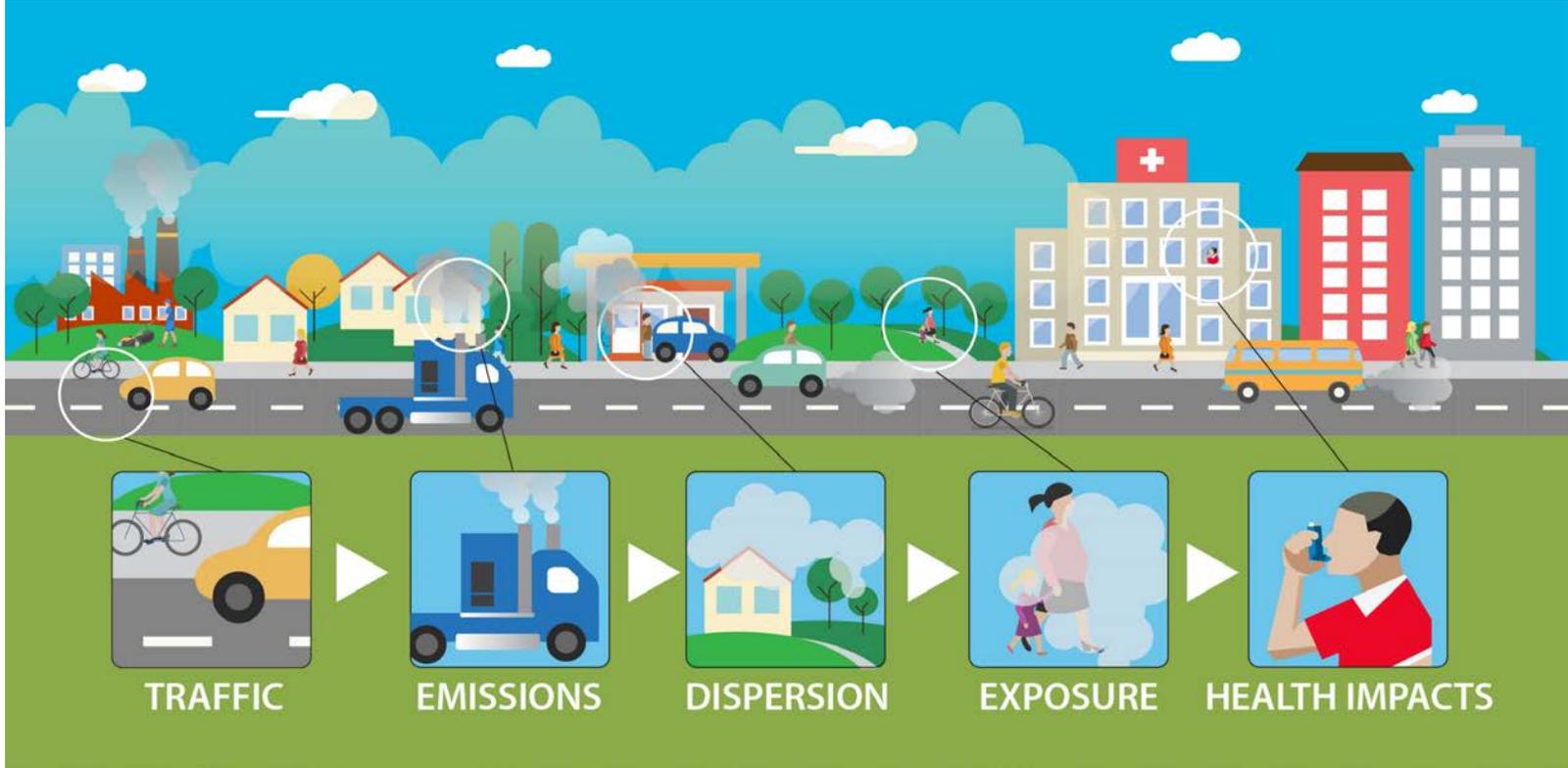




Maternal Exposure to Transportation-Related Air Pollution in South Texas

Suriya Vallamsundar and Joe Zietsman
Texas A&M Transportation Institute

January 25, 2018



Introduction



- ❑ Motor vehicles emit large quantities of pollutants
- ❑ Maternal exposure to air pollution during pregnancy increases the risk for childhood asthma

Background

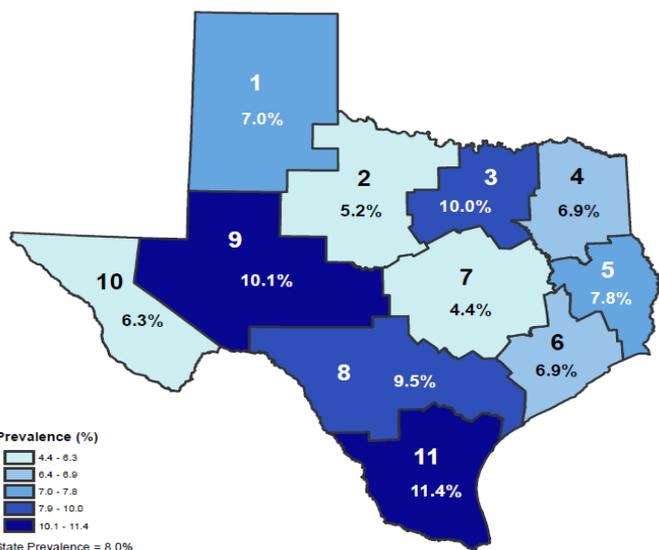
- ❑ Cross disciplinary Health Pilot Study



- ❑ Characterize maternal and in-utero exposure to traffic related air pollution
- ❑ One of the early studies focused on a vulnerable population of pregnant women



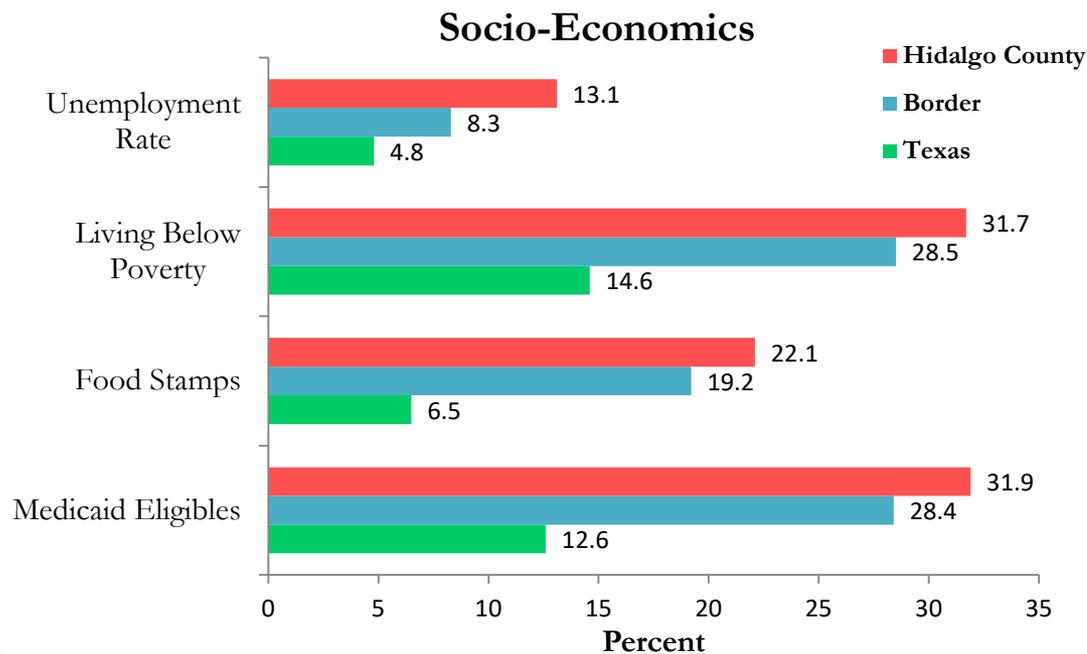
Pilot Project Overview



Quantiles were used for breaks.
Data Source: Texas Behavioral Risk Factor Surveillance System (BRFSS), 2011.
Center for Health Statistics, DSHS.
Date: 4/15/2013



Hidalgo Co.



Pilot Project Approach

TTI

- Model Traffic Emissions
- Pollutant Dispersion
- Exposure Assessment

JHU

- Time Activity Pattern Assessment
- Location, Time spent and Exposure

HSC

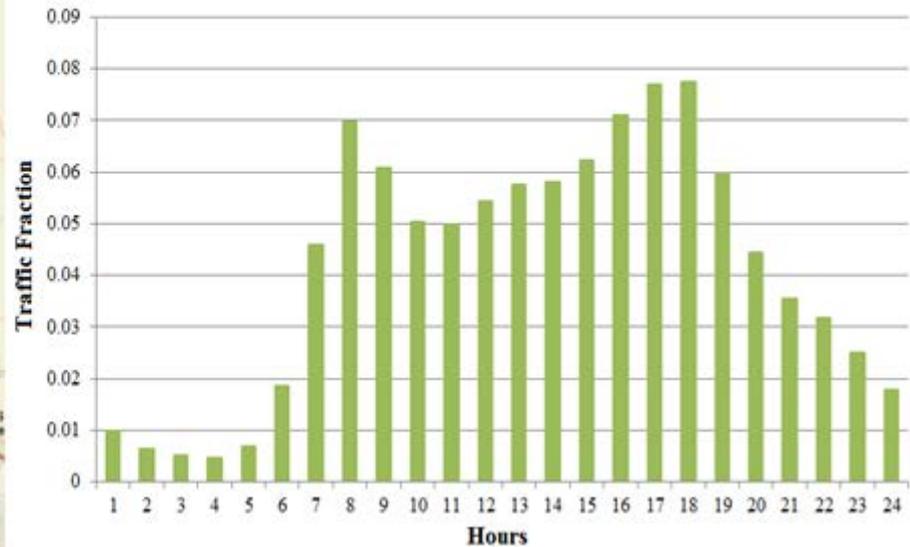
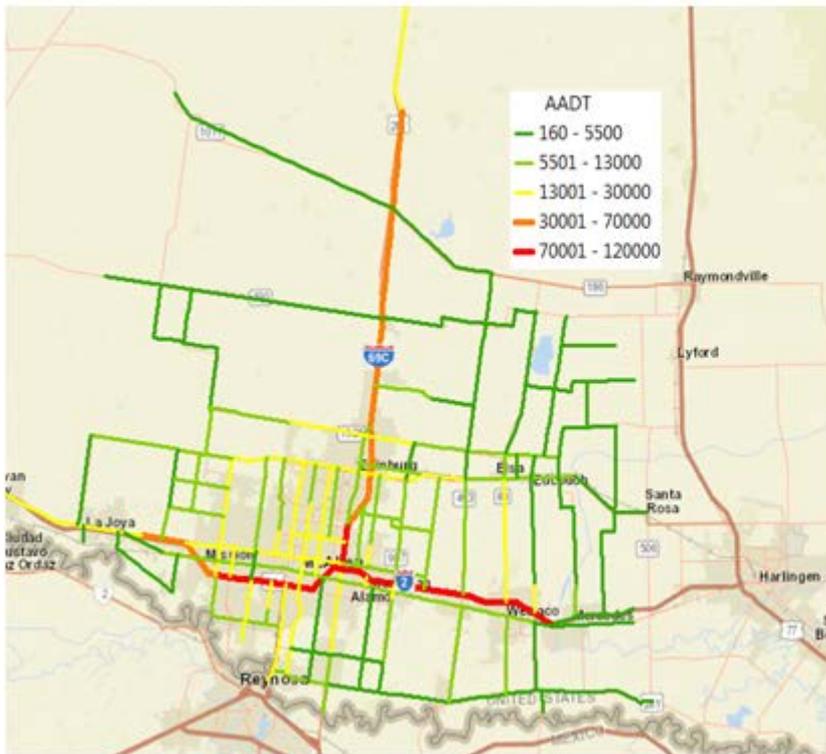
- Collect blood, urine, and hair samples
- Biomarkers of exposure

Individual Measurement

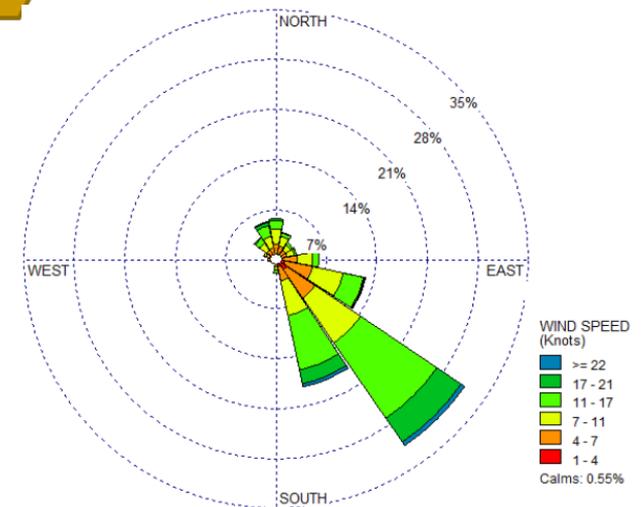
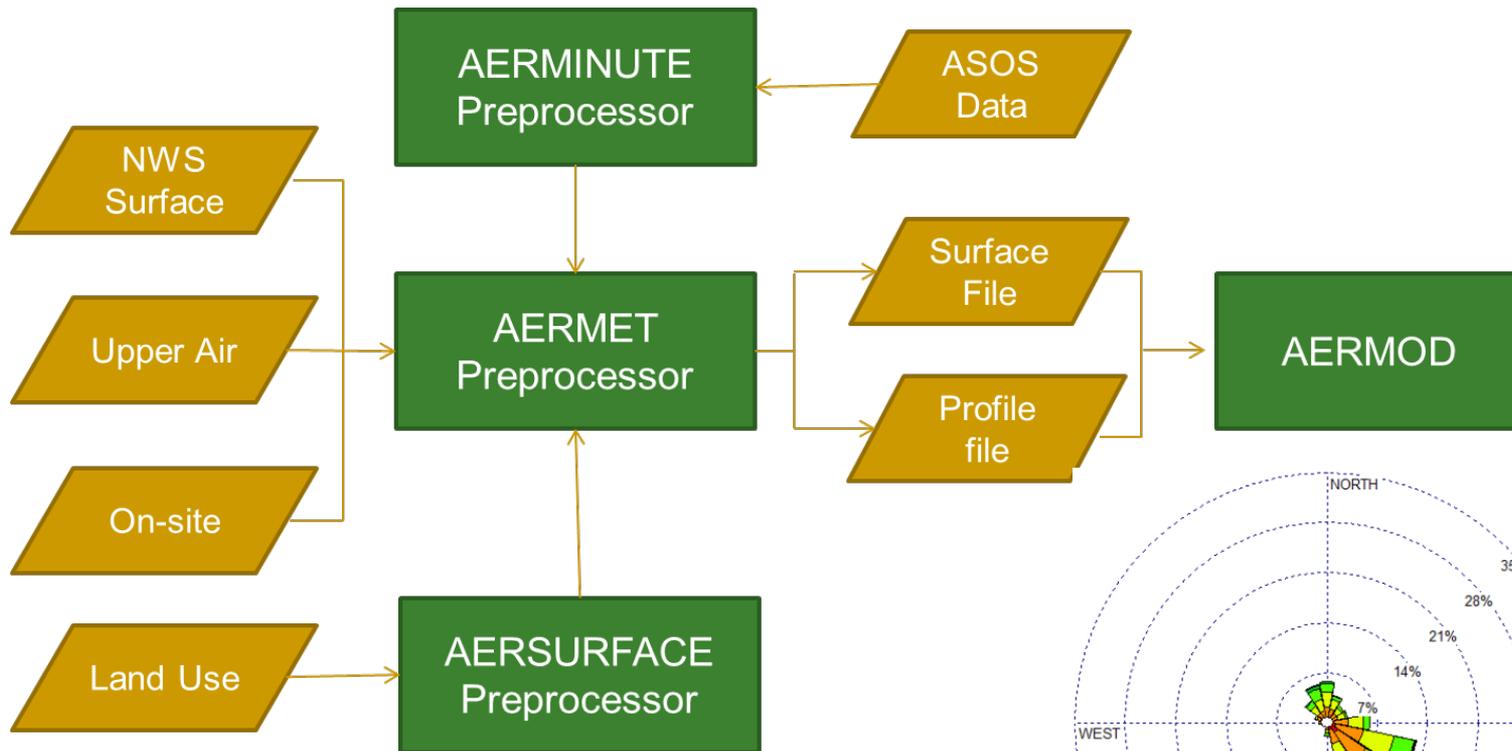
- ❑ Monitor 17 non-smoking women in their third trimester of pregnancy for 3 non-consecutive days
- ❑ Participants are equipped with backpacks containing air sampling equipment (PM_{2.5}), a GPS device and instruments to measure temperature and humidity
- ❑ Sampling Period (Nov, 2015 - April, 2016)



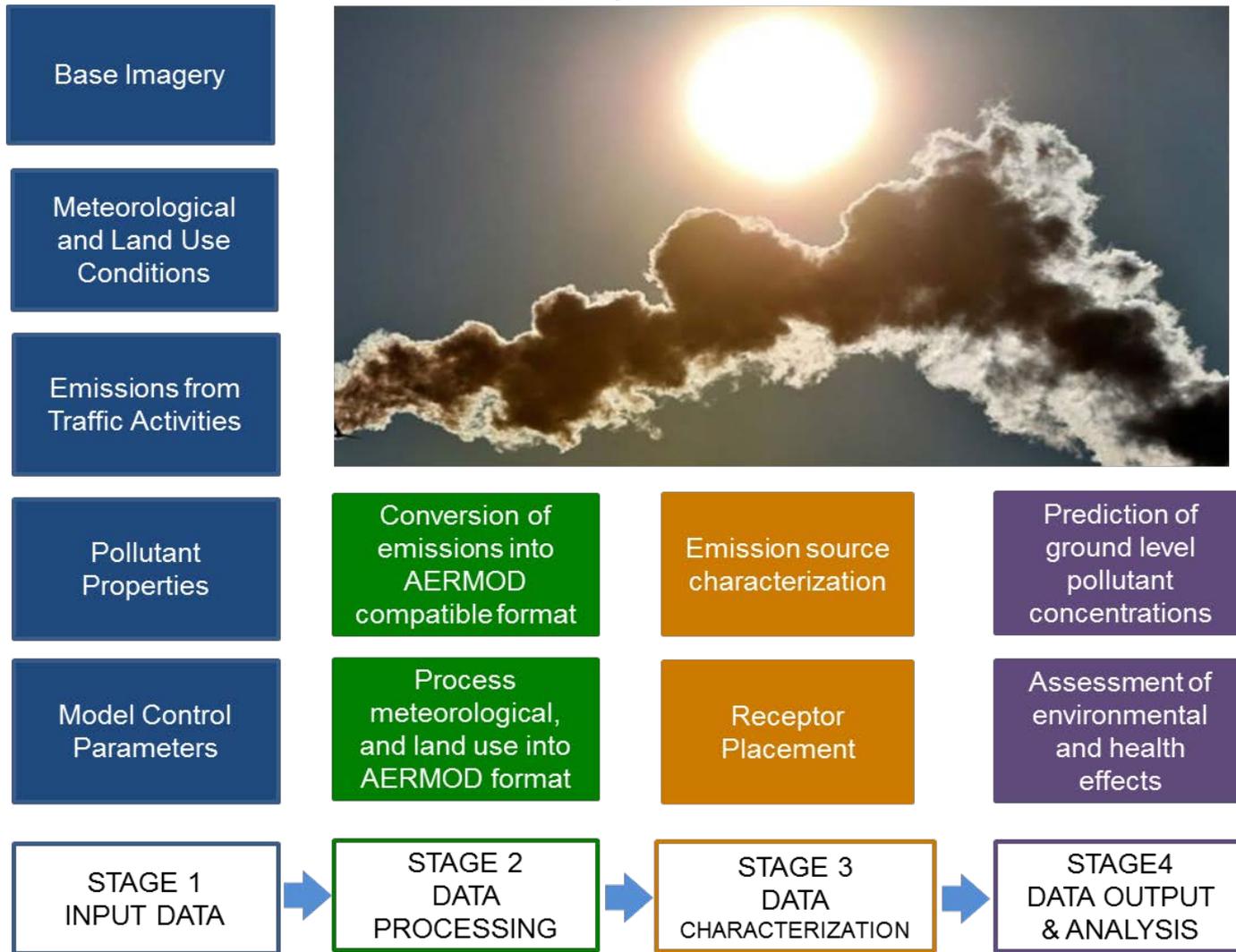
Traffic Data

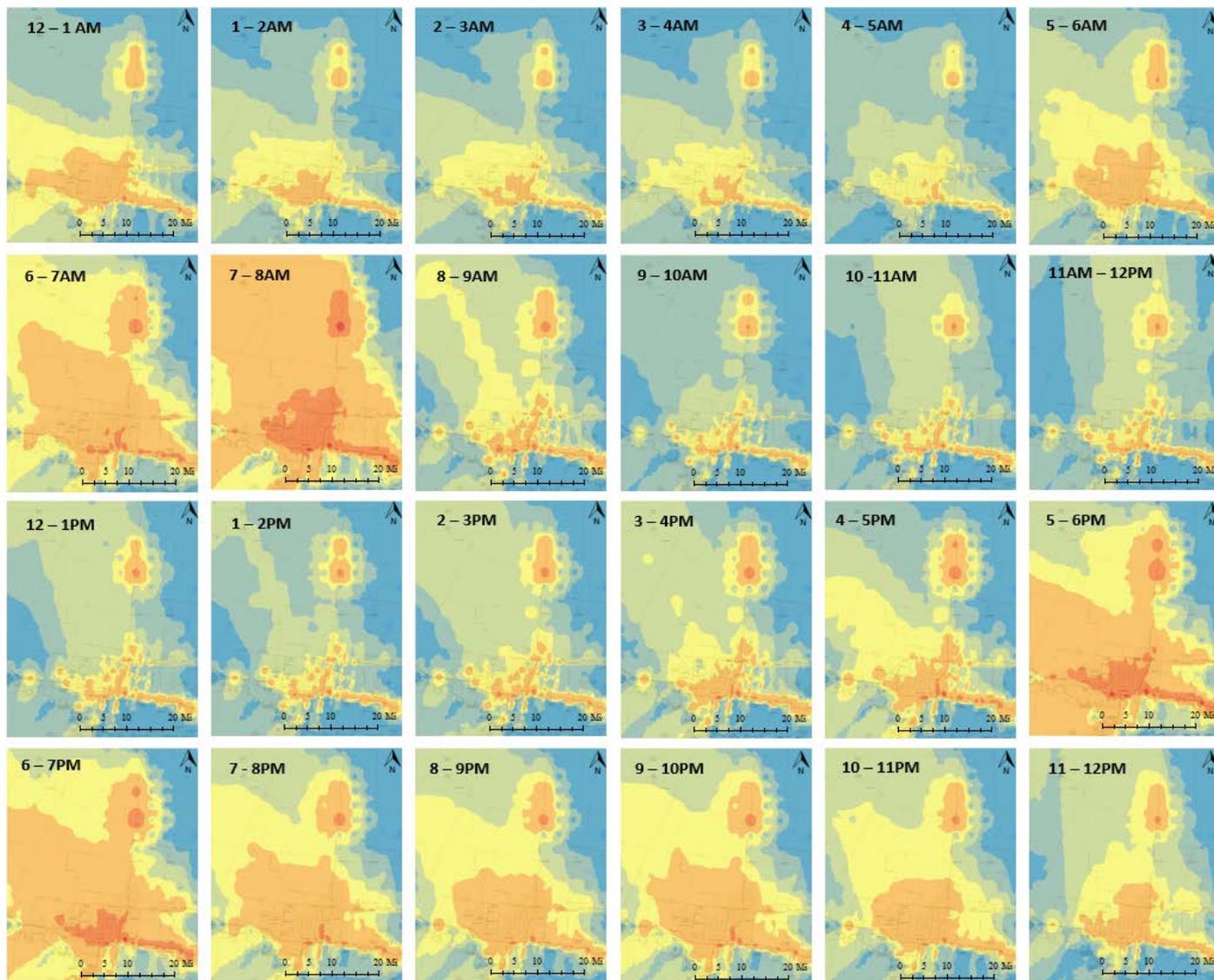


Meteorology

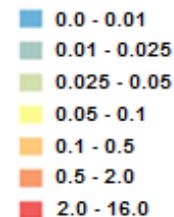


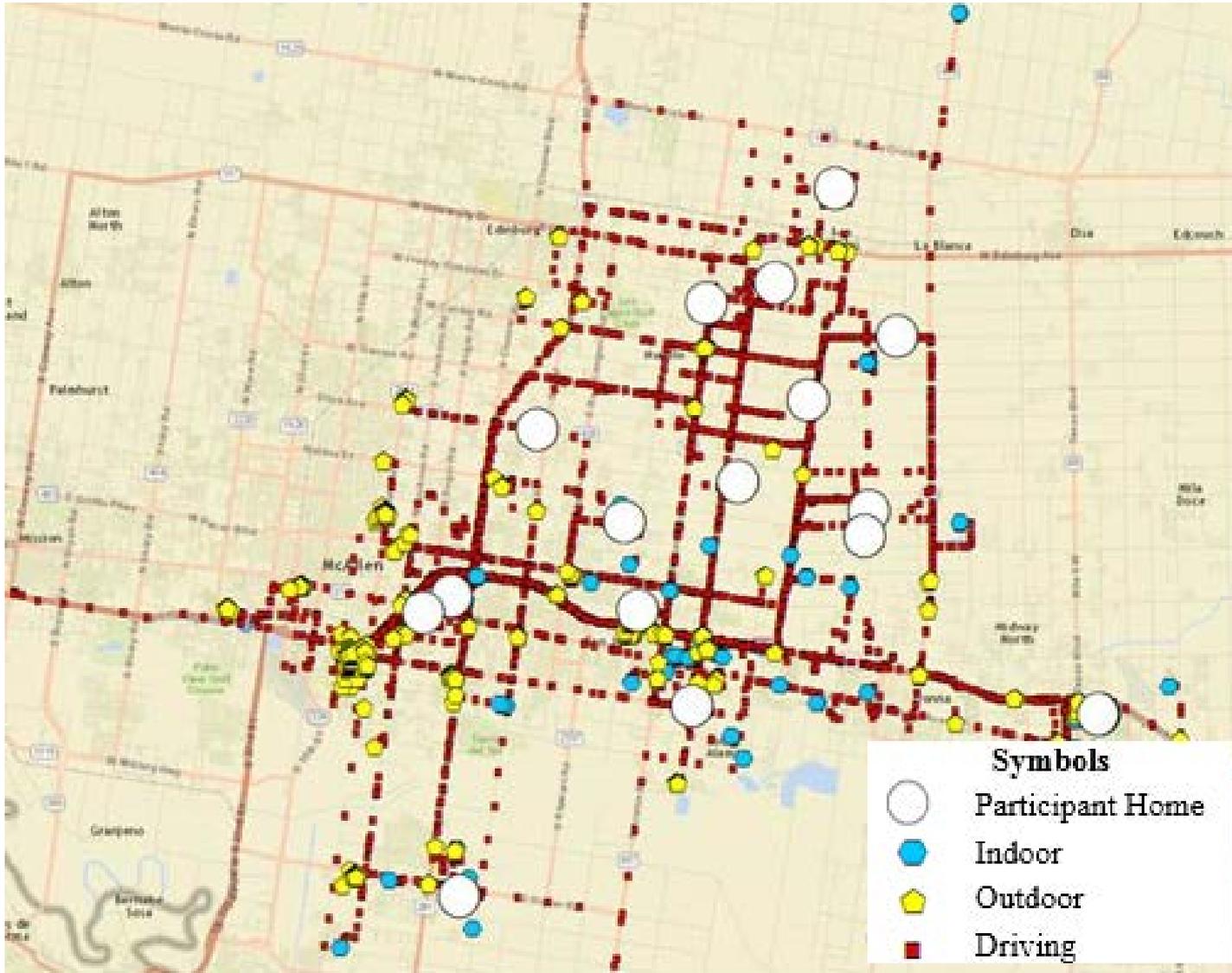
Air Dispersion



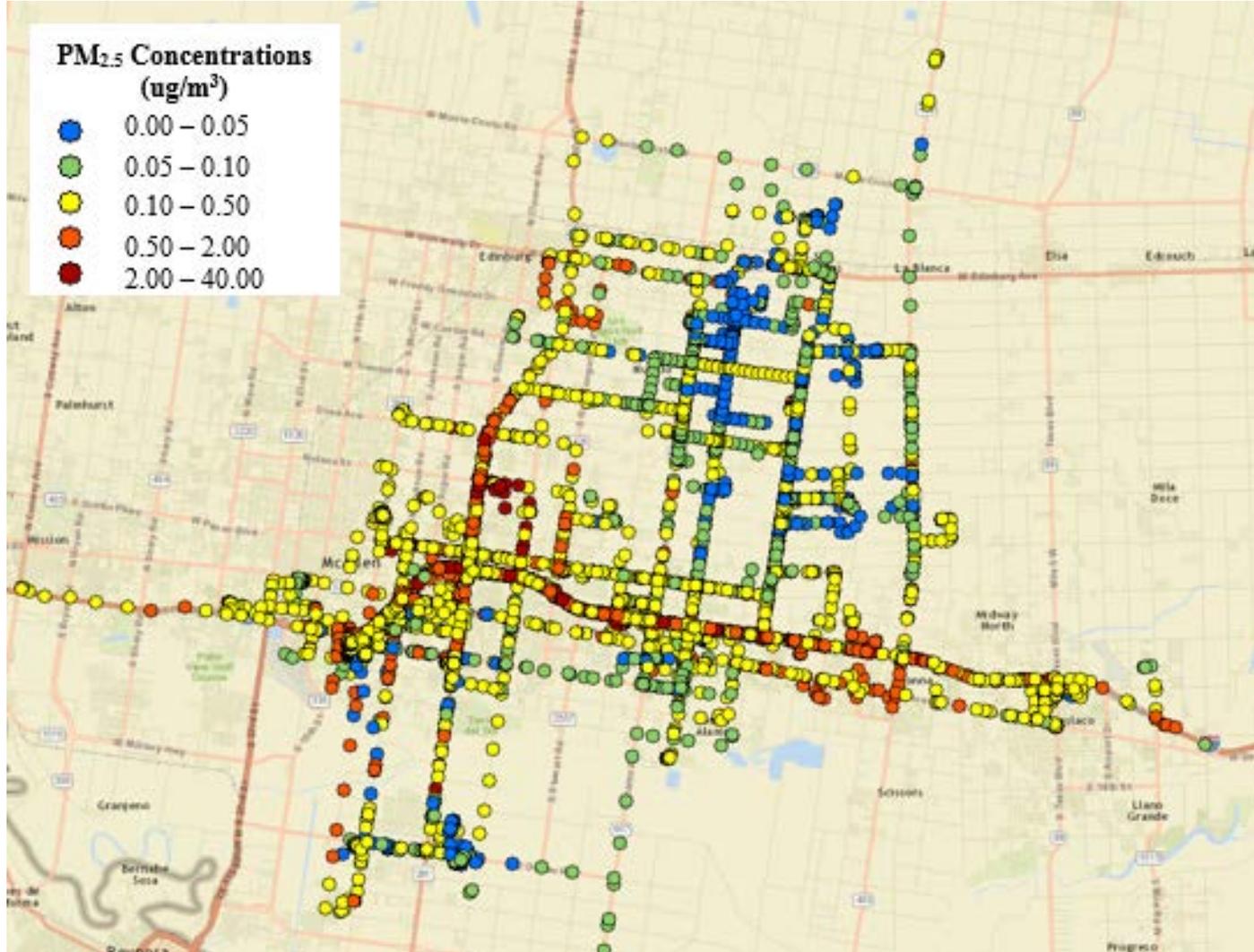


**PM2.5 Concentration
Contours (ug/m3)**





Location
Information



Exposure Assessment

Exposure Assessment

- Total exposure in 3 microenvironments:

$$E_i = \sum(T_{in} C_{in} + T_{io} C_{io} + T_{iv} C_{iv})$$

- T: time
 - C: concentrations
 - i: person
 - v: in-vehicle microenvironment
 - o: outdoor microenvironment
 - n: indoor microenvironment
- AERMOD provides outdoor concentrations

We use the ratio of indoor to outdoor concentrations
and ratio of in-vehicle to outdoor concentrations

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Concluding Remarks

- Integration of health and transportation – topic of growing importance
- Emergence of novel data collection methods
- Targeted policy and intervention measures
- Finalize the biomarker evaluation
- Future: increase sample size, focus on a case study where traffic emissions are greater

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