

Error Characterization Studies for Flood Research

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and
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Sensor Chain to Reduce Scale Gaps



After NOAA

GV Approach: Sensor Chain to Reduce Scale Gaps

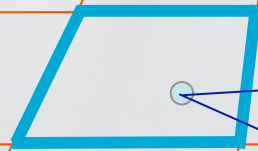


Operational Radar Networks

Research Radars (X-band)



~10 km



~1 km



Rain Gauge

Outline

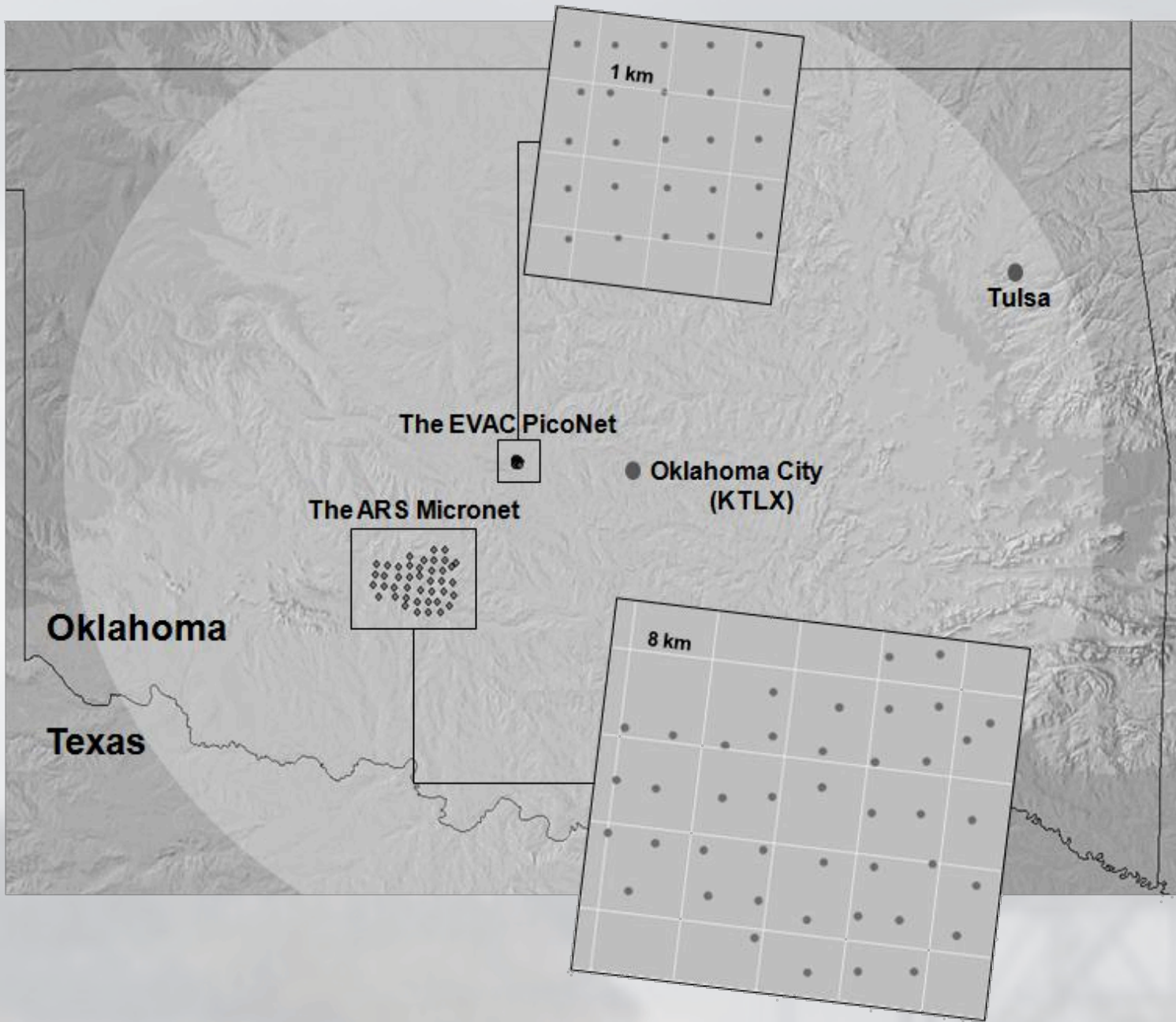
- **Ground Based Radars:**
 - NEXRAD Network of WSR-88D Radars (Hydro-NEXRAD products)
 - Iowa X-band polarimetric radar network
- **Satellite Products**
 - Extreme rainfall for iFloods
- **Hydrologic Validation**
 - Error propagation
 - Baseline performance
 - Requirements

Uncertainty Quantification

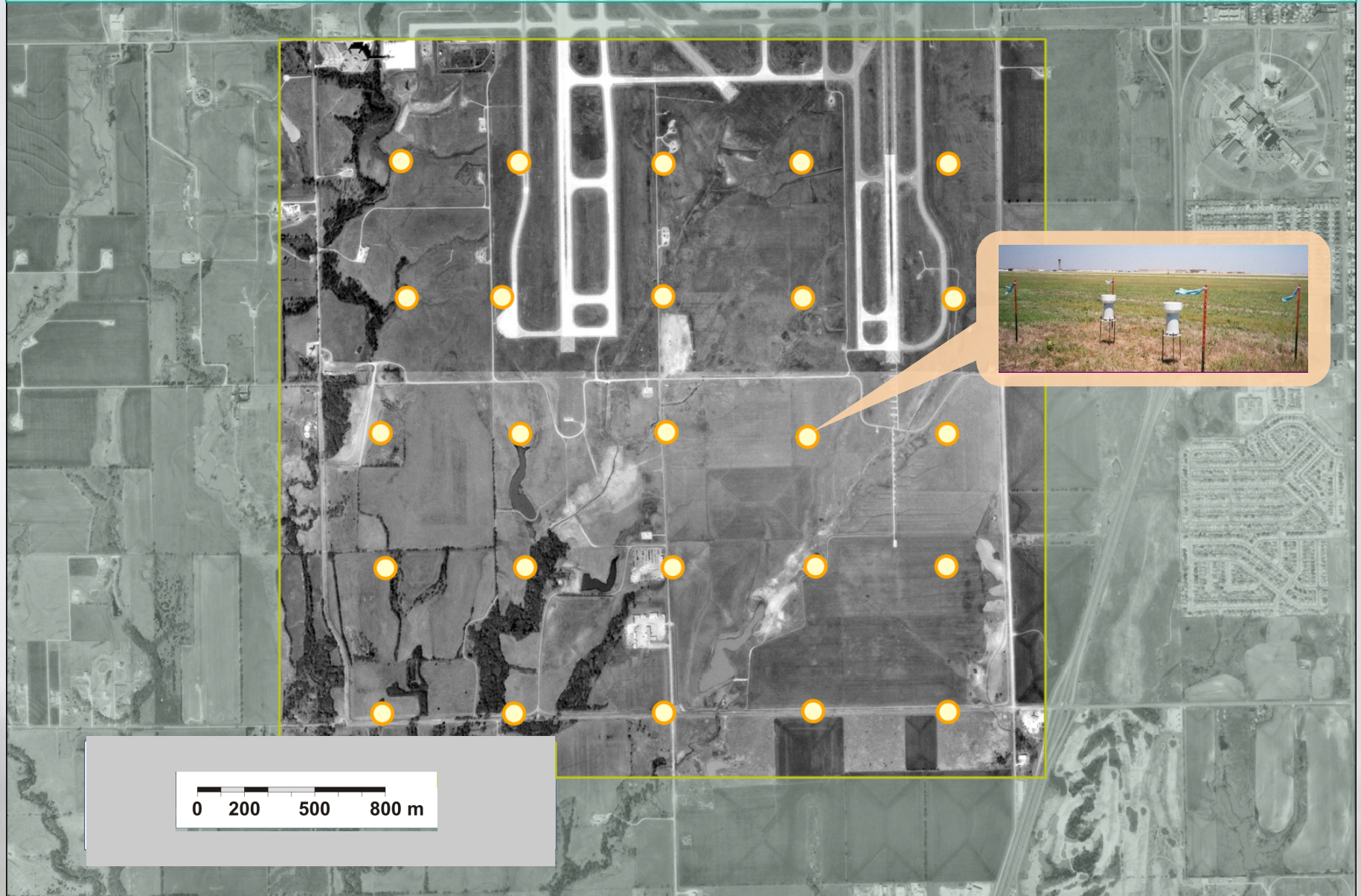
- **Multi-dimensional joint distribution of errors**
- **Space-time error covariance**
- **One-dimensional error distribution**
- **Error variance separation**
- **Bias (space-time?)**

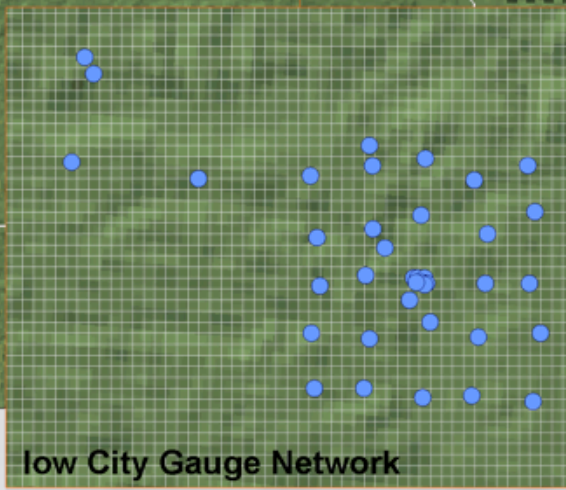
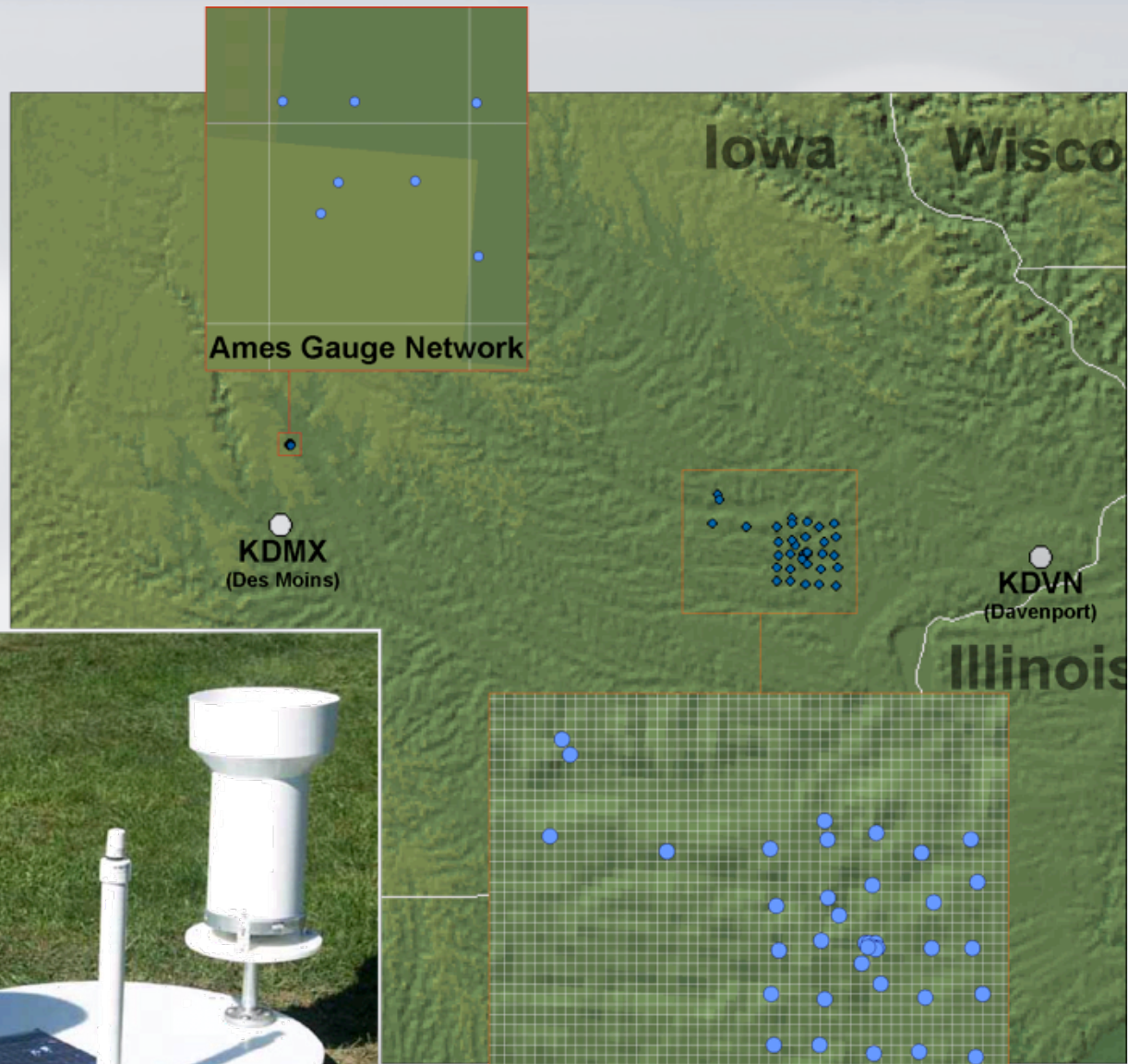


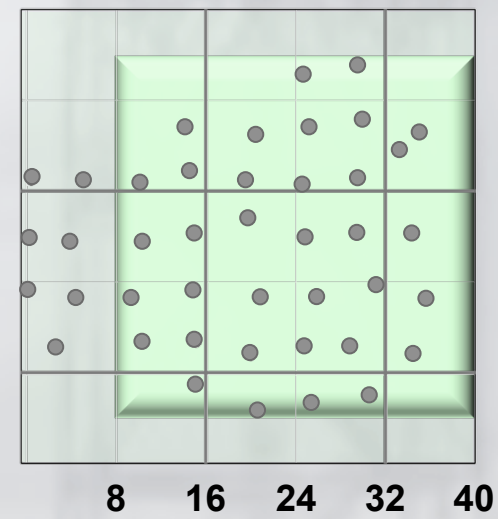
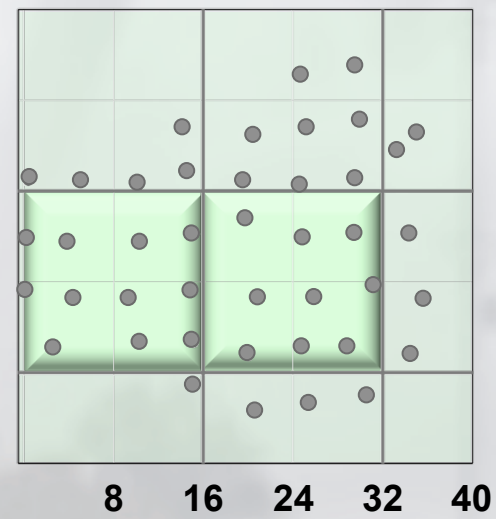
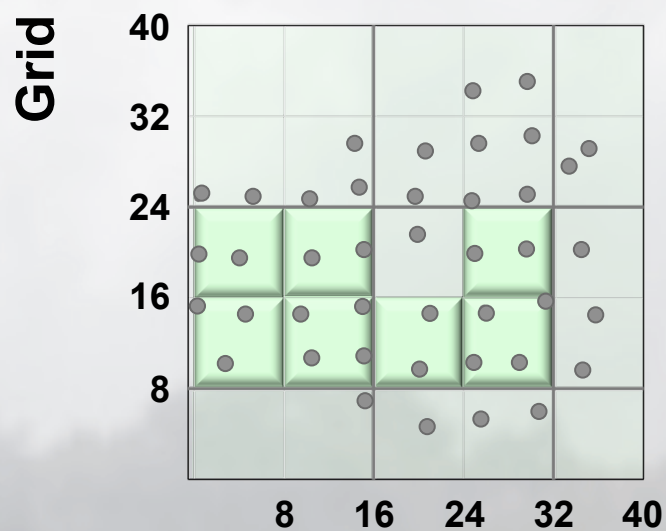
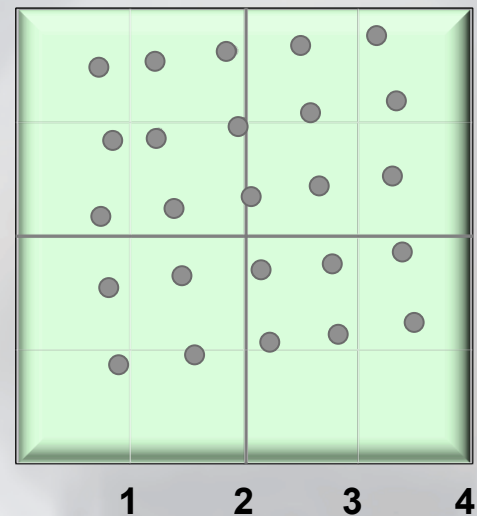
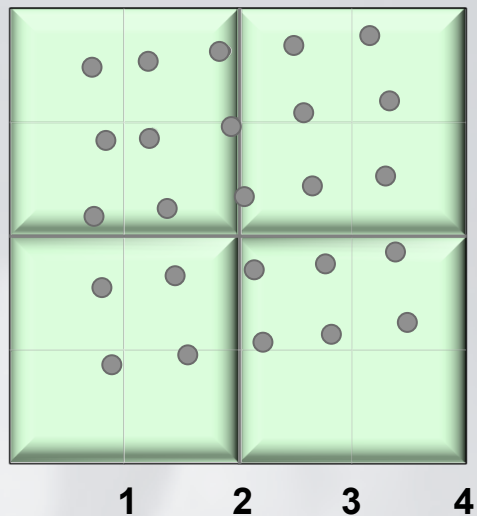
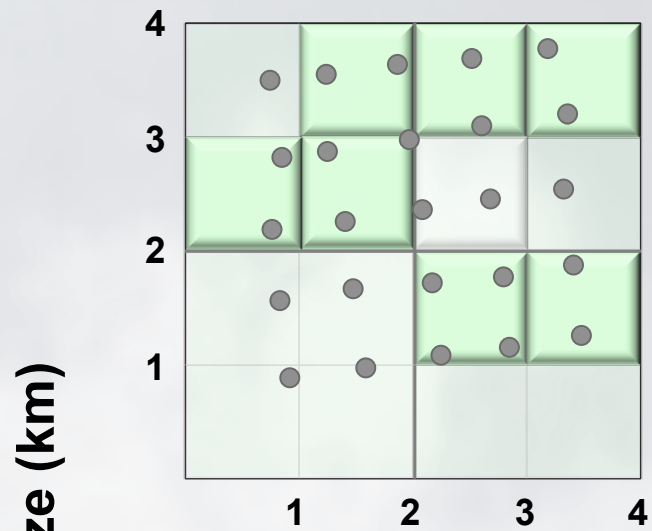
Challenge



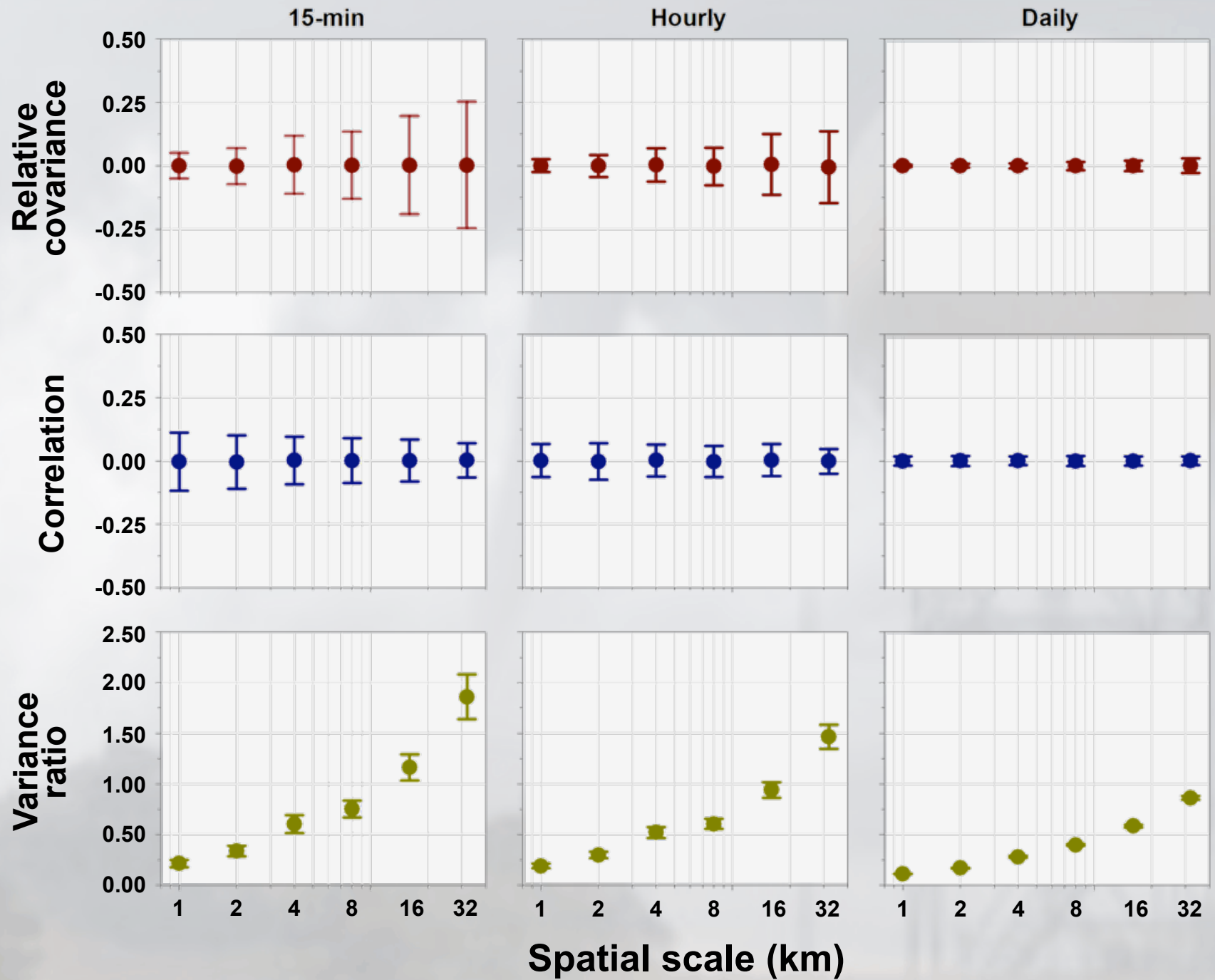
Oklahoma PicoNet

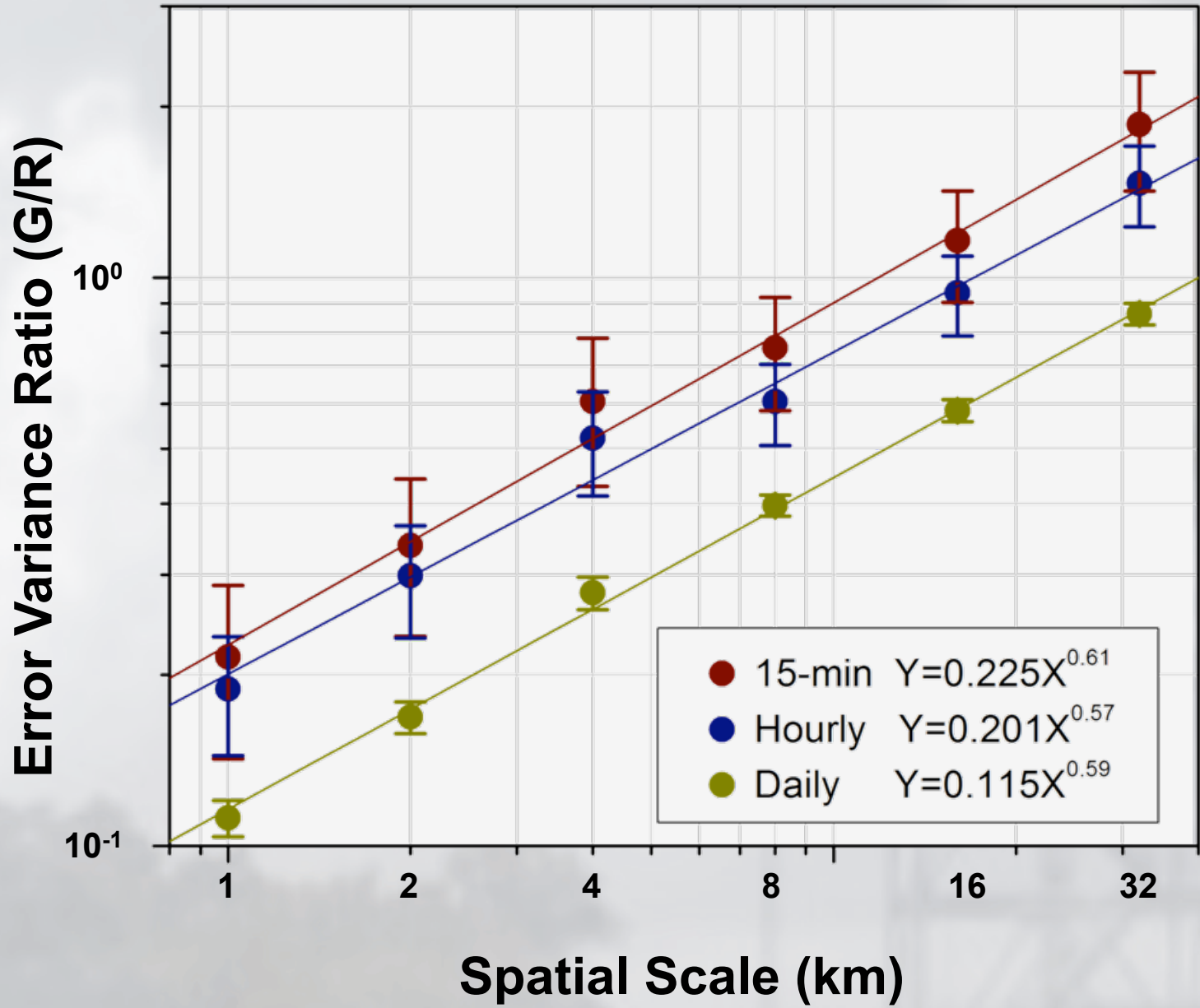


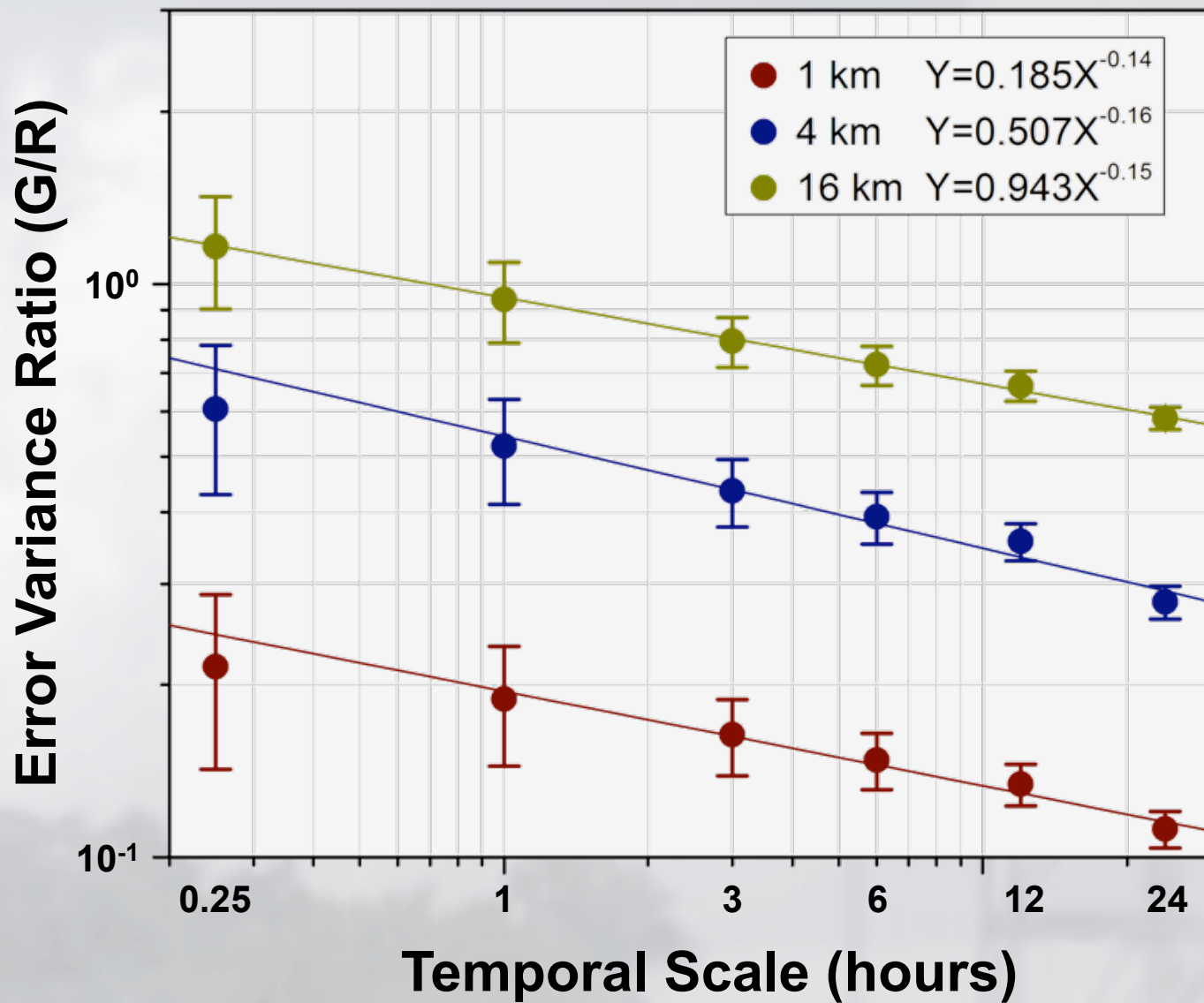


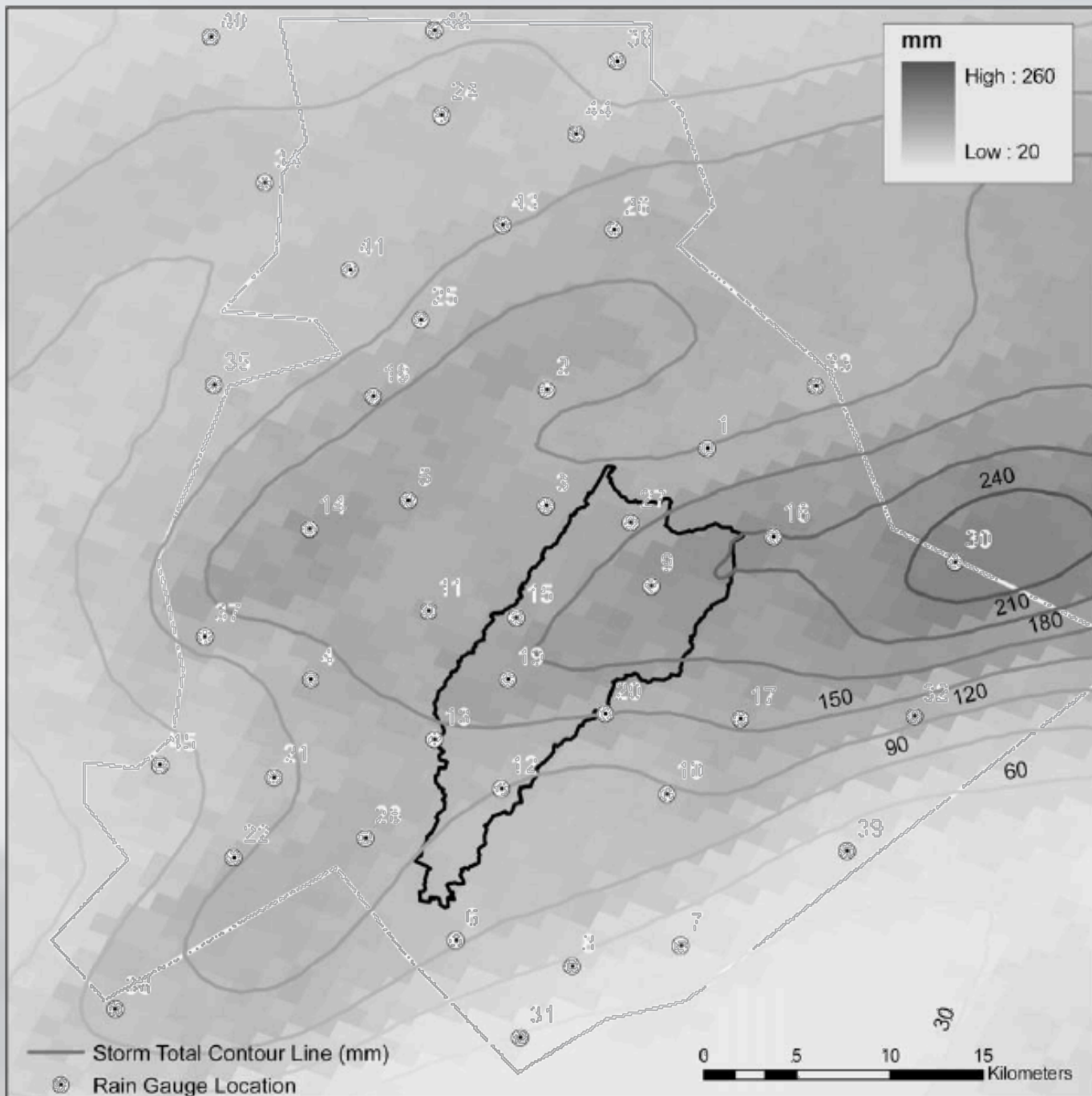


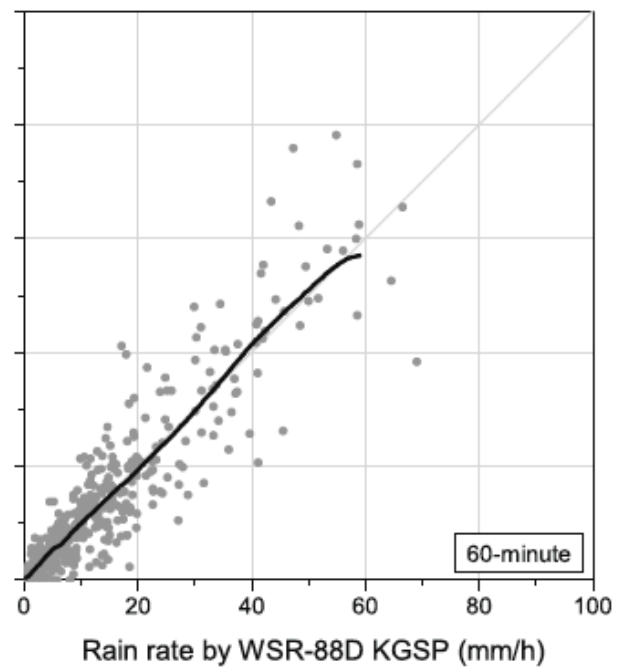
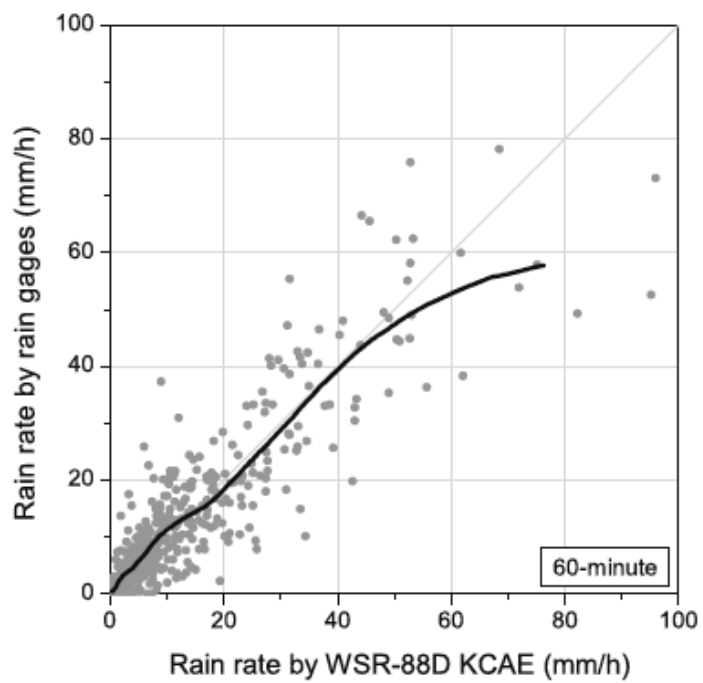
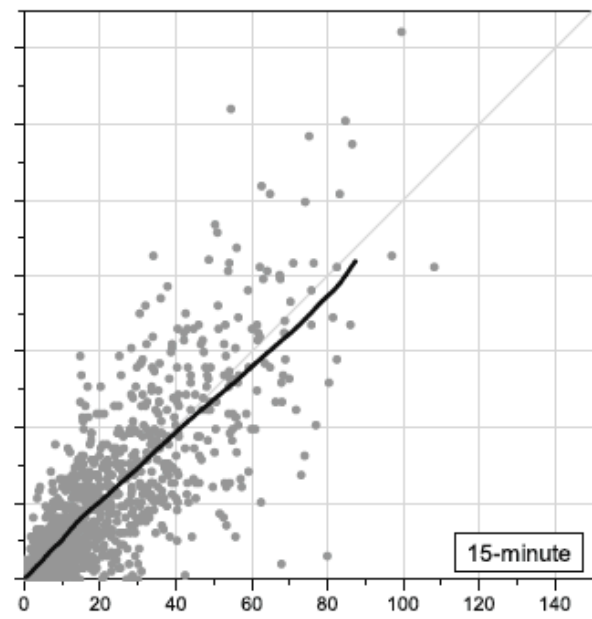
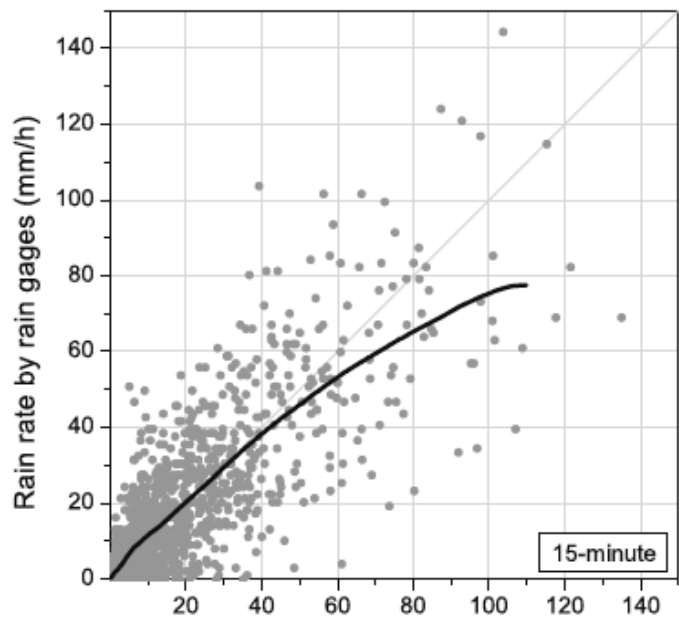
Grid size (km)

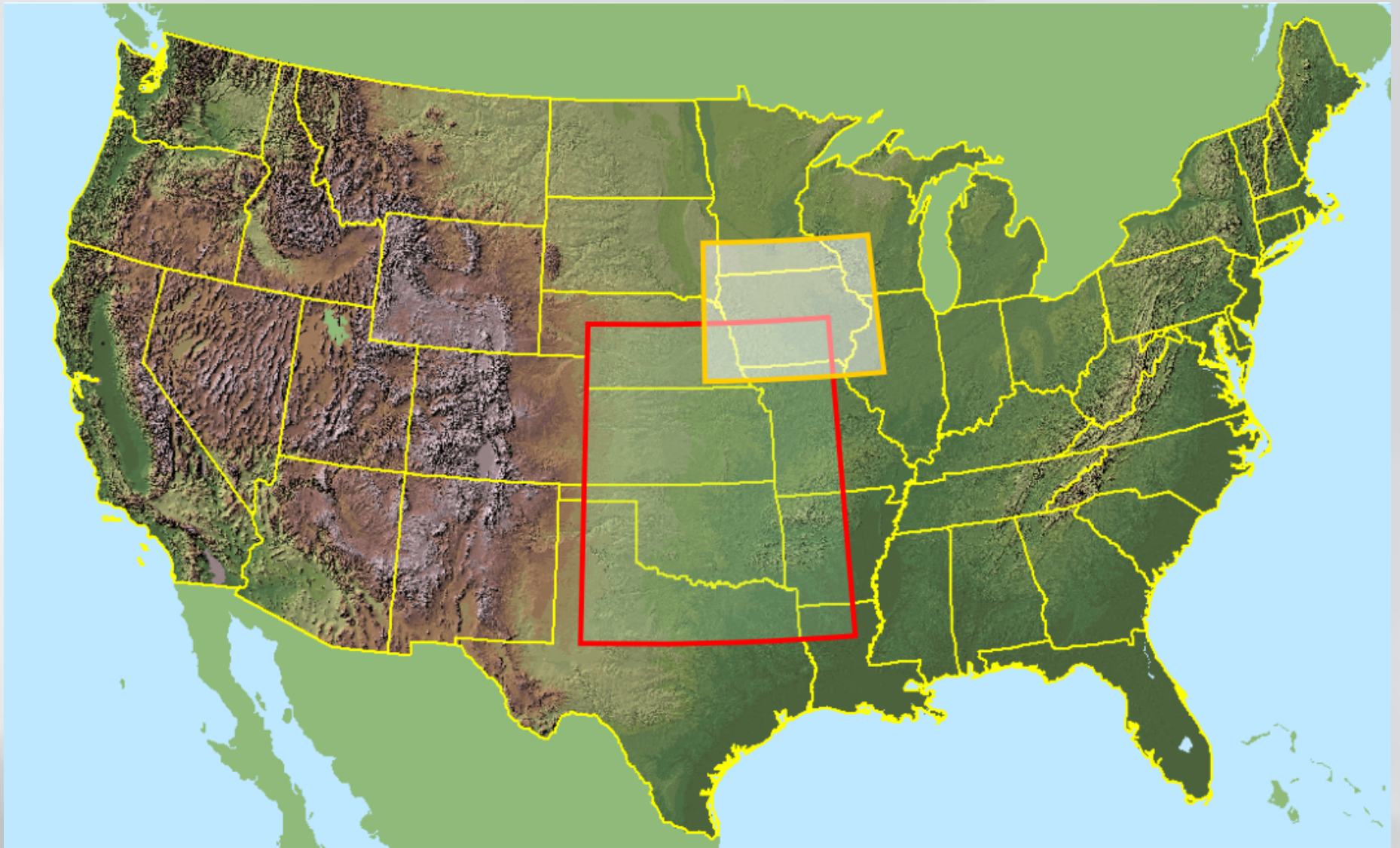




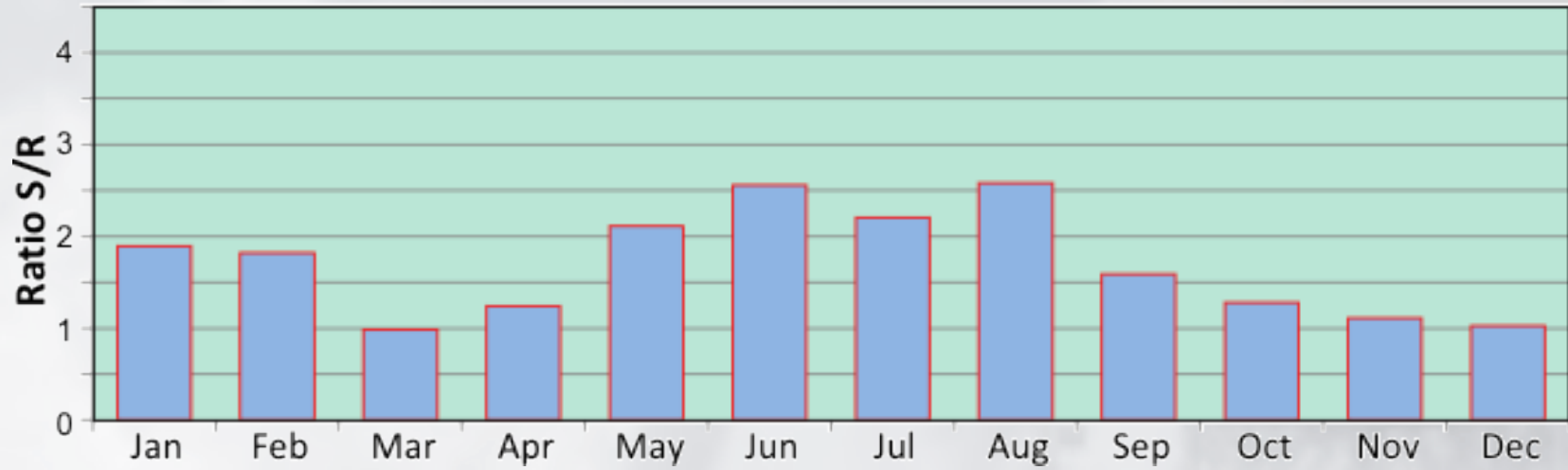




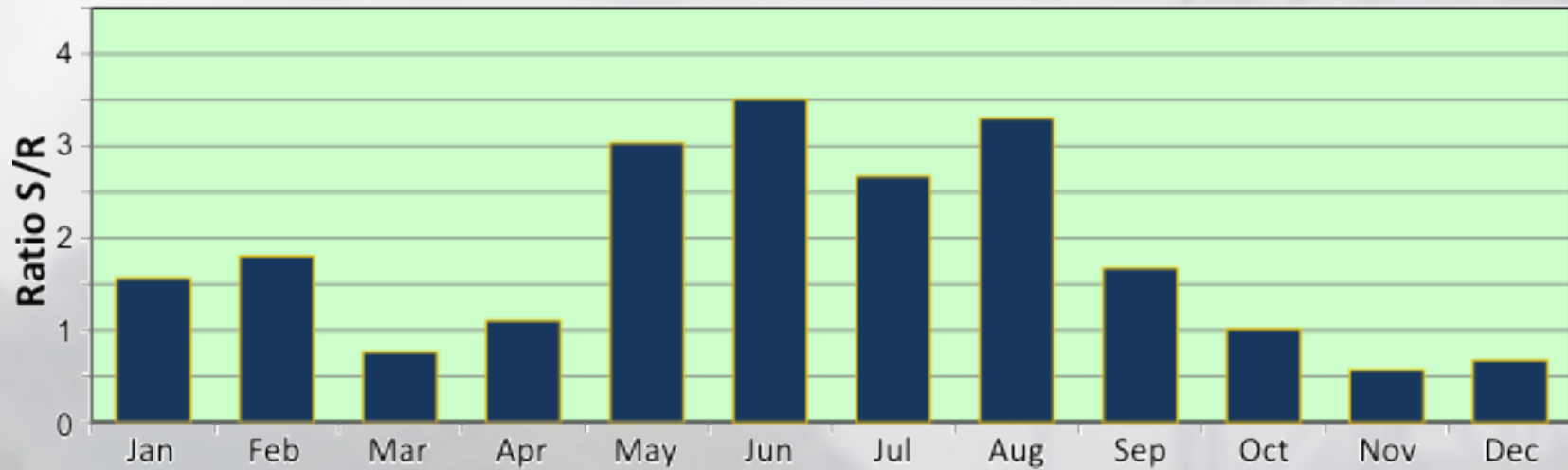


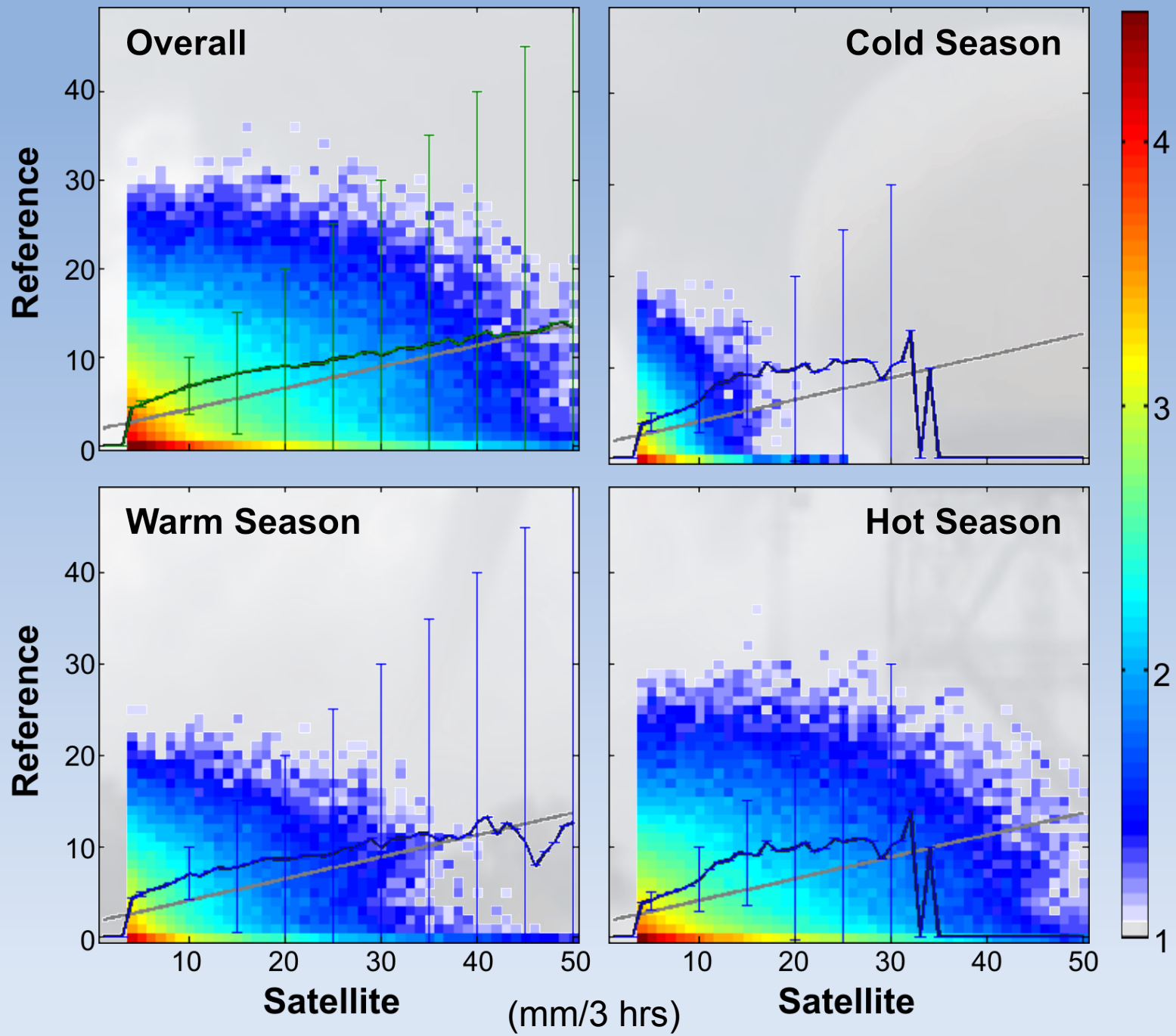


PERSIANN MQB Above Q50 Threshold

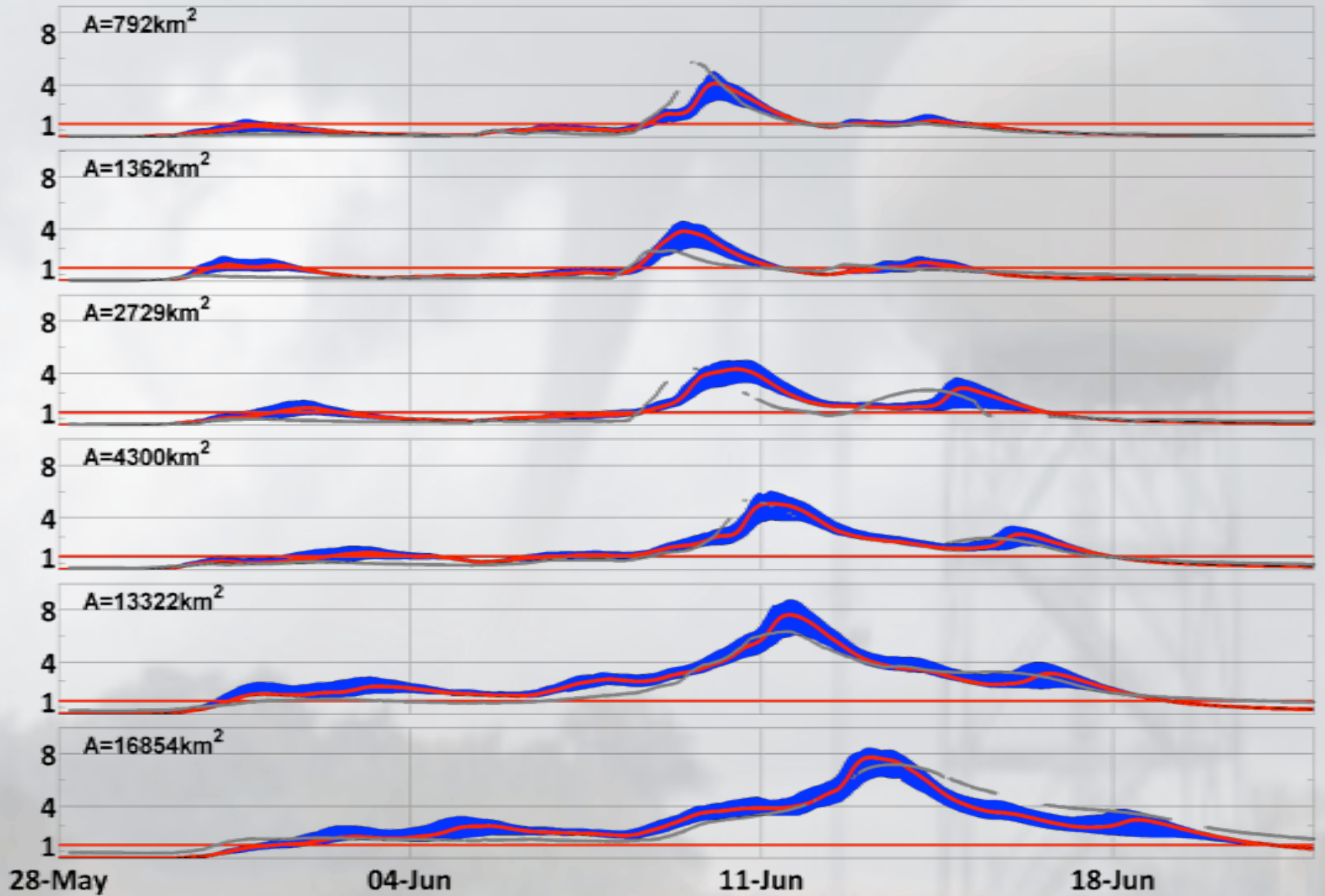


PERSIANN MQB Above Q90 Threshold

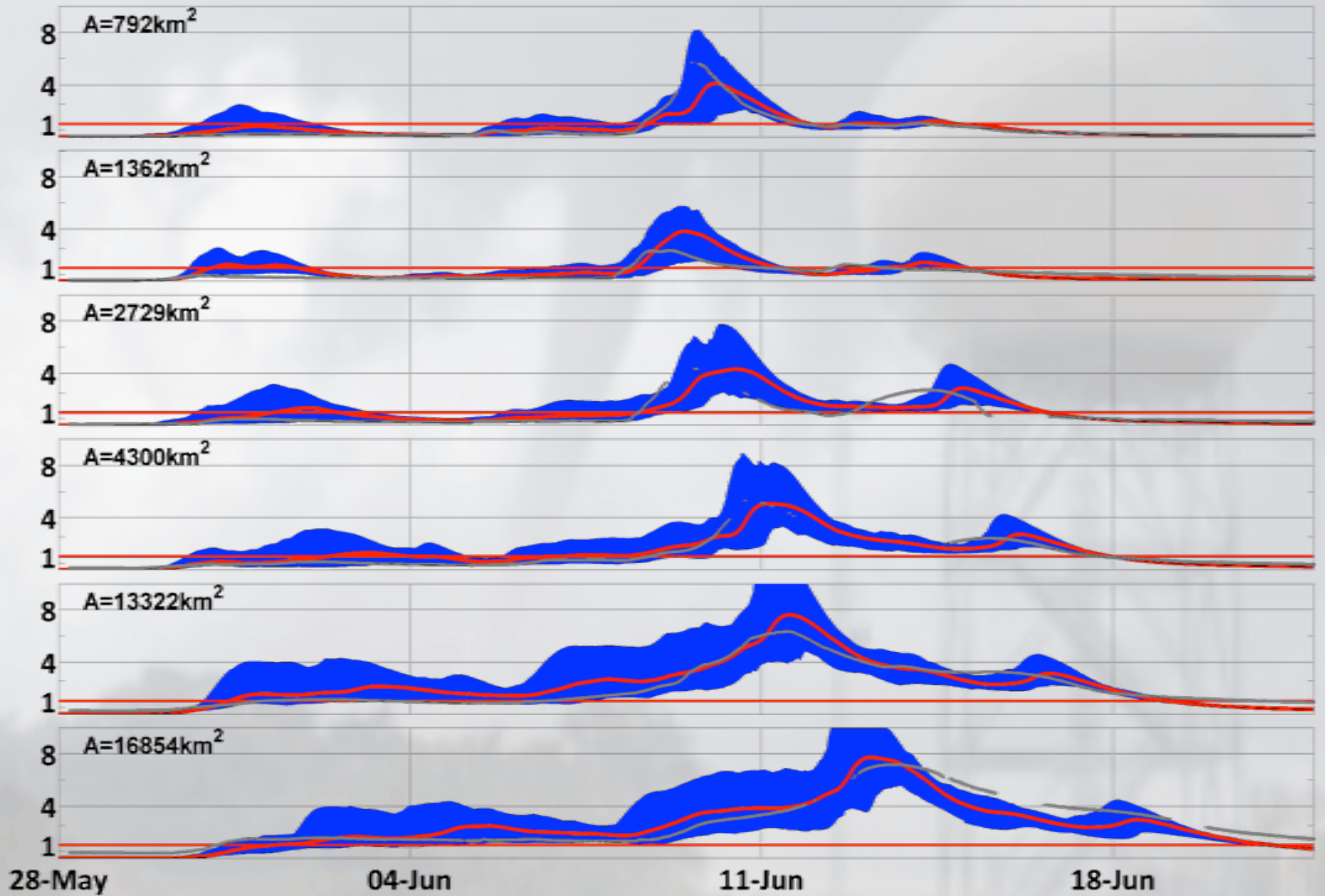




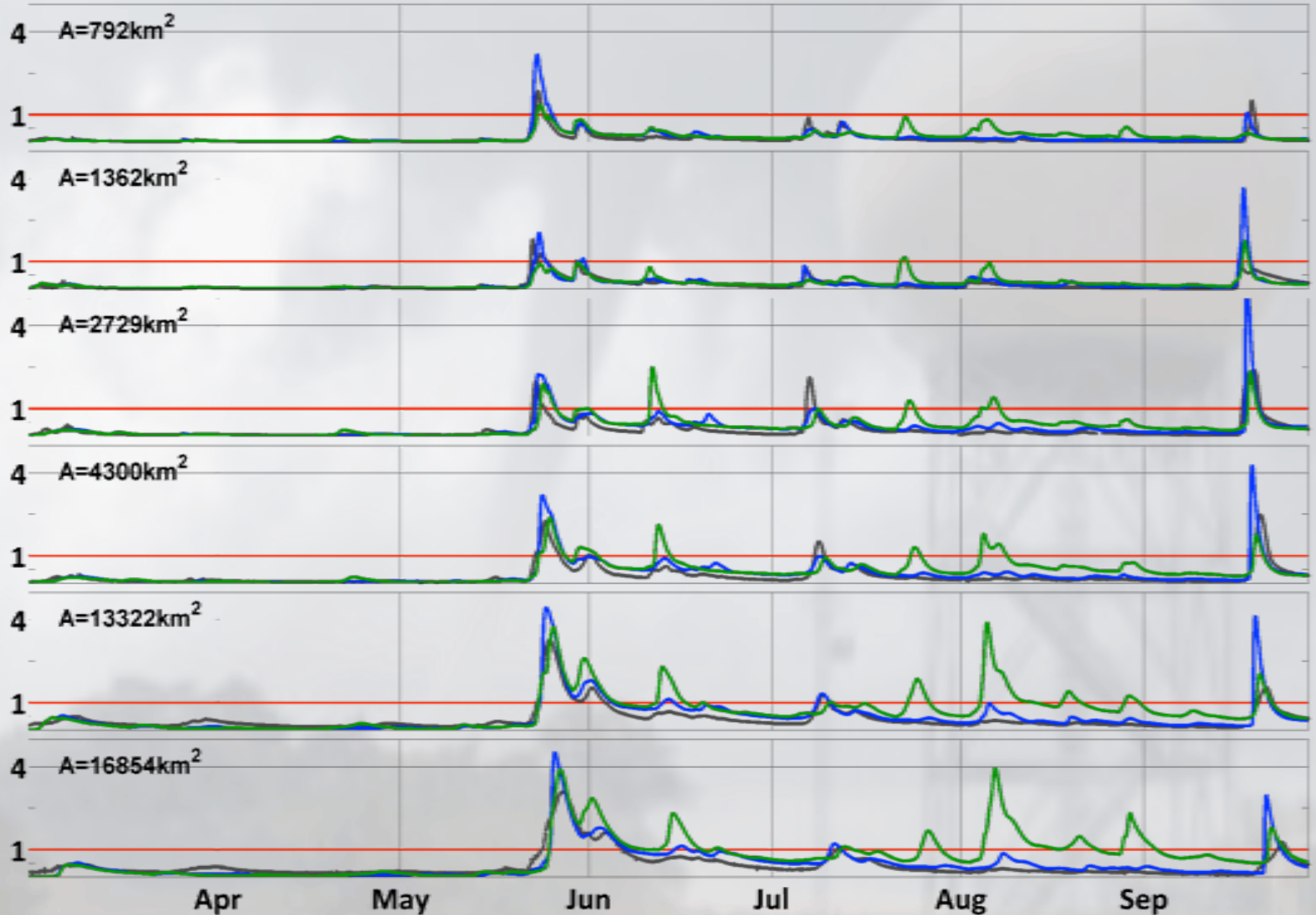
NEXRAD PQPE



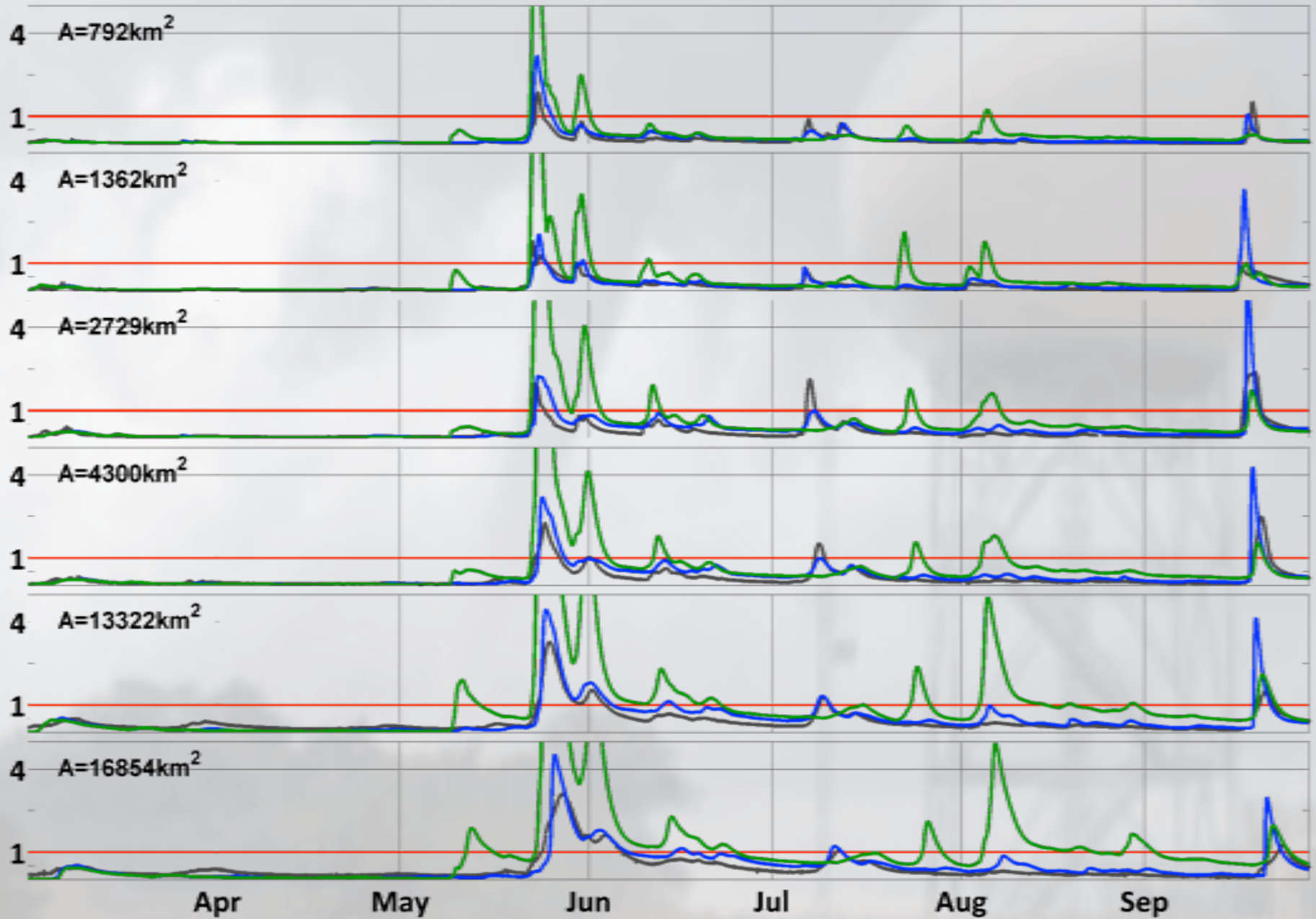
GPM-Like Sampling Uncertainty



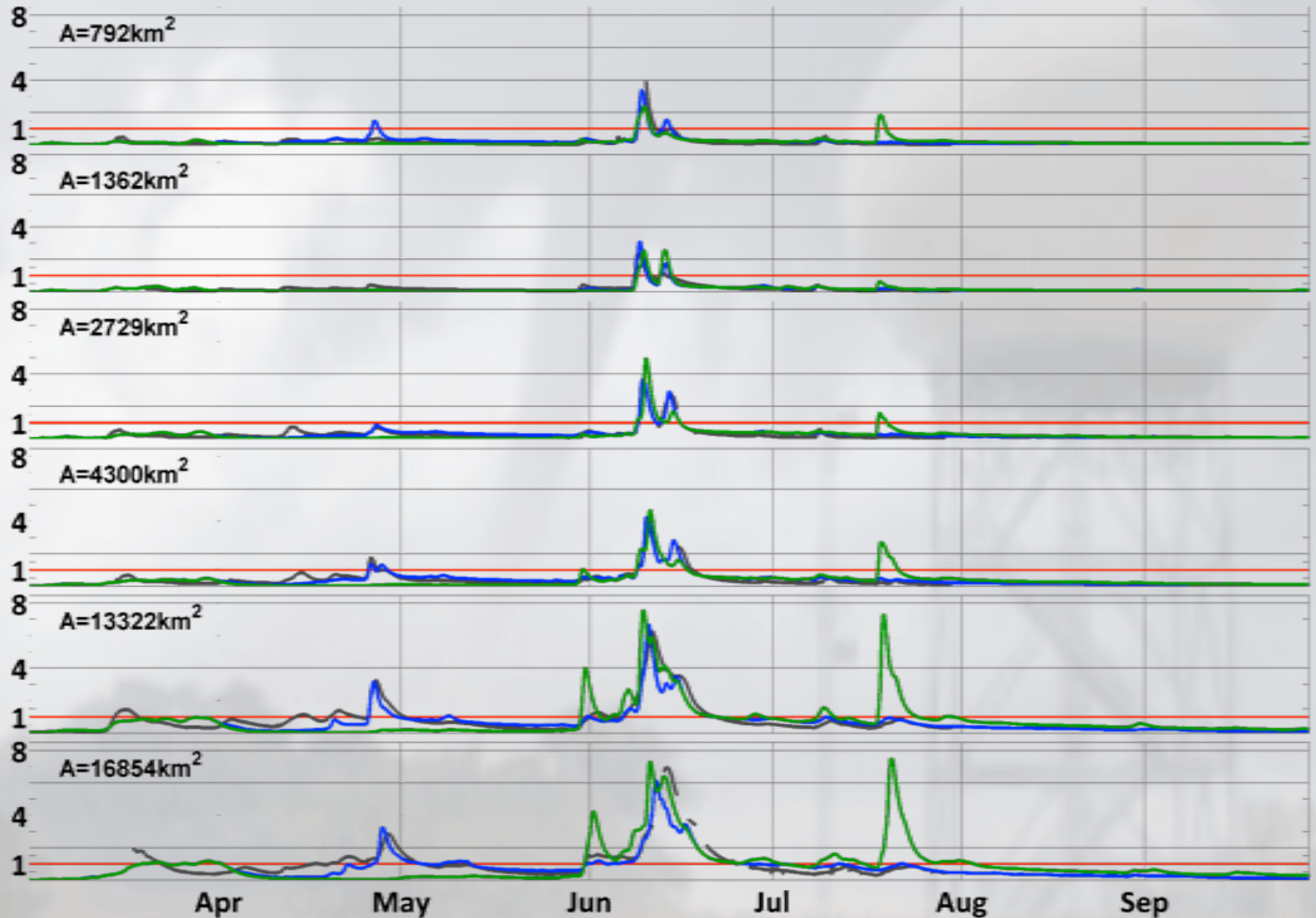
2004 Floods: CMORPH (green), Observed (gray), STAGE IV (blue)



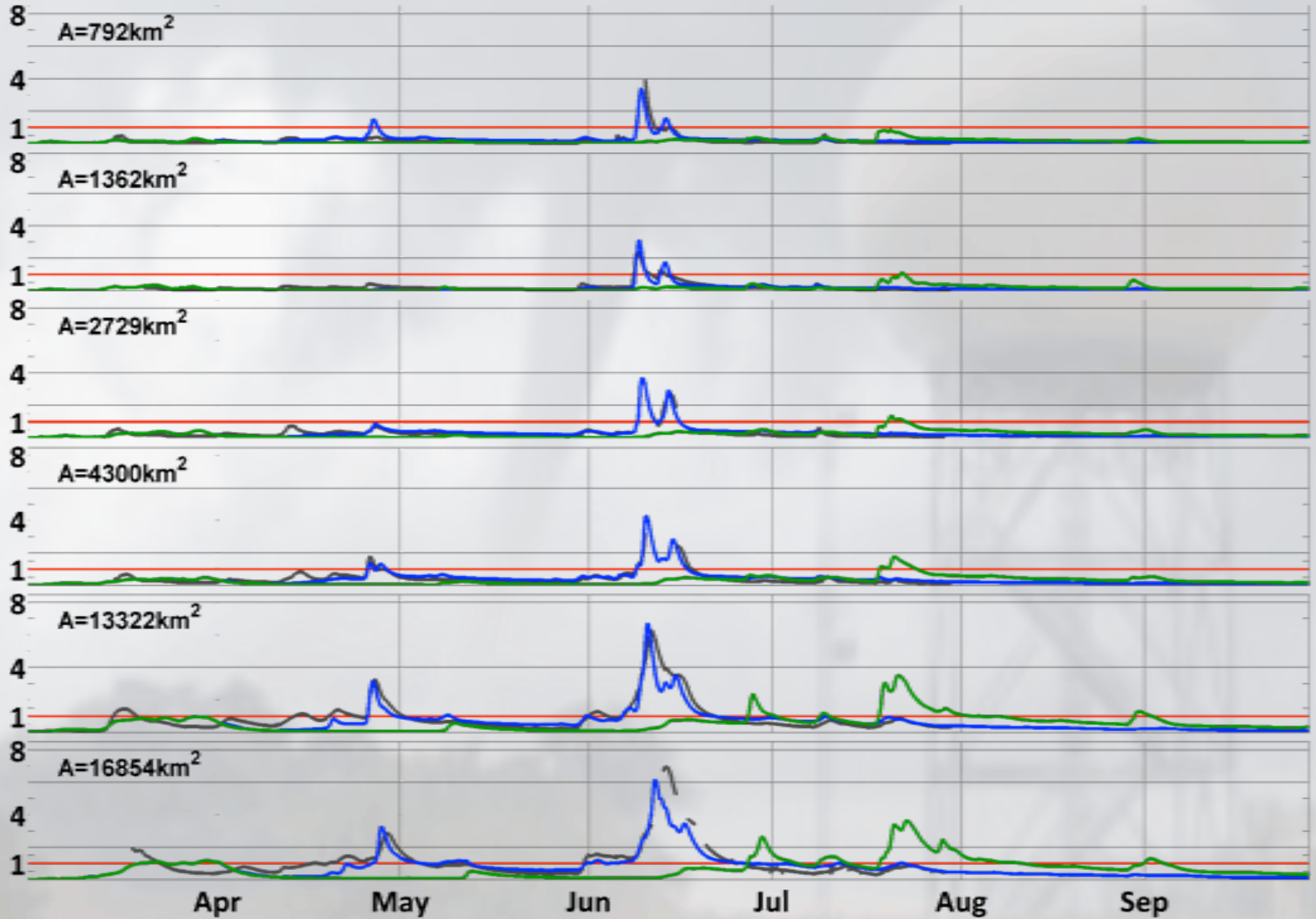
2004 Floods: PERSIANN (green), Observed (gray), STAGE IV (blue)



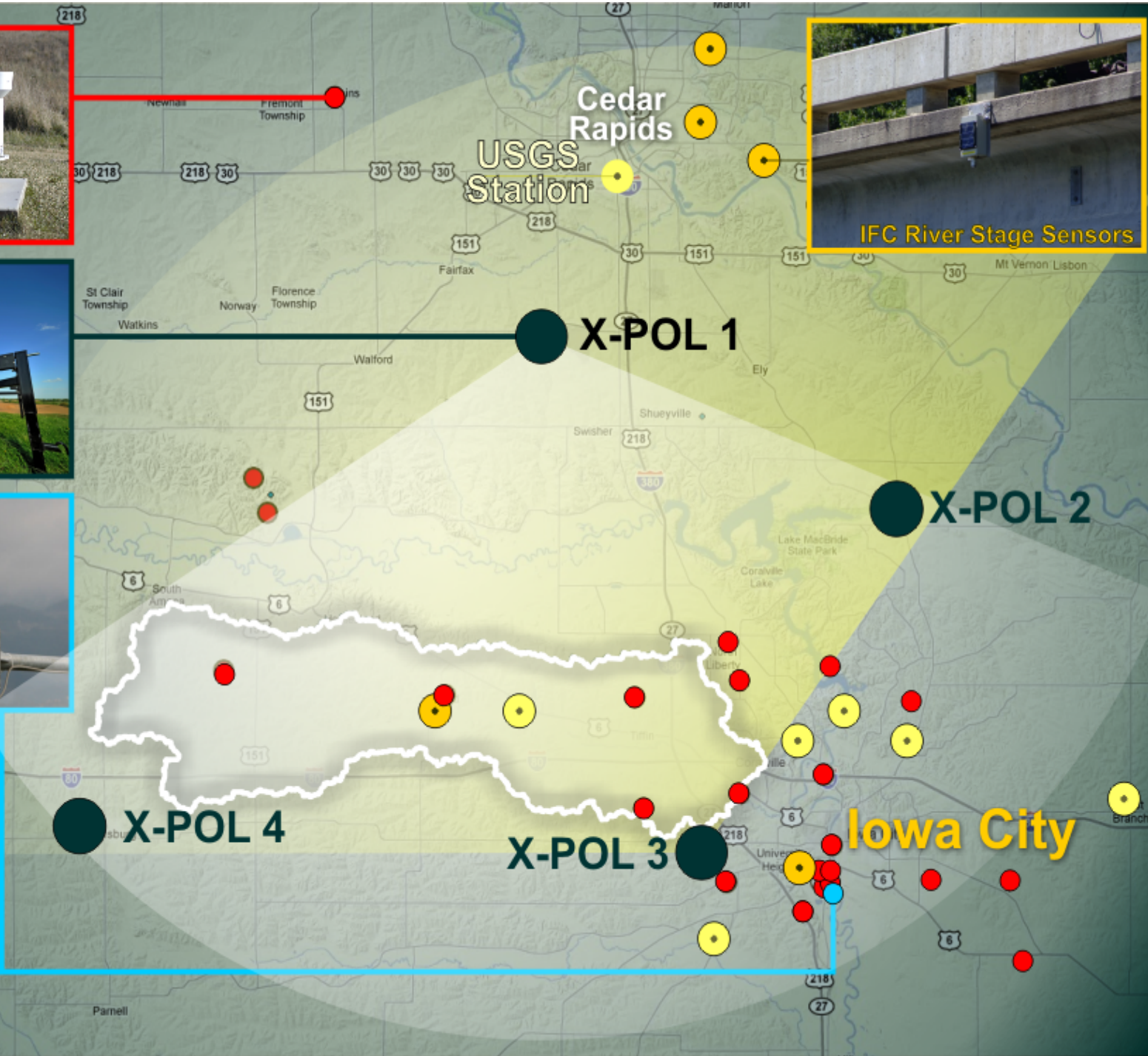
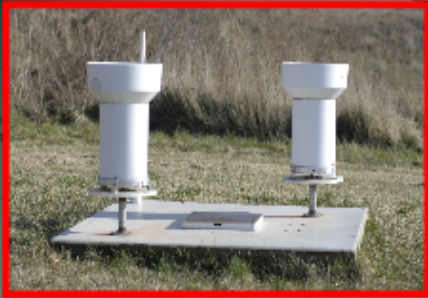
2008 Floods: CMORPH (green), Observed (gray), STAGE IV (blue)



2008 Floods: PERSIANN (green)







Cedar Rapids
USGS Station

IFC River Stage Sensors

X-POL 1

X-POL 2

X-POL 4

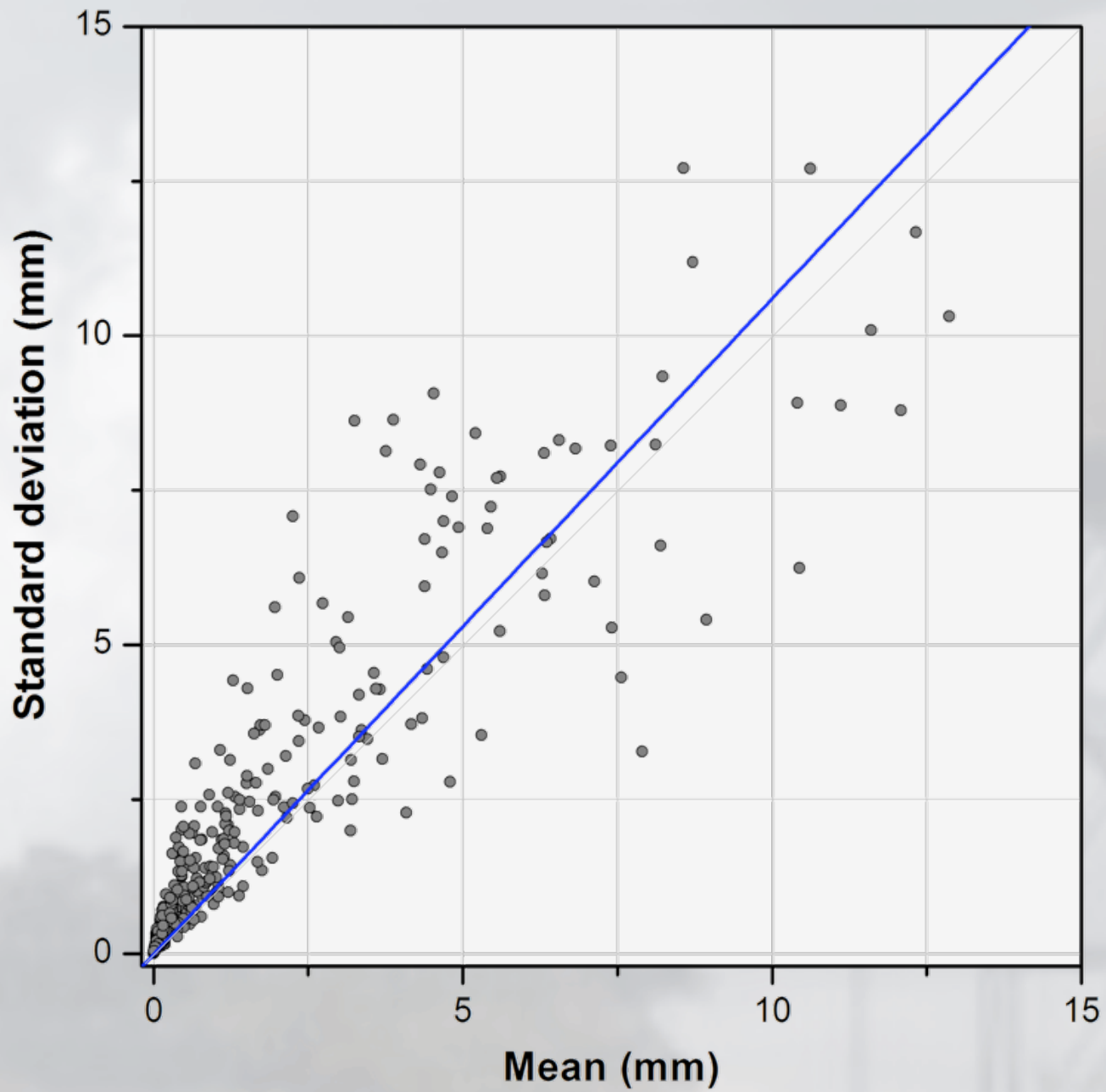
X-POL 3

Iowa City

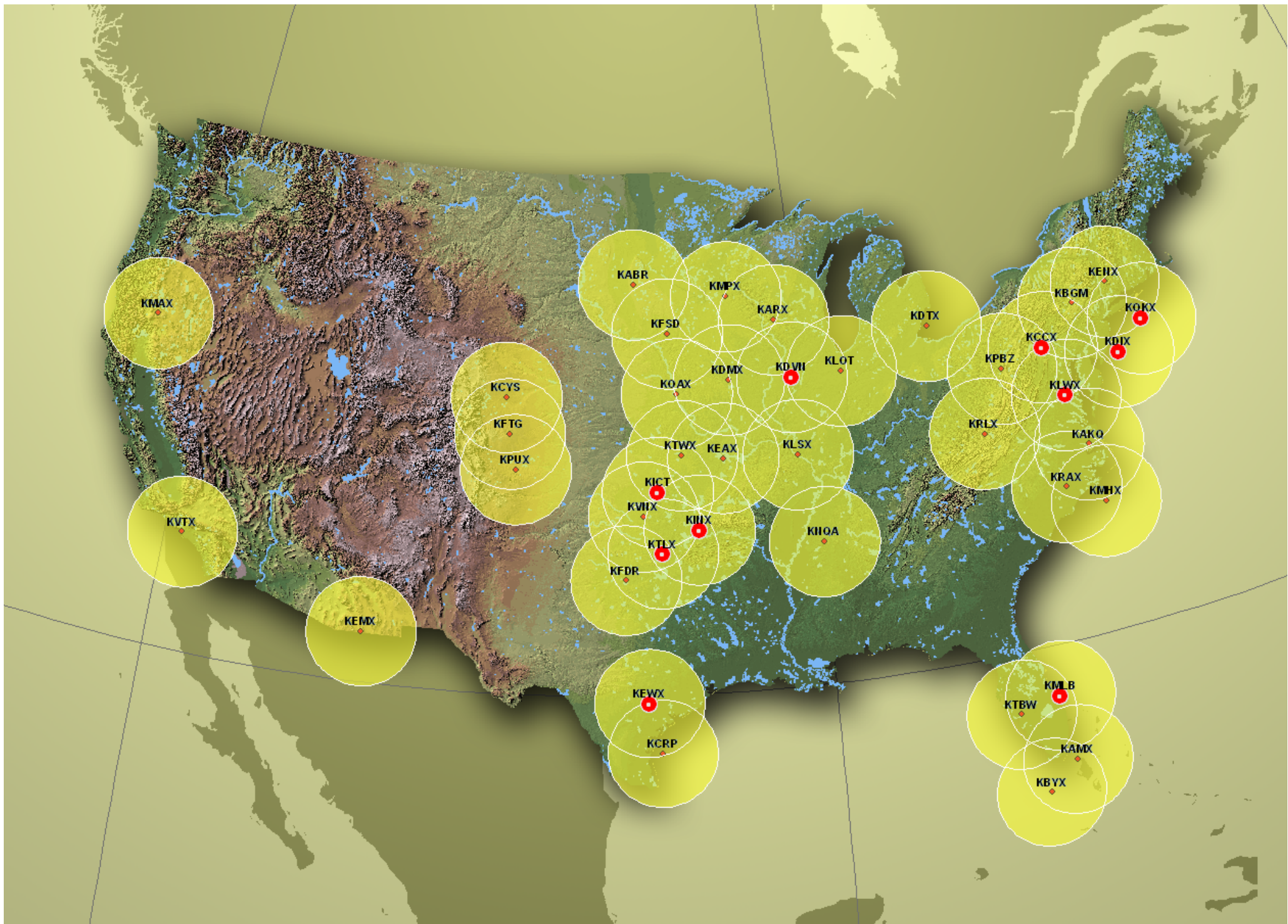
Thank you!

See you at the poster session...





$Y=1.06X$
 $R^2=0.87$



Time-averaged mean error due to VPR

