Data Summary Report
for

LAPS Lidar Measurements at the ARM Alaska Northslope Site (Support to FIRE Project)

May 1998
Barrow Alaska

Prepared for

NASA Grant NAG-1-2074
(CAG.4055)
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Prepared
September 1998
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This report consists of data summaries of the results obtained during the May 1998 measurement period at Barrow Alaska. This report does not contain any data interpretation or analysis of the results which will follow this activity. This report is forwarded with a data set on magnetic media which contains the reduced data from the LAPS lidar in 15 minute intervals. The data was obtained during the period 15-30 May 1998. The measurement period overlapped with several aircraft flights conducted by NASA as part of the FIRE project.

The report contains a summary list of the data obtained plus figures that have been prepared to help visualize the measurement periods. The order of the presentation is as follows:

Section 1. A copy of the Statement of Work for the planned activity of the second measurement period at the ARM Northslope site is provided.

Section 2. A list of the data collection periods shows the number of one minute data records stored during each hour of operation and the corresponding size (Mbytes) of the one hour data folders. The folder and file names are composed from the year, month, day, hour and minute. The date/time information is given in UTC for easier comparison with other data sets.

Section 3. A set of 4 comparisons between the LAPS lidar results and the sondes released by the ARM scientists from a location nearby the lidar. The lidar results show the $\pm$ 1 σ statistical error on each of the independent 75 m altitude bins of the data. This set of 4 comparisons was used to set and validate the calibration value which was then used for the complete data set.

Section 4. A set of false color figures with up to 10 hours of specific humidity measurements are shown in each graph. Two days of measurements are shown on each page. These plots are crude representations of the data and permit a survey which indicates when the clouds were very low or where interesting events may occur in the results. These plots are prepared using the real time sequence plot program which has no smoothing in either the altitude or time (except that you are allowed to pick the integration time and time step. All of these plots were prepared with 15 minute integration and 5 minute time step.

Section 5. A set of time sequence data for all of the extended observation periods are shown with a smoothing algorithm from the Matlab plotting library. Most of these data are integrated for 5 minutes and stepped at 1 minute intervals but several plots are shown with both 15 minute integration and 5 minute steps. The upper level on these data was selected and converted to the white background where the error in the specific humidity reached 25%.

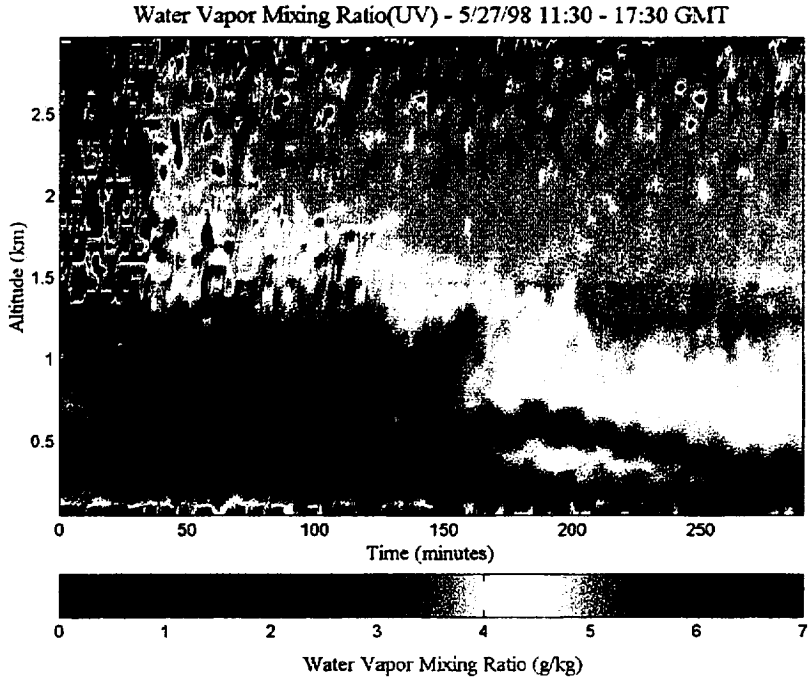
Section 6. The set of one hour integrated plots shown with up to 4 hours per page are provided from the real time analysis snapshot program. The only difference in these plots and the real time display is that the plots are stopped at an altitude where the error appears to be too large for the data to contain any meaningful information.

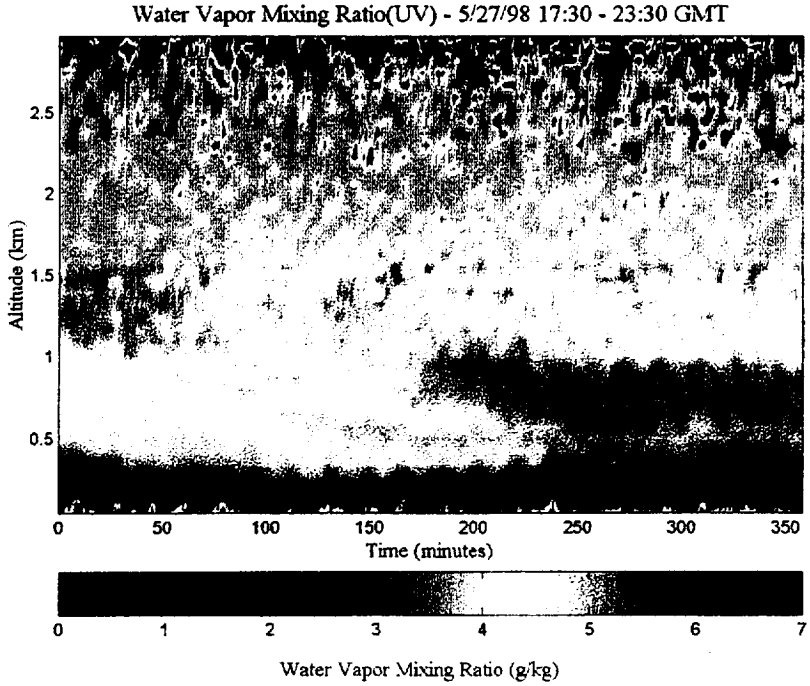
It is unfortunate that low clouds were present so much of the time, however there are some very good and interesting results. The lidar was on and results were obtained during all aircraft flights between 15 and 30 May as far as we know. An analysis and comparison will be undertaken as

soon as the satisfactory analysis of the measurements is completed. There are so many concerns and items that needed checking in the analysis that the preparation of the data summary has taken this long.

One of the most striking features in the data is the period after the clouds disappeared on 27 May1998. The oscillation observed in the moisture profile shown in the figure following this page is real in the data, not an artifact of the processing (in the plots of Section 5, the same feature is observed and the 5 minute integration and 15 minute integration plots can be compared).

Time sequence of water vapor profiles measured at the ARM Northslope site at Barrow Alaska in May 1998 using the ARL/PSU LAPS lidar instrument. The example shows 11 continuous hours of measurements which begin just before a break in the clouds (at 1.4 km) that occurred near 1300 GMT on 27 May 1998. Note the dissipation of the water vapor from the moist layer as time increases and the wave dynamics in the moist layers. Also notice the decent of moist plumes near 1830 and 1900 GMT.





LAPS Lidar Measurements at the ARM Alaska Northslope Site (Add-On)

Statement of Work

Summary: This document requests funding to support an extension of measurements of the ARL/PSU LAPS instrument at Barrow Alaska (Contract No. 327421-A-N4, Task Order No. 354019-A95). The LAPS lidar instrument was transported to the ARM-Northslope site in February 1998 and used to demonstrate the ability of lidar to provide the required measurements on the environment under northern winter conditions. The long range goal is to prepare an updated version of the LAPS instrument for the DoE ARM program and locate the instrument at this site. The February/March measurement period was chosen to provide a special data set on the arctic environment and to demonstrate that lidar can provide useful measurements in the arctic winter conditions. After this winter measurement demonstration was planned, NASA Langley became interested in retaining our measurement capability at Point Barrow during their FIRE project in the May/June 1998. A proposal for a four week operation in support of FIRE was prepared and submitted to NASA on 23 February 1998 ($77,151). This activity was encouraged by our sponsors in the DoE ARM project as a chance to obtain more measurements from the site. Contacts between the program offices of NASA and DoE resulted in a plan between the agencies to support the FIRE aircraft measurements. The NASA Langley office was not able to support the $77K for the four week data collection project which assumed that DoE would provide the apartment and operations support at the ARM site. However, NASA was able to provide $10K of token support. This document requests the additional support from DoE to be able to carry out a two week measurement during the period of the FIRE project.

Brief Background: Lidar techniques provide the best capability available today to measure the meteorological properties, profiles of some of the important chemical species, optical propagation conditions, radar refractivity and ducting conditions, environmental pollution, and radiative transport processes. The lidar has the ability to provide the profiles of many atmospheric properties in real time and provide these measurements with much higher spatial and temporal resolution than can be achieved with any other approach.

The Atmospheric Radiation Measurements (ARM) Program is the primary program of the Department of Energy that has been given the responsibility for developing the major thrust into understanding the global scale environmental change issues associated with the national policies on use of fuels to supply energy for industrial and individual use. To gain the global perspective required, measurement sites have been established at Norman OK, on a Pacific Ocean Island, and at Barrow Alaska. The central US site in Oklahoma, referred to as the CART site, has been in existence for several years and the other two sites are still in their development stage. These sites will be used to gather data over a period of five or more years to provide the basic measurements which will be used to formulate our national policy on fuel use.

The LAPS instrument was shipped to the ARM Site at Point Barrow Alaska on 18 February 1998. The instrument was installed in two shelters which were prepared on site to protect the instrument from severe weather conditions. The LAPS has been designed for weather sealed

outdoor operation at temperate latitudes but could not be expected to maintain its own thermally stabilized environment in the sub-zero temperatures of winter in North Alaska. Initially, the instrument laser transmitter did not work in the Alaska environment. The lidar was completely checked out and was, of course, working fine at PSU prior to shipment. A circuit in the Continuum laser Model 9030 failed sometime prior to setup testing in Alaska. Care was given to prevent cold soaking of the optical equipment during the transit and during the few days of storage at the Alaska site. We do not believe the component failure was cold related. Unfortunately, several shipments of replacement parts to Alaska by the laser company did not result in fixing the laser. Even though we have a top laser engineer on our staff (Mr. Tom Petach), it was necessary to arrange for a service engineer to fly from California to Alaska. Finally the problem was identified as being due to a production design change which had occurred since our purchase of the first unit. We had purchased the first unit commercially sold and we have helped the company with several design improvements in the optical and mechanical systems. We were aware that our unit was an early one but we did not know about the production design change. Approximately three weeks of the planned four week data collection were lost due to the time required repair the laser. In addition, we also lost about two days for the preparation of a second shelter for the instrument console. The second shelter was required to meet the local fire code which did not permit us to run the electrical cables to the instrument shed from inside the apartment. A separate power drop had to be installed and the consol was located in an outside shelter next to the instrument.

Despite these problems, we were able to collect 8 days of good data. Collection of these data achieved the goal of establishing the ability to obtain lidar data during conditions when arctic temperatures reached -20F. Measurements of water vapor, temperature, ozone and optical extinction were obtained.

Planned Measurements: The measurement extension is planned to take place in conjunction with the period of time when the NASA Langley ER-2 is flying over the area as part of the FIRE Program. The flights of the ER-2 are expected to take place between 15 May and 7 June. The plan is to prepare, calibrate and align, the LAPS lidar by 15 May and take data during each of the flight opportunities for 2 weeks, 15 May to 30 May. The operations crew will travel to Alaska on 11 May (arriving late on 12 May). They will prepare the instrument during the 13th and 14th to be ready for data collection on 15 May in conjunction with the NASA ER-2 and C-130 instrumented aircraft flights. The instrument will be packed for the return shipment on 1-3 June and the field crew will complete their work and return to State College on 4 June.

Deliverables: Under this effort ARL would deliver a copy of the data collected during the period 15 May through 30 May. The actual data collected will depend upon the joint operations of the ARL/PSU LAPS instrument and the NASA ER-2 aircraft.

Data Log for measurements at ARM-Alaska site in May 1998.

The plane flew over the site on May 27,28,30 and 31.
All date/time values are in GMT.

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980519

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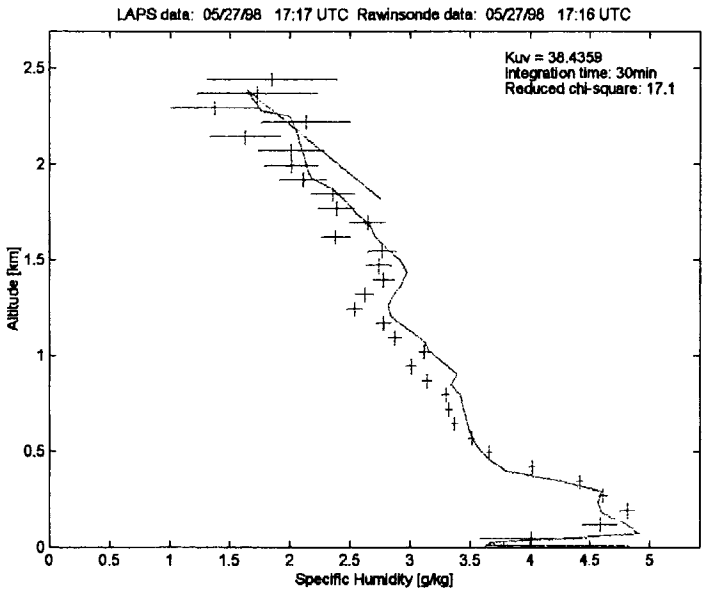
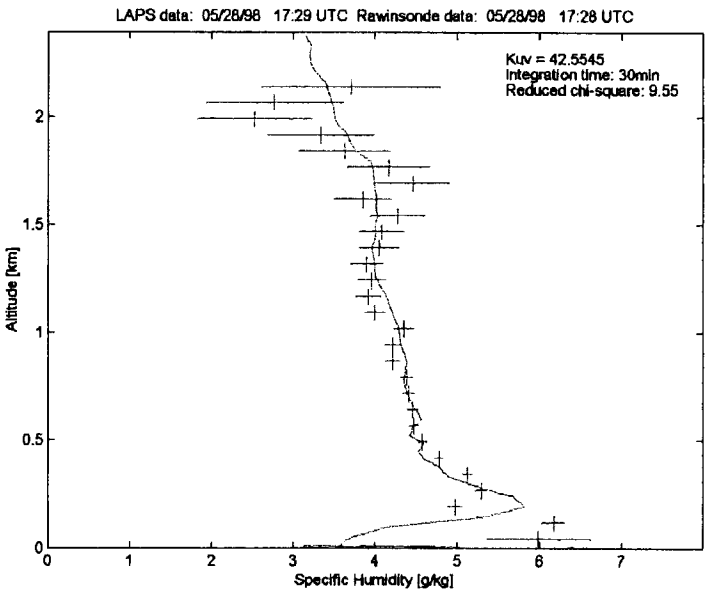
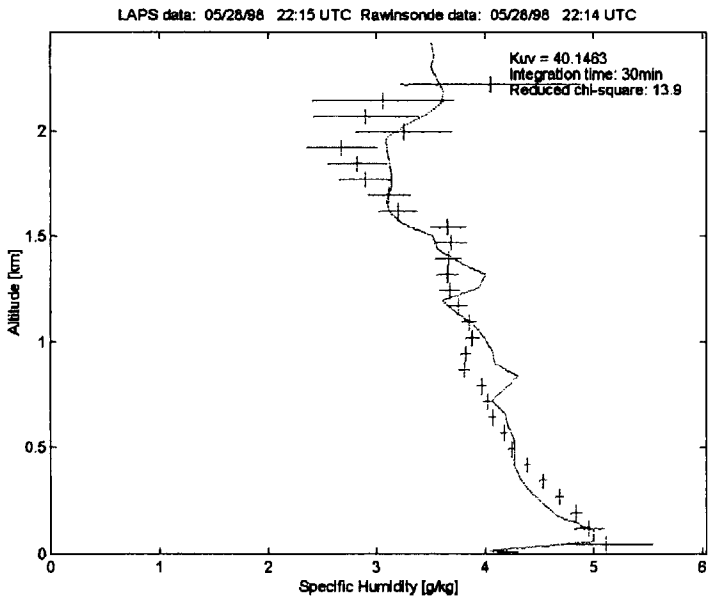
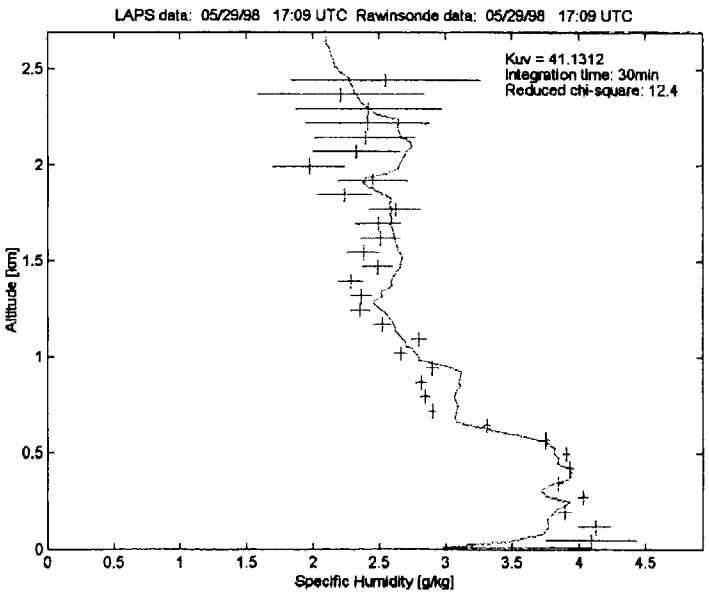
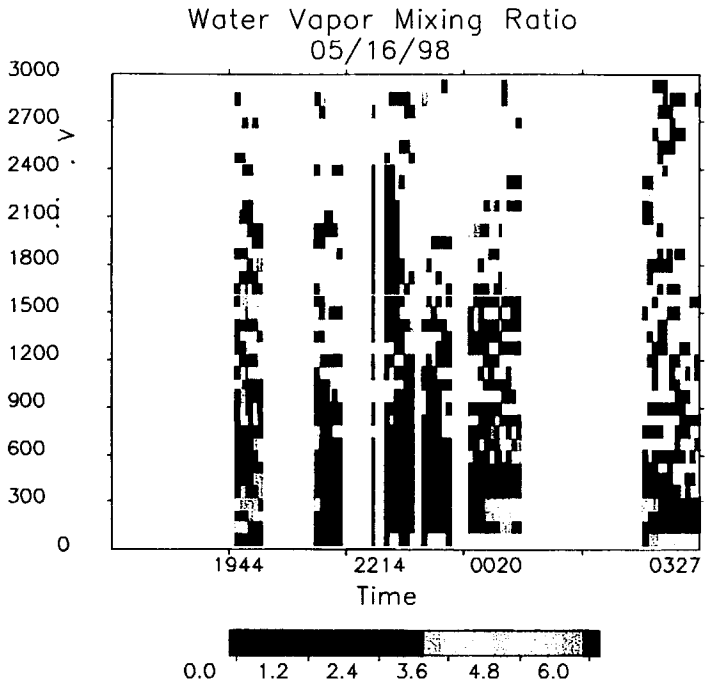
Total files listed:
18,410 file(s) 1,217 dir(s) 294,788,952 bytes (March and May 1998).

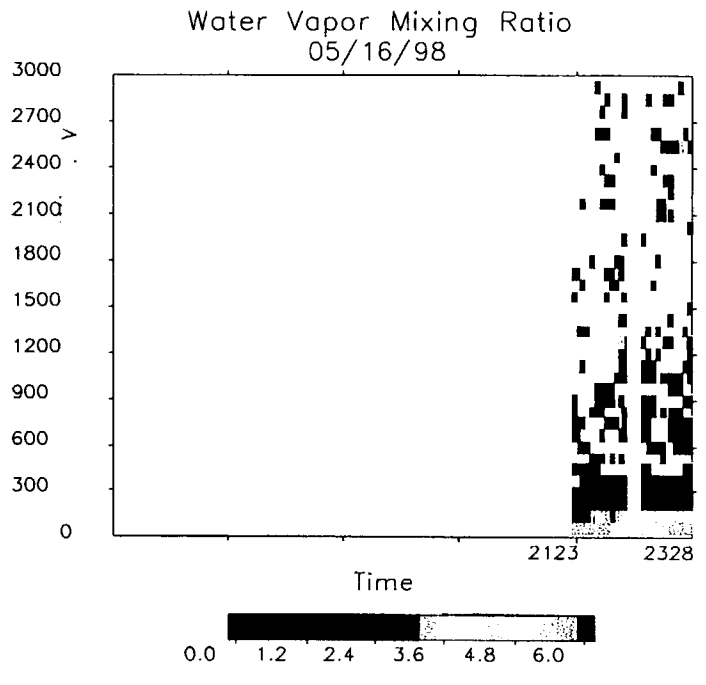

LAPS data: 05/27/98 17:17 UTC Rawinsonde data: 05/27/98 17:16 UTC
Kuv = 38.4359
Integration time: 30min
Reduced chi-square: 17.1
Altitude [km]
Specific Humidity [g/kg]


LAPS data: 05/28/98 17:29 UTC Rawinsonde data: 05/28/98 17:28 UTC
Kuv = 42.5545
Integration time: 30min
Reduced chi-square: 9.55
Altitude [km]
Specific Humidity [g/kg]


LAPS data: 05/28/98 22:15 UTC Rawinsonde data: 05/28/98 22:14 UTC
Kuv = 40.1463
Integration time: 30min
Reduced chi-square: 13.9
Altitude [km]
Specific Humidity [g/kg]


LAPS data: 05/29/98 17:09 UTC Rawinsonde data: 05/29/98 17:09 UTC
Kuv = 41.1312
Integration time: 30min
Reduced chi-square: 12.4
Altitude [km]
Specific Humidity [g/kg]


Water Vapor Mixing Ratio
05/16/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
1944
2214
0020
0327
Time
0.0
1.2
2.4
3.6
4.8
6.0


Water Vapor Mixing Ratio
05/16/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
2123
2328
Time
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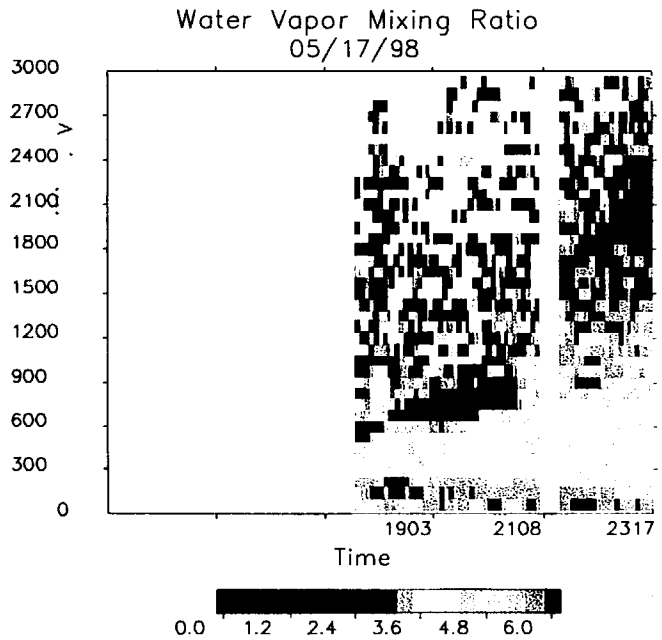
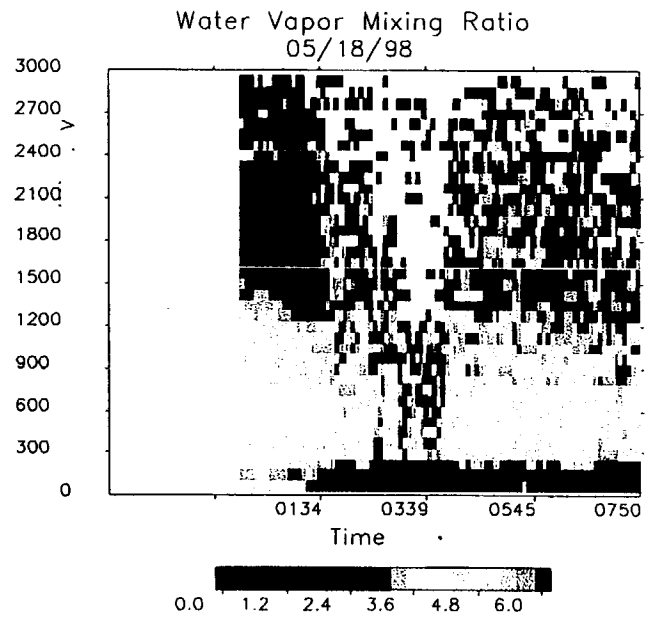
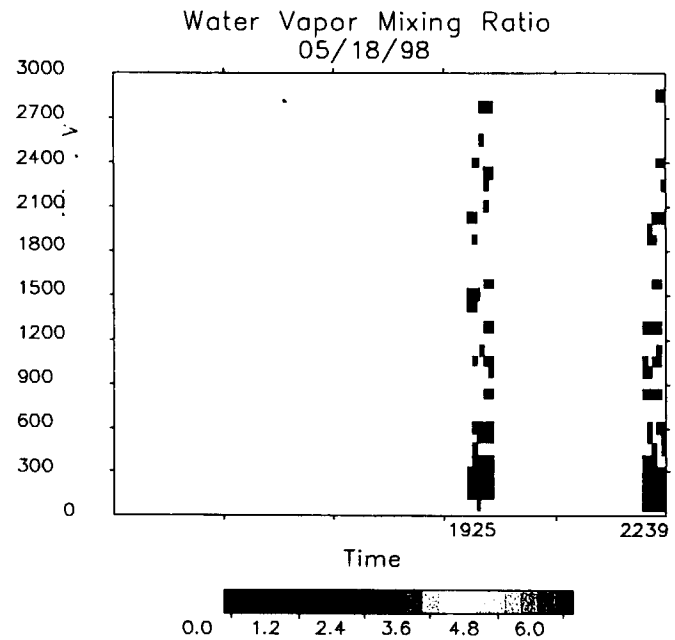
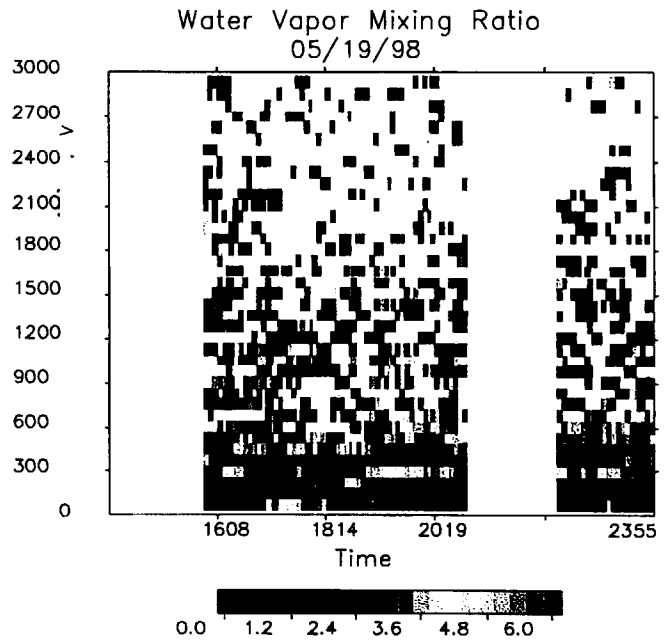
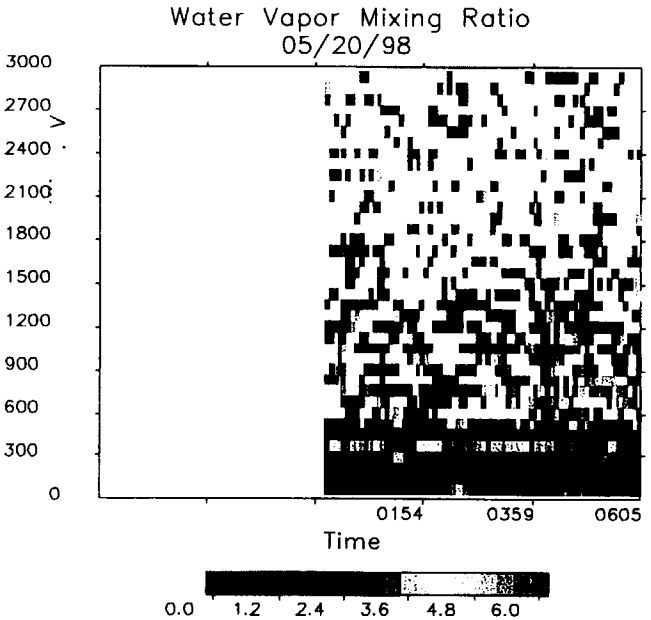
1.2
2.4
3.6
4.8
6.0

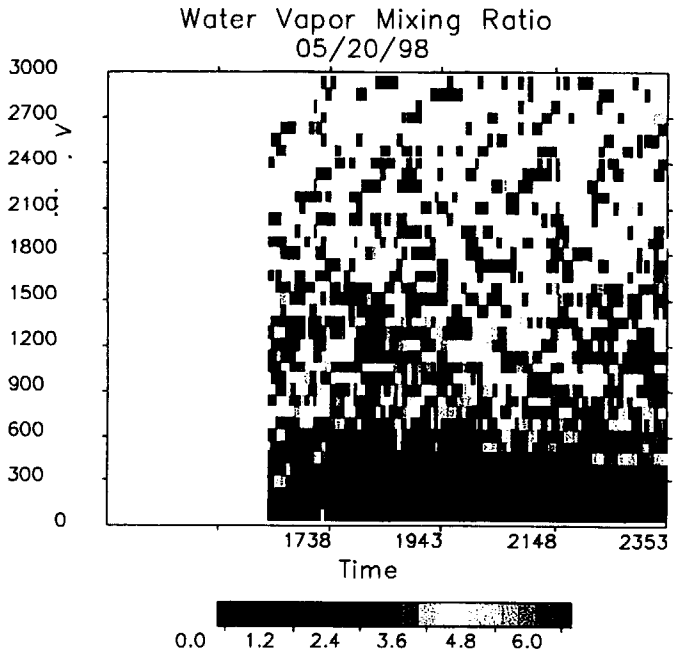

Water Vapor Mixing Ratio
05/17/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
1903
2108
2317
Time
0.0
1.2
2.4
3.6
4.8
6.0

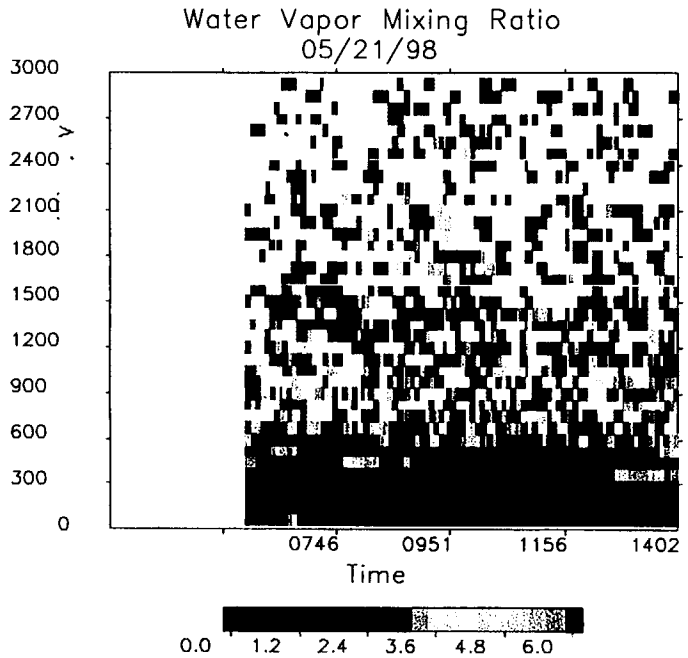

Water Vapor Mixing Ratio
05/18/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
0134
0339
0545
0750
Time
0.0
1.2
2.4
3.6
4.8
6.0

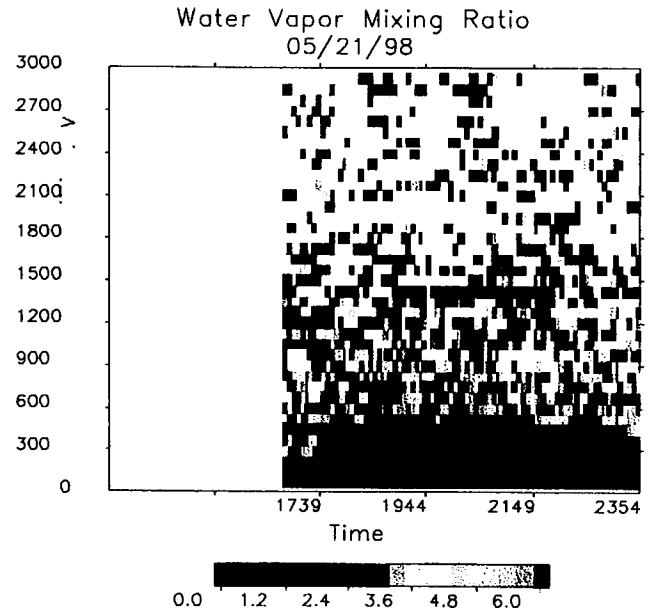

Water Vapor Mixing Ratio
05/18/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
1925
2239
Time
0.0 1.2 2.4 3.6 4.8 6.0

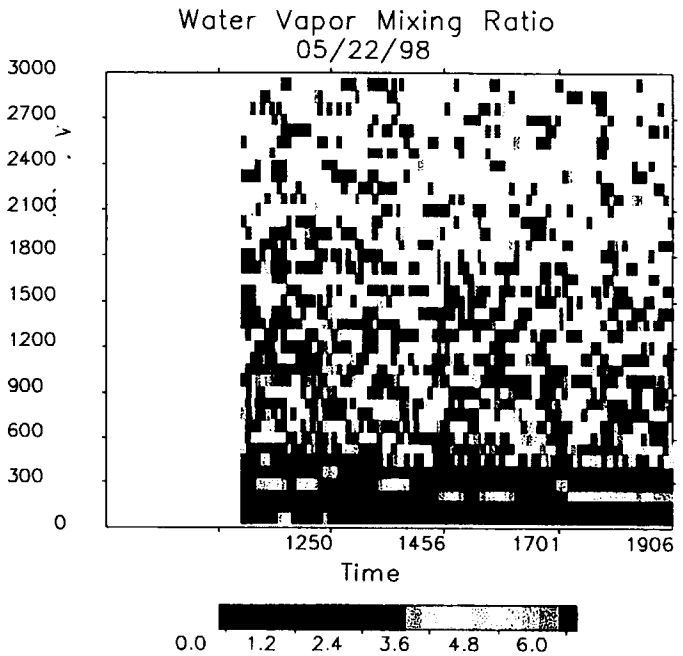

Water Vapor Mixing Ratio
05/19/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
1608
1814
2019
2355
Time
0.0 1.2 2.4 3.6 4.8 6.0

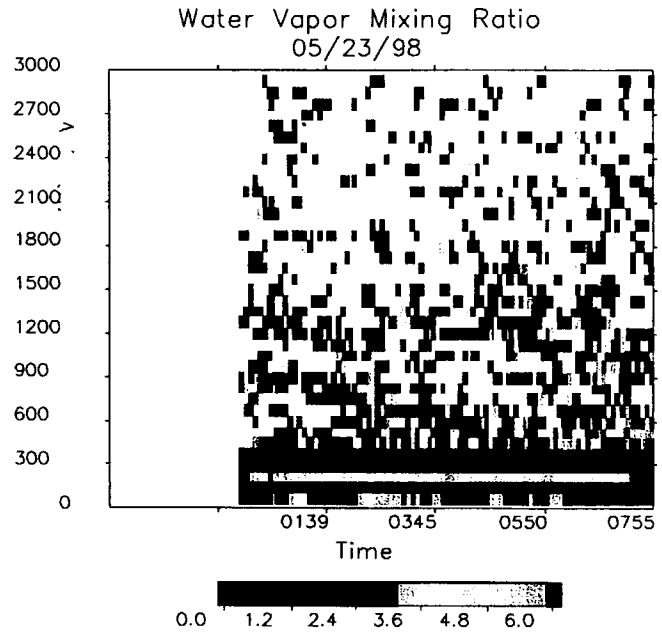

Water Vapor Mixing Ratio
05/20/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
0154
0359
0605
Time
0.0 1.2 2.4 3.6 4.8 6.0

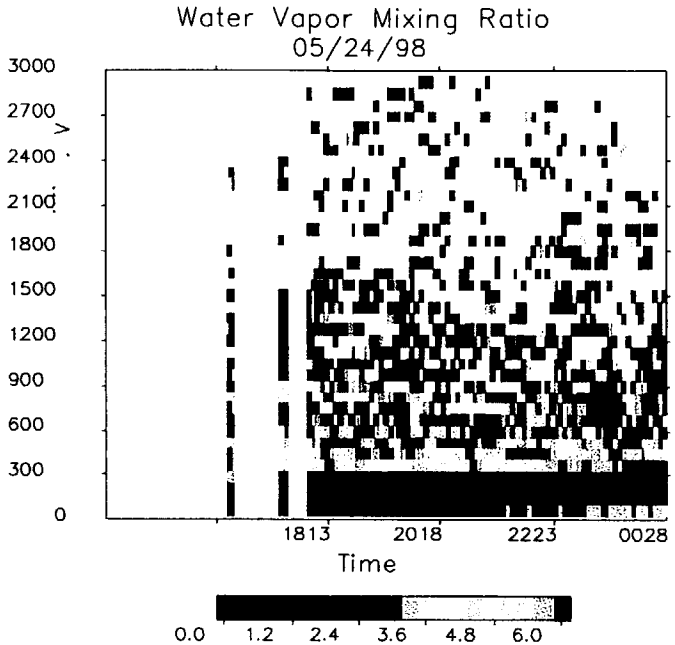

Water Vapor Mixing Ratio
05/20/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
1738
1943
2148
2353
Time
0.0 1.2 2.4 3.6 4.8 6.0

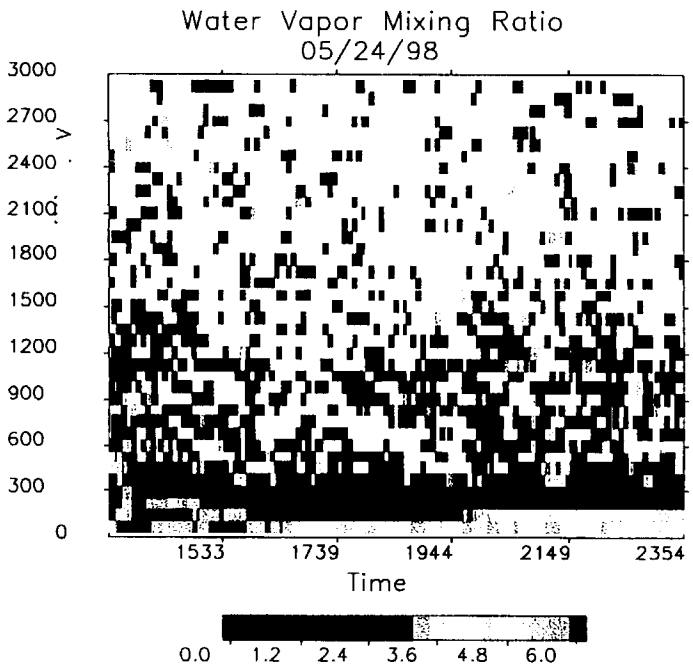

Water Vapor Mixing Ratio
05/21/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
0746
0951
1156
1402
Time
0.0
1.2
2.4
3.6
4.8
6.0

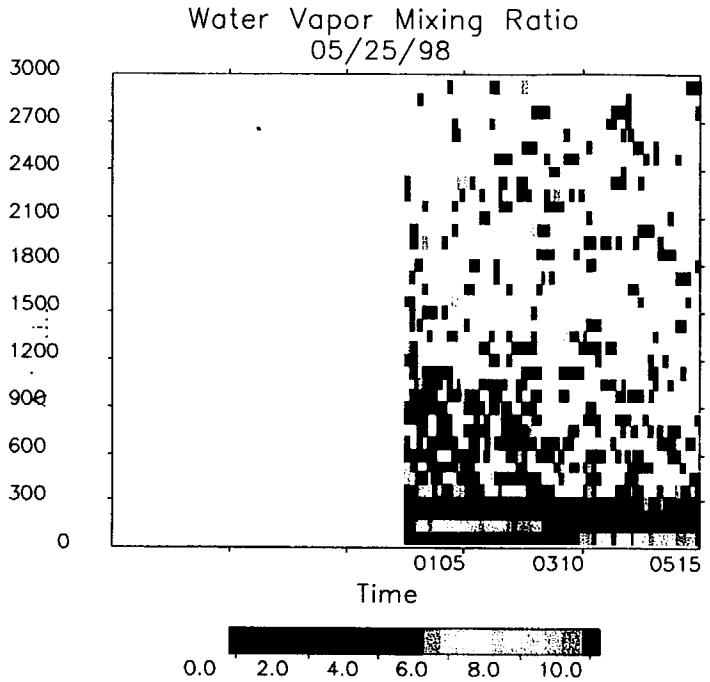

Water Vapor Mixing Ratio
05/21/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
1739
1944
2149
2354
Time
0.0
1.2
2.4
3.6
4.8
6.0

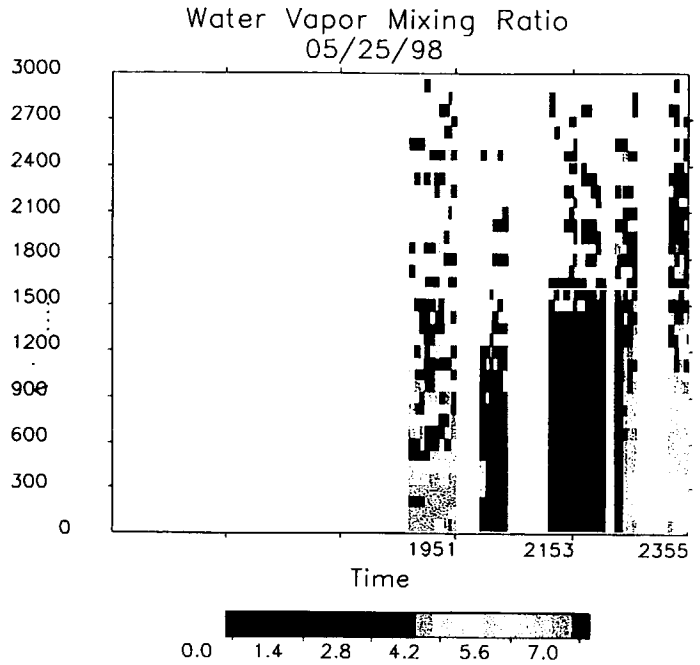

Water Vapor Mixing Ratio
05/22/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Y
1250
1456
1701
1906
Time
0.0
1.2
2.4
3.6
4.8
6.0


Water Vapor Mixing Ratio
05/23/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Z
0139
0345
0550
0755
Time
0.0
1.2
2.4
3.6
4.8
6.0


Water Vapor Mixing Ratio
05/24/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Z
1813
2018
2223
0028
Time
0.0
1.2
2.4
3.6
4.8
6.0


Water Vapor Mixing Ratio
05/24/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
Z
1533
1739
1944
2149
2354
Time
0.0
1.2
2.4
3.6
4.8
6.0


Water Vapor Mixing Ratio
05/25/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
0105
0310
0515
Time
0.0
2.0
4.0
6.0
8.0
10.0


Water Vapor Mixing Ratio
05/25/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1951
2153
2355
Time
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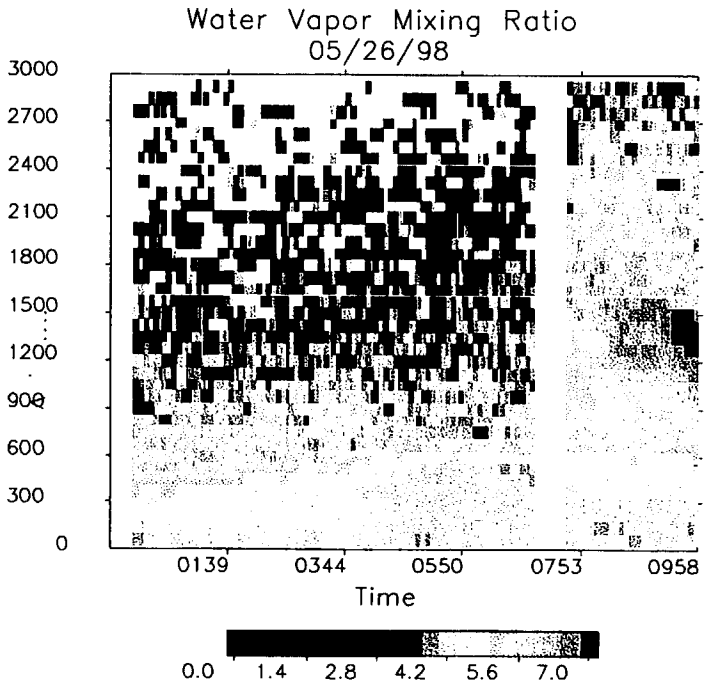
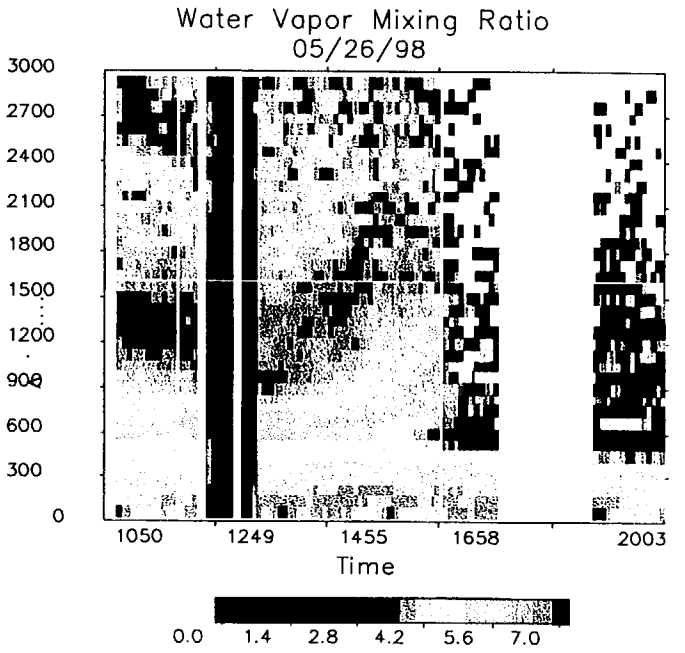
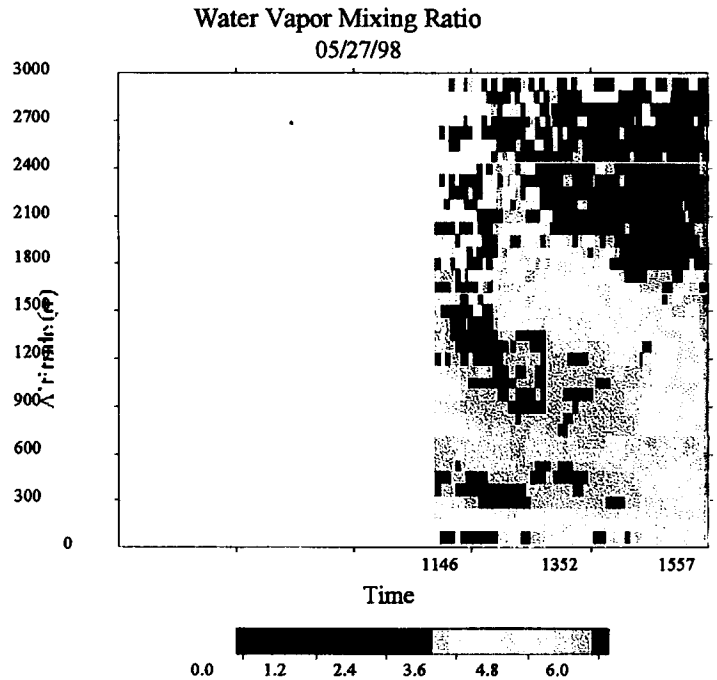
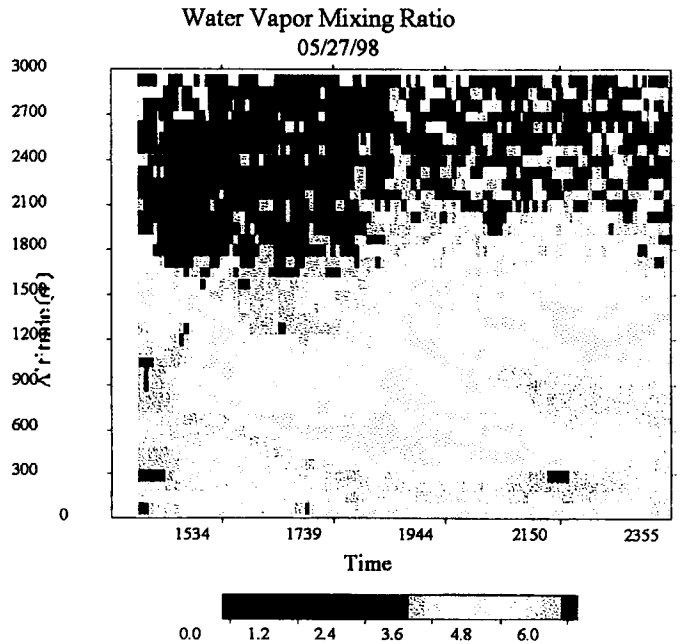
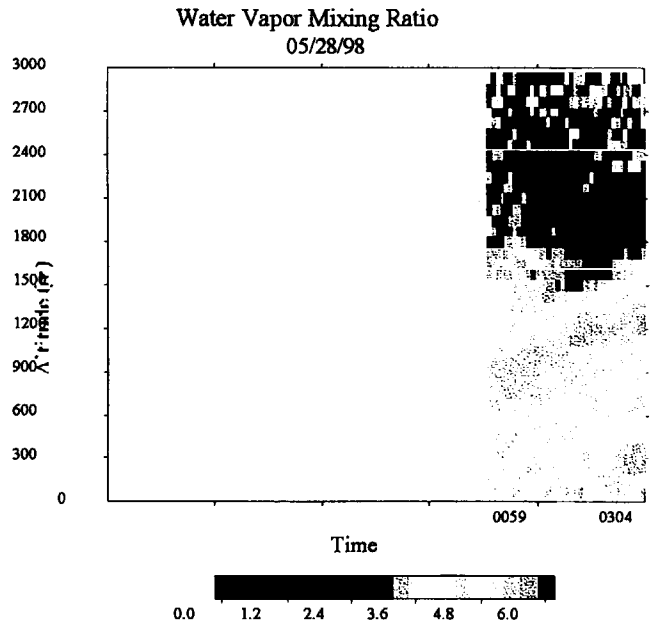
1.4
2.8
4.2
5.6
7.0

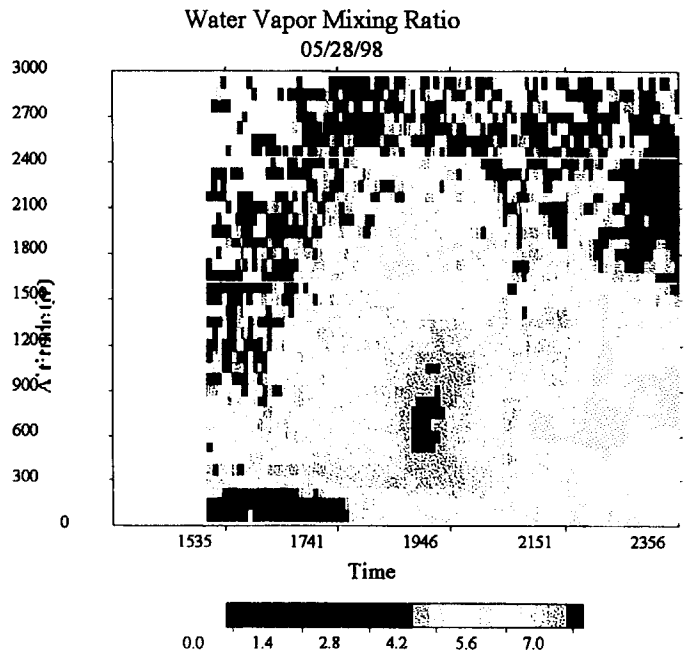

Water Vapor Mixing Ratio
05/26/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
0139
0344
0550
0753
0958
Time
0.0
1.4
2.8
4.2
5.6
7.0


Water Vapor Mixing Ratio
05/26/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1050
1249
1455
1658
2003
Time
0.0
1.4
2.8
4.2
5.6
7.0


Water Vapor Mixing Ratio
05/27/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1146
1352
1557
Time
0.0
1.2
2.4
3.6
4.8
6.0


Water Vapor Mixing Ratio
05/27/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1534
1739
1944
2150
2355
Time
0.0
1.2
2.4
3.6
4.8
6.0


Water Vapor Mixing Ratio
05/28/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
0059
0304
Time
0.0
1.2
2.4
3.6
4.8
6.0


Water Vapor Mixing Ratio
05/28/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1535
1741
1946
2151
2356
Time
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1.4
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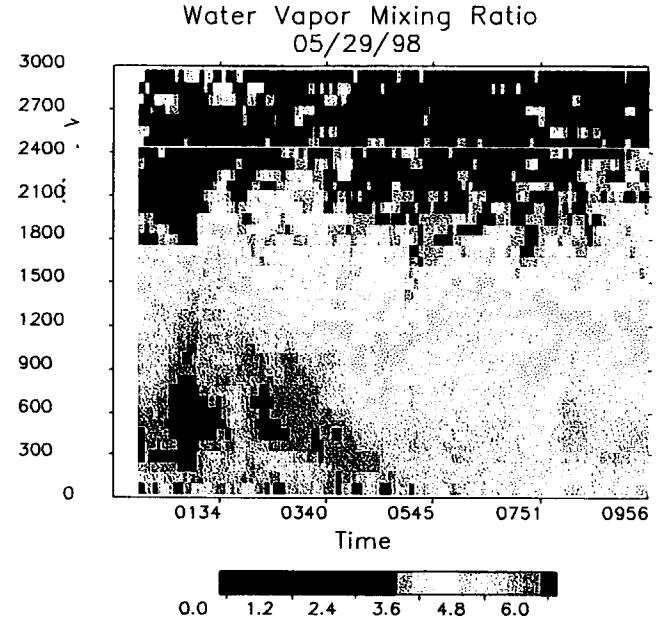
7.0


Water Vapor Mixing Ratio
05/29/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
0134
0340
0545
0751
0956
Time
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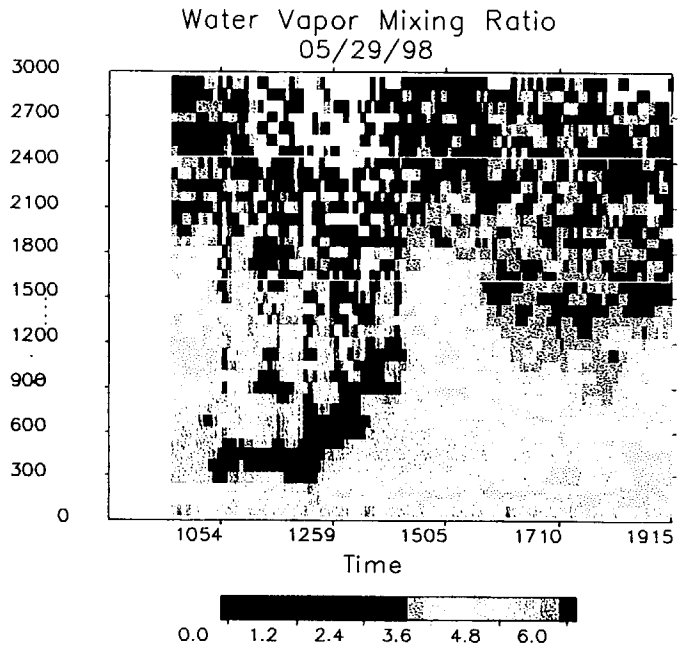
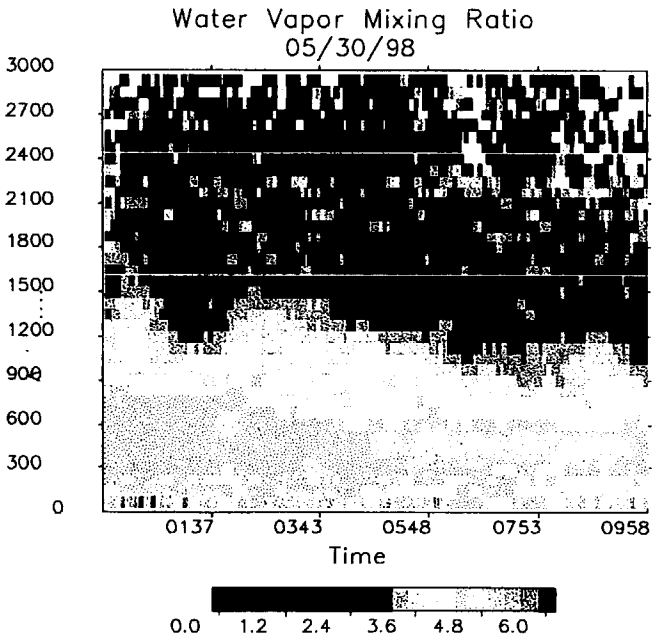
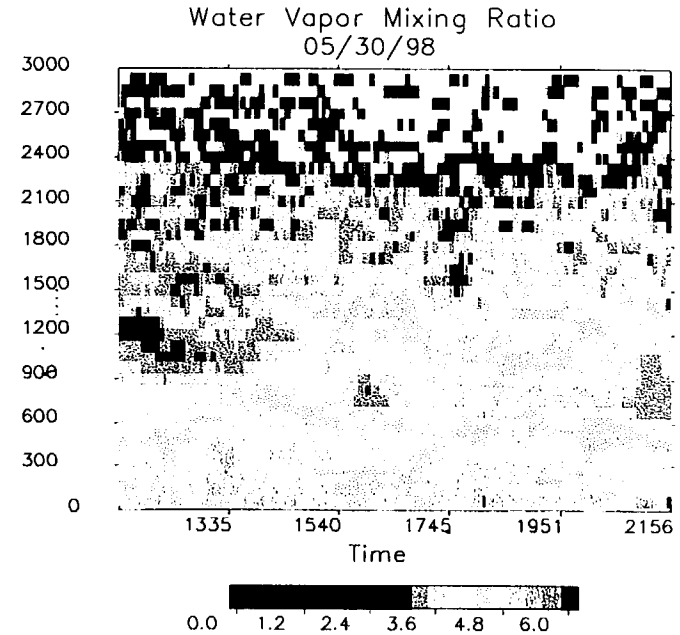
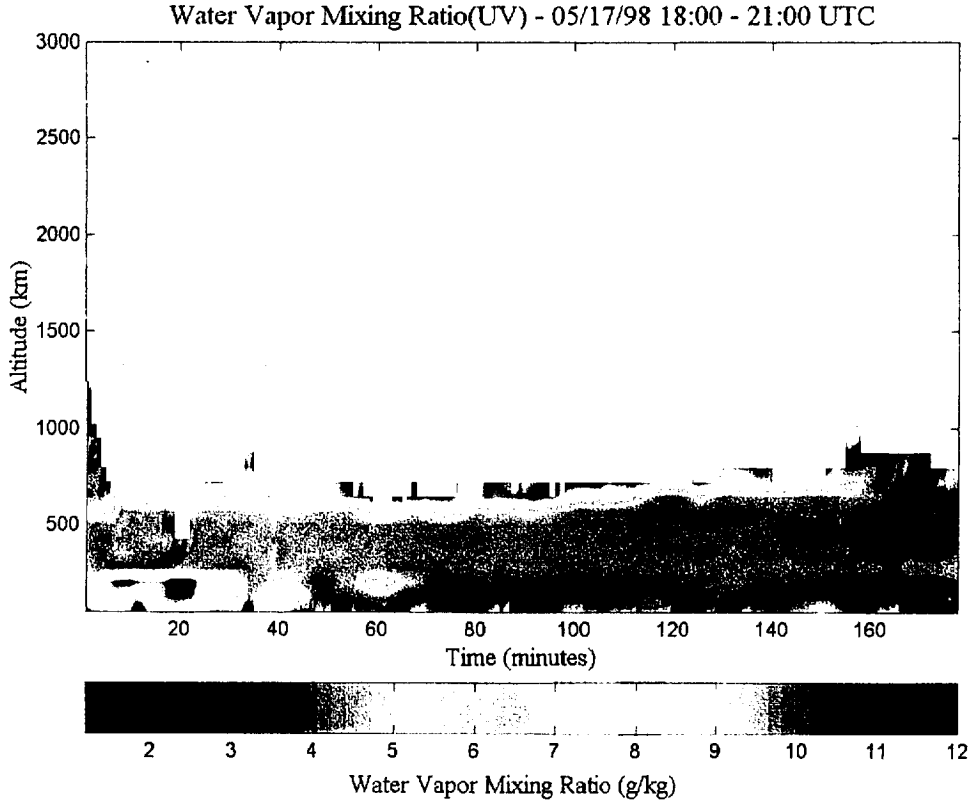
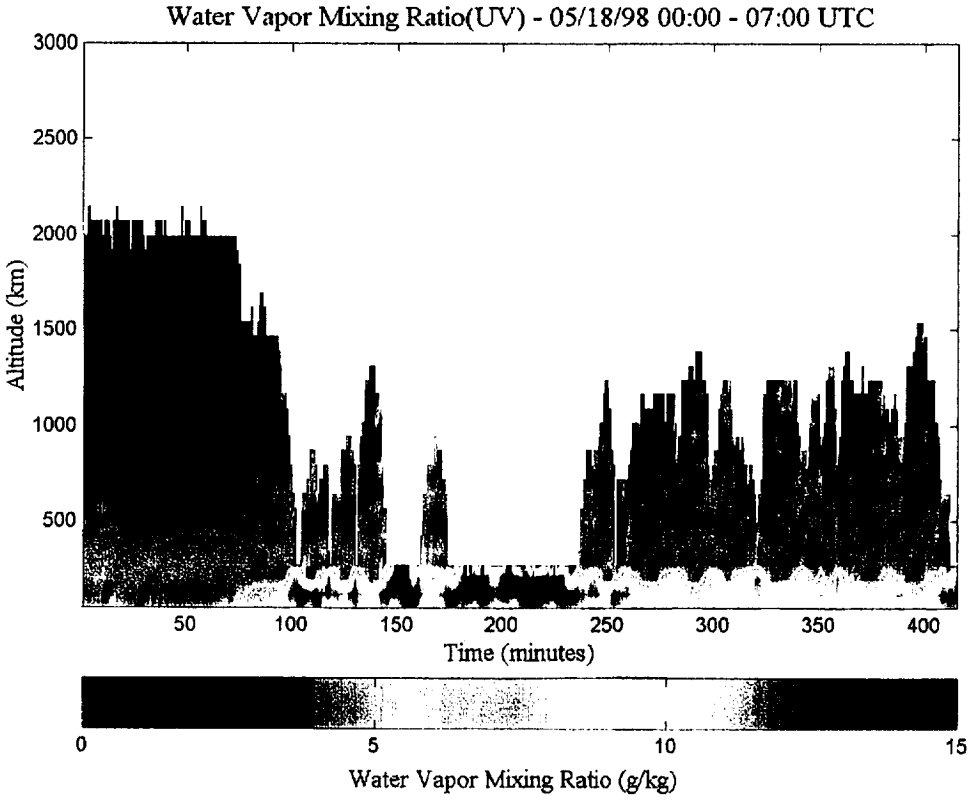
1.2
2.4
3.6
4.8
6.0

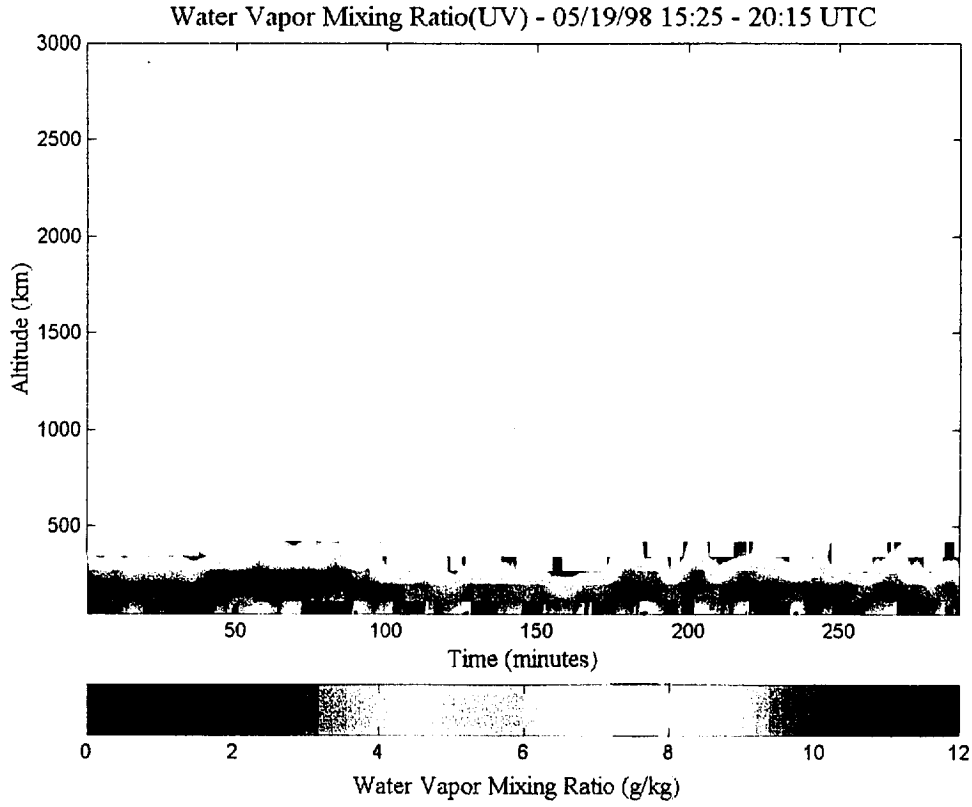

Water Vapor Mixing Ratio
05/29/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1054
1259
1505
1710
1915
Time
0.0
1.2
2.4
3.6
4.8
6.0

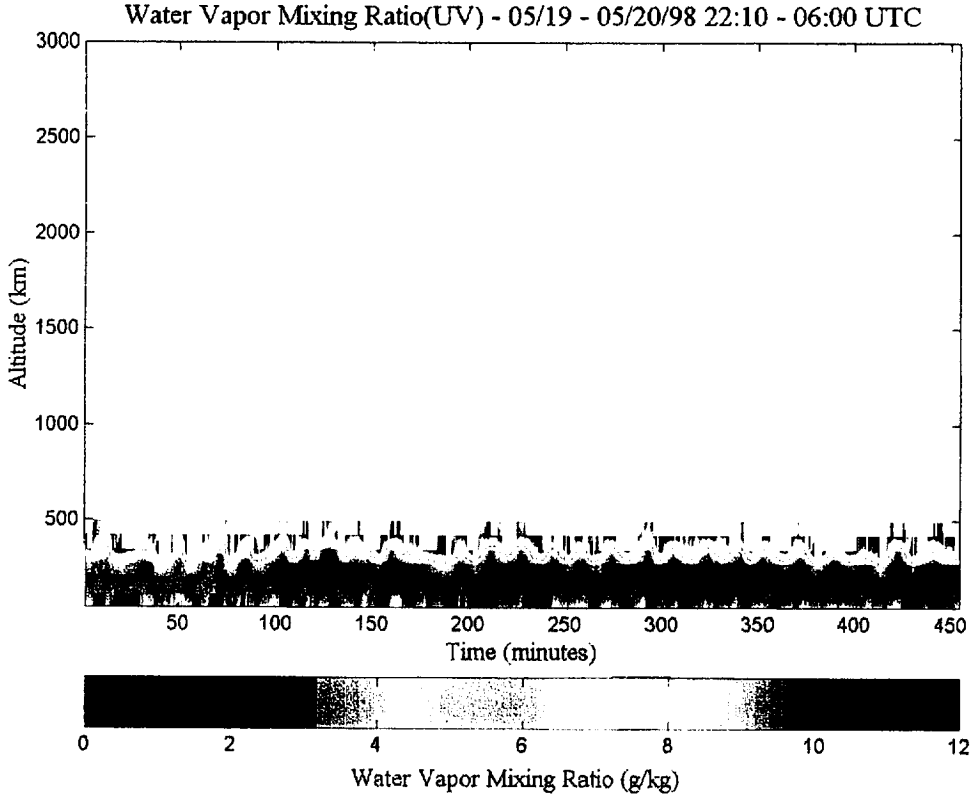

Water Vapor Mixing Ratio
05/30/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
0137
0343
0548
0753
0958
Time
0.0
1.2
2.4
3.6
4.8
6.0

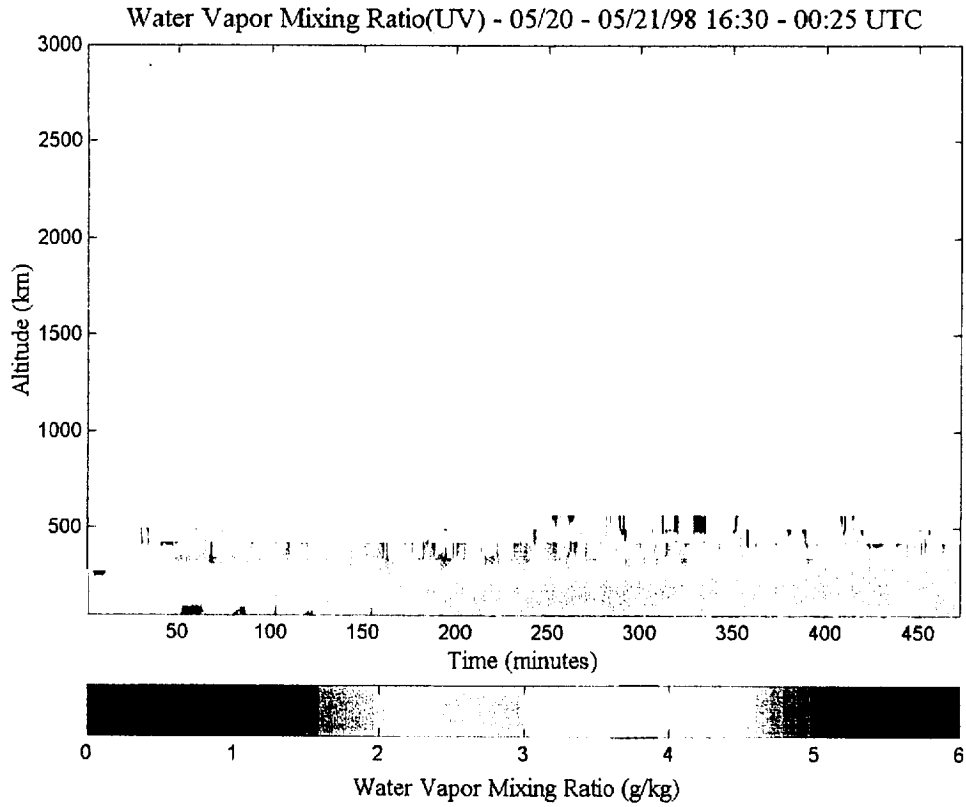

Water Vapor Mixing Ratio
05/30/98
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1335
1540
1745
1951
2156
Time
0.0
1.2
2.4
3.6
4.8
6.0

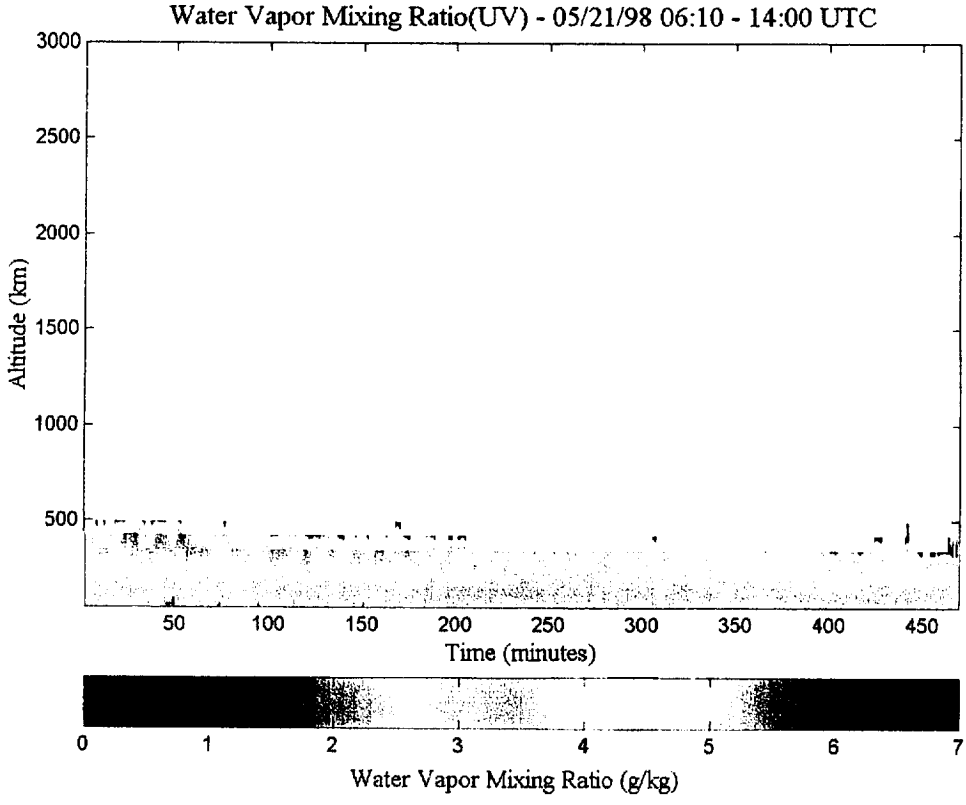

Water Vapor Mixing Ratio(UV) - 05/17/98 18:00 - 21:00 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
20
40
60
80
100
120
140
160
Time (minutes)
2
3
4
5
6
7
8
9
10
11
12
Water Vapor Mixing Ratio (g/kg)

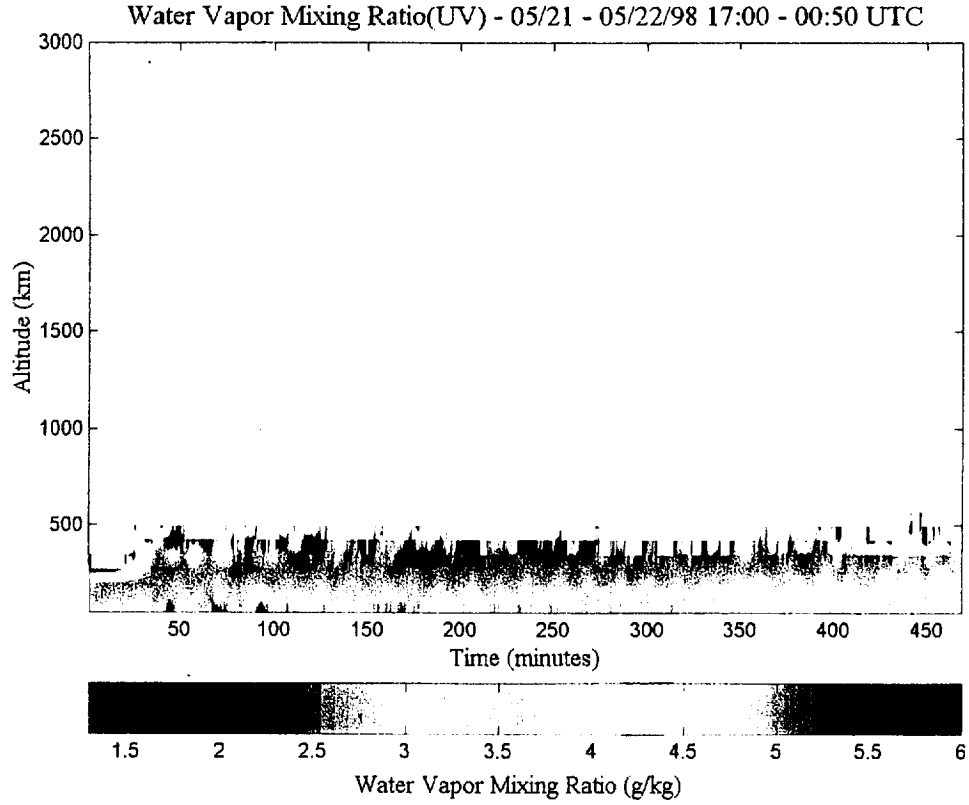

Water Vapor Mixing Ratio(UV) - 05/18/98 00:00 - 07:00 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
50
100
150
200
250
300
350
400
Time (minutes)
0
5
10
15
Water Vapor Mixing Ratio (g/kg)

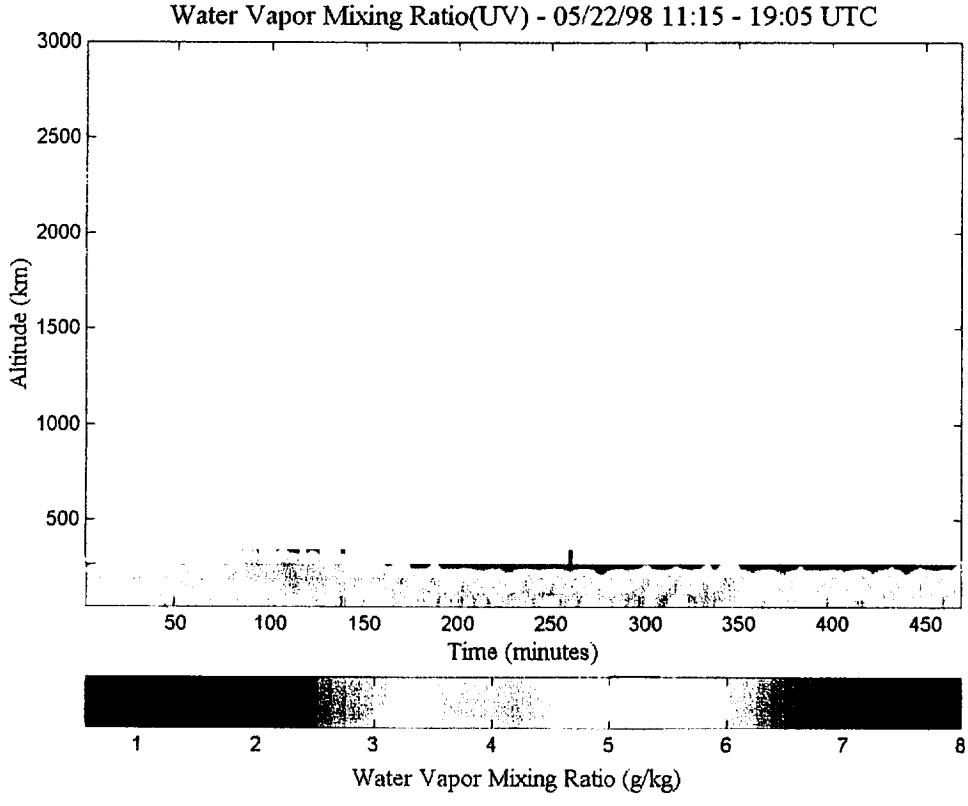

Water Vapor Mixing Ratio(UV) - 05/19/98 15:25 - 20:15 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
50
100
150
200
250
Time (minutes)
0
2
4
6
8
10
12
Water Vapor Mixing Ratio (g/kg)

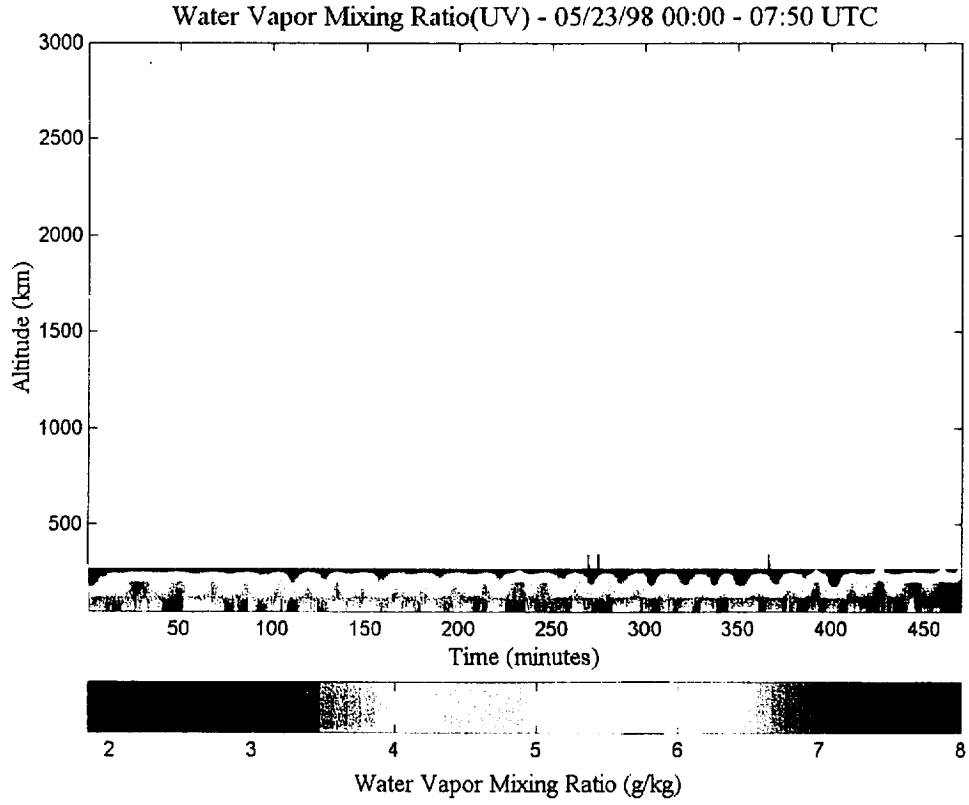

Water Vapor Mixing Ratio(UV) - 05/19 - 05/20/98 22:10 - 06:00 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
50
100
150
200
250
300
350
400
450
Time (minutes)
0
2
4
6
8
10
12
Water Vapor Mixing Ratio (g/kg)

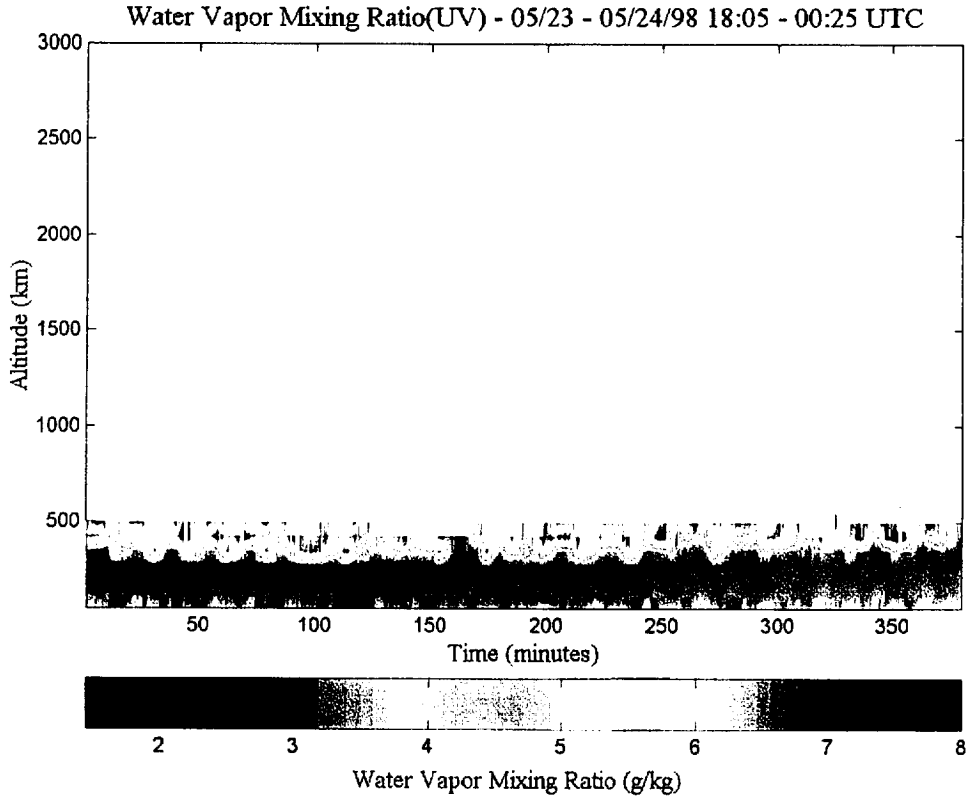

Water Vapor Mixing Ratio(UV) - 05/20 - 05/21/98 16:30 - 00:25 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
50
100
150
200
250
300
350
400
450
Time (minutes)
0
1
2
3
4
5
6
Water Vapor Mixing Ratio (g/kg)

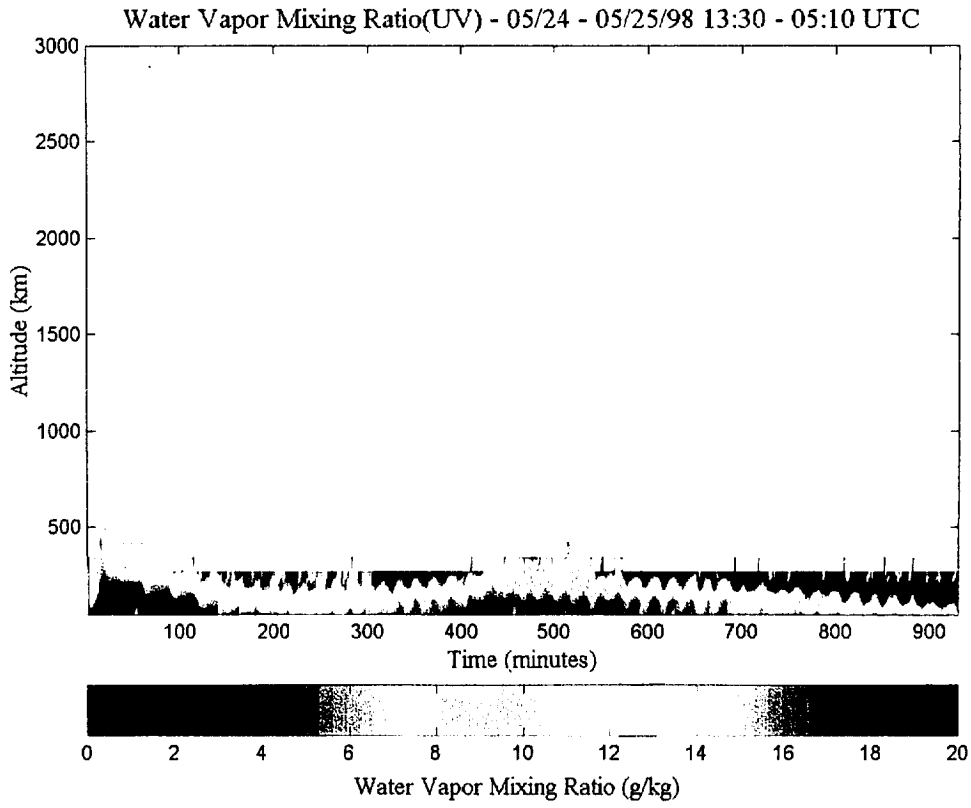

Water Vapor Mixing Ratio(UV) - 05/21/98 06:10 - 14:00 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
50
100
150
200
250
300
350
400
450
Time (minutes)
0
1
2
3
4
5
6
7
Water Vapor Mixing Ratio (g/kg)

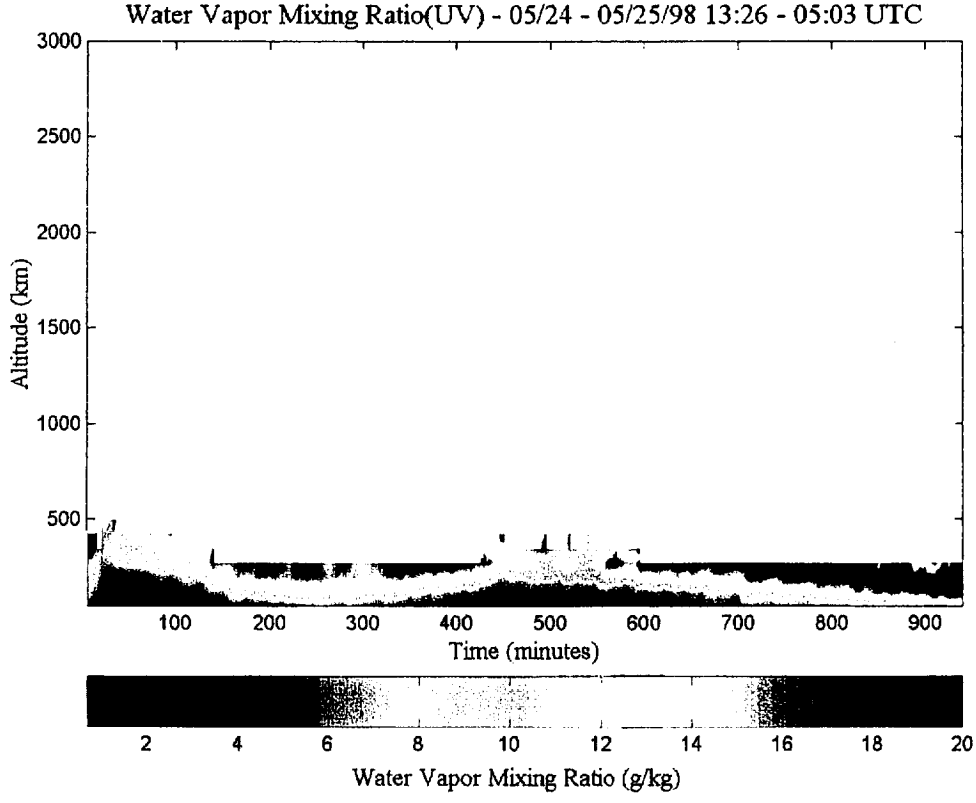

Water Vapor Mixing Ratio(UV) - 05/21 - 05/22/98 17:00 - 00:50 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
50
100
150
200
250
300
350
400
450
Time (minutes)
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
Water Vapor Mixing Ratio (g/kg)

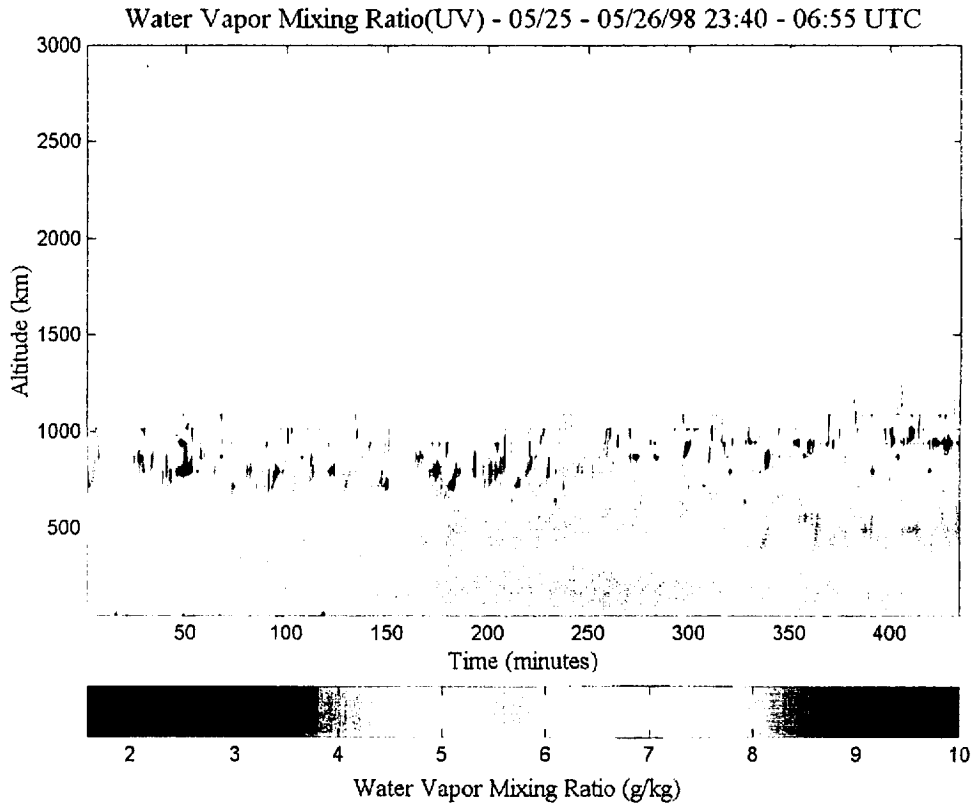

Water Vapor Mixing Ratio(UV) - 05/22/98 11:15 - 19:05 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
50
100
150
200
250
300
350
400
450
Time (minutes)
1
2
3
4
5
6
7
8
Water Vapor Mixing Ratio (g/kg)

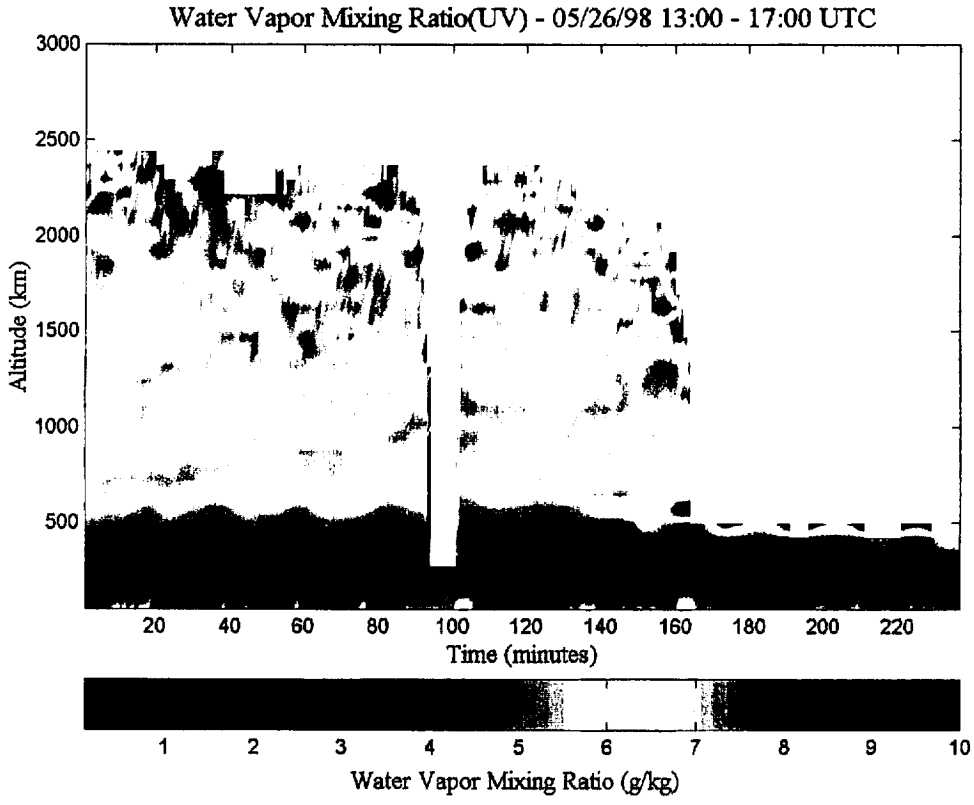

Water Vapor Mixing Ratio(UV) - 05/23/98 00:00 - 07:50 UTC
3000
2500
2000
1500
1000
500
Altitude (km)
50
100
150
200
250
300
350
400
450
Time (minutes)
2
3
4
5
6
7
8
Water Vapor Mixing Ratio (g/kg)

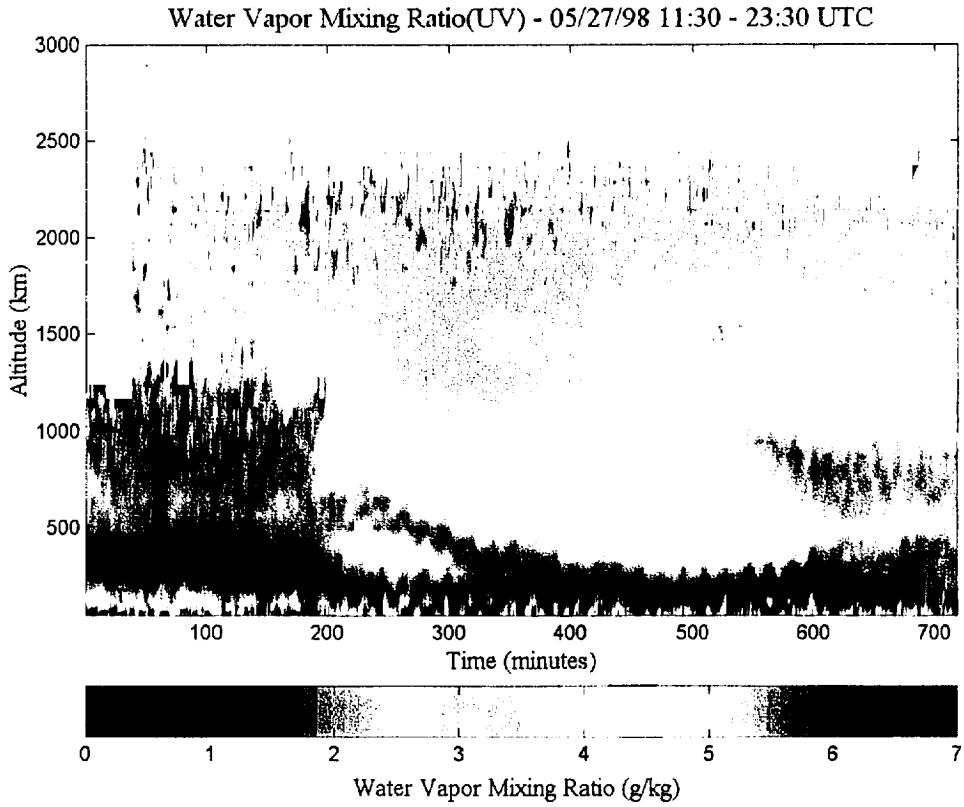

Water Vapor Mixing Ratio(UV) - 05/23 - 05/24/98 18:05 - 00:25 UTC
3000
2500
2000
1500
1000
500
Altitude (km)
50
100
150
200
250
300
350
Time (minutes)
2
3
4
5
6
7
8
Water Vapor Mixing Ratio (g/kg)

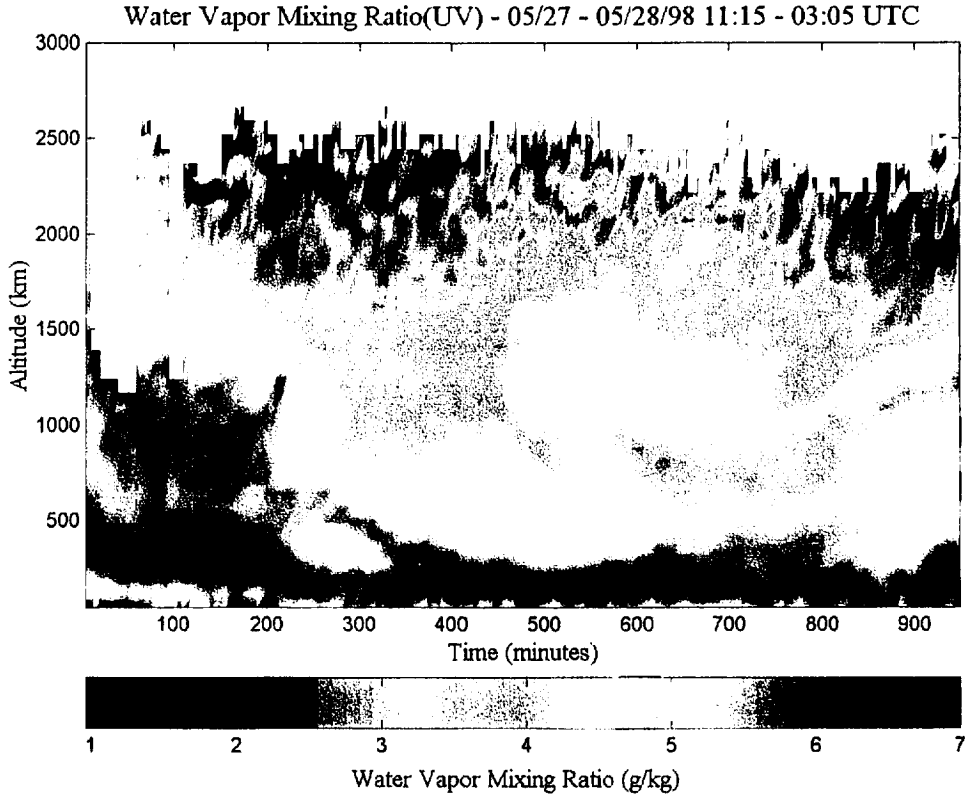

Water Vapor Mixing Ratio(UV) - 05/24 - 05/25/98 13:30 - 05:10 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
100
200
300
400
500
600
700
800
900
Time (minutes)
0
2
4
6
8
10
12
14
16
18
20
Water Vapor Mixing Ratio (g/kg)

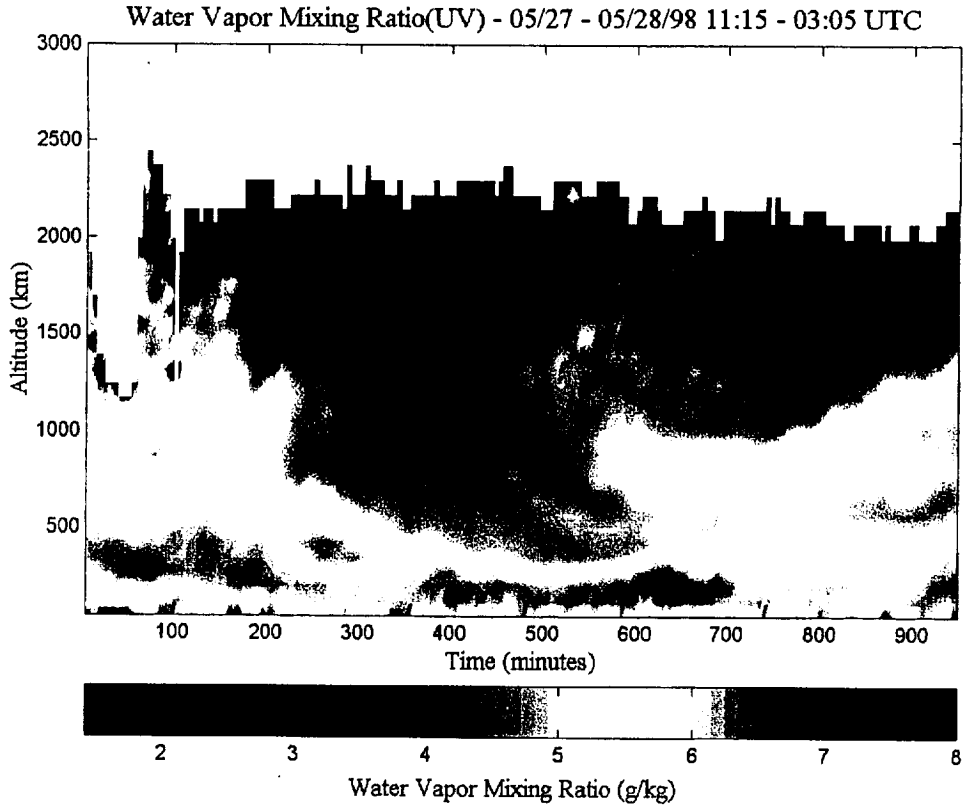

Water Vapor Mixing Ratio(UV) - 05/24 - 05/25/98 13:26 - 05:03 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
100
200
300
400
500
600
700
800
900
Time (minutes)
2
4
6
8
10
12
14
16
18
20
Water Vapor Mixing Ratio (g/kg)

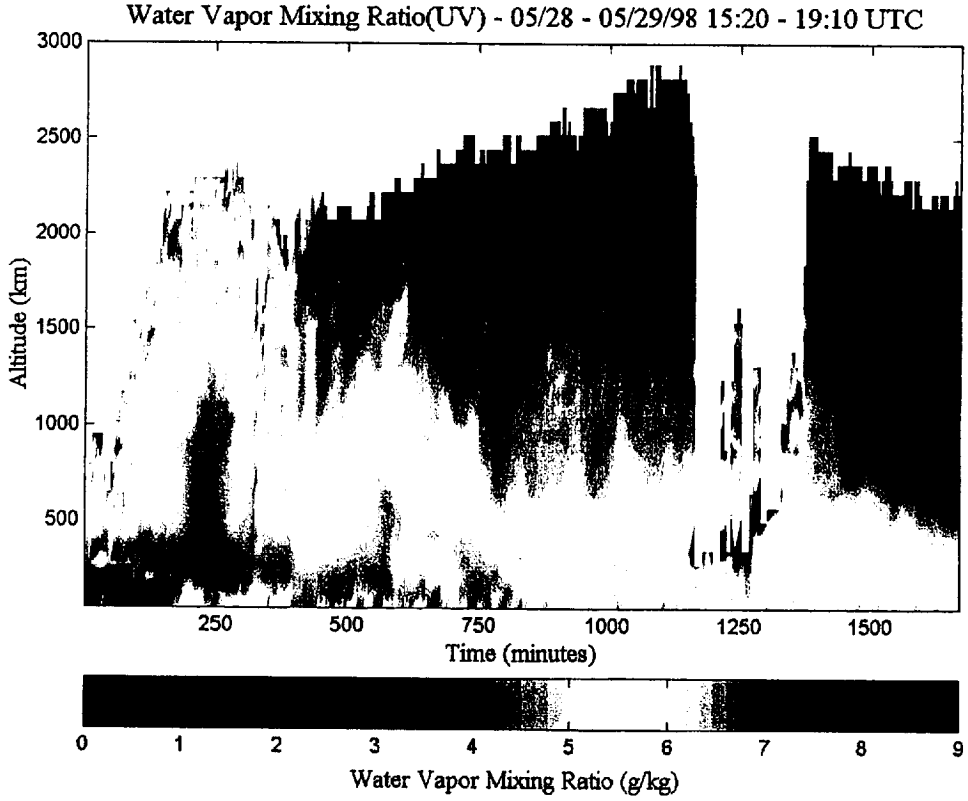

Water Vapor Mixing Ratio(UV) - 05/25 - 05/26/98 23:40 - 06:55 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
50
100
150
200
250
300
350
400
Time (minutes)
2
3
4
5
6
7
8
9
10
Water Vapor Mixing Ratio (g/kg)

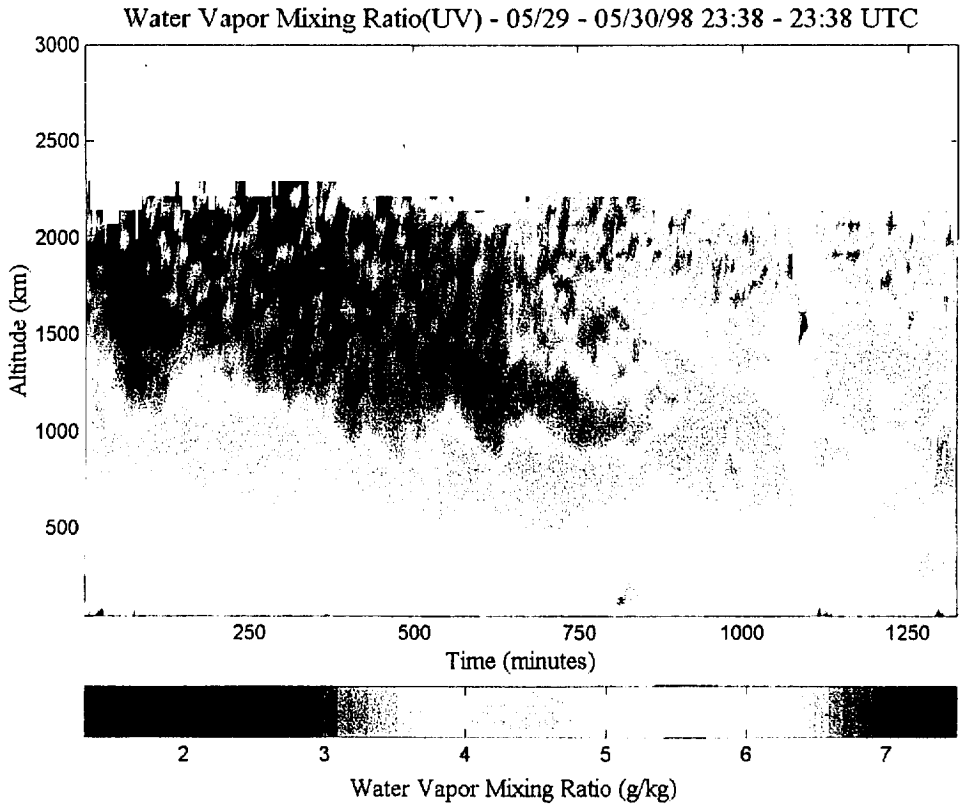

Water Vapor Mixing Ratio(UV) - 05/26/98 13:00 - 17:00 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
20
40
60
80
100
120
140
160
180
200
220
Time (minutes)
1
2
3
4
5
6
7
8
9
10
Water Vapor Mixing Ratio (g/kg)

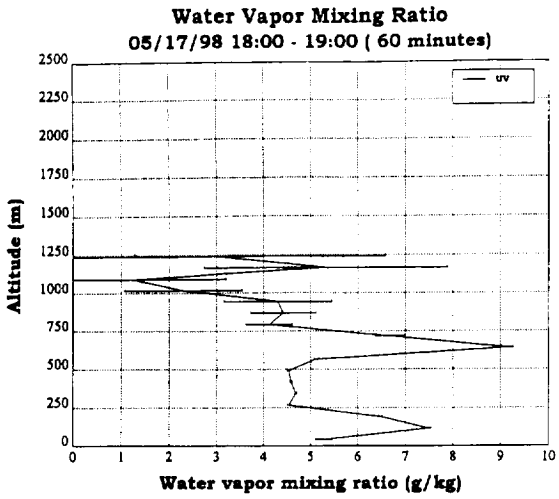

Water Vapor Mixing Ratio(UV) - 05/27/98 11:30 - 23:30 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
100
200
300
400
500
600
700
Time (minutes)
0
1
2
3
4
5
6
7
Water Vapor Mixing Ratio (g/kg)

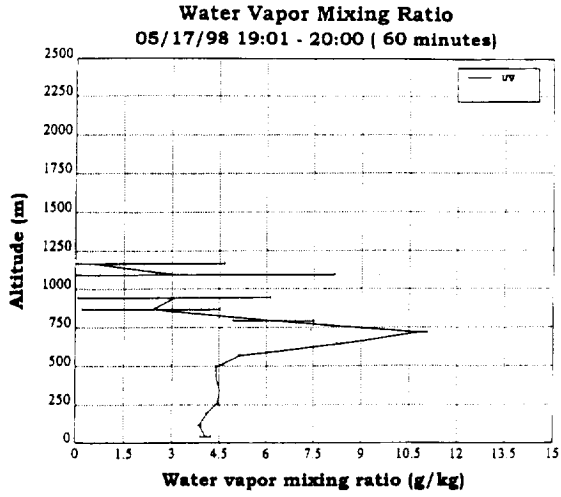

Water Vapor Mixing Ratio(UV) - 05/27 - 05/28/98 11:15 - 03:05 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
100
200
300
400
500
600
700
800
900
Time (minutes)
1
2
3
4
5
6
7
Water Vapor Mixing Ratio (g/kg)

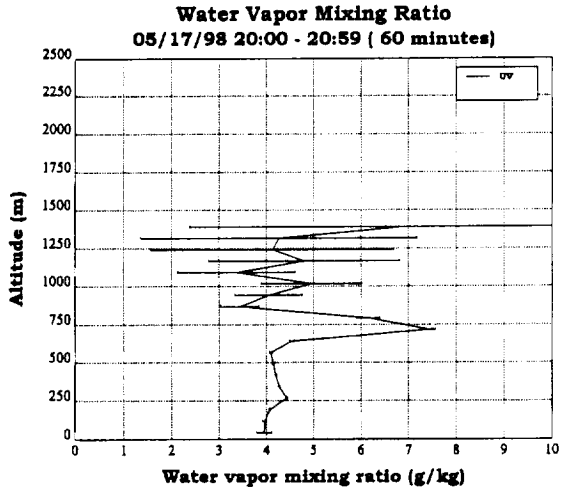

Water Vapor Mixing Ratio(UV) - 05/27 - 05/28/98 11:15 - 03:05 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
100
200
300
400
500
600
700
800
900
Time (minutes)
2
3
4
5
6
7
8
Water Vapor Mixing Ratio (g/kg)

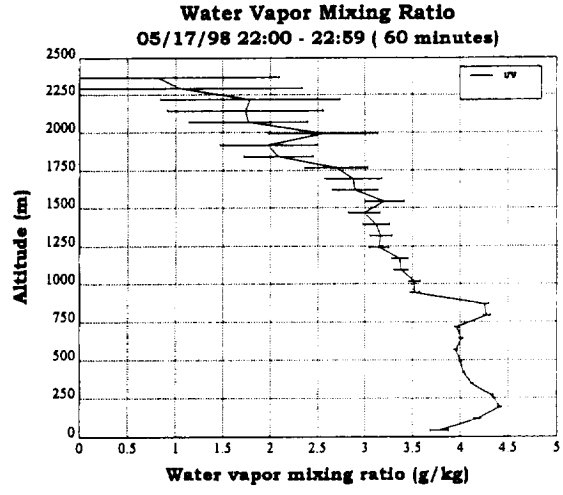

Water Vapor Mixing Ratio(UV) - 05/28 - 05/29/98 15:20 - 19:10 UTC
Altitude (km)
3000
2500
2000
1500
1000
500
250
500
750
1000
1250
1500
Time (minutes)
0
1
2
3
4
5
6
7
8
9
Water Vapor Mixing Ratio (g/kg)

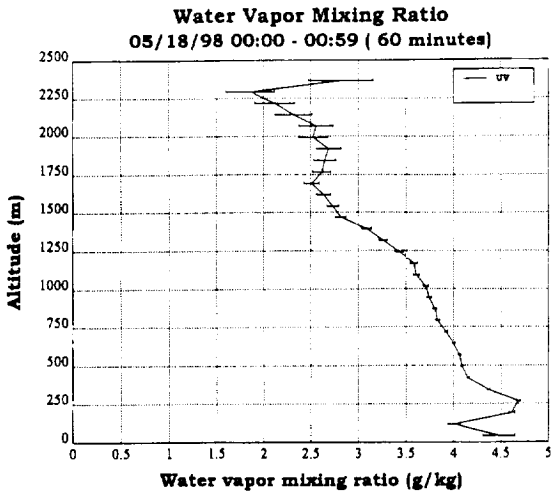

Water Vapor Mixing Ratio(UV) - 05/29 - 05/30/98 23:38 - 23:38 UTC
3000
2500
2000
1500
1000
500
Altitude (km)
250
500
750
1000
1250
Time (minutes)
2
3
4
5
6
7
Water Vapor Mixing Ratio (g/kg)

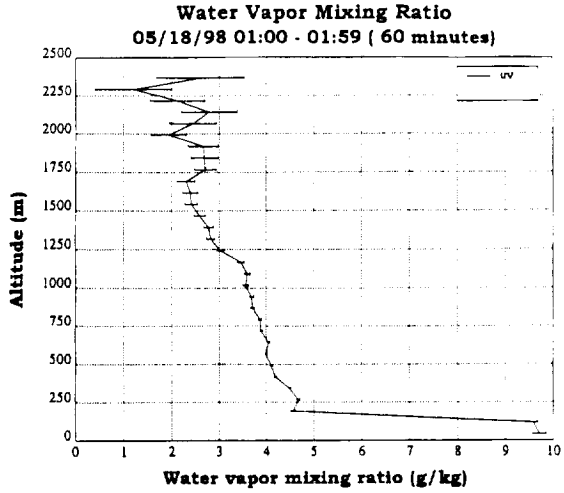

Water Vapor Mixing Ratio
05/17/98 18:00 - 19:00 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

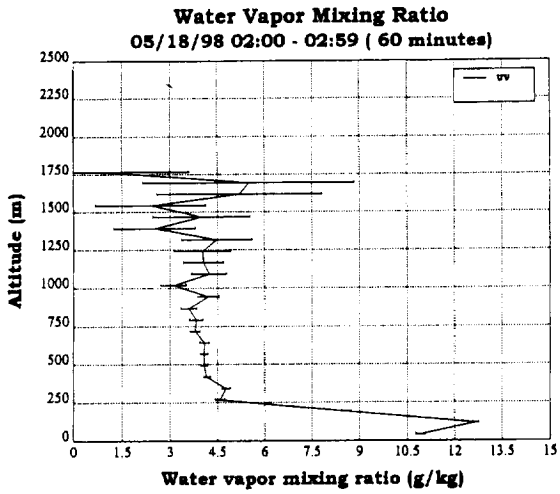

Water Vapor Mixing Ratio
05/17/98 19:01 - 20:00 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

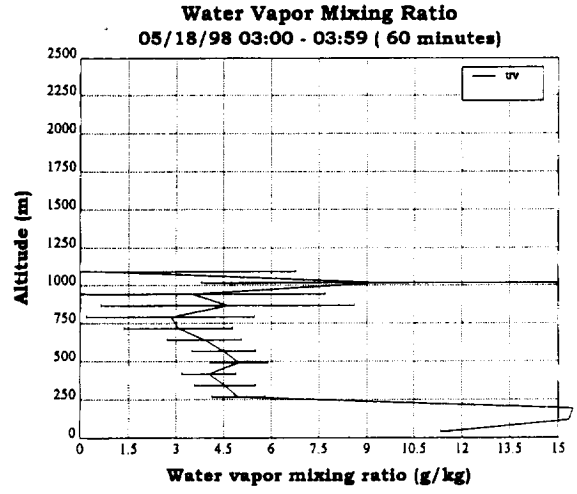

Water Vapor Mixing Ratio
05/17/98 20:00 - 20:59 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

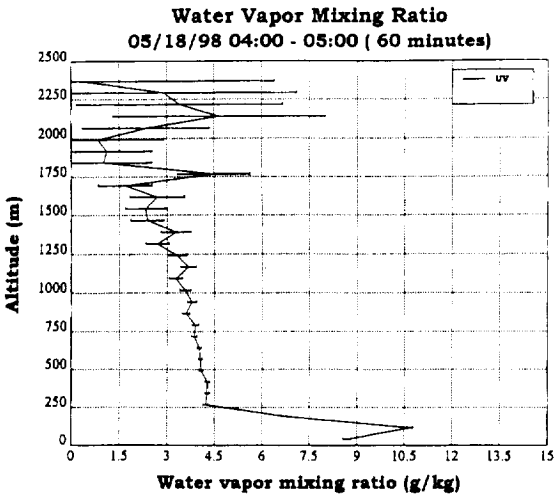

Water Vapor Mixing Ratio
05/17/98 22:00 - 22:59 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

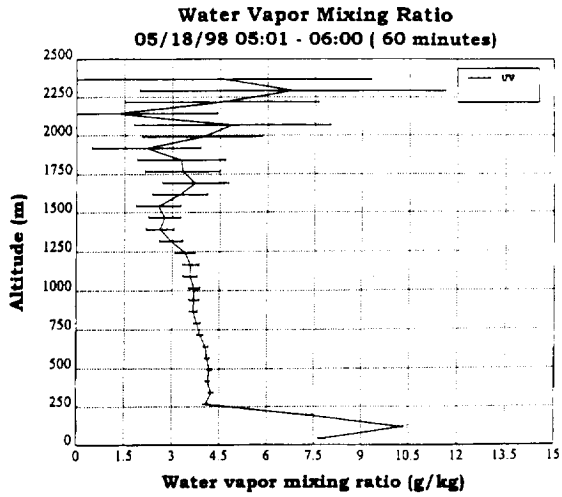

Water Vapor Mixing Ratio
05/18/98 00:00 - 00:59 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
Water vapor mixing ratio (g/kg)

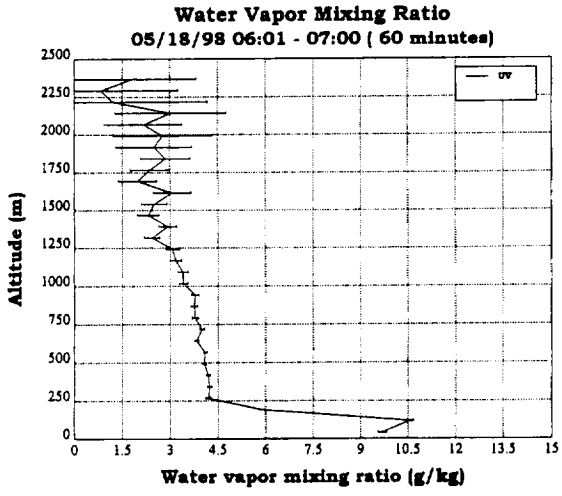

Water Vapor Mixing Ratio
05/18/98 01:00 - 01:59 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

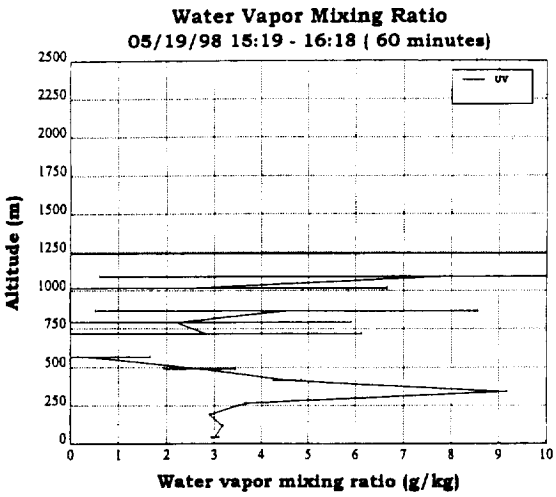

Water Vapor Mixing Ratio
05/18/98 02:00 - 02:59 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

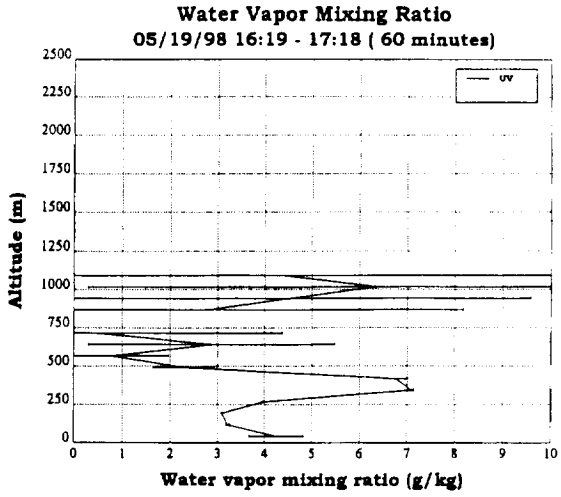

Water Vapor Mixing Ratio
05/18/98 03:00 - 03:59 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

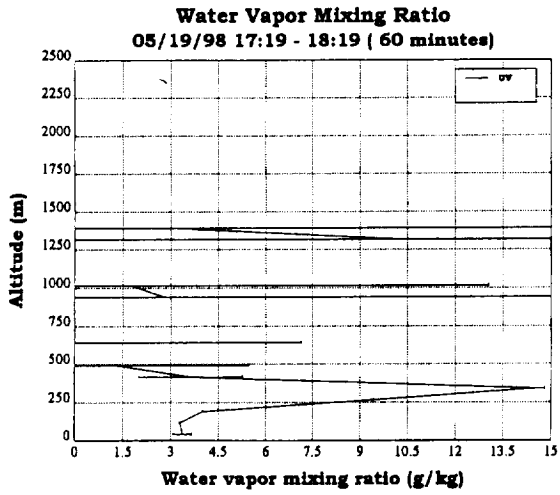

Water Vapor Mixing Ratio
05/18/98 04:00 - 05:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0
1.5
3
4.5
6
7.5
9
10.5
12
13.5
15
Water vapor mixing ratio (g/kg)

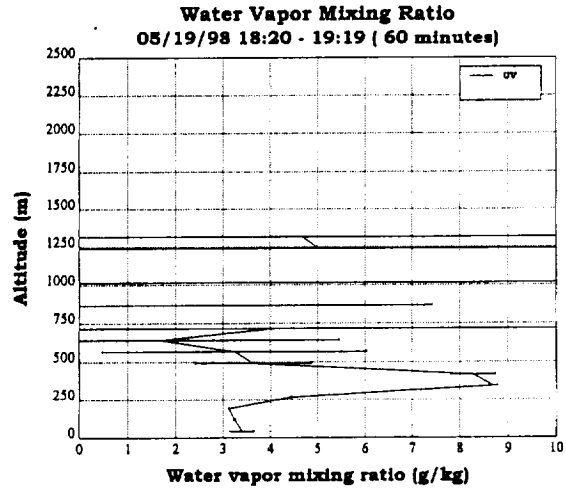

Water Vapor Mixing Ratio
05/18/98 05:01 - 06:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0
1.5
3
4.5
6
7.5
9
10.5
12
13.5
15
Water vapor mixing ratio (g/kg)

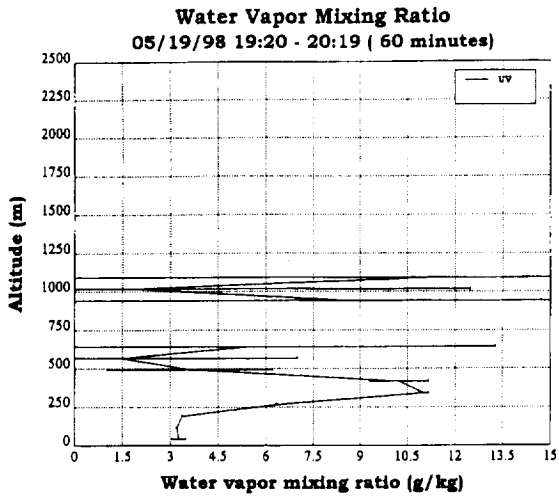

Water Vapor Mixing Ratio
05/18/98 06:01 - 07:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0
1.5
3
4.5
6
7.5
9
10.5
12
13.5
15
Water vapor mixing ratio (g/kg)

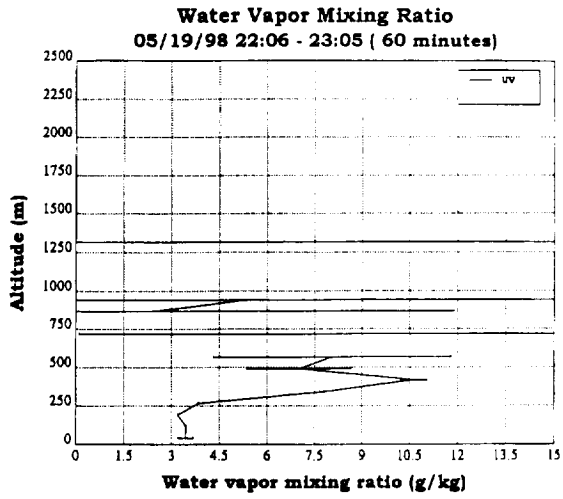

Water Vapor Mixing Ratio
05/19/98 15:19 - 16:18 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

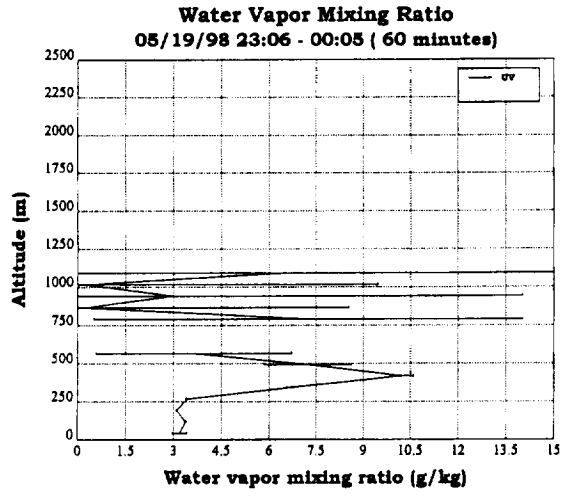

Water Vapor Mixing Ratio
05/19/98 16:19 - 17:18 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

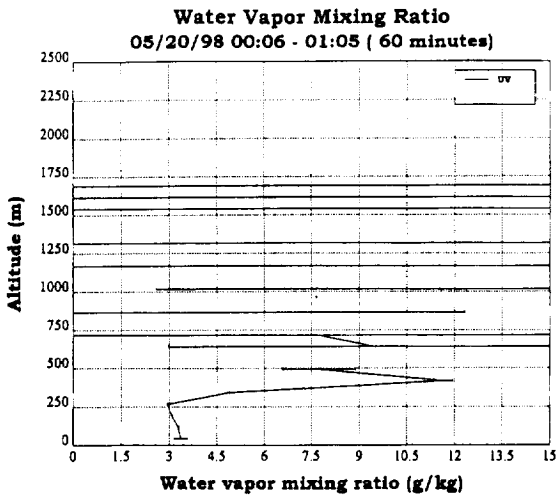

Water Vapor Mixing Ratio
05/19/98 17:19 - 18:19 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

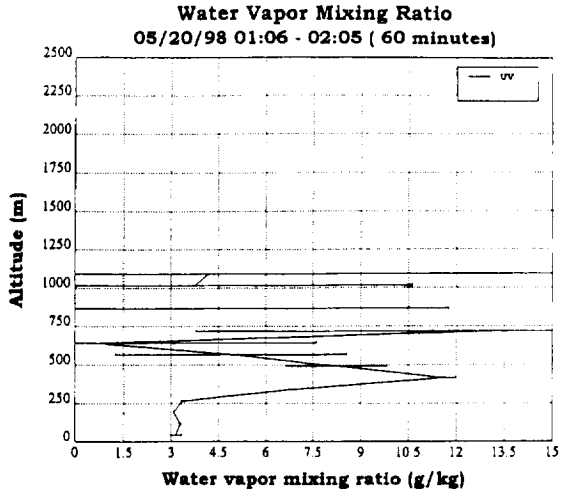

Water Vapor Mixing Ratio
05/19/98 18:20 - 19:19 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

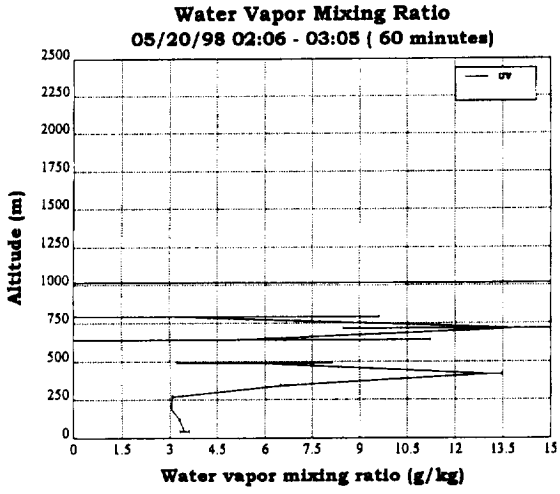

Water Vapor Mixing Ratio
05/19/98 19:20 - 20:19 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

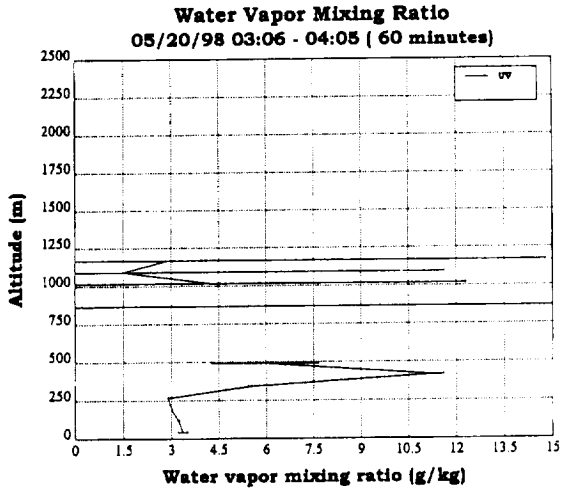

Water Vapor Mixing Ratio
05/19/98 22:06 - 23:05 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

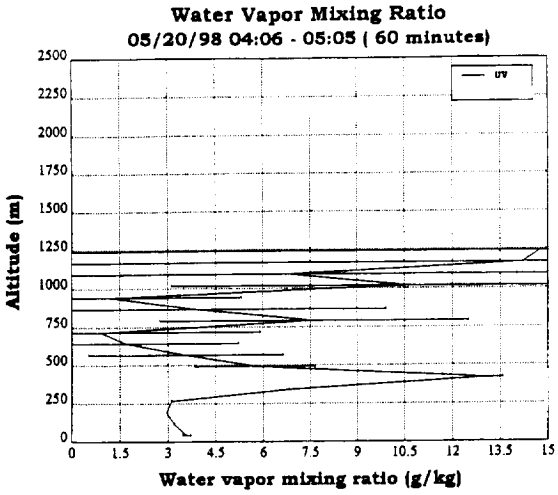

Water Vapor Mixing Ratio
05/19/98 23:06 - 00:05 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

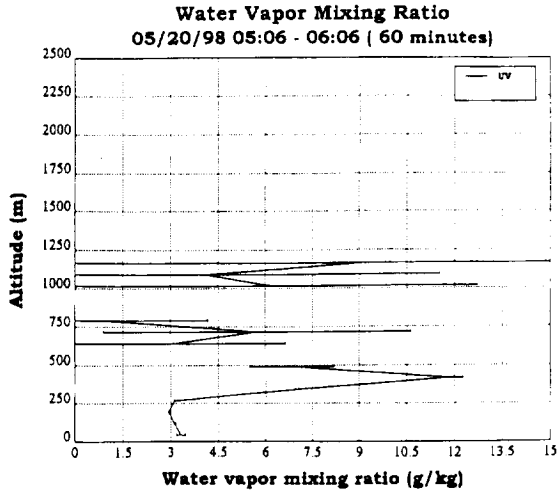

Water Vapor Mixing Ratio
05/20/98 00:06 - 01:05 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

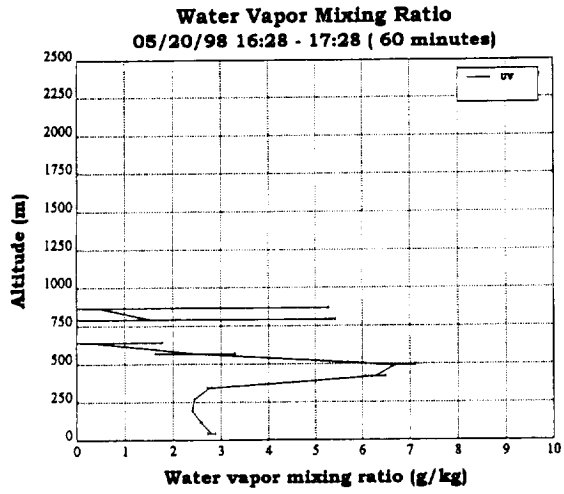

Water Vapor Mixing Ratio
05/20/98 01:06 - 02:05 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

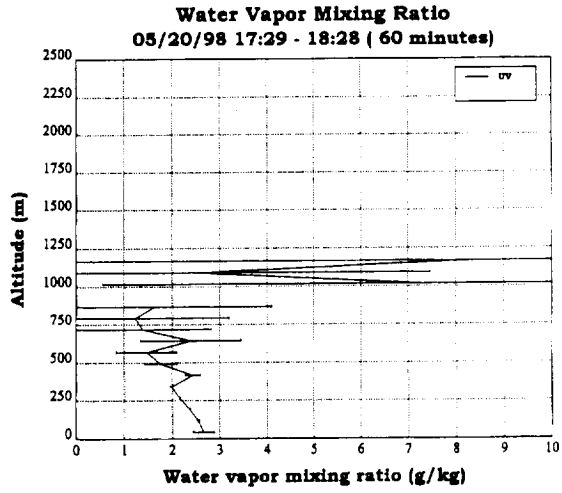

Water Vapor Mixing Ratio
05/20/98 02:06 - 03:05 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

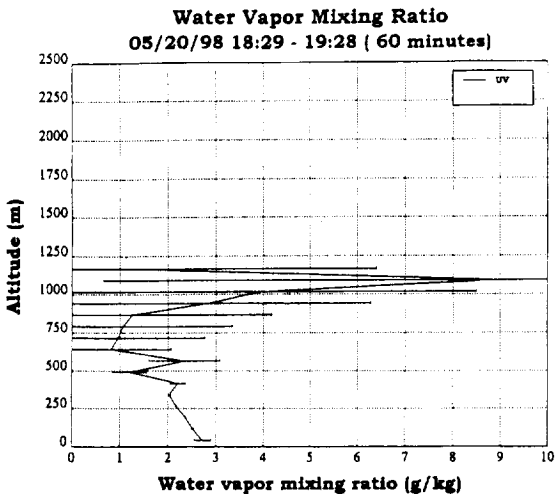

Water Vapor Mixing Ratio
05/20/98 03:06 - 04:05 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

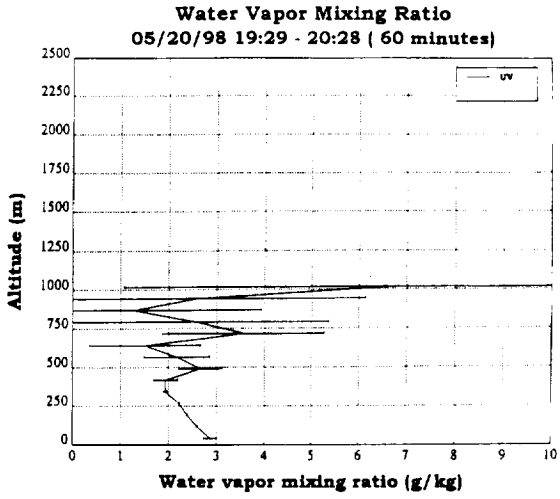

Water Vapor Mixing Ratio
05/20/98 04:06 - 05:05 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

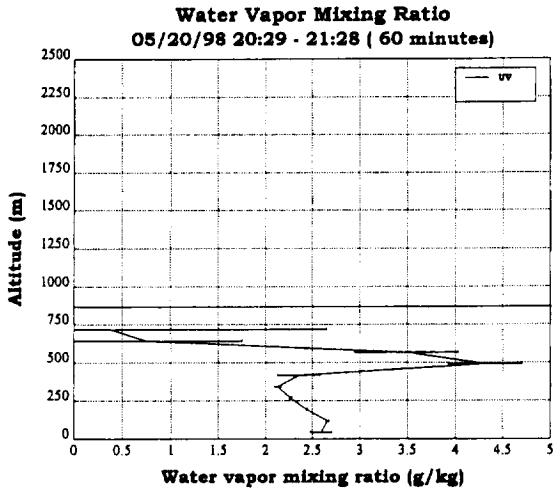

Water Vapor Mixing Ratio
05/20/98 05:06 - 06:06 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

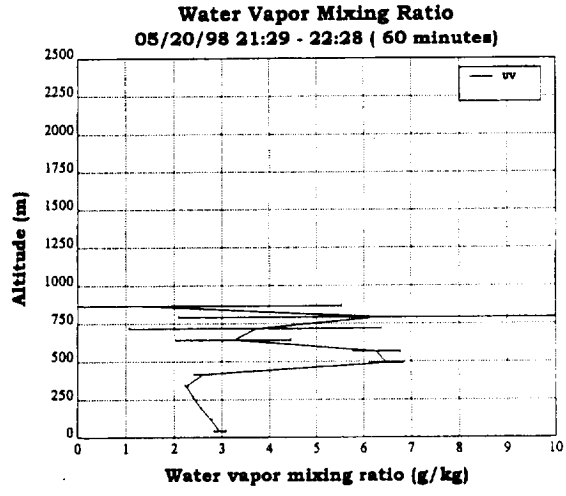

Water Vapor Mixing Ratio
05/20/98 16:28 - 17:28 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

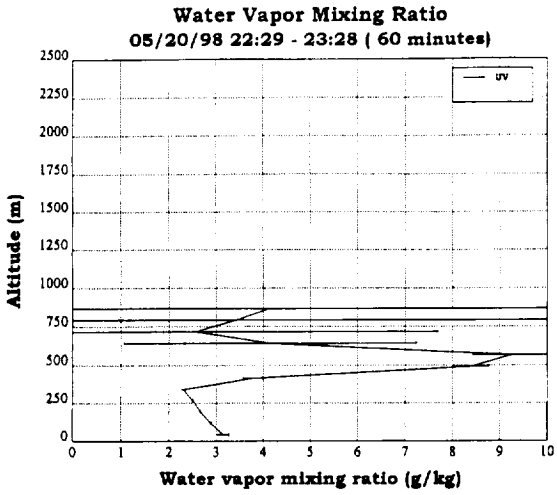

Water Vapor Mixing Ratio
05/20/98 17:29 - 18:28 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

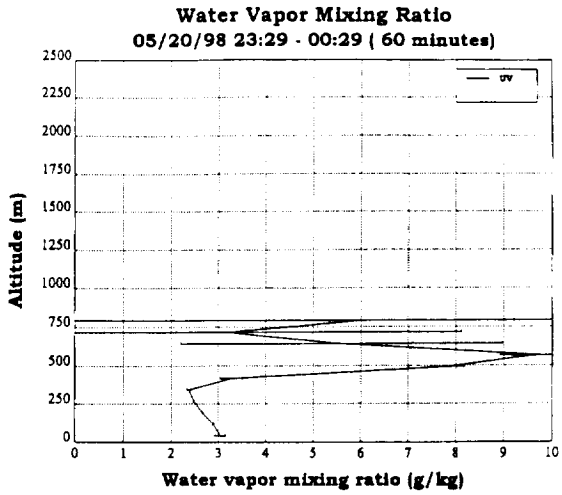

Water Vapor Mixing Ratio
05/20/98 18:29 - 19:28 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

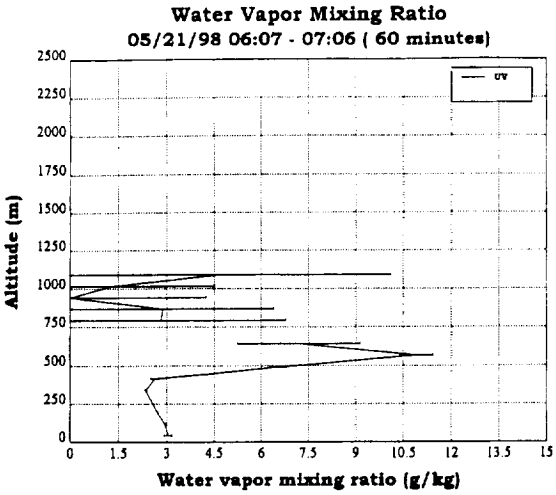

Water Vapor Mixing Ratio
05/20/98 19:29 - 20:28 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

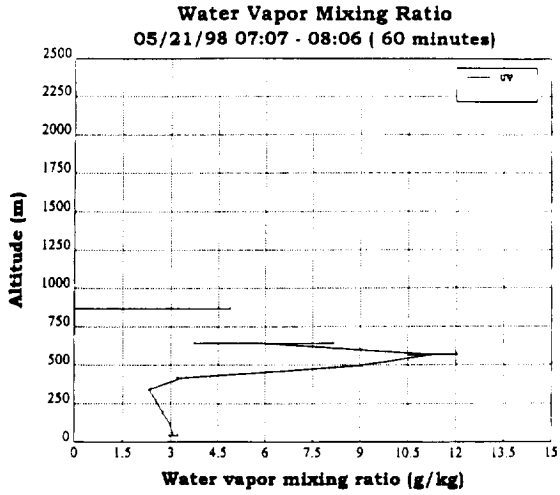

Water Vapor Mixing Ratio
05/20/98 20:29 - 21:28 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

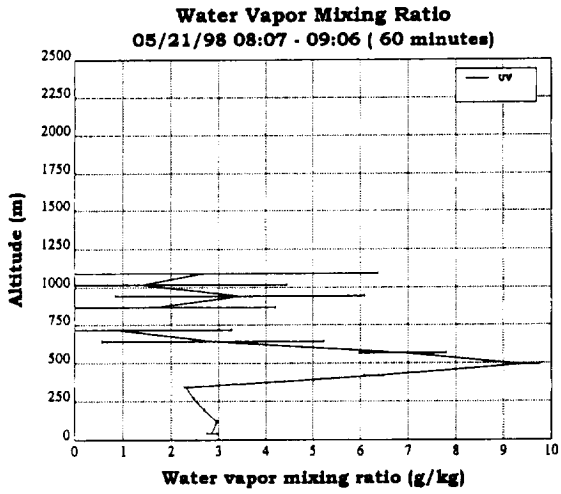

Water Vapor Mixing Ratio
05/20/98 21:29 - 22:28 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

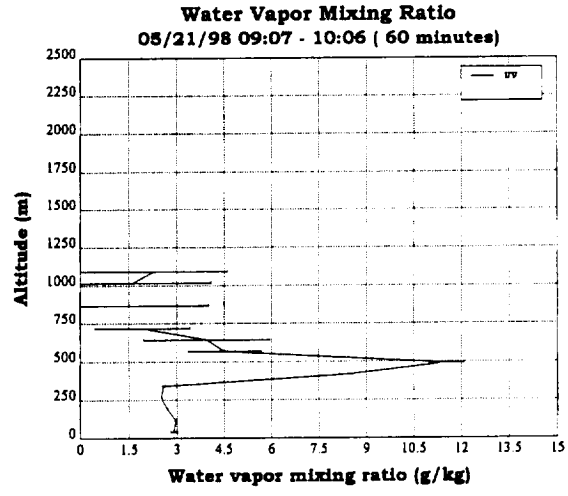

Water Vapor Mixing Ratio
05/20/98 22:29 - 23:28 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

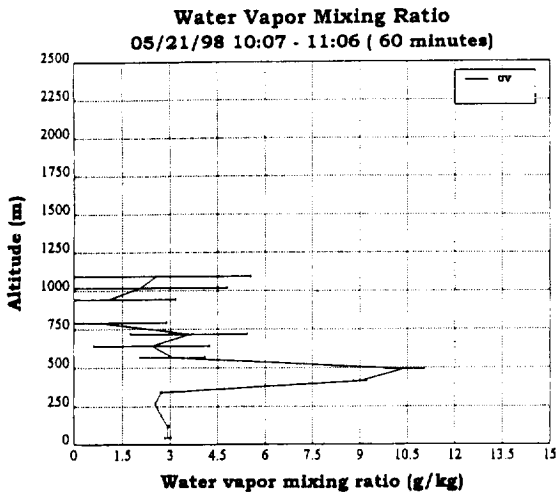

Water Vapor Mixing Ratio
05/20/98 23:29 - 00:29 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

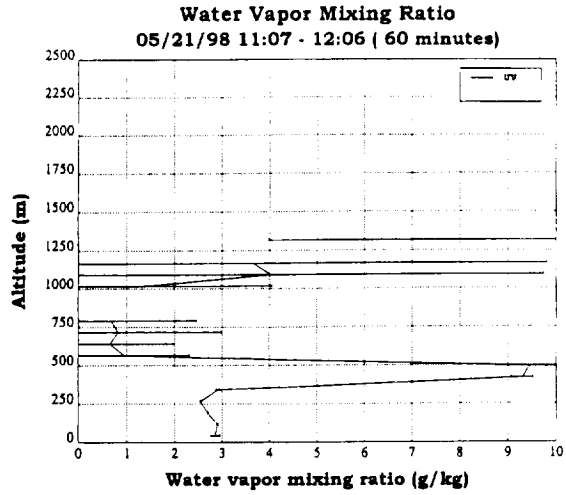

Water Vapor Mixing Ratio
05/21/98 06:07 - 07:06 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

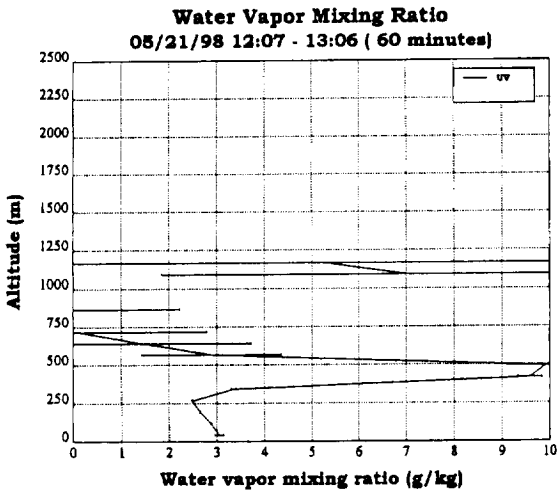

Water Vapor Mixing Ratio
05/21/98 07:07 - 08:06 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

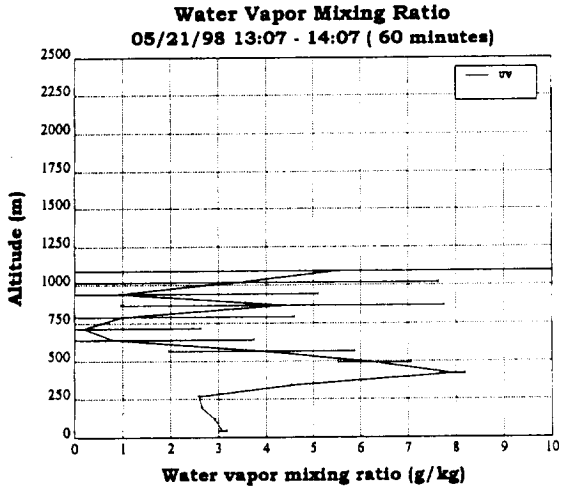

Water Vapor Mixing Ratio
05/21/98 08:07 - 09:06 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

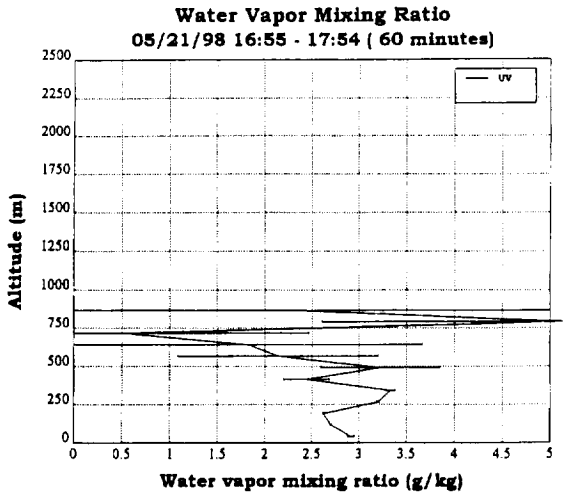

Water Vapor Mixing Ratio
05/21/98 09:07 - 10:06 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

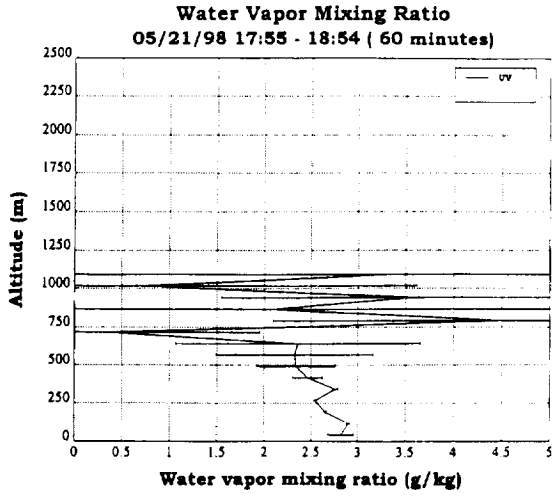

Water Vapor Mixing Ratio
05/21/98 10:07 - 11:06 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

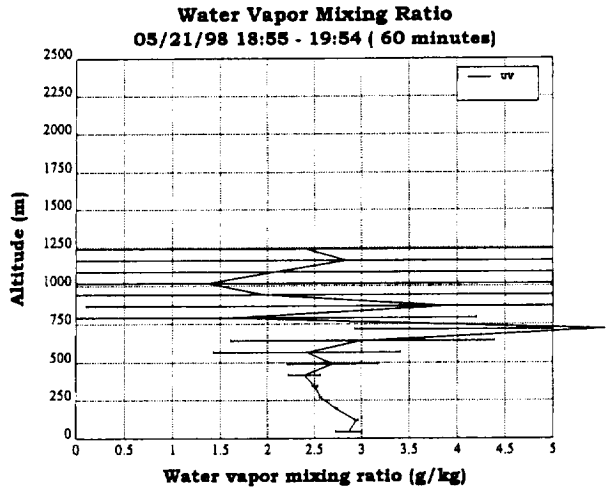

Water Vapor Mixing Ratio
05/21/98 11:07 - 12:06 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

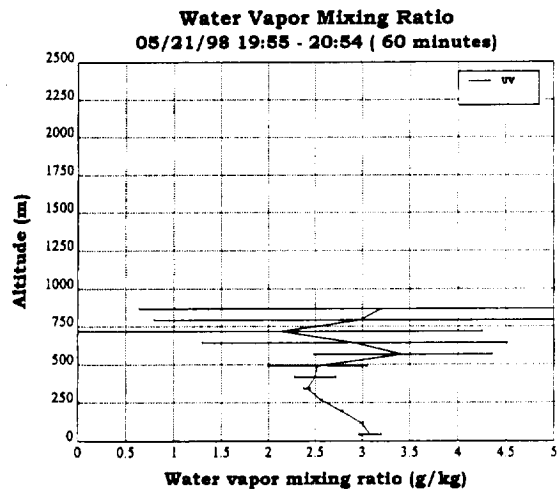

Water Vapor Mixing Ratio
05/21/98 12:07 - 13:06 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

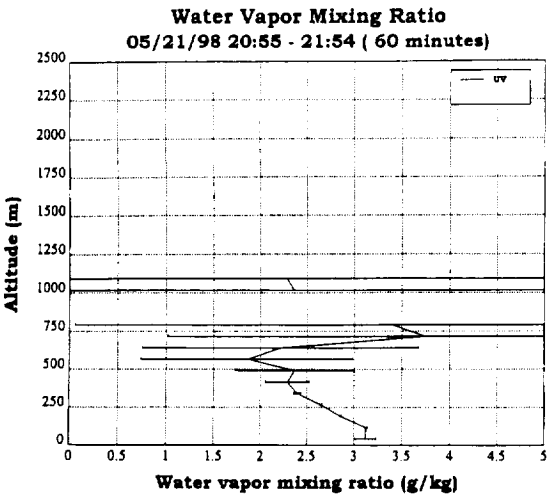

Water Vapor Mixing Ratio
05/21/98 13:07 - 14:07 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

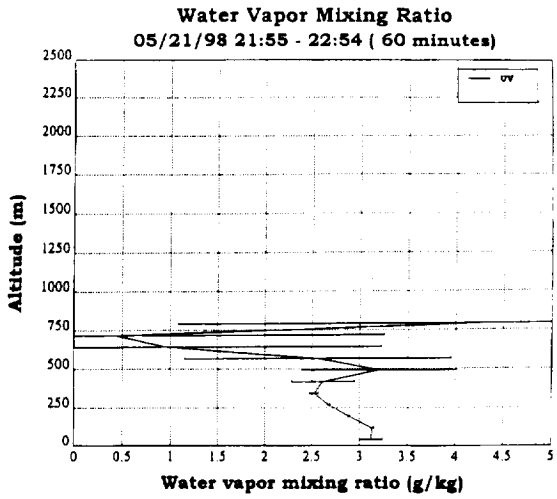

Water Vapor Mixing Ratio
05/21/98 16:55 - 17:54 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

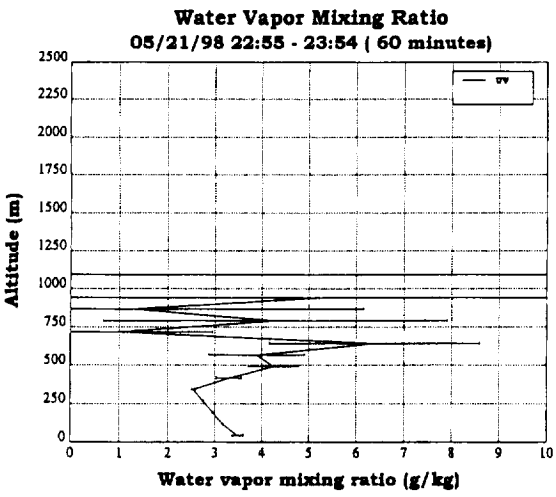

Water Vapor Mixing Ratio
05/21/98 17:55 - 18:54 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

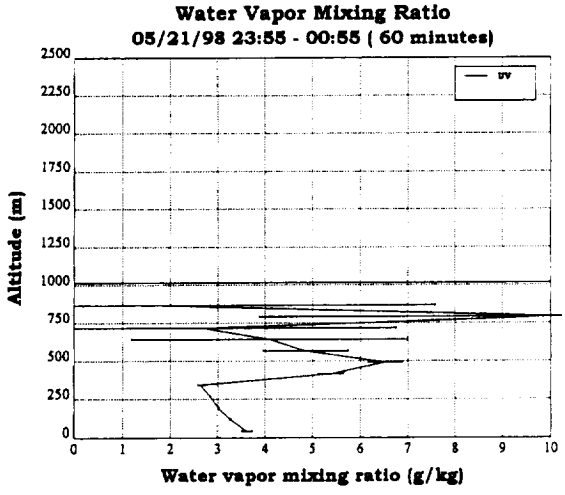

Water Vapor Mixing Ratio
05/21/98 18:55 - 19:54 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

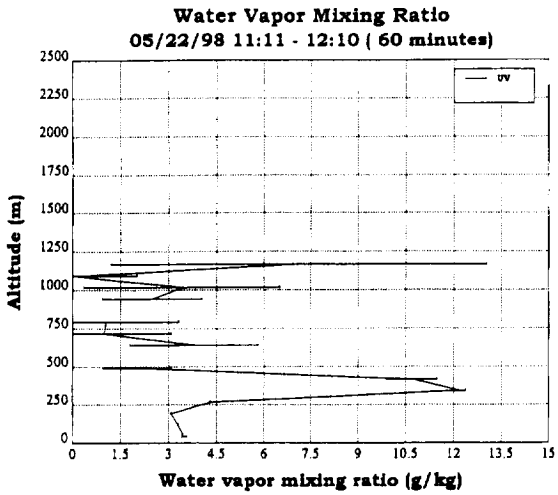

Water Vapor Mixing Ratio
05/21/98 19:55 - 20:54 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

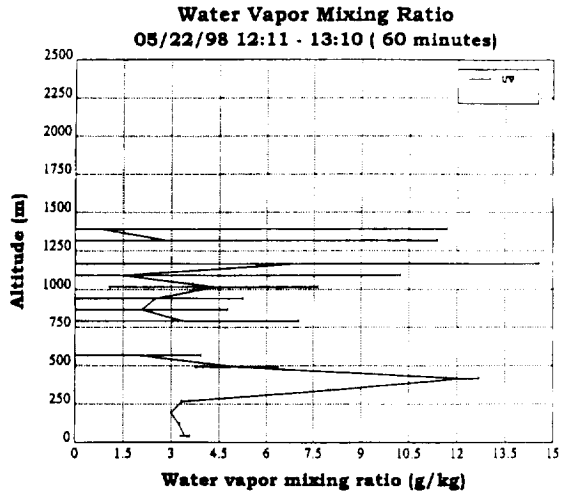

Water Vapor Mixing Ratio
05/21/98 20:55 - 21:54 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

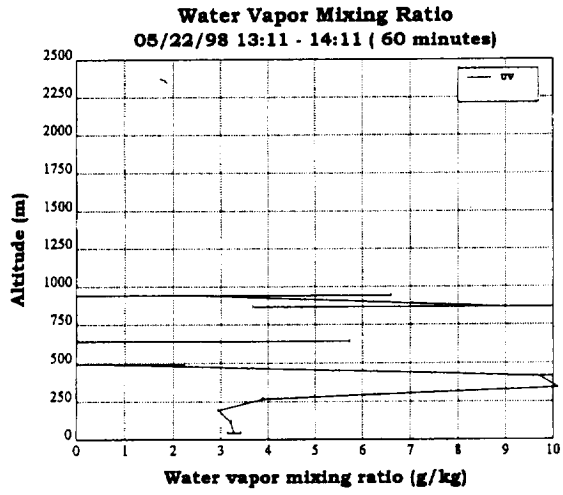

Water Vapor Mixing Ratio
05/21/98 21:55 - 22:54 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

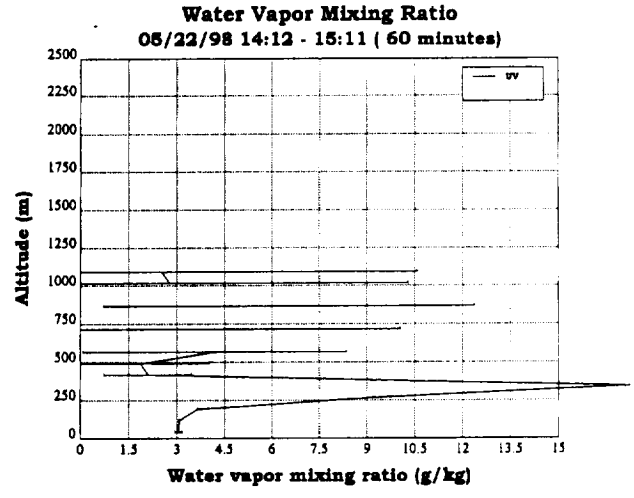

Water Vapor Mixing Ratio
05/21/98 22:55 - 23:54 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

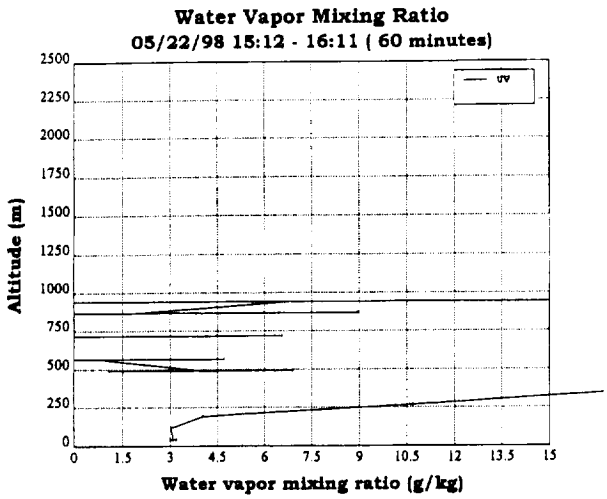

Water Vapor Mixing Ratio
05/21/98 23:55 - 00:55 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

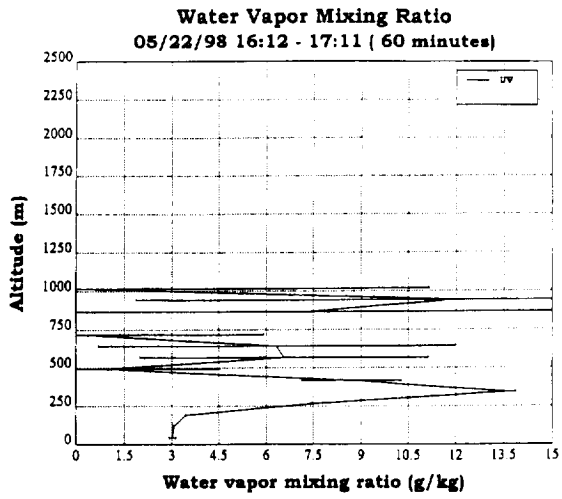

Water Vapor Mixing Ratio
05/22/98 11:11 - 12:10 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

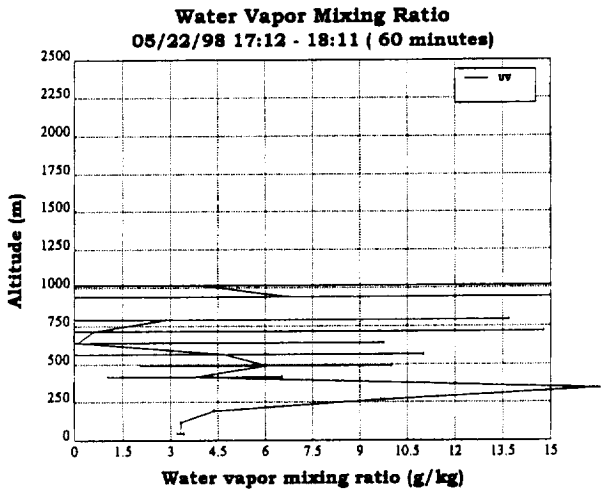

Water Vapor Mixing Ratio
05/22/98 12:11 - 13:10 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

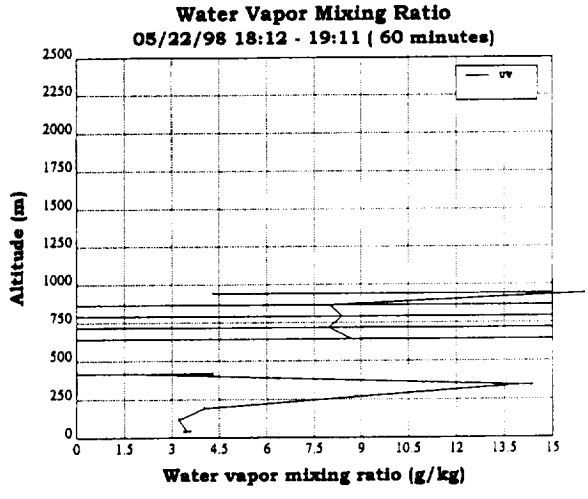

Water Vapor Mixing Ratio
05/22/98 13:11 - 14:11 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

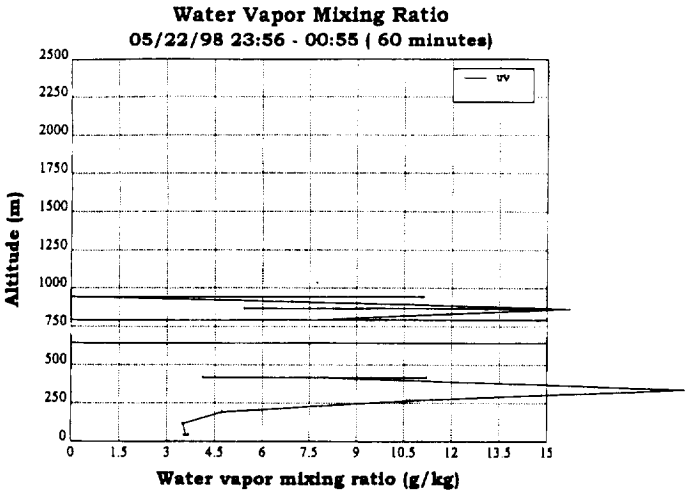

Water Vapor Mixing Ratio
05/22/98 14:12 - 15:11 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

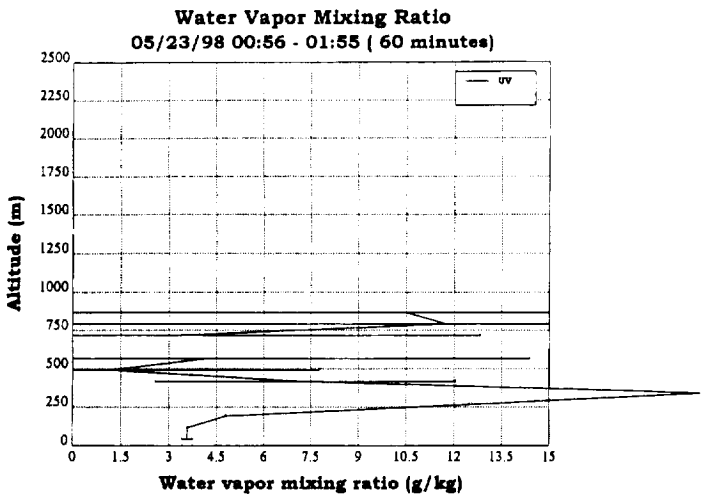

Water Vapor Mixing Ratio
05/22/98 15:12 - 16:11 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

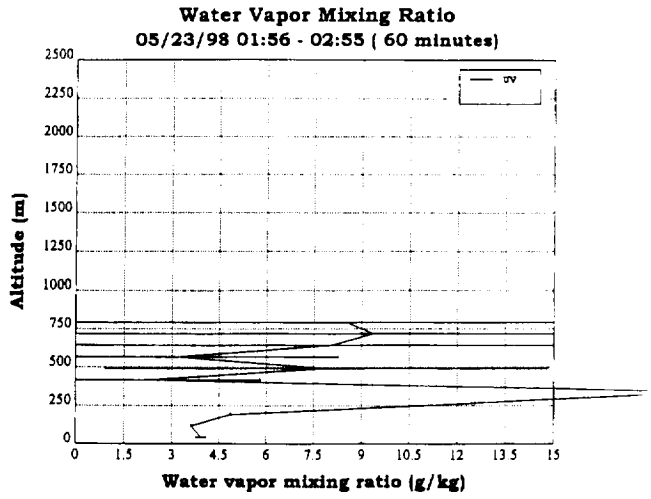

Water Vapor Mixing Ratio
05/22/98 16:12 - 17:11 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

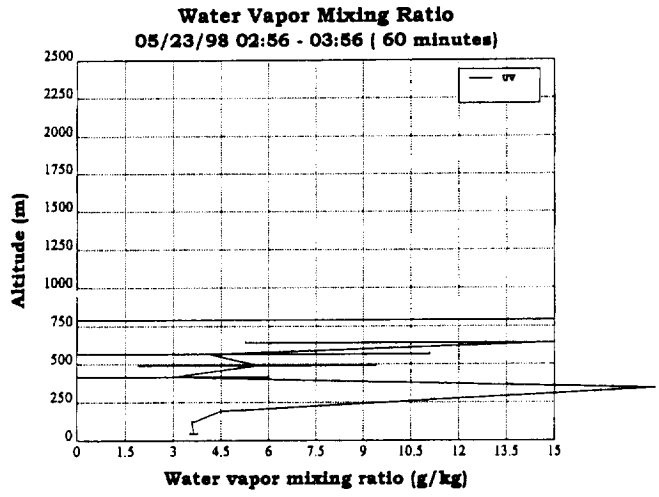

Water Vapor Mixing Ratio
05/22/98 17:12 - 18:11 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

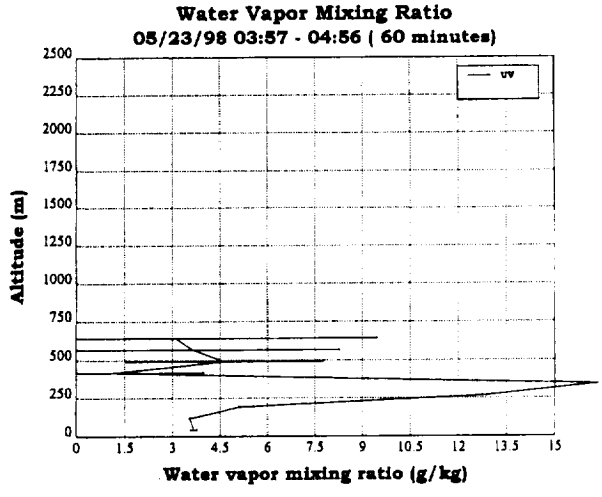

Water Vapor Mixing Ratio
05/22/98 18:12 - 19:11 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

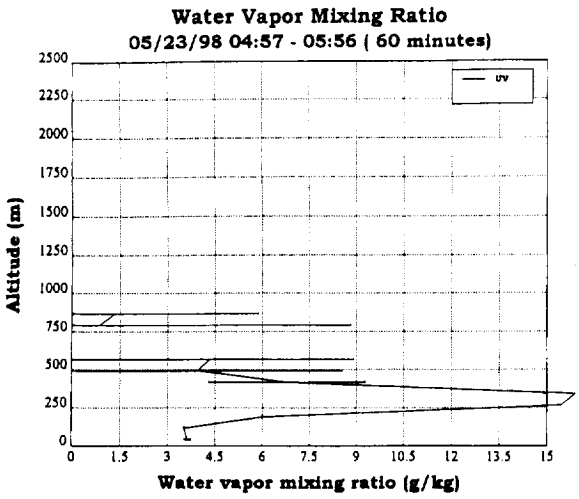

Water Vapor Mixing Ratio
05/22/98 23:56 - 00:55 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0
1.5
3
4.5
6
7.5
9
10.5
12
13.5
15
Water vapor mixing ratio (g/kg)

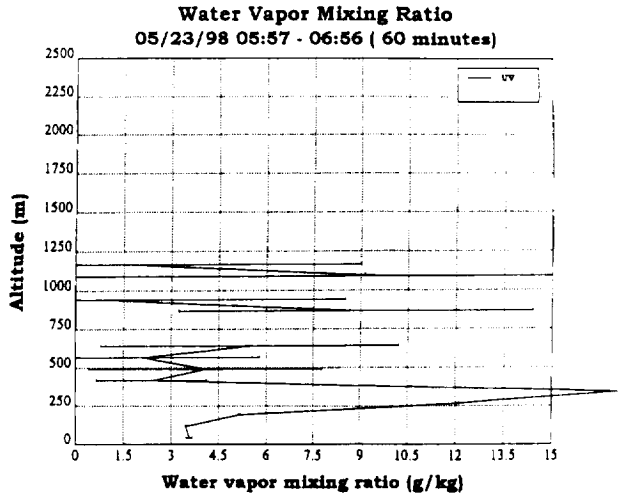

Water Vapor Mixing Ratio
05/23/98 00:56 - 01:55 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

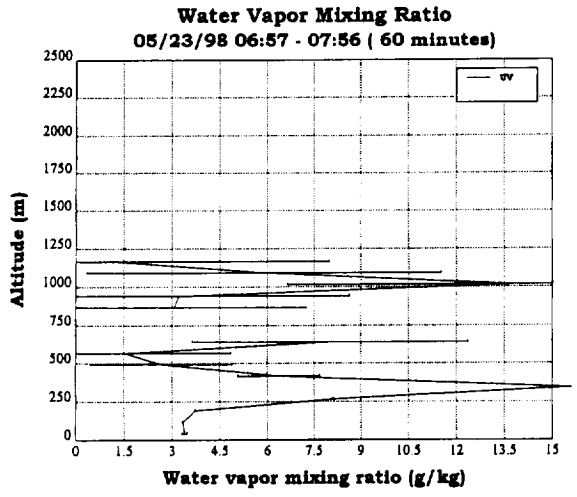

Water Vapor Mixing Ratio
05/23/98 01:56 - 02:55 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

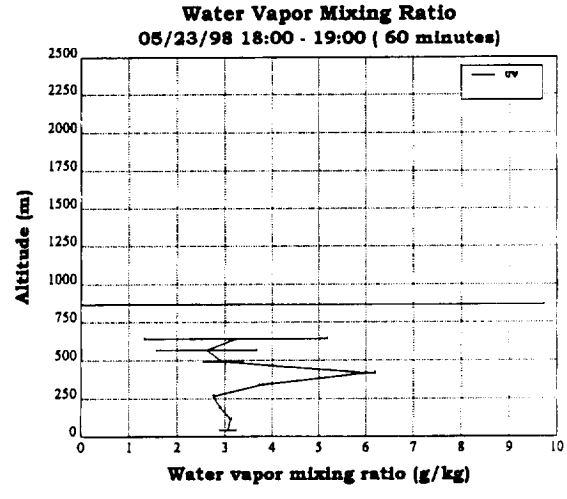

Water Vapor Mixing Ratio
05/23/98 02:56 - 03:56 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

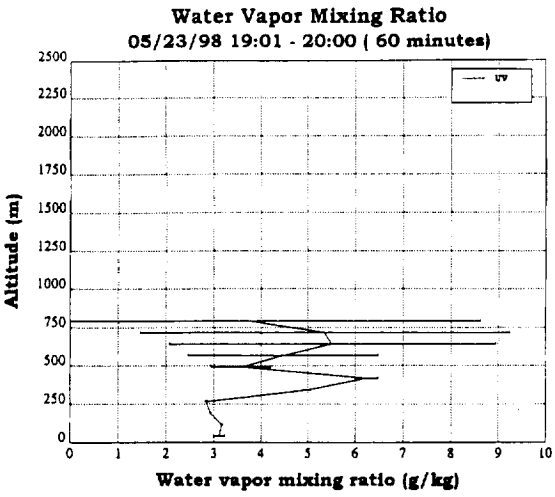

Water Vapor Mixing Ratio
05/23/98 03:57 - 04:56 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

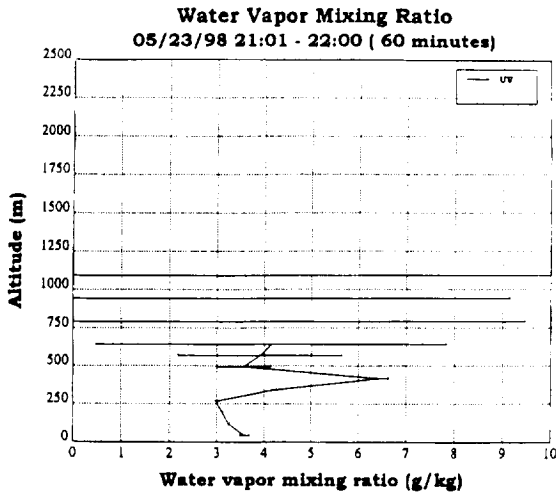

Water Vapor Mixing Ratio
05/23/98 04:57 - 05:56 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

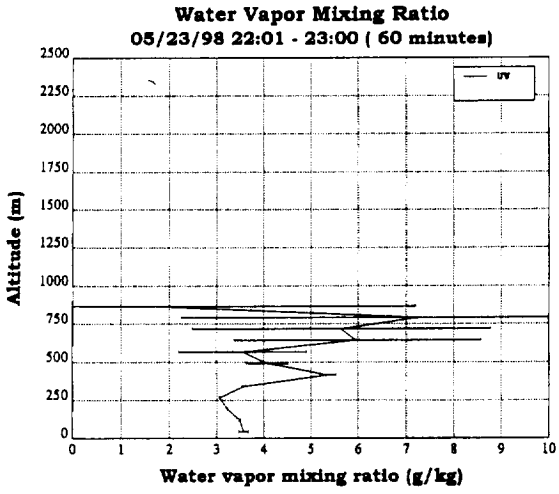

Water Vapor Mixing Ratio
05/23/98 05:57 - 06:56 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

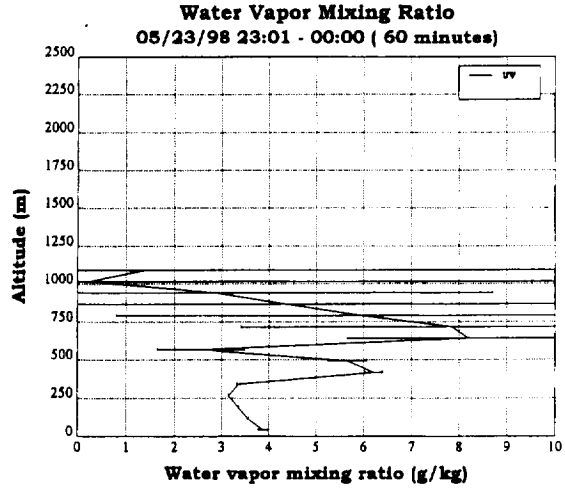

Water Vapor Mixing Ratio
05/23/98 06:57 - 07:56 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

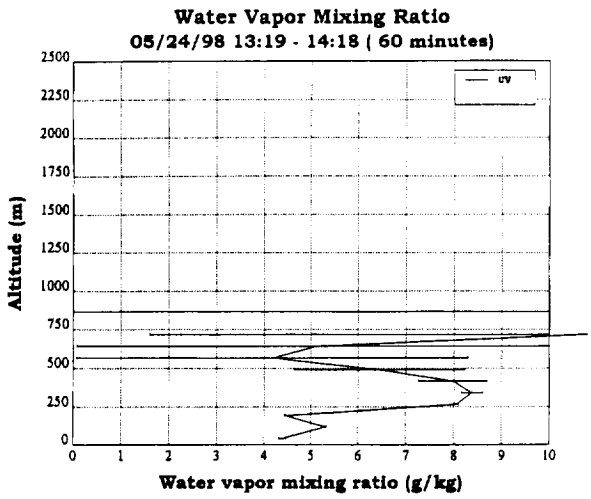

Water Vapor Mixing Ratio
05/23/98 18:00 - 19:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

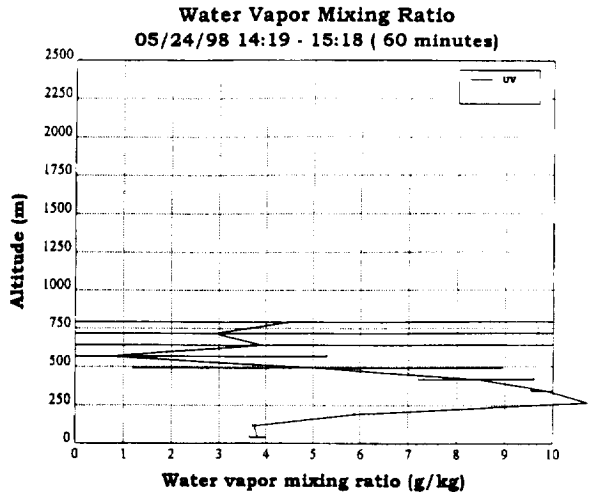

Water Vapor Mixing Ratio
05/23/98 19:01 - 20:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

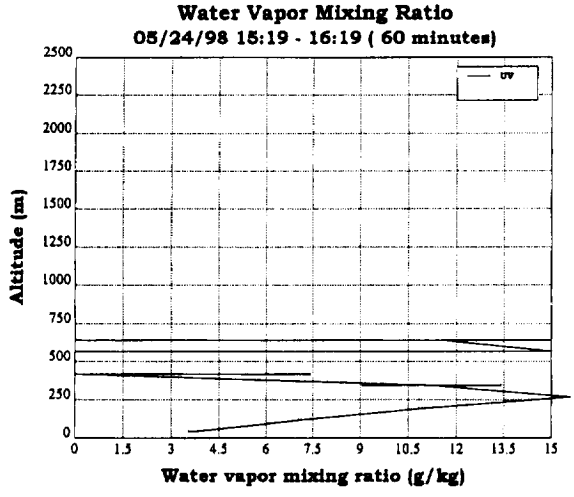

Water Vapor Mixing Ratio
05/23/98 21:01 - 22:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

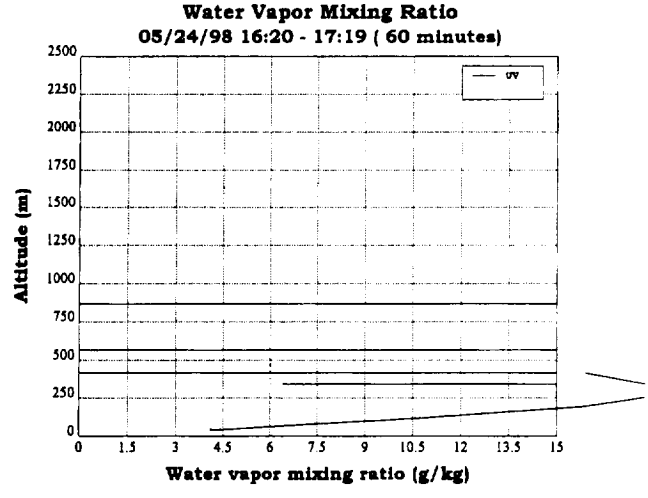

Water Vapor Mixing Ratio
05/23/98 22:01 - 23:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

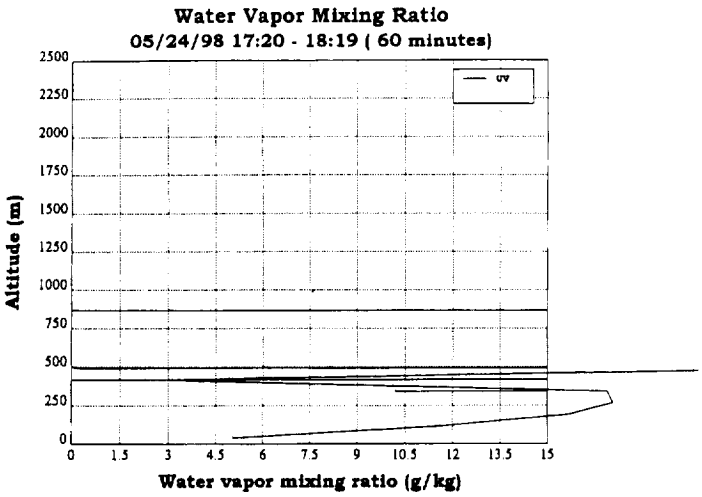

Water Vapor Mixing Ratio
05/23/98 23:01 - 00:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

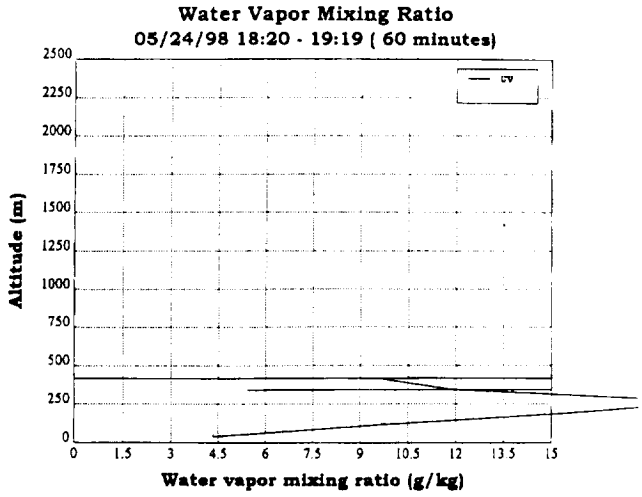

Water Vapor Mixing Ratio
05/24/98 13:19 - 14:18 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

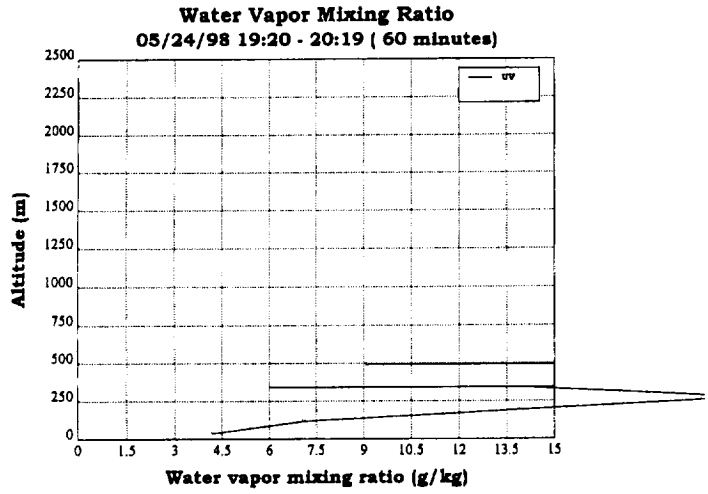

Water Vapor Mixing Ratio
05/24/98 14:19 - 15:18 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

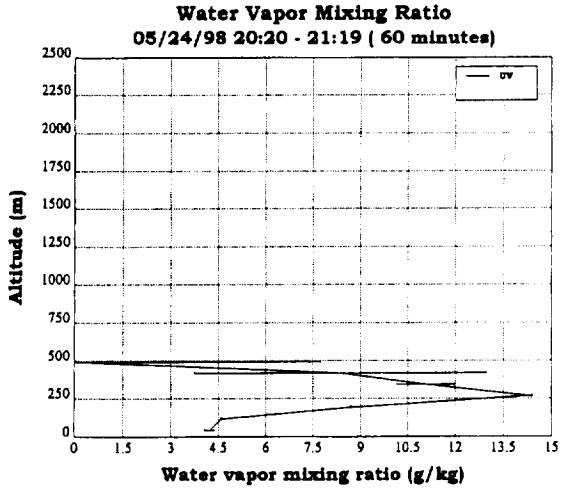

Water Vapor Mixing Ratio
05/24/98 15:19 - 16:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

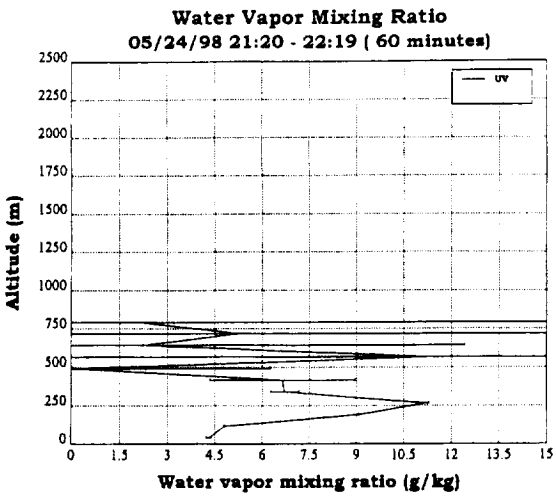

Water Vapor Mixing Ratio
05/24/98 16:20 - 17:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

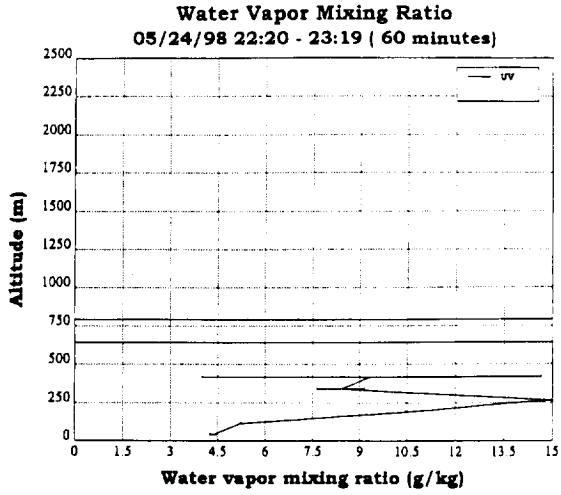

Water Vapor Mixing Ratio
05/24/98 17:20 - 18:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

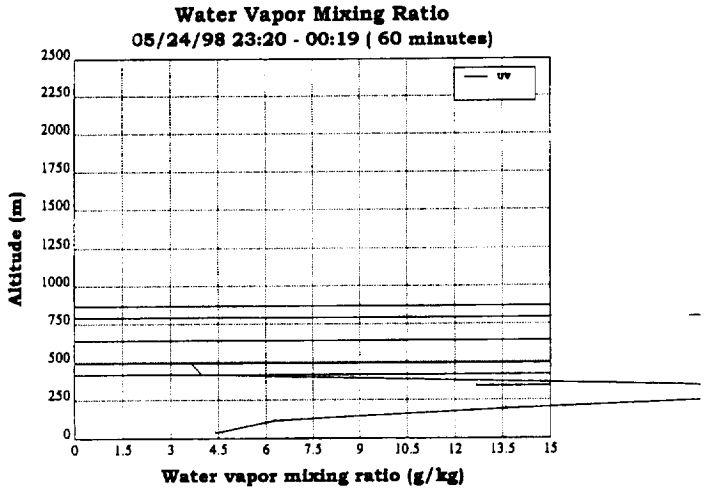

Water Vapor Mixing Ratio
05/24/98 18:20 - 19:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

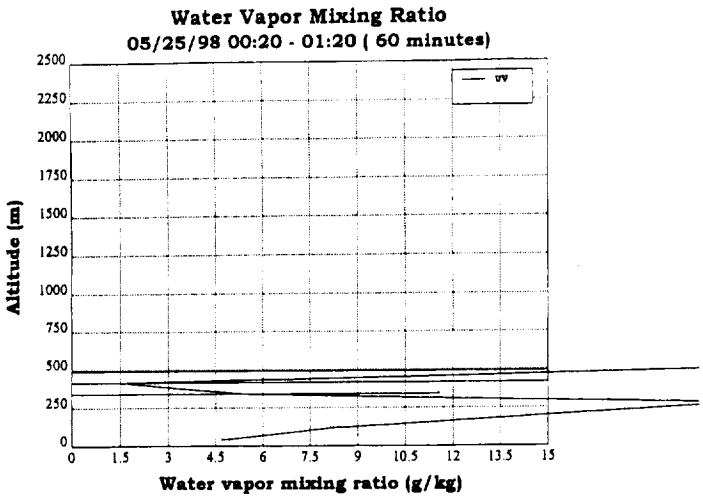

Water Vapor Mixing Ratio
05/24/98 19:20 - 20:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

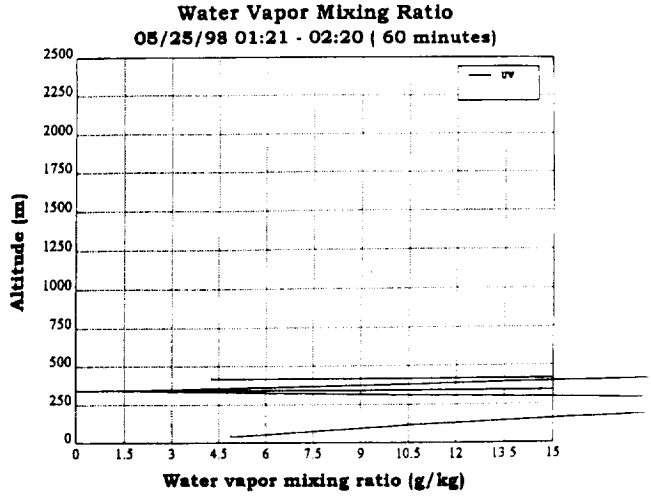

Water Vapor Mixing Ratio
05/24/98 20:20 - 21:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

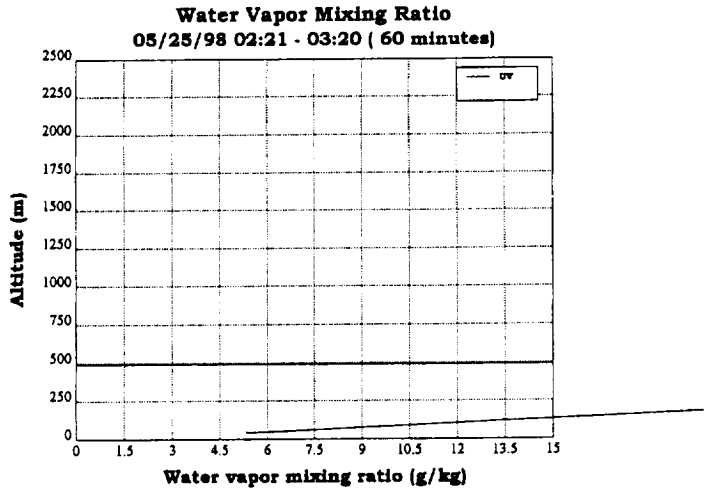

Water Vapor Mixing Ratio
05/24/98 21:20 - 22:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

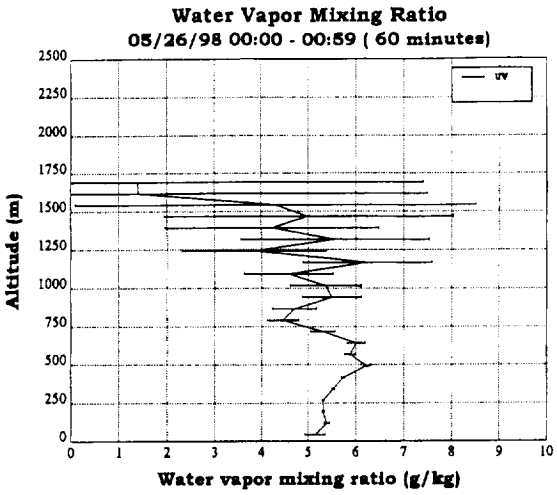

Water Vapor Mixing Ratio
05/24/98 22:20 - 23:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

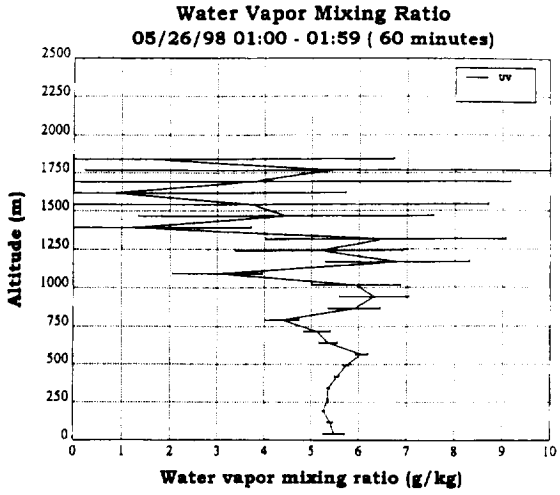

Water Vapor Mixing Ratio
05/24/98 23:20 - 00:19 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

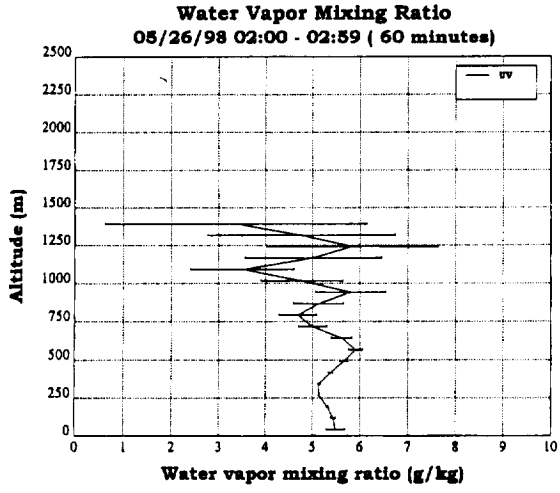

Water Vapor Mixing Ratio
05/25/98 00:20 - 01:20 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

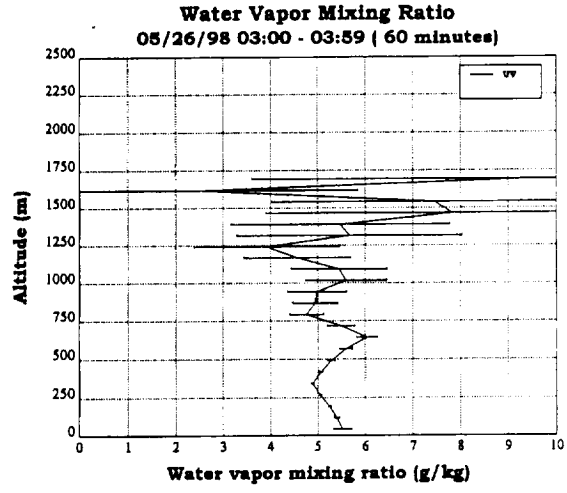

Water Vapor Mixing Ratio
05/25/98 01:21 - 02:20 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

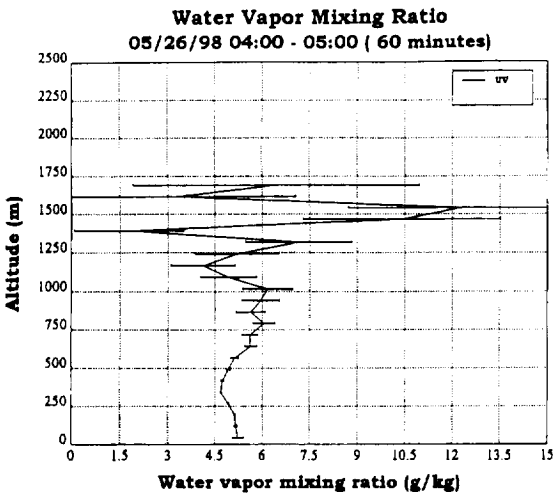

Water Vapor Mixing Ratio
05/25/98 02:21 - 03:20 (60 minutes)
uv
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

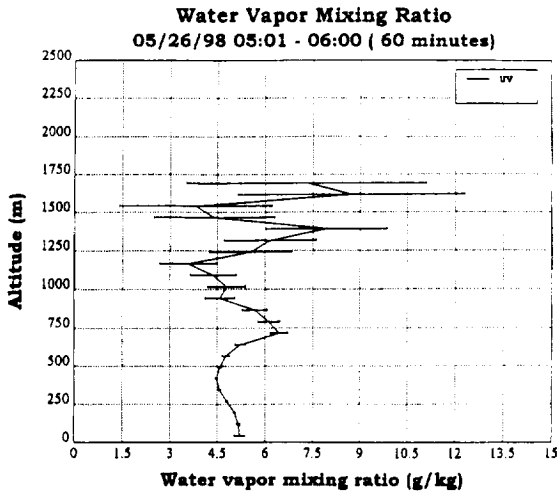

Water Vapor Mixing Ratio
05/26/98 00:00 - 00:59 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

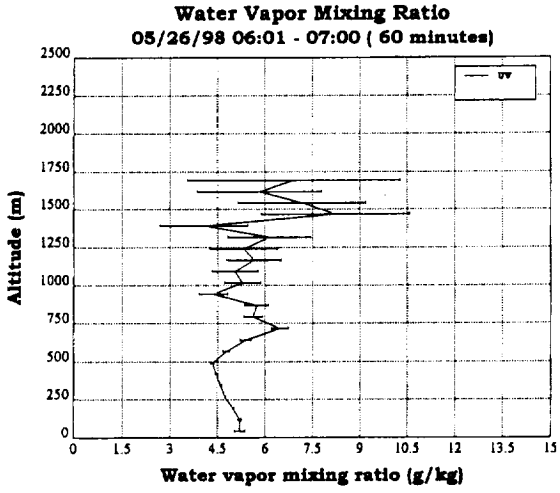

Water Vapor Mixing Ratio
05/26/98 01:00 - 01:59 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

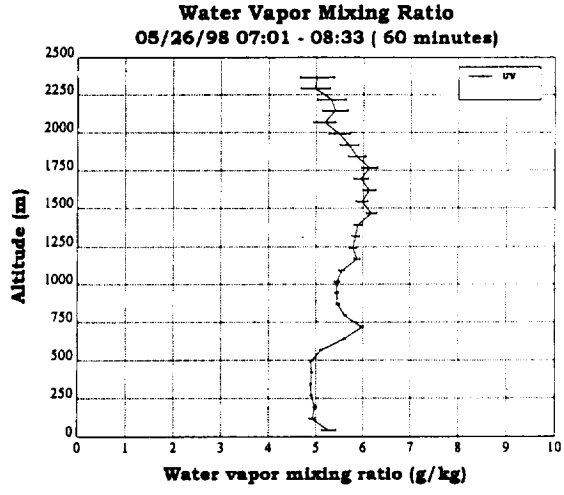

Water Vapor Mixing Ratio
05/26/98 02:00 - 02:59 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

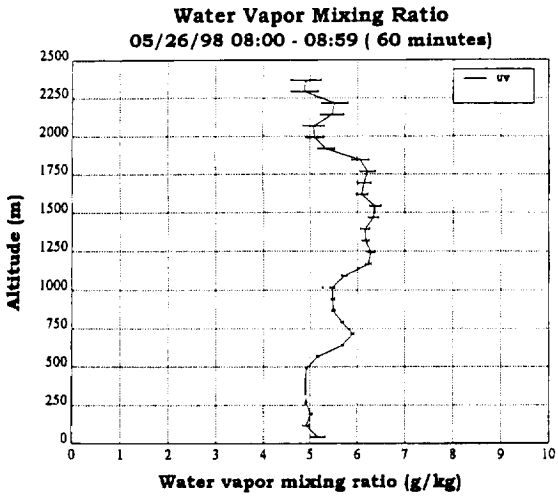

Water Vapor Mixing Ratio
05/26/98 03:00 - 03:59 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

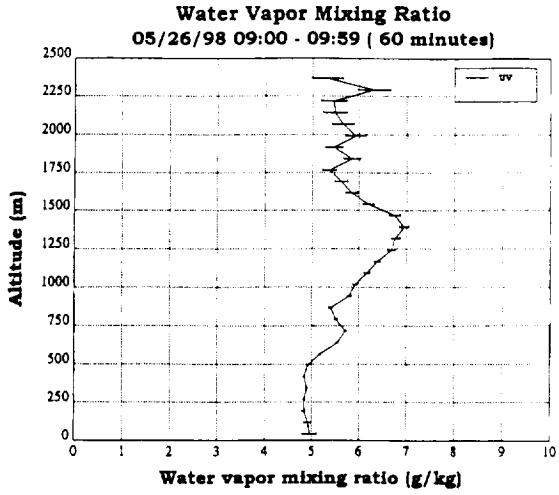

Water Vapor Mixing Ratio
05/26/98 04:00 - 05:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

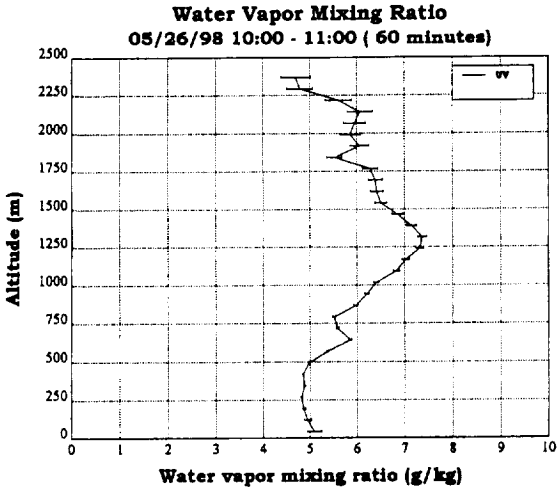

Water Vapor Mixing Ratio
05/26/98 05:01 - 06:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

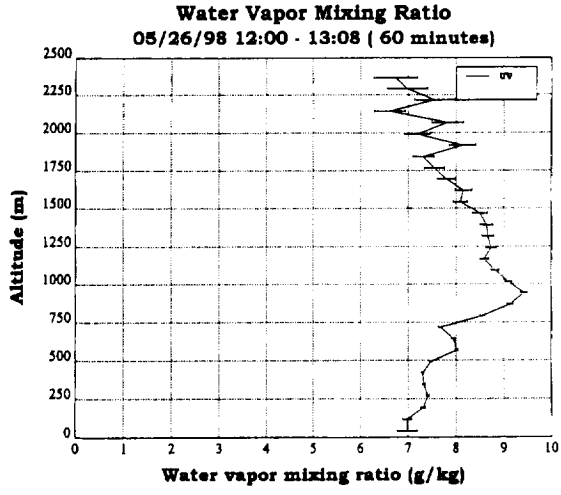

Water Vapor Mixing Ratio
05/26/98 06:01 - 07:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

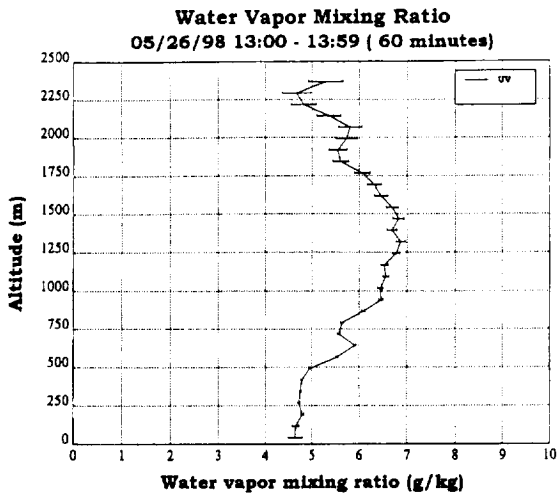

Water Vapor Mixing Ratio
05/26/98 07:01 - 08:33 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

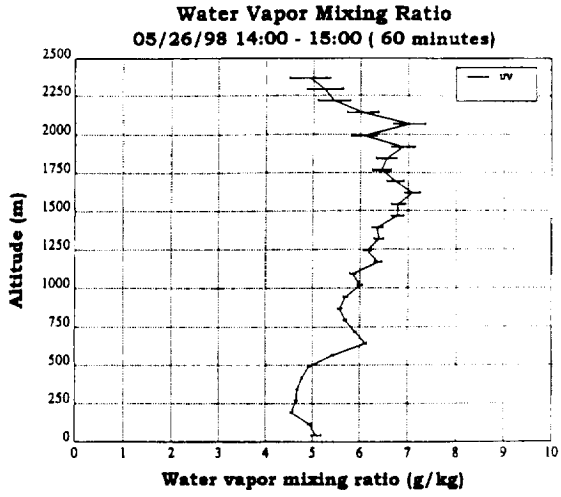

Water Vapor Mixing Ratio
05/26/98 08:00 - 08:59 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

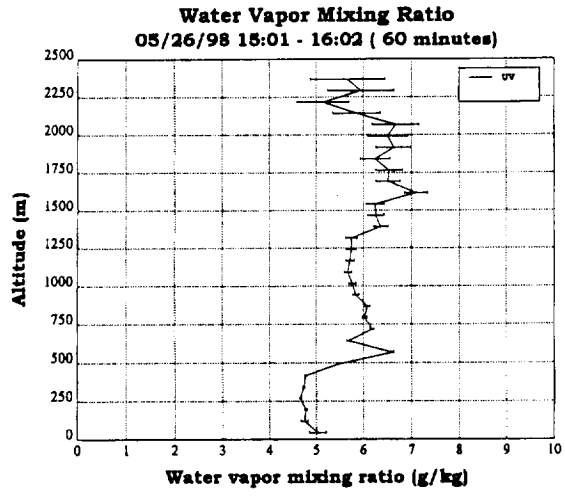

Water Vapor Mixing Ratio
05/26/98 09:00 - 09:59 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

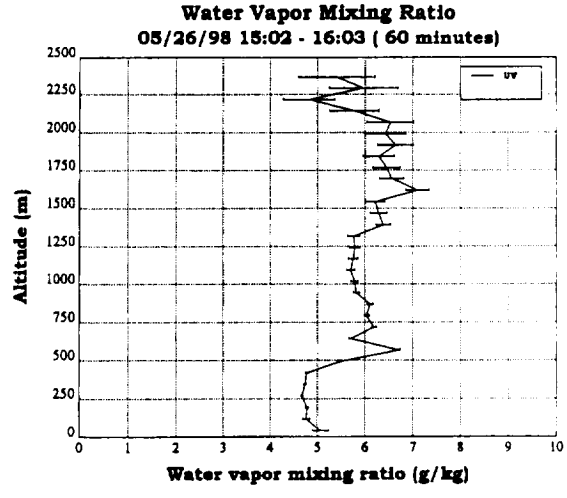

Water Vapor Mixing Ratio
05/26/98 10:00 - 11:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

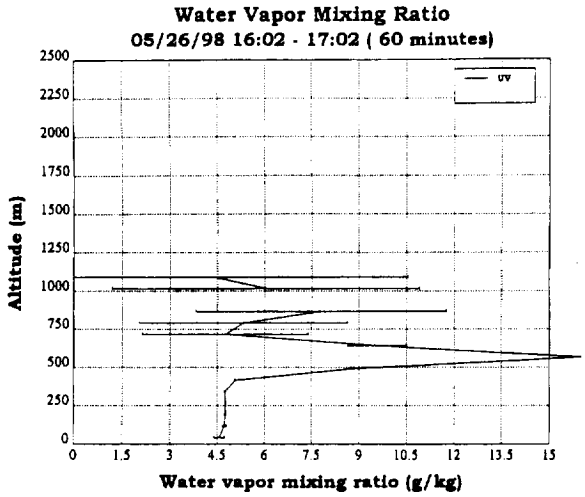

Water Vapor Mixing Ratio
05/26/98 12:00 - 13:08 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

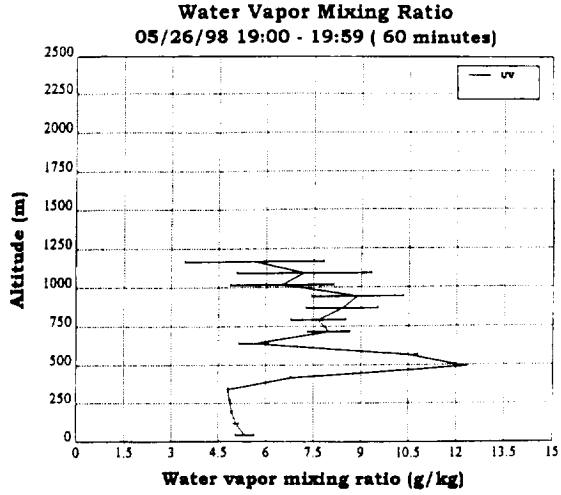

Water Vapor Mixing Ratio
05/26/98 13:00 - 13:59 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

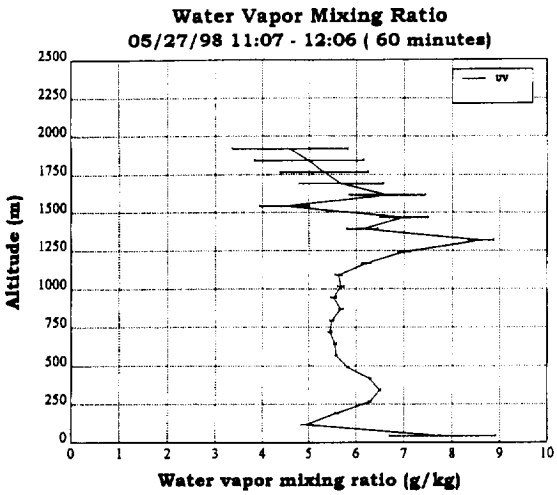

Water Vapor Mixing Ratio
05/26/98 14:00 - 15:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

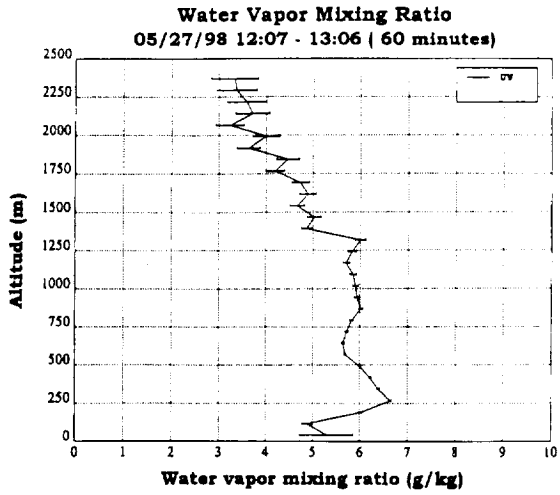

Water Vapor Mixing Ratio
05/26/98 15:01 - 16:02 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

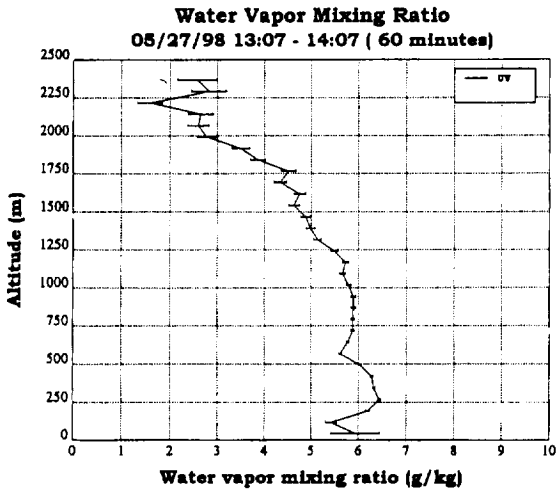

Water Vapor Mixing Ratio
05/26/98 15:02 - 16:03 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

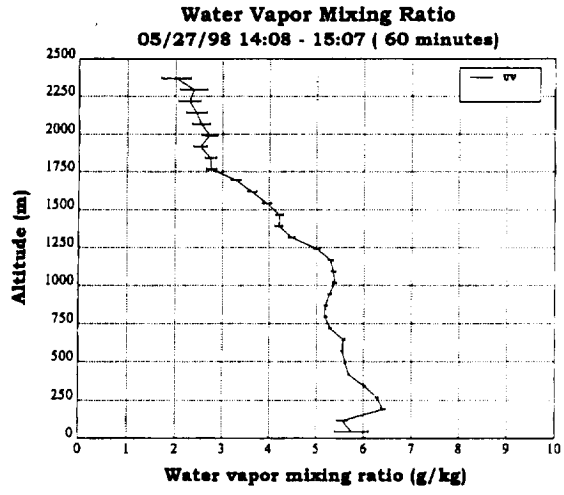

Water Vapor Mixing Ratio
05/26/98 16:02 - 17:02 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0
1.5
3
4.5
6
7.5
9
10.5
12
13.5
15
Water vapor mixing ratio (g/kg)

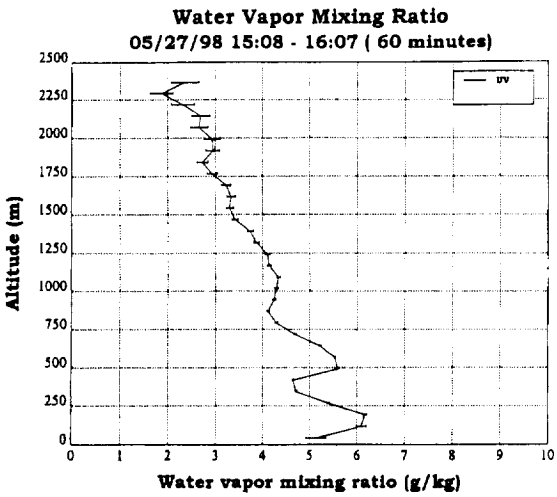

Water Vapor Mixing Ratio
05/26/98 19:00 - 19:59 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0
1.5
3
4.5
6
7.5
9
10.5
12
13.5
15
Water vapor mixing ratio (g/kg)

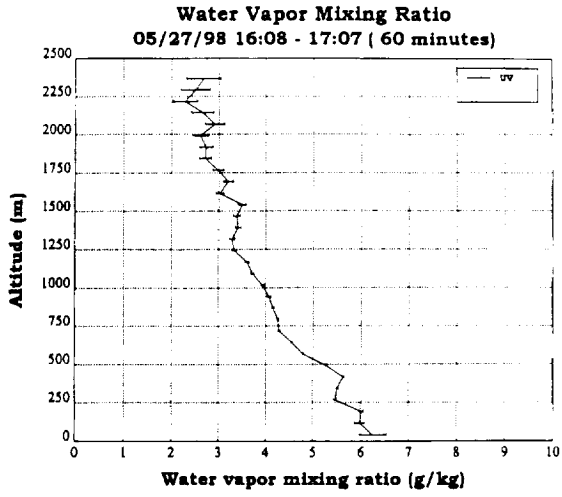

Water Vapor Mixing Ratio
05/27/98 11:07 - 12:06 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

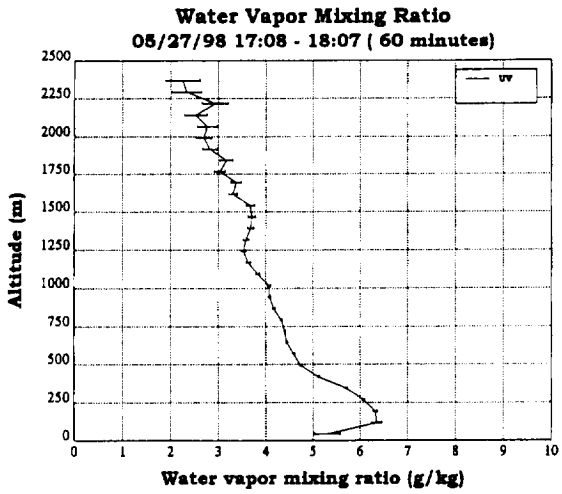

Water Vapor Mixing Ratio
05/27/98 12:07 - 13:06 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

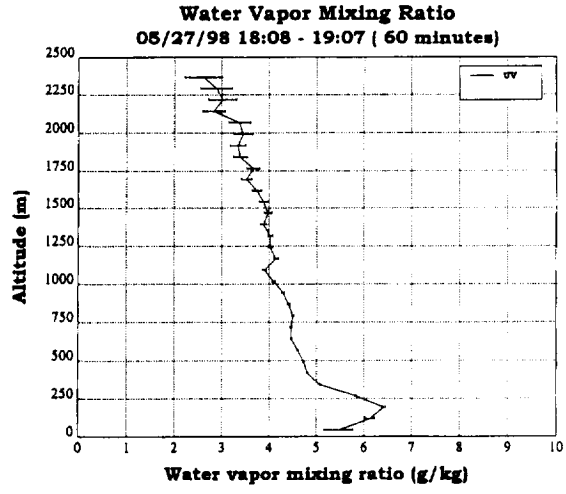

Water Vapor Mixing Ratio
05/27/98 13:07 - 14:07 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

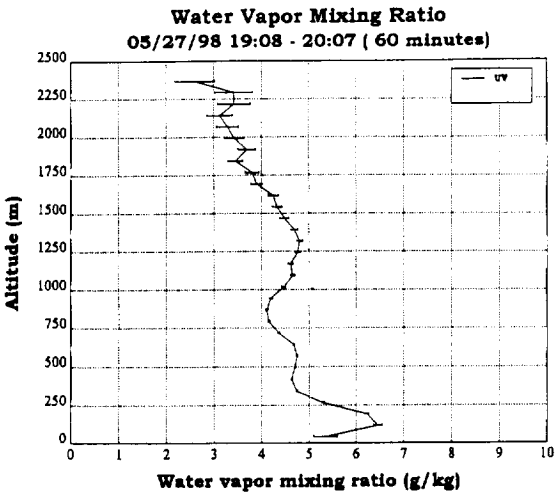

Water Vapor Mixing Ratio
05/27/98 14:08 - 15:07 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

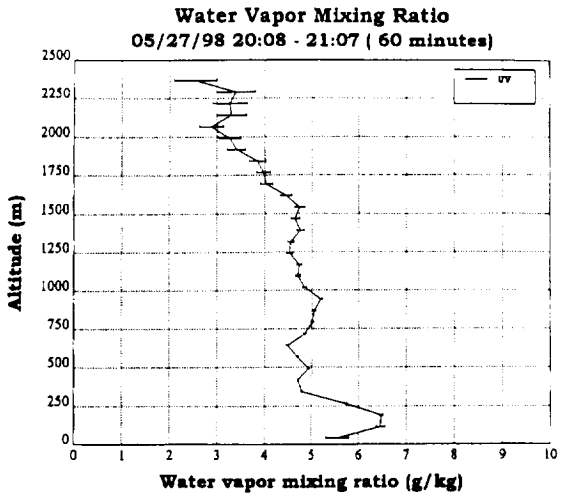

Water Vapor Mixing Ratio
05/27/98 15:08 - 16:07 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

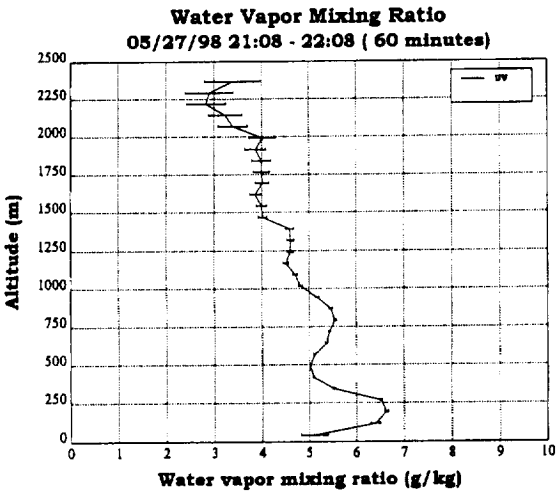

Water Vapor Mixing Ratio
05/27/98 16:08 - 17:07 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

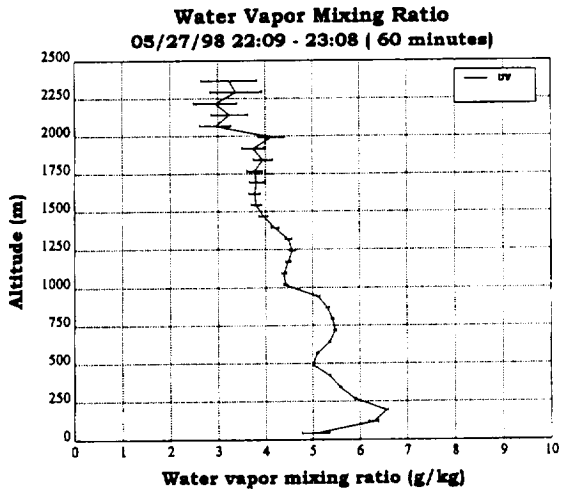

Water Vapor Mixing Ratio
05/27/98 17:08 - 18:07 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

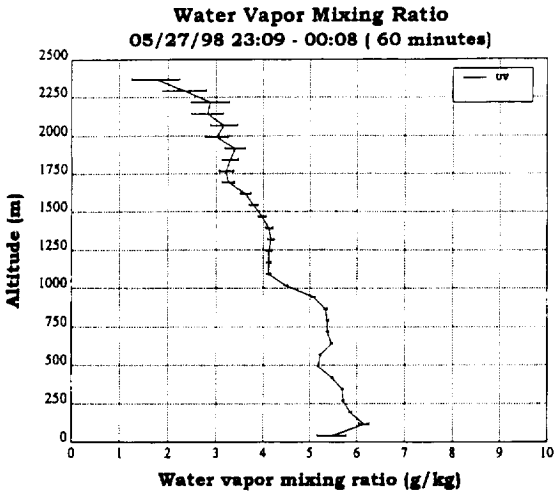

Water Vapor Mixing Ratio
05/27/98 18:08 - 19:07 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

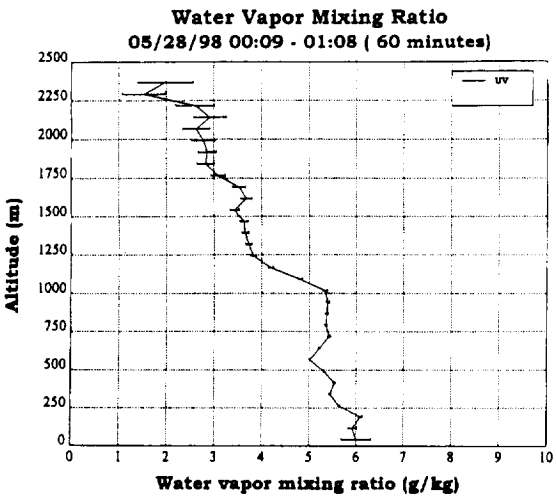

Water Vapor Mixing Ratio
05/27/98 19:08 - 20:07 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

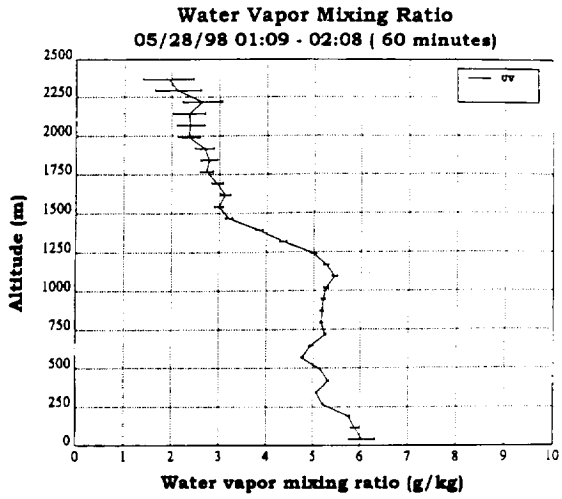

Water Vapor Mixing Ratio
05/27/98 20:08 - 21:07 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

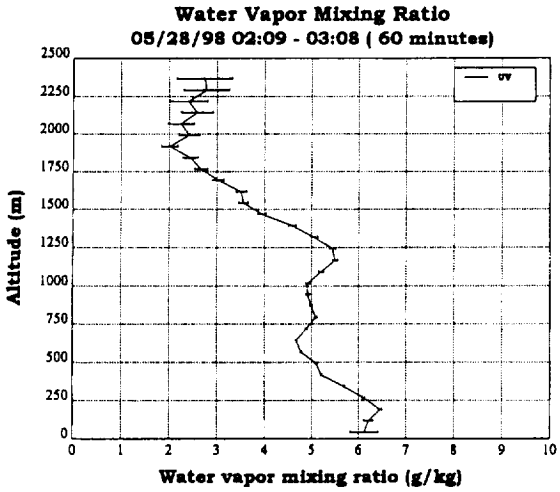

Water Vapor Mixing Ratio
05/27/98 21:08 - 22:08 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

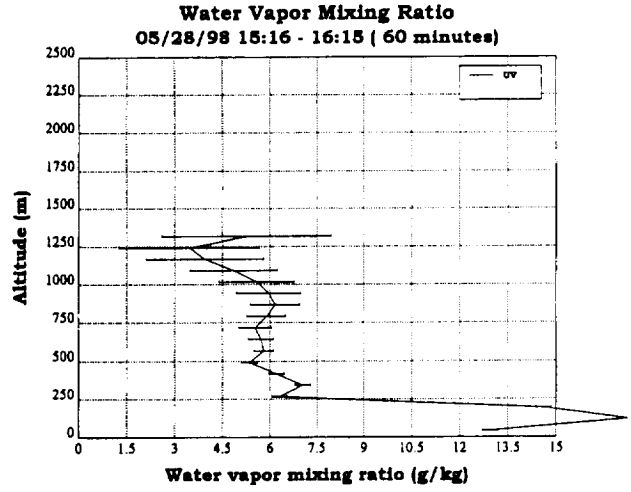

Water Vapor Mixing Ratio
05/27/98 22:09 - 23:08 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

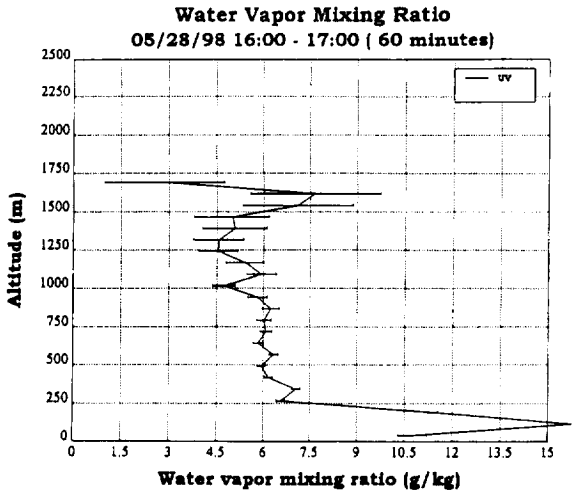

Water Vapor Mixing Ratio
05/27/98 23:09 - 00:08 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0
1
2
3
4
5
6
7
8
9
10
Water vapor mixing ratio (g/kg)

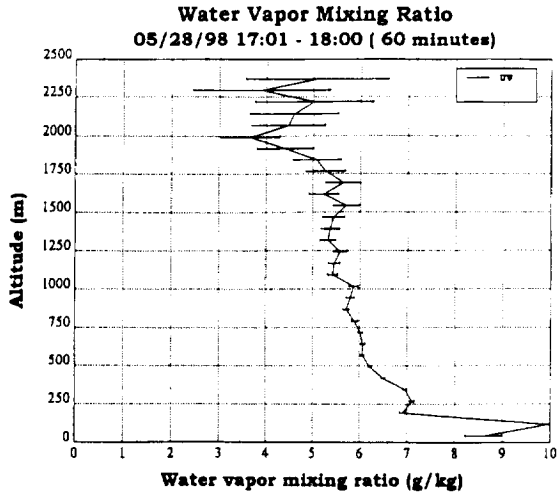

Water Vapor Mixing Ratio
05/28/98 00:09 - 01:08 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

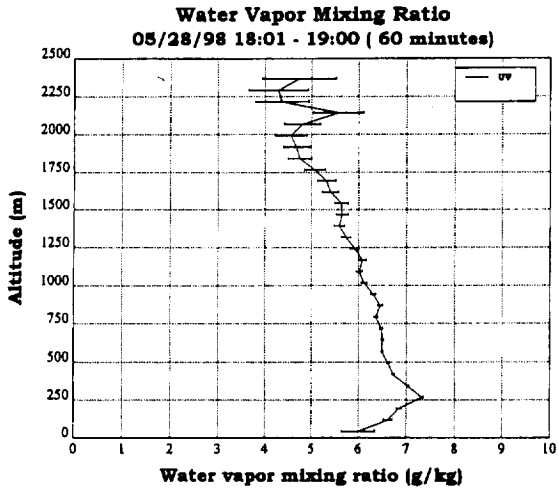

Water Vapor Mixing Ratio
05/28/98 01:09 - 02:08 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

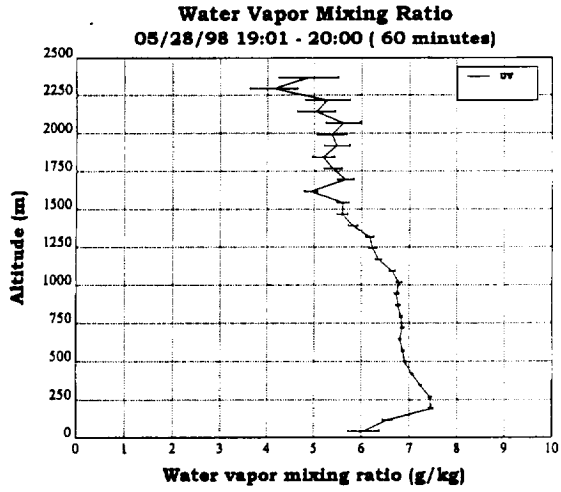

Water Vapor Mixing Ratio
05/28/98 02:09 - 03:08 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

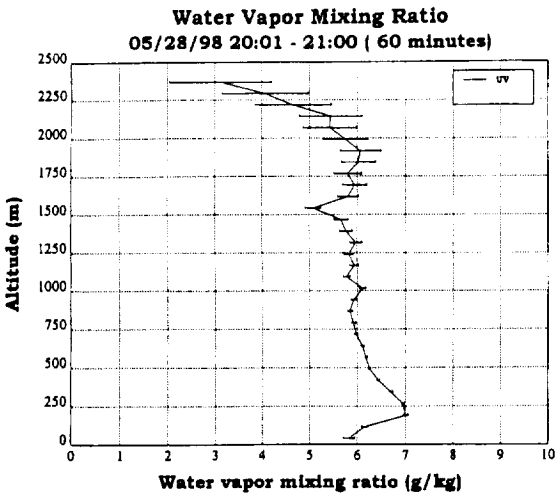

Water Vapor Mixing Ratio
05/28/98 15:16 - 16:15 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

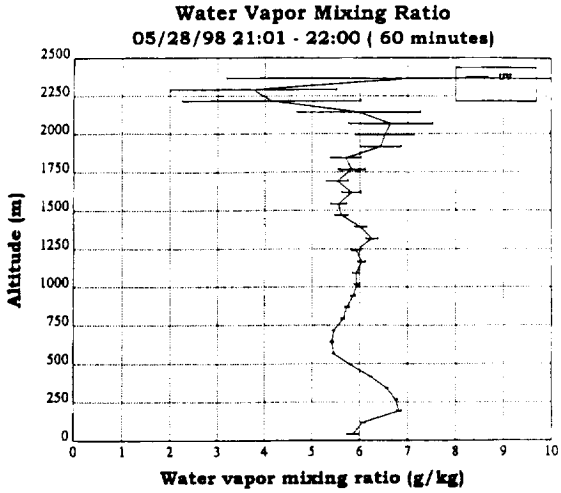

Water Vapor Mixing Ratio
05/28/98 16:00 - 17:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

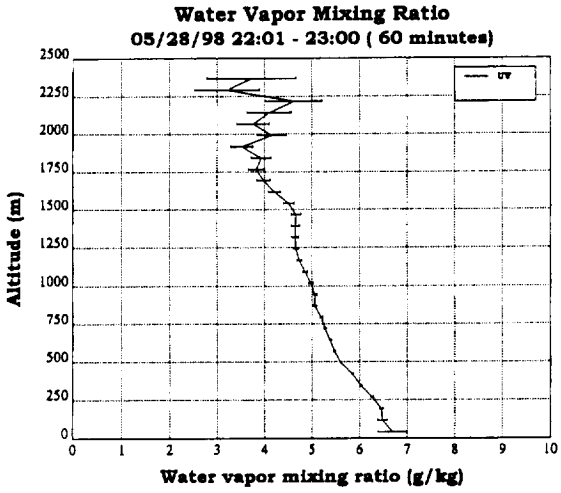

Water Vapor Mixing Ratio
05/28/98 17:01 - 18:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

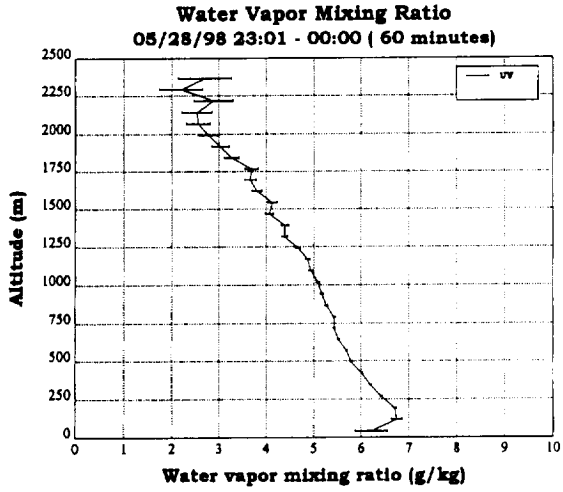

Water Vapor Mixing Ratio
05/28/98 18:01 - 19:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

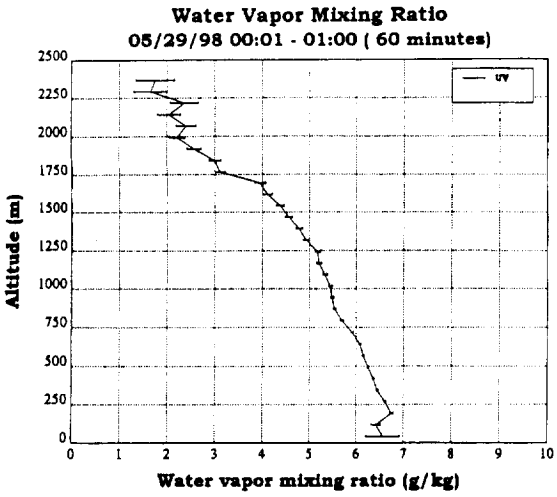

Water Vapor Mixing Ratio
05/28/98 19:01 - 20:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

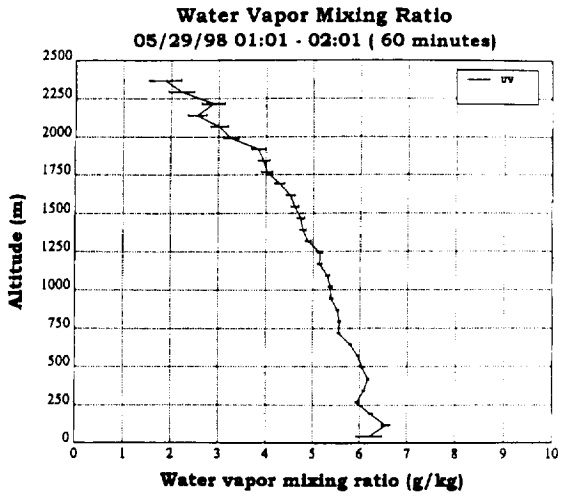

Water Vapor Mixing Ratio
05/28/98 20:01 - 21:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

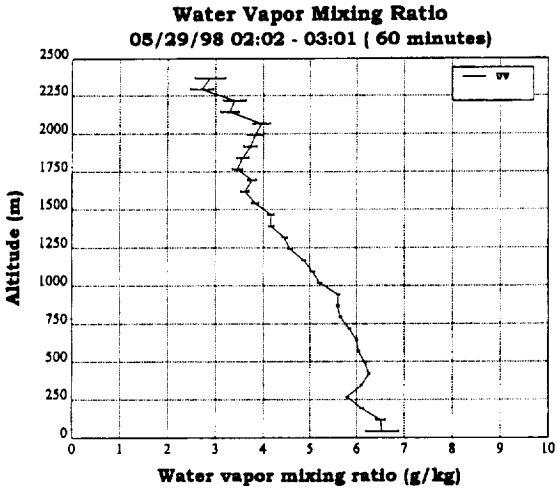

Water Vapor Mixing Ratio
05/28/98 21:01 - 22:00 (60 minutes)
Altitude (m)
Water vapor mixing ratio (g/kg)

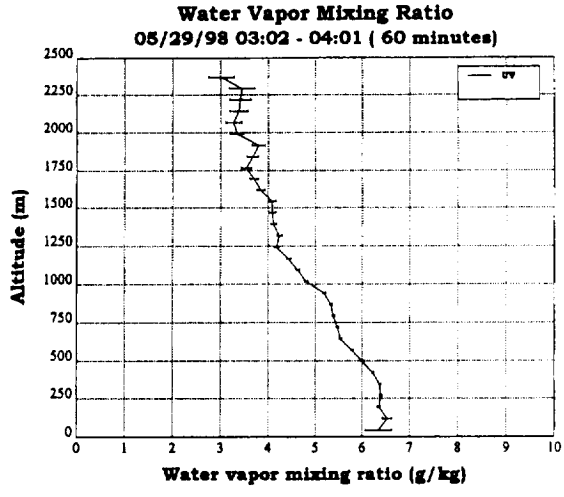

Water Vapor Mixing Ratio
05/28/98 22:01 - 23:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

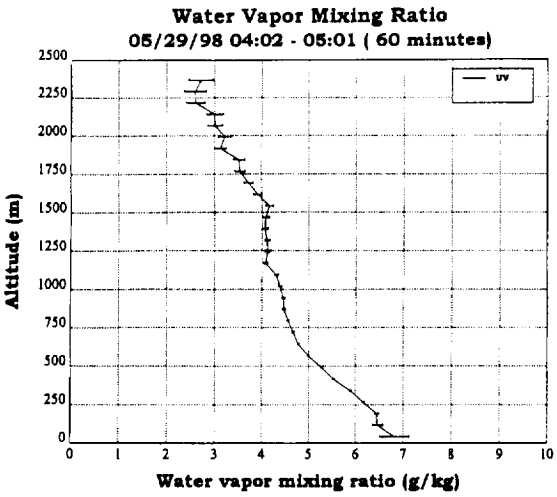

Water Vapor Mixing Ratio
05/28/98 23:01 - 00:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

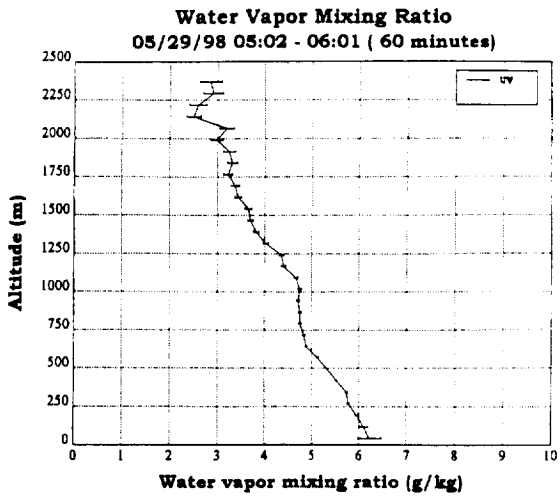

Water Vapor Mixing Ratio
05/29/98 00:01 - 01:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

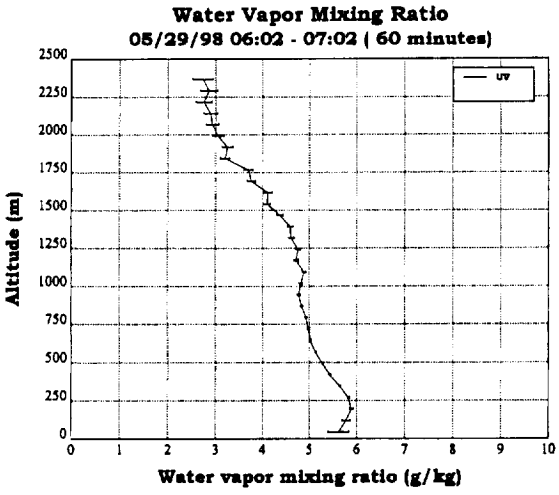

Water Vapor Mixing Ratio
05/29/98 01:01 - 02:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

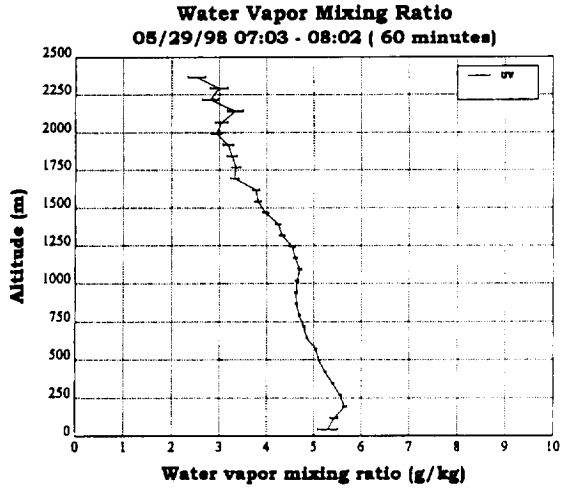

Water Vapor Mixing Ratio
05/29/98 02:02 - 03:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

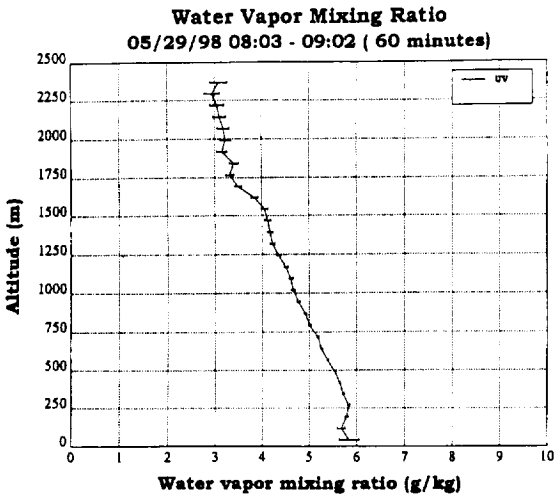

Water Vapor Mixing Ratio
05/29/98 03:02 - 04:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

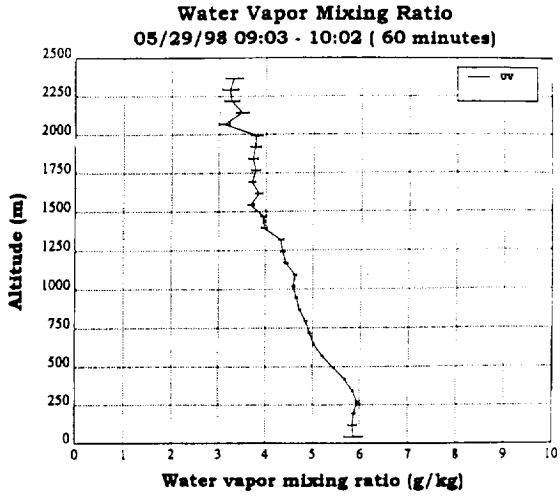

Water Vapor Mixing Ratio
05/29/98 04:02 - 05:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

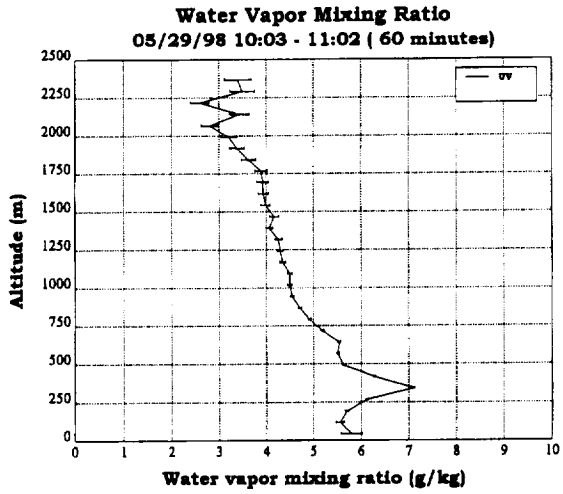

Water Vapor Mixing Ratio
05/29/98 05:02 - 06:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

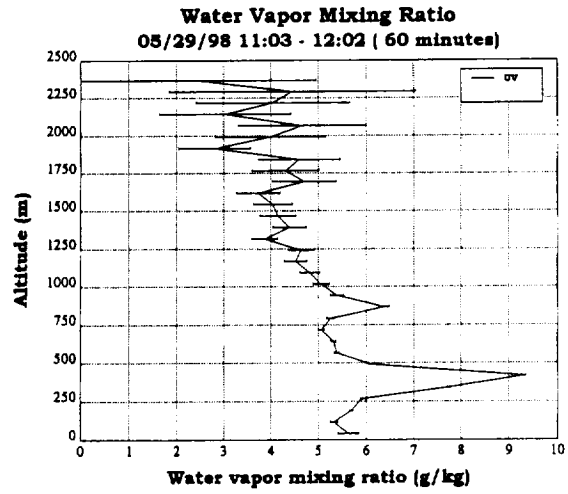

Water Vapor Mixing Ratio
05/29/98 06:02 - 07:02 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

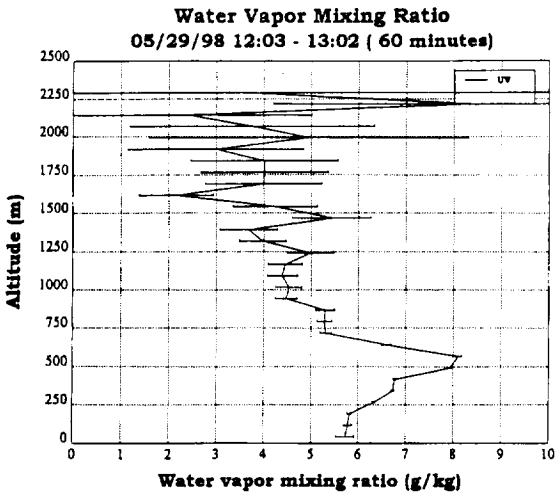

Water Vapor Mixing Ratio
05/29/98 07:03 - 08:02 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

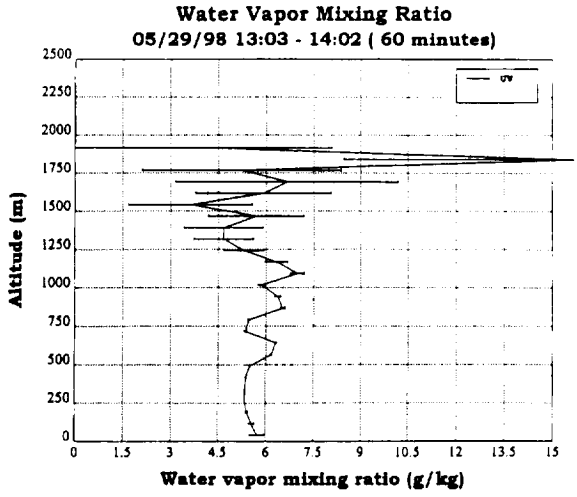

Water Vapor Mixing Ratio
05/29/98 08:03 - 09:02 (60 minutes)
Altitude (m)
Water vapor mixing ratio (g/kg)
wv

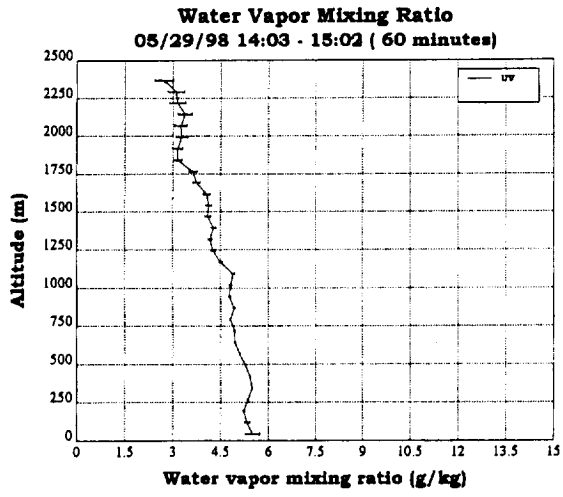

Water Vapor Mixing Ratio
05/29/98 09:03 - 10:02 (60 minutes)
Altitude (m)
Water vapor mixing ratio (g/kg)
wv

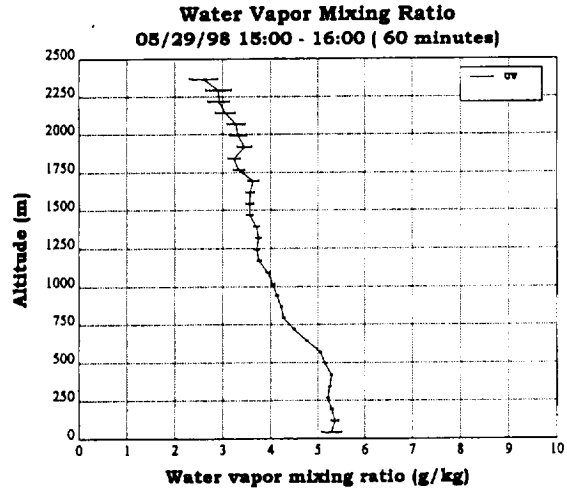

Water Vapor Mixing Ratio
05/29/98 10:03 - 11:02 (60 minutes)
Altitude (m)
Water vapor mixing ratio (g/kg)
wv

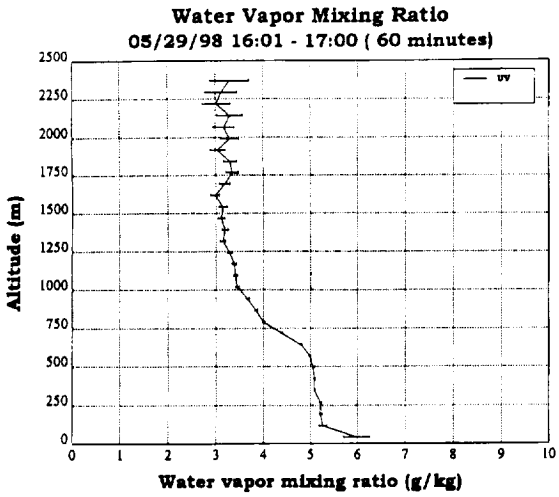

Water Vapor Mixing Ratio
05/29/98 11:03 - 12:02 (60 minutes)
Altitude (m)
Water vapor mixing ratio (g/kg)
wv

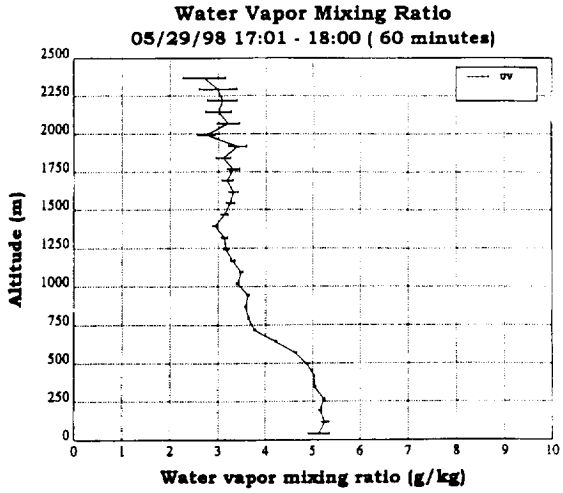

Water Vapor Mixing Ratio
05/29/98 12:03 - 13:02 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

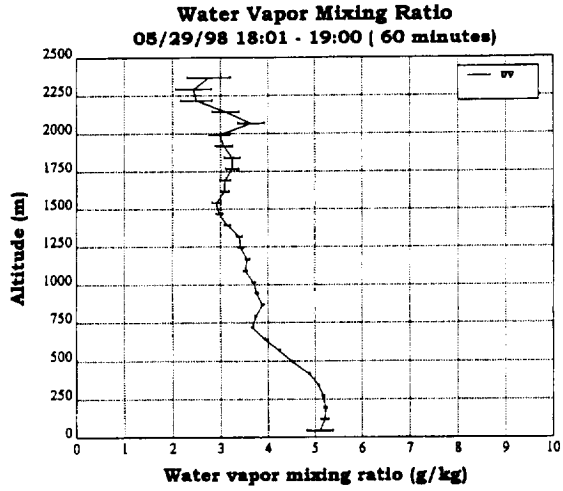

Water Vapor Mixing Ratio
05/29/98 13:03 - 14:02 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

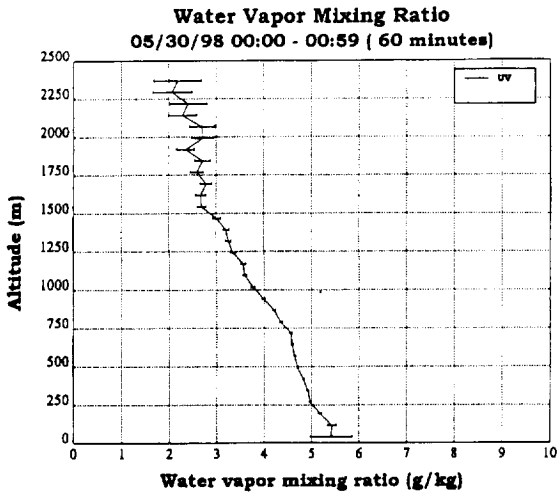

Water Vapor Mixing Ratio
05/29/98 14:03 - 15:02 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15
Water vapor mixing ratio (g/kg)

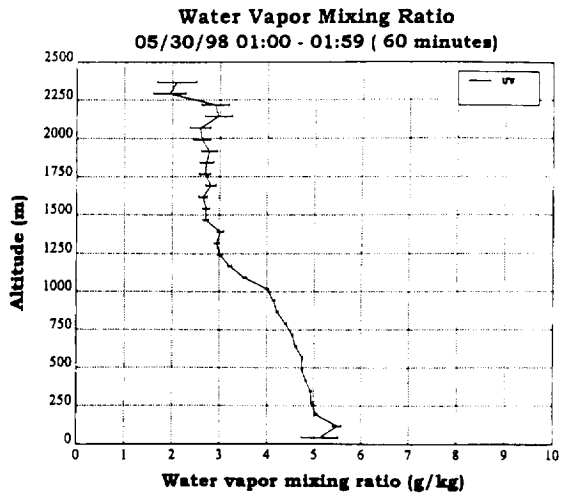

Water Vapor Mixing Ratio
05/29/98 15:00 - 16:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

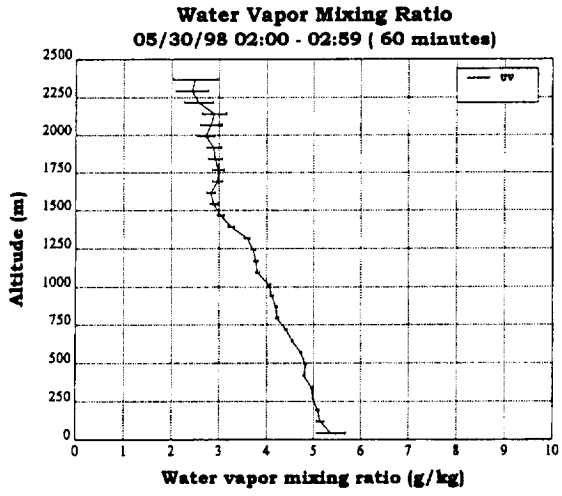

Water Vapor Mixing Ratio
05/29/98 16:01 - 17:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

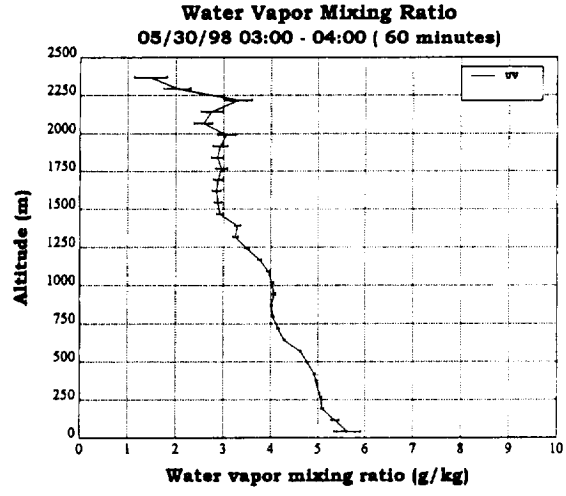

Water Vapor Mixing Ratio
05/29/98 17:01 - 18:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

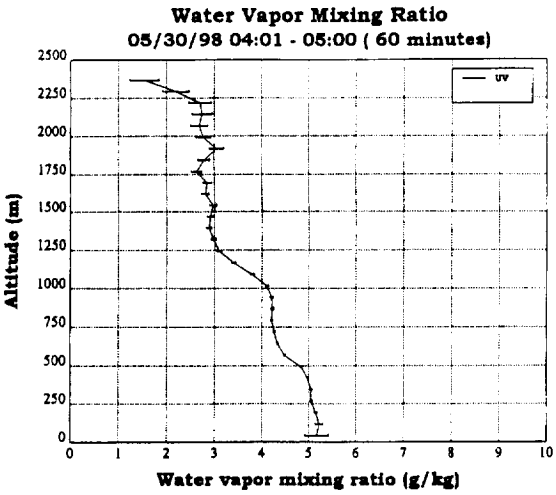

Water Vapor Mixing Ratio
05/29/98 18:01 - 19:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

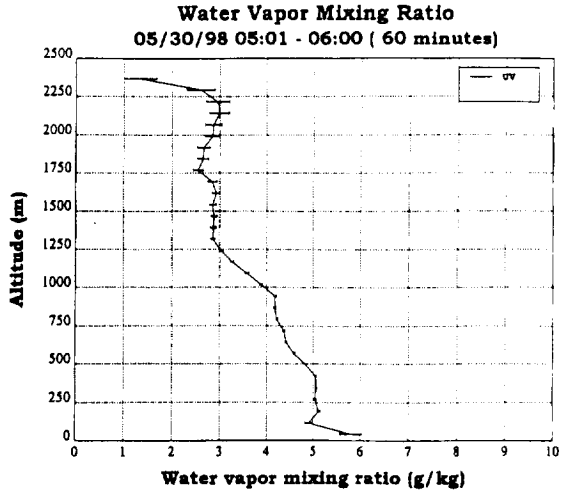

Water Vapor Mixing Ratio
05/30/98 00:00 - 00:59 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

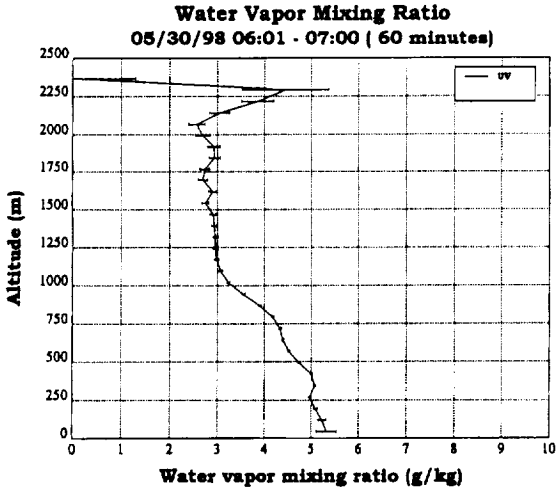

Water Vapor Mixing Ratio
05/30/98 01:00 - 01:59 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

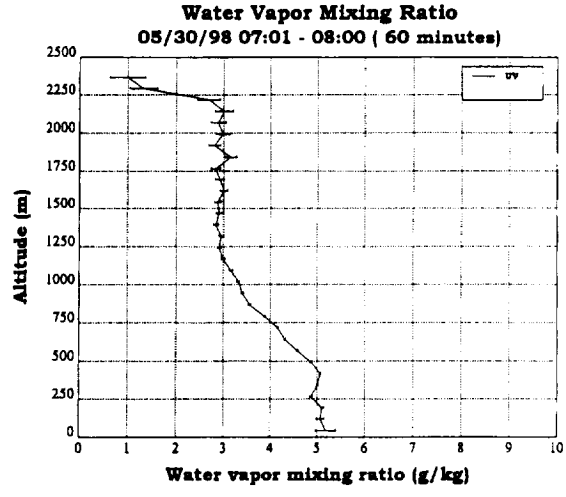

Water Vapor Mixing Ratio
05/30/98 02:00 - 02:59 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

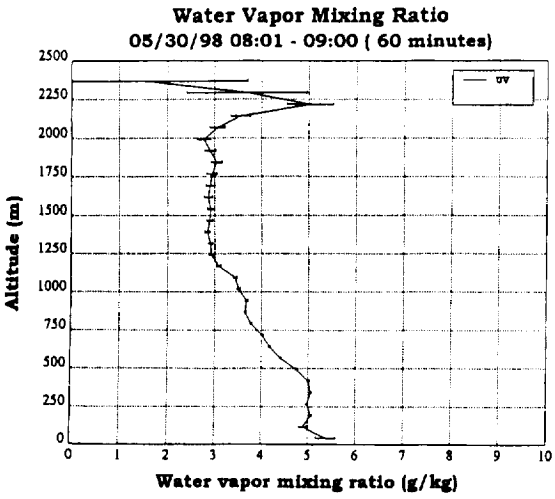

Water Vapor Mixing Ratio
05/30/98 03:00 - 04:00 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

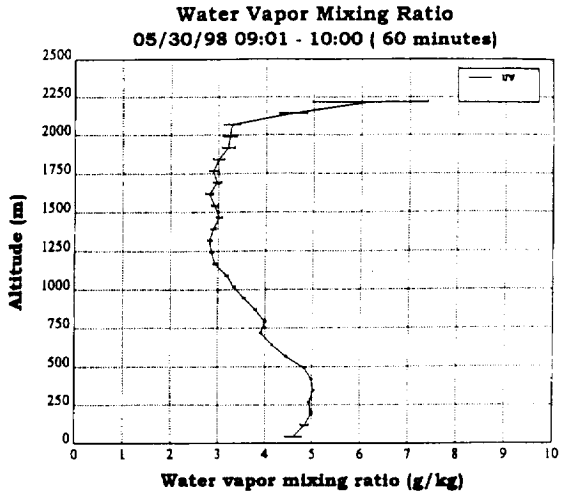

Water Vapor Mixing Ratio
05/30/98 04:01 - 05:00 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

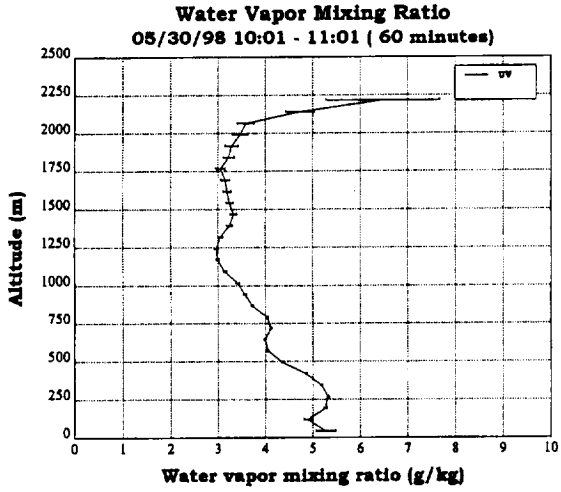

Water Vapor Mixing Ratio
05/30/98 05:01 - 06:00 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

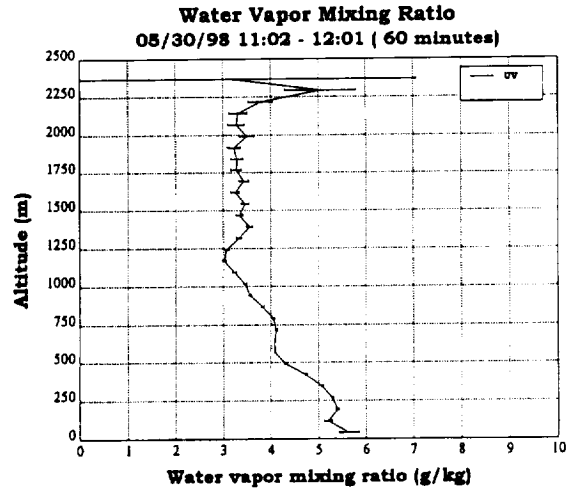

Water Vapor Mixing Ratio
05/30/98 06:01 - 07:00 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

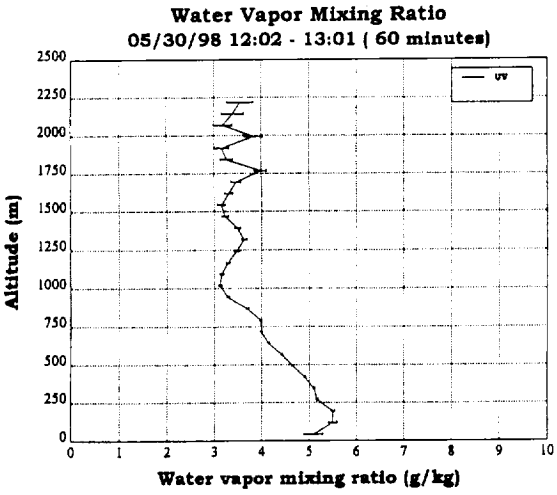

Water Vapor Mixing Ratio
05/30/98 07:01 - 08:00 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)

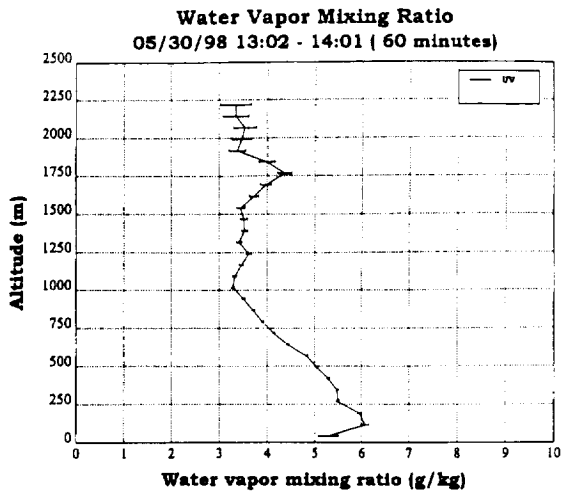

Water Vapor Mixing Ratio
05/30/98 08:01 - 09:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

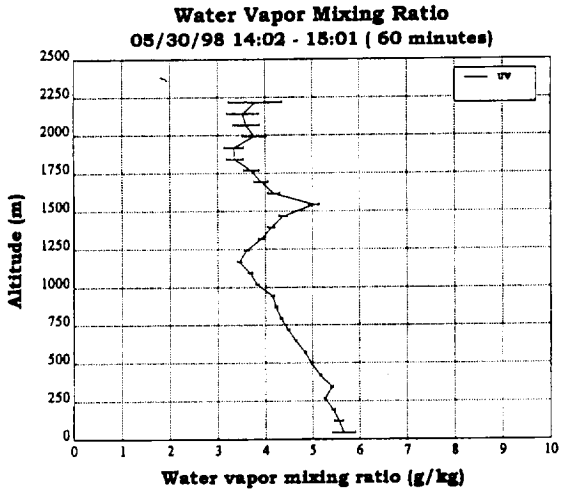

Water Vapor Mixing Ratio
05/30/98 09:01 - 10:00 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

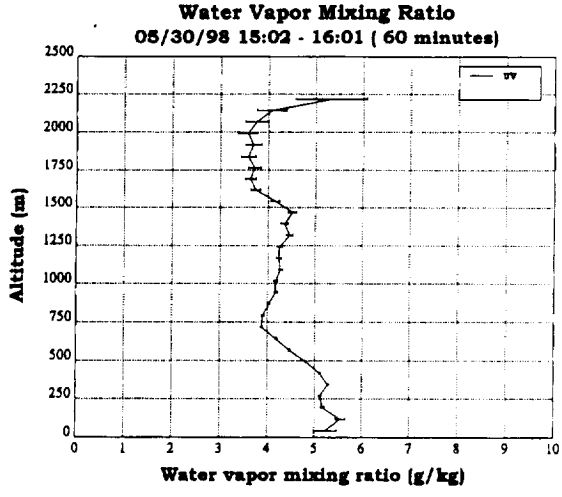

Water Vapor Mixing Ratio
05/30/98 10:01 - 11:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

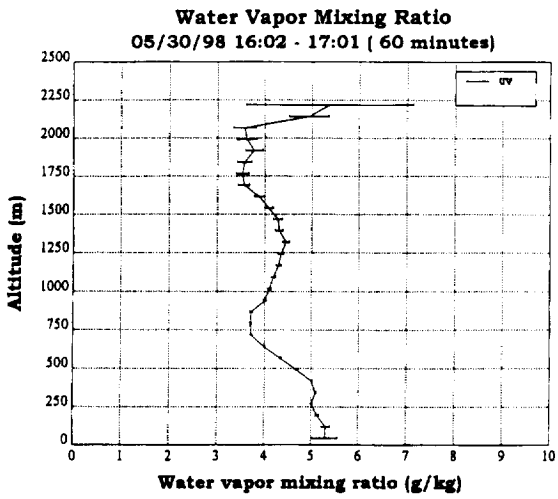

Water Vapor Mixing Ratio
05/30/98 11:02 - 12:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

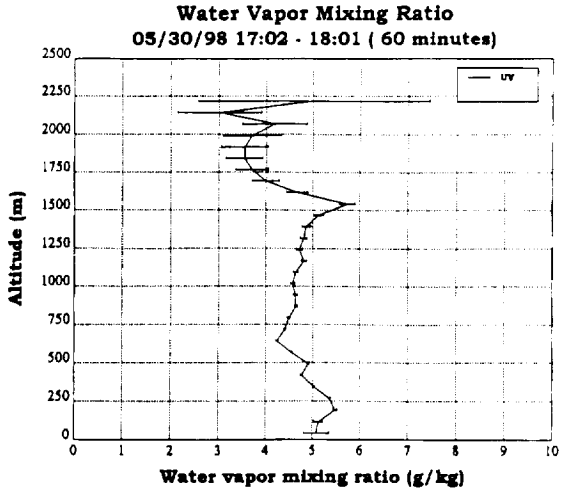

Water Vapor Mixing Ratio
05/30/98 12:02 - 13:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

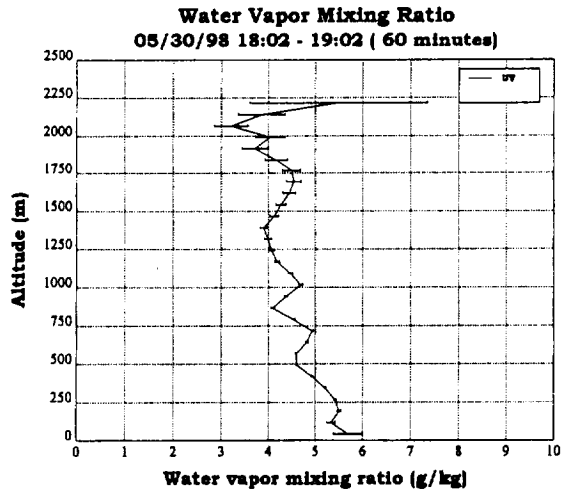

Water Vapor Mixing Ratio
05/30/98 13:02 - 14:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

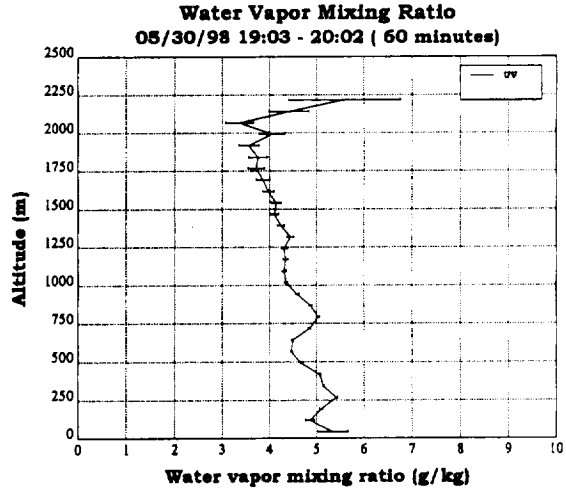

Water Vapor Mixing Ratio
05/30/98 14:02 - 15:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

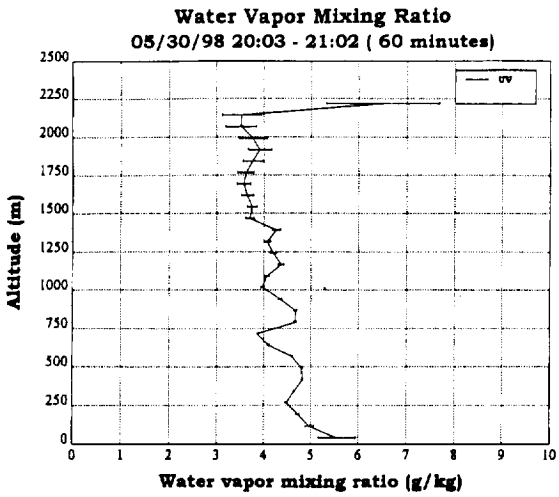

Water Vapor Mixing Ratio
05/30/98 15:02 - 16:01 (60 minutes)
UV
Altitude (m)
Water vapor mixing ratio (g/kg)

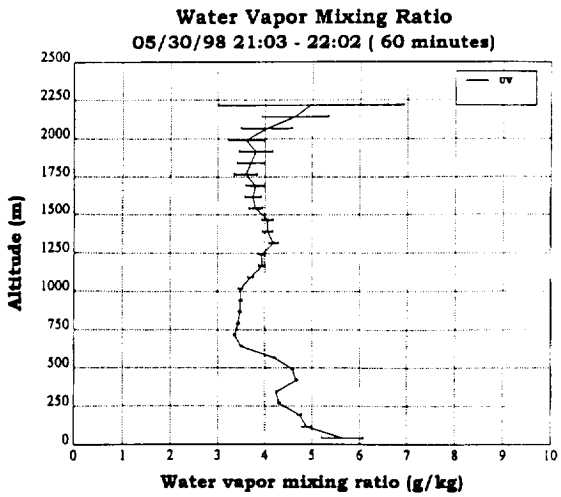

Water Vapor Mixing Ratio
05/30/98 16:02 - 17:01 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)

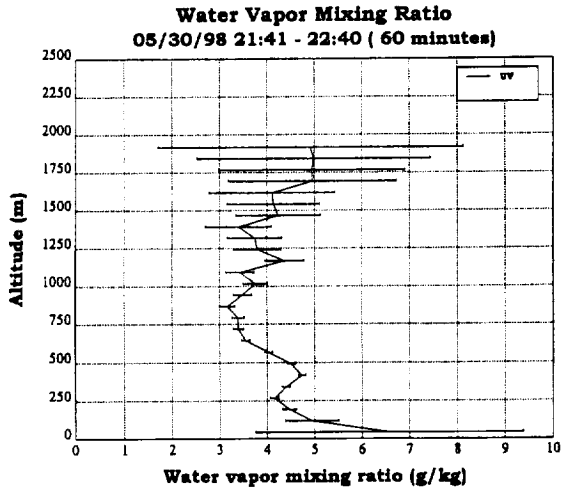

Water Vapor Mixing Ratio
05/30/98 17:02 - 18:01 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)


Water Vapor Mixing Ratio
05/30/98 18:02 - 19:02 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)


Water Vapor Mixing Ratio
05/30/98 19:03 - 20:02 (60 minutes)
UV
Altitude (m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10
Water vapor mixing ratio (g/kg)


Water Vapor Mixing Ratio
05/30/98 20:03 - 21:02 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)


Water Vapor Mixing Ratio
05/30/98 21:03 - 22:02 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)


Water Vapor Mixing Ratio
05/30/98 21:41 - 22:40 (60 minutes)
uv
Altitude (m)
Water vapor mixing ratio (g/kg)