

Dust Storms in Arizona

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20+ Dust
Events in

ourAmazing planet

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The New York Times

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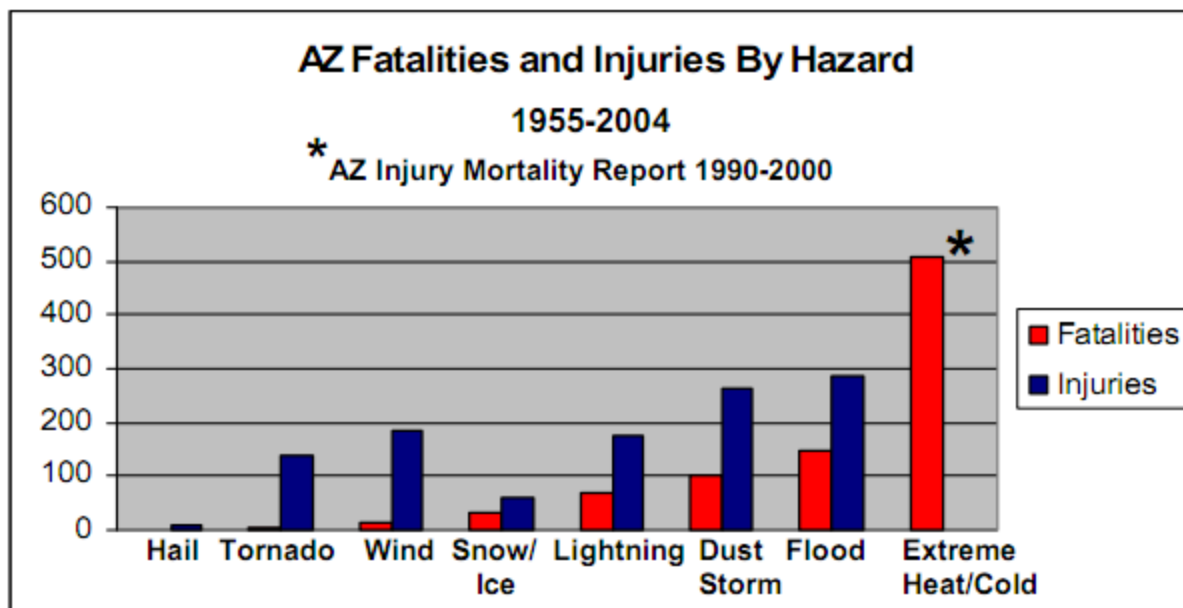
The weather
Channel

EAST VALLEY
Tribune.com
Met Phoenix's East Valley region

BBC

Las Últimas Noticias

Arizona Deaths and Injuries by Hazardous Weather Type



Data Sources:

- Arizona Climate- *The First Hundred Years* (Sellers, Hill and Sanderson-Rae)
- NCDC Storm Data 1955-2004
- SPC Events Database 1950-2004
- NCDC Storm Events Database: Online- www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms
- DOT Fatality Analysis Reporting System: Online- www-fars.nhtsa.dot.gov
- University of Arizona Storm Database: Online- ag2.calsnet.arizona.edu/cgi-bin/storms.cgi
- Injury Mortality Among Arizona Residents, 1990-2000 Report (March 2002)



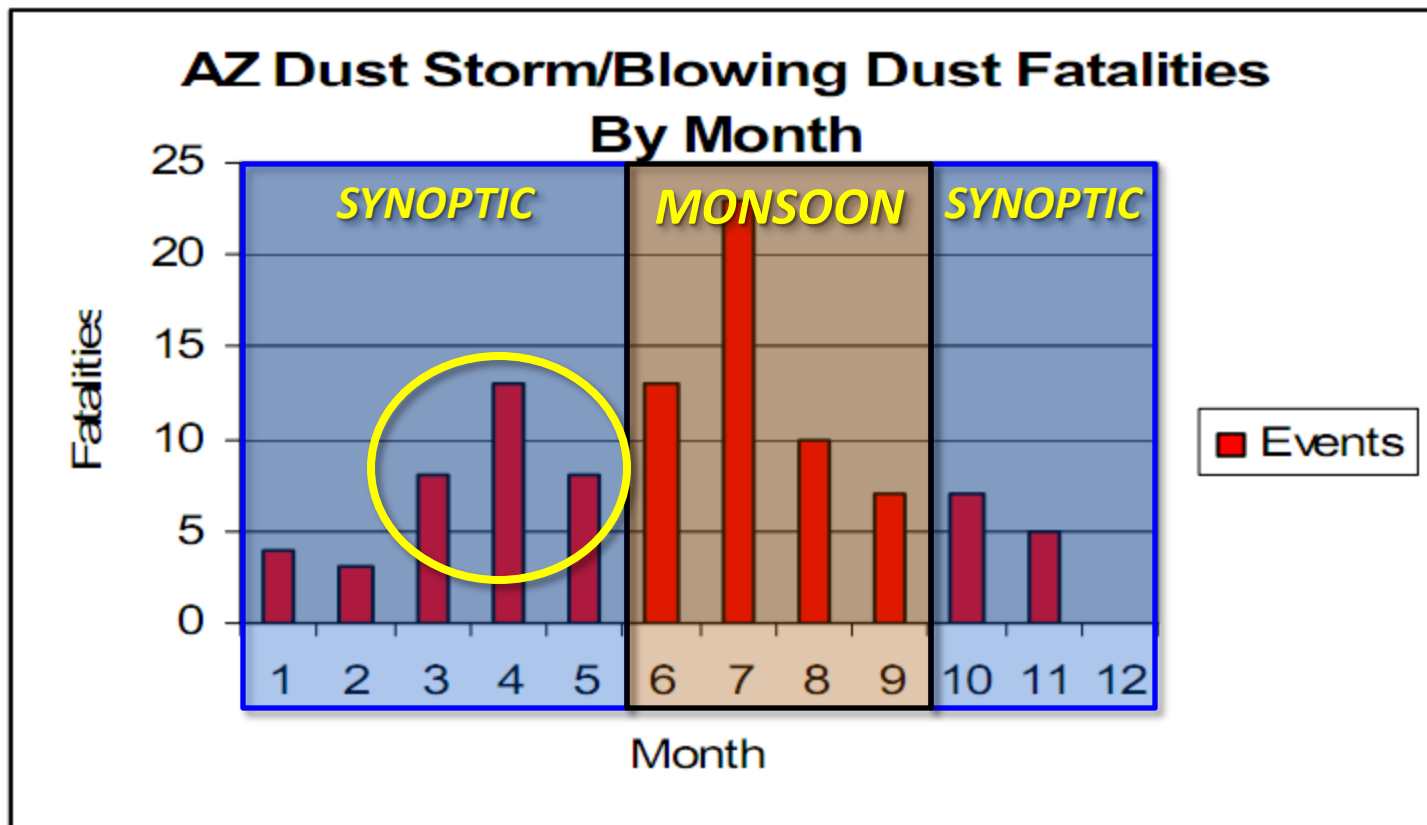


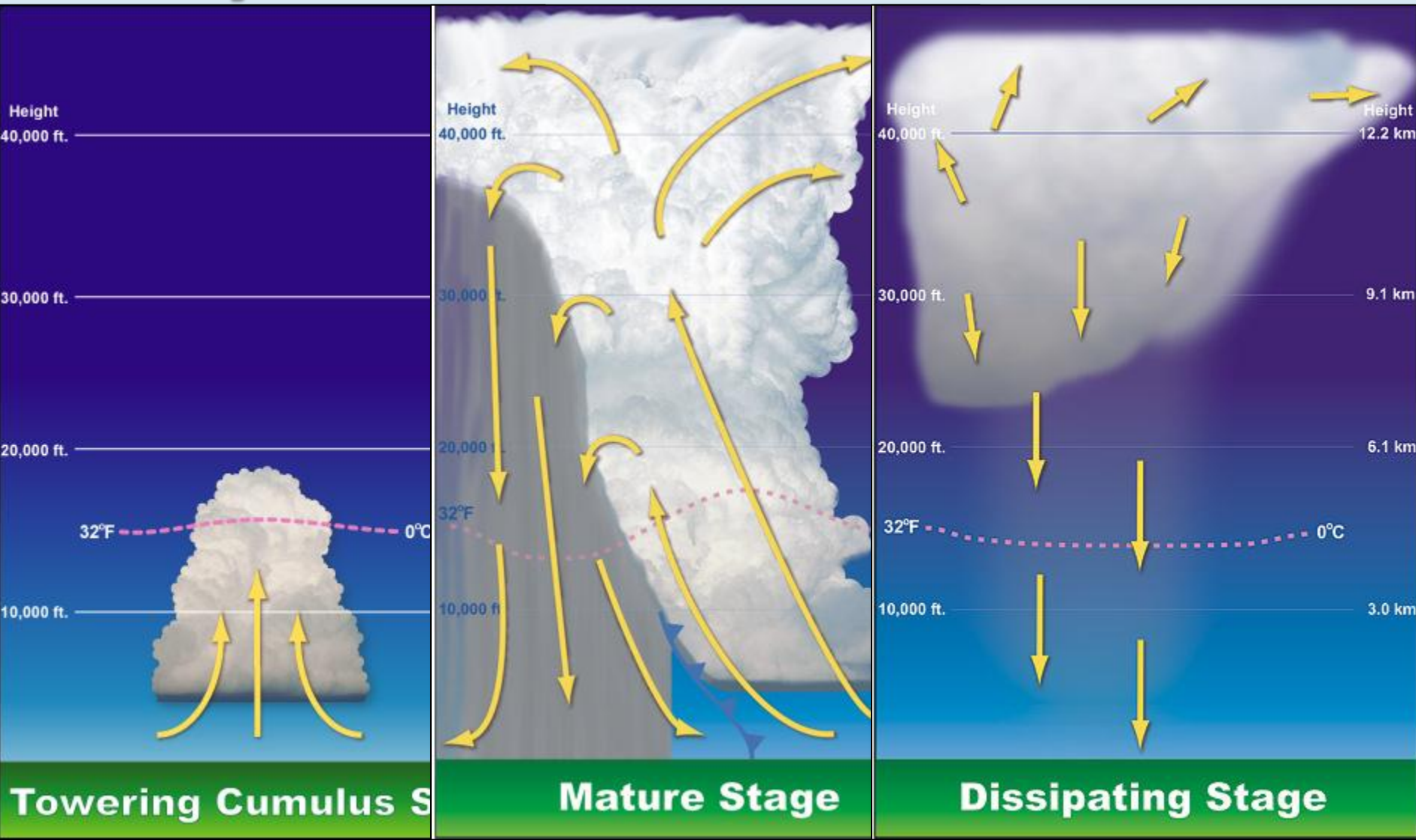
Figure 25. Frequency of dust storm fatalities by month from 1955 to 2004

Two Primary Sources for Blowing Dust

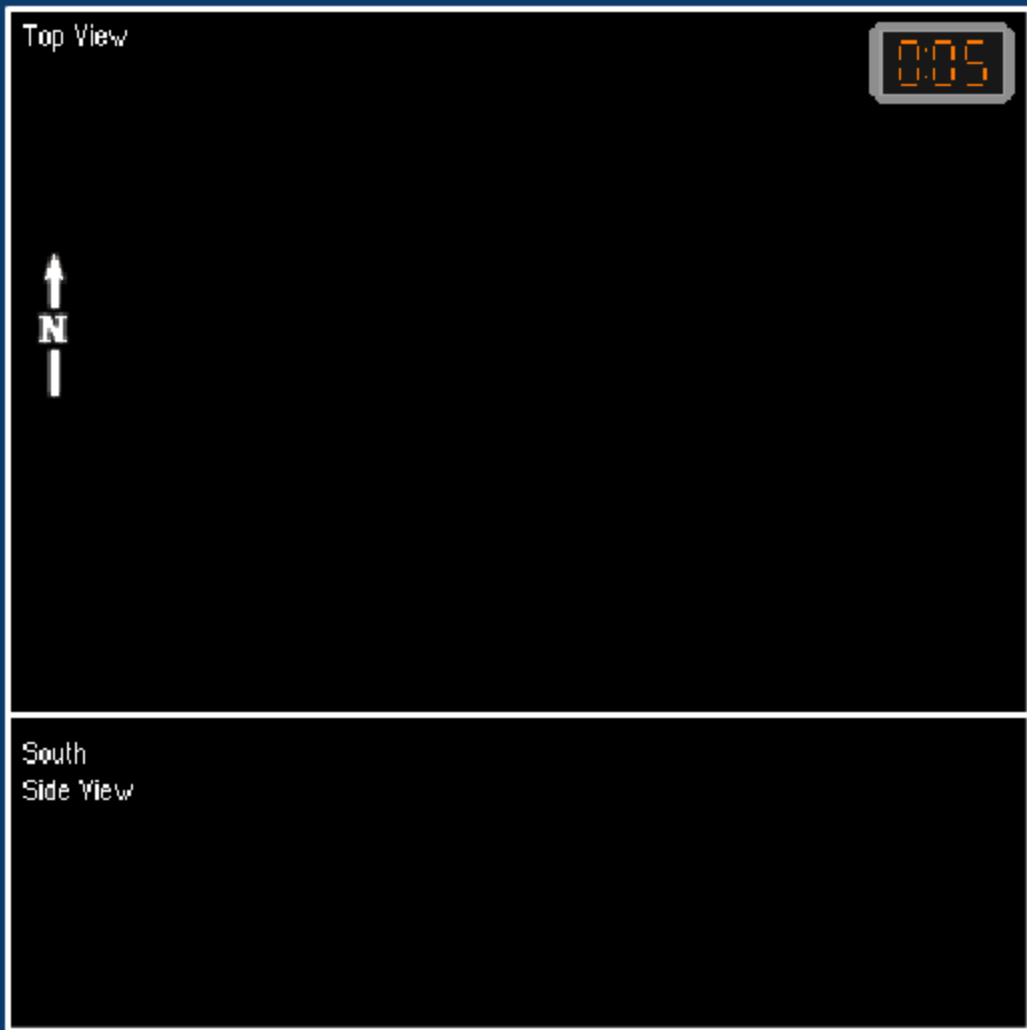
- **Monsoon/Thunderstorms
Summer → Haboobs**



Life Cycle of a Thunderstorm



Pulse Storms & Downburst/Outflow Formation



©The COMET Program

A set of navigation controls for the simulation. From left to right, it includes a square stop button, a left-pointing arrow (rewind), a vertical bar (pause), a right-pointing arrow (play), and a right-pointing arrow with a vertical bar (fast forward). To the right of these buttons is a horizontal seek bar with a slider and end-point arrows. Below the seek bar is the text 'Animation Speed'.



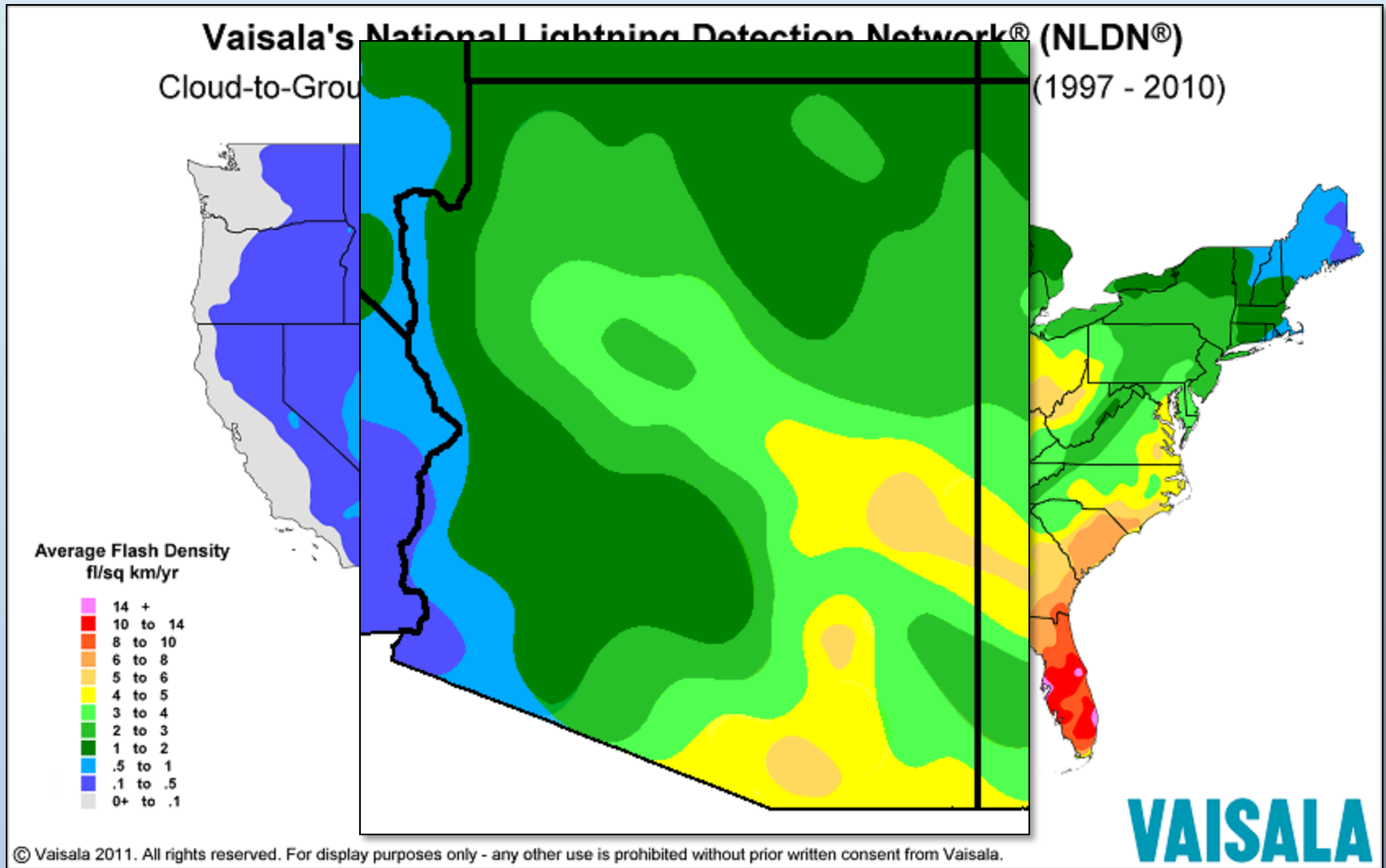
Birth of a Haboob



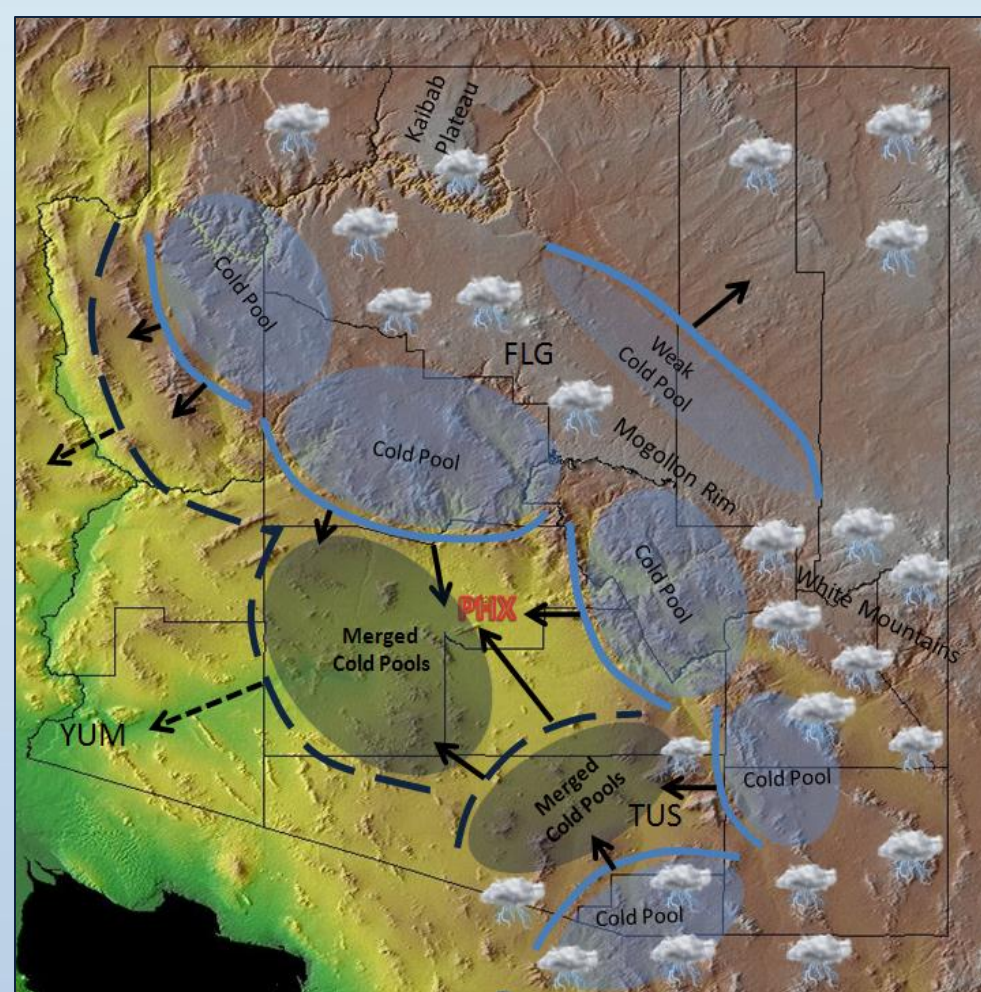
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Thunderstorm Patterns



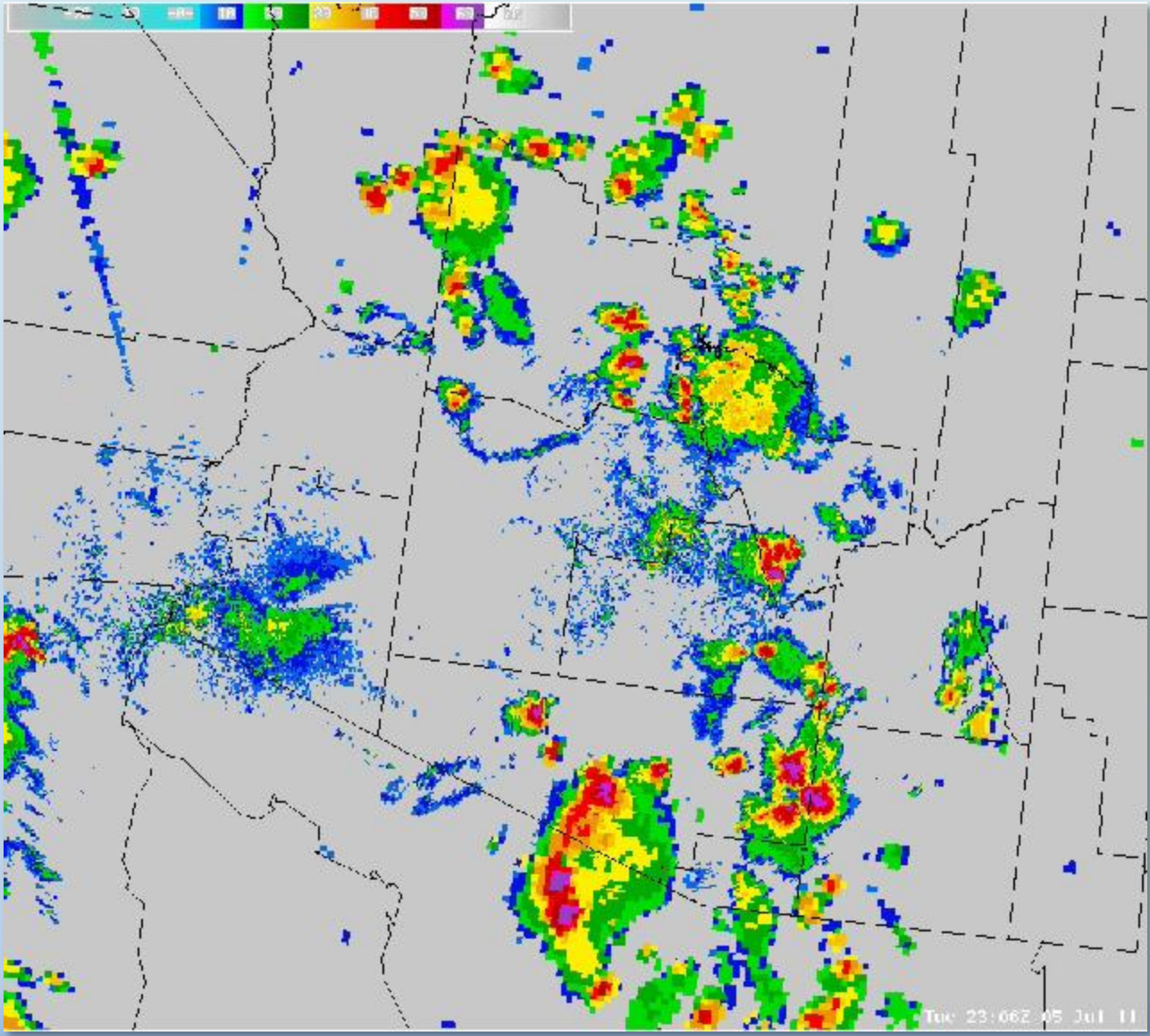
Thunderstorm Patterns: Cold Pool Formation/Movement



Conceptual Diagram of Cold Pool Formation and Movement

- Cold pools (CPs) typically originate from thunderstorm clusters over the higher terrain or mountains of Arizona.
- CPs travel the path of least resistance, down the slopes of river basins and valleys as a density current.
- Phoenix and Interstates 8/10 lie in a confluence region of major rivers and streams in which CPs can collide and merge.
- Under the right conditions, Cold Pools will form Dust Storms.

Monsoon Thunderstorm Patterns – 5 July '11



**50-80 MPH
Winds**

Impact of drought – more dust storms?

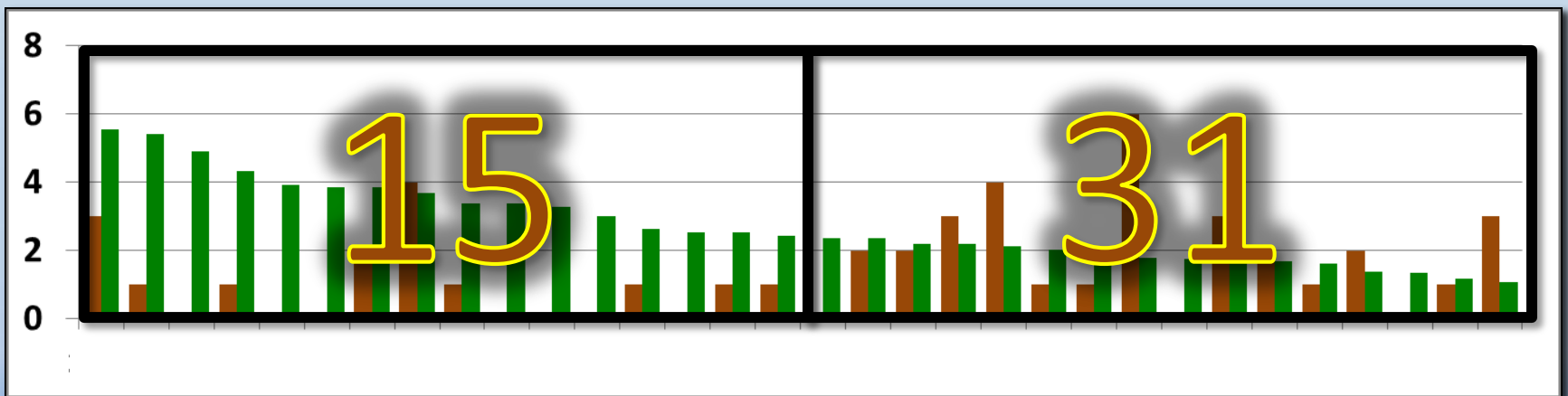
We heard from many people this summer – are the dust storms worse than “normal”? A very difficult question to answer...

- Use data from KPHX (1980-2011, only hard data that has not changed over time).
- 46 events total.

More “dust events” at KPHX in 2011 than any summer since 1980.

Twice as many dust events when summer precipitation in central Arizona is below median.

*Note: No bearing on size, intensity, or duration!
More robust analysis possible with impact data.*

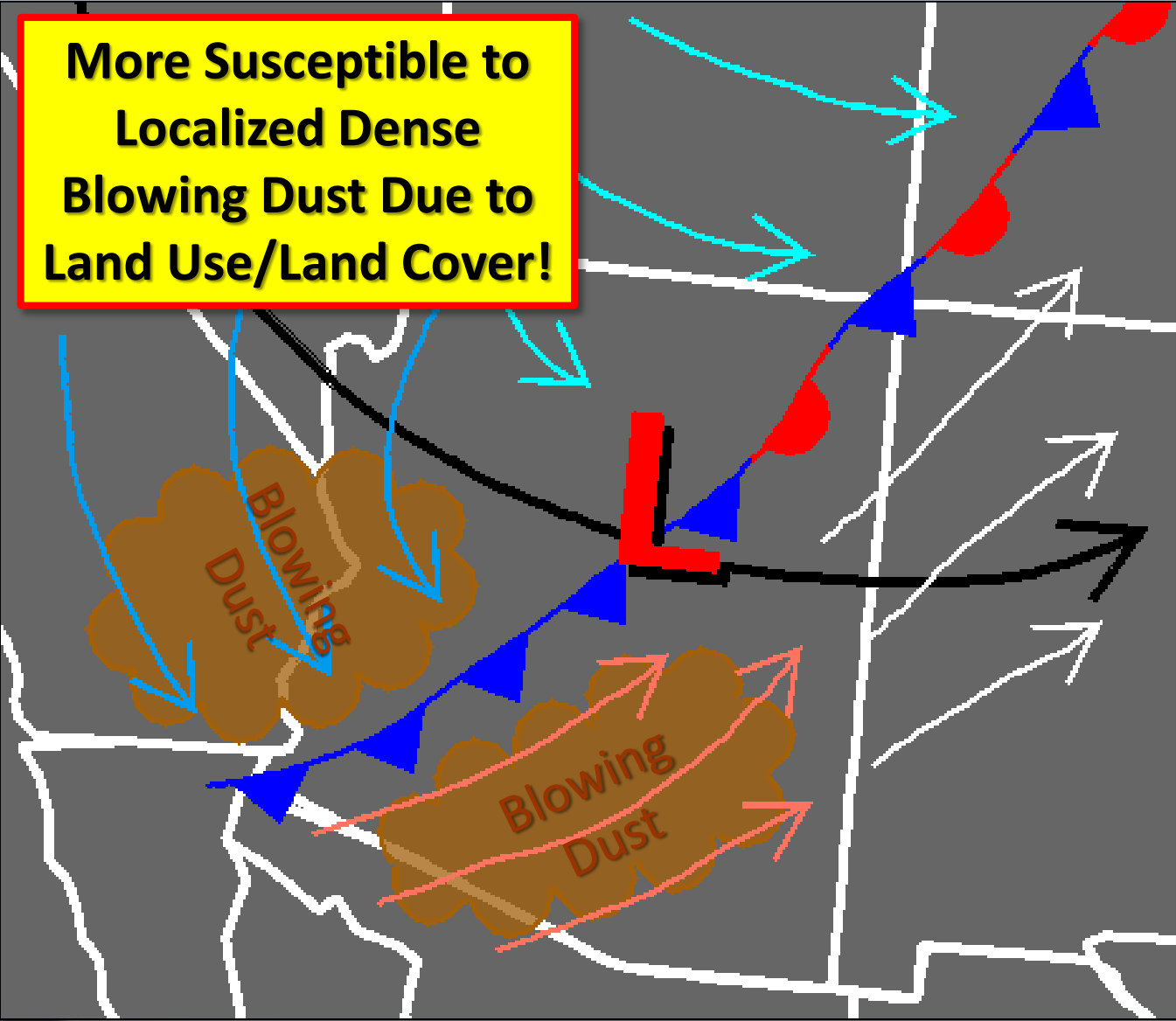


Two Primary Sources for Blowing Dust

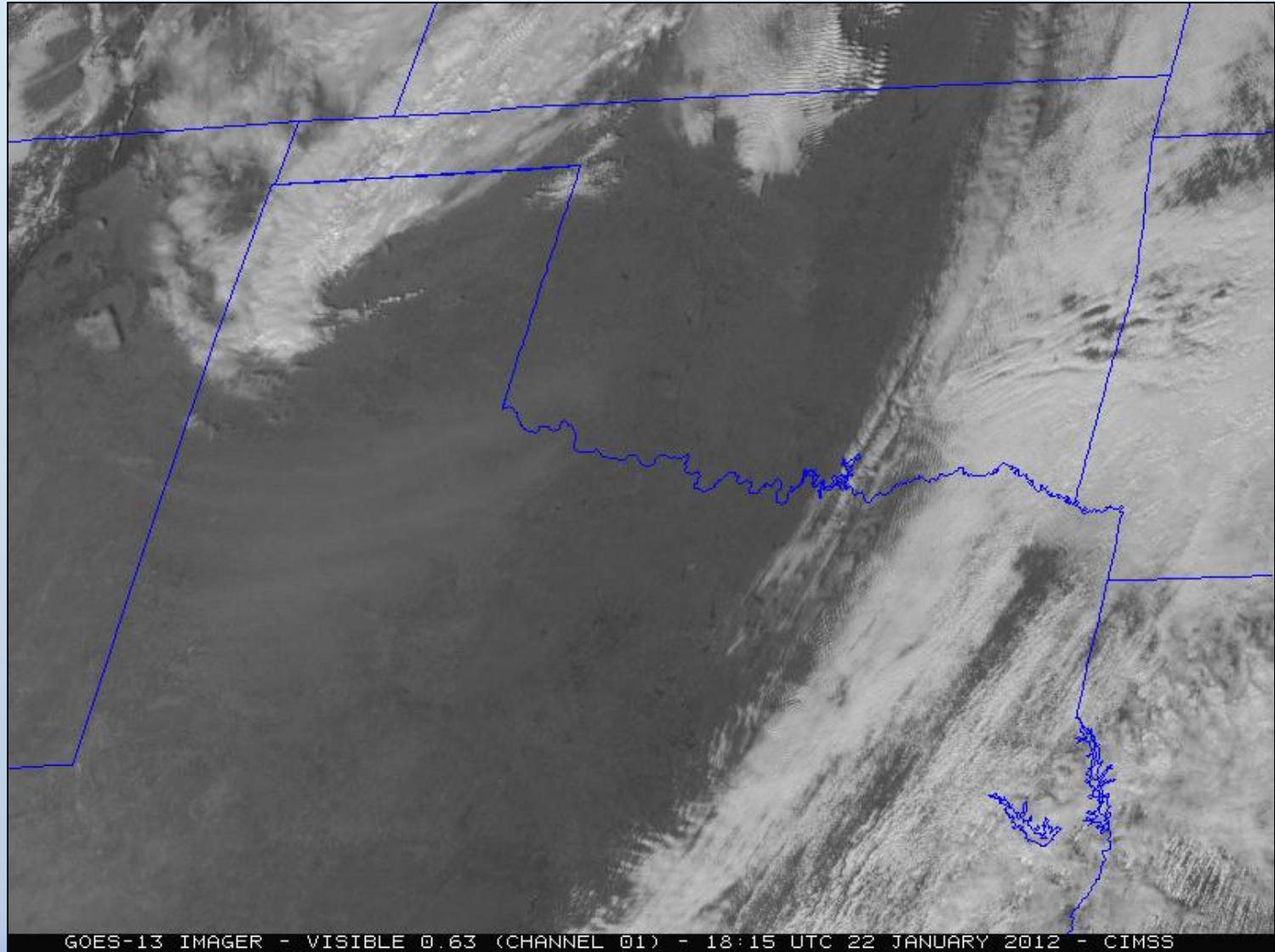
- **Strong Low Pressure (Synoptic) System
Fall/Winter/Spring → Blowing Dust**



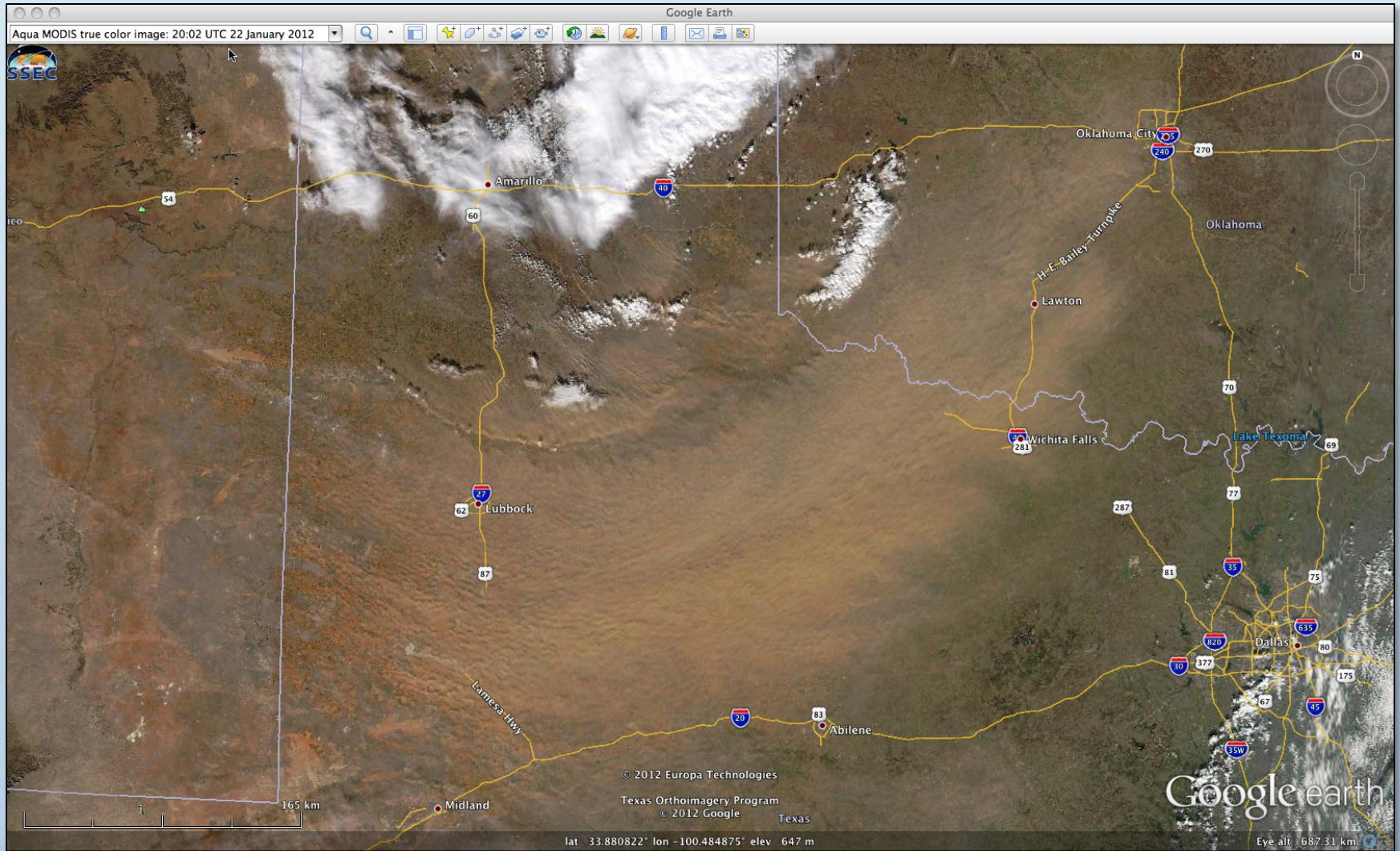
Fall/Winter/Spring Dust Storm Pattern



Widespread Blowing Dust



Widespread Blowing Dust



Localized Blowing Dust

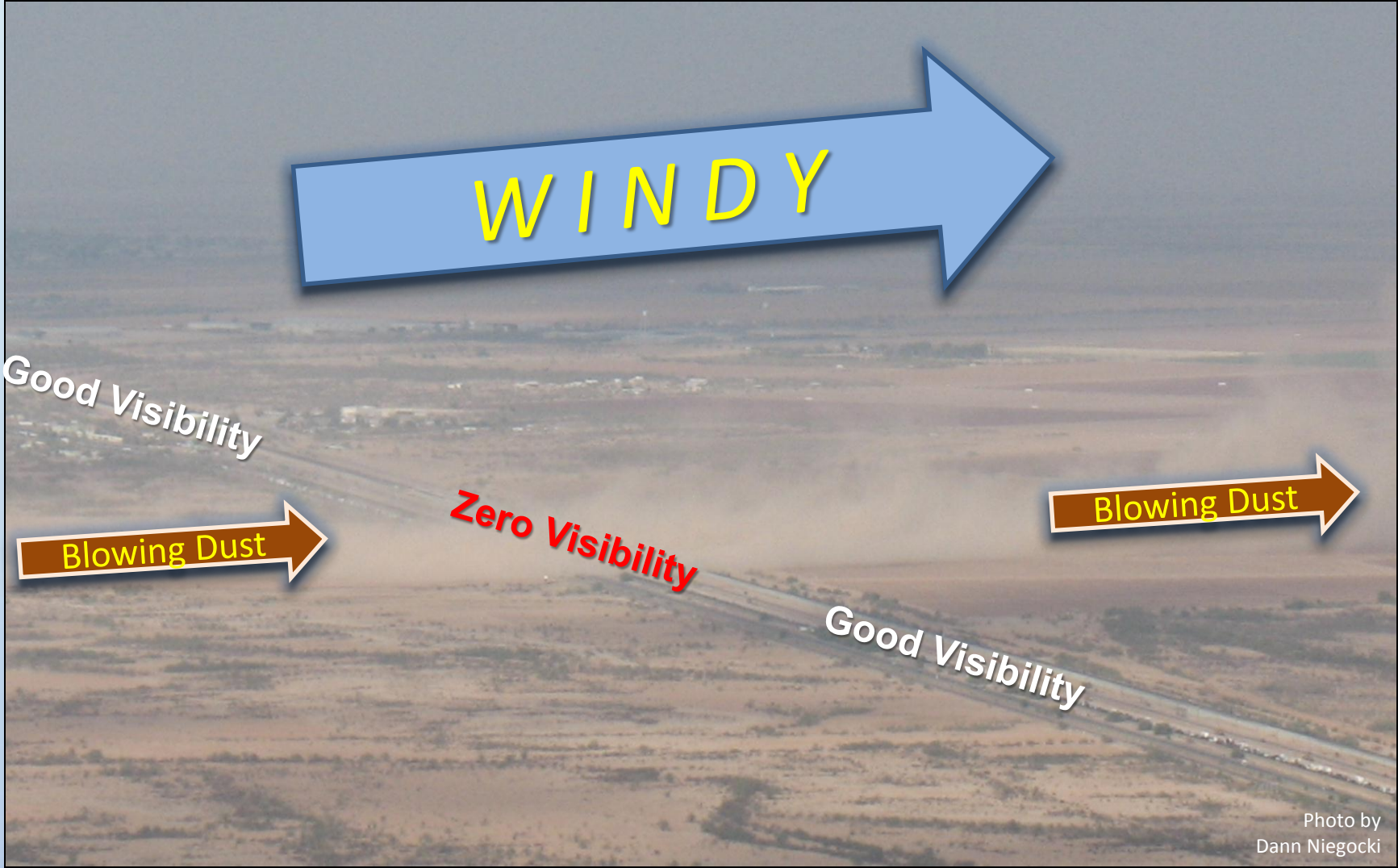
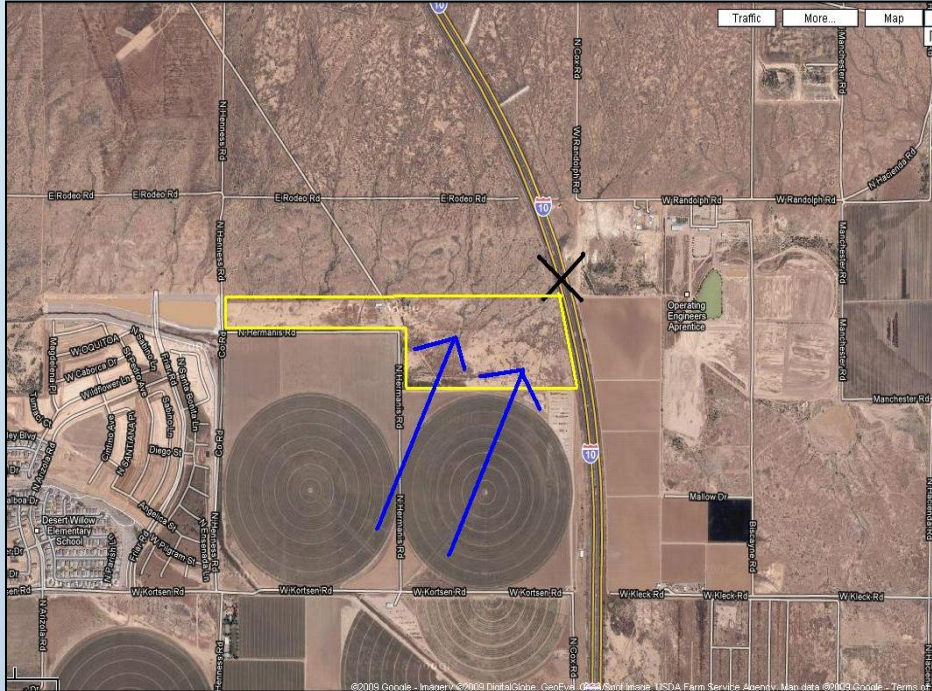


Photo by
Dann Niegocki

Localized Blowing Dust – Dec. 22, 2009



Location in Casa Grande, AZ near MP 191 I-10. Confirmed upon visual inspection. Yellow box indicates land area that was grubbed prior to incident.

- **Two separate accidents at same location with 22 total vehicles and 3 fatalities**
- **Incident occurred at about 10:50 AM. SSW winds at 10-20 mph. Note: Winds of 25+ mph typically raise concern at NWS.**
- **Local land use and associated human activity play a significant role, hampers ability of NWS to forecast events.**

Localized Blowing Dust – Dec. 22, 2009



Conclusion

- **2011 had a lot of blowing dust & big events (but we always have dust).**
- **Two dust seasons described by source of winds - Monsoon and Synoptic (fall/winter/spring).**
- **Monsoon events develop quickly, not able to predict more than a few hours ahead. Difficult to detect and determine severity prior to impacting urban areas and freeways.**
- **Synoptic *wind* events have much higher predictability. However, antecedent conditions, land use, and human activity make *dust* prediction much more difficult. Same detection problems as monsoon, maybe even more difficult due to very localized impacts.**





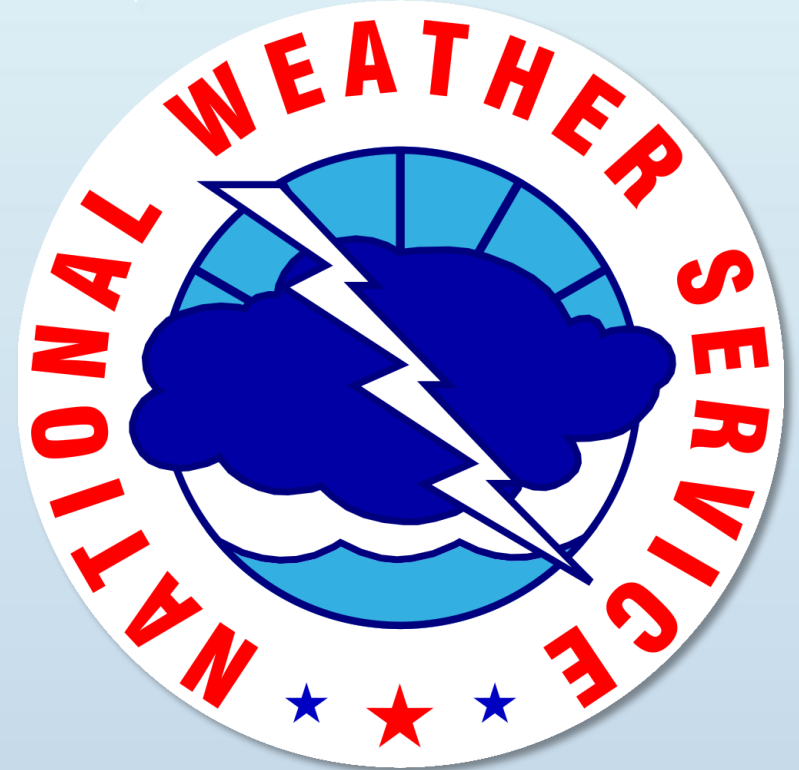
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