Auxiliary Material

Table S1 Description of five emission categories of NEI.

Emission Category	Description	Example
Point	emission sources individually inventoried and usually located at a fixed location	industrial facilities and power plants
Nonpoint	individual emission sources too small in magnitude or too numerous to inventory as point sources	residential heating and consumer solvent use
Onroad	estimates from MOBILE6[a] model for highway vehicles, aircraft, locomotives, marine vessels, etc.	highway vehicles
Nonroad	estimate from NONROAD[b] model for internal combustion engine emissions	railroad equipment, construction equipment
Event	random sources of air pollution emissions	wildfires and prescribed burns

Information from NEI description
(http://www.epa.gov/ttnchie1/net/2008inventory.html)
[a]MOBILE6 Vehicle Emission Modeling Software, an emission factor model to predict gram per mile emissions of VOCs, CO, NO_x, CO_2, PM and toxics from cars, trucks, and motorcycles under various conditions. (Model website http://www.epa.gov/otaq/m6.htm)
[b]NON-ROAD model, estimate the emission inventories for all nonroad equipment with different fuel types, including VOCs, CO, NO_x, PM, SO_2, and CO_2. (Model website http://www.epa.gov/otaq/nonrdmdl.htm#model)

Table S2 List of Instruments on the Cessna 402B. (Information adapted from

http://www.atmos.umd.edu/~RAMMPP/Instruments.html)

Parameter	Temporal Resolution	Detection Limit	Technique/Instrument
Position	10 s	15 m	Garmin GPS90
Pressure	10 s	0.2 hPa	Vaisala PTU 300
Temperature	10 s	0.2 °C	Vaisala PTU 300
RH	10 s	1.00%	Vaisala PTU 300
O_3	10 s	1 ppbv	UV O_3 Analyzer (TEI 49C)
CO	10 s	40 ppbv	Modified NDIR/GFC CO Analyzer (TEI 48S)
SO_2	10 s	0.3 ppbv	Modified UV Fluorescence SO_2 Analyzer (TEI 43C)

NO_2	10 s	60 ppt	Cavity Ringdown Spectroscopy (LGR[a] RMT-200)
Aerosol Absorption	2 min	0.1 μg/m^3	7 Wavelength[b] Aethalomter (Magee Scientific AE31)
Aerosol Scattering	30 s	0.17-0.44 Mm^{-1}	3 Wavelength[c] Integrating Nephelometer (TSI 3563)
Particle Counts	1 s	0.01 um	Condensation Particle Counter (TSI 3007)
Aerosol Size	10 s	N/A	Laser based optical (MetOne 9012)

[a]LGR: Los Gatos Research, Mountain View, CA

[b]7 wavelengths: 380, 470, 520, 590, 660, 880, and 950 nm

[c]Three wavelengths: 450, 550, and 700 nm

Table S3 Major point sources of NO_x in Figure 2c. (Point sources with annual NO_x emissions > 1 × 10^3 tons/year, and NO_x/CO_2 ratio > 3.0 × 10^{-4})

State	Facility Name	Latitude	Longitude
OH	Avon Lake Power Plant	41.50	-82.05
OH	Kyger Creek	38.92	-82.13
OH	Muskingum River	39.59	-81.68
OH	Niles	41.17	-80.75
OH	Richard Gorsuch	39.37	-81.52
OH	Walter C Beckjord Station	38.99	-84.30
PA	Armstrong Power Station	40.93	-79.47
PA	Homer City	40.51	-79.20
PA	New Castle	40.94	-80.37
PA	Portland	40.91	-75.08
PA	Shawville	41.07	-78.37
PA	Sunbury	40.84	-76.83
PA	Titus	40.31	-75.91
WV	Albright Power Station	39.49	-79.64

Table S4 Meteorological fields used for the HYSPLIT model runs.

Year	Meteorology	Resolution	Layer
1997-2004	Eta Data Assimilation System (EDAS)	80 km	26
2004-2006	Eta Data Assimilation System (EDAS)	40 km	26
2007-2011	North America Mesoscale (NAM)	12 km	26

Figure S1. Number of RAMMPP research spirals conducted in the Baltimore/Washington airshed for various summers during the past 15 years.

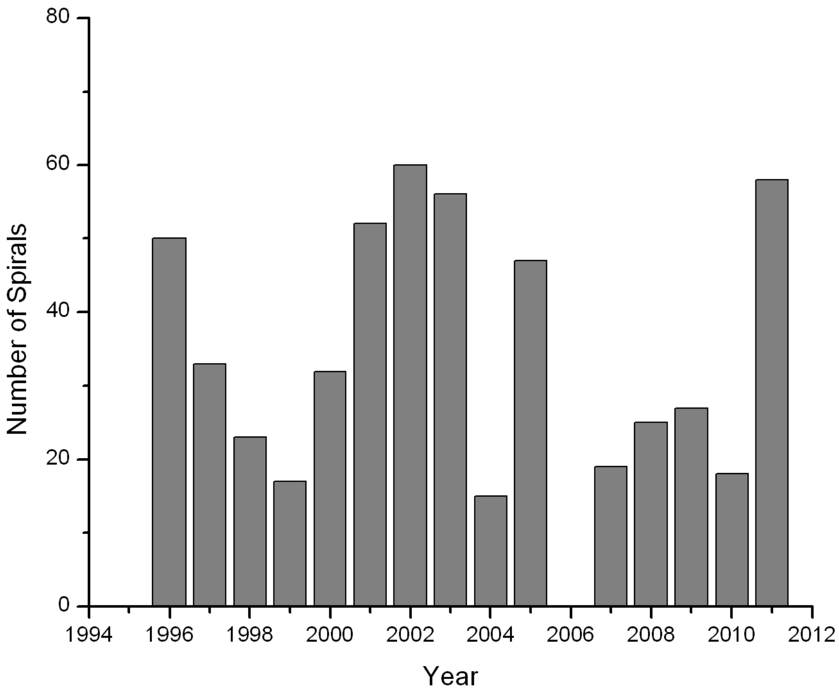


Figure S2. Trends of NO_x and CO emissions of the U.S. and in the research domain. Annual U.S. emissions are scaled (4% and 5% for NO_x and CO respectively) to present the emissions in the research domain.

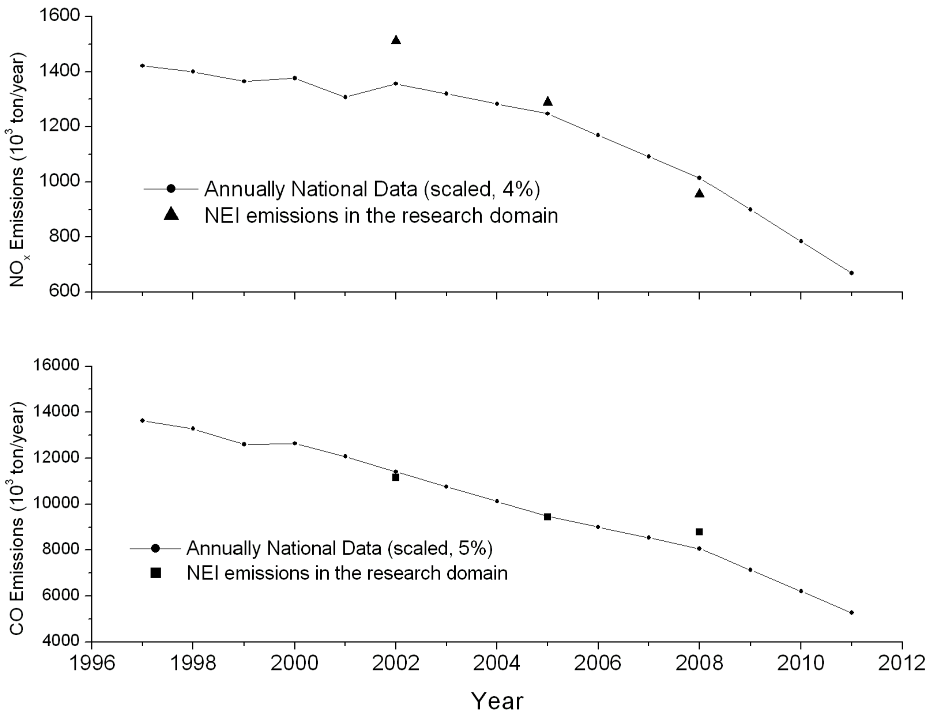


Figure S3. Long-term trends of CEMS CO_2 emissions in the research domain.

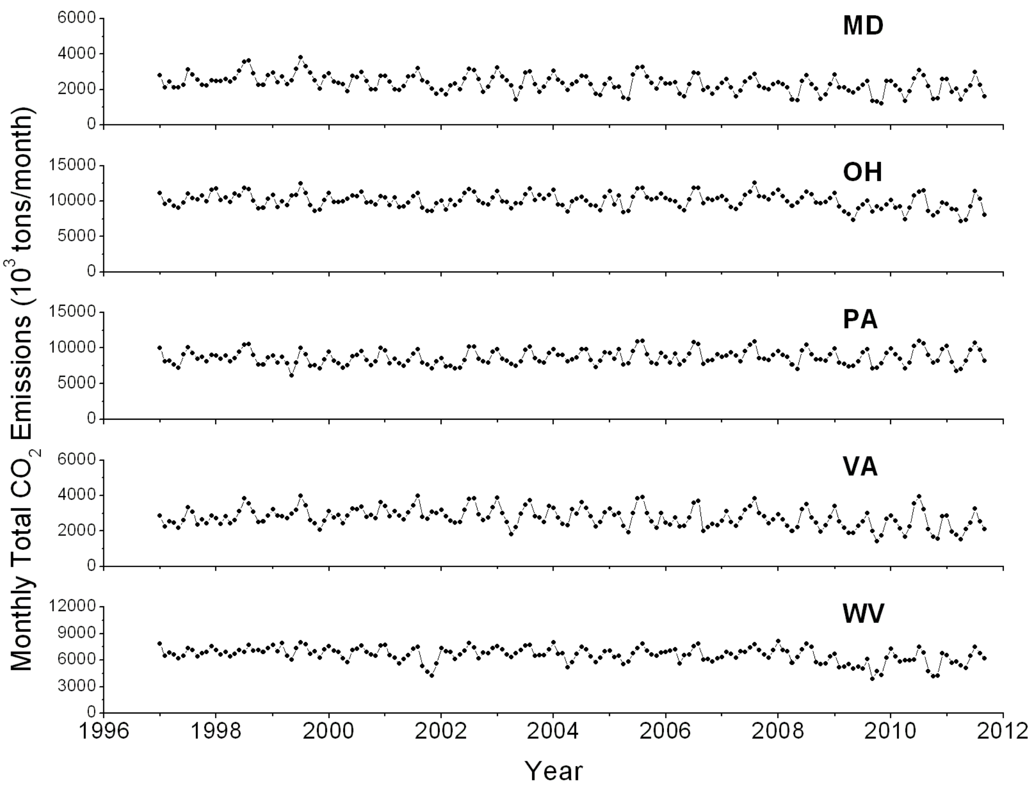


Figure S4. Locations of EPA AQS sites of ground-level O_3, CO, and NO_x measurements (valid sites in the past 15 years)

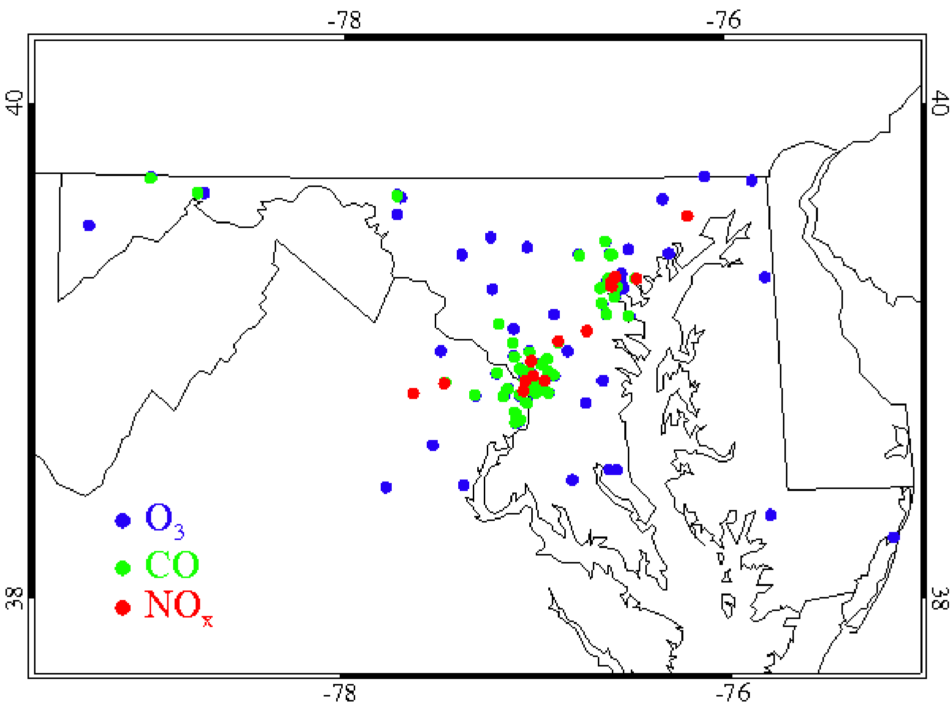
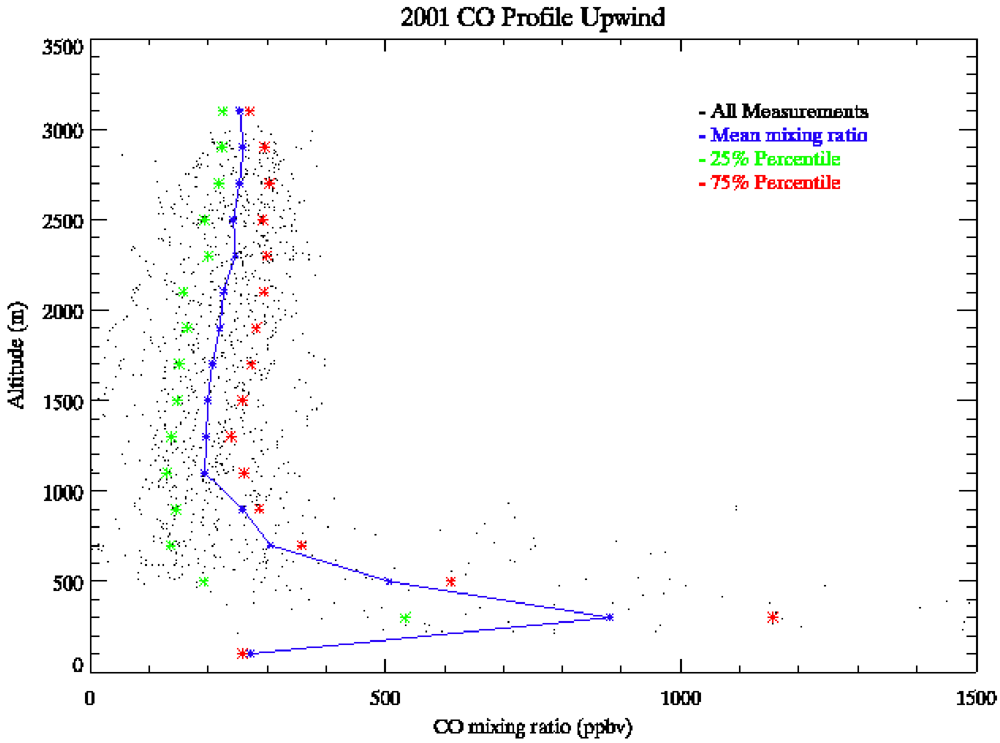


Figure S5 Vertical distribution of tropospheric CO over the Baltimore/Washington region in 2001. (a: upwind spirals; b: downwind spirals).

a)



b)

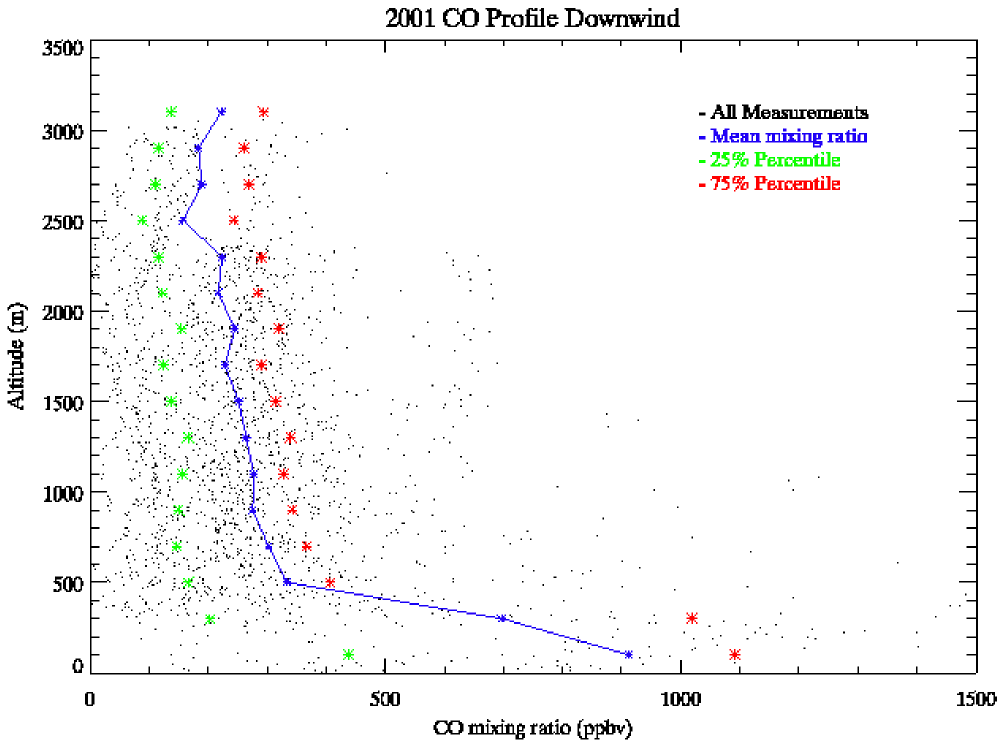


Figure S6. Number of days with daily mean temperature (T_{mean}) higher than 28 °C, based on measurements collected at the Baltimore Washington International Airport.

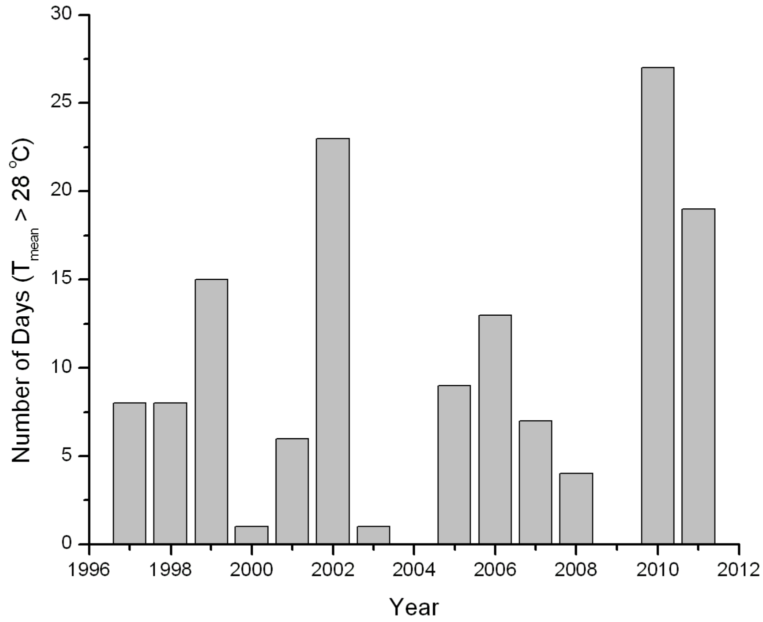
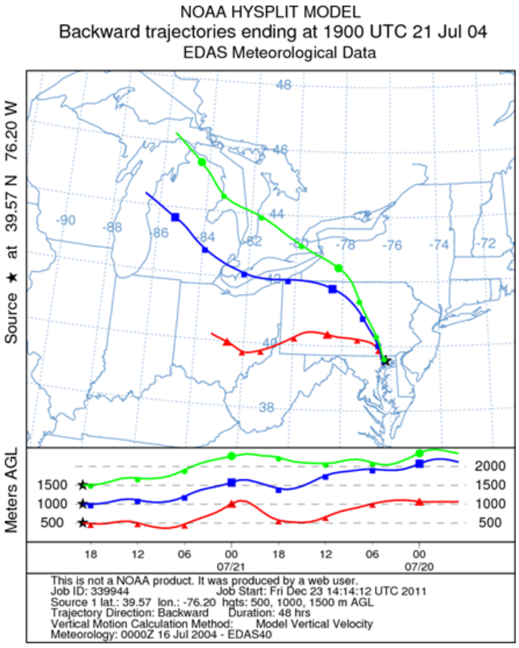
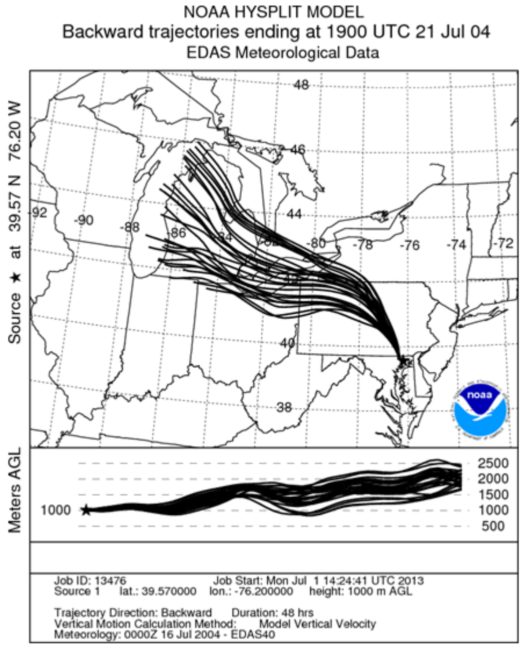
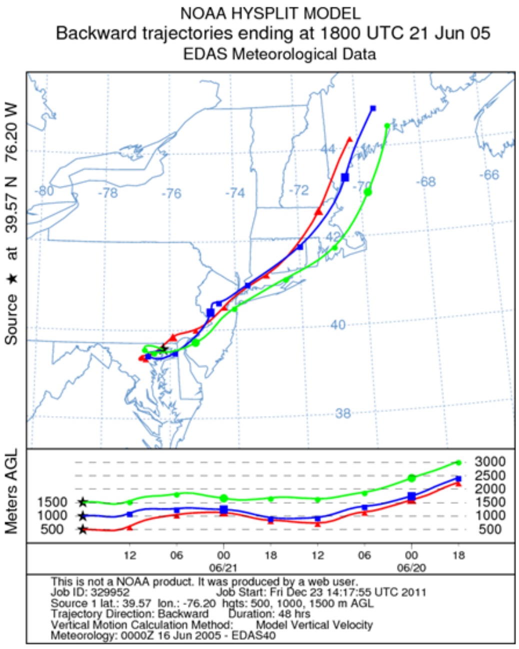
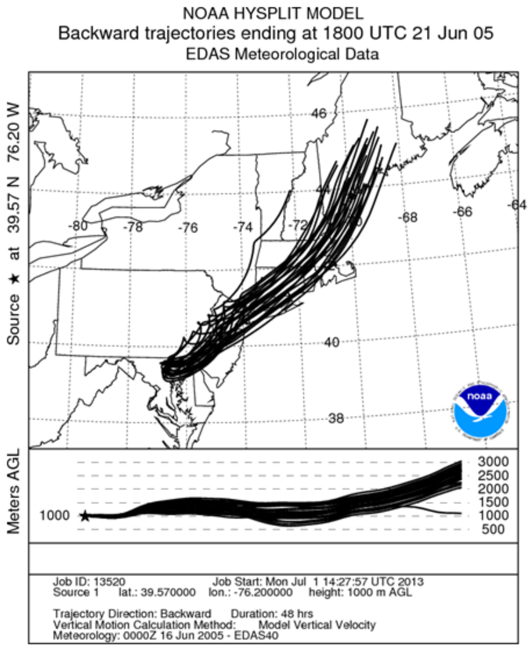


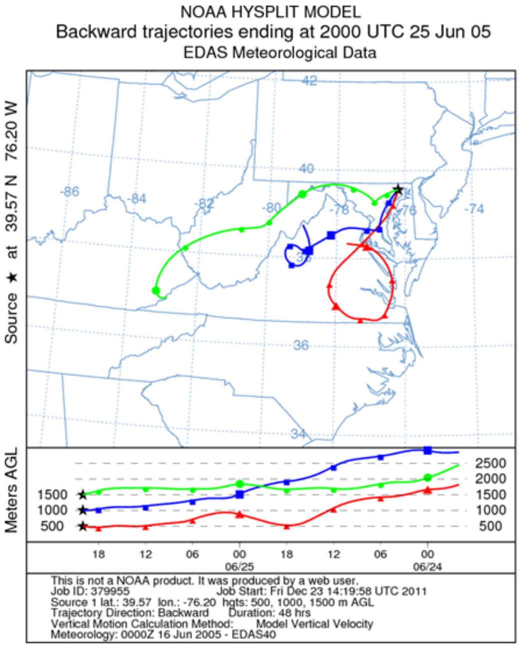
Figure S7. Case studies of single back trajectories and 27-member ensembles from HYSPLIT. Nine cases of back trajectories are investigated, all driven by the Eta Data Assimilation System (EDAS) 40 km meteorological fields for years 2004 to 2005 (Table S4). We have examined ensemble trajectories for the dates of 06/21/2004, 06/21/2005, 06/25/2005, 06/26/2005, 07/10/2005, 07/11/2005, 08/02/2005, 08/13/2005, and 09/13/2005. In each plot, the left panel shows single back trajectories initiated at 500 m, 1000 m, and 1500 m AGL, respectively; the right panel shows the 27-member ensemble back trajectories initiated at 1000 m AGL. Each member of the trajectory ensemble is calculated by offsetting the initial point of the backwards trajectory by either -1, 0, or +1 (hereafter ±1) grid point in the east/west direction, ±1 grid point in the north/south direction, and ±0.01 sigma unit (about 250 m) in the vertical. The 27 member ensemble consists of 9 points in 3 vertical planes, representing all possible combinations of these perturbations plus the central point. Further details given at http://ready.arl.noaa.gov/hypub-bin/trajtype.pl?runtype=archive. Comparison of the single back trajectories initiated at 1000 m AGL (blue line in the left panel) to the ensemble back trajectories initiated at 1000 m AGL shows that the single back trajectories accurately represent the behavior of the ensemble over the past 24 to 48 hrs. Our study focuses on regional transport of pollution over a much smaller area and much shorter period of time than considered in Stohl et al. (2002; 2003). Hence, the divergence between various members of the ensemble is small. These results support the validity of our approach of using single back trajectories in the analysis of aircraft data.

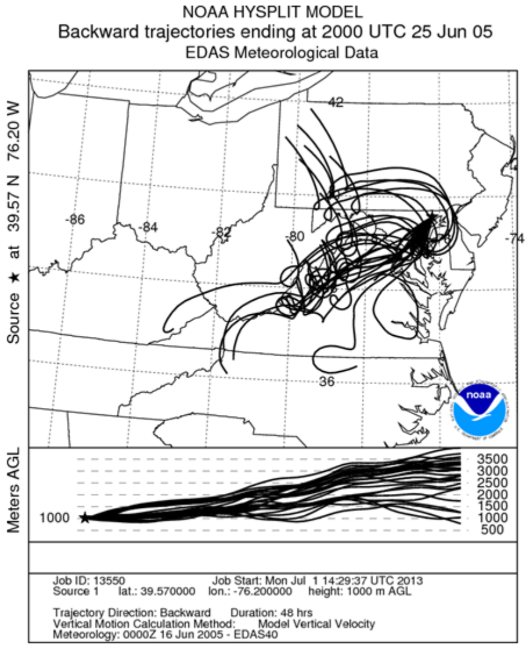

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 21 Jul 04
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
07/21
07/20
This is not a NOAA product. It was produced by a web user.
Job ID: 339944 Job Start: Fri Dec 23 14:14:12 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jul 2004 - EDAS40

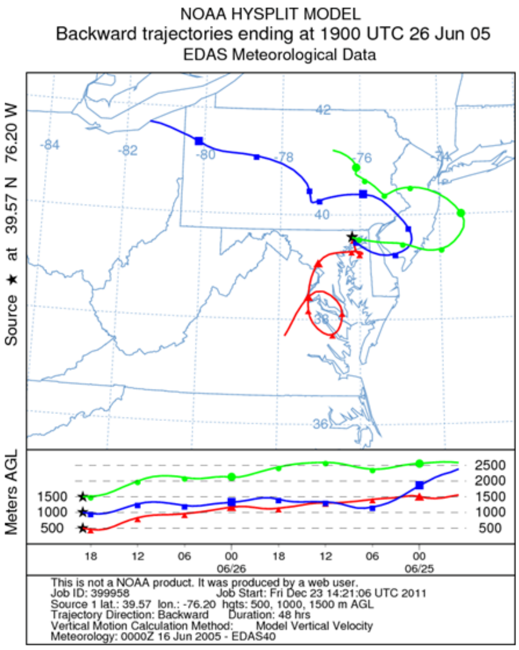

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 21 Jul 04
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
Job ID: 13476 Job Start: Mon Jul 1 14:24:41 UTC 2013
Source 1 lat.: 39.570000 lon.: -76.200000 height: 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jul 2004 - EDAS40

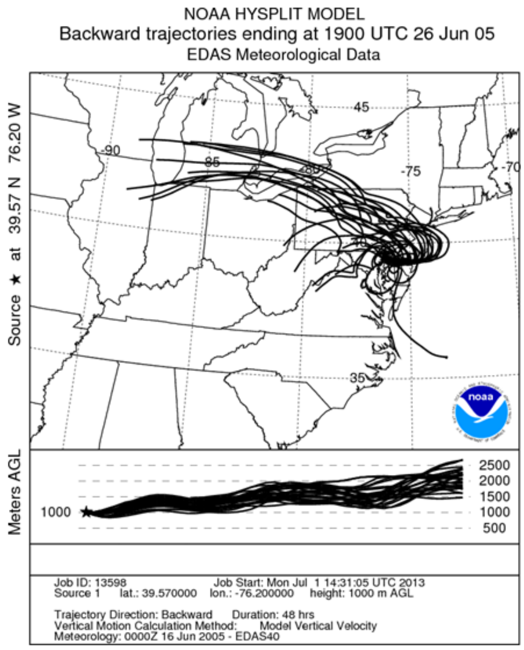

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 21 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
06/21
06/20
This is not a NOAA product. It was produced by a web user.
Job ID: 329952 Job Start: Fri Dec 23 14:17:55 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

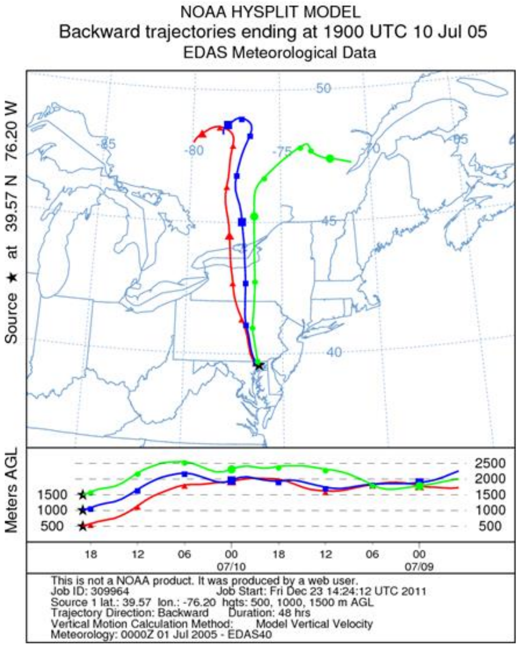

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 21 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
Job ID: 13520 Job Start: Mon Jul 1 14:27:57 UTC 2013
Source 1 lat.: 39.570000 lon.: -76.200000 height: 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

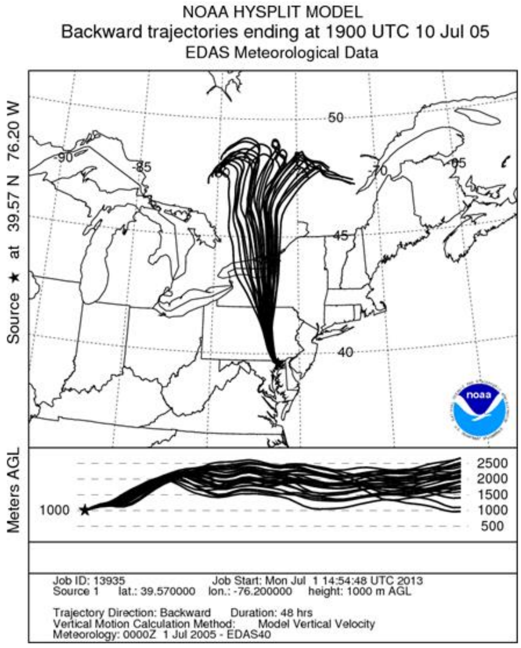

NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 25 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 379955 Job Start: Fri Dec 23 14:19:58 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

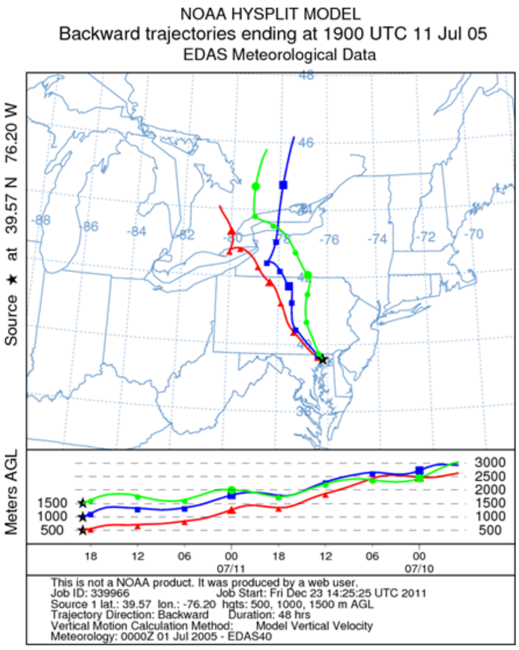

NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 25 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
Job ID: 13550 Job Start: Mon Jul 1 14:29:37 UTC 2013
Source 1 lat.: 39.570000 lon.: -76.200000 height: 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

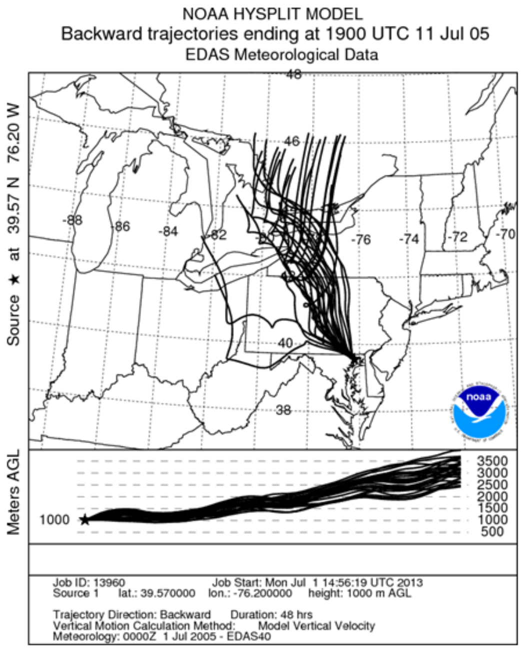

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 26 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 399958 Job Start: Fri Dec 23 14:21:06 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

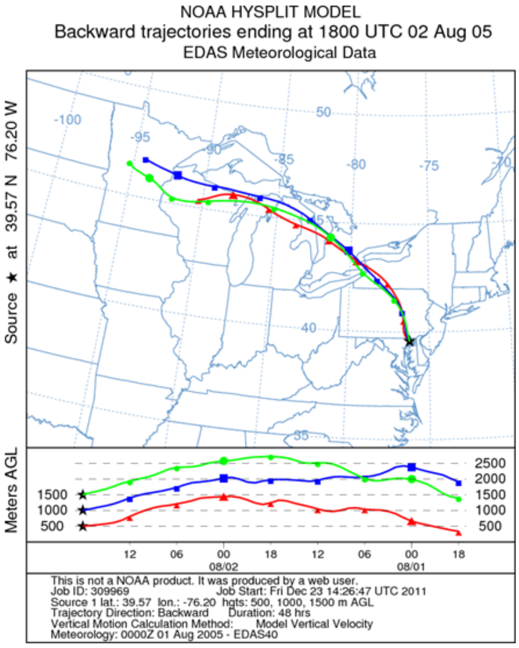

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 26 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
Job ID: 13598 Job Start: Mon Jul 1 14:31:05 UTC 2013
Source 1 lat.: 39.570000 lon.: -76.200000 height: 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

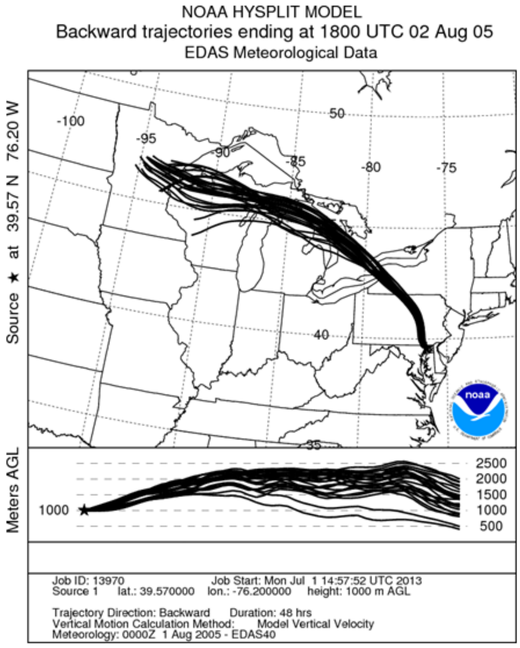

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 10 Jul 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 309964 Job Start: Fri Dec 23 14:24:12 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Jul 2005 - EDAS40

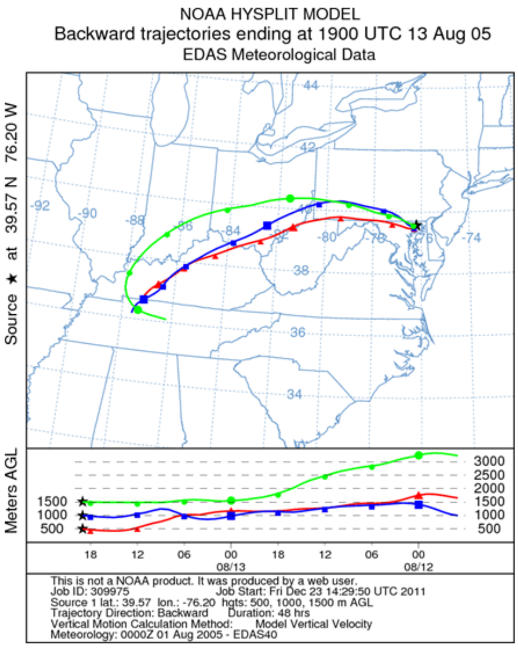

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 10 Jul 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
Job ID: 13935 Job Start: Mon Jul 1 14:54:48 UTC 2013
Source 1 lat.: 39.570000 lon.: -76.200000 height: 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Jul 2005 - EDAS40

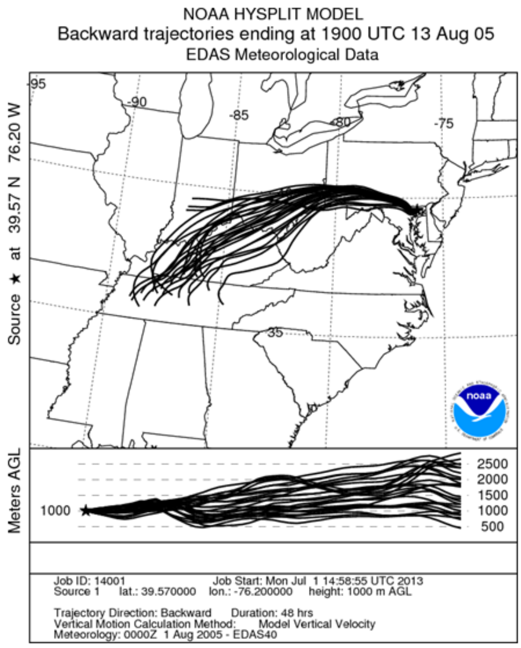

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 11 Jul 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 339966 Job Start: Fri Dec 23 14:25:25 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Jul 2005 - EDAS40


NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 11 Jul 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
Job ID: 13960 Job Start: Mon Jul 1 14:56:19 UTC 2013
Source 1 lat.: 39.570000 lon.: -76.200000 height: 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Jul 2005 - EDAS40


NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 02 Aug 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 309969 Job Start: Fri Dec 23 14:26:47 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Aug 2005 - EDAS40


NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 02 Aug 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
Job ID: 13970 Job Start: Mon Jul 1 14:57:52 UTC 2013
Source 1 lat.: 39.570000 lon.: -76.200000 height: 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Aug 2005 - EDAS40


NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 13 Aug 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 309975 Job Start: Fri Dec 23 14:29:50 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Aug 2005 - EDAS40


NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 13 Aug 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
Job ID: 14001 Job Start: Mon Jul 1 14:58:55 UTC 2013
Source 1 lat.: 39.570000 lon.: -76.200000 height: 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Aug 2005 - EDAS40

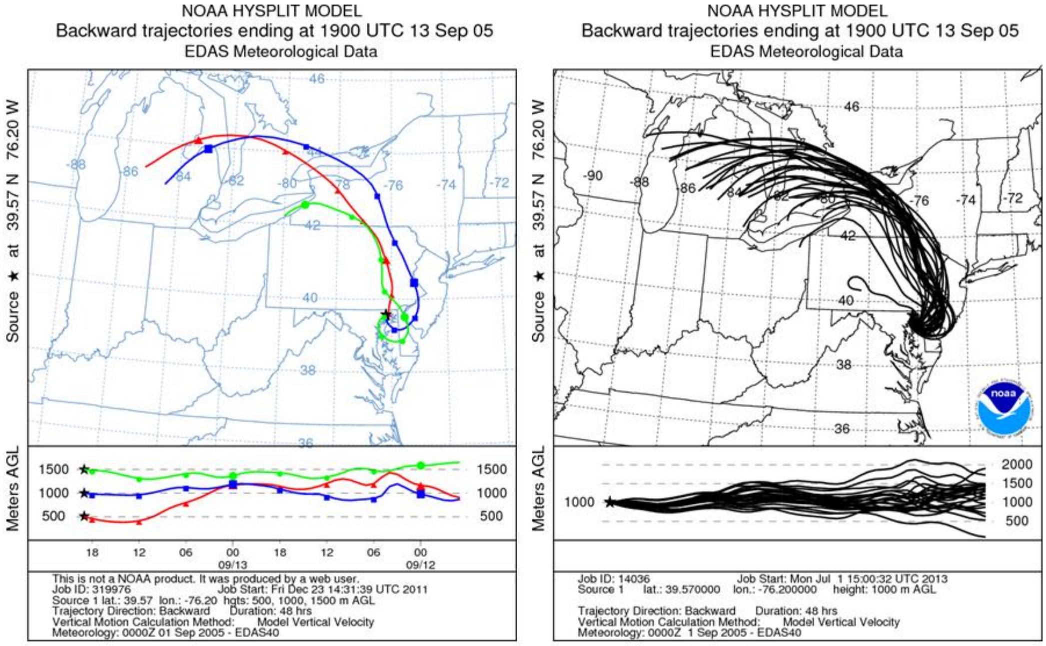
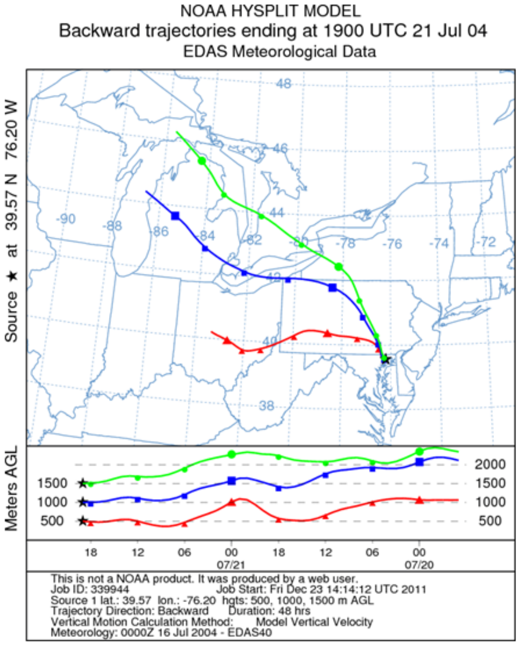
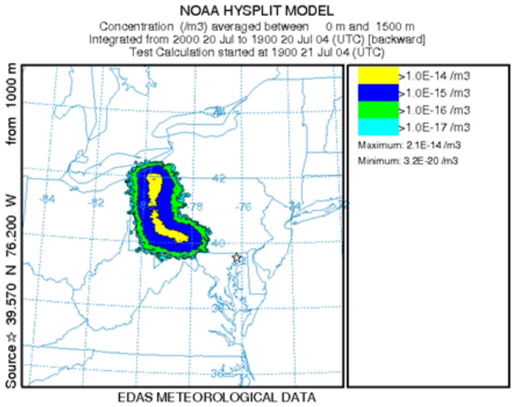
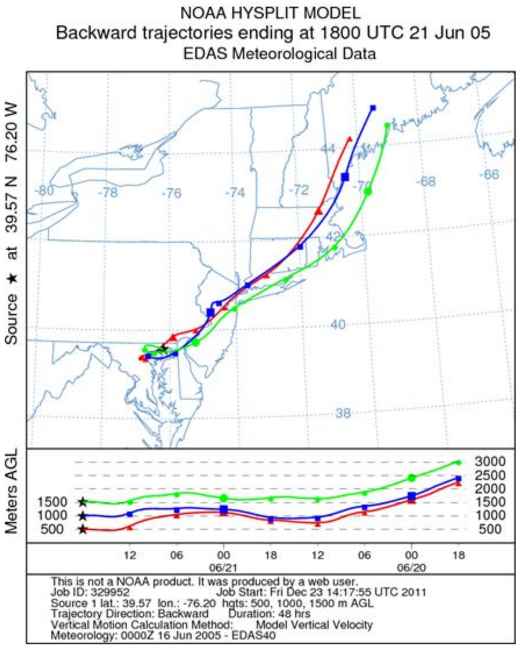
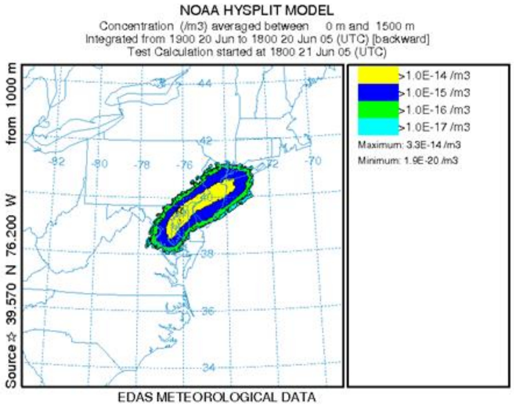


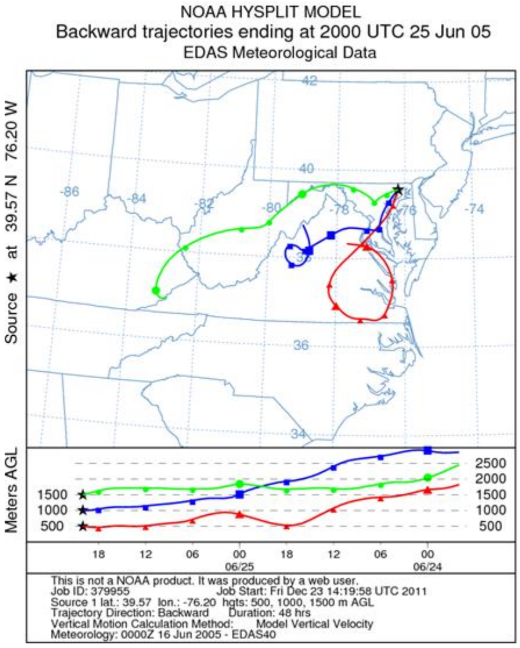
Figure S8. Case studies of HYSPLIT single back trajectories and the 24-hr backward concentration dispersion. Nine cases of back trajectories (for same dates as described in Figure S7) are investigated. In each plot, the left panel shows single back trajectories initiated at 500 m, 1000 m, and 1500 m AGL, respectively; the right panel shows 24-hr backward concentration contours averaged in the lowest 1500 m with unit of air pollutant released at 1000 m AGL. The HYSPLIT backward concentration dispersion demonstrates the possible origins of air pollutants, within the most recent 24-hr period of time, for air pollution observed by the RAMMPP aircraft. The comparison of single back trajectories (the left panel) and the 24-hr backward concentration dispersion (the right panel) shows that the single back trajectories approximately pass over the locations of upwind sources. The source apportionment footprint suggested by the 24-hr backward concentration (the right panel) is comparable to the area of a state in the eastern U.S., supporting the approach we have used to estimate emissions of power plants grouped by state.

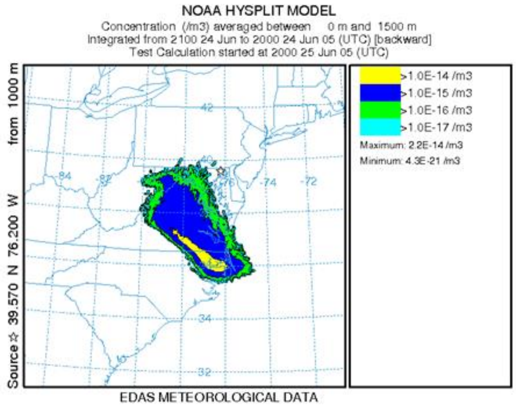

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 21 Jul 04
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 339944 Job Start: Fri Dec 23 14:14:12 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jul 2004 - EDAS40

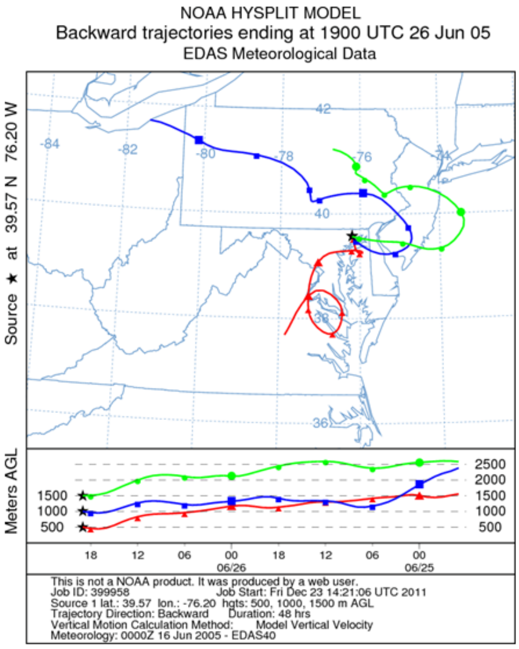

NOAA HYSPLIT MODEL
Concentration (/m3) averaged between 0 m and 1500 m
Integrated from 2000 20 Jul to 1900 20 Jul 04 (UTC) [backward]
Test Calculation started at 1900 21 Jul 04 (UTC)
>1.0E-14 /m3
>1.0E-15 /m3
>1.0E-16 /m3
>1.0E-17 /m3
Maximum: 2.1E-14 /m3
Minimum: 3.2E-20 /m3
Source ☆ 39.570 N 76.200 W from 1000 m
EDAS METEOROLOGICAL DATA

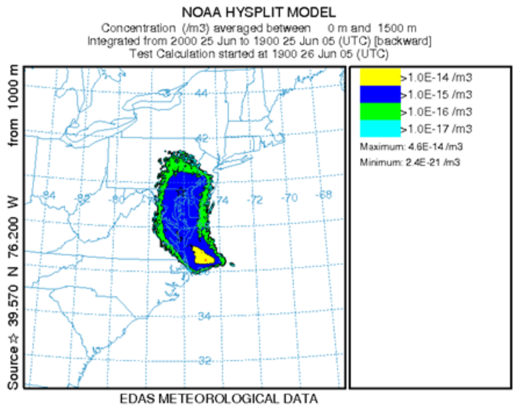

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 21 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 329952 Job Start: Fri Dec 23 14:17:55 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

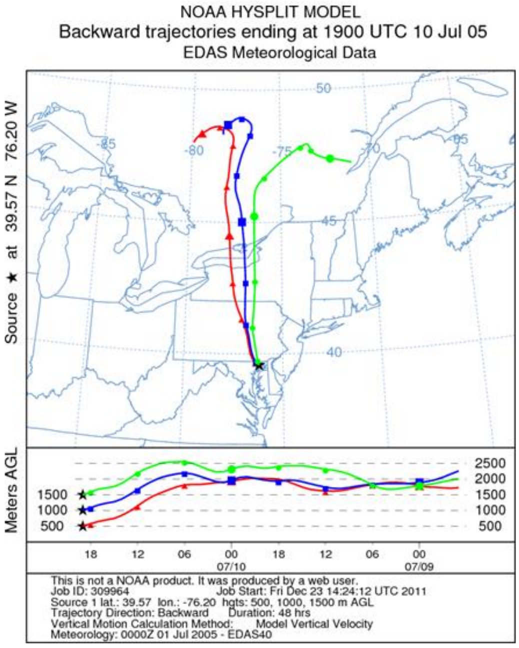

NOAA HYSPLIT MODEL
Concentration (/m3) averaged between 0 m and 1500 m
Integrated from 1900 20 Jun to 1800 20 Jun 05 (UTC) [backward]
Test Calculation started at 1800 21 Jun 05 (UTC)
>1.0E-14 /m3
>1.0E-15 /m3
>1.0E-16 /m3
>1.0E-17 /m3
Maximum: 3.3E-14 /m3
Minimum: 1.9E-20 /m3
Source ☆ 39.570 N 76.200 W from 1000 m
EDAS METEOROLOGICAL DATA

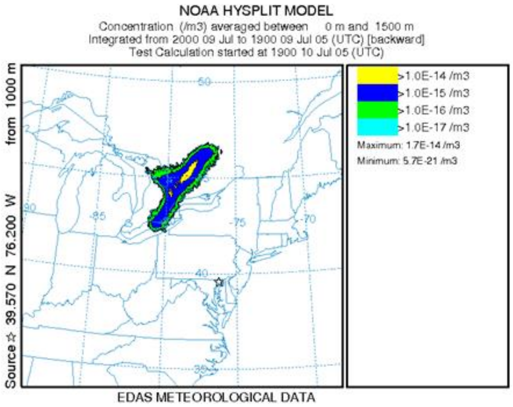

NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 25 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 379955 Job Start: Fri Dec 23 14:19:58 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

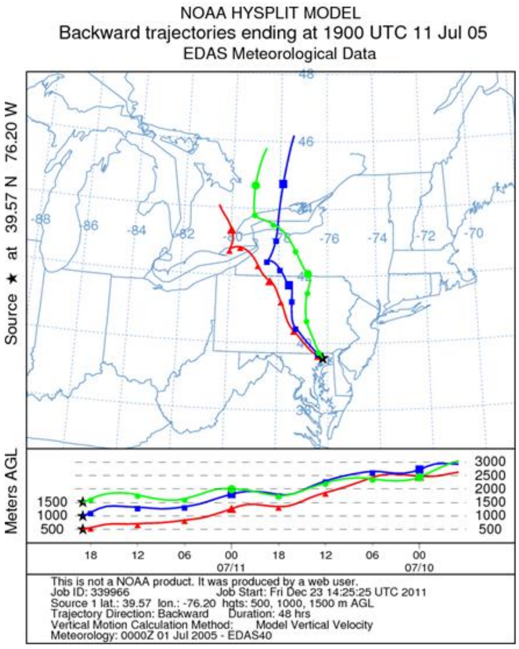

NOAA HYSPLIT MODEL
Concentration (/m3) averaged between 0 m and 1500 m
Integrated from 2100 24 Jun to 2000 24 Jun 05 (UTC) [backward]
Test Calculation started at 2000 25 Jun 05 (UTC)
>1.0E-14 /m3
>1.0E-15 /m3
>1.0E-16 /m3
>1.0E-17 /m3
Maximum: 2.2E-14 /m3
Minimum: 4.3E-21 /m3
Source ☆ 39.570 N 76.200 W from 1000 m
EDAS METEOROLOGICAL DATA

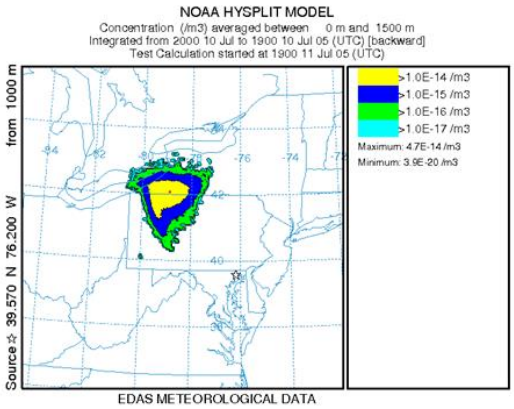

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 26 Jun 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 399958 Job Start: Fri Dec 23 14:21:06 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Jun 2005 - EDAS40

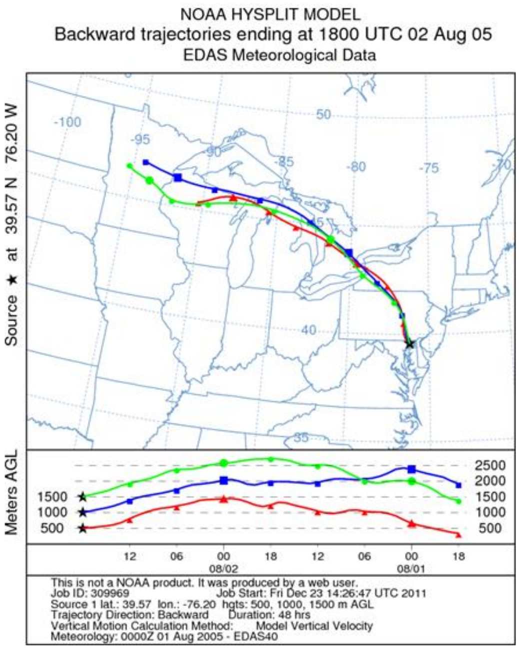

NOAA HYSPLIT MODEL
Concentration (/m3) averaged between 0 m and 1500 m
Integrated from 2000 25 Jun to 1900 25 Jun 05 (UTC) [backward]
Test Calculation started at 1900 26 Jun 05 (UTC)
>1.0E-14 /m3
>1.0E-15 /m3
>1.0E-16 /m3
>1.0E-17 /m3
Maximum: 4.6E-14 /m3
Minimum: 2.4E-21 /m3
Source ☆ 39.570 N 76.200 W from 1000 m
EDAS METEOROLOGICAL DATA

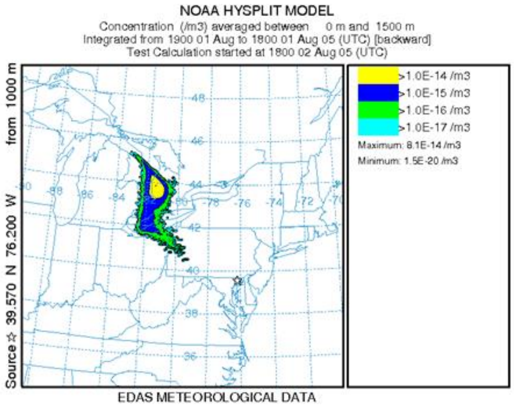

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 10 Jul 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 309964 Job Start: Fri Dec 23 14:24:12 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Jul 2005 - EDAS40

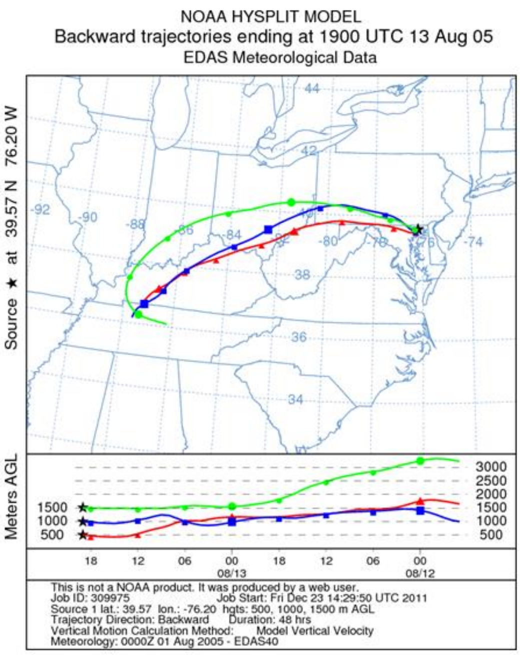

NOAA HYSPLIT MODEL
Concentration (/m3) averaged between 0 m and 1500 m
Integrated from 2000 09 Jul to 1900 09 Jul 05 (UTC) [backward]
Test Calculation started at 1900 10 Jul 05 (UTC)
>1.0E-14 /m3
>1.0E-15 /m3
>1.0E-16 /m3
>1.0E-17 /m3
Maximum: 1.7E-14 /m3
Minimum: 5.7E-21 /m3
Source ☆ 39.570 N 76.200 W from 1000 m
EDAS METEOROLOGICAL DATA

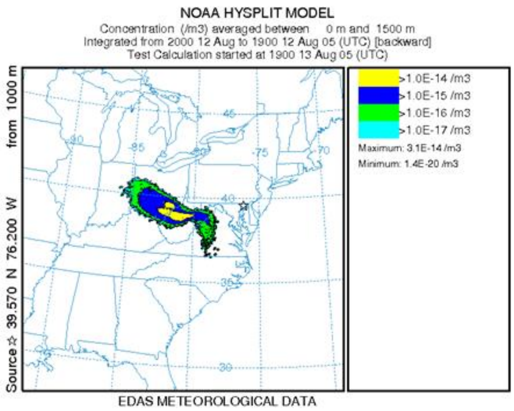

NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 11 Jul 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 339966 Job Start: Fri Dec 23 14:25:25 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Jul 2005 - EDAS40


NOAA HYSPLIT MODEL
Concentration (/m3) averaged between 0 m and 1500 m
Integrated from 2000 10 Jul to 1900 10 Jul 05 (UTC) [backward]
Test Calculation started at 1900 11 Jul 05 (UTC)
>1.0E-14 /m3
>1.0E-15 /m3
>1.0E-16 /m3
>1.0E-17 /m3
Maximum: 4.7E-14 /m3
Minimum: 3.9E-20 /m3
Source ☆ 39.570 N 76.200 W from 1000 m
EDAS METEOROLOGICAL DATA


NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 02 Aug 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 309969 Job Start: Fri Dec 23 14:26:47 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Aug 2005 - EDAS40


NOAA HYSPLIT MODEL
Concentration (/m3) averaged between 0 m and 1500 m
Integrated from 1900 01 Aug to 1800 01 Aug 05 (UTC) [backward]
Test Calculation started at 1800 02 Aug 05 (UTC)
>1.0E-14 /m3
>1.0E-15 /m3
>1.0E-16 /m3
>1.0E-17 /m3
Maximum: 8.1E-14 /m3
Minimum: 1.5E-20 /m3
Source☆ 39.570 N 76.200 W from 1000 m
EDAS METEOROLOGICAL DATA


NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 13 Aug 05
EDAS Meteorological Data
Source ★ at 39.57 N 76.20 W
Meters AGL
This is not a NOAA product. It was produced by a web user.
Job ID: 309975 Job Start: Fri Dec 23 14:29:50 UTC 2011
Source 1 lat.: 39.57 lon.: -76.20 hgts: 500, 1000, 1500 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Aug 2005 - EDAS40


NOAA HYSPLIT MODEL
Concentration (/m3) averaged between 0 m and 1500 m
Integrated from 2000 12 Aug to 1900 12 Aug 05 (UTC) [backward]
Test Calculation started at 1900 13 Aug 05 (UTC)
>1.0E-14 /m3
>1.0E-15 /m3
>1.0E-16 /m3
>1.0E-17 /m3
Maximum: 3.1E-14 /m3
Minimum: 1.4E-20 /m3
Source☆ 39.570 N 76.200 W from 1000 m
EDAS METEOROLOGICAL DATA

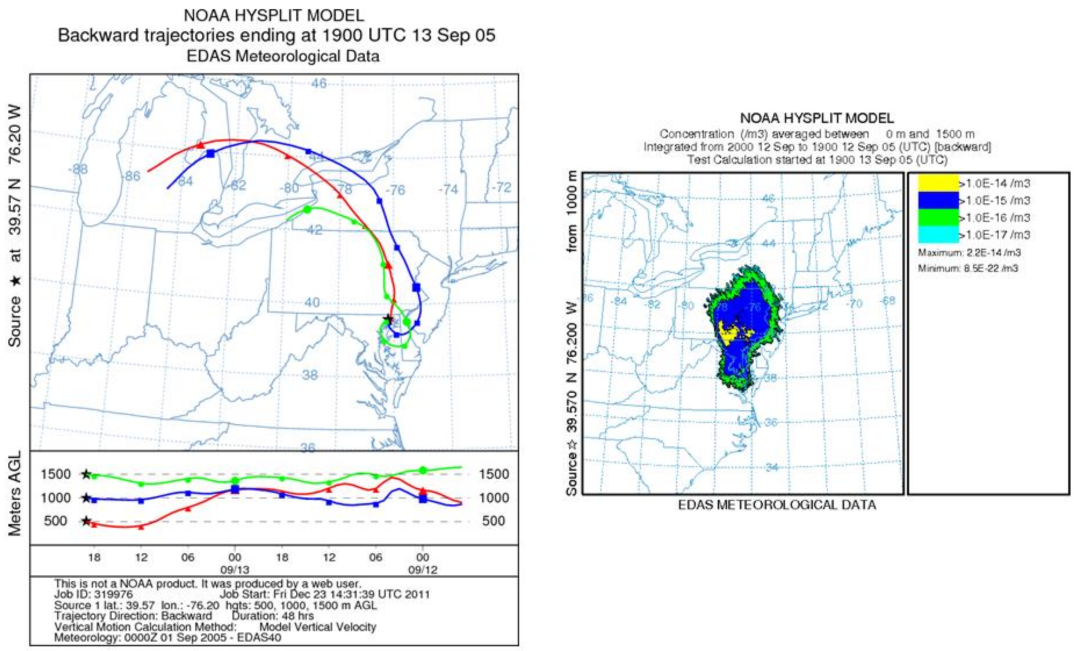
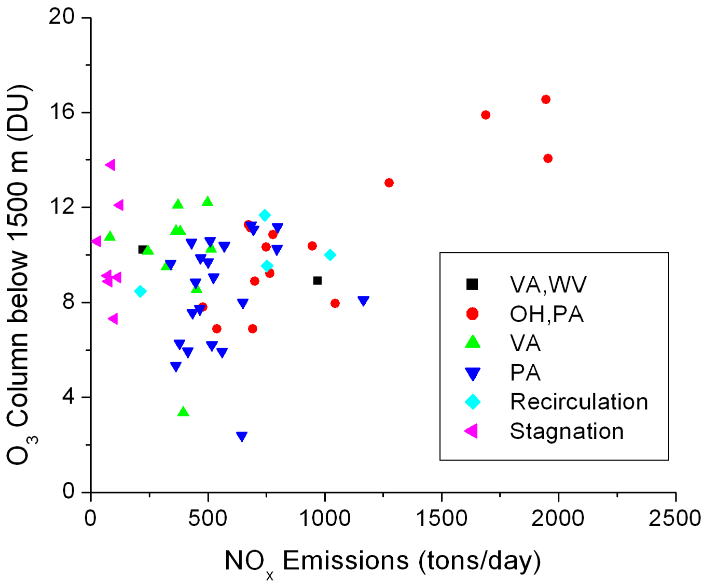
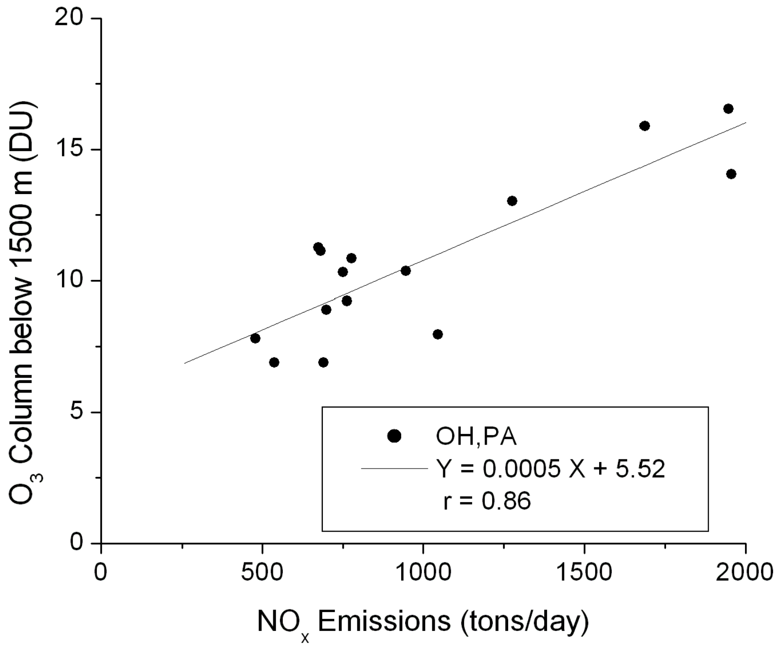


Figure S9. Similar plots as Figure 13 except in a) and b) all coefficients in Table 1 are doubled, e.g., Equation 1 is expressed in $Emission_{total}=Emission_{MD,i}+Emission_{PA,i-1}+0.5Emission_{OH,i-1}$; c) and d) all coefficients in Table 1 are divided by two, e.g., Equation 1 is expressed in $Emission_{total}=Emission_{MD,i}+0.25Emission_{PA,i-1}+0.125Emission_{OH,i-1}$

a)

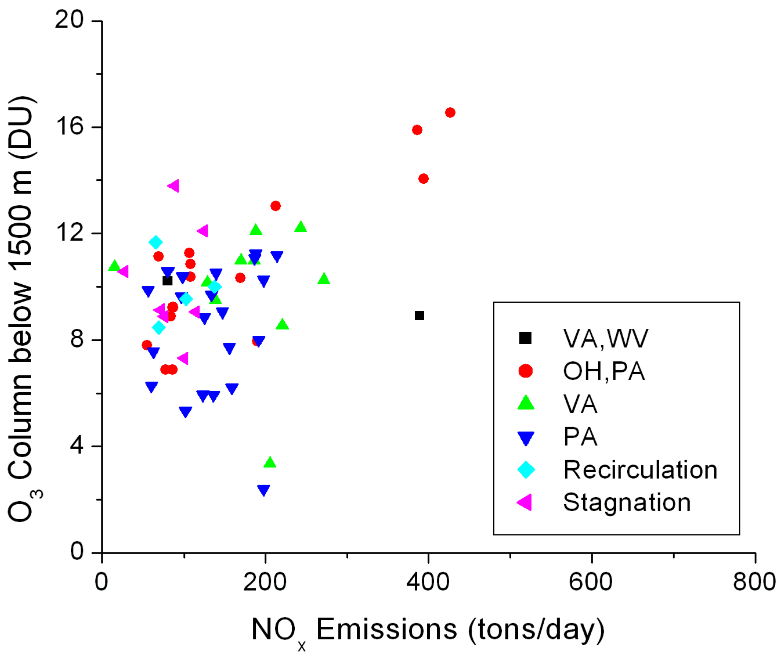


b)



20
15
10
5
0
O_3 Column below 1500 m (DU)
0
500
1000
1500
2000
NO_x Emissions (tons/day)
OH,PA
Y = 0.0005 X + 5.52
r = 0.86

c)



20
16
12
8
4
0
O_3 Column below 1500 m (DU)
0
200
400
600
800
NO_x Emissions (tons/day)
VA,WV
OH,PA
VA
PA
Recirculation
Stagnation

d)

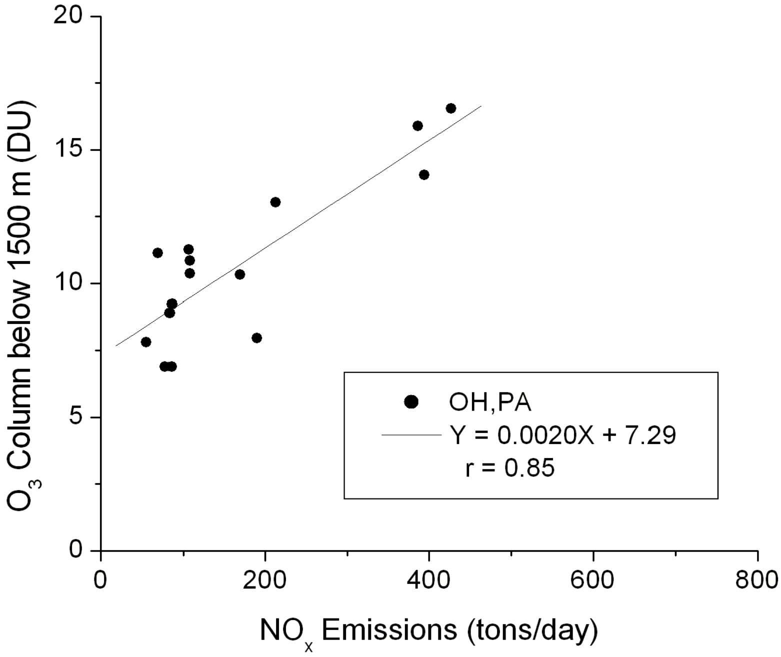
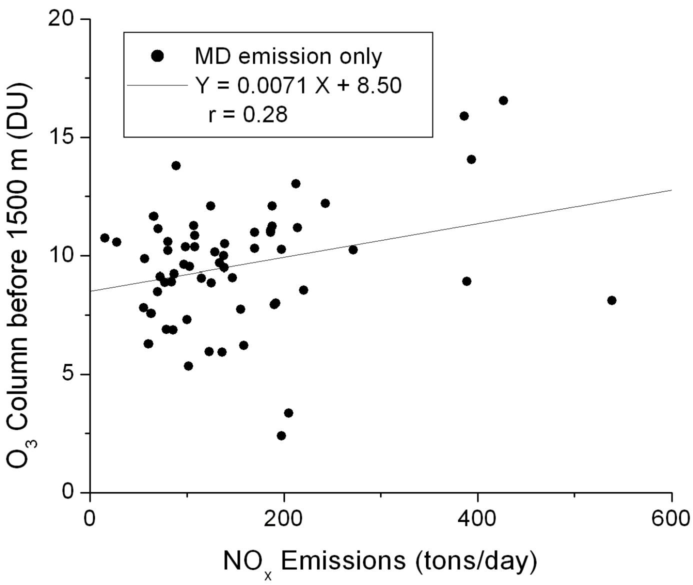


Figure S10. RAMMPP ozone column abundances versus CEMS NO_x emissions in



MD