At the last conference, we presented some results from the analysis of 16+ years of US radar composites and showcased the value of such analysis to investigate new or unexpected signatures.

Three unexpected results were presented:

- a possible convection minimum in summer afternoons in the Mississippi Valley
- a signature of the effect of cities on convection
- a possible difference between weekday and weekend precipitation maximized downwind of the industrial North East

Additional work was performed on these three unexpected results to determine their basis and their statistical significance: are these signatures real, or are we the victim of limited data sampling?

A. Mississippi Valley Convection Minimum

**Claim:**

Void of convection over the Mississippi Valley that occurs in the afternoon in the middle of summer is hypothesized to be caused by orography (valley vs. Ozarks) or by land use / land cover changes (agriculture vs. forest).

**Update:**

![Map of Mississippi Valley](image1)

**Conclusion:**

Real

The data signature is very clear, and numerical simulations show that the weak orography around the valley leads to reduced stability and triggers convection preferably in these areas compared to the valley itself.

Ref: Kirshbaum, Fabry, and Cazenave, 2016: The Mississippi Valley Convection Minimum on Summer Afternoons: Observations and Simulations, MWR, in Review

B. Effect of Cities on Convection

**Claim:**

Urban areas are hypothesized to have an influence on convection either by the land cover change or by the urban heat effect compared to the surrounding rural area, which would cause an increase in convection downwind for the urban area.

**Update:**

![Map of cities](image2)

**Conclusion:**

Probably Real

While it is very difficult to identify for certain the signature of individual cities and the mechanism for their impact, the combination of data from 13 cities show a weak but definite fingerprint on both radar and lightning data over a ~25°20 km area slightly downwind of the city, compatible with its expected local impact. Significance calculations are however difficult to make.

C. Weekday-Weekend Precipitation Difference

**Claim:**

A clear peak in weekday precipitation (or a clear minimum in weekend precipitation) is observed downwind of the industrial North-East. This is possibly because of the effect of increased aerosols during weekdays on precipitation.

**Update:**

![Map of precipitation difference](image3)

**Conclusion:**

Probably Fake

Though the 16 years data shows a ~15% difference between the probability of precipitation on a weekday than on a weekend, data resampling experiments suggest that such large differences can be obtained by natural variability and are not yet significant enough to be declared a reality.