Verifying CORe 3-Hourly Precipitation against MRMS Multi-Sensor Radar Observations over CONUS

2023-01-02

Objectives

- Objective:

  To evaluate the CORe precipitation at its native temporal and spatial resolution (3-hourly / Gussian grid) through comparison against the MRMS Multi-Sensor (MRMS-MS) radar based quantitative precipitation estimates (QPE) over the CONUS

- Features to be examined:

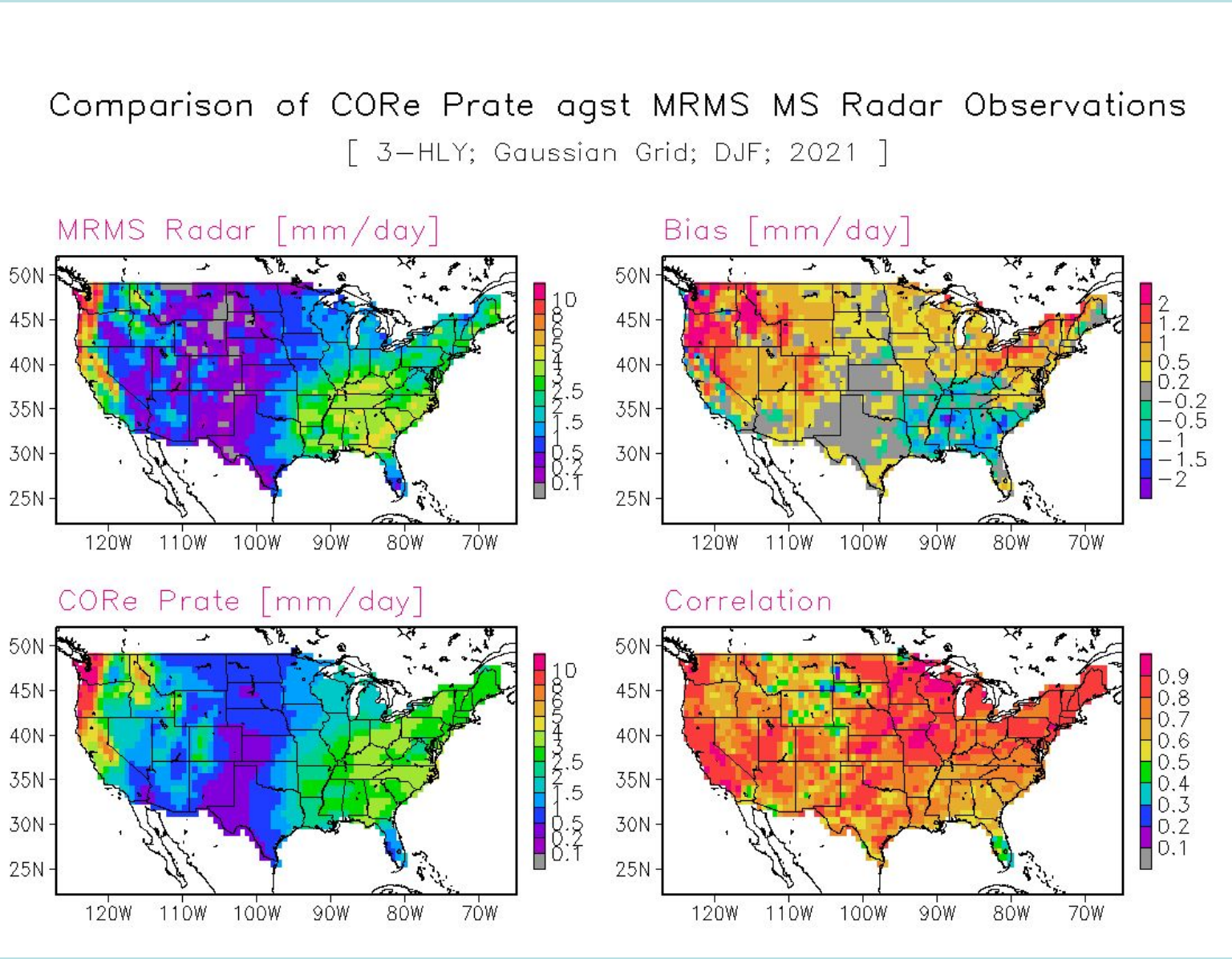
  - *Overall quantitative accuracy;*
  - *Performance to represent precipitation of various intensity;*
  - *Capacity to capture and quantify diurnal cycle;*

MRMS Multi-Sensor QPE

- MRMS:
  - *Multi-Radar Multi-Sensor observation-based precipitation estimates;*
- MRMS Multi-Sensor (MRMS MS):
  - *Radar based estimates bias corrected against gauge observations;*
  - *Gaps filled with gauge analysis over mountainous regions;*
  - *1kmx1km spatial resolution over CONUS;*
  - *Hourly temporal resolution from later 2020;*
- *MRMS MS Used in This Study:*
  - *Data for 2021;*
  - *Integrated to CORe grid and 3-hourly accumulation to match with the CORe data;*
  - *CONUS land only;*

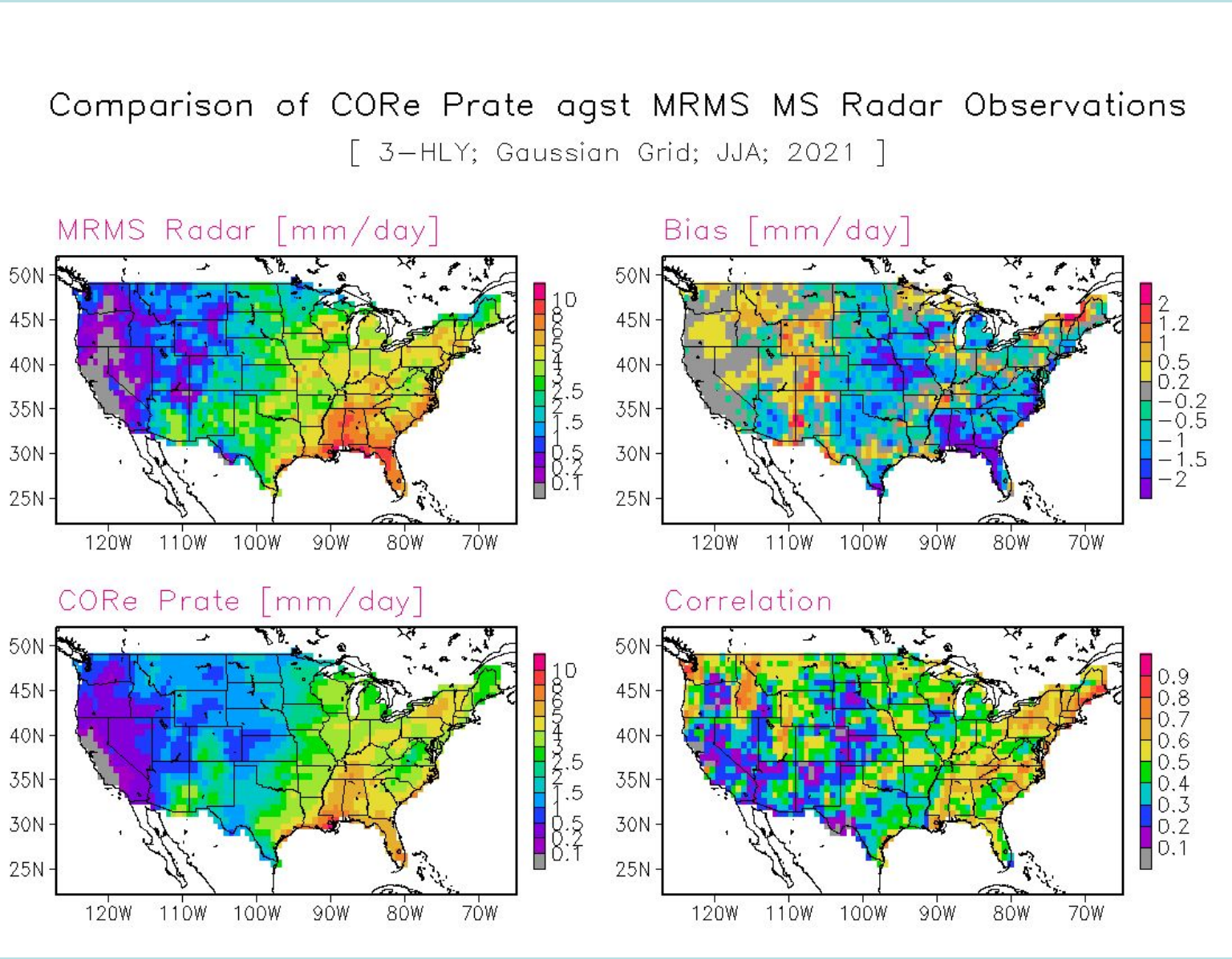
Spatial Performance of 3 Hurly Time Series

1) DJF



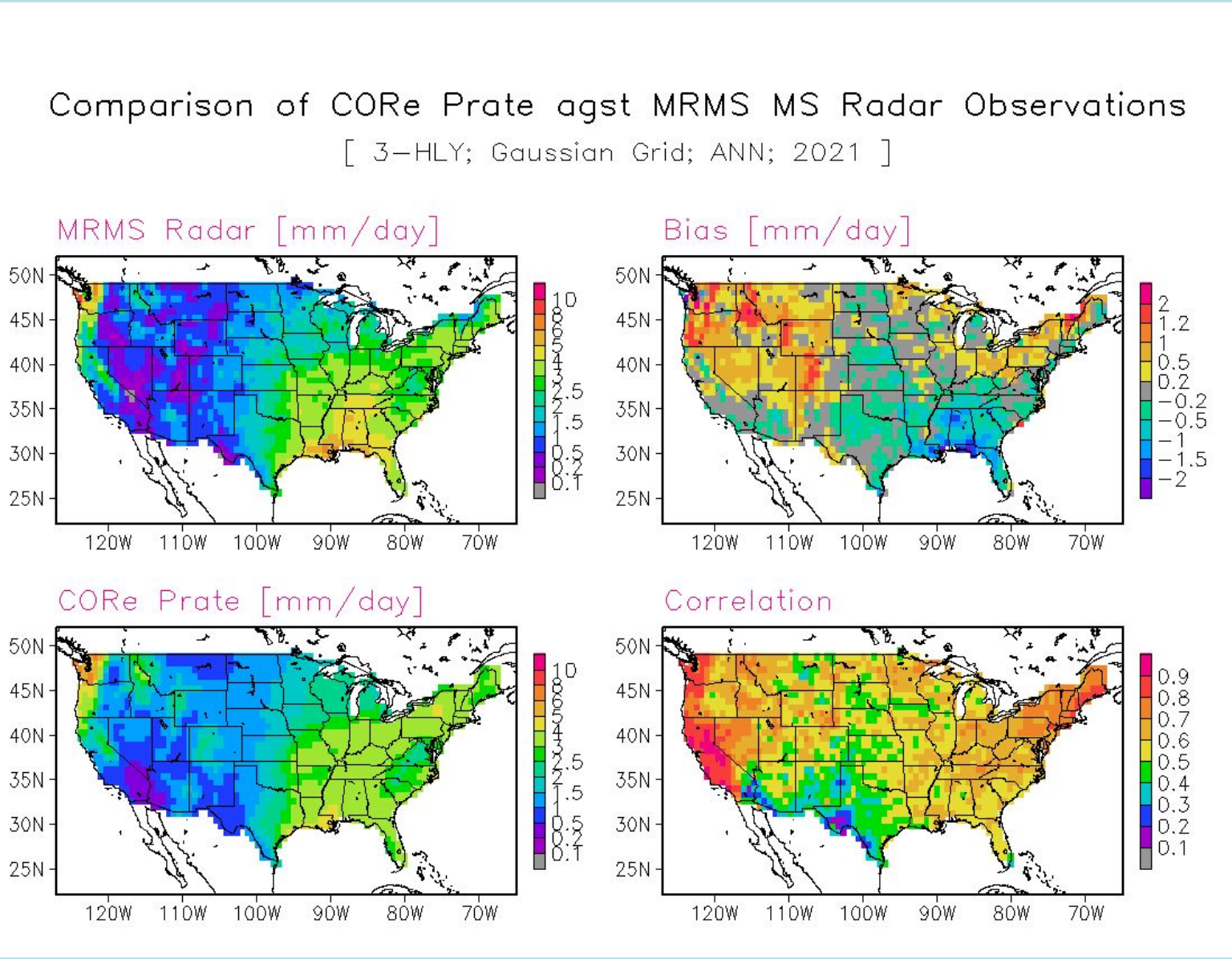
Spatial Performance of 3 Hurly Time Series

2) JJA

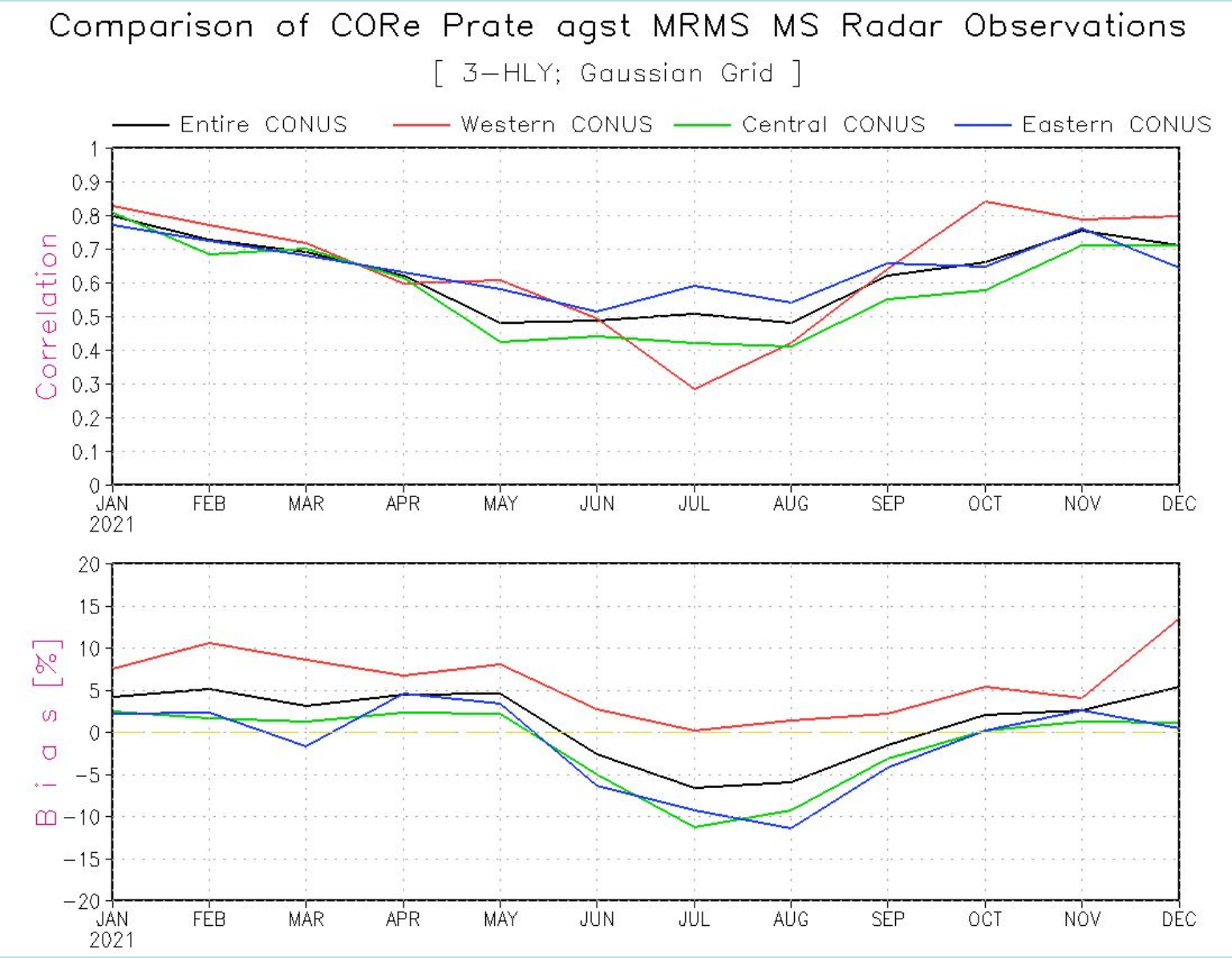


Spatial Performance of 3 Hurly Time Series

3) All Seasons

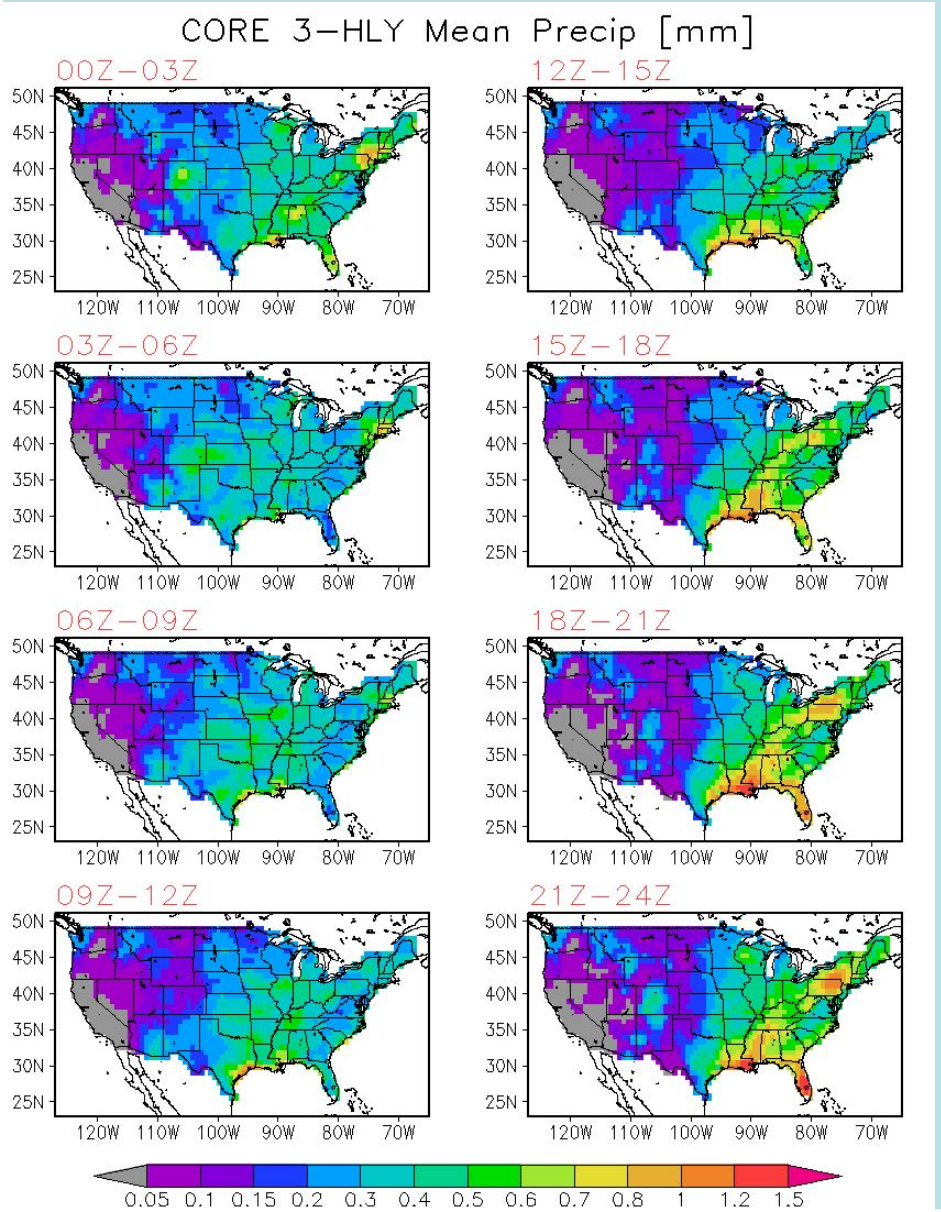


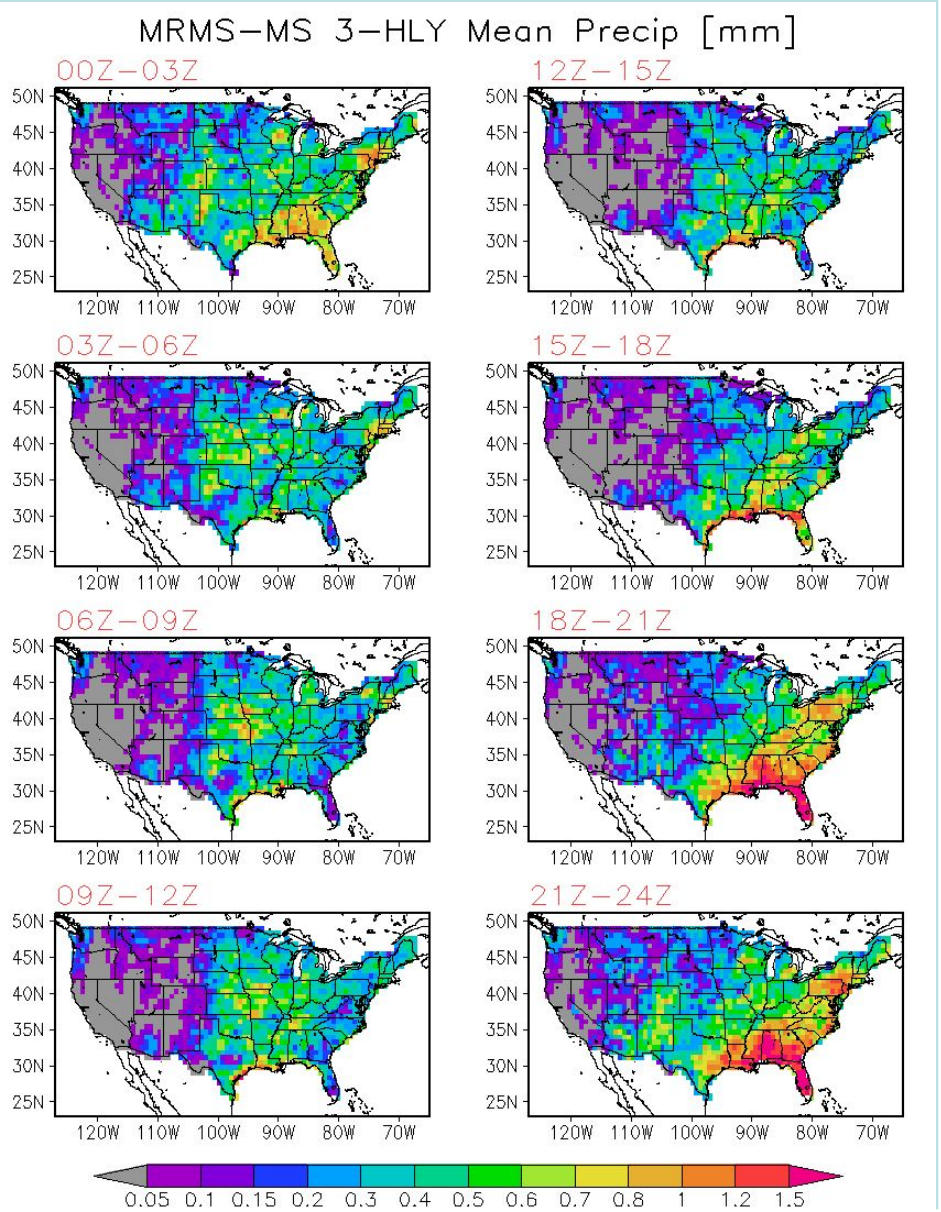
Temporal Variations of Spatial Agreements



Diurnal Cycle During Warm Seasons

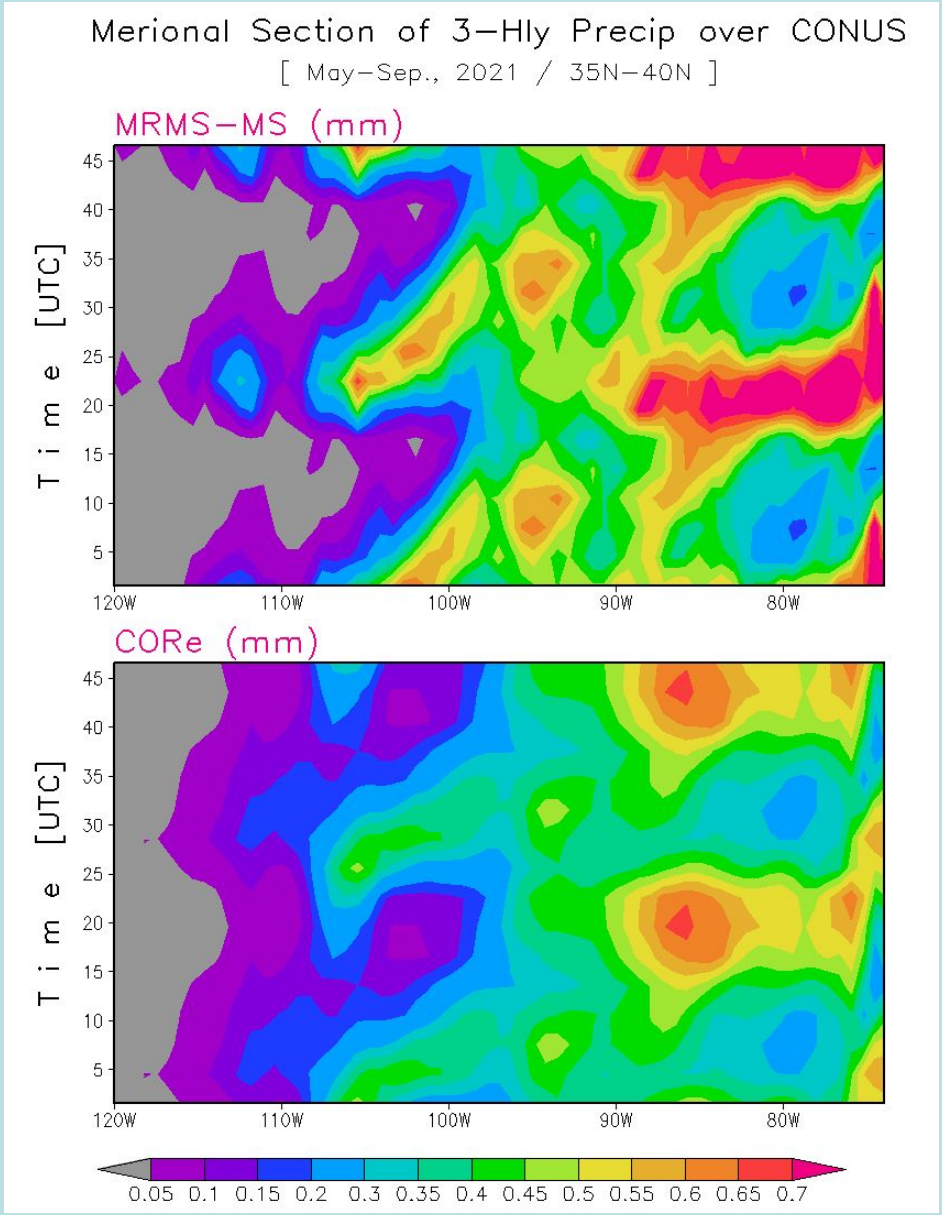
1) Seasonal Mean 3-hourly Precipitation





Diurnal Cycle During Warm Seasons

2) Merional Cross Section over [35°N-40°N]

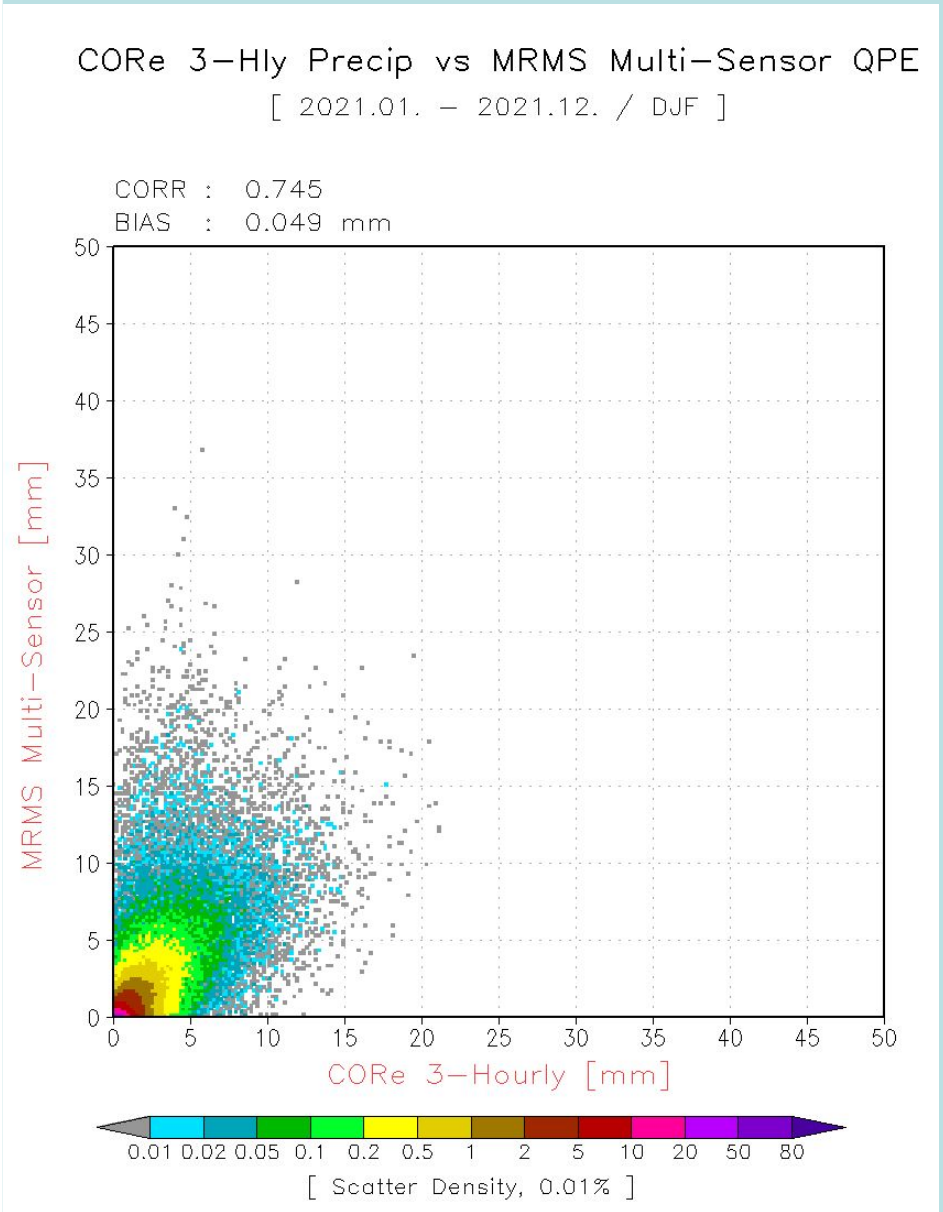


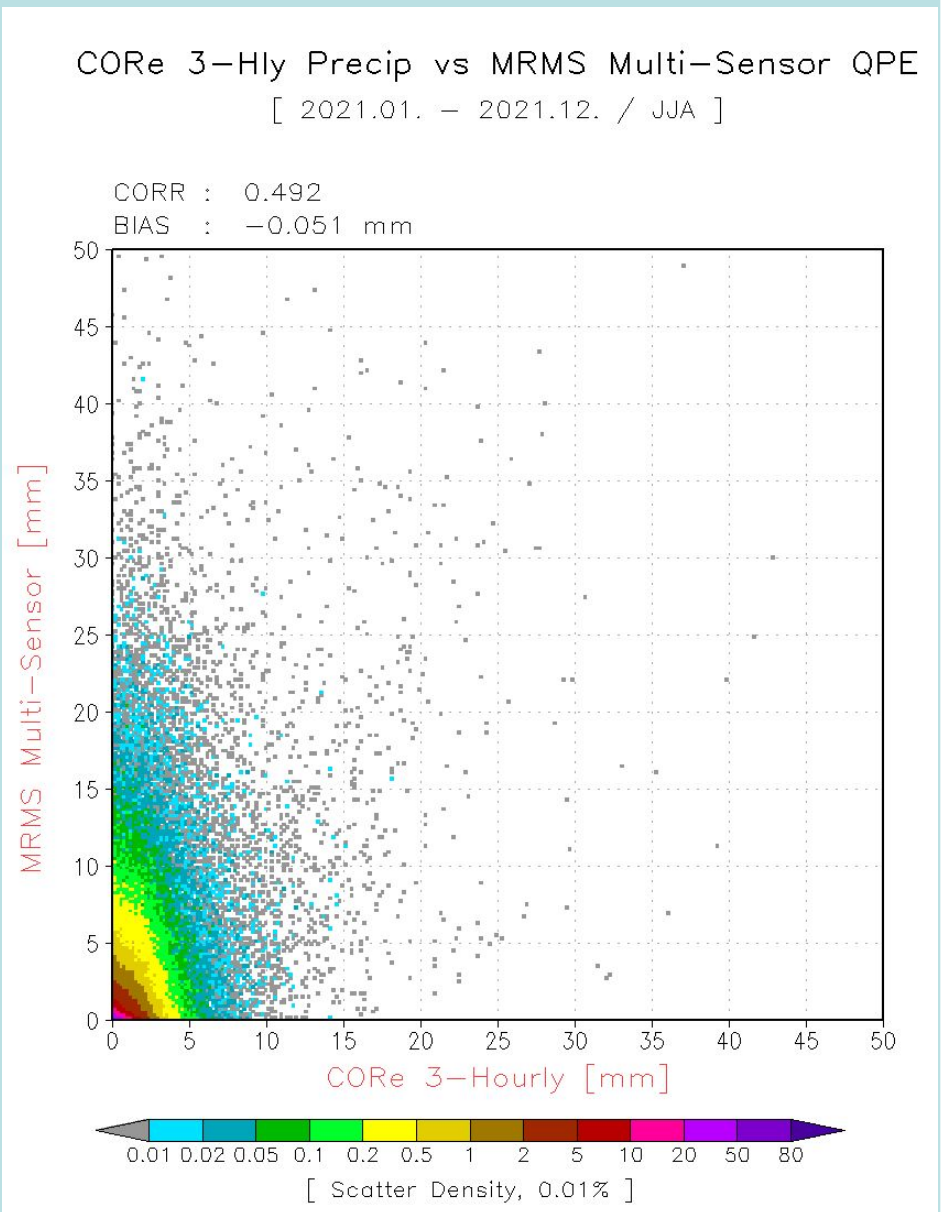
X Axis:
Longitude

Y-Axis:
Time in UTC,
repeated for two diurnal cycles

Quantitative Accuracy

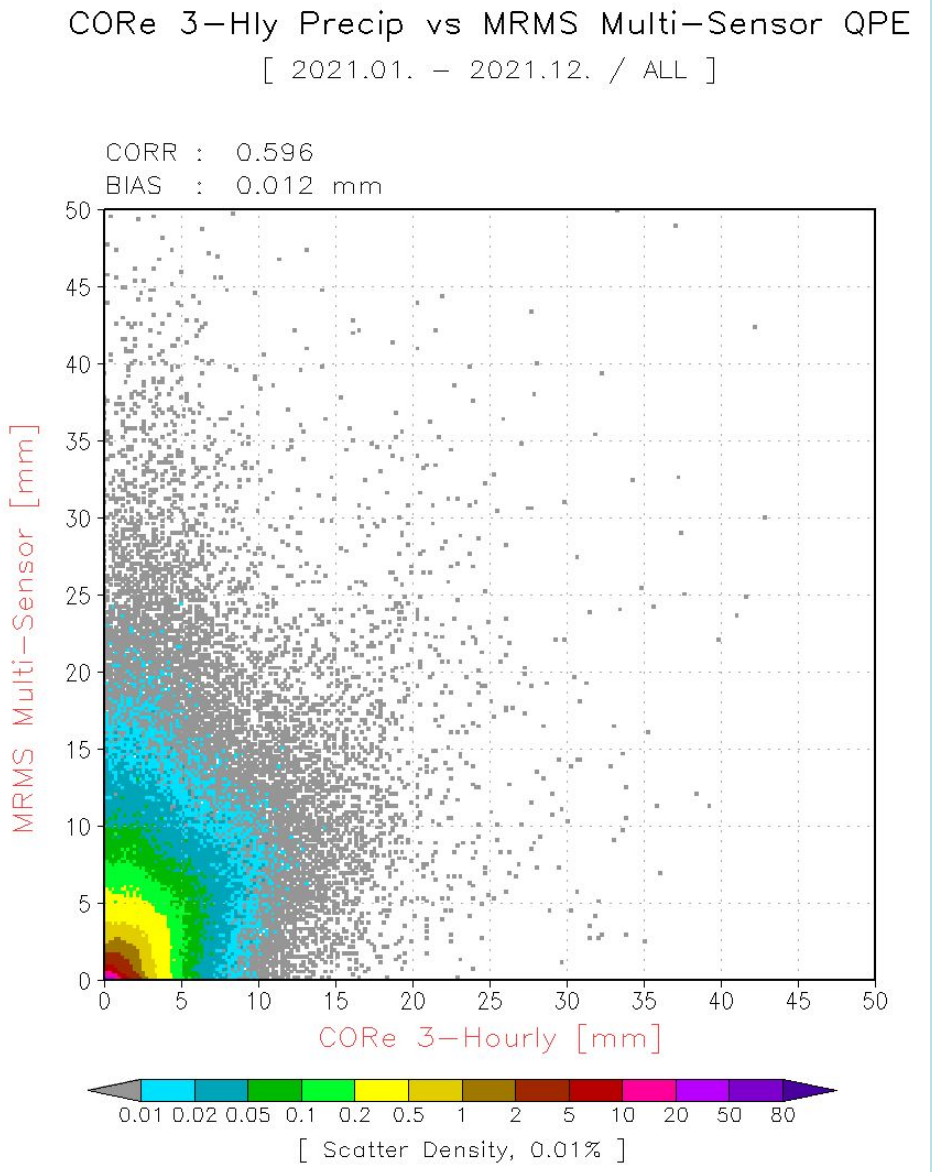
1) Scatter Density Plots

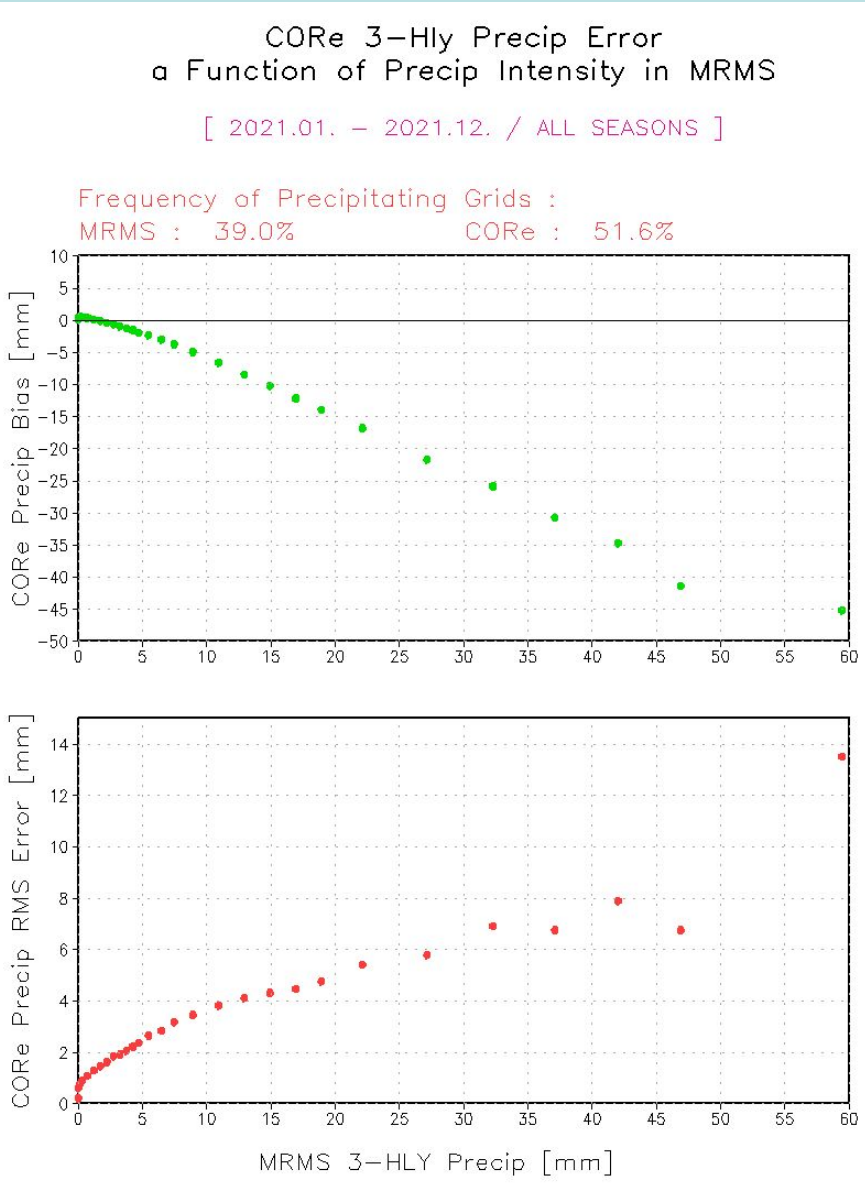




Quantitative Accuracy

2) Error as a Function of Precipitation Intensity for All Seasons





Summary

- Overall, CORe performs quite well in capturing the temporal / spatial variations of precipitation at its native resolution;
- Performance is better for precipitation over eastern CONUS and for cold season and degraded for precipitation over the western mountainous regions and during summer;
- Diurnal cycle of precipitation caused by the propagation of convective systems over the central CONUS and by the land-sea contrasts over the eastern regions is captured reasonably well bur with reduced magnitude;
- CORe tends to generate wider raining areas, under-/over-estimate the heavy / light precipitations compared to the observations;
- This work will be re-conducted when the CORe data are available for 2022;