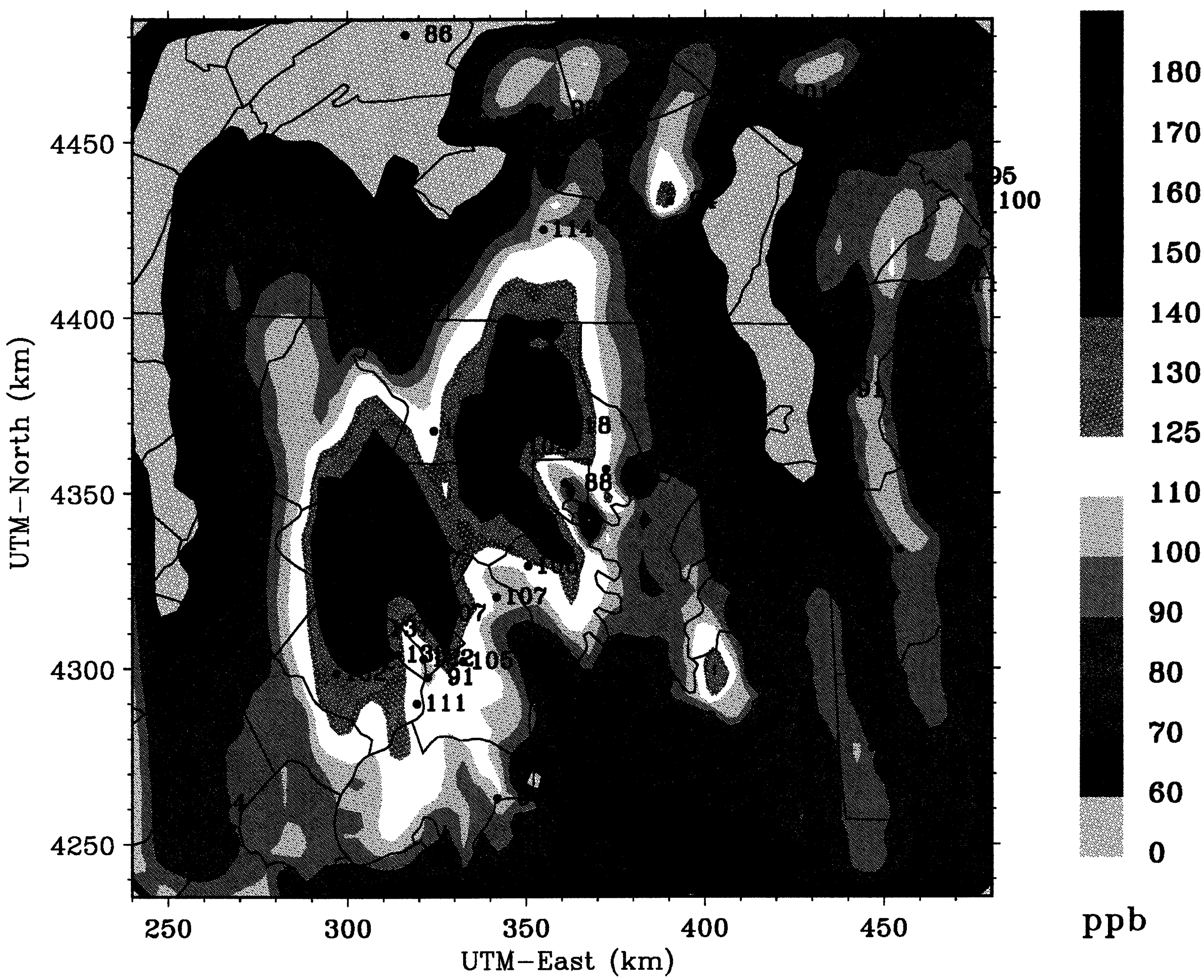
Figure 8(b)

Predicted Daily Max Ozone - 1991 Base Case
UAM-IV Layer 1, Beis2, B/W Domain

0000 - 2400 EST July 16, 1991
Max. = 167.2 ppb, Min. = 30.9 ppb



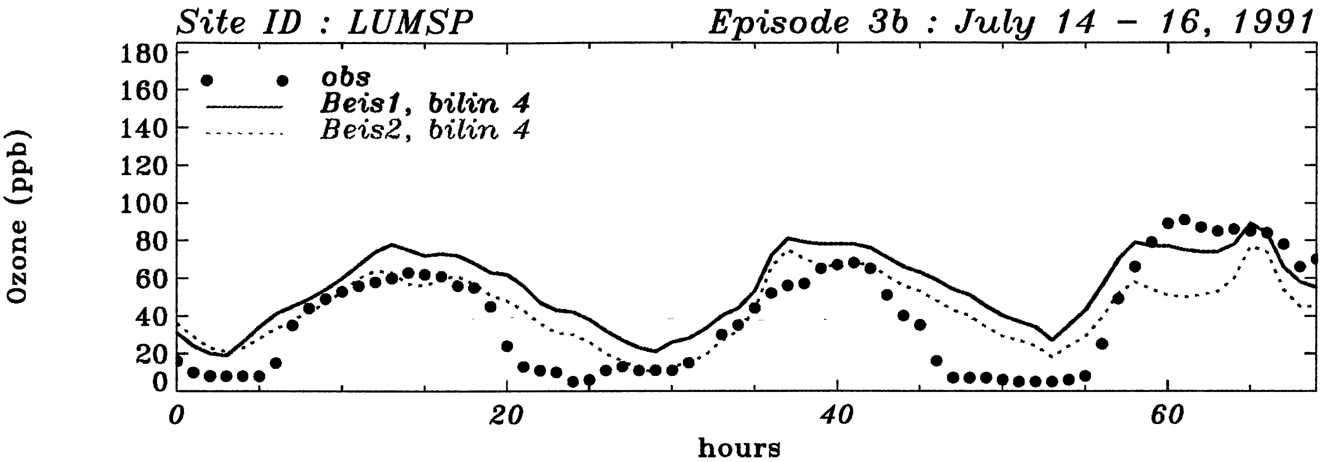
Anthro. emission : 1991 Base case (basA2D2)
Biogenic emission : UAM-BEIS2
Boundary condition : OTAG 1991 Base D2

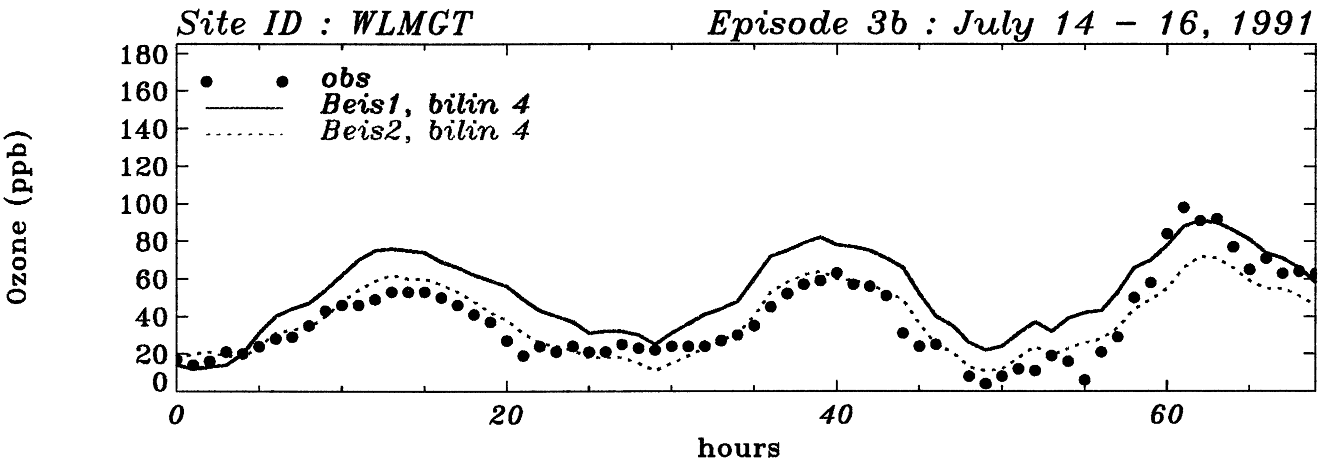
Figure 9

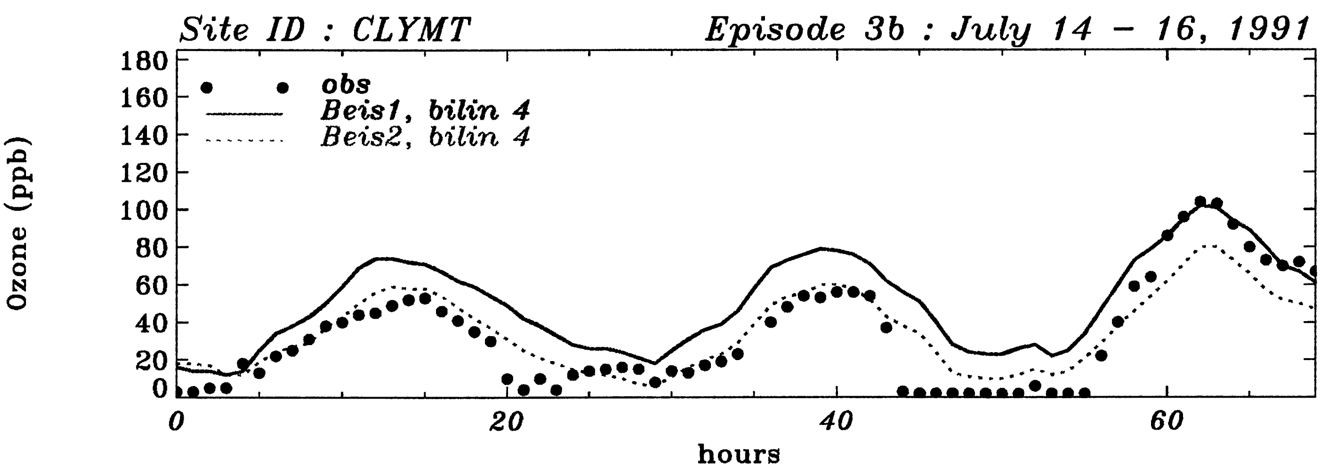
Time Series Plots of Ozone

Simulated vs Observed

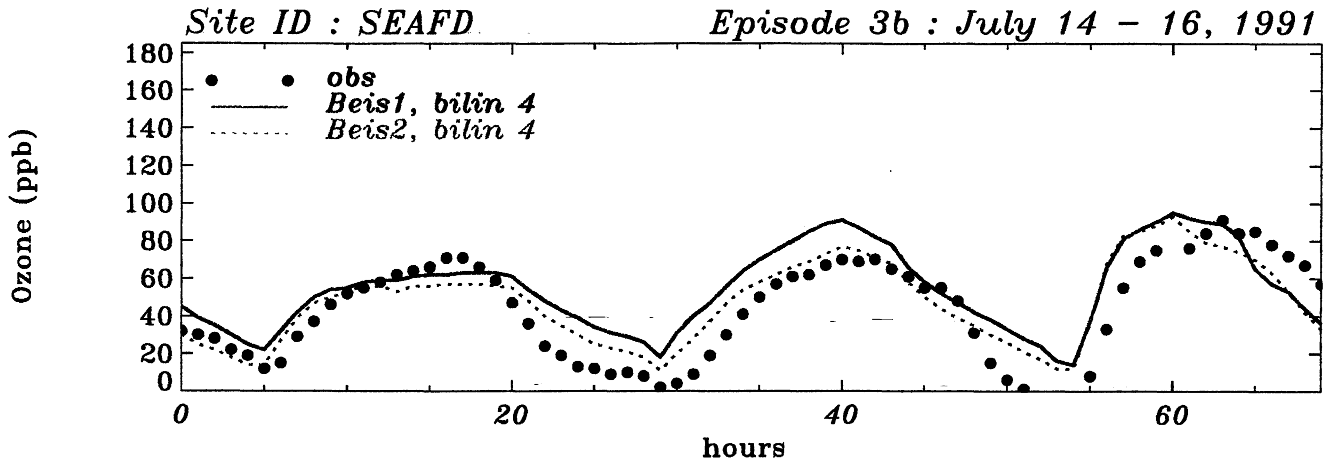
July 14-16, 1991 (Episode 3b)

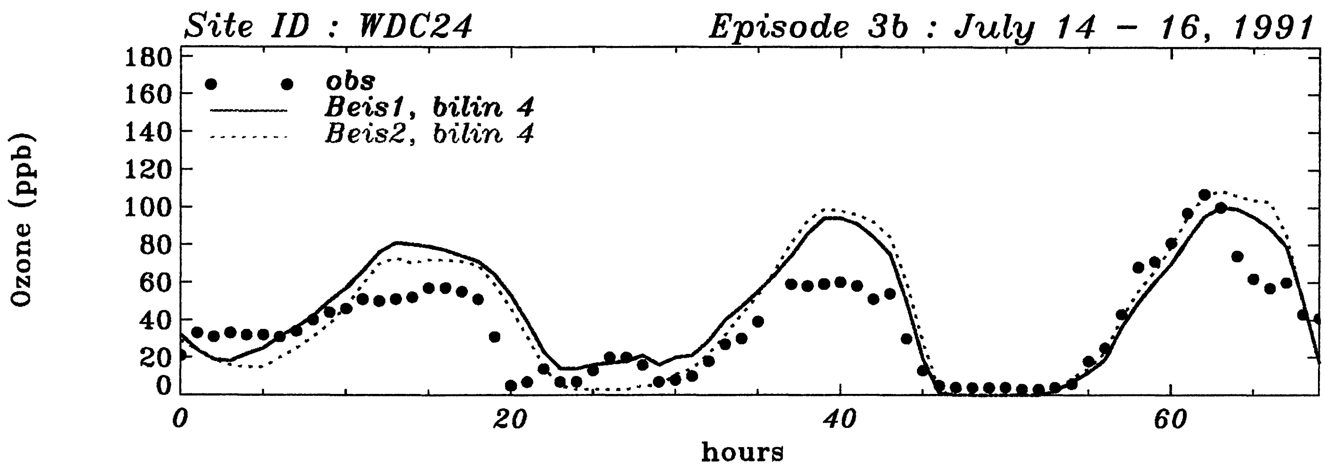


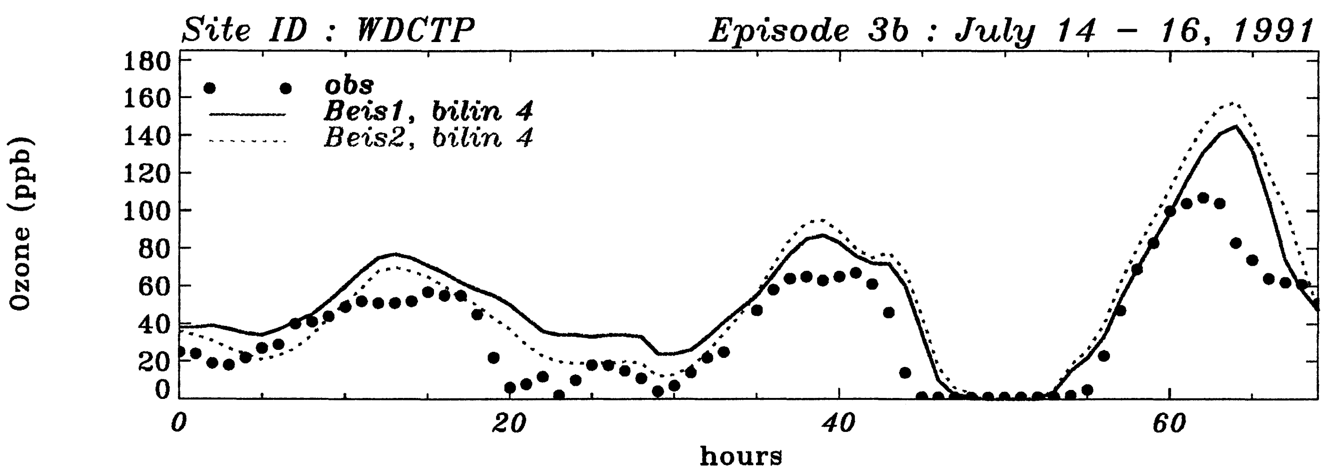




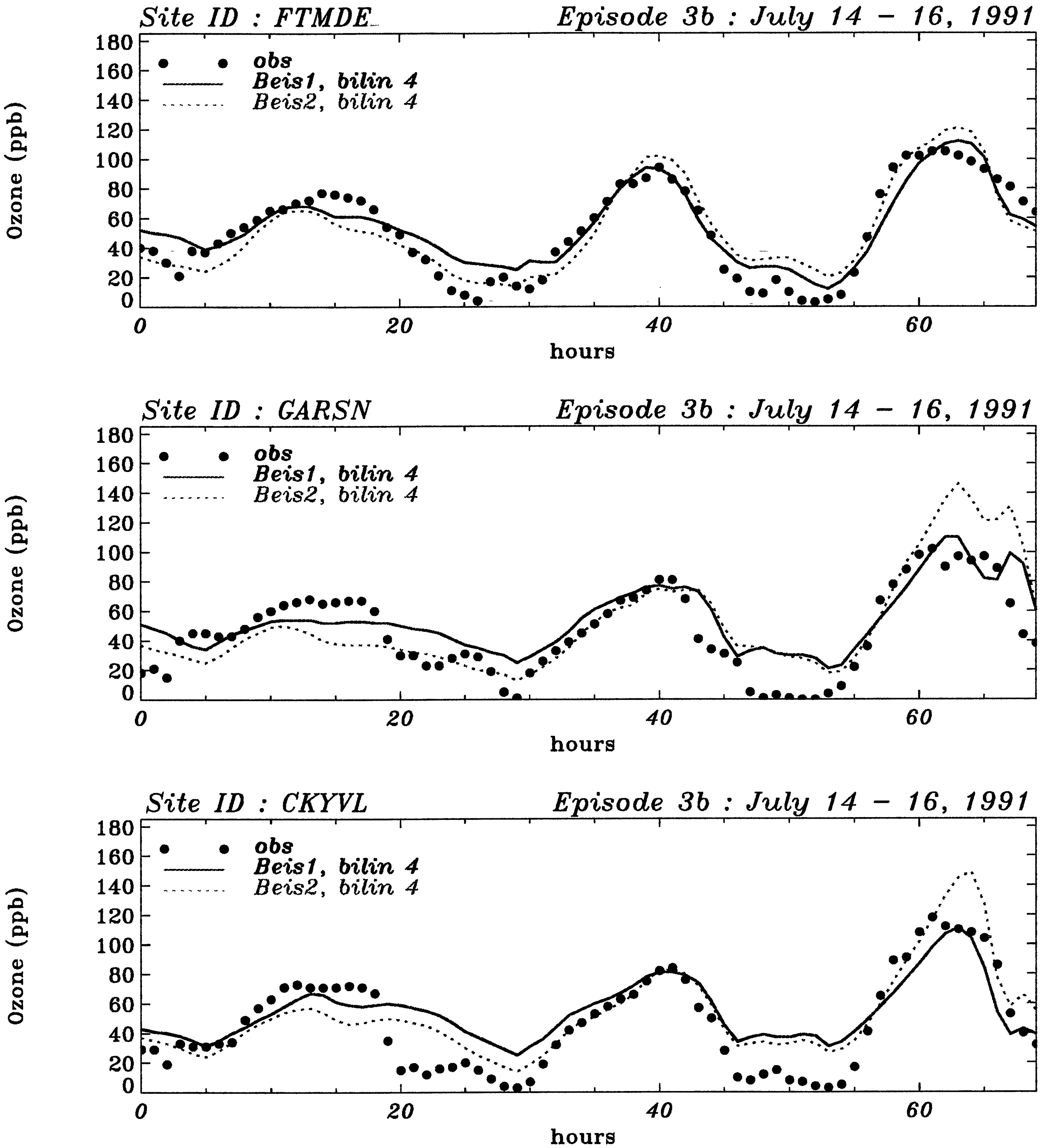
Time Series Plot of Ozone: Simulated vs. Observed
UAM–IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



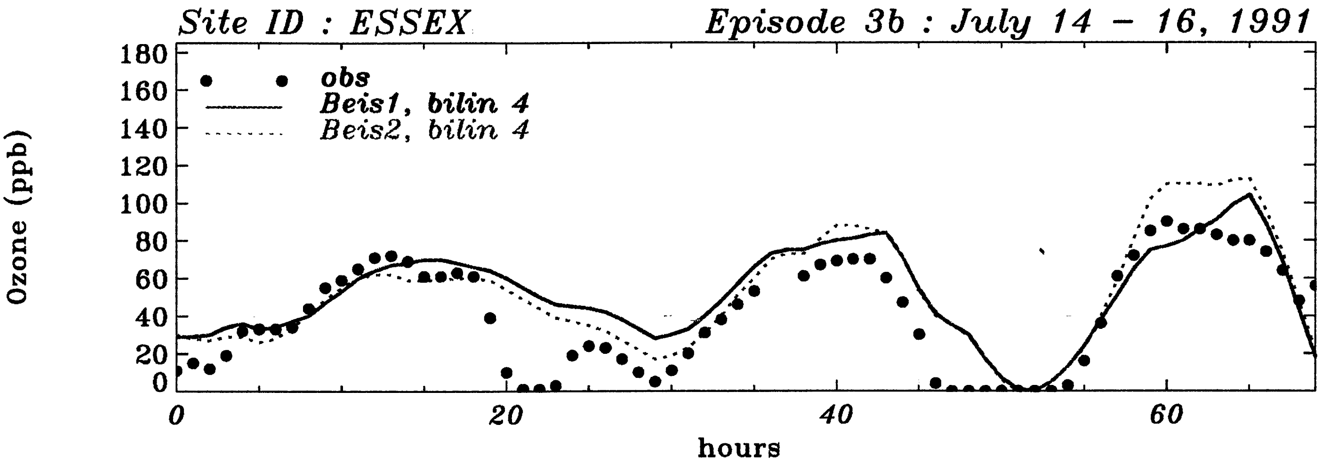


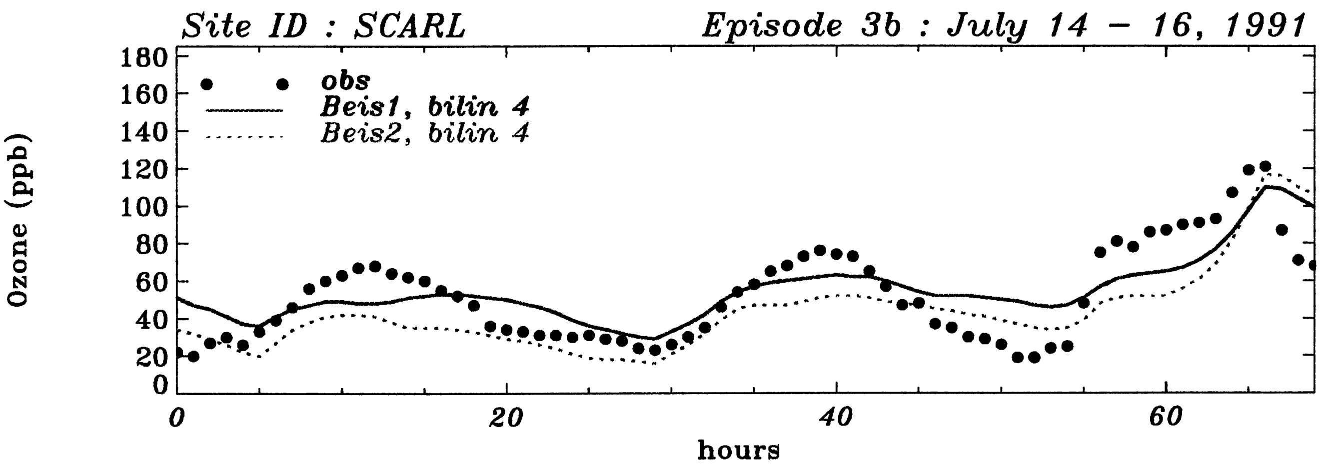


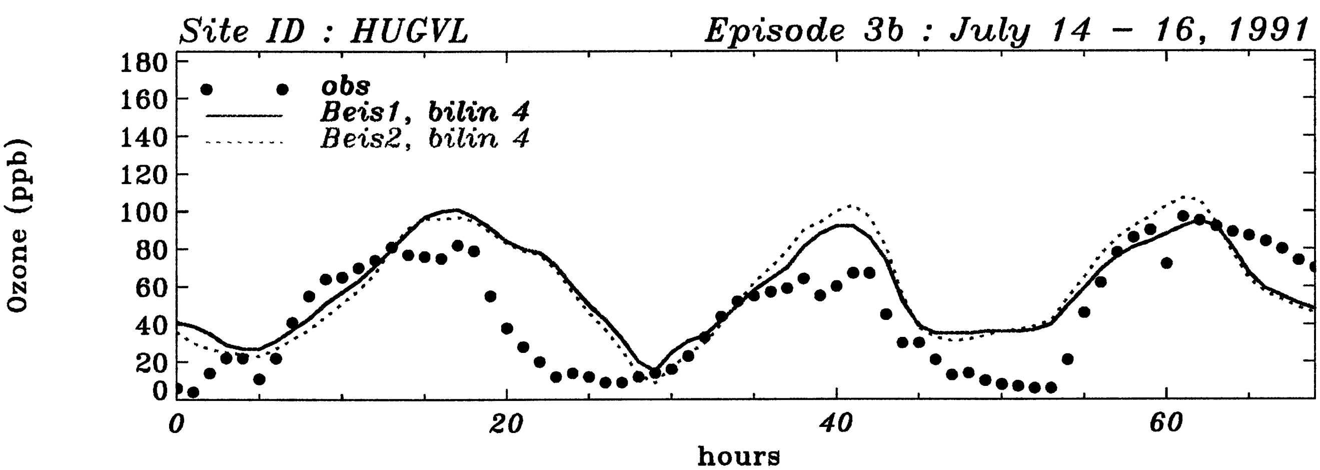
Time Series Plot of Ozone: Simulated vs. Observed
UAM–IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



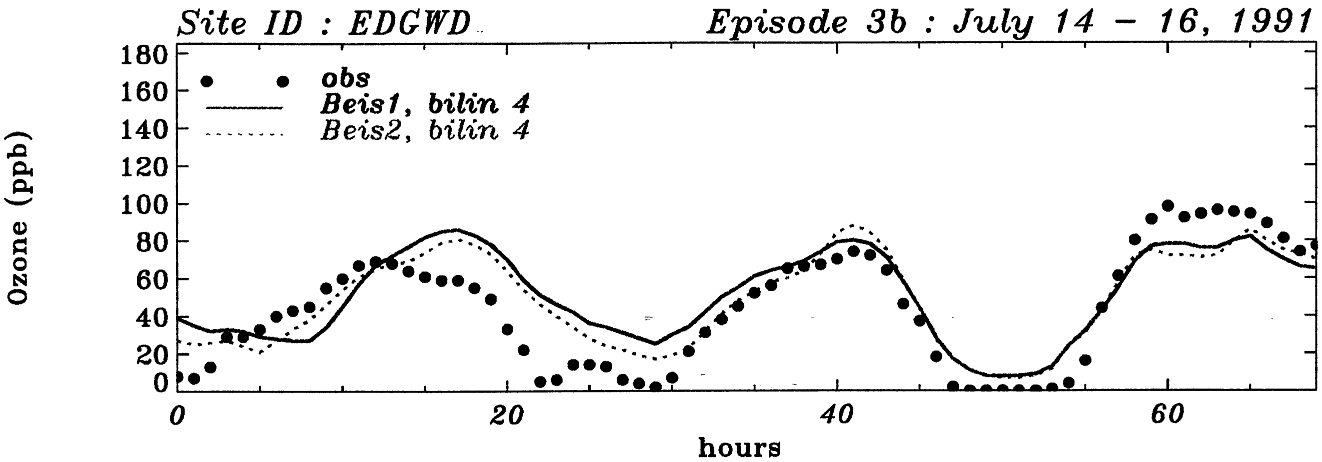
Time Series Plot of Ozone: Simulated vs. Observed
UAM-IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain

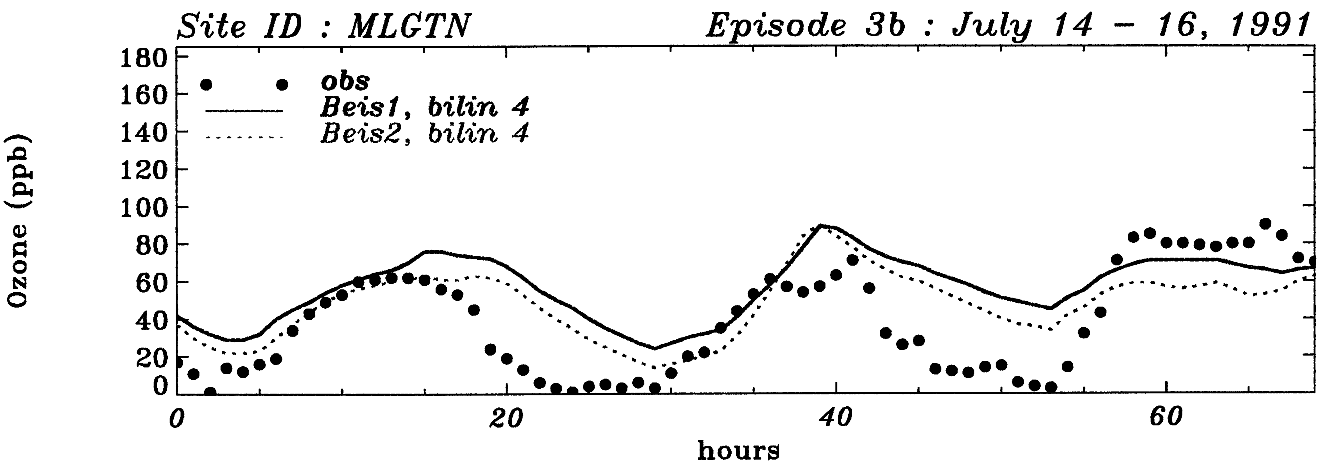


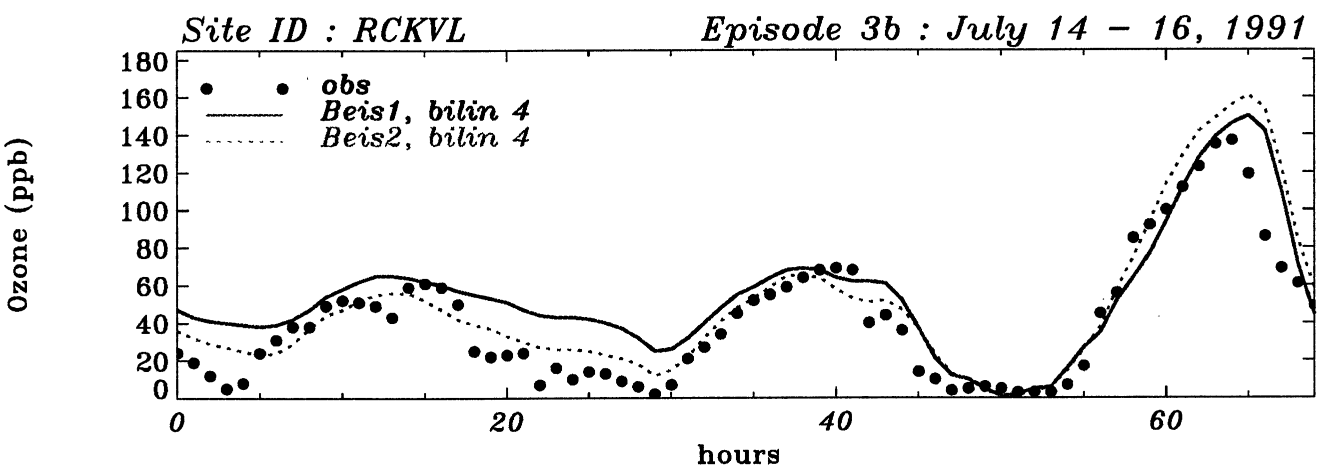




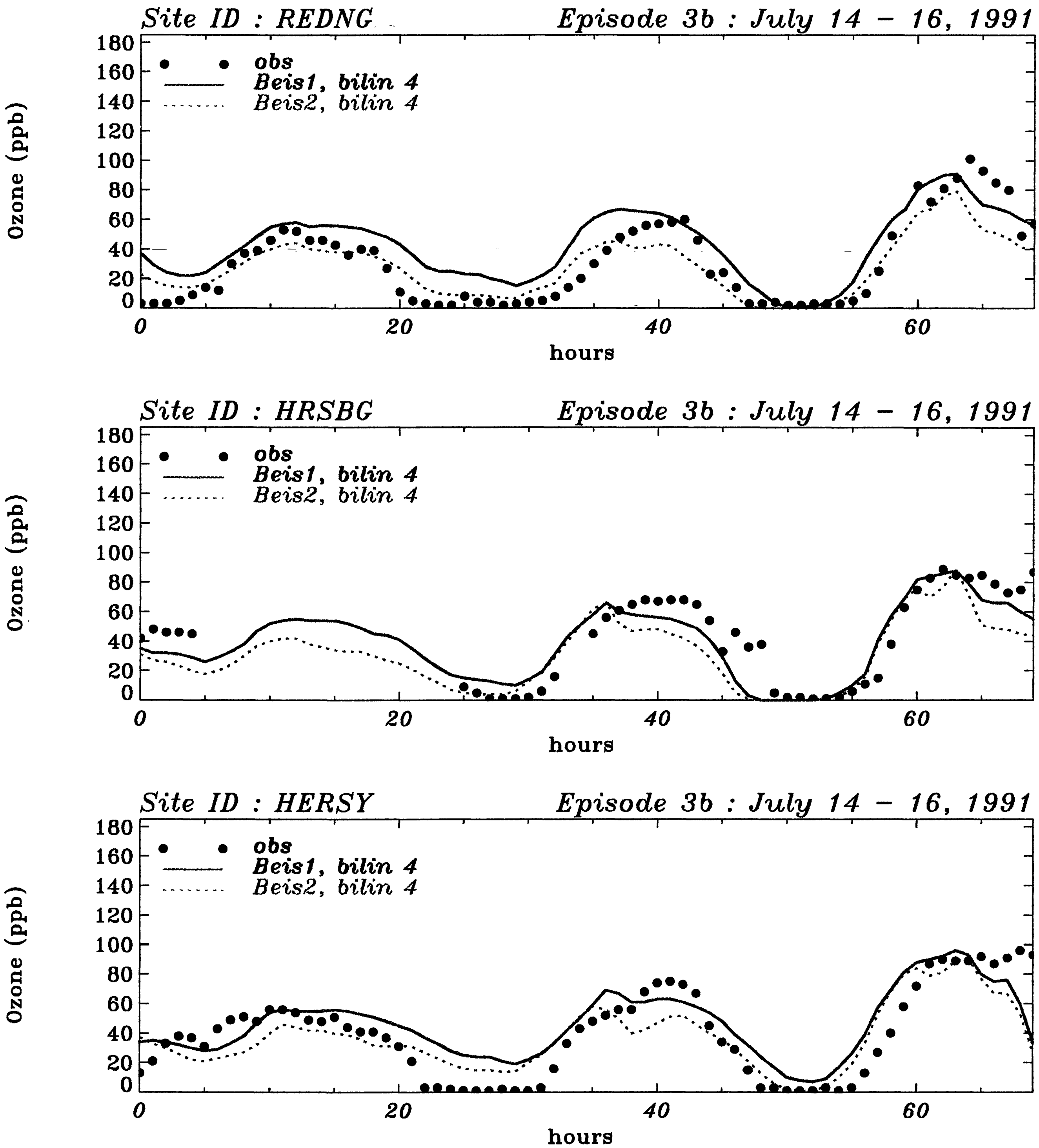
Time Series Plot of Ozone: Simulated vs. Observed
UAM-IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



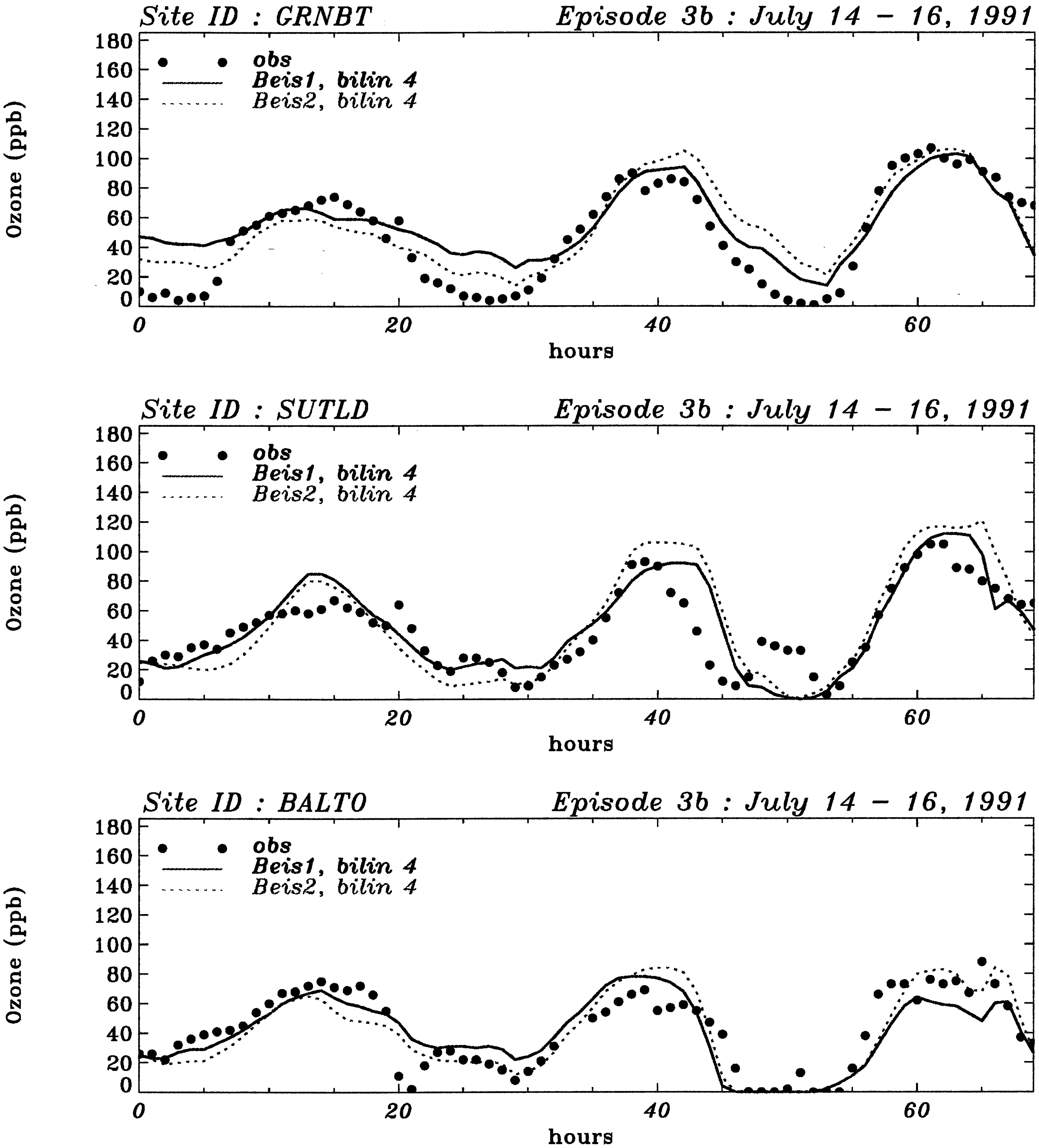




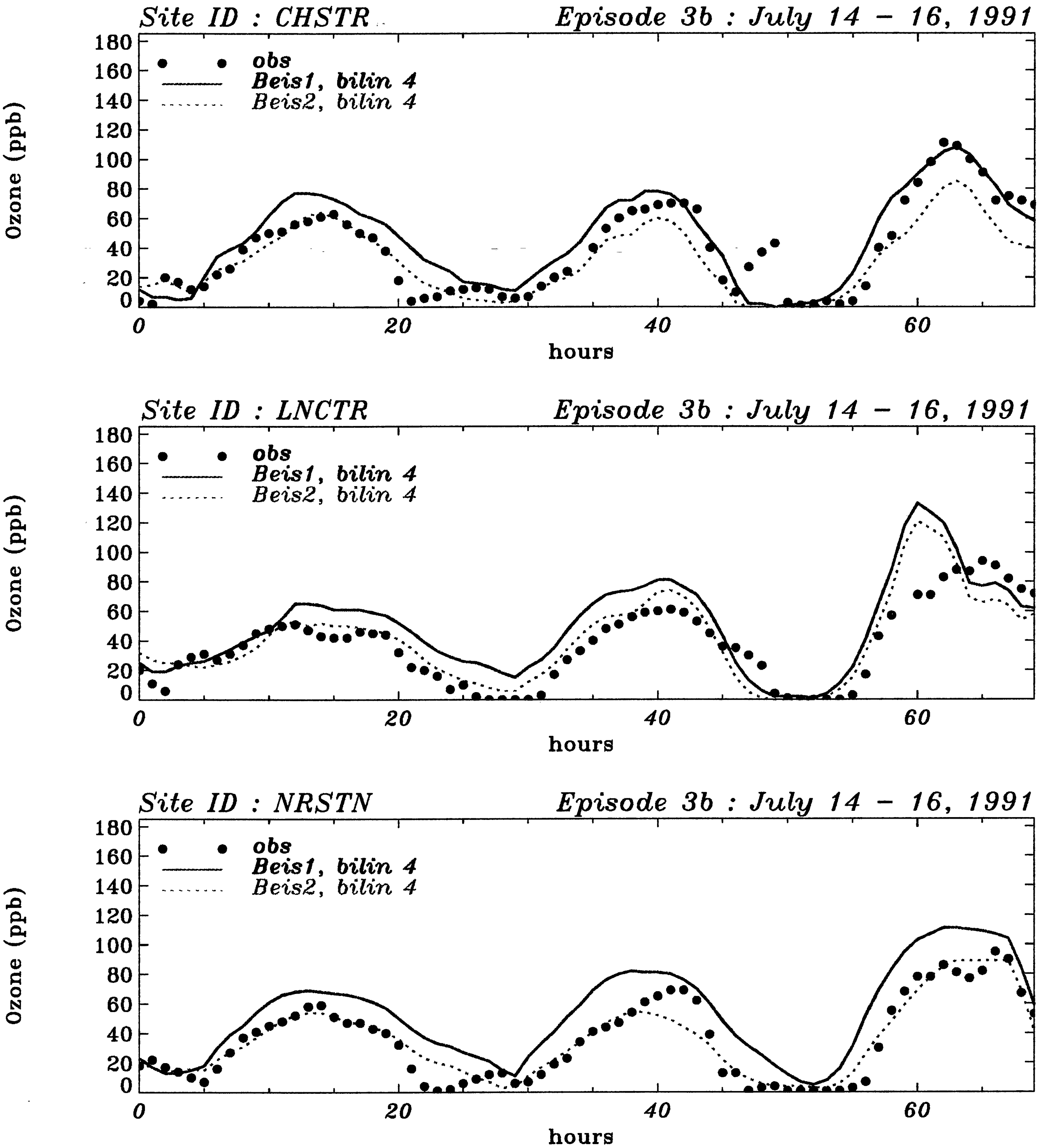
Time Series Plot of Ozone: Simulated vs. Observed
UAM-IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



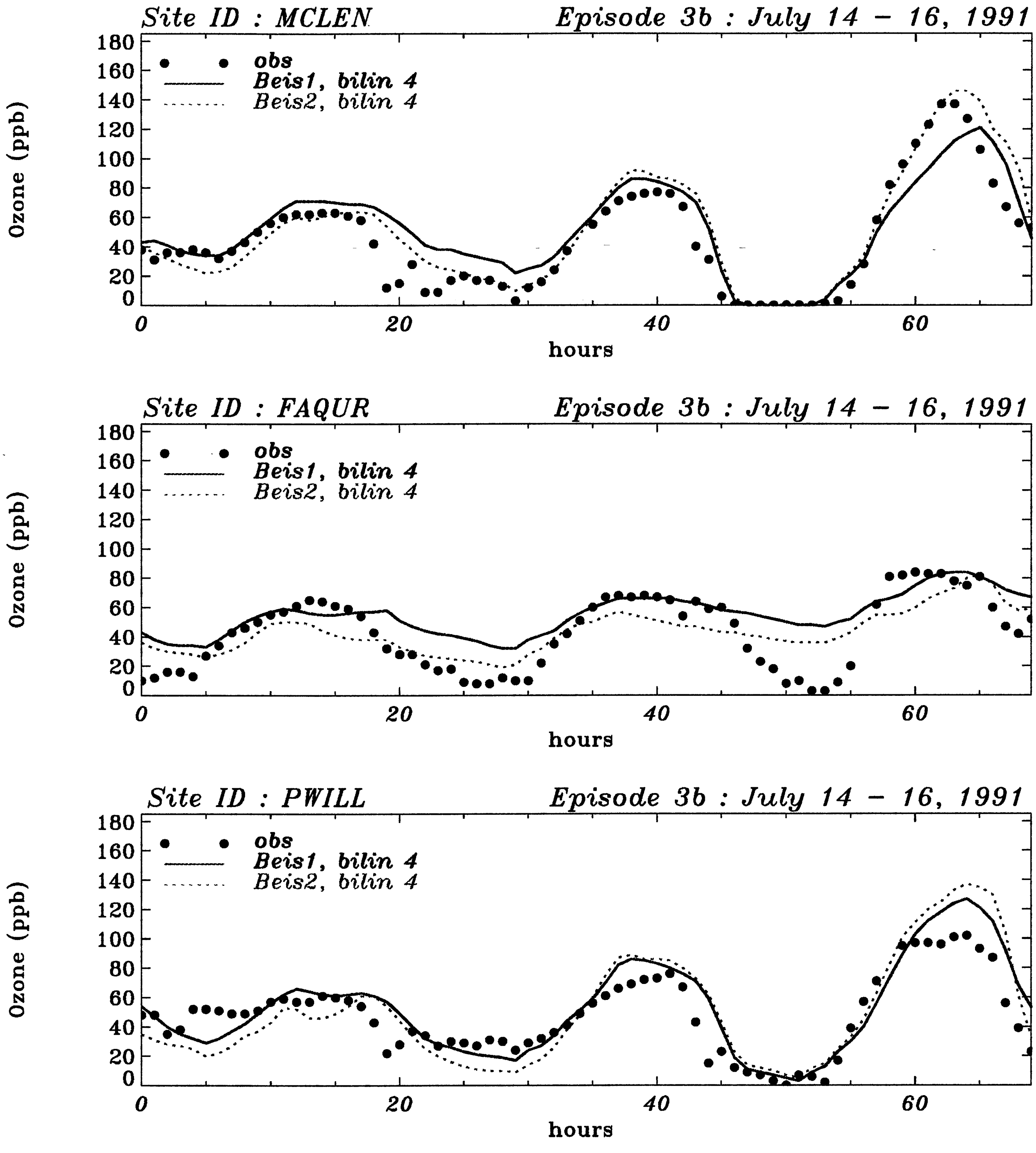
Time Series Plot of Ozone: Simulated vs. Observed
UAM–IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



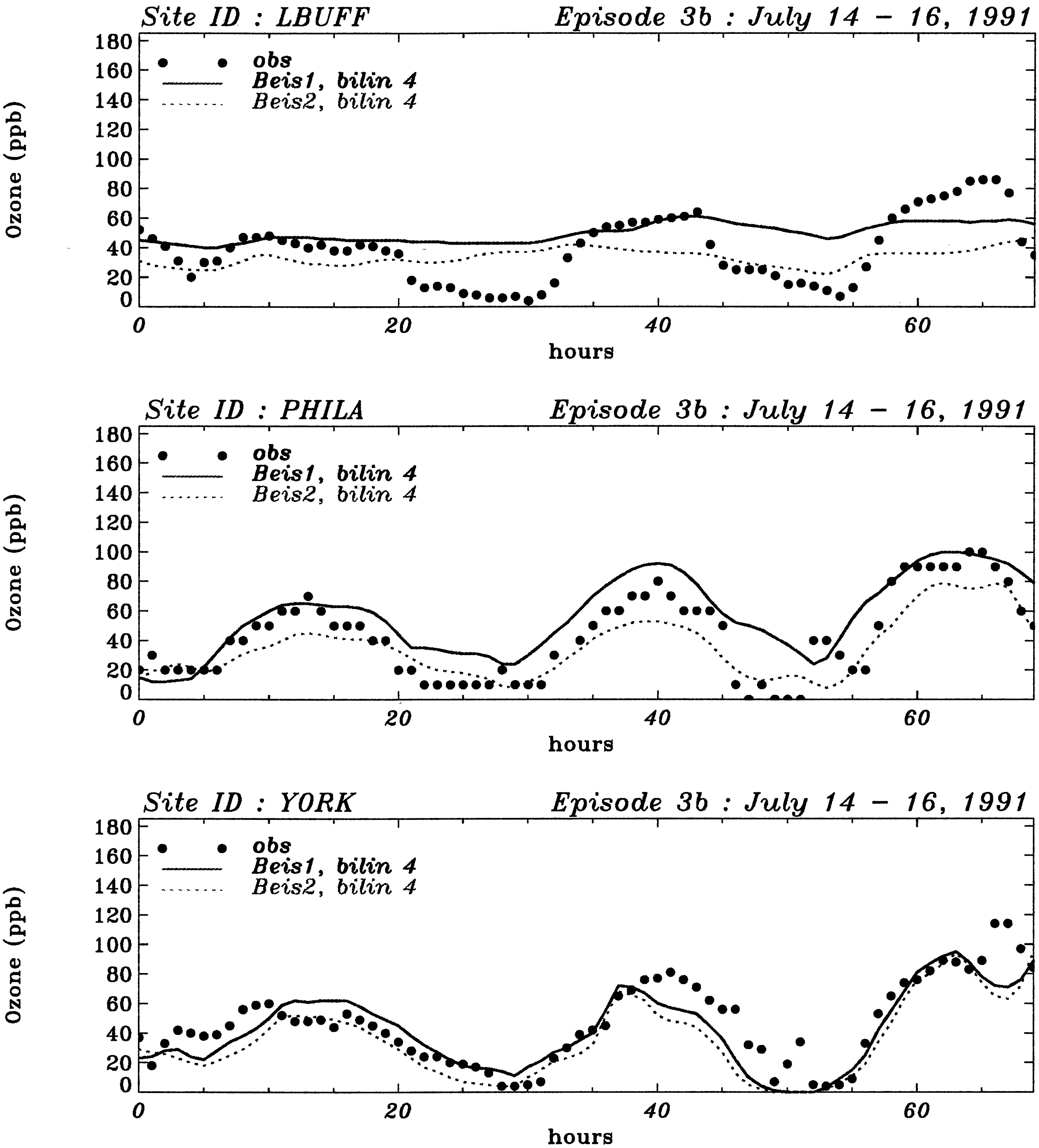
Time Series Plot of Ozone: Simulated vs. Observed
UAM-IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



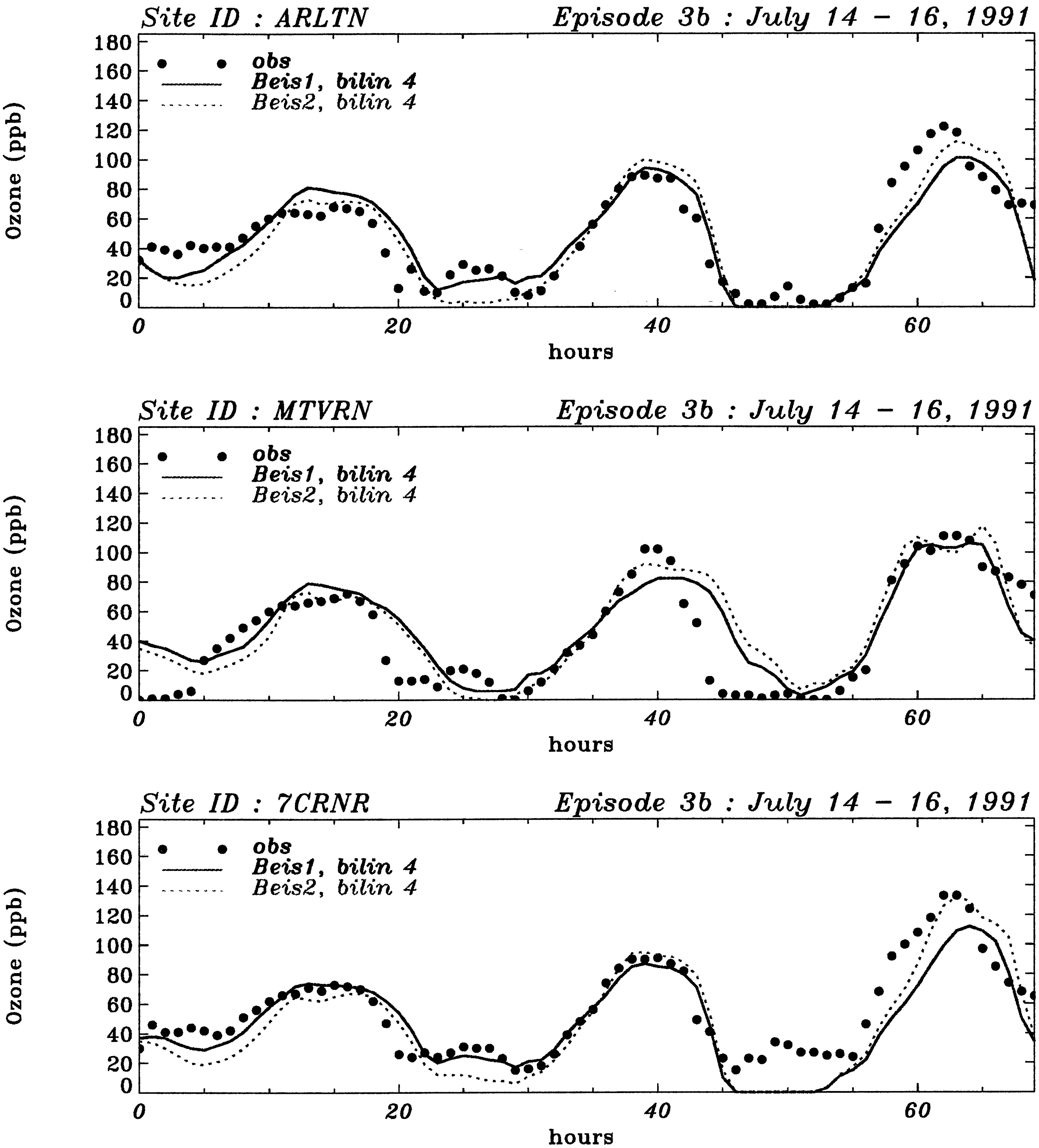
Time Series Plot of Ozone: Simulated vs. Observed
UAM–IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



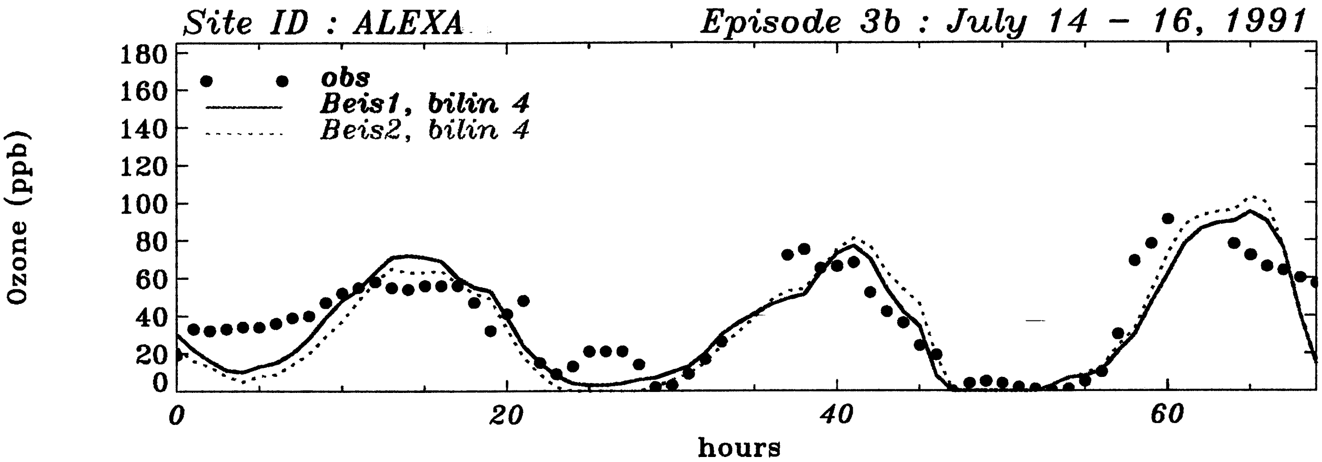
Time Series Plot of Ozone: Simulated vs. Observed
UAM–IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



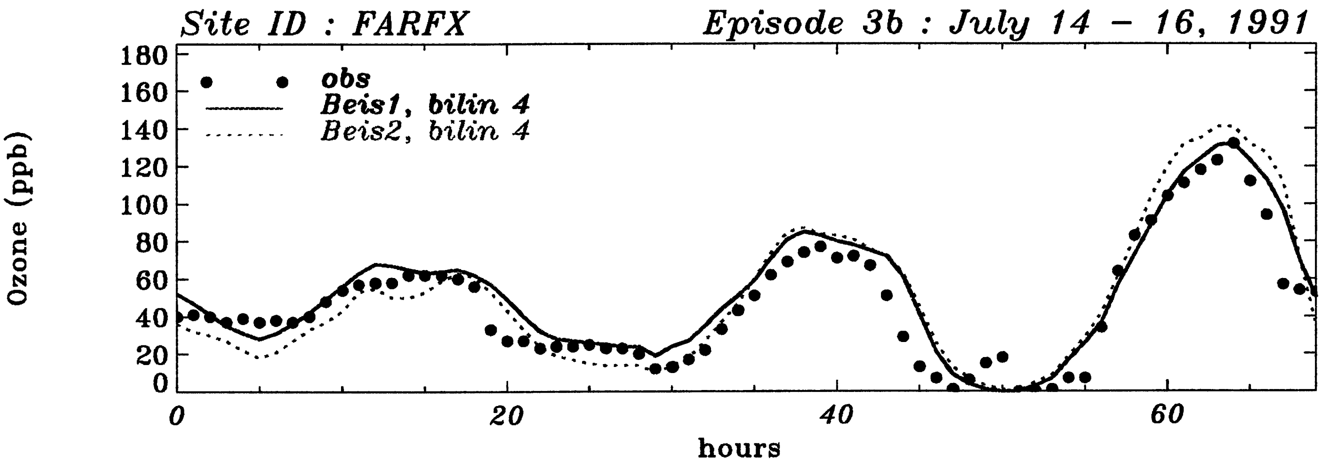
Time Series Plot of Ozone: Simulated vs. Observed
UAM–IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



Time Series Plot of Ozone: Simulated vs. Observed
UAM–IV Layer 1, 91base, Beis1/Beis2 -- B/W Domain



Site ID : ALEXA
Episode 3b : July 14 – 16, 1991
obs
Beis1, bilin 4
Beis2, bilin 4
Ozone (ppb)
hours



Site ID : FARFX
Episode 3b : July 14 – 16, 1991
obs
Beis1, bilin 4
Beis2, bilin 4
Ozone (ppb)
hours

EPA Analysis of Regional Model Results

From: BILL HUNT <RTPMAINHUB.HUNT-BILL@r3mime.r03.epa.gov>
To: ERA_DOM.SMTP("STUDLIEN.SUSAN@EPAMAIL.EPA.GOV","SPR.
Date: 7/10/98 4:21PM
Subject: NOX SIP Call for Regional Modeling to Supplement 1-Hour SIP's

** High Priority **

I am providing the Regional Air Directors for Regions 1 through 7 and their staff with information needed to complete the 1-hour SIP's. EPA has agreed that the NOX SIP call regional modeling may be used as part of the weight of evidence information to support the States selection of emissions reduction targets in the attainment demonstration. The purpose of this transmittal is to provide you and your staff with information on how to access and use these data. The website location from which the NOX SIP call data both emissions and model outputs may be downloaded through file transfer protocol (FTP) access is ftp://www.epa.gov/pub/scram001/modelingcenter/. Two files with additional information are attached to this message. The file, rollback.wpd, in WordPerfect 6.1 format, contains a description of the methodology used to interpret the impact of the modeled strategy on county-specific ambient design values. The file, 1-hour.wk4, in Lotus 1-2-3 Release 5 spreadsheet format, is a listing of the 1-hour ambient county design values (1994-1996) within the regional modeling domain along with the projected change in these design values when the NOX SIP call control measures are applied.

Please share this information with your States. Feel free to call or e-mail Ellen Baldridge, if you have any questions or concerns about accessing the data and using it to supplement the States current analyses.

CC: ERA_DOM.SMTP("WEGMAN.LYDIA@EPAMAIL.EPA.GOV","TIKVA

Procedures for Estimating the Impact of Regional Strategies on Ozone Design Values

The following procedures were used to estimate the effects of regional strategies on 1-hr and 8-hr ozone design values1. Note that, except for Step 1(a), the procedures for treating 1-hr and the 8-hr design values are the same.

Step 1 Calculate Ambient Design Values

(a) For each monitor in a county determine the monitor specific 1-hr design values by taking the 4th highest daily maximum value from ozone data collected at the monitoring site for the period 1994-1996. [For determining an 8-hr design value, calculate the 3-year average of the 4th highest daily maximum 8-hr value in each year at the monitor].

(b) Select the highest design value from all monitors within the county as the county-specific design value.

Step 2 Generate Model Predictions for three OTAG Episodes (July 1991, 1993 and 1995) for the following two scenarios

(a Base Year model predictions reflecting emissions levels in the 1994-1996 time period.

(b) Regional Strategy model predictions reflecting a future year strategy scenario (e.g., state-specific budgets in the NOX SIP call).

Step 3: Calculate an Adjustment Factor for each Grid Cell

Notes

(1) The adjustment factor is based on the percent difference in ozone predictions between the Base Year and the Regional Strategy. These factors will be used in Step 5 to "rollback" ambient design values to reflect the impacts of the regional strategy.
(2) Step 3 must be followed separately for the Base Year scenario and the Regional Strategy.

For each grid cell:

(a) Calculate daily maximum ozone concentrations for every day simulated (excluding 1st two-three days of each episode) for the three OTAG episodes identified in Step 2.

(b) For each episode select the 1st, 2nd, and 3rd highest daily maximum values

(c) For each of these "ranks" (i.e., 1st, 2nd, and 3rd ranked values), average the concentrations across the episodes (e.g., sum all 1st ranked values and divide by number of episodes). This yields an average value for each rank (i.e., average of the highest concentrations, average of 2nd highest, and average of the 3rd highest values).

(d) For each of the average ranks, calculate the percent difference in ozone between the Base Year scenario and the Regional Strategy. As an example of the equation for the highest ranked value:

$$PD1 = [(avgR1 - avgB1 \; / avgB1]^{*} 100$$

Where: PD1 is the percent difference for highest value
avgR1 is the average of highest value for Regional Strategy
avgB1 is the average of highest value for Base Year

This yields a percent difference in each grid for the highest, a percent difference for the 2nd highest, and a percent difference for the 3rd highest values.

(e Calculate the mean of the percent differences (i.e., sum the percent difference calculated for the 1st, 2nd, and 3rd highest values and divide by 3)

$$ADJg = (PD1 + PD2 + PD3) / 3$$

Where ADJg is the adjustment factor for the grid cell

Step 4: Assign Grid Cell Adjustment Factors to Individual Counties

A grid cell's adjustment factor is assigned to a county based on the relative portion of the grid cell area covering the county. The grid with the largest fraction of area in a county is assigned to that county.

For counties that completely contain more that one grid cell, the grid cell with the highest Base Year2 predicted concentration is assigned to that county.

(c) The step of assigning a unique grid cell to each county yields the county-specific adjustment factor. Note that only one grid cell is assigned to a county. Thus, there is no spatial averaging or spatial weighting of adjustment factors using multiple grid cells in determining the county-specific factors.

Step 5: Rollback Ambient Design Value

Note:

This step adjusts the ambient design values in each county to reflect the ozone reductions estimated to result from the Regional Strategy.

(a) Multiply the county-specific ambient design value, from Step 1, times the county-specific adjustment factor from Step 4, using the following equation.

DVA x (1 + ADJc / 100)]

Where DVR is the design value after adjustment for the Regional Strategy,

is the ambient design value, and

ADJc is the adjustment factor for the county

---

1. This process is more fully described in the document: "Procedures for Estimating the Impact of OTAG Strategy Run 5 on Attainment of the 8-Hr Ozone NAAQS", Staff Report, DRAFT October 1997, (located in 62 FRN 60317, November 7, 1997, docket).

2. Note that the 1990 Base Year OTAG model predictions were used in those cases where it was necessary to chose among multiple grid cells for assigning a grid to county.

1994-96 1-Hr Ambient Design Values and Adjusted Design Values Based on SNPR Modeling of the Proposed NOx Budgets

FIPs State	FIPs County			Ambient 1994-96	SNPR Budget Run
9	1	Connecticut	Fairfield	144	129
9	3	Connecticut	Hartford	141	124
9	5	Connecticut	Litchfield	119	101
9	7	Connecticut	Middlesex	140	120
9	9	Connecticut	New Haven	149	131
9	11	Connecticut	New London	132	116
9	13	Connecticut	Tolland	120	103
9	15	Connecticut	Windham	137	117
10	1	Delaware	Kent	115	95
10	3	Delaware	New Castle	134	110
10	5	Delaware	Sussex	109	93
11	1	D.C.	Washington	125	107
24	3	Maryland	Anne Arundel	151	133
24	5	Maryland	Baltimore	130	111
24	9	Maryland	Calvert	97	82
24	13	Maryland	Carroll	115	93
24	15	Maryland	Cecil	139	115
24	17	Maryland	Charles	109	90
24	19	Maryland	Dorchester	117	99
24	25	Maryland	Harford	140	121
24	29	Maryland	Kent	111	95
24	31	Maryland	Montgomery	119	100
24	33	Maryland	Prince Georges	134	119
24	510	Maryland	Baltimore City	137	125
25	1	Massachusetts	Barnstable	128	114
25	3	Massachusetts	Berkshire	89	77
25	5	Massachusetts	Bristol	122	105
25	9	Massachusetts	Essex	119	109
25	13	Massachusetts	Hampden	126	114

25	15	Massachusetts	Hampshire	129	115
25	17	Massachusetts	Middlesex	113	100
25	23	Massachusetts	Plymouth	104	91
25	25	Massachusetts	Suffolk	106	93
25	27	Massachusetts	Worcester	122	105
34	1	New Jersey	Atlantic	110	93
34	3	New Jersey	Bergen	121	107
34	7	New Jersey	Camden	127	109
34	11	New Jersey	Cumberland	105	86
34	13	New Jersey	Essex	115	98
34	15	New Jersey	Gloucester	125	108
34	17	New Jersey	Hudson	120	111
34	19	New Jersey	Hunterdon	113	96
34	21	New Jersey	Mercer	134	113
34	23	New Jersey	Middlesex	139	121
34	25	New Jersey	Monmouth	130	108
34	27	New Jersey	Morris	125	106
34	29	New Jersey	Ocean	138	117
34	39	New Jersey	Union	109	94
36	1	New York	Albany	109	98
36	5	New York	Bronx	122	119
36	13	New York	Chautauqua	103	90
36	15	New York	Chemung	88	77
36	27	New York	Dutchess	115	98
36	29	New York	Erie	91	80
36	31	New York	Essex	99	87
36	41	New York	Hamilton	90	80
36	43	New York	Herkimer	86	75
36	45	New York	Jefferson	104	89
36	47	New York	Kings	131	116
36	53	New York	Madison	88	78
36	55	New York	Monroe	102	91
36	63	New York	Niagara	102	91
36	65	New York	Oneida	90	80
36	67	New York	Onondaga	103	90
36	71	New York	Orange	115	98
36	79	New York	Putnam	125	107
36	81	New York	Queens	123	118

36	85	New York	Richmond	123	109
36	91	New York	Saratoga	96	86
36	93	New York	Schenectady	92	82
36	103	New York	Suffolk	131	115
36	109	New York	Tompkins	102	91
36	111	New York	Ulster	105	90
36	117	New York	Wayne	102	89
36	119	New York	Westchester	124	107
42	1	Pennsylvania	Adams	112	92
42	3	Pennsylvania	Allegheny	133	118
42	7	Pennsylvania	Beaver	107	99
42	11	Pennsylvania	Berks	114	96
42	13	Pennsylvania	Blair	110	87
42	17	Pennsylvania	Bucks	137	117
42	21	Pennsylvania	Cambria	100	81
42	27	Pennsylvania	Centre	106	88
42	43	Pennsylvania	Dauphin	113	95
42	45	Pennsylvania	Delaware	124	106
42	47	Pennsylvania	Elk	95	78
42	49	Pennsylvania	Erie	107	92
42	55	Pennsylvania	Franklin	113	91
42	69	Pennsylvania	Lackawanna	110	96
42	71	Pennsylvania	Lancaster	116	99
42	73	Pennsylvania	Lawrence	101	91
42	77	Pennsylvania	Lehigh	111	97
42	79	Pennsylvania	Luzerne	105	86
42	81	Pennsylvania	Lycoming	87	74
42	85	Pennsylvania	Mercer	111	99
42	91	Pennsylvania	Montgomery	118	98
42	95	Pennsylvania	Northampton	116	97
42	99	Pennsylvania	Perry	103	85
42	101	Pennsylvania	Philadelphia	130	116
42	111	Pennsylvania	Somerset	109	82
42	125	Pennsylvania	Washington	112	88
42	129	Pennsylvania	Westmoreland	119	98
42	133	Pennsylvania	York	105	87

44	3	Rhode Island	Kent	133	114
44	7	Rhode Island	Providence	120	102
51	13	Virginia	Arlington	126	108
51	33	Virginia	Caroline	98	83
51	36	Virginia	Charles City	104	85
51	41	Virginia	Chesterfield	107	87
51	59	Virginia	Fairfax	120	106
51	61	Virginia	Fauquier	99	77
51	69	Virginia	Frederick	103	82
51	85	Virginia	Hanover	116	99
51	87	Virginia	Henrico	108	94
51	89	Virginia	Henry	104	84
51	113	Virginia	Madison	97	79
51	121	Virginia	Montgomery	96	78
51	147	Virginia	Prince Edward	101	78
51	153	Virginia	Prince William	109	92
51	161	Virginia	Roanoke	98	86
51	173	Virginia	Smyth	98	77
51	179	Virginia	Stafford	109	92
51	197	Virginia	Wythe	95	76
51	510	Virginia	Alexandria City	120	103
51	650	Virginia	Hampton City	100	88
51	800	Virginia	Suffolk City	104	86

Memo

To: Jim Sydnor, VDEQ

Tad Aburn, MDE

Don Wambsgans, DC DOH

From: Jacquelyn Magness Seneschal, MWCOG

Subject: Corrections to Design Values

Date: August 7, 1998

CC: Todd Ellsworth, EPA Region III

As part of preparing the Supplement to the Phase II Attainment Plan requested by EPA staff, COG reviewed the EPA worksheet dated 3-6-98 to extract information relative to the Washington Nonattainment Area. For three jurisdictions, Calvert and Prince George's counties in Maryland and the City of Alexandria in Virginia, the design values EPA has used are not consistent with the design values calculated by COG using AIRS data. I have discussed these discrepancies with Todd Ellsworth of EPA Region III, who concurs that COG's design values are correct. Table A (attached) shows the AIRS data and the ambient design values.

In order to provide the most accurate calculation of the predicted design values once transport has been reduced, COG has recalculated the predicted design values for the affected monitors. To do this, the change in ozone levels predicted by EPA was determined as an adjustment factor using a "percent change formula" without conversion to a percent. The corrected design value was then calculated using the following formula:

1-adjustment factor) * design value = predicted design value

Table B summarizes the results of this exercise for all the monitors in the Washington nonattainment area.

Washington Metropolitan Area - Design Values for 1-Hour Ozone
Data Period: 1994-1996 EPA's AIRS Database

AIRS code	Monitor Location	County	Top four 1-hr ozone data during 1994-96 period: 1st Highest	2nd Highest	3rd Highest	4th Highest	Site Specific Design Value	County's Design Value: COG's Data	EPA's Table
DC-Monitors									
110010017	West End Library[a]	DC	115	112	**112**	105	112		
110010025	Takoma	DC	127	123	122	**122**	122		
110010041	River Terrace	DC	137	132	122	**117**	117		
110010043	McMillan	DC	155	135	133	**125**	125	**125**	125
MD-Monitors									
240090010	Calvert[b]	**Calvert, MD**	97	**94**	93	93	94	94	**97 ?**
240170010	S. Maryland	**Charles, MD**	127	112	112	**109**	109	**109**	109
240313001	Rockville	**Montgomery, MD**	127	123	121	**119**	119	**119**	119
240330002	Greenbelt	**Prince George's, MD**	160	131	128	**124**	124		
240338001	Suitland	**Prince George's, MD**	134	129	124	**123**	123		
240338002	Beltsville[c]	**Prince George's, MD**	*Station closed in 1994 - Greenbelt is the comparable station*					**124**	**134 ?**
VA-Monitors									
510130020	Arlington	**Arlington, VA**	138	133	127	**126**	126	**126**	126
510590005	Cub Run	**Fairfax, VA**	138	131	131	**120**	120		
510590018	Mt. Vernon	**Fairfax, VA**	131	125	120	**120**	120		
510591004	Seven Corners	**Fairfax, VA**	143	125	120	**120**	120		
510595001	Lewinsville	**Fairfax, VA**	146	134	132	**118**	118	**120**	120
511530009	Long Park	**Prince William, VA**	133	126	112	**109**	109	**109**	109
511790001	Stafford	**Stafford, VA**	121	111	110	**109**	109	**109**	109
515100009	Alexandria[d]	**City of Alexandria, VA**	125	120	**118**	115	118	**118**	**120 ?**

[a] Site closed on July 1, 1996 - 1996 Data incomplete
[b] Site opened May 10, 1996 - One full year data only
[c] Site closed in 1994 - neighboring Greenbelt is the comparable active station
[d] Data for the year 1996 incomplete

Table B

Actual and Predicted Design Values for Jurisdictions in the Washington Nonattainment Area

State/County	EPA Design Value 1994-1996	COG Design Value 1994-1996	EPA Predicted Design Value	EPA Predicted Reduction (Adjustment Factor)	COG Predicted Design Value
District of Columbia	125 ppb	125 ppb	107 ppb	.1440	107 ppb
Maryland					
Calvert	97 ppb	93 ppb	82 ppb	.1546	79 ppb
Charles	109 ppb	109 ppb	90 ppb	.1473	90 ppb
Montgomery	119 ppb	119 ppb	100 ppb	.1900	100 ppb
Prince Georges	134 ppb	123 ppb	119 ppb	.1119	108 ppb
Virginia					
City of Alexandria	120 ppb	115 ppb	103 ppb	.1650	96 ppb
Arlington	126 ppb	126 ppb	108 ppb	.1429	108 ppb
Fairfax	120 ppb	120 ppb	106 ppb	.1167	106 ppb
Prince William	109 ppb	109 ppb	92 ppb	.1560	92 ppb
Stafford	109 ppb	109 ppb	92 ppb	.1560	92 ppb

Source: EPA Worksheet 3-6-98 as adjusted by COG.