Combining GLM and ABI Data for Enhanced GOES-R Rain Estimates

Robert Adler, Weixin Xu
and Nai-Yu Wang

CICS/University of Maryland

After two years:

- Established lightning/rain relations useful for application to GLM/ABI algorithm (paper published)
- Developed an IR technique and IR + Lightning technique with application to and evaluation by TRMM data (paper submitted)
- Examined value of lightning in convective-stratiform delineation in PMW retrievals (paper published)

IR-based Convective/Stratiform Technique (CST)

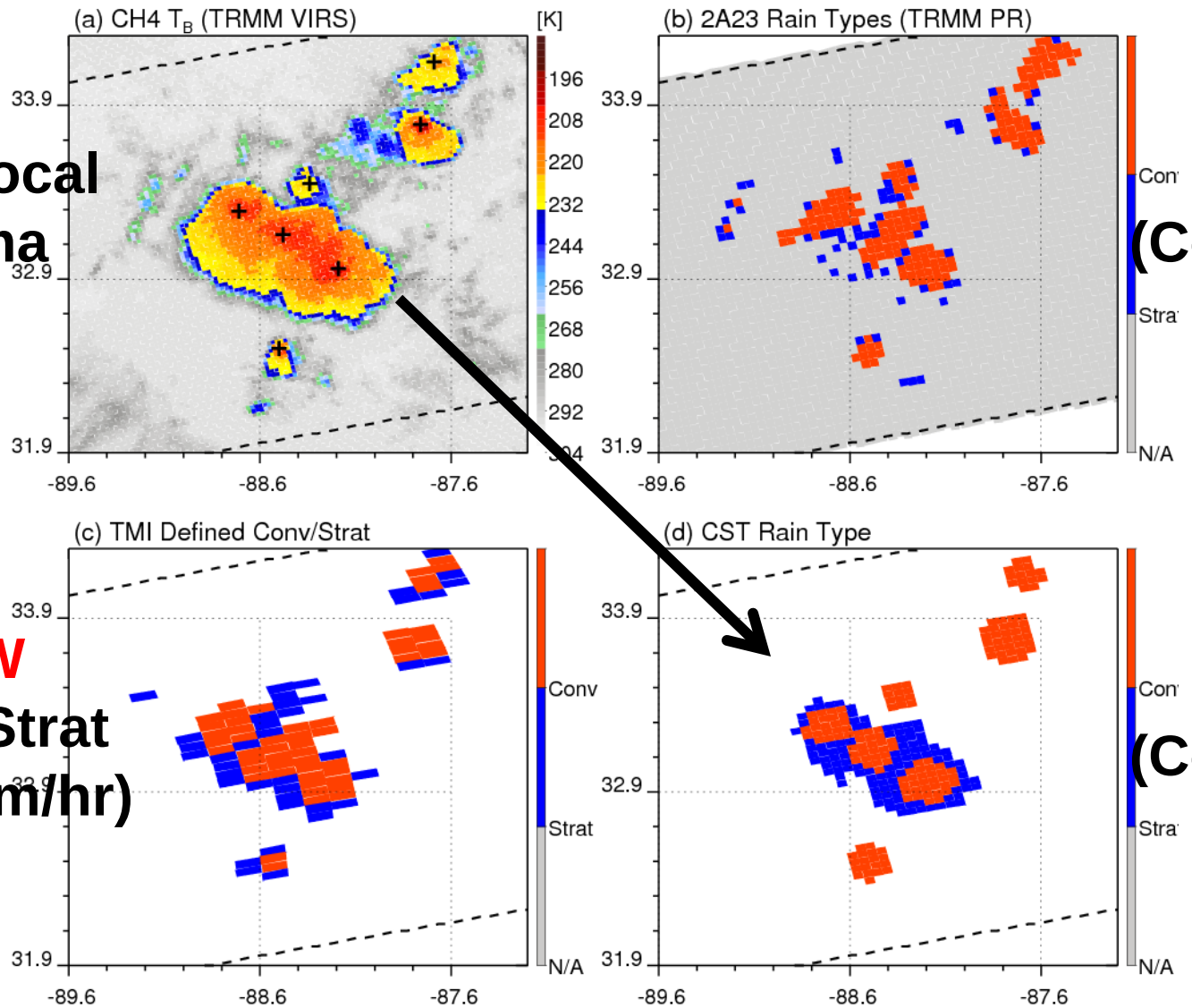
CST catches convective (heavy rain) cores very well in young convective cells—even without lightning

IR Tb, local minima

Radar (Conv/Strat)

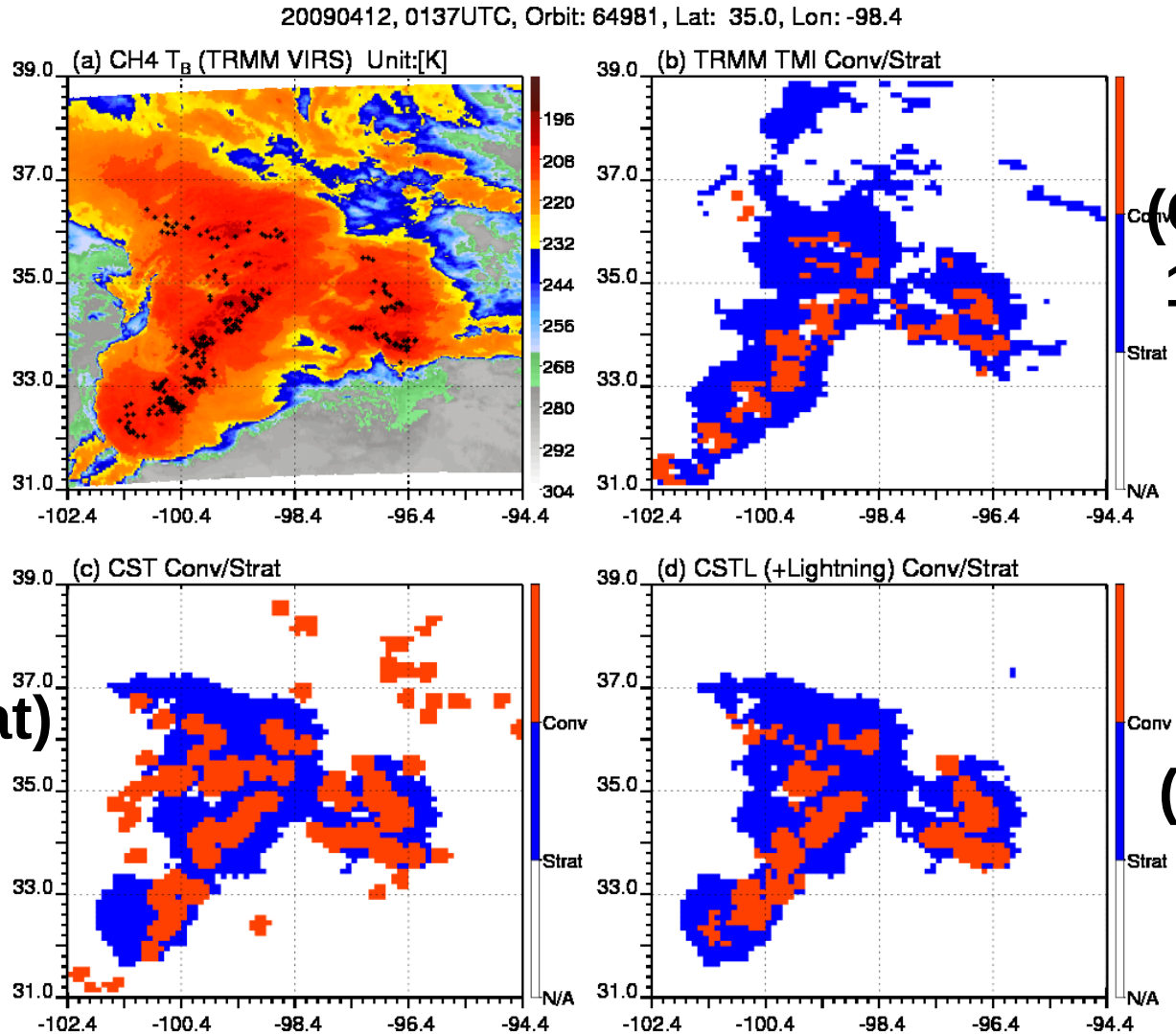
PMW (Conv/Strat by 10 mm/hr)

CST (Conv/Strat)



CST Issues and Addition of Lightning (CSTL)

CST confused by thick cirrus, thick anvil debris, or large MCS cloud shield. Lightning help to solve these issues.



IR Tb

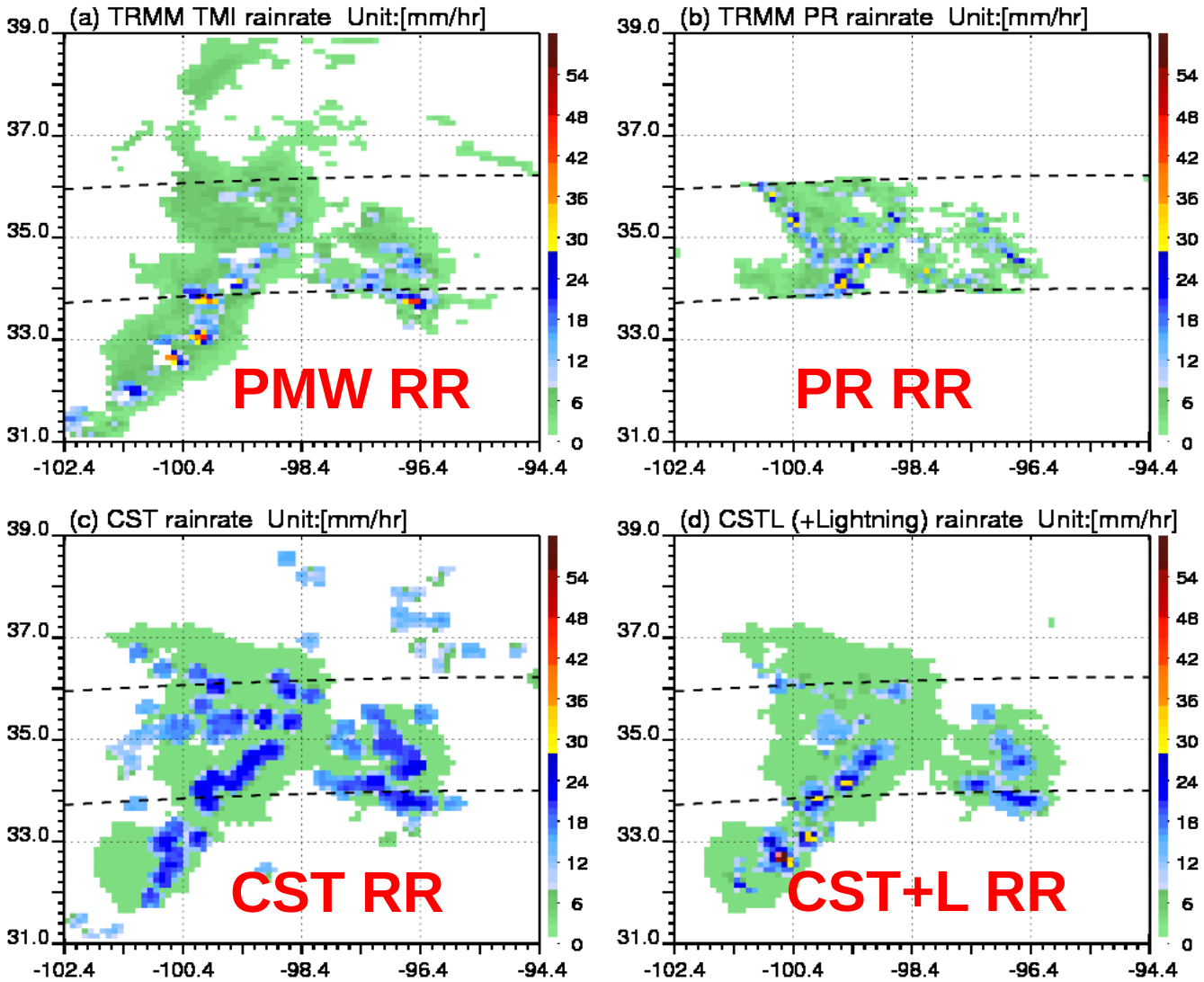
PMW (Conv/Strat 10 mm/hr)

CST (Conv/Strat)

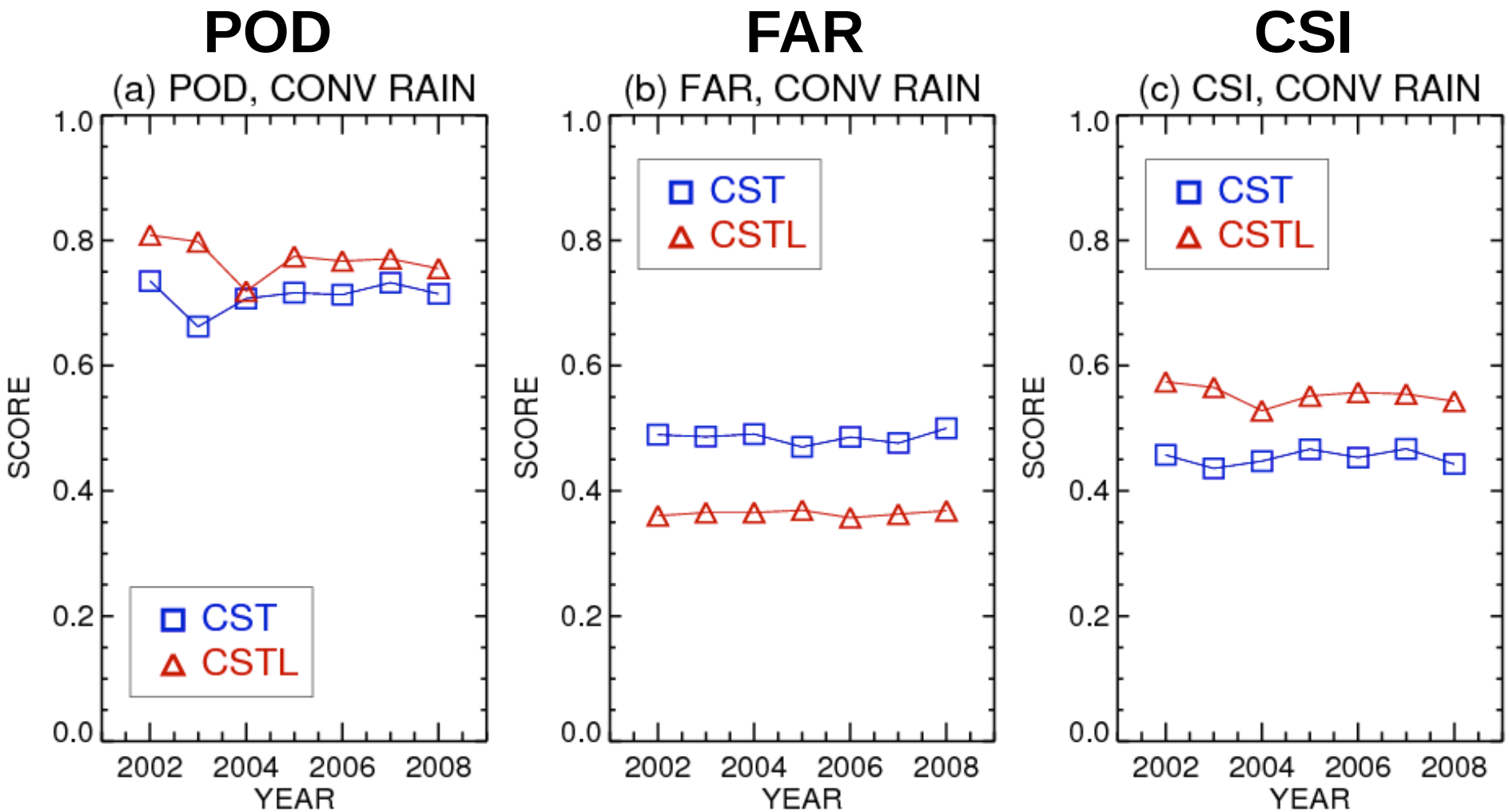
CST + Lightning (Conv/Strat)

CST and CST+L Instant Rainrate Estimates

CST: Tb gradient for C/S; Rainrate as a function of Tb.
CSTL: exist of L. for C/S; Rainrate by Tb and L. density.

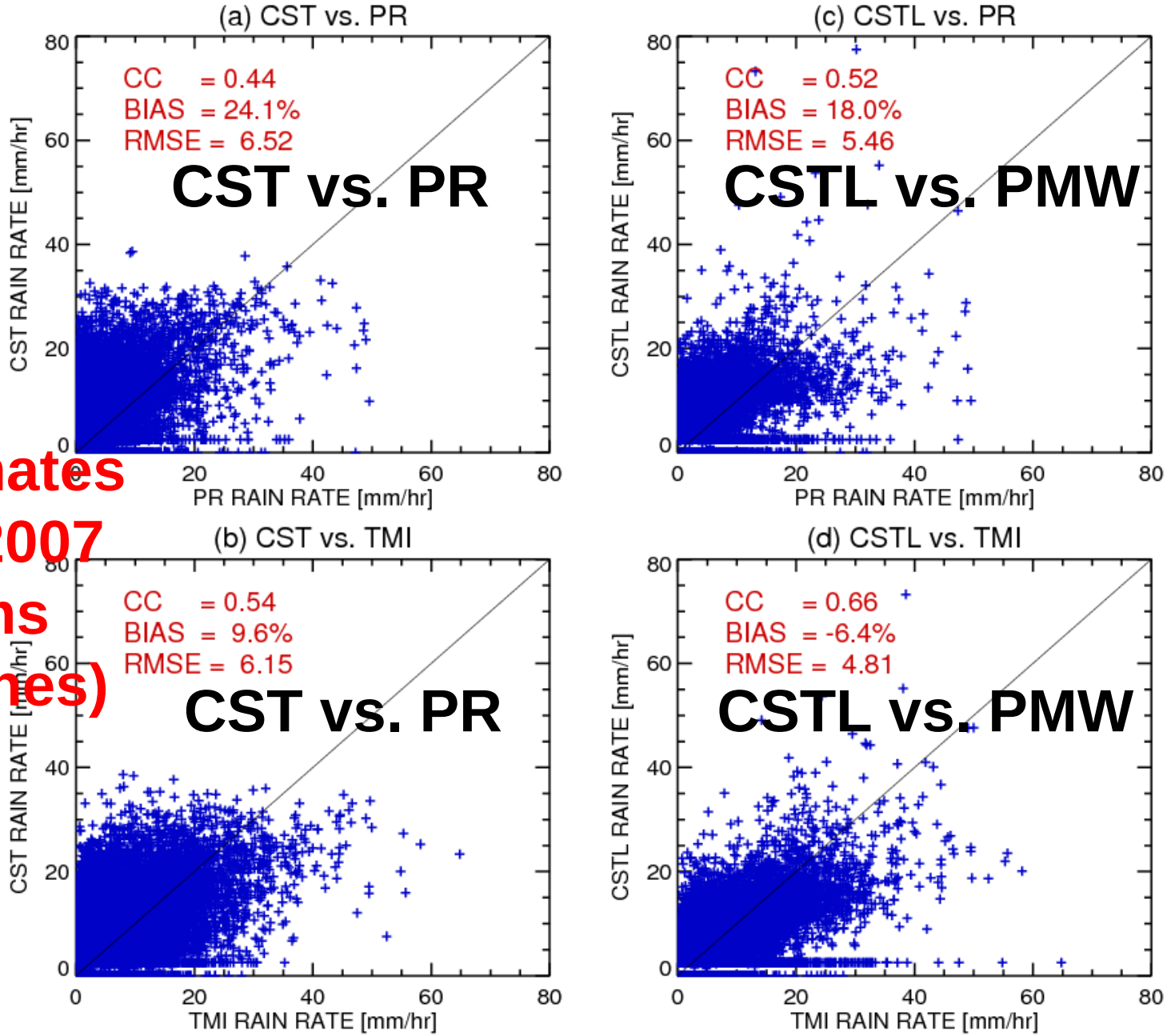


CST vs. CSTL (+ L) on Convective Rain



Lightning info. consistently improves the convective detection (POD) by 8%, lowers the false alarm (FAR) by 30%.

CST vs. CSTL (+ L) on Instant Rainrate (20km)



RR estimates in May 2007 (Storms > 5 Flashes)

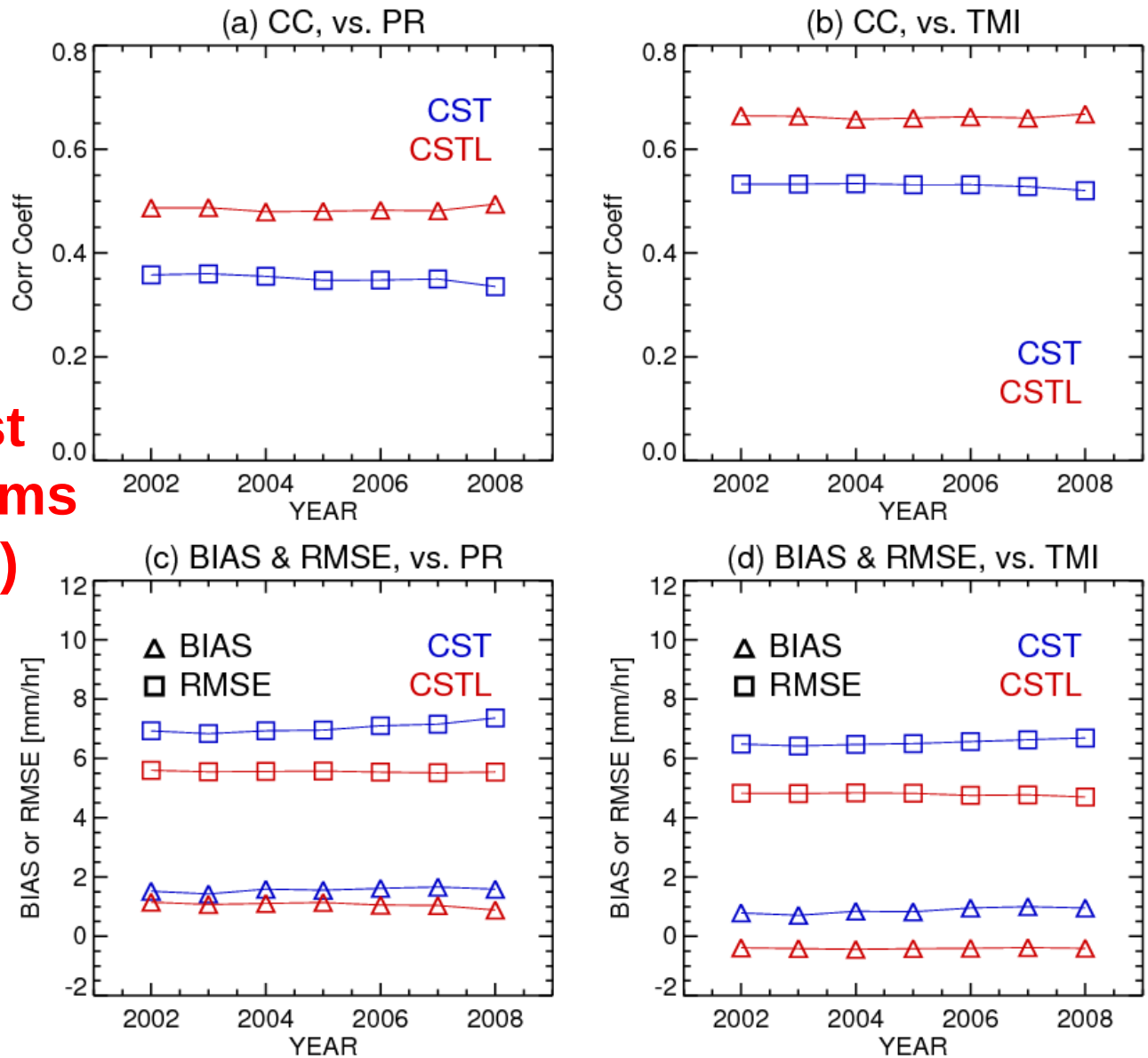
CST vs. CSTL (+ L) General Statistics (20km)

vs. PR **vs. PMW**

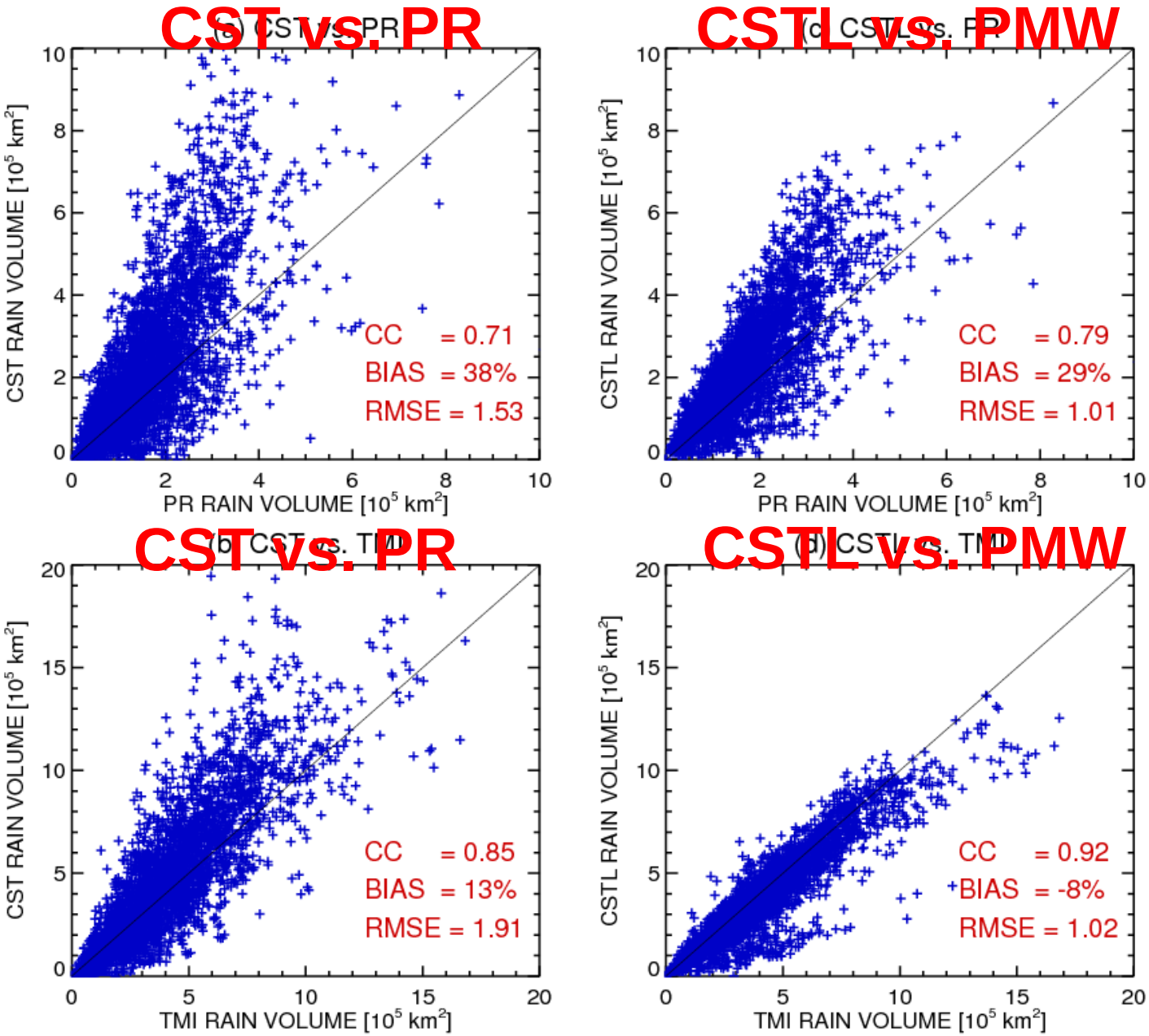
Corr. Coeff.

2002-2008 May-August (CONUS storms > 5 flashes)

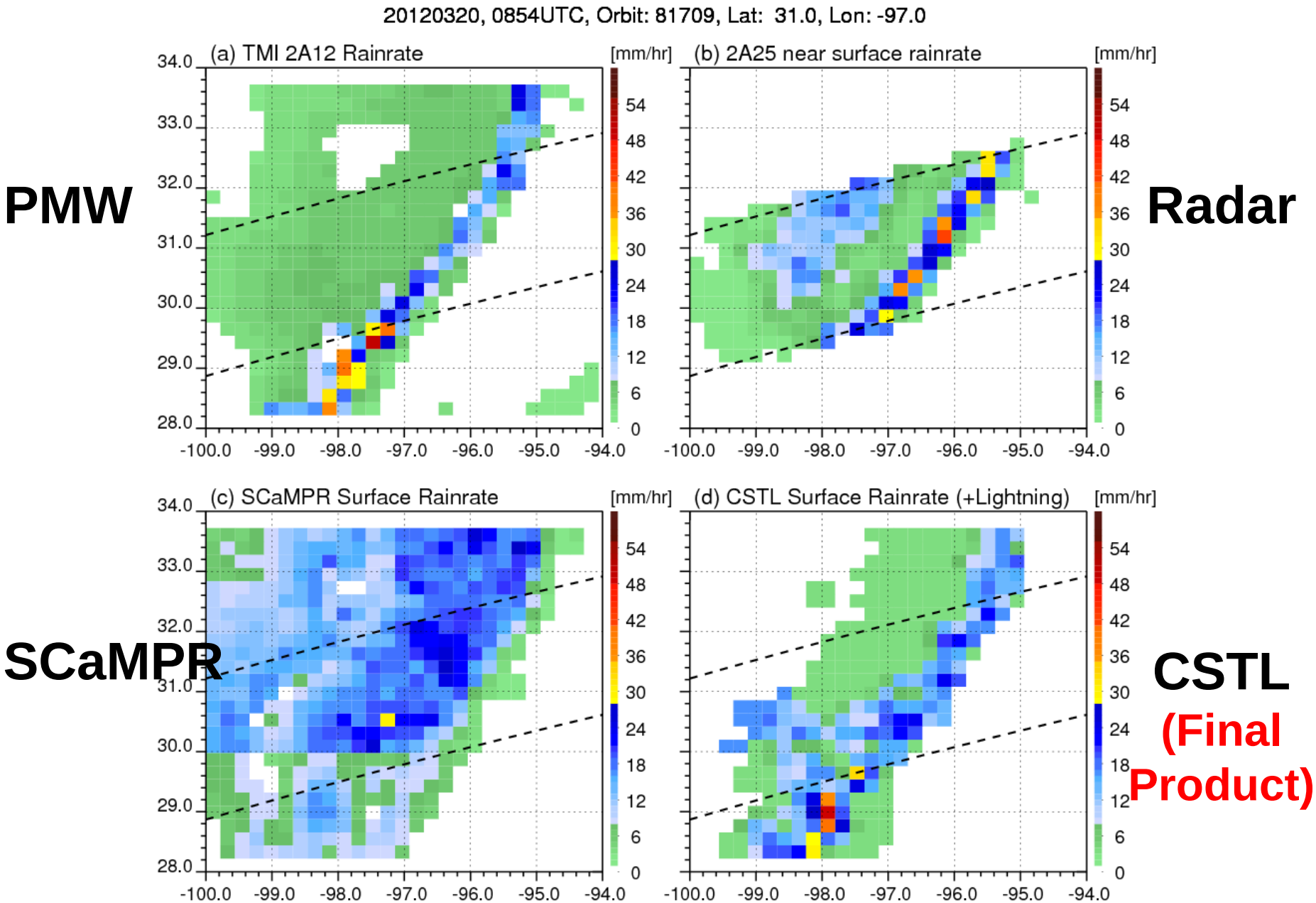
BIAS and RMSE



CST vs. CSTL on Total Rain Volume (800x800 km^2)

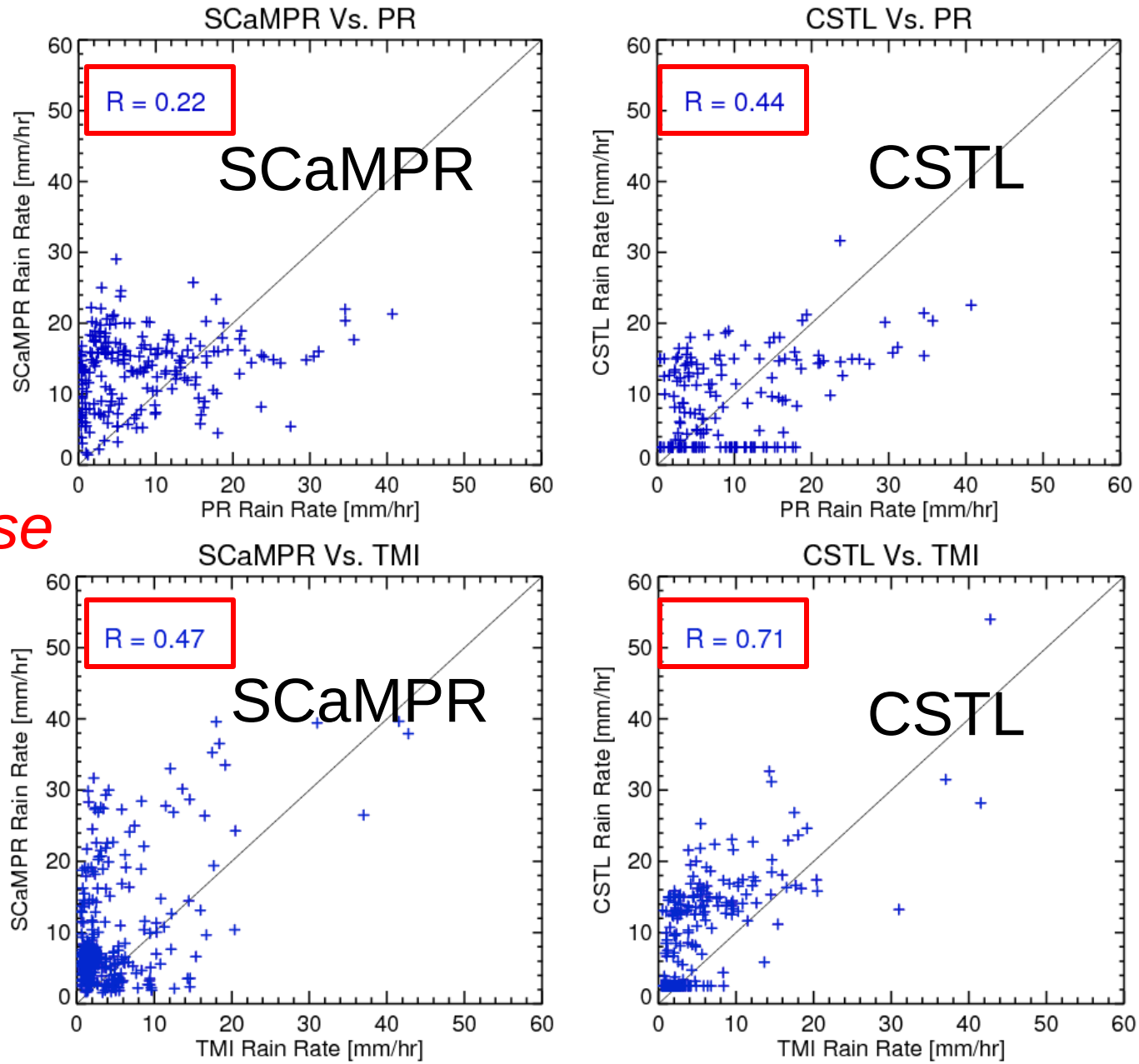


Example: CSTL Vs. SCaMPR RR (20 km)



Example statistics: CSTL Vs. SCaMPR

Vs. PR

One Case

Vs. PMW