Multiple Satellite Products Helpful for Evaluating the Mexico Emissions Inventory

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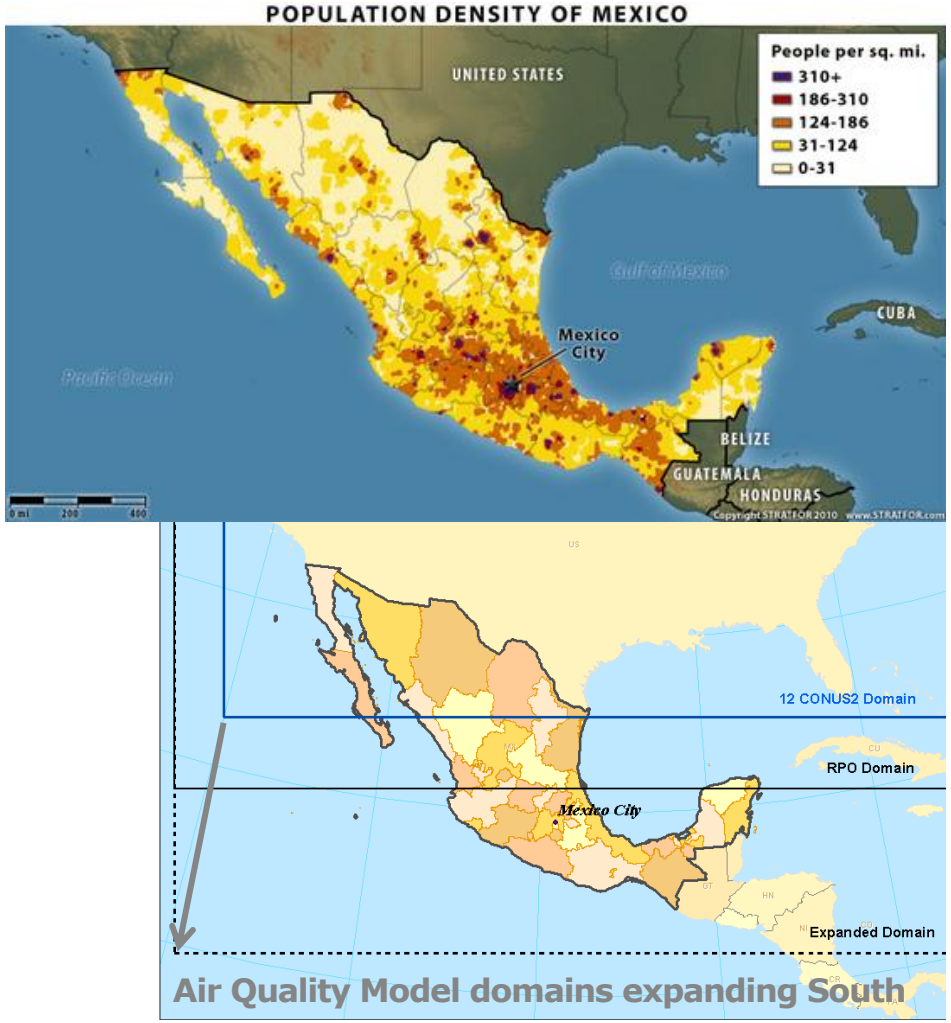
Introduction

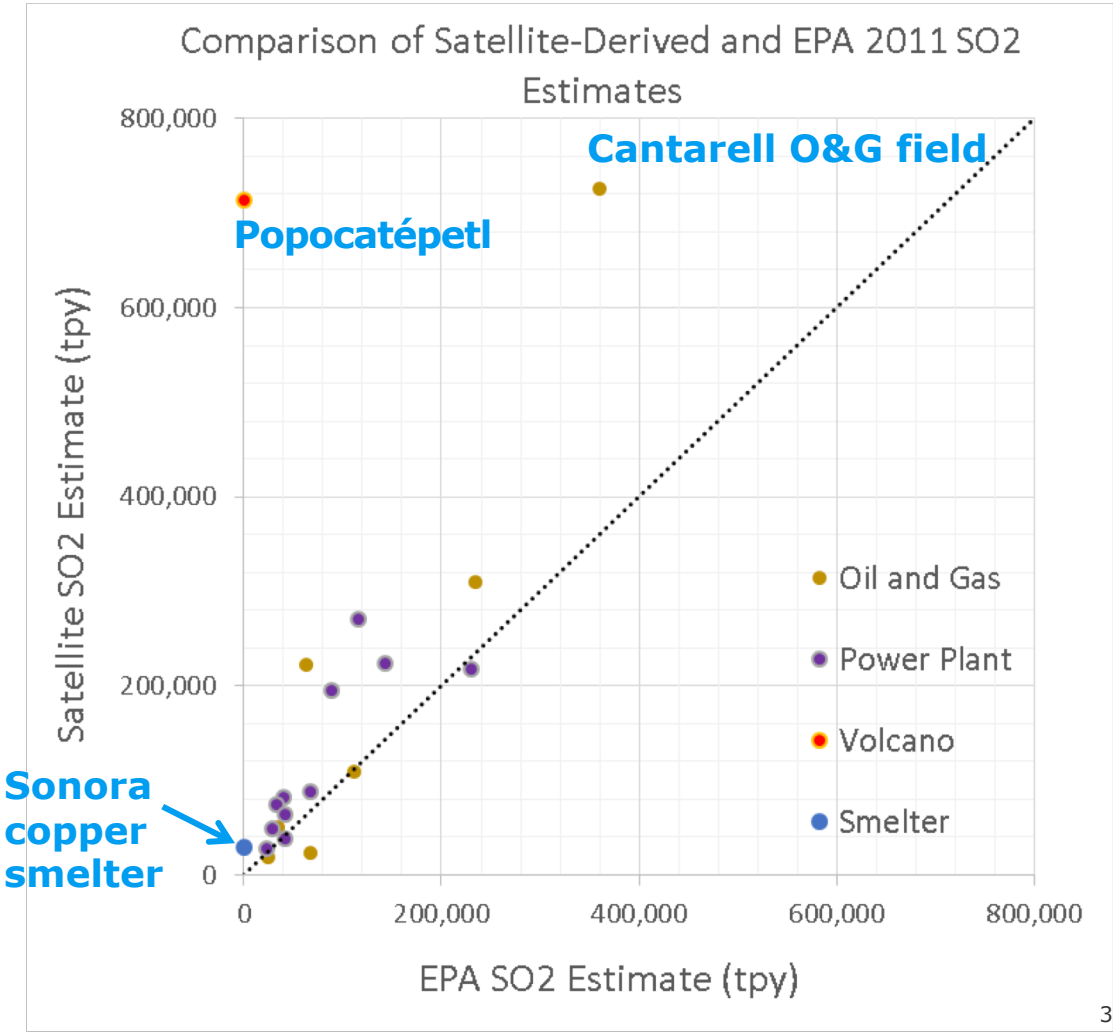
- International transport can contribute to US ozone and PM nonattainment issues, e.g., Mexico emissions
- This TCEQ project evaluated the Mexico emission inventory (EI) using satellite data
- We compared three satellite datasets to EPA's 2011 Mexico EI:

1. Catalogue of large SO_2 sources from NASA https://so2.gsfc.nasa.gov/measures.html#aq
2. Tropospheric NO_2 columns from NASA
3. Gas flaring estimates from NOAA https://www.ngdc.noaa.gov/eog/viirs/download_global_flare.html

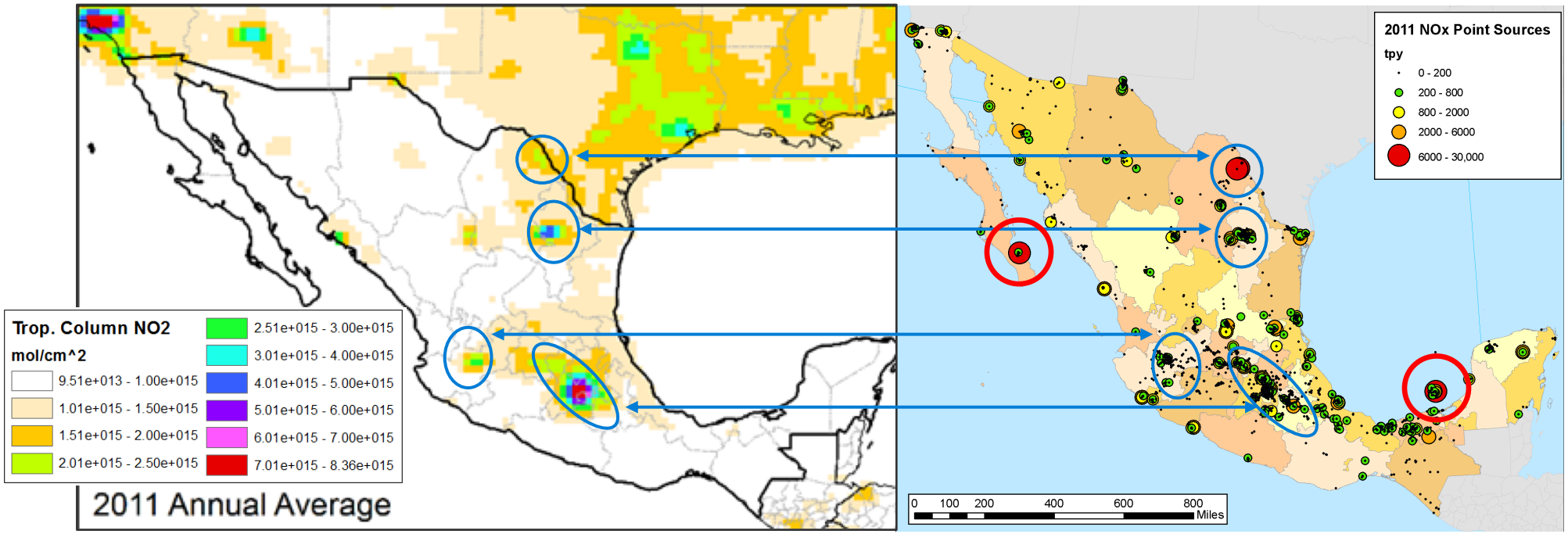


Large SO_2 Sources: Magnitude and Location

- SO_2 emission climatology (2005-2014) from NASA MEaSUREs (OMI data)
- Scatter plot of 2011 satellite vs. EI
- Satellite-derived SO_2 generally higher than EI
  - Satellite uncertainties allow for factor ~2 disagreement
  - Inventory missing 2 sources: Popocatépetl volcano & Sonora copper smelter
  - Discrepancy is large for Cantarell oil and gas field



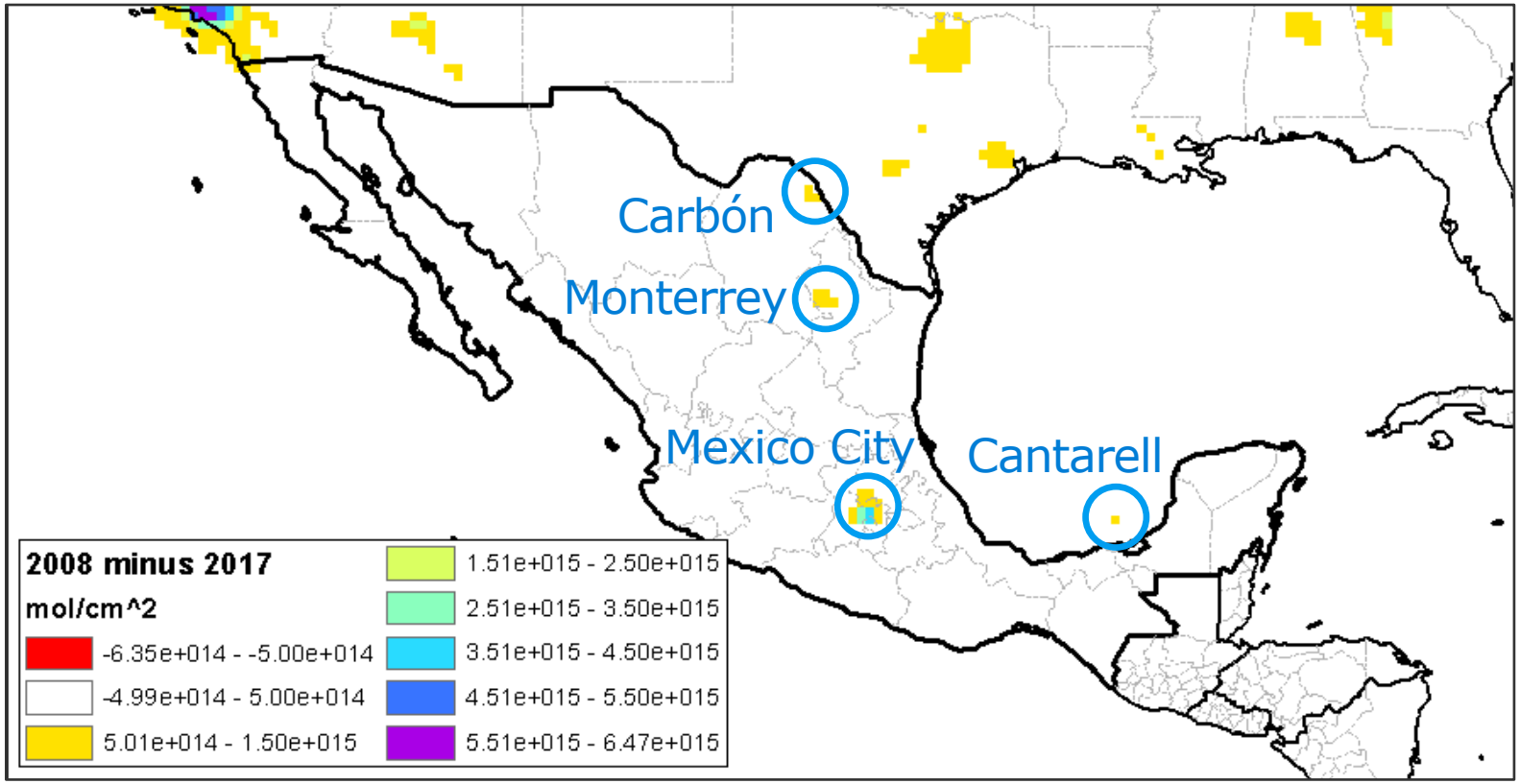
Large NO_2 Sources



- 2011 NO_2 columns from NASA Giovanni tool compared to EI
- Qualitative agreement for many sources (blue)
- Some large sources missing/small in satellite columns (red)

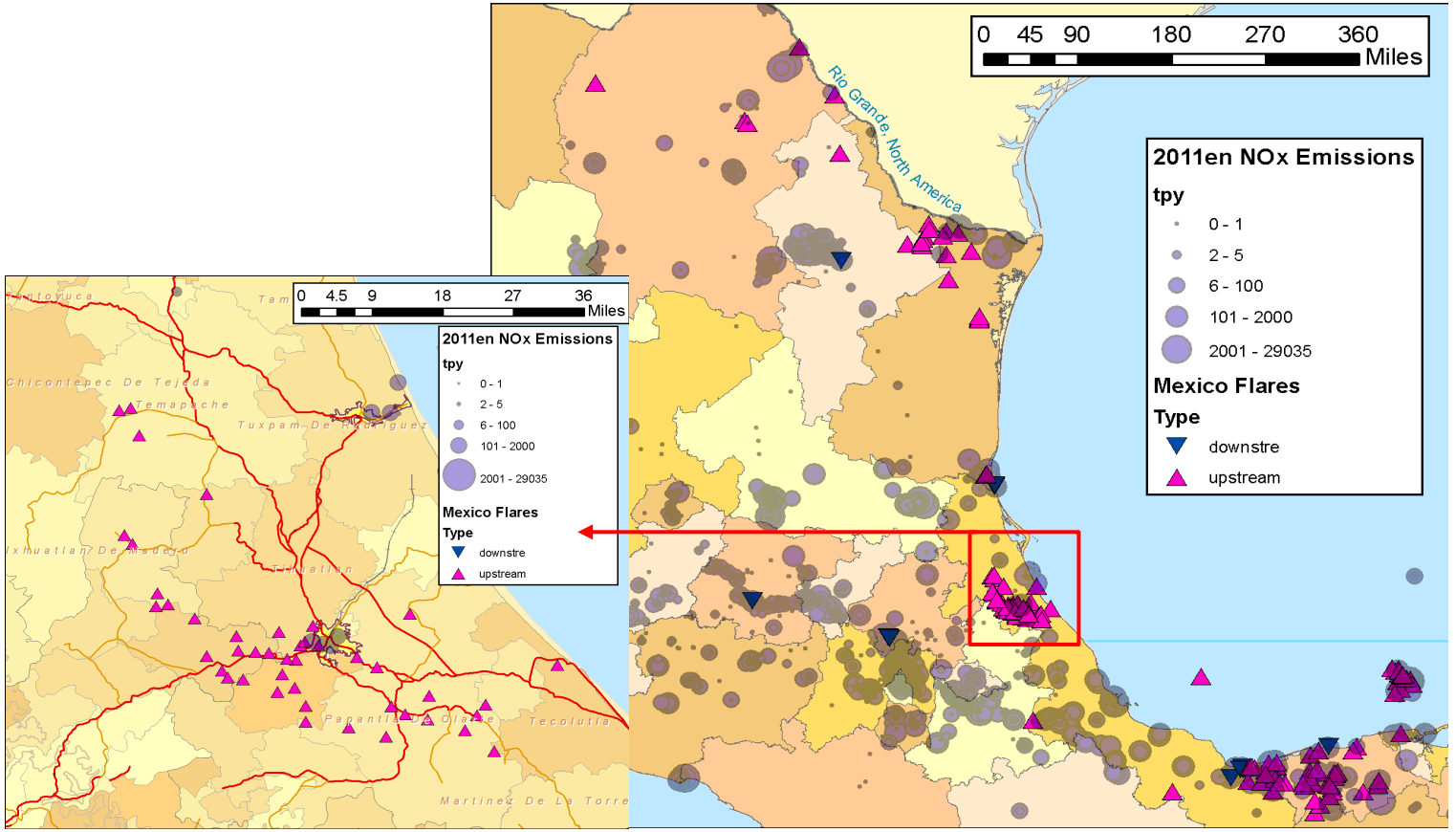
Satellite NO_2 Trends (2008-2017)

- Four locations in Mexico with a decrease in NO_2 columns
  - Carbón Power Plant
  - Monterrey
  - Mexico City area
  - Cantarell field in the Bay of Campeche
- NO_2 decreases indicate reductions from on-road, power plant and offshore O&G sectors



Flaring From Oil and Gas Sources

- Flare data overlaid on EI to look for missing sources
- Downstream O&G flares (blue down arrows) included in the EI
- Upstream O&G flares (pink up arrows) mostly missing from the EI
- Texas AQRP project to improve Mexico O&G inventory



Acknowledgment: The Texas Commission on Environmental Quality (TCEQ) sponsored this work