Daily Weather Briefing

Veracruz Center of Operations Forecasting Team:
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- Rest of March 9: Partly cloudy due to scattered high clouds over most of Mexico. In Veracruz, highs between 32-34 C, 45-55% relative humidity, strong winds out of the S/SE with gusts of 40 km/h gust around noon and decreasing and turning to NE in the afternoon.

- March 10: Possible light fog in the morning with cirrus aloft during the day. Winds from S/SE. Maximum temperatures 31-33 C.

- Long Range: For Veracruz, possible El Norte on Tuesday with 45-55 km N winds with gusts to 70 km/h. Clouds and rain with lower temperatures. Back to “normal” conditions on Wednesday. El Norte is weak and may not affect Mexico City.
Current and Forecasted Regional Meteorological Conditions
Radar Wind Profiler data from T1 (PNNL & ANL / DOE)

SW winds becoming ~9 m/s 2-3 km AGL
outflow from the valley towards the NE at 2-4 m/s

Up-valley flow likely to form in morning with transition to SW flow as PBL grows and becomes coupled to the ambient winds
Sounding data from T1 (PNNL & ANL / DOE)
23 UTC 8 March

WRF PBL forecast of 2500 m AGL
Observed ~2400 m AGL
WRF forecast for Mexico City region PBL heights

Thursday 9 March 2006 (3 pm, 21h fcst)
~ 800 m 10 am (local time)
~ 1600 m 12 noon
~ 3000, 3400 m 3 pm

Friday 10 March 2006 (3 pm, 45h fcst)
~ 900 m 10 am (local time)
~ 1700 m 12 noon
~ 2900 m 3 pm
WRF 21 h forecast
3 pm Thursday
9 March 2006 (local time)

Integrated cloud water
Blue (high level cloud)
Yellow (mid – high level cloud)
Purple (low-mid level cloud)
Grey (low level cloud)
WRF 45 h forecast
3 pm Friday
10 March 2006 (local time)

Integrated cloud water
Blue (high level cloud)
Yellow (mid – high level cloud)
Purple (low-mid level cloud)
Grey (low level cloud)

700 mb winds
500 mb winds
WRF forecast 3 pm CST Sat. 11 Mar

WRF forecast 3 pm CST Sun. 12 Mar

700 mb winds

500 mb winds

500 mb winds
HYPSLIT Forward Trajectories

Based on 06 UTC 8 March GFS forecast

Start 12 UTC 11 March Sat
NOAA HYPSLIT MODEL
Forward trajectories starting at 12 UTC 11 Mar
06 UTC 09 Mar  GFSG Forecast Initialization

Start 12 UTC 13 March Mon
NOAA HYPSLIT MODEL
Forward trajectories starting at 12 UTC 13 Mar 06
06 UTC 09 Mar  GFSG Forecast Initialization

12 UTC 16 March Thur
NOAA HYPSLIT MODEL
Forward trajectories starting at 12 UTC 15 Mar 06
06 UTC 09 Mar  GFSG Forecast Initialization

SW flow, good NE transport

low-level NE transport weakens, 500 mb transport eventually goes to the S

shift in High pressure results in transport to the S
Example Model Evaluations
Evaluation WRF Forecasted Winds at T1

WRF forecast arriving at T1

WS (m/s)
Over
30
20
10
0
Under

T1 Profiler

23 and 00 UTC

gap winds arriving at T1
U. of Iowa’s WRF Forecast compared to DC-8 Flight 3 at 03/04/2006
STEM 60km Forecast compared to DC-8 Flight 3 at 03/04/2006
Movies
Regional outlook for CO, March 9-12

Lower level drifts north.

Higher level plume goes northeast.
Regional outlook for $O_3$, March 9-11

STEM 12 km

WRF-Chem 6 km.
Regional CO Tracers

- Asian
- BB
- Texas
- Southeast
- Mexico City

Colored in age

00:00:00
08 Mar 06
1 of 33
Wednesday
Regional-Scale Plume Forecast Side-by-Side Model Comparisons
Thursday March 9, 18 UTC (12 pm LT)
Friday March 10, 18 UTC (12 pm LT)
Saturday March 11, 18 UTC (12 pm LT)
Sunday March 12, 18 UTC (12 pm LT)
Local-Regional Plume Forecast Side-by-Side Model Comparisons
Thursday March 9, 18 UTC (12 pm LT)
Friday March 10, 18 UTC (12 pm LT)
Saturday March 11, 18 UTC (12 pm LT)
Sunday March 12, 18 UTC (12 pm LT)
Sample Cross Sections for Wednesday - Saturday
Mexico City region tracer transport forecast (CO emissions)

Surface CO tracer, 21 h fcst, 3 pm Thursday 9 Mar (LST)

Surface CO tracer, 45 h fcst, 3 pm Friday 10 Mar (LST)

0-4 km avg. CO tracer

0-4 km avg. CO tracer

emissions earlier in the day

emissions later in the day
45 h WRF forecast, 3 pm Friday CST
0-4 km MSL average

3 pm Friday 10 March CST
69 h WRF forecast,
3 pm Saturday CST
0-4 km MSL average

9,000 ft
15,000 ft
21,000 ft

3 pm Saturday 11 March CST

3 pm Sunday 12 March CST

21,000 ft
15,000 ft
9,000 ft
Contrast in plume age
Mexico City ozone outflow to North on Wednesday and East on Thursday.
Sulfate will have large presence over most of Mexico
Forecasts for Smart Balloon
Modelled CMET Trajectory
Constant Height above Ground, 1000-5000m every 500m
NB: Trajectories more variable than previous forecasts

Thu 18:00

Fri 18:00
Biomass Burning
Mexico City and BB CO along the proposed Thursday flight path.
Fire Forecast

Emissions

Fires around M.C. and to the NW

Plumes carried to E on Fri, Northward along coast on Sat

Sat Mar 11
850 mb

Sat Mar 11
700 mb
Summary

Veracruz Center of Operations

- March 9 (Thursday): Mexico City plume transported to the E-NE late in the afternoon.
- March 10 (Friday): Pollutants are predicted to move to the NE, although there is some disagreement in direction in the vicinity of T2 (T2 on the boundary of the plumes).
- Long-Range Outlook: Mexico City plume is predicted to be transported over the Gulf of Mexico on Saturday and Sunday, with possible accumulation over the mountains along the coast. Plume forecasts are becoming more complicated as a result of the predicted position of trough and high over Mexico and more variable wind speeds/directions.