STATE OF GEORGIA

OFFICE OF THE GOVERNOR

ATLANTA 30334-0900

Sonny Perdue
GOVERNOR

March 22, 2004

The Honorable Mike Leavitt
Administrator
U.S. Environmental Protection Agency
Arial Rios Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Mike:

Since our February 24, 2004 meeting, when we discussed Georgia's strong concerns with EPA's recommendations for the size of the Macon 8-hour ozone nonattainment area, the Georgia Environmental Protection Division (EPD) has developed the additional information to support our viewpoint.

The attached information further responds to EPA's preliminary determination that both Houston and Monroe Counties significantly contribute to the high ozone concentrations monitored in Bibb County. Mike, I believe that this additional information, along with all of the previous data submitted, provides a compelling basis for EPA to determine that Houston and Monroe Counties do not significantly contribute to Macon's ozone concentrations to the extent that they are required to be designated nonattainment.

I know you understand that it is important for the EPA to provide States with credible, timely, and reliable guidance. All of Georgia's analysis has been done in accordance with EPA's guidance on how to make these recommendations. Further, we believe the Clean Air Act provides EPA with the authority to consider planning (e.g., future actions and expected outcomes) when making designation determinations and any effort to exclude the regional emissions analysis would eliminate planning considerations.

Also included in the attached materials is information on the Middle Georgia Clean Air Coalition. While the Macon area was not eligible for EPA's innovative Early Action Compact process, this Coalition is intended to achieve the same purpose—cleaner air in the Macon area sooner than mandated by EPA. Please note that both Houston and Monroe Counties are participants in this Coalition and intend to move aggressively to achieve federal air quality standards with or without a nonattainment designation.

Your careful consideration of this information is much appreciated. Please do not hesitate to contact me should you have additional questions.

Sincerely,

Sonny

Sonny Perdue

cc: Jeffrey Holmstead
Jimmy Palmer
Carol Couch

Attachment A

Georgia EPD's Additional Technical Information

Additional Information To Supplement EPD's February 6, 2004, Submittal Concerning Macon 8-Hour Ozone Nonattainment Area Boundaries

HOUSTON COUNTY

Meteorological Analysis:

We have performed additional analyses of meteorological patterns and the modeled ozone episodes for the Macon area, which indicate that prevailing wind patterns during ozone episodes are from directions other than the South, where Houston County lies in relation to the Macon ozone monitor in Bibb County. The data show that, on an annual basis, southerly winds are the least frequent. The early summer months are characterized by a higher occurrence of southerly winds, but not necessarily higher than other wind directions.

As part of the Fall-line Air Quality Study (FAQS), a Classification and Regression Tree (CART) analysis was performed on the two modeling episodes – August 1-20, 1999, and August 10-20, 2000. Meteorological and air quality data from 1995 – 2001 was used to characterize the bins. Five meteorological bins have been identified that characterize conditions that are conducive to exceedances of the 8-hour ozone standard: Bins 7, 13, 18, 22 and 23. Of these five bins, only two (Bin 7 and Bin 23) contain a southerly wind component as a bin classifying split variable at either upper or surface level. However, an evaluation of the wind trajectory data for the eight days corresponding to bins 7 and 23 indicates that southerly winds were present on only one out of the eight days, August 7, 1999, the one day being due to a Gulf Low moving across the Florida Panhandle. In summary, because the CART analysis concludes that the two modeled episodes are representative of ozone exceedances in the Macon area and the back trajectory analysis done on these episodes indicates low occurrence of southerly wind component, it can be concluded that the ozone precursor emissions are not originating from the direction of Houston County.

Appendix A provides a description of the two modeled ozone episodes, which includes relevant dates, maximum 8-hour ozone concentrations, and meteorological bins. Appendix B (prepared by ICF Consulting / SAI) provides a summary of exceedance bin classification splits for the 8-hour ozone analysis for the Macon area. Appendix C provides the wind trajectories and a synoptic description for selected days of the 1999 and 2000 Macon area ozone episodes that were selected for FAQS.

Furthermore, an analysis of monitored peak daily 8-hour ozone concentrations (from 1997 – 1999) as a function of local resultant wind, performed by Georgia Tech, indicates that the predominant wind directions observed during exceedances of the 8-hour ozone standard are from the west and northwest. Appendix D provides a graphical illustration of the results of this analysis, where ozone concentrations are keyed to EPA's Air Quality Index by color. Appendices E – G provide supporting data and documentation for afore-mentioned ozone concentration analysis. Appendix E contains climate-averaged wind speed and direction data for the weather station WRB, which is located at Warner Robins Air Force Base in Houston County. Data included are frequency of wind speed and direction, both on an annual basis and for the ozone monitoring season from April through October. Appendix F consists of a climatic wind summary for weather stations across the United States. The WRB station is not included, but the Macon Airport station is included. This station is located near the southernmost point of Bibb County and is very close in proximity to the WRB station. Indications from this report echo those of the WRB station data. Finally, Appendix G contains the local climate data annual report for the Macon Airport station, which in the "normals" section provides more detail of the information contained in the climatic wind

summary report. This data further indicates that predominant wind flows in the Macon area are not from the Houston County direction during the ozone season.

$PM_{2.5}$ Trends:

The Macon area has three monitors for fine particulates, two of which are located in Bibb County. The third monitor is sited in Houston County to the South. Of these three monitors, only one – the Macon Allied monitor site in Bibb County – is showing a violation of the annual $PM_{2.5}$ standard. Comparison of the monitored $PM_{2.5}$ values at all three monitors indicate that the Houston County monitor consistently registers lower concentrations of fine particulate than its counterparts in Bibb County, especially those of the Macon Allied monitor.

We believe that this is significant because it has long been accepted that fine particulate production is a mixture of direct release (primary particulate) and atmospheric reaction production (secondary particulate). In the Macon area, and across Georgia in general, the majority of the fine particulates are secondary in nature. Emissions of source materials such as volatile organic compounds (VOCs), oxides of nitrogen, sulfur dioxide and ammonia can result in the final formation of organic, nitrate, sulfate, or ammonium-based fine particulates, respectively. The same VOCs can act as a precursor for both ozone and organic carbon fine particulates, as illustrated by the report in the February 23, 2004, edition of *Chemistry and Engineering News* (Appendix H). Research reported in this edition finds that isoprene, previously thought to be relatively non-reactive, is potentially a major contributor to the formation of fine particulates.

The speciation data from the Macon site indicates that the highest concentration of particulates from Macon is not from sulfate, but from organic carbon, indicating a hydrocarbon source for the particulates. A review of the gravimetric data from Bibb and Houston Counties finds that the $PM_{2.5}$ concentrations are highest at the Macon-Allied Chemical monitoring site and lowest in Houston County. Therefore, there is an indication that, since the same VOC source for both ozone and fine particulate production is shared, that a related decrease in ozone concentration may be assumed in Houston County. Appendix I provides color-coded charts that indicate the monitored $PM_{2.5}$ concentrations at the three Macon area monitors and the speciation results for the monitored $PM_{2.5}$ concentrations. The annual speciation of fine particulates is very similar to that of the summer ozone season.

MONROE COUNTY

Regarding Monroe County, we are providing in Appendix J a chart that indicates the contribution of each of the five sectors (area, mobile, non-road, EGU, and non-EGU point sources) to the Monroe County NOx emissions inventory. The data in this chart indicates that emissions from Georgia Power Company's Plant Scherer eclipse those from other sectors.

The chart in Appendix I also indicates the reductions in NOx emissions already achieved between calendar year 2000 and projected calendar year 2004 emissions. The application of over-fired air technology and a fuel conversion to "Powder River Basin" coal at all four units at Plant Scherer has achieved a reduction in NOx emissions of 35 – 45 percent from the baseline year. By the beginning of the 2004 ozone season, all four units at Plant Scherer will be utilizing both of these NOx reduction techniques. The emissions data contained in this chart for calendar year 2000 were obtained from the emissions inventory prepared for the FAQS. The 2004 figures for non-EGU sources were obtained by extrapolating the CY 2000 and CY 2007 FAQS data, and the 2004 EGU emissions were derived by multiplying CY 2003 heat inputs for the units at Plant Scherer times an emission rate factor of 0.14 lbs NOx per million Btu.

It should be noted that large sources of NOx emissions in Monroe County are already being regulated under a number of emission standards adopted as part of the Atlanta 1-hour ozone nonattainment area SIP. These regulations include the following Georgia Rules:

- Rule 391-3-1-.02(2)(bbb), Gasoline Marketing: this rule limits Reid vapor pressure and sulfur content of gasoline that is sold in the 45 county area surrounding Atlanta;

- Rule 391-3-1-.02(2)(jjj), NOx Emissions from Electric Utility Steam Generating Units: this rule imposes NOx emission limits, on an averaged basis during the ozone season, on major electric steam generating units located in the vicinity of the Atlanta area, including Georgia Power's Plant Scherer in Monroe County;

- Rule 391-3-1-.02(2)(lll), NOx Emissions from Fuel Burning Equipment: this rule limits NOx emissions from fuel burning equipment to 30 ppm at 3% oxygen on a dry basis during the ozone season in the 45 county area surrounding Atlanta;

- Rule 391-3-1-.02(2)(mmm), NOx Emissions from Stationary Gas Turbines and Stationary Engines Used to Generate Electricity: this rule limits NOx emissions from affected equipment in the 45 county area surrounding Atlanta to 30 – 160 ppm, depending on the equipment and its date of installation, at 15% oxygen on a dry basis during the ozone season;

- Rule 391-3-1-.02(2)(nnn), NOx Emissions from Large Stationary Gas Turbines: this rule limits NOx emissions from affected equipment in the 45 county area surrounding Atlanta to 6 – 50 ppm at 15% oxygen on a dry basis;

- Rule 391-3-1-.02(5), Open Burning: this rule restricts various types of open burning during the ozone season in the 45 county area surrounding Atlanta; and

- Rule 391-3-1-.03(8)(c)15., Additional Provisions for Electrical Generating Units Located in Areas Contributing to the Ambient Air Level of Ozone in the Metropolitan Atlanta Ozone Nonattainment Area: this rule requires new major sources, as well as existing major sources undergoing significant modifications, in the 45 county area surrounding Atlanta to undergo case-by-case BACT reviews and obtain emission offsets for any residual emissions increases that are not controlled.

USE OF REGIONAL EMISSIONS ANALYSIS

In making our recommendations for the Macon 8-hour ozone boundary, we have considered all 11 factors in EPA's guidance. Some of these factors address past and present impacts, and some address projections. EPA, in its December 3, 2003 letter, recommended Houston County partially due to projected population in 2007, projected population density in 2007, and projected NOx and VOC emissions densities in 2007. Similarly, we have projected future ozone concentrations, following the 11th factor, regional emissions analysis. We believe that for an area like Macon, the use of this type of analysis, which projects what air quality will be in the near future, is appropriate to consider for the purpose of establishing nonattainment boundaries, along with the other factors. The analysis that was done and which has been previously submitted to EPA is helpful to better understand, for a relatively borderline 8-hour ozone area like Macon, what areas are significantly contributing towards nonattainment now and how pervasive and long-term this impact will be. The modeling that was used along with other factors to support our recommendations for both Houston and Monroe should be strongly considered.

Appendices

A. Modeled Ozone Episodes and Meteorological Bins
B. Portion of Ozone Episode Selection Analysis Report Prepared by ICF Consulting/SAI
C. Wind Trajectory Charts and Synoptic Description of Meteorological Conditions
D. Peak Daily 8-Hour Average Ozone Concentrations as a Function of Local Resultant Wind
E. Climate Averaged Wind Speed and Direction Data for the Warner Robins Weather Station
F. Climatic Wind Summary for Selected United States Weather Stations
G. Local Climate Data Annual Report for the Macon Airport Weather Station
H. Article Excerpt from *Chemistry and Engineering News*
I. Monitored PM Data Trends and Speciation Data
J. NOx Emissions in Monroe County
K. Ozone and Fine Particulate Monitoring Sites in the Macon, Georgia Area

APPENDIX A

Modeled Ozone Episodes and Meteorological Bins

MACON

Year	Month	Day	Macon 8hr O3 max	Macon Sites w/in 10ppb 8hr DV (99)	Macon Bin
1999	8	1	**99.8**	1	**23**
1999	8	2	**88**	0	**23**
1999	8	3	84.4	0	(11)
1999	8	4	**88.3**	0	**7**
1999	8	5	**119.9**	0	**18**
1999	8	6	**118.3**	0	(20)
1999	8	7	**97.6**	1	**23**
1999	8	8	77.8	0	(24)
1999	8	9	76	0	**(23)**
1999	8	10	69.4	0	(17)
1999	8	11	80.8	0	(19)
1999	8	12	**95.4**	1	(19)
1999	8	13	83.3	0	**(18)**
1999	8	14	**99.3**	1	**23**
1999	8	15	66.6	0	(25)
1999	8	16	67.6	0	(9)
1999	8	17	**93.3**	1	**23**
1999	8	18	**103.4**	1	**22**
1999	8	19	**85.1**	0	(21)
1999	8	20	59.3	0	(14)
2000	8	10	77.4	0	(6)
2000	8	11	?	?	?
2000	8	12	70	?	11
2000	8	13	74	?	11
2000	8	14	**92.6**	1	**7**
2000	8	15	**105.5**	1	**18**
2000	8	16	**91.5**	1	**22**
2000	8	17	**133.8**	0	**18**
2000	8	18	**90.8**	1	**23**
2000	8	19	**89.6**	1	**22**
2000	8	20	59.8	0	(15)

Bin **23** Exceedance Days	=	21
Bin **18** Exceedance Days	=	9
Bin **13** Exceedance Days	=	8
Bin **7** Exceedance Days	=	7
Bin **22** Exceedance Days	=	7
Other Bin Exceedance Days	=	18
Total Exceedance Days	=	70

APPENDIX B

Portion of Ozone Episode Selection Analysis Report Prepared by ICF Consulting/SAI

Table 2-5.
Air quality variables included in the CART analysis.
Note that not all variables were used for all areas (as indicated)

Variable Name	Description
avgmxoz	Average of the maximum 1-hour ozone concentrations at the sites in the area. Used for the Atlanta and Birmingham site CART analysis.
avgmxoz8	Average of the maximum 8-hour ozone concentrations at the sites in the area. Used for the Atlanta and Birmingham site CART analysis.
avgozya	Average of the maximum daily 1-hour ozone concentrations for all areas except Atlanta, on the previous day.
avgozyb	Average of the maximum daily 1-hour ozone concentrations for all areas except Birmingham, on the previous day.
avgozya8	Average of the maximum daily 8-hour average ozone concentrations for all areas except Atlanta, on the previous day.
avgozyb8	Average of the maximum daily 8-hour average ozone concentrations for all areas except Birmingham, on the previous day.
binavg1	*The classification variable for the 1-hour site-average analysis*: a value of 1, 2, 3, or 4 depending on whether the average maximum1-hour ozone concentration over all sites in the urban area on the present day was <75, [75,95), [95,110), or ≥ 110 ppb, respectively, for Atlanta and <70, [70,85), [85,100), or ≥ 100 ppb, respectively, for Birmingham. Used for the Atlanta and Birmingham average ozone analyses only.
binavg8	*The classification variable for the 8-hour site-average analysis*: a value of 1, 2, 3, or 4 depending on whether the average maximum 8-hour ozone concentration over all sites in the urban area on the present day was <65, [65,85), [85,95), or ≥ 95 ppb, respectively, for Atlanta and <60, [60,75), [75,85), or ≥ 85 ppb, respectively, for Birmingham. Used for the Atlanta and Birmingham average ozone analyses only.
exmx_st	Site at which maximum 1-hour ozone concentration was recorded.
exmx8_st	Site at which maximum 8-hour average ozone concentration was recorded.
max1h[1]	*The classification variable for the 1-hour analysis*: a value of 1, 2, 3, 4, or 5 depending on whether the maximum 1-hour ozone concentration over all sites in the urban area on the present day was <65, [65,85), [85,105), [105,125), or ≥ 125 ppb, respectively. Used for Atlanta and Birmingham only.
max8h[1]	*The classification variable for the 8-hour analysis*: a value of 1, 2, 3, or 4 depending on whether the maximum 8-hour average ozone concentration over all sites in the urban area on the present day was <65, [65,85), [85,105), or ≥ 105 ppb, respectively.
nexsit1a	Number of sites exceeding 125 ppb. Used for the 1-hour Atlanta peak location CART analysis.
nexsti8a	Number of sites exceeding 85 ppb. Used for the 8-hour Atlanta peak location CART analysis.
nexsit1b	Number of sites exceeding 125 ppb. Used for the 1-hour Birmingham peak location CART analysis.
nexsit8b	Number of sites exceeding 85 ppb. Used for the 8-hour Birmingham peak location CART analysis.
Rectal	Flag indicating if the day was classified as a recirculation day[2] in Atlanta. A value of 1 signifies recirculation, 0 – no recirculation.

[1] The label here is generic. For the actual CART runs, the variable names were modified slightly to reflect the area of interest, e.g., atlmax1h, for Atlanta.

Variable Name	Description
Recbir	Flag indicating if the day was classified as a recirculation day in Birmingham. A value of 1 signifies recirculation, 0 – no recirculation.
yavgoza1	Yesterday's average maximum 1-hour ozone concentration in Atlanta. Used for the Atlanta average and site CART analyses.
yavgoza8	Yesterday's average maximum 8-hour ozone concentration in Atlanta. Used for the Atlanta average and site CART analyses.
yavgozb1	Yesterday's average maximum 1-hour ozone concentration in Birmingham. Used for the Birmingham average and site CART analyses.
yavgozb8	Yesterday's average maximum 8-hour average concentration in Atlanta. Used for the Birmingham average and site CART analyses.
yatlmax1	Yesterday's maximum 1-hour ozone concentration in Atlanta.
y(area)max8	Yesterday's maximum 8-hour average ozone concentration in a given area.
ybirmax1	Yesterday's maximum 1-hour ozone concentration in Birmingham.
wewd	Weekend/week day identifier. Value = 1 for weekday, 2 for weekend/holiday.

[2] The definition of a recirculation day is based on: (1) the difference in wind direction at the 850 mb level between the previous day's pm sounding and the analysis day's am sounding and (2) the average 850 mb wind speed (average of the pm and am soundings). A day was classified as a recirculation day if the difference in 850 mb wind direction from the previous afternoon to the current morning was within 15° of 180° (i.e., almost directly opposite) or if the average wind speed at 850 mb was ≤ 3 m/s. Athens and Atlanta data were used for the Atlanta variable, and Centerville/Birmingham data were used for the Birmingham variable.

Table 2-6.
Surface meteorological variables included in the CART analysis.
Variable names are generic and vary slightly for each monitoring site.
(See Table 2-3 for sites used for the specific areas.)

Variable Name	Description
pmax	Maximum sea level pressure on the present day.
rh12	Surface relative humidity at noon.
tavg[3]	Average surface temperature (°C) for the present day.
tmax	Maximum surface temperature (°C) for the present day.
wb710	Average surface wind direction bin from 0700 to 1000 LST (1=N, 2=E, 3=S, 4=W, 5=Calm[4]).
wb1013	Average surface wind direction bin from 1000 to 1300 LST.
wb1316	Average surface wind direction bin from 1300 to 1600 LST.
ws710	Average surface wind speed ms^{-1} from 0700 to 1000 LST.
ws1013	Average surface wind speed ms^{-1} from 1000 to 1300 LST.
ws1316	Average surface wind speed ms^{-1} from 1300 to 1600 LST.

Table 2-7.
Upper-air meteorological variables included in the CART analysis.
Variable names are generic and vary slightly for each monitoring site.
(See Table 2-4 for sites used for the specific areas.)

Variable Name	Description
wb85am	Wind direction bin value of 1 through 5, indicating that the wind direction corresponding to the morning sounding was from (in degrees) [315, 45), [45, 135),[135, 225), [225, 315), or calm[4] respectively.
wb85pm	Identical to above, but for the afternoons sounding.
ywb85pm	Identical to above, but for the previous afternoon's sounding.
ws85am	Upper-air 850 mb wind speed corresponding to the morning sounding.
ws85pm	Upper-air 850 mb wind speed corresponding to the afternoon sounding.
yws85pm	Upper-air 850 mb wind speed corresponding to the previous afternoon's sounding.
t85am	Upper-air 850 mb temperature corresponding to the morning sounding on the current day.
t85pm	Upper-air 850 mb temperature corresponding to the afternoon sounding on the current day.
rh85am	Upper-air 850 mb relative humidity corresponding to the morning sounding on the current day.
rh85pm	Upper-air 850 mb relative humidity corresponding to the afternoon sounding on the current day.
avg85	Average of the morning and afternoon sounding heights above sea level of the 850 mb surface.
delt900	Difference between the temperature at 900 mb and the surface using the morning temperature sounding data.

[3] Note that *tavg* is a 24-hour average and thus may have a different signature than maximum temperature.
[4] Calm winds are reported as a wind speed of zero.

Table 2-11c.
Summary of exceedance bin classification splits for 8-hour ozone analysis of Columbus (frequent bins).

Bin	15	19
# of exceedance days	7	29
Key classification parameters	yco8max8 > 59.0 ybirmax8 ≤ 82.2 t85pmb > 19.2 ws85pma ≤ 5.05 wb85ama = 1, 2, 3 avg85a ≤ 1545.	yco8max8 > 59.0 ybirmax8 > 82.2 rh85pmb ≤ 75.3 rh85ama ≤ 77.1 rh85pma ≤ 82.5 ws85ama > 1.3 rh85pmb ≤ 81.5 ywb85pmb = 1, 3, 4, 5

Table 2-11d.
Summary of exceedance bin classification splits for 8-hour ozone analysis of Macon (frequent bins).

Bin	7	13	18
# of exceedance days	7	8	9
Key classification parameters	ymamax8 > 65.0 tmaxma ≤ 34.7 ws1013ma ≤ 1.5 ymamax8h ≤ 92.0 wb710ma = 1, 5 wb85pma = 1, 3, 5	ymamax8 > 65.0 tmaxma ≤ 34.7 ws1013ma > 1.5 rh12ma ≤ 61.5 yatlmax8 > 95.2 wb1013ma = 4, 5 wewd = 1	ymamax8 > 65.0 tmaxma > 34.7 ws85pma ≤ 4.1 ws85ama ≤ 5.1 ws85pma > 1.8 t85pma ≤ 23.5 yws85pma ≤ 3.8

Bin	22	23
# of exceedance days	7	21
Key classification parameters	ymamax8 > 65.0 tmaxma > 34.7 ws85pma ≤ 4.1 ws85ama > 5.1	ymamax8 > 65.0 tmaxma > 34.7 ws85pma > 4.1 wb710ma = 1, 3, 4, 5 ws85pma ≤ 7.7

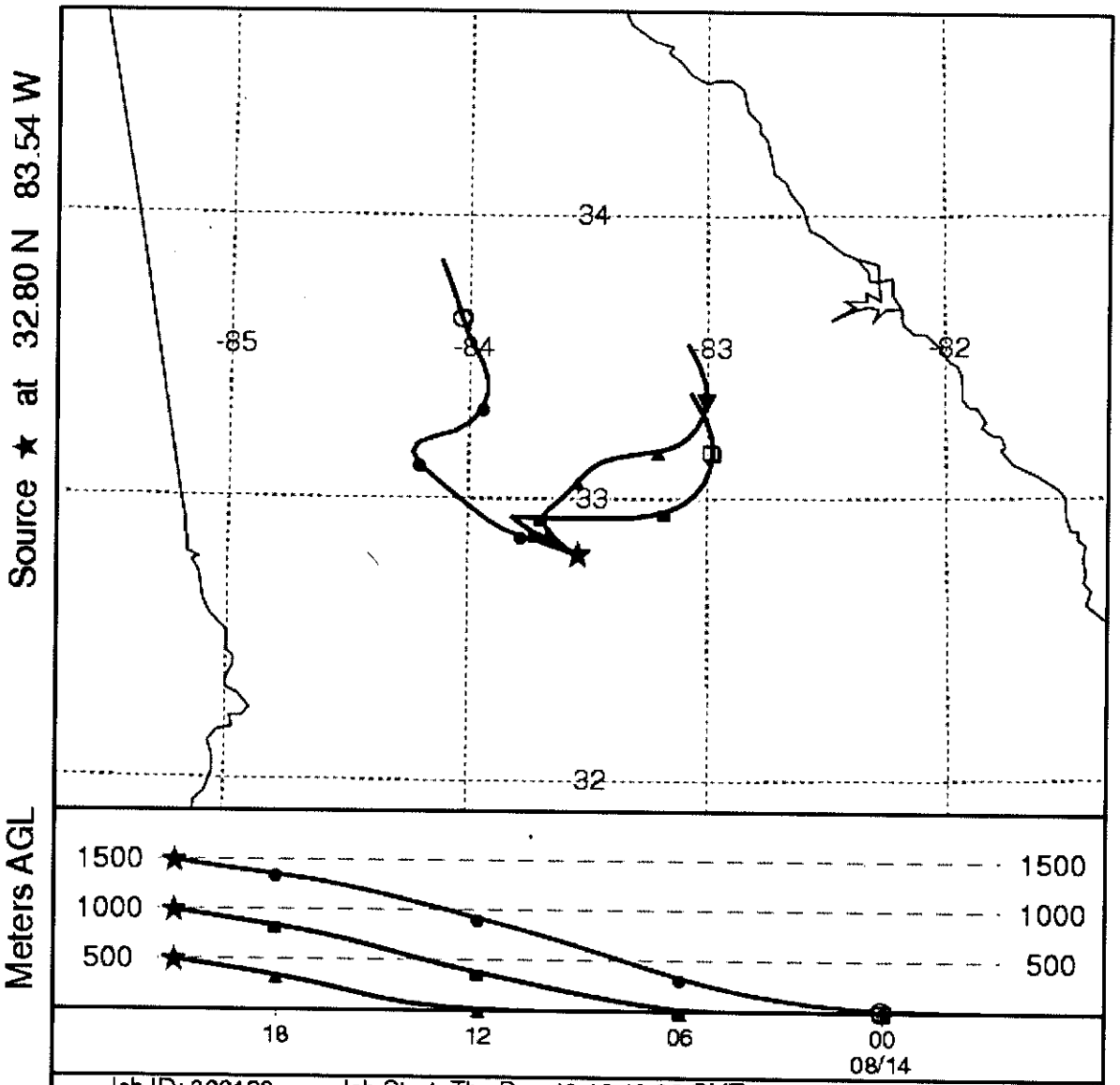
APPENDIX C

Wind Trajectory Charts and Synoptic Description of Meteorological Conditions

Synoptic Description of Aug. 14th-18th, 2000 – Macon, Georgia

Aug. 14th-18th – Strong ridging and surface high pressure were the dominant synoptic features for this time period. On the 14th, a surface high settled into the southeast as an upper level trough lifted off to the northeast, leaving Macon in a light NNE flow. The strong upper level ridge over the Central Plains continued to intensify on the 15th, with the 12z FFC rawinsonde data showing very dry and stable conditions. Ozone build up continued on the 16th as the upper level ridge settled into the north-central Gulf. With plenty of subsidence and light NNE flow, highest concentrations of surface ozone should have been south of the metro area. The upper ridge axis began to shift southwestward on the 17th, as a backdoor trough became stationary over central Georgia by the afternoon. The weak dry trough aided to increase subsidence and reinforce the already low T_d, leading to increased ozone production and accumulation. EDAS 24-hour backward trajectory analysis on the 17th indicated possible transport from metro Atlanta and Macon with the NW flow. A weak 500mb upper level trough and accompanying surface cold front passed through on the 18th allowing for some vertical mixing. The 12z FFC sounding showed increased instability with negative lifted index values and elevated CAPE, causing a few pop up thunderstorms with the daytime heating. Backward trajectory analysis showed possible transport from Alabama on the 18th as winds became more WNW at the surface and aloft.

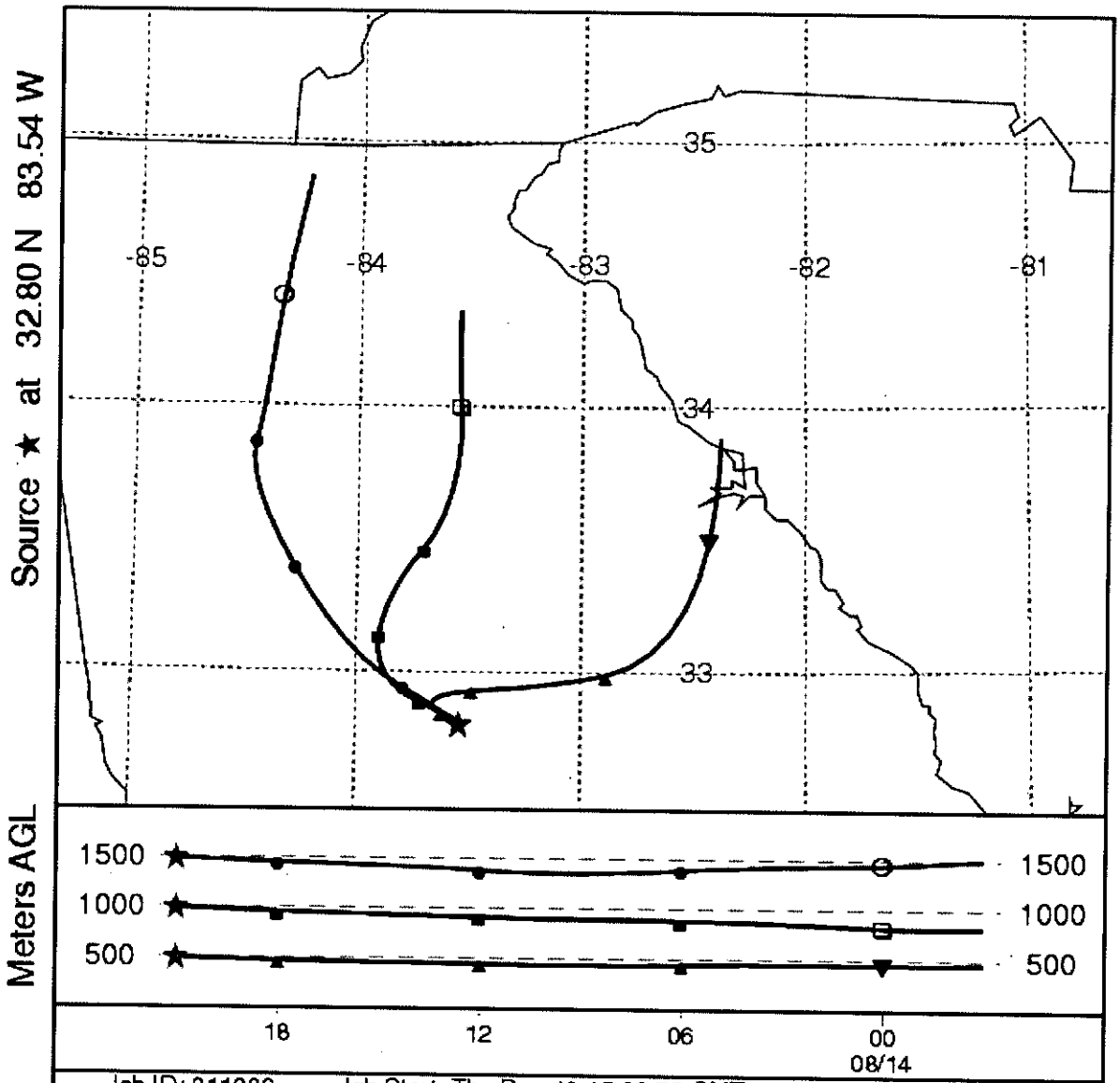
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 14 Aug 00
EDAS Meteorological Data



Job ID: 390420 Job Start: Thu Dec 18 16:43:20 GMT 2003
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 14 Aug 00
FNL Meteorological Data



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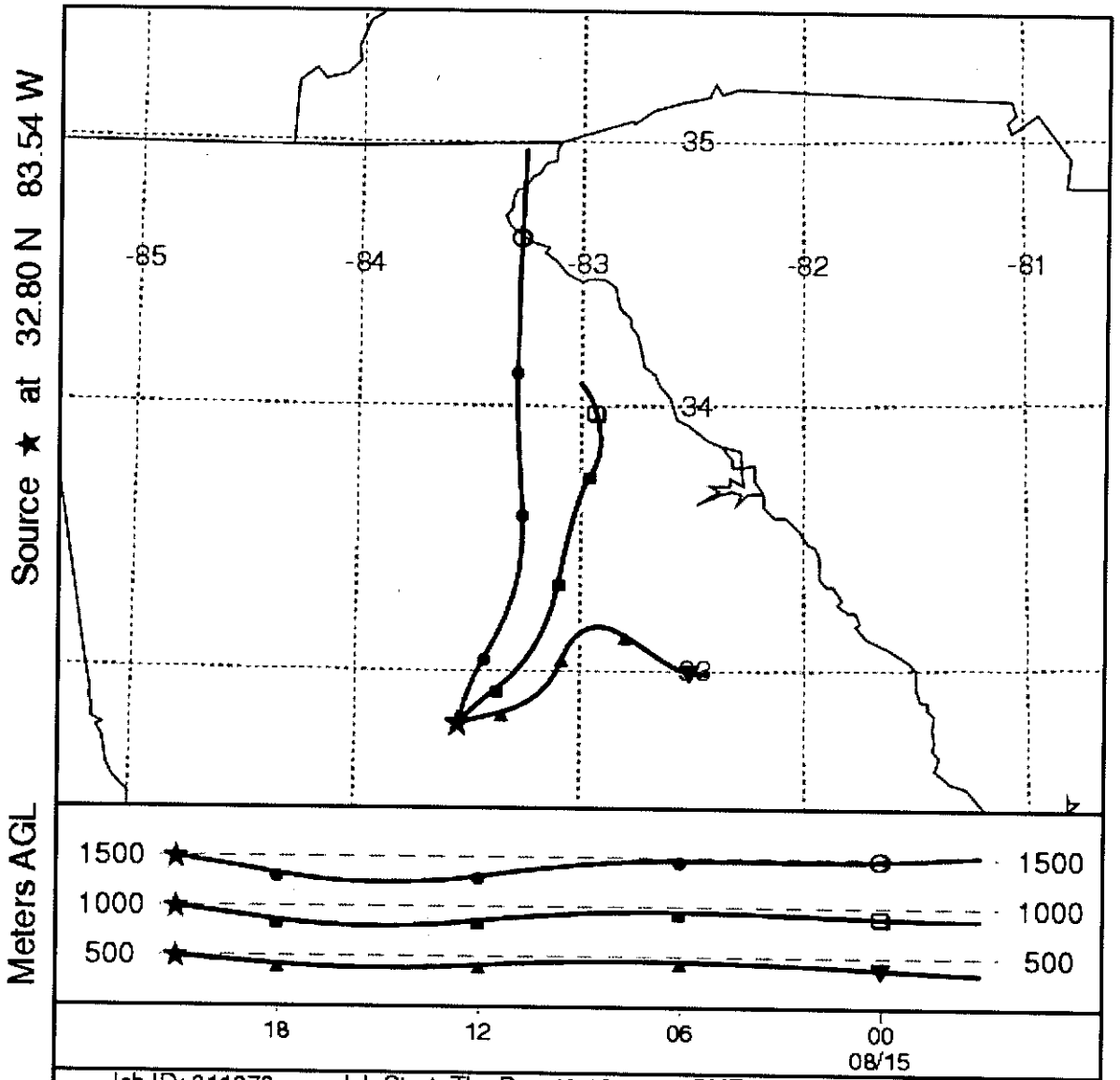
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 15 Aug 00
FNL Meteorological Data



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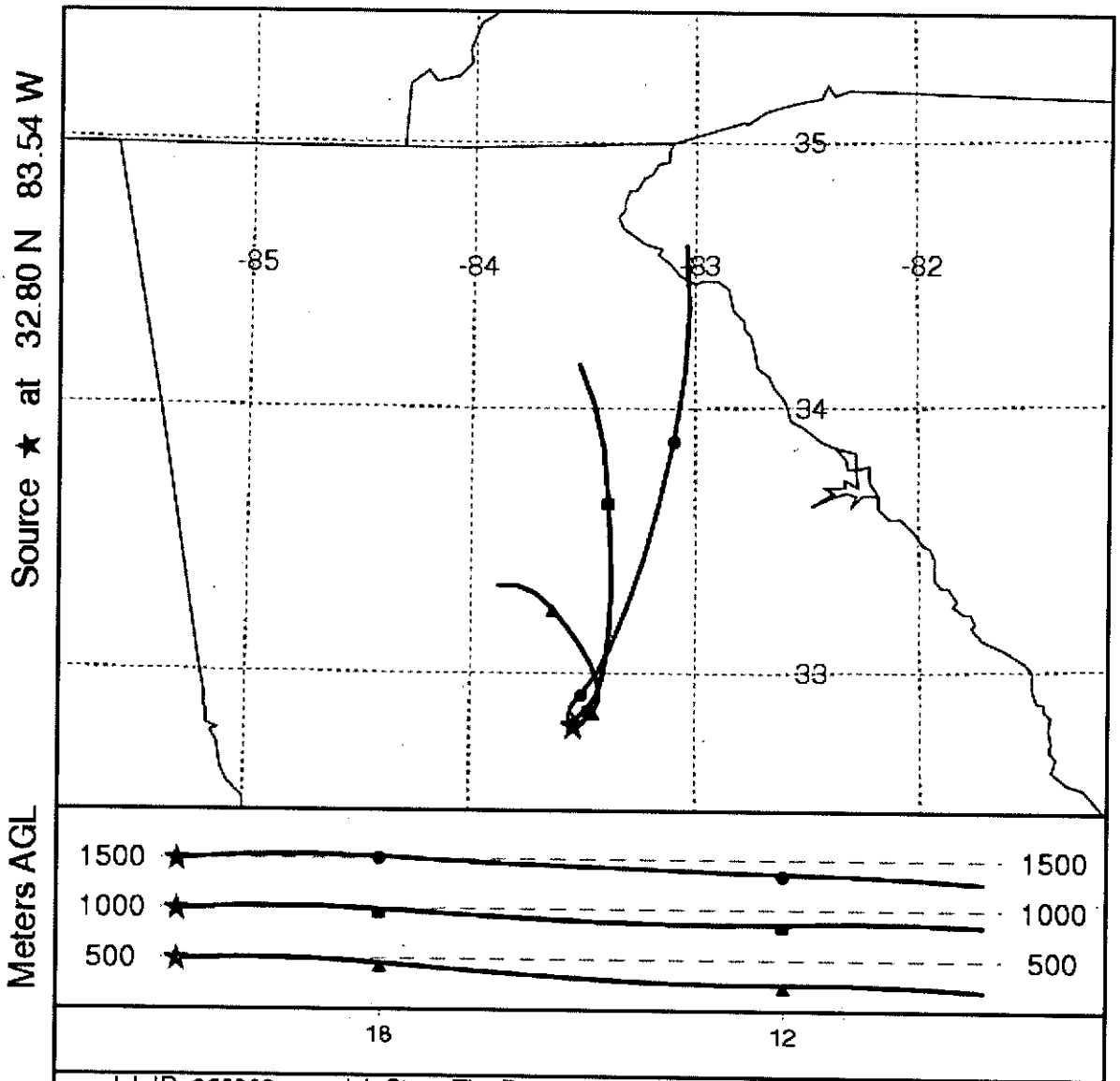
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

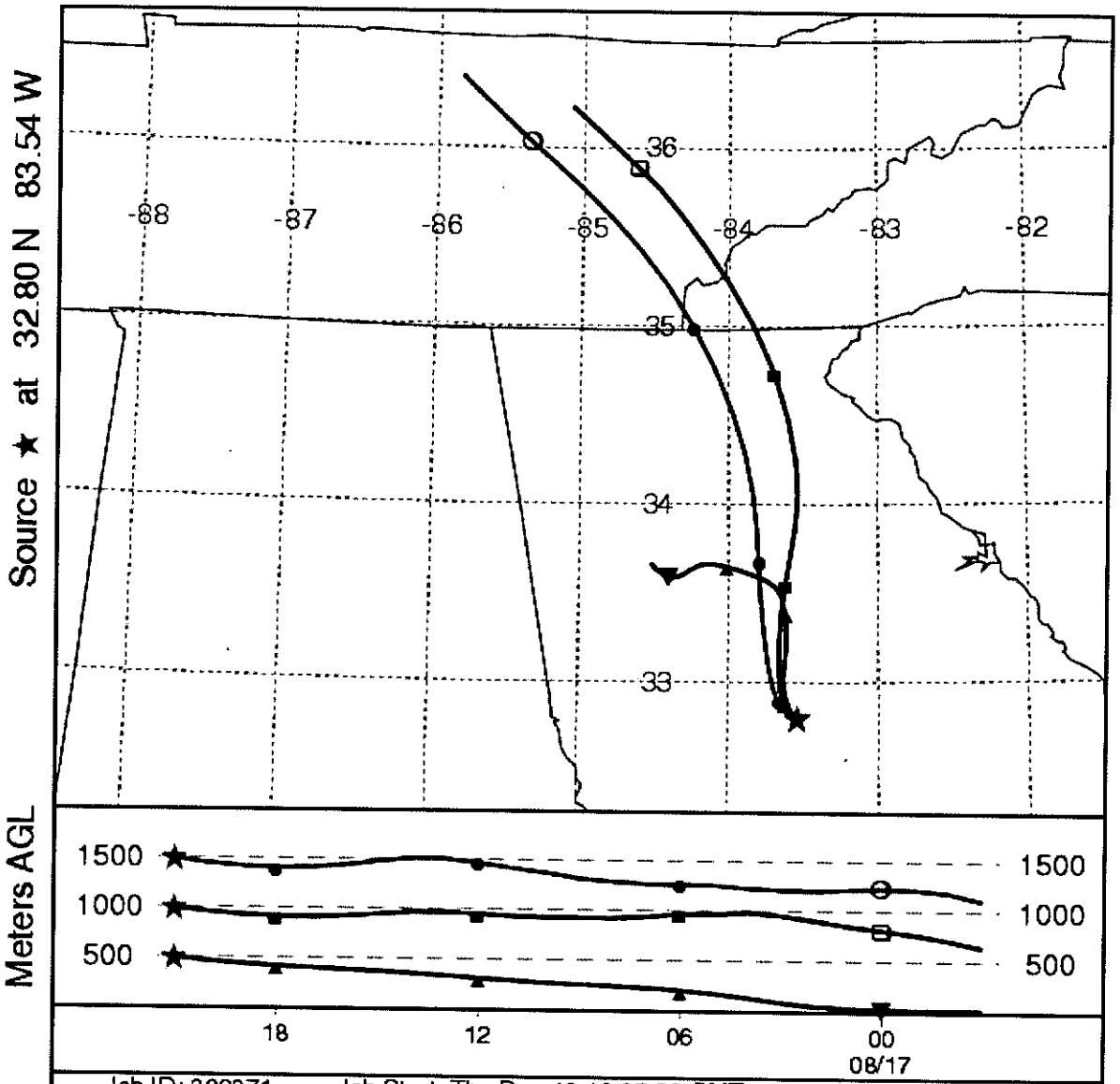
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 16 Aug 00
EDAS Meteorological Data



Job ID: 390388 Job Start: Thu Dec 18 16:37:43 GMT 2003
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 12 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

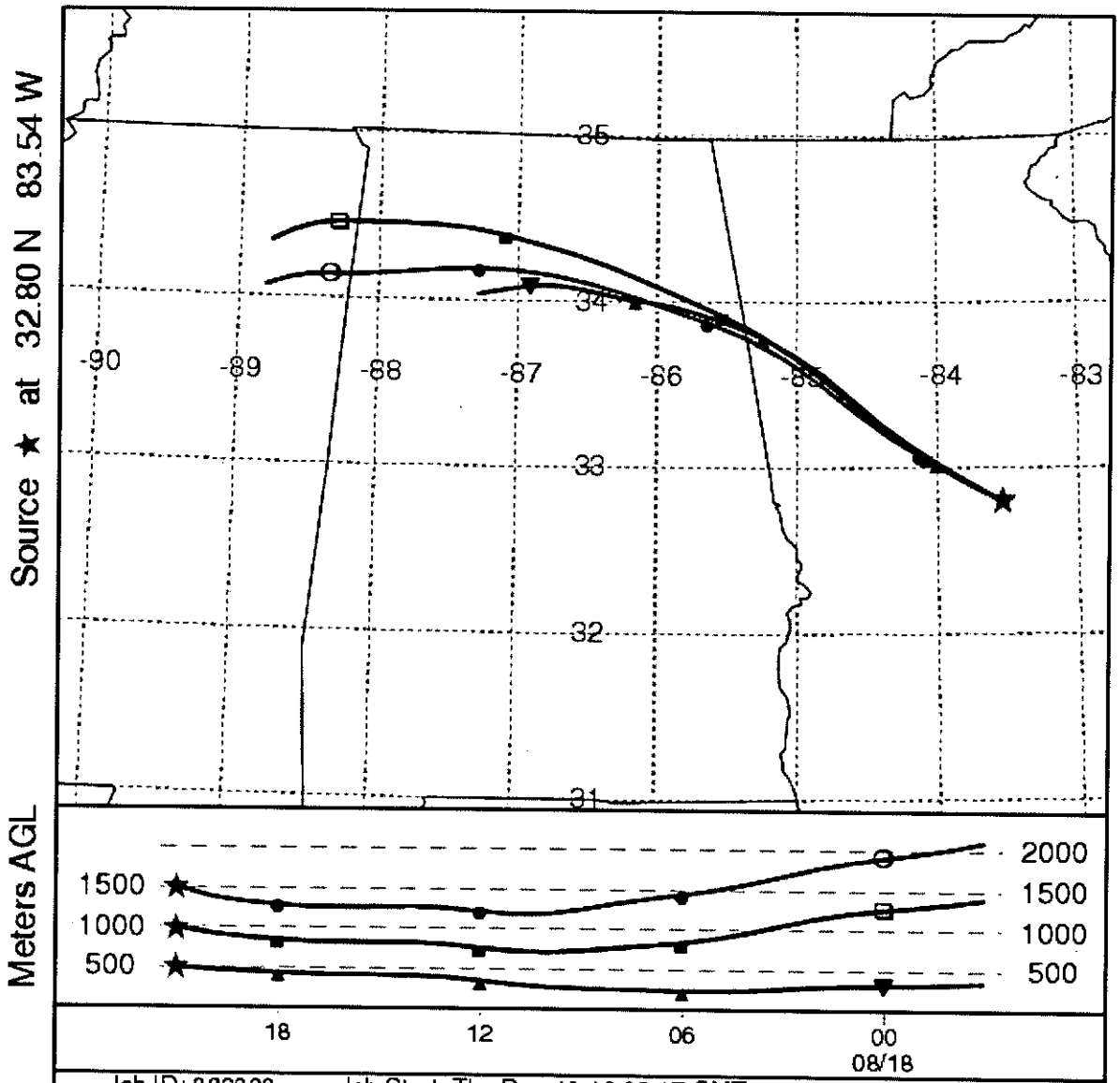
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 17 Aug 00
EDAS Meteorological Data



Job ID: 390371 Job Start: Thu Dec 18 16:35:22 GMT 2003
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

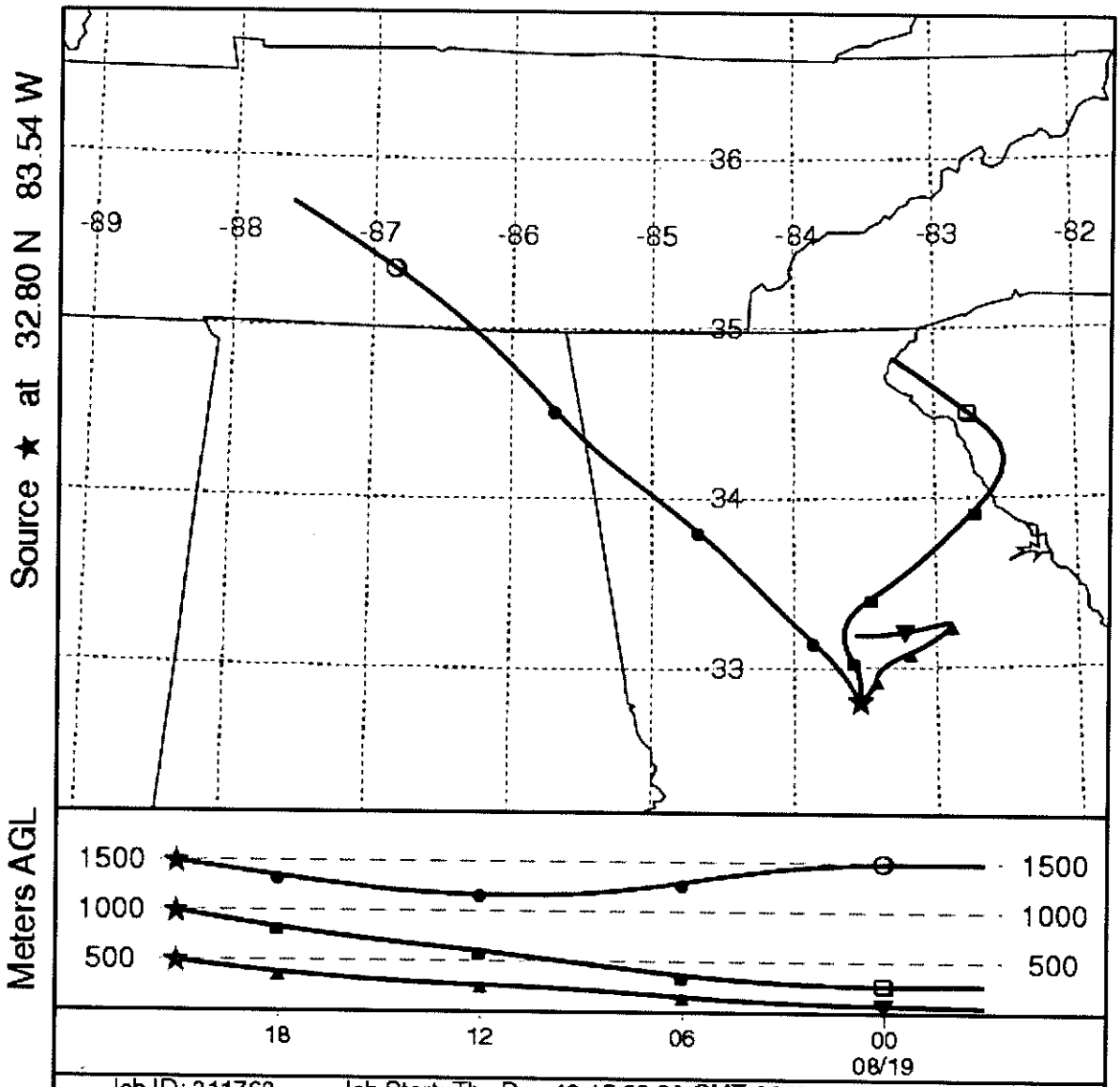
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 18 Aug 00
EDAS Meteorological Data



Job ID: 390398 Job Start: Thu Dec 18 16:39:17 GMT 2003
lat: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

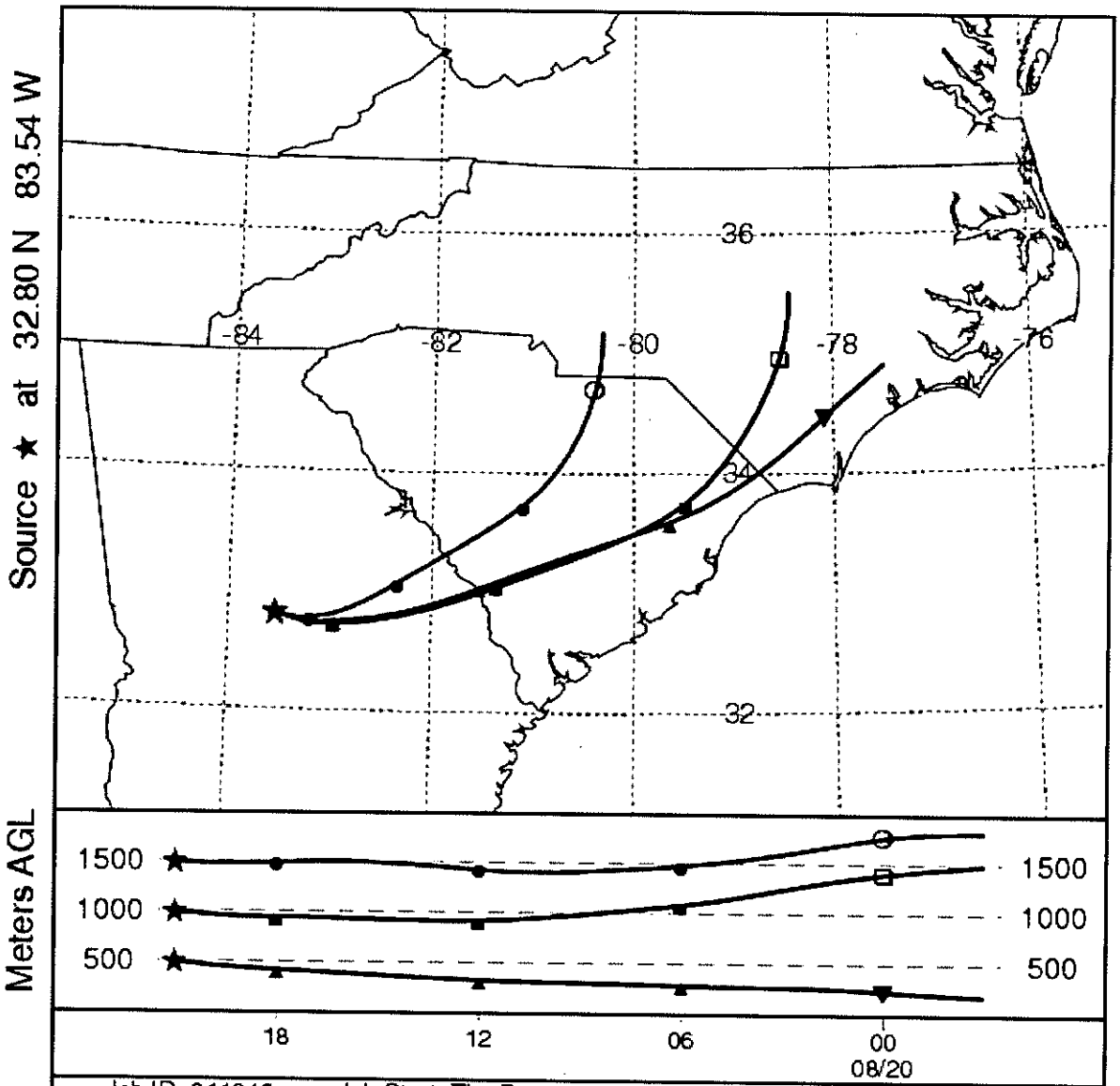
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 19 Aug 00
FNL Meteorological Data



Job ID: 311763 Job Start: Thu Dec 18 15:22:28 GMT 2003
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 20 Aug 00
FNL Meteorological Data



Job ID: 311849 Job Start: Thu Dec 18 15:25:25 GMT 2003
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

Synoptic Description of (9-19) August 2000:

8/9/00: A strong upper level ridge whose center was positioned over southern Louisiana was the dominant synoptic feature. High pressure extended over the southeastern US and the flow aloft was predominantly zonal with the main jet over the US-Canadian border. The 12Z rawinsonde data for Peachtree City (FFC) indicated slightly unstable conditions with light winds aloft coupled with low-level instability and some moisture advection near 600 mb. These parameters were indicative of the potential for afternoon cumulus convection. Good warm air advection was apparent from the sounding upper level wind profile, and water vapor and satellite imagery indicated a good swath of Gulf moisture advection over the Southeast. Visible satellite imager at 1800Z showed a convective outflow boundary setting up and extending across northern Alabama through north Georgia into upstate South Carolina. With no major focus mechanism nearby, such as a front, and upper level support minimal, cumulus convection was isolated in nature.

8/10/00: The outflow boundary from 9 September was still an important feature to consider since synoptic conditions were similar to 9 September. However, an increase in downslope (NW) flow near 200 mb with additional mid-level drying above 600 mb was evident from the 12Z FFC rawinsonde data on 10 September. The ETA forecast model predicted lowering of geopotential heights with some minor cooling at 850 mb, which would only slightly enhance the convective potential across north Georgia. Upper level synoptic charts indicated that the upper level ridge was strengthening near the surface over the Southeastern US. An outflow boundary did develop just south of metro Atlanta; however, outflow from this convective activity could have enhanced subsidence north of metro area.

8/11/00-8/13/00: Synoptic conditions for the period involved a weak frontal passage on 12 August. Pre-frontal conditions existed on 11 August. The major synoptic features for 11 August were a weak trough digging from the north, a high amplitude ridge out west and a weak tropical disturbance off the Florida/Georgia coast. Mid-level moisture advection at 500 mb was evident from the 12Z FFC rawinsonde data along with minor cold air advection, which was indicative of the frontal passage. Post-frontal conditions existed on 12 August, with strong drying above 700 mb. Stable conditions existed with drying aloft, in response to the upper air anticyclone slowly drifting eastward and the front slipping southward of the metro area. An upper level vorticity maximum skirted across north Georgia, following the passage of the front. On 13 August additional low and mid-level drying occurred in response to the surface ridge building across the Southeast. The strong upper level anticyclone responsible for this drying was centered over the north central plains.

8/14/00: A strong steep surface inversion indicated good residual buildup and the onset of a regional episode, as verified by the high nocturnal ozone readings at the Fort Mountain high elevation site (~865m asl). Light wind speed, low relative humidity at 850 mb, a stable lapse, and good downslope flow gave stable conditions over north Georgia,

in response to the strong surface ridge beginning to build over the Southeast. The strong upper level ridge drifted over the Central Plains.

8/15/00-8/18/00: A surface ridge axis extended southward towards the Gulf Coast, while the upper level ridge held firm over the Central Plains and upper Mississippi Valley on 15 August. On 16 August a regional buildup of ozone continued as an upper level ridged became firmly entrenched over the north central Gulf of Mexico, and the surface ridge intensified. Light northwesterly flow was indicated above 1200m agl at the FFC SODAR PA1-LR acoustic sounder during the day on 16 August. Mixing heights extended up to 2500m according to the SODAR mixing height calculation, which was in agreement with the mixing height and stable conditions depicted by the FFC 12Z rawinsonde data. Split flow with light NNE winds aloft existed over north Georgia due to the center of the high being positioned slightly west of metro Atlanta. With plenty of subsidence and light NNE flow, the highest concentrations of surface ozone should have been on the south side of the metro area. On 17 August, continued subsident and stable conditions led to good ozone production over the metro area. This production combined with good residual ozone and fumigation, helped enhance the regional episode. On 18 August, isentropic forward and back trajectory analysis indicated possible transport from Alabama. However, some ventilation did occur during the afternoon of 18 August to keep levels from really ramping, due to the passage of a weak 500 mb upper level trough.

8/19/00: Instability was on the rise on 19 August as the surface ridge weakened and a weak front approached north Georgia from the west. Some moisture advection was evident at 850 mb, due to a weak disturbance riding along the front. However, a definite air mass change did not occur until 20 August, when split flow and an increase in low-level wind speed "bumped" the residual ozone layer. The ETA forecast model depicted a weak Atlantic back-door cold front building in from the northeast. This front was accompanied by a slight increase in Atlantic moisture at 850 mb on 20 August, which gave a "cleaner" flow regime across north Georgia.

Synoptic Description for August 9th-19th, 2000

Overview:
Given below is a brief description of the synoptic events of August 9th-19th, 2000. Several days had similar weather patterns; therefore those days are grouped together. Numbers in parentheses are high temperatures and dew point.

Data:
Surface, upper air, and satellite data used for analysis primarily came from the National Climate Data Center (NCDC) dataset, and the Unisys Weather archive dataset. SODAR data for this time period was not retrievable for plotting.

Description:
August 9th – (84/70) Conditions were partly to mostly cloudy across much of the state with increased instability in the afternoon causing scattered showers and thunderstorms (thunderstorms primarily in the southern portion of the state). Surface winds were light, out of the west-southwest.

August 10th – (90/66) Skies were overcast ahead of an approaching cold front (located over southern Tennessee). Unstable air ahead of the front, as well as a trough ahead of the front, caused storms across much of the state, and much of the southeast.

August 11th – (82/55) Frontal passage through northern/middle Ga., with scattered storms over southern and eastern portions of the state. A big ridge of high pressure over the upper Midwest and Great Lakes began building toward the south.

August 12th – (84/55) Mostly clear skies with winds light out of the north-northeast. Stable conditions across the state with high pressure in control. Some scattered showers still across the southernmost parts of the state.

August 13th-15th – High pressure dominant over these three days with light and variable winds. Temperatures climbed from the low 80's to the low 90's under clear skies.

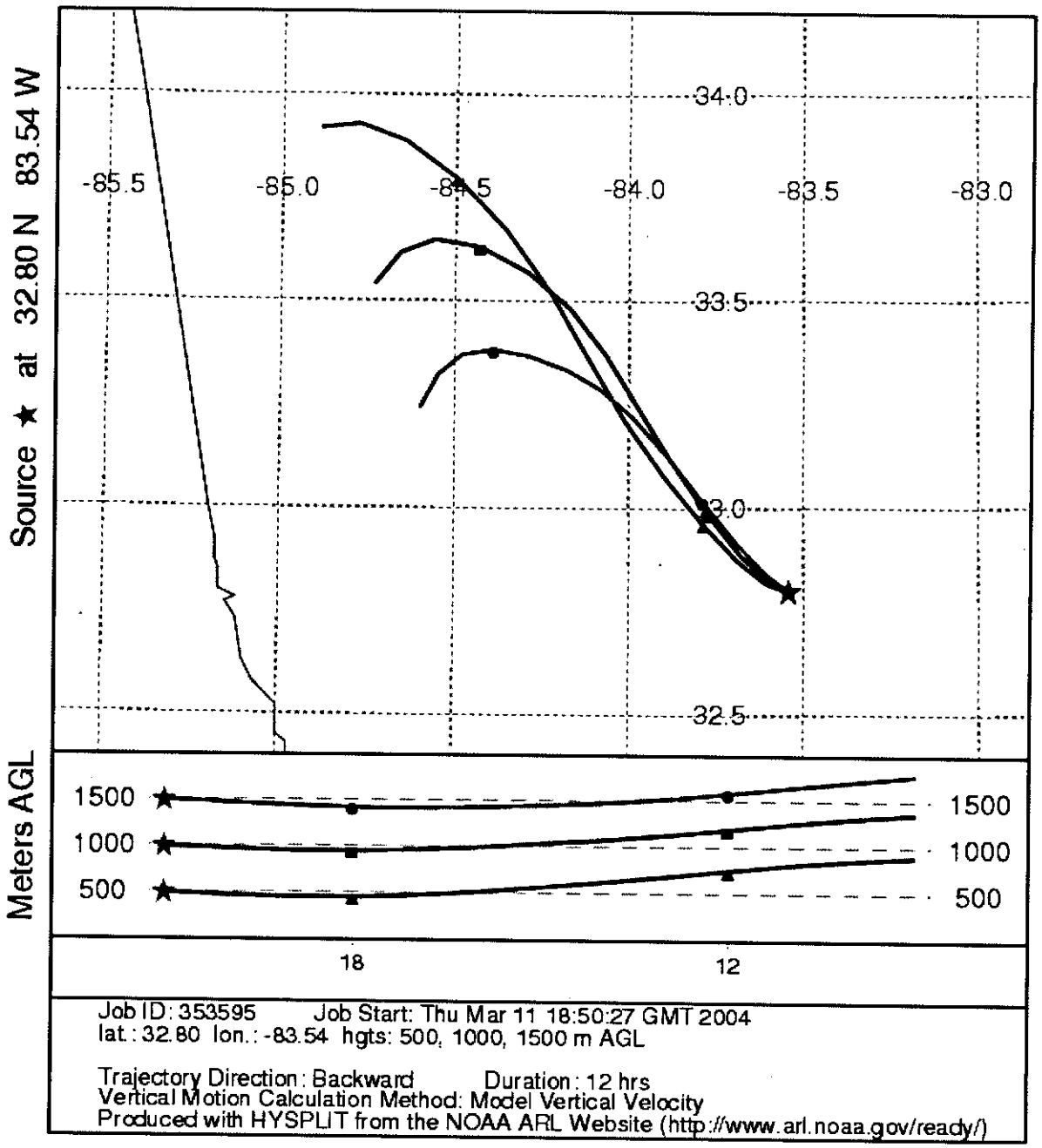
August 16th – (91/63) Not much moisture associated with a weak trough over southern/middle Georgia. Still under mostly clear skies with light winds.

August 17th – (93/61) A weak cold front moved through in the morning, becoming a stationary front over middle Georgia by the afternoon. There were some scattered showers under partly cloudy skies and light westerly winds.

August 18th – (93/64) Stationary front still over Georgia causing a few scattered showers across the state under mostly cloudy skies. Winds were out of the north-northwest.

August 19th – (88/66) Frontal passage through northern Ga., with showers and storms across the southern part of the state. Skies were partly cloudy with light winds.

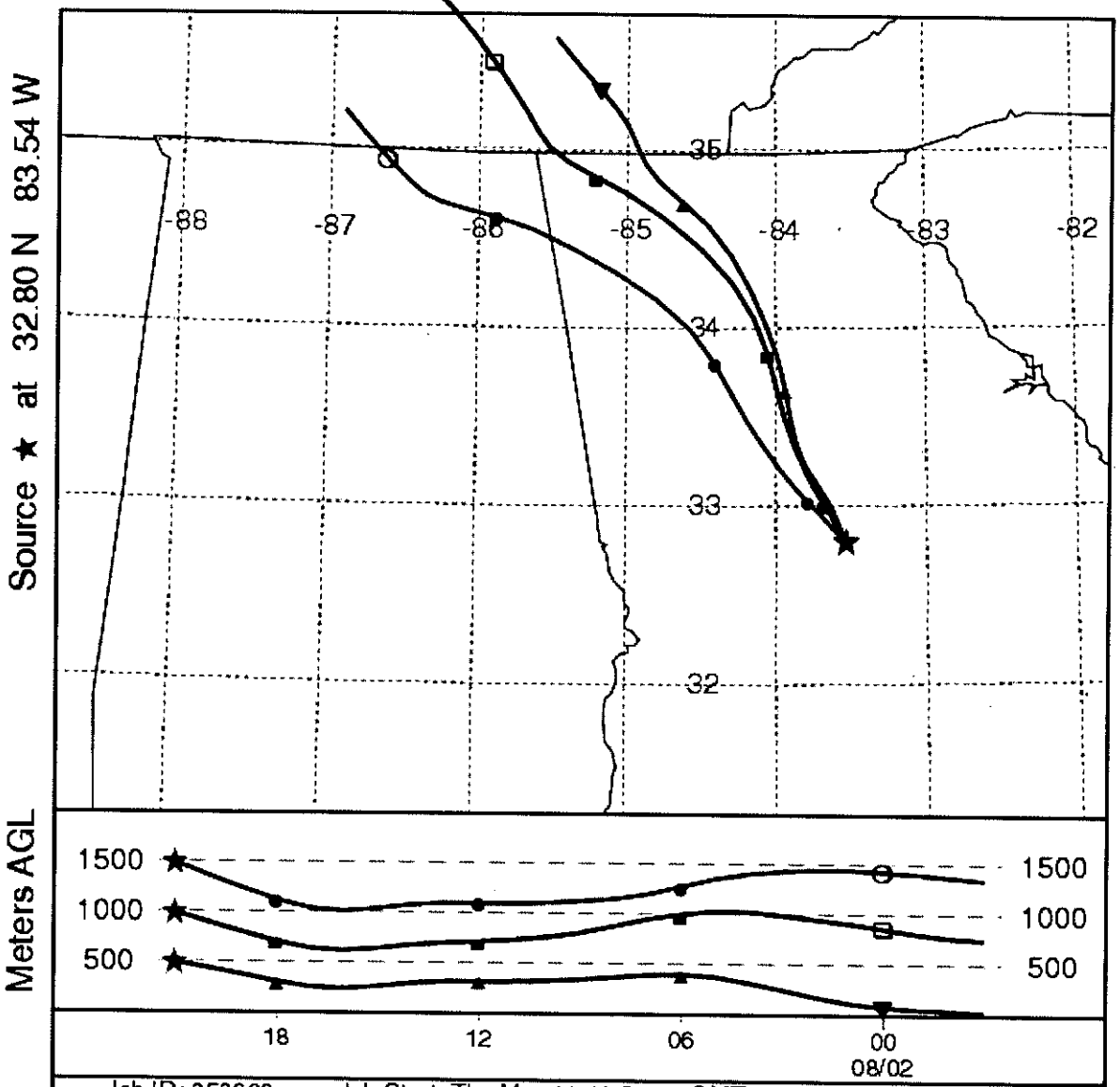
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 01 Aug 99
EDAS Meteorological Data



Job ID: 353595 Job Start: Thu Mar 11 18:50:27 GMT 2004
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 12 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

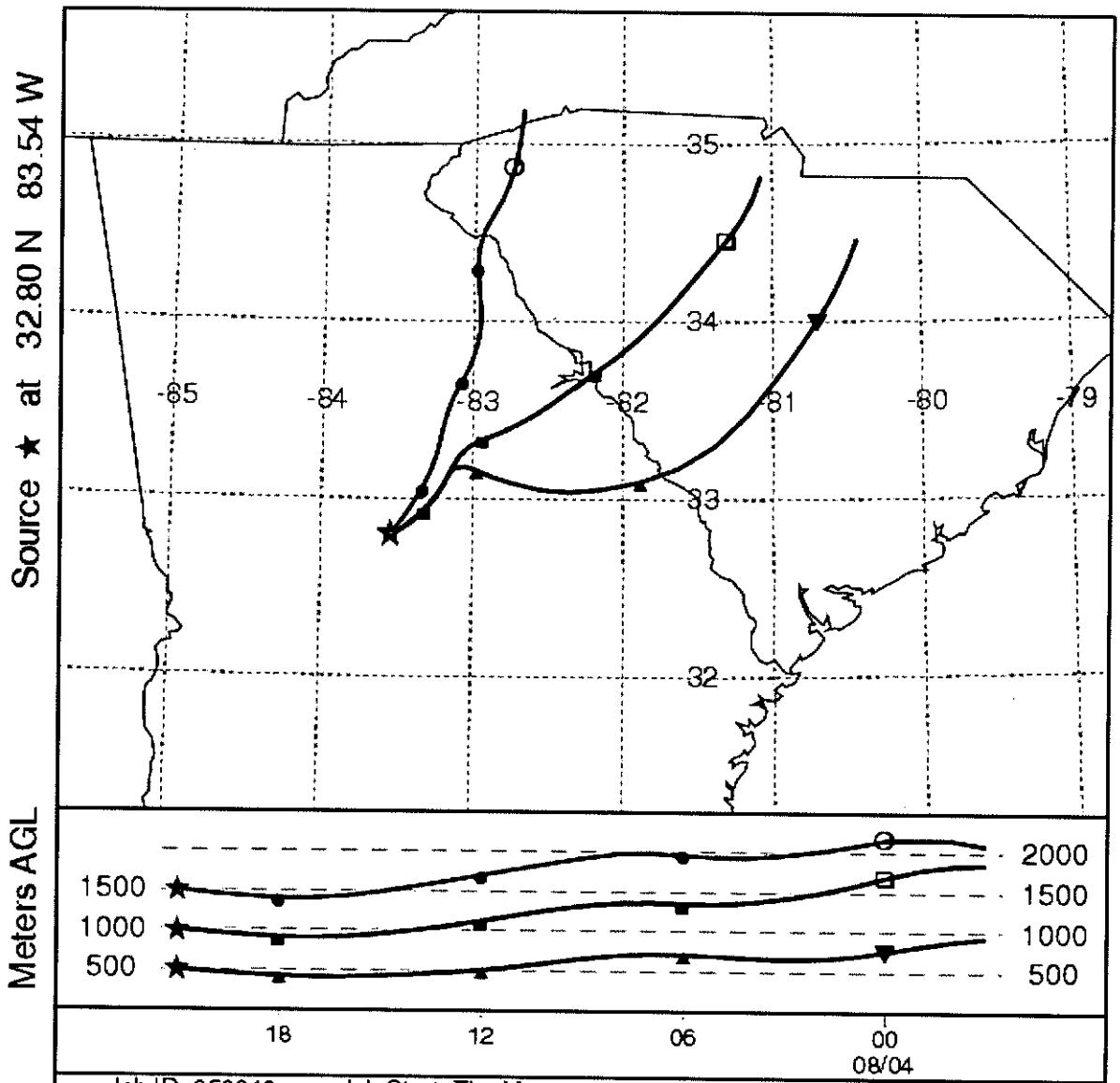
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 02 Aug 99
EDAS Meteorological Data



Job ID: 353608 Job Start: Thu Mar 11 18:51:46 GMT 2004
lat: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

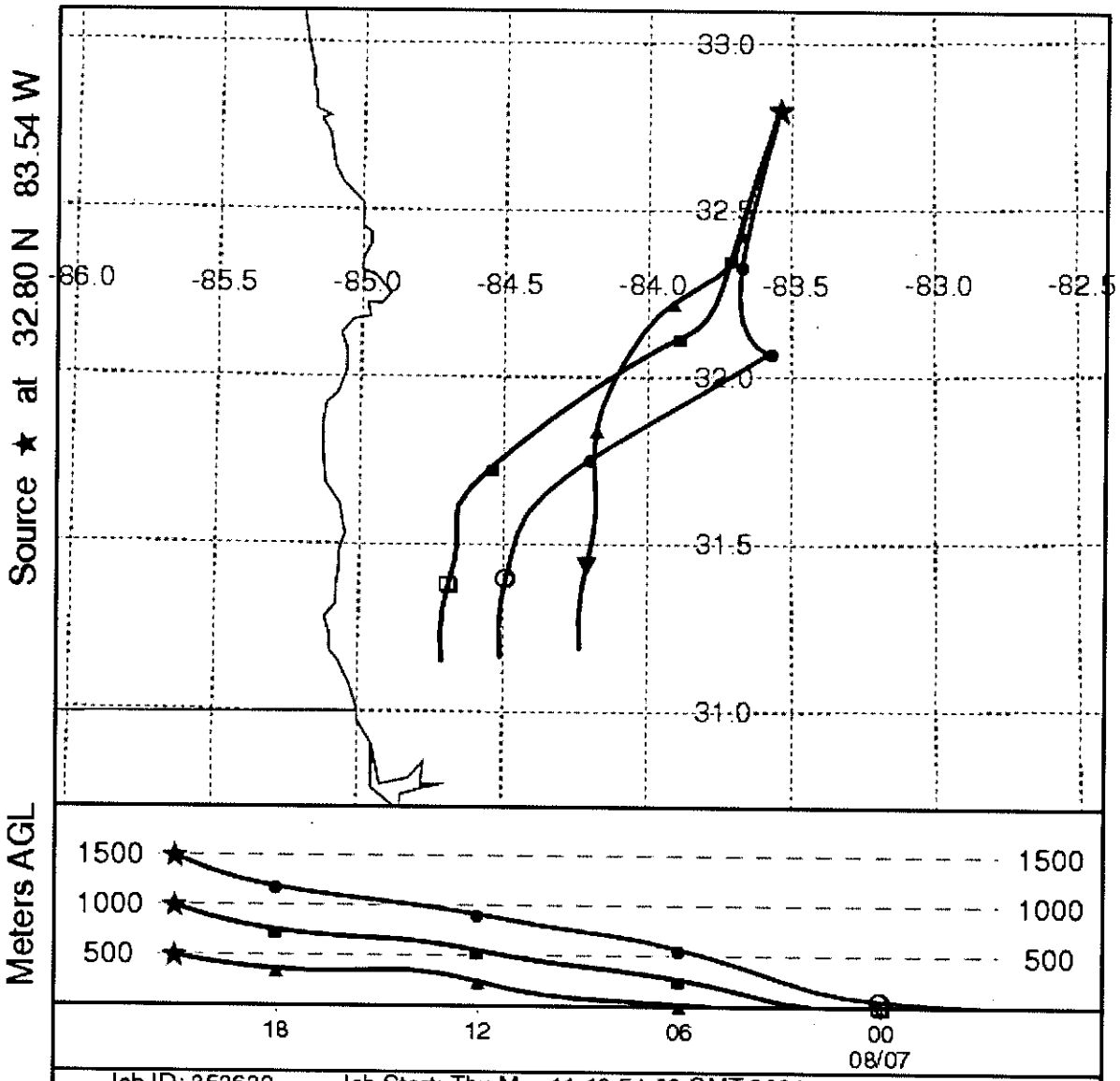
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 04 Aug 99
EDAS Meteorological Data



Job ID: 353618 Job Start: Thu Mar 11 18:53:08 GMT 2004
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

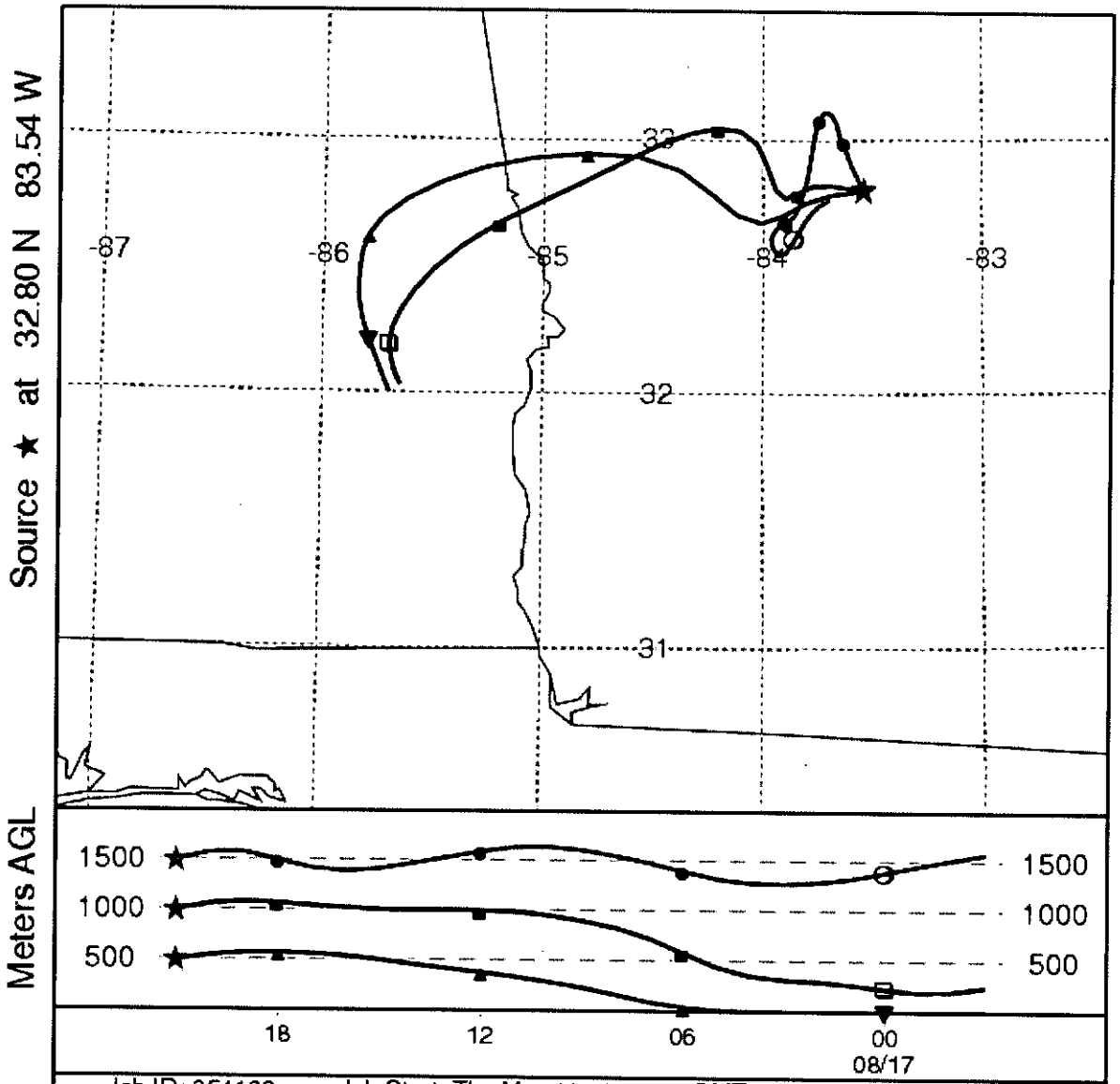
NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 07 Aug 99
EDAS Meteorological Data



Job ID: 353630 Job Start: Thu Mar 11 18:54:06 GMT 2004
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

NOAA HYSPLIT MODEL
Backward trajectories ending at 21 UTC 17 Aug 99
EDAS Meteorological Data



Job ID: 354136 Job Start: Thu Mar 11 19:28:22 GMT 2004
lat.: 32.80 lon.: -83.54 hgts: 500, 1000, 1500 m AGL

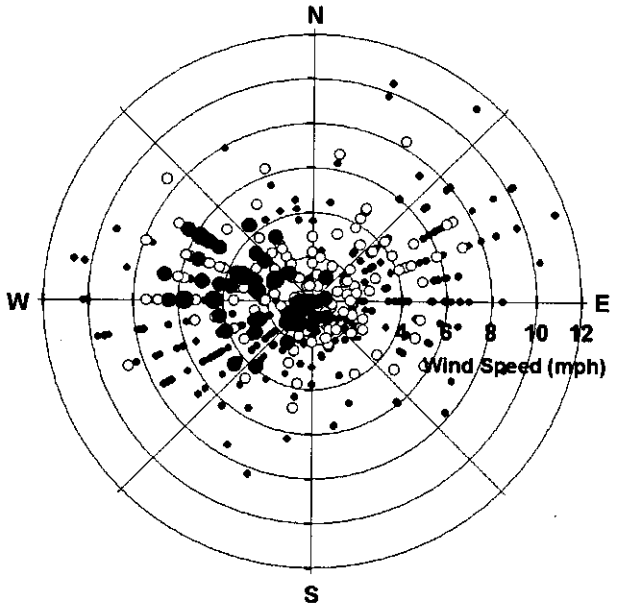
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

APPENDIX D

Peak Daily 8-Hour Average Ozone Concentrations as a Function of Local Resultant Wind

Peak Daily 8-Hour Average Ozone Concentrations As A Function Of Local Resultant Wind

Macon Allied Monitor Site



• Good
(O_3 < 0.065 ppmv)

○ Moderate
(0.065 ppmv ≤ O_3 < 0.085 ppmv)

• Unhealthy for Sensitive Groups
(0.085 ppmv ≤ O_3 < 0.105 ppmv)

• Unhealthy
(0.105 ppmv ≤ O_3 < 0.125 ppmv)

APPENDIX E

Climate Averaged Wind Speed and Direction Data For The Warner Robins Weather Station

GLOBAL CLIMATOLOGY BRANCH
AFCCC, ASHEVILLE NC

PERCENTAGE FREQUENCY OF OCCURRENCE SURFACE WIND DIRECTION VERSUS WIND SPEED
FROM SURFACE OBSERVATIONS

STATION NUMBER: 722175 STATION NAME: Warner Robins AFB GA PERIOD OF RECORD: DEC 1972 - Dec 2002
UTC TO LST: -5 MONTH: ALL HOURS: ALL

DIRECTION (DEGREES)	WIND SPEED IN KNOTS 1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-64	GE 65	TOTAL %	MEAN WIND	MEDIAN WIND
(N) 350-010	4.3	2.8	0.6	0.1	0.0	0.0						7.8	5.0	4.0
020-040	3.4	2.3	0.4	0.0	0.0				0.0			6.1	4.7	4.0
050-070	3.6	3.1	0.5	0.0	0.0			0.0				7.2	5.0	5.0
(E) 080-100	3.3	2.4	0.4	0.0	0.0							6.1	4.9	4.0
110-130	4.3	2.3	0.3	0.0	0.0	0.0						6.9	4.4	4.0
140-160	4.7	2.3	0.4	0.1	0.0		0.0					7.4	4.4	4.0
(S) 170-190	2.3	2.1	0.6	0.1	0.0	0.0	0.0					5.1	5.7	5.0
200-220	1.7	2.5	0.6	0.1	0.0	0.0						4.9	6.1	6.0
230-250	1.7	2.7	0.7	0.1	0.0	0.0						5.2	6.2	6.0
(W) 260-280	1.7	2.9	1.1	0.2	0.0	0.0	0.0	0.0				5.9	7.0	6.0
290-310	2.1	3.0	1.7	0.5	0.1	0.0	0.0			0.0		7.4	7.7	7.0
320-340	4.8	4.6	1.9	0.5	0.1	0.0						11.9	6.4	6.0
VARIABLE	0.0											0.0	2.6	3.0
CALM	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	18.1	//////////	//////////
TOTALS	37.7	32.9	9.4	1.6	0.2							100.0	4.6	4.0

TOTAL NUMBER OF OBSERVATIONS 246711

GLOBAL CLIMATOLOGY BRANCH
AFCCC, ASHEVILLE NC

PERCENTAGE FREQUENCY OF OCCURRENCE SURFACE WIND DIRECTION VERSUS WIND SPEED
FROM SURFACE OBSERVATIONS

STATION NUMBER: 722175 STATION NAME: Warner Robins AFB GA PERIOD OF RECORD: DEC 1972 - Dec 2002
UTC TO LST: -5 MONTH: APRIL HOURS: ALL

DIRECTION (DEGREES)	WIND SPEED IN KNOTS 1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-64	GE 65	TOTAL %	MEAN WIND	MEDIAN WIND
(N) 350-010	3.4	2.2	0.8	0.1								6.5	5.4	4.0
020-040	2.0	1.3	0.3									3.6	4.8	4.0
050-070	2.0	1.4	0.2									3.6	4.7	4.0
(E) 080-100	2.3	1.8	0.3									4.3	4.9	4.0
110-130	4.3	3.2	0.5									8.0	4.9	4.0
140-160	5.5	3.6	0.8	0.1								10.0	4.9	4.0
(S) 170-190	2.3	3.3	1.2	0.2								7.0	6.6	6.0
200-220	1.8	3.3	1.2	0.2								6.5	6.9	6.0
230-250	1.7	3.5	1.2	0.2								6.6	6.9	7.0
(W) 260-280	1.6	3.4	1.7	0.3								7.0	7.4	7.0
290-310	1.9	3.2	2.6	0.7	0.1							8.6	8.4	8.0
320-340	4.1	4.5	2.5	0.7	0.2							12.1	7.2	6.0
VARIABLE														
CALM	//////	//////	//////	//////	//////	//////	//////	//////	//////	//////	//////	16.2	//////	//////
TOTALS	32.9	34.8	13.3	2.4	0.4							100.0	5.3	5.0

TOTAL NUMBER OF OBSERVATIONS 20576

GLOBAL CLIMATOLOGY BRANCH
AFCCC, ASHEVILLE NC
STATION NUMBER: 722175

PERCENTAGE FREQUENCY OF OCCURRENCE SURFACE WIND DIRECTION VERSUS WIND SPEED
FROM SURFACE OBSERVATIONS
STATION NAME: Warner Robins AFB GA PERIOD OF RECORD: DEC 1972 - Dec 2002
UTC TO LST: -5 MONTH: MAY HOURS: ALL

CATEGORY A: CEILING GE 200 BUT LESS THAN 1500 FEET WITH VISIBILITY GE 1/2 MILE (0800 METERS).
AND/OR
VISIBILITY GE 1/2 MILE (0800 METERS) BUT LESS THAN 3 MILES (4800 METERS) WITH CEILING GE 200 FEET.

DIRECTION (DEGREES)	WIND SPEED IN KNOTS 1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-64	GE 65	TOTAL %	MEAN WIND	MEDIAN WIND
(N) 350-010	1.5	3.1	0.4									5.0	5.9	6.0
020-040	5.0	4.9	1.1									10.9	5.3	5.0
050-070	4.4	5.3	0.5									10.3	5.1	5.0
(E) 080-100	5.3	3.8	0.6									9.7	4.6	4.0
110-130	7.1	3.2	0.3	0.1								10.7	4.2	3.0
140-160	6.4	3.3	0.9	0.1								10.7	4.7	4.0
(S) 170-190	3.0	2.7	0.7	0.1								6.4	5.4	5.0
200-220	2.7	2.5	0.3	0.2								5.6	5.4	5.0
230-250	2.2	2.1	0.2	0.1								4.6	5.1	5.0
(W) 260-280	1.0	1.5	0.3	0.1								3.0	6.0	5.0
290-310	0.9	0.6	0.3	0.1								1.8	6.0	5.0
320-340	2.2	1.0	0.6	0.1								3.9	5.5	4.0
VARIABLE														
CALM	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	17.4	//////////	//////////
TOTALS	41.7	34.0	6.2	0.8								100.0	4.2	4.0

TOTAL NUMBER OF OBSERVATIONS 1169

GLOBAL CLIMATOLOGY BRANCH
AFCCC, ASHEVILLE NC
STATION NUMBER: 722175

PERCENTAGE FREQUENCY OF OCCURRENCE SURFACE WIND DIRECTION VERSUS WIND SPEED
FROM SURFACE OBSERVATIONS
STATION NAME: Warner Robins AFB GA PERIOD OF RECORD: DEC 1972 - Dec 2002
UTC TO LST: -5 MONTH: JUNE HOURS: ALL

CATEGORY A: CEILING GE 200 BUT LESS THAN 1500 FEET WITH VISIBILITY GE 1/2 MILE (0800 METERS).
AND/OR
VISIBILITY GE 1/2 MILE (0800 METERS) BUT LESS THAN 3 MILES (4800 METERS) WITH CEILING GE 200 FEET.

DIRECTION (DEGREES)	WIND SPEED IN KNOTS 1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-64	GE 65	TOTAL %	MEAN WIND	MEDIAN WIND
(N) 350-010	2.8	1.2	0.2	0.3	0.3							4.6	5.8	4.0
020-040	3.5	1.7	0.5	0.4								6.1	5.3	4.0
050-070	5.9	4.8	0.6									11.3	4.7	4.0
(E) 080-100	5.2	2.8	0.4	0.1								8.4	4.4	4.0
110-130	4.8	1.8	0.2									6.7	3.7	3.0
140-160	7.5	2.3	0.3	0.1								10.3	3.5	3.0
(S) 170-190	2.8	1.4	0.4	0.1	0.1							4.8	5.0	4.0
200-220	2.8	2.9	0.5	0.1	0.1	0.1						6.5	5.9	5.0
230-250	3.2	3.5	0.7		0.1							7.4	5.5	5.0
(W) 260-280	2.1	2.2	0.7	0.2								5.1	6.0	5.0
290-310	1.4	0.7	0.3			0.1						2.4	5.6	4.0
320-340	2.6	1.2	0.7	0.1								4.5	5.0	4.0
VARIABLE														
CALM	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	21.9	//////////	//////////
TOTALS	44.5	26.3	5.3	1.3	0.5	0.2						100.0	3.8	3.0

TOTAL NUMBER OF OBSERVATIONS 1197

GLOBAL CLIMATOLOGY BRANCH
AFCCC, ASHEVILLE NC
STATION NUMBER: 722175

PERCENTAGE FREQUENCY OF OCCURRENCE SURFACE WIND DIRECTION VERSUS WIND SPEED
FROM SURFACE OBSERVATIONS
STATION NAME: Warner Robins AFB GA PERIOD OF RECORD: DEC 1972 - Dec 2002
UTC TO LST: -5 MONTH: JULY HOURS: ALL

CATEGORY A: CEILING GE 200 BUT LESS THAN 1500 FEET WITH VISIBILITY GE 1/2 MILE (0800 METERS).
AND/OR
VISIBILITY GE 1/2 MILE (0800 METERS) BUT LESS THAN 3 MILES (4800 METERS) WITH CEILING GE 200 FEET.

DIRECTION (DEGREES)	WIND SPEED IN KNOTS 1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-64	GE 65	TOTAL %	MEAN WIND	MEDIAN WIND
(N) 350-010	2.9	1.1	0.5	0.1		0.1						4.6	4.8	3.0
020-040	3.8	1.4	0.3									5.5	4.0	3.0
050-070	6.1	3.7	0.7									10.4	4.3	4.0
(E) 080-100	5.3	1.7	0.3									7.3	3.9	4.0
110-130	5.5	2.5	0.4	0.1		0.1						8.5	4.3	3.0
140-160	7.5	1.9	0.7	0.3								10.3	4.2	3.0
(S) 170-190	3.1	2.4	1.1	0.3								6.8	6.1	5.0
200-220	3.5	2.3	0.1									5.9	4.4	4.0
230-250	3.3	1.9	0.2	0.1								5.5	4.6	4.0
(W) 260-280	3.8	1.9	0.5		0.1	0.1						6.4	5.2	4.0
290-310	1.4	0.8	0.3			0.1				0.1		2.7	6.6	4.0
320-340	2.3	1.5	0.4		0.1	0.1						4.3	5.3	4.0
VARIABLE	0.1											0.1	3.0	3.0
CALM	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	21.7	//////////	//////////
TOTALS	48.5	23.1	5.4	0.7	0.2	0.3				0.1		100.0	3.6	3.0

TOTAL NUMBER OF OBSERVATIONS 1537

GLOBAL CLIMATOLOGY BRANCH
AFCCC, ASHEVILLE NC
STATION NUMBER: 722175

PERCENTAGE FREQUENCY OF OCCURRENCE SURFACE WIND DIRECTION VERSUS WIND SPEED
FROM SURFACE OBSERVATIONS
STATION NAME: Warner Robins AFB GA PERIOD OF RECORD: DEC 1972 - Dec 2002
UTC TO LST: -5 MONTH: AUGUST HOURS: ALL

DIRECTION (DEGREES)	WIND SPEED IN KNOTS 1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-64	GE 65	TOTAL %	MEAN WIND	MEDIAN WIND
(N) 350-010	3.8	2.2	0.3									6.4	4.5	4.0
020-040	4.8	2.3	0.3	0.1								7.5	4.2	4.0
050-070	5.4	3.5	0.4									9.3	4.5	4.0
(E) 080-100	5.2	3.3	0.5									9.0	4.6	4.0
110-130	5.8	2.5	0.2									8.5	4.0	4.0
140-160	6.0	2.2	0.1									8.3	3.7	3.0
(S) 170-190	2.6	1.7	0.3	0.1								4.7	4.8	4.0
200-220	2.0	2.2	0.3									4.6	5.2	5.0
230-250	2.3	2.3	0.3									4.9	5.1	5.0
(W) 260-280	1.9	2.1	0.4									4.5	5.5	5.0
290-310	1.6	1.6	0.3									3.5	5.2	5.0
320-340	3.9	2.5	0.3									6.8	4.6	4.0
VARIABLE	0.1											0.1	2.3	2.0
CALM	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	21.8	//////////	//////////
TOTALS	45.4	28.5	3.9	0.4								100.0	3.6	3.0

TOTAL NUMBER OF OBSERVATIONS 20808

GLOBAL CLIMATOLOGY BRANCH
AFCCC, ASHEVILLE NC

PERCENTAGE FREQUENCY OF OCCURRENCE SURFACE WIND DIRECTION VERSUS WIND SPEED
FROM SURFACE OBSERVATIONS

STATION NUMBER: 722175 STATION NAME: Warner Robins AFB GA PERIOD OF RECORD: DEC 1972 - Dec 2002
UTC TO LST: -5 MONTH: SEPTEMBER HOURS: ALL

DIRECTION (DEGREES)	WIND SPEED IN KNOTS 1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-64	GE 65	TOTAL %	MEAN WIND	MEDIAN WIND
(N) 350-010	5.4	3.2	0.6	0.1								9.2	4.7	4.0
020-040	5.6	3.7	0.6									10.0	4.7	4.0
050-070	6.4	5.8	1.0									13.1	5.1	5.0
(E) 080-100	5.0	3.7	0.4									9.1	4.7	4.0
110-130	4.5	2.1	0.2									6.9	4.2	4.0
140-160	4.3	1.7	0.3									6.2	4.2	4.0
(S) 170-190	1.5	1.1	0.2	0.1								2.9	5.1	4.0
200-220	1.0	1.1	0.1									2.3	5.1	5.0
230-250	1.0	1.4	0.2									2.6	5.5	5.0
(W) 260-280	1.0	1.4	0.3									2.7	5.8	5.0
290-310	1.4	1.1	0.4	0.1								3.0	5.6	5.0
320-340	5.2	3.1	0.7	0.1								9.1	4.9	4.0
VARIABLE	0.1											0.1	2.3	2.5
CALM	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	22.8	//////////	//////////
TOTALS	42.4	29.2	4.9	0.5	0.1							100.0	3.7	3.0

TOTAL NUMBER OF OBSERVATIONS 20319

GLOBAL CLIMATOLOGY BRANCH
AFCCC, ASHEVILLE NC

PERCENTAGE FREQUENCY OF OCCURRENCE SURFACE WIND DIRECTION VERSUS WIND SPEED
FROM SURFACE OBSERVATIONS

STATION NUMBER: 722175 STATION NAME: Warner Robins AFB GA PERIOD OF RECORD: DEC 1972 - Dec 2002
UTC TO LST: -5 MONTH: OCTOBER HOURS: ALL

DIRECTION (DEGREES)	WIND SPEED IN KNOTS 1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-64	GE 65	TOTAL %	MEAN WIND	MEDIAN WIND
(N) 350-010	7.5	4.4	0.7	0.1								12.7	4.7	4.0
020-040	4.9	3.9	0.9									9.8	5.1	4.0
050-070	4.5	5.0	1.0									10.5	5.5	5.0
(E) 080-100	3.0	2.6	0.4									6.0	5.0	5.0
110-130	3.7	1.7	0.2									5.6	4.1	4.0
140-160	3.2	1.4	0.2									4.7	4.1	3.0
(S) 170-190	1.2	0.9	0.1									2.3	5.0	4.0
200-220	0.9	0.9	0.2									2.0	5.5	5.0
230-250	0.9	1.2	0.2									2.2	5.6	5.0
(W) 260-280	0.9	1.8	0.5									3.3	6.6	6.0
290-310	1.8	2.1	0.9	0.2								5.0	6.6	6.0
320-340	7.2	5.0	1.2	0.3								13.8	5.3	4.0
VARIABLE	0.1											0.1	2.8	3.0
CALM	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	//////////	21.9	//////////	//////////
TOTALS	39.6	30.8	6.8	0.8	0.1							100.0	4.0	4.0

TOTAL NUMBER OF OBSERVATIONS 20540

APPENDIX F

Climatic Wind Summary for United States Weather Stations

NATIONAL CLIMATIC DATA CENTER
151 PATTON AVENUE ROOM 120
ASHEVILLE, NC 28801-5001
(NCDC)
PHONE : (828) 271-4800 INTERNET : orders@ncdc.noaa.gov
FACSIMILE : (828) 271-4876 WEB site : http://www.ncdc.noaa.gov

November 1998

CLIMATIC WIND DATA FOR THE UNITED STATES

The climatic wind data contained in this summary was extracted from the NCDC's Local Climatological Data publication, Navy & Air Force climatic briefs, and other sources. Locations are not all inclusive and wind data may be available for sites not listed in this summary. The total period of this summary is 1930-1996. The period of record (POR) for which wind data is summarized varies for individual sites and may begin and end at any time during the 1930-1996 period. All available wind data is provided regardless of POR or source. Updated data for many sites can be obtained from post 1996 Local Climatological Data annual publications.
In the table, prevailing wind directions (DIR) are given in compass points; mean wind speeds (SPD) and peak gust (PGU) are in miles per hour (mph). When peak gust (PGU) wind velocities are not available, fastest-mile or 5-second winds may be substituted. This will be indicated by a $ for fastest-mile and # for 5-second winds preceding PGU (ie: $PGU = fastest-mile winds). Wind types may be combined to reflect the highest reported wind. When appropriate wind data is not available, an N/A will appear in lieu of data.
Conversion tables of miles per hour to knots and compass points to degrees are provided at the end of this wind table.

****

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
ALABAMA														
Birmingham	DIR	N	N	N	N	N	N	N	N	N	S	S	S	N
	SPD	8	9	9	9	7	6	6	6	7	6	7	8	7
	$PGU	49	59	65	56	65	56	57	50	50	43	52	41	65
Huntsville	DIR	ESE	ESE	ESE	N	N	N	ESE	ESE	ESE	S	S	S	ESE
	SPD	9	10	10	9	8	7	6	6	7	7	8	9	8
	#PGU	43	43	40	48	45	56	64	45	46	55	43	48	64
Mobile	DIR	N	N	N	N	SE	SE	SE	SE	S	S	S	S	S
	SPD	10	11	11	10	9	6	7	7	8	8	9	10	9
	#PGU	45	61	55	46	62	60	64	53	60	59	48	43	64
Montgomery	DIR	NW	NW	NW	NW	NW	NW	S	S	S	S	S	S	WNW
	SPD	8	8	8	7	6	6	6	5	6	6	7	7	7
	PGU	43	66	54	60	60	60	55	59	41	73	56	48	73
Ozark/	DIR	NW	N	S	S	S	W	W	E	ENE	E	NNW	NW	E
Ft Rucker	SPD	6	6	7	6	5	3	3	3	3	5	5	6	5
	PGU	46	64	74	61	71	60	58	60	82	48	52	44	82
ALASKA														
Anchorage	DIR	N	N	N	S	SSE	SSE	SSE	SSE	SSE	N	N	N	N
	SPD	6	7	7	7	8	8	7	7	7	7	7	6	7
	PGU	64	61	75	44	43	46	40	44	48	55	55	55	75
Barrow	DIR	ENE	ENE	ENE	ENE	ENE	E	E	E	ENE	ENE	ENE	ENE	ENE
	SPD	12	11	11	12	12	12	12	12	13	13	12	12	12
	PGU	58	74	56	47	41	43	55	47	66	54	53	61	74
Cold Bay	DIR	SSE	SE	SE	NNW	SSE	SSE	SSE	SSE	SSE	NNW	NNW	SSE	SSE
	SPD	18	18	17	17	16	16	16	16	17	17	18	18	17
	PGU	85	83	76	85	72	69	58	81	95	87	75	85	95

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Jacksonville	DIR	WNW	NW	WSW	ESE	SE	WSW	SW	SW	ENE	NE	NE	NW	WSW
	SPD	8	9	9	9	8	8	7	7	8	8	8	8	8
	PGU	55	62	66	67	56	58	69	61	55	47	46	45	69
Key West	DIR	NE	NE	NE	NE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE
	SPD	12	12	12	12	11	10	10	9	10	11	12	12	11
	PGU	58	52	75	63	52	51	51	56	58	67	69	48	75
Miami	DIR	NNW	NNW	ESE	ESE	ESE	ESE	ESE	ESE	E	ENE	E	NNW	ESE
	SPD	10	10	11	11	10	8	8	8	8	9	10	9	9
	PGU	45	61	59	55	46	58	56	115	62	47	49	46	115
Orlando	DIR	N	N	N	N	N	N	N	N	S	S	S	S	N
	SPD	8	9	9	9	8	7	6	6	7	8	8	8	8
	PGU	48	51	62	53	68	62	74	62	56	40	41	43	74
Panama City/ Tyndall AFB	DIR	N	N	SSE	S	S	WSW	WSW	E	ENE	N	N	N	N
	SPD	7	7	8	7	6	6	6	5	6	6	6	7	6
	PGU	54	60	59	63	60	69	64	78	79	49	69	53	79
Pensacola NAS	DIR	N	N	N	N	N	N	ESE	ESE	ESE	SE	SE	SE	N
	SPD	10	11	11	12	10	10	8	7	9	9	9	10	10
	PGU	35	35	35	35	32	32	35	35	53	35	35	34	53
Tallahassee	DIR	N	N	S	S	S	N	S	N	ENE	N	N	N	N
	SPD	7	7	8	7	6	5	5	5	6	6	6	6	6
	PGU	44	51	53	48	41	76	67	64	83	58	68	36	83
Tampa	DIR	ENE	ENE	ENE	ENE	E	E	E	E	E	E	W	W	E
	SPD	9	9	10	9	9	8	7	7	8	8	8	8	8
	PGU	44	46	58	49	51	61	60	48	45	53	60	37	61
Vero Beach	DIR	N	N	ESE	SE	ESE	ESE	ESE	ESE	ENE	ENE	ESE	NW	ESE
	SPD	9	9	10	10	9	8	7	7	7	9	9	8	8
	PGU	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W. Palm Bch	DIR	NW	NW	NW	NW	SE	SE	SE	SE	ESE	ESE	ESE	ESE	ESE
	SPD	10	11	11	11	10	8	8	8	9	10	11	10	10
	#PGU	46	40	43	38	39	53	32	41	52	45	46	48	53
GEORGIA														
Albany NAS	DIR	NW	NW	SSW	SSW	SSW	SW	SSW	ENE	ENE	NE	NE	NW	ENE
	SPD	7	8	8	7	6	6	6	5	6	6	6	6	6
	PGU	54	55	64	89	62	61	55	72	44	49	56	45	89
Athens	DIR	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WSW	WSW	WSW	WSW	WNW
	SPD	8	9	9	8	7	7	6	6	7	7	8	8	7
	PGU	55	54	83	60	52	58	78	56	55	47	59	45	83
Atlanta	DIR	NW	NW	NW	WNW	NW	W	W	E	E	E	NW	NW	NW
	SPD	10	11	11	10	9	8	8	7	8	9	9	10	9
	PGU	55	68	61	61	72	60	77	63	45	56	56	47	77
Augusta	DIR	W	WNW	WNW	S	SE	SE	WSW	SE	NE	NNW	WNW	WNW	WSW
	SPD	7	8	8	7	6	6	6	5	5	6	6	6	6
	#PGU	44	43	48	43	52	49	45	33	38	52	49	40	52
Brunswick/ Glynco NAS	DIR	WNW	W	W	SSE	SSE	SSE	SSW	SSE	NE	NNE	NNE	NNE	SW
	SPD	7	8	8	7	7	7	6	6	6	6	6	6	7
	PGU	48	48	56	64	61	49	62	64	61	45	60	41	64

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Columbus	DIR	ENE	ENE	NW	NW	WNW	WNW	S	S	E	E	ENE	ENE	ENE
	SPD	7	8	8	7	7	6	6	6	6	7	7	7	7
	#PGU	53	37	44	40	46	62	39	40	38	52	40	33	62
Macon	DIR	WNW	WNW	WNW	WNW	WNW	WNW	WSW	ENE	ENE	ENE	WNW	WNW	WNW
	SPD	8	9	9	9	7	7	7	7	6	7	7	7	8
	#PGU	46	44	43	72	64	36	41	51	39	45	54	33	72
Savannah	DIR	W	W	WNW	WNW	S	S	S	S	S	S	SW	SW	W
	SPD	9	9	9	9	8	8	7	7	7	8	8	8	8
	PGU	51	49	68	53	68	66	63	58	54	61	62	48	68
Valdosta/ Moody AFB	DIR	WNW	NNW	SSW	WSW	E	WSW	SSW	WSW	NNE	NNE	ENE	NNE	ENE
	SPD	5	6	6	5	5	3	3	3	3	5	5	5	5
	PGU	51	56	55	60	59	75	51	55	53	51	63	45	75
HAWAII														
Barbers PT NAS	DIR	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE
	SPD	9	9	10	10	9	9	10	9	9	9	9	9	9
	PGU	69	59	59	45	44	45	43	52	48	41	70	52	70
Kaneohe Bay MCAS	DIR	E	E	E	E	E	E	ENE	ENE	E	E	E	E	E
	SPD	8	9	12	10	10	10	10	10	9	9	9	8	9
	PGU	96	75	59	60	47	41	46	53	40	54	92	64	96
Hilo	DIR	SW	SW	SW	SW	SW	SW	WSW	SW	SW	SW	SW	SW	SW
	SPD	8	8	8	8	8	7	7	7	7	7	7	7	7
	PGU	47	55	40	40	41	32	36	36	37	33	36	45	55
Honolulu	DIR	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE
	SPD	10	10	11	12	12	13	13	13	11	11	11	10	11
	PGU	41	46	51	41	39	35	40	36	49	35	40	46	51
Kahului	DIR	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	SPD	13	14	14	15	17	17	18	17	16	13	14	13	15
	PGU	54	46	52	49	44	47	46	45	44	46	51	54	54
Lihue	DIR	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE
	SPD	11	12	13	13	13	13	14	13	12	12	12	12	12
	PGU	66	59	54	47	40	39	41	38	115	40	51	53	115
Pearl Harbor/ Hickam AFB	DIR	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE
	SPD	9	10	12	13	12	13	14	13	12	12	10	10	12
	PGU	52	53	49	47	40	43	51	41	38	40	81	49	81
Wahiawa/ Wheeler AFB	DIR	NW	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	SPD	7	7	8	7	8	8	8	8	7	7	6	7	7
	PGU	46	38	46	31	31	31	38	38	31	31	31	31	46
IDAHO														
Boise	DIR	ESE	ESE	ESE	ESE	ESE	ESE	NW	NW	NW	NW	NW	NW	ESE
	SPD	8	9	10	10	9	9	8	8	8	8	8	8	9
	PGU	59	45	53	58	49	54	71	54	49	47	54	47	71
Lewiston	DIR	S	E	E	WNW	WNW	WNW	WNW	WNW	WNW	E	E	S	WNW
	SPD	6	7	6	7	6	6	6	5	5	5	6	6	6
	PGU	72	64	60	58	54	54	59	51	59	59	59	63	72
Pocatello	DIR	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW
	SPD	10	11	11	12	11	10	9	9	9	10	11	10	10
	PGU	68	60	64	66	61	70	66	68	51	51	58	58	70

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Cheyenne	DIR	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	W	WNW	WNW	WNW
	SPD	15	15	15	14	13	11	10	10	11	12	14	15	13
	PGU	77	70	75	64	71	84	79	61	62	71	76	74	84
Lander	DIR	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW
	SPD	5	5	7	8	8	8	7	7	7	6	6	6	7
	PGU	86	69	63	83	67	63	66	67	64	53	59	66	86
Sheridan	DIR	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW
	SPD	8	8	9	10	9	8	7	7	8	8	8	8	8
	PGU	71	69	68	69	63	54	59	58	67	64	73	69	73

****

CONVERSION TABLE OF MILES PER HOUR (MPH) TO KNOTS (KTS)

MPH	0	1	2	3	4	5	6	7	8	9
MPH	KTS	KTS	KTS	KTS	KTS	KTS	KTS	KTS	KTS	KTS
0	0	1	2	3	3	4	5	6	7	8
10	9	10	10	11	12	13	14	15	16	17
20	17	18	19	20	21	22	23	23	24	25
30	26	27	28	29	30	30	31	32	33	34
40	35	36	36	37	38	39	40	41	42	43
50	43	44	45	46	47	48	49	50	50	51
60	52	53	54	55	56	56	57	58	59	60
70	61	62	63	63	64	65	66	67	68	60
80	70	70	71	72	73	74	75	76	76	77
90	78	79	80	81	82	83	83	84	85	86

(eg: 25 mph = 22 kts)

CONVERSION TABLE OF COMPASS POINTS (16) TO WHOLE DEGREES

N = 35-01	**E** = 08-10	**S** = 17-19	**W** = 26-28
NNE = 02-03	**ESE** = 11-12	**SSW** = 20-21	**WNW** = 29-30
NE = 04-05	**SE** = 13-14	**SW** = 22-23	**NW** = 31-32
ENE = 06-07	**SSE** = 15-16	**WSW** = 24-25	**NNW** = 33-34

APPENDIX G

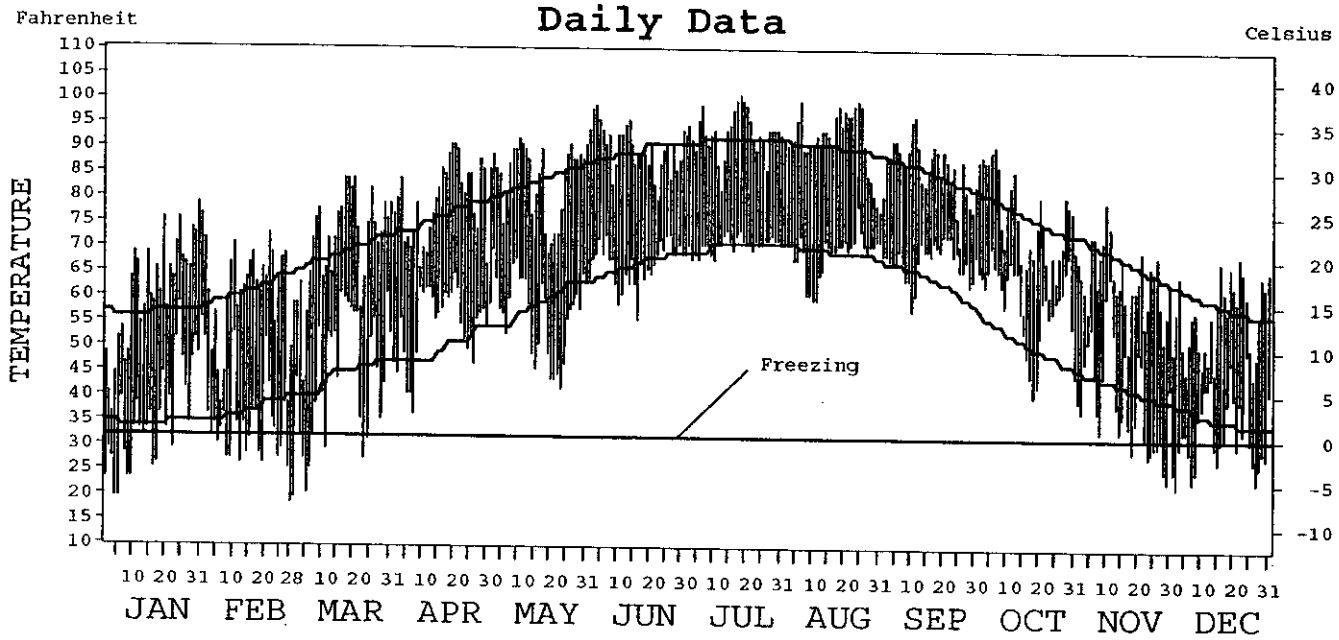
Local Climate Data Annual Report for the Macon Airport Weather Station

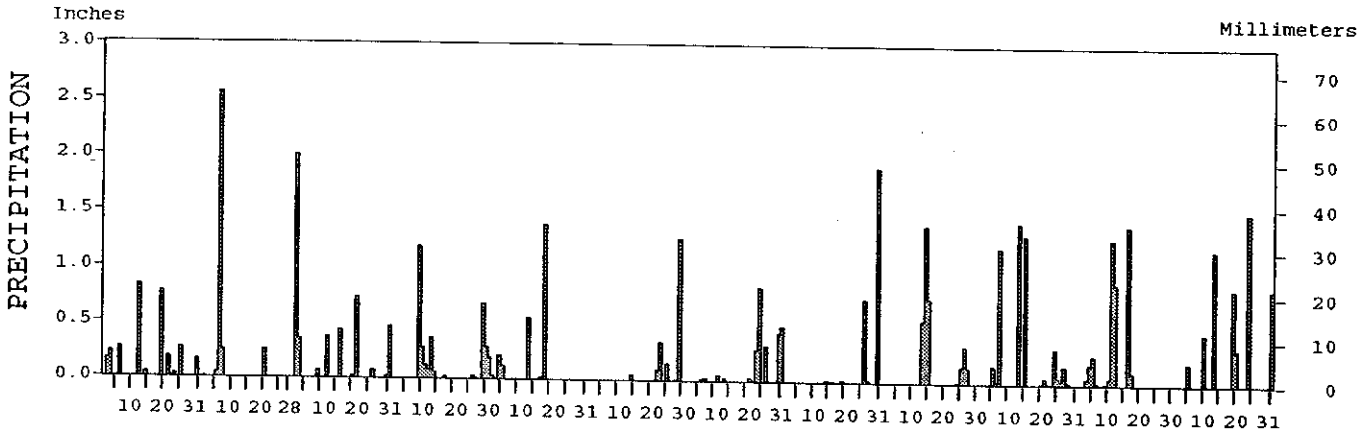
2002 LOCAL CLIMATOLOGICAL DATA
ANNUAL SUMMARY WITH COMPARATIVE DATA

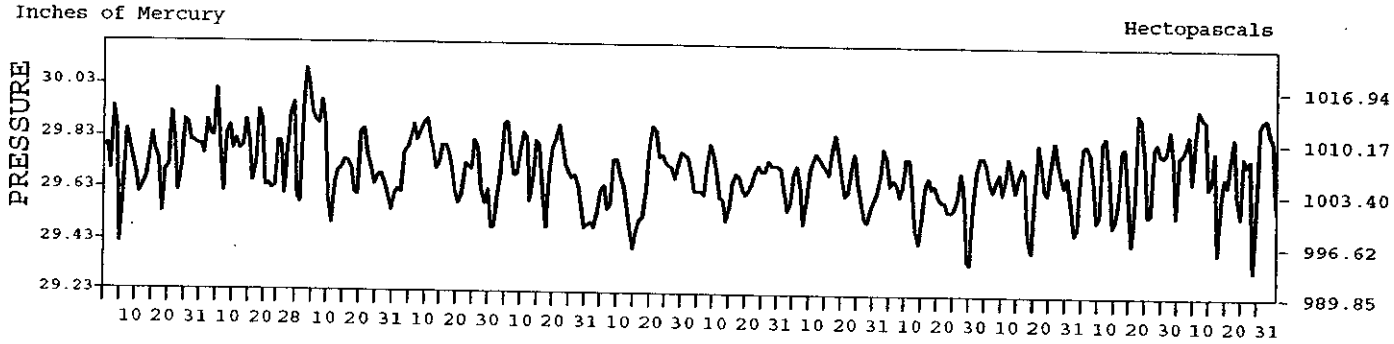
ISSN 0198-1625

MACON,
GEORGIA (MCN)

Daily Data







I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER.

Thomas R Karl

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE

NATIONAL CLIMATIC DATA CENTER
ASHEVILLE, NORTH CAROLINA

DIRECTOR
NATIONAL CLIMATIC DATA CENTER

METEOROLOGICAL DATA FOR 2002

MACON, GA (MCN)

LATITUDE: 32° 41′ 16″ N | LONGITUDE: 83° 39′ 16″ W | ELEVATION (FT): GRND: 356 BARO: 359 | TIME ZONE: EASTERN (UTC + 5) | WBAN: 03813

	ELEMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	MEAN DAILY MAXIMUM	61.8	60.3	71.2	79.4	84.2	90.3	93.5	92.2	86.5	76.4	64.4	57.0	76.4
	HIGHEST DAILY MAXIMUM	79	73	84	91	92	99	101	100	97	91	80	69	101
	DATE OF OCCURRENCE	30	21	20+	20+	10	03	18	24+	11	06	10	22	JUL 18
	MEAN DAILY MINIMUM	36.5	34.5	44.1	54.5	57.0	67.1	71.1	69.5	68.0	59.6	40.5	34.0	53.0
	LOWEST DAILY MINIMUM	20	19	20	37	42	56	68	60	58	41	24	23	19
	DATE OF OCCURRENCE	05+	28	01	07	23	16	10+	11+	10	18	29	02	FEB 28
	AVERAGE DRY BULB	49.2	47.4	57.7	67.0	70.6	78.7	82.3	80.9	77.3	68.0	52.5	45.5	64.8
	MEAN WET BULB	44.6		51.6	60.9	63.7	70.6	73.8		71.3	64.0	47.9	41.0	
	MEAN DEW POINT	39.5		45.1	56.3	59.2	66.7	70.7		68.9	62.0	43.2	35.6	
	NUMBER OF DAYS WITH:													
	MAXIMUM ≥ 90°	0	0	0	3	8	17	27	26	10	2	0	0	93
	MAXIMUM ≤ 32°	0	0	0	0	0	0	0	0	0	0	0	0	0
	MINIMUM ≤ 32°	11	12	7	0	0	0	0	0	0	0	7	16	53
	MINIMUM ≤ 0°	0	0	0	0	0	0	0	0	0	0	0	0	0
H/C	HEATING DEGREE DAYS	487	487	259	46	33	0	0	0	0	58	381	597	2348
	COOLING DEGREE DAYS	5	0	40	110	216	418	540	499	376	156	11	0	2371
RH	MEAN (PERCENT)	74	62	68	72	71	72	75	71	80	85	75	72	73
	HOUR 01 LST	81	72	78	84	89	87	89	86	92	92	86	80	85
	HOUR 07 LST	89	82	87	89	89	89	91	91	93	95	89	85	89
	HOUR 13 LST	57	46	52	56	50	53	54	50	63	69	56	56	55
	HOUR 19 LST	68	48	54	61	59	59	67	59	78	86	73	69	65
S	PERCENT POSSIBLE SUNSHINE													
W/O	NUMBER OF DAYS WITH:													
	HEAVY FOG(VISBY ≤ 1/4 MI)	4	2	6	7	5	3	0	1	0	2	3	1	34
	THUNDERSTORMS	0	0	4	3	4	6	10	4	1	2	2	1	37
CLOUDINESS	SUNRISE-SUNSET: (OKTAS)													
	CEILOMETER (≤ 12,000 FT.)													
	SATELLITE (> 12,000 FT.)													
	MIDNIGHT-MIDNIGHT: (OKTAS)													
	CEILOMETER (≤ 12,000 FT.)													
	SATELLITE (> 12,000 FT.)													
	NUMBER OF DAYS WITH:													
	CLEAR													
	PARTLY CLOUDY													
	CLOUDY													
PR	MEAN STATION PRESS. (IN.)	29.74	29.78	29.74	29.73	29.69	29.64	29.67	29.67	29.61	29.66	29.70	29.74	29.70
	MEAN SEA-LEVEL PRESS. (IN.)	30.13	30.17	30.13	30.11	30.07	30.02	30.04		29.99	30.04	30.09	30.13	
WINDS	RESULTANT SPEED (MPH)		2.8	1.2	0.3	2.0	1.3	1.4		2.2	1.8	2.7	1.8	
	RES. DIR. (TENS OF DEGS.)		30	28	01	05	07	26		11	03	29	31	
	MEAN SPEED (MPH)	5.8	6.2	6.2	5.7	5.8	5.9	5.3	5.4	5.9	5.2	5.5	6.7	5.8
	PREVAIL.DIR.(TENS OF DEGS.)	27	29	32	09	05	28	27	05	05	05	30	28	28
	MAXIMUM 2-MINUTE WIND:													
	SPEED (MPH)	29	24	26	25	28	30	30	24	31	23	25	29	31
	DIR. (TENS OF DEGS.)	26	30	33	33	28	31	10	02	19	01	28	29	19
	DATE OF OCCURRENCE	06	04	22	29	13	29	07	26	14	13	17+	25	SEP 14
	MAXIMUM 5-SECOND WIND:													
	SPEED (MPH)	44	32	35	36	35	37	36	30	43	29	35	36	44
	DIR. (TENS OF DEGS.)	21	34	33	32	29	31	10	17	19	36	28	28	21
	DATE OF OCCURRENCE	19	27	22	29	13+	29	07	19	14	13	17	25	JAN 19
PRECIPITATION	WATER EQUIVALENT:													
	TOTAL (IN.)	2.94	3.11	4.53	3.10	2.51	1.91	2.53	2.73	3.32	4.80	4.28	5.39	41.15
	GREATEST 24-HOUR (IN.)	0.83	2.58	2.21	1.44	1.40	1.27	0.84	1.91	2.15	1.43	2.05	1.53	2.58
	DATE OF OCCURRENCE	12	05-06	02-03	09-10	17-18	29	24	30	14-15	13	11-12	24	FEB 05-06
	NUMBER OF DAYS WITH:													
	PRECIPITATION ≥ 0.01	10	5	10	11	8	6	10	7	7	13	10	7	104
	PRECIPITATION ≥ 0.10	8	3	6	6	5	3	5	2	6	6	6	7	63
	PRECIPITATION ≥ 1.00	0	1	1	1	1	1	0	1	1	3	2	2	14
SNOWFALL	SNOW,ICE PELLETS,HAIL:													
	TOTAL (IN.)													
	GREATEST 24-HOUR (IN.)													
	DATE OF OCCURRENCE													
	MAXIMUM SNOW DEPTH (IN.)													
	DATE OF OCCURRENCE													
	NUMBER OF DAYS WITH:													
	SNOWFALL ≥ 1.0													

published by: NCDC Asheville, NC

NORMALS, MEANS, AND EXTREMES

MACON, GA (MCN)

LATITUDE: 32° 41′ 16″ N LONGITUDE: 83° 39′ 16″ W ELEVATION (FT): GRND: 356 BARO: 359 TIME ZONE: EASTERN (UTC + 5) WBAN: 03813

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	56.6	60.9	68.5	75.9	83.4	89.5	91.8	90.5	85.4	76.8	67.8	59.2	75.5
	MEAN DAILY MAXIMUM	46	57.2	61.4	68.9	77.4	84.8	90.0	92.4	91.3	86.3	77.7	68.5	59.8	76.3
	HIGHEST DAILY MAXIMUM	54	84	85	95	96	99	106	108	105	102	100	88	82	108
	YEAR OF OCCURRENCE		1949	1989	1949	1986	1967	1954	1980	1986	1980	1954	1961	1972	JUL 1980
	MEAN OF EXTREME MAXS.	55	74.9	77.0	83.4	88.9	94.2	98.4	99.2	98.6	95.5	89.3	81.8	76.1	88.1
	NORMAL DAILY MINIMUM	30	34.5	37.0	43.8	49.5	58.6	66.6	70.5	69.5	63.7	51.1	42.5	36.3	52.0
	MEAN DAILY MINIMUM	46	35.5	37.8	44.0	51.0	59.8	67.3	71.1	70.1	64.7	52.3	43.3	37.0	52.8
	LOWEST DAILY MINIMUM	54	-6	9	14	29	40	46	54	55	35	26	10	5	-6
	YEAR OF OCCURRENCE		1985	1973	1980	1987	1997	1972	1967	1952	1967	1952	1950	1962	JAN 1985
	MEAN OF EXTREME MINS.	55	17.8	21.3	27.7	35.6	46.1	56.8	64.9	62.5	51.3	35.9	26.4	20.3	38.9
	NORMAL DRY BULB	30	45.4	48.8	56.9	64.3	71.9	78.5	81.2	80.4	75.3	64.8	56.0	48.7	64.3
	MEAN DRY BULB	55	47.0	50.1	56.5	64.5	72.6	79.1	81.7	81.0	75.5	65.3	55.5	48.6	64.8
	MEAN WET BULB	49	42.2	44.5	49.9	56.7	64.2	70.4	73.1	72.9	68.5	58.2	49.6	43.5	57.8
	MEAN DEW POINT	49	36.2	37.8	43.1	50.4	59.3	66.4	70.1	69.8	65.2	53.9	44.1	37.7	52.8
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	*	1.2	7.0	17.8	22.3	21.5	11.4	1.2	0.0	0.0	82.4
	MAXIMUM ≤ 32°	30	0.3	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
	MINIMUM ≤ 32°	30	14.5	10.1	3.7	0.2	0.0	0.0	0.0	0.0	0.0	0.5	4.7	11.4	45.1
	MINIMUM ≤ 0°	30	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H/C	NORMAL HEATING DEG. DAYS	30	590	440	279	122	13	0	0	0	4	96	298	522	2364
	NORMAL COOLING DEG. DAYS	30	1	3	21	69	214	406	515	481	305	78	17	5	2115
RH	NORMAL (PERCENT)	30	70	67	67	65	68	71	74	76	76	71	71	71	71
	HOUR 01 LST	30	78	76	77	77	82	84	86	89	88	85	82	79	82
	HOUR 07 LST	30	83	83	86	86	87	87	90	92	93	89	87	84	87
	HOUR 13 LST	30	57	54	52	47	50	52	56	57	57	50	52	56	53
	HOUR 19 LST	30	64	58	55	52	56	60	66	68	70	65	66	66	62
S	PERCENT POSSIBLE SUNSHINE	48	55	59	64	72	72	71	68	72	68	70	65	58	66
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	54	3.8	3.0	2.0	1.2	1.1	1.0	1.2	1.8	2.1	1.9	3.4	3.9	26.4
	THUNDERSTORMS	54	1.4	1.9	3.4	4.0	6.2	8.7	12.9	8.9	3.4	0.9	1.1	0.9	53.7
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	1					2.8	4.8	6.4	4.8		5.6		5.6	
	MIDNIGHT-MIDNIGHT (OKTAS)	1					3.2	4.8	6.4	4.0					
	MEAN NO. DAYS WITH:														
	CLEAR	1	2.5	4.0	8.0		15.0	10.0	1.0	7.0	3.0	4.0	1.0	7.0	
	PARTLY CLOUDY	1	1.0	2.0			4.0	5.0	2.0	1.0	8.0	2.0	1.0	1.0	
	CLOUDY	1	4.0	2.0	6.0		2.0	2.0	1.0	6.0	4.0	4.0	1.0	6.0	
PR	MEAN STATION PRESSURE(IN)	28	29.76	29.71	29.66	29.64	29.62	29.63	29.66	29.67	29.67	29.71	29.74	29.76	29.69
	MEAN SEA-LEVEL PRES. (IN)	47	30.15	30.10	30.05	30.03	30.00	30.00	30.04	30.02	30.04	30.08	30.12	30.15	30.06
WINDS	MEAN SPEED (MPH)	42	7.9	8.3	8.8	8.3	7.3	7.1	6.7	6.3	6.8	6.5	6.9	7.5	7.4
	PREVAIL.DIR(TENS OF DEGS)	28	30	30	30	30	27	27	27	06	06	06	30	30	30
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	8	37	37	35	45	47	44	40	38	37	33	40	34	47
	DIR. (TENS OF DEGS)		32	15	07	33	31	27	28	12	36	18	30	26	31
	YEAR OF OCCURRENCE		1995	1996	2001	1996	1995	1998	2000	1995	1998	1995	1995	2000	MAY 1995
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	8	46	44	44	72	64	55	53	51	47	45	54	45	72
	DIR. (TENS OF DEGS)		32	21	07	33	30	28	28	12	01	18	25	26	33
	YEAR OF OCCURRENCE		1995	2000	2001	1996	1995	1998	2000	1995	1998	1995	1996	2000	APR 1996
PRECIPITATION	NORMAL (IN)	30	5.00	4.55	4.90	3.14	2.98	3.54	4.32	3.79	3.26	2.37	3.22	3.93	45.00
	MAXIMUM MONTHLY (IN)	54	10.87	9.32	11.90	8.42	11.77	9.06	18.16	8.63	10.51	9.39	10.27	10.39	18.16
	YEAR OF OCCURRENCE		1991	1983	1980	1964	1957	1965	1994	1991	2000	1959	1992	1972	JUL 1994
	MINIMUM MONTHLY (IN)	54	0.69	0.37	1.20	0.11	0.32	0.89	0.37	1.13	0.35	0.00	0.43	0.58	0.00
	YEAR OF OCCURRENCE		1954	2000	1985	1986	1956	1988	1986	1980	1984	1963	1956	1955	OCT 1963
	MAXIMUM IN 24 HOURS (IN)	54	5.07	5.17	4.34	3.65	5.37	4.97	10.60	2.96	4.83	5.35	3.14	4.50	10.60
	YEAR OF OCCURRENCE		1991	1981	1991	1955	1976	1965	1994	1959	1998	1970	1992	1972	JUL 1994
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	11.0	9.4	10.3	7.2	9.1	9.4	12.2	10.6	7.5	5.3	7.5	9.4	108.9
	PRECIPITATION ≥ 1.00	30	1.3	1.4	1.3	1.0	0.8	0.9	1.1	0.9	0.6	0.4	0.8	1.4	11.9
SNOWFALL	NORMAL (IN)	30	0.6	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.6
	MAXIMUM MONTHLY (IN)	48	3.7	16.5	2.6	0.0	T	0.0	T	0.0	0.0	0.0	0.2	1.6	16.5
	YEAR OF OCCURRENCE		1955	1973	1993		1993		1993				1950	1993	FEB 1973
	MAXIMUM IN 24 HOURS (IN)	48	3.7	16.5	2.6	0.0	T	0.0	T	0.0	0.0	0.0	0.2	1.6	16.5
	YEAR OF OCCURRENCE		1955	1973	1993		1993		1993				1950	1993	FEB 1973
	MAXIMUM SNOW DEPTH (IN)	45	2	12	T	0	0	0	0	0	0	0	T	T	12
	YEAR OF OCCURRENCE		1988	1973	1987								1950	1989	FEB 1973
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5

PRECIPITATION (inches) 2002 MACON, GA (MCN)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1973	6.10	5.71	6.49	6.33	4.25	3.29	2.81	7.09	0.98	0.67	1.98	2.78	48.48
1974	5.36	5.37	1.78	4.08	4.24	2.91	1.42	4.55	3.93	0.43	2.20	3.71	39.98
1975	6.09	6.90	6.66	4.90	4.68	3.83	5.84	2.17	4.71	3.53	2.26	3.91	55.48
1976	3.72	0.59	4.81	1.94	8.25	3.05	1.95	3.69	6.74	3.88	3.52	4.20	46.34
1977	3.72	2.02	7.89	1.28	1.55	1.12	5.04	2.96	3.34	1.67	3.38	3.80	37.77
1978	7.48	1.87	3.79	4.42	3.89	4.16	2.14	4.45	1.41	0.20	2.07	2.21	38.09
1979	5.74	8.46	3.73	6.85	3.76	2.54	5.70	4.18	6.10	0.40	3.37	1.88	52.71
1980	3.27	2.43	11.90	2.54	2.79	2.03	4.14	1.13	5.04	1.27	1.37	0.60	38.51
1981	0.97	8.27	3.44	4.18	0.95	7.54	3.19	3.58	1.69	4.51	1.11	8.66	48.09
1982	4.25	5.88	2.10	6.92	3.92	2.69	5.77	2.49	3.00	0.71	4.16	6.85	48.74
1983	4.57	9.32	5.95	3.85	1.44	5.69	2.06	2.98	1.93	0.83	6.96	5.52	51.10
1984	5.17	3.62	4.72	2.97	6.41	1.53	13.60	1.52	0.35	0.66	1.45	2.01	44.01
1985	2.17	5.74	1.20	1.19	3.78	1.36	5.93	2.50	1.79	3.58	3.70	2.98	35.92
1986	1.69	4.04	2.97	0.11	2.36	2.21	0.37	6.61	5.43	2.32	6.70	3.68	38.49
1987	6.92	7.01	4.25	0.68	2.78	5.10	1.38	3.21	1.50	0.05	3.36	1.88	38.12
1988	5.46	2.43	3.21	5.22	2.39	0.89	3.43	6.75	6.05	3.74	1.83	2.27	43.67
1989	1.85	4.58	4.92	5.61	4.38	5.03	6.21	2.34	2.41	2.28	3.01	8.85	51.47
1990	4.59	3.48	4.55	2.08	2.29	0.95	3.83	1.22	1.84	6.31	1.33	3.52	35.99
1991	10.87	1.74	10.01	4.29	2.52	4.11	4.77	8.63	0.68	0.31	0.63	3.62	52.18
1992	5.99	4.49	3.59	1.97	1.14	5.49	9.88	6.32	2.83	2.86	10.27	3.20	58.03
1993	5.46	4.21	10.32	1.91	2.69	3.30	2.19	5.95	1.29	6.37	2.93	2.84	49.46
1994	3.80	4.48	6.10	1.56	2.28	5.01	18.16	4.88	1.69	7.36	2.62	2.75	60.69
1995	4.26	7.01	2.19	1.22	1.55	4.26	6.41	2.33	2.42	4.41	1.90	4.04	42.00
1996	5.76	3.00	6.27	2.76	2.99	1.91	2.83	2.48	2.54	2.49	2.80	3.23	39.06
1997	5.55	5.02	1.23	2.86	4.30	1.63	1.41	1.96	3.54	3.67	7.63	7.28	46.08
1998	5.33	6.62	5.14	7.04	0.86	2.93	3.21	1.61	7.44	0.94	0.62	1.53	43.27
1999	6.33	1.82	2.55	0.89	0.73	5.96	4.30	3.23	3.35	2.91	2.20	1.80	36.07
2000	5.21	0.37	5.19	0.68	0.59	2.86	1.98	5.49	10.51	1.08	4.24	3.10	41.30
2001	2.58	1.16	9.83	3.08	5.95	5.82	6.82	1.19	6.60	0.12	2.48	1.58	47.21
2002	2.94	3.11	4.53	3.10	2.51	1.91	2.53	2.73	3.32	4.80	4.28	5.39	41.15
POR= 103 YRS	4.10	4.41	4.93	3.46	3.17	3.64	4.99	4.03	3.16	2.36	2.72	3.97	44.94

WBAN : 03813

AVERAGE TEMPERATURE (°F) 2002 MACON, GA (MCN)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1973	46.6	46.0	62.0	62.1	70.1	79.4	82.9	80.9	79.5	67.3	59.6	49.4	65.5
1974	59.3	50.3	61.5	64.2	73.9	76.2	81.1	80.3	73.1	63.3	55.2	49.7	65.7
1975	51.2	52.9	55.6	63.7	73.9	77.3	78.2	80.1	73.1	66.6	56.8	47.4	64.7
1976	43.5	54.9	60.4	65.0	69.0	76.5	81.4	79.6	74.7	61.5	49.7	45.6	63.5
1977	36.8	46.6	59.8	67.3	74.3	82.1	83.2	81.3	78.1	62.2	58.7	47.1	64.8
1978	40.5	42.7	54.7	65.6	72.3	80.9	82.2	81.0	78.3	65.0	61.1	50.0	64.5
1979	42.9	45.5	58.1	64.6	71.3	77.3	81.0	81.3	75.1	65.1	58.6	50.0	64.2
1980	50.6	46.7	54.7	64.1	73.2	80.6	84.8	84.6	80.6	64.6	55.6	48.8	65.7
1981	43.3	52.3	56.2	68.8	70.5	82.6	83.2	78.1	74.6	63.2	56.3	46.4	64.6
1982	44.2	52.6	60.4	62.1	73.6	79.2	81.9	80.8	75.0	66.8	58.6	56.0	65.9
1983	44.9	49.1	56.2	60.9	73.3	78.7	84.0	83.9	74.2	67.2	55.7	45.8	64.5
1984	44.4	51.5	56.6	64.4	71.5	79.5	80.3	82.1	73.2	72.1	54.2	56.0	65.5
1985	41.1	48.9	58.6	65.0	72.9	81.0	81.4	80.0	74.3	69.8	64.2	44.5	65.1
1986	44.7	53.2	57.1	64.9	73.8	82.1	86.6	80.1	77.6	66.4	61.7	49.0	66.4
1987	45.5	48.7	56.0	62.3	75.0	79.1	82.2	84.2	75.3	58.4	57.4	52.0	64.7
1988	42.2	47.1	56.4	63.9	69.8	78.7	81.3	82.2	75.8	61.2	57.7	48.2	63.7
1989	51.7	51.1	59.2	63.3	70.0	78.7	80.4	80.9	75.0	64.3	55.9	41.4	64.3
1990	52.0	56.3	59.7	62.9	72.0	81.0	82.7	83.1	78.0	66.7	56.9	52.8	67.0
1991	47.9	53.4	59.7	68.1	75.4	78.1	82.3	80.3	75.6	66.0	53.5	51.6	66.0
1992	47.3	52.7	55.7	61.8	69.6	77.5	82.4	78.7	75.6	62.7	55.2	47.5	63.9
1993	50.6	47.3	53.8	60.0	71.5	80.5	85.7	82.0	77.5	64.4	54.5	45.6	64.5
1994	42.8	52.0	59.5	67.8	69.1	78.6	79.1	77.8	73.0	63.8	58.1	50.8	64.4
1995	47.2	48.7	58.9	64.3	74.4	76.1	82.7	81.5	73.4	65.3	50.9	45.7	64.1
1996	45.9	49.2	51.7	61.2	73.8	77.4	81.2	78.9	74.4	62.8	53.0	49.1	63.2
1997	48.1	51.9	62.7	60.0	67.8	74.2	81.2	78.8	75.0	64.2	51.3	46.5	63.5
1998	49.0	50.5	54.0	62.1	74.8	82.0	84.2	80.5	76.4	66.7	59.8	52.8	66.1
1999	49.5	52.0	53.7	67.0	70.8	77.8	80.9	83.7	73.4	65.1	56.9	48.0	64.9
2000	45.8	51.9	58.9	60.3	75.2	79.2	81.6	80.5	72.8	63.9	53.8	39.3	63.6
2001	44.3	54.2	53.4	64.5	71.0	76.8	80.4	80.1	72.9	61.4	59.8	52.1	64.2
2002	49.2	47.4	57.7	67.0	70.6	78.7	82.3	80.9	77.3	68.0	52.5	45.5	64.8
POR= 103 YRS	47.3	49.7	56.8	64.3	72.3	79.0	81.1	80.4	75.7	65.2	55.4	48.3	64.6

HEATING DEGREE DAYS (base 65°F) 2002 MACON, GA (MCN)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1973-74	0	0	0	56	189	480	186	412	160	104	4	0	1591
1974-75	0	0	14	95	299	469	424	338	306	112	0	0	2057
1975-76	0	0	10	57	280	537	658	290	168	62	17	0	2079
1976-77	0	0	0	163	455	593	867	506	190	52	0	0	2826
1977-78	0	0	0	121	202	554	754	617	321	62	12	0	2643
1978-79	0	0	0	70	130	467	675	541	226	62	7	0	2178
1979-80	0	0	3	79	221	461	441	534	321	70	3	0	2133
1980-81	0	0	2	79	284	493	667	349	279	22	6	0	2181
1981-82	0	0	6	106	268	570	639	344	191	129	2	0	2255
1982-83	0	0	3	85	215	310	618	437	281	149	1	0	2099
1983-84	0	0	14	39	284	591	631	386	270	94	18	0	2327
1984-85	0	0	4	23	327	276	737	448	215	87	6	0	2123
1985-86	0	0	7	41	94	625	620	330	253	87	2	0	2059
1986-87	0	8	0	93	162	491	597	451	285	143	2	0	2232
1987-88	0	0	0	202	240	406	700	515	272	87	5	0	2427
1988-89	0	0	0	152	216	513	407	400	229	148	31	0	2096
1989-90	0	0	15	115	280	724	398	250	192	119	10	0	2103
1990-91	0	0	6	96	243	378	522	325	201	32	2	0	1805
1991-92	0	0	0	58	359	429	541	354	302	151	30	0	2224
1992-93	0	0	6	88	307	534	441	487	351	164	9	0	2387
1993-94	0	0	3	109	335	597	679	364	197	48	25	0	2357
1994-95	0	0	0	83	212	435	545	447	197	77	11	0	2007
1995-96	0	0	12	85	430	594	585	455	406	157	13	0	2737
1996-97	0	0	0	115	362	488	517	372	119	166	33	0	2172
1997-98	0	0	0	110	406	568	498	398	352	115	1	0	2448
1998-99	0	0	0	56	170	383	475	361	343	74	12	0	1874
1999-00	0	0	4	94	240	521	589	372	191	154	1	0	2166
2000-01	0	0	8	77	353	790	632	302	356	96	1	0	2615
2001-02	0	0	13	155	179	397	487	487	259	46	33	0	2056
2002-	0	0	0	58	381	597							

WBAN : 03813

COOLING DEGREE DAYS (base 65°F) 2002 MACON, GA (MCN)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1973	0	0	53	47	189	439	562	500	446	136	30	6	2408
1974	17	6	59	87	288	344	505	482	264	49	13	1	2115
1975	3	5	25	80	282	377	415	476	261	113	40	0	2077
1976	0	4	28	70	148	347	514	457	297	63	0	0	1928
1977	0	0	34	127	296	520	573	512	397	40	18	4	2521
1978	0	0	9	87	244	481	544	504	405	76	22	8	2380
1979	0	1	18	57	210	375	505	514	312	86	33	4	2115
1980	0	7	8	54	264	473	622	615	476	76	6	0	2601
1981	0	2	15	142	184	534	574	414	301	56	16	2	2240
1982	4	4	57	48	275	431	532	495	308	149	31	37	2371
1983	0	0	16	33	265	418	594	594	298	112	7	3	2340
1984	0	0	17	83	226	442	482	536	259	250	11	2	2308
1985	5	2	24	94	261	487	516	470	293	195	76	0	2423
1986	0	5	16	92	284	519	673	485	385	144	73	1	2677
1987	0	0	14	70	317	430	540	601	312	6	19	10	2319
1988	1	2	10	58	162	416	516	542	333	42	5	2	2089
1989	2	16	57	101	192	419	486	499	323	101	12	0	2208
1990	2	11	29	61	235	485	553	568	403	157	9	7	2520
1991	0	7	44	132	333	400	546	483	325	97	21	20	2408
1992	0	4	22	63	176	381	548	431	329	25	22	0	2001
1993	0	0	11	22	216	473	647	534	384	97	26	0	2410
1994	0	8	31	137	154	417	443	404	249	54	12	2	1911
1995	0	0	17	65	310	341	556	522	270	105	13	2	2201
1996	1	1	1	51	293	377	512	439	288	55	11	1	2030
1997	0	12	56	24	125	282	511	436	304	93	0	0	1843
1998	6	1	18	35	309	517	598	490	349	114	21	10	2468
1999	2	3	0	142	199	392	500	589	261	104	5	0	2197
2000	0	0	8	20	326	433	524	487	250	50	25	0	2123
2001	0	7	2	88	192	363	485	476	258	51	28	3	1953
2002	5	0	40	110	216	418	540	499	376	156	11	0	2371

published by: NCDC Asheville, NC

SNOWFALL (inches) 2002 MACON, GA (MCN)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1973-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1974-75	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	0.0	T
1975-76	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1976-77	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0
1977-78	0.0	0.0	0.0	0.0	0.0	T	T	0.2	T	0.0	0.0	0.0	0.2
1978-79	0.0	0.0	0.0	0.0	0.0	0.0	T	3.4	0.0	0.0	0.0	0.0	3.4
1979-80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.1	0.0	0.0	0.0	1.5
1980-81	0.0	0.0	0.0	0.0	0.0	T	0.0	T	0.0	0.0	0.0	0.0	T
1981-82	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	T	0.0	0.0	0.0	2.2
1982-83	0.0	0.0	0.0	0.0	0.0	0.0	1.4	T	T	0.0	0.0	0.0	1.4
1983-84	0.0	0.0	0.0	0.0	0.0	T	T	0.1	0.0	0.0	0.0	0.0	0.1
1984-85	0.0	0.0	0.0	0.0	0.0	0.0	T	T	0.0	0.0	0.0	0.0	T
1985-86	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	T	0.0	0.0	0.0	T
1986-87	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	T	0.0	0.0	0.0	T
1987-88	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	2.1
1988-89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	T	0.0	0.2
1989-90	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	0.0	T
1990-91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.4
1991-92	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1992-93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	T	0.0	2.6
1993-94	T	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	1.6
1994-95	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
1995-96		0.0	0.0	0.0	T	0.0	T	T	0.0	0.0	0.0		
1996-97													
1997-98													
1998-99													
1999-00													
2000-01													
2001-02													
2002-													
POR= 47 YRS	T	0.0	0.0	0.0	T	T	T	T	0.1	0.0	T	0.0	0.1

WBAN : 03813

REFERENCE NOTES:

PAGE 1:
THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).

PAGE 2 AND 3:
H/C INDICATES HEATING AND COOLING DEGRER DAYS.
RH INDICATES RELATIVE HUMIDITY
W/O INDICATES WEATHER AND OBSTRUCTIONS
S INDICATES SUNSHINE.
PR INDICATES PRESSURE.
CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).

GENERAL:
T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE.
+ INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.
NORMALS ARE 30-YEAR AVERAGES (1961 - 1990).
ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM.
PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH.
POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING.
WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED.
0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05.
CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET.
THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.

GENERAL CONTINUED:
CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED.
WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM. "36" INDICATES TRUE NORTH.
RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION.
AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2.
SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL.
A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F.
DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR.
DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY.
WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.

ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.

2002
MACON,
GEORGIA (MCN)

Located very near the geographical center of Georgia, Macon is well situated to escape rigorous climatic extremes. The climate is a blend of the maritime and continental types. Rarely does either dominate for long unbroken periods. The prevailing northwesterly winds of winter and early spring are frequently superseded by southerly flows of warm, moist tropical air. The southern extremity of the Appalachians presents an effective barrier to the rapid flow of cold air in winter. In summertime the prevailing southerlies frequently give way to the drier westerly and northerly winds. In short, the climate is truly equable.

Severe storms occur occasionally in this locality. Tornadoes occur, about twice each year within the area covered by Bibb and adjacent counties. Thunderstorms occur on approximately two days out of five from June through August. Occasionally, thunderstorms are accompanied by severe squalls, but property damage from this cause has been heavy in only a few instances. As Macon is some 200 miles from both the Atlantic and the Gulf of Mexico, hurricanes offer no direct threat, and secondary effects are generally milder than those produced by the heavier thunderstorms. Property damage of a minor nature occurs occasionally due to gale force winds and heavy rainfall.

Snow occurs at some time during most winters, but amounts of snow are usually quite small. However, on rare occasions heavy snow does occur in this area.

Based on the 1951-1980 period, the average first occurrence of 32 degrees Fahrenheit in the fall is November 8 and the average last occurrence in the spring is March 17.

The National Weather Service Office is surrounded by predominantly flat terrain. Flanking the station on the west, a range of wooded hills about 300 feet in height runs in a general northwest-southeast direction. The nearest point of these hills is about 2 1/2 miles to the southwest. Most of the countryside is well wooded, except for a few farms. Much of the outlying area is swampy, especially in the river and creek bottoms. Besides the swamps, the only bodies of water in the vicinity are the Ocmulgee River, Echeconnee Creek, and Tobesofkee Creek. These have little influence on the climate, except that when other conditions are favorable, they contribute to the formation of fog.

STATION LOCATION

MACON, GEORGIA

LOCATION	Occupied From	Occupied To	Airline Distances and Directions from previous Location	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE SEA LEVEL: GROUND TEMPERATURE SITE	ELEVATION ABOVE GROUND: WIND INSTRUMENT	EXTREME THERMOMETERS	PSYCHROMETER	SUNSHINE SWITCH	TIPPING BUCKET RAIN GAUGE	WEIGHING RAIN GAGE	8 INCH RAIN GAGE	HYGROTHERMOMETER	AUTOMATIC OBSERVING EQUIPMENT *	* TYPE M = AMOS T = AUTOB S = ASOS W = AWOS REMARKS
*NOTE:																
AIRPORT																
Herbert Smart Municipal Airport, Administration Building	9/20/38	12/1/48		32°50'	83°34'	428	26	5	5				4			
Administration Building Municipal Airport Cochran Field *	12/1/48	05/01/94	10 mi. SSW	32°42'	83°39'	b354	23 g23	5 c	5 c	%5	3	NA d4	3 e4	a5 f4	NA	Wind instruments 74 feet to 8/24/62. a. Commissioned 1660 feet S of thermometer site 7/16/64. b. 356 feet to 7/16/64. c. Decommissioned prior to December 1966. d. Commissioned 6/1/82. e. Moved 5 ft. South 6/1/82. %. Commissioned 12/9/70. f. Lowered & type change 8/3/85. g. Type change 9/6/85.
* Name changed to Lewis B. Wilson Airport in June 1967.																
Middle GA Regional Airport	05/01/94	Present	NA	32°41'	83°39'	h356									S	ASOS commissioned 05/01/94. h. Ground elevation.

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* NOTES: For earlier station history see previous edition..

APPENDIX H

Article Excerpt from Chemistry and Engineering News

GOVERNMENT

CONCERNED SCIENTISTS

Scientific leaders say Administration has undermined science

A STATEMENT BY MORE THAN 60 prominent scientists and an accompanying report by the Union of Concerned Scientists (UCS), issued last week, charge the Bush Administration with undermining the integrity of science in policy decisions.

But Bush's science adviser, John H. Marburger III, director of the White House Office of Science & Technology Policy, delivered an equally harsh criticism of the report, saying it makes "sweeping accusations" that are not supported and appear politically motivated. He said incidents and issues the report mentions do not add up to the Administration seeking to undermine the processes of science.

The group of scientists led by UCS includes 20 Nobel Laureates, 19 winners of the National Medal of Science, heads of leading universities, and former federal agency directors. They say President George W. Bush and his staff have systematically distorted scientific information to further policy goals in health, the environment, and nuclear weaponry. "The public deserves rational decision-making based on the best scientific advice about what is likely to happen, not what political entities might wish to happen," said Chemistry Nobel Laureate F. Sherwood Rowland, one of the signers.

Kurt Gottfried, emeritus professor of physics at Cornell University and chairman of the board of UCS, said: "The Bush Administration has engaged in practices that are in conflict with the spirit of science and the scientific method, leading to growing and widespread concern in the American scientific community."

Marburger convened a hasty phone-in press briefing last week to respond to the report. While he strongly took issue with its substance, he conceded that the Bush Administration seems to have foundered in its communication with the scientific community.

"The President is quite supportive of science," Marburger insisted, adding that he has no plan to discuss the report with Bush or to follow the report's recommendation for an independent investigation of how science has fared in the Administration. —BETTE HILEMAN

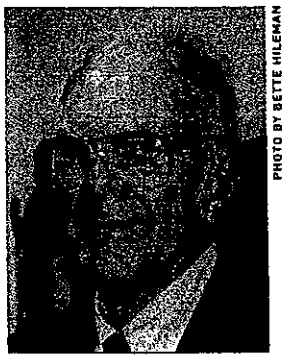


PHOTO BY BETTE HILEMAN

Rowland

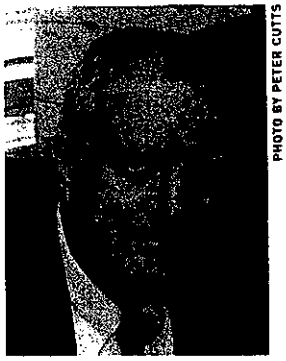


PHOTO BY PETER CUTTS

Marburger

ENVIRONMENTAL CHEMISTRY

NEW PLAYER IN THE ATMOSPHERE

Isoprene derivatives may be significant source of secondary organic aerosols

ISOPRENE, A COMPOUND EMITTED in large quantities by natural vegetation and previously thought to be uninvolved in producing atmospheric aerosols, has now been found to be a potentially major player in that process.

The discovery was made by an international team that examined natural aerosols from the Amazonian rain forest. The team, led by professors Magda Claeys from the pharmaceutical sciences department at the University of Antwerp and Willy Maenhaut from the analytical chemistry department at Ghent University, both in Belgium, found in the aerosols two previously unknown compounds that are photooxidation products of isoprene.

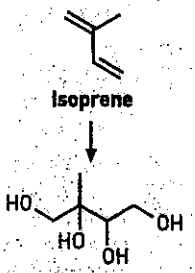
The compounds are diastereomeric 2-methylthreitol and 2-methylerythritol. They each have four hydroxyl groups on an isoprene skeleton, suggesting that they formed from a hydroxyl radical-induced reaction [*Science*, **303**, 1173 (2004)]. They have low volatility and so can condense into aerosol particles. Such particles formed by oxidation of volatile hydrocarbons are known as secondary organic aerosols (SOAs).

Isoprene accounts for up to 50% of the nonmethane hydrocarbons in the atmosphere. Although isoprene readily oxidizes to form volatile products, popular wisdom has held that it doesn't form products with low volatility.

The new discovery, however, carries weighty implications for atmospheric modeling and air-quality studies. The researchers estimate that up to 2 teragrams (2×10^{12} g) of the nonvolatile polyols could be produced worldwide each year. This is a large percentage of the estimated 8 to 40 teragrams of SOAs formed from biogenic emissions.

Recent evidence, in particular from the lab of professor Hans Puxbaum of Vienna University of Technology, in Austria, has suggested that isoprene might react with radicals or acids to form nonvolatile molecules. Now, the field measurements by Claeys, Maenhaut, and colleagues support that evidence, Puxbaum says.

The Belgian researchers are examining natural aerosols from a rural site in Hungary, where they have again found evidence that isoprene contributes to SOA formation. —ELIZABETH WILSON

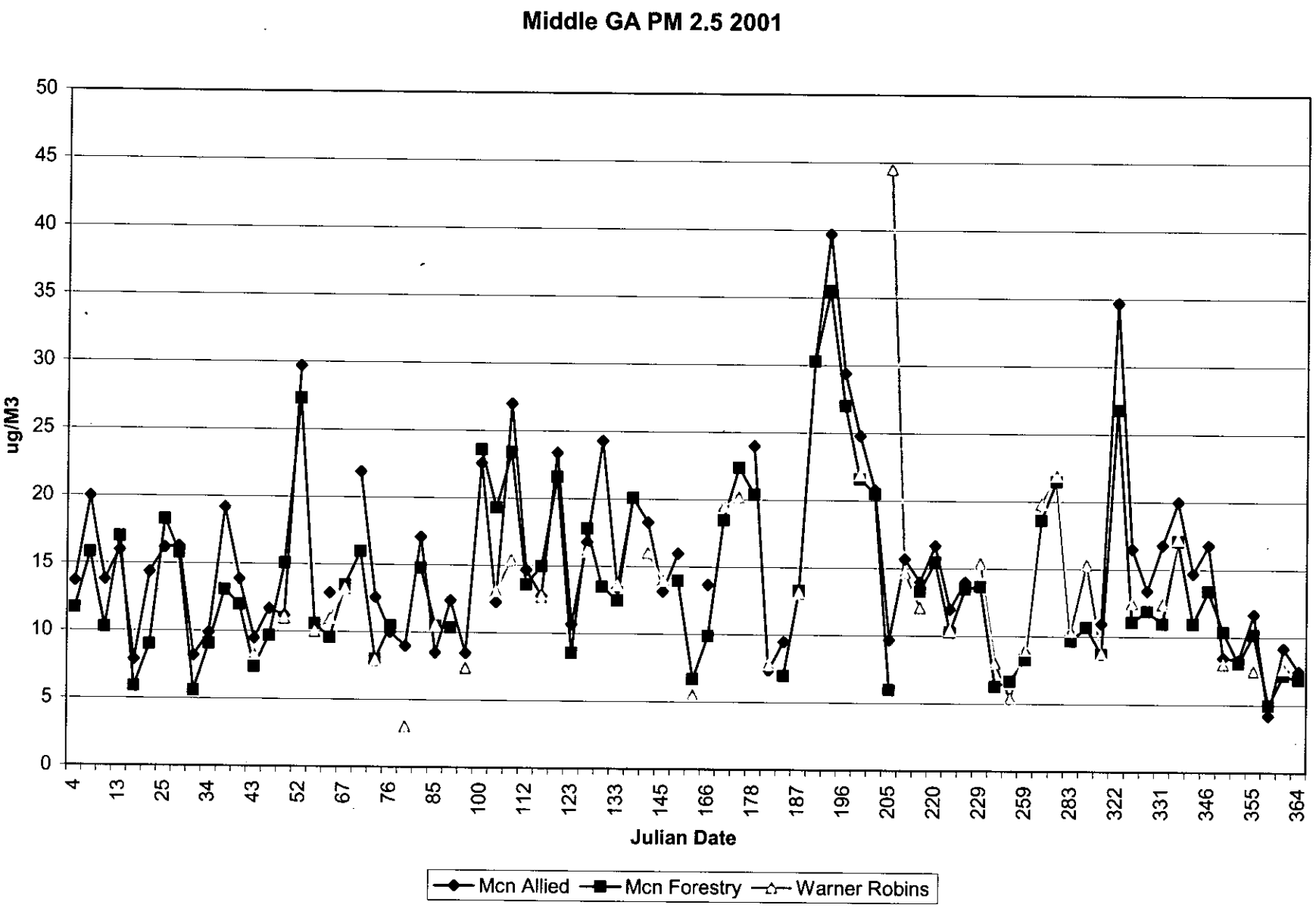


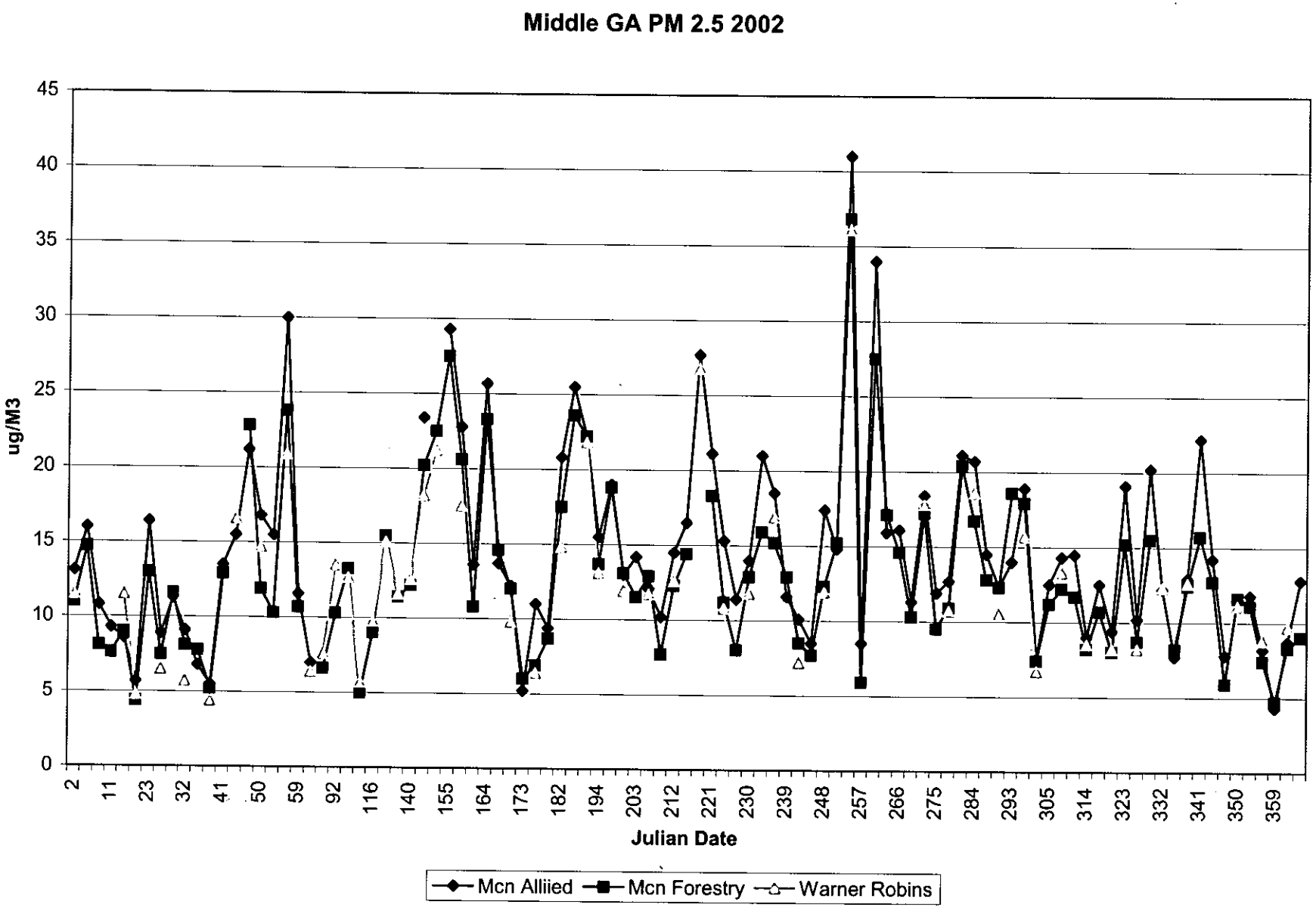
2-Methylthreitol
2-Methylerythritol
(diastereomers)

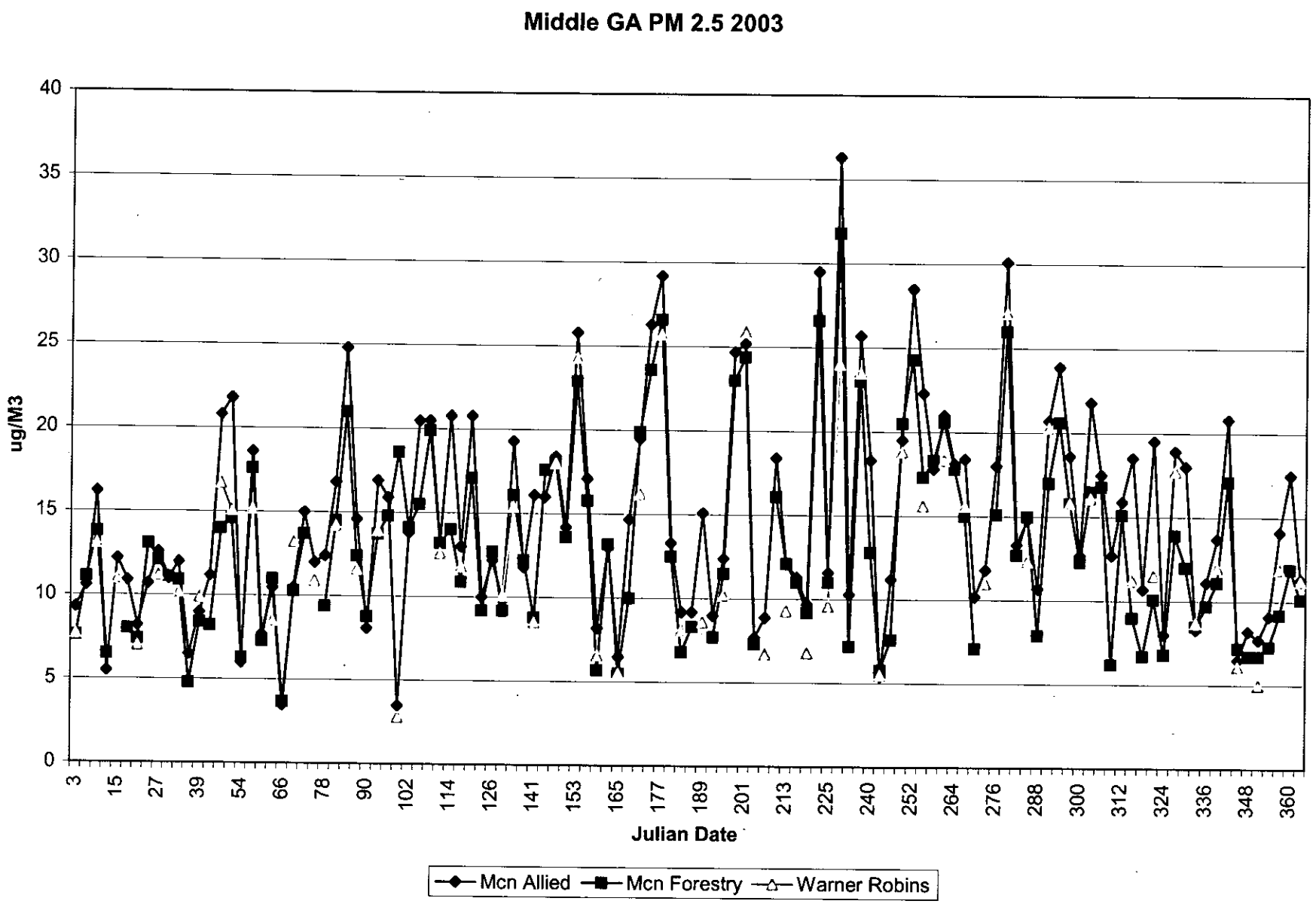
IN THE AIR Isoprene produced by plants photooxidizes into previously unknown, aerosol-forming 2-methyltetrols.

APPENDIX I

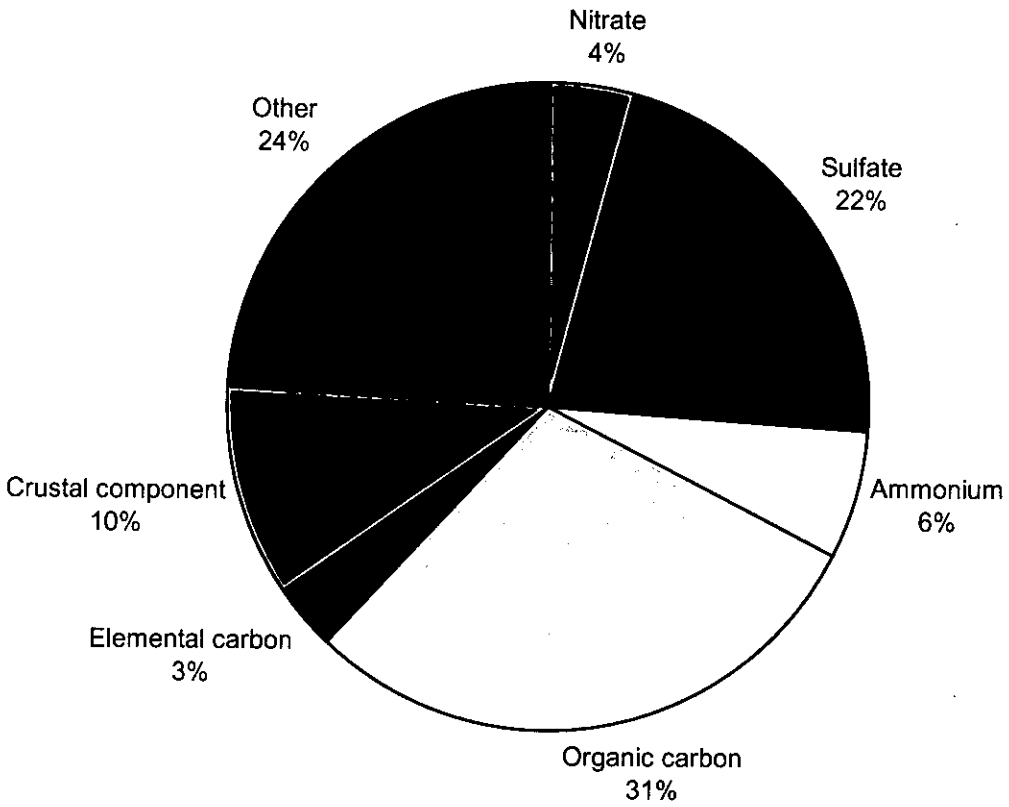
Monitored PM Data Trends and Speciation Data


Middle GA PM 2.5 2001
ug/M3
50
45
40
35
30
25
20
15
10
5
0
4
13
25
34
43
52
67
76
85
100
112
123
133
145
166
178
187
196
205
220
229
259
283
322
331
346
355
364
Julian Date
Mcn Allied
Mcn Forestry
Warner Robins

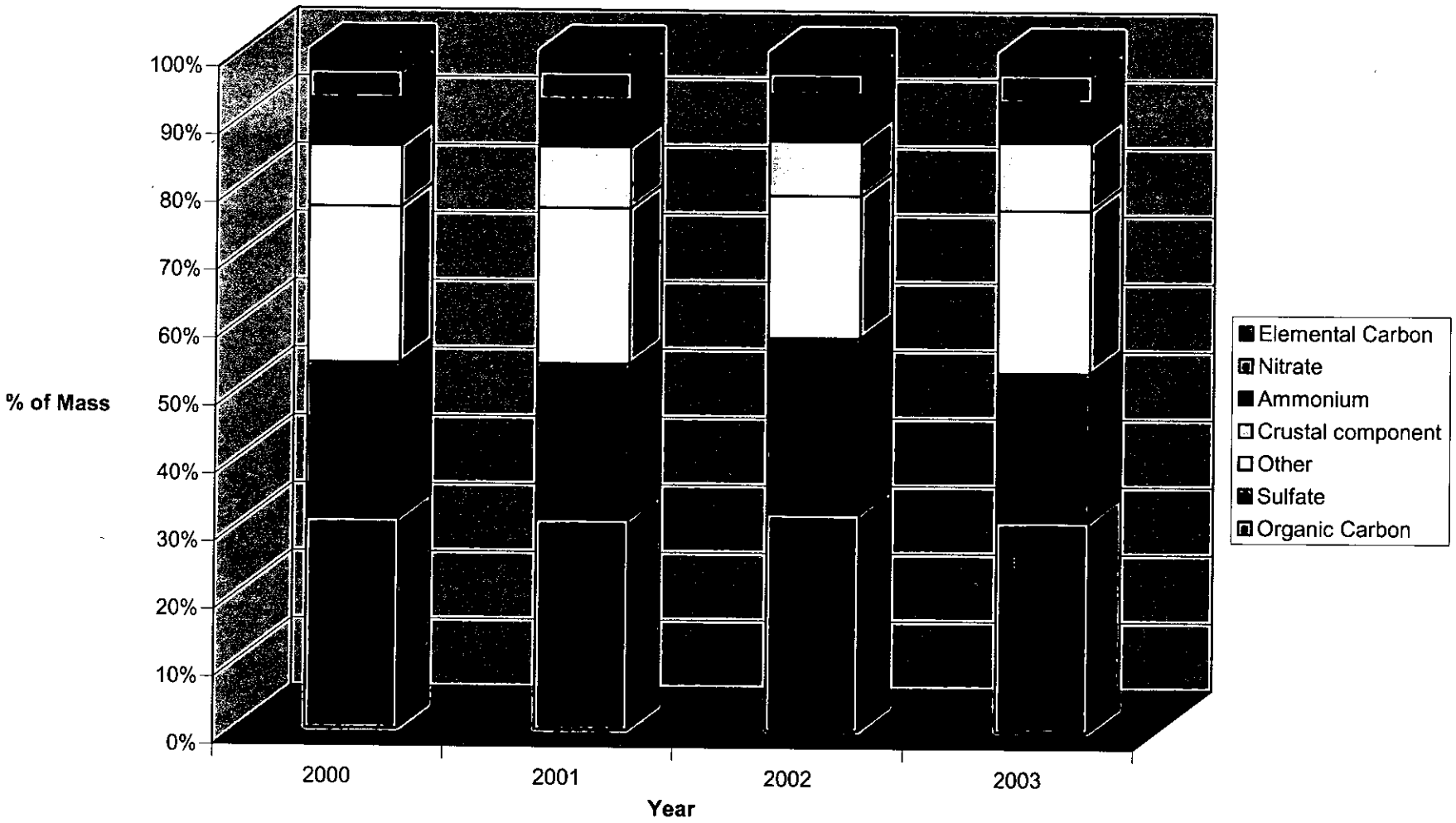

Middle GA PM 2.5 2002
ug/M3
45
40
35
30
25
20
15
10
5
0
2
11
23
32
41
50
59
92
116
140
155
164
173
182
194
203
212
221
230
239
248
257
266
275
284
293
305
314
323
332
341
350
359
Julian Date
Mcn Alliied
Mcn Forestry
Warner Robins


Middle GA PM 2.5 2003
ug/M3
40
35
30
25
20
15
10
5
0
3
15
27
39
54
66
78
90
102
114
126
141
153
165
177
189
201
213
225
240
252
264
276
288
300
312
324
336
348
360
Julian Date
Mcn Allied
Mcn Forestry
Warner Robins

Macon
AIRS Code 130210007 POC 5 (ROUTINE)
Date(s): 1/3/2003 - 12/29/2003
Average Concentration (µg/m³)

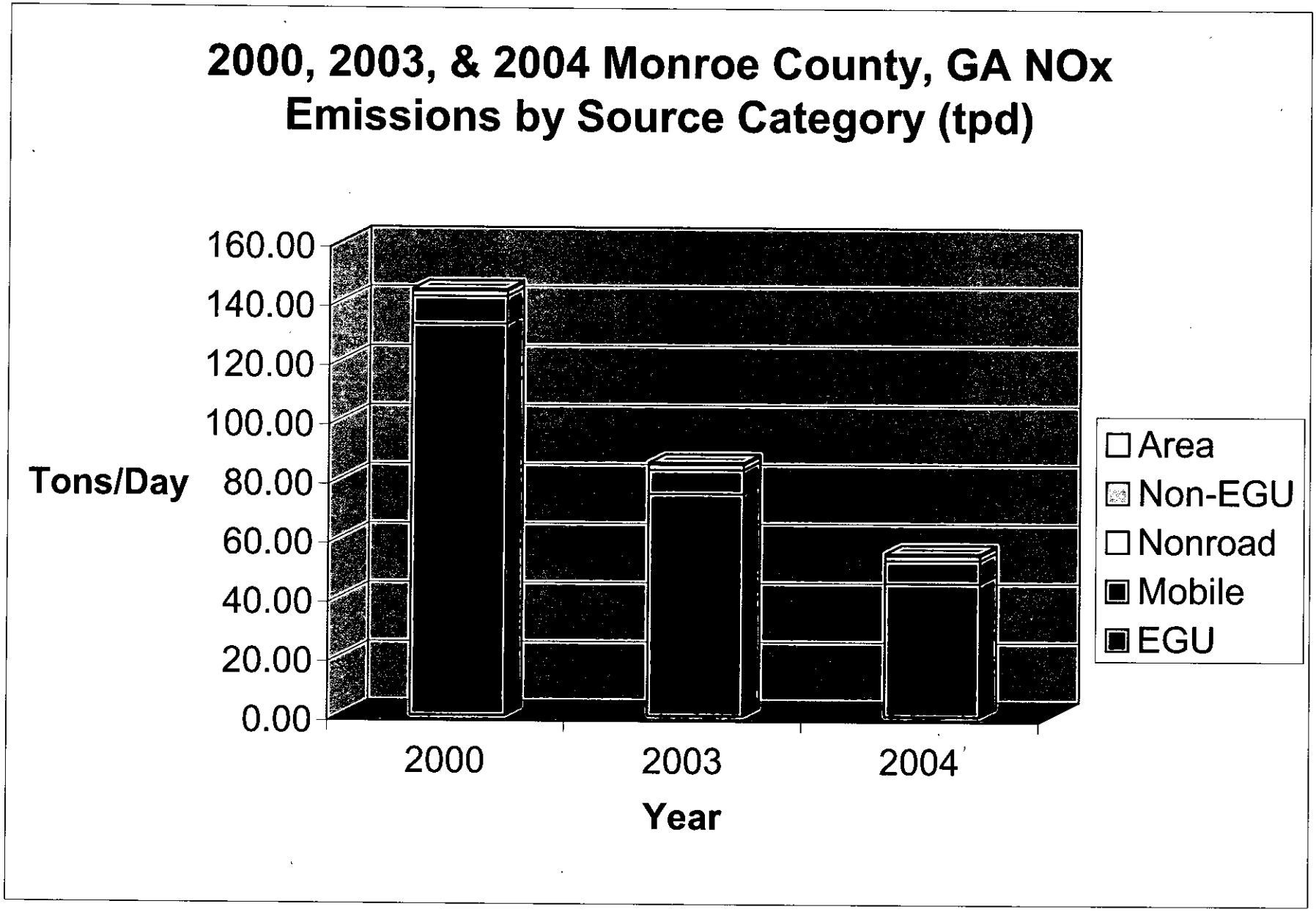


Macon PM 2.5 Speciation



APPENDIX J

NOx Emissions in Monroe County


2000, 2003, & 2004 Monroe County, GA NOx
Emissions by Source Category (tpd)
Tons/Day
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2000
2003
2004
Year
Area
Non-EGU
Nonroad
Mobile
EGU

Monroe County NOx Emissions Inventory

	2000	2003	2004	2007
EGU	132	75.1	45.0	95.4
Mobile	9.39	8.17	7.76	6.54
Non-road	1.75	1.68	1.66	1.59
Non-EGU	0.39	0.39	0.39	0.39
Area	0.27	0.27	0.27	0.27

1. 2000 and 2007 emissions from Georgia Tech FAQS; note that FAQS inventory did not account for additional NOx controls (over-fired air and low-sulfur coal) at Plant Scherer.

2. 2003 emissions for mobile, non-road, non-EGU, & area sources extrapolated from 2000 & 2007 emissions from GA Tech FAQS. 2003 EGU number obtained from 2003 Preliminay CERR Data from Steve Allison. 2003 number is an annual number divided by 365.

3. 2004 emissions for mobile, non-road, non-EGU, & area sources extrapolated from 2000 & 2007 emissions from GA Tech FAQS. 2004 EGU number obtained from 2003 activity data from (4) Scherer units multiplied by a 0.14 lbs NOx / mmBTU emission rate.

APPENDIX K

Ozone and Fine Particulate Monitoring Sites in Macon, Georgia Area

Attachment B

Middle Georgia Clean Air Coalition Information

HOUSTON COUNTY COMMISSIONERS

Serving All of Houston County

OFFICE

200 Carl Vinson Parkway
Warner Robins, GA 31088
478-542-2115
FAX 478-923-5697

COMMISSIONERS

NED SANDERS
Chairman

THOMAS J. McMICHAEL
GAIL C. ROBINSON
LARRY THOMSON
H. JAY WALKER, III

March 17, 2004

Ms. Carol A. Couch, Ph.D.
Director, Environmental Protection Division
2 Martin Luther King, Jr. Drive, S.E.
Suite 1152 East Tower
Atlanta, Georgia 30334-9000

Re: Letter Concerning Designation of 8-hour Ozone Nonattainment Areas Dated December 3, 2003

Georgia EPD Letter Dated February 6, 2004, in response to above letter dated December 3, 2003.

Dear Ms. Couch:

This letter is submitted as an update on the current actions of Houston County and the Middle Georgia Clean Air Coalition (MGCAC) to address NOx emissions reduction at the local level. We have reviewed your recent letter in response to EPA about the potential Ozone Nonattainment designations for four counties in Georgia, and as such, we understand the letter served as an aggregate Georgia response. While we firmly stand by your previous comments, we believe there is some important additional information relating to the nonattainment designation specific to Houston County. Several items portray Houston County in a significantly different light and we ask your special attention to the following:

1. The unequivocal commitment of the senior elected leadership in Houston County, to the region's clean air attainment through the Middle Georgia Clean Air Coalition (MGCAC).
2. The analysis of the 11 boundary line guidance criteria to determine the Houston contribution to the Bibb County non-attainment situation.
3. The precedence of a similar EPA decision in Tuscaloosa, AL.

The communities of Middle Georgia understand that they are all connected, not only economically, but also in terms of environmental compliance. They are clearly aware that science points to a variety of contributors to Middle Georgia's ozone situation, but only aggressive leadership and cohesive community action will achieve and maintain attainment. To accomplish that objective, the Macon CMSA communities have created the Middle Georgia Clean Air Coalition (MGCAC), composed of elected officials, non-governmental organizations, and industry. Clearly, Houston County is an aggressive leader of this regional

approach and Coalition as the County and its municipalities were the first to pass a resolution creating the MGCAC. Additionally, as the Houston County Commission Chairman, I have volunteered to chair the MGCAC until official officers are formally elected and Houston County will continue to be a driving force behind its actions. To date, Bibb, Houston, Jones, and Monroe Counties and the Cities of Centerville, Forsyth, Perry, and Warner Robins have adopted the resolution. The remaining Counties (Crawford, Peach, and Twiggs) and Cities (Byron, Culloden, Danville, Fort Valley, Gray, Jeffersonville, Macon, Payne City, and Roberta) were encouraged to pass the resolution at their next meeting (a sample Resolution is attached). Additionally, the level of involvement by the Georgia EPD, Department of Transportation and the Office of the Governor in the creation of the MGCAC is a testament to the level and strength of the community commitment to this effort.

Through the MGCAC, the local communities can find solutions for attainment of the EPA national standards. Their quick and decisive actions demonstrate they are dedicated to developing broad community support for a strategy that is oriented to action and results. We believe that our early actions (earlier than a SIP would bring) and a commitment to changing the dynamics distinguish Middle Georgia, and Houston County in particular, from other areas being considered for designation.

The broad goals of the MGCAC are to reduce NOx and VOC emissions; to protect the region's public health; and to exert leadership in environmental sustainability. Success lies in planning for the future, and taking action now. Consequently, the MGCAC, at only its second meeting, agreed to immediately pursue the following six specific emission reduction initiatives and we formed a committee of volunteers for each strategy to guide implementation (see attached meeting minutes from March 4, 2004).

- **Truck Stop Electrification**: Working with local truck stop owners to provide electrical hook-ups for trucks to prevent extended idling. Tasks will include working with industry (IdleAaire) and the State government to pursue finding options for public/private partnerships, meeting with truck stop owners to gain commitment, and meeting with County officials to gain their commitment.

- **Implement Commuter Strategies**: The committee will investigate several approaches to decrease the level of commuting in the region such as Ride Share Programs, Parking Incentives, or Tax Credits and work with local employers to implement strategies.

- **Open Burning Ban**: The committee with develop an ordinance to ban burning leaves, tree limbs, and other yard waste, waste from land clearing, and forested land by owners on High Ozone Days and work with Counties and Cities to implement the ordinance.

- **Alternatively Fueled School Bus Fleets**: The committee will pursue funding options for Counties to convert their school bus and other municipal vehicles to Bio-diesel, ULSD, Propane, or CNG through retrofit and/or purchase.

- **Public Education and Awareness**: The committee will identify methods to develop education programs through the Counties, Cities and School Systems to implement air and energy awareness programs. Additionally, the committee will identify ways to cooperate and support a Middle Georgia Clean Cities Coalition Education Campaign.

- **Strategy for the Future**: This committee, comprising all the elected officials of the 7 Counties and 13 Cities, will develop a comprehensive long-term strategy to address air pollution in the Middle Georgia Region. As a means to coordinate for regional development the strategy will address smart growth, commuting, public awareness, Alternative Fuel Vehicles, local government procurement practices, and other early, mid, and long-range actions.

As previously stated, Houston County has also applied the EPA's 11 boundary line guidance criteria to determine its contribution to the Bibb County non-attainment situation. The 11 criteria assessment is contained in attachment 4; however, the general conclusion is that Houston County should not be considered as a contributor to the ozone issues in Bibb County, chiefly because:

- Bibb County is the only location of an ozone monitor in the Macon CMSA. Houston County, which is directly south of Bibb County and Macon, comprises only approximately 6.8% of the airshed's point source NOx. In fact, the NOx budget for the Macon CMSA is predominantly dominated by a single coal-burning power plant northwest of Macon, which contributes 80.6% of the total point source NOx in the Macon CMSA airshed. It should be noted that this plant has voluntarily switched its coal to Powder River basin coal and is using other techniques to further reduce emissions.
- Meteorology validates Houston County's exclusion from the non-attainment category. An analysis of ozone exceedance events at the Bibb County monitor have been characterized as occurring under westerly and northwesterly airflow. Again, Houston County is directly south of Bibb County and Macon. Monitored exceedances have not been associated with a southerly airflow, validating the claim that Houston County is not a significant source of emissions to Bibb County.
- The level of out commuting in Houston County is low. In 2000, 79.7% of the people working in Houston County (39,954 people) also live there. Of the workers in Bibb County, only approximately 10 percent were commuting in from Houston (8,570 people).

Based on the above actions and analyses, we believe that Houston County should be excluded from the non-attainment classification. This action would be consistent with other EPA actions as meteorological data were used to separate counties with a potential designation. A similar analysis in the Tuscaloosa, AL,

area showed that on the days of measured non-attainment in neighboring Jefferson County, prevailing winds were not from the direction of Tuscaloosa County. This analysis provided EPA with the necessary data to concur with the State of Alabama that Tuscaloosa County did not contribute to the non-attainment in Jefferson County.

We want to be clear; we are committed to the Middle Georgia Clean Air Coalition. An exclusion of Houston County from the non-attainment category will have no bearing on our leadership role in the Middle Georgia Clean Air Coalition. Houston County is fully committed to air quality in the Middle Georgia region regardless of designation.

Thank you in advance for your positive response to this letter. If there is additional information or clarification that you need, please let us know.

Sincerely,

Ned M. Sanders, P. E.
Chairman, Houston County Commission

Attachments:
1. Middle Georgia Clean Air Coalition Resolution
2. Minutes of the Middle Georgia Clean Air Coalition March 4, 2004
3. Middle Georgia Clean Air Coalition Tentative Charter
4. 11 Boundary Line Guidance Criteria Analyses for Houston County Georgia

WHEREAS, on July 15, 2003, the Georgia EPD made recommendations to the United States EPA concerning county's in middle Georgia to be designated nonattainment for new ozone standards; and

WHEREAS, Houston County was not included in the EPD's recommendation to be designated nonattainment under the new ozone standards; and

WHEREAS, in December of 2003, the United States EPA notified Georgia EPD of its intent to designate Bibb, Houston and Monroe Counties as nonattainment under the new ozone standards; and

WHEREAS, the Houston County Board of Commissioners concurs with Bibb County's nonattainment designation, but does not concur with the inclusion of Houston and Monroe County in this designation; and

WHEREAS, the Houston County Board of Commissioners are proud of our county, its people, its resources, its quality of life and for Georgia's largest employer, Robins Air Force Base, located in Houston County; and

WHEREAS, the members of the Houston County Board of Commissioners pledge to work with and support the efforts of the 21st Century Partnership, the Middle Georgia Clean Air Coalition, Georgia Tech and the Georgia EPD in crafting a coordinated response complete with new data for consideration along with the development of an aggressive strategy to address ozone and particulate matter in Houston County and middle Georgia that will be technically effective, accurate, timely and be implemented at the local level to improve air quality in middle Georgia; and

WHEREAS, the Houston County Board of Commissioners embrace the goals of the Clean Air Act, understand air quality is a regional issue and are committed to improving the air quality in middle Georgia.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF HOUSTON COUNTY that the undersigned members of this body resolve to assist in the creation of the Middle Georgia Clean Air Coalition to take necessary actions to help Houston County and the middle Georgia area reach National Ambient Air Quality Standards attainment in the shortest time possible.

This 5th day of February 2004.

Ned M. Sanders, Chairman

Tom McMichael, Commissioner

Larry Thomson, Commissioner

Gail Robinson, Commissioner

Jay Walker, Commissioner

Attachment 2

Minutes of the Middle Georgia Clean Air Coalition March 4, 2004
Middle Georgia Regional Development Center

Meeting called to order 10:00 AM.

Mr. Ron Carbon, Director of the 21st Century Partnership, presented the overview of the agenda and outlined the objectives of the day.

Resolution Adoption Status:
Mr. Carbon reviewed the status of the resolution creating the Middle Georgia Clean Air Coalition. To date, Bibb, Houston, Jones, and Monroe Counties and the Cities of Centerville, Forsyth, Perry, and Warner Robins have adopted the resolution. The remaining Counties (Crawford, Peach, and Twiggs) and Cities (Byron, Culloden, Danville, Fort Valley, Gray, Jeffersonville, Macon, Payne City, and Roberta) were encouraged to pass the resolution at their next meeting. (Sample Resolution is attached)

Charter:
Mr. Carbon presented a Tentative Charter for members' review and consideration. The membership agreed to form a Committee to review the Tentative Charter and present a Draft Charter for review and action at the next meeting on 8 April. Comments on the Draft Charter will be incorporated into proposed the Final Charter by mid-April, and the Final Charter will be presented for adoption at the May Meeting.

Chairman Sanders volunteered to serve as Acting Chairman of the MGCAC until formal elections are held. Chairman Sanders will lead the Charter Committee consisting of the following members:

Chairman Sanders, Houston County—Chairman
Mayor Ronnie Brand, Centerville
Mayor Sonja Mallory, Jeffersonville
Mayor Jimmy Pace, Forsyth
Bill Vaughn, Bibb County Administrator
Ron Carbon, 21st Century Partnership
Charise Stephens, Clean Cities Coalition (CCC).

(Tentative Charter Attached)

Ozone Reduction Strategies:
Mr. Ray Clark, President/CEO of Clark Group LLC, presented an overview of the emission sources, suite of potential reduction strategies, and recommended immediate action strategies. Ron Methier, Chief, Air Quality GA EPD; Ed White, Vice Chairman, Macon Clean Cities Coalition; and Charise Stephens, Director, Clean Cities Coalition also presented details about the immediate action strategies.

Once each strategy was presented and questions were answered, a committee of volunteers was formed to guide the implementation of each strategy. Each committee will meet during the upcoming month and present a status update at the next meeting on 8 April.

The first person listed will serve as the committee chairman. Refer to the attached Excel spreadsheet for the contact information for members of each.

Truck Stop Electrification
Macon: Mr. Tim Stewart -- Chairman
Peach County: Commissioner Thomas Palmer
Twiggs County: Chairman Ray Bennett
EPD: Ron Methier
Bibb: Bill Vaughn
Clean Cities: Charise Stephens
Clark Group: Ray Clark

Task: Work with industry and Government to pursue funding options to leverage public/private partnerships.
Meet with Truck Stop owners to gain commitment.
Meet with County officials to gain commitment.

Commuter Strategies
Bibb: Bill Vaughn -- Chairman
Macon: Tim Stewart
Houston: Chairman Sanders
GA DOT: Ms Cora Cook, Tammy Hunsicker
EPD: Ron Methier
Clean Cities: Charise Stephens
Clark Group: Ray Clark

Tasks: Develop an approach within 60 days and present it for adoption.
Create a Smog Forecasting Group in the Macon area.

Open Burning Ban
Monroe: Chairman Spear -- Chairman
Centerville: Mayor Ronnie Brand
Potentially Jones County: Commissioner Al Andrews
Twiggs County: Chairman Ray Bennett
EPD: Ron Methier
Clean Cities: Charise Stephens
Clark Group: Ray Clark

Task: Immediately implement Burn Ban Ordinances effective during the Ozone Season.

Alternatively Fueled School Buses and other Fleets
Houston: Chairman Sanders
Clean Cities: Charise Stephens and Ed White
EPD: Ron Methier
Macon: Tim Stewart
Potentially Peach: Commissioner Thomas Palmer
Clean Cities: Charise Stephens

Clark Group: Ray Clark

Task: Identify funding sources.
Work with County Officials and School Boards to implement strategy.

Public Awareness and Education
All are going to read CCC Plan. EPD and CCC will head up efforts in the future.
CCC will present a proposed Plan for adoption.

Tasks: All--Review CCC Program Plan for adoption.
CCC: Propose Air and Energy awareness program for adoption by School Boards and member MGCAC Counties and Cities.

Strategy for the Future
All Elected Officials: 7 Counties and 13 Cities.
Bibb: Chairman Olmstead -- Chairman
GA EPD: Ron Methier
GA DOT: Cora Cook
Clean Cities: Charise Stephens
Clark Group: Ray Clark
21st Century Partnership: Ron Carbon

Task: Develop comprehensive long-term strategy to address air pollution in the Middle Georgia Region: Address smart growth, commuting, public awareness, Alternative Fuel Vehicles, point source reductions, procurement practices, etc.

Wrap-up:
Mr. Carbon reviewed the actions discussed and highlighted the committee memberships and responsibilities. The members decided the regular meetings would be monthly on the second Thursday of the month. The next meeting will be on 8 April at 10:00 AM at the RDC.

Attachments:
1. Sample MGCAC Resolution
2. Tentative Charter
3. Contact information Excel datasheet

Attachment 3

The Middle Georgia Clean Air Coalition

TENTATIVE CHARTER

"We will act now to reduce NOx and Ozone in the Middle Georgia Community to ensure that we protect the region's public health, maintain a robust economic growth, and show leadership in environmental sustainability"

Article I Identification

Section 1. Middle Georgia Clean Air Coalition

Section 2. The purpose of the Middle Georgia Clean Air Coalition is to exert leadership responsibilities for clean air in the region and to develop strategies to reduce air pollution emissions below the National Ambient Air Quality Act standards.

Section 3. Facilitate implementation of reduction strategies through appropriate governing agencies

Article II Principles

The Middle Georgia Clean Air Coalition:

a. Accepts and supports national air quality standards and advocates immediate community action to attain those goals
b. Believes air quality is a regional issue that defies political boundaries and that collaboration is essential for solutions
c. All actions must be based on objective scientific data

Article III Activities

Section 1. The underlying principle of the Middle Georgia Clean Air strategy is to accept responsibility for cleaning our air shed and to take actions that produce results. The Middle Georgia Clean Air Coalition will undertake the following activities:

a. Rapidly synthesize the best science available
b. Engage the entire political and civic leadership to take actions
c. Design an air shed solution
d. Develop a plan for short-term attainment and long-term maintenance of attainment status
e. Develop alternatives that can be taken by each of the political jurisdictions
f. Seek and support funding for mutual projects
g. Develop a citizen's guide to reducing emissions

Section 2. Relationship to other organizations:

a. Middle Georgia Clean Cities Coalition: Support the goals, coordinate activities and seek funding for alternative fuel vehicles and other projects
b. RAFB environmental office
c. Local industry
d. Local NGOs: in general should there be a section that explains the goals of working with other organizations or relationships
e. Georgia Environmental Protection Division

Article IV Meetings

Section 1. Frequency and place of meetings. The Middle Georgia Clean Air Coalition will focus on results, not meetings. Communication about activities will be posted on a web page and a weekly summary of actions by e-mail. Meetings will be called for decision making, as needed. However, not less than one time per month the entire coalition will meet to discuss progress, assign new responsibilities and to ensure accountability to the strategy.

Section 2. Conduct of meetings. The Chairman of the Houston County Commission shall chair the first meeting within 14 days of the approval of this charter. At the first meeting a permanent chair shall be elected by a majority vote and all meetings will be conducted in accordance with Roberts Rule of Order. The meetings shall be open to the public and they shall be given at least seven days notice.

Section 3. A quorum at membership meetings shall consist of 40 percent of the members.

Section 4. Does the group comply with the Open Meeting/Open Records rules?

Article V Membership

Section 1. Membership in the Middle Georgia Clean Air Coalition:

Executive Board: The Mayors and County Commission Chairmen of cities and counties in Bibb, Crawford, Houston, Jones, Monroe, Peach, Twiggs Counties, and Robins Air Force Base

a.

Ex-officio Members: Government Staff agencies,

Regional Directors for GA Senators and Congressmen, Office of the Governor of Georgia, Georgia State Agencies, Representatives from Georgia Universities and Colleges, Local Govn't Staff Agencies: Counties, Cities, Development Authorities

Board of Advisors: The President of the area Chambers of Commerce, local interest groups, and other local or national environmental groups with a specialty in air quality issues.

Article VI Organizational Structure

Section 1. Officers. Officers shall include a Chairman, Secretary, and Treasurer

The Officers shall serve a period of one year. An election will be held within 3 weeks of the start of a new year. Officers must be a member of the Executive Board.

Section 2. Staffing.

A. There shall be a MGCAC Staff Coordinator for the meetings to develop the agenda, decisions to be made, alternatives to each decision and the impacts of each alternative. This function should be a party who is expert in the science and policy of air quality attainment. Additional duties of the coordinator:

- Serve as liaison among the members of the coalition

- Keep a record of the affairs of the Coalition and handle correspondence. Submit written reports to the Coalition as required.

B. Chief Scientific Advisor:

Article VII Financial Issues

Section 1. Assessment and Contributions

Section 2. Distributions.

Article VII Changes

Section 1. Changes to this Charter may be approved by 2/3ds of the voting members present at a general meeting.

Section 2. Any member may initiate changes to this Charter.

Article VIII Dissolution

Section 1. This Coalition can be dissolved with a vote of 2/3 of the members.

Attachment 4

11 Boundary Line Guidance Criteria Analyses for Houston County Georgia

EPA Factor #1: Comparison of Emissions and Air Quality in Adjacent Areas
The NOx budget for the Macon CMSA is dominated by a single coal-burning power plant northwest of Macon, contributing 80.6% of the total point source NOx in the Macon CMSA airshed. The plant has voluntarily switched its coal to Powder River basin coal and is using techniques to further reduce emissions. Houston County, directly south of Bibb County and Macon, comprises only approximately 6.8% of the airshed's point source NOx.

EPA Factor #2: Population Density and Degree of Urbanization
In 2000, Bibb County's population density (616 persons/mile^2) was more than twice that of Houston County (294 persons/mile^2).

EPA Factor #3: Monitoring Data Representing Ozone Concentrations
Bibb County is the only location of an ozone monitor in the Macon CMSA. The three-year average of the 4th maximum ozone level is used to designate attainment status. In 2003, the value was 0.087 ppm, exceeding the standard of 0.085 ppm by 0.002 ppm.

EPA Factor #4: Location of Emission Sources
The NOx budget for the Macon CMSA is dominated by a single coal-burning power plant northwest of Macon, contributing 80.6% of the total point source NOx in the Macon C/MSA airshed. The plant has voluntarily switched its coal to Powder River basin coal and is using techniques to further reduce emissions. Houston County, directly South of Bibb County and Macon, comprises only approximately 6.8% of the airshed's point source NOx.

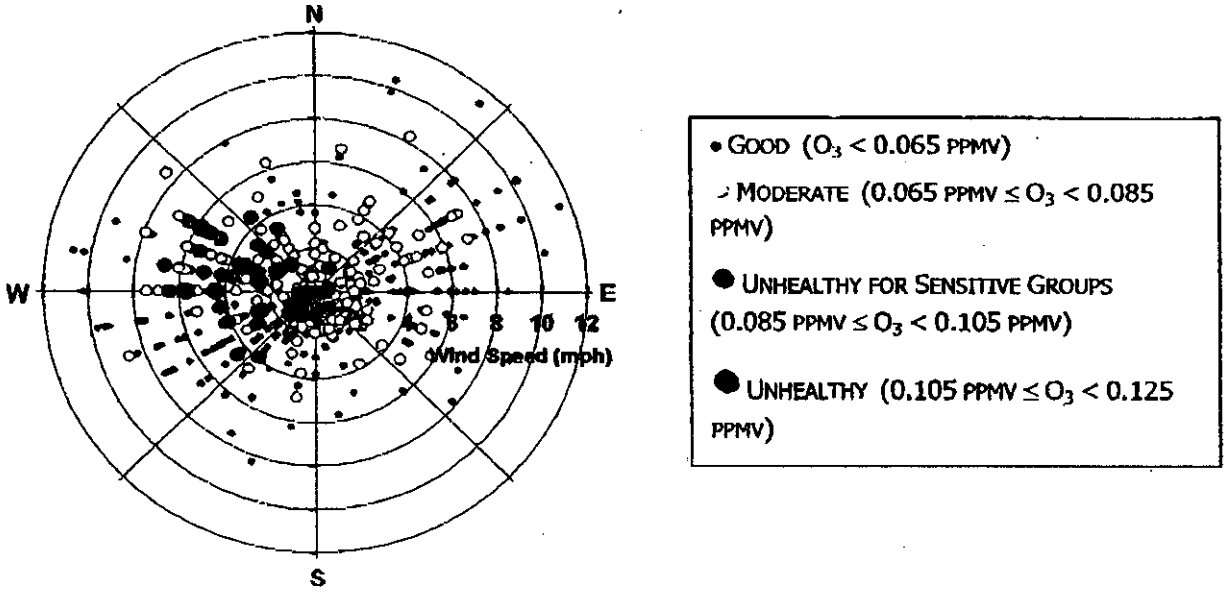
EPA Factor #5: Traffic and Commuting Patterns
The level of out commuting in Houston County is low. In 2000, 79.7% of the people working in Houston County (39,954 people) also live there. Of the workers in Bibb County, only approximately 10 percent were commuting in from Houston (8,570 people).

EPA Factor #6: Expected Growth
Monroe, Peach, and Houston counties all have high rates of growth. From 2000 to 2010 the projected change in population is 13.3%, 15.6% and 16.5% respectively.

EPA Factor #7: Meteorology
An analysis of the ozone exceedance events at the Bibb County monitor have been characterized as occurring under westerly and northwesterly airflow. Houston County is directly south of Bibb County. Monitored exceedance events have not been associated with a southerly

airflow, which validates the claim that Houston County is not a significant source of emissions to Bibb County. See wind rose below.

A similar analysis in the Tuscaloosa, AL area showed that prevailing winds on a majority of the days that measured non-attainment in neighboring Jefferson County, were not from the Tuscaloosa direction, which provided EPA with some of the data necessary to concur with Alabama that Tuscaloosa County does not contribute to the non-attainment in Jefferson County.



Peak daily 8-hour average ozone concentrations as a function of local resultant wind 1997-1999. Chang, M., et.al. 2001. The Fall Line Air Quality Study. Phase I Pilot Study.

EPA Factor # 8: Level of Emission Control

Georgia Power Plant Scherer has voluntarily switched its coal to Powder River basin coal (reduction estimate of 28.07 tpd NOx) and is using the over fired air technique (reduction estimate of 42.15 tpd NOx) to reduce emissions. (Plant Scherer contributes an estimated 113.41 tpd NOx).

Houston County point sources operate under Title V permits.

Both the Arkwright and Brown and Williamson point sources in Bibb County have either closed or are closing, which potentially will yield an estimated reduction of 11 tpd NOx.

EPA Factor #9: Geography/Topography of Region

Geography and topography do not play a major role in the air quality of the Macon region.

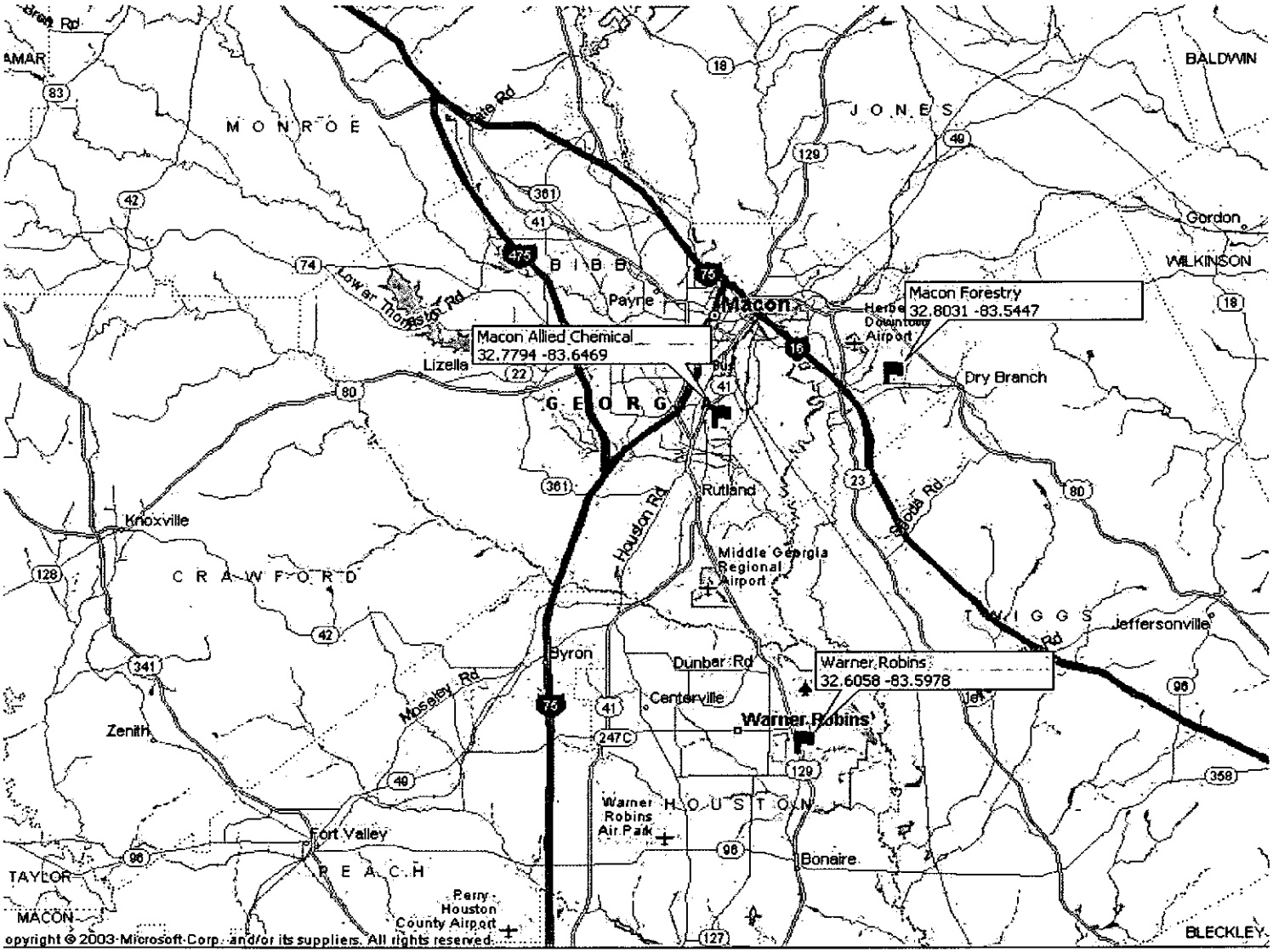
EPA Factor #10: Jurisdictional Boundaries

The GA EDP holds the authority to enforce regulatory measures in all counties surrounding a non-attainment area no matter their designation.

EPA Factor #11: Regional Emission Reductions

Regional emissions reductions from the Regional NOx SIP Call, metro-Atlanta 1-hour ozone attainment plan, and other state and federal rules being implemented now will have a significant impact in the near-term on the Macon area, as well as other parts of the southeast.

Regional emissions reductions are starting to be seen in ozone monitors and can be further predicted with additional air quality modeling. Modeling by GA Tech researchers show that the Macon region will be in attainment by 2007 with efforts already in place to reduce emissions.



Monitor Type:	Macon Allied	Macon Forestry	Warner Robins
PM2.5	X	X	X
PM2.5 Speciation	X		
Ozone		X	