

AQAST Spotlight: Daniel Cohan & TCEQ

AQAST Helps Regulators Tackle Texas-Sized Ozone Problems

By: Ben Kaldunski & Tracey Holloway

Although NASA's work in the Lone Star State is most often associated with rocket launches and the space program, Texas also hosts exciting work connecting space observations with ground-level information needs. Members of NASA's Air Quality Applied Sciences Team (AQAST) have been working with Texas' air quality managers to improve scientific understanding of the complicated factors that contribute to ozone pollution in Houston, Dallas, and other parts of the state.

The health-damaging air pollutant ozone is formed in the atmosphere from a mix of human-caused and natural pollutants. Understanding the role of natural sources, like wildfires, soil, and plants, has been a challenging aspect of ozone science. Human activity is responsible for the majority of ozone-forming emissions in urban areas, but high levels of natural (or "biogenic") emissions can push pollution levels over the limits set by the federal Environmental Protection Agency (EPA). In rural areas where human emissions are low, understanding biogenic emissions is even more critical.

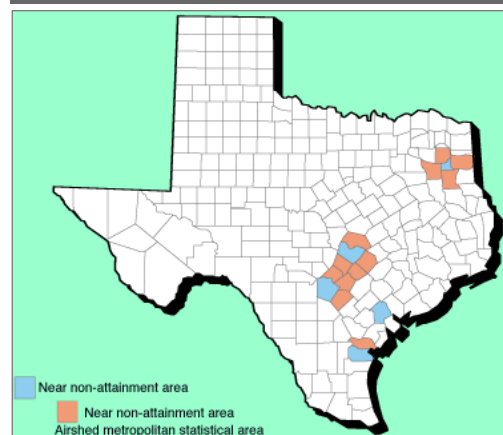
Daniel Cohan, an AQAST member and professor at Rice University in Houston, is using data retrieved from instruments mounted on NASA satellites to improve understanding of these natural emissions. Data collected from satellite instruments that measure solar radiation, cloud cover, and chemicals that lead to ozone formation (such as NO₂) can be used to build more accurate estimates of biogenic emissions and improve understanding of ground-level ozone.

Cohan and AQAST colleagues work to ensure that research addresses priority issues to local, state, and federal air quality management agencies. The Texas Commission on Environmental Quality (TCEQ) works to ensure that air in state meets EPA standards to protect public health, and Cohan works with TCEQ to make sure his work serves the state. "The ongoing involvement of air quality managers in AQAST meetings, conference calls, and research collaborations lets us continually adapt our efforts and address emerging needs as policies and conditions evolve," Cohan said.

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Daniel Cohan, an AQAST member and professor at Rice University in Houston, has worked with the Texas Commission on Environmental Quality (TCEQ) on several projects that have helped the agency improve ozone modeling capabilities (Image provided by Rice University).



This map shows areas in Texas that are in non-attainment, or close to being in non-attainment, with federal ozone standards. TCEQ is responsible for developing strategies to reduce air pollution in these areas. The agency is making progress as a result of their partnership with AQAST (Image provided by the Texas Center for Policy Research).

AQAST Spotlight: Daniel Cohan in Texas

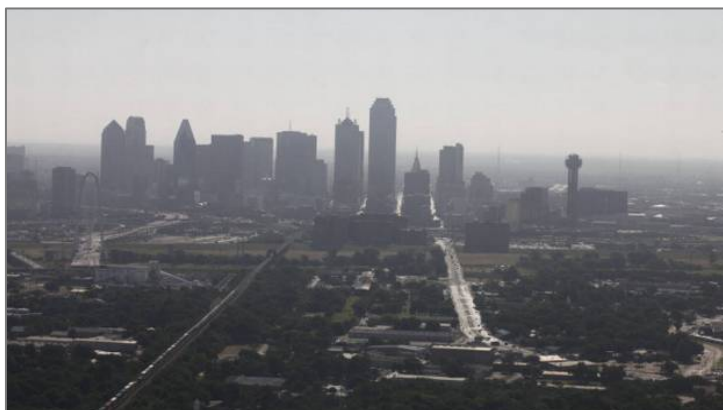
Mark Estes, a member of TCEQ's modeling and data analysis group, said working with Cohan and other AQAST members has been, "kind of like a genie offering us three wishes, and we are trying to find the best wishes to choose."

For the past several years, Cohan has been working closely with Estes and other TCEQ staff to improve the agency's understanding of the different sources and factors that cause ground level ozone problems. Having previously worked for Georgia's environmental agency, Cohan has long focused his research on the priorities of air quality management at the state level.

Understanding biogenic emissions is just the type of high-impact research that helps decision-makers. Estes said it is critical to simulate biogenic emissions accurately because over- or under-estimating those emissions could skew the simulations of ozone chemistry in TCEQ's air quality models. Inaccurate modeling could lead to the implementation of less effective emission reduction strategies. Estes explained that the levels of background ozone entering eastern Texas from natural sources, as well as other states or Mexico, can be substantial. In Houston, the average background ozone concentration is about 30 parts per billion (ppb) compared to about 40ppb in Dallas. Cohan's research could help TCEQ incorporate more accurate simulations of background ozone into their models.

Cohan's research has provided TCEQ with improved methods for calculating natural emissions, which in turn affect air quality models used to evaluate different pollution reduction strategies. "TCEQ has an outstanding modeling team that is committed to using the best methods and science to ensure their pollution control strategies are robust." Cohan said.

Cohan's research and collaboration with Estes and TCEQ demonstrates the successful marriage of NASA science with state-level pollution control efforts. Together, AQAST and TCEQ are focusing research efforts to help the agency address Texas-sized air quality problems. "We would like to see AQAST focus all of their efforts on Texas." Estes said. "But that wouldn't be fair to the other states."



The collaborative effort between AQAST researchers and Texas air quality managers has led to improved understanding of the complex chemistry and other factors that cause ozone problems in Houston (left), Dallas (right), and other parts of Texas. Improved modeling produced from AQAST research will help Texas implement the most effective pollution reduction strategies. (Images provided by the University of North Texas Library Archives).