

# Local Sources

Agricultural Activities



Power Plant



Cement Plants



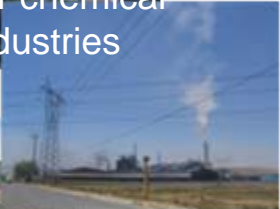
Other chemical industries



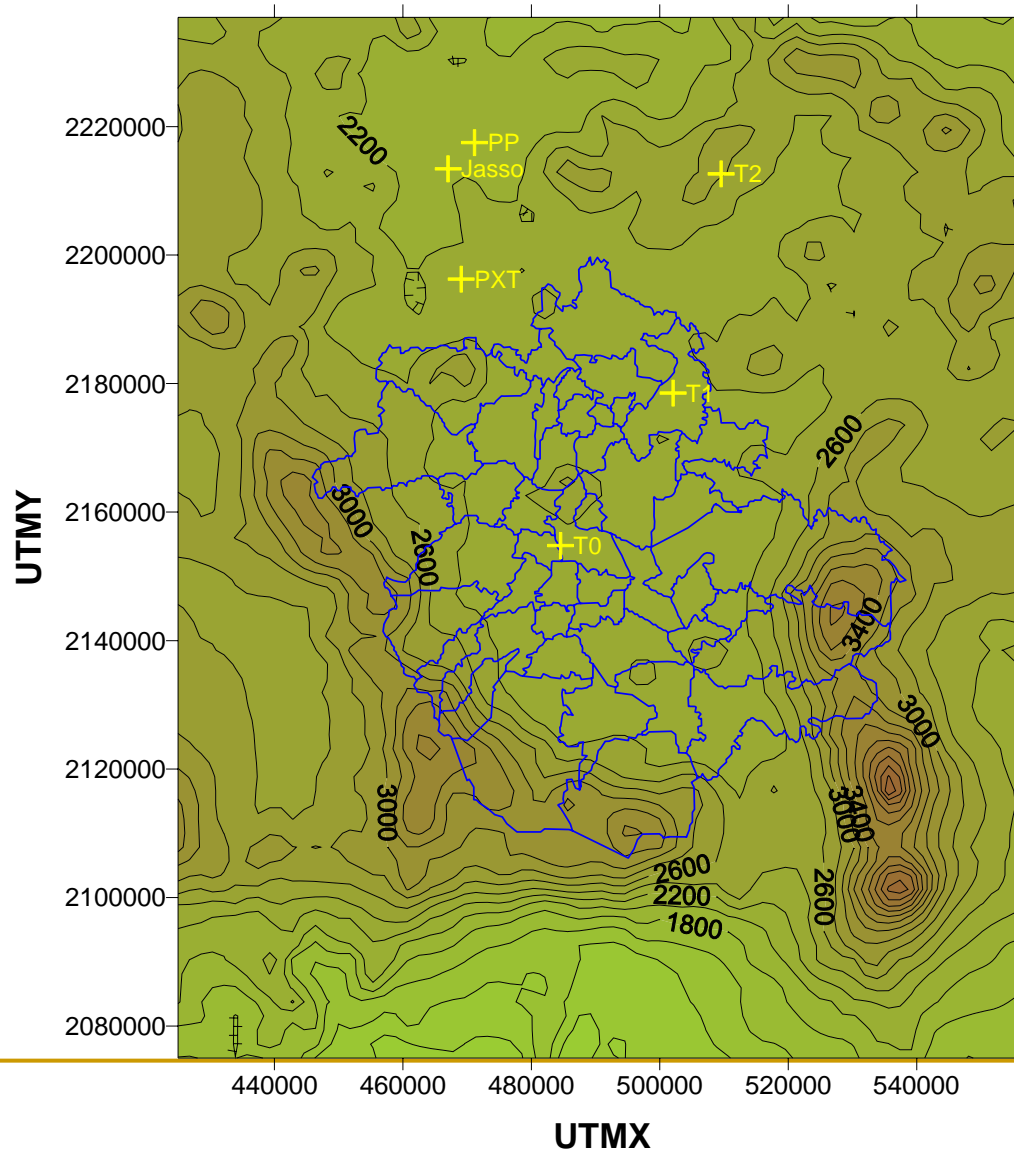
Refinery



Sky-open mines



# Monitoring sites location



# Field measurements

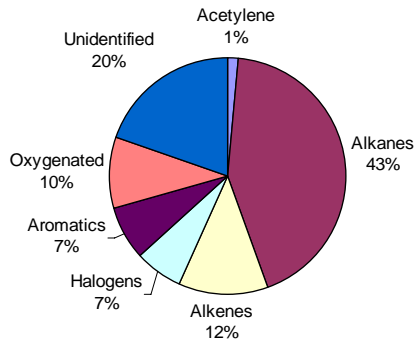
## March 18 – April 22th, 2007

- |                                     |           |          |
|-------------------------------------|-----------|----------|
| ■ VOC & Carbonyls                   | Two Sites | 12 h     |
| ■ PM10/PM2.5                        | Two Sites | 12, 24 h |
| ■ Elemental carbon                  | One Site  | 5'       |
| ■ Size Part. Dist.                  | One Site  | 15'      |
| ■ Opt. parameters                   | One Site  | 1'       |
| ■ Criteria pollutants               | Two Sites | 1'       |
| ■ Radiosondes                       | One Site  | 4 daily  |
| ■ Biomonitoring                     |           |          |
| ■ Colmn. Integrated SO <sub>2</sub> | Mobile    |          |

# VOC chemical composition (ppbC)

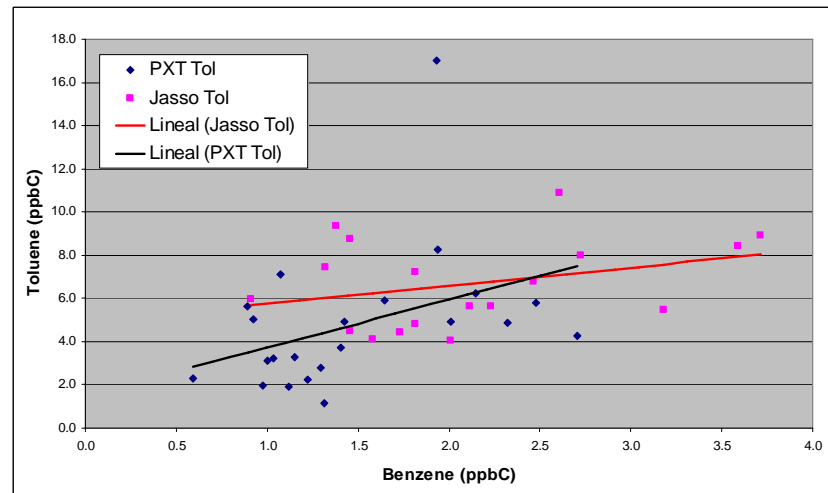
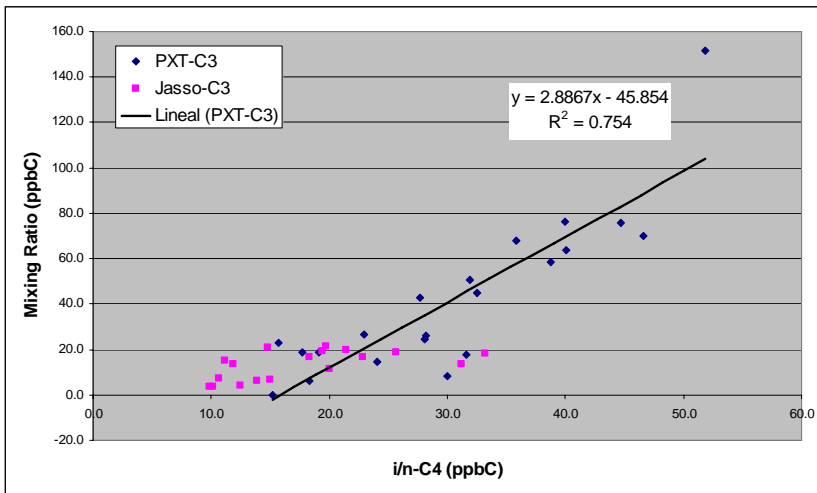
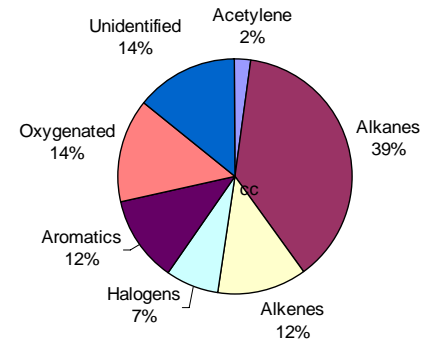
PXT

Average concentration 313.6 ppbC

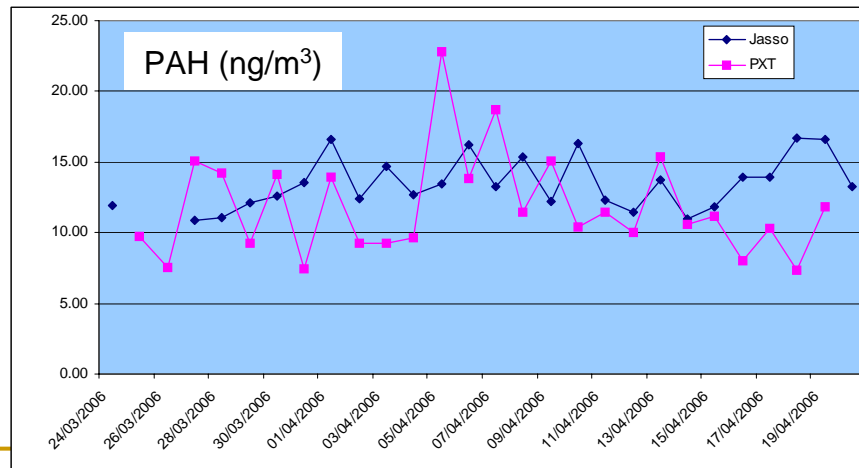
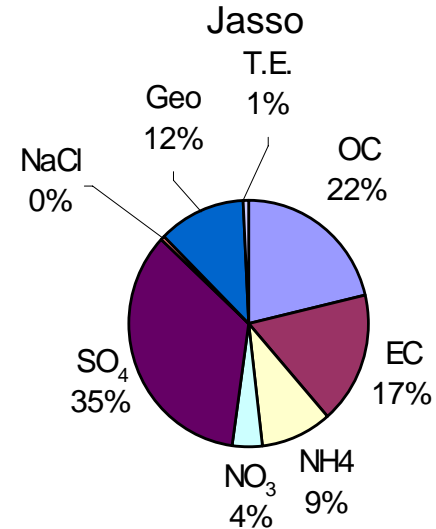
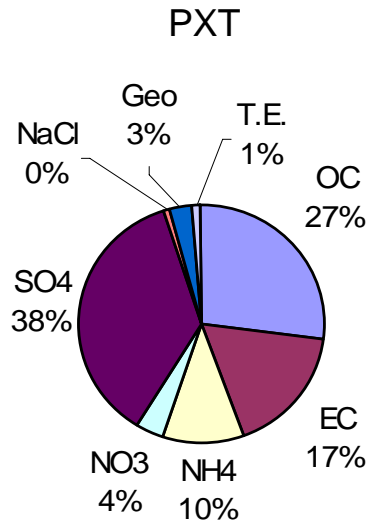


Jasso

Average concentration 260.3 ppbC



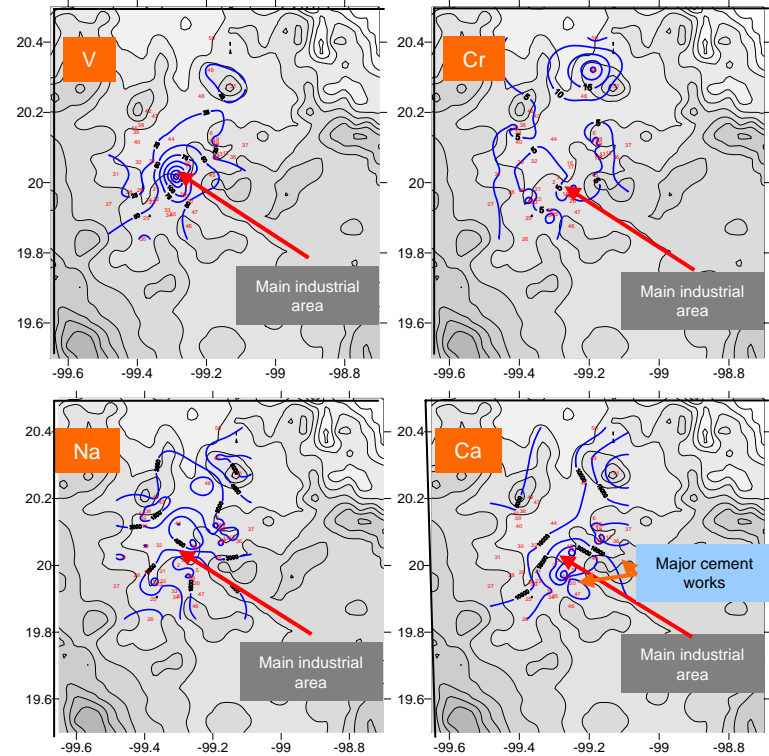
# PM<sub>2.5</sub> chemical composition



# Biomonitoring around Tula, Hidalgo

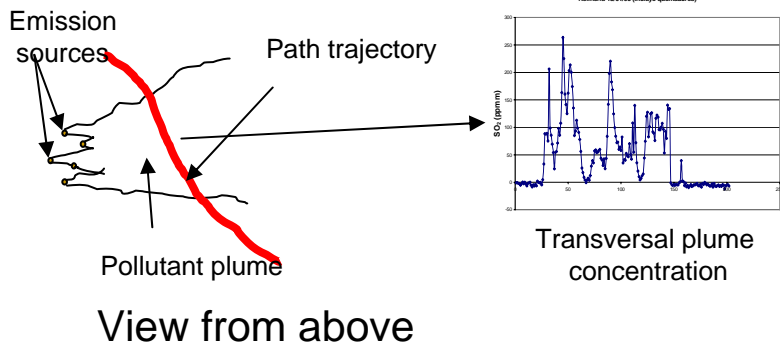
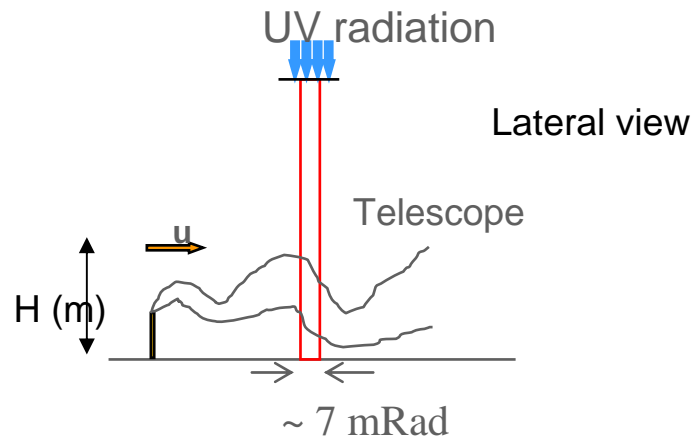


**Biomonitor:** the epiphytic “ball moss” (*Tillandsia recurvata*)

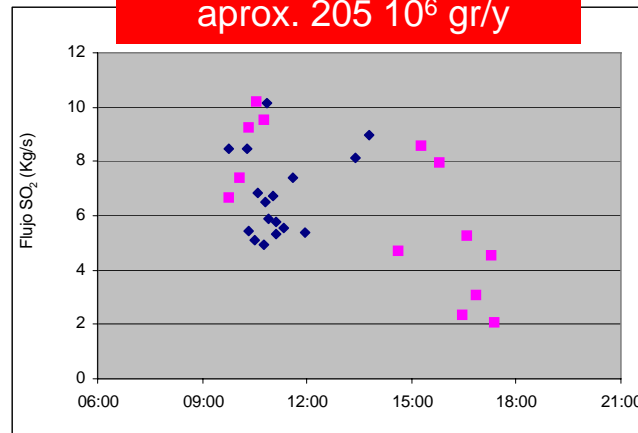


**Spatial distribution of some elements in *T. recurvata* at Mezquital Valley, México.**

# Column Integrated SO<sub>2</sub> concentration Mini-DOAS system



Average flux 6.6 kg/s  
aprox. 205 10<sup>6</sup> gr/y



# Important findings from the Tula study

- $PM_{10}$  and  $SO_2$  were the only pollutants exceeded AQ standards along the FC.  $O_3$  concentrations at PXT site is close to reach the hourly standard (0.11 ppm)
- HC's concentration in the neighborhood of Tula is lower than 0.5 ppmC. Alkenes (40%), Alkenes (12%) and AROM (7-12%), Oxy (10-14%), Halogens (7%), un-known (14-20%)
- The coarse PM is highly dominated by crustal material (Ca mainly).  $PM_{2.5}$  is dominated by total carbon (40%) and sulfates (~40%). Other secondary inorganic aerosols (14%) and trace elements (< 1%)
- Total PAH's concentration on  $PM_{2.5}$  ranges from 7 to 25  $ng/m^3$  in both sites, far lower that observed peaks in MCMA (200-300  $ng/m^3$ ). Benzo[a]pyrene average concentration < 1.0  $ng/m^3$ ; Indene ranges from 1 to 5  $ng/m^3$
- From the chemical analysis of biomonitors, the regional atmospheric deposition of Ba, Ca, Cu, Fe, Mo, Ni, Ti, V y Zn have origin on the local industry emissions
- From the  $SO_2$  column integrated measurements, the total  $SO_2$  flux from the industrial area at Tula resulted of 6.6 kg/s in average
- From Residence Time Analysis using modeled forward trajectories with WRF-Flexpart, the Tula's  $SO_2$  emissions were transported significantly towards the MCMA's (at different height levels) along the MIALGRO FC, except for the O3-North and few Convection meteorological scenarios (From B. de Foy personal communication)