CLIMAS
Climate Assessment for the Southwest

Climate and Weather Patterns Associated with Wind Erosion

Dr. Dave DuBois
NM State Climatologist
New Mexico State University

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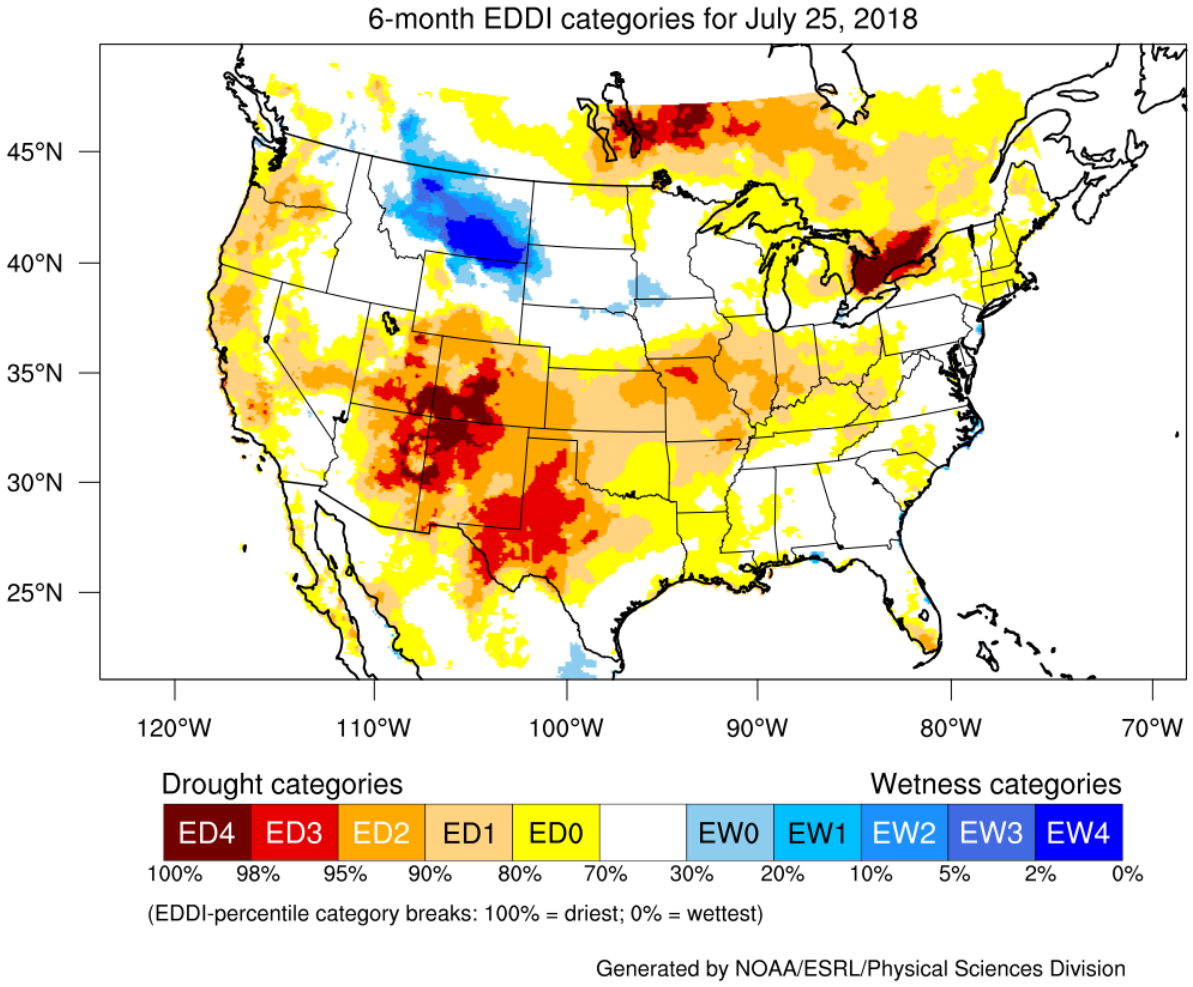
A few key conditions for wind erosion

- Dry soils
  - time since last precipitation
  - time of day
- Lack or loss of vegetative cover
  - density and type of cover
- Erodibility of surface
  - particle size
  - disturbance level
  - fraction of area crusted
- Sufficient winds to lift particles and sustain them

Role of drought and vegetation

- Recent drought was not only dry but enveloped in record warmth
- Evaporative demand is high, delayed green-up, increase in plant mortality, loss of plant cover over time



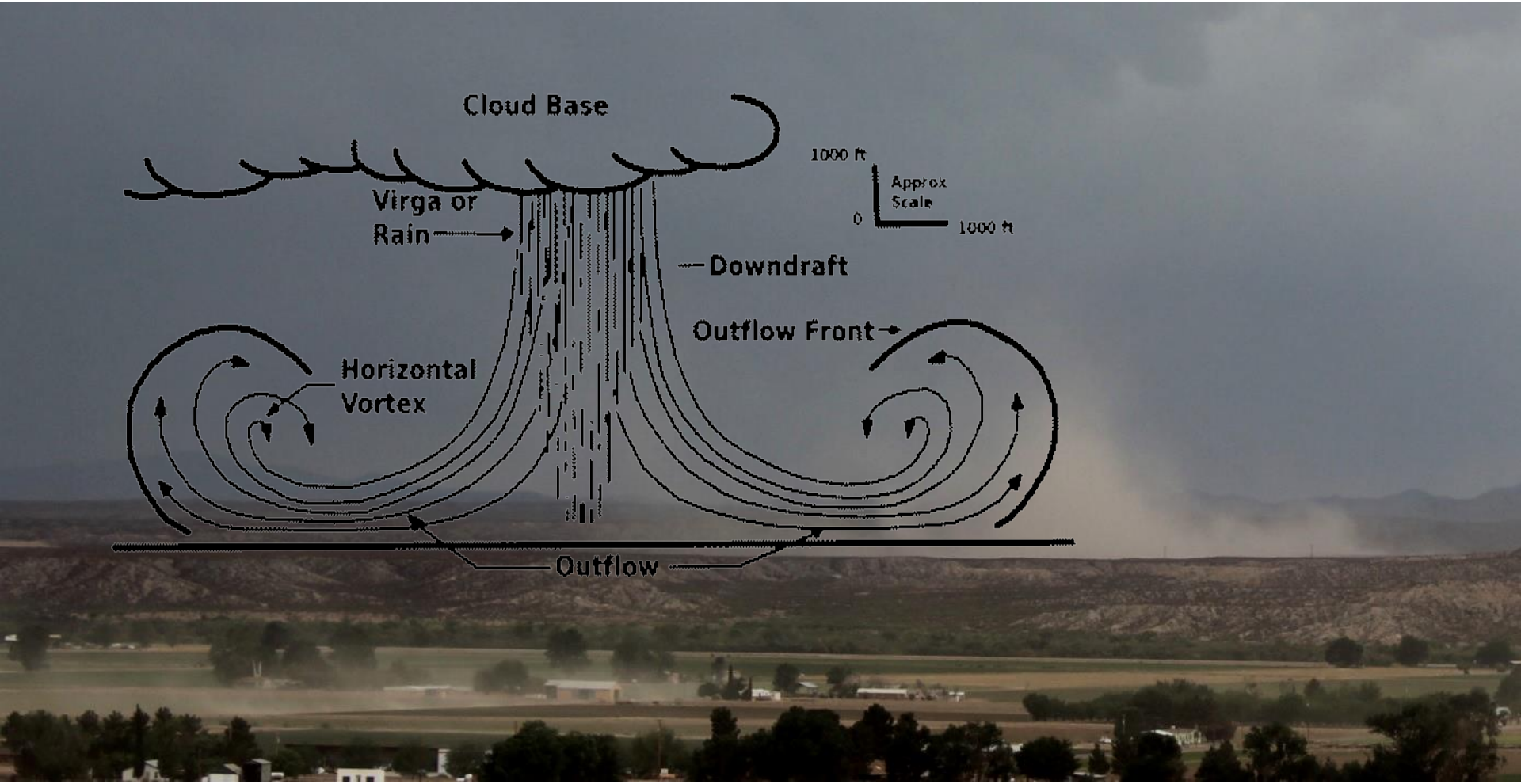
Main Types of Wind Erosion Events

- Dust devils
- Dust channels
- Thunderstorm microburst
- Thunderstorm gust front
- Convective outflow
- Synoptic or frontal

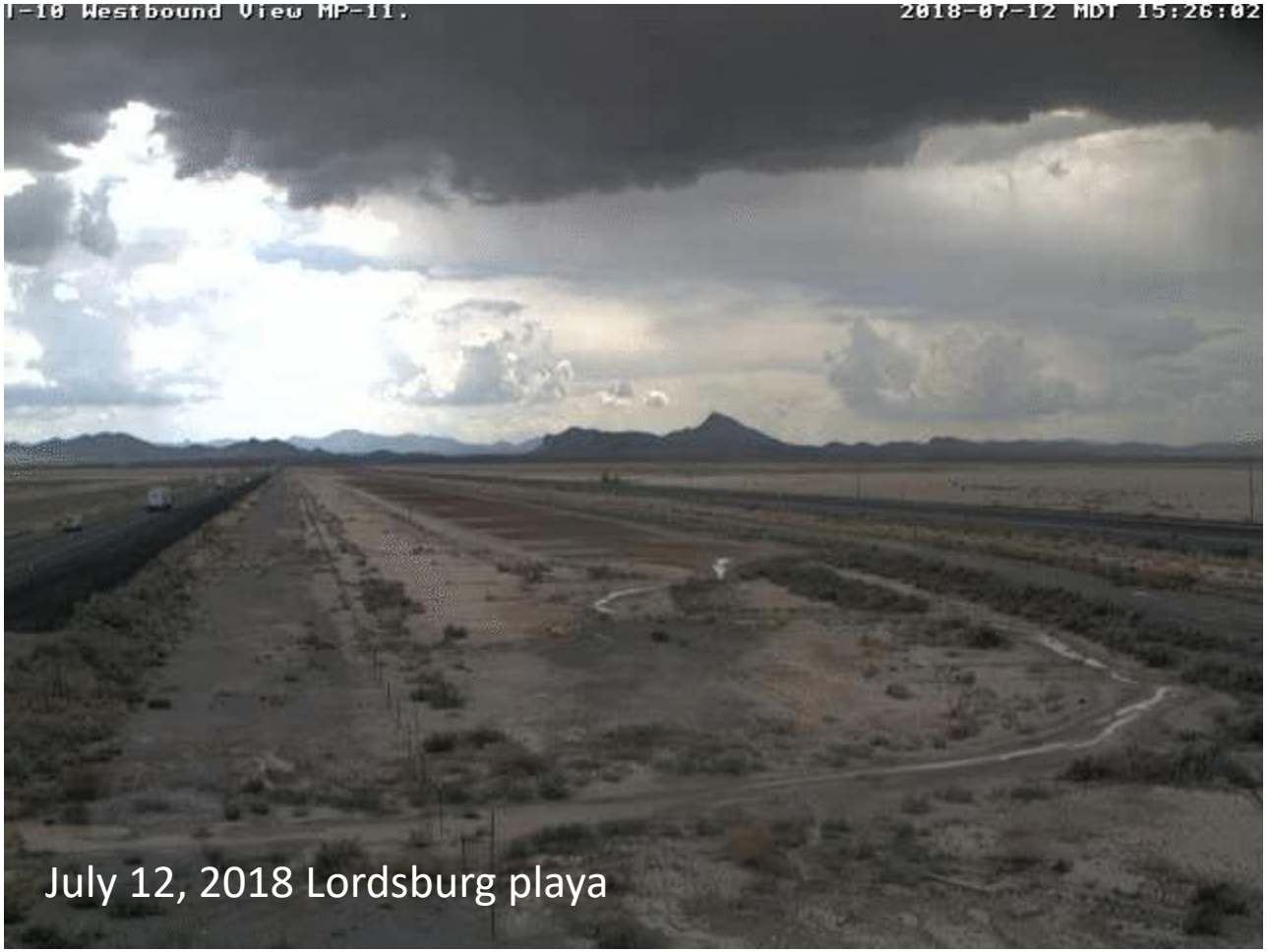
Dust Devil Events

Microburst

Size < 4km, duration 2 to 5 minutes

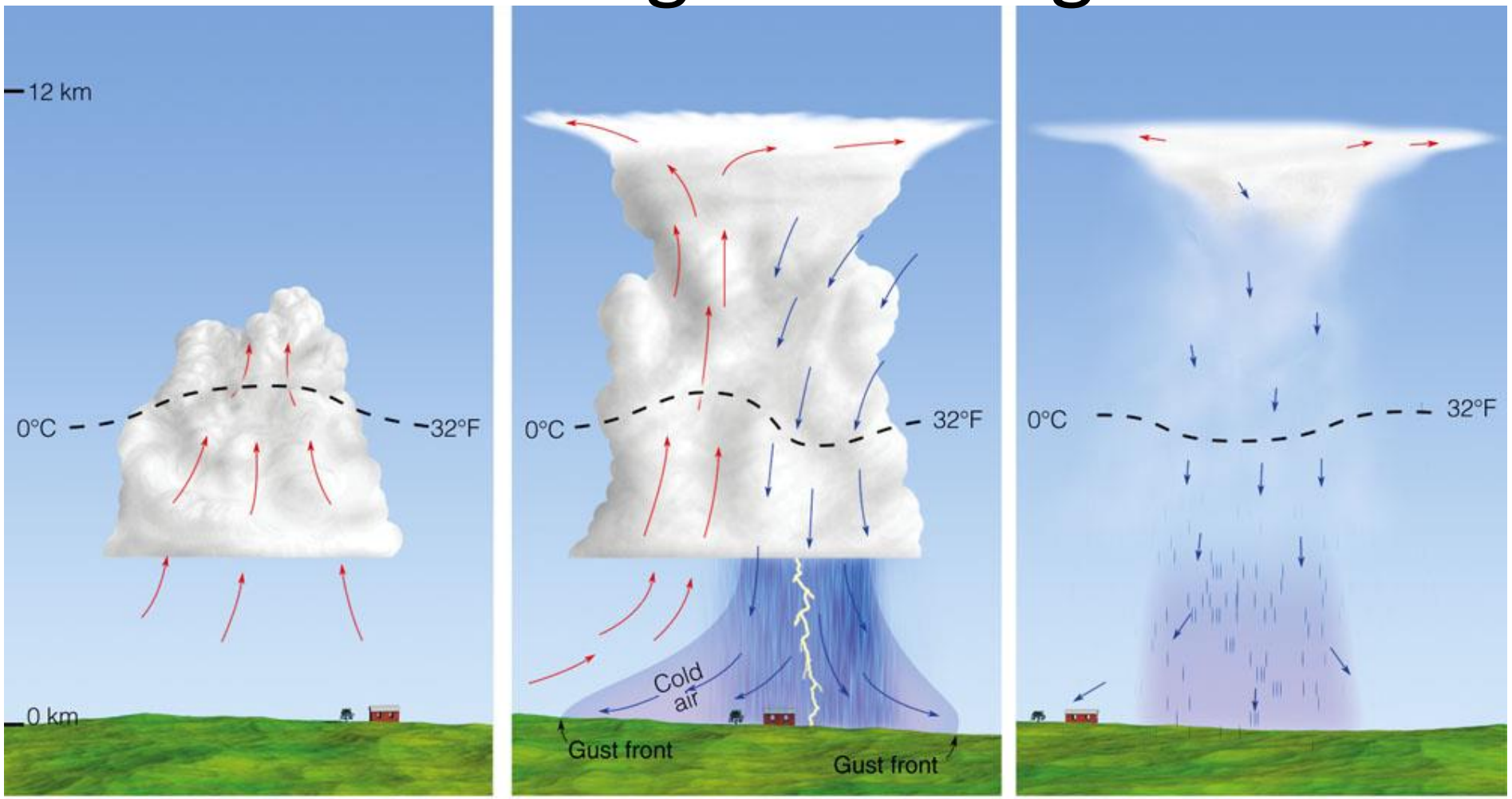


Dust ahead of wet microburst



July 12, 2018 Lordsburg playa

Thunderstorm growth stages



(a) Cumulus (b) Mature (c) Dissipating

Figure from Ahrens (2009)

July 9, 2015 outflow example

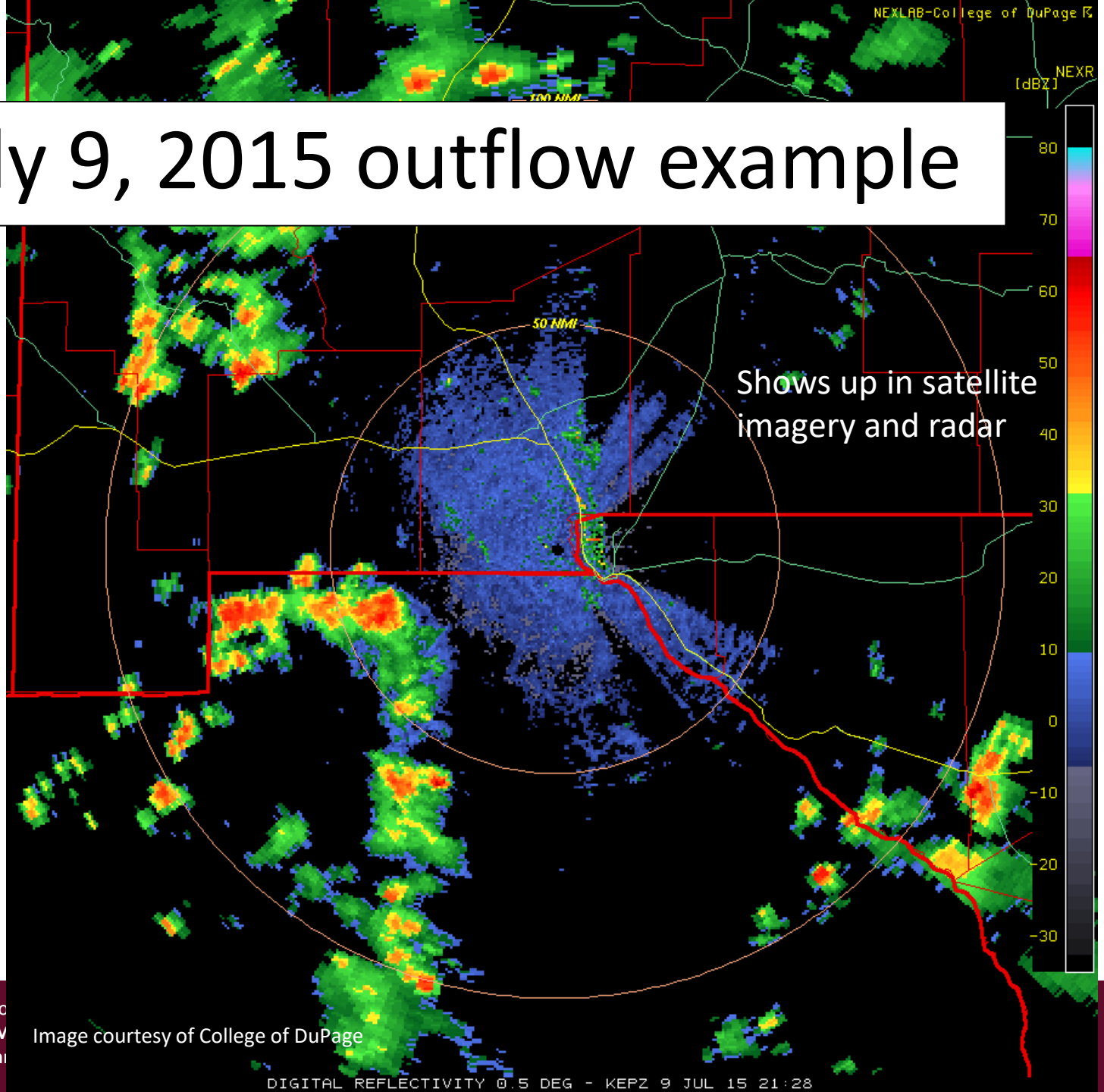
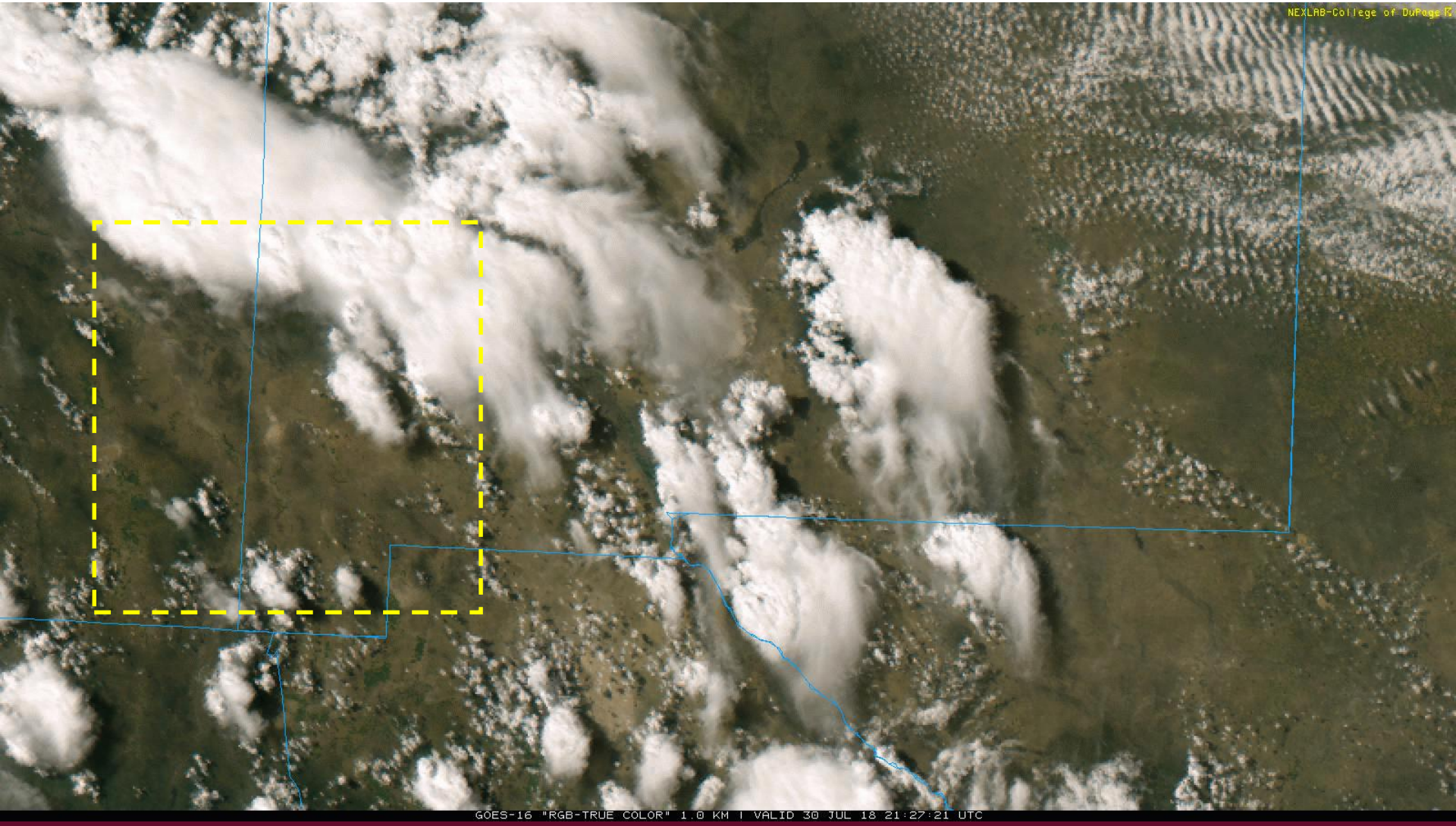


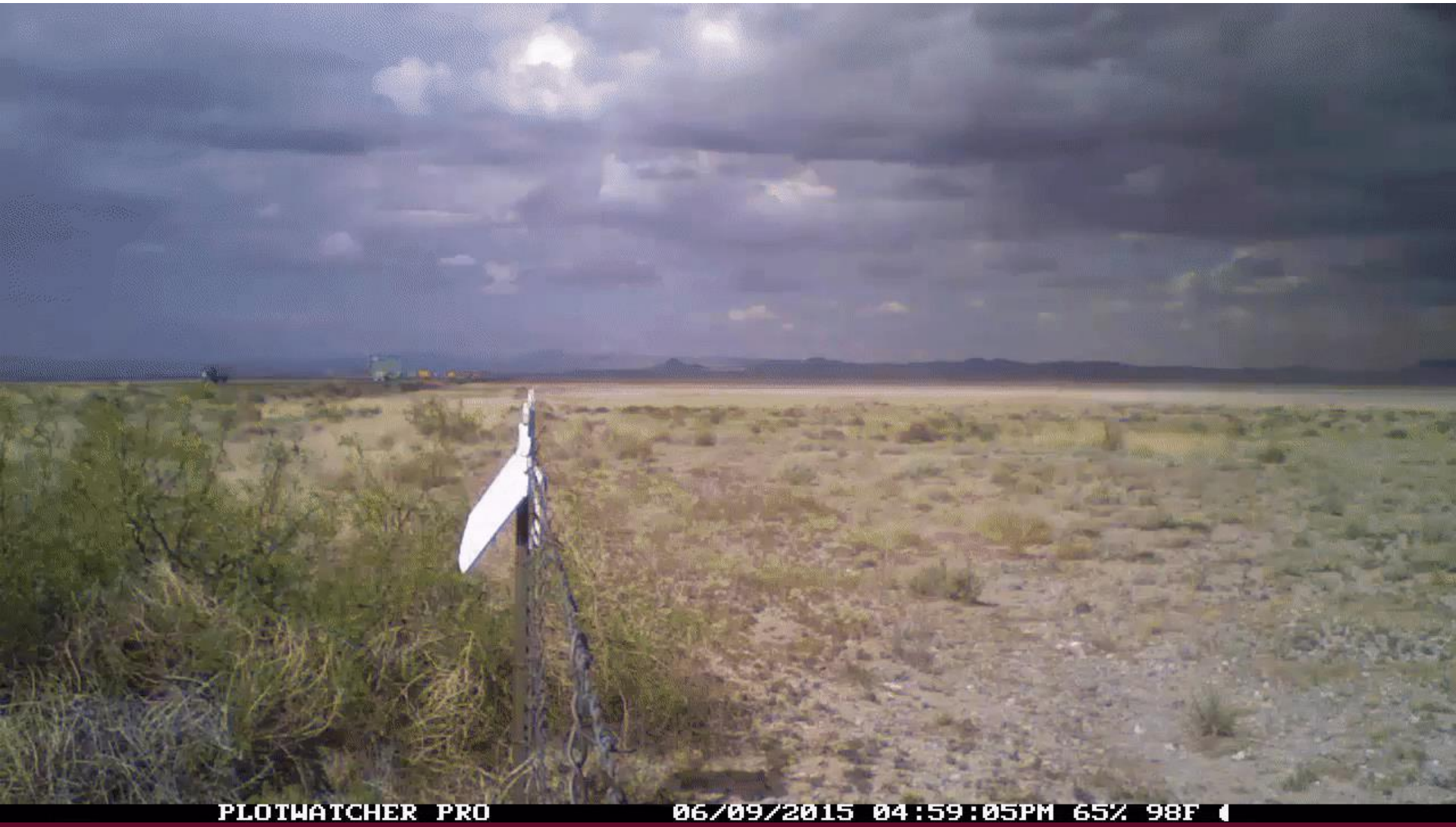
Image courtesy of College of DuPage

Thunderstorm outflow during monsoon

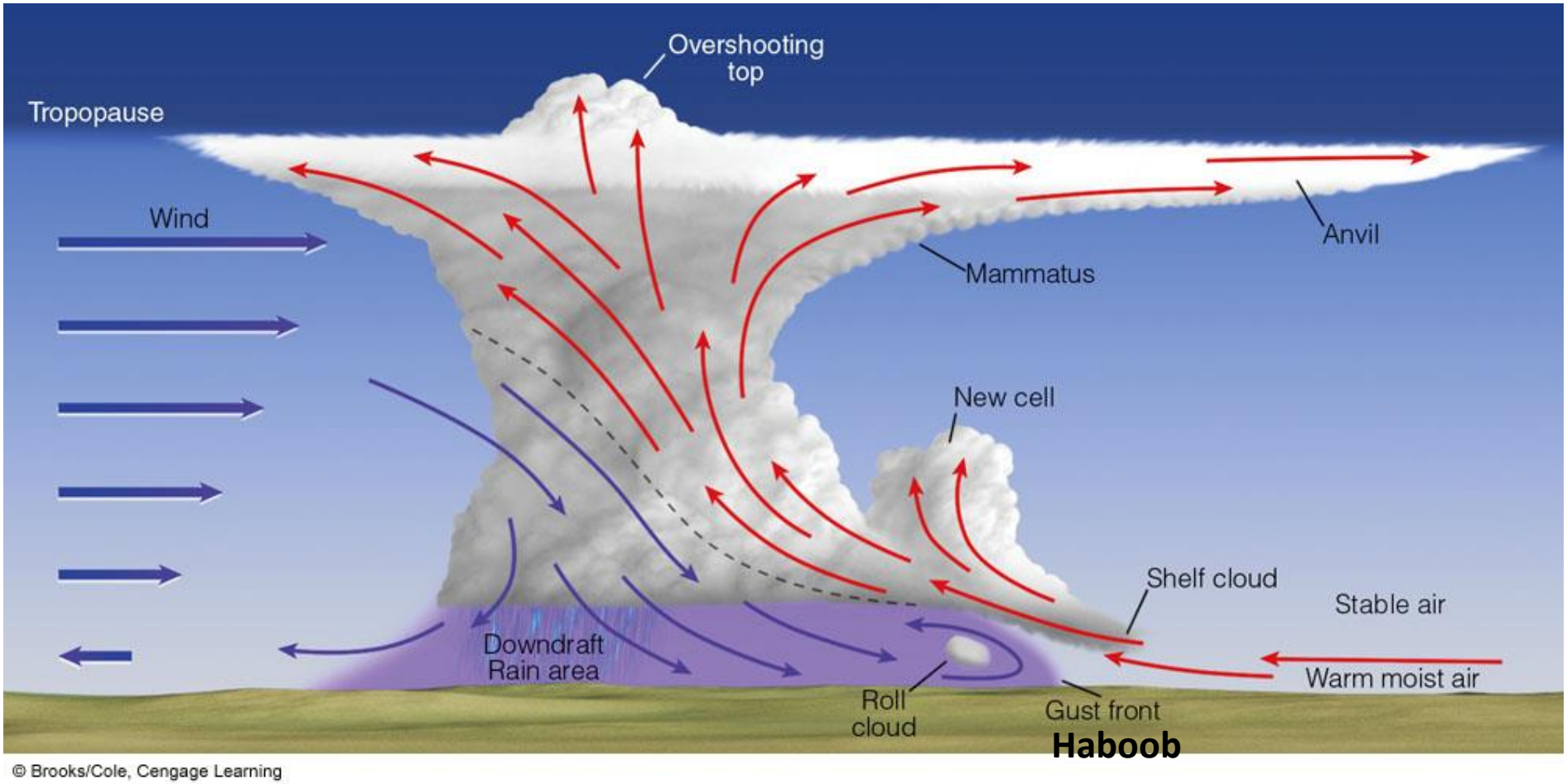
View from satellite



Gust front horizontal winds



Haboob



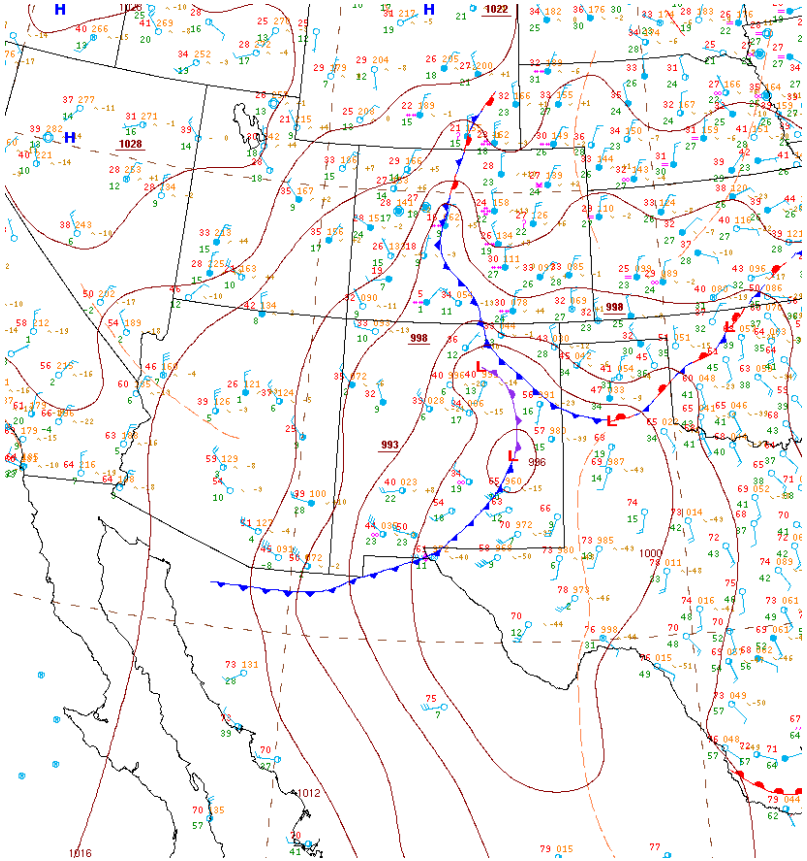
Cold air from the downdraft undercutting warm air

Haboob

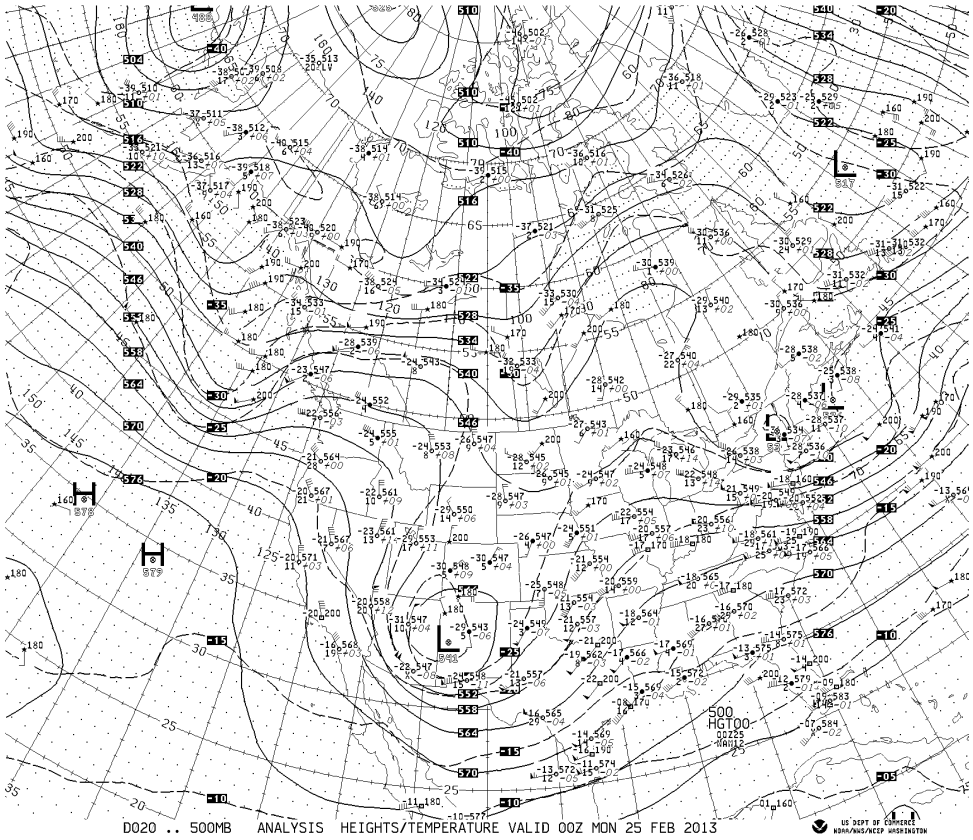
Typical Synoptic Storm

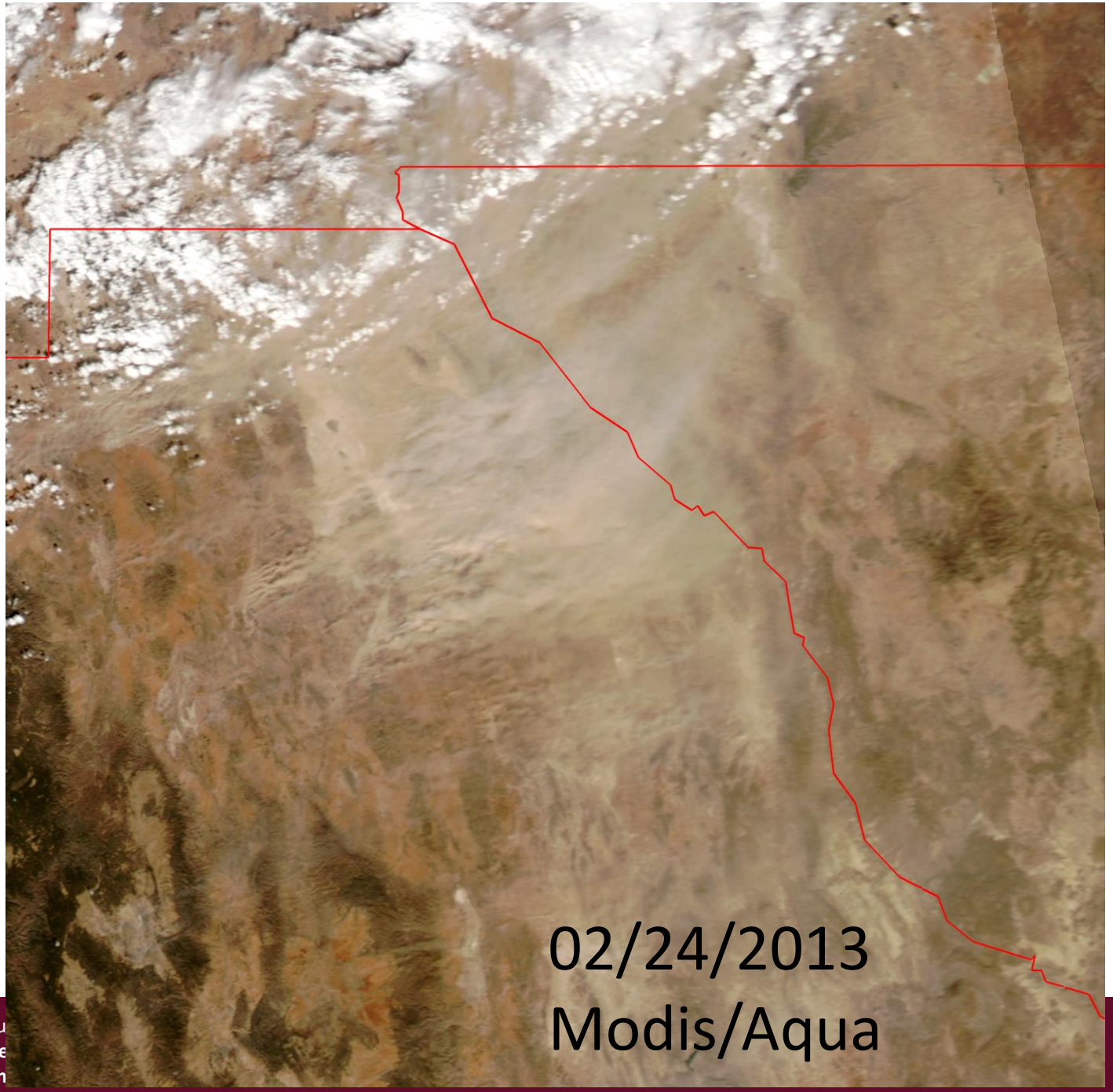
- Surface cold front, upper level trough, 2/24/2013

surface



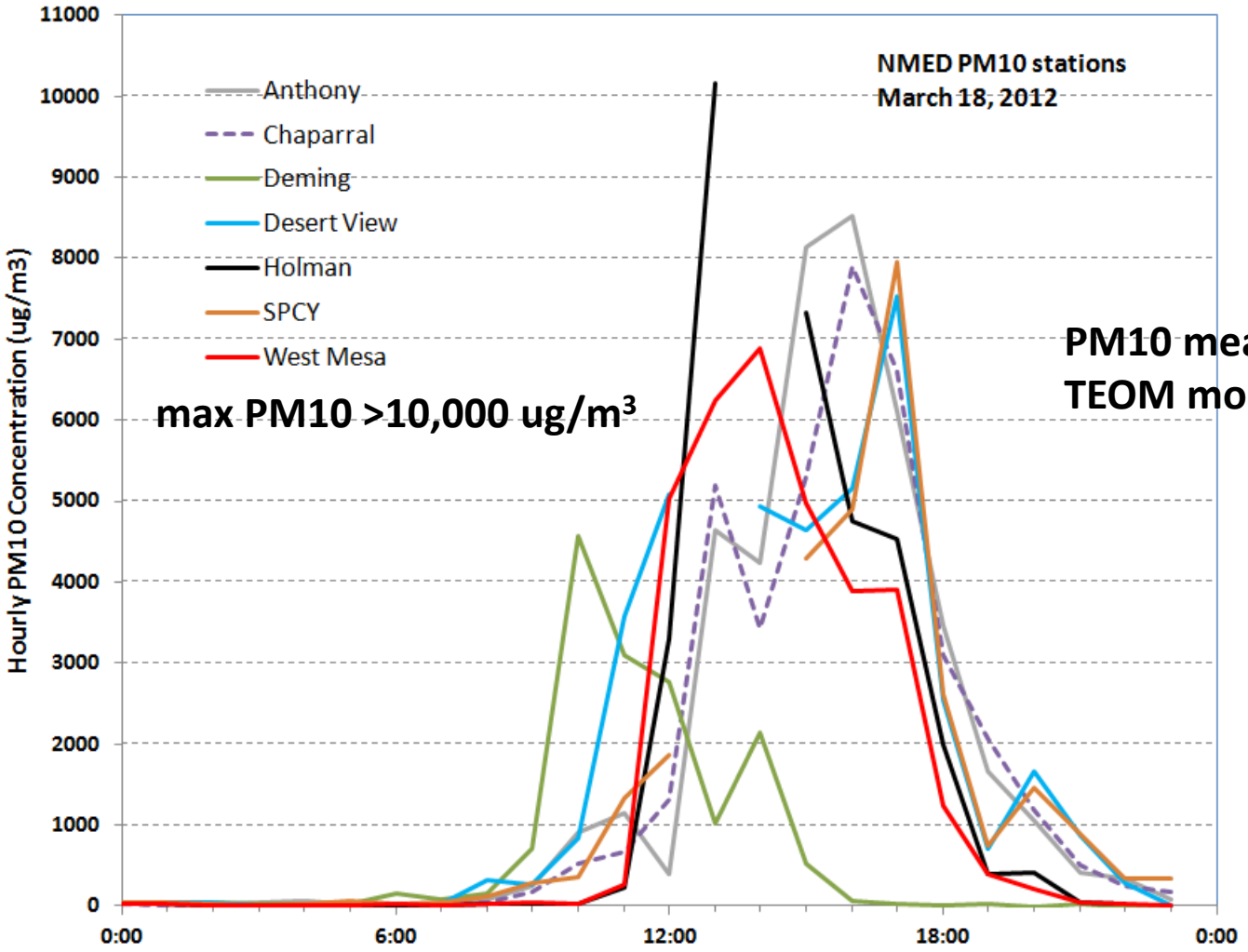
500 mb




02/24/2013
Modis/Aqua

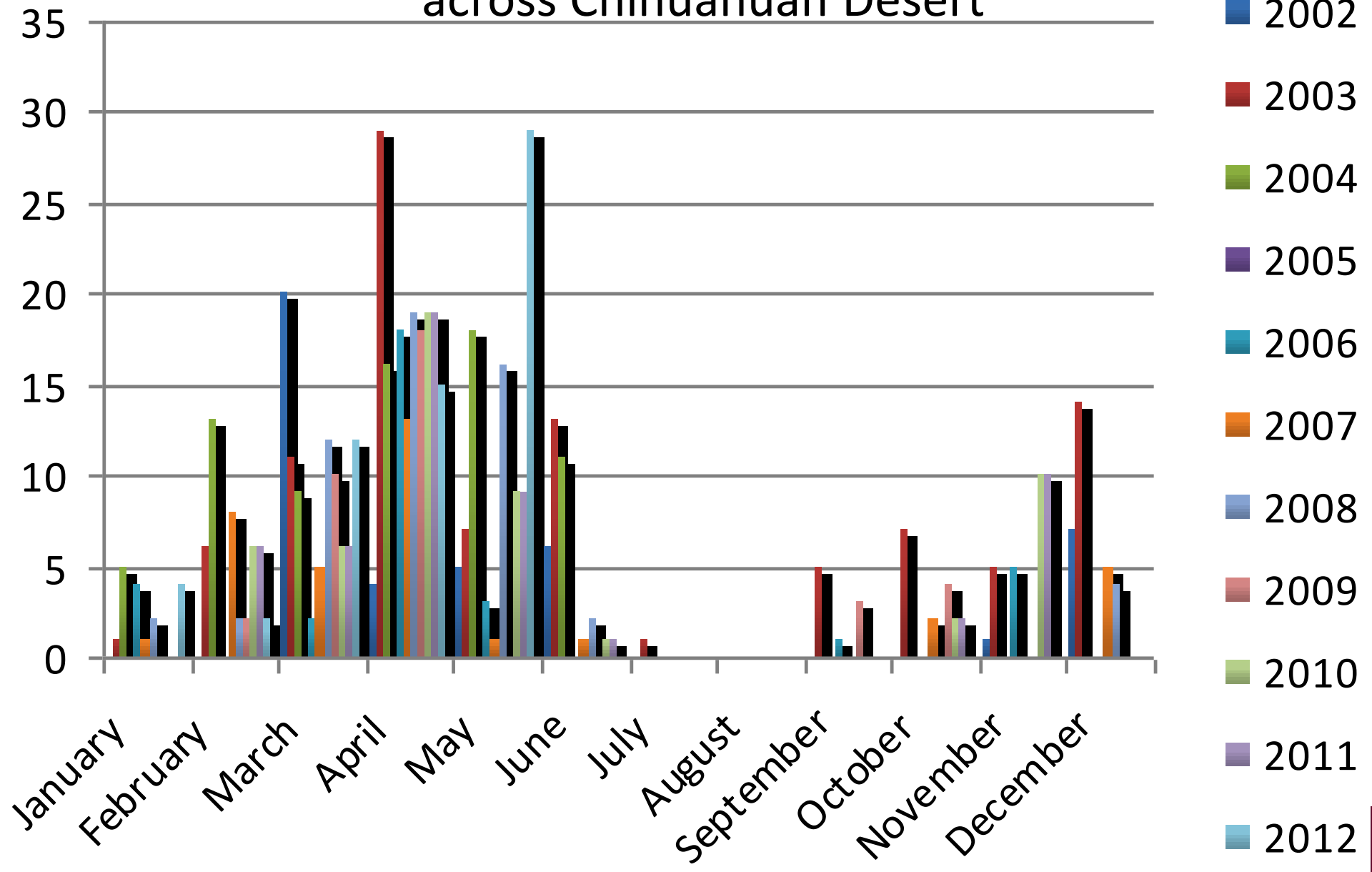
Impacts from synoptic storm

- Duration: most of day

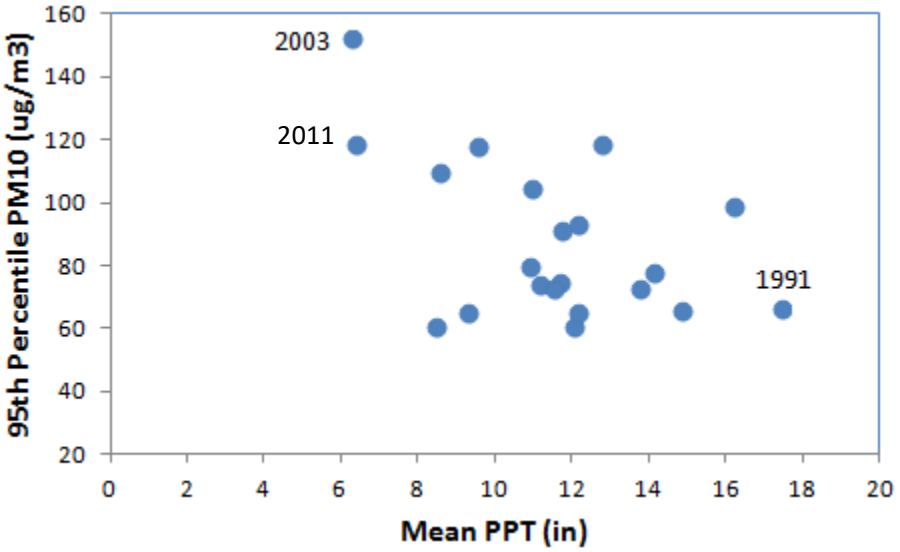


PM10 measured using TEOM monitors

Synoptic dust storm frequency based on imagery across Chihuahuan Desert



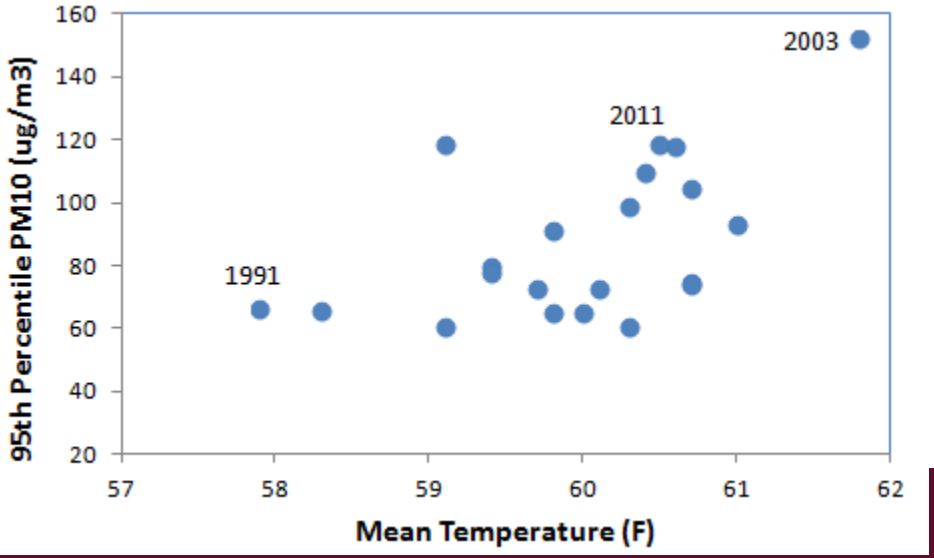
Climate and Dust Levels



Our highest PM10 occurs during our driest years

…and during our warmest years

Over 21 years in NM climate division 8



Dr. Dave DuBois
State Climatologist
New Mexico State University

Email: dwdubois@nmsu.edu
Website: weather.nmsu.edu
Twitter: @nmclimate