Model Sensitivity Analysis of Ozone to Mobile Emissions in the MCMA

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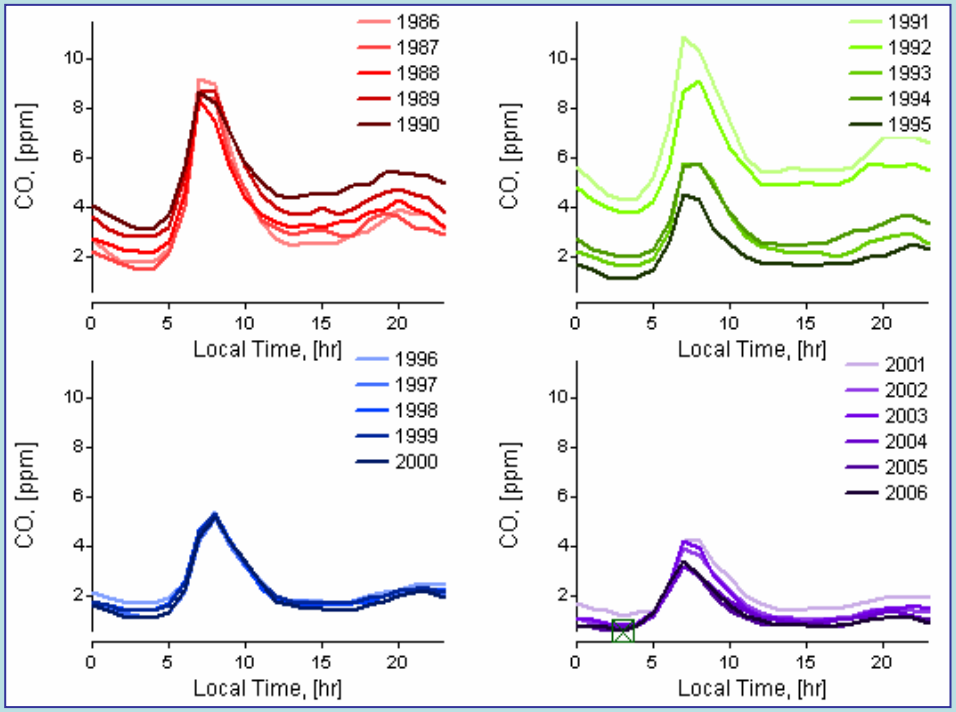
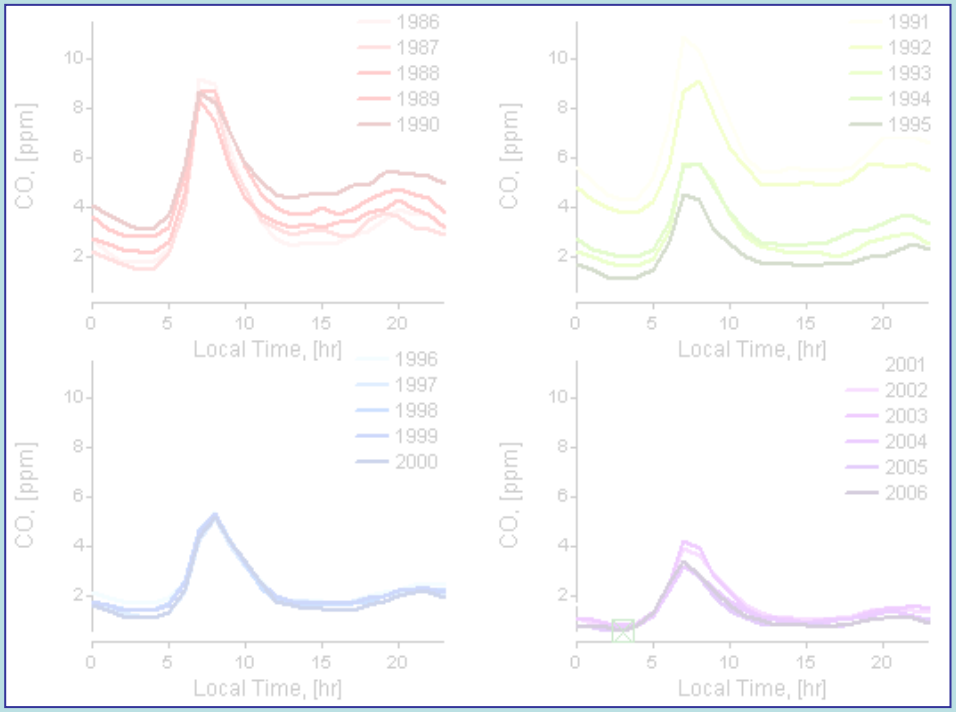
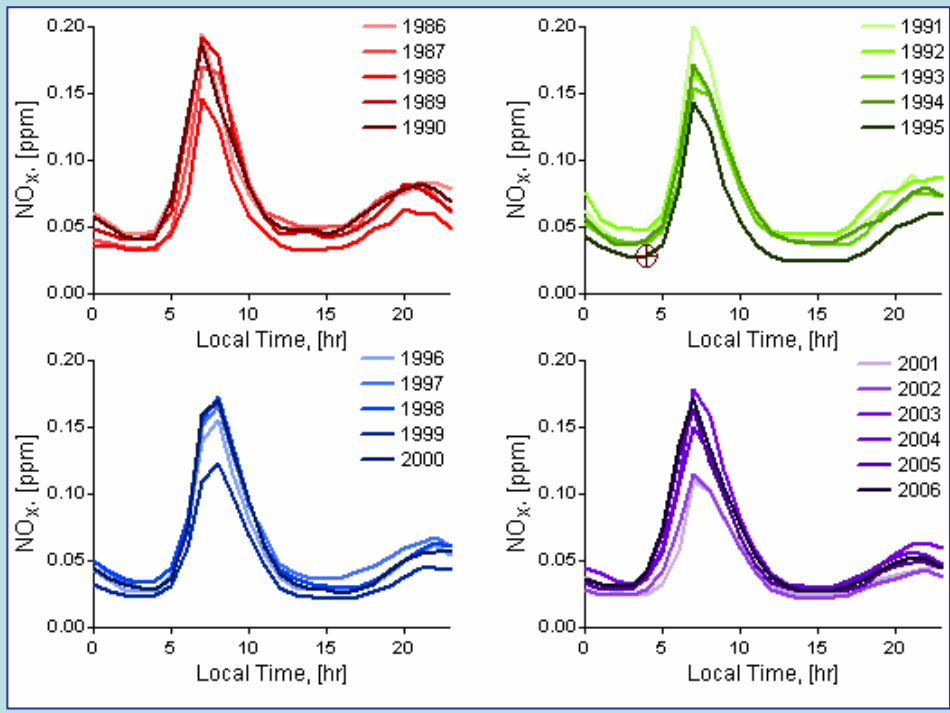
Mexico City



- CO data shows a “breathing effect”.
- Emissions have been perturbed significantly already.
- Non-linear correlations between CO, NO_X and O_3 trends.

All RAMA monitoring stations in 21 years.
Only data from March and April.
Holidays and weekends not included.





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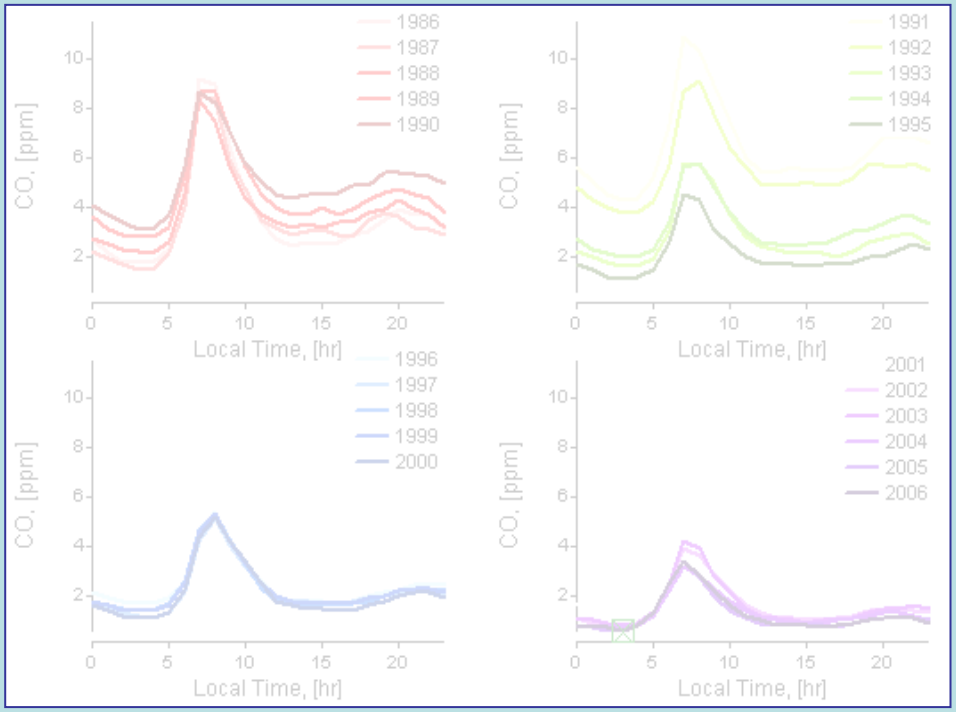

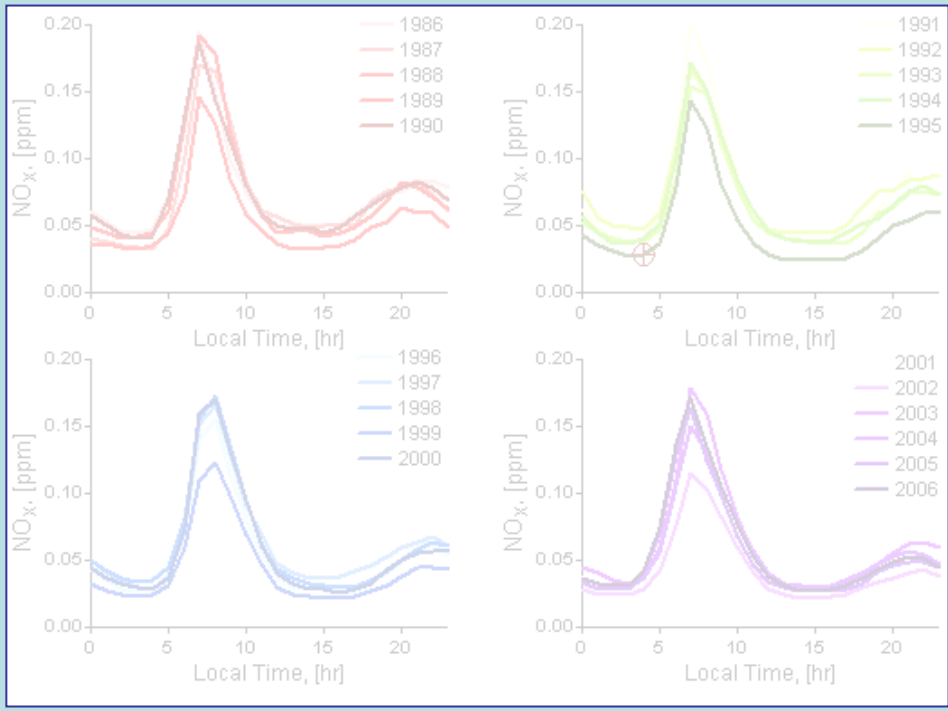

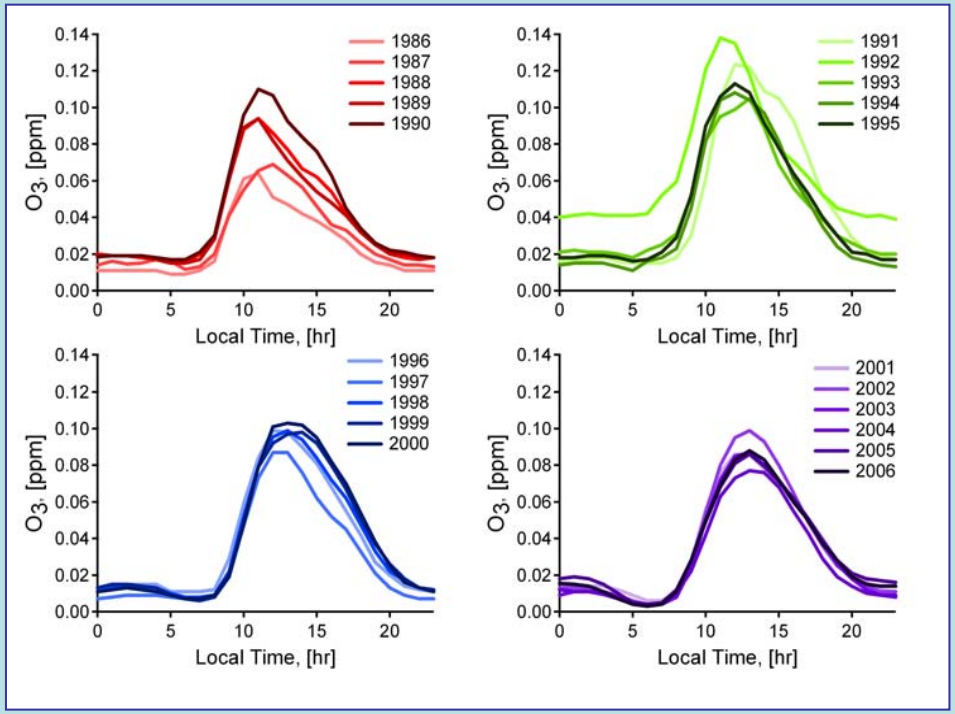

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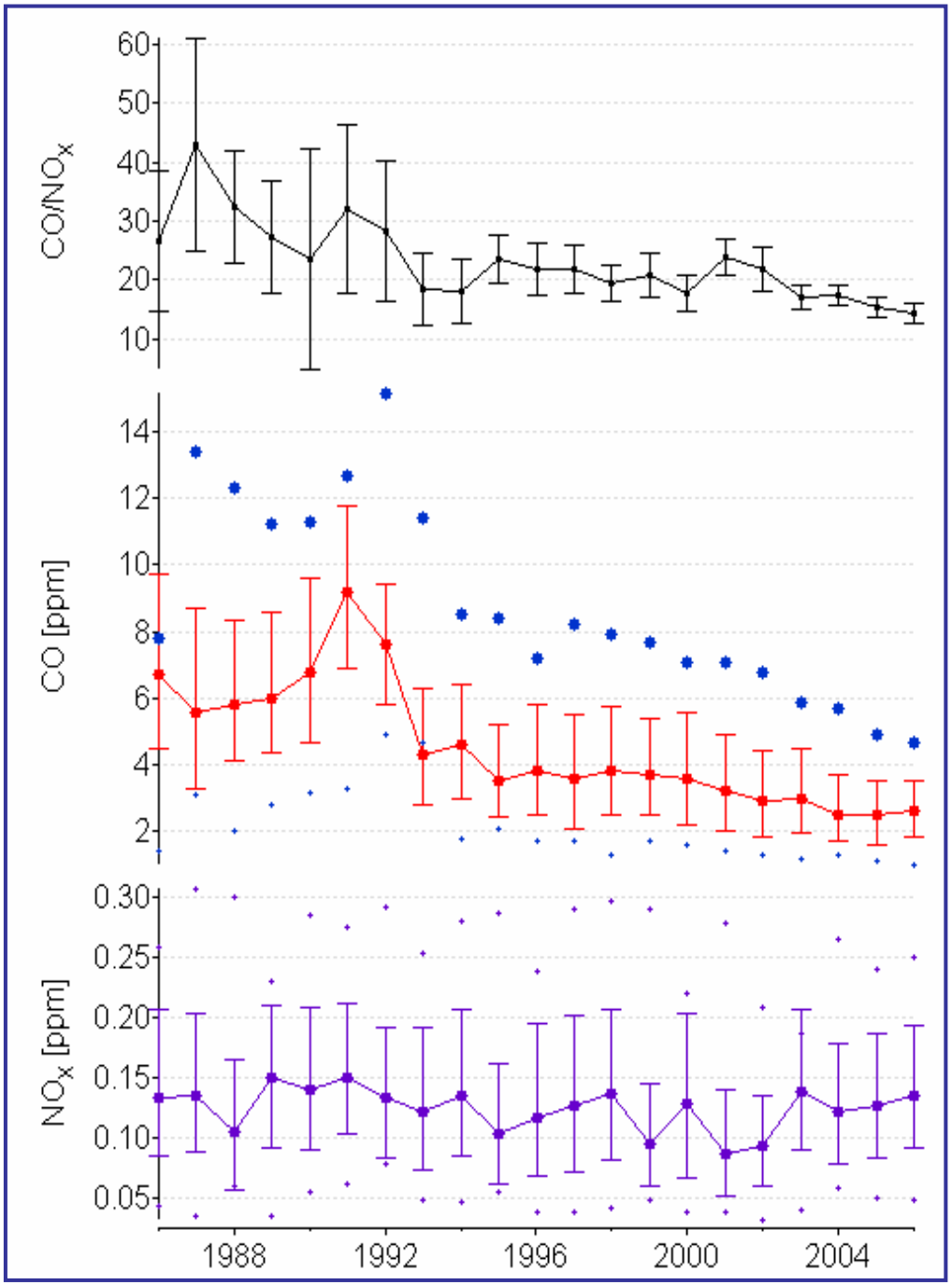
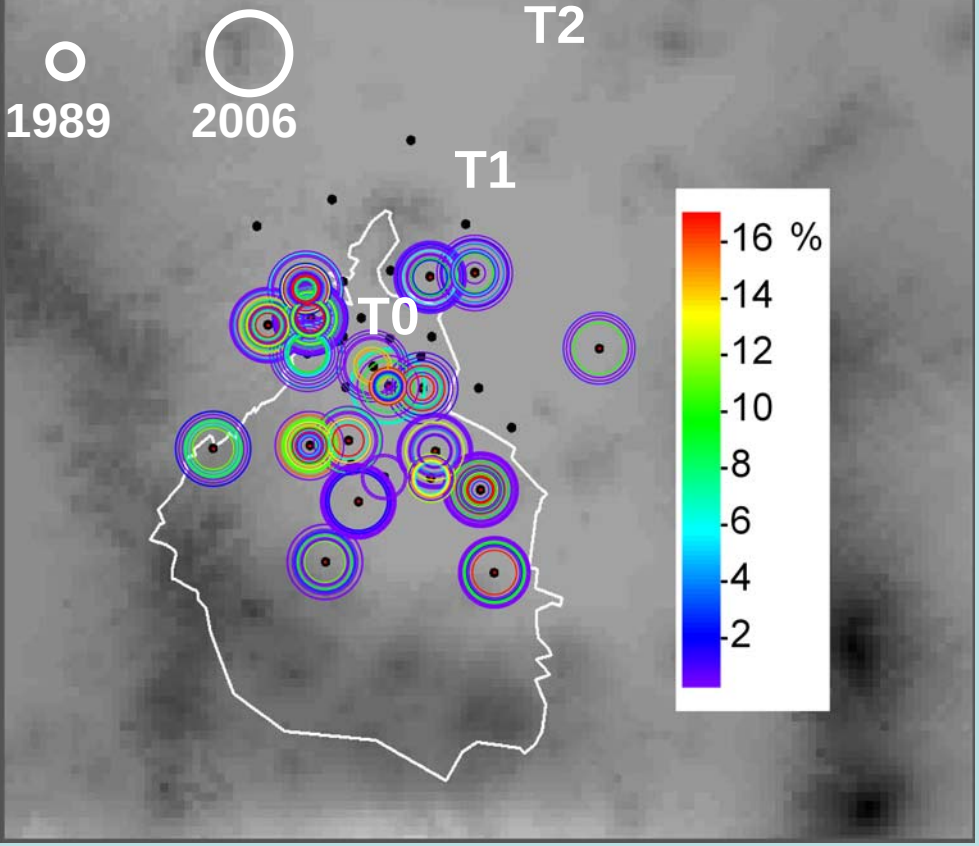


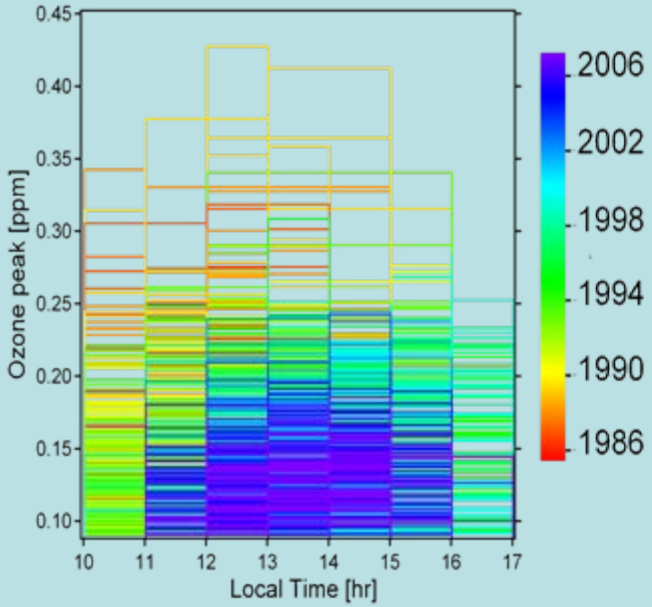
6 to 9 AM CO and NOx measurements

No Holidays, no weekends

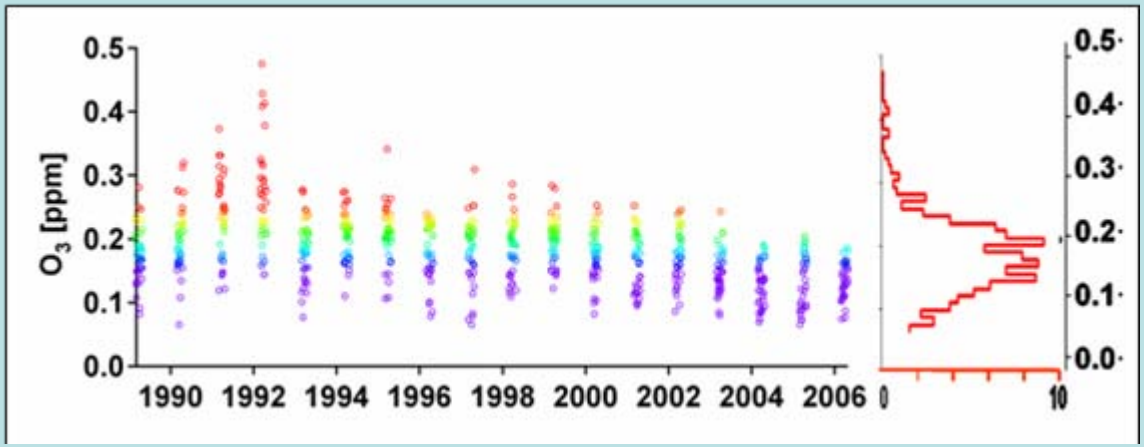
Implications for Mobile emission sources:

- **Downward CO/NOx**
- **Downward VOC/NOx**
- **Little or not change in NOx emissions**
- **Reduced CO variability**
- **No change in NOx variability**





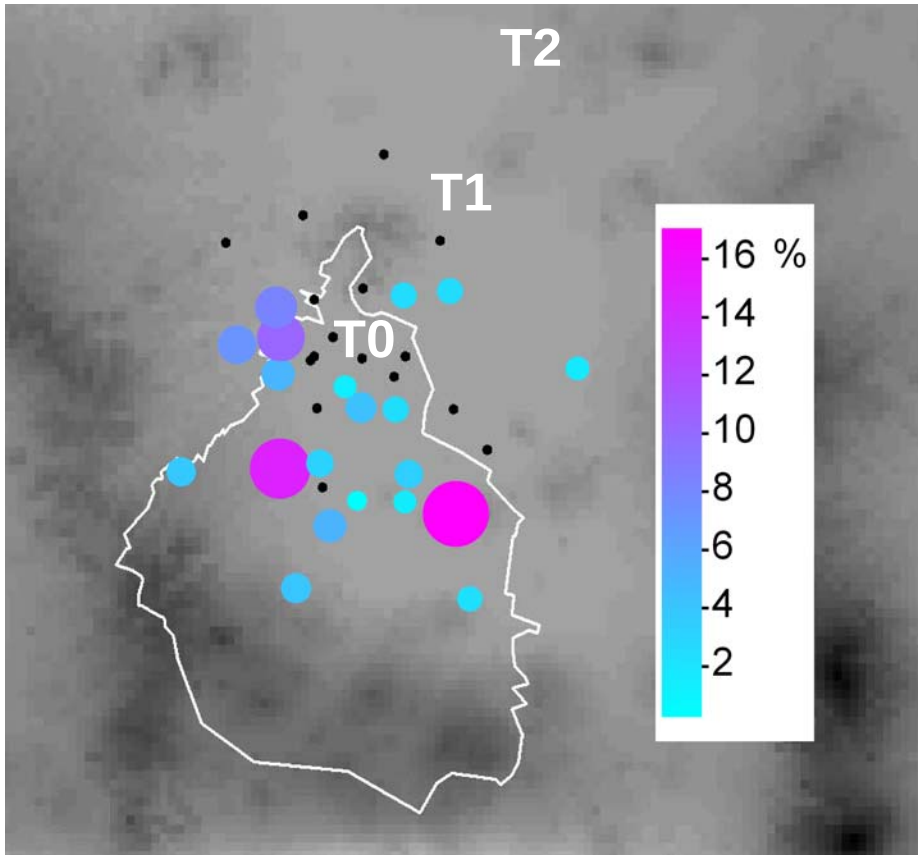
O3movBack.mov



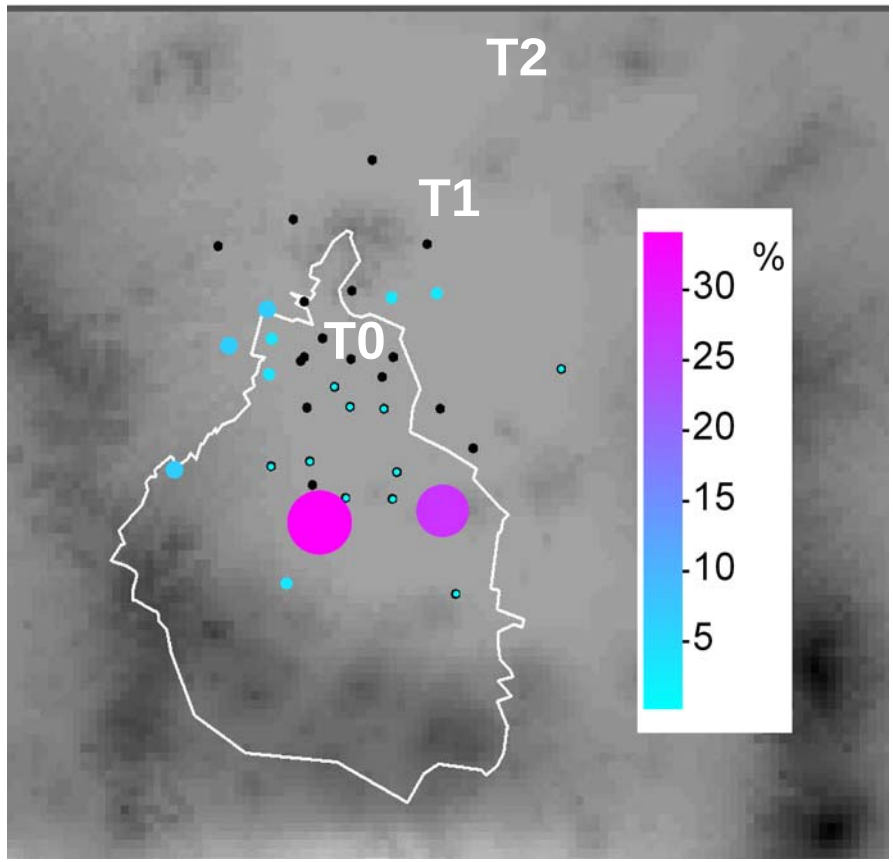
- Reduction and time delay of the O_3 peak, but high concs. persist.
- Evidence of 3 high freq. locations of O_3 peak -likely correlated with prevalent wind patterns during Mar-Apr.
- "core-to-skirt" effect of the location of the O_3 peak suggesting that RAMA can be blinded to the "real" O_3 peak.

Frequency of O_3 peak localization

Historical

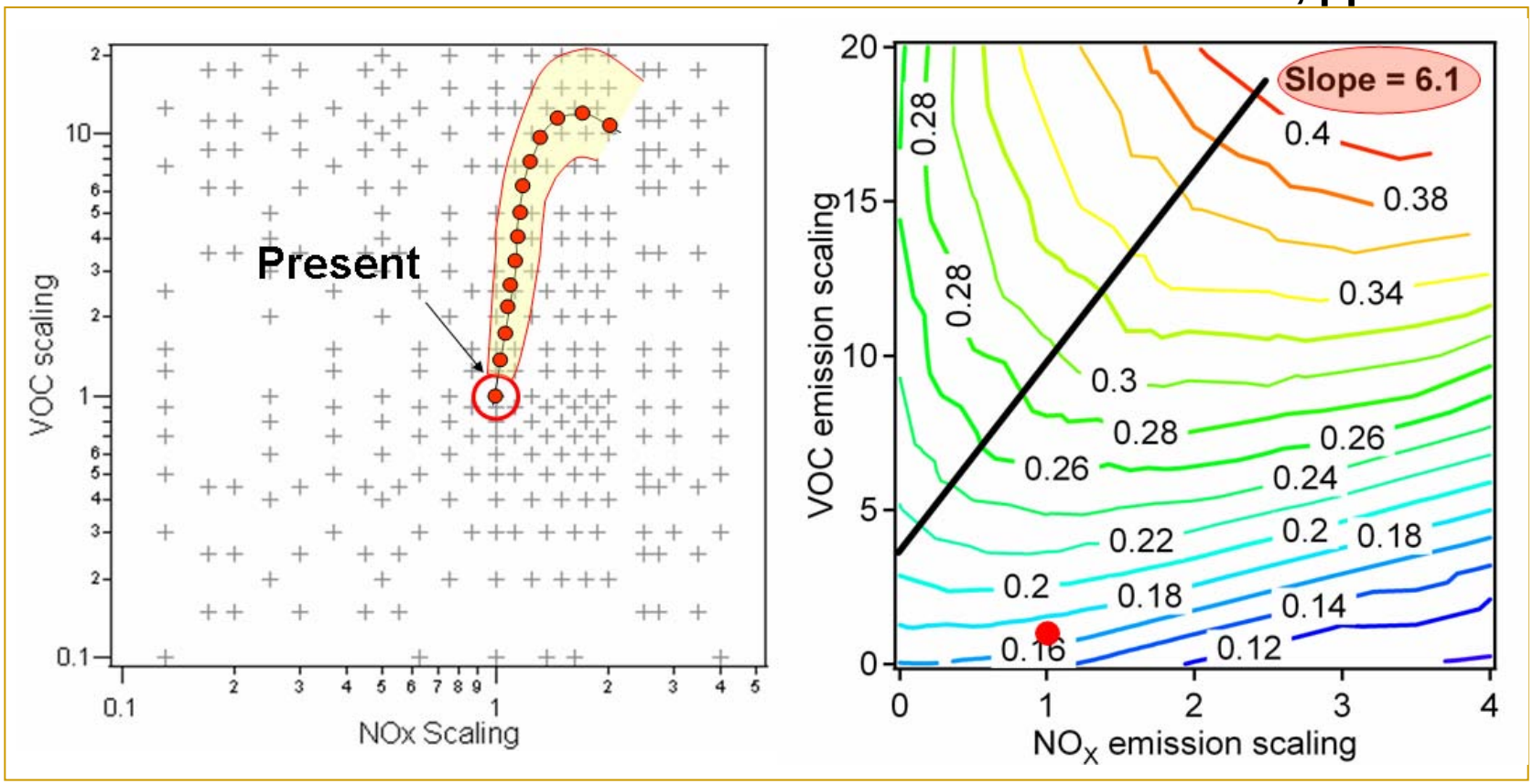


MILAGRO



MODEL SENSITIVITY

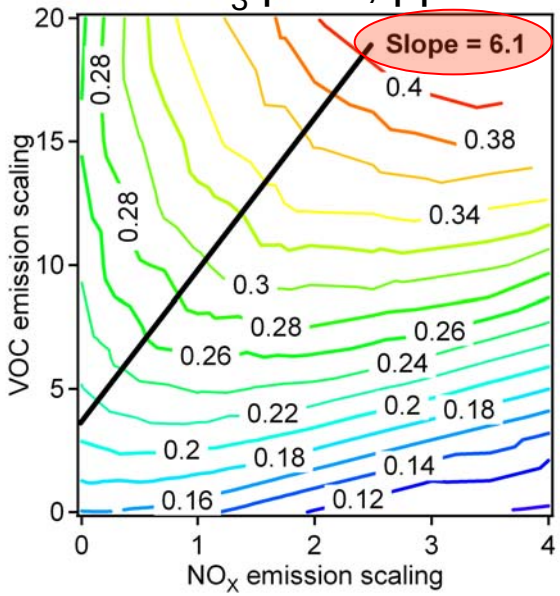
PEAK OZONE, ppm



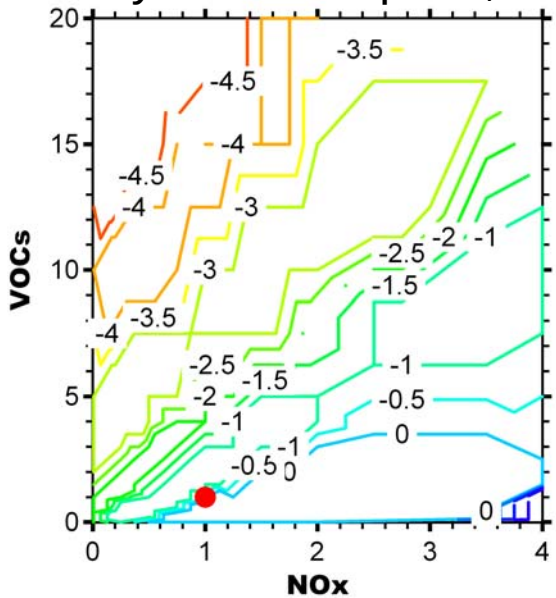
- **CAMx "Ozone South" meteorological scenario (Lei et al., 2007)**
- **Modest VOC sensitivity regime under present conditions**
- **Need of drastic concurrent mobile and non-mobile VOC/NO_X reductions**

MODEL SENSITIVITY

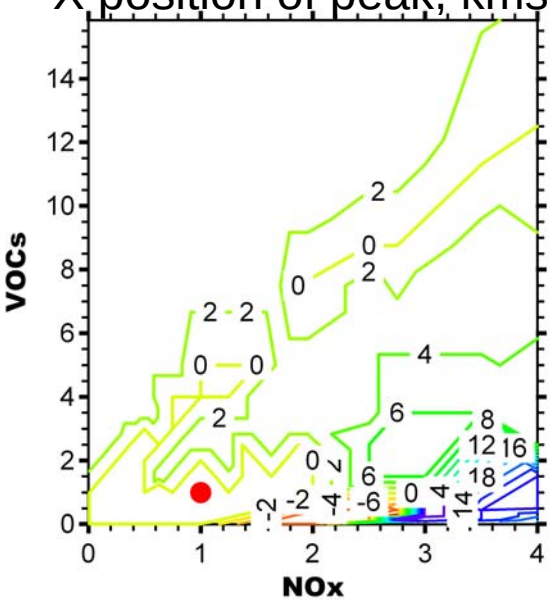
O_3 peak, ppm



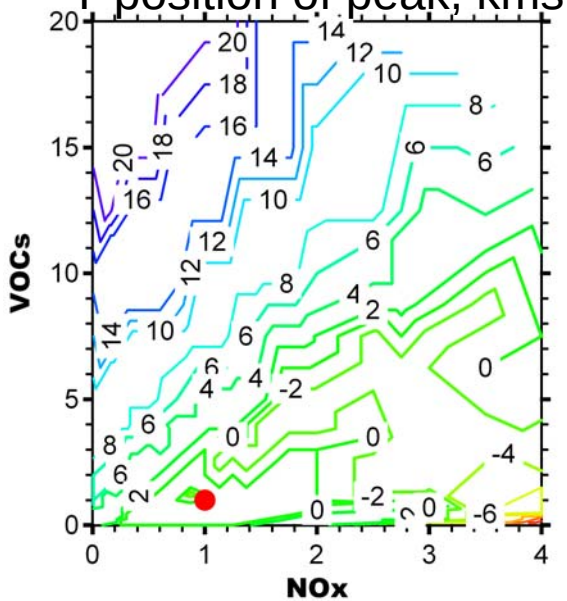
Delay of time of peak, Hrs



X position of peak, kms



Y position of peak, kms



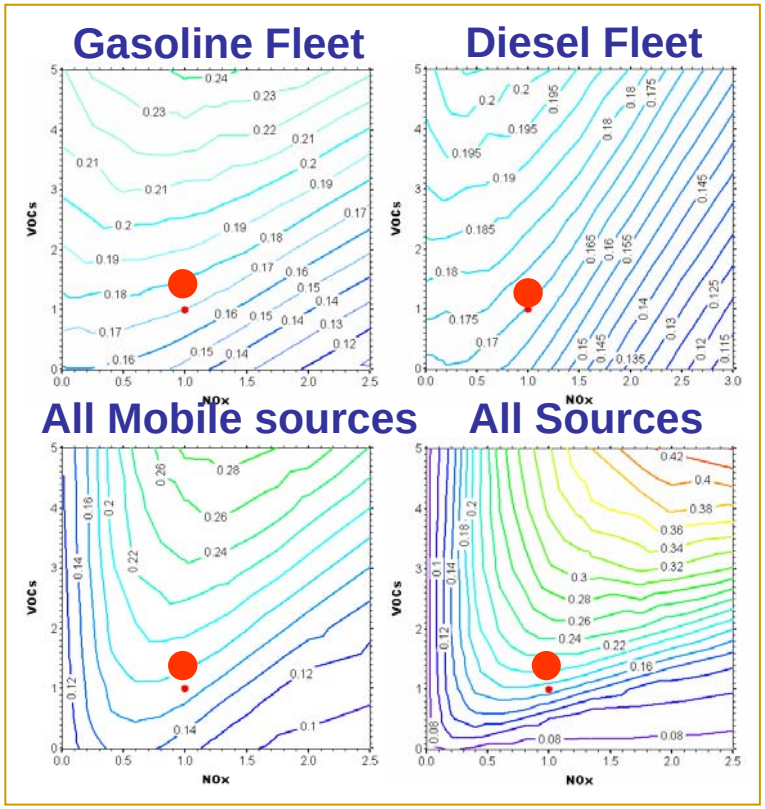
Reproduced observed time delay in O_3 peak.

Reproduced historical O_3 peak reductions.

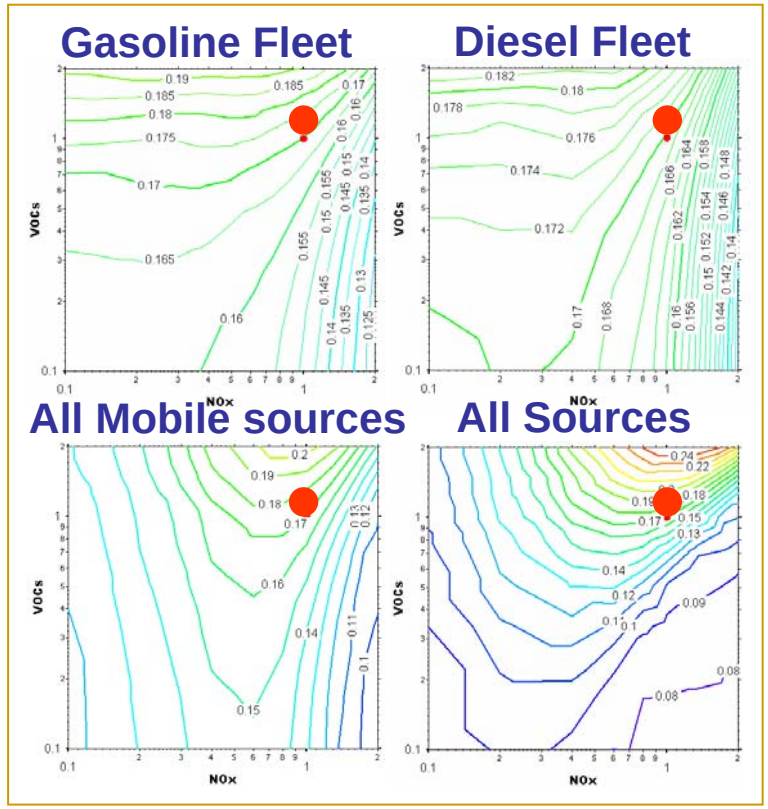
Reproduced "core-to-skirt" O_3 peak effect.

Is RAMA blinded to "real" O_3 peak nowadays?

PAST



FUTURE



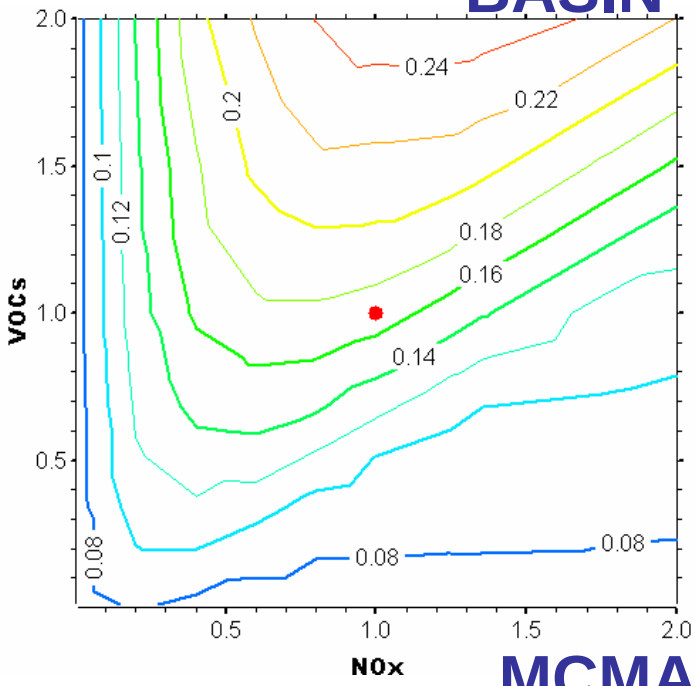
❖Under present emission conditions, reductions in emissions from the gasoline fleet alone are not as effective as reductions of all mobile emission sources.

CONCLUSIONS

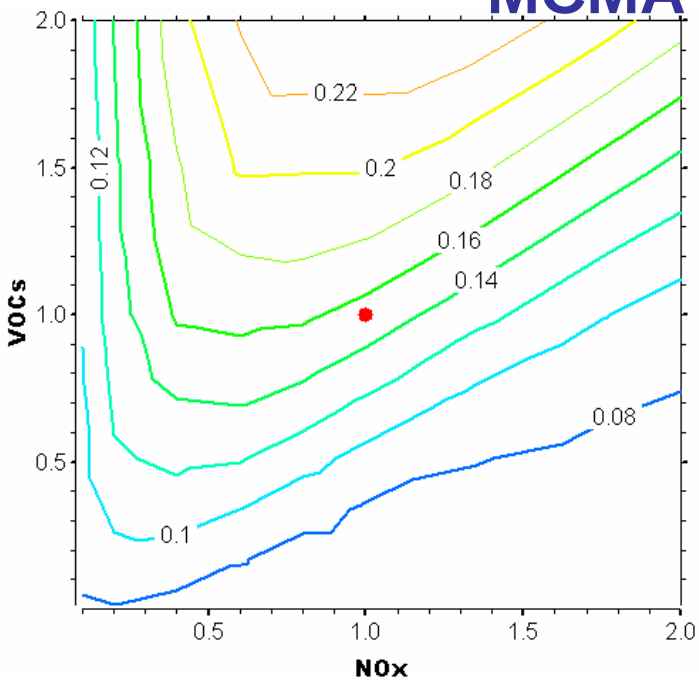
- Historical perturbations in mobile emission sources account for most of the:
  - Primary and secondary pollutant trends
  - “breathing effect”
  - “core-to-skirt effect”
  - Time delay in O_3 peak
- CO/NO_X trends suggest a large reduction of VOC/NO_X ratio largely linked to mobile sources.
- Results suggest a current modest VOC sensitivity regime.

- Need for drastic concurrent mobile and non-mobile VOC/NO_X emission reductions.
- Under present emission conditions, reductions in emissions from the gasoline fleet are not as effective as with the reductions of all mobile emission sources.

BASIN



MCMA



CENICA