

WEATHERING THE ELEMENTS

TCEQ meteorologists forecast the state's diverse climate

Cloudy with a chance of showers, sunny and breezy, or snow and ice—most people use these forecasts to help plan a day, or schedule an event. But for the TCEQ meteorologists, an accurate weather projection can predict much more, including the concentrations of air pollutants that may affect the public's health.

According to its basic definition, meteorology is the study of the earth's atmosphere, but at the TCEQ, scientists expand that characterization with intense observation of how weather affects our environment.

Located in a row of offices on the TCEQ campus in north Austin, Bryan Lambeth and Weslee Copeland use computer models to simulate meteorological conditions—such as wind, solar radiation, humidity, and air temperature—and chemical reactions that contribute to the formation of air pollutants, or ozone.

“As with anything that is suspended in the atmosphere, movement of air, which is what weather is, is important in finding out what is coming into the area,” said Copeland.

Every workday and when warranted by meteorological events and high levels of pollution coming into the state from elsewhere, the TCEQ creates a special forecast of PM_{2.5}, PM₁₀, and ozone levels for 14 areas in Texas. During ozone season—from March to October—the TCEQ provides daily forecasts and also identifies what are commonly called “ozone action days” for nine participating metropolitan areas in the state (Austin, Beaumont–Port Arthur, Corpus

Christi, Dallas–Fort Worth, El Paso, Houston, San Antonio, Tyler–Longview, and Victoria).

“Ozone occurs at its highest in the summer season, and mainly because of the warmer temperatures,” said Lambeth. “Besides the warm temperatures, you also need sunshine, light winds, and already elevated ozone levels coming into an area to get your worst ozone—and we have all of that in the summertime.”

“It's like a recipe,” said Copeland. “If one of those ingredients is not just right, you won't have the high ozone. If we don't see light winds but everything else is there, we may not declare an ozone action day. Everything just has to be perfect.”

In addition, Lambeth and Copeland keep tabs on every single potential disruption in the state's environment from any airborne event—including those originating thousands of miles away.

“Every year, dust from Africa in the summer and smoke from agricultural burning in Mexico and Central America in the spring make their way across Texas, where a noticeable haze will blanket a large portion of the state,” said Lambeth. “The agency also provided a radiation forecast after the Fukushima Daiichi nuclear-facility incident in 2011.”

However, most of their daily analysis is focused on statewide weather trends. In any given month, the agency meteorologists may also be monitoring dust storms in West Texas, winter stagnation events, and smoke from wildfires, as well as other, non-routine

episodes such as July 4th and New Year's fireworks.

A Forecasting Destiny

For Lambeth and Copeland, watching the weather is a labor of love—a career spawned by climatic events that shaped their similar destinies.

"I began tracking hurricanes as a hobby when I was a kid," said Lambeth. "When I was a student at Harlingen High School, Hurricane Beulah passed directly over my great aunt's farmhouse near San Benito, where we rode out the storm. Winds gusted to over 100 miles per hour, and nearby fields were flooded with many inches of standing water for days. The mosquitoes were horrible in the following weeks from all the standing water. Power was out for three days and there was considerable damage to buildings, homes, and trees in the area."

For Copeland, it was the afternoon of May 27, 1997.

"I had just finished 7th grade at Cedar Park Middle School when the storm system that spawned the Jarrell F5 tornado moved through Cedar Park. I was a couple blocks away from the Albertson's grocery store that received heavy damage from the tornado. While I had always held a keen interest in the weather, this event cemented my destiny as a future meteorologist."

Predicting Mother Nature

Figuring out what the weather will be like days, or weeks, in advance is literally a science. To accomplish this, the TCEQ meteorologists use computer models to

predict what the weather could be on any given day. For Lambeth, a 30-year meteorology veteran, instant forecasting wasn't always the norm.

"It was back in the stone age, when I started, when we had data coming in on teletype and fax machines, and we didn't have any air-quality data that was current, like we do now. The air-quality information that we were working with was often a day old. Now, it all comes on the Internet. Now, we have much faster access to information like satellite images. We have fast access to things like radar, and our own air-quality data, in real time."

Using atmospheric physical laws and measured observations, Lambeth and Copeland can predict the weather conditions and from there calculate the potential pollutant concentrations.

"We have researched what has happened in the past, so we look at the past for things to look for in the future. So we know, for instance, that we have our worst ozone air pollution when the winds are light, the temperatures are hot, and there's plenty of sunshine," said Lambeth.

"Having a three-dimensional view of the atmosphere, as well as an understanding of what has happened in the past and what's occurring right now, all this can be used to figure out what is going to happen with the movement of the air," added Copeland.

Mapping Out Texas Weather from Your Computer

Keeping track of climate developments in Texas is not restricted to just TCEQ

Meet the TCEQ Meteorologists



Bryan Lambeth, P.E.

Education: University of Texas at Austin. Bachelor of Science, engineering science with major in meteorology. Master's, engineering with major in meteorology and minor in environmental-health engineering.

Years at the TCEQ / Texas Air Control Board: 30



Weslee Copeland

Education: Texas A&M. Bachelor of Science, meteorology with minor in mathematics.

Years at the TCEQ: 7

meteorologists. Daily data is accessible on the agency's website, where all weather watchers can track hourly air quality by day, month, or year. Historical meteorological data from the TCEQ, local Texas monitoring networks, and the EPA, since 1972, is also available.

For those interested in the more technical aspects of forecasting, the agency posts real-time wind measurements in the lower atmosphere, which help determine the movement of air pollution across Texas. Air trajectories that show the movement of air over metropolitan areas of Texas for the past 30 days are also accessible.

As anyone who watches the forecast on television knows, satellite images play a large role in weather analysis. The TCEQ provides the public with the ability to view images from both geostationary and spectroradiometer monitoring satellites. 📡

On the Web

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[Introduction to Air Quality Modeling: Meteorological Modeling](#)

[General Air Quality and Meteorological Data](#)

[Historical Pollutant and Weather Data](#)

Watch these videos on our YouTube site

(youtube.com/user/TCEQNews):

- TCEQ meteorologists Bryan Lambeth and Weslee Copeland discuss tools used to forecast weather
- Video from the Nov. 28, 2010, El Paso dust storm



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