MODELING AIR QUALITY

Outdoor Air Pollution in Southeast Texas

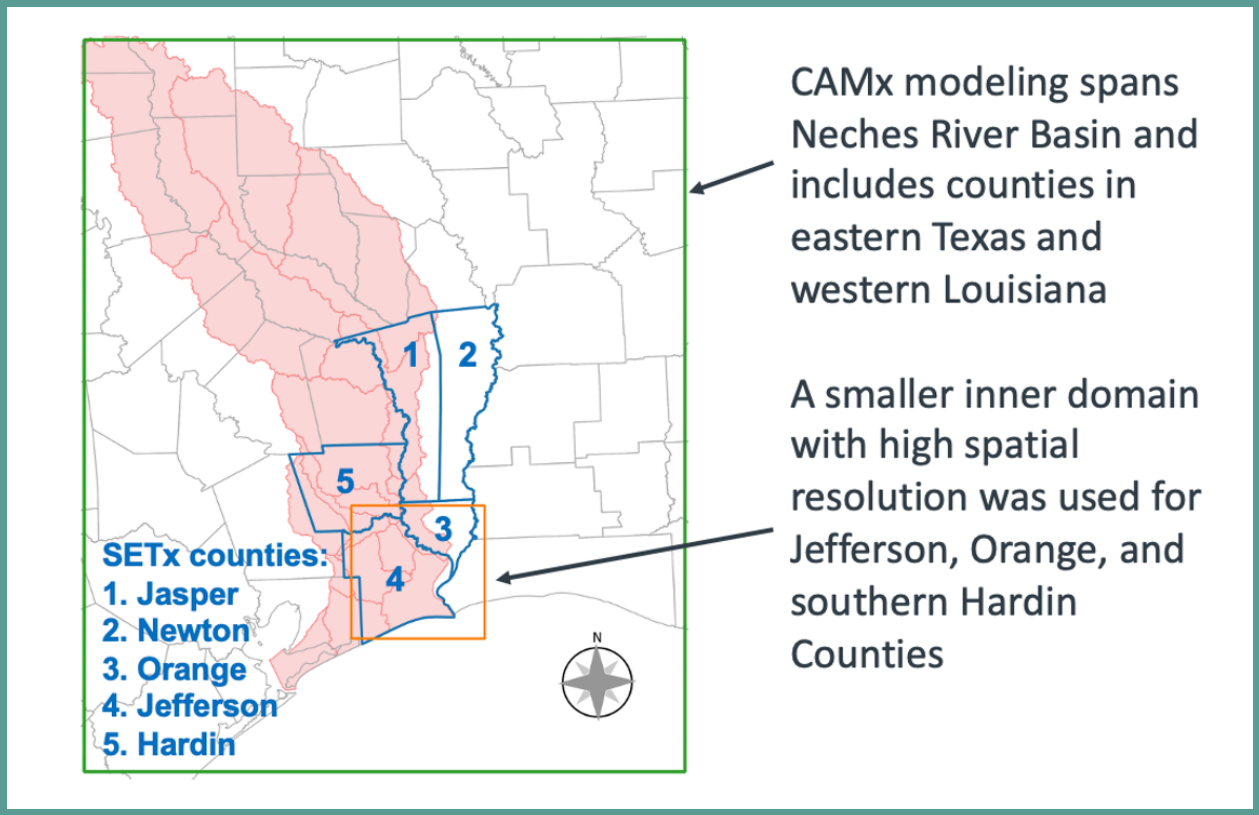
SOUTHEAST TEXAS
URBAN INTEGRATED FIELD LAB

WHY NOW?

Southeast Texas is home to some of the most vital oil refineries and chemical manufacturing plants in the United States. These industries along with other urban sources in the Beaumont-Port Arthur area can contribute to air pollution. In addition to measurements, computer modeling can be used to provide important information for communities about outdoor air pollution.

WHAT WE DID

The SETx-UIFL research team developed an air quality modeling platform for Southeast Texas. The geographic region (Figure 1) covered by the model includes Jefferson, Orange, Hardin, Jasper, and Newton Counties and extends into parts of eastern Texas and western Louisiana. The modeling platform uses information from a weather model and from federal and state databases of emissions from local industries, motor vehicles, and many other sources. The research team used the model to simulate nine air pollutants of interest.



Geographic region included in the outdoor air quality modeling study

FINDINGS

Predictions by the model were used to investigate how different emission sources contributed to average air pollutant concentrations. For example, model predictions in Figure 2 show that emissions from local industrial sectors, fires, smaller area-wide sources, and onroad/offroad vehicles as well as transport of pollution from other areas outside of Southeast Texas counties can influence benzene, styrene, or acetonitrile concentrations at locations across Jefferson County. The contributions from each type of emission source to the predicted outdoor air concentrations varied by pollutant, location, and wind patterns. The results of the modeling provide additional information for air quality planning in the Beaumont-Port Arthur area.

Styrene

- Synthetic rubber manufacturing
- Nonpoint (area) sources
- Petroleum refining
- Petrochemical manufacturing
- Prescribed burning and other fires in Southeast Texas

Acetonitrile

- Synthetic rubber manufacturing
- Landfill and wastewater treatment
- Prescribed burning and other fires in Southeast Texas
- Regional and longer-range transport from outside of Southeast Texas

Benzene

- Petroleum refining
- Petrochemical manufacturing
- Petroleum bulk stations/terminals & warehousing/storage
- Prescribed burning and other fires in Southeast Texas
- Onroad and nonroad mobile sources
- Nonpoint (area) sources
- Oil and natural gas production
- Synthetic rubber manufacturing
- Regional and longer-range transport from outside of Southeast Texas

Emission sources contributing to the highest modeled average pollutant concentrations at locations across Jefferson County

MORE ABOUT SETX-UIFL

The Southeast Texas Urban Integrated Field Lab (SETx-UIFL) is one of four projects funded in 2022 by the U.S. Department of Energy to study how climate, environment, and urban changes affect cities. A team of over 80 researchers from UT, Lamar University, Texas A&M, Prairie View A&M, Oak Ridge National Lab, and Los Alamos National Lab has collected data and conducted modeling across hazards including flooding, hurricanes, heat stress, and air quality. Our Why: Southeast Texas faces numerous hazards, yet smaller communities like this one have often felt forgotten compared to larger cities. The SETx-UIFL was designed to explore the complex dynamics of disaster vulnerability for this economically and culturally vibrant region. We believe Southeast Texas is a bellwether for the entire Gulf Coast, and an exemplar for strategies that protect people and places. We hope this effort supports your path toward lasting resilience.

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