Research to Operations (R2O): UAlbany–NWS Albany CSTAR Program

Kristen L. Corbosiero

Department of Atmospheric and Environmental Sciences

University at Albany

UAlbany–NWS Albany CSTAR Program

~ *CSTAR* = Collaborative Science,
Technology, and Applied Research

UAlbany–NWS Albany CSTAR Program

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~ Between *UAlbany Department of Atmospheric & Environmental Sciences* & the *Albany National Weather Forecast* (NWS) office

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~ Funded by the *National Oceanic and Atmospheric Administration* (NOAA)

UAlbany–NWS Albany CSTAR Program

~ *Engage university* faculty and students in *applied research* of *interest* to operational *forecasters*

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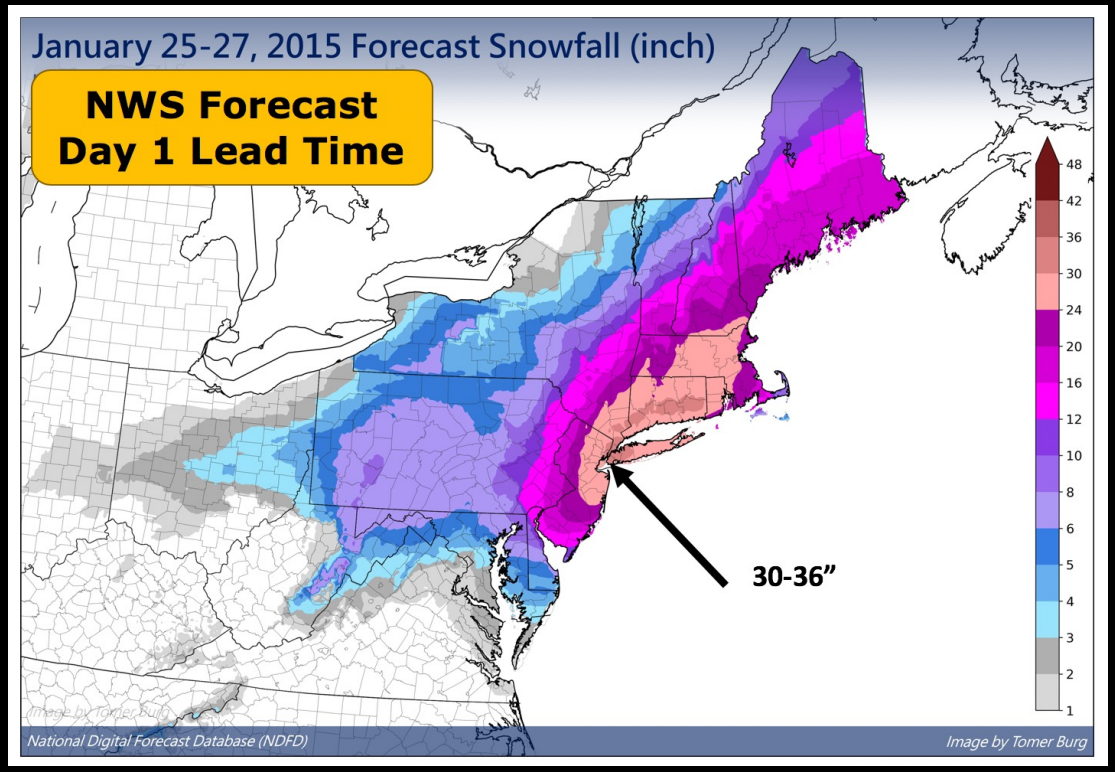

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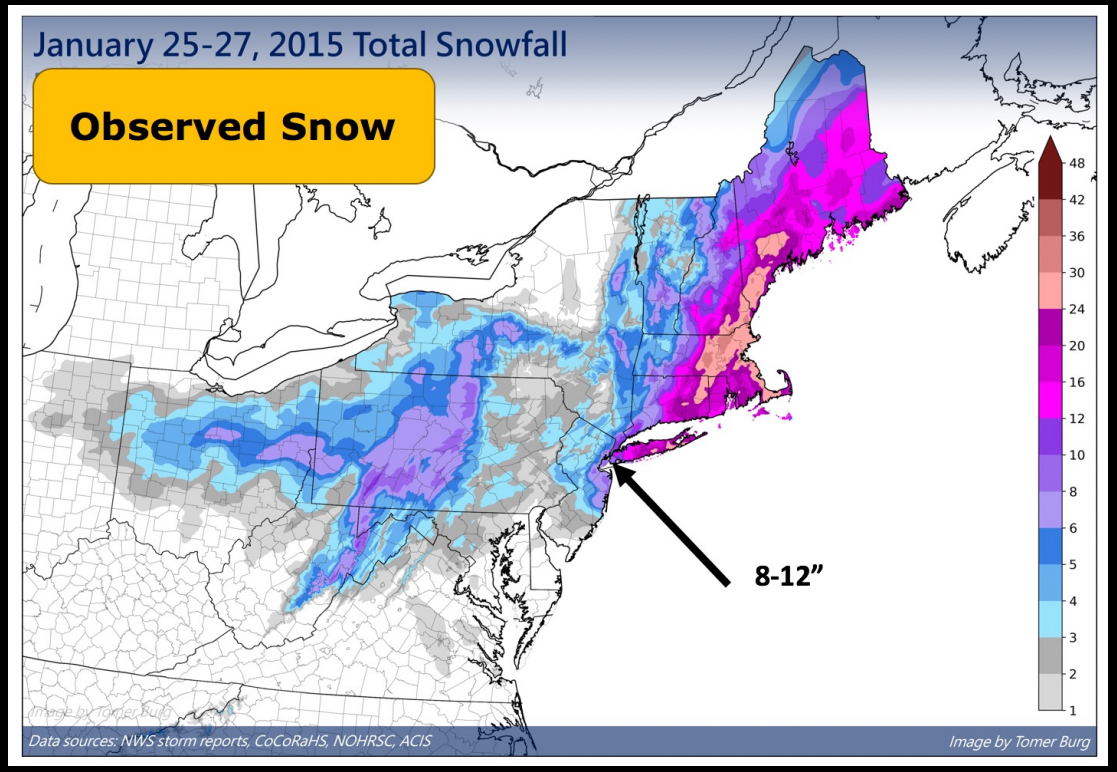

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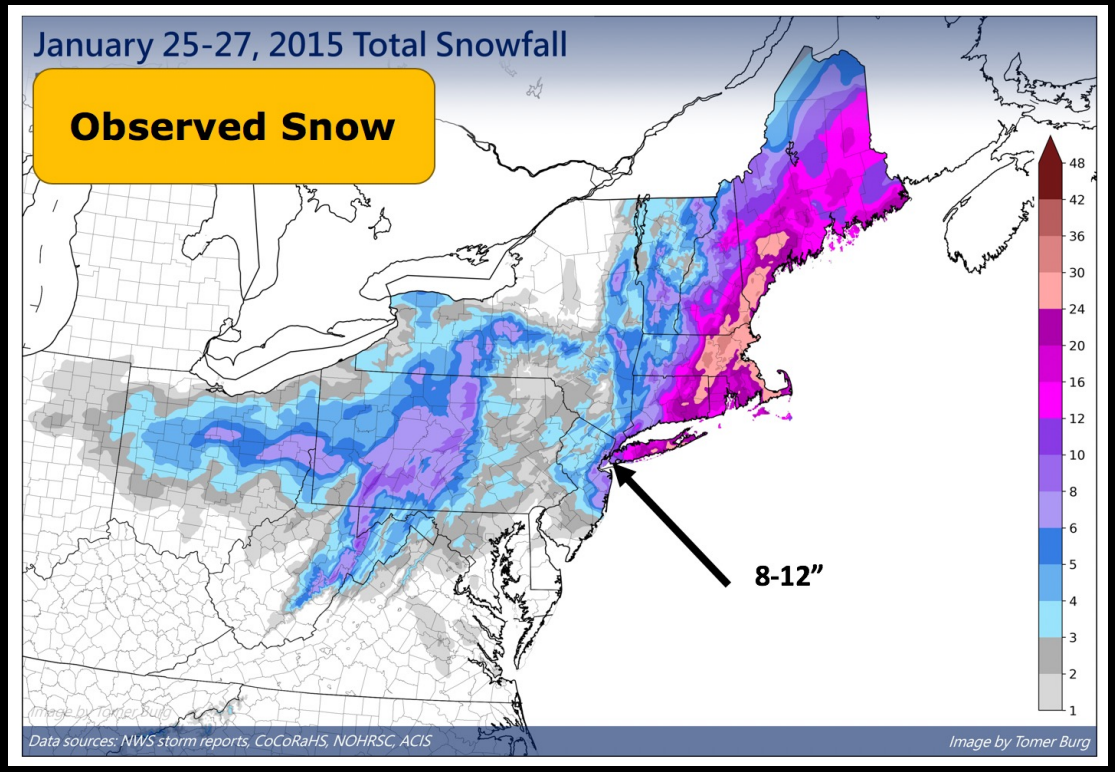

~ *Improve forecasts* by *applying scientific knowledge* to *operational products* and services

UAlbany–NWS Albany CSTAR Program

~ Started by *Lance Bosart*, *Dan Keyser*, and *Gene Auciello* in the late 1990s

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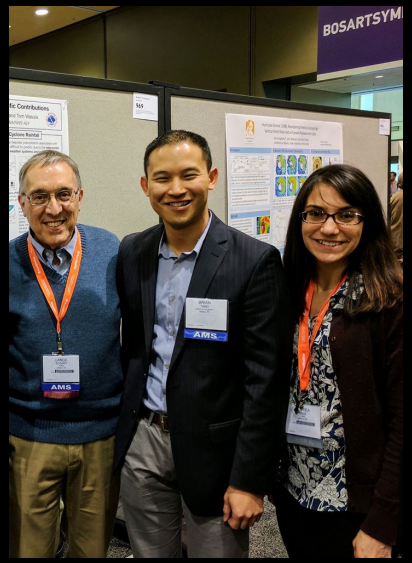

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UAlbany–NWS Albany CSTAR Program

~ *Three graduate students* working with *DAES advisors* and *NWS forecasters* (*focal points*)

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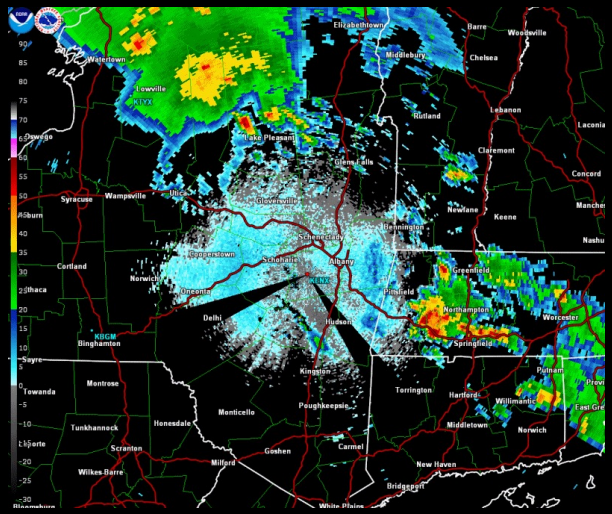

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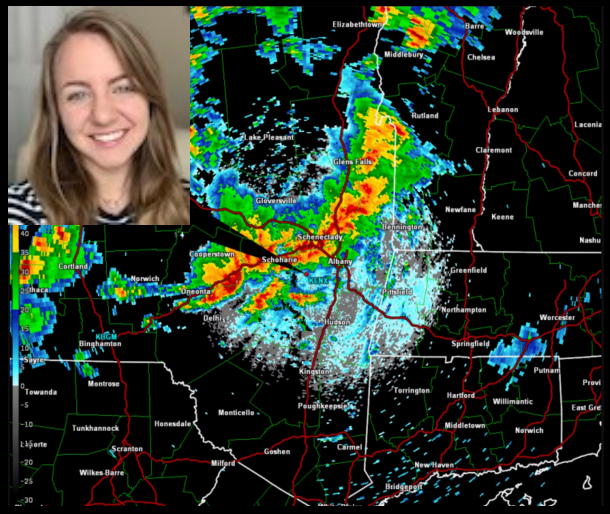

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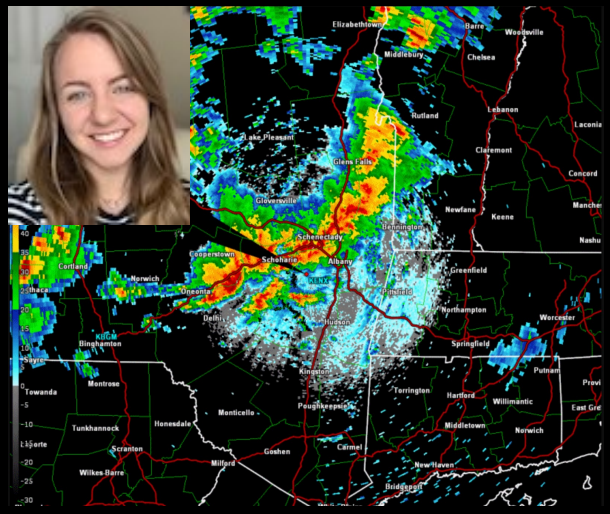

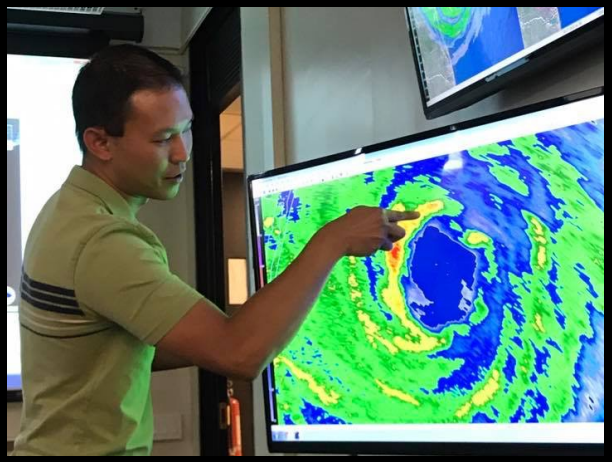

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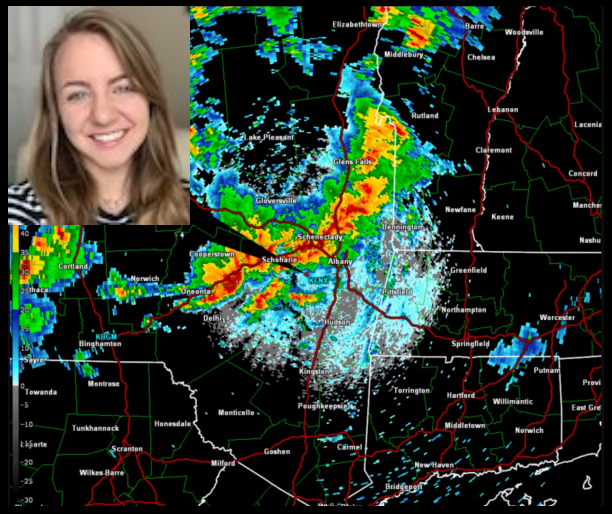

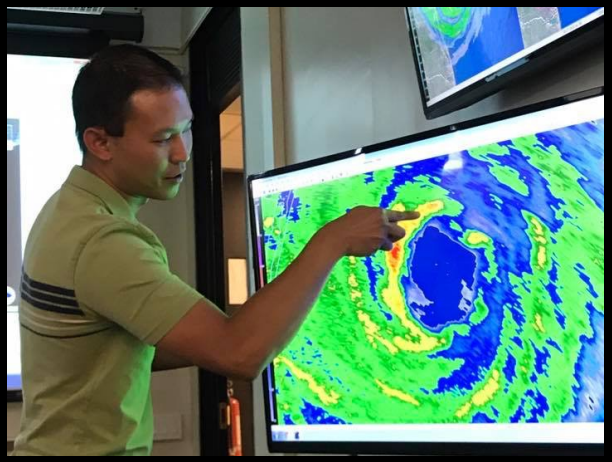

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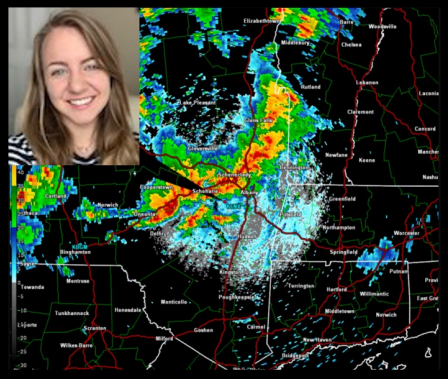

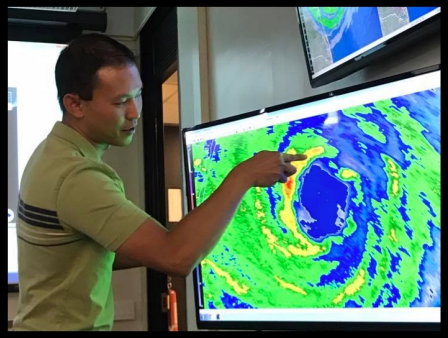

~ Bring *improved scientific understanding* and *technology* into the *forecast system*

UAlbany–NWS Albany CSTAR Program

UAlbany–NWS Albany CSTAR Program

1) Winter weather
    - *Mesoscale snowbands*
    - *Uncertain precipitation type*

UAlbany–NWS Albany CSTAR Program

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    - *Prediction* of *severe thunderstorms*
    - Forecasting *tornadoes*

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    - *Predecessor rain events*
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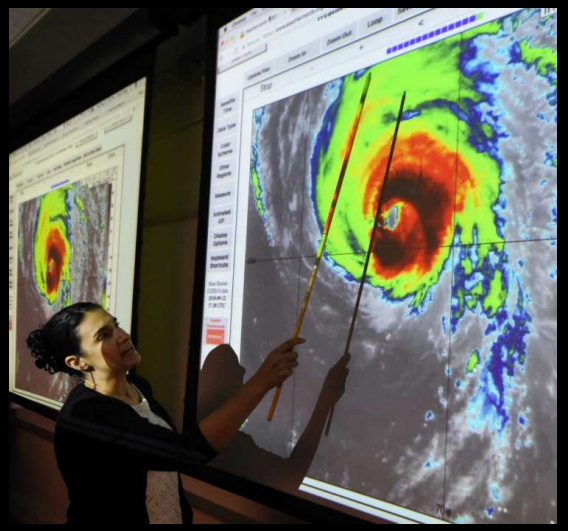

UAlbany–NWS Albany CSTAR Program

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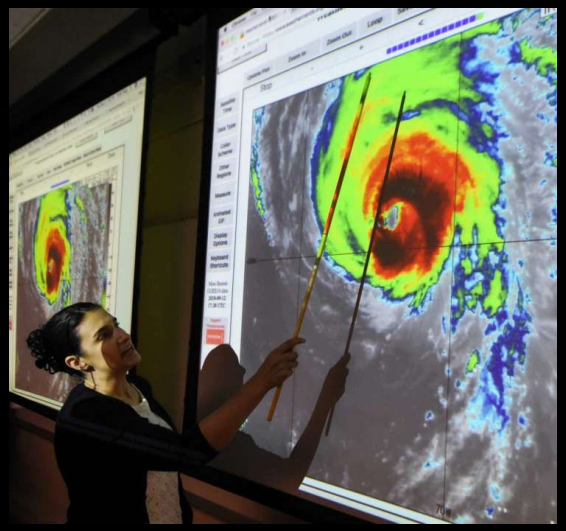

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UAlbany–NWS Albany CSTAR Program

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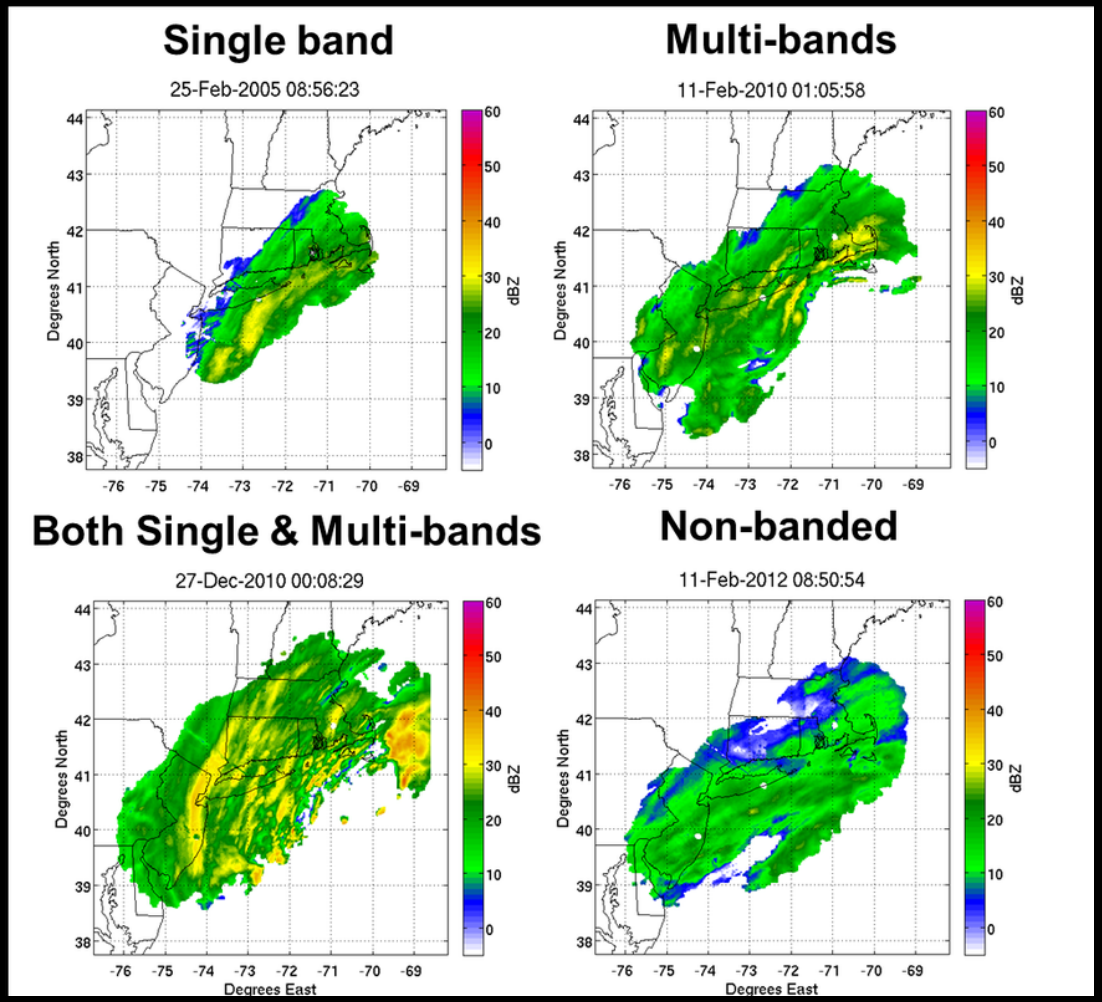

Novak (2002)
Kenyon (2013)

UAlbany–NWS Albany CSTAR Program

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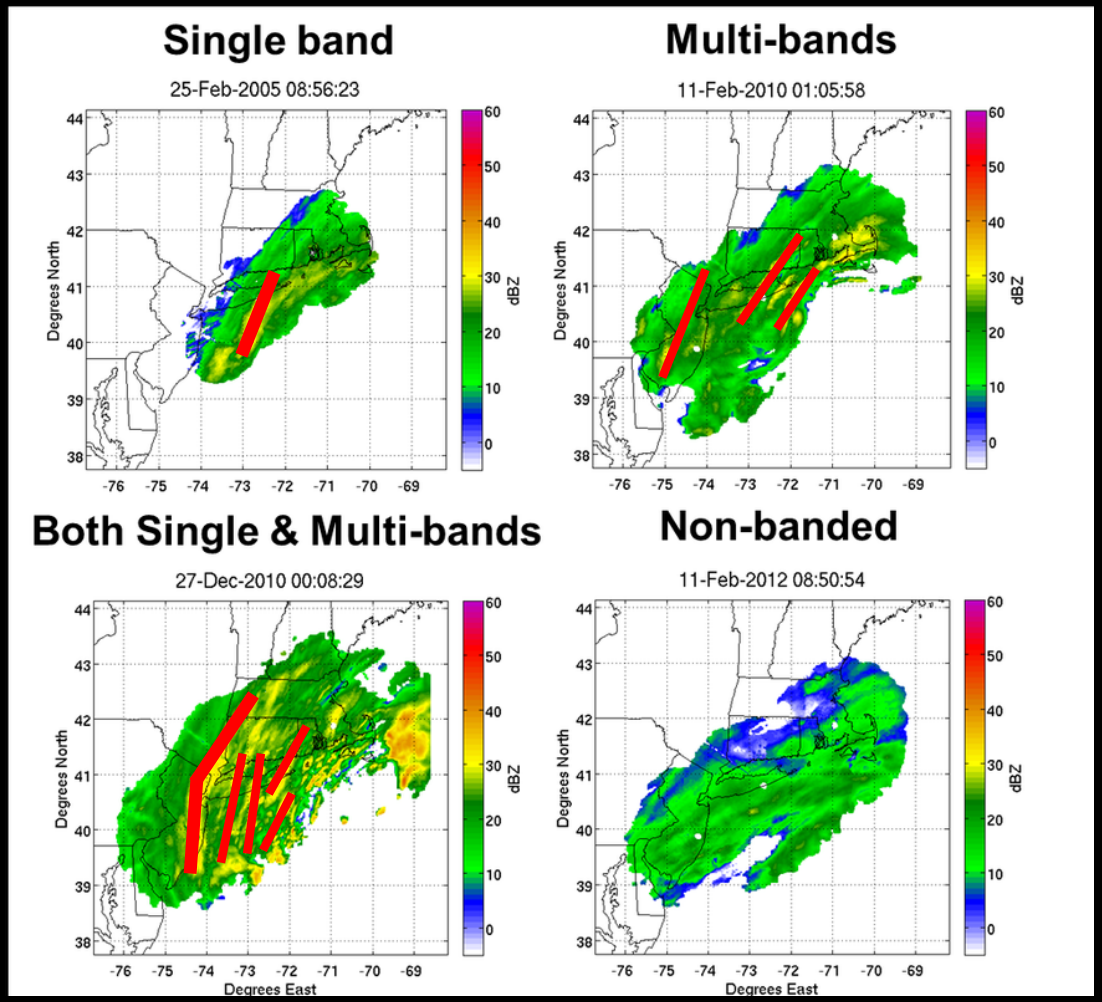

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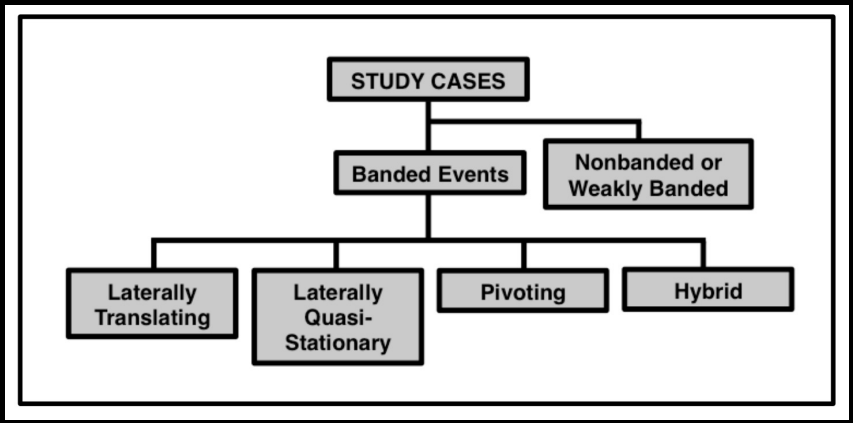
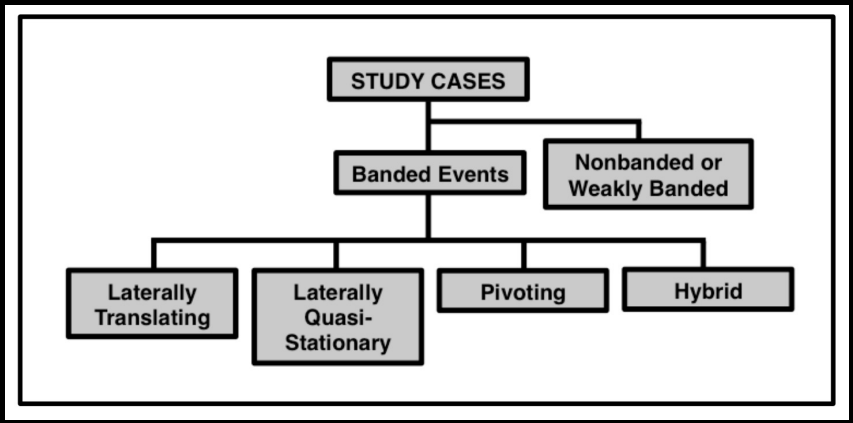
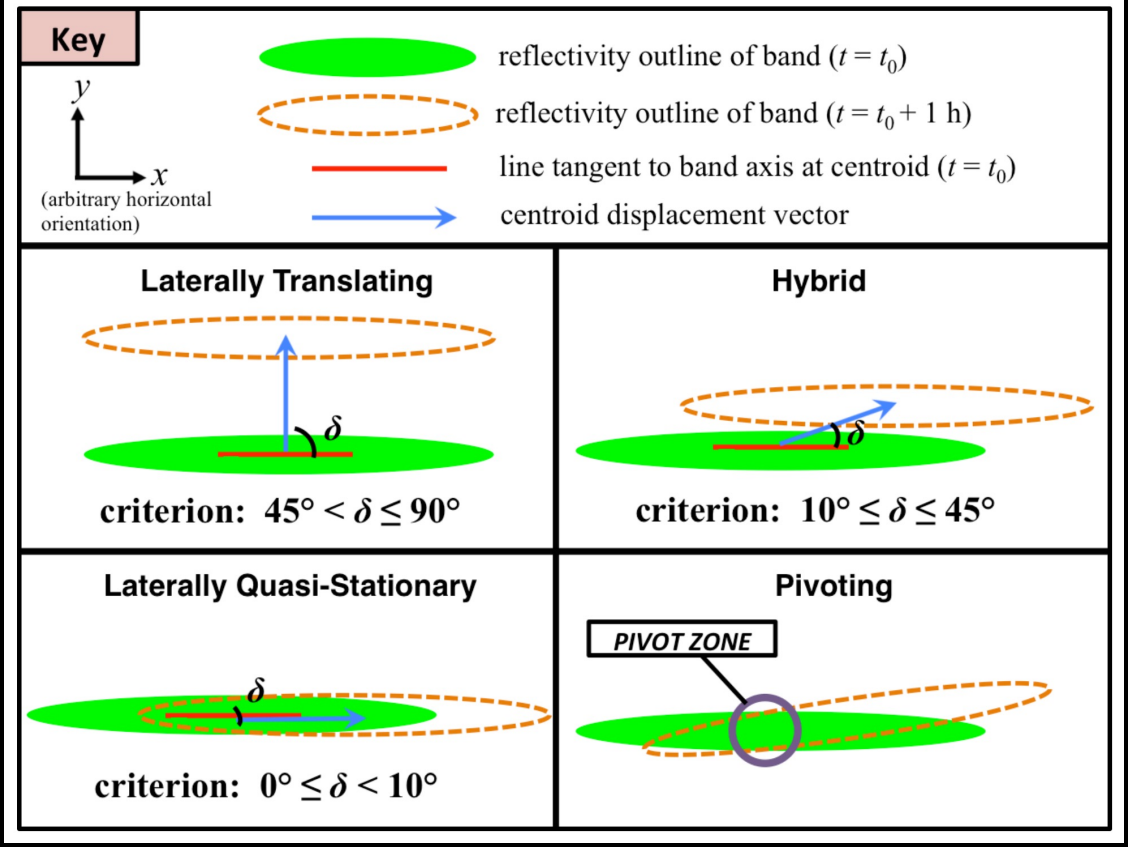


Kenyon (2013)

UAlbany–NWS Albany CSTAR Program



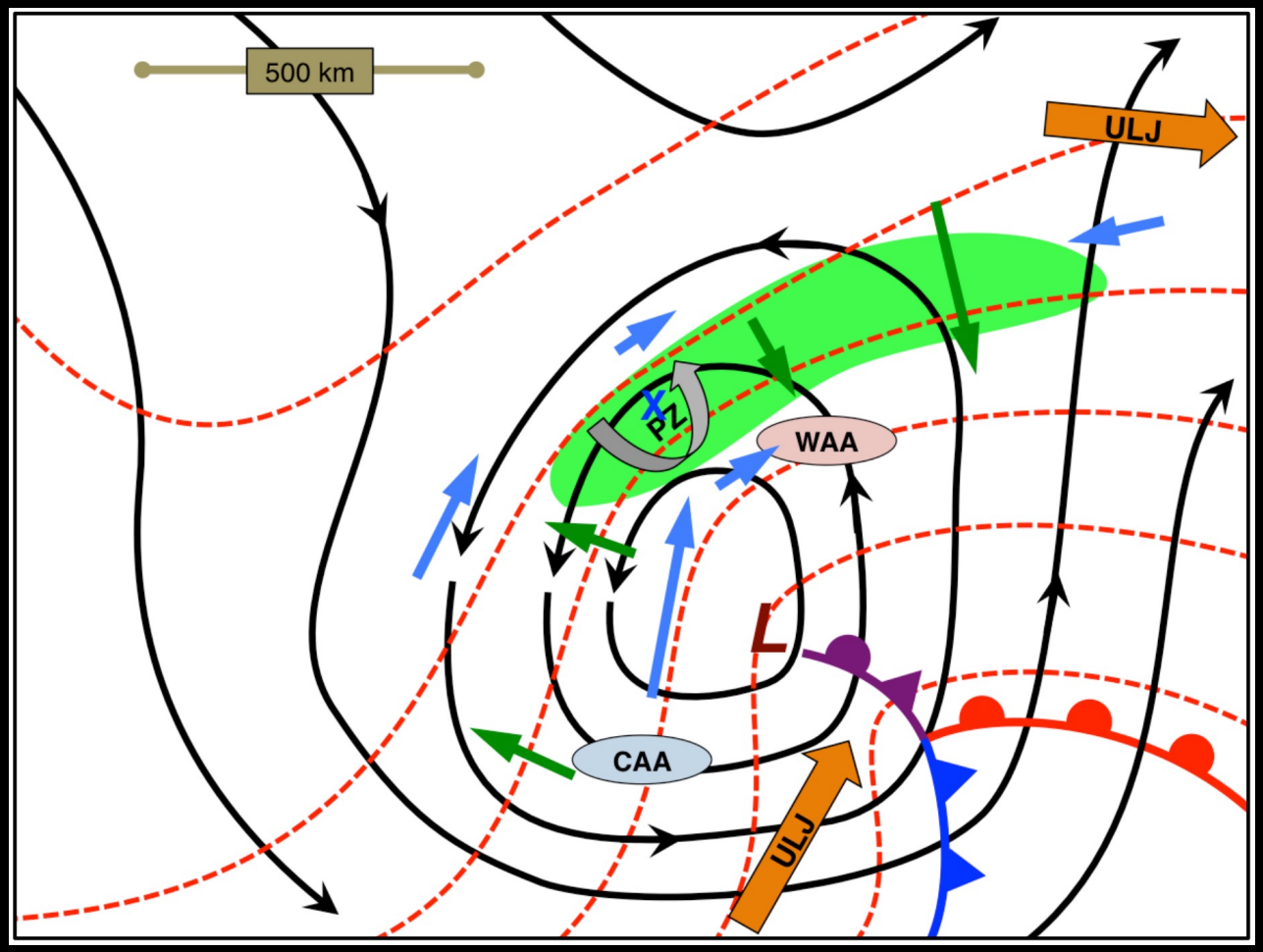


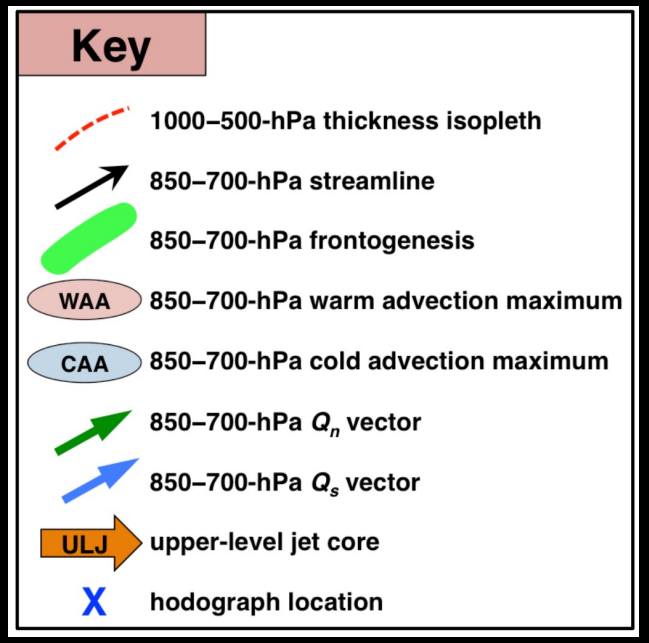
Kenyon (2013)

UAlbany–NWS Albany CSTAR Program

1) Winter weather

- *Pivoting snowbands*





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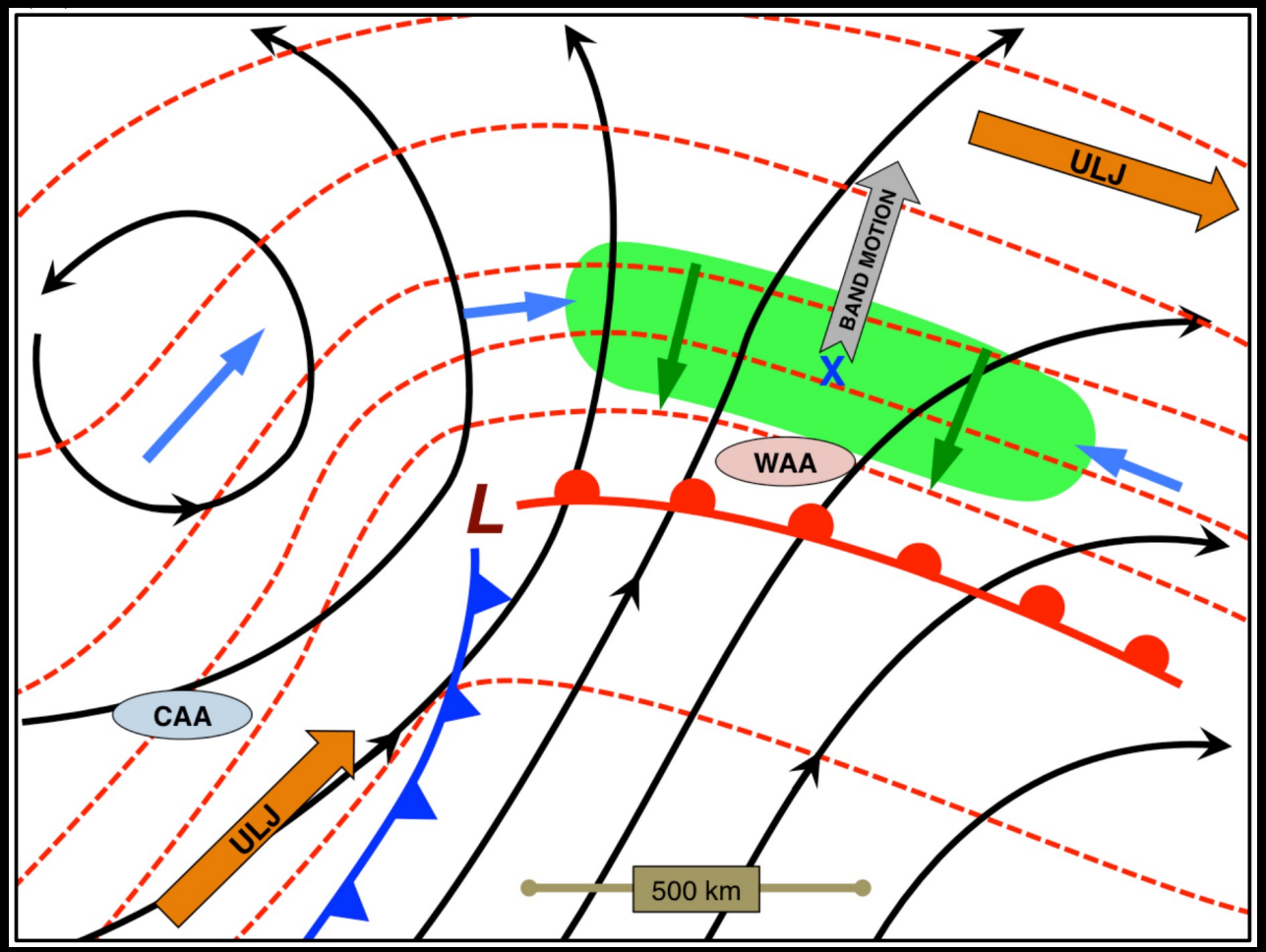
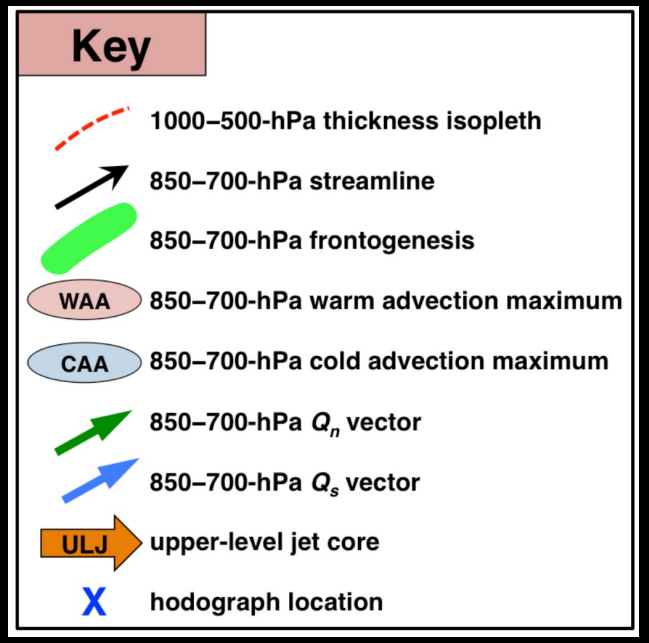
UAlbany–NWS Albany CSTAR Program

1) Winter weather

- *Laterally translating snowbands*





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UAlbany–NWS Albany CSTAR Program

1) Winter weather

- *Laterally translating snowbands*

FXUS61 KALY 142116
AFDALY

AREA FORECAST DISCUSSION
National Weather Service Albany NY
416 PM EST Fri Jan 14 2022

Strong isentropic lift, aided by a powerful low-level jet of 50+ knots, will be allowing for a laterally translating band of snowfall (based of CSTAR research) to lift from south to north across the area for late Sunday night. 12z GEFS show 850 u wind anomalies of -4 to -5 STD, which is very impressive. This suggests very strong flow, which will supply abundant moisture and will upslope into the high terrain. Snowfall rates will easily exceed 1" per hour within this snowband and rates could reach 2" to 3" per hour where the upslope enhances the precip. The band looks to move quickly and will be rocketing northward across the area for the late overnight hours.

SHORT TERM...Frugis

UAlbany–NWS Albany CSTAR Program

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    - *Near-freezing uncertain precipitation type*

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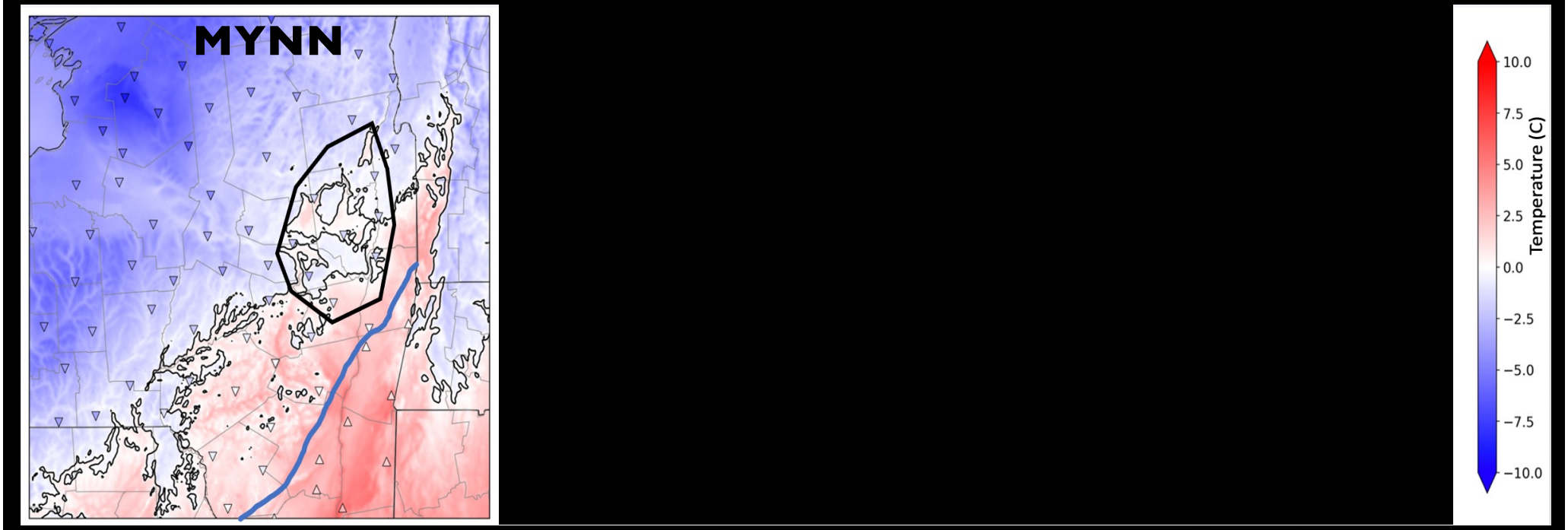

- Color fill is WRF 2-m temperature
- Up-triangle indicates above-freezing NYSM site
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Seymour (2020)

UAlbany–NWS Albany CSTAR Program

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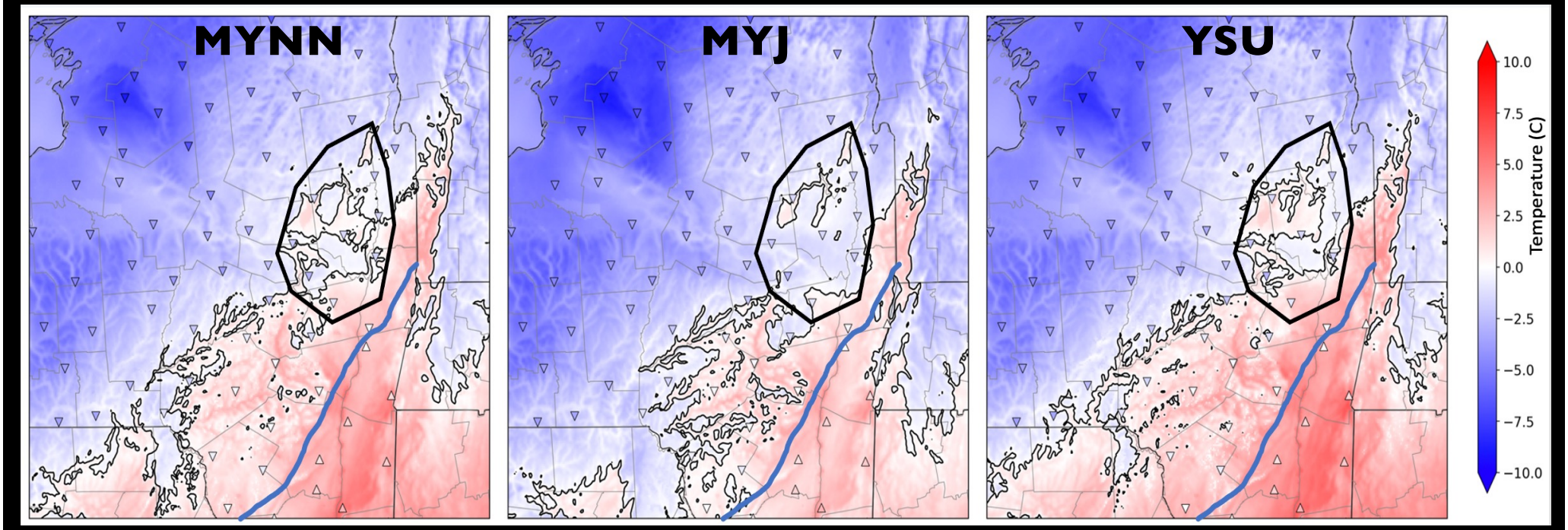

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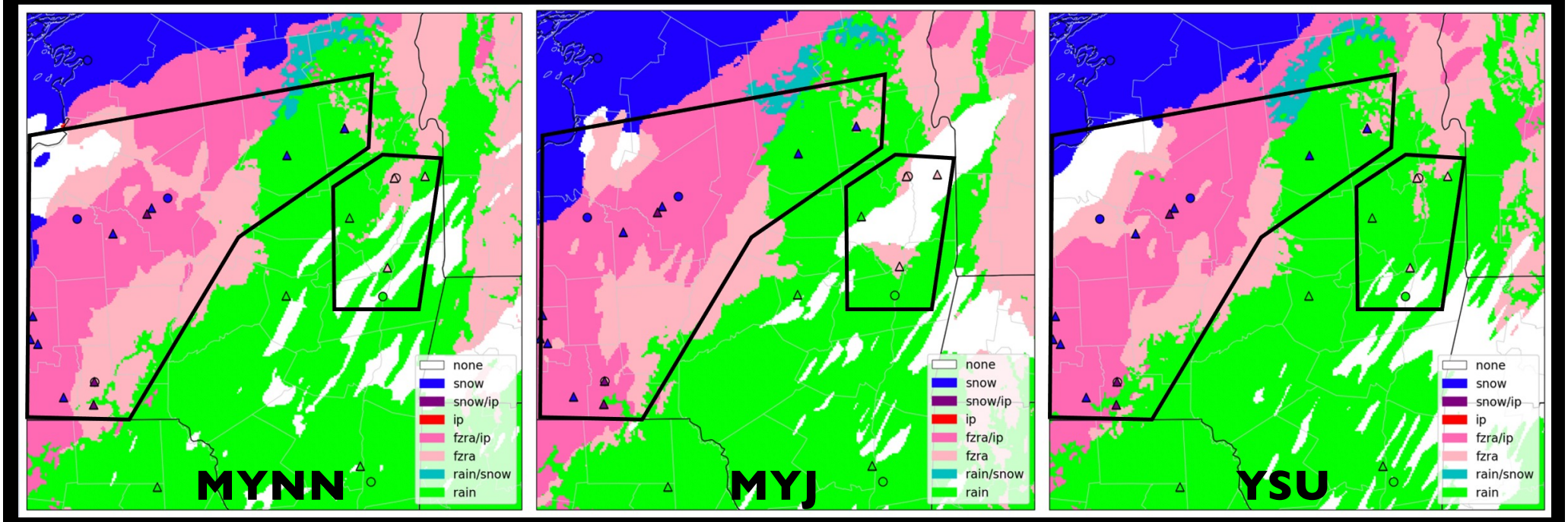

Fill = WRF simulated p-type
Circle = ASOS report
Triangle = mPING report

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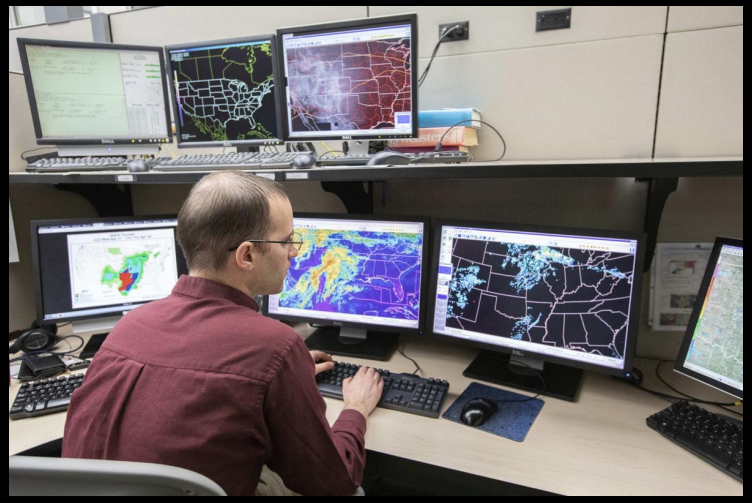

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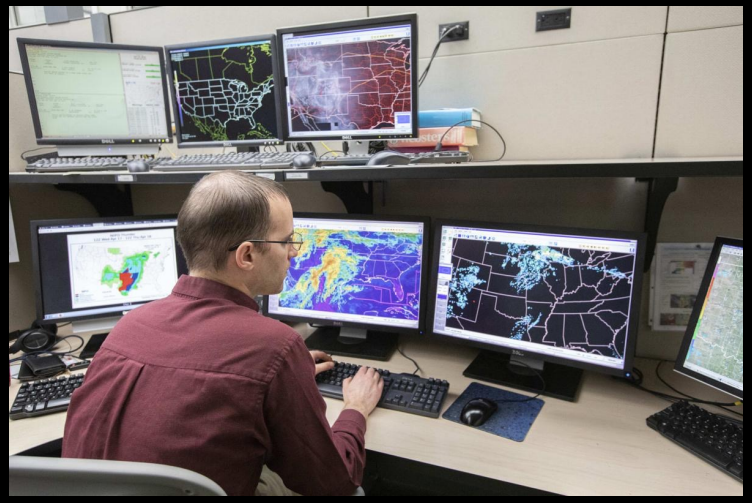

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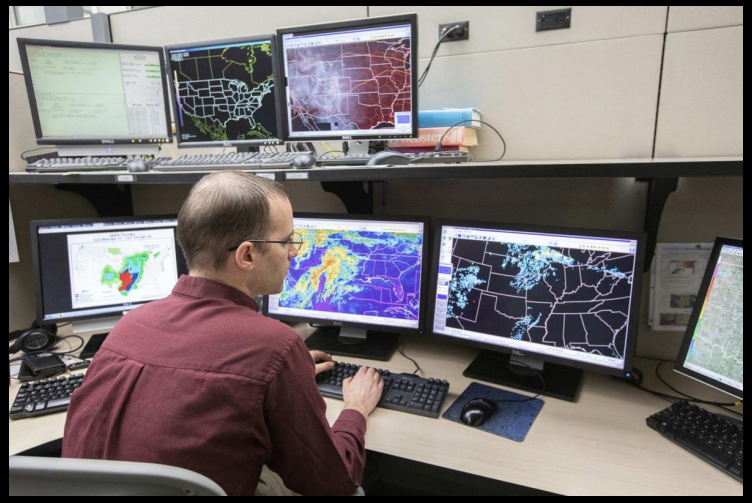

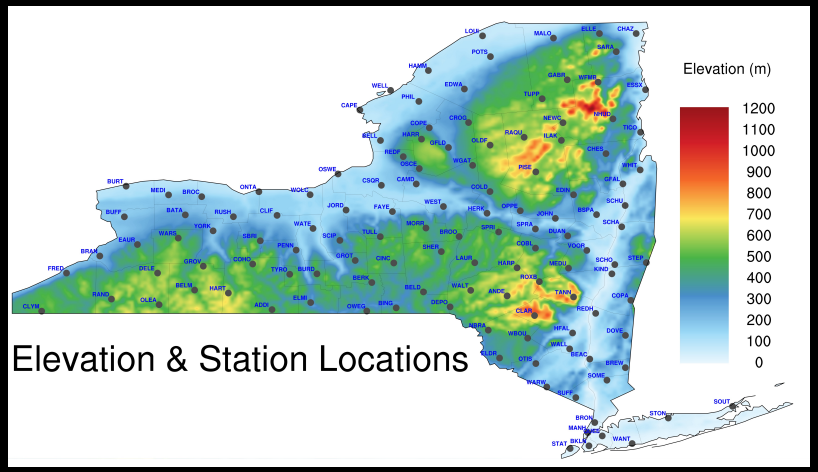

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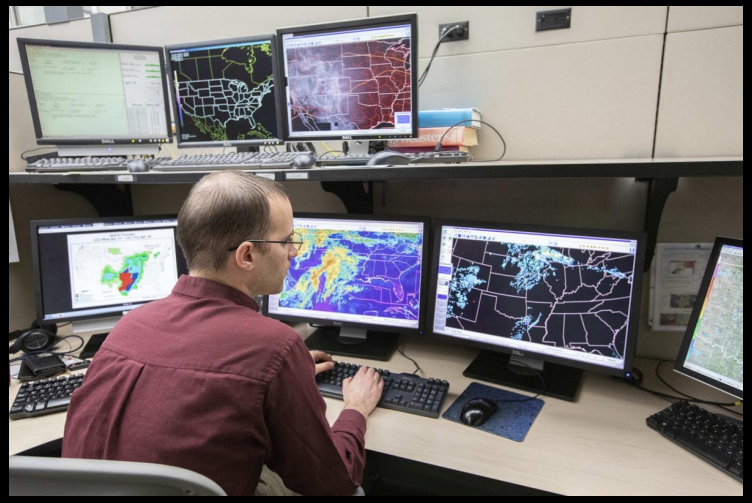

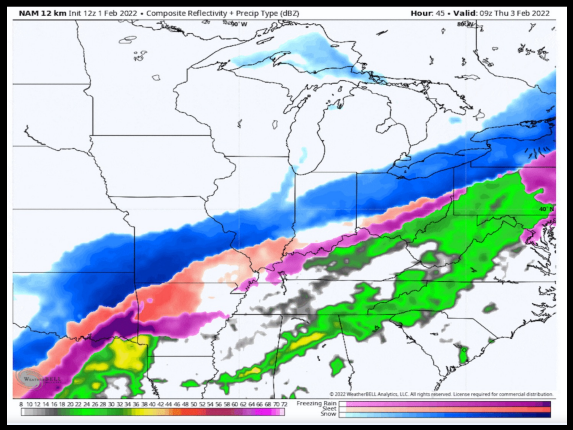

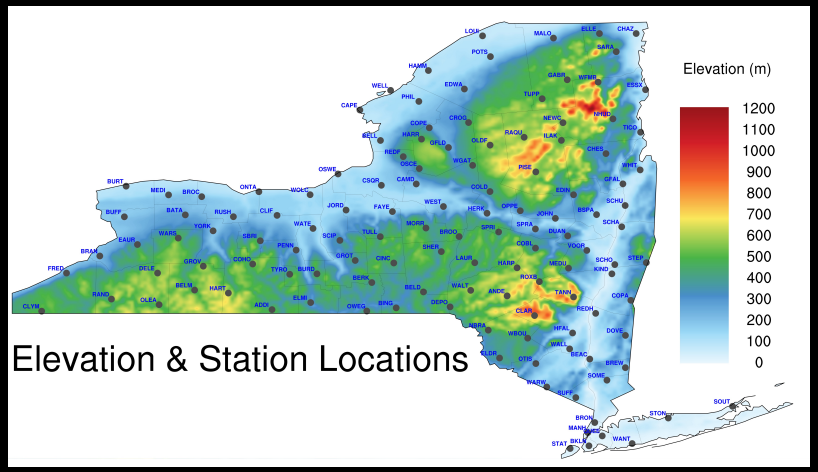

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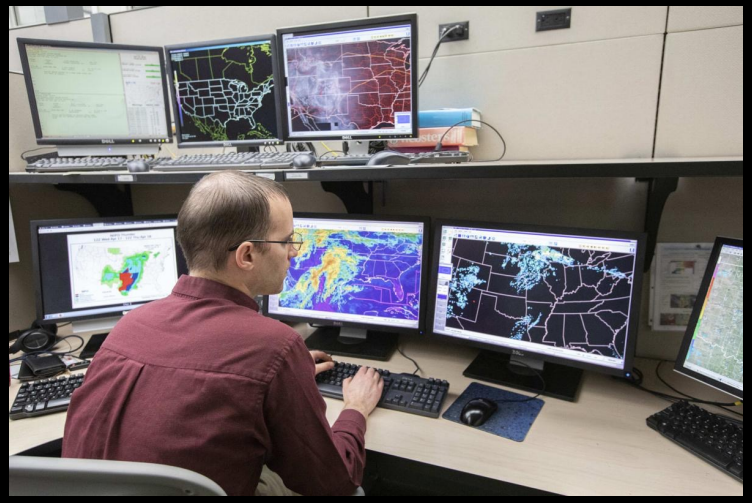

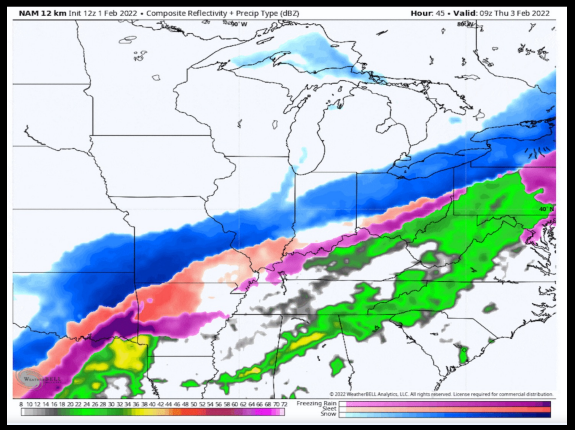

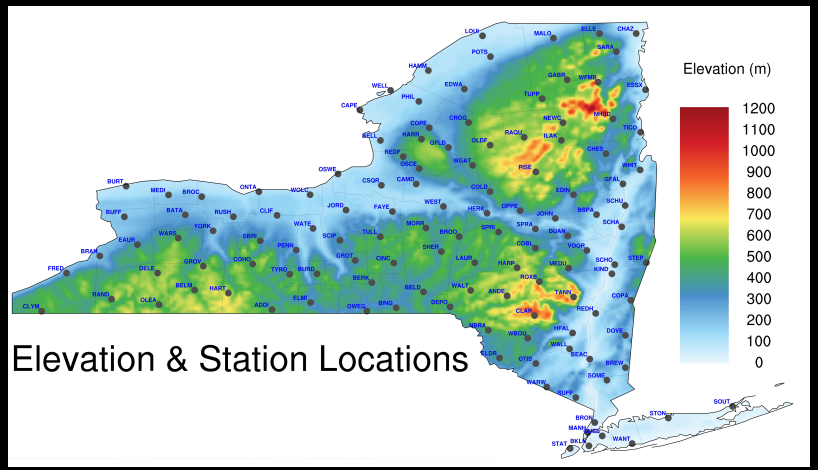

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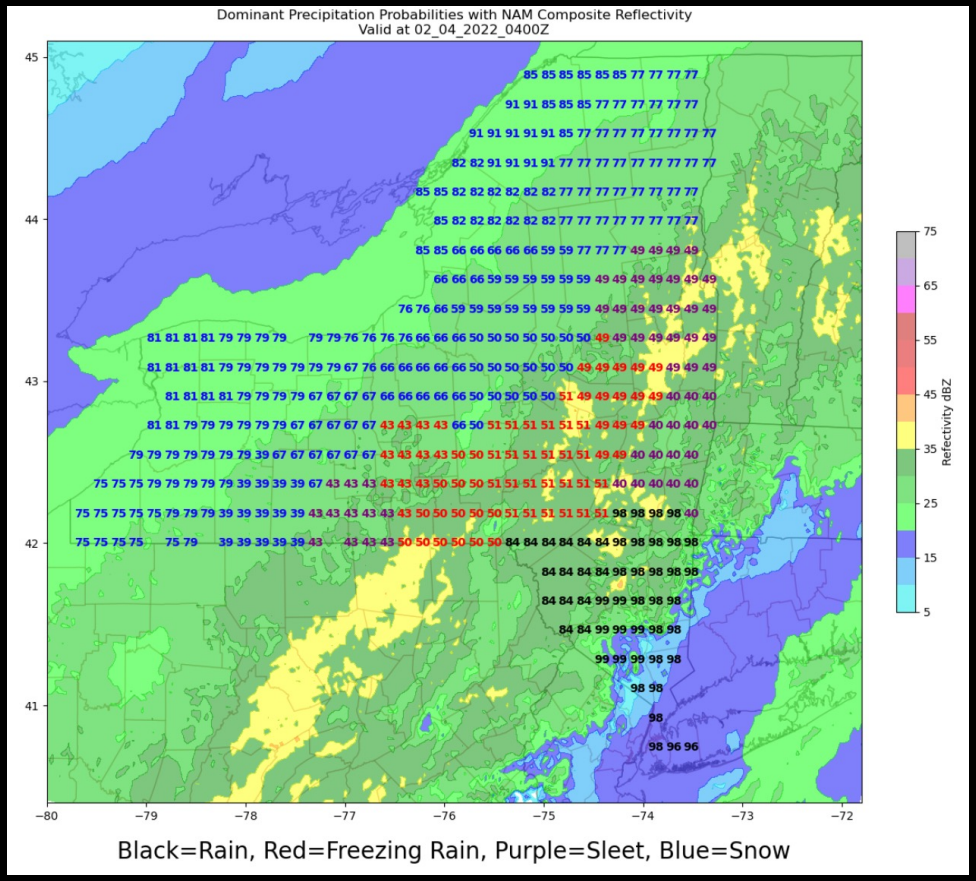

Filipiak (2022)

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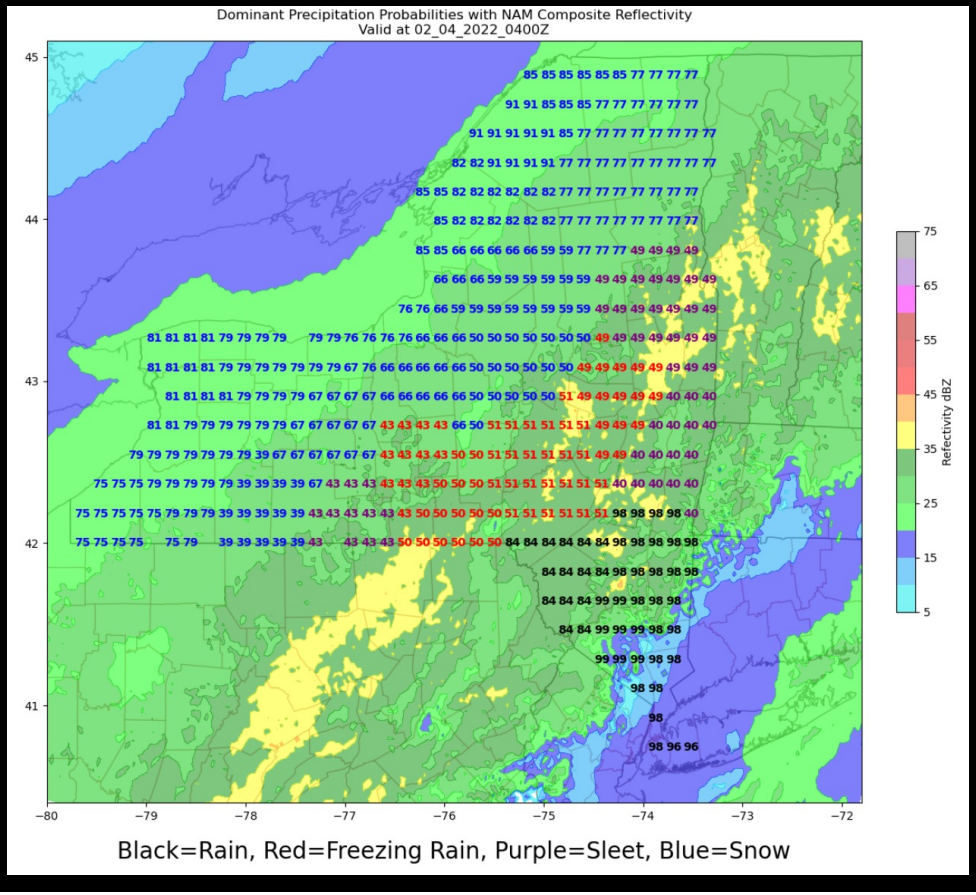

Filipiak (2022)

Dewpoint at surface	Temperature at surface	Positive Area	Max Wet Bulb 925-700hPa	Surface Wet Bulb Temperature	Min Temperature surface-850hPa	Temperature at 850hPa	Max Temperature 850-700hPa	Mean Temperature surface to 850hpa	Dewpoint at 925hPa
0.05826	0.049744	0.0489	0.04838	0.04403	0.04156	0.034428	0.033562	0.033138	0.032682

UAlbany–NWS Albany CSTAR Program

1) Winter weather

- *Near-freezing uncertain precipitation type*

FXUS61 KALY 040234
AFDALY

AREA FORECAST DISCUSSION
National Weather Service Albany NY
934 PM EST Thu Feb 3 2022

.NEAR TERM /THROUGH FRIDAY/...
Based on reports from spotters, social media and data from the NY State Mesonet, and experimental precipitation type CSTAR output, sleet and freezing rain occurring to the Johnstown/Amsterdam area and even near the Herkimer sawtooth. Some slight reductions in the snow forecasts out there and a slight increase in the ice forecasts from the Capital Region east and south.

NEAR TERM...SND/NAS

UAlbany–NWS Albany CSTAR Program

3) Tropical cyclone precipitation

UAlbany–NWS Albany CSTAR Program

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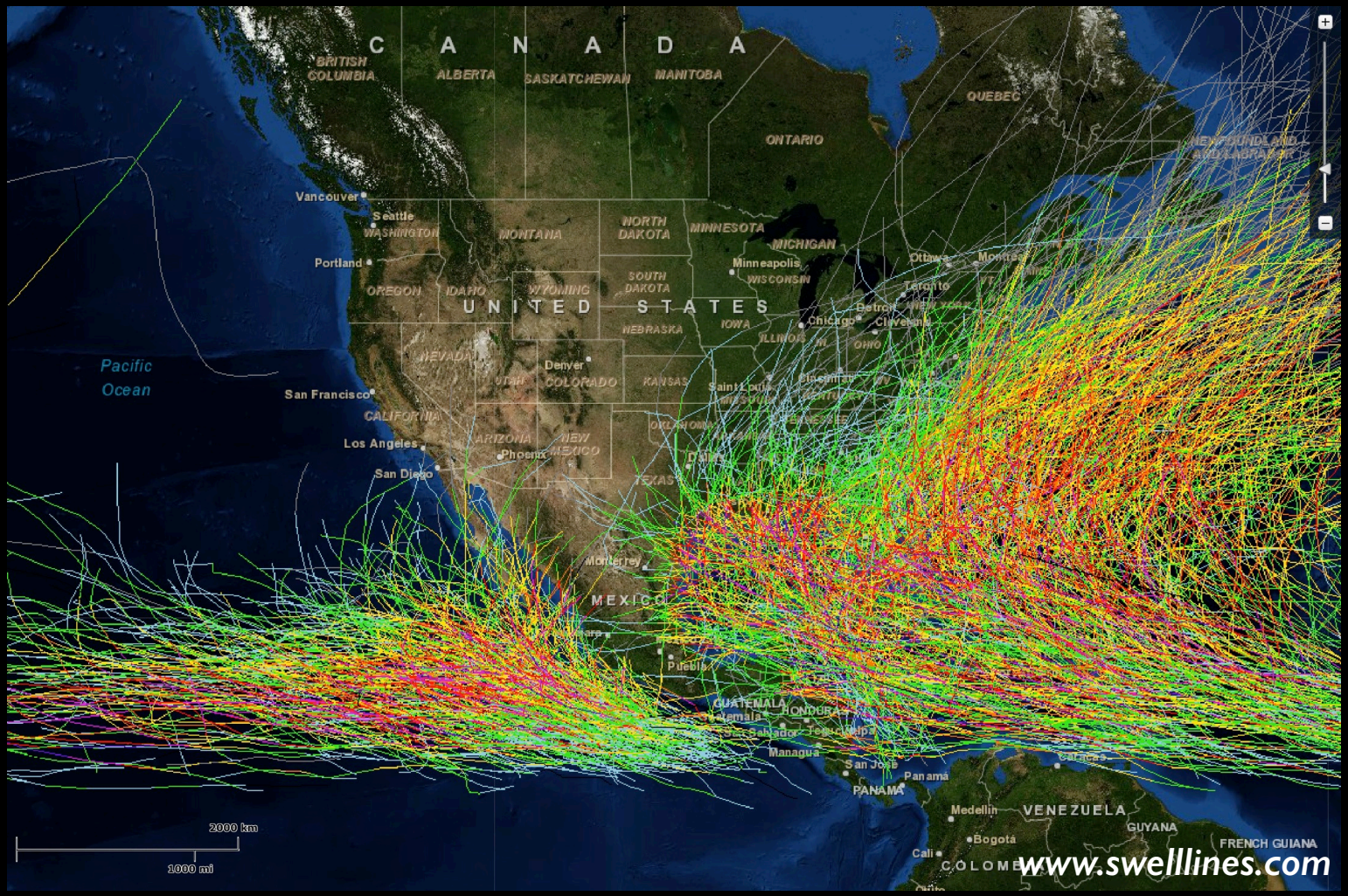

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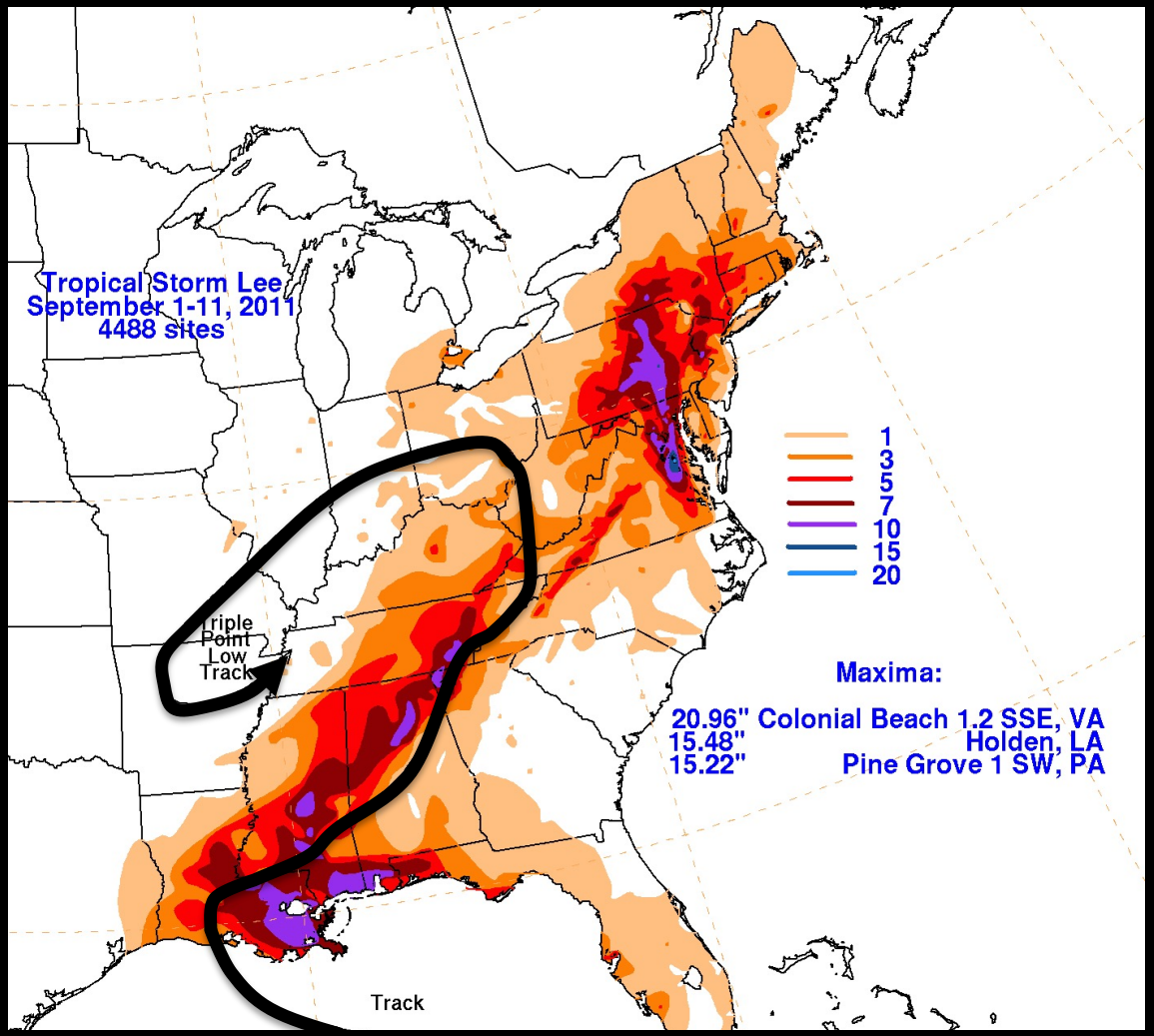

Roth (2011)

UAlbany–NWS Albany CSTAR Program

3) Tropical cyclone precipitation
   - *Predecessor rain events (PREs)*

UAlbany–NWS Albany CSTAR Program

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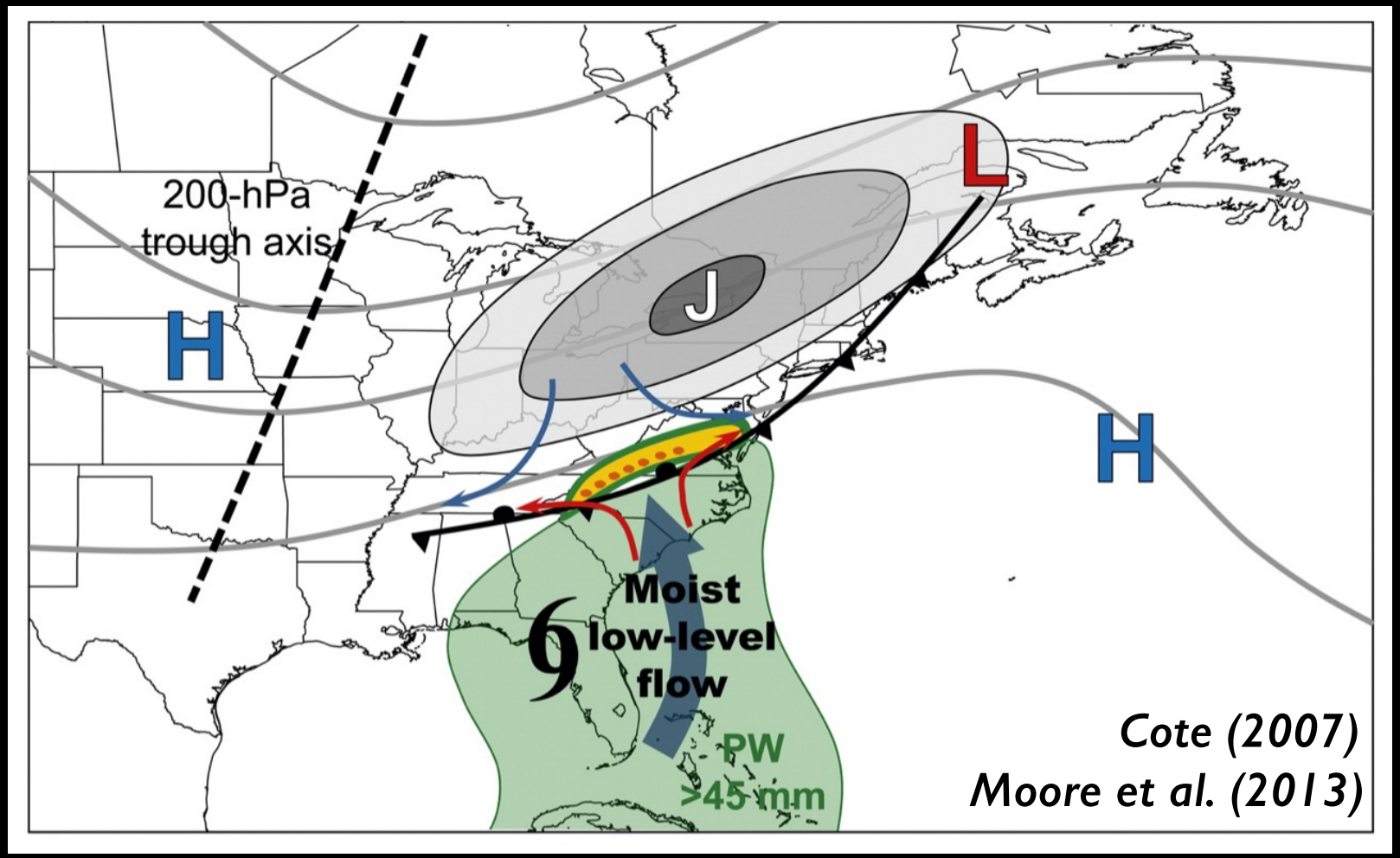


UAlbany–NWS Albany CSTAR Program

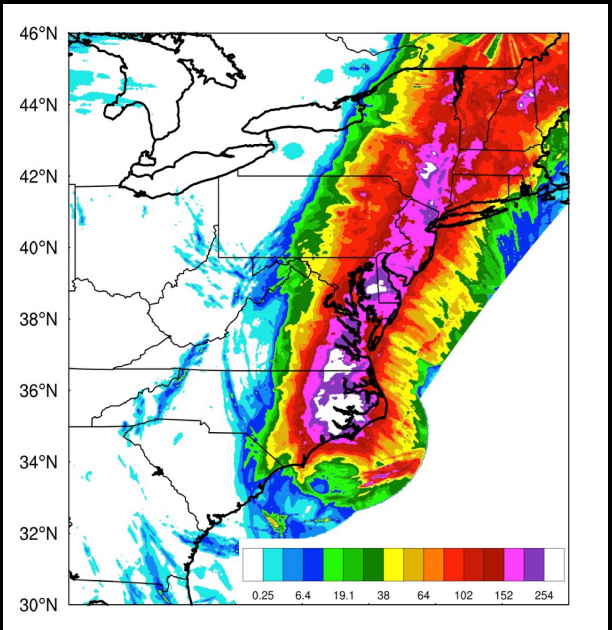
3) Tropical cyclone precipitation
   - *Rainfall* in *complex terrain*

Smith (2017)

UAlbany–NWS Albany CSTAR Program

3) Tropical cyclone precipitation

- *Rainfall* in *complex terrain*



Observed rainfall

Smith (2017)

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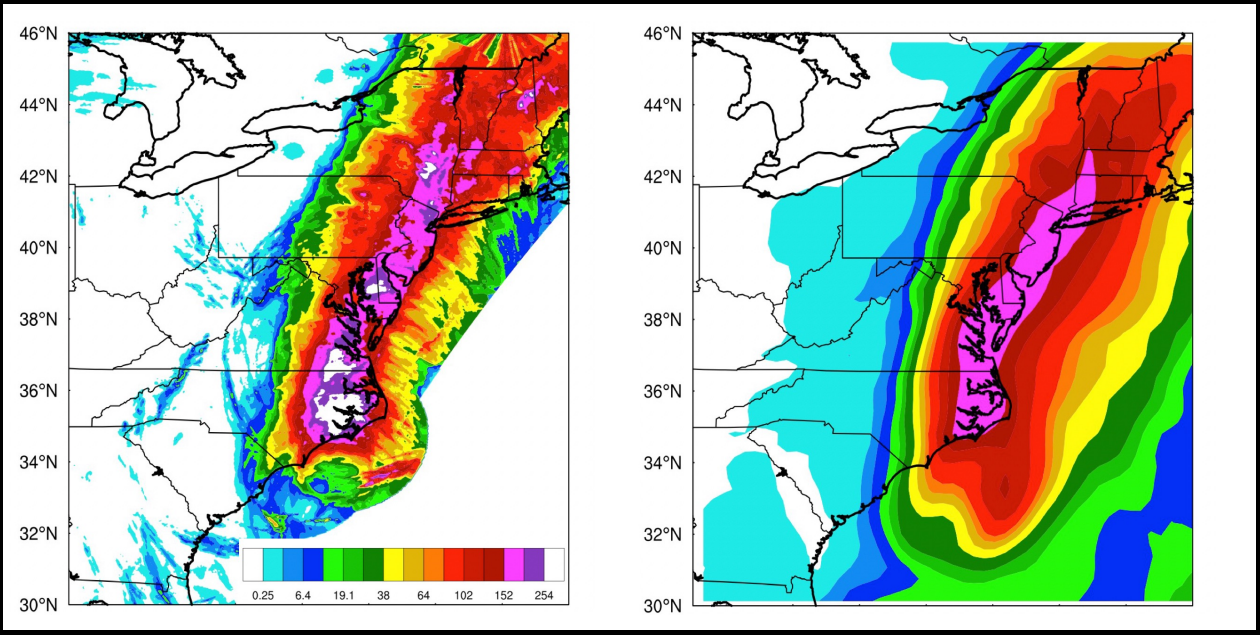
3) Tropical cyclone precipitation

- *Rainfall* in *complex terrain*



Observed rainfall

80-member GFS ensemble mean rainfall

Smith (2017)

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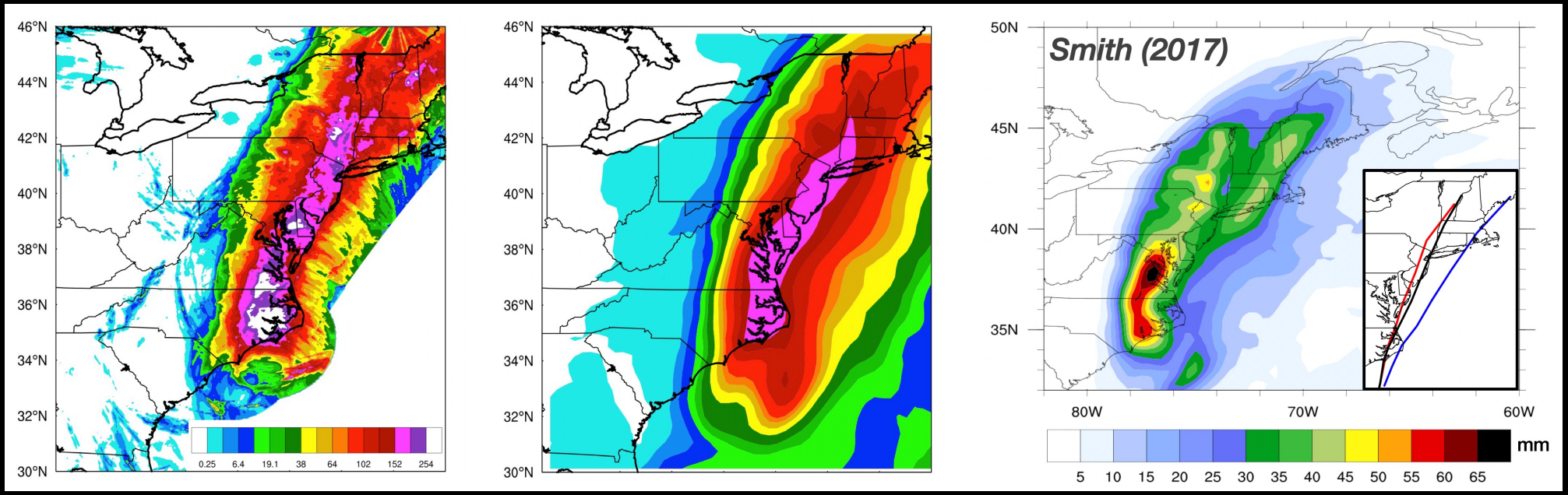
3) Tropical cyclone precipitation

- *Rainfall* in *complex terrain*



Observed rainfall

80-member GFS ensemble mean rainfall

80-member GFS ensemble standard dev. rainfall

Smith (2017)

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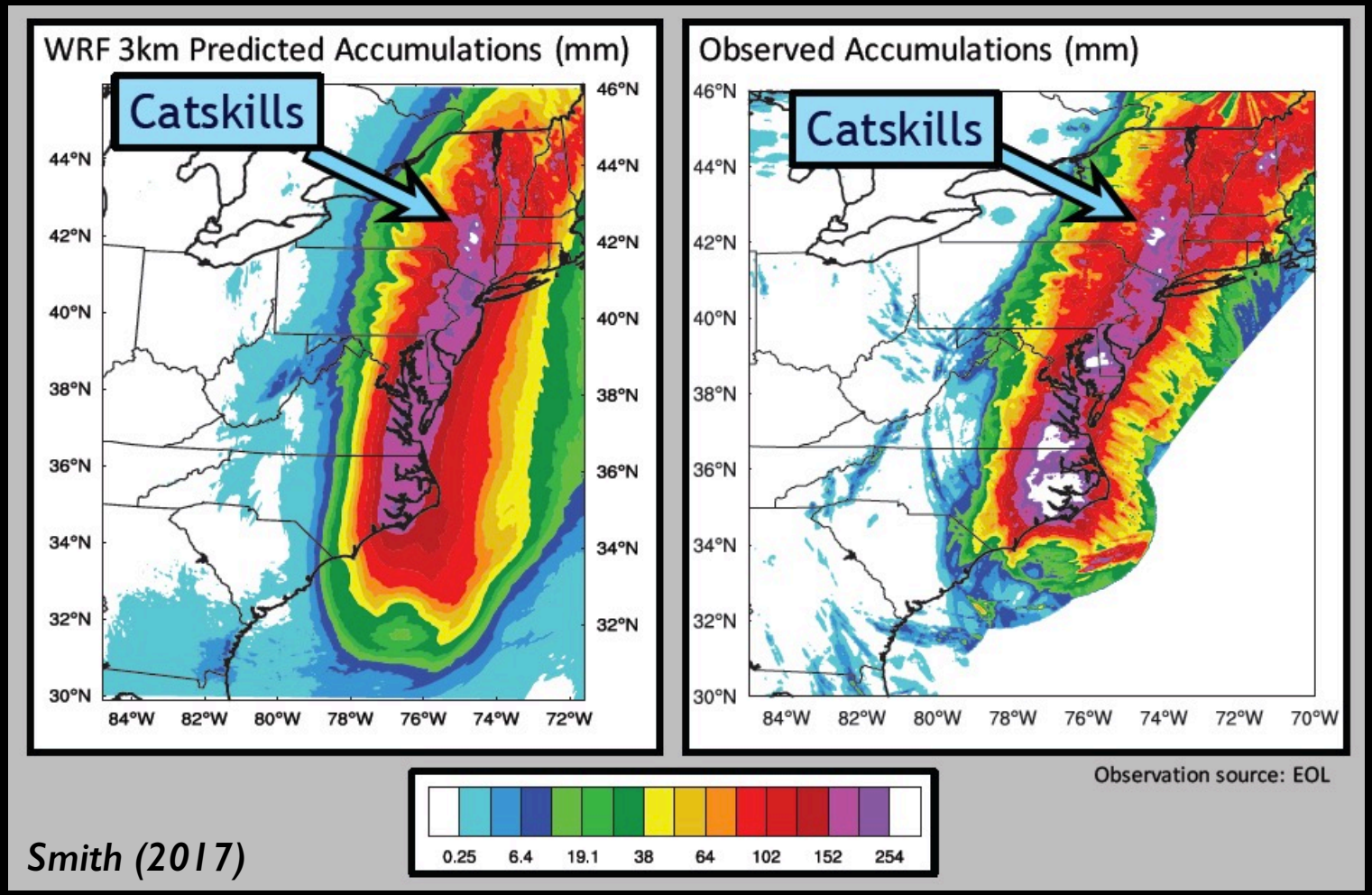
3) Tropical cyclone precipitation

- *Rainfall* in *complex terrain*



Smith (2017)

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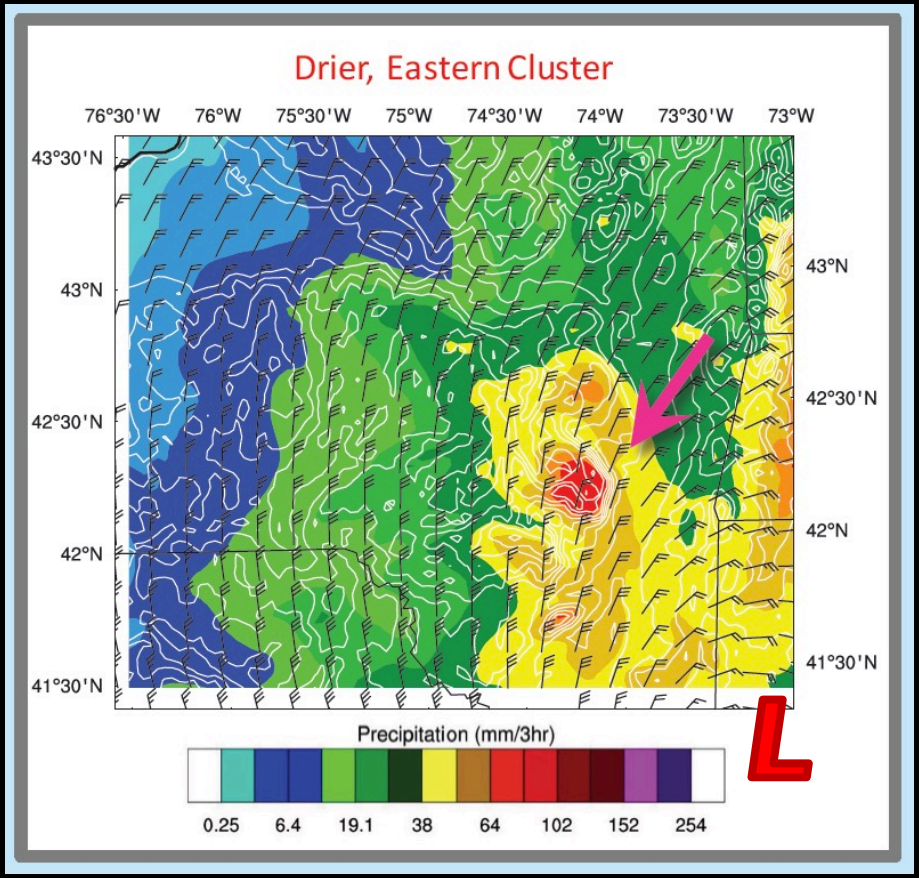
- *Rainfall* in *complex terrain*



Smith (2017)

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3) Tropical cyclone precipitation

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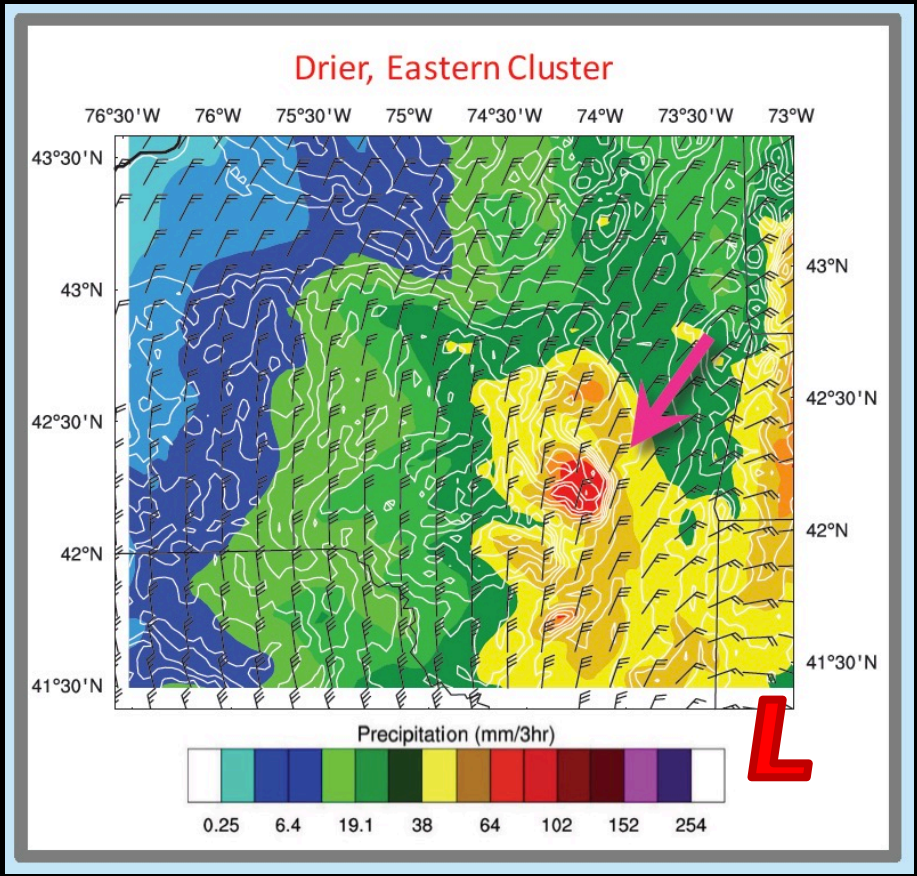

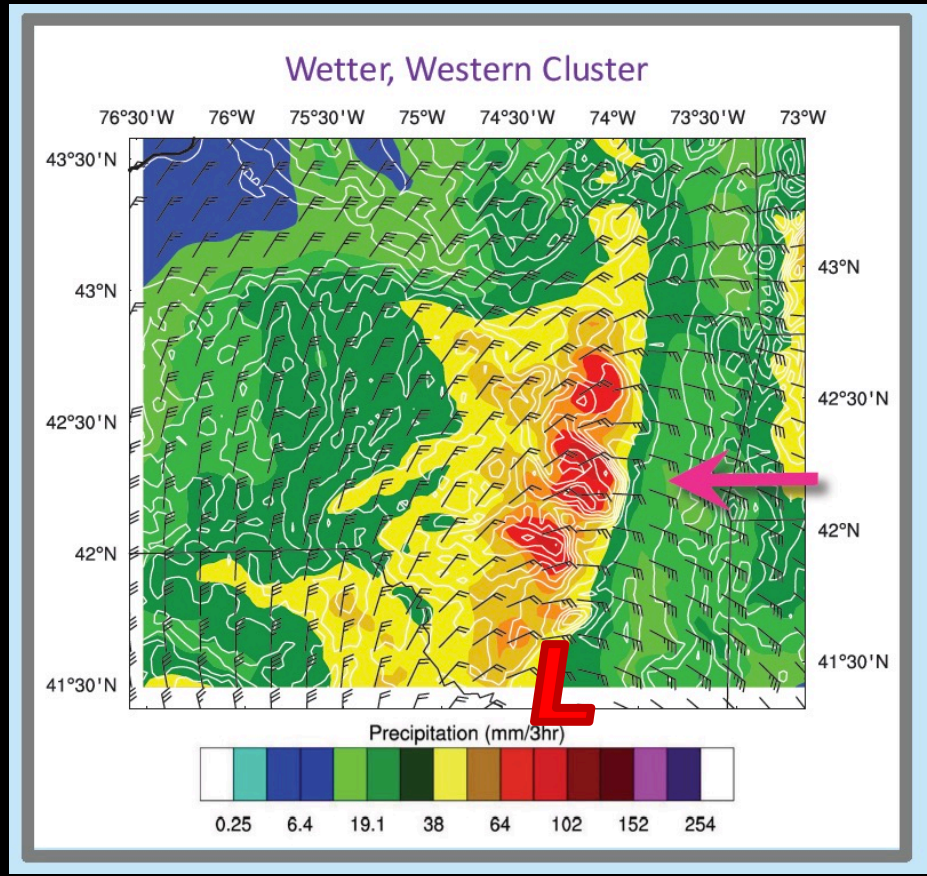

Smith (2017)

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~ After the *research* was *complete*, *students met* with *focal points* for *R2O*

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~ More recently, *NOAA VLab*