National Mosaic and Multi-sensor QPE Reanalysis

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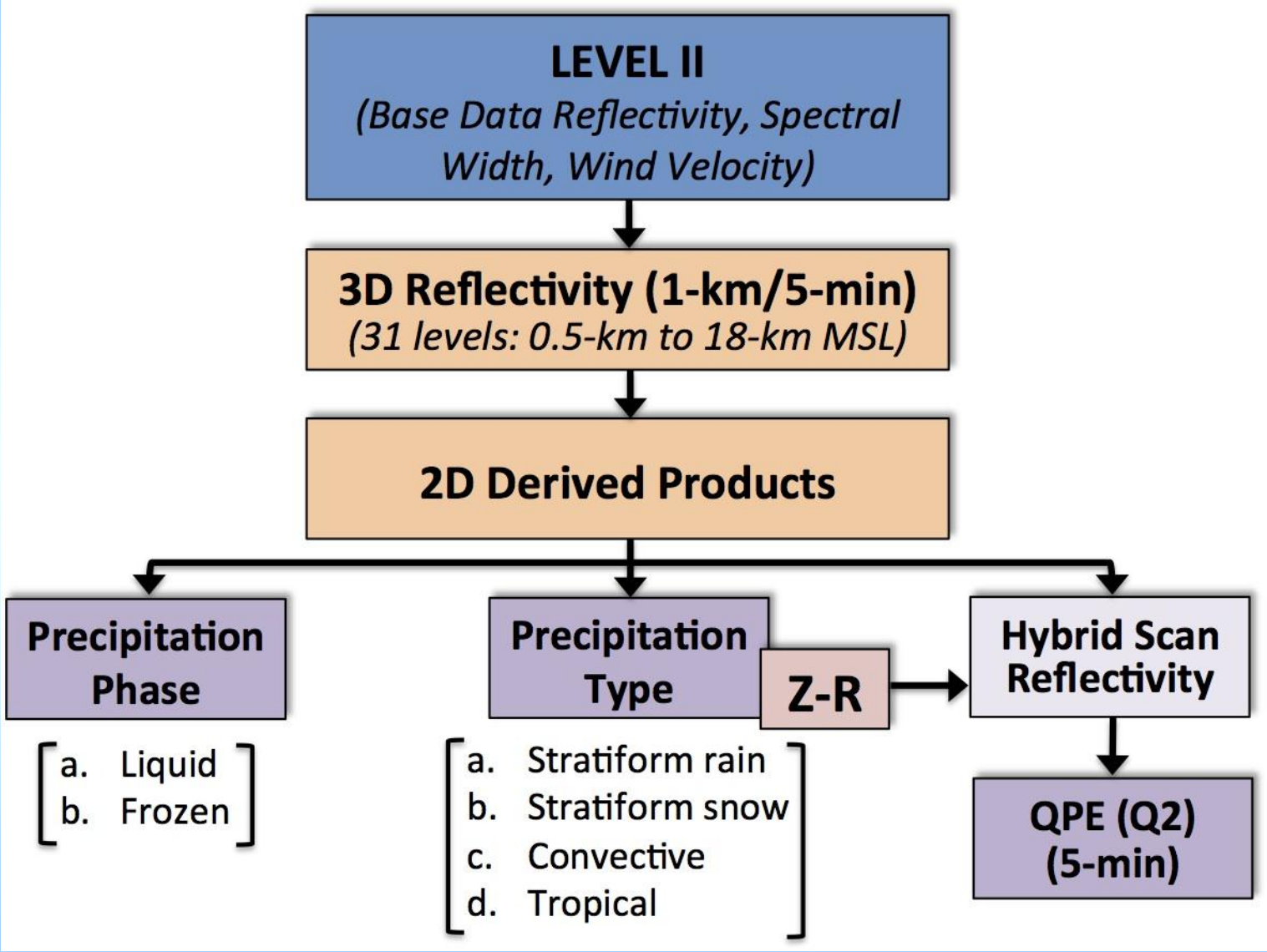
Outline

- Project Description
- Production and QA Approach
- Applications
- Schedule & Issues

Project Description
National Mosaic and Multi-sensor QPE

- Developed at the National Severe Storms Laboratory (NSSL) in Norman, OK
- Estimate of precipitation
  - Primarily surface radar-based
  - Incorporates RUC model data and gauge networks
  - Residual products – Reflectivity, Hail, Phase, Type
- Represents significant step in resolution
  - 0.01 degree (1 km spatial resolution)
  - 5-minute temporal resolution

NMQ


LEVEL II
(Base Data Reflectivity, Spectral Width, Wind Velocity)
3D Reflectivity (1-km/5-min)
(31 levels: 0.5-km to 18-km MSL)
2D Derived Products
Precipitation Phase
a. Liquid
b. Frozen
Precipitation Type
a. Stratiform rain
b. Stratiform snow
c. Convective
d. Tropical
Z-R
Hybrid Scan Reflectivity
QPE (Q2) (5-min)

Project Description

CDR(s) (Validated Outputs)	Period of Record	Spatial Resolution; Projection information	Time Step	Data format	Inputs	Uncertainty Estimates (in percent or error)	Collateral Products (unofficial and/or unvalidated)
- 3-D Reflectivity - 2-D Reflectivity - Precip Estimate	1998-present	1kmx1km	5 min	Netcdf	NEXRAD Level II RUC DEM Rain Gauge	??? - Still in research phase	-Reflectivity -Hail size -Echo Top -Bright Band -Precip Type -Precip Phase

Production Approach

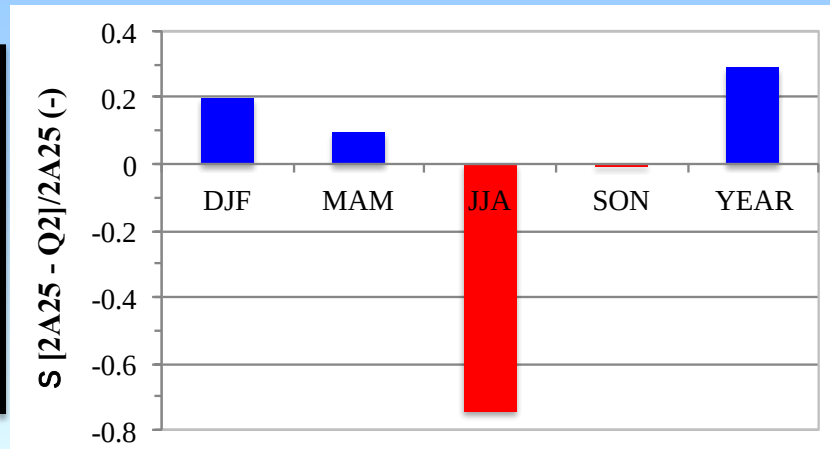
- Describe at a high level what goes into it creating the CDR (2-3 slides):
  - Input – NEXRAD Level II, Rapid Update Cycle (RUC), Rain Gauge, and Digital elevation data
  - NEXRAD and RUC -> 3-D Reflectivity Mosaic (Cube)
  - 3-D Reflectivity mosaic, DEM and R.G. -> Precip estimates
  - Uncertainty – R.G. based approach (cross validation)
  - Challenges – Still in beta mode. Pilot approach to transfer tools, algorithms, and knowledge. Now studying expansion and scaling to CONUS

Quality Assurance Approach

- Describe how you determine product quality for each successive time period (e.g., day/week/month) used to extend the long term record
  - QC built into the reflectivity processing – RUC data used for temperature profile – AP mitigation
  - Initial QA check is a visual inspection of the daily precipitation accumulation files.
  - If problems in the daily files than an invesitgation into the hourly files is made.

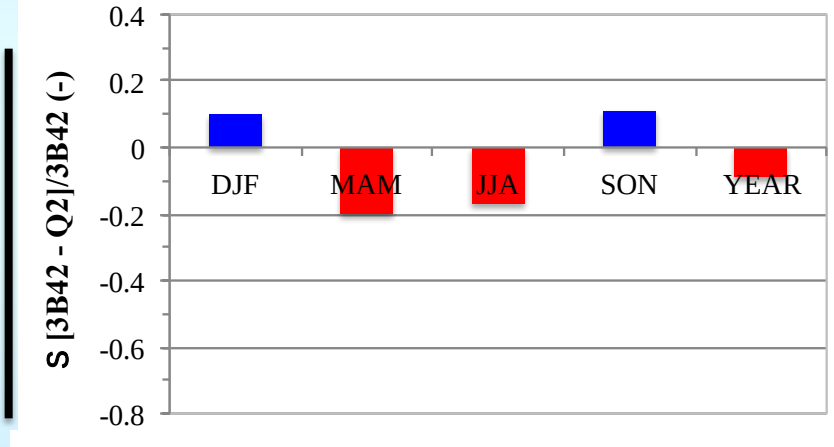
Seasonal differences TPR 2A25 | TMPA 3B42 | NMQ

TPR vs. NMQ



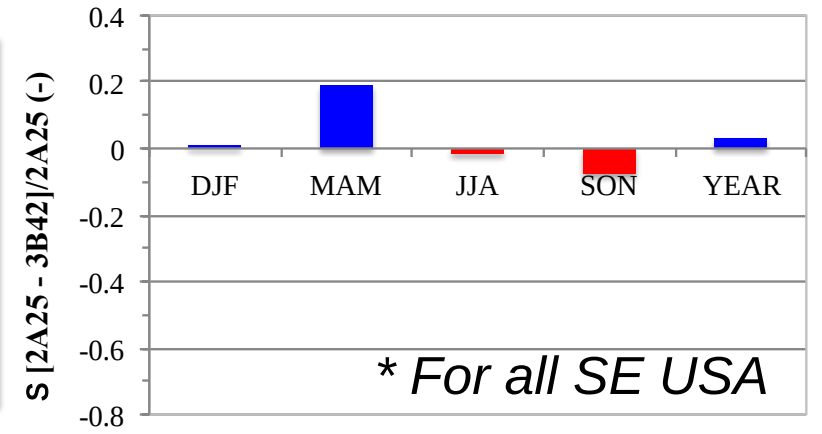
- ❑ WINTER & SPRING : TPR > NMQ
- ❑ SUMMER & FALL : NMQ > TPR

TMPA vs. NMQ



- ❑ WINTER & FALL : TMPA > NMQ
- ❑ SPRING & SUMMER : NMQ > TMPA

TPR vs. TMPA



- ❑ **YEAR : TPR > NMQ > TMPA**

Applications

- Agriculture
  - Modeling for Crop Yields– Roberts NCSU Ag Dept
- Satellite QPE validation/verification
  - GPM/TRMM – Prat and Nelson, Amitai
- Engineering applications
  - Salinity – Barataria Bay – Habib et al J. Hydrol 2008 Vol 350
  - South Florida Water Management District
- Drought Monitoring
- Birds Bats Bees
  - Migration – BAMS article May 2012 93 (5) – Chilson et al.

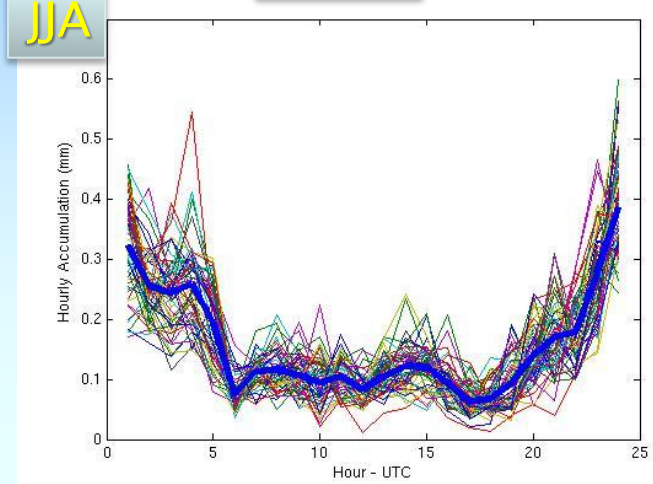
Diurnal Cycle

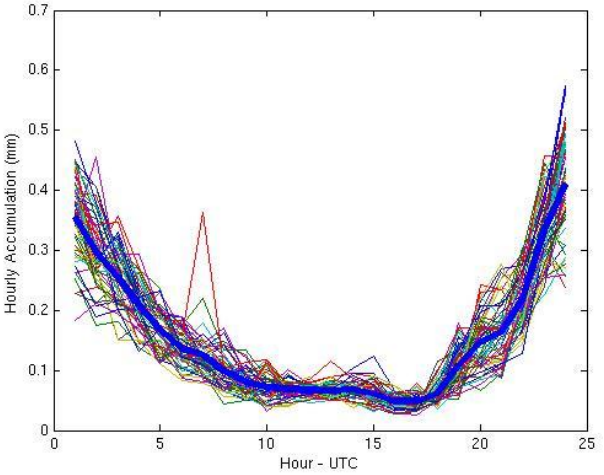
- Pattern
- Peaks
- Bias

Gauge

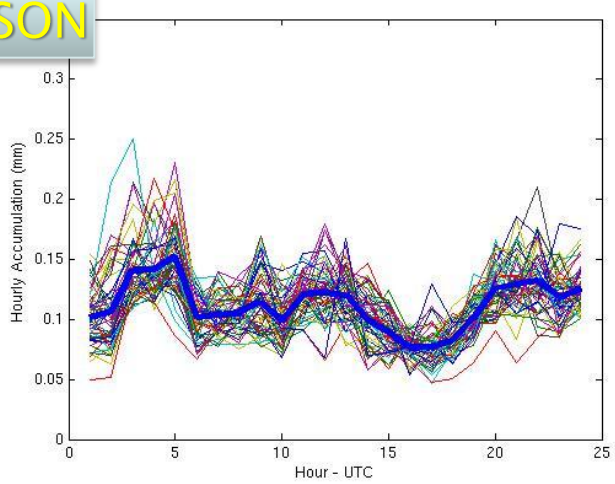
NMQ

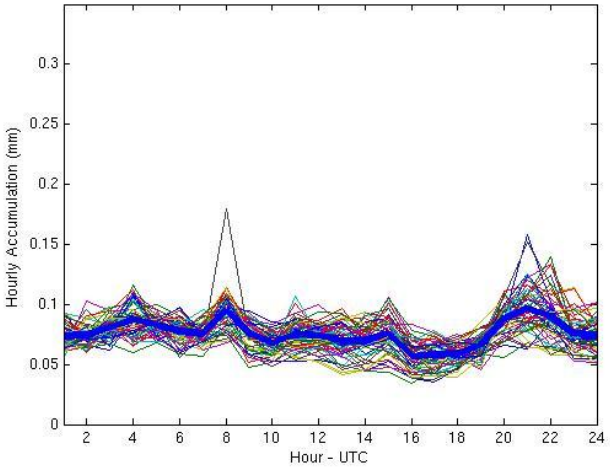
JJA





SON





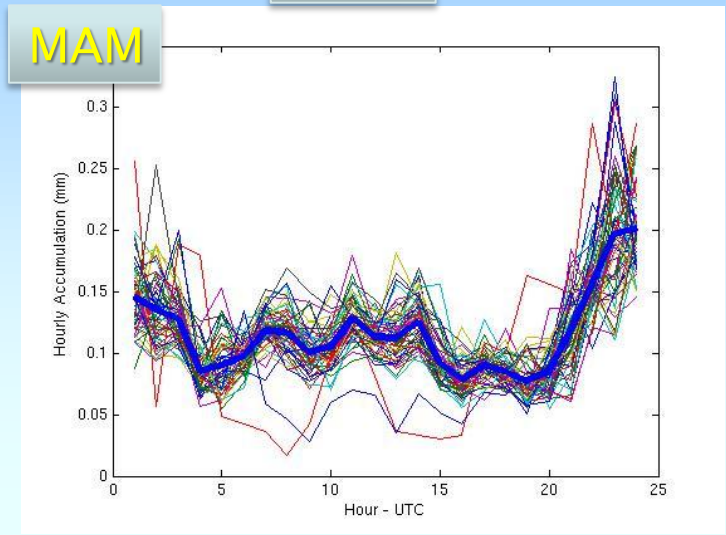
Diurnal Cycle

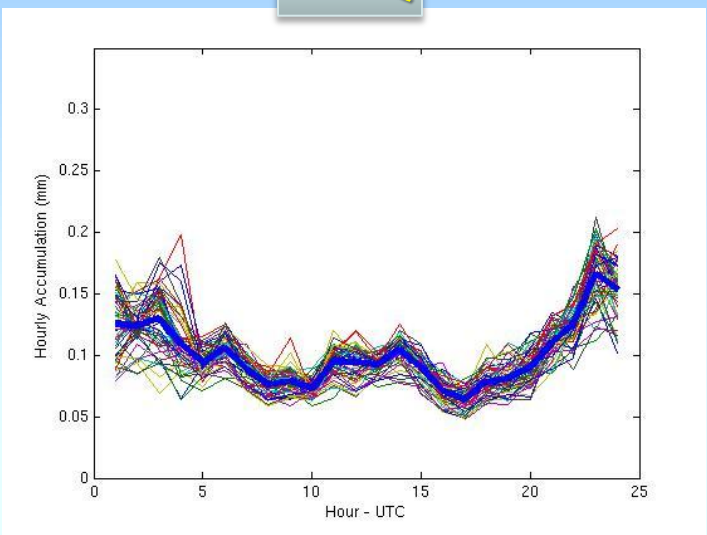
- Pattern
- Peaks
- Bias
- Frozen

Gauge

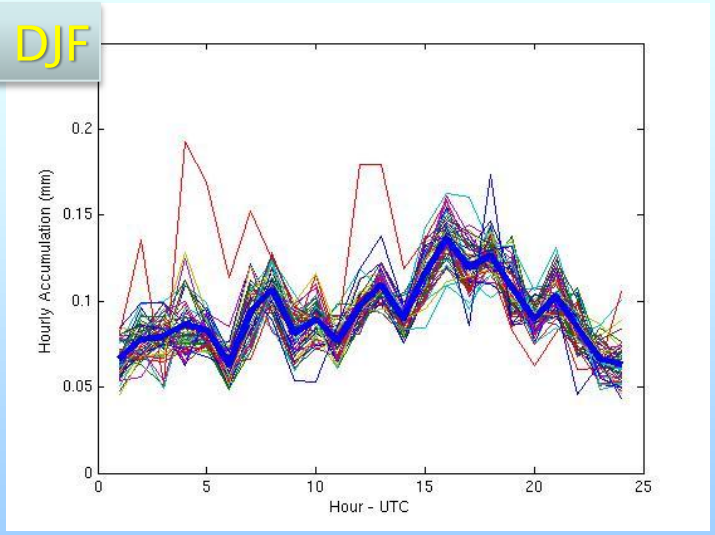
NMQ

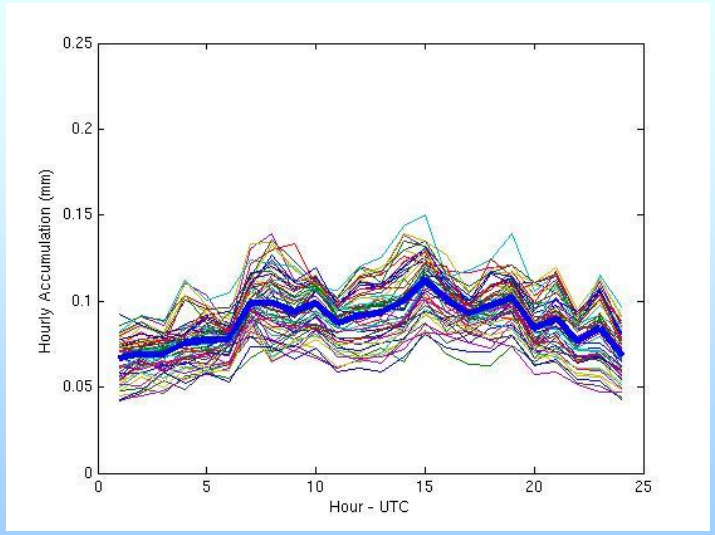
MAM





DJF

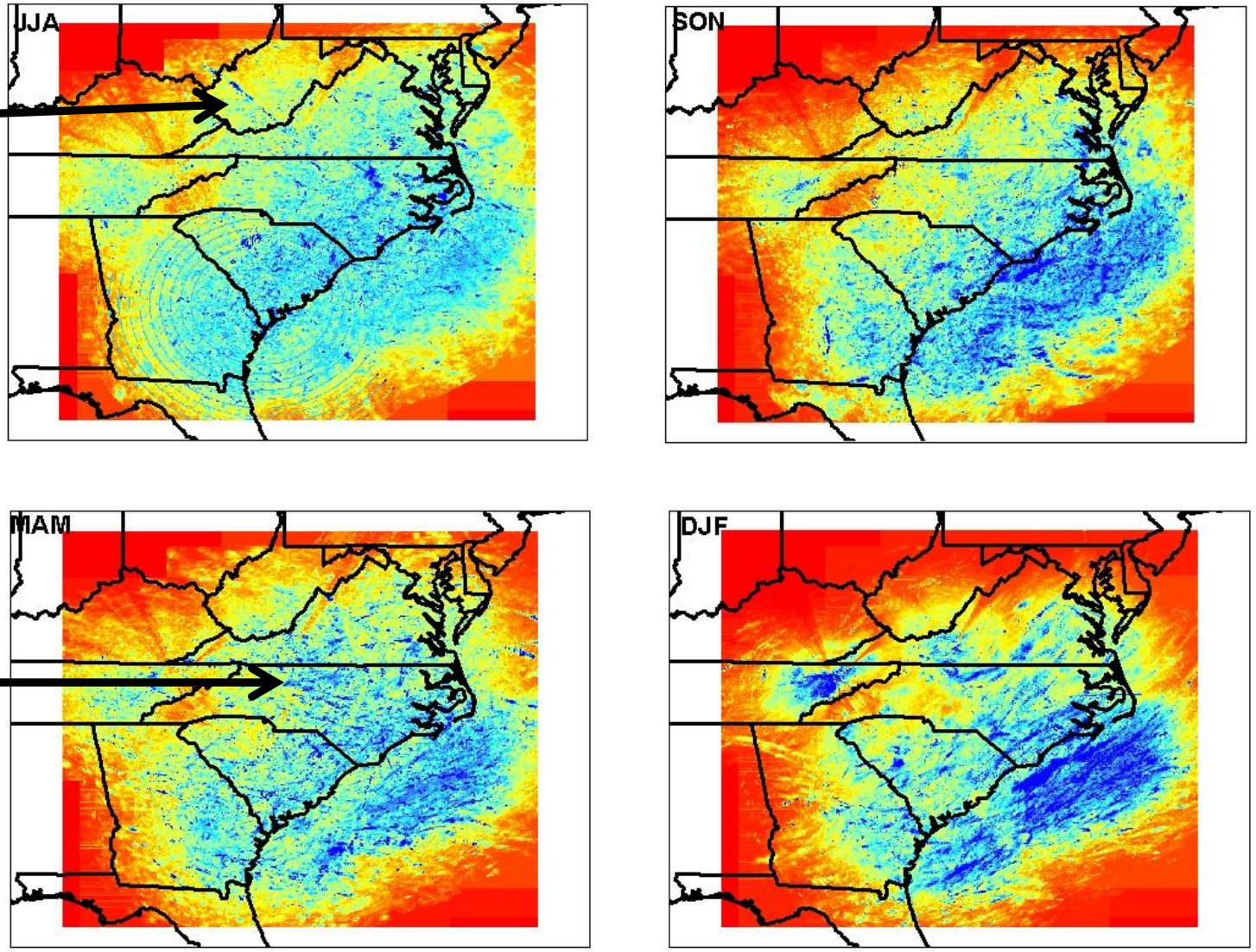




Maximum Hourly Precipitation

Storm Track

Seasonal Distribution Of Storms



Schedule & Issues

- State project status and plans for next phase of the project
  - Project has been shown to work as a proof of concept. The next phase is to investigate expanding the project to the CONUS.

- State any risks or concerns
  - 10 radar pilot domain -> 144 radar CONUS domain provides many challenges.
  - How does this project scale in terms of data management
  - How does the project scale in terms of data processing
  - How does the project scale in terms of data analysis

- How can the CDR Program better assist you?
  - Processing and reprocessing requires massive compute resources
  - Keep providing funds to CICS for advances in high performance computing