Wilmington Air Quality Study

Emissions Inventory Development and Evaluation

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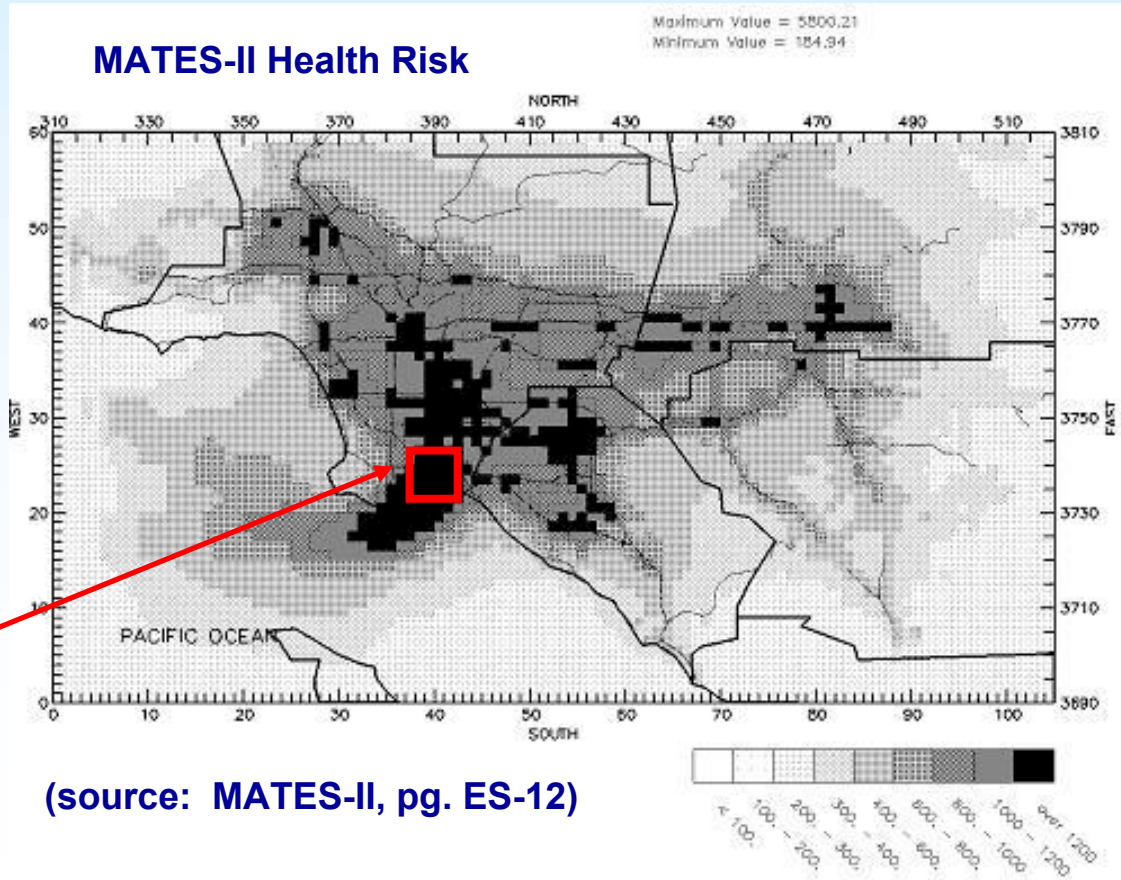
Wilmington

- Identified by MATES-II as one of the most impacted areas of the Los Angeles region
- Located near
  - Freeways
  - Refineries
  - Ports
  - Local Traffic
  - Manufacturing
  - Local Facilities



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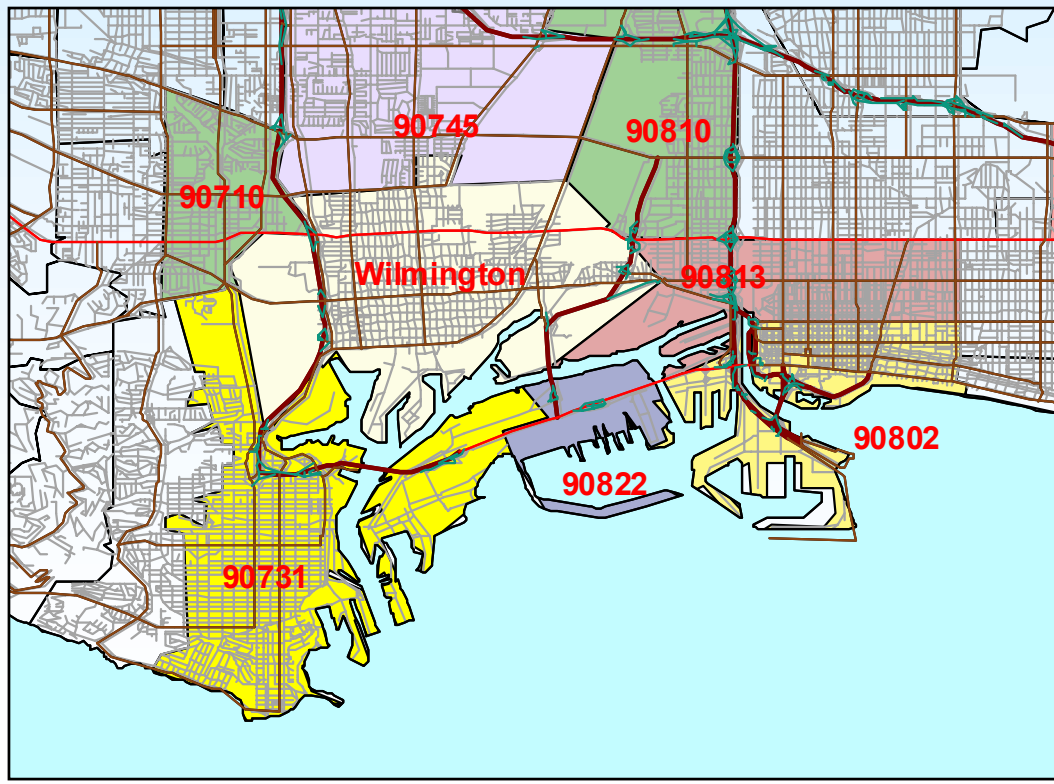
(source: MATES-II, pg. ES-12)

Wilmington Study Objective

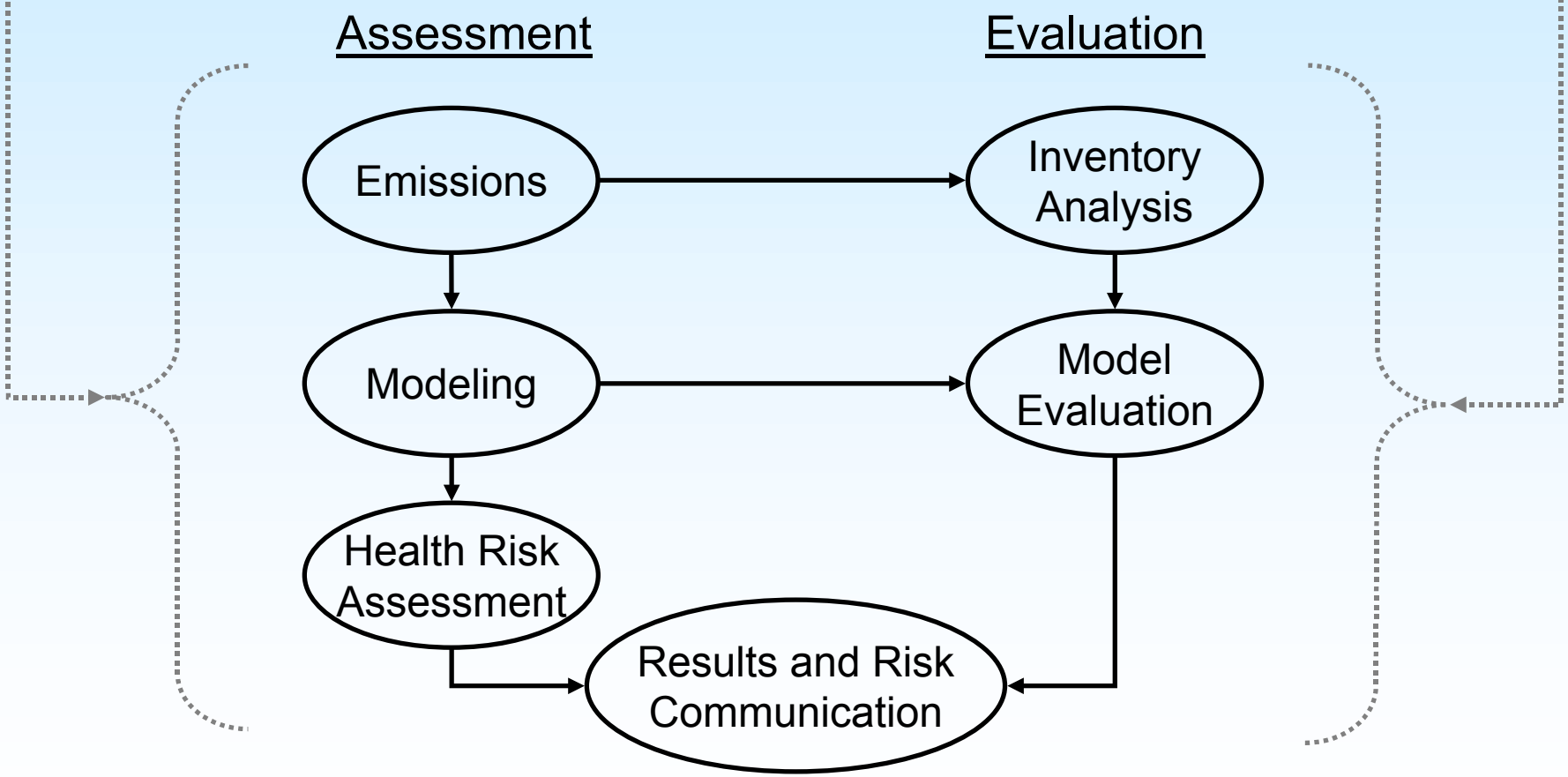
- Develop and evaluate modeling methodology capable of assessing the impact of toxic air contaminants at a fine resolution
- Study Components
  - Local scale inventories
  - Local and regional scale modeling
  - Health risk assessment
  - Limited exposure assessment
  - Model evaluation



Wilmington Neighborhood Assessment - Conceptual Plan

- What are estimated pollutant concentrations?
- What are health risks?

- What do the results mean?
- Can I trust them?



Wilmington Air Quality Study

- Emissions Inventory Plan
  - Three categories
    - Industrial and Commercial Facilities
    - On-Road Emissions
    - Marine Terminals and Related Off-Road
  - Tiered approach: 90744, all others
  - Goal: Develop a robust, spatially resolved, process and stack level modeling inventory
  - Inventory data evaluation
    - Spatial QA/QC
    - Multiple data sources
    - On-site surveys
    - Sensitivity and uncertainty analysis

Industrial and Commercial Facilities

- Inventory Development Procedure
  - Develop facility list from multiple databases
  - Collect inventories from multiple sources
  - Conduct on-site surveys
    - Verify existing inventories
    - Augment for on-site, off-road and on-road sources
    - Estimate release parameters
  - Compile inventory
    - Choose among data sources for best representation
      - Favor more recent, more complete data sources
    - Assign default locations and stack parameters as necessary
- Defaults
  - Location by GDT Geocoding
  - Stack parameters

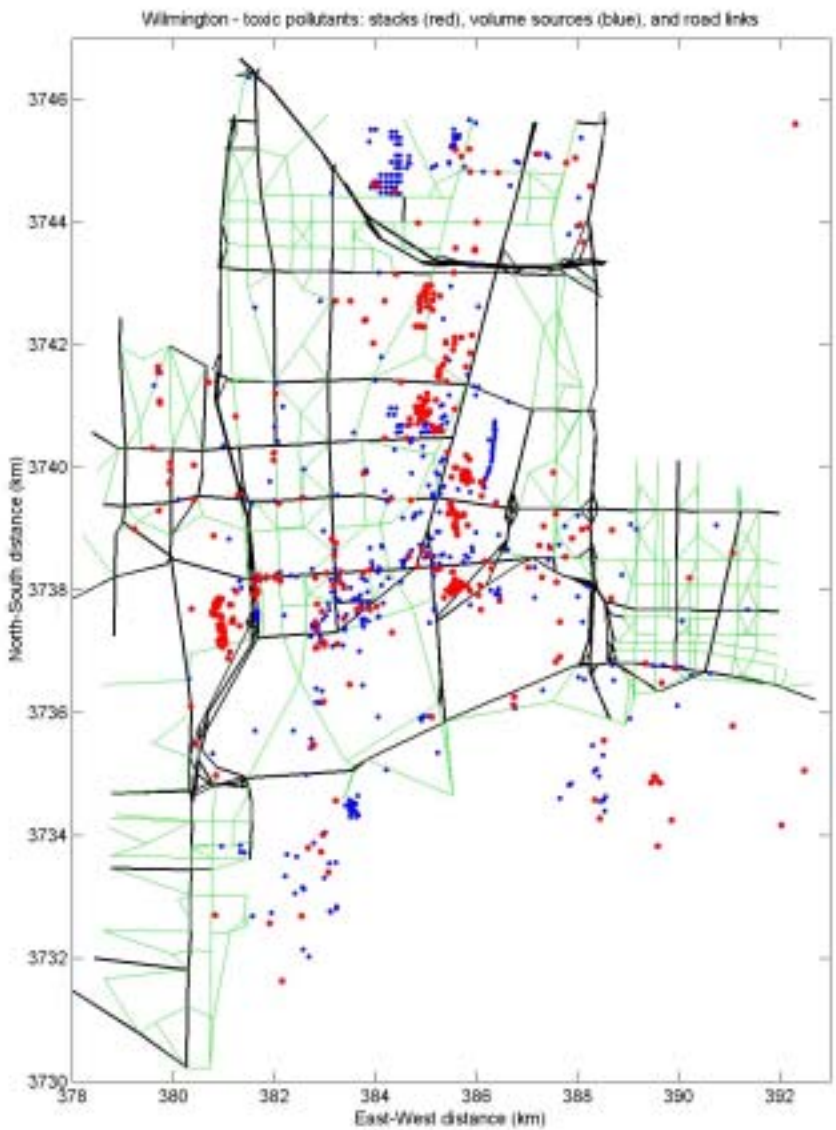
Industrial and Commercial Facilities

- Inventory Data Evaluation
  - Why evaluate?
    - Individual errors may affect local scale modeling and risk
    - Determine level of data necessary to support credible local scale risk estimates
- Evaluation Goals
  - Evaluate inventory databases
    - How credible are primary databases, and how can they be improved?
  - Contribution of “Neighborhood” sources
    - Do smaller facilities affect risk? At what resolution?
  - Assess uncertainty

Industrial and Commercial Facilities

Preliminary Results

- Toxics Inventory: 405 facilities, 1660 release points, >14,000 records
- Criteria Inventory: 259 facilities, 761 release points, >7200 records
- Inventory data obtained from 170 facilities by survey



Industrial and Commercial Facilities

- Preliminary risk-score evaluation
  - Toxicity-weighted emissions
    - Cancer risk: Emissions * Unit Risk Factor * MW Adj * 1700
    - Chronic risk: ((Emissions/8760) / Reference exposure) * 150

Preliminary Results

- 80% of toxicity-weighted emissions verified or obtained by survey
- 10 facilities account for 70% of toxicity weighted emissions.
- Diesel PM on-site, off-road and on-road emissions are important, and not typically allocated to facilities.

Pollutant	Percent of Total Inventory Cancer Score
Diesel PM	68
Hexavalent Chromium	12
1,3 Butadiene	6
Benzene	3
Cadmium	3
Sum	**92**

Data Source	Percent of Total Inventory Cancer Score
Surveyed Sources	80
Non-Surveyed Sources	20

Industrial and Commercial Facilities

- Work in Progress
  - Spatial QA/QC
    - Use GIS to help identify potential database errors that may not be caught using standard QA/QC procedures.
  - Inventory database evaluation
    - Compare inventories developed by survey to ARB databases to assess strengths and weaknesses, and develop proposals for database improvements.
  - Contribution of Neighborhood Sources
    - Determine whether facilities not typically reported to inventory databases affect local risks and should be considered in future assessments.
  - Inventory Uncertainty
    - Reporting uncertainty: same facility, different sources should have similar emissions.
    - Analysis of gas stations, diesel PM sources.

On-Road Emissions

- Method: Link (Roadway) - Based Inventory
  - Travel demand models
    - Roadway network, classified by type
    - Volume and speed on each link
  - EMFAC
    - Fleet characteristics, LA County
    - Develop composite emission factors for default fleet by temperature and relative humidity
  - Temporal profile
    - UC Davis Study - generic to Los Angeles
  - ARB speciation factors for toxics

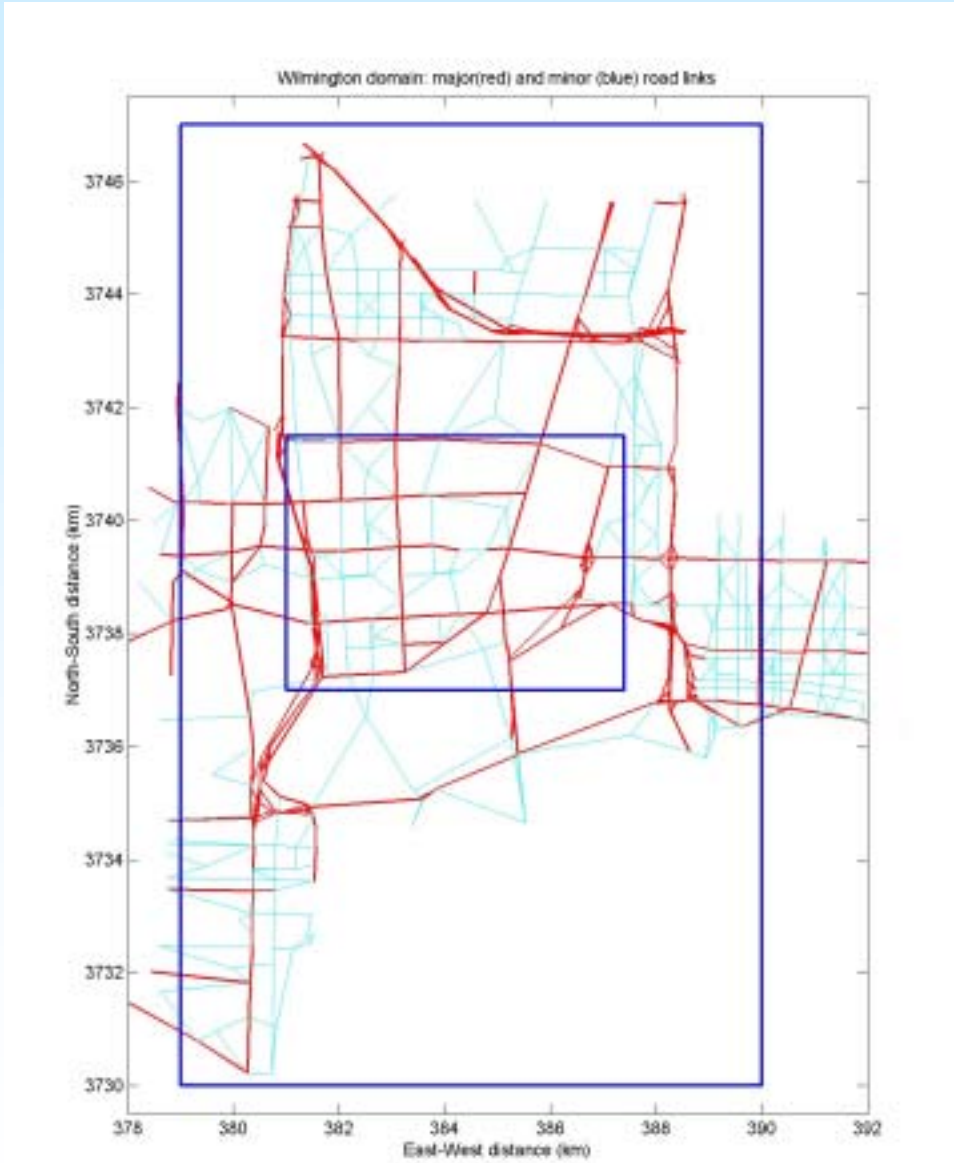
On-Road Emissions

- Inventory Evaluation
  - Qualitative evaluation of assumptions
    - Link-based inventories require different assumptions
    - Spatial resolution makes assumptions more important
  - Vehicle volumes
    - Use vehicle counts to evaluate volumes on specific links
  - Speed, emission factors and other sources
    - Sensitivity analysis
  - Importance of different roadway classifications
    - Evaluate different roadway classifications to determine levels of risk each generate and how inclusion/exclusion would affect model results.

On-Road Emissions

Preliminary Results

- About 2000 links in model domain
- Freeways, ramps and major arterials more spatially accurate than other links.
- Freeways, ramps, and major arterials account for 50% of links, 80% of on-road diesel PM emissions in model domain
- Unclear extent travel demand models should be used for link-based assessment



On-Road Emissions

- Work in Progress
  - Compile list of assumptions in link-based approach
  - Compare predicted traffic volumes to traffic counts
  - Sensitivity Analysis
  - Comparison of contribution to modeled risk from each roadway classification. Determine which to consider in the future
  - Uncertainty analysis: diesel PM sources

Off-Road Emissions

- Inventory Development
  - Ports of Los Angeles and Long Beach
    - Statewide emissions estimates cannot be directly attributed to ports.
    - We are working with Ports to develop inventories for marine terminals, on-road sources, and related locomotive emissions.
  - Locomotives
    - Working with Rail companies and Ports to develop link and throttle-notch specific inventories
  - Not considered: construction
    - Transient, not appropriate for long-term risk assessment

Conclusion

- Emissions inventories have a major impact on local scale modeling results
  - Spatial resolution is important, but achieving spatial resolution introduces new opportunities for error.
- Developing diesel PM inventories for local scale assessment is a concern.
- Completing this study will help us:
  - Refine and improve local scale modeling inventories
  - Focus on most important pollutants and sources
  - Understand model performance
    - Credibility of neighborhood assessment risk results.