# Science priorities for building better SCS models for the insurance industry

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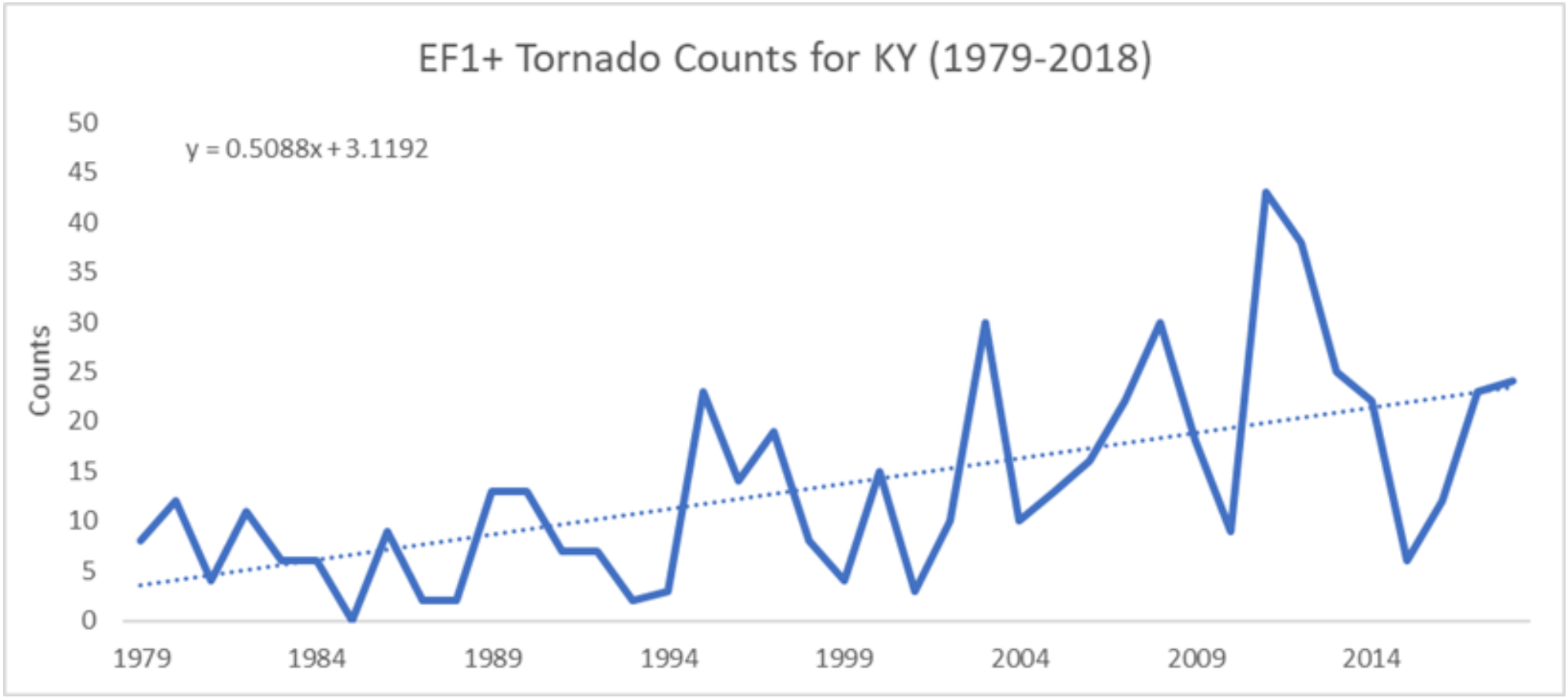
# Observed long term eastward shift in severe thunderstorm activity

## Kentucky shows 600% increase in tornado activity since 1979.

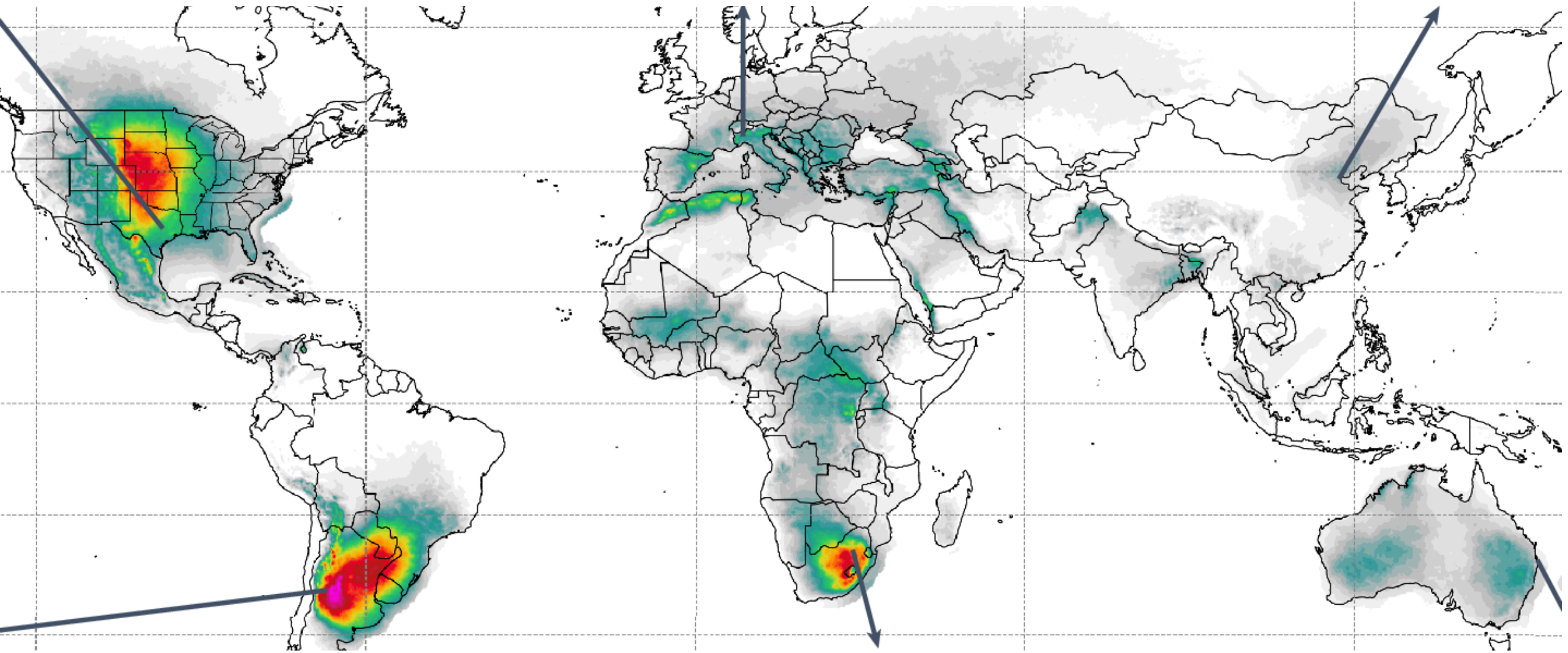


# Why trend is remarkable:

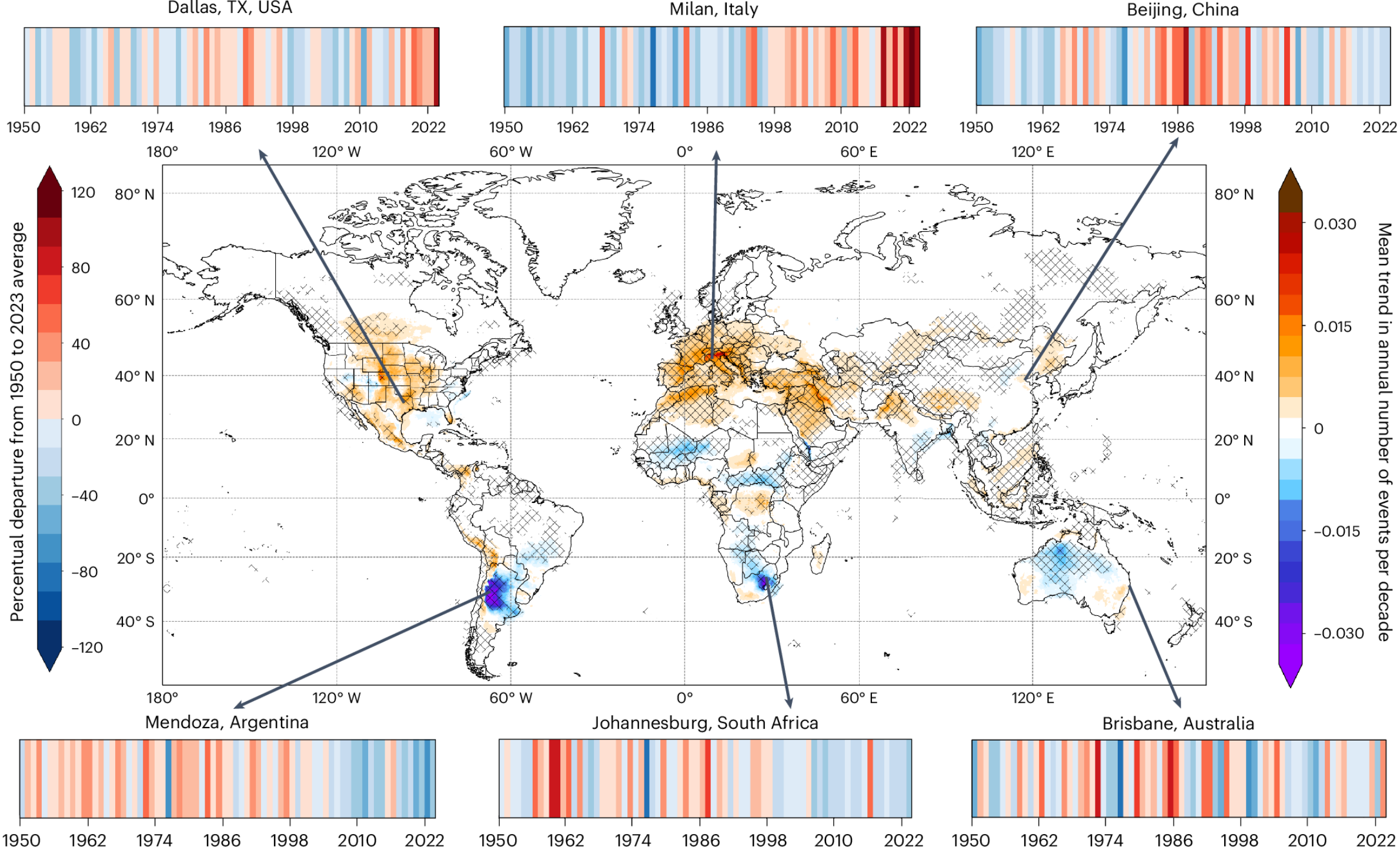
- Scale of change (over 10% increase every year) is much greater than the expected 1% per year impacts from global warming.
- US wide, Area * Intensity of >EF1+ increased 400% past 20 years. [Not shown]
- The change is gradual.

## How well do environments account for observed trends in frequency, intensity, and location of SCS activity?

# Annual number of very large hail events (> 5 cm) in each 0.25-degree x 0.25-degree box.

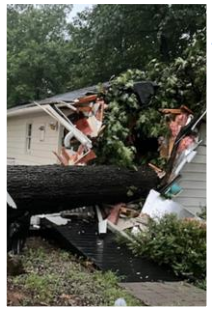


Battaglioli, F., et *al. Nat. Geosci.* **19**, 52–58 (2026)


Dallas, TX, USA
Milan, Italy
Beijing, China
1950
1962
1974
1986
1998
2010
2022
180°
120° W
60° W
0°
60° E
120° E
80° N
60° N
40° N
20° N
0°
20° S
40° S
Percentual departure from 1950 to 2023 average
120
80
40
0
−40
−80
−120
Mean trend in annual number of events per decade
0.030
0.015
0
−0.015
−0.030
Mendoza, Argentina
Johannesburg, South Africa
Brisbane, Australia

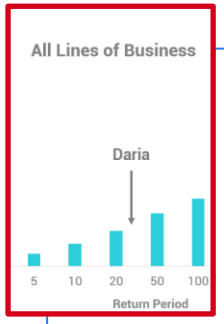
# Catastrophe Modeling Framework

Hazard



Vulnerability

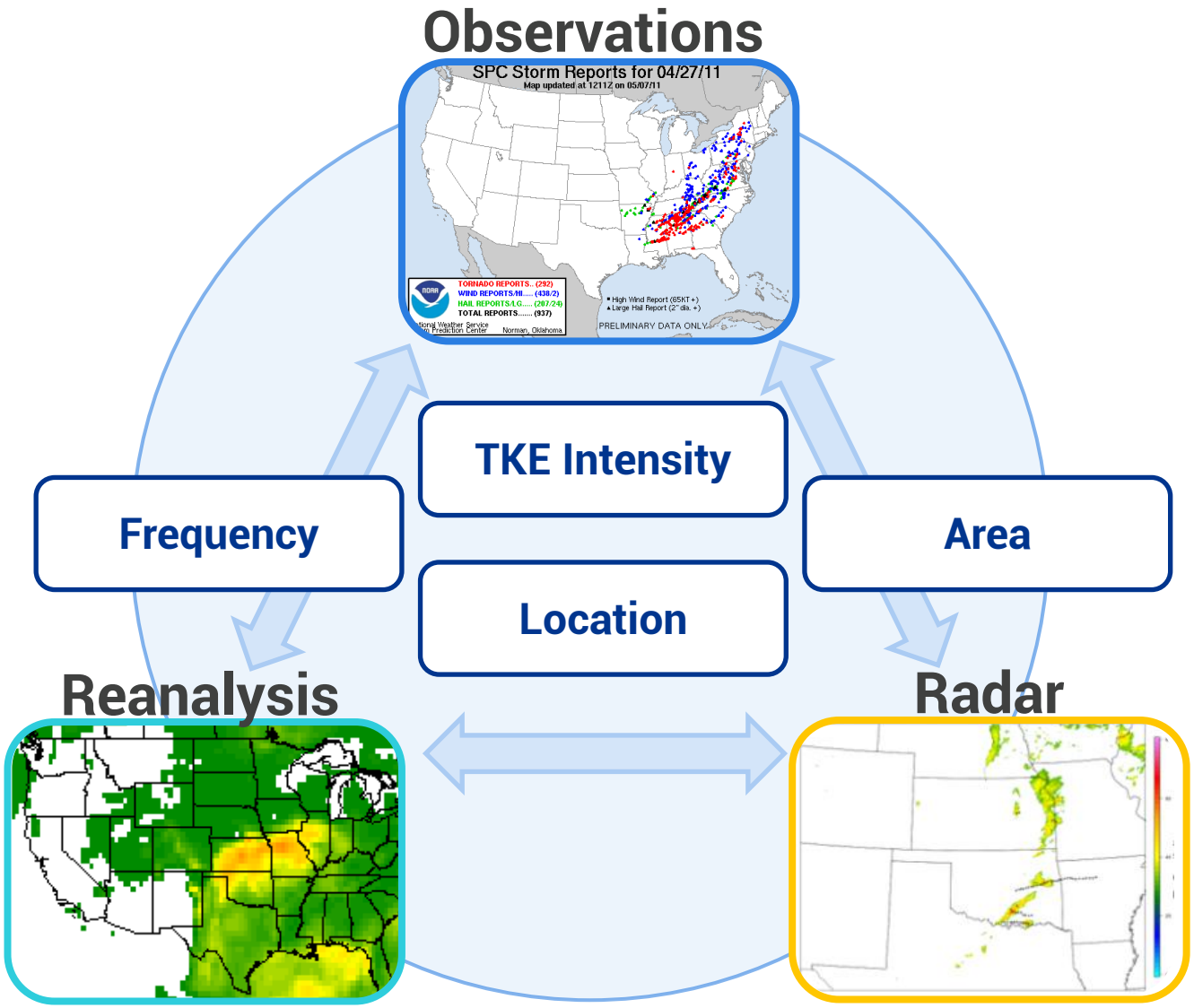
← Exposures




Loss

← Policy conditions

# Losses depend on frequency, intensity, area, and location.



# Catastrophe SCS models could benefit from:

- Environmental drivers and predictive relationships to
  - Frequency,
  - Area * Intensity
  - TKE (hail size distributions)

- What resolution preserves predictive power?

- Sub-kilometer-scale straight-line wind simulations