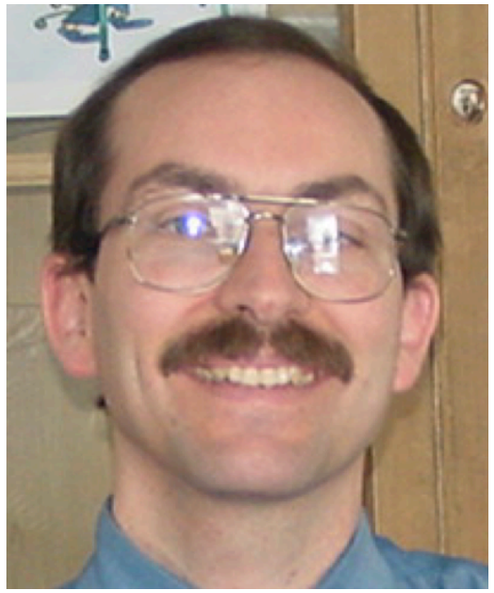
MAPLE, O-MAPLE, P-MAPLE, MAPLES

Isztar Zawadzki, McGill University

WORK OF A TEAM

Urs Germann

Alan Seed

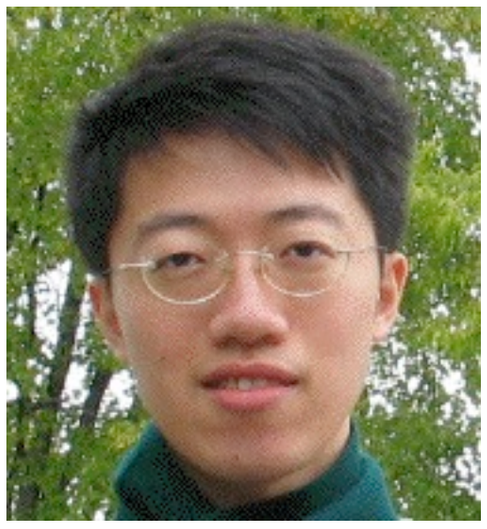


Barry Turner

Gyuwon Lee

Aldo Bellon

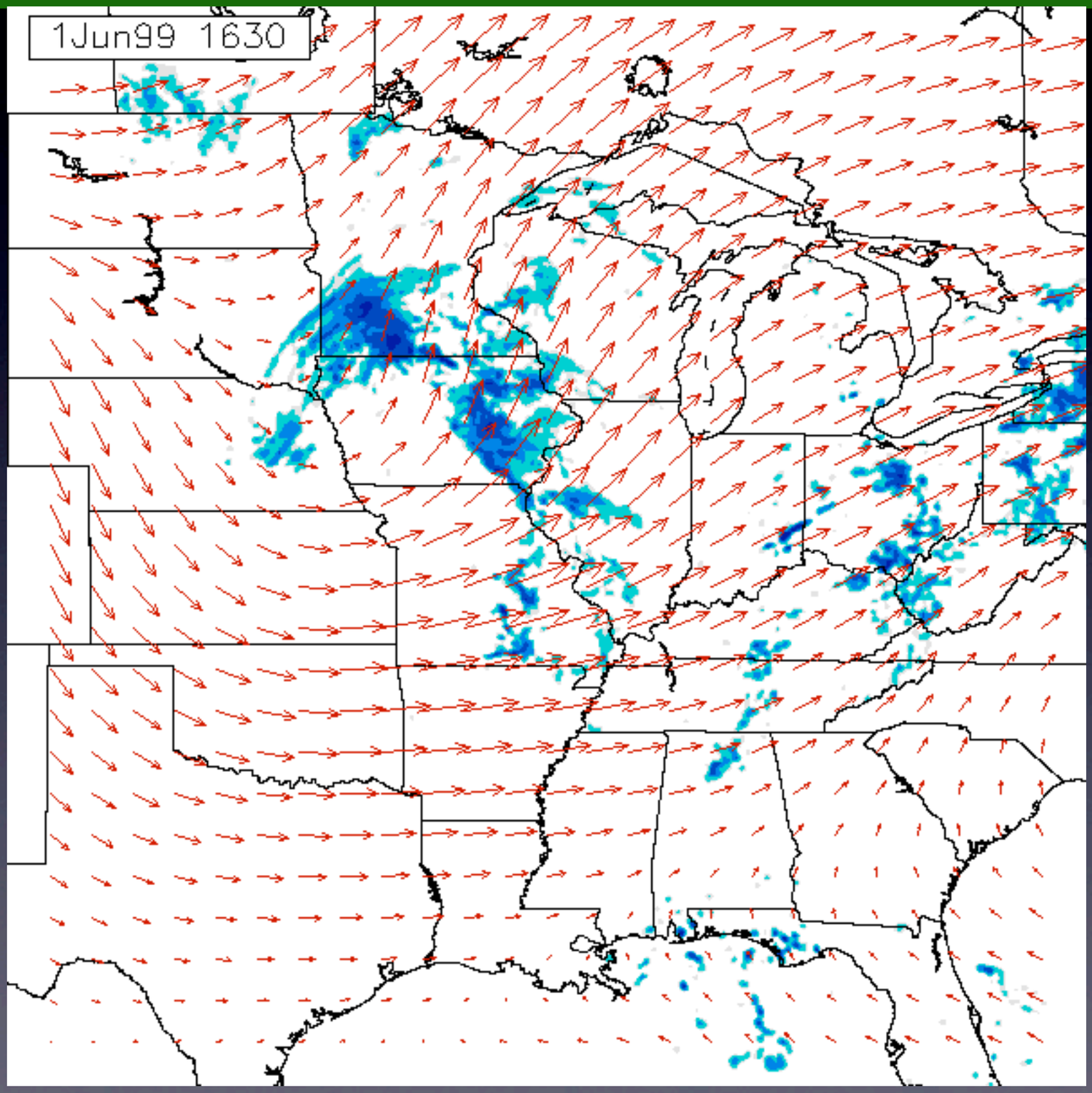
Alumu Kilambi



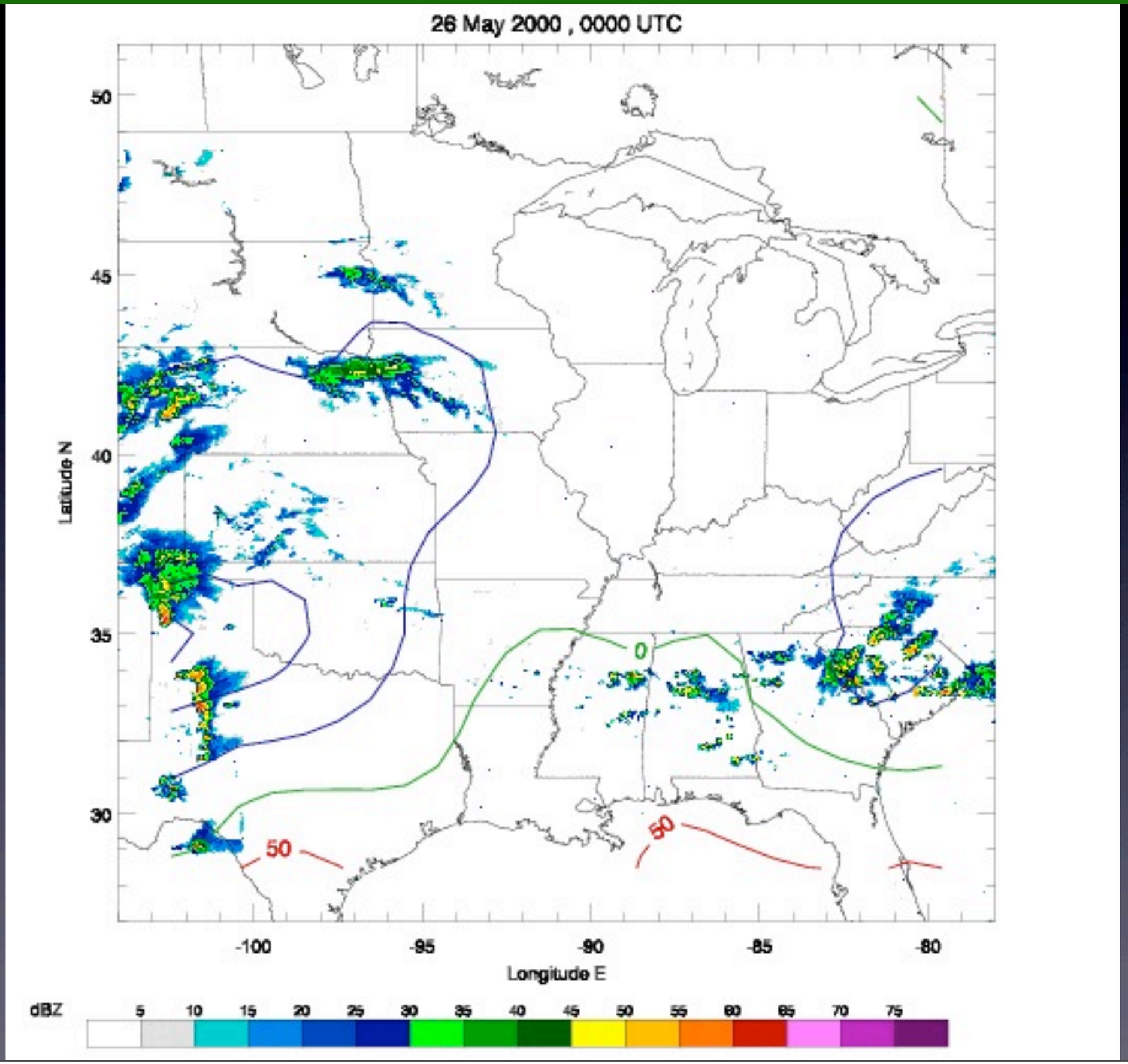
Kaoshen Chung

Marc Berenguer

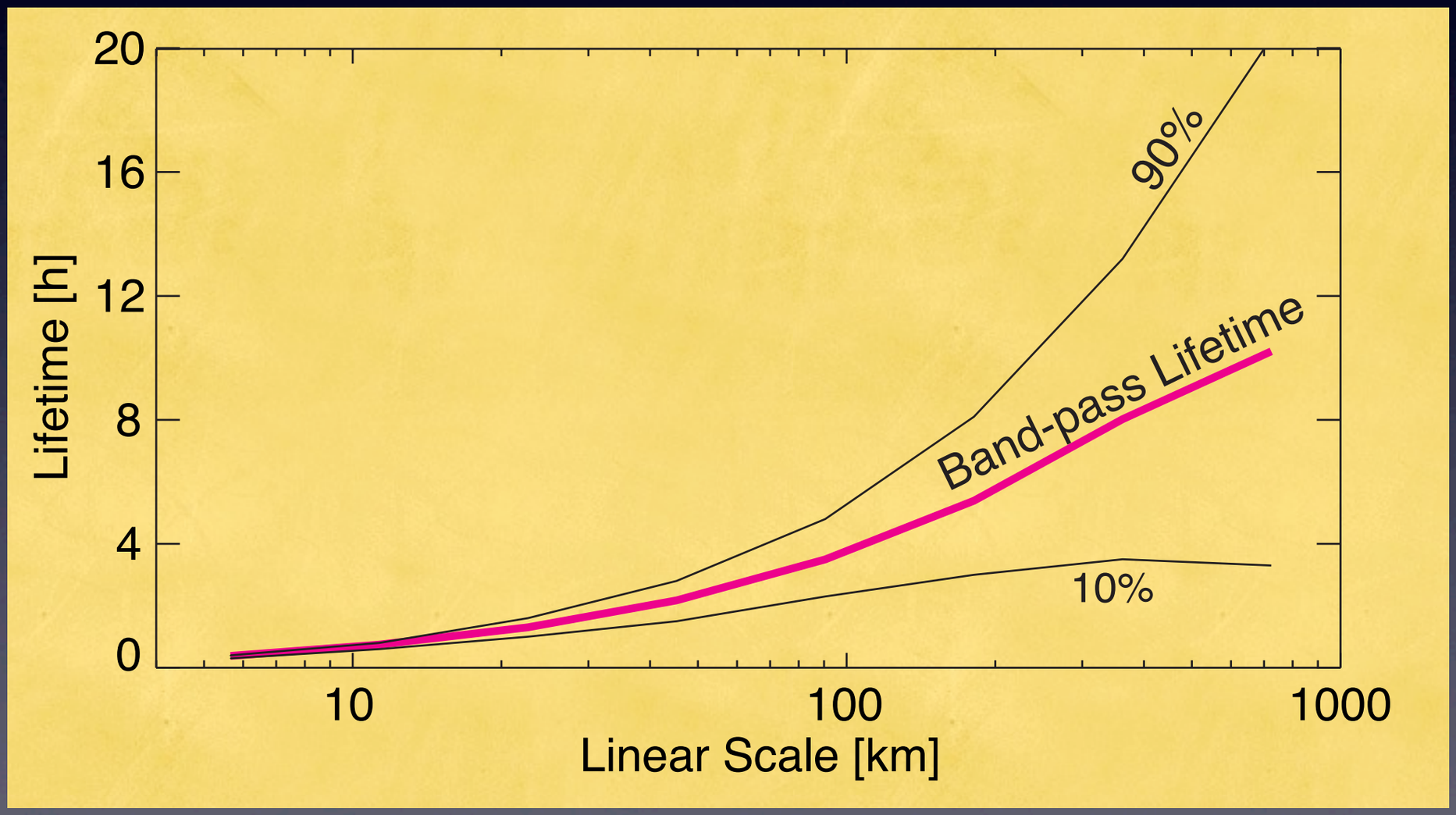
Field of echo motion from continental scale composites derived by VET (Variational Echo Tracking)



Divergence of VET echo motion



Lifetime as function of scale and its distribution



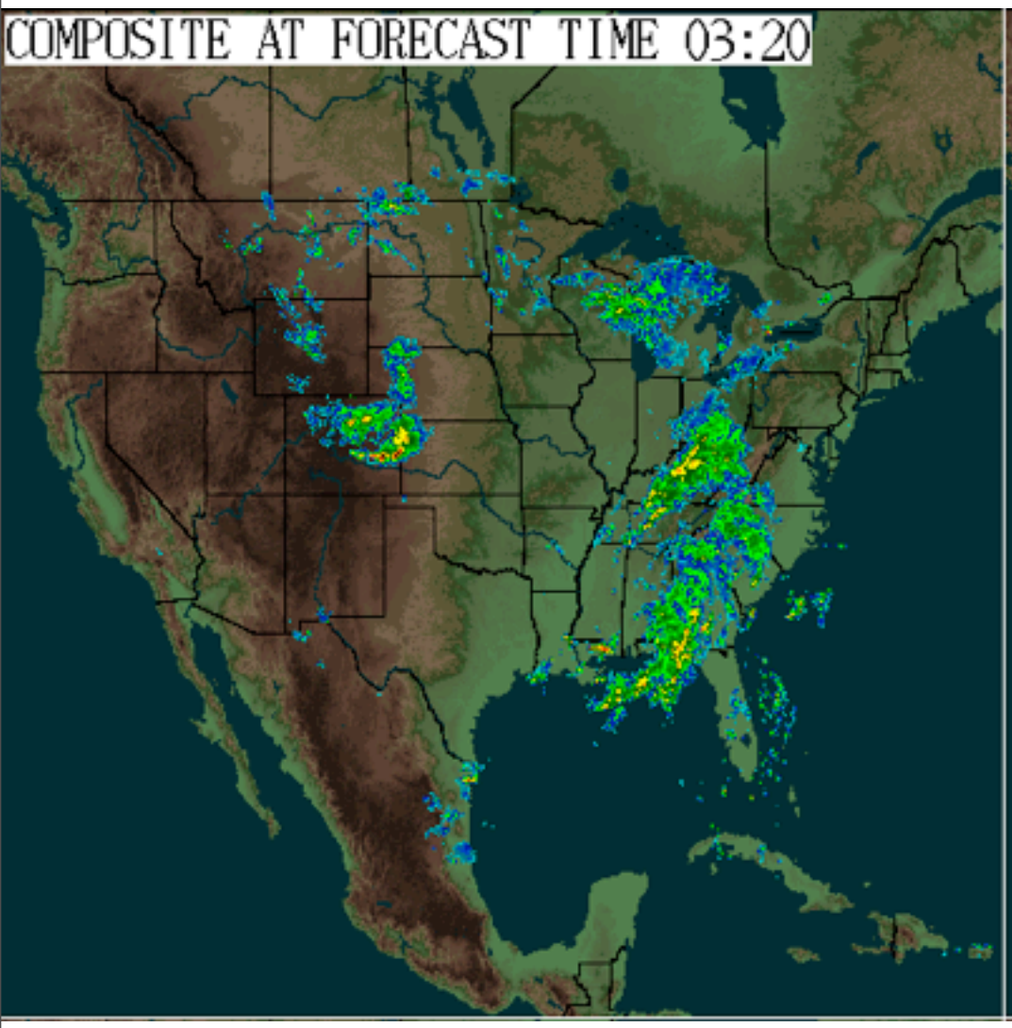
Nowcasting of precipitation with continental scale composites; the operational product:

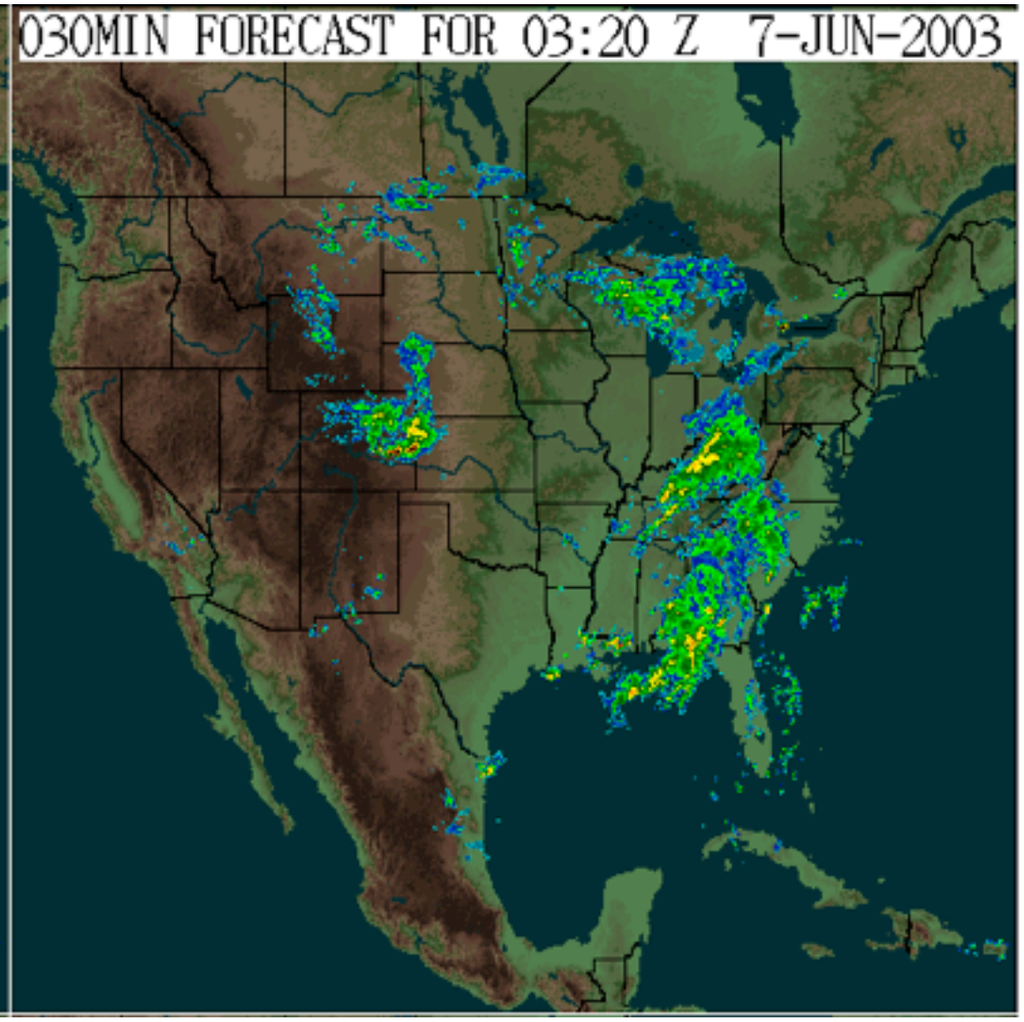
MAPLE

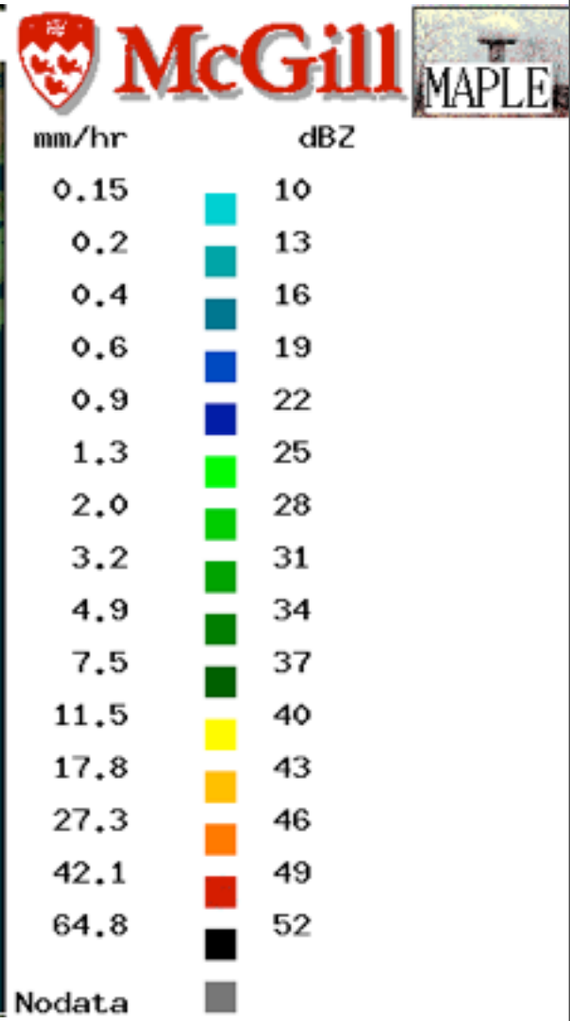
(McGill Algorithm for Precipitation-nowcasting by Lagrangian Extrapolation)

Observations

up to 10h nowcast







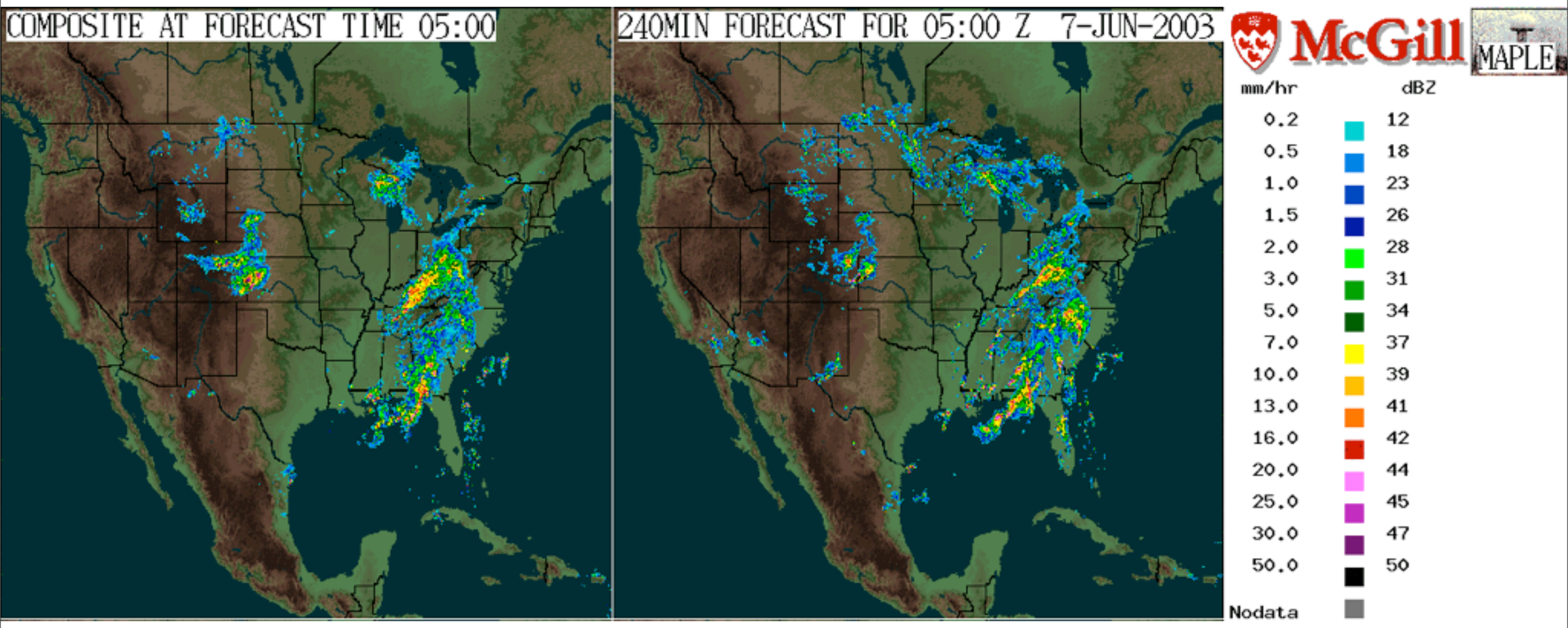
Nowcasting of precipitation with continental scale composites; the operational product:

MAPLE

(McGill Algorithm for Precipitation-nowcasting by Lagrangian Extrapolation)

Observations

10h of 4h nowcast



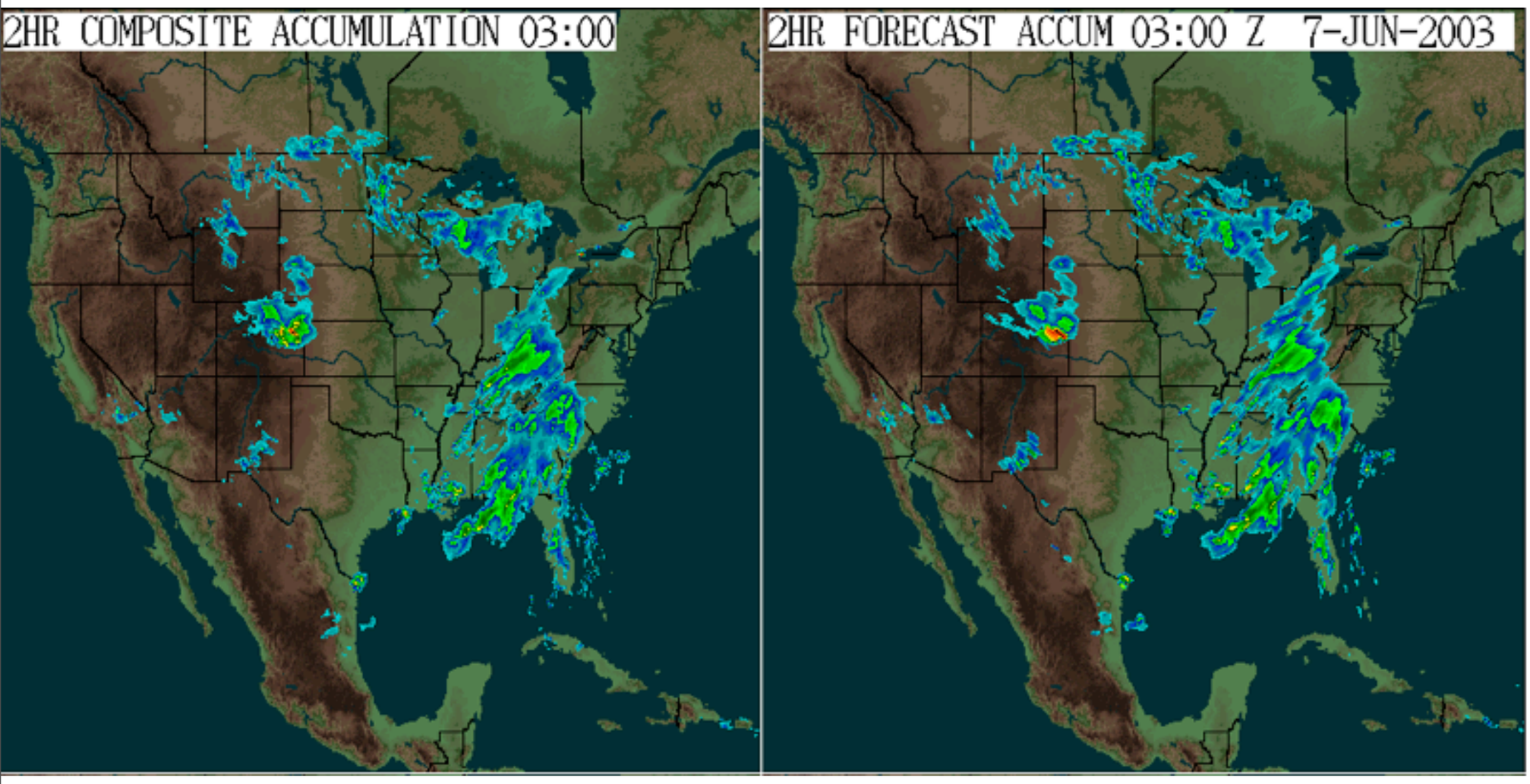
Nowcasting of precipitation with continental scale composites; the operational product:

MAPLE

NOWCAST OF 2h ACCUMULATIONS

Observations

up to 10 h of 2h accum. nowcast

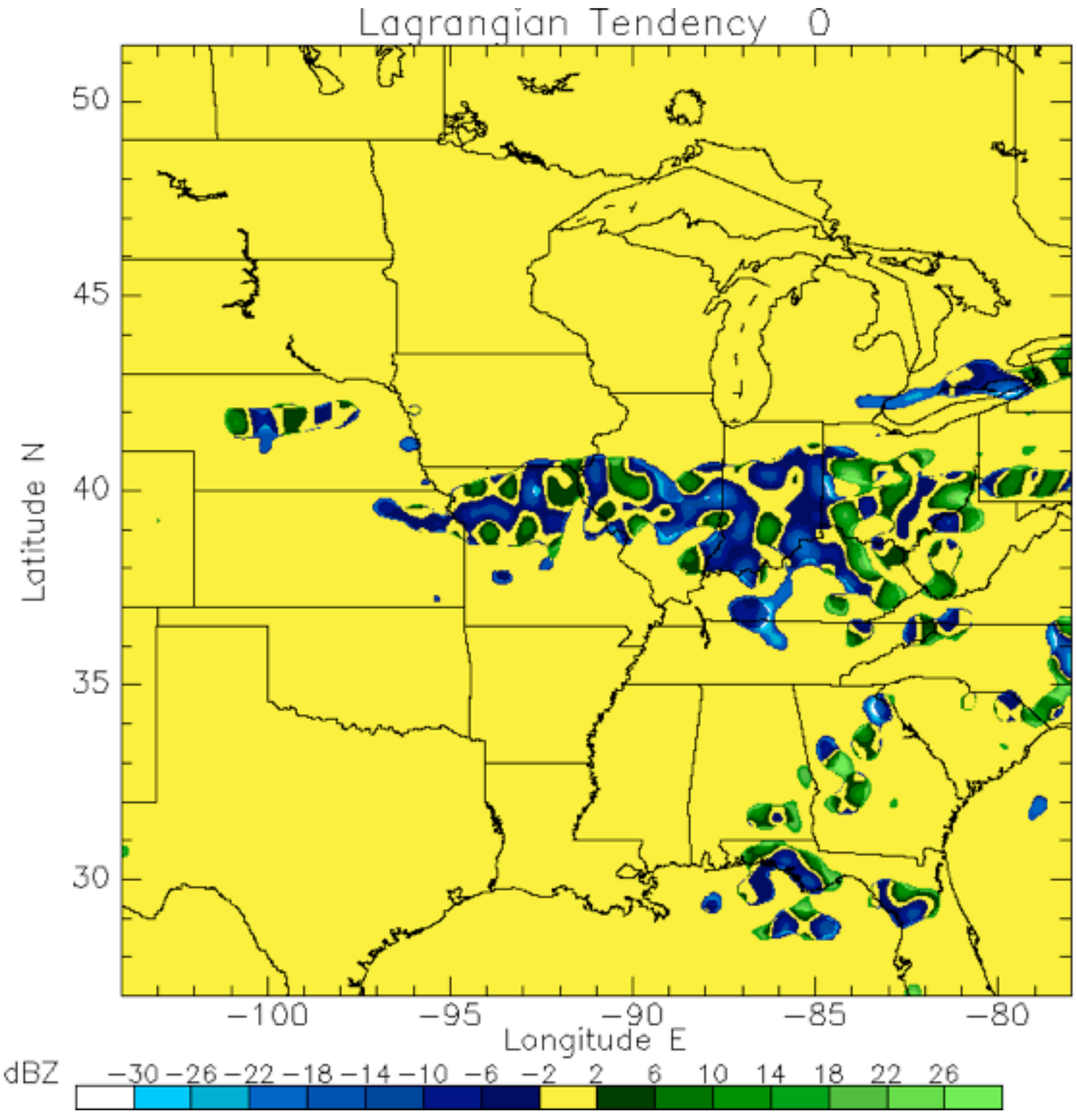


McGill

MAPLE

Can we increase the predictability by adding tendency to Lagrangian persistency?

The answer my friend is blowing in the wind



STEPS IN NOWCASTING BY EXTRAPOLATION OF RADAR PRECIPITATION PATTERNS

Optimize the forecast:

Filter out non-predictable scales to maximize rms (filtering increases the area of the pattern!)

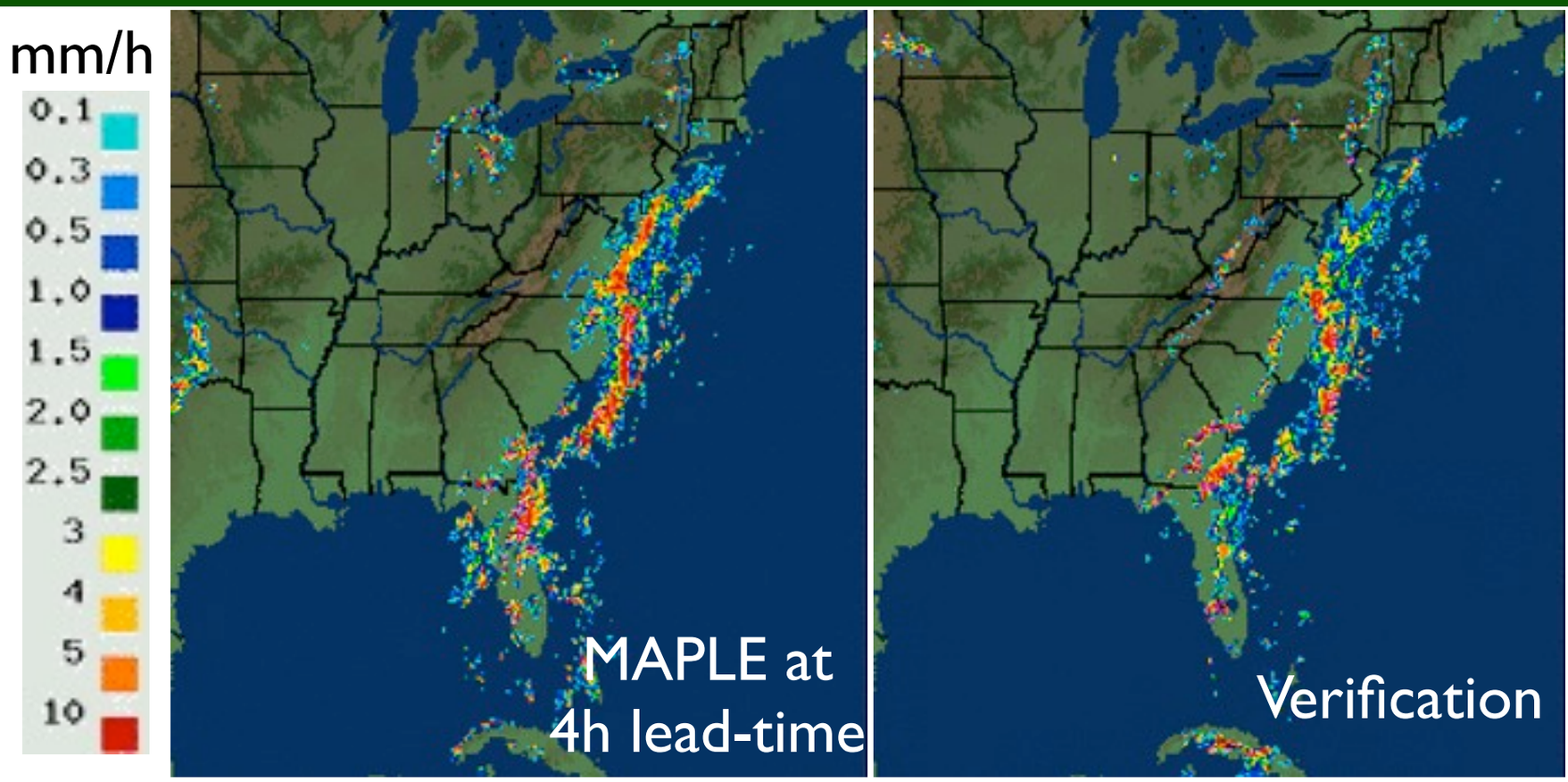
Limit spread by choosing a minimum threshold that maximizes the score (CSI for example)

Adjust total to compensate for the above

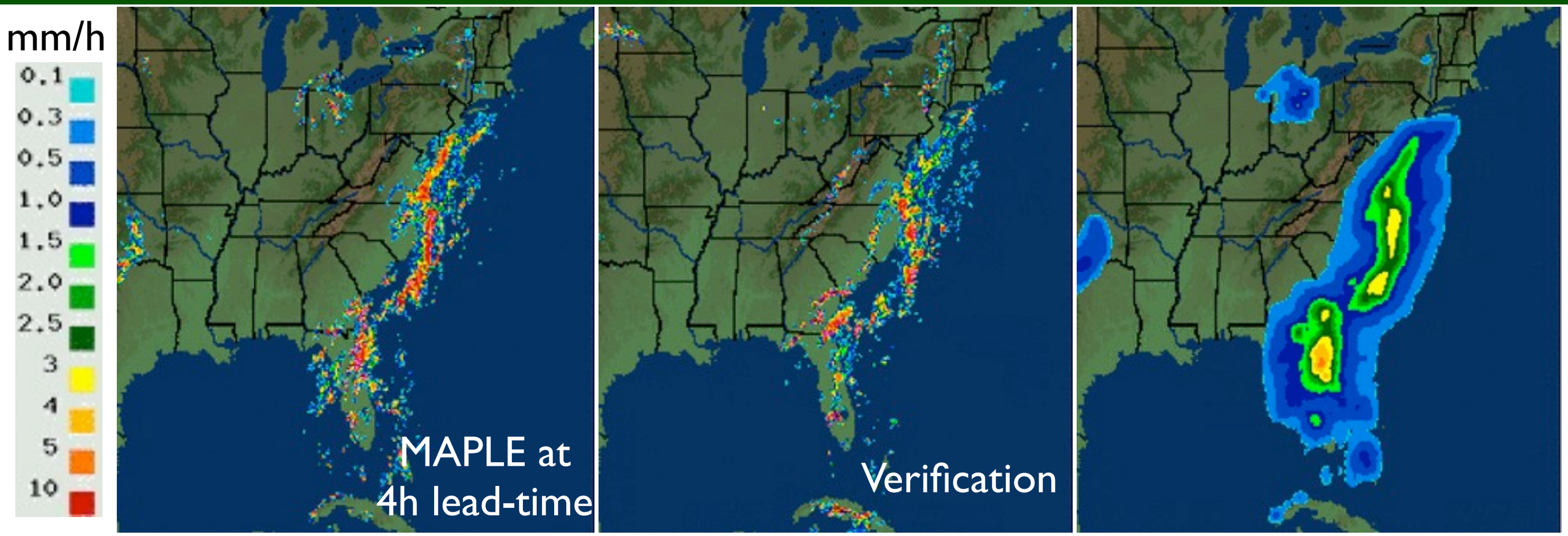
Adjust range of intensities

Do the optimization adaptively (using the immediate past as guide)

Optimization

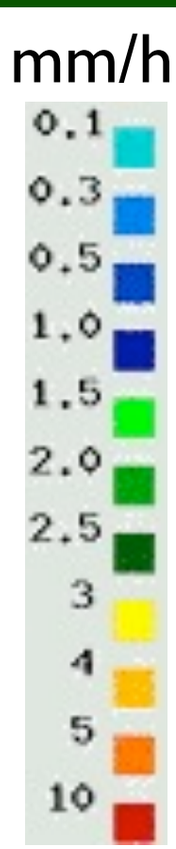


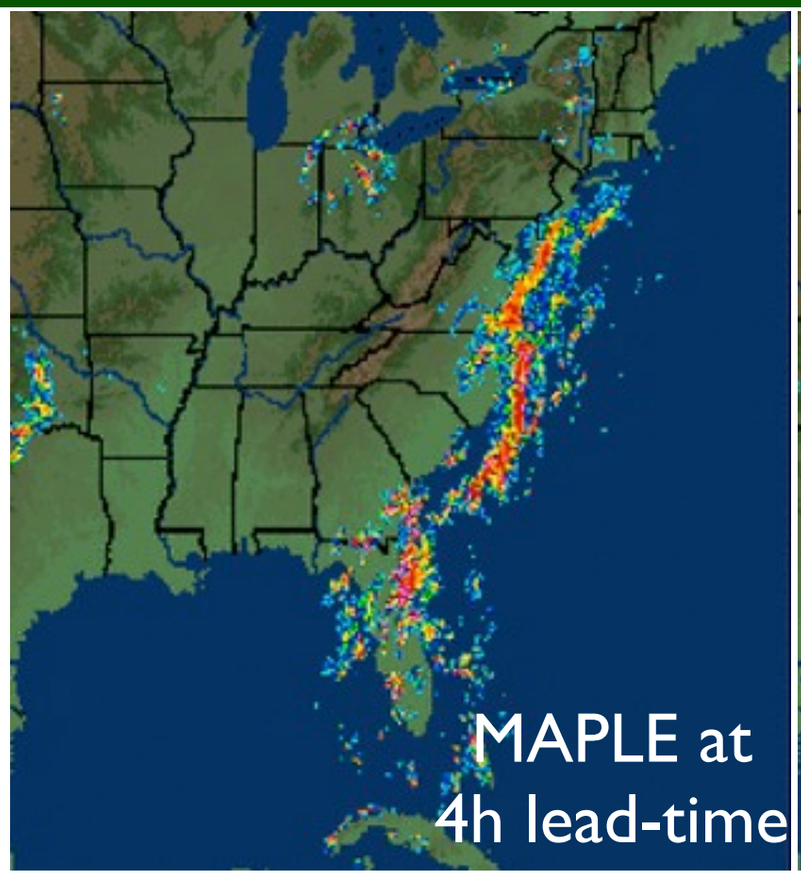
Optimization

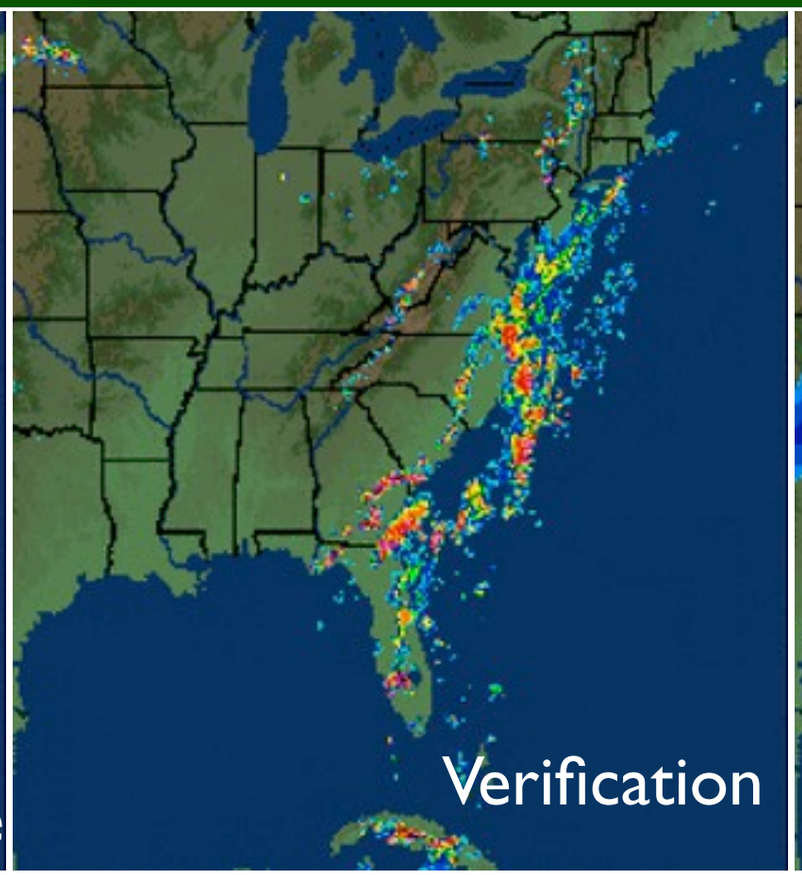


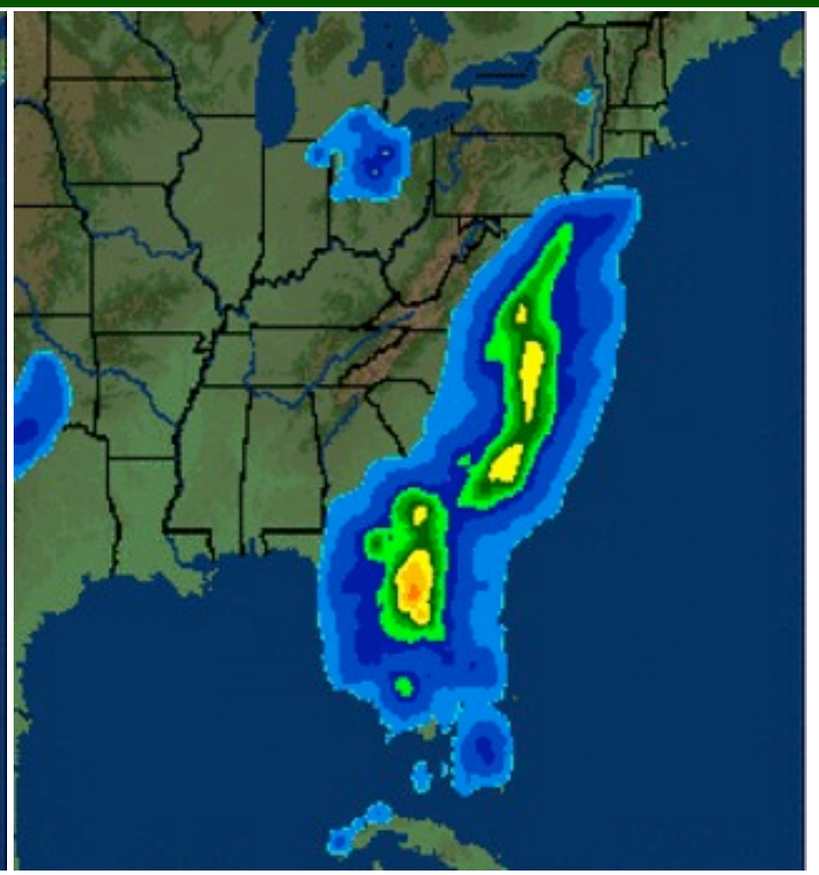
Filtered to
optimize RMS

Optimization



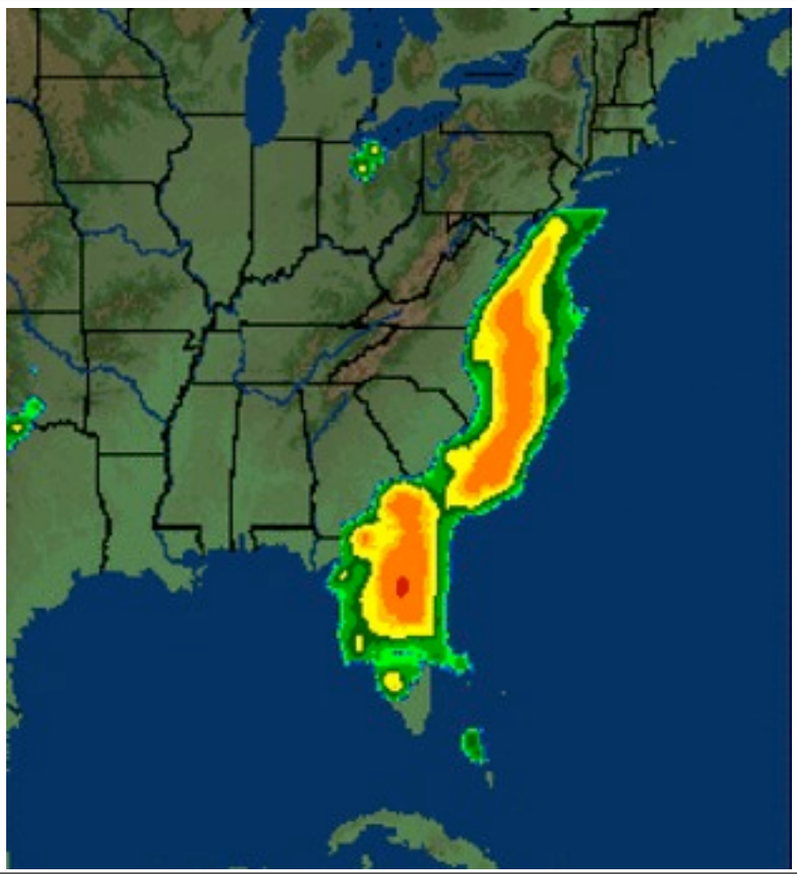






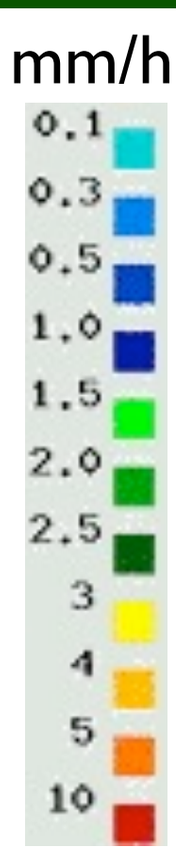
Filtered to optimize RMS

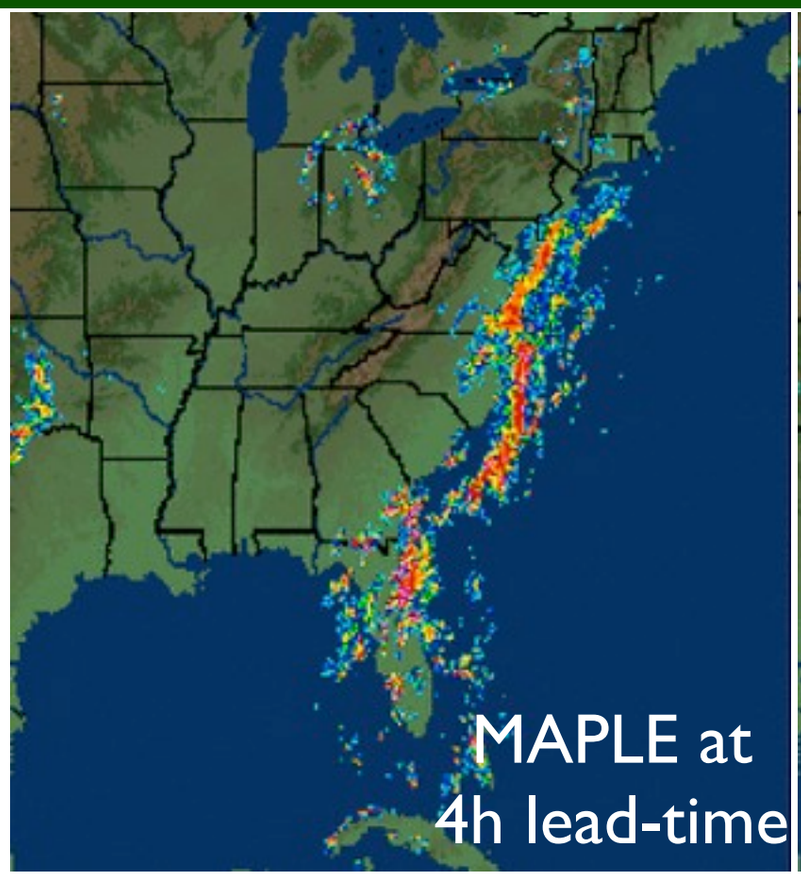
Thresholded to optimize CSI of 0.1mm/h

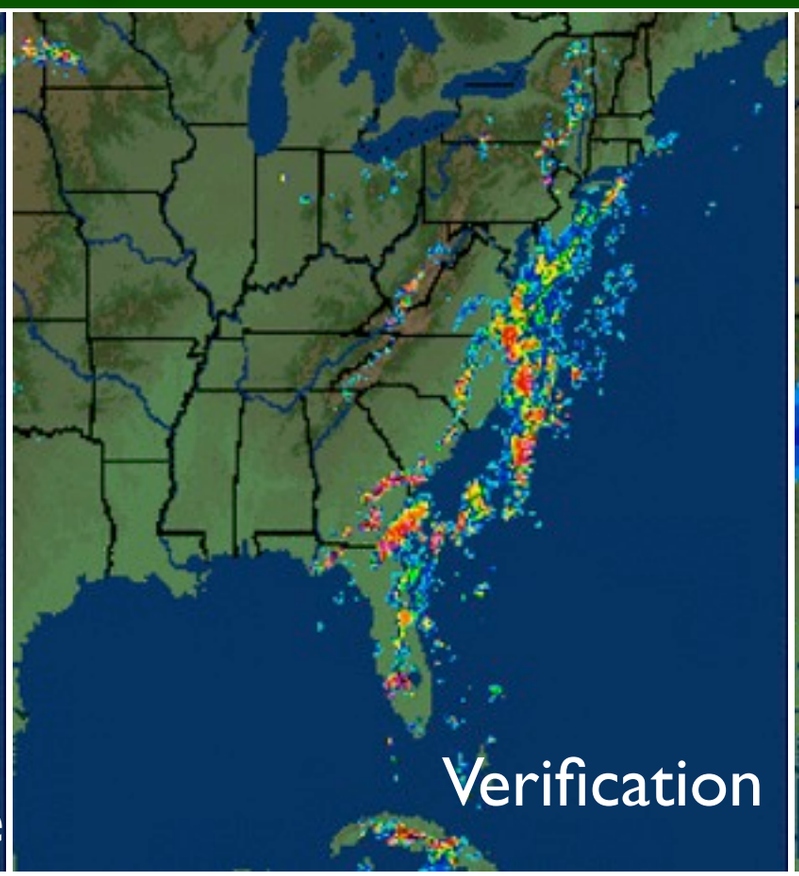


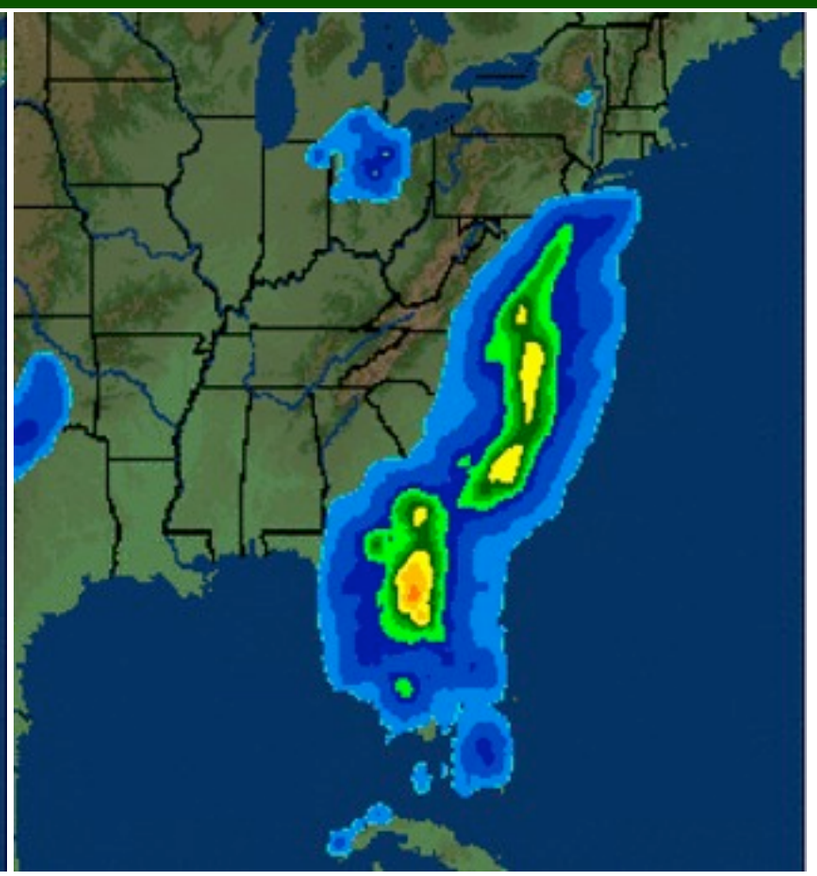
Cutout mass is added to the field to maintain the mean

Optimization



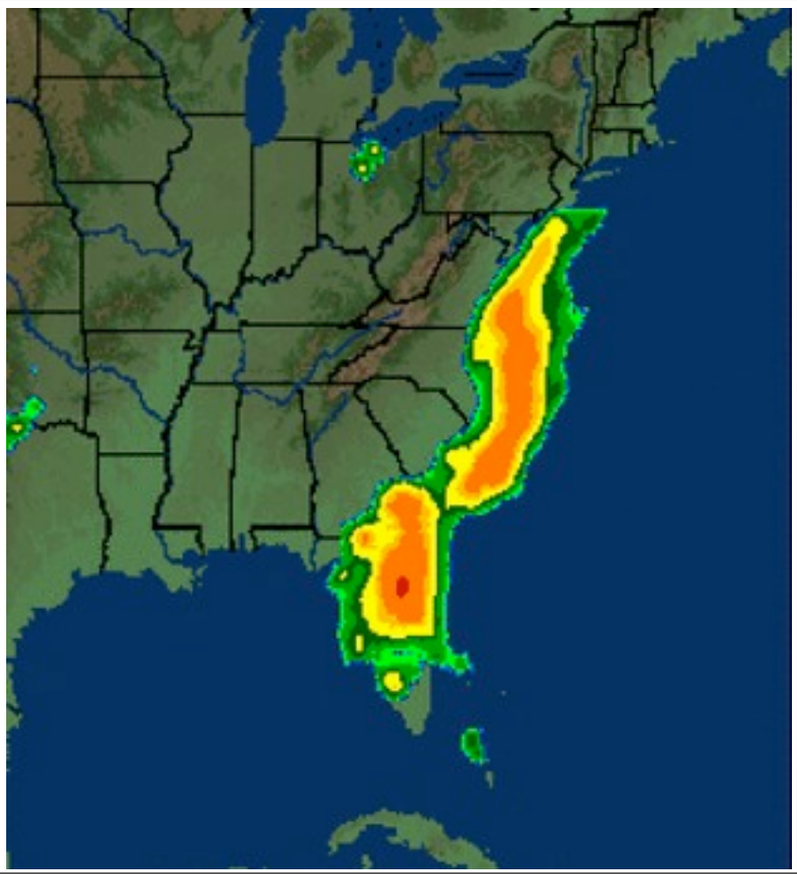


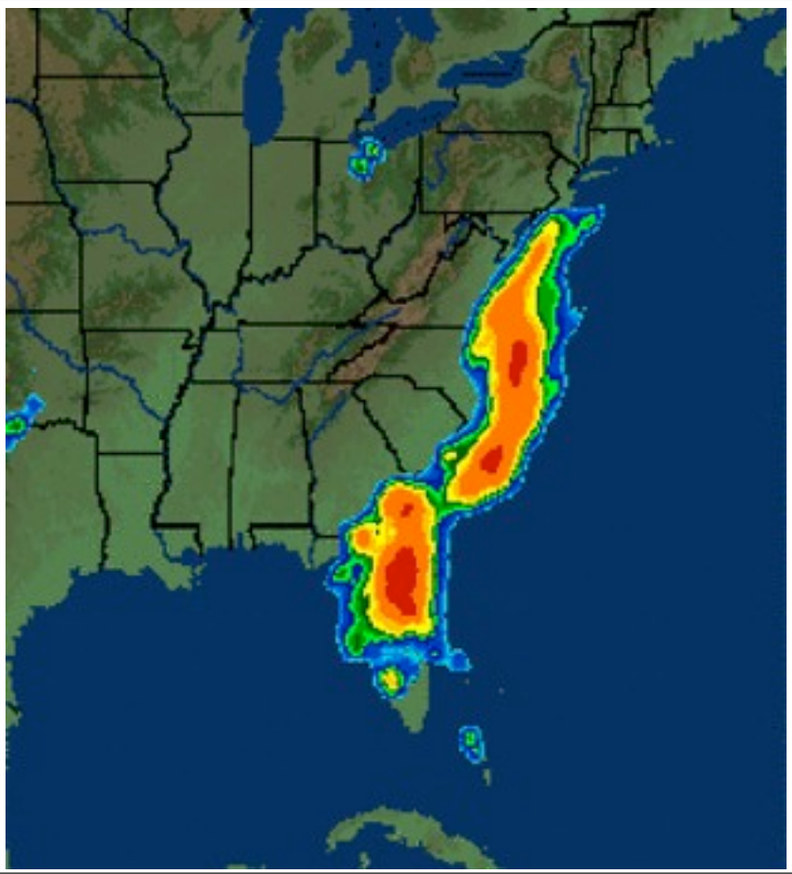




Thresholded to optimize CSI of 0.1mm/h

Cutout mass is added to the field to maintain the mean



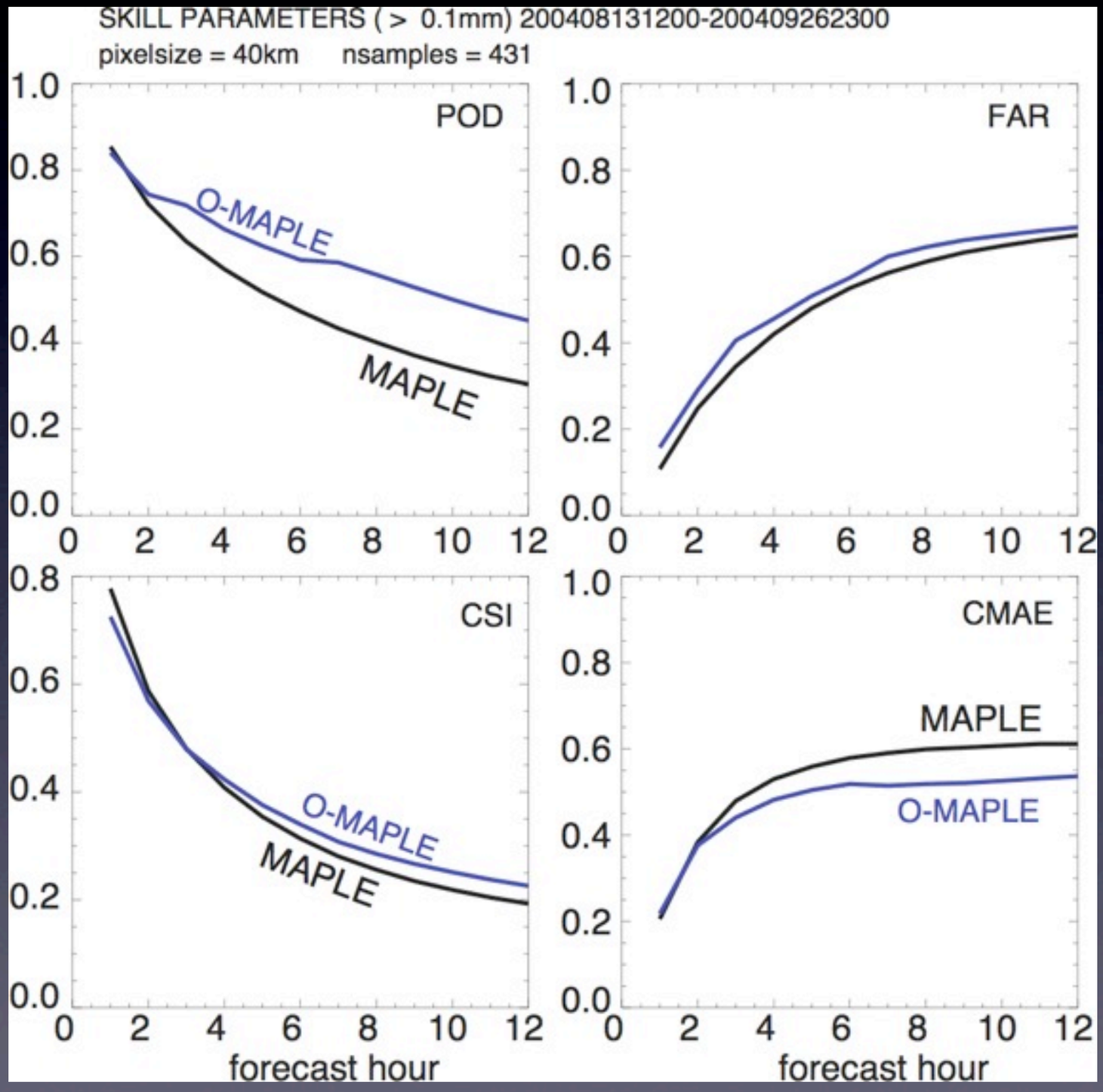


Filtered to optimize RMS

Distribution of intensities is re-scaled to match the 0.1 threshold and maintain the mean

Measure of skill of Nowcast

R>0.1mm/h



Unable to improve further the deterministic nowcast,

we fall-back on a

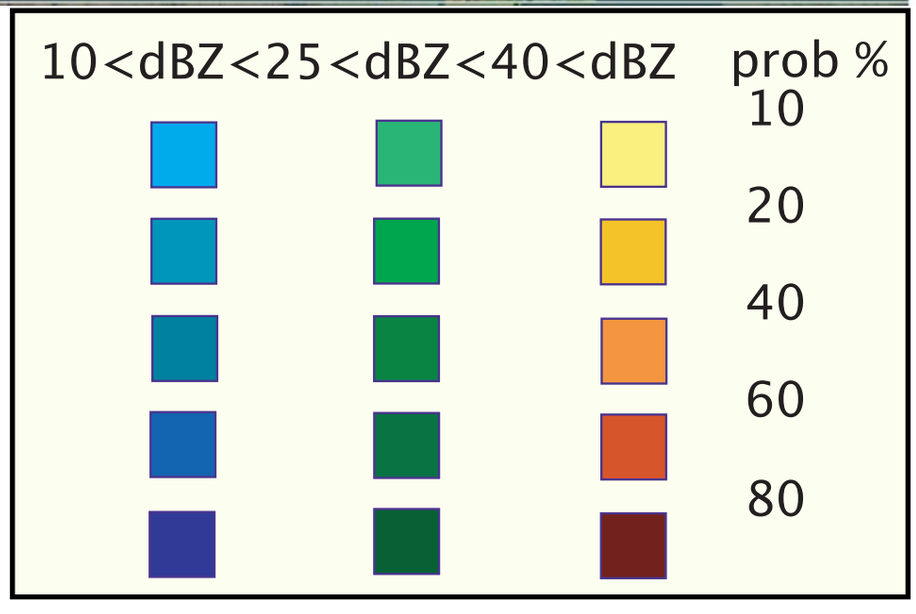
PROBABILISTIC NOWCAST

Probabilistic MAPLE

McGill MAPLE

prob %	Threhold
10.0	>10 dbZ
20.0	>10 dbZ
40.0	>10 dbZ
60.0	>10 dbZ
80.0	>10 dbZ
10.0	>25 dbZ
20.0	>25 dbZ
40.0	>25 dbZ
60.0	>25 dbZ
80.0	>25 dbZ
10.0	>40 dbZ
20.0	>40 dbZ
40.0	>40 dbZ
60.0	>40 dbZ
80.0	>40 dbZ
Nodata	

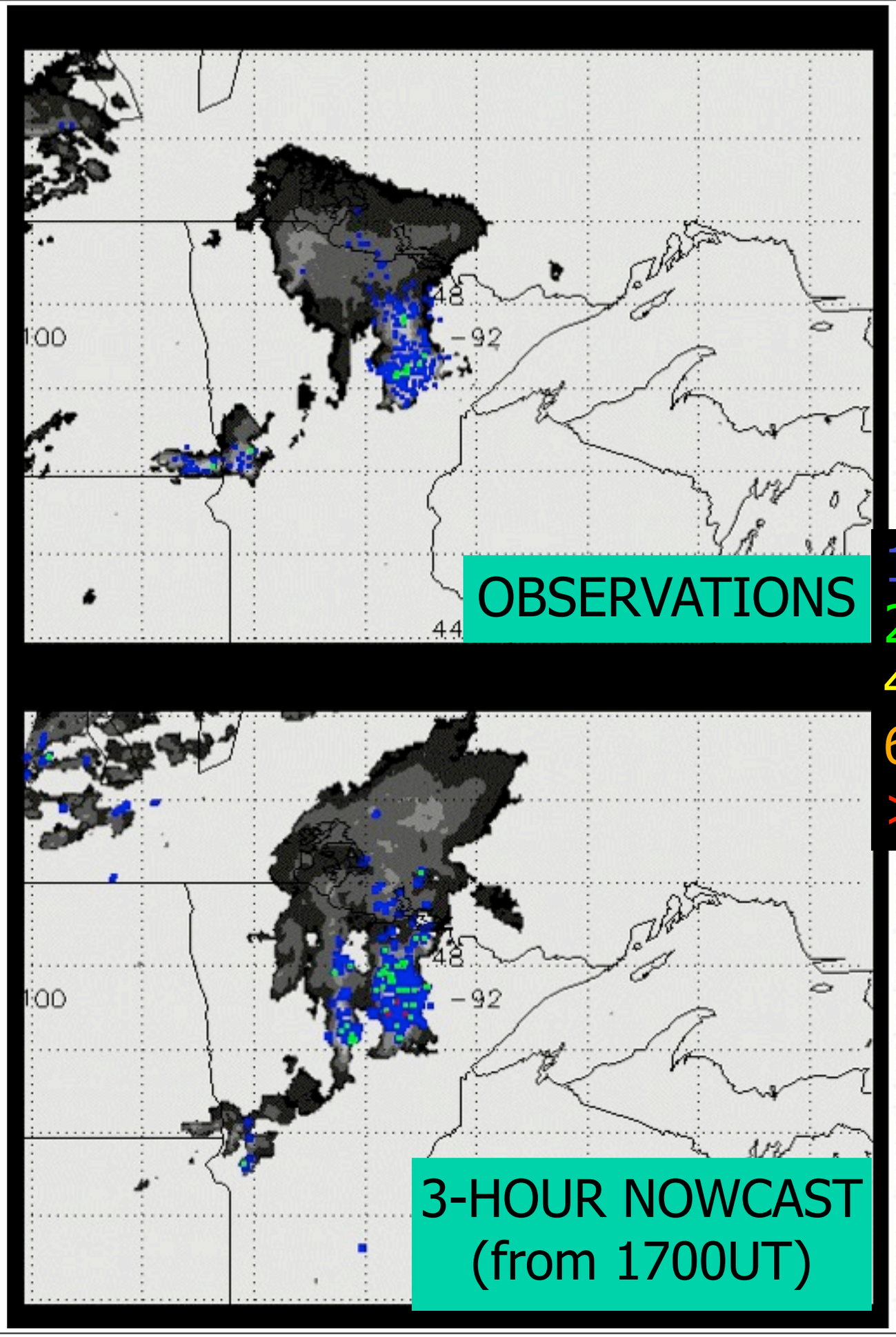
Up to 10h Nowcast



Nowcast of precipitation and lightning

Nowcasting of precipitation
(rate in grey-scale)

and lightning
(# of flashes in color)



1 flash
2-4 flashes
4-6 flashes
6-8 flashes
> 8 flashes

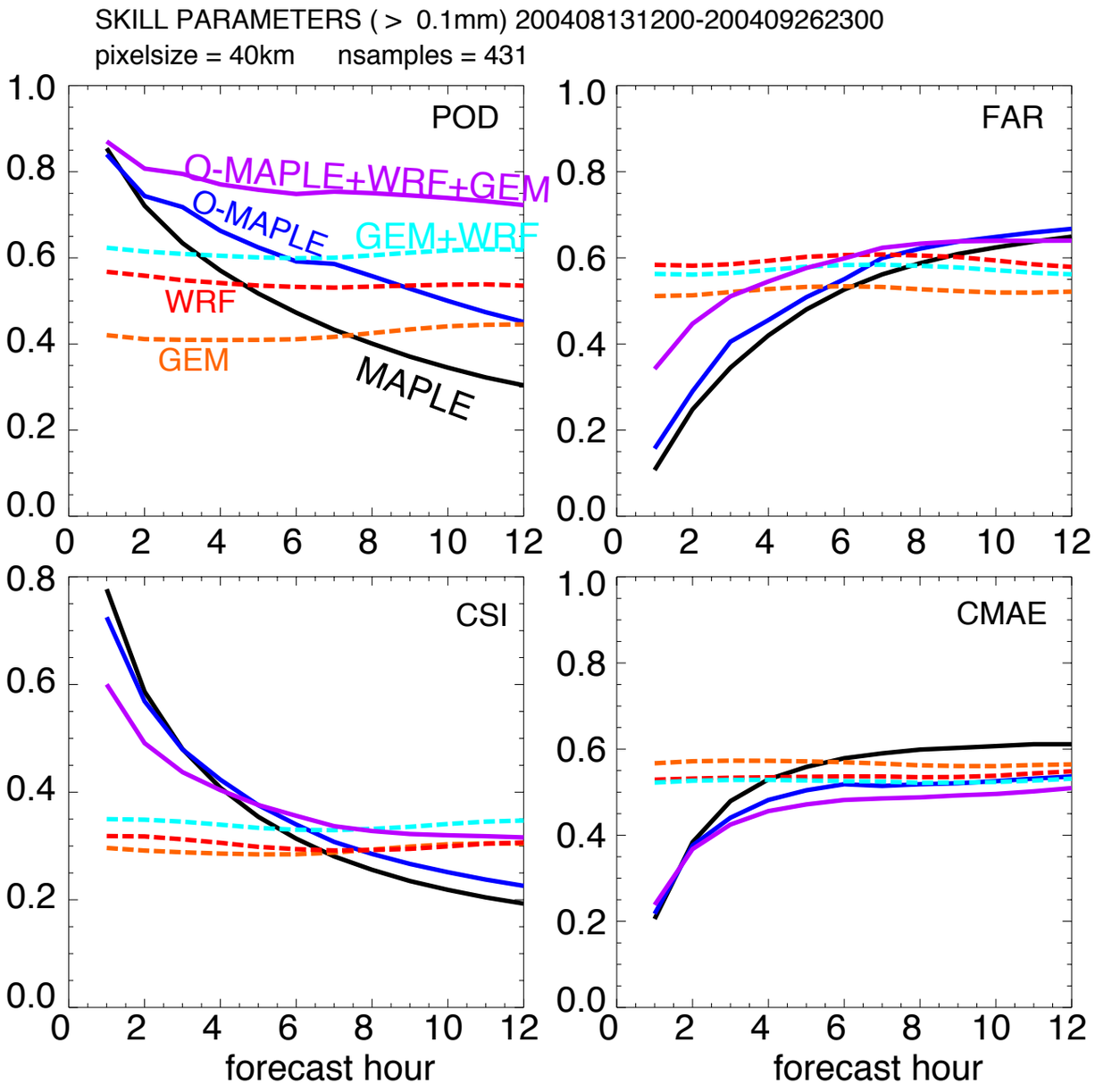
4 July 1999, 1945-2000UT

MAPLES

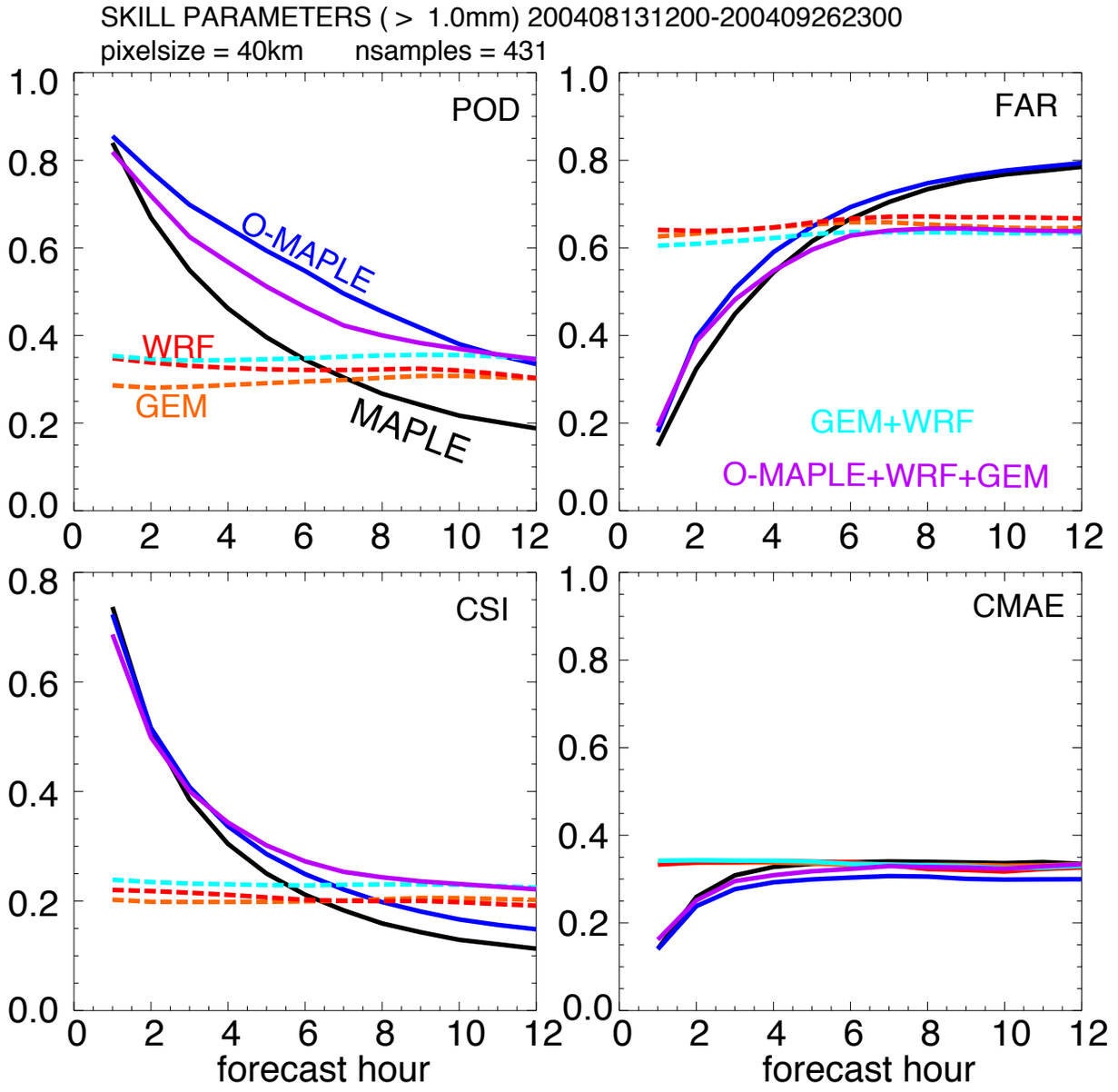
(merged model precipitation output with Lagrangian persistence nowcast)

Model vs. Nowcast & Merging

R>0.1mm/h

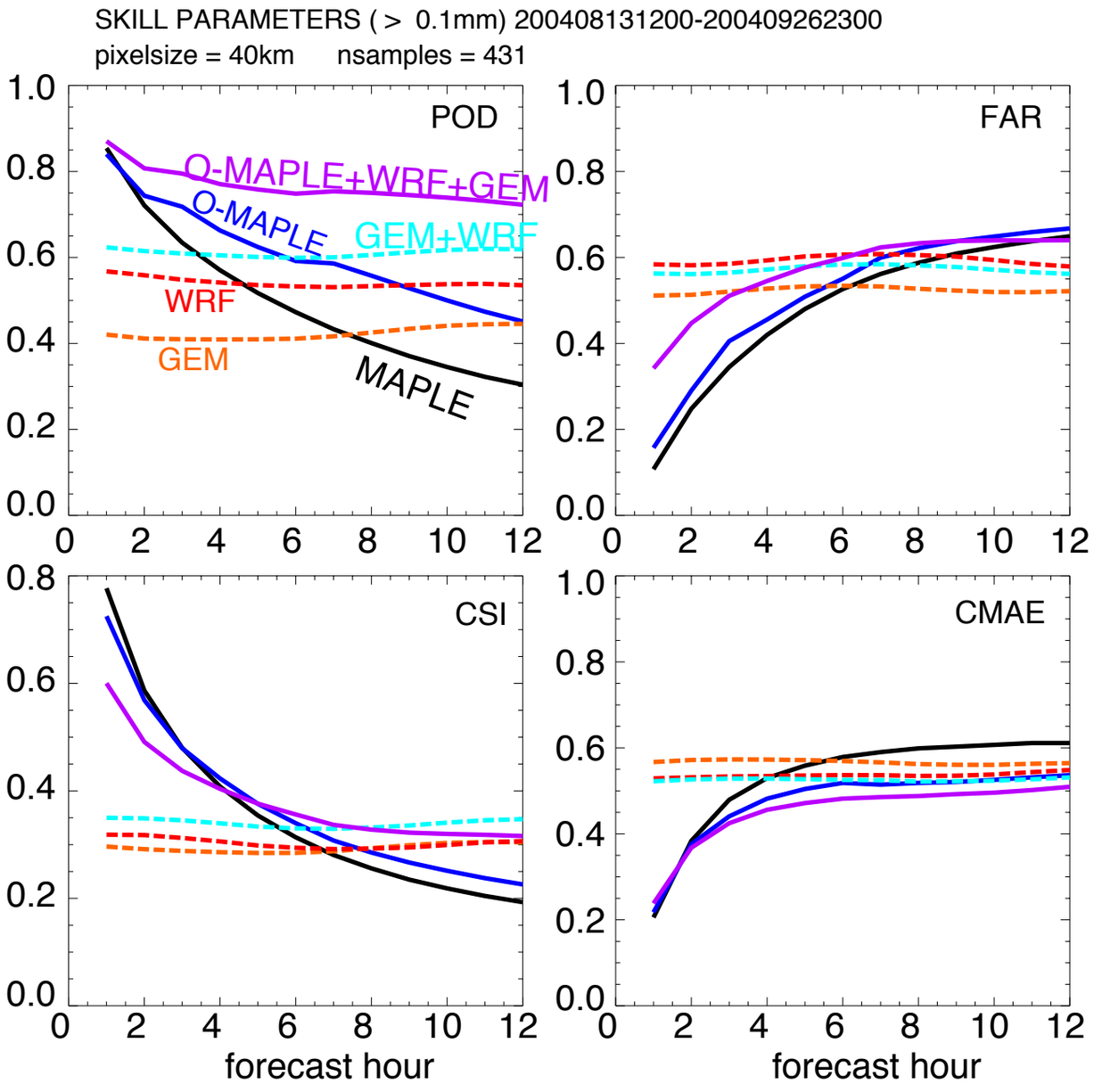


R>1mm/h

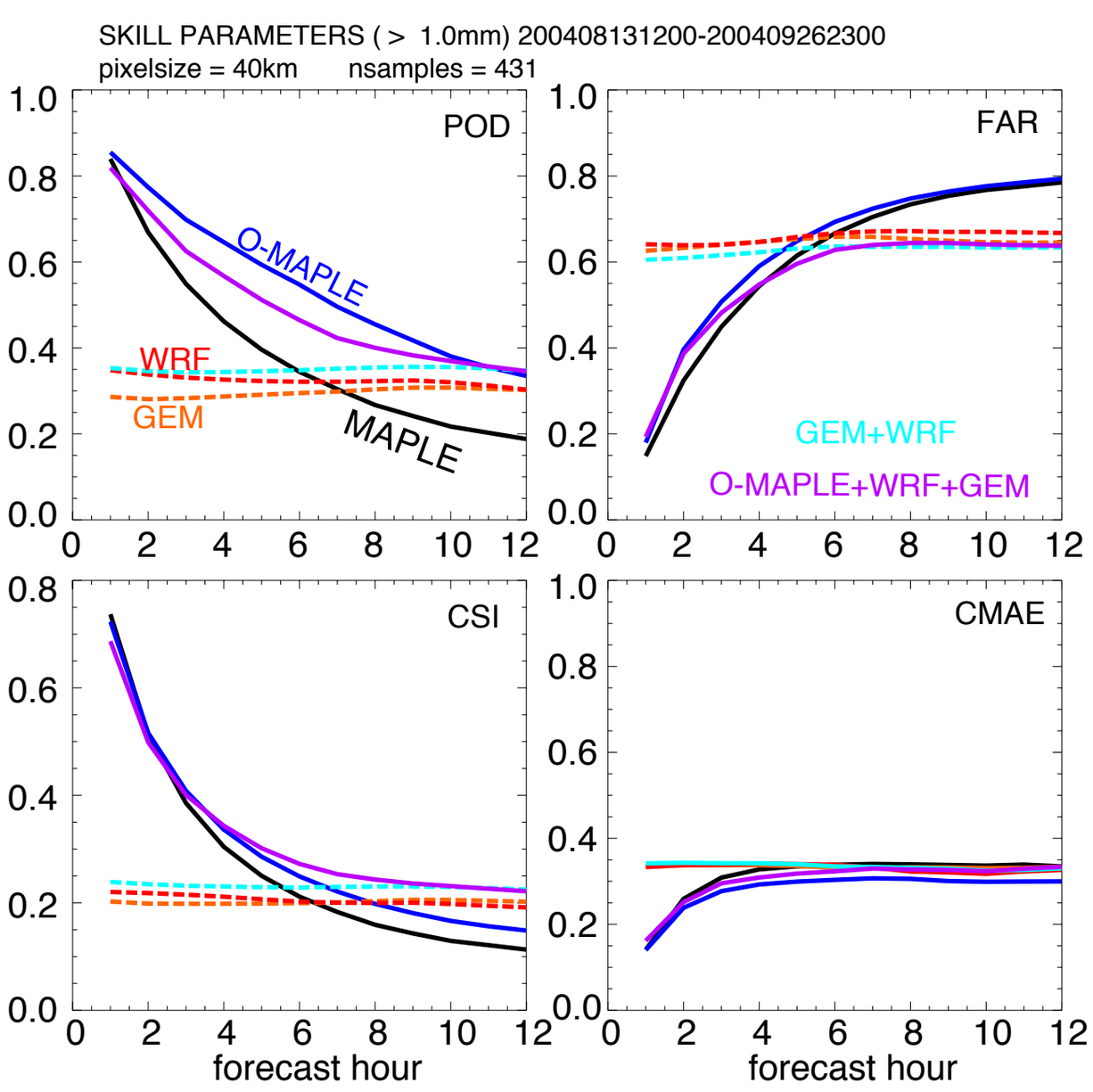


Model vs. Nowcast & Merging

R>0.1mm/h



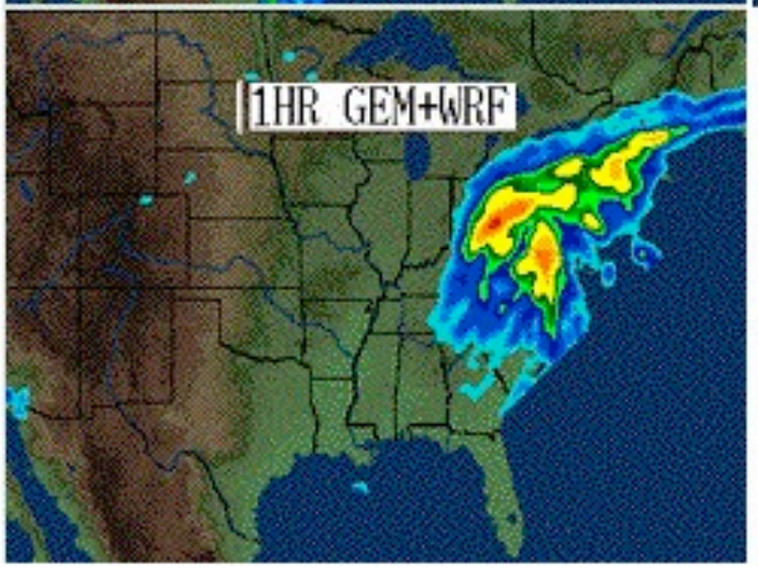
R>1mm/h



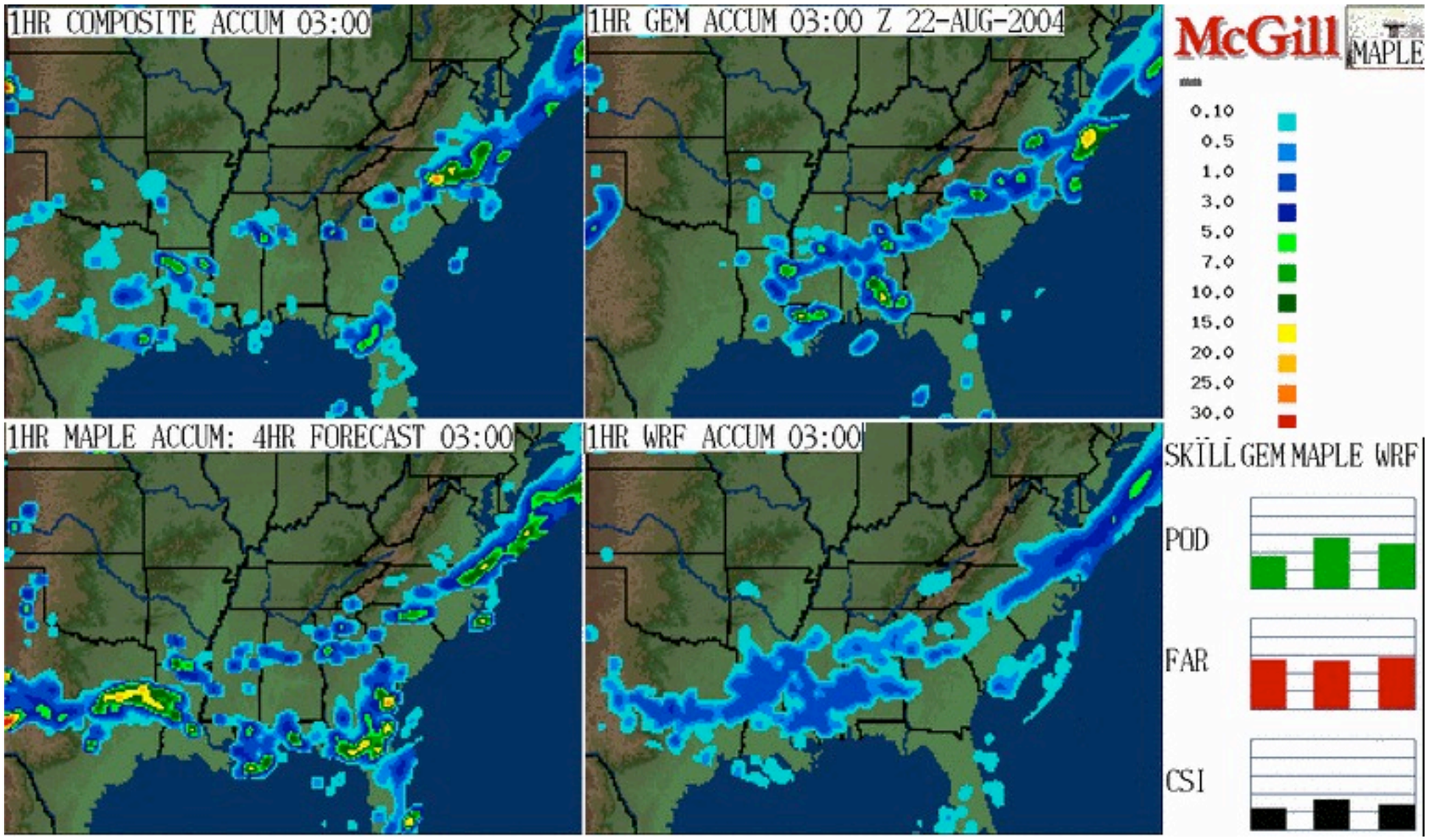
a good balance for t<4h is obtained with

$$weight = \frac{1}{1-[CSI(i,t)]^{2.5}} - 1$$

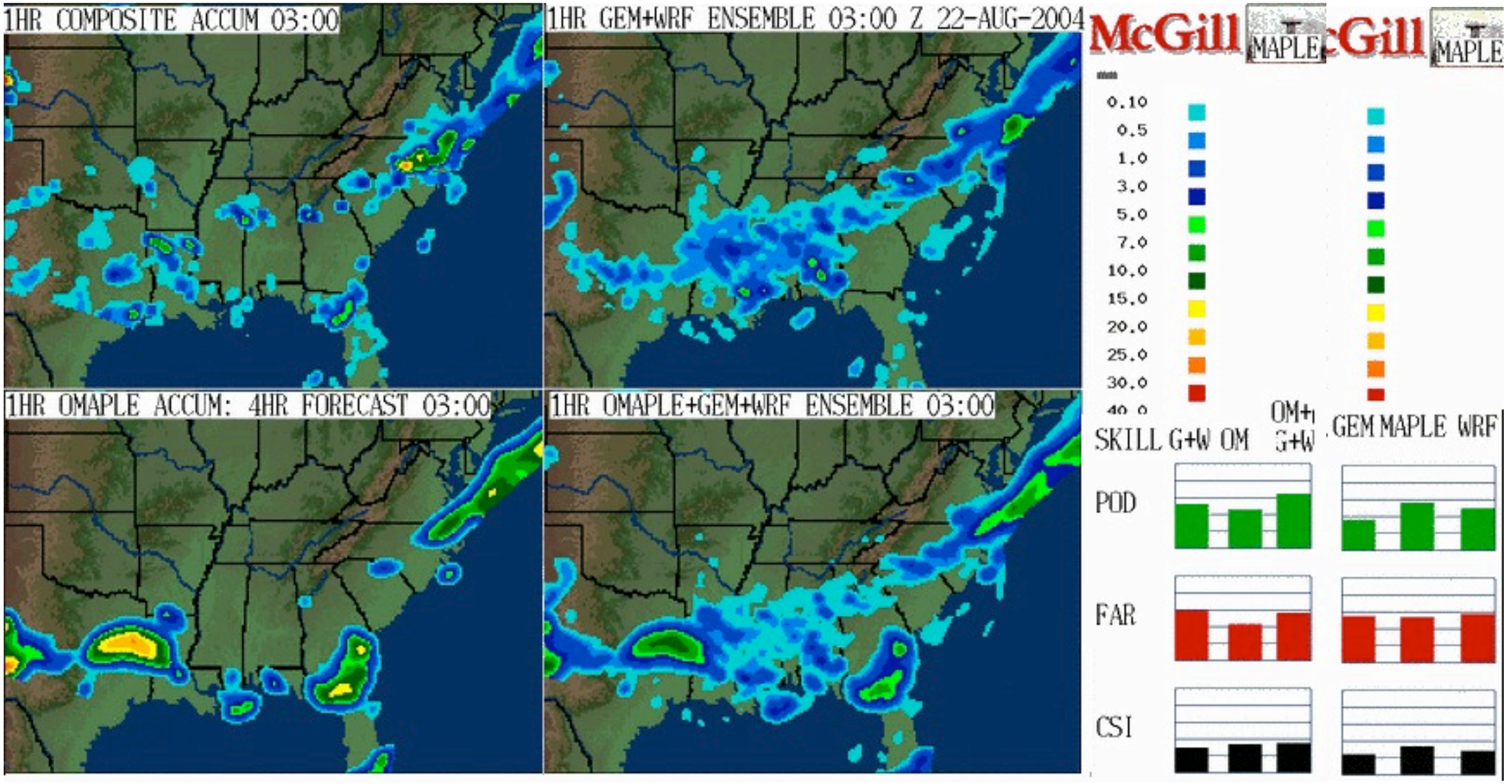
Example of Nowcast & Merger



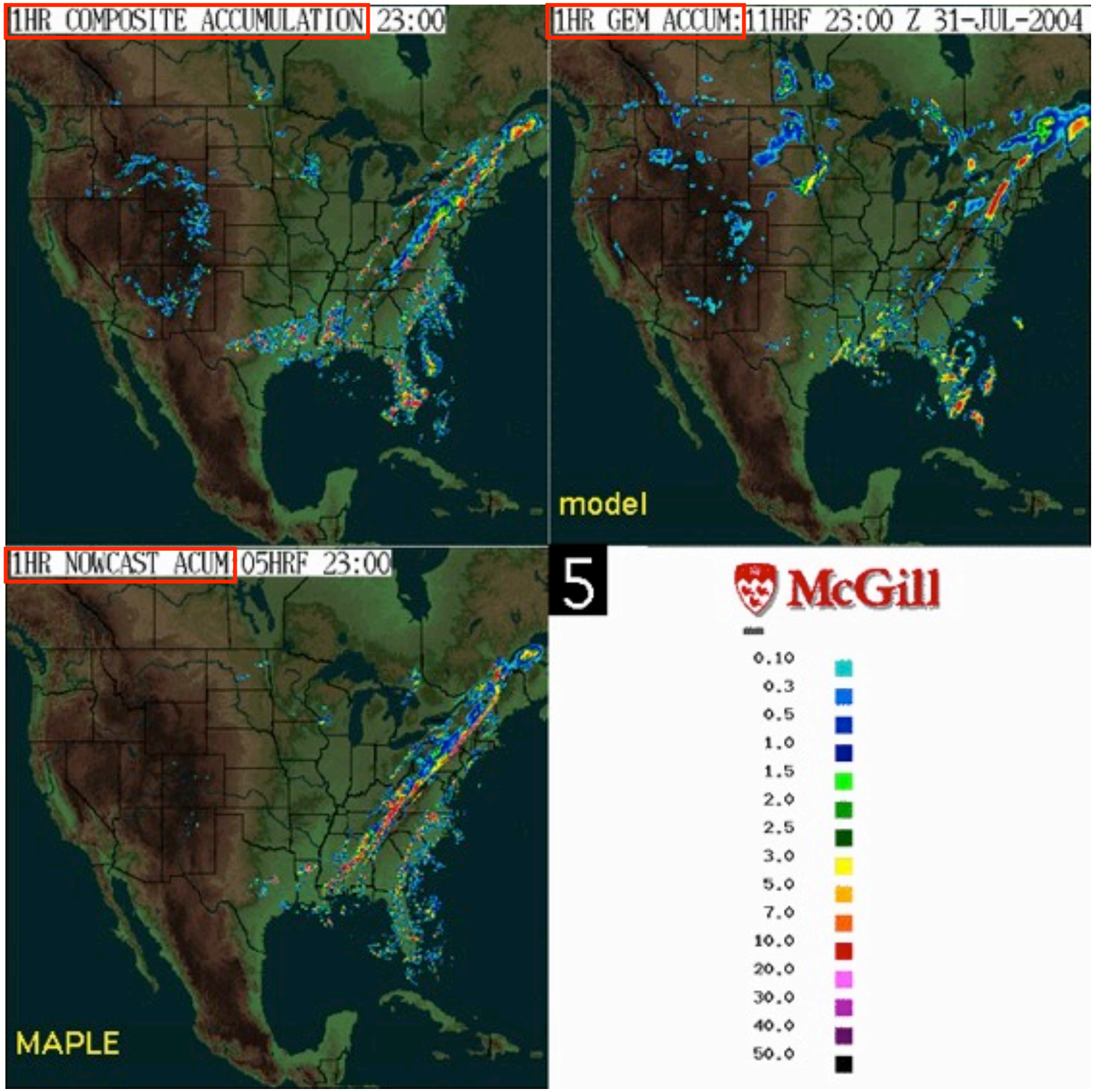
Example of Nowcast & Merger; average case



Example of Nowcast & Merger; average case



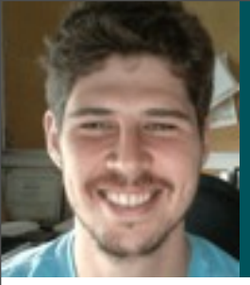
Nowcasting Skill of Model and of Lagrangian Persistence



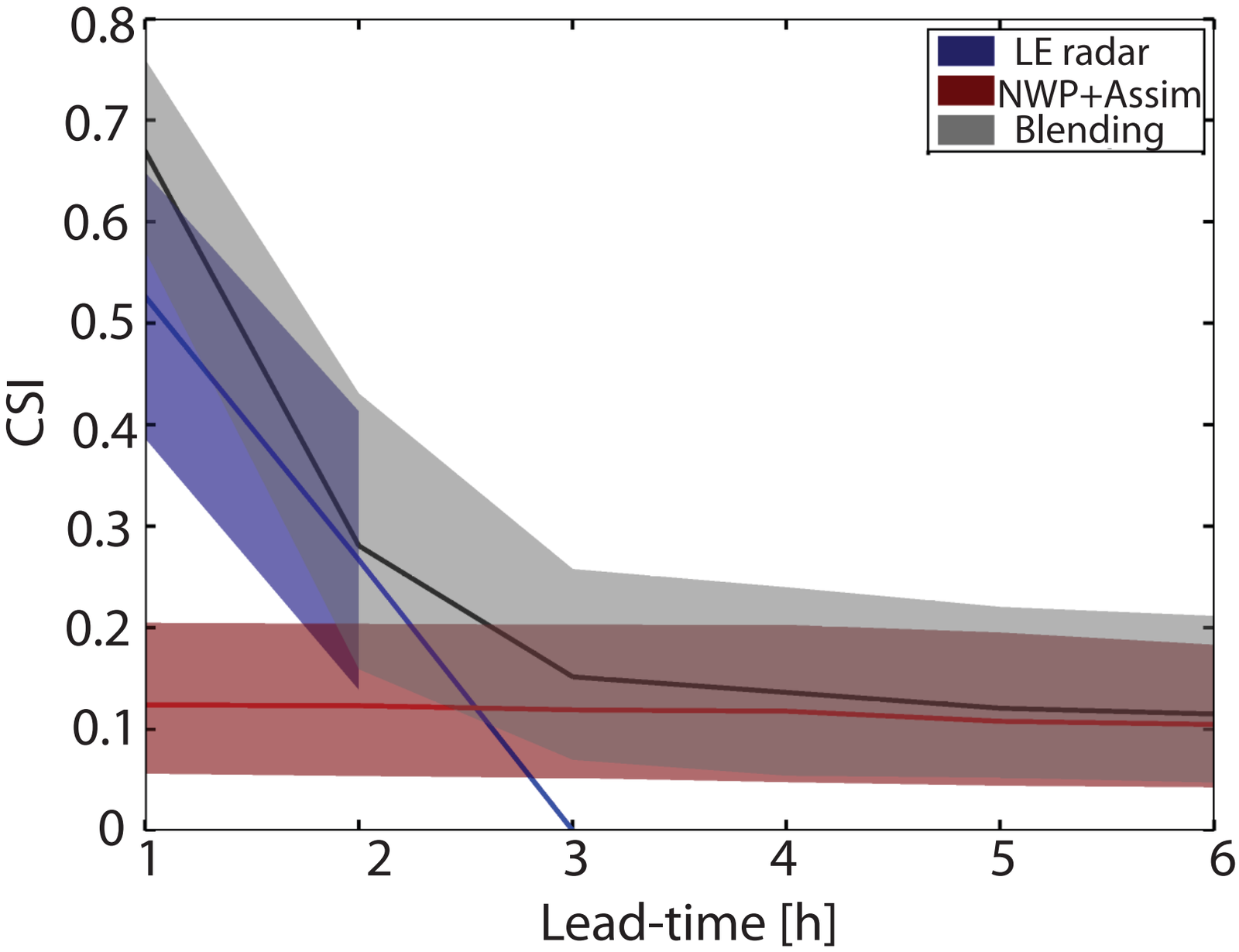
The nowcast is improved when model nowcast and Lagrangian persistence nowcast are merged by a skill-weighted average.

However, there is no advantage in doing this adaptively: climatological skill is as good as the skill determined in a particular situation just prior to the nowcast.

Question: Why?



Blending NWP with Lagrangian persistence of a 3 radars network (Catalunya)



LAPS with 3D VAR; position corrected; blended by averaging; re-calibrated by PMM.