Deconstruction of a science paper's data evidence basis

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MPO 624

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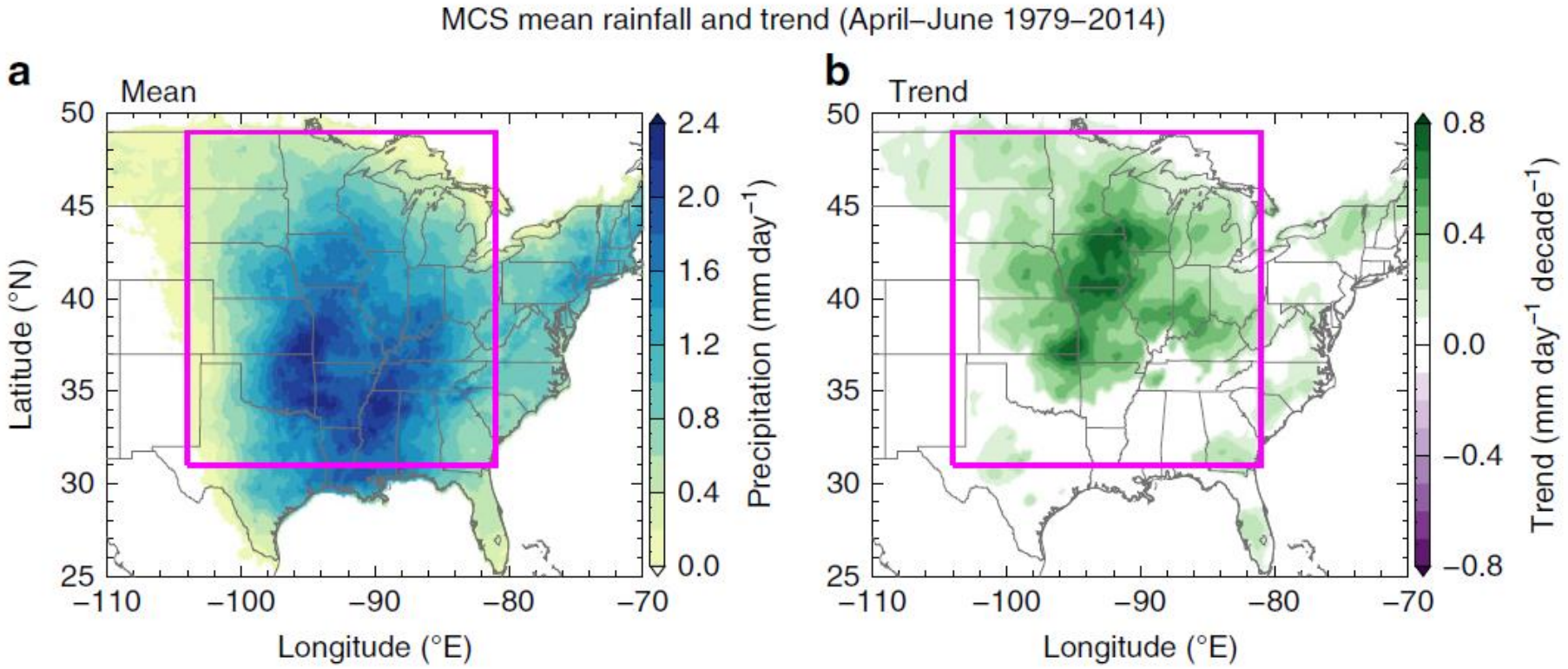
My Paper

- More frequent intense and long-lived storms dominate the springtime trend in central US rainfall
  - Zhe Feng, L. Ruby Leung, Samson Hagos, Robert A. Houze, Casey D. Burleyson & Karthik Balaguru
  - Feng, Z. et al. More frequent intense and long-lived storms dominate the springtime trend in central US rainfall. *Nat. Commun*. 7, 13429
- Size of evidence set:
  - 4 figures, 0 tables, 0 magic in-text results

Figure 1



- Summary display of raw data
  - Increasing springtime MCS rainfall

Figure 2

- Feature claimed to exist
  - MCS precipitation increasing in precipitation, lifetime, and frequency
  - Non-MCS precipitation not showing same trend

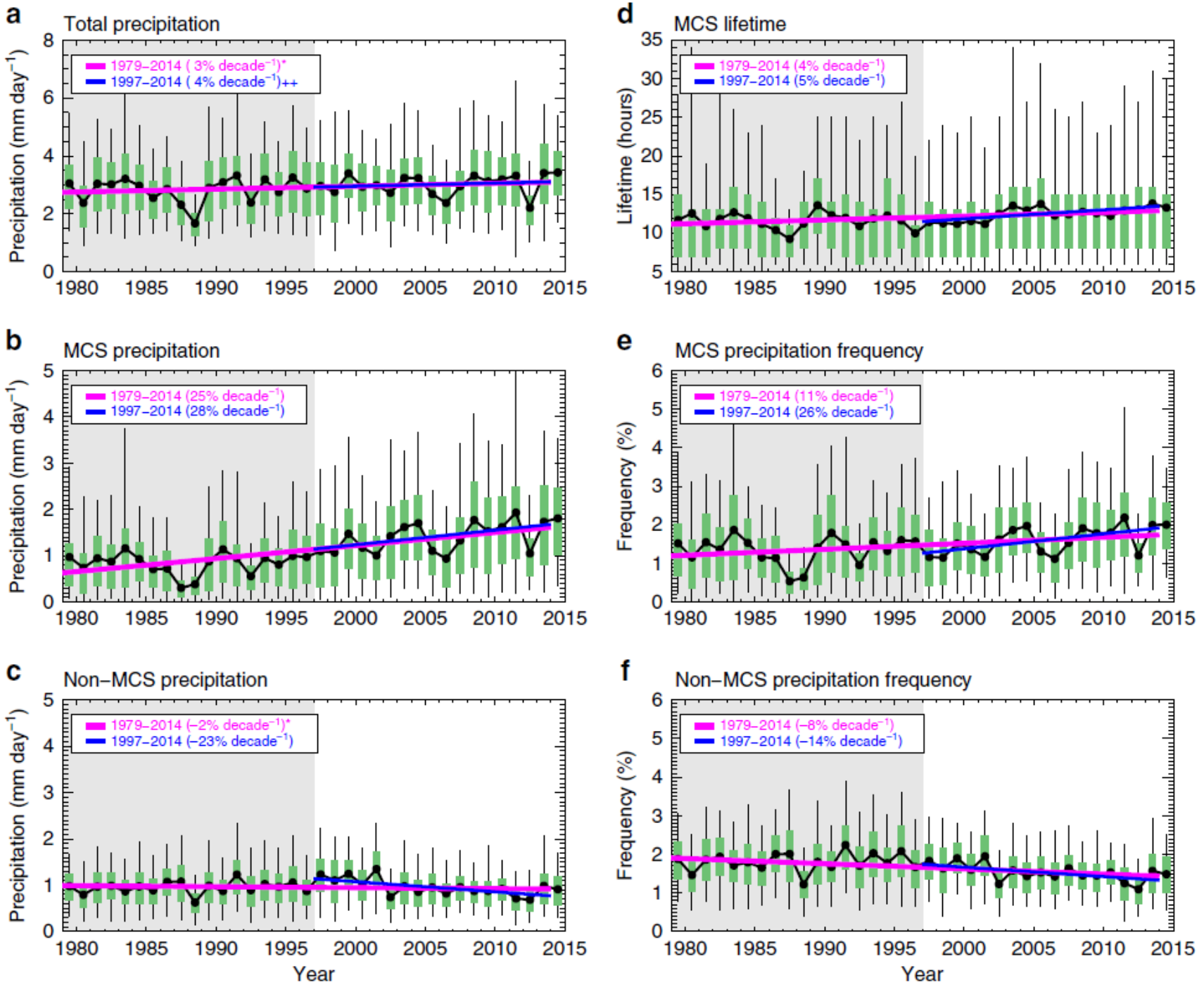


Figure 3

- Feature claimed to exist
  - MCS 95th percentile events increasing
  - MCS rain-rate increasing

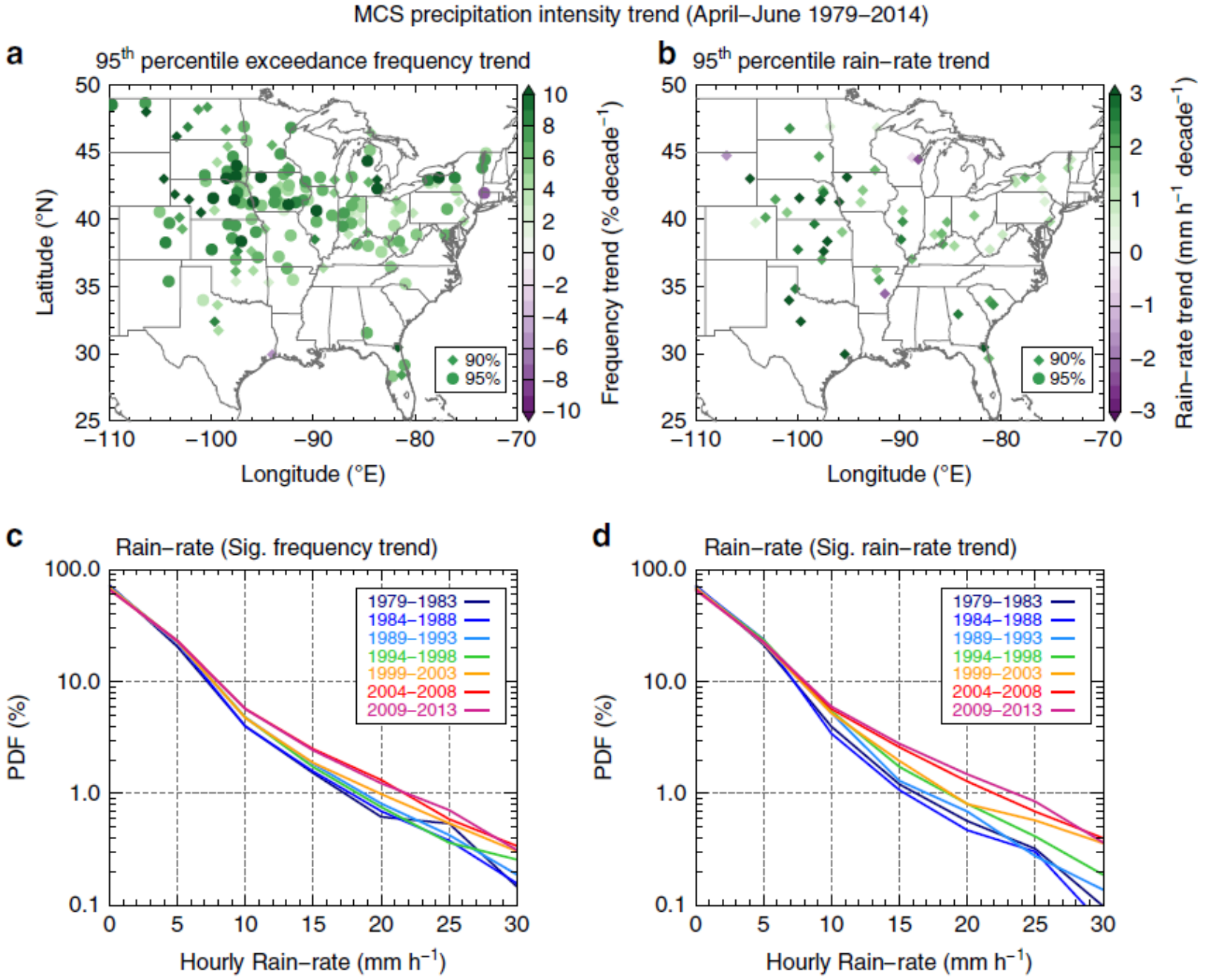
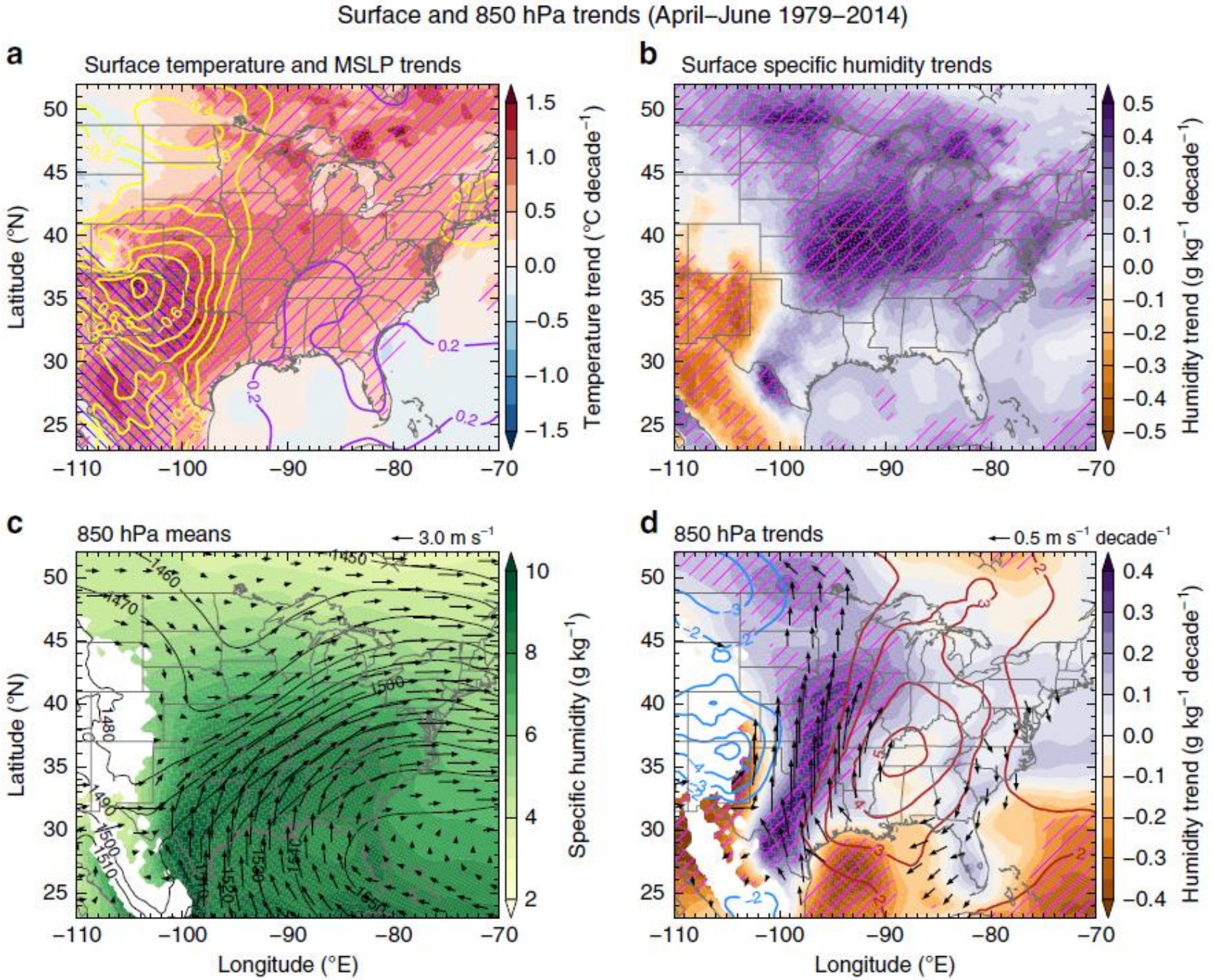


Figure 4

- Relationship claimed to exist
  - Causality interpretation
  - Strengthening of jet → increased moisture transport → increased rainfall in central US



Abstract & its claims

The changes in extreme rainfall associated with a warming climate have drawn significant attention in recent years. Mounting evidence shows that sub-daily convective rainfall extremes are increasing faster than the rate of change in the atmospheric precipitable water capacity with a warming climate. However, the response of extreme precipitation depends on the type of storm supported by the meteorological environment. Here using long-term satellite, surface radar and rain-gauge network data and atmospheric reanalyses, we show that the observed increases in springtime total and extreme rainfall in the central United States are dominated by mesoscale convective systems (MCSs), the largest type of convective storm, with increased frequency and intensity of long-lasting MCSs. A strengthening of the southerly low-level jet and its associated moisture transport in the Central/Northern Great Plains, in the overall climatology and particularly on days with long-lasting MCSs, accounts for the changes in the precipitation produced by these storms.