Daily Weather Briefing

**Veracruz Center of Operations**

- Rest of March 4: Highs in the low 80’s F and scattered cloudiness along the coast, as seen in the satellite image that should be dissipating during the day; mostly sunny over the central plateau with clouds over the mountain peaks
- March 5: Mostly clear along the coast and over the central plateau
Current and Forecasted Regional Meteorological Conditions
3 March WRF forecast

3 km WRF forecast
9 km WRF forecast
0 UTC 4 March
(6 pm 3 March local time)
24 h forecast

Missing clouds
Sounding comparison, Veracruz, 6 am 4 March (Saturday) local time (12 UTC 4 March sounding)

Forecast sounding too dry
In upper levels of the PBL

Good forecast of transition
to westerlies

Forecast is missing weak onshore winds
Sounding comparison, Mexico City, 6 am 4 March (Saturday) local time (12 UTC 4 March sounding)

Good forecast of transition to westerlies
WRF 18 h forecast
12 noon Saturday
4 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 45 h forecast
3 pm Sunday
5 March 2006 (local time)

700 mb winds

500 mb winds

Integrated cloud water
Blue (high level cloud)
Yellow (mid – high level cloud)
Purple (low-mid level cloud)
Grey (low level cloud)
A high degree of confidence is placed in this feature.

Long Range 500 hPa GFS Forecast

00 UTC 8 March Wed.

00 UTC 9 March Thur.

00 UTC 10 March Fri.

00 UTC 11 March Sat.
72-h Forward Trajectories Based on Long Range GFS Forecast

Multi-day NE transport period
OMI NO2

OMI mean tropospheric NO₂ 03 Mar 2006

NO₂ tropospheric column [10^{15} molec./cm²]

Mexico City shown clearly
March 3 - isolated high points over southern Mexico may be fires - or just noise

March 4 - Mex. Overpass from 10:30pm last night
Assimilated MOPITT CO

High CO over Mexico from local anthro and biomass burning

High CO over Gulf from N.America and Asia

Louisa Emmons, NCAR
MODIS Fire Detections (Mar 2-3)

Fire emissions based on MODIS used in MOZART, STEM, WRF-Chem

Louisa Emmons, NCAR
Verification of Mexico City Plume Location

- Peak ozone ~200 ppb
- Clean on north side of city
- SW basin
- S basin
Mexico City Plume Forecast from WRF (Xuexi Tie, Danny McKenns)
O$_3$ concentration in PPBV
2006-03-05 21:00:00

P25 in ug/m3
2006-03-05 21:00:00

WRF-Chem Lowest Level
O$_3$, THC, pm2.5, NO$_y$
AT: 2006/03/0400UT
AT+45

Total Hydrocarbons in PPBV
2006-03-05 21:00:00

NOy concentration in PPBV
2006-03-05 21:00:00
Mexico City Plume Forecast from WRF (Bill Skamarock)

00 UTC 3 March 2006 forecast

Flow in the Central Mexico region is generally north-northeasterly and weak – forecast plume moves south and west.
Mexico City CO emissions tracer,
12 noon 4 March 2006 (Saturday, local time)
Lowest model level tracer conc. (18 h forecast)
Mexico City CO emissions tracer,
3 pm 5 March 2006 (Sunday, local time)
(45 h forecast)
Mexico City CO emissions tracer,
3 pm 5 March 2006 (Sunday, local time) (45 h forecast)

0-4 km mass-weighted tracer conc.  4-6 km mass-weighted tracer conc.
Mexico City CO emissions tracer,
3 pm 6 March 2006 (Monday, local time)
mass-weighted tracer conc. (69 h forecast)

0-4 km average

4-6 km average

6-10 km average
Mexico City CO emissions tracer, 3 pm 7 March 2006 (Tuesday, local time) mass-weighted tracer conc. (93 h forecast)
Mexico City Plume Forecast from MM5-FLEXPART (Ben deFoy)
Sat 12:00, Plume south of basin
Discrepancy with other models: height injection, strength of wind shear?
Smart Balloon Trajectories
Saturday 12:00, 3500m AGL

Westward transport south of the city

northward transport for releases north of the city
Wed, 12:00 Plume: aged to the south, fresh to the east and north

MCMA Plume Cloud 08-Mar-2006 16:00 - 17:00 CST
72 hr FLEXPART forward trajectories

Wed, 12:00 Plume: Northeast Transport in the basin?
Mexico City Plume Forecast from FLEXPART (Danny McKenna, Andreas Stohl)
Flexpart Mexico City Tracer
AT: 2006/03/04:00UT AT+21
21 UTC 4 March

700mb

MIXING RATIO OF MC–CO₂ AT 2900 m
AND GEOPOTENTIAL HEIGHT CONTOURS AT 700 hPa
BASED ON GFS ANALYSIS
ANALYSIS 20060304 0 UTC ACTUAL 20060304 210000 UTC
MAXIMUM VALUE: 0.4328+03

500mb

MIXING RATIO OF MC–CO₂ AT 4500 m
AND GEOPOTENTIAL HEIGHT CONTOURS AT 500 hPa
BASED ON GFS ANALYSIS
ANALYSIS 20060304 0 UTC ACTUAL 20060304 210000 UTC
MAXIMUM VALUE: 0.170E+03
Flexpart Mexico City Tracer
AT: 2006/03/04:00UT AT+42
18 UTC 5 March

700mb

MIXING RATIO OF MC–COL AT 2900 m
AND GEOPOTENTIAL HEIGHT CONTOURS AT 700 hPa
BASED ON GPS ANALYSIS
ANALYSIS 20060304 0 UTC ACTUAL 20060305 180000 UTC
MAXIMUM VALUE: 0.410 X 10^3

500mb

MIXING RATIO OF MC–COL AT 4500 m
AND GEOPOTENTIAL HEIGHT CONTOURS AT 500 hPa
BASED ON GPS ANALYSIS
ANALYSIS 20060304 0 UTC ACTUAL 20060305 180000 UTC
MAXIMUM VALUE: 0.162 X 10^3
Mexico City Plume Forecast from STEM (Marcelo Mena)

00 UTC 3 March 2006 forecast
Mexico plume continues to drift S, SW, into Tuesday. Biomass burning presence is not as strong.
Tuesday evening, MARCH 08, 0Z.

Plume continues presence due West, and Mexico City tracer has interesting lofted structure.
March 05 Cone of Influence

Receptor over southern part of domain, at 4km high, is somewhat influenced by Mexico City, but not directly.
Mexico City Plume Forecast from MOZART (Louisa Emmons)
MOZART Tracers - Today (3/4)

Mexico City: 850 mb

Fires: 700 mb

Mexico City pollution going more westward than south

Louisa Emmons, NCAR
Flow from M.C. to W&S at 700mb, to N at 500mb
Asian pollution reaching S.Mexico

Mex.City: 700mb
Mex.City: 500 mb
Fires: 700mb
Asia: 700mb

Louisa Emmons, NCAR
MOZART Tracers - Mar 6 18Z

Forecast for Monday: Flow still to South and West from Mexico City

Mex City: 700 mb
Fires: 700 mb
Mex.City: 500mb

Louisa Emmons, NCAR
MOZART CO forecast

Mexico City and fires dominate Mexico CO

Fires in Columbia stay to South
March 4: Conditions are still favorable for sampling over the city and/or south of Mexico City. Most models have regional transport to the west and southwest, while one model has regional transport to the south.

March 5: The majority of the Mexico City plume will continue to be transported to the southwest and west at lower elevations. Some splitting of the plume may happen, with pollutants aloft (~500 mb) being transported to the northeast.

Long-Range Outlook: Continued transport to the southwest on Monday and Tuesday. During mid-week, a propagating through over the U.S. will bring westerly to southwesterly winds over central Mexico so that period is likely to be favorable for transport (and cloud-free) to the northeast (and possibly a multi-aircraft semi-Lagrangian experiment). The winds are currently forecasted to shift on Wednesday. The dry conditions and strong southerly winds may be favorable for more biomass burning events.