

# SEVERE CONVECTIVE STORMS



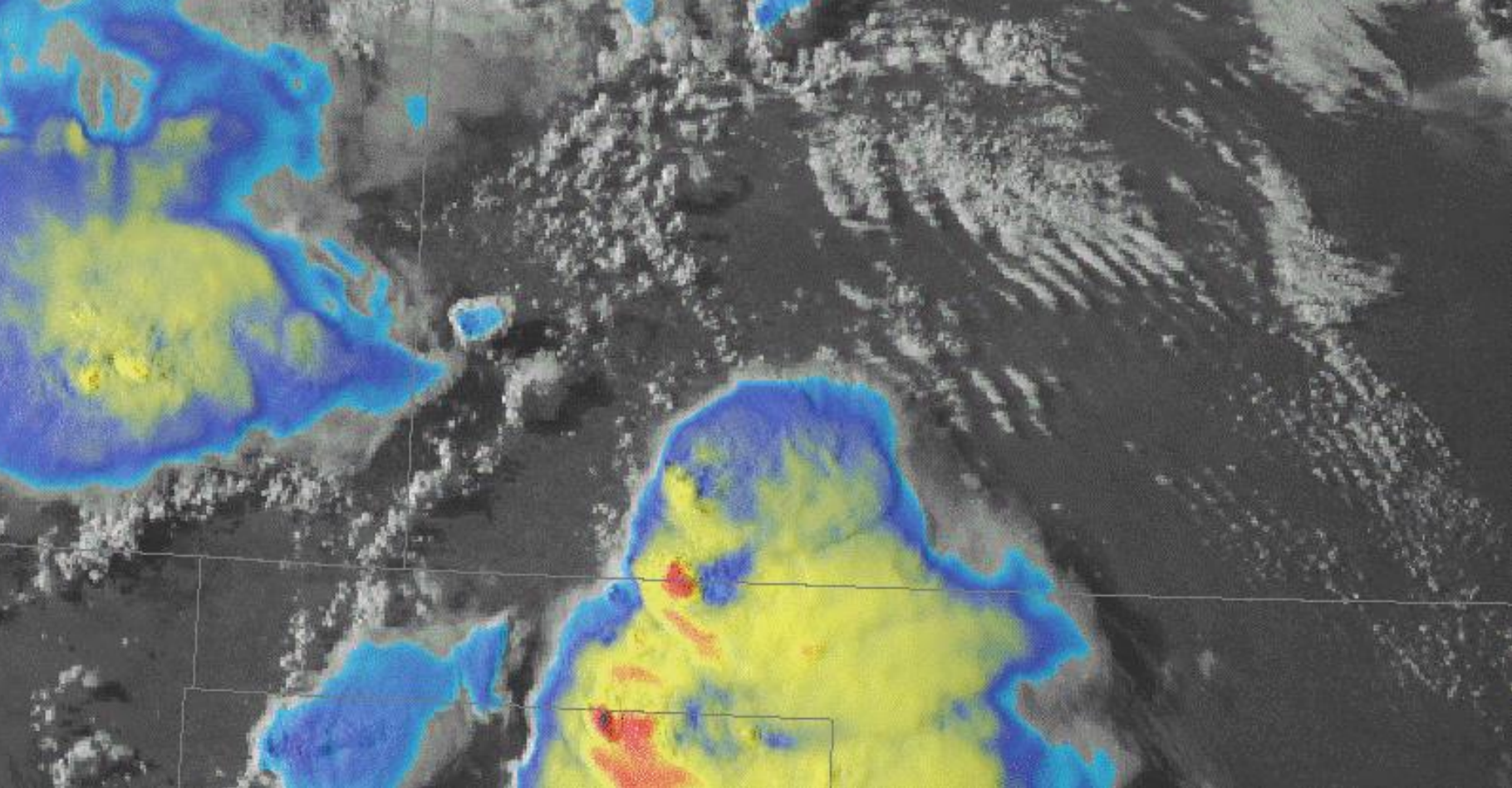
Sorry closed  
early due to  
storms.

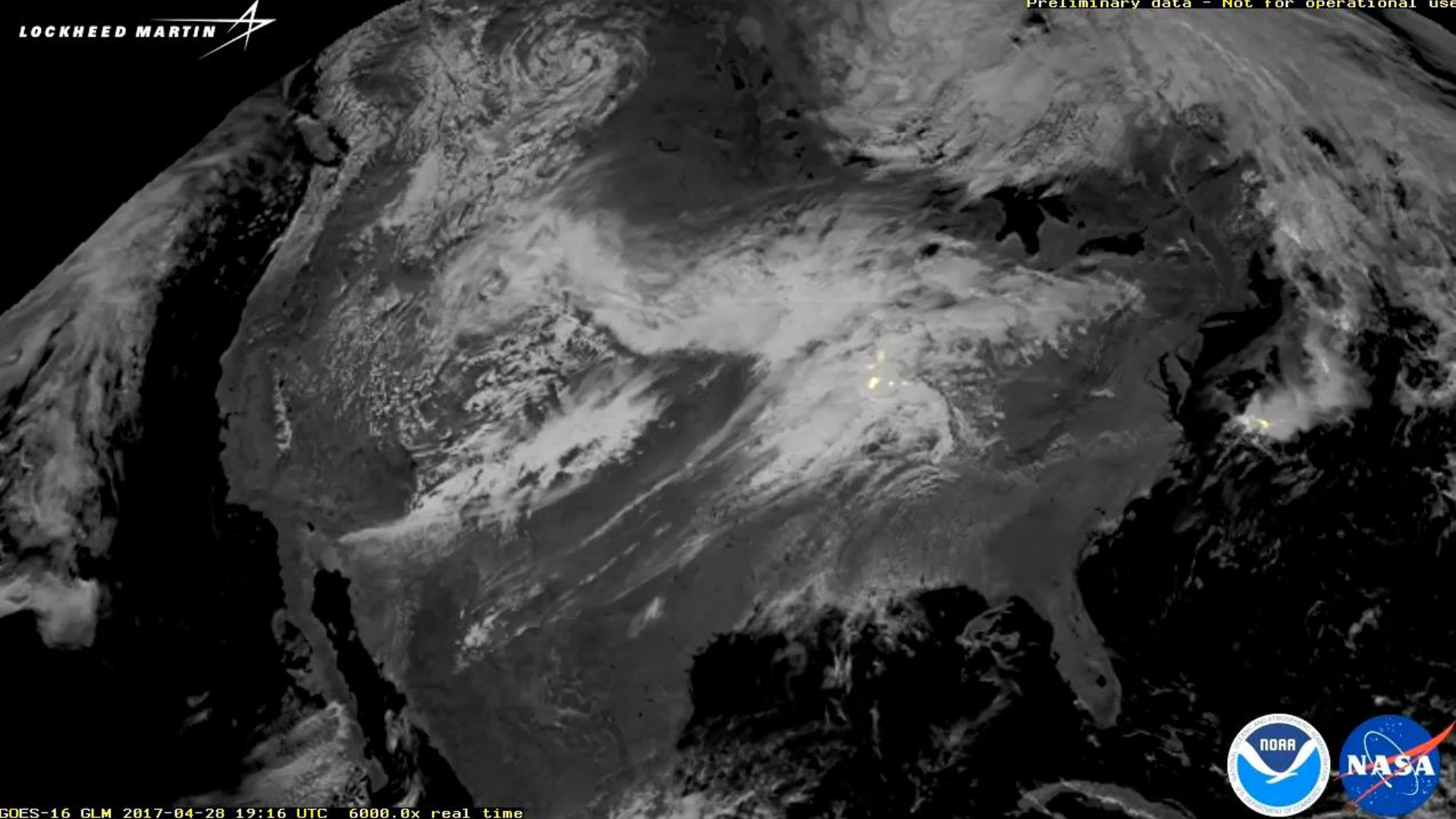
Management











## con·vec·tion

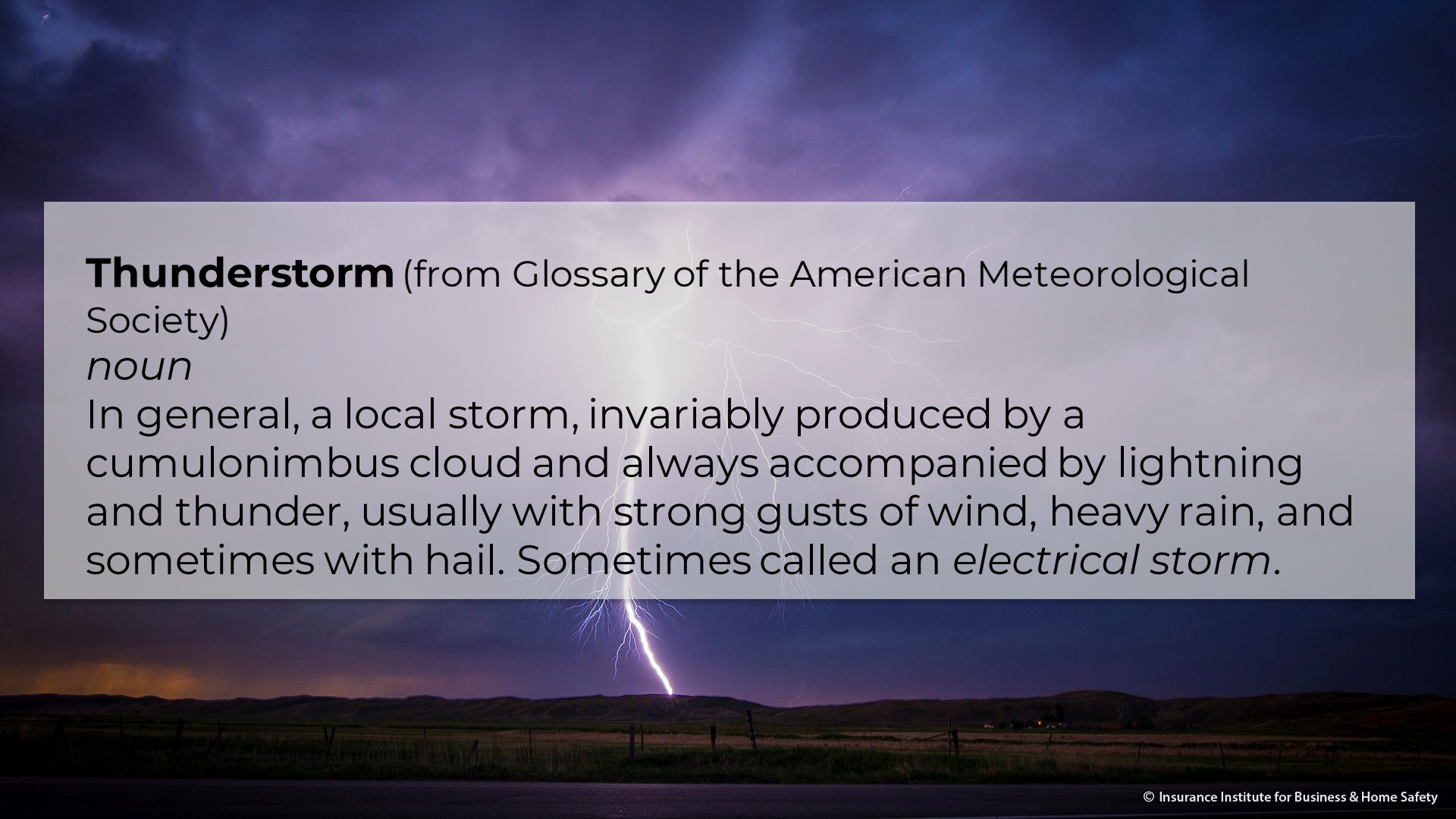
kən'vekSH(ə)n/

*noun*

The movement caused within a fluid by the tendency of hotter, less dense material to rise and colder, denser material to sink under the influence of gravity, which results in transfer of heat.





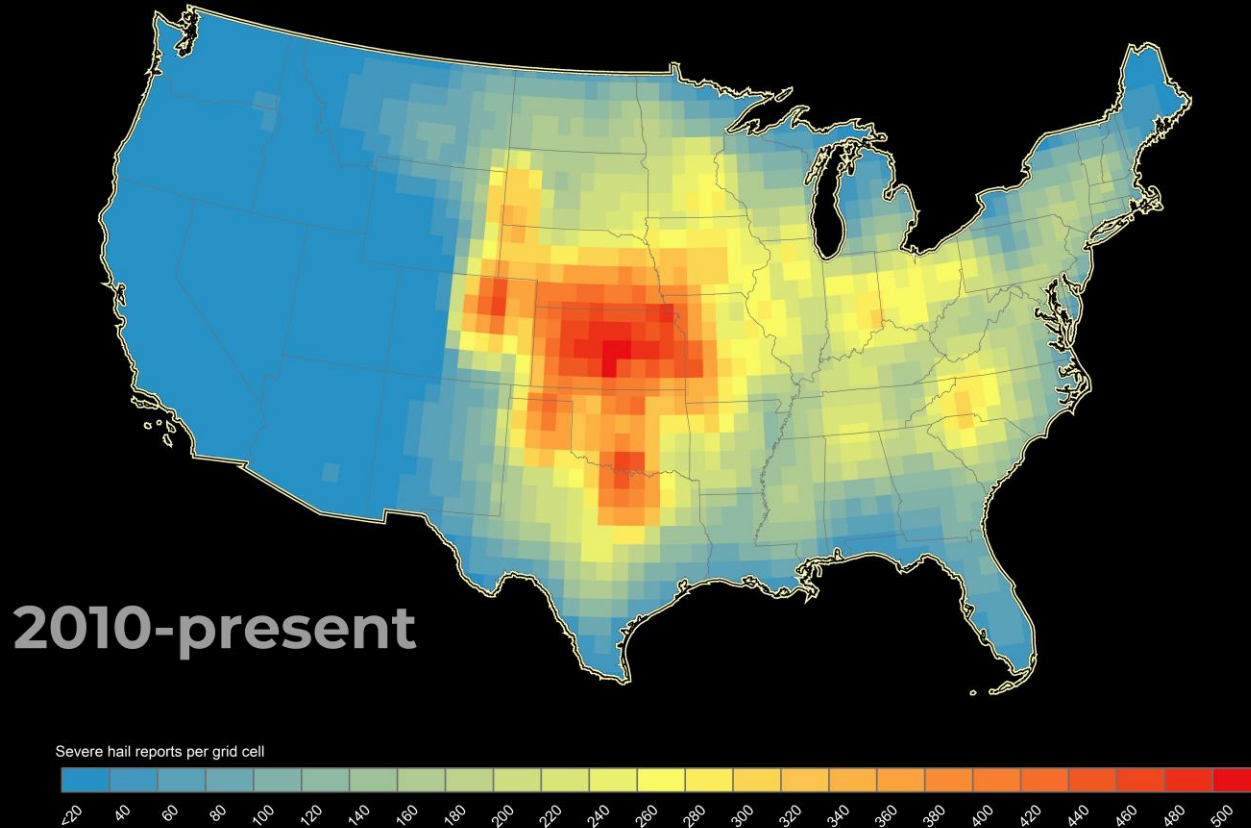


**Thunderstorm** (from Glossary of the American Meteorological Society)

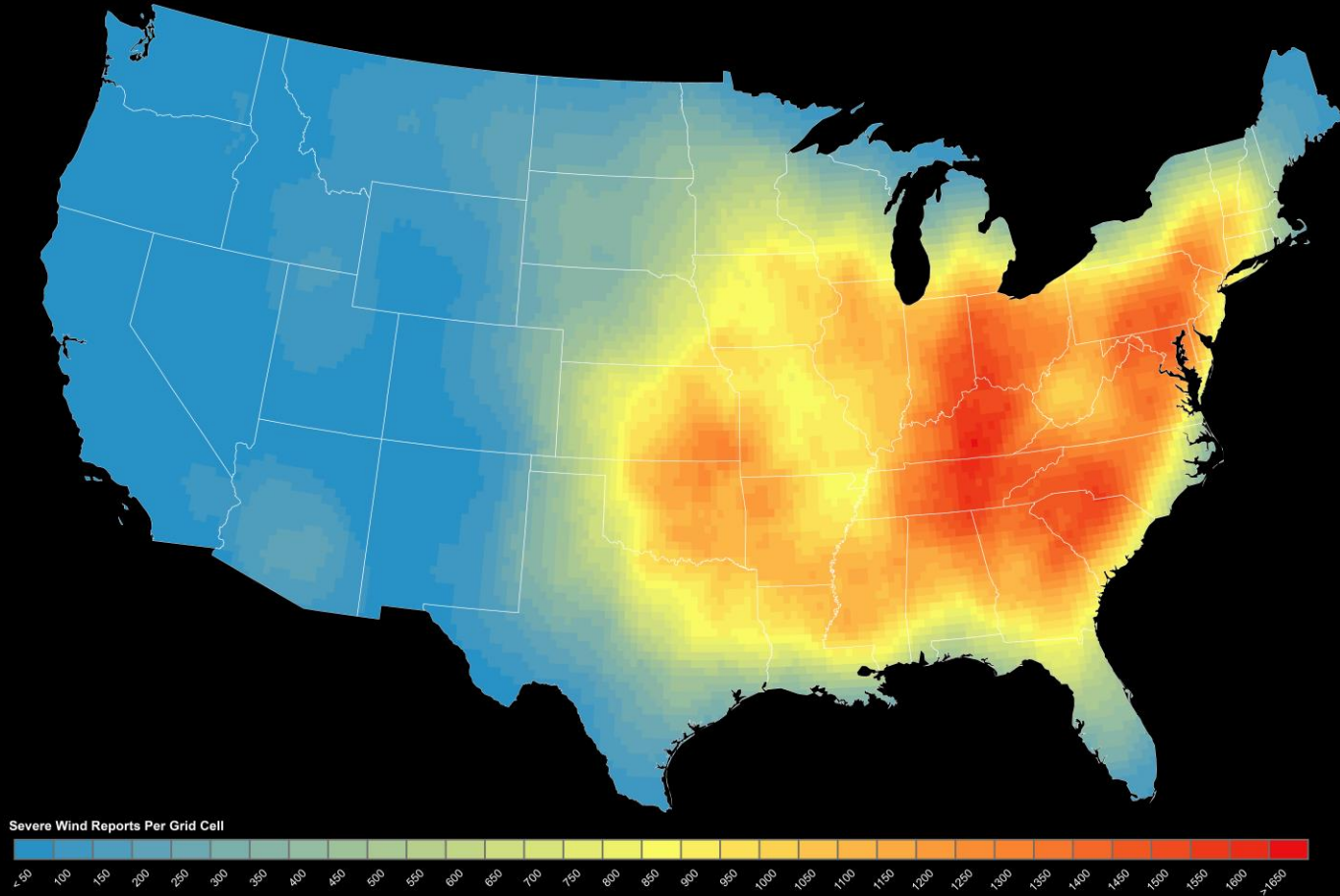
*noun*

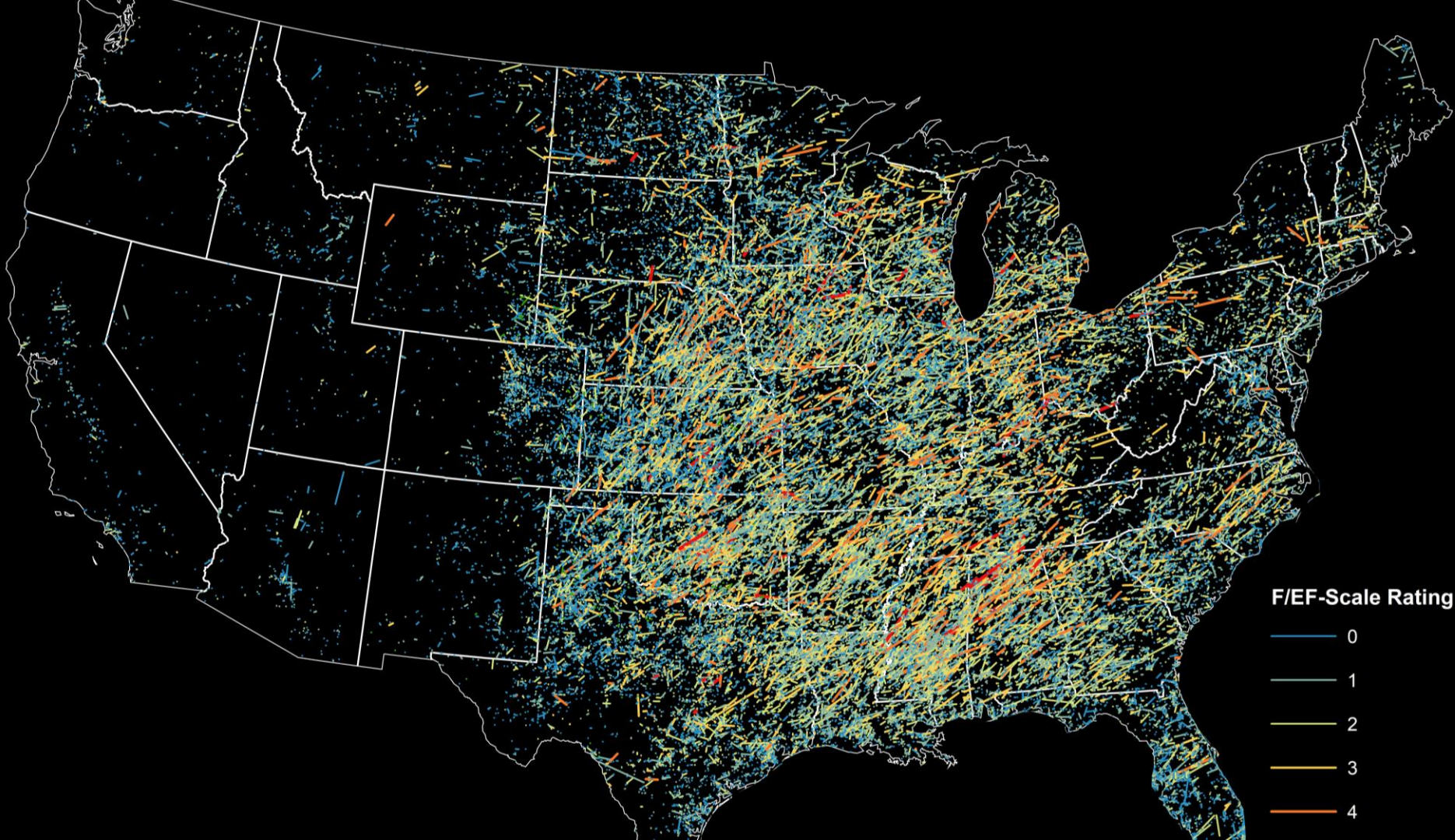
In general, a local storm, invariably produced by a cumulonimbus cloud and always accompanied by lightning and thunder, usually with strong gusts of wind, heavy rain, and sometimes with hail. Sometimes called an *electrical storm*.

# Severe hail report density

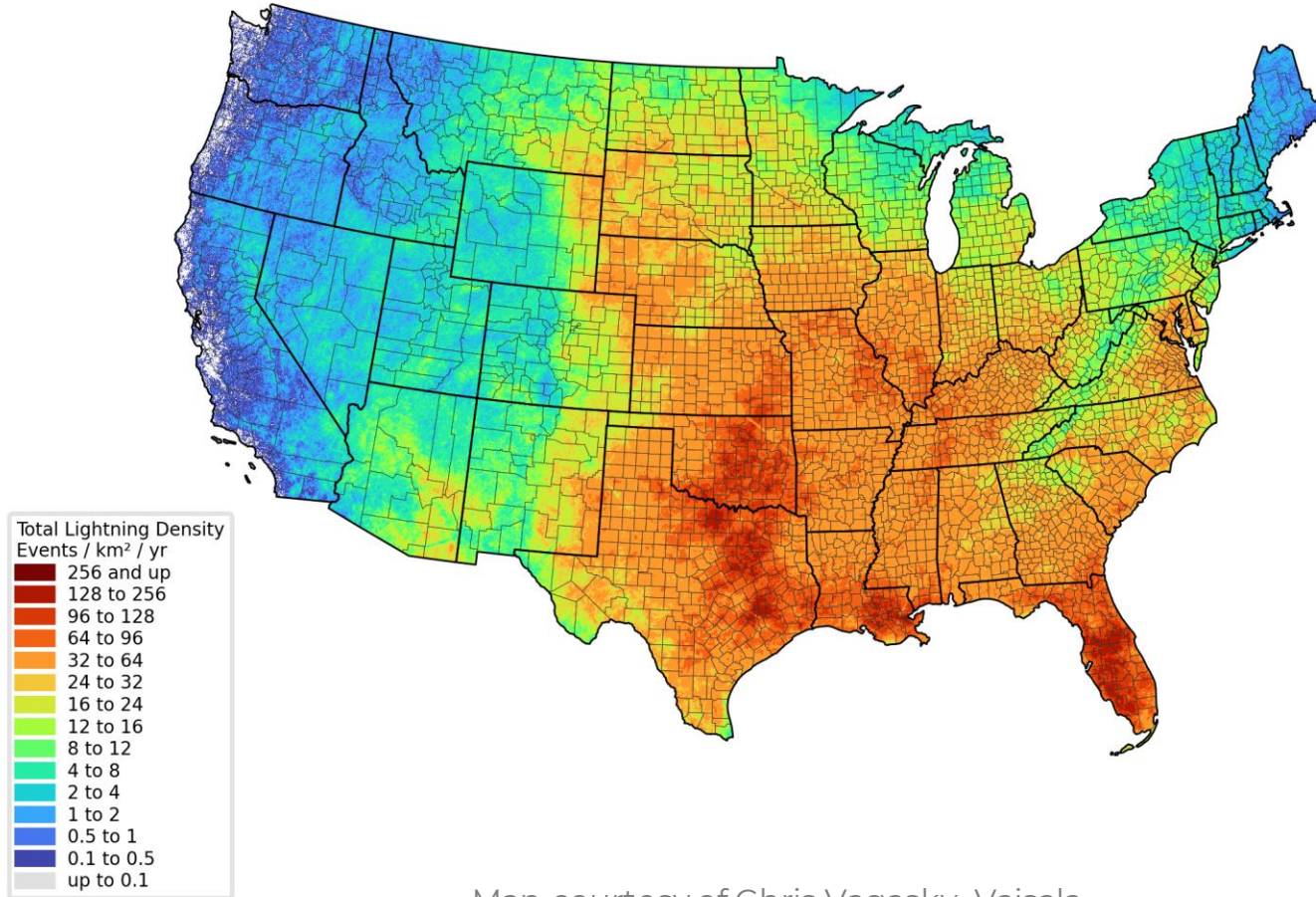


# Severe wind report density



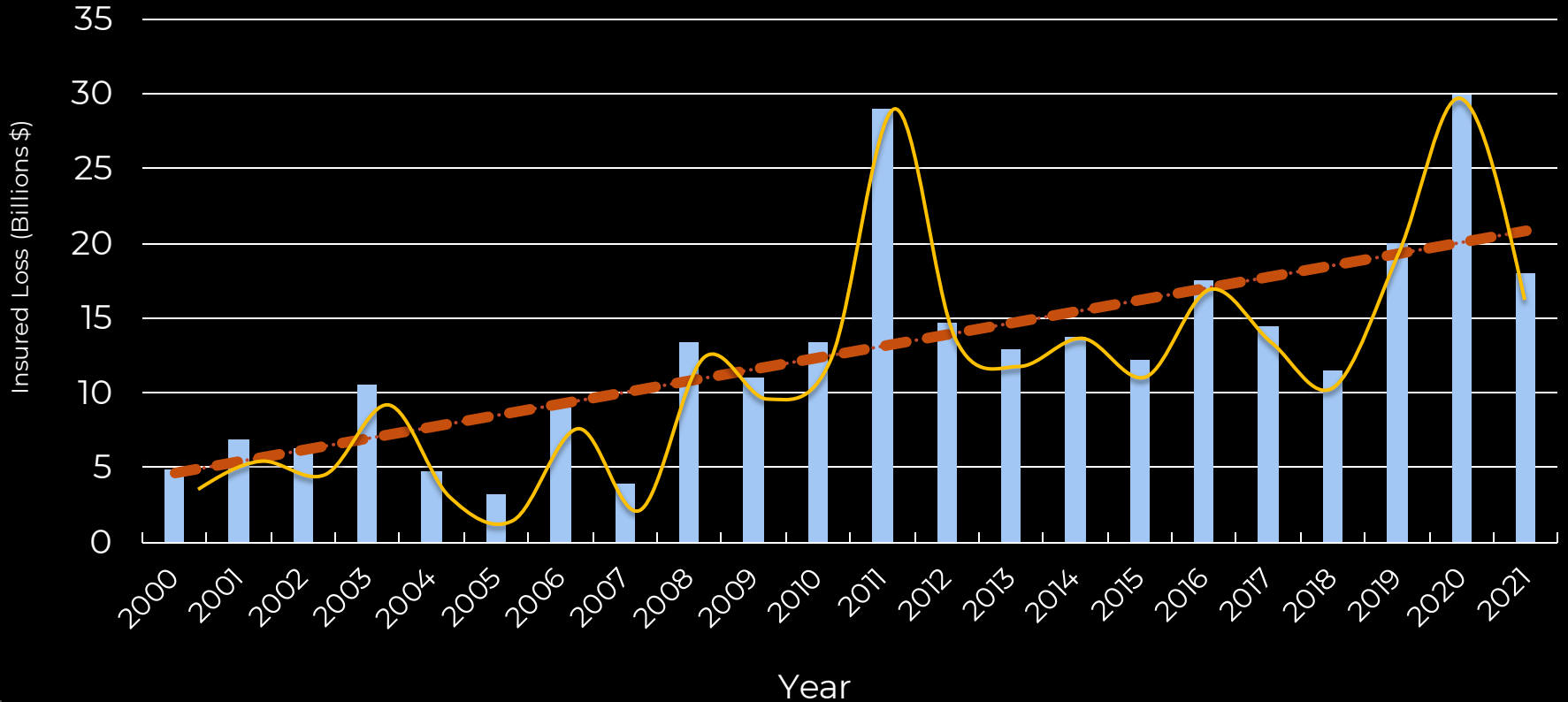


# Lightning stroke density



Map courtesy of Chris Vagasky, Vaisala

## Annual Severe Convective Storm Insured Losses - AON



# Severe Convective Storm Hazards and Loss

Loss by SCS Hazard from Risk Management Solutions



## Hail

Hail accounts for 70% of annual average loss. In any given year hail is 60-80% of the damage produced by severe convective storms



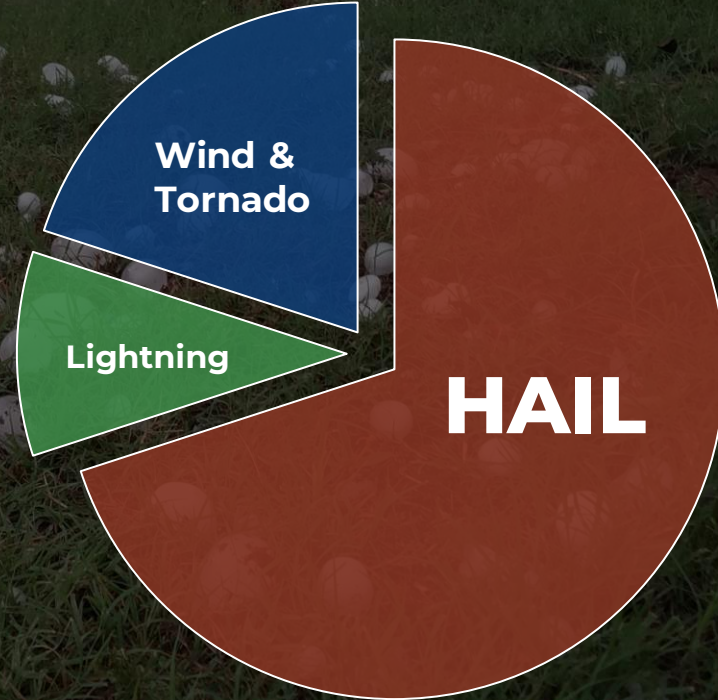
## Wind & Tornadoes

Severe winds both from straight-line wind events and tornadoes account for about 20% of average annual loss.



## Lightning

Lightning, including fires started by lightning accounts for about 10%



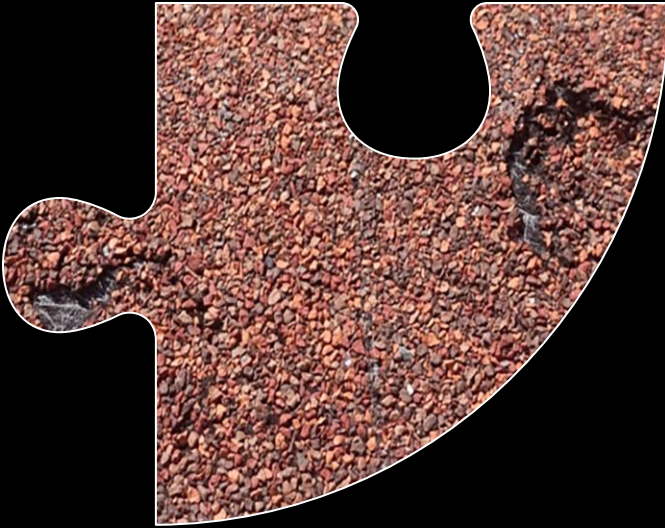




# Vulnerable Roof Covers

U.S. & Canada only countries  
that the dominant roof covers  
are: **ASPHALT SHINGLES**

Most building materials are  
not designed to resist large  
hail



# Ingredients for a Catastrophic Hailstorm

## Big Hail

Damage to structures begins often at hail sizes above 1.5 inches (3.8 cm)

## Lots of Hail + Wind

High concentrations of hail embedded in strong winds make even small hailstones damaging



## Major metro

Our suburban environment is growing quickly. We build larger and closer together than ever before

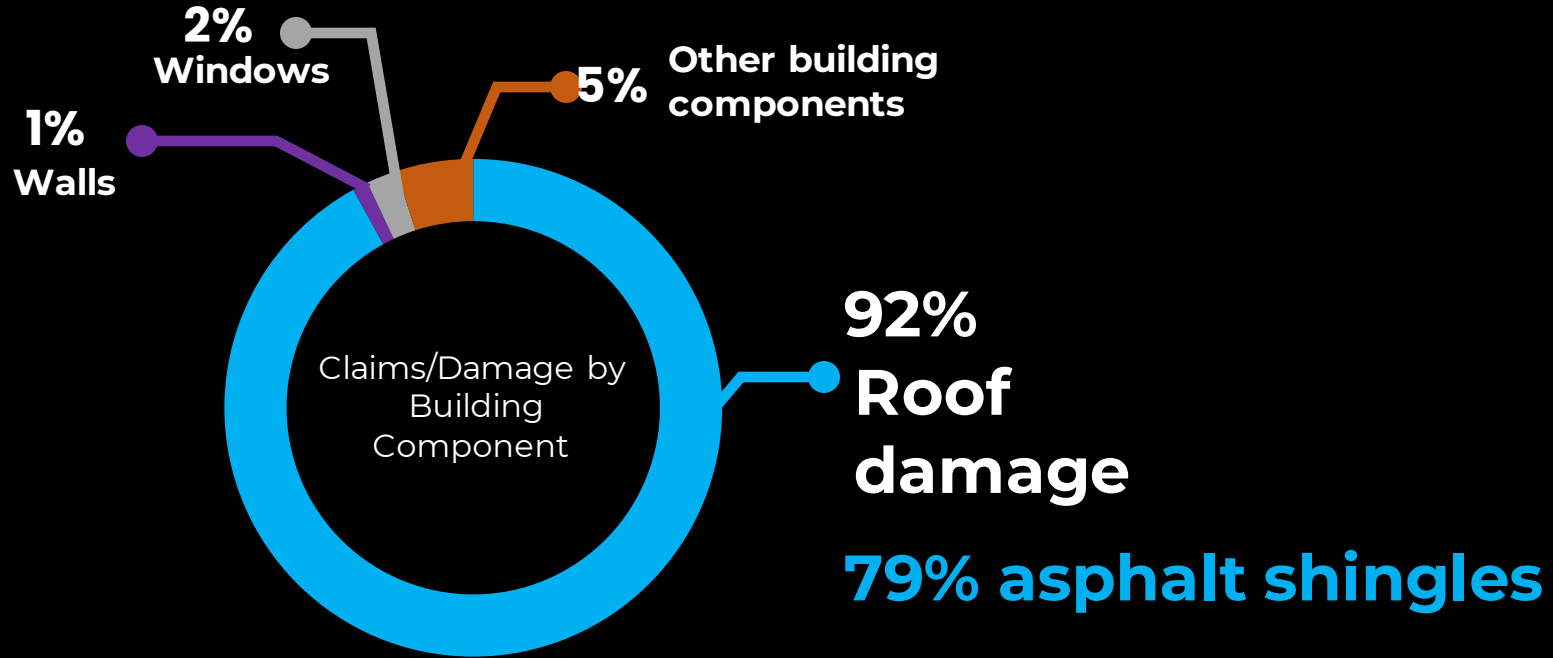
## Vulnerable Roof Covers

U.S. & Canada only countries that the dominant roof cover is asphalt shingles

Most building materials are not designed to resist large hail




# IBHS Closed Claims Study 2012: Dallas-Fort Worth Hail Event



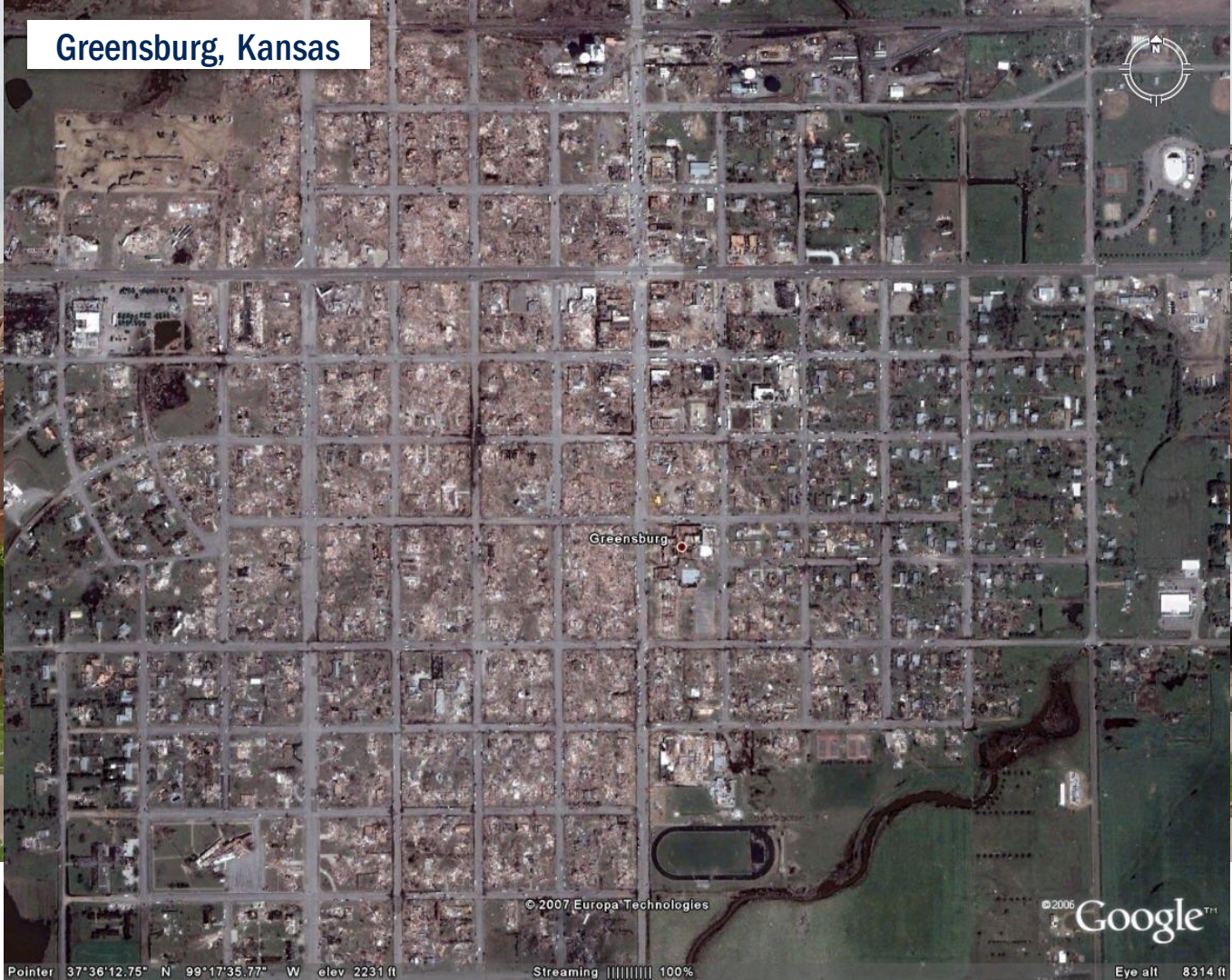
Adapted from Brown et al. (2015)



A large, dark, swirling tornado is shown touching down on a grassy field. The sky is filled with dark, heavy clouds, and the overall atmosphere is dramatic and ominous. The text is overlaid on the right side of the image.

**TORNADOES DRIVE THE  
TAIL OF THE  
LOSS DISTRIBUTION**

# Greensburg, Kansas



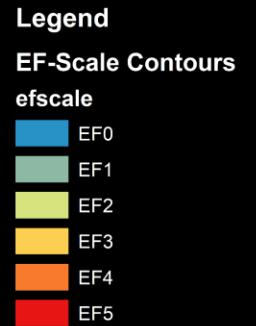
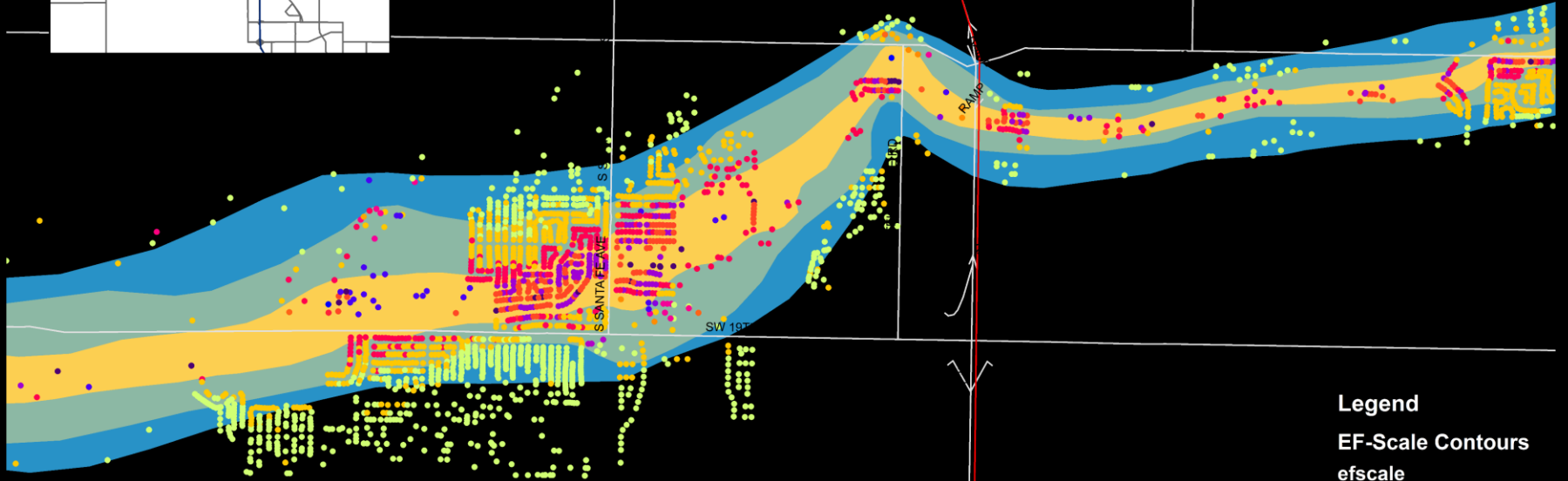
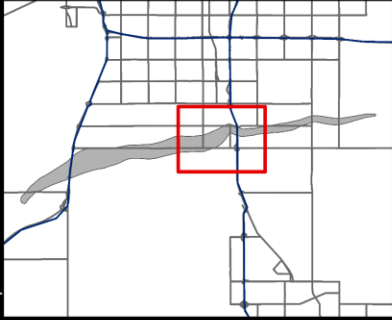
© 2007 Europa Technologies

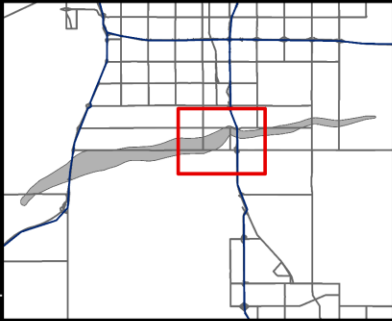
© 2006 Google™

Pointer 37°36'12.75" N 99°17'35.77" W elev 2231 ft

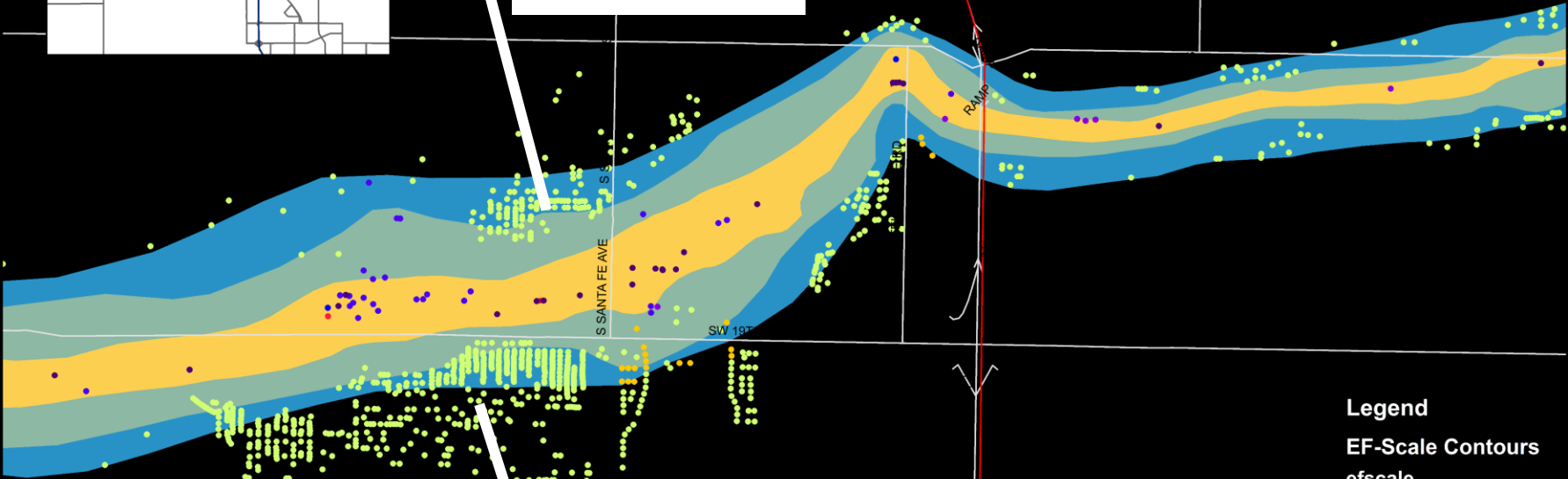
Streaming 100%

Eye alt 8314 ft

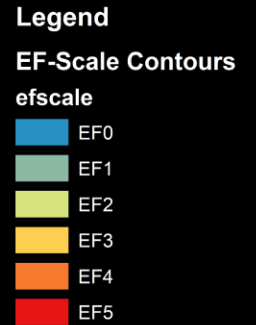




**Primarily  
shingle loss**



**Primarily  
shingle loss**



## Legend

Tornado track densities per grid cell contours

- 1-5 Tracks
- 5-10 Tracks
- 10-15 Tracks
- 15-20 Tracks
- 20-25 Tracks
- 25-30 Tracks
- > 30 Tracks

Hail v. Convective Winds

Prediction Map

Data sources: Allen et. al. (2017), Lombardo and Zickar (2019)

Grid

- 10% annual exceedance probability for convective winds > 60 mph & hail < 1 inch
- 10% annual exceedance probability for convective winds > 60 mph and hail 1-2 inches
- 10% annual exceedance probability for hail > 2 inches

# The big picture Wind & hail

