AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN DIEGO

Trial By Fire In San Diego

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Senior Meteorologist

San Diego County Air Pollution Control District

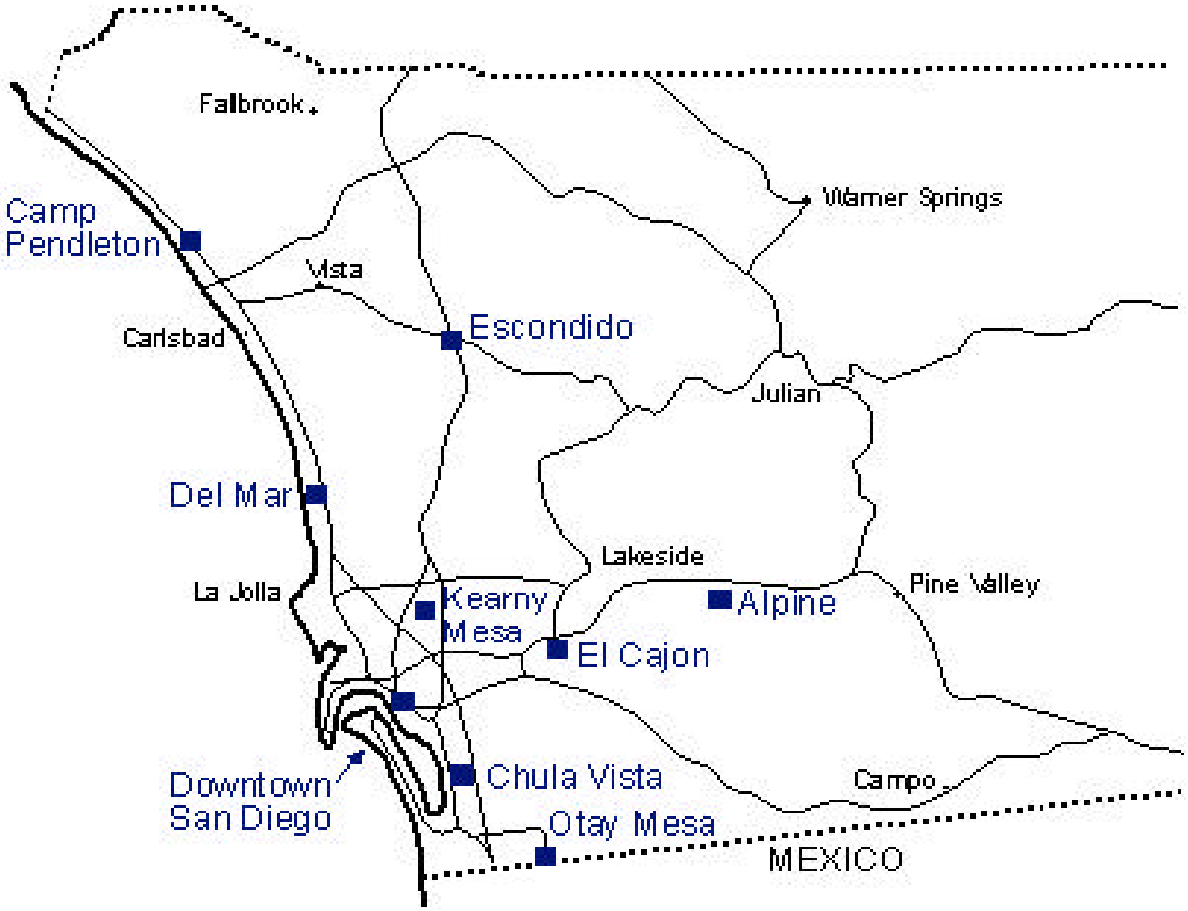
Presented to the U.S. EPA's 2004 National Air Quality Conference

Baltimore, Maryland - February 24, 2004

The wildfires of 2003 resulted in some of the worst air quality impacts ever measured in San Diego county

Impacts were primarily particulate matter, although the carbon monoxide standard was also exceeded

San Diego County Monitoring Stations

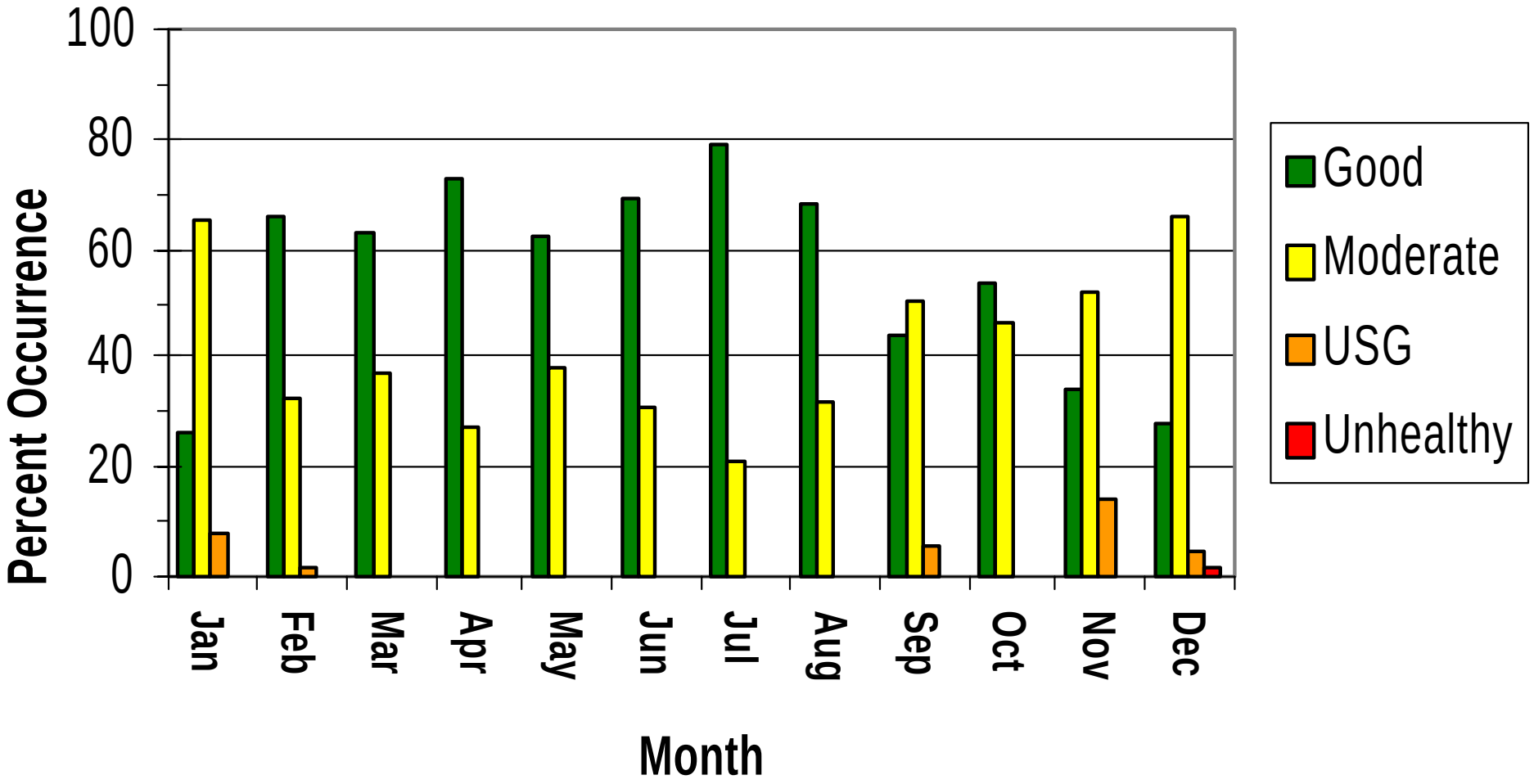


The District began PM2.5 forecasting on October 1, 2003

Forecasting largely based on statistical analysis of filter data collected at 5 monitoring sites in San Diego county

San Diego county monitoring stations with PM2.5 filter measurements (FRM)

DTN PM2.5: 1999 - 2001: Percent Occurrence of AQI Categories

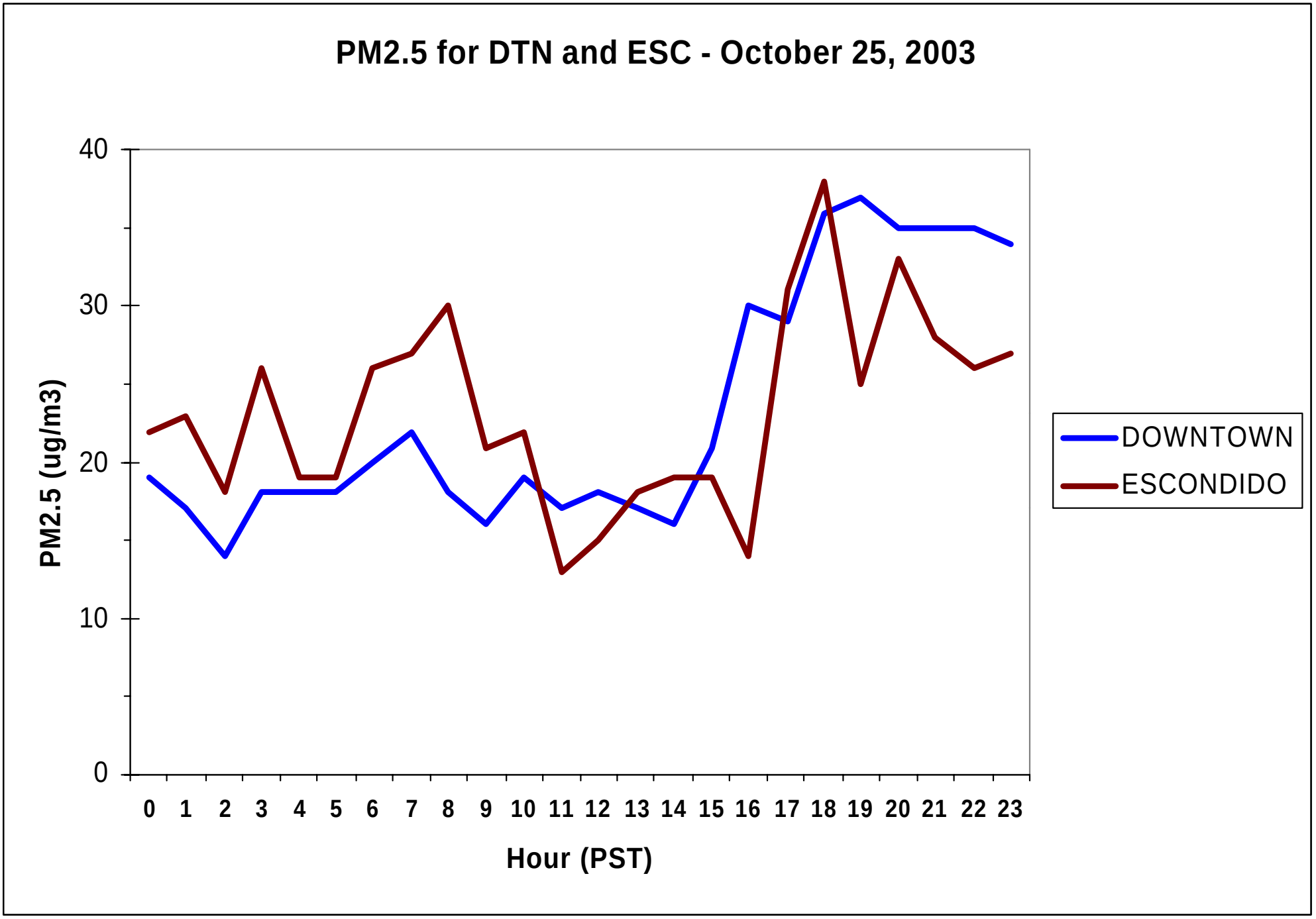


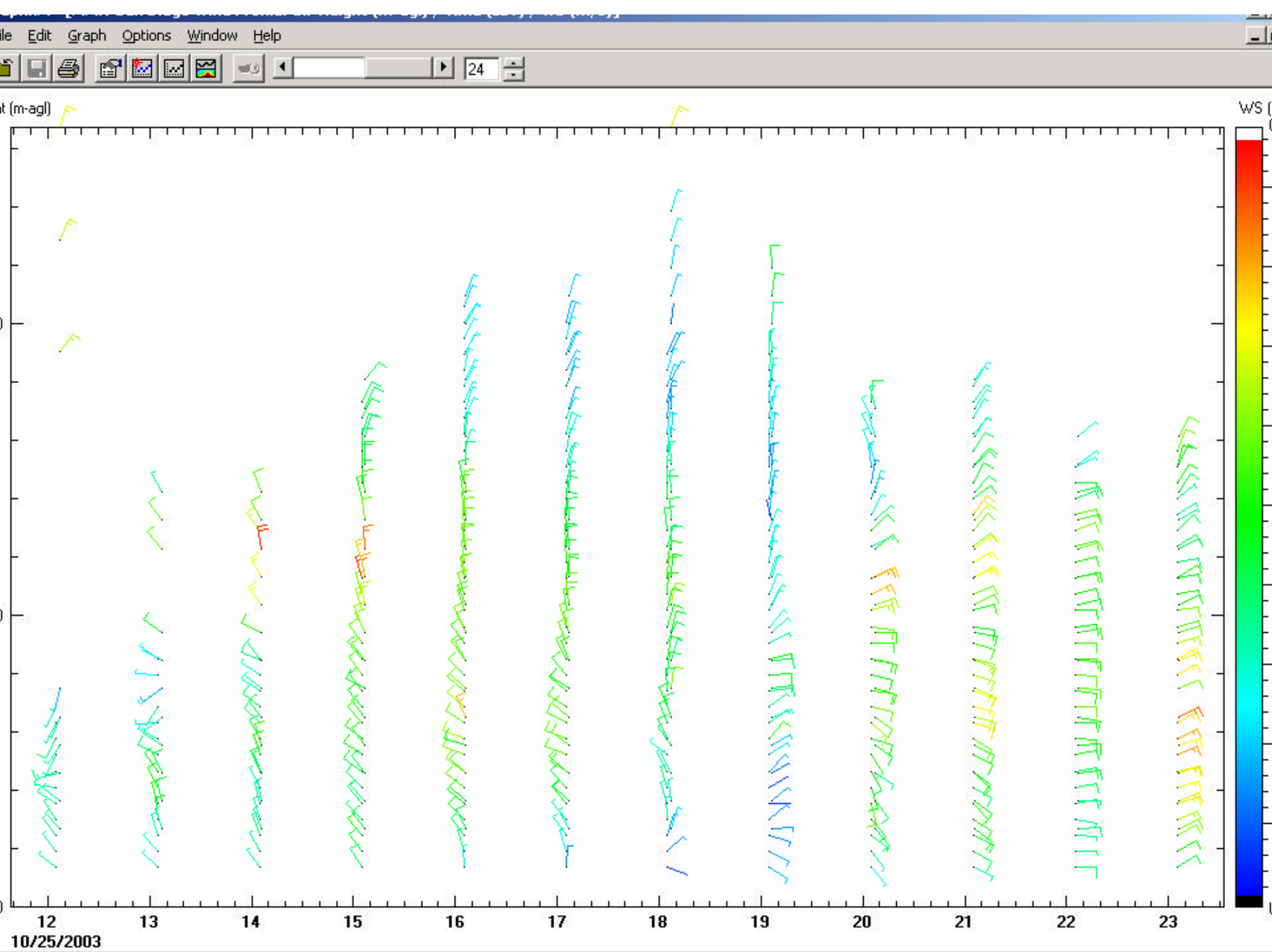
Forecast verification and reporting data limited to two monitoring sites using PM2.5 BAM real-time samplers

San Diego County Monitoring Stations with PM2.5 BAM real-time samplers

The Air Quality Forecast for Sunday, October 26th was made at 4:30 PM on Saturday, October 25th. The forecast was for Moderate levels of PM2.5 throughout the county. Santa Ana winds were expected to increase PM2.5 levels over Saturday values (Good to Moderate).

The Cedar fire began at approximately 5:30 PM on Saturday.


PM2.5 for DTN and ESC - October 25, 2003
PM2.5 (ug/m3)
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour (PST)
DOWNTOWN
ESCONDIDO


File Edit Graph Options Window Help
24
t (m-agl)
WS
12
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19
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21
22
23
10/25/2003

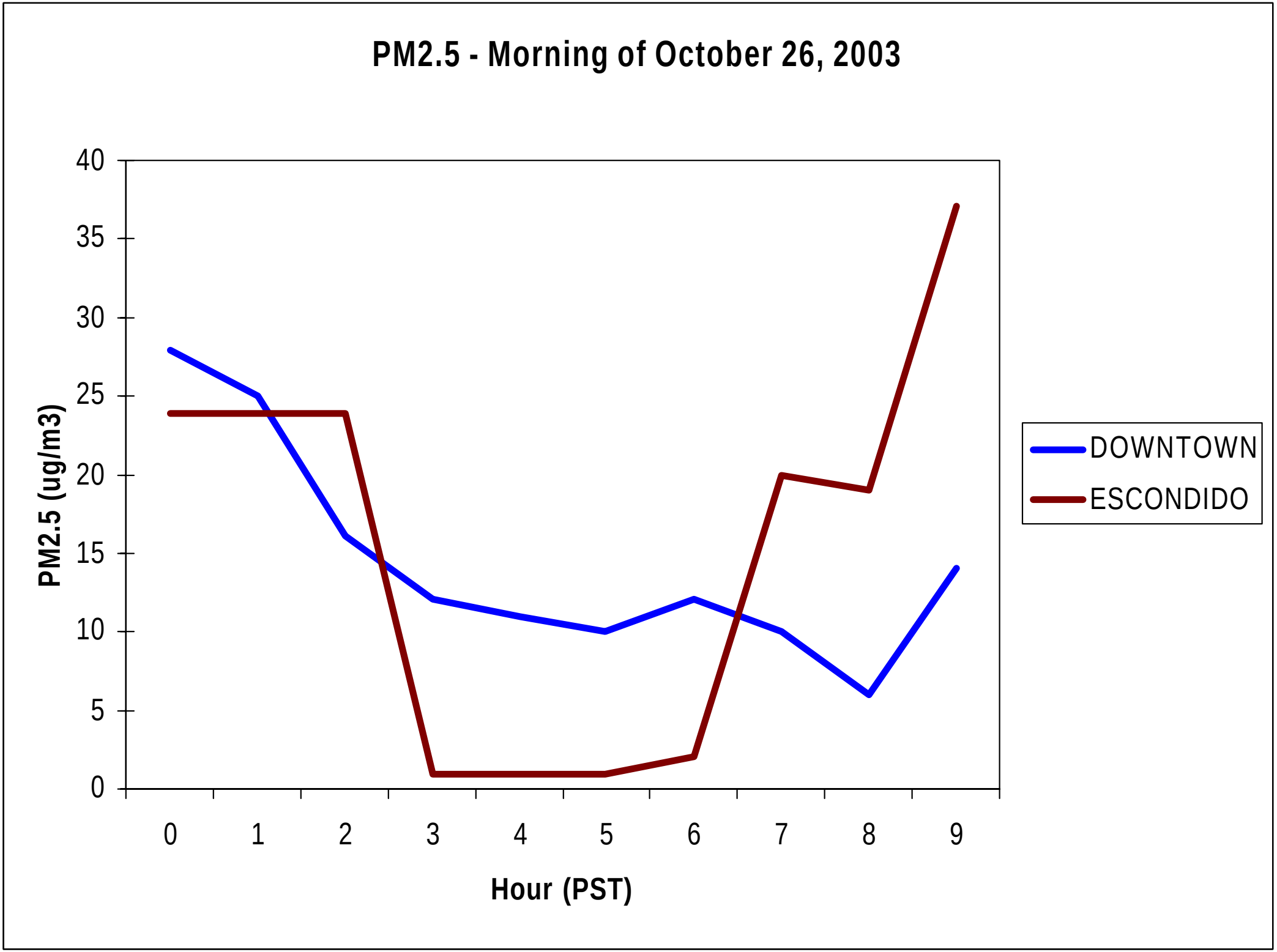
ftp://ftp.cts.com/users/j/t/jtimmer/20031026.txt - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address ftp://ftp.cts.com/users/j/t/jtimmer/20031026.txt

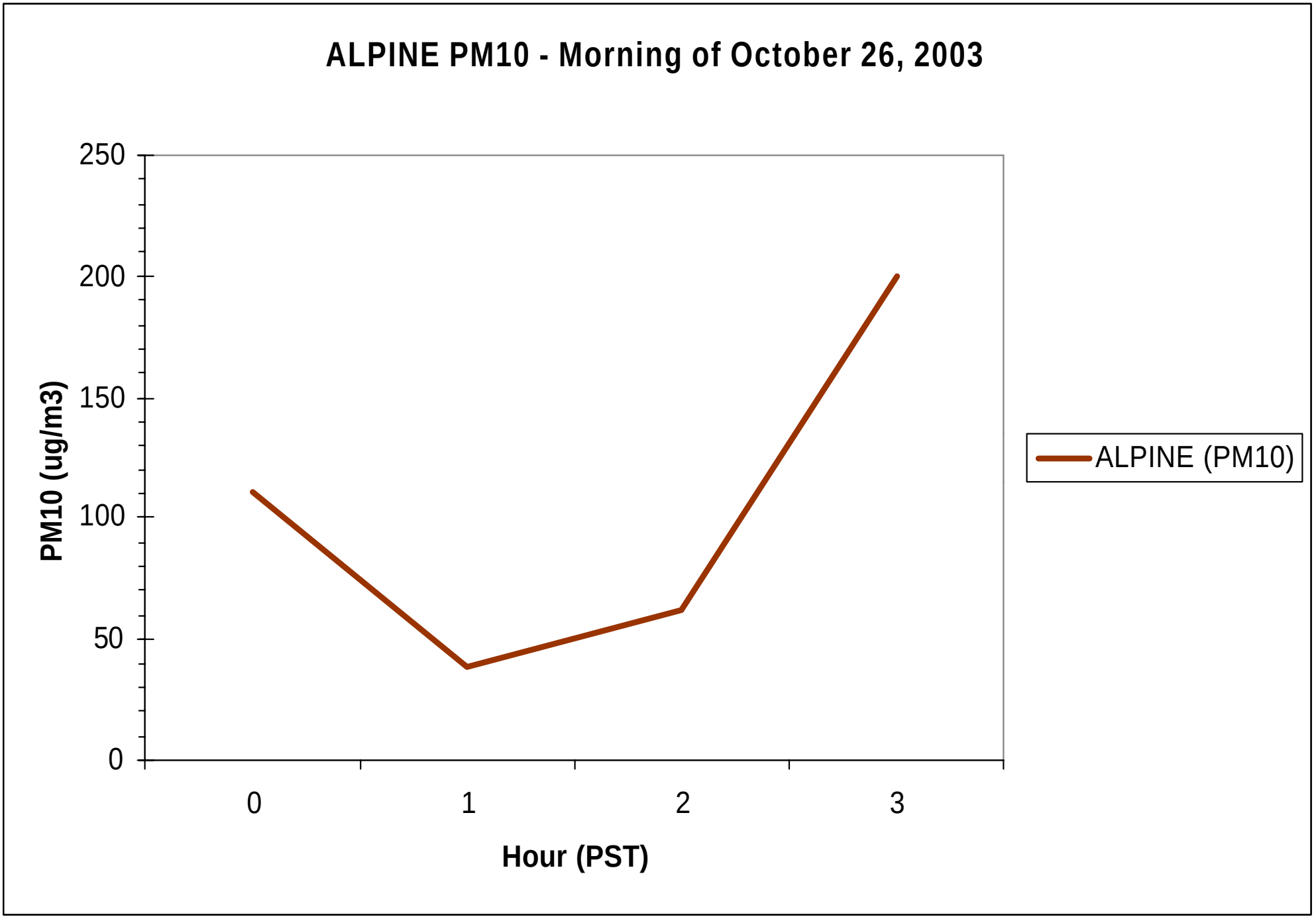
San Diego County Air Pollution Control District - Daily Annex Parameter Detail
Generated: 2003-10-27 01:15:01

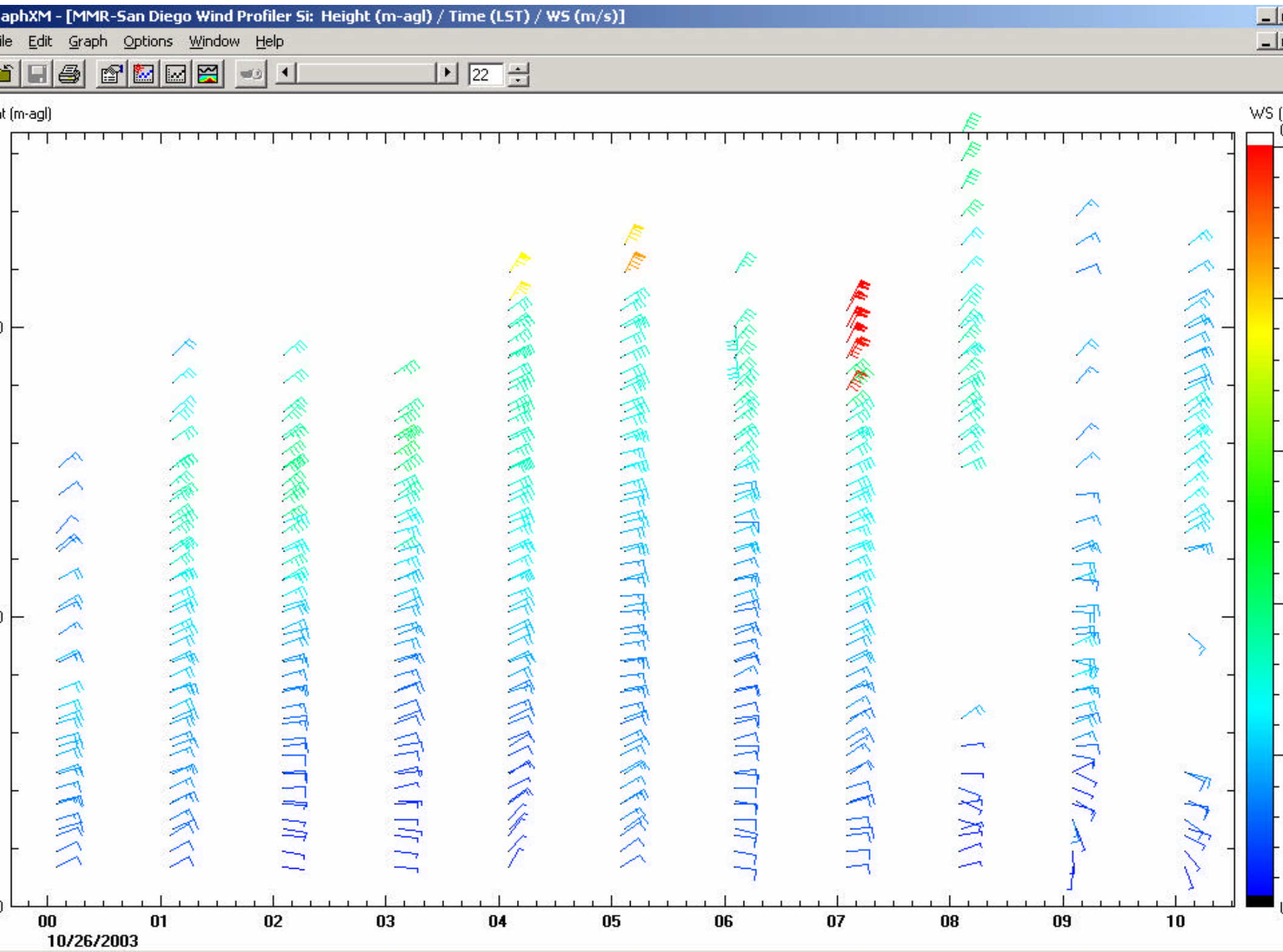
Daily Parameter Detail Report For: 2003-10-26

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	AVG	N
01_OZONE (PPM)																										
ALPINE	.045	.044	.042	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.044	3
CHULA_VI	.002	.002	.004	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.003	3
DEL_MAR	.004	.007	.017	.022	.013	.026	.015	.011	.018	.019	.015	.019	.017	.017	.036	.046	.042	.020	.031	.030	.035	.032	.034	.038	.024	24
DOWNTOWN	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	....	..
EL_CAJON	.000	.000	.000	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.000	3
ESCONDIDO	.002	.002	.006	.008	.009	.004	.003	.011	.007	.004	.027	.037	.051	.056	.048	.046	.034	.003	.002	.002	.002	.002	.002	.002	.015	24
OTAY_MES	.018	.020	.036	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.025	3
OVERLAND	.022	.021	.010	!!!!	.013	.028	.021	.014	.021	.026	.029	.042	.133	.056	.053	.047	.047	.038	.043	.042	.043	.041	.036	.030	.037	23
PENDLETON	.003	.010	.015	.014	.010	.005	.012	.014	.015	.026	.033	.044	.050	.051	.063	.068	.064	.050	.019	.005	.012	.013	.008	.015	.026	24
02_NOX (PPM)																										
ALPINE	.003	.003	.003	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.003	3
CHULA_VI	.060	.051	.040	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.050	3
DOWNTOWN	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	....	..
EL_CAJON	.064	.067	.068	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.066	3
ESCONDIDO	.069	.075	.040	.030	.026	.037	.068	.067	.091	.093	.034	.020	.010	.009	.009	.018	.029	.110	.168	.180	.177	.151	.098	.095	.071	24
OTAY_MES	.021	.017	.001	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.013	3
OVERLAND	.024	.019	.024	!!!!	.025	.013	.019	.032	.080	.021	.019	.035	.134	.044	.034	.034	.041	.025	.031	.040	.040	.039	.034	.049	.037	23
PENDLETON	.048	.033	.023	.023	.026	.041	.031	.031	.034	.020	.014	.009	.007	.007	.007	.007	.008	.013	.070	.091	.045	.038	.047	.031	.029	24
03_NO2 (PPM)																										
ALPINE	.001	.002	.002	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.002	3
CHULA_VI	.044	.037	.034	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.038	3
DOWNTOWN	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	....	..
EL_CAJON	.042	.043	.042	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.042	3
ESCONDIDO	.041	.041	.032	.027	.024	.029	.035	.037	.050	.052	.024	.017	.008	.008	.009	.017	.028	.055	.055	.050	.047	.045	.045	.042	.034	24
OTAY_MES	.019	.017	.002	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.013	3
OVERLAND	.023	.018	.023	!!!!	.023	.012	.018	.027	.034	.018	.016	.021	.109	.042	.033	.032	.039	.023	.029	.038	.038	.037	.032	.045	.032	23
PENDLETON	.030	.025	.021	.021	.022	.027	.022	.019	.021	.015	.011	.007	.006	.006	.006	.006	.007	.013	.043	.055	.038	.033	.035	.027	.022	24
04_NO (PPM)																										
ALPINE	.001	.001	.001	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.001	3
CHULA_VI	.017	.015	.007	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.013	3
DOWNTOWN	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	....	..
EL_CAJON	.021	.024	.026	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.024	3
ESCONDIDO	.028	.033	.008	.003	.002	.008	.033	.030	.042	.041	.010	.004	.002	.001	.001	.001	.001	.055	.113	.130	.130	.106	.054	.053	.037	24
OTAY_MES	.002	.001	####	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.001	3
OVERLAND	.001	.001	.001	!!!!	.002	.001	.002	.006	.046	.003	.005	.014	.025	.003	.002	.002	.002	.002	.002	.002	.003	.002	.002	.004	.006	23
PENDLETON	.018	.008	.002	.002	.004	.014	.009	.011	.014	.005	.003	.002	.001	.001	.001	.001	.001	.001	.027	.036	.007	.005	.012	.004	.008	24
05_SO2 (PPM)																										
CHULA_VI	.002	.003	.002	!!!!	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.002	3
DOWNTOWN	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	!!!!	....	..

Done


PM2.5 - Morning of October 26, 2003
PM2.5 (ug/m3)
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
Hour (PST)
DOWNTOWN
ESCONDIDO


ALPINE PM10 - Morning of October 26, 2003
250
200
150
100
50
0
PM10 (ug/m3)
0
1
2
3
Hour (PST)
ALPINE (PM10)


aphXM - [MMR-San Diego Wind Profiler Si: Height (m-agl) / Time (LST) / WS (m/s)]
ile Edit Graph Options Window Help
22
t (m-agl)
WS (
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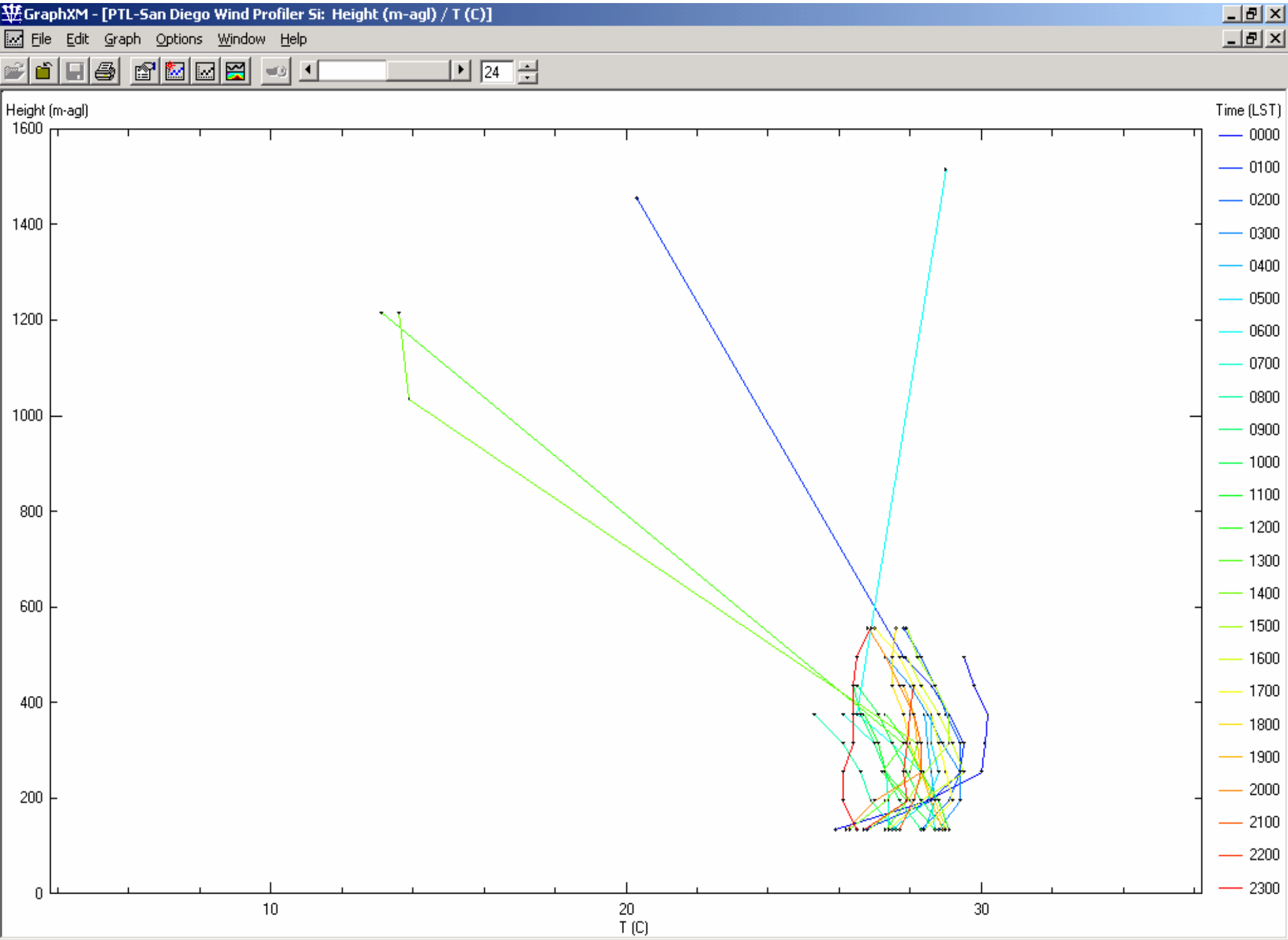
01
02
03
04
05
06
07
08
09
10
10/26/2003


GraphXM - [PTL-San Diego Wind Profiler Si: Height (m-agl) / T (C)]
File Edit Graph Options Window Help
24
Height (m-agl)
1600
1400
1200
1000
800
600
400
200
0
10
20
30
T (C)
Time (LST)
0000
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
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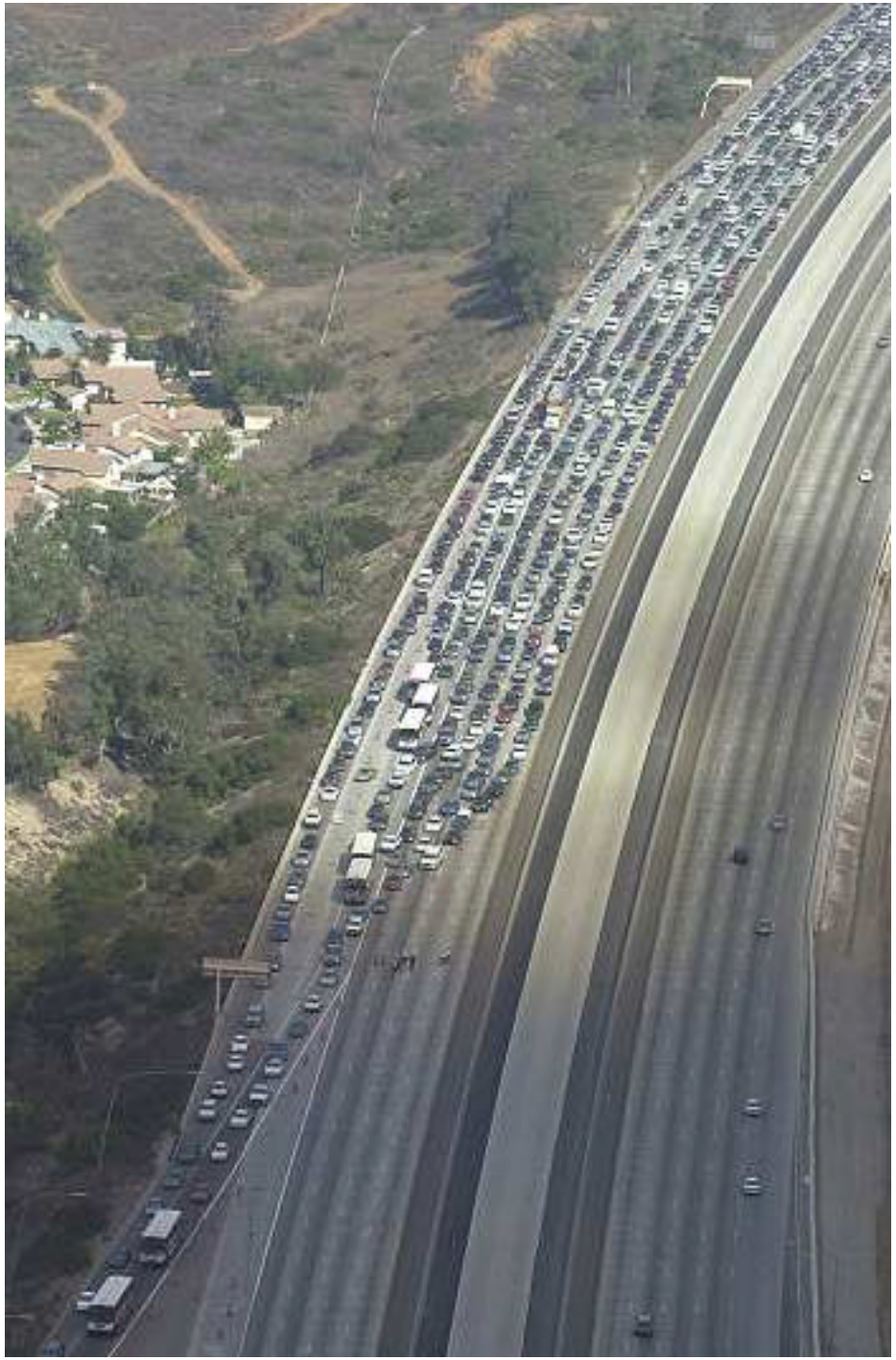
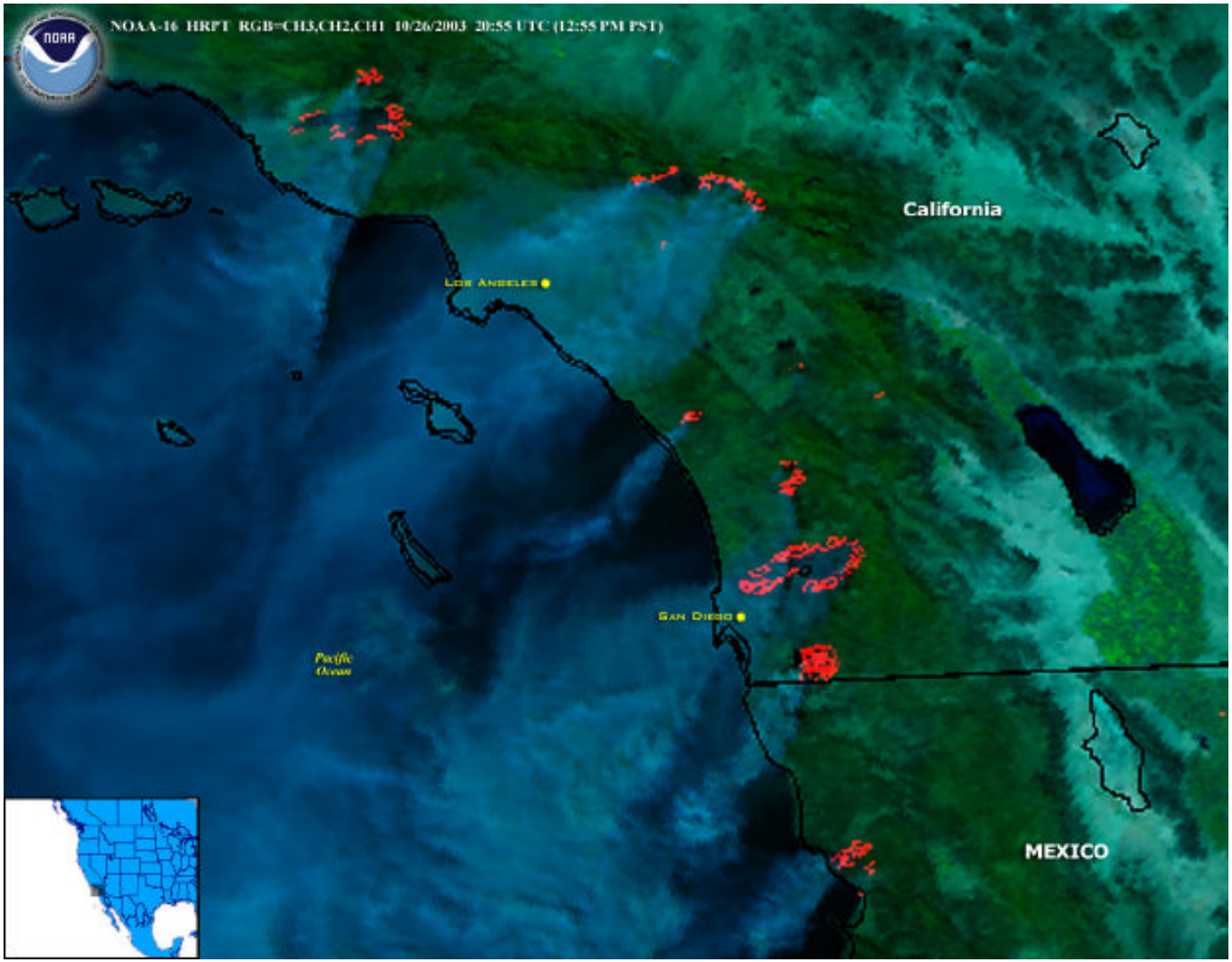
1800
1900
2000
2100
2200
2300



SOUTH
15
NORTH
4WVU495

Satellite Image from October 26, 2003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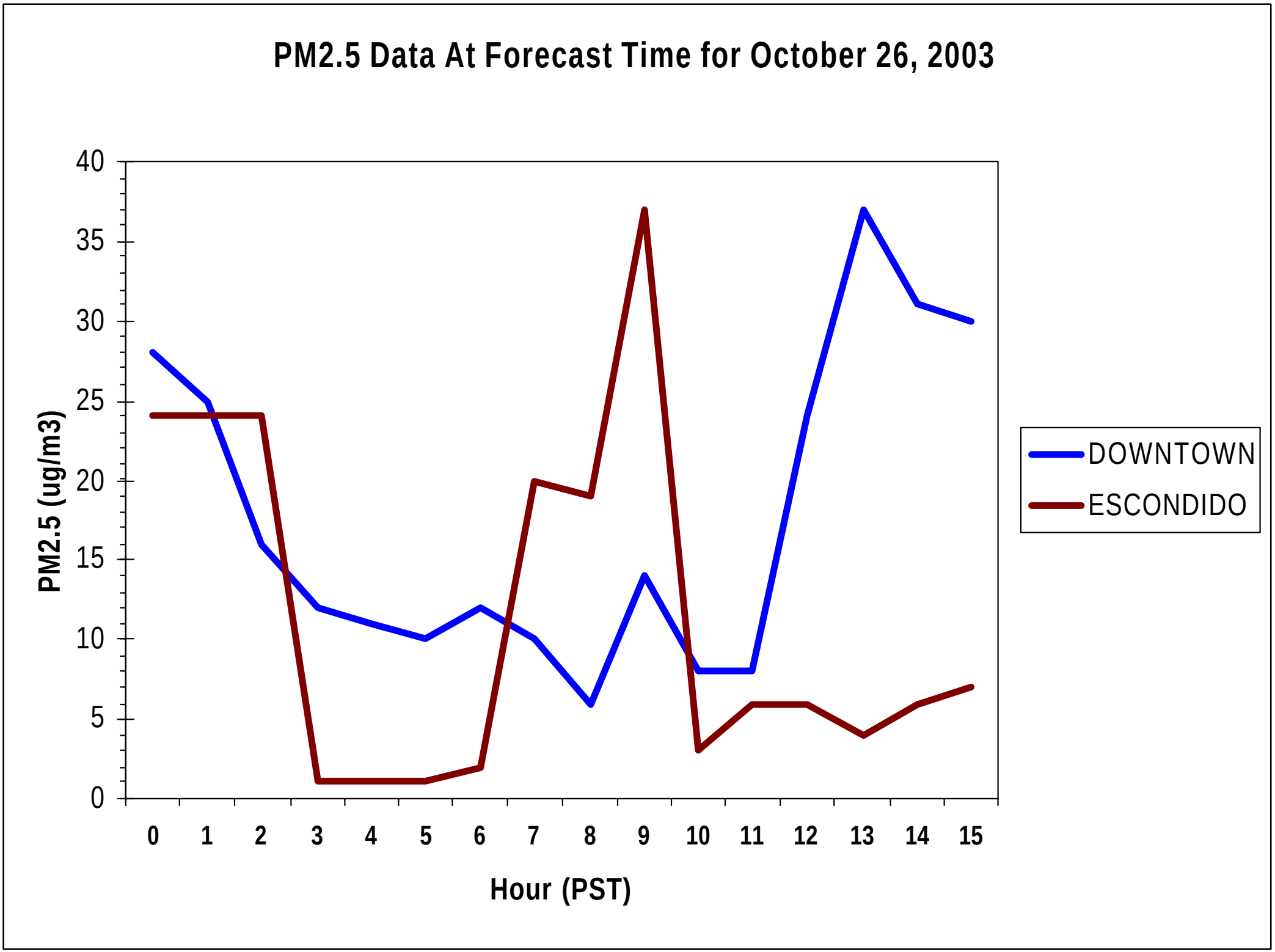
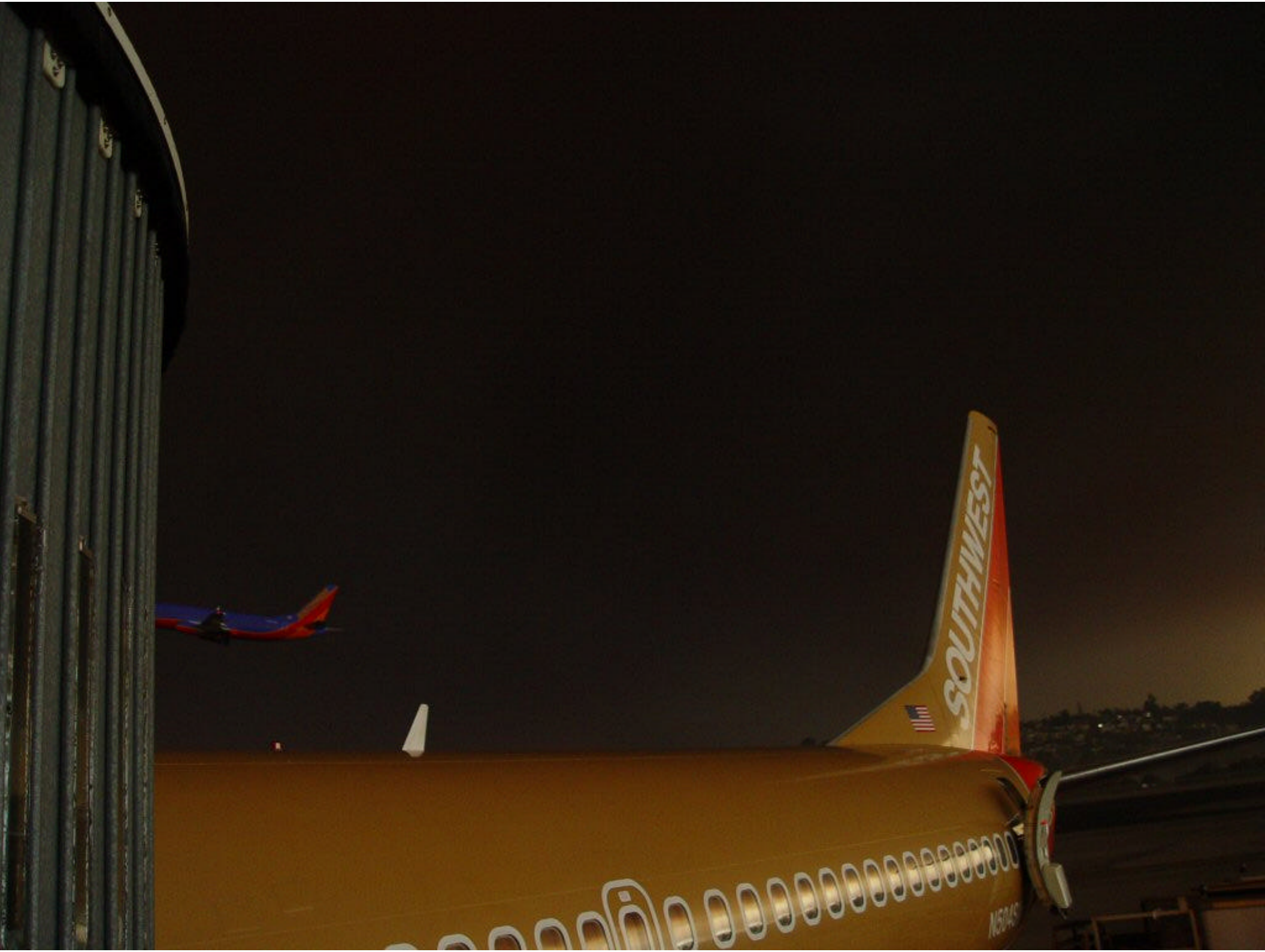
California
Los Angeles
San Diego
Pacific Ocean
MEXICO

NOAA-16 HRPT RGB=CH3,CH2,CH1 10/26/2003 20:55 UTC (12:55 PM PST)
Nevada
California
LOS ANGELES
Arizona
SAN DIEGO
Pacific Ocean
MEXICO


PM2.5 Data At Forecast Time for October 26, 2003
PM2.5 (ug/m3)
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Hour (PST)
DOWNTOWN
ESCONDIDO


SOUTHWEST

SOUTHWEST
SOUTHWEST

SOUTHWEST

OCT 26 2003

FINISHER

Air Pollution Report and Forecast:

Dated Sunday, October 26, 2003

Today is Sunday, October 26, 2003.

Due to the severity of the fires affecting San Diego County, some of our air monitoring stations are not reporting real-time data. Therefore, our normal air quality forecast and report has been superceded by the following:

In areas of heavy smoke, assume that air quality levels are unhealthy for sensitive groups to unhealthy for all individuals. In areas with minor smoke impacts, assume that air quality levels are moderate to unhealthy for sensitive groups. The responsible pollutant is fine particulate matter of 2.5 micrometers and less in diameter, known as PM2.5.

In areas where you smell smoke it is advised that you limit physical activity. If possible, stay indoors to limit your exposure to fine particulate matter.

This recording will be updated as we get more information.

Thank you.

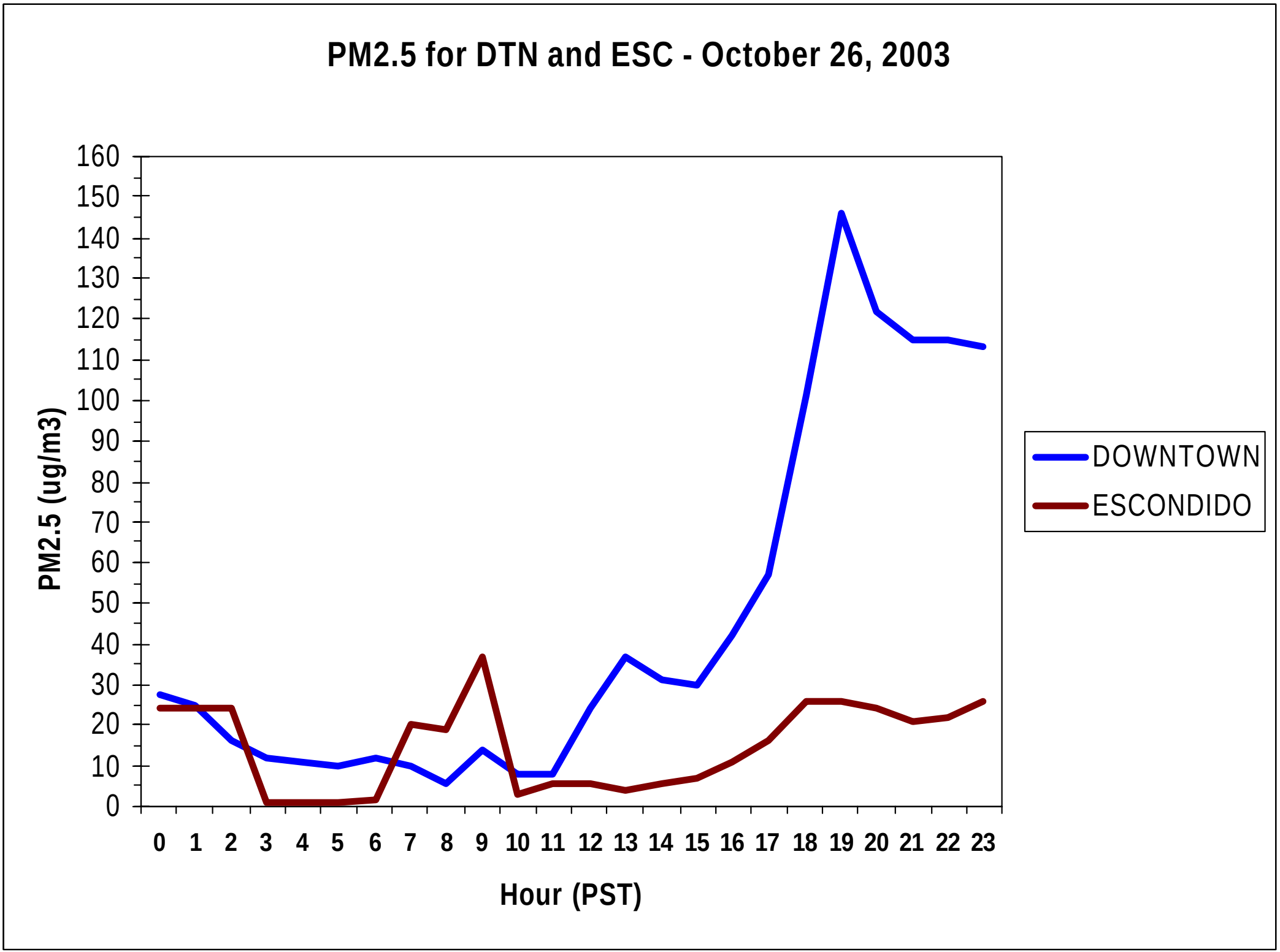
WCB / 1600 PST

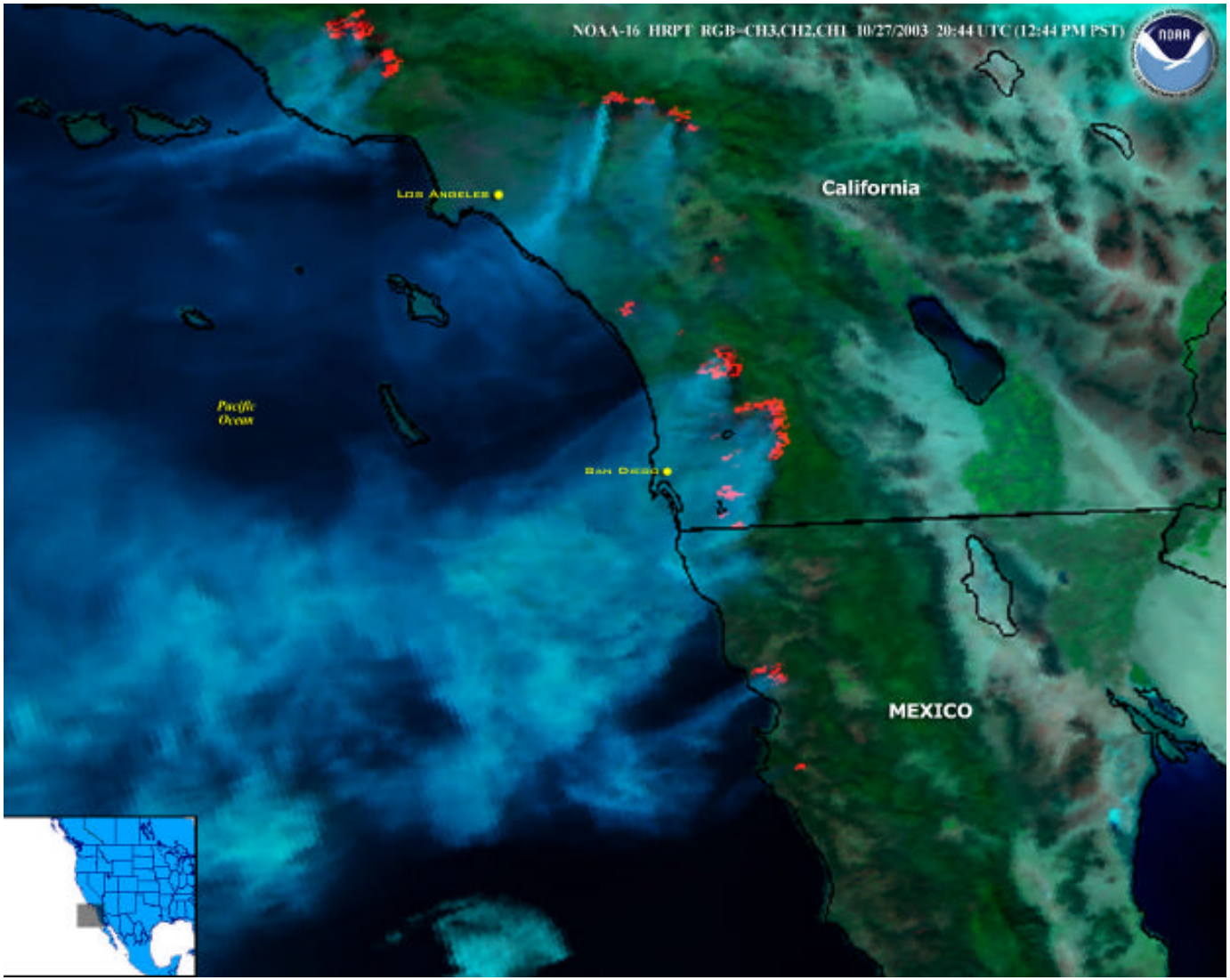
By Sunday afternoon, we knew that the Santa Ana winds would continue, but with decreasing strength over the next few days.

We forecasted continued poor fire and air quality conditions through Wednesday, when conditions would start to improve.

We still had many rough days ahead!

Alpine 7
El Cajon 21
San Diego 37


PM2.5 for DTN and ESC - October 26, 2003
PM2.5 (ug/m3)
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour (PST)
DOWNTOWN
ESCONDIDO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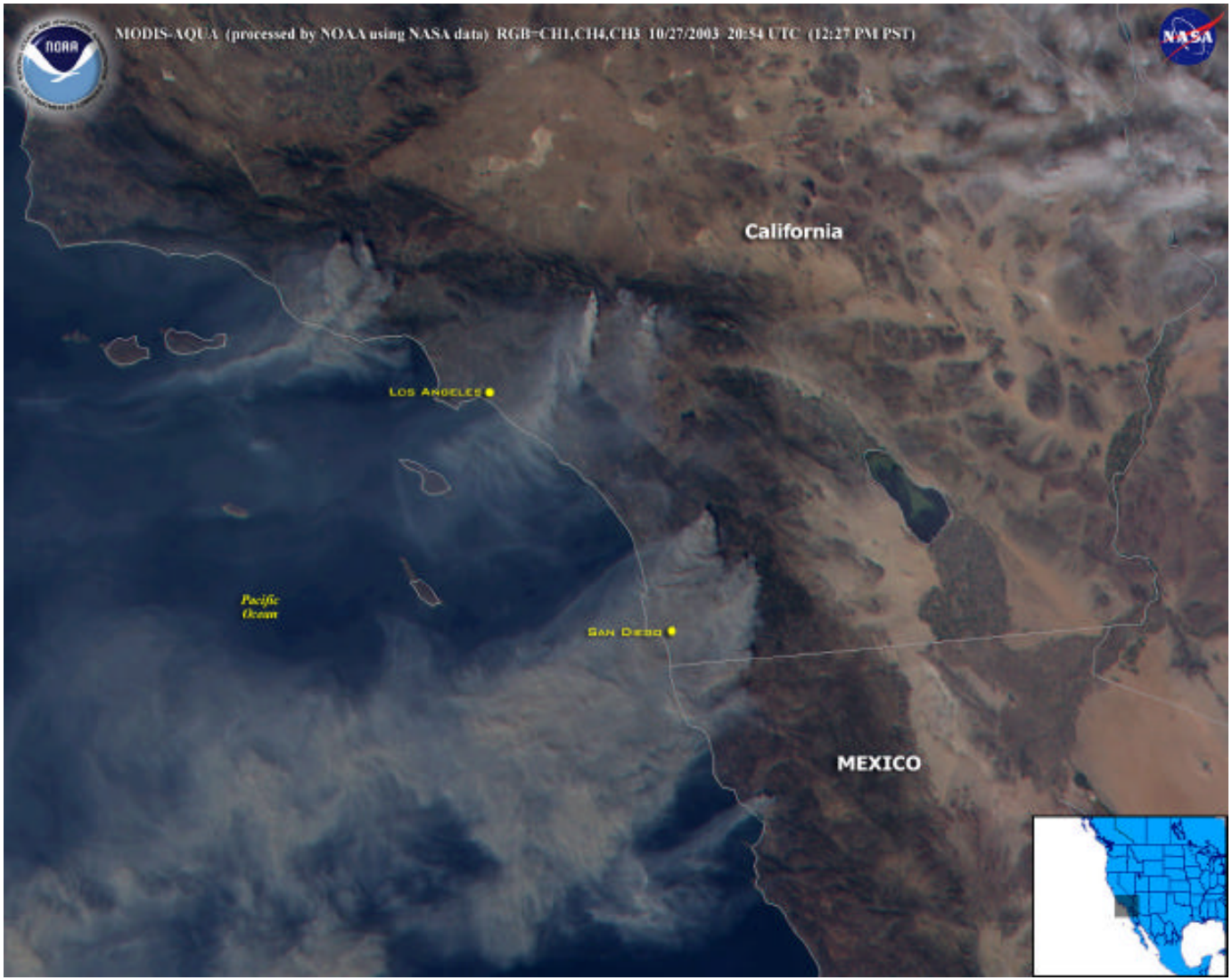
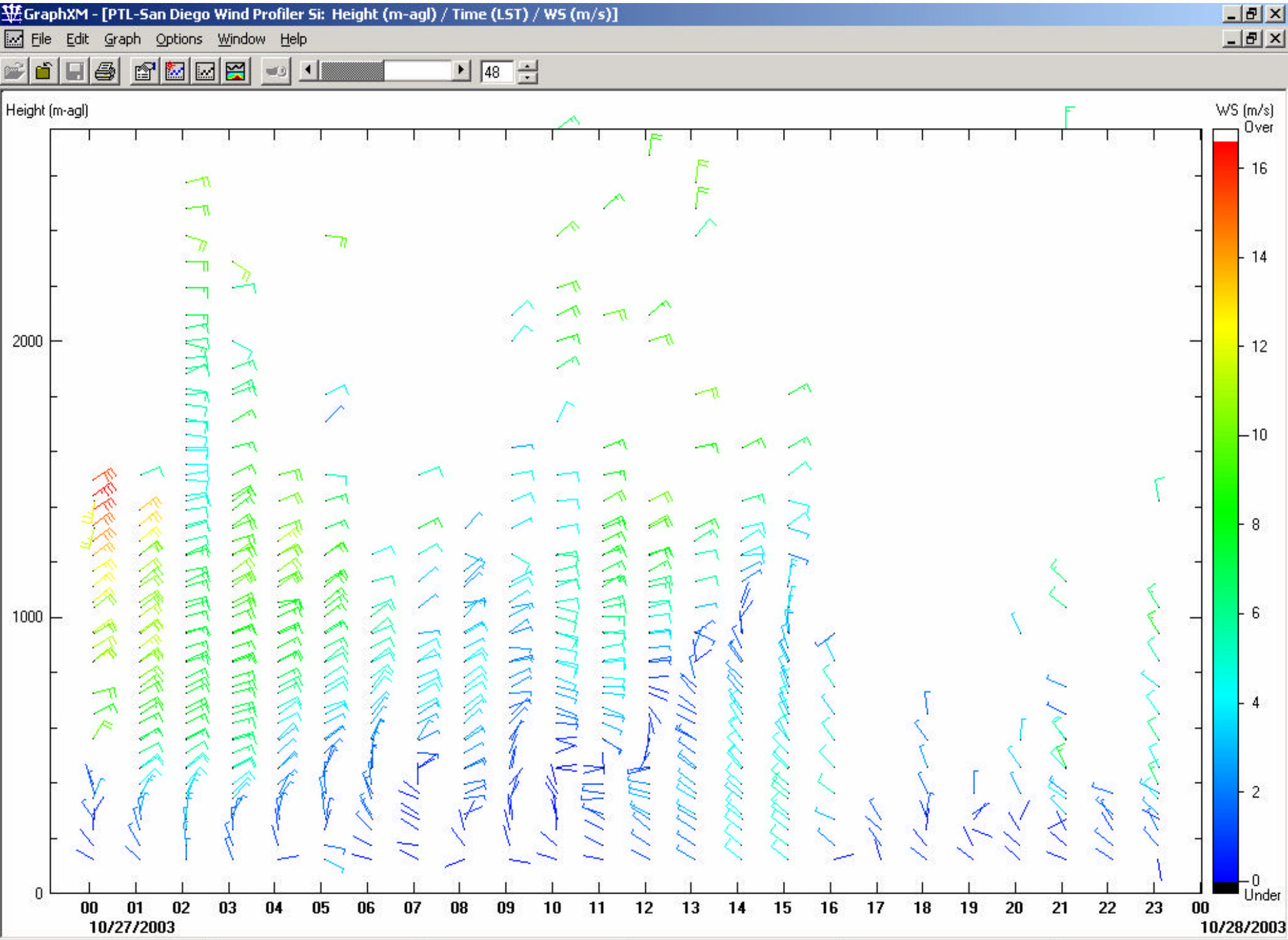
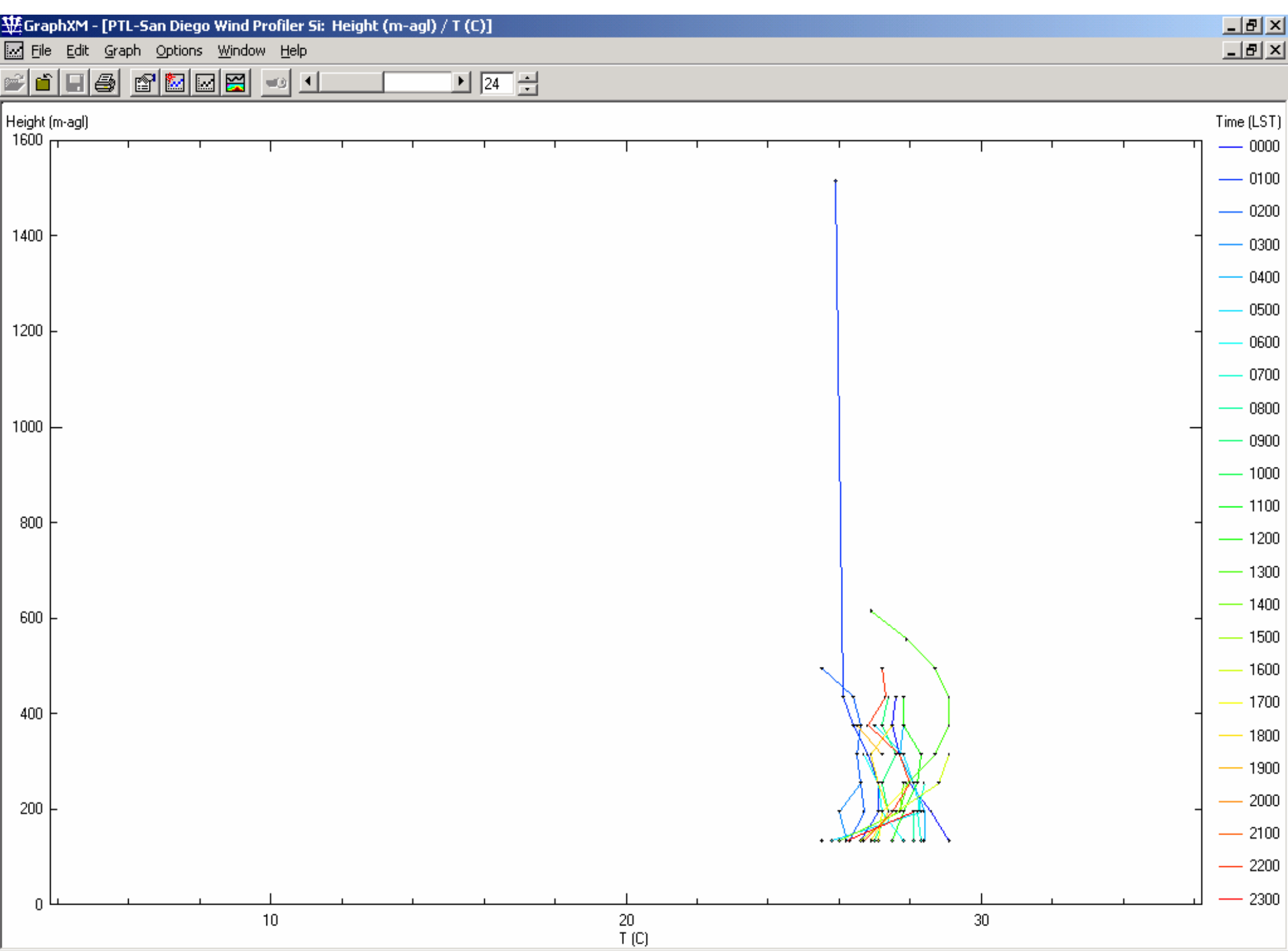
NOAA
Los Angeles
California
Pacific Ocean
San Diego
MEXICO


MODIS-AQUA (processed by NOAA using NASA data) RGB=CH1,CH4,CH3 10/27/2003 20:54 UTC (12:27 PM PST)
California
LOS ANGELES
Pacific Ocean
SAN DIEGO
MEXICO


GraphXM - [PTL-San Diego Wind Profiler Si: Height (m-agl) / Time (LST) / WS (m/s)]
File Edit Graph Options Window Help
48
Height (m-agl)
2000
1000
0
WS (m/s)
Over
16
14
12
10
8
6
4
2
0
Under
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 00
10/27/2003
10/28/2003


GraphXM - [PTL-San Diego Wind Profiler Si: Height (m-agl) / T (C)]
File Edit Graph Options Window Help
24
Height (m-agl)
1600
1400
1200
1000
800
600
400
200
0
10
20
30
T (C)
Time (LST)
0000
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
1400
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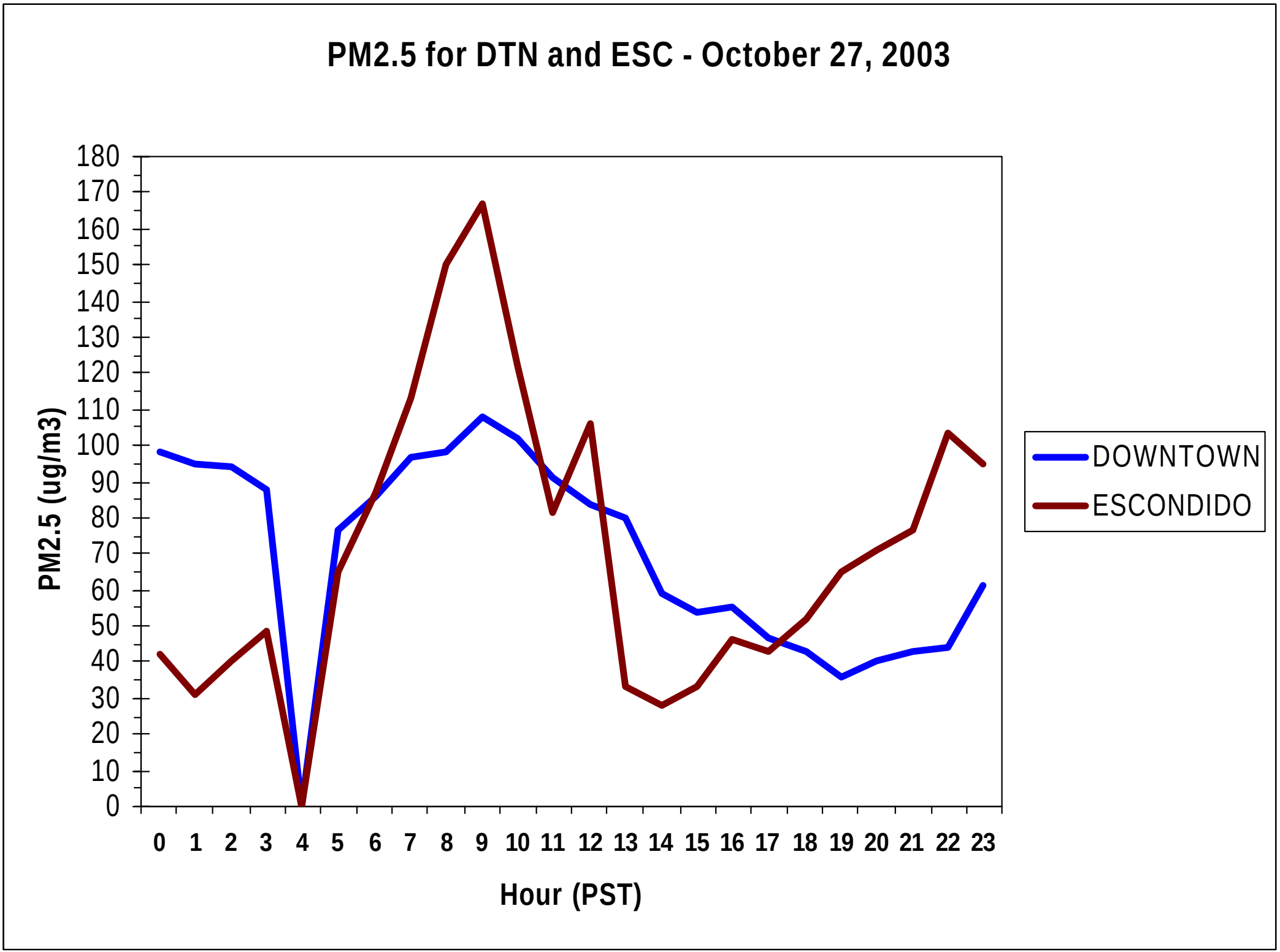
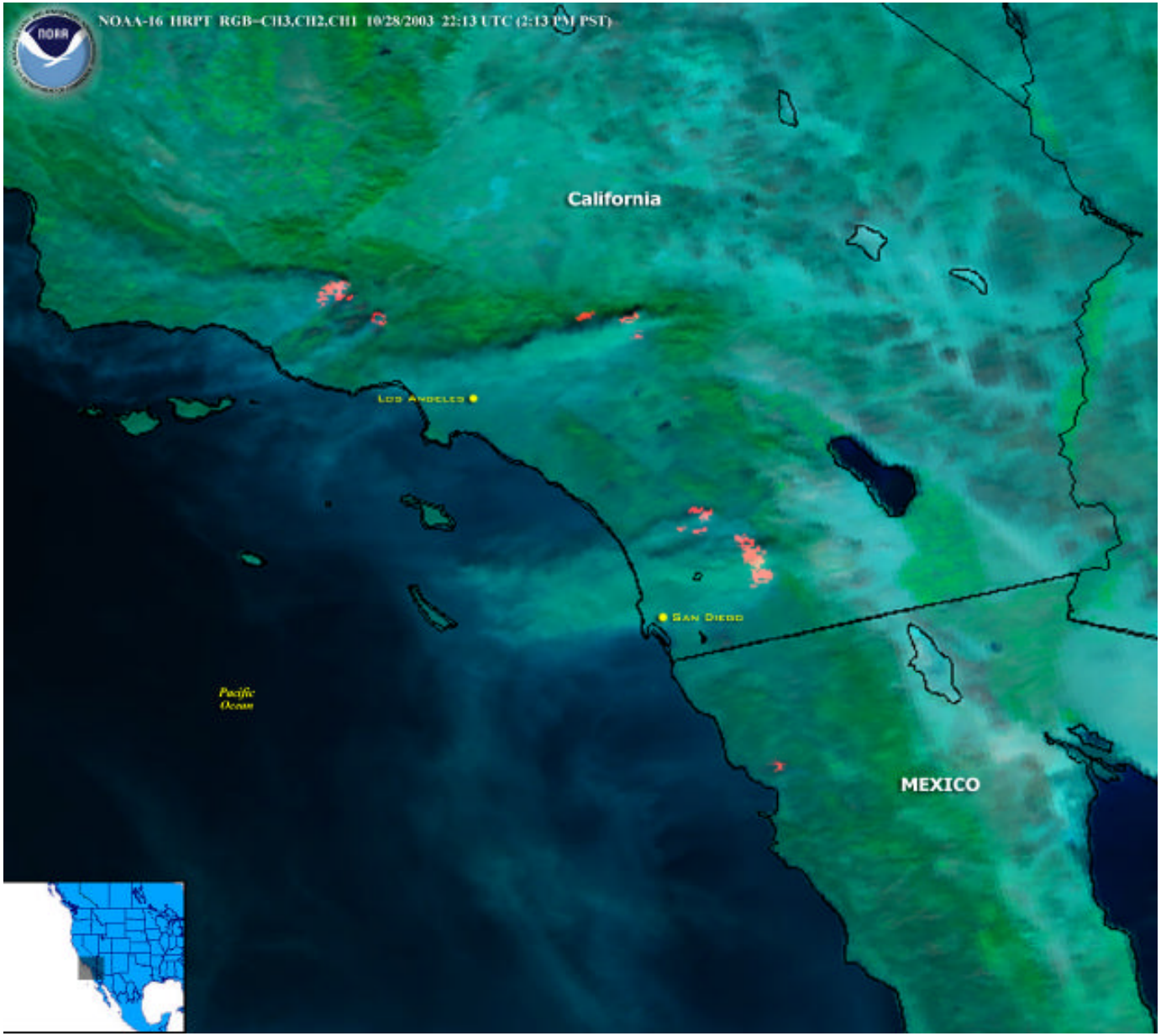
1800
1900
2000
2100
2200
2300


PM2.5 for DTN and ESC - October 27, 2003
PM2.5 (ug/m3)
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour (PST)
DOWNTOWN
ESCONDIDO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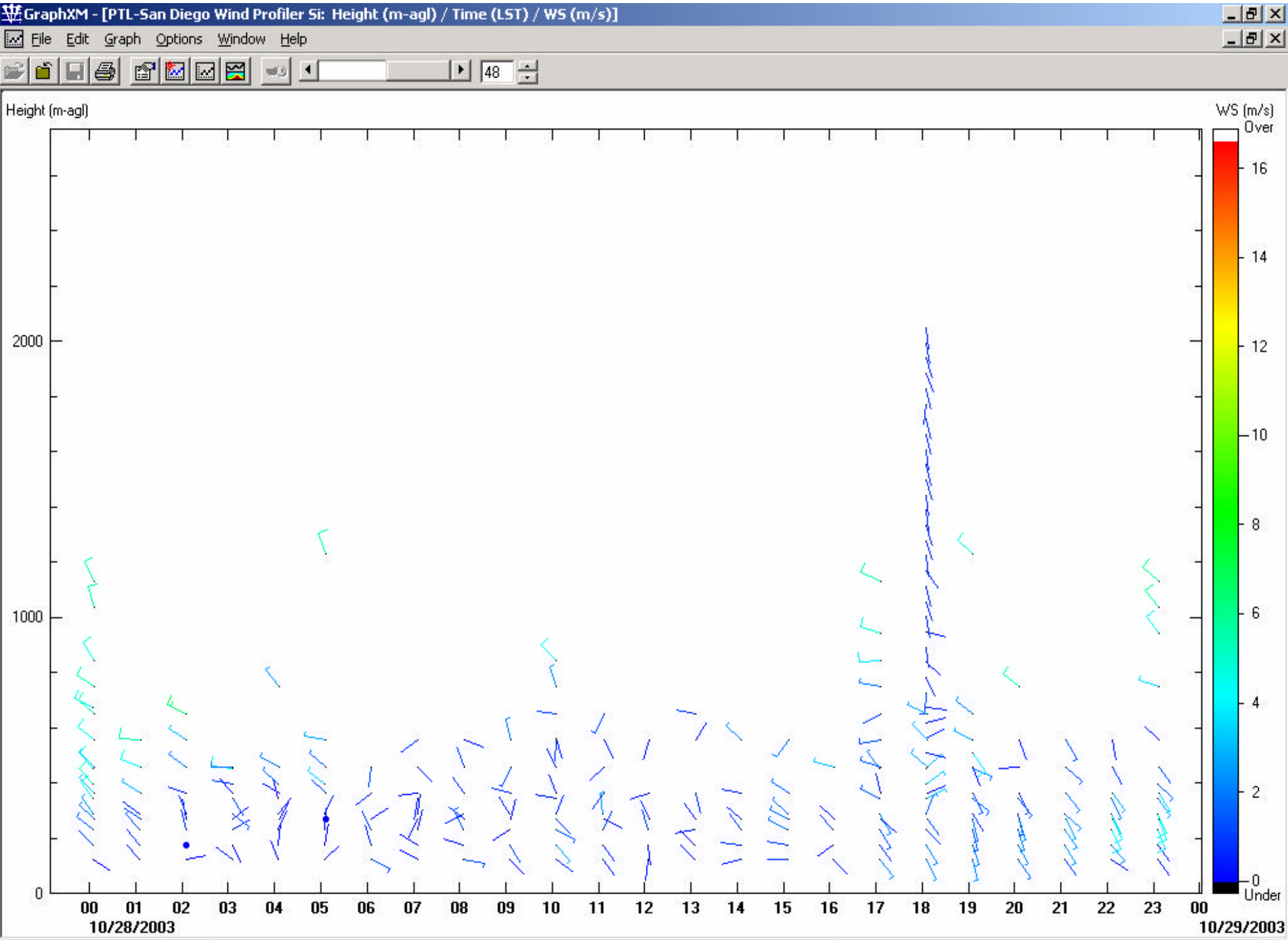
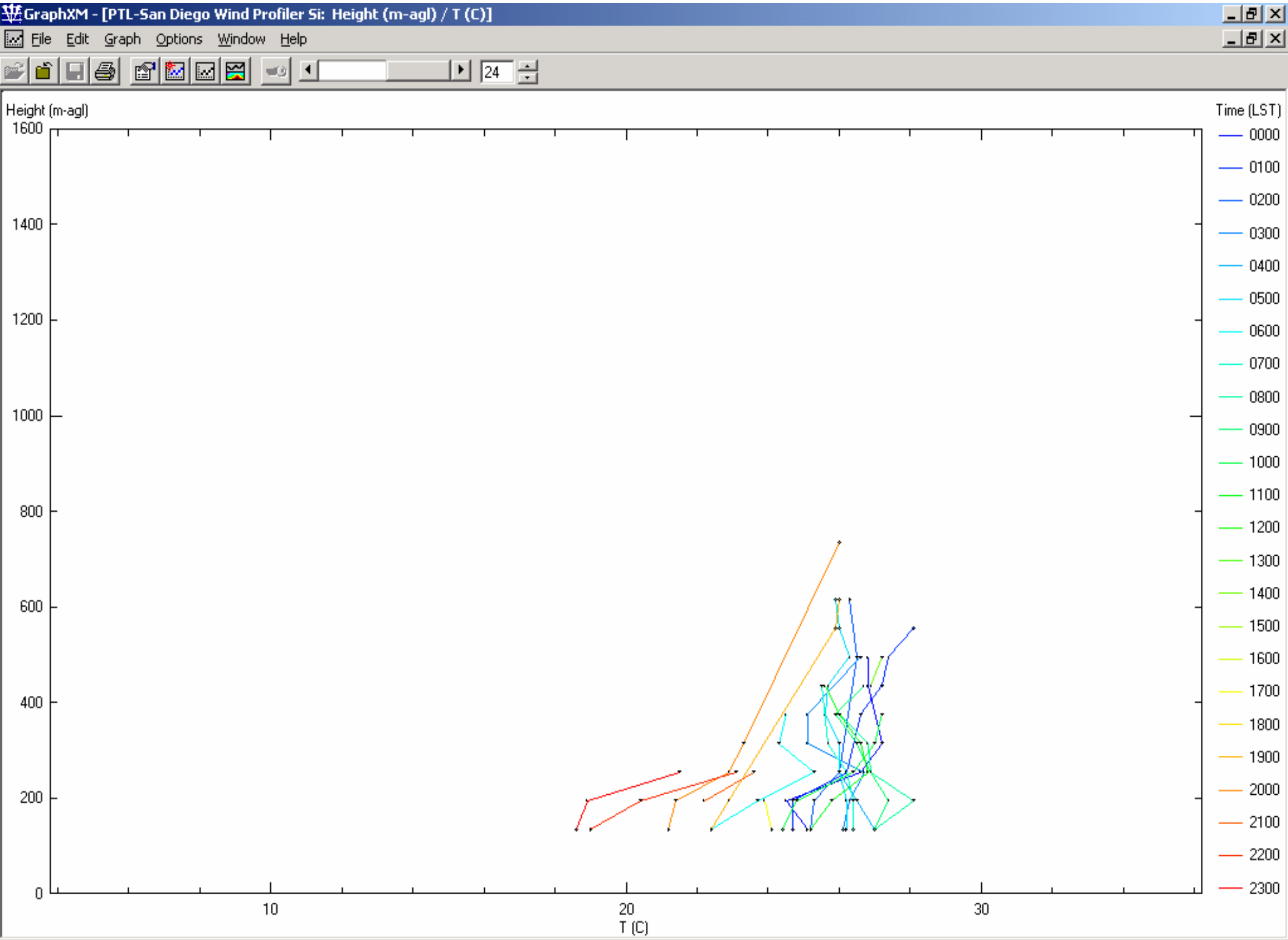
California
Los Angeles
San Diego
Pacific Ocean
MEXICO


GraphXM - [PTL-San Diego Wind Profiler Si: Height (m-agl) / Time (LST) / WS (m/s)]
File Edit Graph Options Window Help
48
Height (m-agl)
2000
1000
0
WS (m/s)
Over
16
14
12
10
8
6
4
2
0
Under
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 00
10/28/2003
10/29/2003


GraphXM - [PTL-San Diego Wind Profiler Si: Height (m-agl) / T (C)]
File Edit Graph Options Window Help
24
Height (m-agl)
1600
1400
1200
1000
800
600
400
200
0
10
20
30
T (C)
Time (LST)
0000
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
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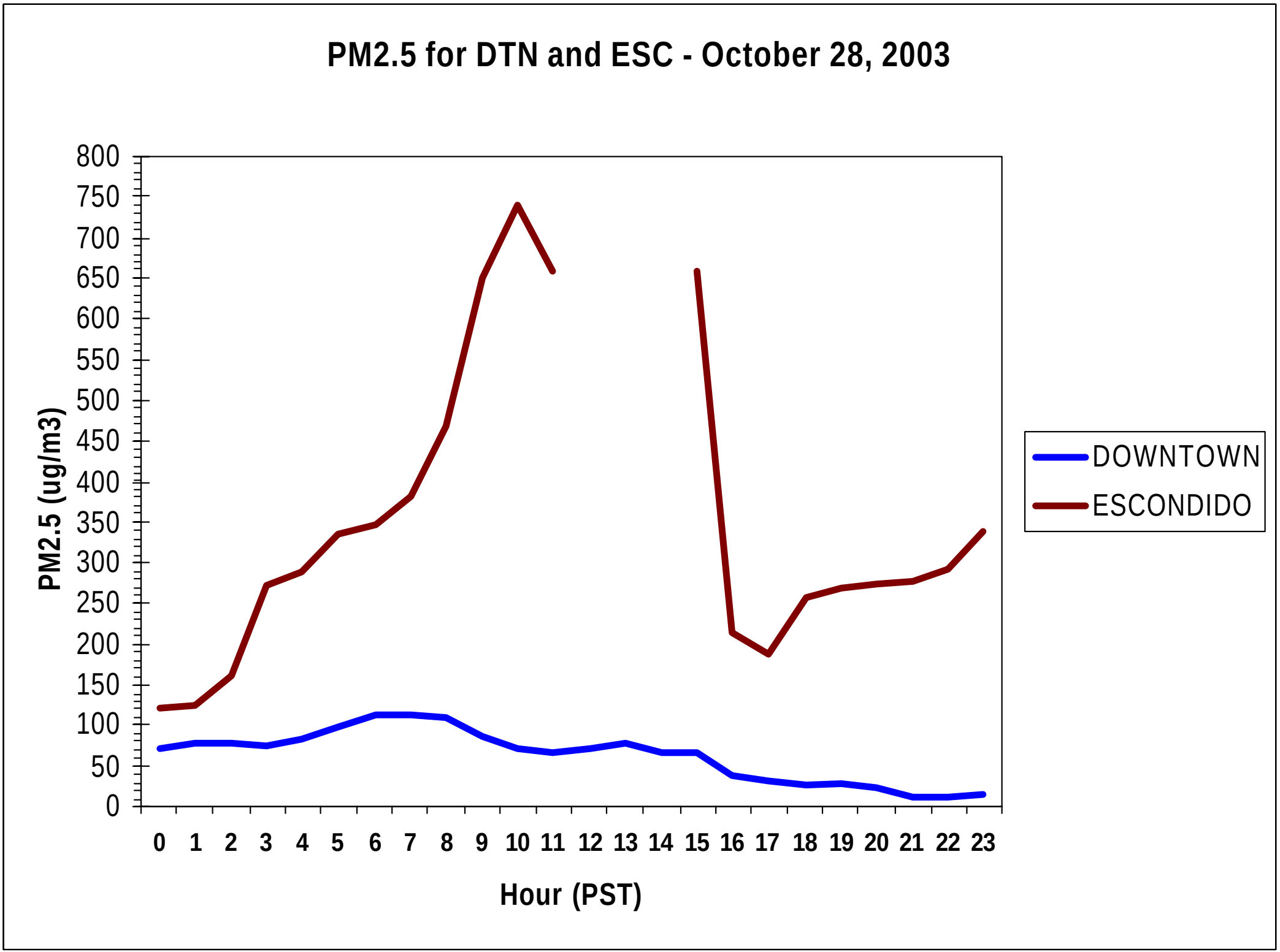
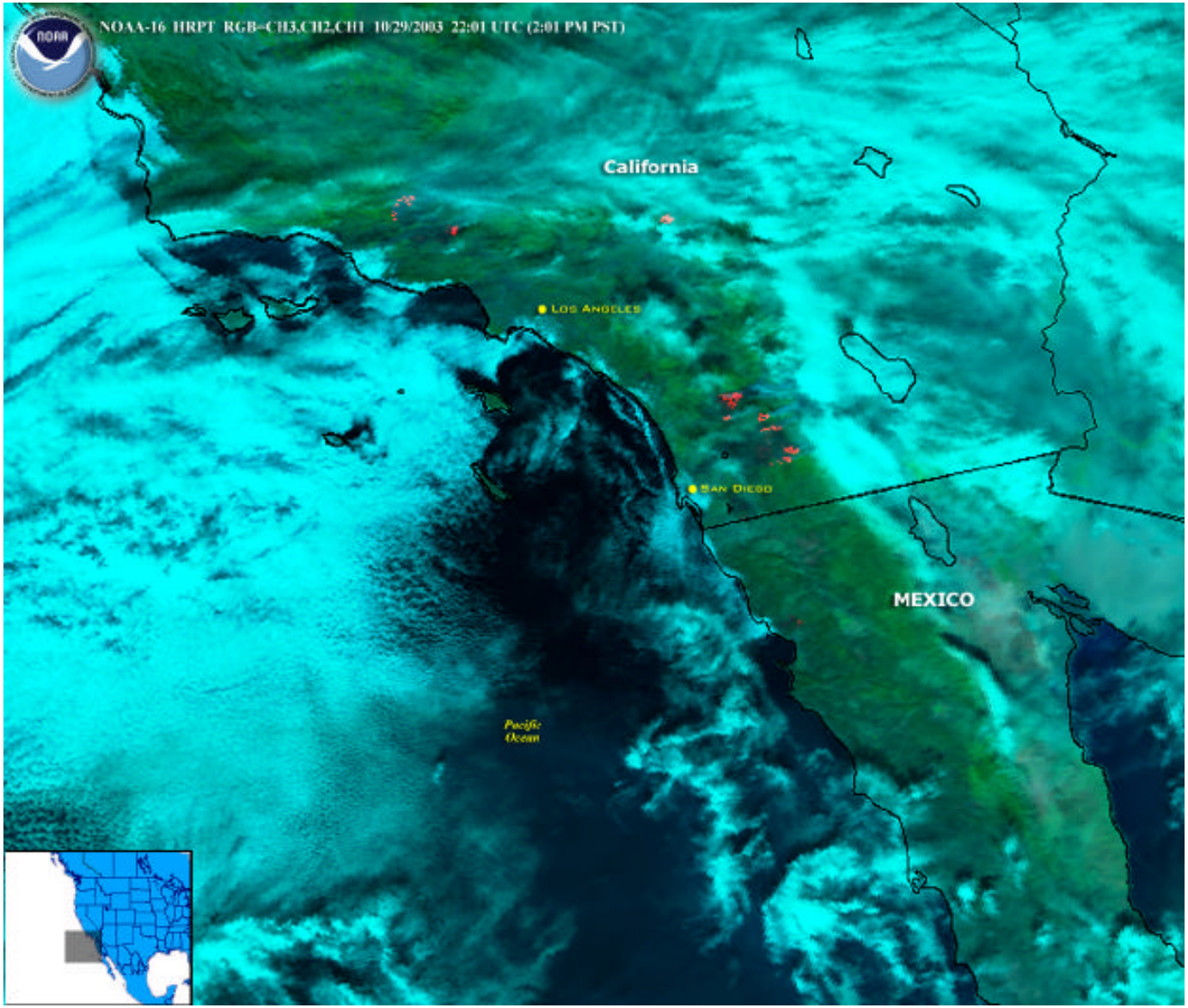
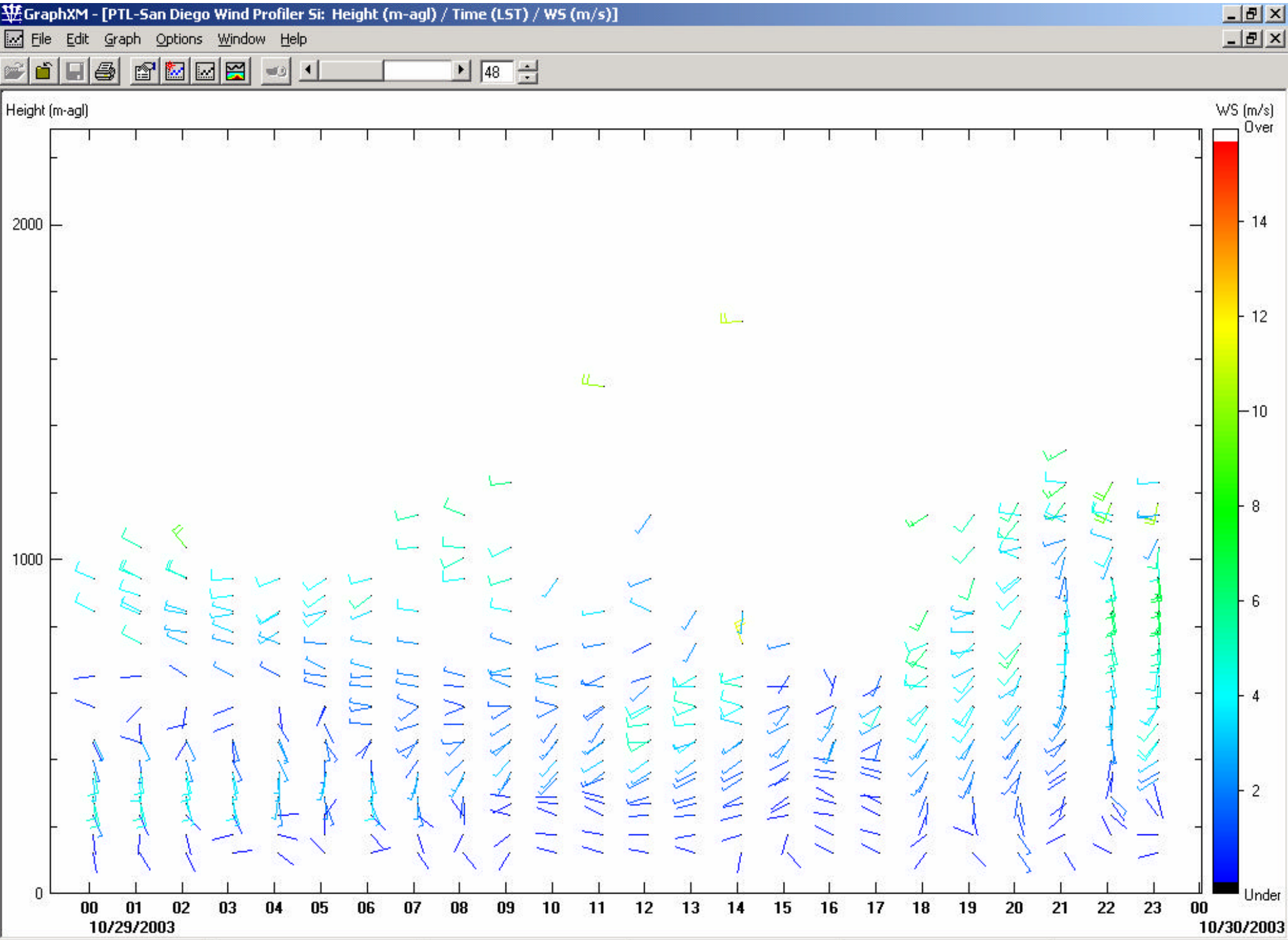
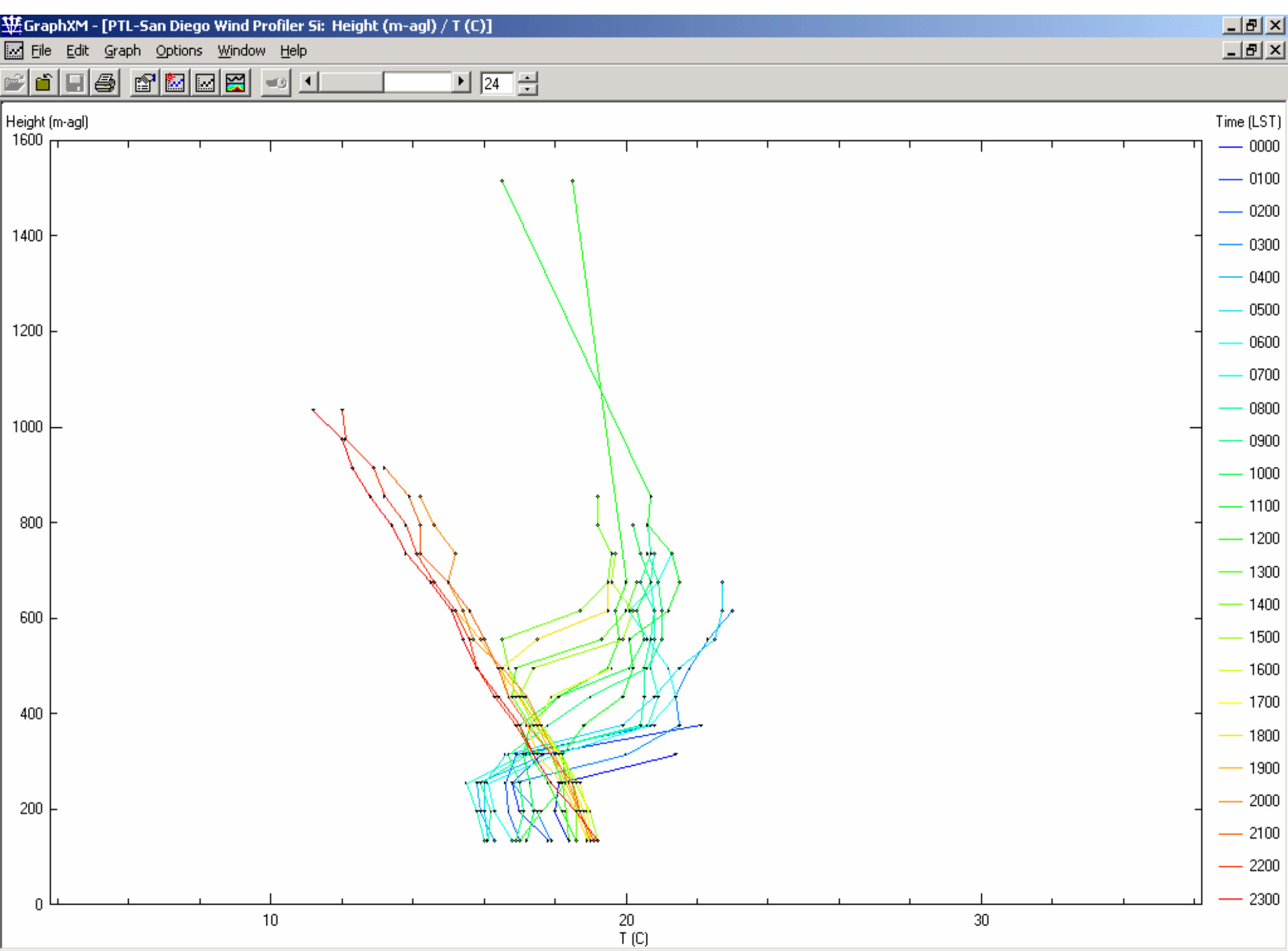
1800
1900
2000
2100
2200
2300

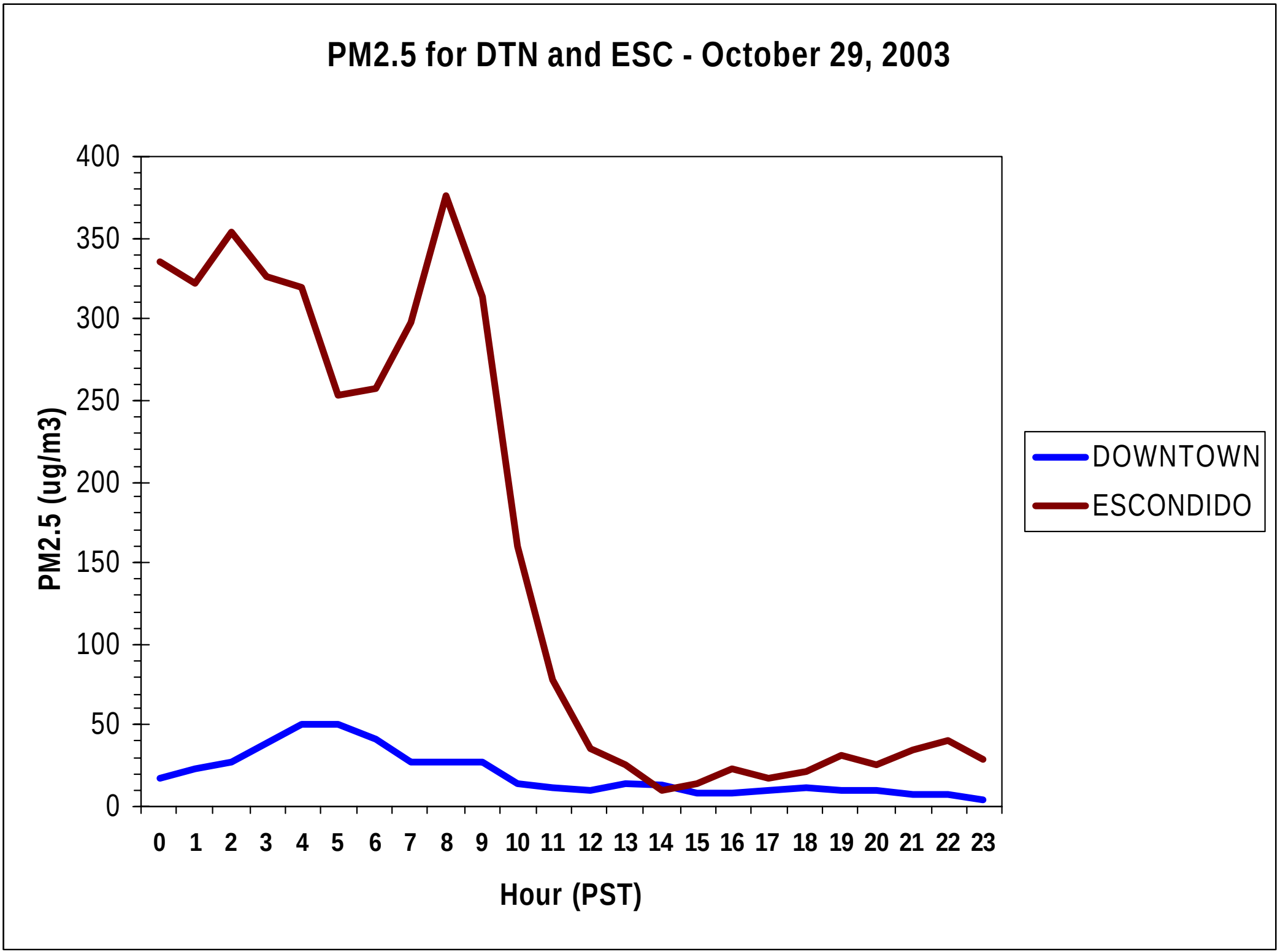

PM2.5 for DTN and ESC - October 28, 2003
PM2.5 (ug/m3)
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour (PST)
DOWNTOWN
ESCONDIDO

UFCW
VONS
EMPLOYEES
ON
STRIKE
UFCW
VONS
EMPLOYEES
ON
STRIKE


NOAA-16 HRPT RGB--CH3,CH2,CH1 10/29/2003 22:01 UTC (2:01 PM PST)
California
LOS ANGELES
SAN DIEGO
MEXICO
Pacific Ocean


GraphXM - [PTL-San Diego Wind Profiler Si: Height (m-agl) / Time (LST) / WS (m/s)]
File Edit Graph Options Window Help
48
Height (m-agl)
2000
1000
0
WS (m/s)
Over
14
12
10
8
6
4
2
Under
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 00
10/29/2003
10/30/2003


GraphXM - [PTL-San Diego Wind Profiler Si: Height (m-agl) / T (C)]
File Edit Graph Options Window Help
24
Height (m-agl)
1600
1400
1200
1000
800
600
400
200
0
10
20
30
T (C)
Time (LST)
0000
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300

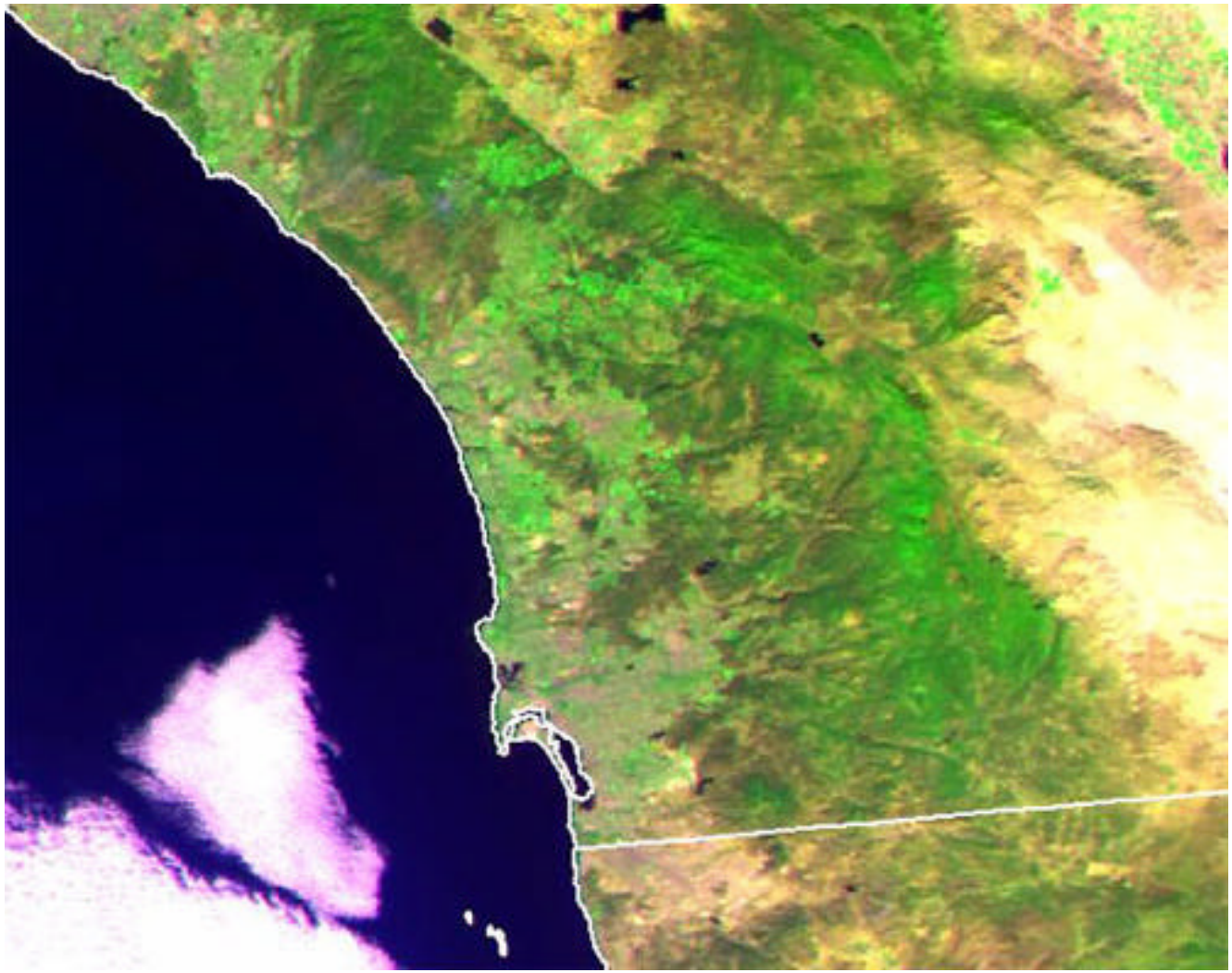

PM2.5 for DTN and ESC - October 29, 2003
PM2.5 (ug/m3)
400
350
300
250
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour (PST)
DOWNTOWN
ESCONDIDO

FIRE SUMMARY

- Worst fire in recent California history
- 392,000 acres burned in San Diego County
- 2574 homes and 2700 other structures destroyed
- $900,000,000 in damage (increasing)
- 16 confirmed dead
- 4 days of unhealthy-hazardous air quality

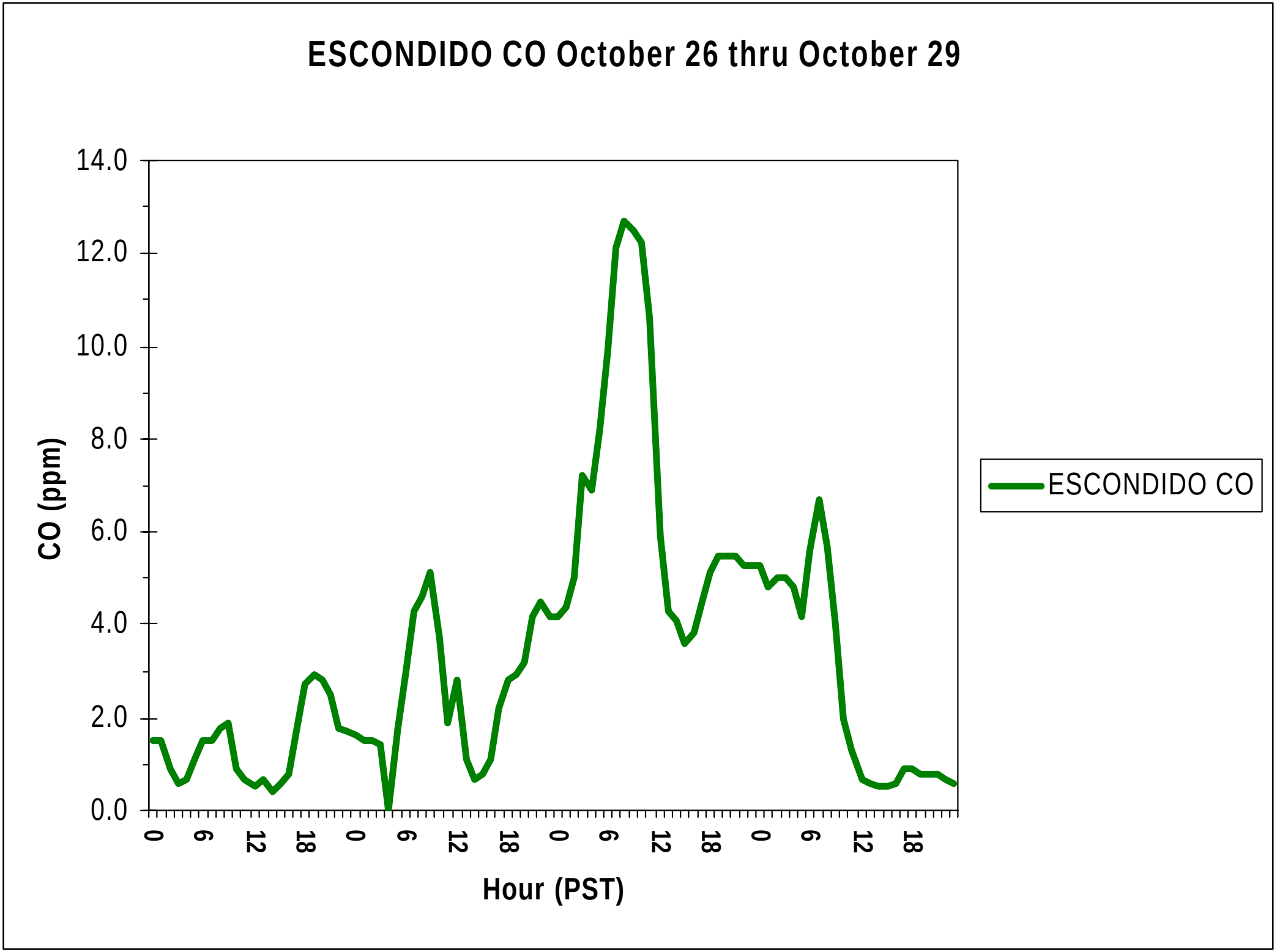
Lessons Learned

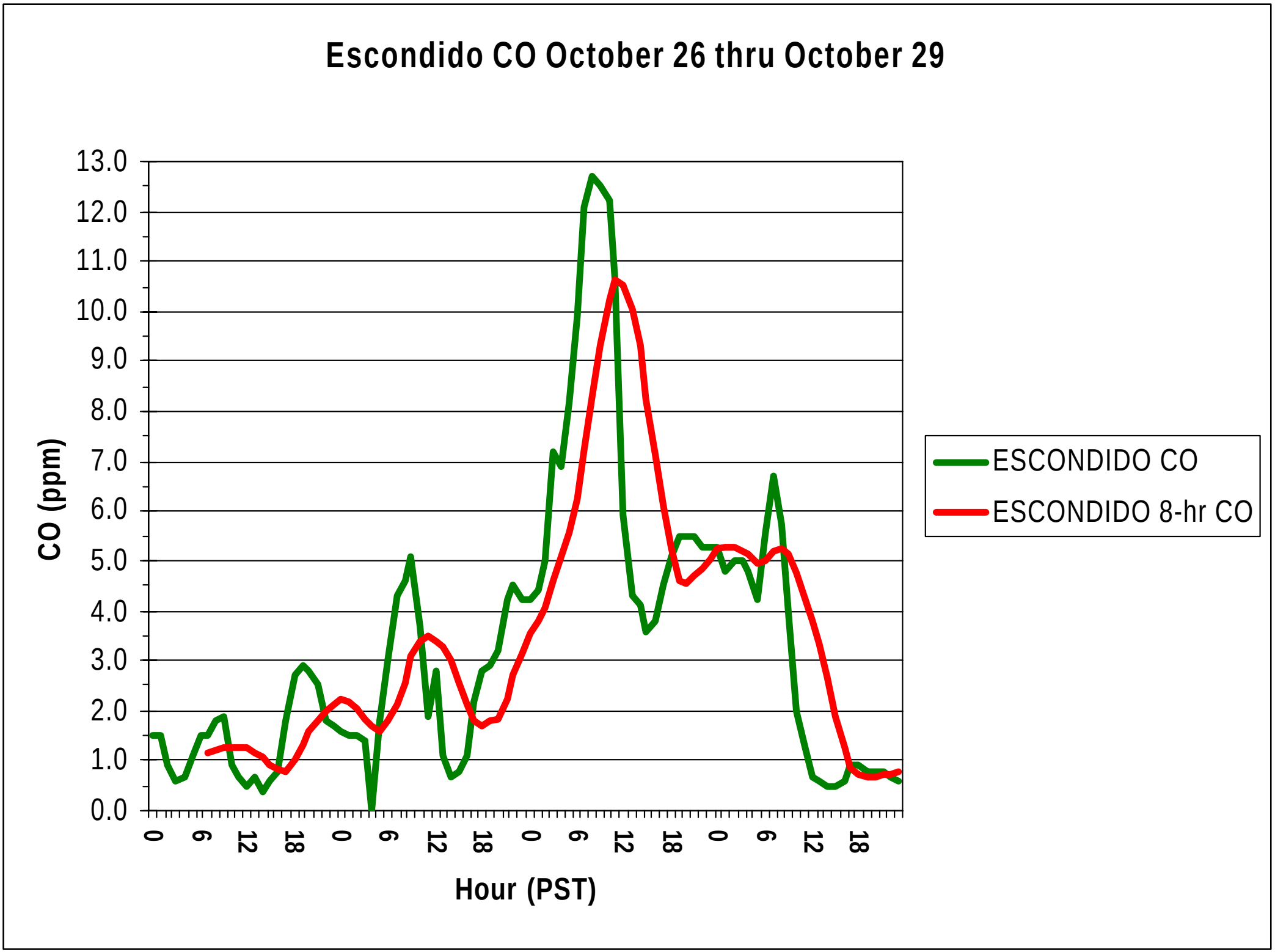
- Plan for the unexpected (scripts and templates)
- Forecast/report on the conservative side
- Departments/Agencies need to know responsibilities before the emergency
- Have central contacts for school districts
- Have media packets available to reduce confusion of “new” news reporters
- Coordinate better with private organizations concerned with public health
- Prepare to be inundated with calls
- Watch all pollutants and don’t leave the laptop at home!
- Plan for the unexpected!

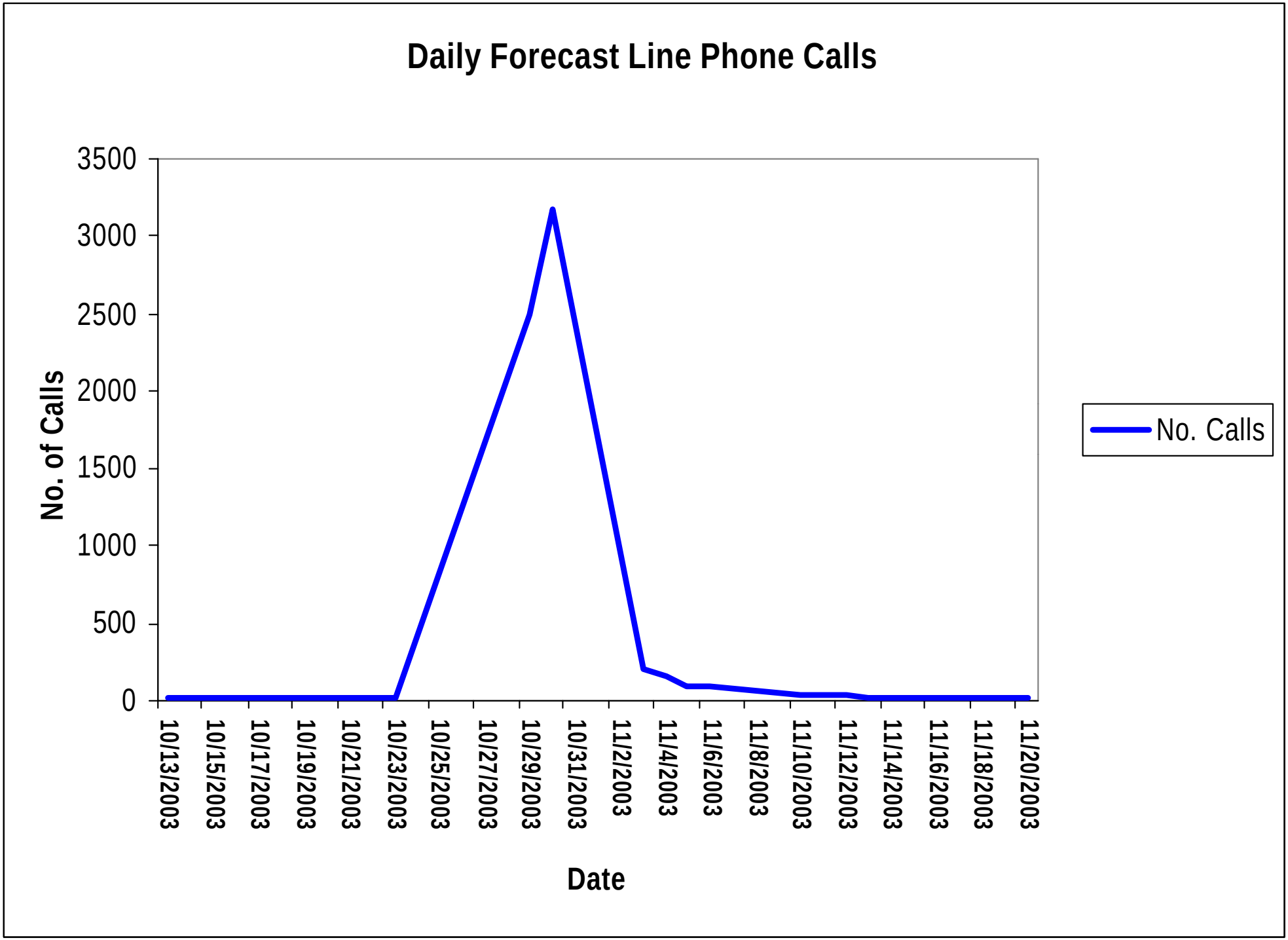


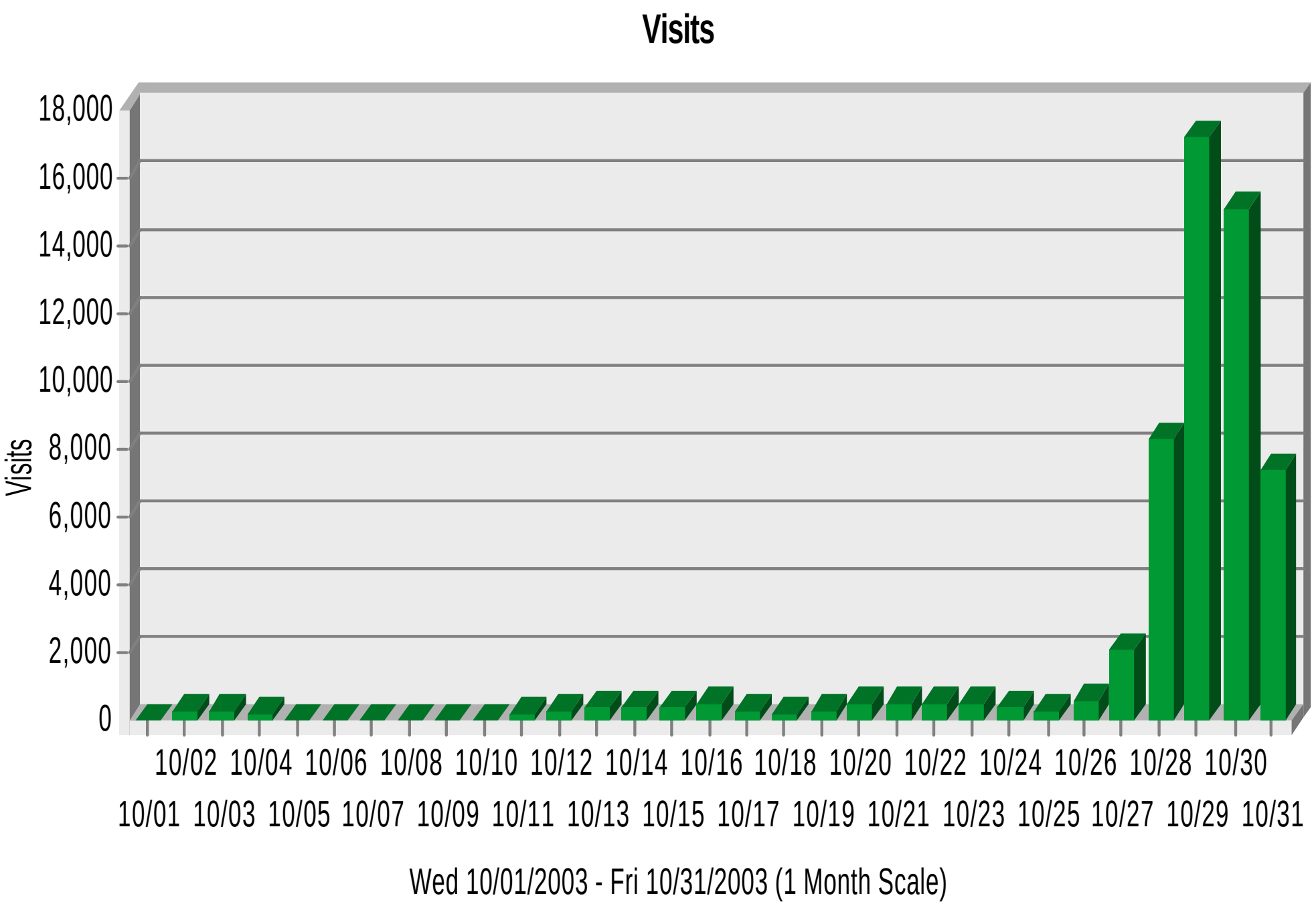
Roblar II
(Camp Pendleton)
Paradise Fire
Cedar Fire
Otay Fire

	DTN PM2.5	DTN AQI	DTN Category	ESC PM2.5	ESC AQI	ESC Category
Thu, 10/23/2003	11.1	36	GOOD	24.5	69	MODERATE
Fri, 10/24/2003	13.0	42	GOOD	18.8	57	MODERATE
Sat, 10/25/2003	23.3	66	MODERATE	23.3	66	MODERATE
Sun, 10/26/2003	45.5	111	UNHEALTHY for SENSITIVE GROUPS	14.3	46	GOOD
Mon, 10/27/2003	73.0	155	UNHEALTHY	73.9	156	UNHEALTHY
Tue, 10/28/2003	62.9	145	UNHEALTHY for SENSITIVE GROUPS	348.1	398	HAZARDOUS
Wed, 10/29/2003	19.3	59	MODERATE	154.2	205	VERY UNHEALTHY
Thu, 10/30/2003	3.9	13	GOOD	5.0	16	GOOD
Fri, 10/31/2003	2.3	7	GOOD	3.3	11	GOOD
Sat, 11/1/2003	2.5	8	GOOD	1.8	6	GOOD
Sun, 11/2/2003	2.8	9	GOOD	9.3	30	GOOD

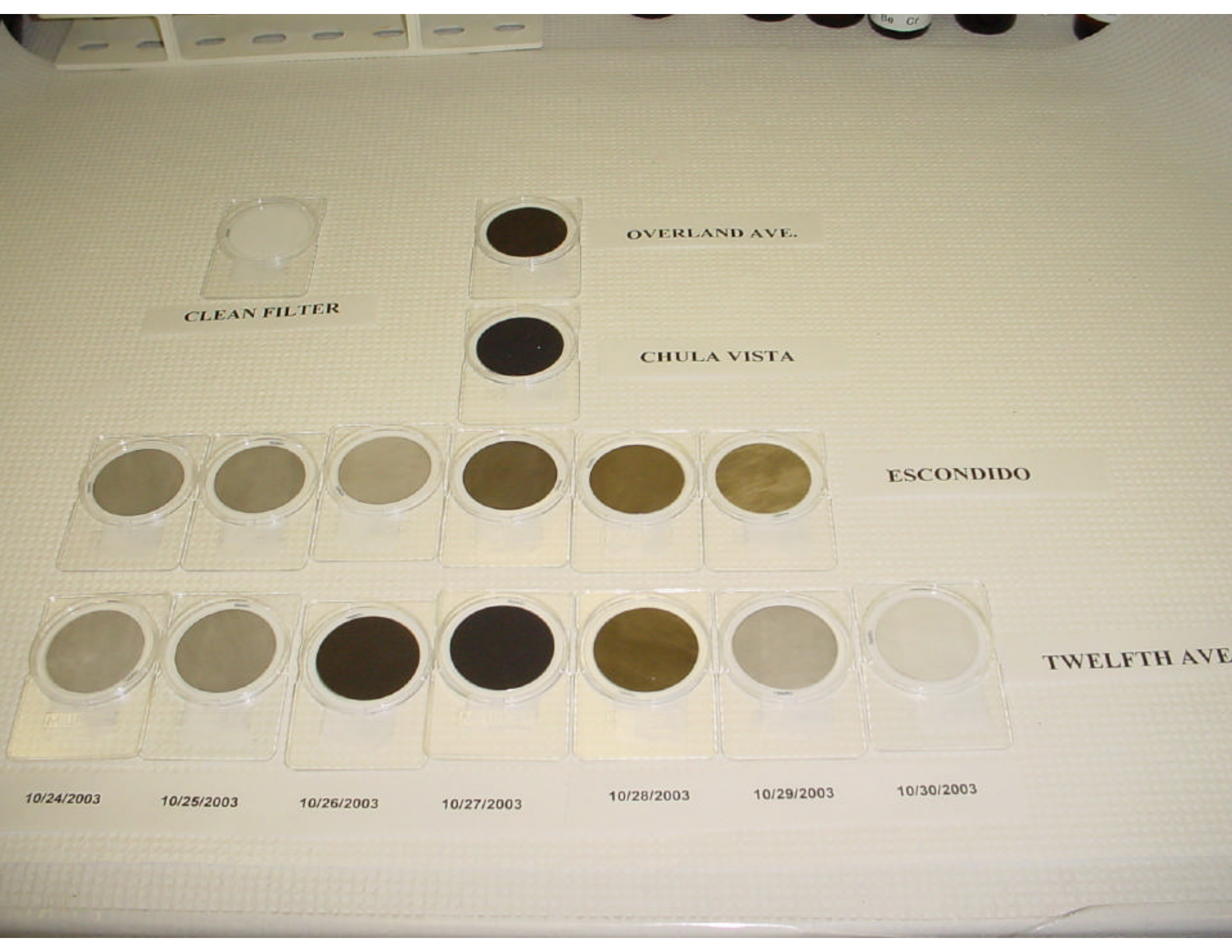

ESCONDIDO CO October 26 thru October 29
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
CO (ppm)
0
6
12
18
0
6
12
18
0
6
12
18
0
6
12
18
Hour (PST)
ESCONDIDO CO


Escondido CO October 26 thru October 29
CO (ppm)
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
6
12
18
0
6
12
18
0
6
12
18
0
6
12
18
Hour (PST)
ESCONDIDO CO
ESCONDIDO 8-hr CO

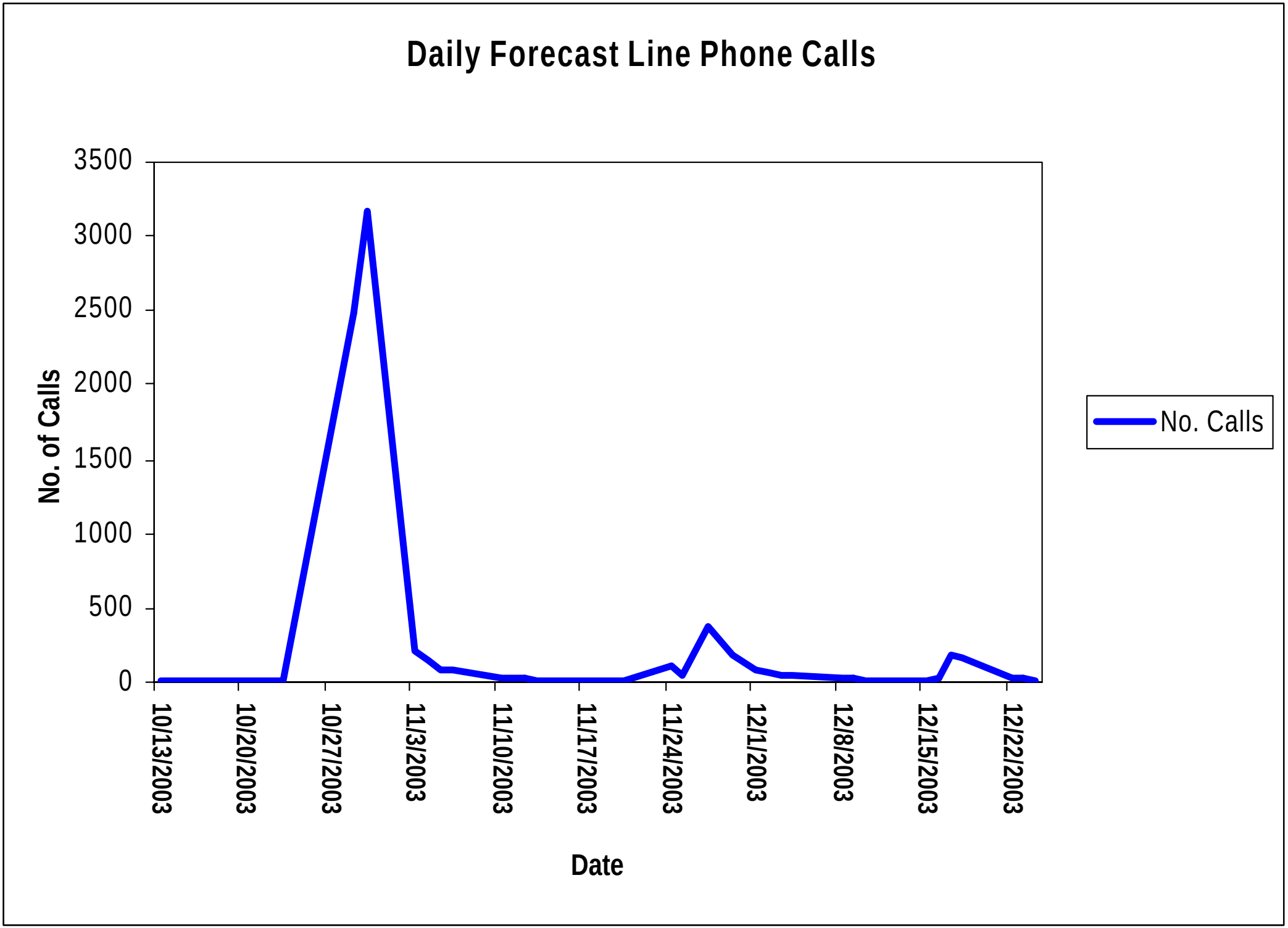

Daily Forecast Line Phone Calls
No. of Calls
3500
3000
2500
2000
1500
1000
500
0
10/13/2003
10/15/2003
10/17/2003
10/19/2003
10/21/2003
10/23/2003
10/25/2003
10/27/2003
10/29/2003
10/31/2003
11/2/2003
11/4/2003
11/6/2003
11/8/2003
11/10/2003
11/12/2003
11/14/2003
11/16/2003
11/18/2003
11/20/2003
Date
No. Calls

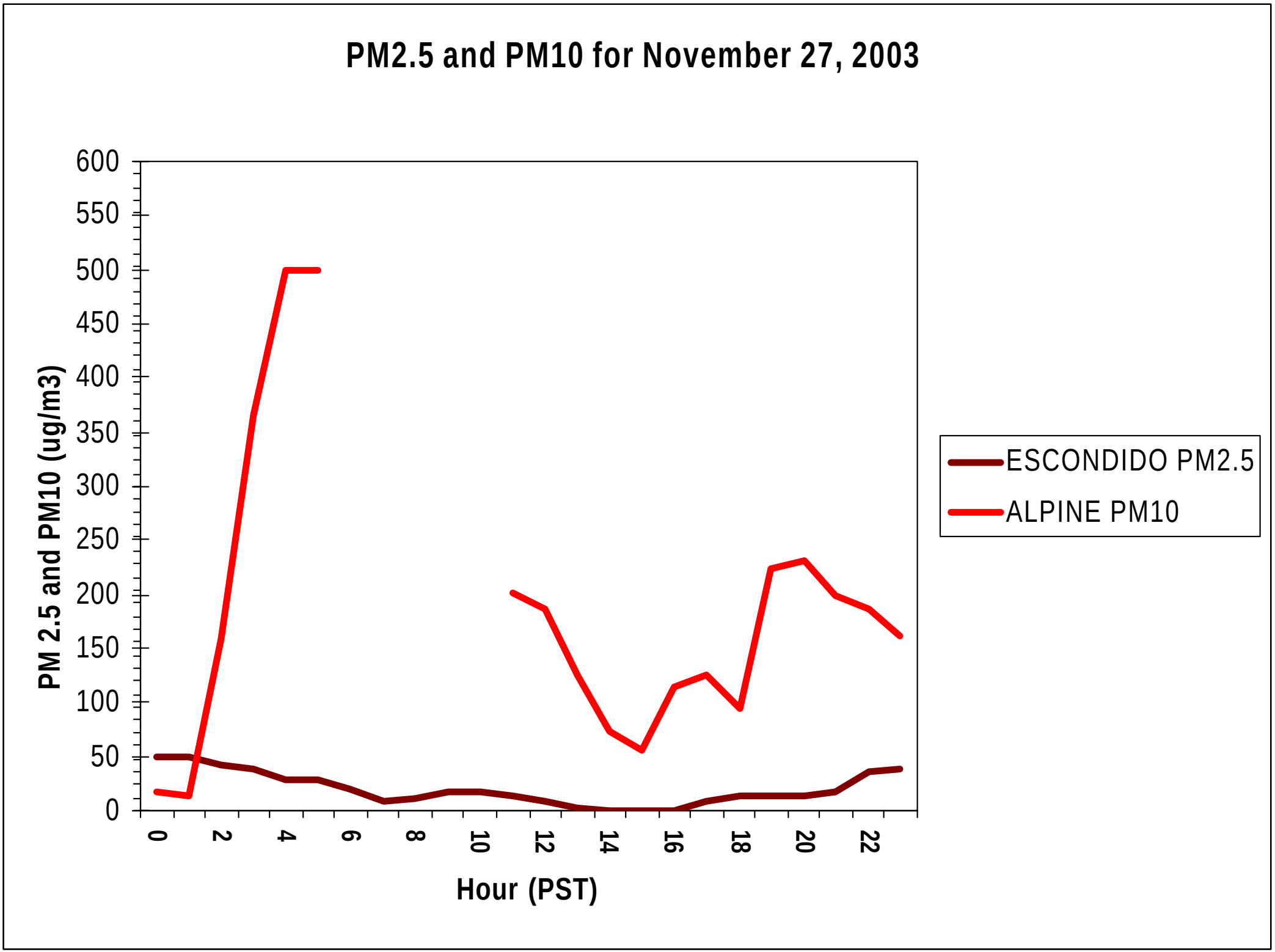

Visits
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Visits
10/01 10/02 10/03 10/04 10/05 10/06 10/07 10/08 10/09 10/10 10/11 10/12 10/13 10/14 10/15 10/16 10/17 10/18 10/19 10/20 10/21 10/22 10/23 10/24 10/25 10/26 10/27 10/28 10/29 10/30 10/31
Wed 10/01/2003 - Fri 10/31/2003 (1 Month Scale)

6125A
KEARNY VILLA ROAD


CLEAN FILTER
OVERLAND AVE.
CHULA VISTA
ESCONDIDO
TWELFTH AVE
10/24/2003
10/25/2003
10/26/2003
10/27/2003
10/28/2003
10/29/2003
10/30/2003

	DTN PM2.5	DTN AQI	DTN Category	ESC PM2.5	ESC AQI	ESC Category	Comments
Thu, 10/23/2003	27.2	74	MODERATE	24.5	69	MODERATE	
Fri, 10/24/2003	31.9	83	MODERATE	18.8	57	MODERATE	
Sat, 10/25/2003	57.2	134	UNHEALTHY for SENSITIVE GROUPS	23.3	66	MODERATE	Cedar Fire Started late PM
Sun, 10/26/2003	111.7	178	UNHEALTHY	14.3	46	GOOD	
Mon, 10/27/2003	179.1	229	VERY UNHEALTHY	73.9	156	UNHEALTHY	
Tue, 10/28/2003	154.4	205	VERY UNHEALTHY	348.1	398	HAZARDOUS	Paradise Fire affecting ESC
Wed, 10/29/2003	47.4	115	UNHEALTHY for SENSITIVE GROUPS	154.2	205	VERY UNHEALTHY	
Thu, 10/30/2003	9.6	31	GOOD	5.0	16	GOOD	
Fri, 10/31/2003	5.6	18	GOOD	3.3	11	GOOD	
Sat, 11/1/2003	6.1	20	GOOD	1.8	6	GOOD	
Sun, 11/2/2003	6.9	22	GOOD	9.3	30	GOOD	


Daily Forecast Line Phone Calls
3500
3000
2500
2000
1500
1000
500
0
No. of Calls
10/13/2003
10/20/2003
10/27/2003
11/3/2003
11/10/2003
11/17/2003
11/24/2003
12/1/2003
12/8/2003
12/15/2003
12/22/2003
Date
No. Calls


PM2.5 and PM10 for November 27, 2003
PM 2.5 and PM10 (ug/m3)
600
550
500
450
400
350
300
250
200
150
100
50
0
0
2
4
6
8
10
12
14
16
18
20
22
Hour (PST)
ESCONDIDO PM2.5
ALPINE PM10

THANKS! POLICE / FIREFIGHTERS
NORTH
15
Riverside
Junction
52

64°
7:15
NBC

SAN DIEGO
1911

SAN DIEGO POLICE

Acknowledgements:

District Meteorologists:

Ralph DeSiena

Bill Reeve

Adam Canter

District Monitoring Staff and Management

National Oceanic and Atmospheric Administration

- The NOAA Operational Significant Event Imagery Support Team (George Stephens)

Photographers