Preliminary Assignment of Ship Emissions to European Countries. Final Report to European Commission Directorate General Environment, Entec UK Limited. [http://ec.europa.eu/environment/air/pdf/task1\\_asign\\_report.pdf](http://ec.europa.eu/environment/air/pdf/task1_asign_report.pdf)

Eyring, V., Kohler, H.W., Lauer, A. and Lempert, B. (2005). Emissions from International Shipping: 2. Impact of Future Technologies on Scenarios until 2050. *Journal of Geophysical Research*, **110**.

Eyring, V., Stevenson, D.S., Lauer, A., Dentener, F.J., Butler, T., Collins, W.J., Ellingsen, K., Gauss, M., Hauglustaine, D.A., Isaksen, I.S.A., Lawrence, M.G., Richter, A., Rodriguez, J.M., Sanderson, M., Strahan, S.E., Sudo, K., Szopa, S., van Noije, T.P.C. and Wild, O. (2007). Multi-model Simulations of the Impact of International Shipping on Atmospheric Chemistry and Climate in 2000 and 2030. *Atmospheric Chemistry and Physics*, **7**, 757-780.

Fehsenfeld, F.C., Dickerson, R.R., Hubler, G., Luke, W.T., Nunnermacker, L.J., Williams, E.J., Roberts, J.M., Calvert, J.G., Curran, C.M., Delany, A.C., Eubank, C.S., Fahey, D.W., Fried, A., Gandrud, B.W., Langford, A.O., Murphy, P.C., Norton, R.B., Pickering, K.E. and Ridley, B.A. (1987). A ground-based intercomparison of NO, NO<sub>x</sub>, and NO<sub>y</sub> measurement techniques, *Journal of Geophysical Research*, **92**, 14,710.

Garland, J.A. and Derwent, R.G. (1979). Destruction at the Ground and the Diurnal Cycle of Concentrations of Ozone and Other Gases. *Quarterly Journal of the Royal Meteorological Society*, **105**, 169–183.

George, C., Streckowski, R.S., Kleffmann, J., Stemmler, K. and Ammann, M. (2005). Photoenhanced uptake of gaseous NO<sub>2</sub> on solid organic compounds: a photochemical source of HONO? *Faraday Discussions*, **130**, 195–210.

Grosjean, D. and Harrison, J. (1985). Response of chemiluminescent analysers and ultraviolet ozone analysers to organic air pollutants. *Environmental Science and Technology*, **19**, 862–865.

Guenther, A., Baugh, B., Brasseur, G., Greenberg, J., Harley, P., Klinger, L., Serca, D., and Vierling, L. (1999). Isoprene Emission Estimates and Uncertainties for the Central African EXPRESSO Study Domain. *Journal of Geophysical Research*, **104**, 30,625-30,639.

- Guenther, A., Greenberg, J., Helmig, D., Klinger, L., Vierling, L., Zimmerman, P. and Geron, C. (1996). Leaf, Branch, Stand and Landscape Scale Measurements of Volatile Organic Compound Fluxes from U.S. Woodlands. *Tree Physiology*, **16**, 17-24.
- Guenther, A., Hewitt, C.N., Erickson, D., Fall, R., Geron, C., Graedel, T., Harley, P., Klinger, L., Lerdau, M., McKay, W., Pierce, T., Scholes, B., Steinbrecher, R., Tallamraju, R., Taylor, J. and Zimmerman, P. (1995). A Global-Model of Natural Volatile Organic-Compound Emissions. *Journal of Geophysical Research*, **100**, 8873-8892.
- Guenther, A.B., Monson, R.K. and Fall, R. (1991). Isoprene and Monoterpene Rate Variability: Observations with Eucalyptus and Emission Rate Algorithm Development. *Journal of Geophysical Research*, **96**, 10799-10808.
- Guenther, A.B., Zimmerman, P.R., Harley, P.C., Monson, R.K. and Fall, R. (1993). Isoprene and Monoterpene Rate Variability: Model Evaluations and Sensitivity Analyses. *Journal of Geophysical Research*, **98**, 12609-12617.
- Guenther, A., Karl, T., Harley, P., Wiedinmyer, C., Palmer, P. I. and Geron, C. (2006). Estimates of global terrestrial isoprene emissions using MEGAN (Model of Emissions of Gases and Aerosols from Nature). *Atmospheric Chemistry and Physics*, **6**, 3181-3210.
- Gustafsson, R.J., Orlov, A., Griffiths, P.T., Cox, R.A. and Lambert, R.M. (2006). Reduction of NO<sub>2</sub> to nitrous acid on illuminated titanium dioxide aerosol surfaces: implications for photocatalysis and atmospheric chemistry. *Chemical Communications*, **37**: 3936-3938.
- Harrison, R.M., Grenfell, J.L., Yamulki, S., Clemitshaw, K.C., Penkett, S.A., Cape, J.N. and McFadyen, G.G. (1999). Budget of NO<sub>y</sub> species measured at a coastal site. *Atmospheric Environment*, **33** (26): 4255-4272.
- Hayman, G.D., Jenkin, M.E., Pilling, M.J. and Derwent, R.G. (2002). Modelling of Tropospheric Ozone Formation. A Final Project Report produced for the Department for Environment, Food and Rural Affairs and Devolved Administrations on Contract EPG 1/3/143.
- Hayman, G.D. (2006). UK Biogenic VOC Emissions. Paper submitted to the Air Quality Expert Group.
- Hayman, G.D., Abbott, J., Thomson, C., Bush, T., Kent, A., Derwent, R.G., Jenkin, M.E., Pilling, M.J., Rickard, A. and Whitehead, L. (2006b). Modelling of Tropospheric Ozone. Final Report (AEAT/ENV/R/2100 Issue 1) produced for the Department for Environment, Food and Rural Affairs and the Devolved Administrations on Contract EPG 1/3/200.  
[http://www.airquality.co.uk/archive/reports/cat05/0612011037-420\\_ED47154\\_Final\\_Report\\_Issue1.pdf](http://www.airquality.co.uk/archive/reports/cat05/0612011037-420_ED47154_Final_Report_Issue1.pdf)
- Hayman, G.D., Abbott, J., Davies, T., Thomson, C.L., Jenkin, M.E., Thetford, R. and Fitzgerald, P. (2008a). The Ozone Source-Receptor Model – the UK Ozone Policy Tool. Paper in preparation.
- Hayman, G.D., Abbott, J., Stedman, J.R., Kent, A. and Cooke, S. (2008b). Modelling UK Urban Ozone Decrements. Paper in preparation.
- Hayman, G., Thomson, C., Abbott, J. and Bush, T. (2006a). Ozone Modelling for the Review of the Air Quality Strategy. Supporting Technical Document for the Review of the Air Quality Strategy by the Department for Environment, Food and Rural Affairs, the Scottish Executive, Welsh Assembly Government and the Department of the Environment Northern Ireland (AEAT/ENV/R/2092 Issue 1).

[www.airquality.co.uk/archive/reports/cat16/0604031524\\_ED47154\\_OSRM\\_Modelling\\_for\\_AQS\\_Issue1.pdf](http://www.airquality.co.uk/archive/reports/cat16/0604031524_ED47154_OSRM_Modelling_for_AQS_Issue1.pdf)

Houweling, S., Rockmann, T., Aben, I., Keppler, F., Krol, M., Meirink, J.F., Dlugokencky, E.J. and Frankenberg, C. (2006). Atmospheric Constraints on Global Emissions of Methane from Plants. *Geophysical Research Letters*, **33**, L15821, doi:10.1029/2006GL026162.

IPCC (2000). Special Report on Emissions Scenario. Intergovernmental Panel on Climate Change. <http://www.ipcc.ch/ipccreports/sres/emission/index.htm>

IPCC (2001). Climate change 2001: The scientific basis. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.  
<http://www.ipcc.ch/ipccreports/tar/wg1/index.htm>

Jacobi, H.W. and Hilker, B. (2007). A mechanism for the photochemical transformation of nitrate in snow. *Journal of Photochemistry and Photobiology A: Chemistry*, **185** (2-3): 371-382.

Jaffe, D.A., Parrish, D., Goldstein, A., Price, H. and Harris, J. (2003). Increasing background ozone during spring on the west coast of North America. *Journal of Geophysical Research*, **30**, 1613, doi:10.1029/2003GL017024.

Jenkin, M.E. (2004). Analysis of Sources and Partitioning of Oxidant in the UK. Part 1: The NO<sub>x</sub>-Dependence of Annual Mean Concentrations of Nitrogen Dioxide and Ozone. *Atmospheric Environment*, **38**, 5117-5129.

Jenkin, M.E., Davies, T.J. and Stedman, J.R. (2002). The origin and day-of-week dependence of photochemical ozone episodes in the UK. *Atmospheric Environment*, **36**, 999-1012.

Jenkin, M.E., Utembe, S.R. and Johnson, D. (2006). The simulated speciation and distribution of oxidized organic nitrogen in the atmospheric boundary layer. In the proceedings of the ACCENT Barnsdale Expert Meeting "Understanding and Quantifying the Atmospheric Nitrogen Cycle", Rutland Water, November 2005, pp 130-136. Editors: Tony Cox, David Fowler, Paul Monks and Peter Borrell. Available at [www.accent-network.org](http://www.accent-network.org).

Johnson, D., Utembe, S.R., Jenkin, M.E., Derwent, R.G., Hayman, G.D., Alfarra, M.R., Coe, H. and McFiggans, G. (2006). Simulating Regional Scale Secondary Organic Aerosol Formation during the TORCH 2003 Campaign in the Southern UK. *Atmospheric Chemistry and Physics*, **6**, 403-418.

Jonson, J.E., Simpson, D., Fagerli, H. and Solberg, S. (2006). Can we explain the trends in European ozone levels? *Atmospheric Chemistry and Physics*, **6**, 51-66.

Kent, A.J., Thomson, C.L., Grice, S. and Stedman, J.R. (2006). Comparison of Health-based Metrics and Modelling Methods for Ozone in the UK. National Atmospheric Emissions Inventory, AEA Technology, National Environmental Technology Centre. Report AEAT/ENV/R/1935 Issue 2.

Kent, A.J., Grice, S., Stedman, J.R., Bush, T.J., Vincent K.J., Abbott J., Derwent, R. and Hobson, M. (2007). UK air quality modelling for annual reporting 2005 on ambient air quality assessment under Council Directives 96/62/EC, 1999/30/EC and 2000/69/EC. AEA Energy & Environment. Report AEAT/ENV/R/2278.

Keppler, F., Hamilton, J.T.G., Brass, M. and Rockmann, T. (2006). Methane Emissions from Terrestrial Plants under Aerobic Conditions. *Nature*, **439**, 187-191.

Khalil, M.A.S., Butenhoff, C.L. and Rasmussen, R.A. (2007). Atmospheric Methane: Trends and Cycles of Sources and Sinks. *Environmental Science and Technology*, **41**, 2131-2137.

Khalil, M.A.S. and Shearer, M.J. (2006). In Greenhouse Gases and Animal Agriculture: an Update. (Ed. Soliva, C.R., Takahashi, J. and Kreuzer, M.), International Congress Series 1293, Elsevier, Amsterdam.

Lawrence, M.G. and Crutzen, P.J. (1999). Influence of NO<sub>x</sub> Emissions from Ships on Tropospheric Photochemistry and Climate. *Nature*, **402**, 167-170.

Lee, J.D., Lewis, A.C., Monks, P.S., Jacob, M., Hamilton, J.F., Hopkins, J.R., Watson, N.M., Saxton, J.E., Ennis, C., Carpenter, L.J., Carslaw, N., Fleming, Z., Bandy, B.J., Oram, D.E., Penkett, S.A., Slemr, J., Norton, E., Rickard, A.R., Whalley, L.K., Heard, D.E., Bloss, W.J., Gravestock, T., Smith, S.C., Stanton, J., Pilling, M.J. and Jenkin, M.E. (2006). Ozone photochemistry and elevated isoprene during the UK heatwave of August 2003. *Atmospheric Environment*, **40** (39), 7598-7613.

Lelieveld, J. and Dentener, F. (2000). What controls tropospheric ozone? *Journal of Geophysical Research*, **105**, 3531-3551.

Lelieveld, J., van Ardenne, J., Fischer, H., de Reus, M., Williams, J. and Winkler, P. (2004). Increasing ozone over the Atlantic Ocean. *Science*, **304**, 1483-1487.

Logan, J.A. (1999). An analysis of ozone sonde data for the troposphere: Recommendations for testing 3-D models and development of a gridded climatology for tropospheric ozone. *Journal of Geophysical Research*, **104**, 16,115-16,150.

LRTAP (2007). Task Force on Hemispheric Transport of Air Pollution. Interim Report. [http://www.htap.org/activities/2007\\_Interim\\_Report.htm](http://www.htap.org/activities/2007_Interim_Report.htm)

Marenco, A., Gouget, H., Nedelec, P., Pages, J.-P. and Karcher, F. (1994). Evidence of a long-term increase in tropospheric ozone from Pic du Midi data series: Consequences: Positive radiative forcing. *Journal of Geophysical Research*, **99**, 16,617-16,632.

Martinez-Villa, G. (2001). A study of nitrous acid and other air pollutants in the greater London area. PhD Thesis, Imperial College, London.

Mather, T.A., Harrison, R.G., Tsanev, V.I., Pyle, D.M., Karumudi, M.L., Bennett, A.J., Sawyer, G.M. and Highwood, E.J. (2007). Observations of the plume generated by the December 2005 oil depot explosions and prolonged fire at Buncefield (Hertfordshire, UK) and associated atmospheric changes. *Proceeding of the Royal Society A: Mathematical and Physical Engineering Sciences*, **463** (2081): 1153-1177.

McFadyen, G.G. and Cape, J.N. (2005). Peroxyacetyl nitrate in eastern Scotland. *Science of the Total Environment*, **337** (1-3): 213-222.

Meehl, G.A. and Tebaldi, C. (2004). More intense, more frequent, and longer lasting heat waves in the 21st century. *Science*, **305**, 994-997.

Monks, P.S., Blake, R.S. and Borrell, P. (2007). Review of tools for modelling tropospheric ozone formation and assessing impacts on human health and ecosystems. University of Leicester:  
[ftp://ftp.keele.ac.uk/pub/cha12/T&TP/Defra/2007\\_10\\_Defra\\_draft\\_report\\_workshop.pdf](ftp://ftp.keele.ac.uk/pub/cha12/T&TP/Defra/2007_10_Defra_draft_report_workshop.pdf)

Monks, P.S., Rickard, A.R., Dentener, F., Jonson, J.-E., Lindskog, A., Roemer, M., Schuepbach, E., Friedli, T.K. and Solberg, S. (2003). Tropospheric ozone and precursors,



trends, budgets and policy: TROTREP synthesis and integration report. <http://atmos.chem.le.ac.uk/trotrep>.

Moussiopoulos, N., Sahn, P., Kunz, R., Vogele, T., Schneider, C. and Kessler, C. (1997). High-resolution Simulations of the Wind Flow and the Ozone Formation during the Heilbronn Ozone Experiment. *Atmospheric Environment*, **31**, 3177-3186.

Murazaki, K. and Hess, P. (2006). How does climate change contribute to surface ozone change over the United States? *Journal of Geophysical Research*, **111**, D05301, doi:10.1029/2005JD005873.

Murrells, T. and Hobson, M. (2006). UK Road Transport Emission Projections: The Assumptions and Results of the September 2004 Base Projections from the National Atmospheric Emissions Inventory. AEA Technology Report AEAT/ENV/R/2139.

National Academy of Sciences (2007). Models in environmental regulatory decision making. National Academies Press, Washington DC, USA.

NEGTA (2001). Transboundary Air Pollution: Acidification, Eutrophication and Ozone in the UK. Report by National Expert Group on Transboundary Air Pollution, Defra, London.

NEPAP (2006). The Development of European Surface Ozone. Implications for a Revised Abatement Policy: A Contribution from the EU research project NEPAP (Network for the support of European Policies on Air Pollution). Ed. Solberg, S. and Lindskog, A. EMEP/CCC-Report 1/2005.

Nijenhuis, W.A.H. (1999). Tree Species Database prepared by TNO-MEP. Apeldoorn, Netherlands.

Oltmans, S.J., Lefohn, A.S., Scheel, H.E., Harris, J.M., Levy II, H., Galbally, I.E., Brunk, E.-G., Meyer, C.P., Lathrop, J.A., Johnson, B.J., Shadwick, D.S., Cuevas, E., Schmidlin, D.W., Tarasick, Claude, H., Kerr, J.B., Uchino, O. and Mohnen, V. (1998). Trends of ozone in the troposphere. *Geophysical Research Letters*, **25**, 139-142.

Oltmans, S.J., Lefohn, A.S., Harris, J.M., Galbally, I., Scheel, H.E., Bodeker, G., Brunke, E., Claude, H., Tarasick, D., Johnson, B.J., Simmonds, P.G., Shadwick, D., Anlauf, K., Hayden, K., Schmidlin, F., Fujimoto, T., Akagi, K., Meyer, C., Nichol, S., Davies, J., Redonda, A. and Cuevas, E. (2006). Long-term changes in tropospheric ozone. *Atmospheric Environment*, **40**, 3156-3173.

Ordóñez, C., Brunner, D., Staehelin, J., Hadjinicolaou, P., Pyle, J.A., Jonas, M., Wernli, H. and Prévôt, A.S.H. (2007). Strong influence of lowermost stratospheric ozone on lower tropospheric background ozone changes over Europe. *Geophysical Research Letters*, **34**, L07805, doi:10.1029/2006GL029113.

Oreskes, N., Shrader-Frechette, K. and Belitz, K. (1994). Verification, validation and confirmation of numerical models in the Earth Sciences. *Science*, **263**, 641-646.

Parrish, D.D., Dunlea, E.J., Atlas, E.L., Schauffler, S., Donnelly, S., Stroud, V., Goldstein, A.H., Millet, D.B., McKay, M., Jaffe, D.A., Price, H.U., Hess, P.G., Flocke, F. and Roberts, J.M. (2004). Changes in the photochemical environment of the temperate North Pacific troposphere in response to increased Asian emissions. *Journal of Geophysical Research*, **109**, D23S18, doi:10.1029/2004JD004978.

Passant N.R. (2006). Personal Communication.

- Passant, N.R. (2002). Speciation of UK Emissions of Non-Methane Volatile Organic Compounds. AEAT Report AEAT/ENV/R/0545.
- PORG (1997). Ozone in the United Kingdom. Fourth report of the UK Photochemical Oxidants Review Group, Department of the Environment, Transport and the Regions, London. Published by Institute of Terrestrial Ecology, Bush Estate, Penicuik, Midlothian, EH26 0QB, UK. ISBN: 0-870393-30-9. Available at [www.aeat.co.uk/netcen/airqual/reports/home.html](http://www.aeat.co.uk/netcen/airqual/reports/home.html)
- Possell, M., Heath, J., Hewitt, C.N., Ayres, E. and Kerstiens, G. (2004). Interactive effects of elevated CO<sub>2</sub> and soil fertility on isoprene emissions from *Quercus robur*. *Global Change Biology*, **10**, 1835-1843.
- Possell, M., Hewitt, C.N. and Beerling, D.J. (2005). The effects of glacial atmospheric CO<sub>2</sub> concentrations and climate on isoprene emissions by vascular plants. *Global Change Biology*, **11**, 60-69.
- Raes, F. and Hjorth, J. (2006). Answers to the Urbino questions. ACCENT Secretariat, Universita di Urbino, ISBN 92-79-02413-2, Italy.
- Rafaj, P. and Amann, M. (2007). Ozone precursor emissions from anthropogenic sources in the 21st century. Presentation of an analysis undertaken by IIASA for the Royal Society report on Ozone in the 21st century.
- Reimann, S., Calanca, P. and Hofer, P. (2000). The anthropogenic contribution to isoprene concentrations in a rural atmosphere. *Atmospheric Environment*, **34**, 109–115.
- Royal Society (2008). Ozone in the 21st century. Draft report, Royal Society, London.
- Sanderson, M.G., Collins, W.J., Hemming, D.L. and Betts, R.A. (2007). Stomatal conductance changes due to increasing carbon dioxide levels: Projected impact on surface ozone levels. *Tellus B*, **59**, 404-411.
- Ryerson, T.B., Trainer, M., Angevine, W.M., Brock, C.A., Dissly, R.W., Fehsenfeld, F.C., Frost, G.J., Goldan, P.D., Holloway, J.S., Hübler, G., Jakoubek, R.O., Kuster, W.C., Neuman, J.A., Nicks Jr., D.K., Parrish, D.D., Roberts, J.M., Sueper, D.T., Atlas, E.L., Donnelly, S.G., Flocke, F., Fried, A., Potter, W.T., Schauffler, S., Stroud, V., Weinheimer, A.J., Wert, B.P., Wiedinmyer, C., Alvarez, R.J., Banta, R.M., Darby, L.S. and Senff, C.J. (2003). Effect of Petrochemical Industrial Emissions of Reactive Alkenes and NO<sub>x</sub> on Tropospheric Ozone Formation in Houston, Texas. *Journal of Geophysical Research*, **108**, D8, 4249, doi:10.1029/2002JD003070.
- Schar, C., Vidale, P.L., Luthi, D., Frei, C., Haberli, C., Liniger, M.A. and Appenzeller, C. (2004). The role of increasing temperature variability in European summer heatwaves. *Nature*, **427**, 332-336.
- Schöpp, W., Amann, M., Cofala, J., Heyes, C. and Klimont, Z. (1999). Integrated Assessment of European Air Pollution Emission Control Strategies. *Environmental Modeling and Software*, **14** (1), 1-9.
- Shindell, D.T., Faluvegi, G., Stevenson, D.S., Emmons, L.K., Lamarque, J.-F., Peron, G., Dentener, F.J., Ellingsen, K., Amann, M., Atherton, C.S., Bell, N., Bergmann, D.J., Bey, I., Butler, T., Cofala, J., Collins, W.J., Derwent, R.G., Doherty, R.M., Drevet, J., Eskes, H.J., Fiore, A., Gauss, M., Hauglustaine, D.A., Horowitz, L.W., Isaksen, I.S.A., Krol, M.C., Lawrence, M.G., Montanaro, V., Müller, J.-F., Pitari, G., Prather, M.J., Pyle, J.A., Rast, S., Rodriguez, J.M., Sanderson, M.G., Savage, N.H., Schultz, M.G., Strahan, S.E., Sudo, K., Szopa, S., van Noije, T.P.C., Wild, O. and Zeng, G. (2006). Multi-model simulations of carbon monoxide: Comparison

- with observations and projected near-future changes. *Journal of Geophysical Research*, **111**, D19306, doi:10.1029/2006JD007100.
- Simmonds, P.G., Derwent, R.G., Manning, A.J. and Spain, G. (2004). Significant growth in surface ozone at Mace Head, Ireland, 1987 – 2003. *Atmospheric Environment*, **38**, 4769-4778.
- Simmonds, P.G., Manning, A.J., Derwent, R.G., Ciais, P., Ramonet, M., Kazan, V. and Ryall, D. (2005). A burning question. Can recent growth rate anomalies in the greenhouse gases be attributed to large-scale biomass burning events? *Atmospheric Environment*, **39**, 2513-2517.
- Simmonds, P.G., Seuring, S., Nickless, G. and Derwent, R.G. (1997). Segregation and interpretation of ozone and carbon monoxide measurements by air mass origin at the TOR station Mace Head, Ireland from 1987 to 1995. *Journal of Atmospheric Chemistry*, **28**, 45-49.
- Simpson, D. (1993). Photochemical model calculations over Europe for two extended summer periods: 1985 and 1989. Model results and comparisons with observations. *Atmospheric Environment*, **27A(6)**:921–943.
- Simpson, D. (1995). Biogenic emissions in Europe 2: Implications for ozone control strategies. *Journal of Geophysical Research*, **100(D11)**:22891–22906.
- Simpson, D., Fagerli, H., Jonson, J.E., Tsyro, S., Wind, P. and Tuovinen, J.-P. (2003). Transboundary Acidification, Eutrophication and Ground Level Ozone in Europe: PART I - Unified EMEP Model Description. EMEP Report 1/2003 (ISSN 0806-4520). Available at [http://emep.int/publ/reports/2003/emep\\_report\\_1\\_part1\\_2003.pdf](http://emep.int/publ/reports/2003/emep_report_1_part1_2003.pdf)
- Simpson, D., Guenther, A., Hewitt, C.N. and Steinbrecher, R. (1995). Biogenic Emissions in Europe 1. Estimates and Uncertainties. *Journal of Geophysical Research*, **100**, 22875-22890.
- Simpson, D., Jonson, J.-E. and Fagerli, H. (2005). Photo-oxidants, Status in 2003. Transboundary acidification, eutrophication and ground level ozone in Europe. EMEP Status report 1/2005. The Norwegian Meteorological Institute, Oslo, Norway.
- Simpson, D., Winiwarter, W., Börjesson, G., Cinderby, S., Ferreira, A., Guenther, A., Hewitt, C.N., Janson, R., Khalil, M.A.K., Owen, S., Pierce, T.E., Puxbaum, H., Shearer, M., Skiba, U., Steinbrecher, R., Tarrasón, L. and Öquist, M.G. (1999). Inventorying Emissions from Nature in Europe. *Journal of Geophysical Research*, **104**, 8113-8152.
- Sitch, S., Cox, P.M., Collins, W.J. and Huntingford, C. (2007). Indirect radiative forcing of climate change through ozone effects on the land-carbon sink. *Nature*, **448**, 791-794.
- Sofiev, M. and Tuovinen, J.-P. (2001). Factors determining the Robustness of AOT40 and Other Ozone Exposure Indices. *Atmospheric Environment*, **35**, 3521-3528.
- Solberg, S., Coddeville, P., Forster, C., Hov, Ø., Orsolini, Y. and Uhse, K. (2005). European surface ozone in the extreme summer 2003. *Atmospheric Chemistry and Physics Discussions*, **5**, 9003-9038, [www.atmos-chem-phys-discuss.net/5/9003/2005/](http://www.atmos-chem-phys-discuss.net/5/9003/2005/).
- Solberg, S. and Hjellebrette, A.-G. (2004). Ozone measurements 2002. EMEP/CCC-Report 2/2004. Norwegian Institute for Air Research, Kjeller, Norway.
- Solberg, S., Simpson, D., Jonson, J., Hjellebette, A.-G. and Derwent, R.G. (2004). EMEP Assessment Part I. European Perspective. Chapter 6. Ozone. Norwegian Meteorological Institute, Oslo, Norway.

- Staehelin, J., Kegel, R. and Harris, N.R.P. (1998). Trend analysis of the homogenized total ozone series of Arosa (Switzerland), 1926-1996. *Journal of Geophysical Research*, **103**, 8389-8399.
- Staehelin, J., Thudium, J., Buehler, R., Volz-Thomas, A. and Graber, W. (1994). Trends in surface ozone concentrations at Arosa (Switzerland). *Atmospheric Environment*, **28**, 75-87.
- Stedman, J.R., Linehan, E. and King, K. (1999). Quantification of the Health Effects of Air Pollution in the UK for the Review of the National Air Quality Strategy. AEA Technology.
- Stedman, J.R., Bush, T.J., Murrells, T.P. and King, K. (2001). Baseline PM<sub>10</sub> and NO<sub>x</sub> projections for PM<sub>10</sub> objective analysis. AEA Technology, National Environmental Technology Centre. Report AEAT/ENV/R/0726.
- Stedman, J.R., Bush, T.J., Vincent, K.J., Kent, A.J., Grice, S. and Abbott, J. (2005). UK Air Quality Modelling for Annual Reporting 2003 on Ambient Air Quality Assessment under Council Directives 96/62/EC, 1999/30/EC and 2000/69/EC. AEA Technology, National Environmental Technology Centre. Report AEAT/ENV/R/1790. See [http://www.airquality.co.uk/archive/reports/cat05/0501121424\\_dd12003mapsrep4.pdf](http://www.airquality.co.uk/archive/reports/cat05/0501121424_dd12003mapsrep4.pdf)
- Stedman, J.R. and Kent, A.J. (2008). An analysis of the spatial patterns of health related surface ozone metrics across the UK in 1995, 2003 and 2005. *Atmospheric Environment*, **42**, 1702-1716.
- Stemmler, K., Ammann, M., Donders, C., Kleffmann, J. and George, C. (2005). Photosensitized reduction of nitrogen dioxide on humic acid as a source of nitrous acid. *Nature*, **440** (7081): 195-198.
- Stevenson, D.S., Dentener, F.J., Schultz, M.G., Ellingsen, K., van Noije, T.P.C., Wild, O., Zeng, G., Amann, M., Atherton, C.S., Bell, N., Bergmann, D.J., Bey, I., Butler, T., Cofala, J., Collins, W.J., Derwent, R.G., Doherty, R.M., Drevet, J., Eskes, H.J., Fiore, A.M., Gauss, M., Hauglustaine, D.A., Horowitz, L.W., Isaksen, I.S.A., Krol, M.C., Lamarque, J.F., Lawrence, M.G., Montanaro, V., Muller, J.F., Pitari, G., Prather, M.J., Pyle, J.A., Rast, S., Rodriguez, J.M., Sanderson, M.G., Savage, N.H., Shindell, D.T., Strahan, S.E., Sudo, K. and Szopa, S. (2006), Multimodel ensemble simulations of present-day and near-future tropospheric ozone. *Journal of Geophysical Research*, **111**, D08301, doi:10.1029/2005JD006338.
- Stevenson, D., Doherty, R., Sanderson, M., Johnson, C., Collins, B. and Derwent, D. (2005). Impacts of climate change and variability on tropospheric ozone and its precursors. *Faraday Discussions*, **130**, 41-57, DOI:10.1039/b417412g.
- Stewart, H.E., Hewitt, C.N., Bunce, R.G.H., Steinbrecher, R., Smiatek, G. and Schoenemeyer, T. (2003). A Highly Spatially and Temporally Resolved Inventory for Biogenic Isoprene and Monoterpene Emissions – Model Description and Application to Great Britain. *Journal of Geophysical Research*, **108** (D20), 4644.
- Stott, P.A., Stone, D.A. and Allen, M.R. (2004). Human contribution to the European heatwave of 2003. *Nature*, **432**, 610-614.
- Sudo, K., Takahashi, M. and Akimoto, H. (2003). Future changes in stratosphere-troposphere exchange and their impacts on future tropospheric ozone simulations. *Geophysical Research Letters*, **30**, 2256, doi:10.1029/2003GL018526.
- Sutton, R.T. and Hodson, D.L.R. (2005). Atlantic Ocean forcing of North American and European summer climate. *Science*, **309**, 115-118.

- Szopa, S., Hauglustaine, D.A., Vautard, R. and Menut, L. (2006). Future global tropospheric ozone changes and impact on European air quality. *Geophysical Research Letters*, **33**, L14805, doi:10.1029/2006GL025860.
- Tarrason, L., Fagerli, H., Klein, H., Simpson, D., Benedictow, A.C., Vestreng, V., Rigler, E., Emberson, L., Posch, M. and Spranger, T. (2006). Transboundary Acidification, Eutrophication and Ground Level Ozone in Europe from 1990 to 2004 in support for the review of the Gothenburg Protocol. EMEP Report 1/2006, (ISSN 1504-6109 - print). Available at [http://emep.int/publ/reports/2006/status\\_report\\_1\\_2006\\_ch.pdf](http://emep.int/publ/reports/2006/status_report_1_2006_ch.pdf)
- Thunis, P., Rouil, L., Cuvelier, C., Stern, R., Kerschbaumer, A., Bessagnet, B., Schaap, M., Builtjes, P., Tarrasón, L., Douros, J., Moussiopoulos, N., Pirovano, G. and Bedogni, M. (2007). Analysis of Model Responses to Emission-reduction Scenarios within the CityDelta Project. *Atmospheric Environment*, **41**, 208–220.
- TFH (2008). Health risks of ozone from long-range transboundary air pollution. Task Force on Health, World Health Organisation. European Centre for Environment and Health, Bonn, Germany.
- U.S. Environmental Protection Agency (2007). Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM<sub>2.5</sub>, and Regional Haze. US EPA Office of Air Quality Planning and Standards Report EPA-454/B-07-002.
- UN ECE (2004). Task Force on Measurements and Modelling. Review of the Unified EMEP model. United Nations Economic Commission for Europe. EB.AIR/GE.1/2004/6, Geneva, Switzerland.
- UNECE/WHO (2004). Modelling and Assessment of the Health Impact of Particulate Matter and Ozone. Joint Task Force on the Health Aspects of Air Pollution, United Nations Economic Commission for Europe and World Health Organisation. <http://www.unece.org/env/documents/2004/eb/wg1/eb.air.wg1.2004.11.e.pdf>
- Utembe, S.R., Jenkin, M.E., Derwent, R.G., Lewis, A.C., Hopkins, J.R. and Hamilton, J.F. (2005). Modelling the ambient distribution of organic compounds during the August 2003 ozone episode in the southern UK. *Faraday Discussions*, **130**, 311-326.
- van Loon, M., Vautard, R., Schaap, M., Bergström, R., Bessagnet, B., Brandt, J., Builtjes, P.J.H., Christensen, J.H., Cuvelier, C., Graff, A., Jonson, J.E., Krol, M., Langner, J., Roberts, P., Rouil, L., Stern, R., Tarrasón, L., Thunis, P., Vignati, E., White, L. and Wind, P. (2007). Evaluation of Long-term Ozone Simulations from Seven Regional Air Quality Models and their Ensemble. *Atmospheric Environment*, **41**, 2083–2097.
- Vautard, R., Builtjes, P.H.J., Thunis, P., Cuvelier, C., Bedogni, M., Bessagnet, B., Honore, C., Moussiopoulos, N., Pirovano, G., Schaap, M., Stern, R., Tarrason, L. and Wind, P. (2007). Evaluation and Intercomparison of Ozone and PM<sub>10</sub> simulations by several Chemistry-Transport Models over 4 European Cities within the CityDelta Project. *Atmospheric Environment*, **41**, 173-188.
- Vingarazan, R. (2004). A review of surface ozone background levels and trends. *Atmospheric Environment*, **38**, 3431-3442.
- Volz, A. and Kley, D. (1988). Evaluation of the Montsouris series of ozone measurements in the 19th century. *Nature*, **332**, 240-242.
- Wang, Y.H. and Jacob, D.J. (1998). Anthropogenic forcing on tropospheric ozone and OH since preindustrial times. *Journal of Geophysical Research*, **103**, 31123-31135.

West, J.J. and Fiore, A.M. (2005). Management of Tropospheric Ozone by Reducing Methane Emissions. *Environmental Science and Technology*, **39**, 4685-4691.

West, J.J., Fiore, A.M., Naik, V., Horowitz, L.W., Schwarzkopf, M.D. and Mauzerall, D.L. (2007). Ozone Air Quality and Radiative Forcing Consequences of Changes in Ozone Precursor Emissions. *Geophysical Research Letters*, **34**, L06806, doi:10.1029/2006GL029173.

West, J.J., Fiore, A.M., Horowitz, L.W. and Mauzerall, D.L. (2006). Global Health Benefits of Mitigating Ozone Pollution with Methane Emission Controls. *Proceedings of the National Academy of Sciences*, **103**, 3988-3993.

Williams, M., Carruthers, D. and Johnson, K. (2006). Modelling of Current and Future Concentrations of PM, NO<sub>x</sub> and O<sub>3</sub> in London using ADMS-Urban. Supporting Technical Document for the Review of the Air Quality Strategy by the Department for Environment, Food and Rural Affairs, the Scottish Executive, Welsh Assembly Government and the Department of the Environment Northern Ireland. Report FM642/TR04/R1/06.

[http://www.airquality.co.uk/archive/reports/cat16/0605181650\\_TR04\\_R1\\_ModellingforLondon\\_01Mar06h.pdf](http://www.airquality.co.uk/archive/reports/cat16/0605181650_TR04_R1_ModellingforLondon_01Mar06h.pdf)

Winer, A.M., Peters, J.W., Smith, J.P. and Pitts, J.N. (1974). Response of commercial chemiluminescence NO-NO<sub>2</sub> analyzers to other nitrogen containing compounds. *Environmental Science and Technology*, **8** (13), 1118–1121.

Winiwarter, W., Kressler, F. and Steinnocher, K. (2001). Emissions from Forests using PELCOM Landcover Data; An Application Theme of the EC-funded project PELCOM (Pan-European Land Cover Monitoring). Research Report (ARC-S-0153) prepared by the Austrian Research Centre – Seibersdorf.

WHO (2004). Health Aspects of Air Pollution – Answers to Follow up Questions from CAFÉ. World Health Organisation Report on a WHO Working Group Meeting, Bonn, Germany, 15-16 January 2004. <http://www.euro.who.int/document/E82790.pdf>

Yu, Y., Sokhi, R.S. and Middleton, D.R. (2007). Estimating contributions of Environment Agency regulated sources to secondary pollutants using CMAQ and NAME III models. Environment Agency Science Report: SC030171/SR4.

Zeng, G. and Pyle, J.A. (2003). Changes in tropospheric ozone between 2000 and 2100 modeled in a chemistry-climate model. *Geophysical Research Letters*, **30**, 1392, doi:10.1029/2002GL016708.

Zhou, X.L., Beine, H.J., Honrath, R.E., Fuentes, J.D., Simpson, W., Shepson, P.B. and Bottenheim, J.W. (2001). Snowpack photochemical production of HONO: a major source of OH in the Arctic boundary layer in springtime. *Geophysical Research Letters*, **28** (21): 4087-4090.