

Supplementary material to paper:

Ethane, ethyne and carbon monoxide concentrations in the upper troposphere and lower stratosphere from ACE and GEOS-Chem: a comparison study

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Table S1. Average CO VMR profiles for the period January 2004 – February 2007 in 10° latitude bins from ACE satellite measurements in ppbv

| Altitude (km) | Latitude (Degrees) | | | | | | | | | | | | | | | | | |
|------------------|--------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------------|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 90°S- 80°S | 80°S- 70°S | 70°S- 60°S | 60°S- 50°S | 50°S- 40°S | 40°S- 30°S | 30°S- 20°S | 20°S- 10°S | 10°S- 0° | 0°- 10°N | 10°N- 20°N | 20°N- 30°N | 30°N- 40°N | 40°N- 50°N | 50°N- 60°N | 60°N- 70°N | 70°N- 80°N | 80°N- 90°N |
| 5.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| 6.5 | 58 | 62 | 68 | 72 | 81 | 92 | 92 | 83 | 85 | 90 | 110 | 116 | 110 | 119 | 136 | 137 | 140 | 117 |
| 7.5 | 54 | 62 | 66 | 71 | 78 | 91 | 91 | 85 | 94 | 95 | 103 | 107 | 111 | 121 | 126 | 127 | 127 | 118 |
| 8.5 | 51 | 62 | 65 | 74 | 82 | 96 | 88 | 89 | 92 | 94 | 101 | 110 | 115 | 120 | 119 | 117 | 111 | 110 |
| 9.5 | 38 | 51 | 54 | 65 | 78 | 91 | 88 | 91 | 93 | 100 | 96 | 102 | 107 | 106 | 93 | 91 | 79 | 89 |
| 10.5 | 29 | 40 | 44 | 54 | 71 | 82 | 81 | 84 | 88 | 97 | 93 | 94 | 94 | 84 | 69 | 66 | 57 | 65 |
| 11.5 | 25 | 32 | 36 | 45 | 61 | 74 | 78 | 80 | 84 | 88 | 88 | 85 | 82 | 67 | 50 | 48 | 41 | 43 |
| 12.5 | 23 | 26 | 30 | 37 | 50 | 61 | 65 | 65 | 68 | 71 | 72 | 70 | 61 | 47 | 38 | 35 | 31 | 34 |
| 13.5 | 20 | 23 | 27 | 32 | 41 | 53 | 57 | 59 | 61 | 57 | 63 | 55 | 47 | 39 | 31 | 30 | 26 | 28 |
| 14.5 | 18 | 20 | 24 | 28 | 35 | 46 | 53 | 55 | 58 | 53 | 51 | 47 | 40 | 34 | 27 | 26 | 23 | 25 |
| 15.5 | 15 | 17 | 21 | 24 | 31 | 41 | 48 | 44 | 46 | 51 | 49 | 45 | 37 | 31 | 24 | 23 | 20 | 21 |
| 16.5 | 14 | 16 | 18 | 20 | 26 | 33 | 37 | 7 | 19 | 39 | ---- | 34 | 30 | 26 | 20 | 19 | 17 | 18 |
| 17.5 | 15 | 15 | 16 | 17 | 21 | 25 | 28 | 14 | 1 | 14 | ---- | 26 | 24 | 21 | 18 | 17 | 15 | 16 |
| 18.5 | 15 | 15 | 15 | 15 | 17 | 21 | 23 | 19 | 20 | ---- | ---- | 21 | 21 | 18 | 16 | 15 | 14 | 15 |

Table S2. Average C₂H₆ VMR profiles for the period January 2004 – February 2007 in 10° latitude bins from ACE satellite measurements in ppbv

| Altitude (km) | Latitude (Degrees) | | | | | | | | | | | | | | | | | |
|------------------|--------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------------|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 90°S- 80°S | 80°S- 70°S | 70°S- 60°S | 60°S- 50°S | 50°S- 40°S | 40°S- 30°S | 30°S- 20°S | 20°S- 10°S | 10°S- 0° | 0°- 10°N | 10°N- 20°N | 20°N- 30°N | 30°N- 40°N | 40°N- 50°N | 50°N- 60°N | 60°N- 70°N | 70°N- 80°N | 80°N- 90°N |
| 5.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| 6.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| 7.5 | 0.254 | 0.257 | 0.263 | 0.315 | 0.443 | 0.319 | 0.337 | ---- | ---- | ---- | ---- | 0.901 | 0.740 | 1.054 | 1.034 | 1.115 | 1.244 | 0.871 |
| 8.5 | 0.257 | 0.251 | 0.266 | 0.327 | 0.389 | 0.566 | 0.436 | 0.428 | 0.422 | 0.679 | 0.631 | 0.718 | 0.804 | 0.907 | 0.918 | 0.944 | 0.921 | 0.770 |
| 9.5 | 0.166 | 0.201 | 0.225 | 0.313 | 0.399 | 0.553 | 0.402 | 0.439 | 0.462 | 0.577 | 0.560 | 0.651 | 0.760 | 0.814 | 0.749 | 0.726 | 0.629 | 0.612 |
| 10.5 | 0.099 | 0.147 | 0.175 | 0.263 | 0.382 | 0.510 | 0.450 | 0.440 | 0.466 | 0.532 | 0.549 | 0.650 | 0.694 | 0.625 | 0.510 | 0.454 | 0.390 | 0.438 |
| 11.5 | 0.070 | 0.094 | 0.131 | 0.188 | 0.304 | 0.405 | 0.401 | 0.429 | 0.451 | 0.421 | 0.519 | 0.515 | 0.500 | 0.397 | 0.306 | 0.268 | 0.231 | 0.312 |
| 12.5 | 0.057 | 0.068 | 0.109 | 0.155 | 0.250 | 0.344 | 0.348 | 0.355 | 0.380 | 0.406 | 0.421 | 0.414 | 0.372 | 0.252 | 0.201 | 0.169 | 0.134 | 0.209 |
| 13.5 | 0.036 | 0.054 | 0.091 | 0.124 | 0.198 | 0.298 | 0.316 | 0.306 | 0.300 | 0.303 | 0.334 | 0.330 | 0.244 | 0.188 | 0.140 | 0.115 | 0.086 | 0.161 |
| 14.5 | 0.022 | 0.038 | 0.071 | 0.103 | 0.154 | 0.225 | 0.252 | 0.229 | 0.240 | 0.232 | 0.257 | 0.234 | 0.171 | 0.137 | 0.097 | 0.077 | 0.056 | 0.116 |
| 15.5 | 0.011 | 0.024 | 0.045 | 0.067 | 0.111 | 0.157 | ---- | 0.035 | 0.201 | 0.199 | 0.158 | 0.160 | 0.119 | 0.100 | 0.066 | 0.051 | 0.034 | 0.067 |
| 16.5 | 0.007 | 0.014 | 0.025 | 0.041 | 0.070 | 0.096 | ---- | 0.113 | 0.076 | ---- | ---- | 0.108 | 0.081 | 0.063 | 0.040 | 0.031 | 0.020 | 0.035 |
| 17.5 | 0.008 | 0.011 | 0.015 | 0.022 | 0.041 | 0.058 | ---- | 0.073 | ---- | 0.051 | ---- | 0.071 | 0.049 | 0.038 | 0.024 | 0.020 | 0.016 | 0.020 |
| 18.5 | 0.010 | 0.010 | 0.012 | 0.014 | 0.022 | 0.041 | 0.044 | ---- | ---- | ---- | ---- | 0.050 | 0.035 | 0.025 | 0.016 | 0.016 | 0.018 | 0.012 |

Table S3. Average C₂H₂ VMR profiles for the period January 2004 – February 2007 in 10° latitude bins from ACE satellite measurements in ppbv

| Altitude (km) | Latitude (Degrees) | | | | | | | | | | | | | | | | | |
|------------------|--------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------------|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 90°S- 80°S | 80°S- 70°S | 70°S- 60°S | 60°S- 50°S | 50°S- 40°S | 40°S- 30°S | 30°S- 20°S | 20°S- 10°S | 10°S- 0° | 0°- 10°N | 10°N- 20°N | 20°N- 30°N | 30°N- 40°N | 40°N- 50°N | 50°N- 60°N | 60°N- 70°N | 70°N- 80°N | 80°N- 90°N |
| 5.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| 6.5 | ---- | 0.047 | 0.088 | 0.140 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.242 | 0.222 | 0.271 | 0.096 |
| 7.5 | 0.047 | 0.034 | 0.054 | 0.076 | 0.102 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.130 | 0.158 | 0.180 | 0.184 | 0.239 | 0.088 |
| 8.5 | 0.036 | 0.033 | 0.043 | 0.050 | 0.059 | 0.110 | 0.084 | 0.115 | 0.091 | 0.130 | 0.116 | 0.127 | 0.109 | 0.139 | 0.148 | 0.148 | 0.177 | 0.105 |
| 9.5 | 0.025 | 0.026 | 0.035 | 0.048 | 0.060 | 0.091 | 0.068 | 0.075 | 0.077 | 0.096 | 0.095 | 0.098 | 0.099 | 0.109 | 0.107 | 0.104 | 0.109 | 0.088 |
| 10.5 | 0.015 | 0.018 | 0.026 | 0.039 | 0.055 | 0.078 | 0.068 | 0.071 | 0.070 | 0.088 | 0.082 | 0.084 | 0.085 | 0.086 | 0.068 | 0.064 | 0.061 | 0.050 |
| 11.5 | 0.007 | 0.011 | 0.016 | 0.026 | 0.039 | 0.051 | 0.050 | 0.052 | 0.056 | 0.052 | 0.056 | 0.056 | 0.062 | 0.050 | 0.038 | 0.033 | 0.027 | 0.033 |
| 12.5 | 0.008 | 0.009 | 0.012 | 0.018 | 0.029 | 0.038 | 0.041 | 0.036 | 0.040 | 0.044 | 0.040 | 0.045 | 0.042 | 0.030 | 0.024 | 0.019 | 0.017 | 0.018 |
| 13.5 | 0.010 | 0.007 | 0.010 | 0.014 | 0.021 | 0.029 | 0.031 | 0.030 | 0.028 | 0.035 | 0.032 | 0.031 | 0.028 | 0.020 | 0.015 | 0.013 | 0.012 | 0.009 |
| 14.5 | 0.008 | 0.007 | 0.009 | 0.012 | 0.017 | 0.024 | 0.026 | 0.027 | 0.027 | 0.035 | 0.031 | 0.029 | 0.021 | 0.016 | 0.012 | 0.010 | 0.010 | 0.014 |
| 15.5 | 0.008 | 0.007 | 0.008 | 0.010 | 0.013 | 0.019 | 0.025 | 0.023 | 0.024 | 0.022 | 0.023 | 0.023 | 0.018 | 0.014 | 0.010 | 0.008 | 0.008 | 0.011 |
| 16.5 | 0.008 | 0.006 | 0.006 | 0.007 | 0.010 | 0.015 | 0.021 | 0.021 | 0.020 | 0.016 | 0.016 | 0.019 | 0.013 | 0.009 | 0.008 | 0.006 | 0.007 | 0.008 |
| 17.5 | 0.007 | 0.004 | 0.005 | 0.006 | 0.007 | 0.011 | 0.016 | 0.018 | 0.016 | 0.015 | 0.013 | 0.014 | 0.010 | 0.007 | 0.005 | 0.005 | 0.006 | 0.009 |
| 18.5 | 0.006 | 0.004 | 0.005 | 0.005 | 0.005 | 0.008 | 0.012 | 0.013 | 0.013 | 0.014 | 0.012 | 0.011 | 0.007 | 0.006 | 0.004 | 0.004 | 0.005 | 0.007 |

2005 CO GEOS-Chem total emissions

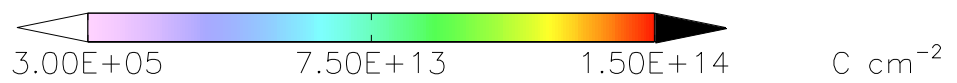
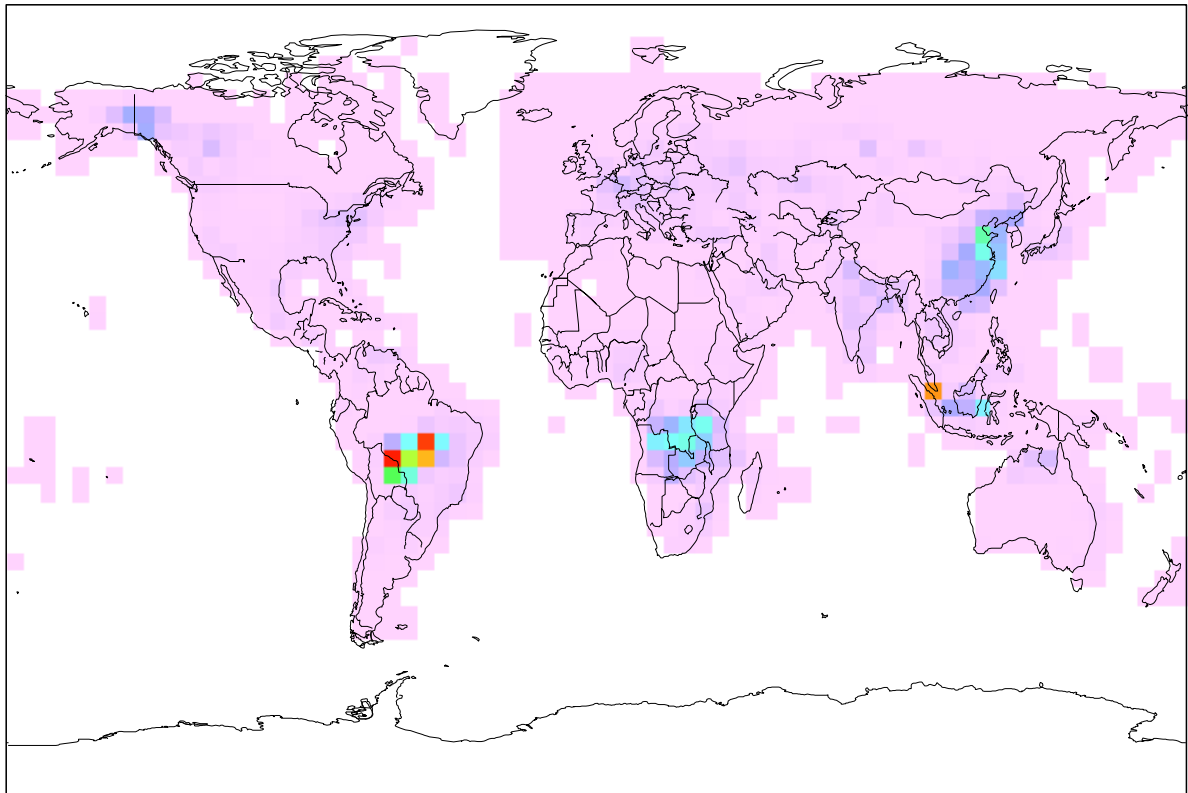


Fig. S1. 2005 CO global emissions including CO production from VOCs oxidation

2005 C₂H₆ GEOS-Chem total emissions

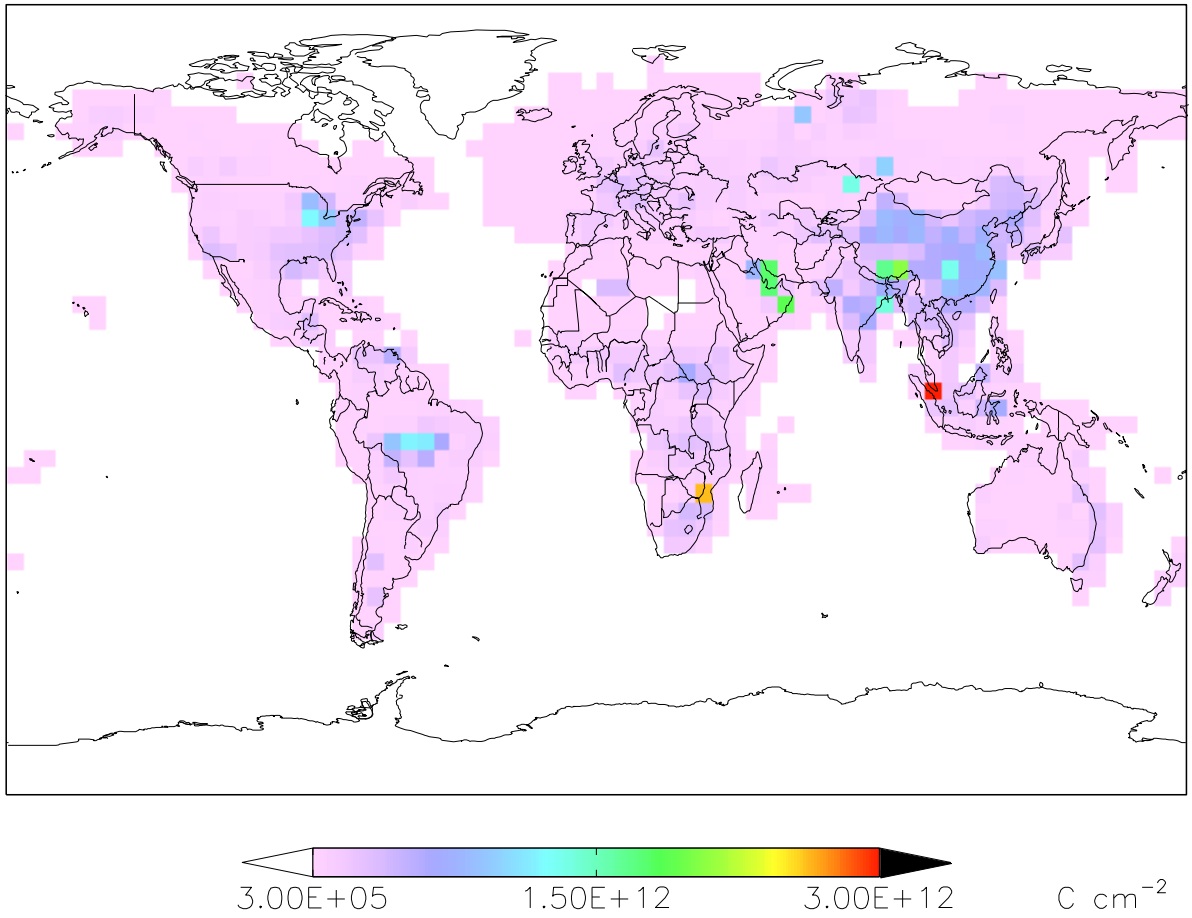


Fig. S2. 2005 C₂H₆ global emissions

2005 C₂H₂ GEOS-Chem total emissions

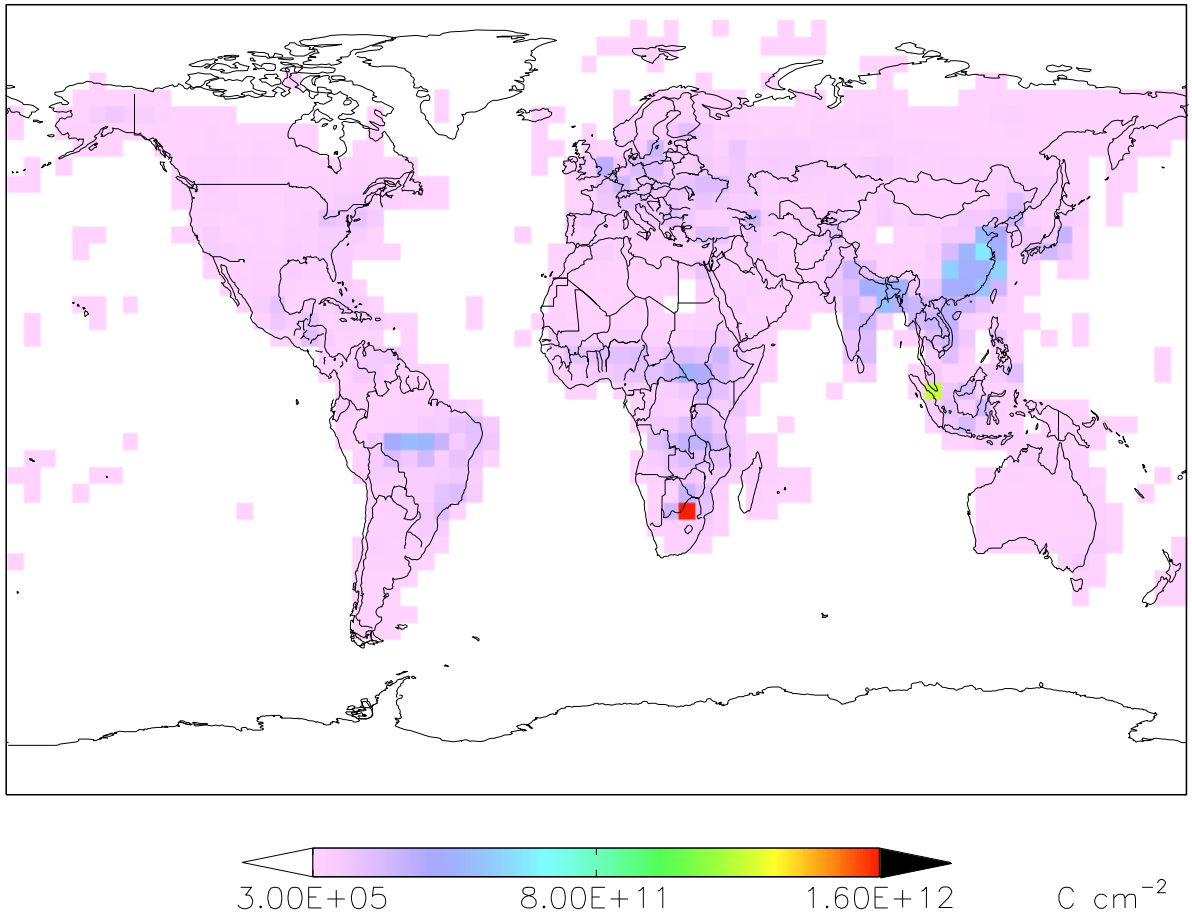


Fig. S3. 2005 C₂H₂ global emissions

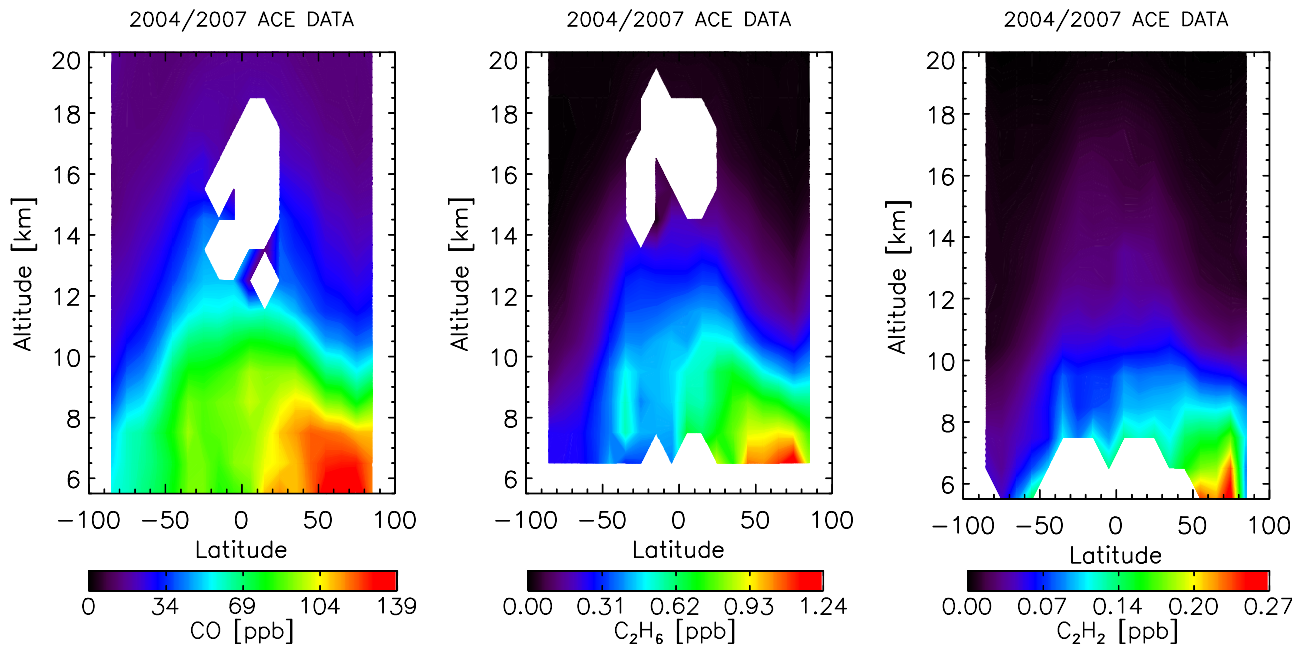


Fig. S4. Concentrations altitude-latitude cross sections for ACE data for the period of time between February 2004 and February 2007