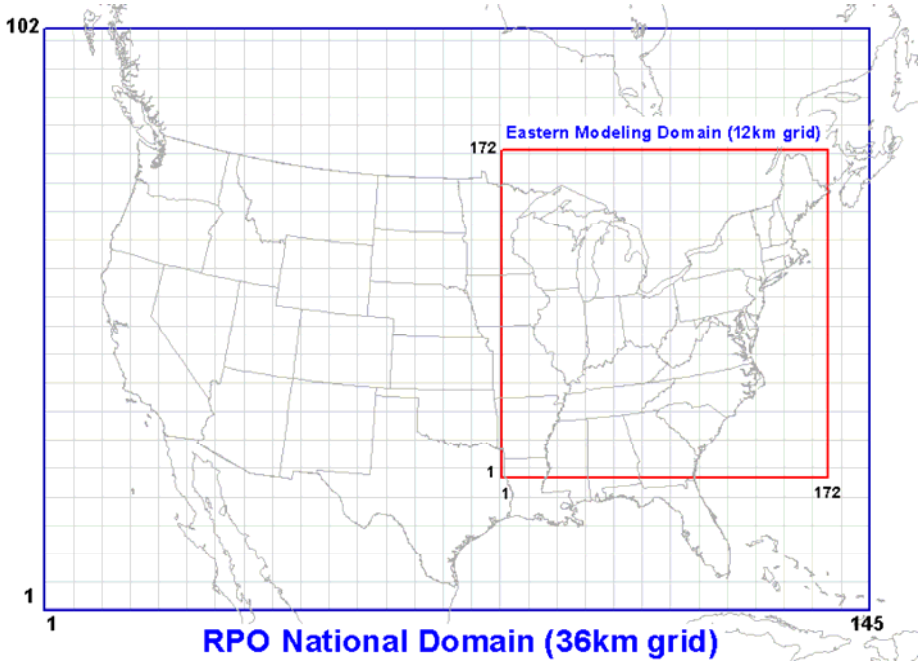
Appendix 8C

OTC Modeling
Grid Configurations

Developed by NYDEC


102
Eastern Modeling Domain (12km grid)
172
1
1
172
1
1
145
RPO National Domain (36km grid)

OTC Grid Definitions for MM5 and CMAQ

Model	Columns Dot (nx)	Rows Dot (ny)	X-Origin (km)	Y-Origin (km)
MM5 36-km	149	129	-2664	-2304
CMAQ 36-km	145	102	-2628	-1728
MM5 12-km	175	175	252	-900
CMAQ 12-km	172	172	264	-888

NYDEC, June 2005

OTC MM5/SMOKE/CMAQ Modeling System Grid Configurations

OTC MM5/SMOKE/CMAQ modeling system for 2002 annual simulation is applied with a Lambert Conformal Conic projection with parallels at 33N and 45N. A spherical earth radius of 6370km is used in these programs.

MM5 Setup

MM5 was run with two-way nesting at 36 and 12km horizontal grid spacing and with 29 vertical layers. The top is at 50 mb.

For 36km domain, the center is at 97W and 40N. There are 149 grids (dot-points) in east-west direction and 129 grids (dot-points) in north-south direction. The south-west corner is at (-2664km, -2304km) and the north-east corner is at (2664km, 2304km)

For 12km domain, there are 175 grids in east-west direction and 175 grids in north-south direction. The south-west corner is at (252km, -900km) and the north-east corner is at (2340km, 1188km)

The 30 sigma-levels for the 29 vertical layers are:

1.0000, 0.9974, 0.9940, 0.9890, 0.9820, 0.9720, 0.9590, 0.9430, 0.9230, 0.8990, 0.8710, 0.8390, 0.8030, 0.7630, 0.7180, 0.6680, 0.6180, 0.5680, 0.5180, 0.4680, 0.4180, 0.3680, 0.3180, 0.2680, 0.2180, 0.1680, 0.1230, 0.0800, 0.0400, 0.0000

CMAQ Setup

CMAQ 36km modeling domain has 145 cells in east-west direction and 102 cells in north-south direction. The south-west corner is at (-2628km, -1728km) and the north-east corner is at (2592km, 1944km)

CMAQ 12km modeling domain has 172 cells in east-west directions and 172 cells in north-south direction. The south-west corner is at (264km, -888km) and the north-east corner is at (2328km, 1176km)

There are 22 vertical layers for CMAQ. The sigma-levels for these 22 layers are:

1.0000, 0.9974, 0.9940, 0.9890, 0.9820, 0.9720, 0.9590, 0.9430, 0.9230, 0.8990, 0.8710, 0.8390, 0.8030, 0.7630, 0.7180, 0.6680, 0.5680, 0.4680, 0.3680, 0.2680, 0.1680, 0.0800, 0.0000

SMOKE Setup

SMOKE modeling domains are same as CMAQ, except that the emissions are limited to the lower 16 CMAQ layers.

OTC Vertical Layer Definition for MM5 Simulations and Approach For Reducing CMAQ Layers By Collapsing Multiple MM5 Layers

MM5					CMAQ				
Layer	Sigma	Pres(mb)	Height(m)	Depth(m)	Layer	Sigma	Pres(mb)	Height(m)	Depth(m)
29	0.000	50	18600	2145	23	0.000	50	18600	4290
28	0.040	88.5	16450	2145					
27	0.080	127.1	14300	1460	21	0.080	127.1	14300	2920
26	0.123	168.5	12800	1460					
25	0.168	211.8	11400	1200	20	0.168	211.8	11400	2390
24	0.218	260.0	10200	1200					
23	0.268	308.1	8990	934	19	0.268	308.1	8990	1870
22	0.318	356.3	8060	934					
21	0.368	404.5	7120	772	18	0.368	404.5	7120	1540
20	0.418	452.6	6350	772					
19	0.468	500.8	5580	662	17	0.468	500.8	5580	1320
18	0.518	549.0	4920	662					
17	0.568	597.1	4250	581	16	0.568	597.1	4250	1160
16	0.618	645.3	3670	581					
15	0.668	693.4	3090	532	15	0.668	693.4	3090	532
14	0.718	741.6	2560	455	14	0.781	741.6	2560	455
13	0.763	785.0	2110	388	13	0.763	785.0	2110	388
12	0.803	823.5	1720	337	12	0.803	823.5	1720	337
11	0.839	858.2	1380	290	11	0.839	858.2	1380	290
10	0.871	889.0	1090	247	10	0.871	889.0	1090	247
9	0.899	916.0	844	207	9	0.899	916.0	844	207
8	0.923	939.1	637	169	8	0.923	939.1	637	169
7	0.943	958.3	468	133	7	0.943	958.3	468	133
6	0.959	973.7	334	107	6	0.959	973.7	334	107
5	0.972	986.3	227	82	5	0.972	986.3	227	82
4	0.982	995.9	145	57	4	0.982	995.9	145	57
3	0.989	1002.6	89	40	3	0.989	1002.6	89	40
2	0.994	1007.5	48	27	2	0.994	1007.5	48	27
1	0.9974	1010.7	21	21	1	0.9974	1010.7	21	21
0	1.000	1013.24	0	0	0	1.000	1013.24	0	0

Note: Layer-top pressures assume a surface pressure of 1013.24 hPa. Layer-top heights are determined by averaging MM5 (CMAQ)-calculated layer-top heights over time (August 2002) and space (the entire 172x172 domain).