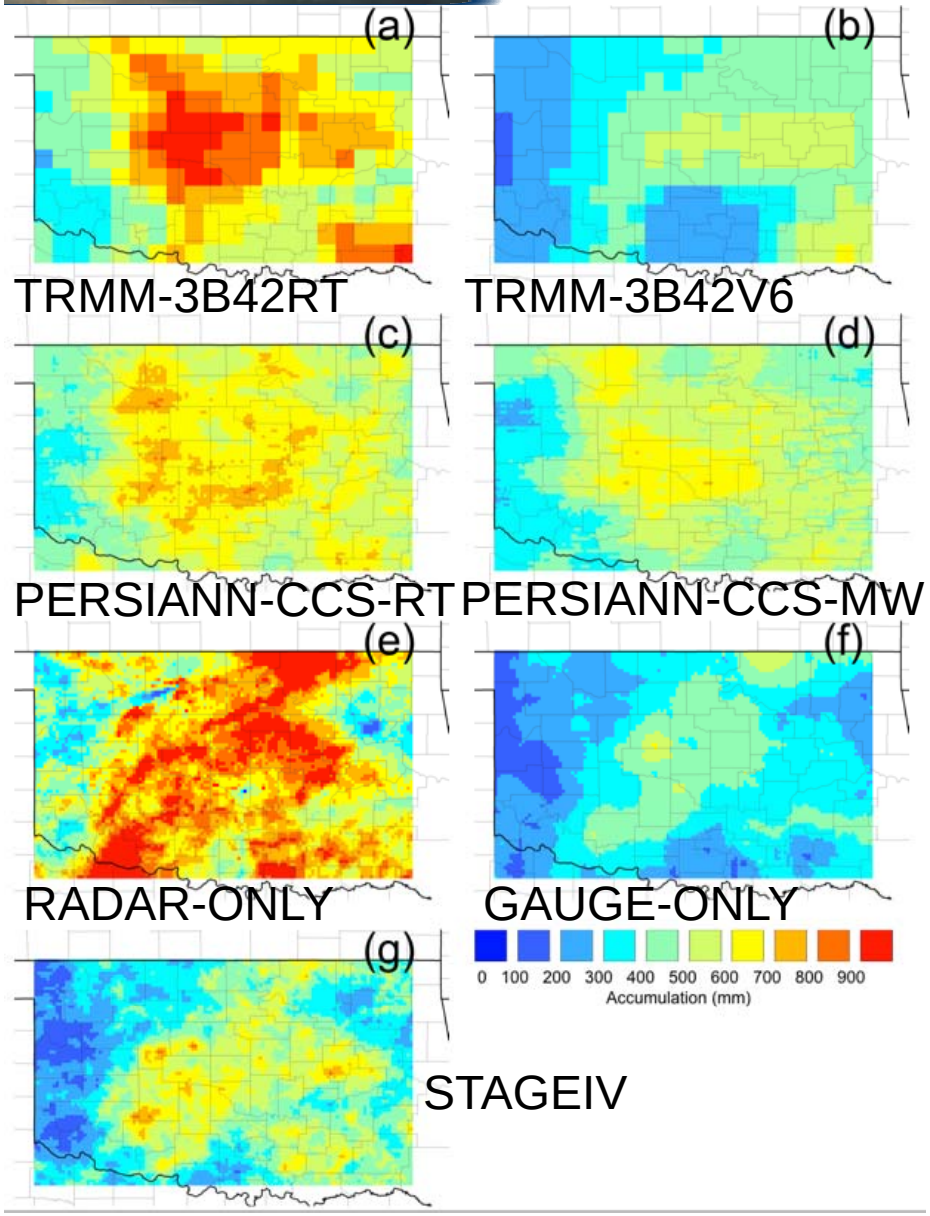
Activities Involving NASA Rainfall Products at the National Severe Storms Laboratory

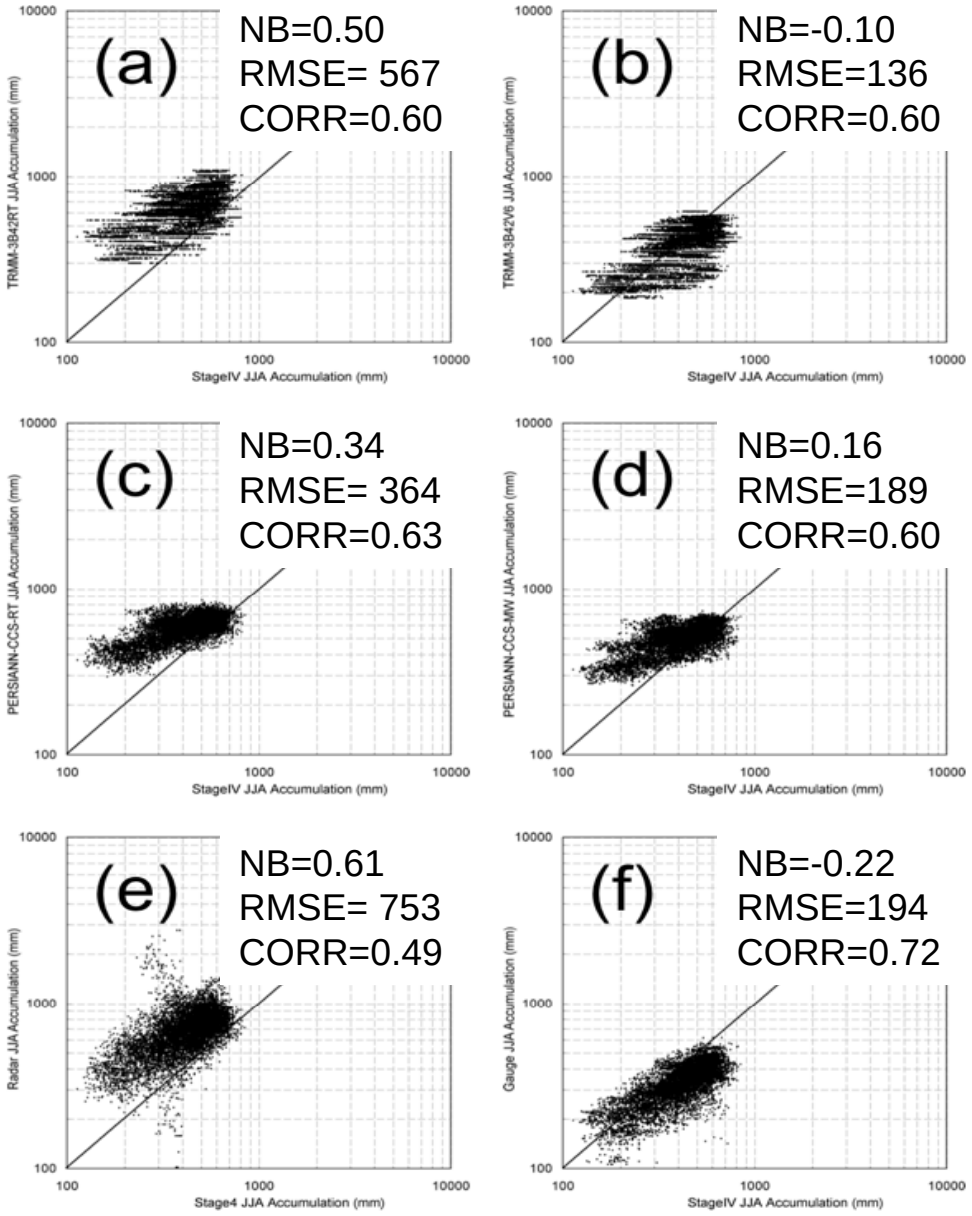
J.J. Gourley and Ken Howard

Warning R&D Division

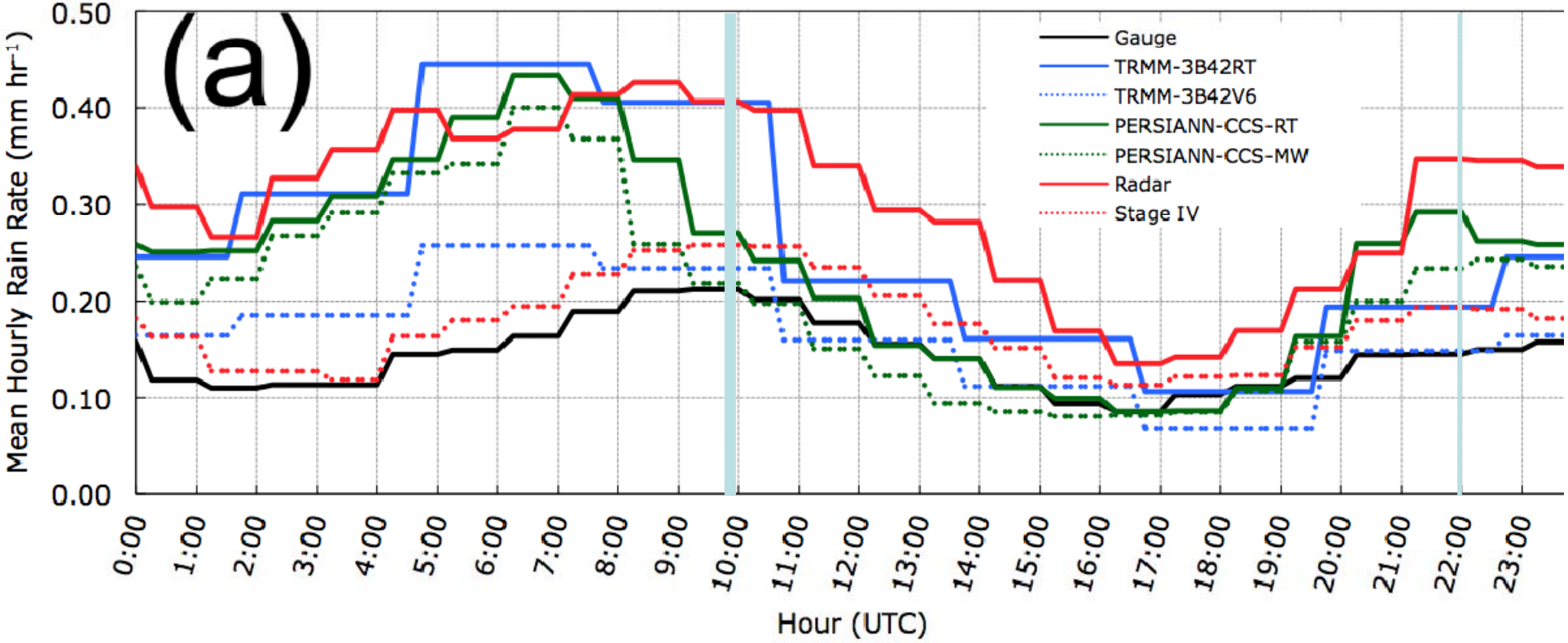
jj.gourley@noaa.gov

JJA 2007 Rainfall Evaluation





Rainfall Evaluation for Mean Diurnal Signal

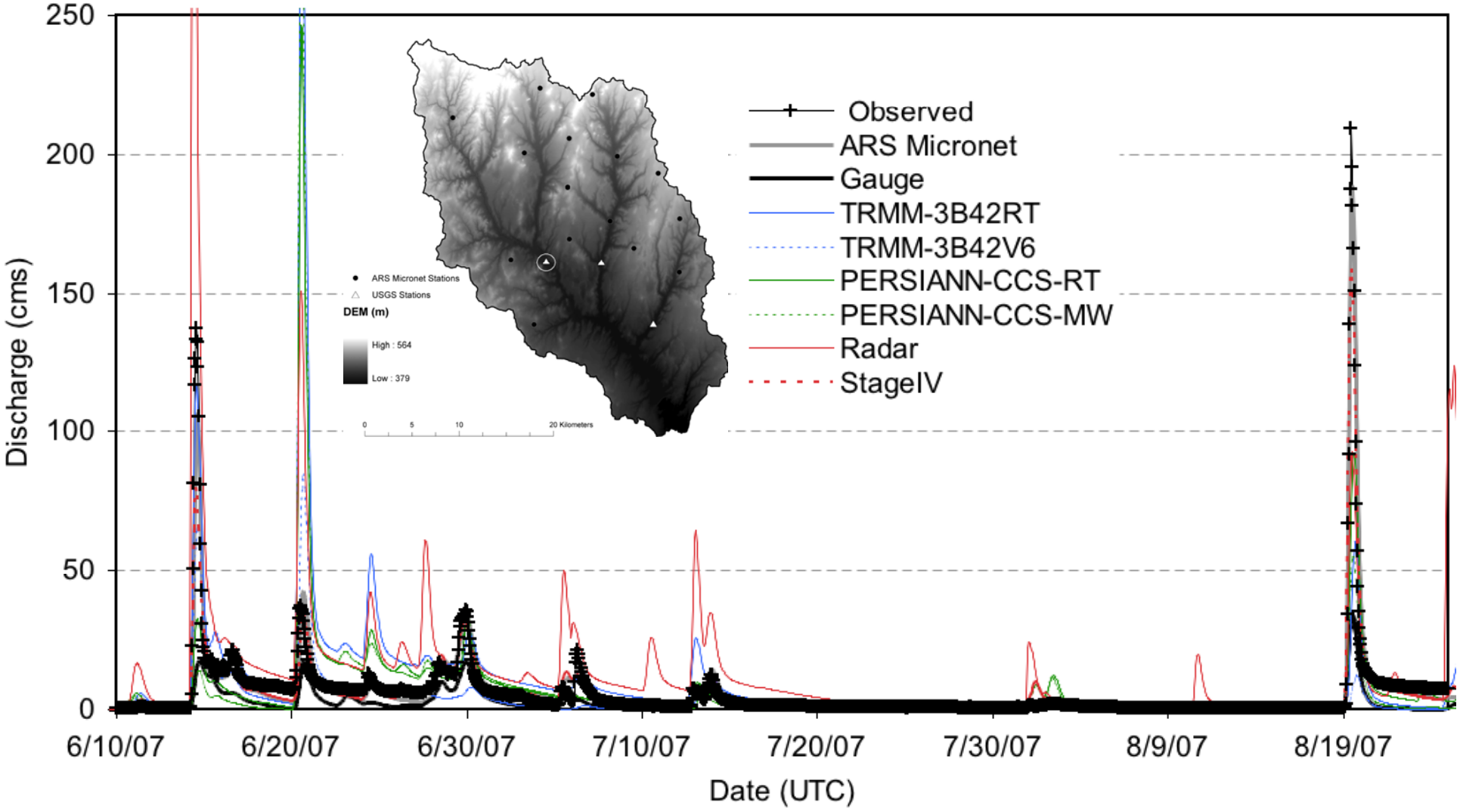


- Houry resolution with GOES-based PERSIANN-CCS products performed better than 3-hr TRMM products in capturing diurnal-scale convection

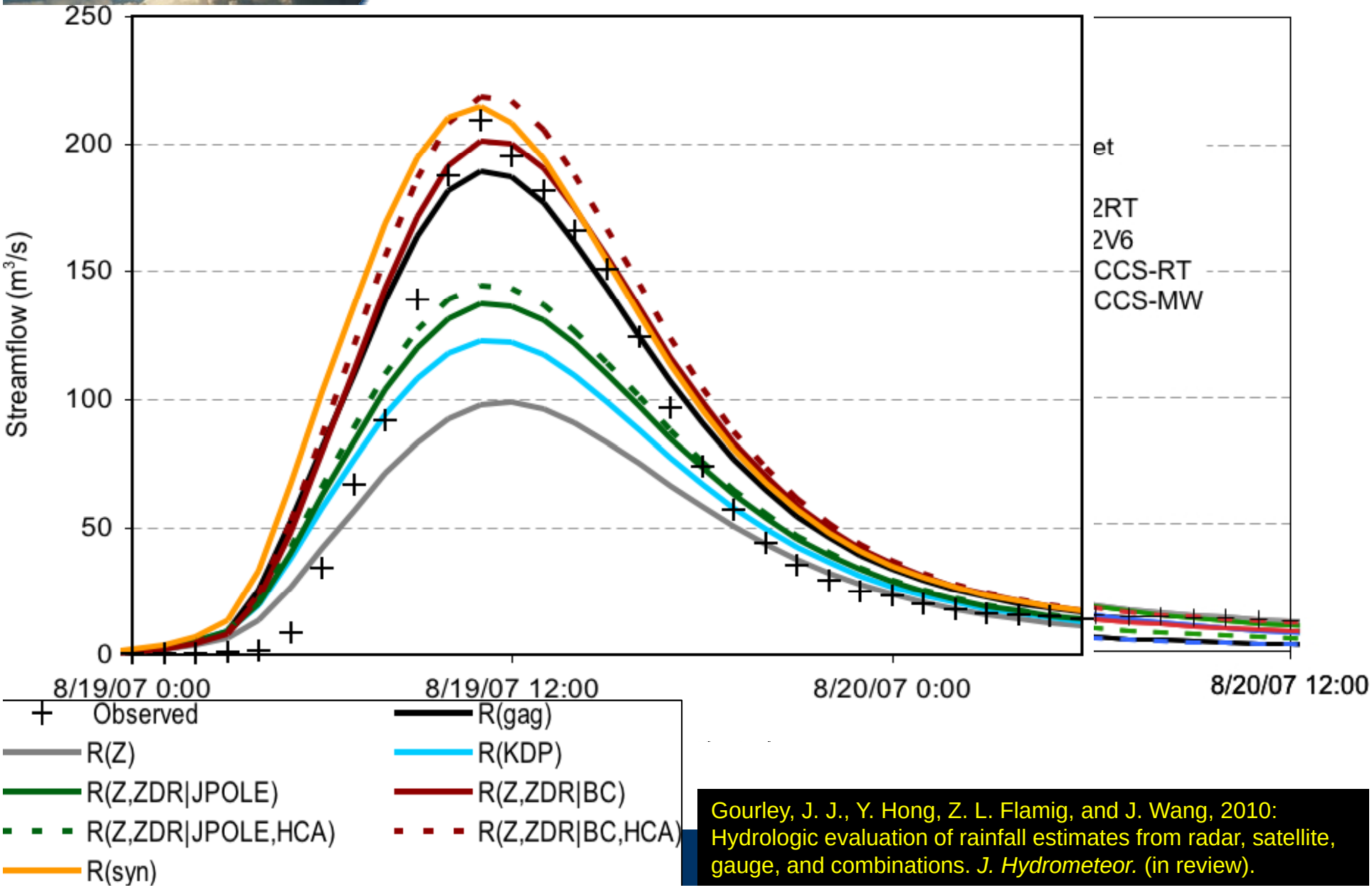
- All satellite-based rainfall algorithms depicted nocturnal rainfall max 3-4 hrs too early…presumably due to cirrus clouds

Gourley, J. J., Y. Hong, Y., Z. L. Flamig, L. Li, J. Wang, 2010: Inter-comparison of rainfall estimates from radar, satellite, gauge, and combinations for a season of record rainfall. *J. Appl. Meteor. Climatol.* **49,** 437-452.

Evaluation of Inputs in HL-RDHM Distributed Hydrologic Model



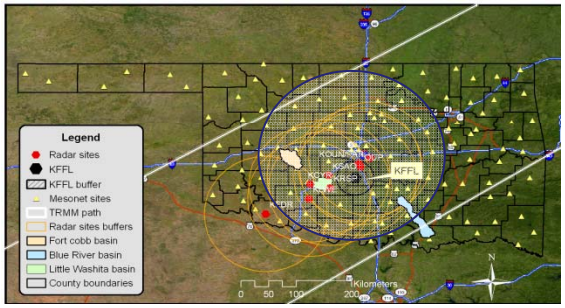
TS Erin (100-yr return flow)



Gourley, J. J., Y. Hong, Z. L. Flamig, and J. Wang, 2010: Hydrologic evaluation of rainfall estimates from radar, satellite, gauge, and combinations. *J. Hydrometeor.* (in review).

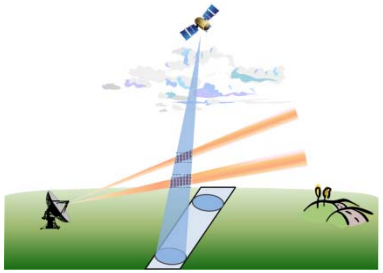
KOUN-PR Reflectivity Comparison

Study Area



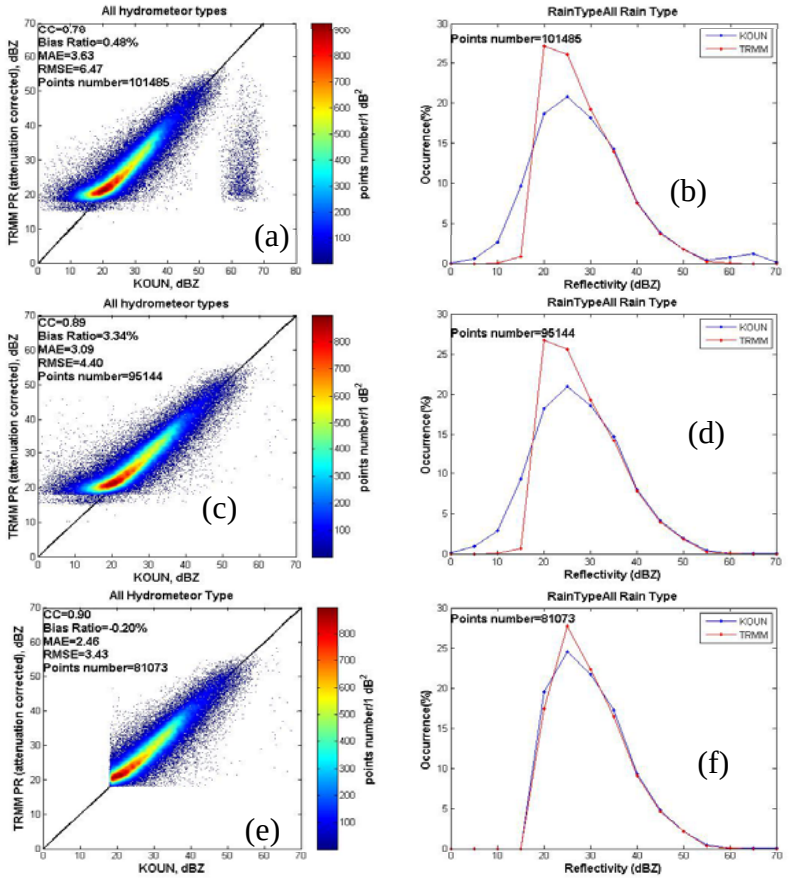
Study region showing various ground-based radar platforms in the OK region, as well as in situ observation networks.

Methodology



Schematic of geometry matchup of the Ground Radar (GR) and Precipitation Radar (PR). The purple area show the intersections between GR sweeps and PR footprints.

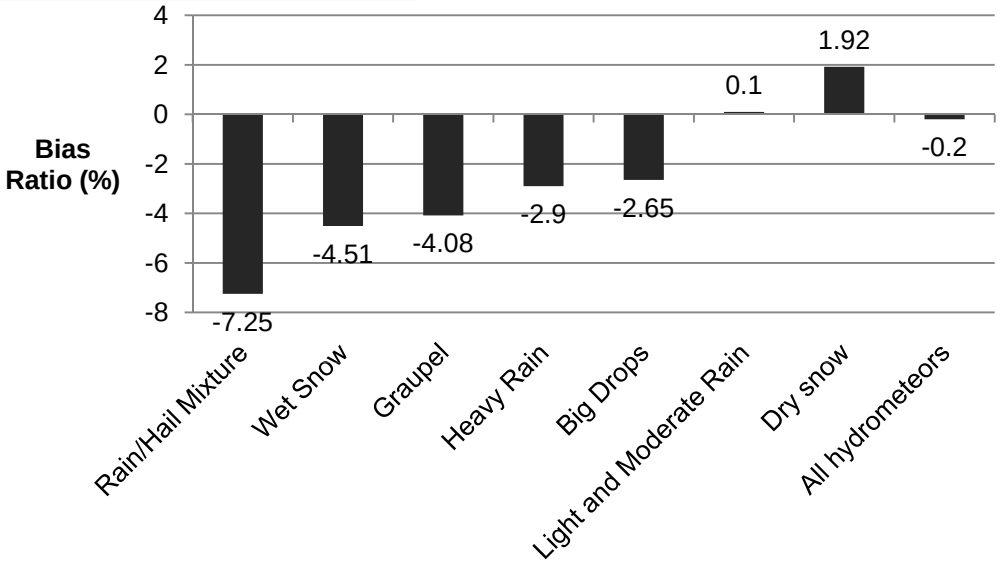
Results



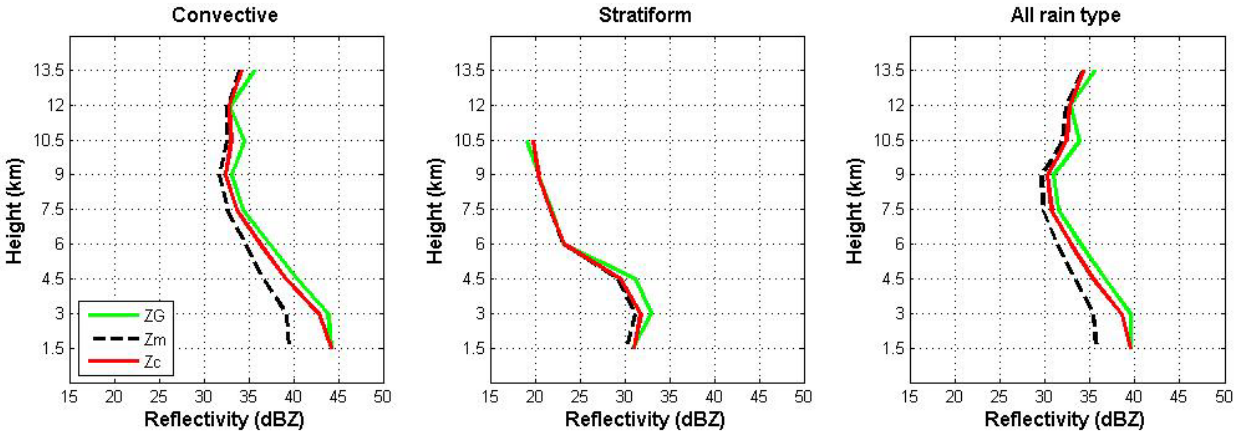
Scatterplots and histograms for reflectivity with improving quality control: (a) and (b) KOUN reflectivity and attenuation corrected PR reflectivity with no quality control; (c) and (d) removed non-meteorological echoes based on KOUN's hydrometeor classification algorithm (HCA) results; (e) and (f) same as (c) and (d) but applied >18 dBZ threshold. Data density denoted on color scale is in units of number of points per 1-dBZ bin.

Wen, Y., Y. Hong, G. Zhang, T. J. Schuur, J. J. Gourley, Z. L. Flamig, K. R. Morris, and Q. Cao, 2010: Cross validation of space-borne radar and ground polarimetric radar based on the results of polarimetric echo classification. *J. Appl. Meteor. Climatol. (in review).*

Why PR and KOUN have differences?
—Back scattering? Attenuation?



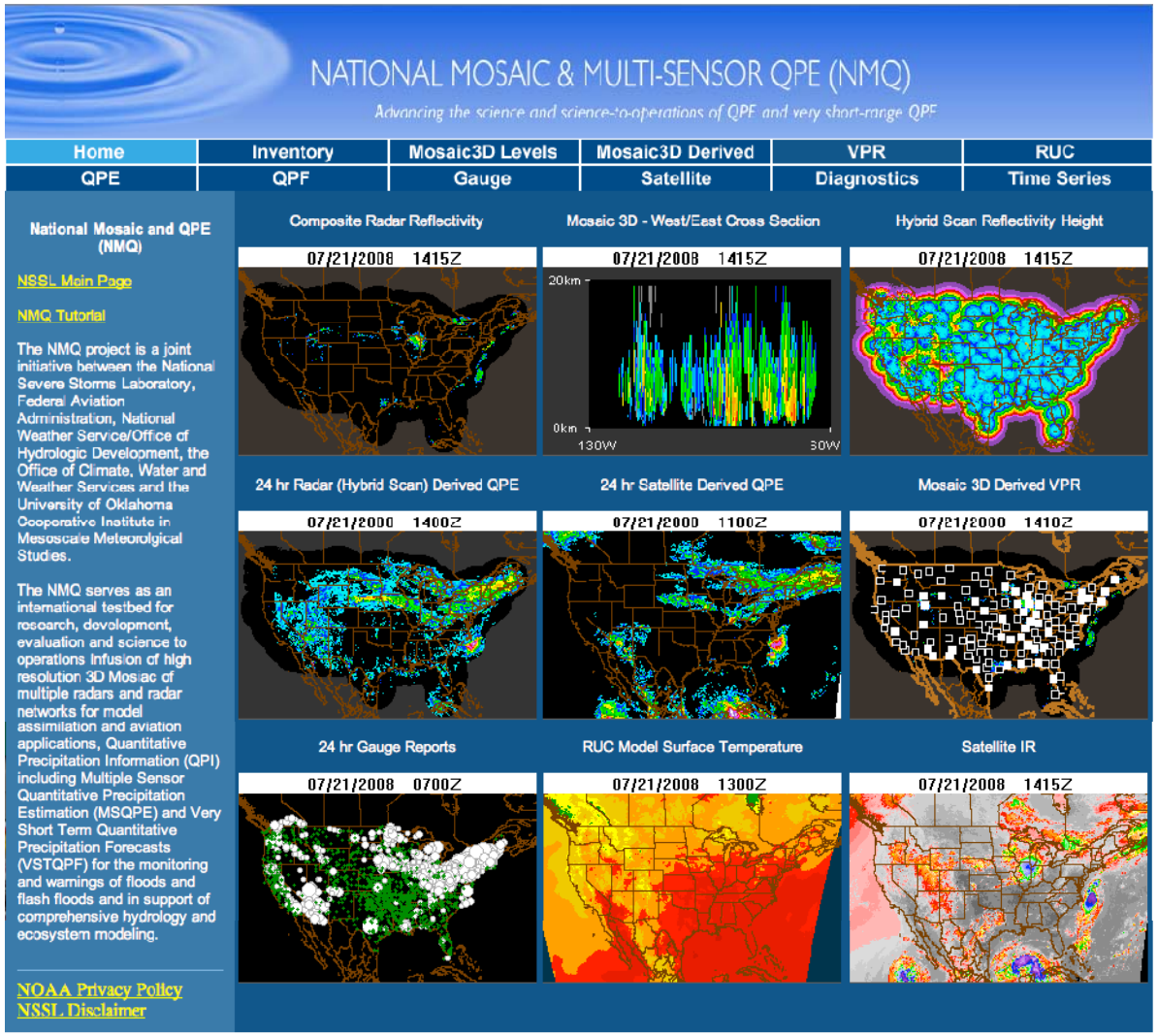
Bias [(PR-KOUN)*100/KOUN] for the different hydrometeor classifications, as determined by KOUN HCA for all 20 events



Mean vertical reflectivity profiles classified from PR for: (a) convective rain, (b) stratiform rain, and (c) all rain types. ZG is reflectivity from KOUN, Zm is measured reflectivity from TRMM 1C21, and Zc is attenuation corrected TRMM 2A25.

Q2

Real time platform to develop, test, and assess advanced techniques in quality control, data integration and precipitation estimation and short term forecasting.



http://nmq.ou.edu

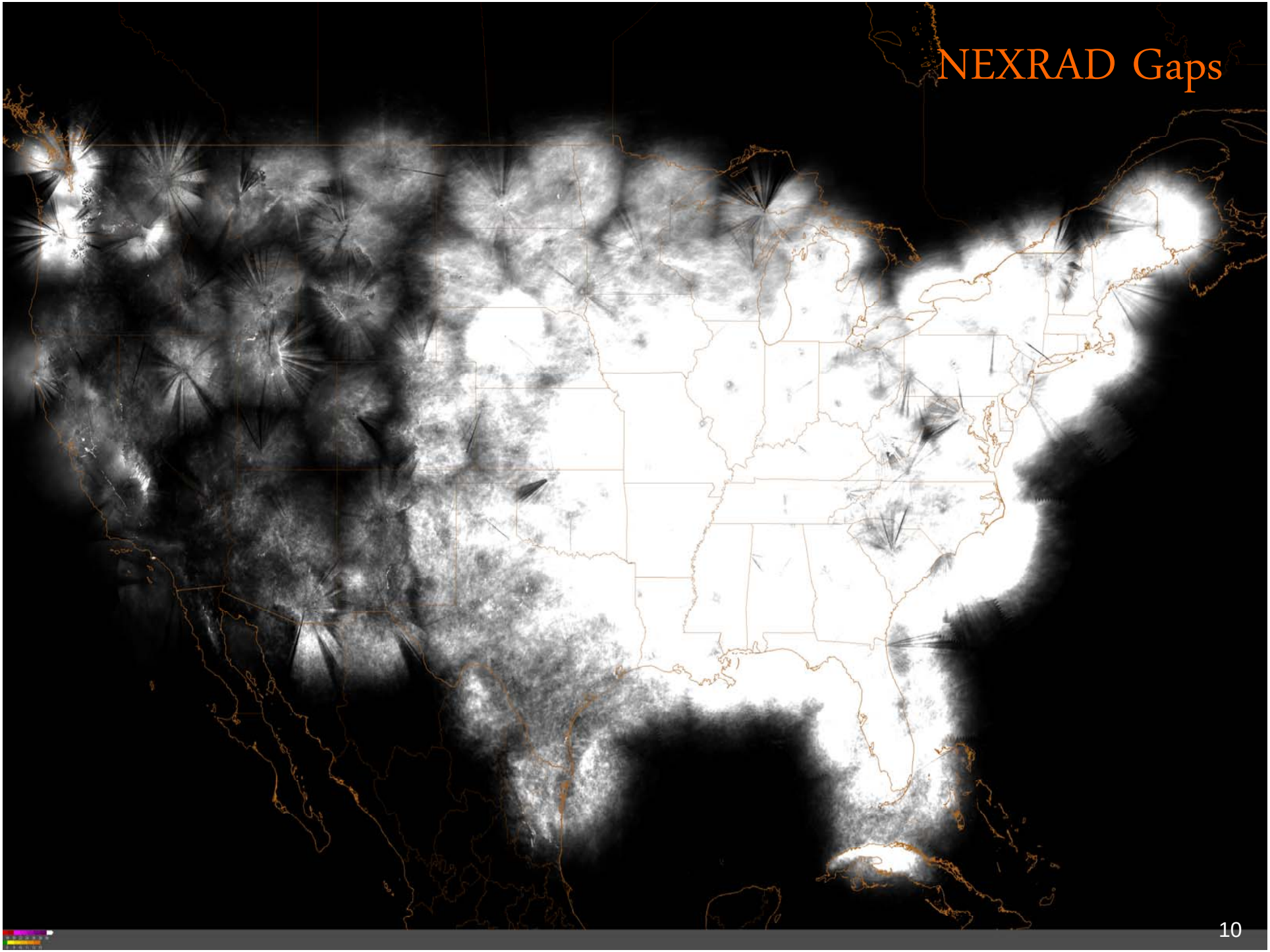
Q2 Implementation

Q2 exists today as a scientific and community-based convergence towards accurate, 1-km^2/2.5-min **multi-sensor** precipitation estimates on a national scale

Q2 is a continuation of NSSL's departure from a radar-centric approach to precipitation estimation towards a integration of radar, satellite, model, and surface observations

Q2 goal is to glean the best practices and techniques from NOAA's River Forecast Centers, Forecast Offices, Office of Hydrology, domestic/international organizations and universities

NEXRAD Gaps



Q2 Plans for Dual Polarization Radar and GPM Era

- Real-time ingest of TRMM 2A25 and 3B42RT products in NMQ underway enabling CONUS-wide evaluation
- Same architecture will be used for forthcoming GPM and NEXRAD dual-pol products (Q3?)
- By maintaining a complete archive of NMQ/Q3 and TRMM/GPM intermediate and final products, robust analyses and intercomparisons can proceed…ultimately leading to joint, synergistic development using ground- and satellite-based observing platforms for multisensor precipitation estimation