Forecast for the vicinity of Veracruz

- Sunday - Monday: Clear with periods of partly cloudy skies (high cirrus) and haze. High temperatures of ~33-35 C. RH ~45-55% at midday. SE winds 25-35 km/h during daytime with gusts of 40 km/h.
- Monday afternoon: Cold air mass entering NW part of Gulf of Mexico.
- Tuesday: Weak cold air mass passing over the area with northerly winds estimated 30-40 km/h with gusts up to 55 km/h. Increased cloudiness and probability of rain for parts of Veracruz state.
- Long Range: Weakening of cold air mass Tuesday night and Wednesday with decreasing winds. Next cold air mass moving over the NW Gulf possibly on Thursday.
Current and Forecasted Regional Meteorological Conditions
Yesterday’s Ozone from SIMAT

Wind shift changed CMET balloon direction

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<th>Time</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
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<td>105</td>
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Legend:
- Green: 2-6 m/s
- Yellow: 6-10 m/s
- Orange: 10-14 m/s
- Red: 14-18 m/s
- Dark Red: 18-20 m/s
Radar Wind Profiler data from T1 (PNNL & ANL / DOE)

SE winds aloft decreasing

weak SE winds in Mexico City
WRF forecast for Mexico City region PBL heights

Sunday 12 March 2006
3 pm, 21h fcst
~ 1000 m 10 am (local time)
~ 1400 m 12 noon
~ 2200 m 3 pm (3000 m 5 pm)

Monday 13 March 2006
3 pm, 45h fcst
~ 1100 m 10 am (local time)
~ 1700 m 12 noon
~ 2500 m 3 pm (2500 m 5 pm)
WRF accumulated precip forecast (9 km)
Tuesday and Wednesday 14 -15 March 2006

Accumulated precip (mm)

- 12 UTC Tue Mar 14 (6 am)
- 18 UTC Tue Mar 14 (noon)
- 00 UTC Wed Mar 15 (6 pm)
- 06 UTC Wed Mar 15 midnight
- 12 UTC Wed Mar 15 06 am

Less rain than yesterday's forecast

- Light rain Veracruz?

- No rain in Mexico City

Rain diminishing by noon
Based on 00 UTC 12 March Forecast

12 UTC 15 March Wed, 500 mb
- Trough does not affect Mx
- High moves over Mx for next several days

12 UTC 18 March Sat, 500 mb
- Begin influence of trough from Yukon
- High moves back over Gulf

12 UTC 15 March Wed, 700 mb

12 UTC 18 March Sat, 700 mb
Movie
Regional outlook CO, March 12-15

Simulated CO (ppbv) in the 3km layer at 6GMT, 03/12/2006

Tuesday
complex split advection to NE and SW.

Wednesday
Older Mexico City emissions wrap around from west, and merge with new emissions to North.
Regional-Scale Plume Forecast Side-by-Side Model Comparisons
Sunday March 12, 18 UTC (11 pm LT)

STEM 3 km CO

WRF - C5 Tracer 0-4 km

Mozart CO

Effects of wind shear

FLEXPART column tracer
Monday March 13, 21 UTC (15 pm LT)

STEM 3 km CO

WRF - C5 Tracer 0-4 km

GMAO CO 600 mb

MOZART MC 650 mb

Shift to S and W for newer emissions

FLEXPART column tracer
Tuesday March 14, 21 UTC (15 pm LT)

STEM 3 km CO

push to the SW at lower altitudes

WRF - C5 Tracer 0-4 km

push to the SW of Mexico City

MOZART MC 700 mb

FLEXPART column tracer

GMAO CO 600 mb
Wednesday March 15, 21 UTC (15 pm LT)

STEM 3 km CO

WRF - C5 Tracer 0-4 km

NE transport for newer emissions

FLEXPART column tracer
Wednesday March 15

FLEXPART column tracer
Thursday March 16
Local-Regional Plume Forecast Side-by-Side Model Comparisons
Sunday March 12, 21 UTC (15 pm LT)

STEM 1 km CO

MM5-Flexpart

WRF - C1 Tracer 0-4 km

sfc convergence

MM5-Flexpart

0-4 km avg.
Monday March 13, 21 UTC (15 pm LT)

STEM 1 km CO

MM5-Flexpart

WRF - C1 Tracer

sic convergence
Tuesday

March 14 and 15, 18 UTC (12 pm LT)

Wednesday

Thursday

Older material moves SE

Thursday

Local transport the SW again

MM5-Flexpart Moves to N-NW in the afternoon morning March 14 and 15, 18 UTC (12 pm LT)
Sample Cross Sections of Tracer and Chemistry for Wednesday - Saturday
45 h WRF forecast C5 tracer, 3 pm Monday CST
0-4 km MSL average

12,000 ft
18,000 ft

3 pm Sunday 12 March CST, C5 tracer
0-4 km MSL average

21 h WRF forecast C5 tracer, 3 pm Sunday CST
0-4 km MSL average

3 pm Sunday 12 March CST, C5 tracer

Saturday’s emissions
18,000 ft
12,000 ft

Friday’s emissions?

Sunday’s emissions

3 pm Monday 13 March CST, C5 tracer

3 pm Monday 13 March CST, C5 tracer

Sunday’s emissions

Monday’s emissions

Friday’s emissions?

18,000 ft
12,000 ft

older material
prior to 00
UTC 12 March
(Objective of
today’s C-130
flight)

STEM VOC age

Saturday’s emissions

older material prior to 00 UTC 12 March (Objective of today’s C-130 flight)
69 h WRF forecast C5 tracer, 3 pm Tuesday CST
0-4 km MSL average

93 h WRF forecast C5 tracer, 3 pm Wednesday CST
0-4 km MSL average

WRF 9 km forecast, C5 tracer
Tuesday – very complex plume
Wednesday - return to NE outflow
Tuesday March 14 18 Z Carbon Monoxide

North South Section

Tuesday shows spread plume to E and SW.

East-West Section
Wednesday March 15 18 Z Carbon Monoxide

Wednesday shoes more complex pattern, with new emissions and old emissions accessible to North.
WRF Chem Thro’ DC8 C-130 Flight Segment
Sunday 03/12 15:00 LST
WRF Chem Thro’ DC8 C-130 Flight Segment
Sunday 03/12 15:00 LST
Biomass Burning
MOZART Fire Tracer

Biomass Burning Emissions Mar 11

Emissions

Strongest fire in past few days NE of MC

Low level C.American fire plume continues over Gulf

Mon Mar 13
800 mb

Fires: 800hPa

Tue Mar 14
700 mb

Fires: 700hPa

Today 650 mb

Fire plume co-located with city plume
March 12 (Sunday): New emissions from Mexico City plume transported to the SW. Older material located NE of Mexico City and over the Gulf of Mexico,

March 13 (Monday): Continued transport of new emissions to the S and SW of Mexico City.

Long-Range Outlook: Mexico City plume transport will shift to the NW on Tuesday and to the N on Wednesday. Ambient winds aloft will be relatively weak as a result of the high pressure system, so that the pollutants will remain over the central plateau - with opportunities to sample plume with complex ages. Wednesday may be a good T0-T1-T2 sampling period. Plume is forecasted to move back to the SW on Thursday and Friday, with the next NE Langragian sampling scenario starting on Saturday.