



Dust Storm LN
7200

Blowing Dust and Highway Safety in Texas, New Mexico and Oklahoma: Identifying Dust Emission "Hot Spots"



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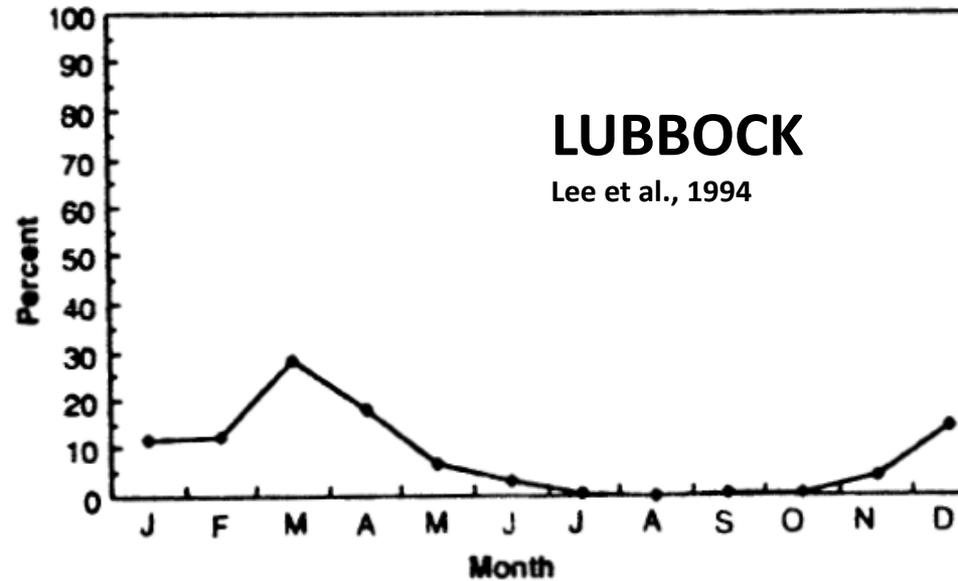
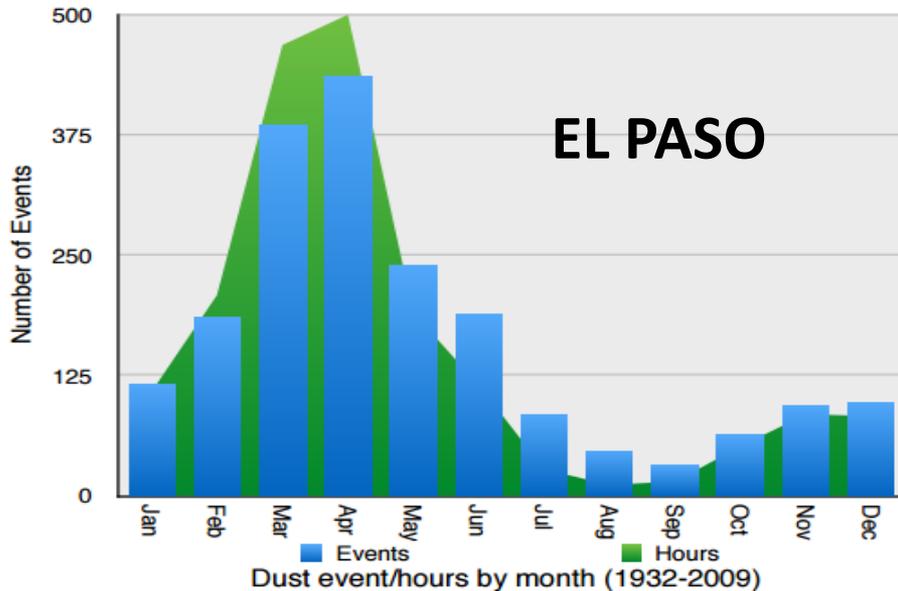
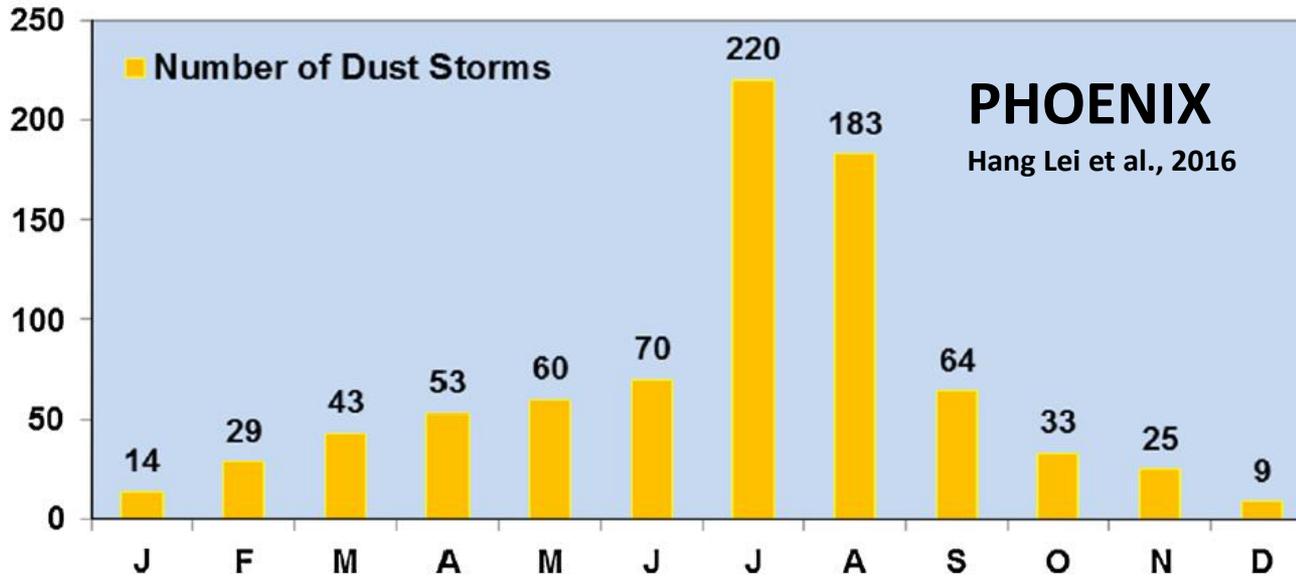


Egypt- a week ago yesterday- AP photo

**Abu Dhabi- one year ago today
(Gulf Times photo)
*Some reports from the USDOT discuss
loss of traction from sand during crosswinds
as a contributing factor (Day, 1993)***



Seasonality of Dust Storms is Different than Arizona in Texas and New Mexico



Three Types of Dust Storms from a Transportation Safety Perspective

- **Small, isolated plumes near ground** (extremely hard to detect or forecast: often hard for drivers to anticipate: can happen almost anywhere)
- **Haboobs/convective dust events caused by thunderstorm outflows** (biggest dust concern in Arizona for impact weather as well as highway safety? Occur in TX/NM, also a hazard)
- **Large regional dust storms** beginning as isolated plumes rising into the atmosphere and spreading out over the synoptic scale-over ~100 – 100,000 square miles: often seen on satellite. More frequent in Texas and New Mexico than Arizona. *Except in the most intense events and/or right near source areas*, more gradual in onset and progression: hazard spread over much larger area but less immediate threat to motorists?

Nationwide in the US, dust events *caused by non-convective wind storms alone* contributed to 62 deaths and hundreds of injuries between 1980 and 2005, and many of them were related to traffic accidents (Ashley and Black, 2008).

Gaines County Texas in a Dust Storm... looking down at the fields you can see that plumes are coming only from some fields and only some parts of the field.



Gaines County Texas in a Dust Storm... the plume of dust is coming only from localized points in the land, although the wind is about the same speed everywhere.

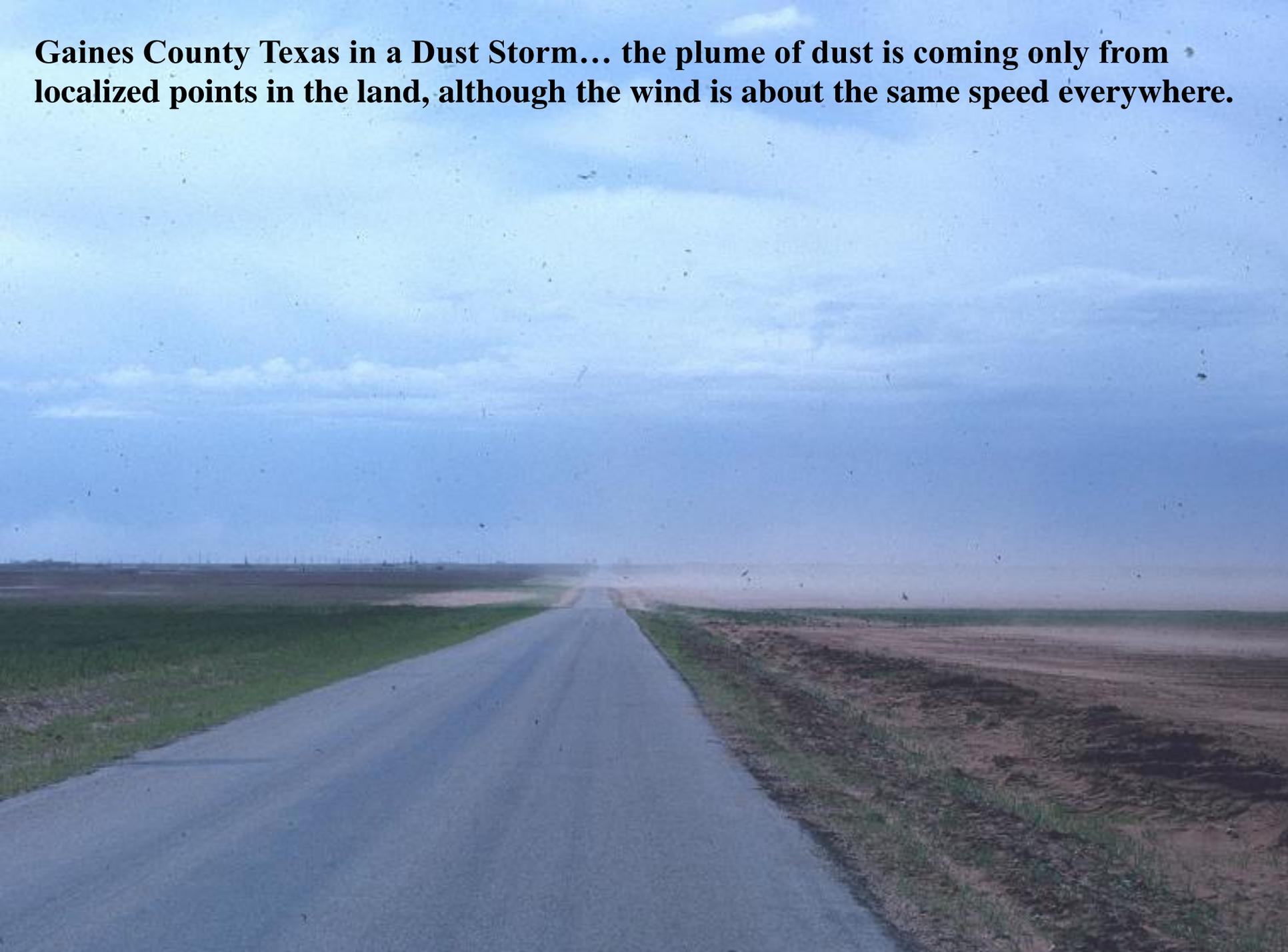
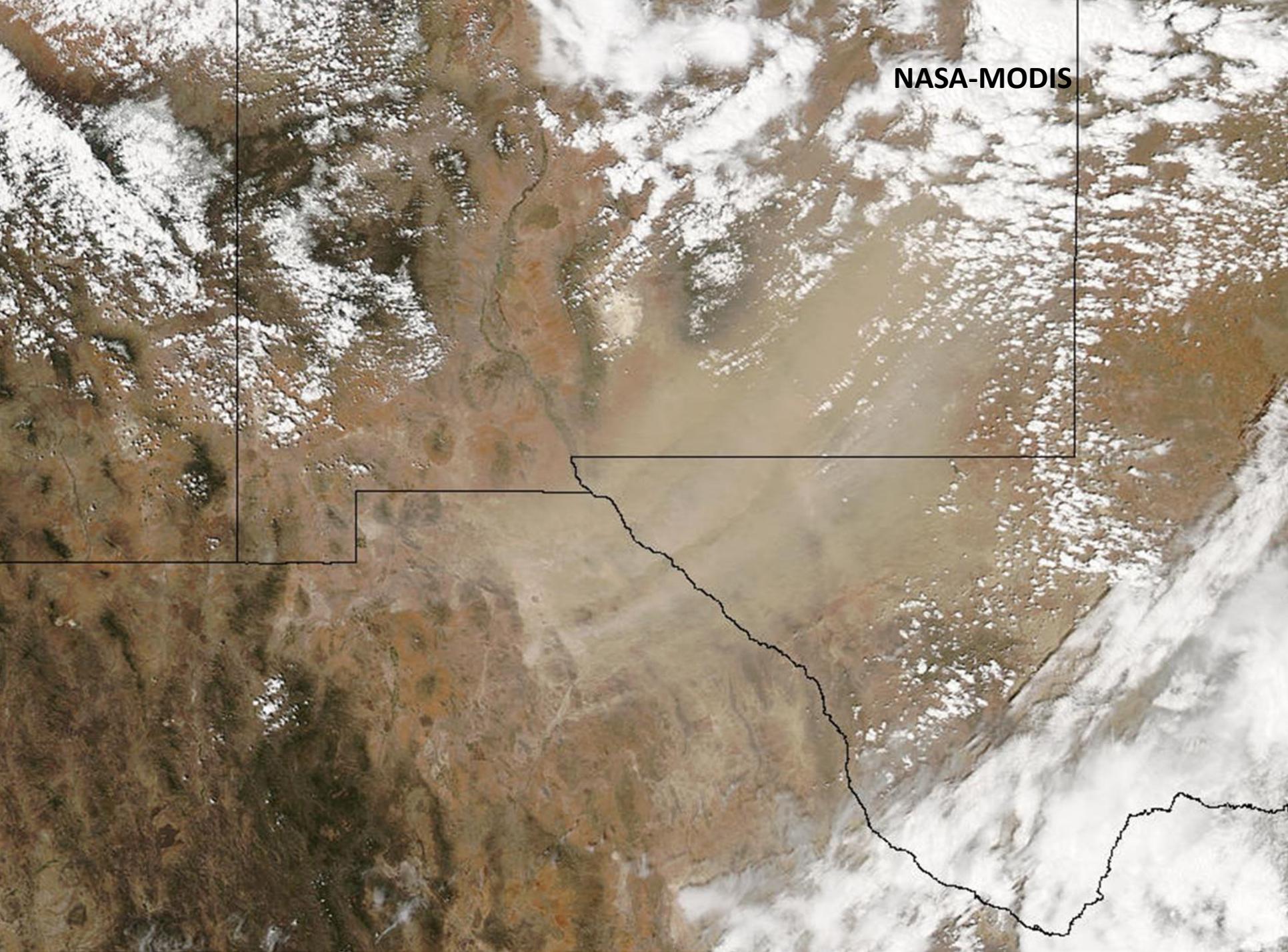


Photo by David Novlan



NASA-MODIS

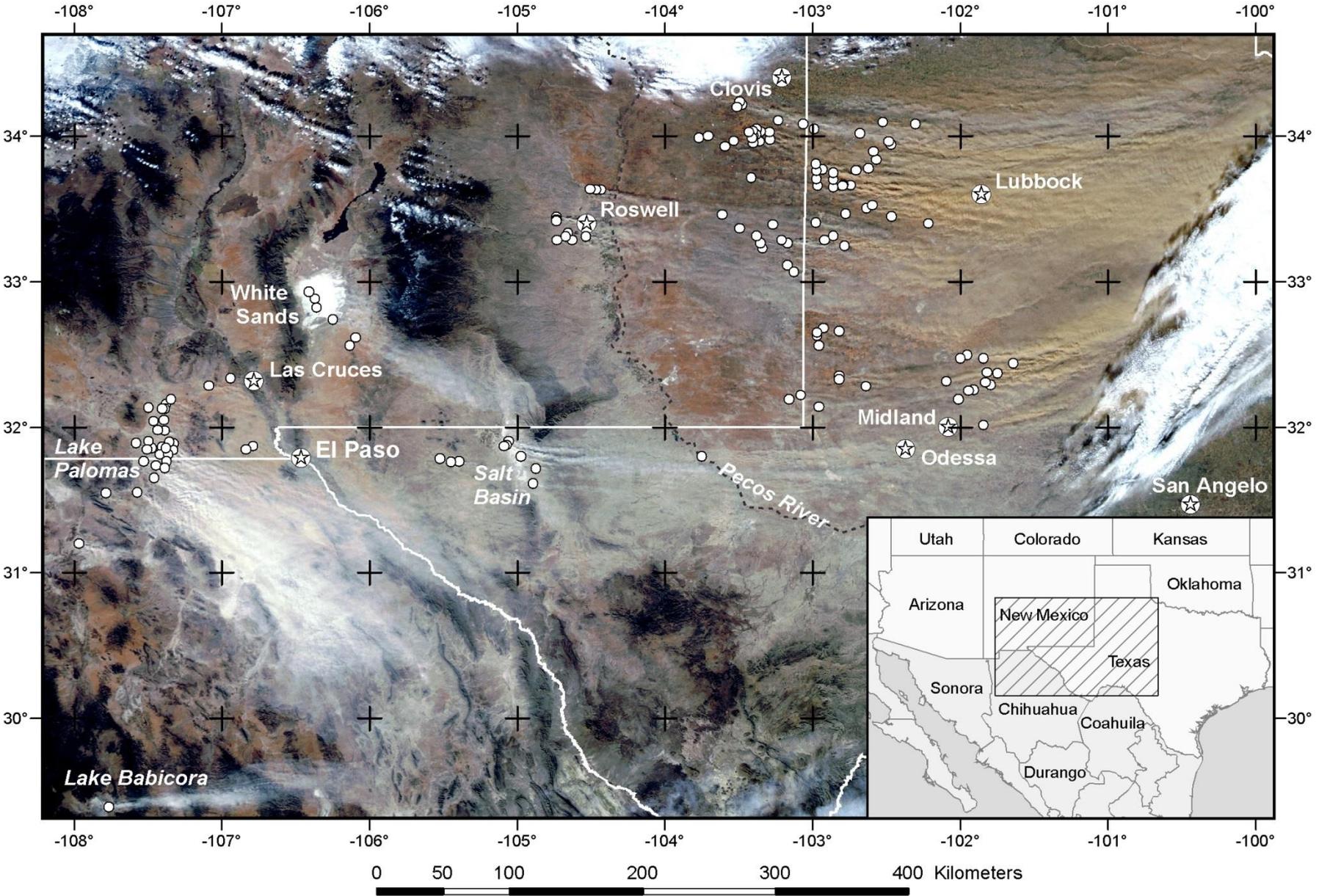


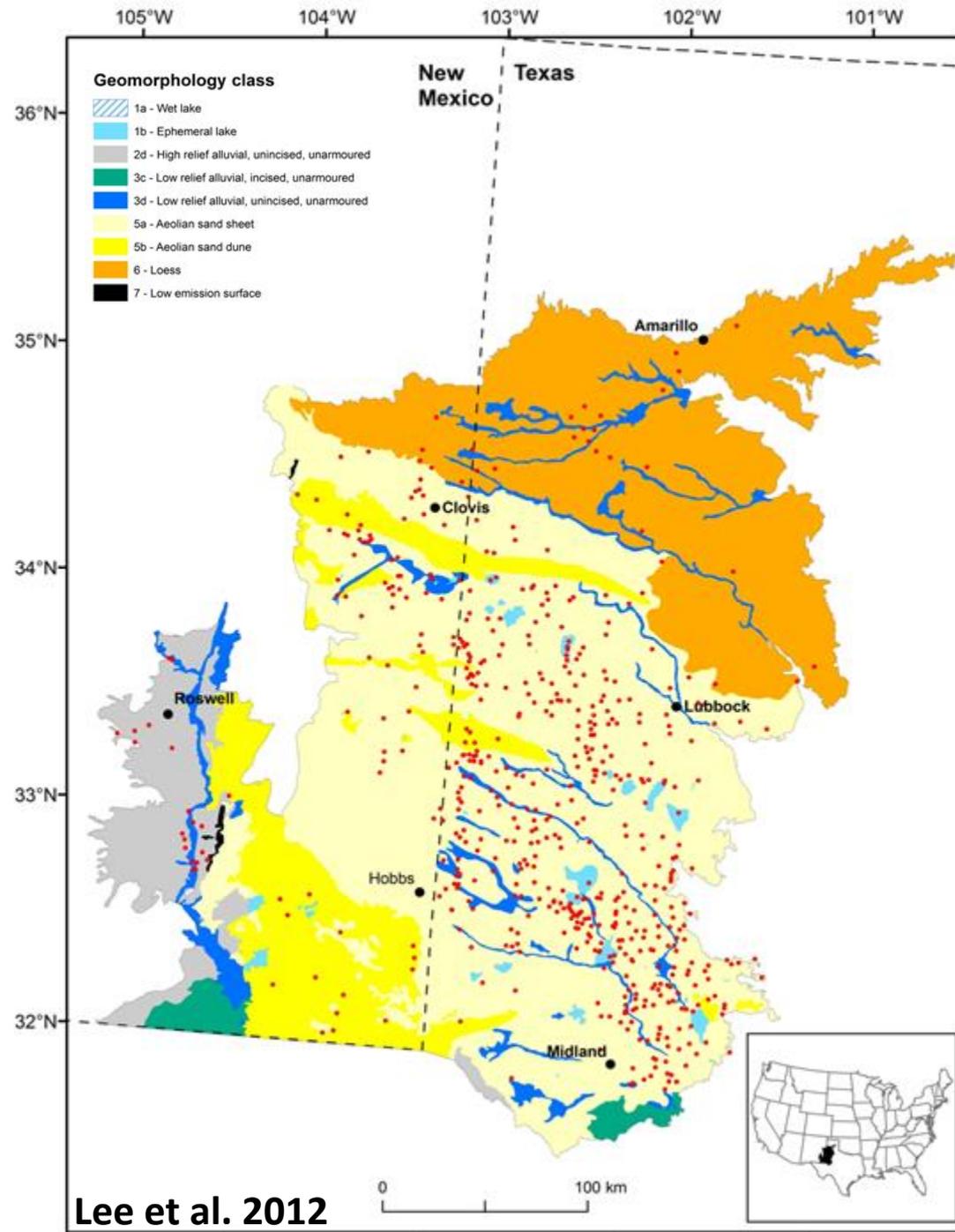


**TCEQ Webcam
Chelsea Street
El Paso**

12/26/2003 16:00

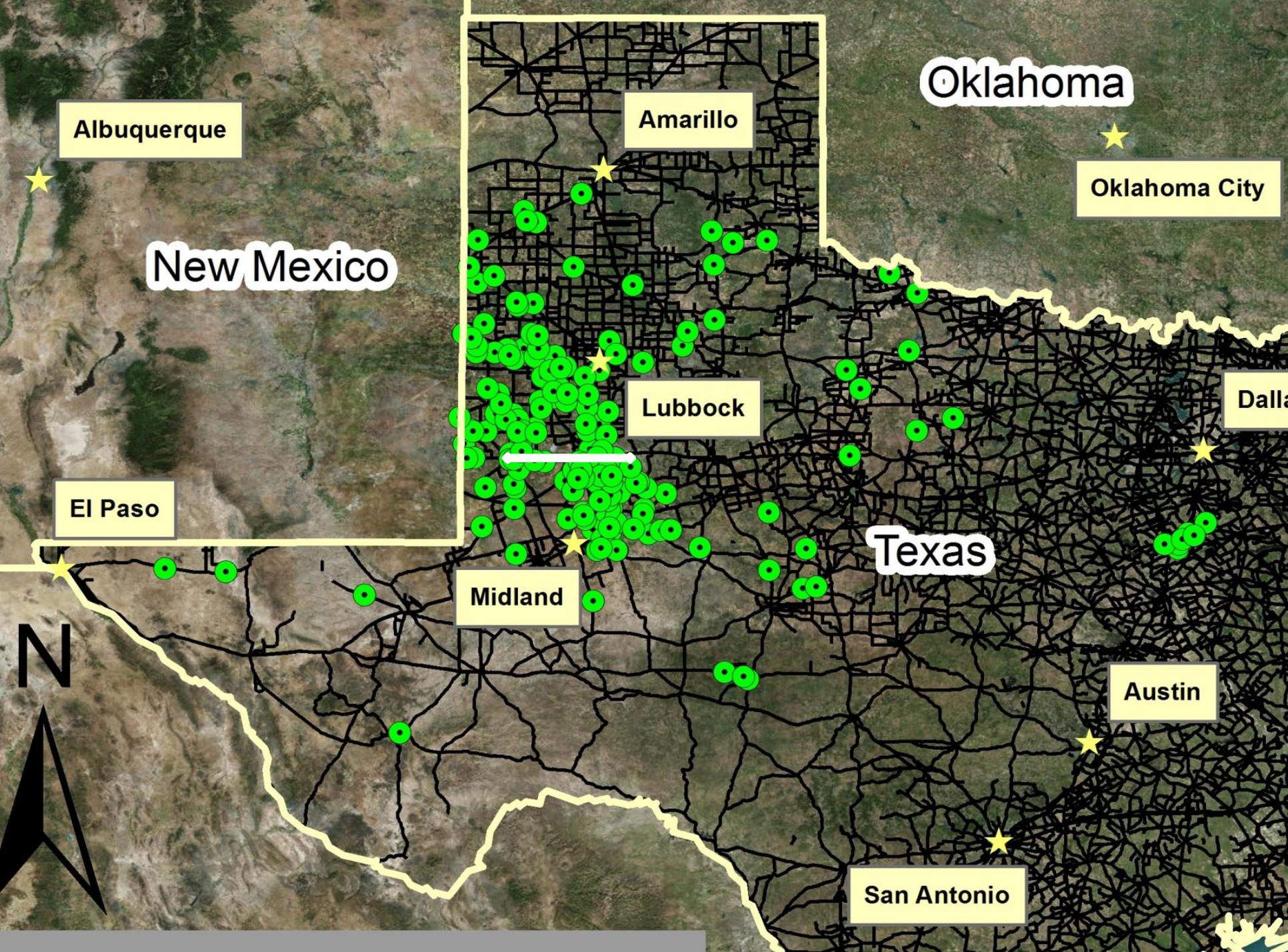
Up to ~150 point sources of dust can be identified on a single high-resolution MODIS satellite image. (Lee et al., 2009)





We mapped 828 individual points in West Texas and Eastern New Mexico that were sources of MAJOR dust plumes- large enough to be visible on NASA MODIS satellite images- over a 9 year period. Many of these points were visited in the field to confirm or further investigate land use as shown on USDA and/or USGS maps.

Of those, 185- or 22.4%- were located within 1 km of a Federal or State highway.



Albuquerque

New Mexico

El Paso

N

Midland

Amarillo

Lubbock

Texas

San Antonio

Austin

Oklahoma

Oklahoma City

Dallas

Photo by John Stout



Photo by John Stout



Photo by John Stout



Photo by John Stout



Photo taken in Roscoe, TX 79545, USA

32° 30' 35.40" N 100° 39' 2.16" W

Photo by John Stout



Dust Storm I.N.
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Barren land + flat plains + high winds + numerous State and Federal highways crossing the High Plains and Panhandle region + long travel times/distances + many commercial vehicles and farm vehicles = possibility of problems!



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Near U.S. Highway 62 in Meadow, TX

On the Texas South Plains Alone...

Vehicle accidents from blowing dust have injured and killed more people than tornadoes.

Feb 20, 2012: 11-car pileup from dust storm near Memphis, TX.

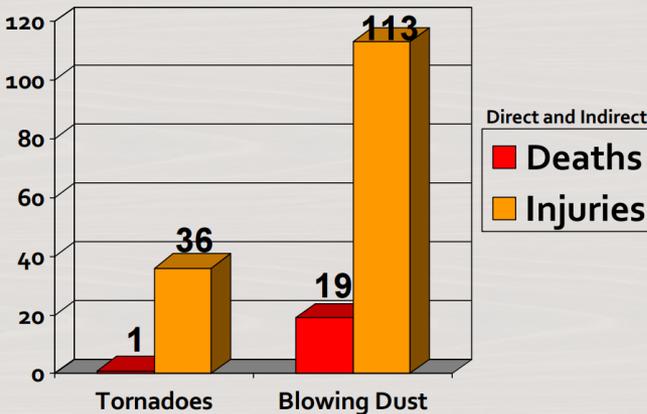


PHOTO BY DAVID DRUMMOND, WEST'S



Dec 19, 2012: Fatal wreck south of New Deal, TX.

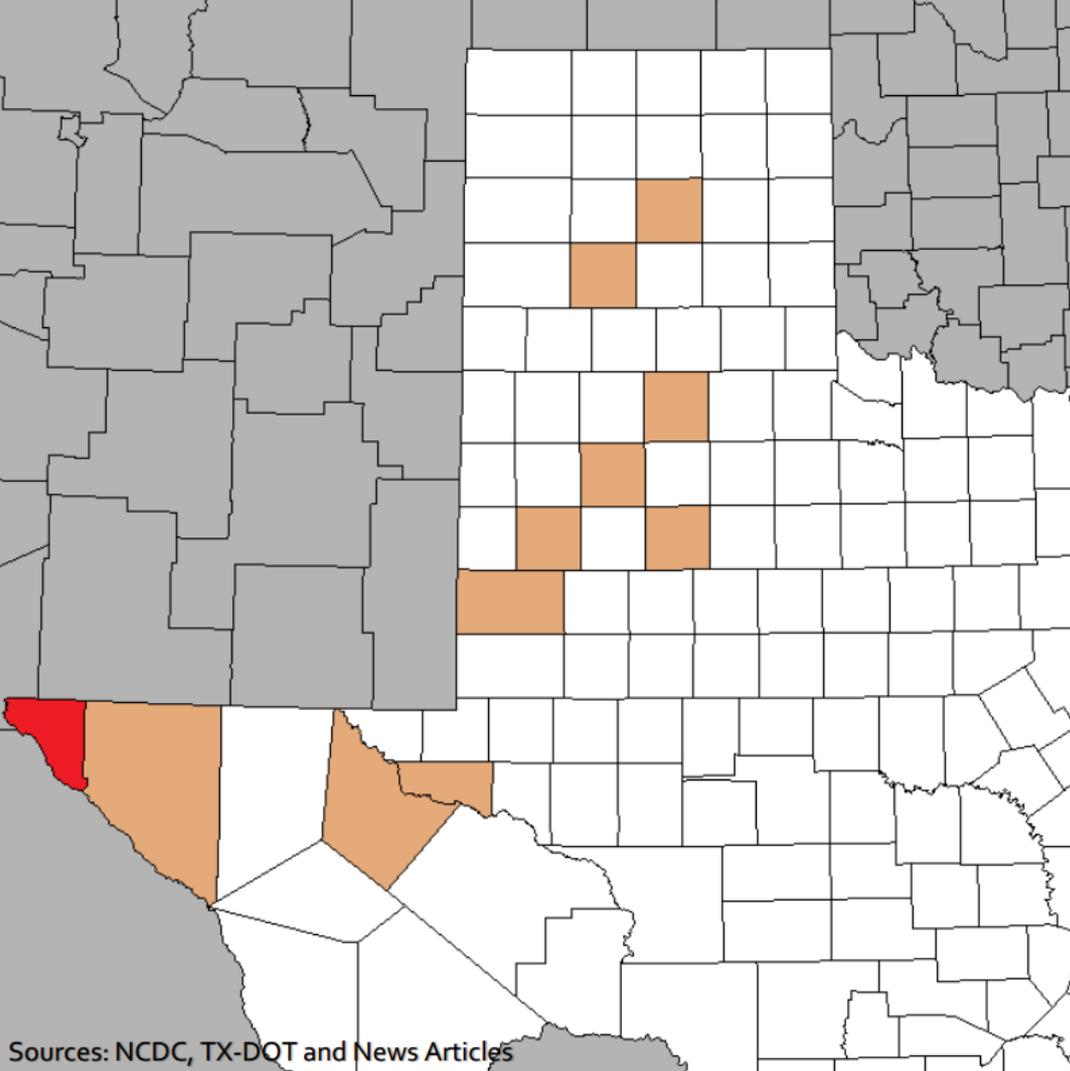
June 22, 2006: Fatal accident near Brownfield, TX.



Data and images from Matt Ziebell, NWS- Lubbock, presented at the Texas Weather Conference, 2016. "from the Texas Panhandle south to the Trans-Pecos... since 2004... more people have died from motor vehicle injuries associated with dust storms than from tornadoes, lightning and flooding combined."

Motor Vehicle Fatalities With Dust Cited as Contributing Factor

2004 - 2015



Data and images from Matt Ziebell, NWS- Lubbock,
presented at the Texas Weather Conference, 2016.

**“from the Texas Panhandle south to the Trans-Pecos...
since 2004... more people have died from motor vehicle
injuries associated with dust storms than from tornadoes,
lightning and flooding combined.”**

Dust blamed for 10 car pile-up, injuries, road closure

Posted: February 20, 2012 - 4:13pm



Photo by T. Boyce

By RUSSELL ANGLIN

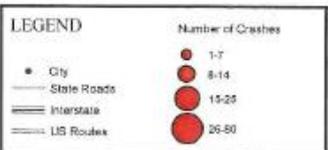
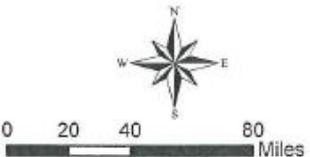
russell.anglin@amarillo.com

Northbound and southbound lanes of Highway 287 are closed between Memphis and Childress due to a multiple-vehicle wreck near Newlin, Texas Department of Transportation spokesman Paul Braun

Officials are reporting six tractor-trailer

Dust- Related Crashes in New Mexico, 2008- 2013

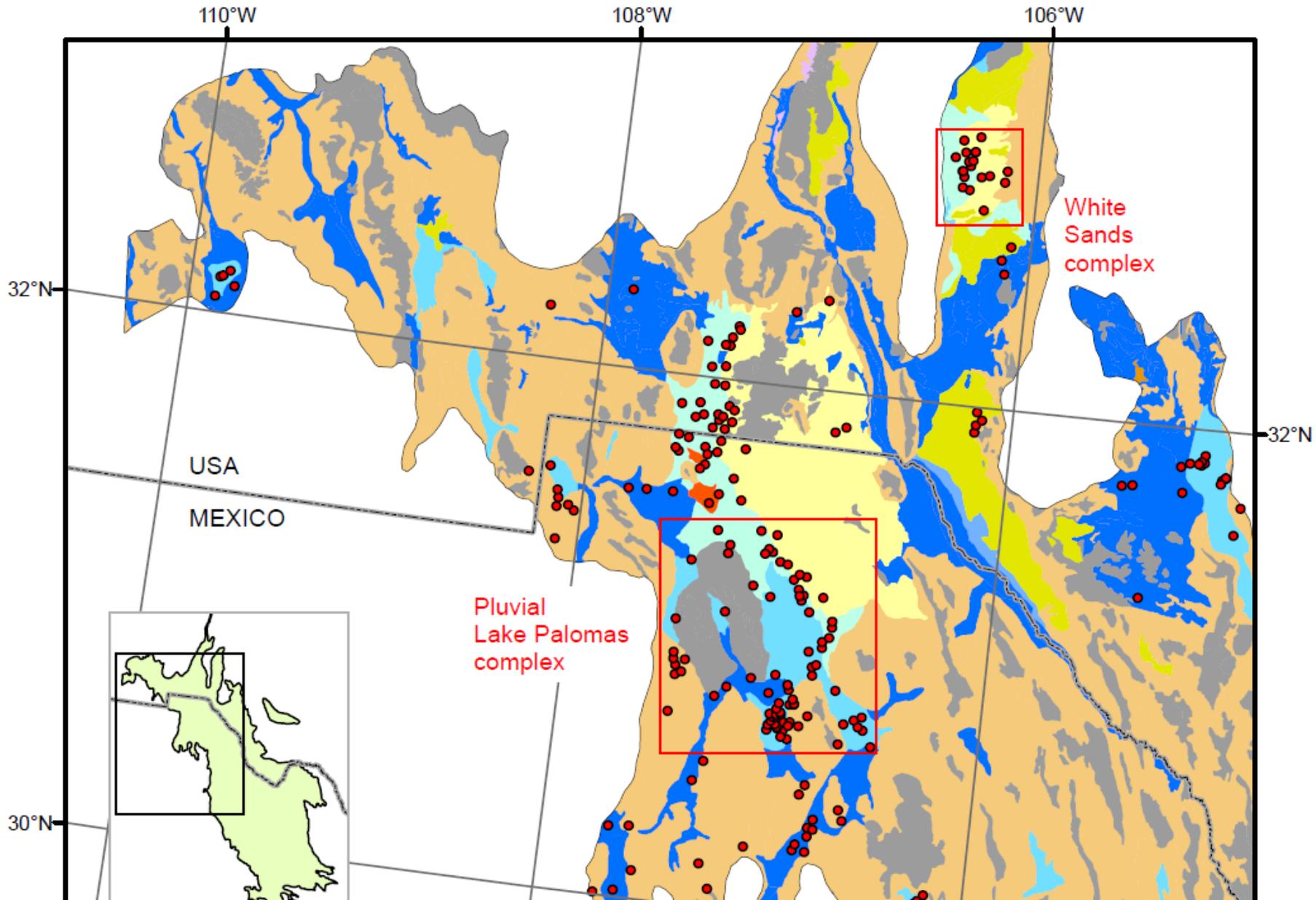
- Three general regions:
1. Colorado Plateau/
Four Corners Region
(not yet investigated)
 2. Southern Plains:
similar terrain and
issues to West Texas
and Oklahoma
 3. Chihuahuan Desert

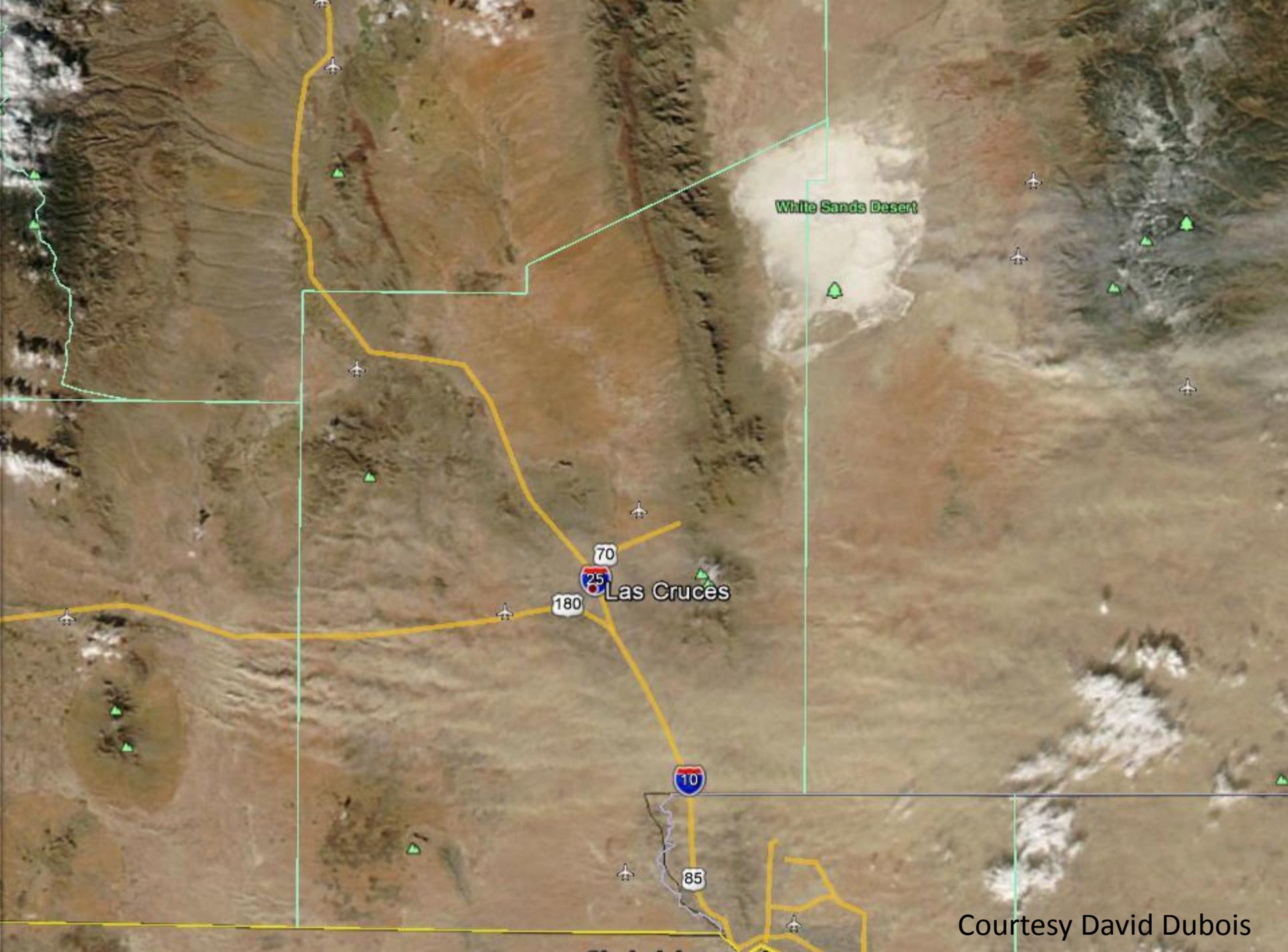


Prepared by
New Mexico
Department of Transportation



We have also mapped almost 2000 individual point sources of dust visible on NASA MODIS satellite images over the Chihuahuan Desert region, and visited dozens of these sites. The types of terrain acting as dust sources in this region are generally similar to those in Arizona.

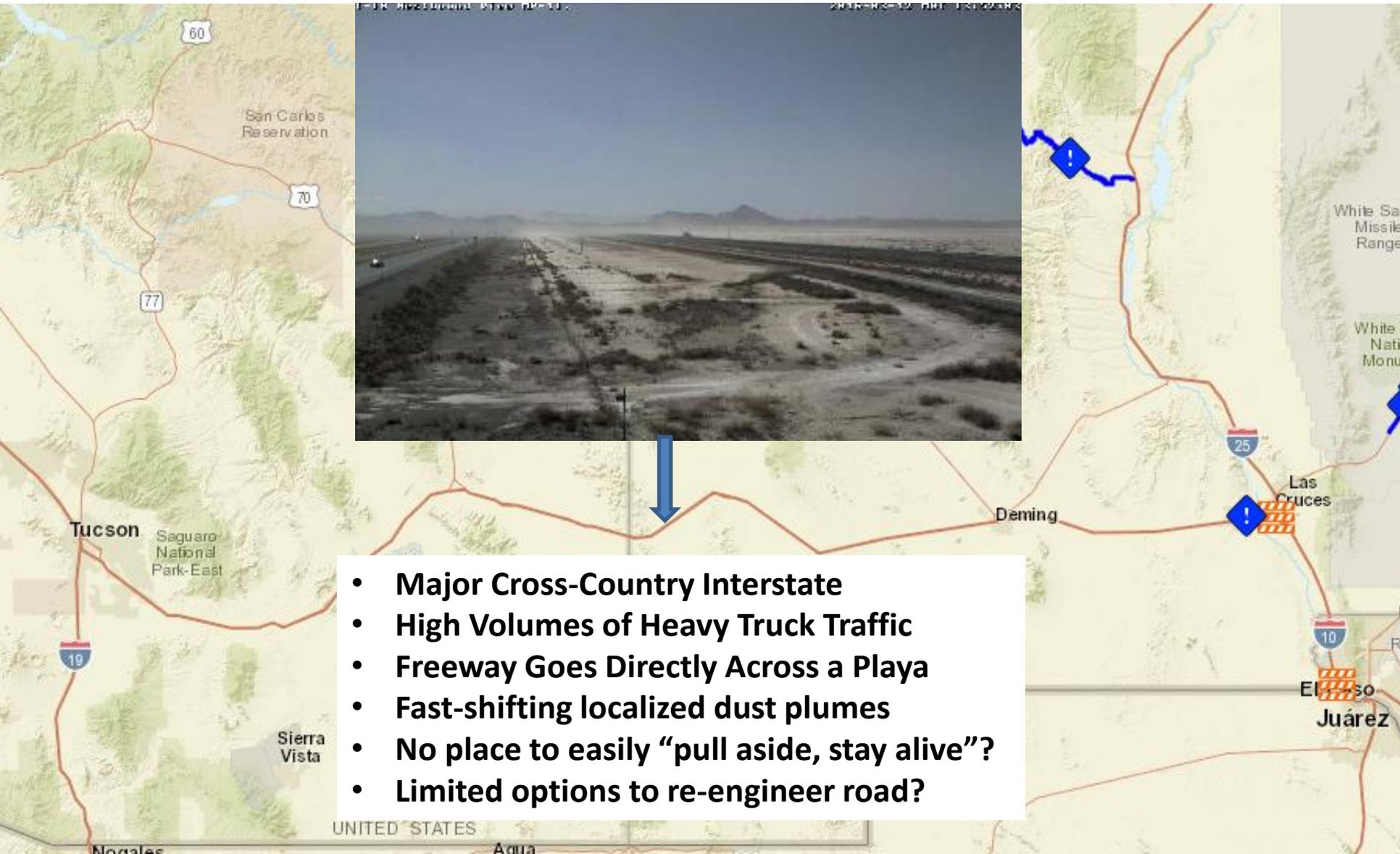




Courtesy David Dubois

Special concern: Playas (dry lake beds).

Lordsburg Playa, NM- Interstate 10 one week ago Saturday.

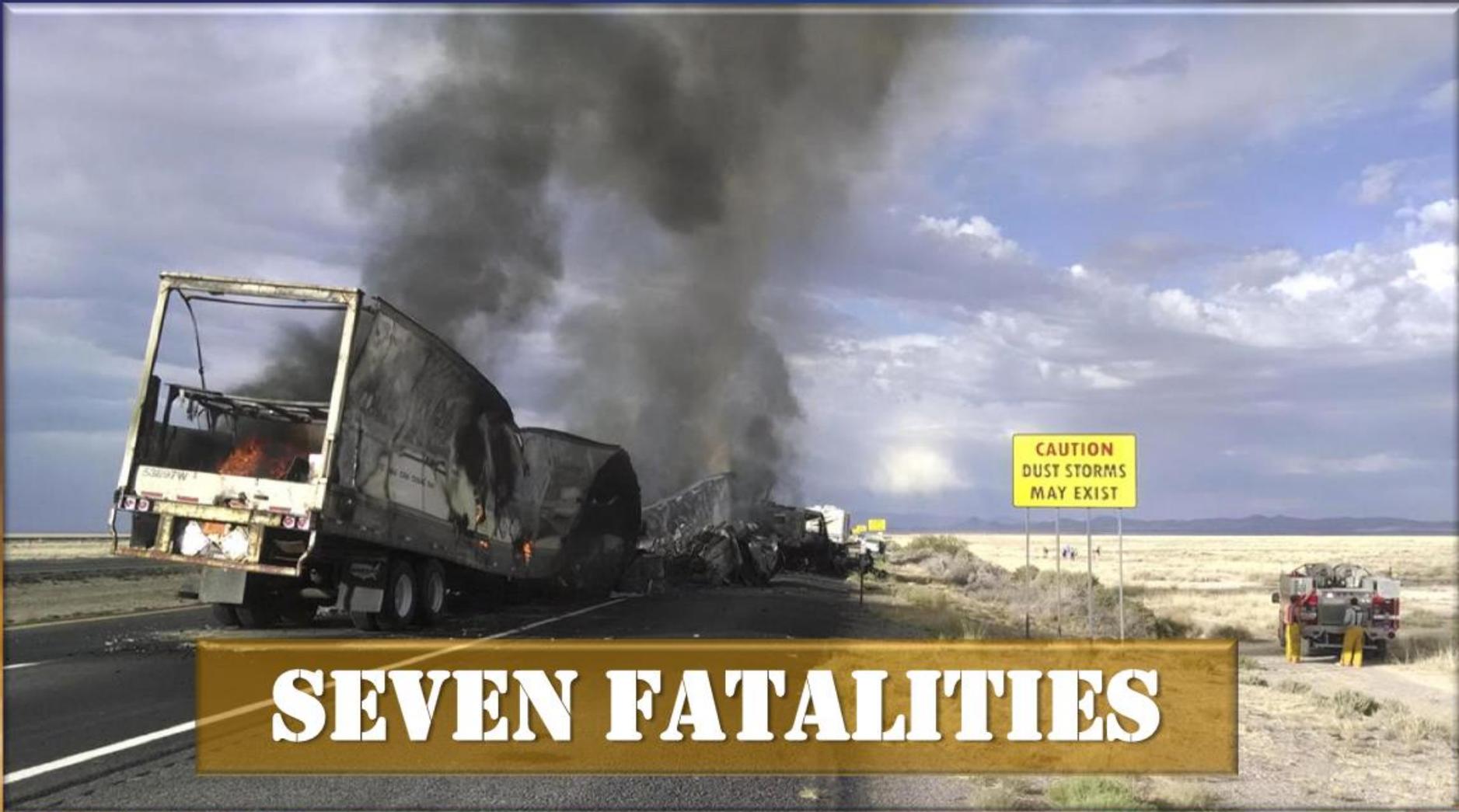


- Major Cross-Country Interstate
- High Volumes of Heavy Truck Traffic
- Freeway Goes Directly Across a Playa
- Fast-shifting localized dust plumes
- No place to easily “pull aside, stay alive”?
- Limited options to re-engineer road?



May 22, 2014 Dust Storm Tragedy

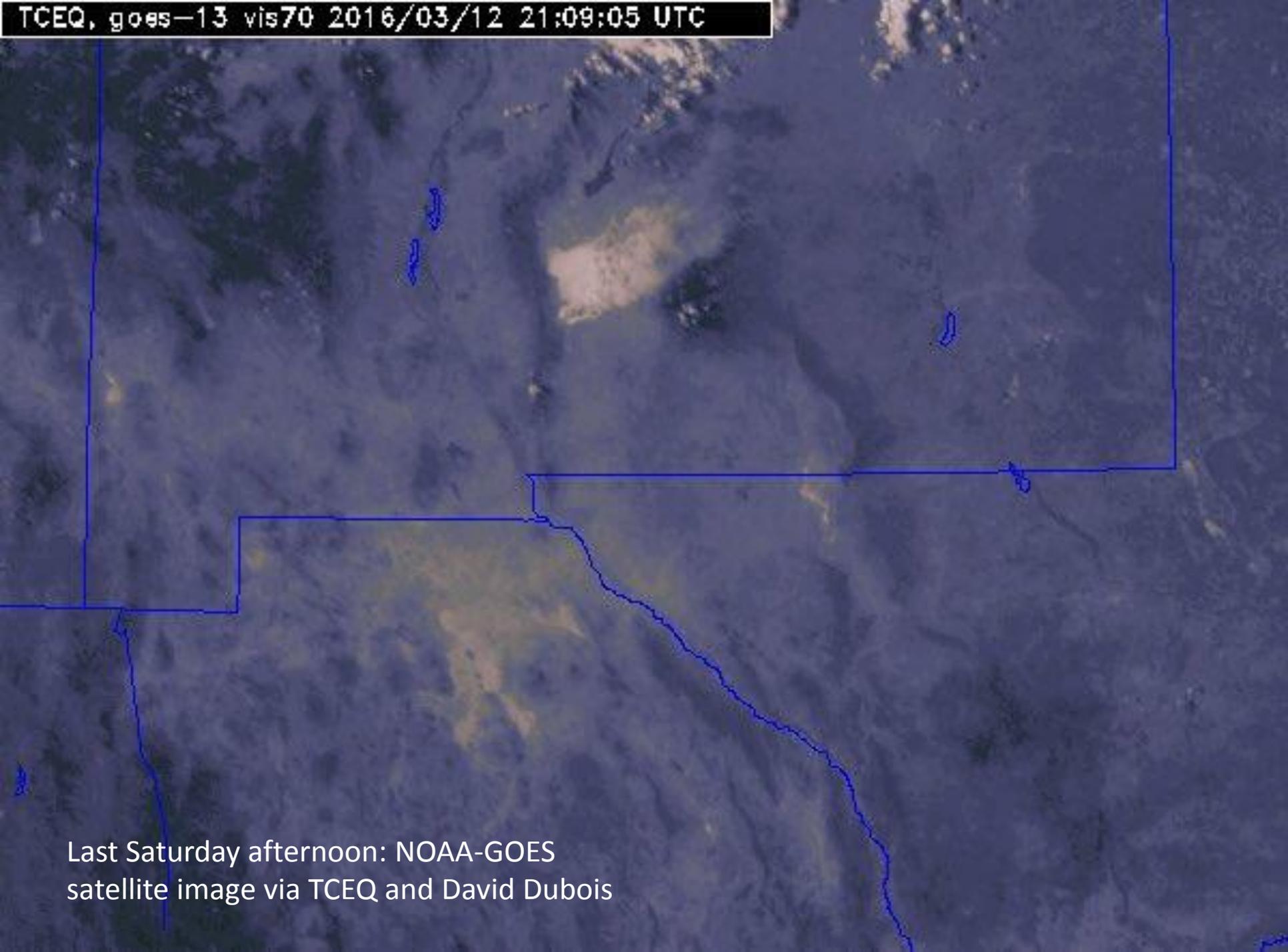
I-10 just east of AZ-NM border



SEVEN FATALITIES

Presentation by John Fausett, NWS- El Paso, last year's workshop

TCEQ, goes-13 vis70 2016/03/12 21:09:05 UTC



Last Saturday afternoon: NOAA-GOES
satellite image via TCEQ and David Dubois

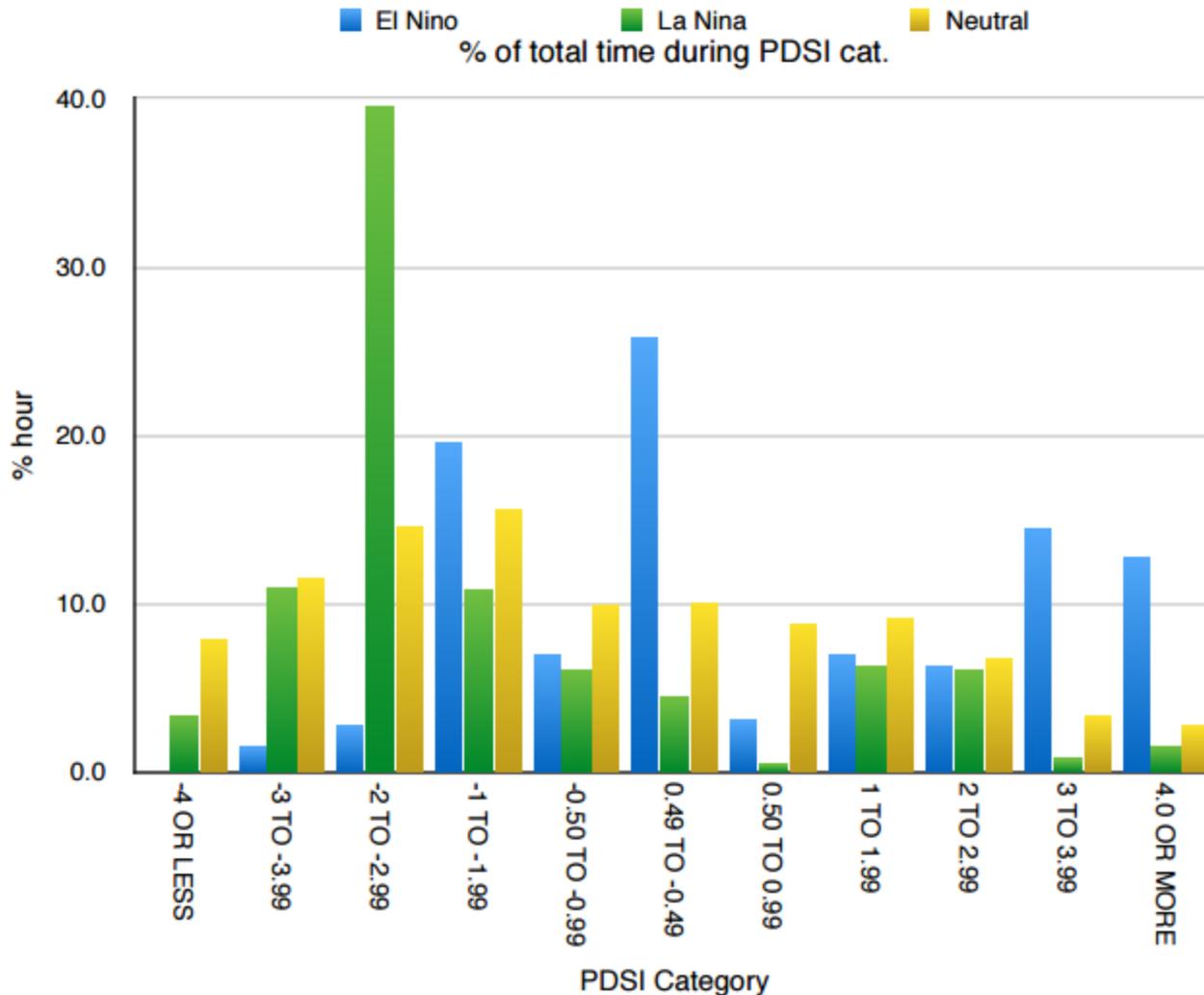
Photo by Christine Laney



Photo by Gail Arnold



Research Underway: Relating likelihood of dust events to climate factors such as drought category, ENSO (El Niño/La Niña) status, and other climate oscillations to form decision aids to forecast periods of greatest concern for dust



When Texas, New Mexico and Oklahoma were the heart of the Dust Bowl in the 1930s, there were far fewer, lighter vehicles travelling up to 20- 30 mph on relatively few roads. *Now we have a superhighway bisecting a highly erodible playa (or fallow agricultural land) where a truck weighing tens of thousands of pounds moving over 60 mph can go by every 4 seconds**. And *commercial drivers are taught how to drive in snow, fog, ice and rain- but not dust or sand***. Your hazards with dusty roads are ours, and vice versa!



* Remarks by Tom Church, NMDOT Secretary, and ** Raul Garcia, New Mexico Trucking Association, at the New Mexico Dust Storm Stakeholders Workshop last month in Las Cruces.

Thanks to:

- Tarek Kandakji and Joe Collins, graduate student research assistants at TTU & UTEP
- Funding provided by U.S. Department of Transportation, NOAA, and NASA
- Research partners from many agencies and institutions who are helping us understand dust storms and their impacts in Texas, New Mexico, and Oklahoma

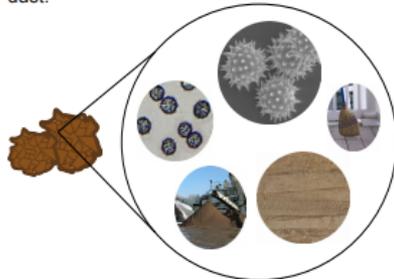


DUST HEALTH AND SAFETY BROCHURE- Distributed through U of AZ Pharmacy / Superfund Research Program. FOR FURTHER INFO, PLEASE CONTACT: Denise Moreno Tel.: 520.626.9049, www.superfund.pharmacy.arizona.edu <dmoreno@pharmacy.arizona.edu>

Where does dust come from?

Dust can come from both natural and man-made sources. Areas with few plants can be a natural source of dust. Plants act as a windbreak and hold soil particles in place so they won't be carried away. Pollen and spores produced by plants are another natural source of dust that can be easily spread by the wind. When a lot of pollen is in the air, it can cause a haze seen by the naked eye.

Human activities can increase dust in the air in many ways. For example, rock crushing, drilling, demolition, shoveling, and sweeping can create dust. Driving on dirt roads and plowing of agricultural fields breaks up clumps of soil and grinds soil particles into smaller sizes, which can be lifted into the air without strong wind. Burning can result in very small particles of soot. Mining, mine tailings, and smelting are other human activities that create dust.



What are dust storms?

Dust storms can occur in small areas or over regions spanning thousands of square miles and can vary in intensity. Less intense dust storms produce a hazy effect over a large area. In very intense dust storms, visibility can be suddenly and drastically reduced to less than a few meters.

In drylands such as Arizona, an intense dust storm called a **haboob** can occur when the air contained in the towering clouds of a thunderstorm cools and is pushed down quickly to the surface. If this sudden downdraft is over a dust source, the winds pick up the soil, creating what looks like a wall of dust that is pushed away from the storm. The dust wall can be a mile high, many miles wide, and can travel many miles.



Haboob dust storm in Phoenix, Arizona (Photo credit: National Weather Service).

Smaller dust events can also be very intense. Localized high winds blowing continuously over a dust source cause "corridors" or "plumes" of dust. This kind of dust storm can be too small to identify from weather stations or satellites and can lower visibility down to just meters. Small dust events can also strike with little warning and last up to an hour or more. **Dust devils** are another form of a local, hard-to-detect but intense dust event that whirls dust up in the air.



Dust devil on old mine tailings (Photo credit: Alex Valentin-Vargas).

FACT!

Dust particles can serve as seeds that form cloud droplets and even ice crystals!

How is health affected by outdoor dust?

One of the major problems with dust is reduced visibility. Large amounts of dust can block/reflect light and bring visibility to zero, creating a dangerous situation for ground and air transportation. If you are caught in a dust storm while driving your vehicle, remember, **"Pull aside, stay alive."** This means to get off the roadway, turn off all lights (to prevent other motorists behind you from thinking that you are in motion), and wait out the storm.

Dust may get into the eyes causing irritation or injury. Particles can also cause breathing issues and can make asthma and bronchitis more serious.

Other problems with inhaling dust have to do with what it contains. Lead and arsenic can attach to dust particles and enter the body. Even germs can hitch a ride on dust particles. In the American Southwest, the Valley Fever fungus attaches to soil and dust particles. When people or animals breathe in the Valley Fever fungus, they can get very sick.

How is outdoor dust regulated?

Each state is responsible for ensuring good air quality by presenting an "implementation plan" that outlines how standards will be achieved and maintained. Particulate matter is one of the six air pollutants for which the United States Environmental Protection Agency (US EPA) has set standards (**regulations**). These standards separate particulate matter into two groups that include PM₁₀ and PM_{2.5}. The US EPA works with state and local governments to put into action these standards. To learn more about these standards, visit: www3.epa.gov/ttn/naaqs/criteria.html.