Motivation
The global mean radiative forcing of the climate system for the year 2000, relative to 1750

(IPCC, 2000)
Relationship to México
Meridional Circulation

- 1 – 3 days
- 3 – 14 days
- 60-90 days

*Particle Lifetime
Background
March, 1991
NCAR King Air Measurements
11:00 am LST
Photochemical Interactions

Cortes Pass Project
View from the Cortez Pass

View from Iztacíhuatl

9 am, March 12, 2005

11 am, March 12, 2005

9 am, April 16, 2005

9 am, April 16, 2005
Research Questions

1) What are the rates of turbulent exchange of momentum, energy, latent heat, CO2 and particles within the boundary layer?

2) What is the deposition flux of particles in the surface layer at the national park of Izta-Popo Zoquiapan?

3) How do the properties of particles change with age and photochemical processing?

4) How do the optical properties of anthropogenic particles alter radiative fluxes?
Participants*

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*MIRAGE Campaign
PM1.0 Inlet

Aerosol Mass Spectrometer
Scripps Institute

Scanning Mobility Particle Sizer (SMPS)
0.015 – 0.5 µm

PAN/PPN

PMS LASAir II
0.3 – 25 µm

Nephelometer Radiance

CN TSI 3010

UNAM

CCN U. Wyoming

PPAH

Web Camera
FNLS - Wind Speed (m/s) 650 hPa - 07-Mar-2006 18 UTC - Max. wind speed = 21.8578
FNL - Wind Speed (m/s) 650 hPa - 10-Mar-2006 18 UTC - Max. wind speed = 44.6575
Easterly Flow

MEX: BC = 1000 CO

PDC: BC = 3400 CO

Low CN

Southeasterly Flow

PDC: BC = 1800 CO

High CN

Northwesterly Flow

PDC: BC = 3200 CO - 430

High CN

BC (ng m⁻³) vs. CO (ppm)
Easterly Flow

- MEX: BC = 317 PPAH
- PDC: BC = 117 PPAH

Southeasterly Flow

- PDC: BC = 69 PPAH

Northwesterly Flow

- PDC: BC = 76 PPAH

- PDC: BC = 139 PPAH
- PDC: BC = 122 PPAH
- PDC: BC = 204 PPAH
Summary

The regional boundary layer grows to altitudes above the Cortes Pass (4 km) every day.

“Free troposphere” values of BC are usually >500 ng m$^{-3}$ and CO is usually above 0.1 ppm.

The CO concentration at the pass is 1/10 of the Mexico City CO and out of phase by approximately 6 hours.

The relationship between BC and CO reflects removal and dilution processes. The average ratio between BC and CO in Mexico City is 1000:1 whereas it is 3000:1 in the Cortes Pass. This relationship also depends on the origin of the BL air, whether from the east or west.

The relationship between BC and PPAH is also sensitive to air mass origin and reflects secondary processes.

Very little BC or PPAH is removed by precipitation.
Come visit us!   darrel@servidor.unam.mx

Many thanks to the staff of the Parque Nacional Izta-Popo Zoquiapan
This project was funded by DGAPA PAPIIT IN-113306