Precipitation Estimation of Extremes over the Continental United States with Radar Data

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<u>Need</u>: extreme statistics in an area

Rain gauges

- Low spatial completeness, but long time record
- Easy to quantify in millimeters

Weather radar

- High spatial completeness (4 km grid)
- Short time record
- Hard to quantify in millimeters

NEXRAD Stage IV – radar-inclusive multisensor

DJF 20-year return value

Image: Risser et al. (2019)

Some choice of gridding algorithm

DJF 20-year return value (gridded)

Image: Risser et al. (2019)

Order-of-operations problem

- Traditional gauge-based methods (grid then fit) underestimate extremes at <25 km scales
- Risser et al. (2019) method (fit then grid) agrees with Stage IV at those scales

Differences in Application

- Traditional methods are best for comparing to GCMs at >50 km resolution
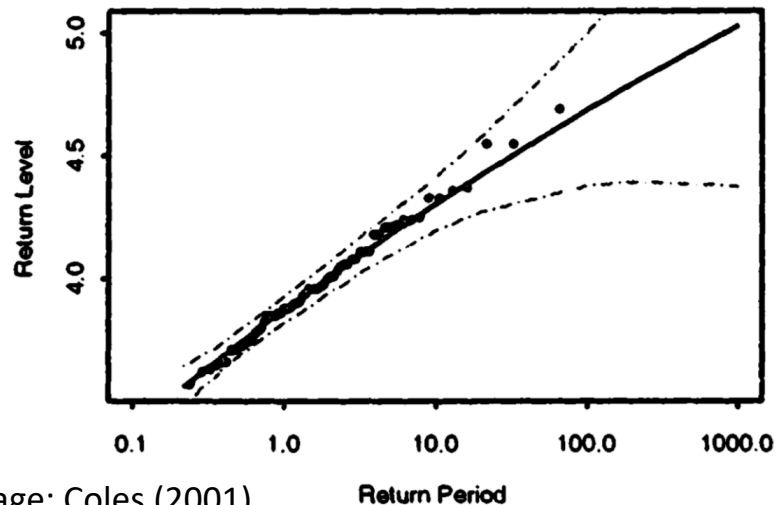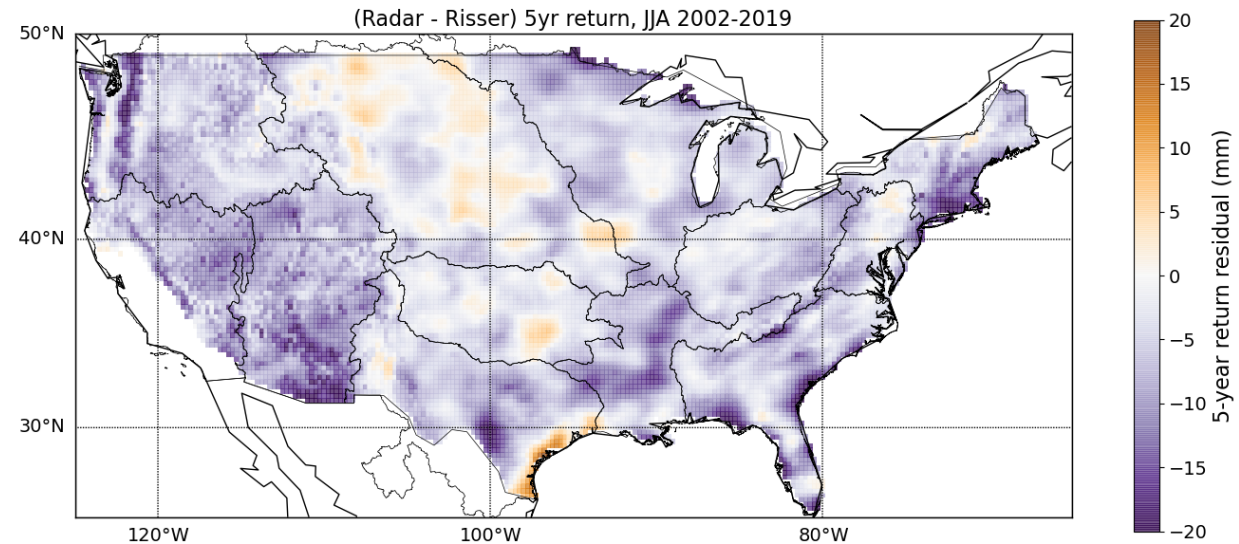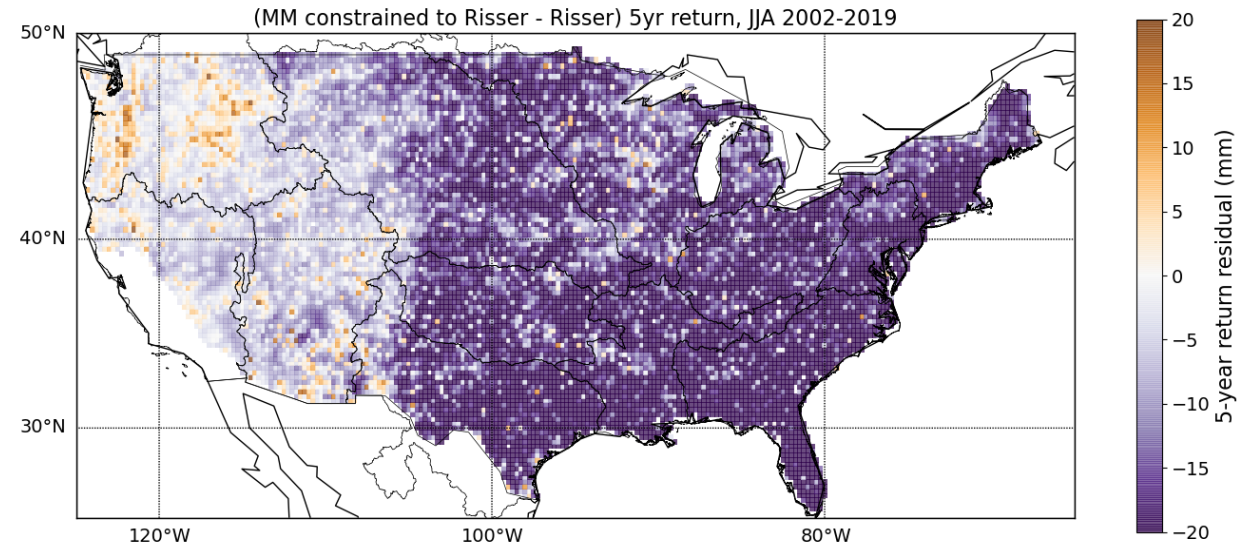- Fit-then-grid (or radar) for impacts

Image: Coles (2001)

(MM constrained to Risser - Risser) 5yr return, JJA 2002-2019

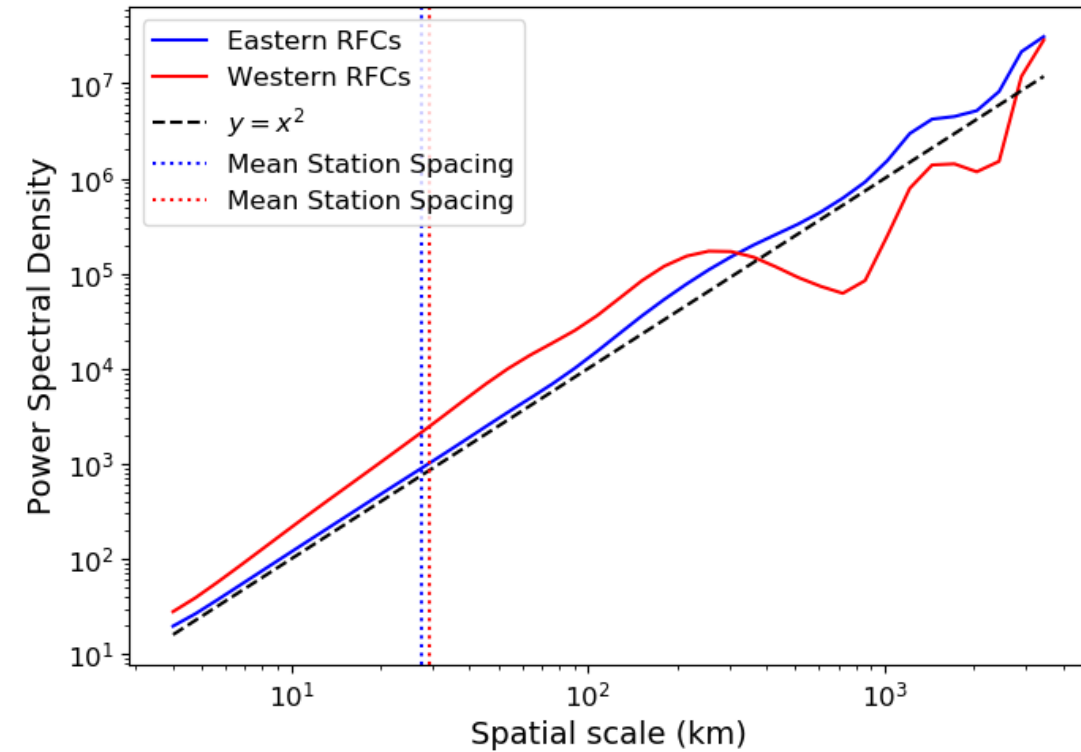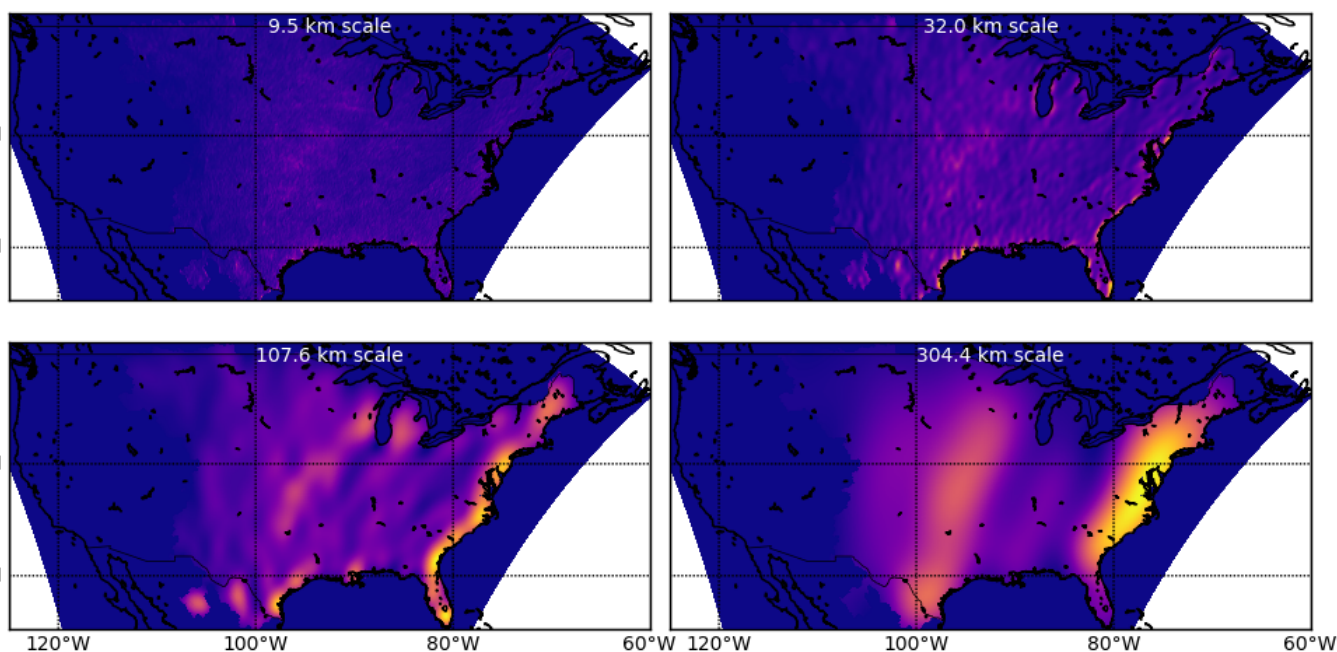(Radar - Risser) 5yr return, JJA 2002-2019

Images: Molter et al. (in prep)

Results II: Spatial Scales of Extreme Statistics

- Little power on scales <100 km

- Rain gauges are sufficient to represent spatial variability in extreme climatology despite small scales of individual extreme storms

NEXRAD radar-inclusive data by spatial scale

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Images: Molter et al. (in prep)