

Supplementary information

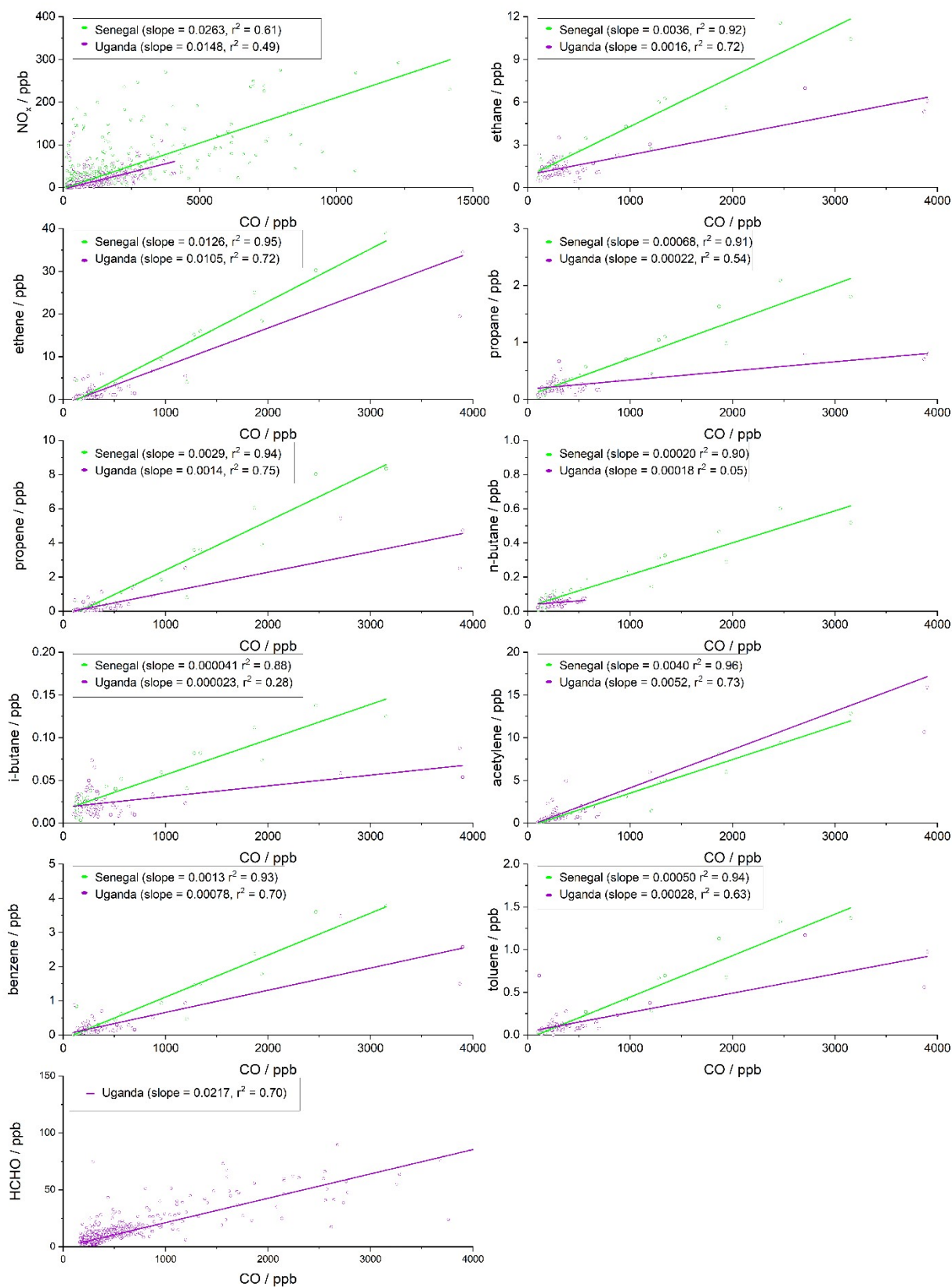


Figure S1: NO_x and selected VOCs plotted against CO for fires in Senegal (blue) and Uganda (orange).

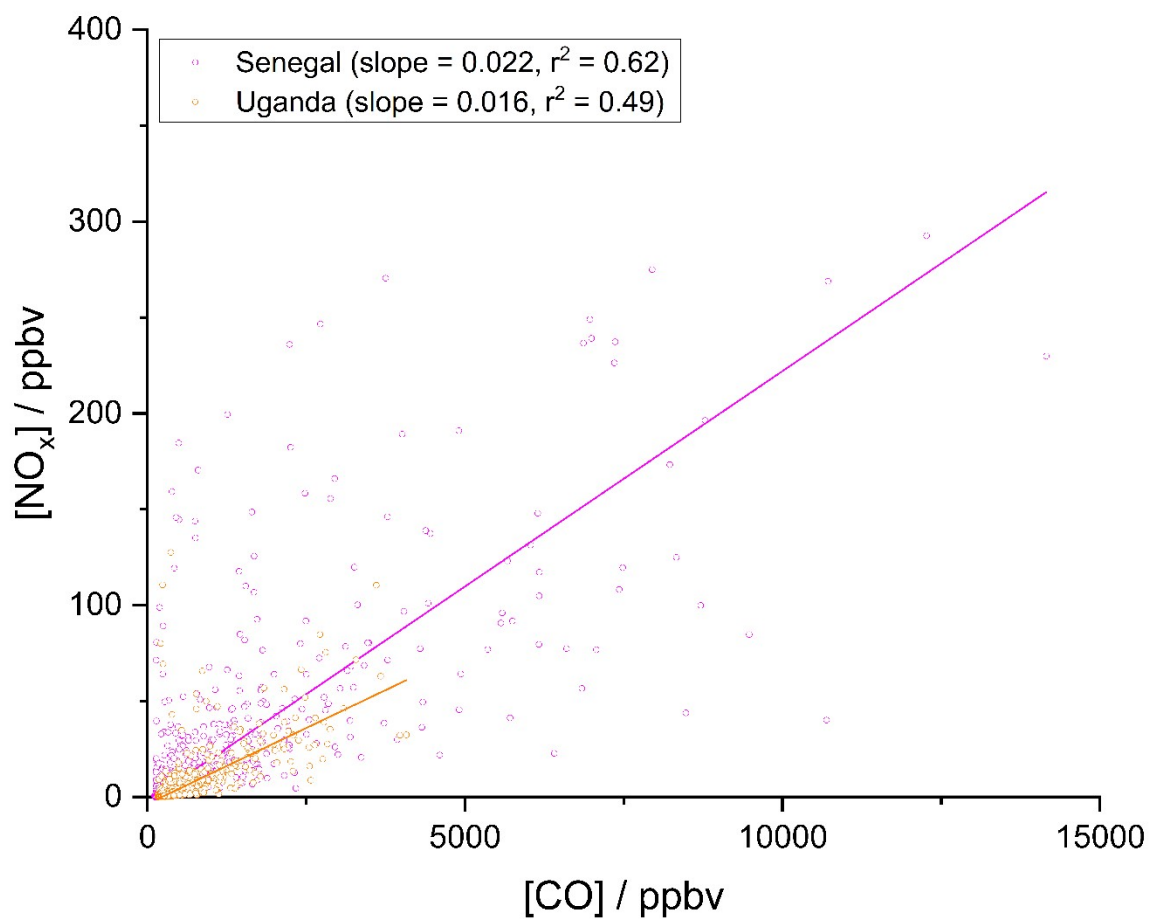


Figure S2: NO_x plotted against total VOC for fires in Senegal (blue) and Uganda (orange).

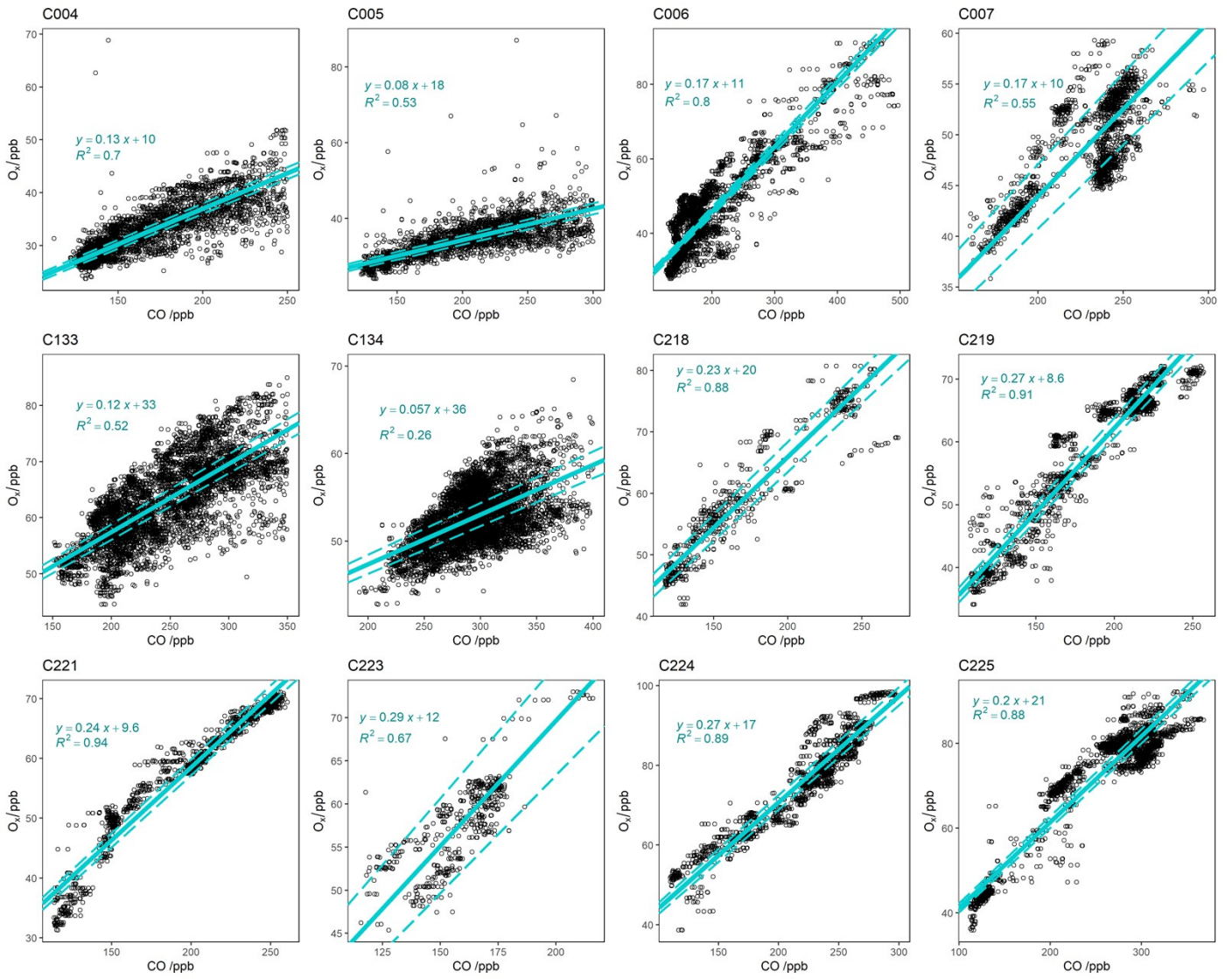


Figure S3: O_x / CO scatter plots for periods in fires on each flight. The linear regression fit for each dataset was carried out using reduced major axis (RMA) regression.

| Flight number | Benzene / ppbv | Toluene / ppbv | Toluene: Benzene | Calculated age / hrs |
|----------------|----------------|----------------|------------------|----------------------|
| MOYA-1 Haze | | | | |
| C004 | 131.4 | 50.6 | 0.3849 | 5.1 |
| C004 | 173.4 | 74.6 | 0.4301 | 0.9 |
| C004 | 144.8 | 58.3 | 0.4027 | 3.4 |
| C004 | 152.8 | 64.6 | 0.4224 | 1.6 |
| C004 | 198.6 | 83.2 | 0.4192 | 1.9 |
| | | | <i>Average</i> | 2.6 |
| | | | | |
| C005 | 44.8 | 19.1 | 0.4266 | 1.2 |
| C005 | 66.0 | 28.1 | 0.4260 | 1.2 |
| C005 | 175.9 | 74.6 | 0.4239 | 1.4 |
| | | | <i>Average</i> | 1.3 |
| | | | | |
| MOYA-2 Haze | | | | |
| c133 | 173.7 | 69.3 | 0.3990 | 3.7 |
| c133 | 129.3 | 53.3 | 0.4118 | 2.5 |
| c133 | 126.2 | 52.3 | 0.4144 | 2.3 |
| c133 | 173.7 | 69.3 | 0.3990 | 3.7 |
| c133 | 129.3 | 53.3 | 0.4118 | 2.5 |
| c133 | 132.5 | 55.0 | 0.4151 | 2.2 |
| c133 | 210.7 | 87.5 | 0.4153 | 2.2 |
| c133 | 192.7 | 75.0 | 0.3892 | 4.7 |
| c133 | 144.9 | 60.3 | 0.4161 | 2.1 |
| c133 | 404.2 | 175.2 | 0.4334 | 0.6 |
| c133 | 301.1 | 129.1 | 0.3677 | 4.1 |
| | | | <i>Average</i> | 2.4 |
| | | | | |
| c134 | 140.3 | 60.4 | 0.4309 | 0.8 |
| c134 | 305.5 | 130.6 | 0.4275 | 1.1 |
| c134 | 268.6 | 115.0 | 0.4281 | 1.1 |
| | | | <i>Average</i> | 1.0 |
| | | | | |
| MOYA-1 Ocean N | | | | |
| C006 | 101.4 | 35.4 | | 8.9 |
| C006 | 88.3 | 28.1 | | 12.4 |
| C006 | 180.1 | 54.6 | | 14.2 |
| C006 | 42.8 | 15.5 | | 7.5 |
| C006 | 35.2 | 10.2 | | 15.9 |
| | | | <i>Average</i> | 11.8 |
| | | | | |
| MOYA-1 Ocean S | | | | |
| C007 | 90.4 | 25.8 | | 16.6 |
| C007 | 55.8 | 15.6 | | 17.3 |
| C007 | 41.4 | 11.7 | | 16.9 |
| | | | <i>Average</i> | 16.9 |

Table S1a: VOCs to calculate plume age (in hours) close to fires (MOYA 1 and 2 data) using benzene / toluene ratios

| Flight number | CO / ppb | Benzene / ppbv | Benzene : CO | Calculated age / hrs |
|---------------|----------|----------------|----------------|----------------------|
| C219 | 169.5 | 49.7 | 0.00029 | 195.6 |
| C219 | 219.7 | 86.1 | 0.00039 | 149.4 |
| C219 | 222.2 | 76.3 | 0.00034 | 170.4 |
| C219 | 191.2 | 54.0 | 0.00028 | 201.6 |
| C219 | 209.0 | 66.4 | 0.00032 | 182.8 |
| | | | <i>Average</i> | 179.9 |
| C218 | 252.4 | 141.5 | 0.00056 | 92.3 |
| C218 | 235.0 | 95.1 | 0.00040 | 144.3 |
| C218 | 173.9 | 53.7 | 0.00031 | 187.4 |
| C218 | 151.1 | 40.5 | 0.00027 | 210.0 |
| C218 | 139.5 | 26.7 | 0.00019 | 263.6 |
| | | | <i>Average</i> | 201.3 |
| C221 | 228.6 | 97.0 | 0.00042 | 136.6 |
| C221 | 96.3 | 35.8 | 0.00037 | 157.9 |
| | | | <i>Average</i> | 147.2 |
| C223 | 146.2 | 46.7 | 0.00032 | 182.0 |
| C223 | 225.6 | 85.1 | 0.00038 | 155.5 |
| C223 | 169.6 | 61.0 | 0.00036 | 163.0 |
| | | | <i>Average</i> | 166.8 |
| C224 | 238.5 | 92.9 | 0.00039 | 150.3 |
| C224 | 271.7 | 100.7 | 0.00037 | 158.3 |
| C224 | 287.1 | 114.1 | 0.00040 | 147.1 |
| C224 | 233.8 | 87.4 | 0.00037 | 156.8 |
| C224 | 243.9 | 84.1 | 0.00034 | 169.8 |
| | | | <i>Average</i> | 156.5 |
| C225 | 320.7 | 252.5 | 0.00079 | 38.1 |
| C225 | 289.0 | 205.1 | 0.00071 | 54.7 |
| C225 | 303.7 | 261.7 | 0.00086 | 23.7 |
| C225 | 340.0 | 226.0 | 0.00066 | 65.1 |
| C225 | 316.8 | 282.1 | 0.00089 | 18.5 |
| | | | <i>Average</i> | 40.0 |

Table S1b: VOCs to calculate plume age (in hours) close to fires (ARNA) using benzene / CO ratios