

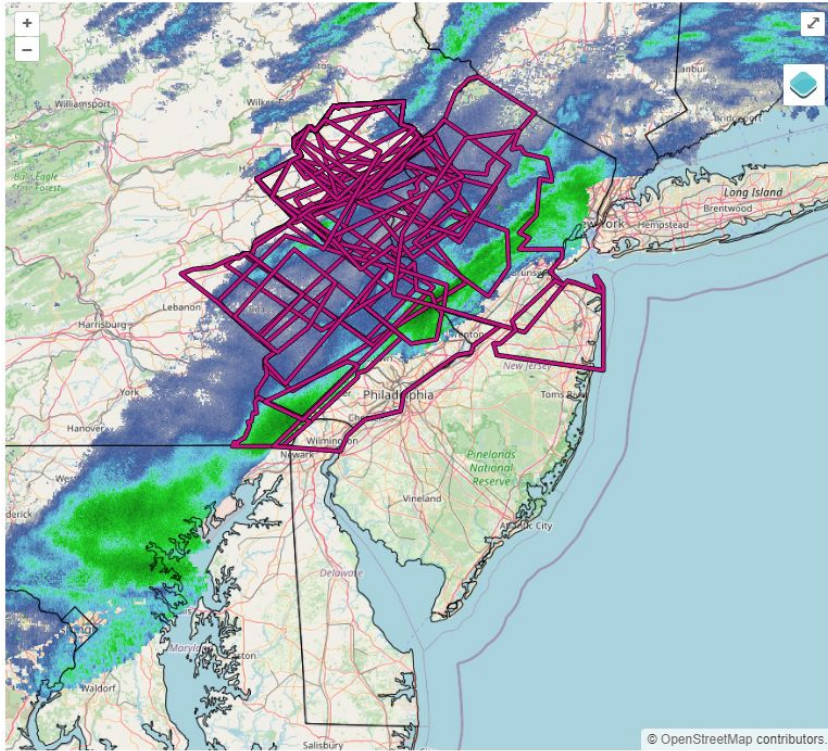


Decades of Snow Squall Research Leads to Successful Warnings at WFO Mount Holly (PHI)

Mike Lee, Lead Meteorologist at WFO PHI

Cameron Wunderlin, Information Technology Officer at WFO PHI

Busy Year for Snow Squalls at PHI



- Snow Squall Events: 4
 - January 14th
 - February 17th
 - March 10th
 - March 20th
- Snow Squall Warnings: 39
- Recently brought in a new crop of staff

Forecaster Backgrounds



Mike Lee, Meteorologist

- WFO Morehead City, NC from 2019-2022
- WFO Mount Holly, NJ 2022-Present
- **Never issued a Snow Squall Warning before 2024**

Cameron Wunderlin, Meteorologist

- WFO Mount Holly, NJ 2022-Present
- **Never issued a Snow Squall Warning before 2024**

Best Practices & Research Used



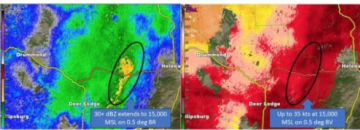
- Snow Squall Parameter (Banacos et al. 2014)
- Satellite cloud top infrared temperatures & day cloud phase distinction
- Live Traffic Webcams (Vaisala Network, MVIEW, DOT)
- METAR visibilities
- Little to no radar

Snow Squall Warning Best Practices

Identification & Signatures

RADAR SIGNATURES

SIGNIFICANT EVENTS



- Max dBZ values typically exceed **30 dBZ**
- Max radial velocities typically in excess of **30 knots**
- Forward motion of the band can serve as a proxy for maximum wind gusts

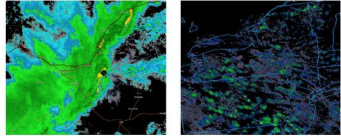
OTHER RADAR TIPS

- Tweak your **color tables** to highlight certain important thresholds (30 dBZ, 30 knots).
- Use VCP 215 & SAILS in radar ops to help with low topped nature of squalls

TOTAL OBSERVATION CONCEPT

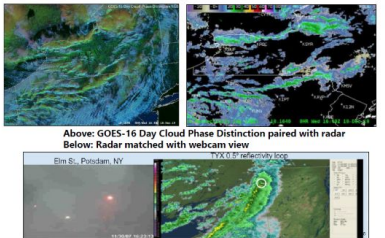
- Use **all reliable** observations available to you, including but not limited to: radar, satellite, direct observations (e.g. ASOS, spotters), webcams, road network observations, pavement temperatures, traffic reports & live traffic Request **GOES Meso-Sector** for 1 minute satellite data
- In areas of **poor radar coverage**, GOES satellite may be a reliable substitute, including 1-minute data and Day Cloud Phase Distinction (glaciated cloud tops in green which indicates snow bands)
- In areas of **radar beam blockage**, use all-tilts
- **Lightning data** may be useful in a triage scenario to isolate the strongest squalls

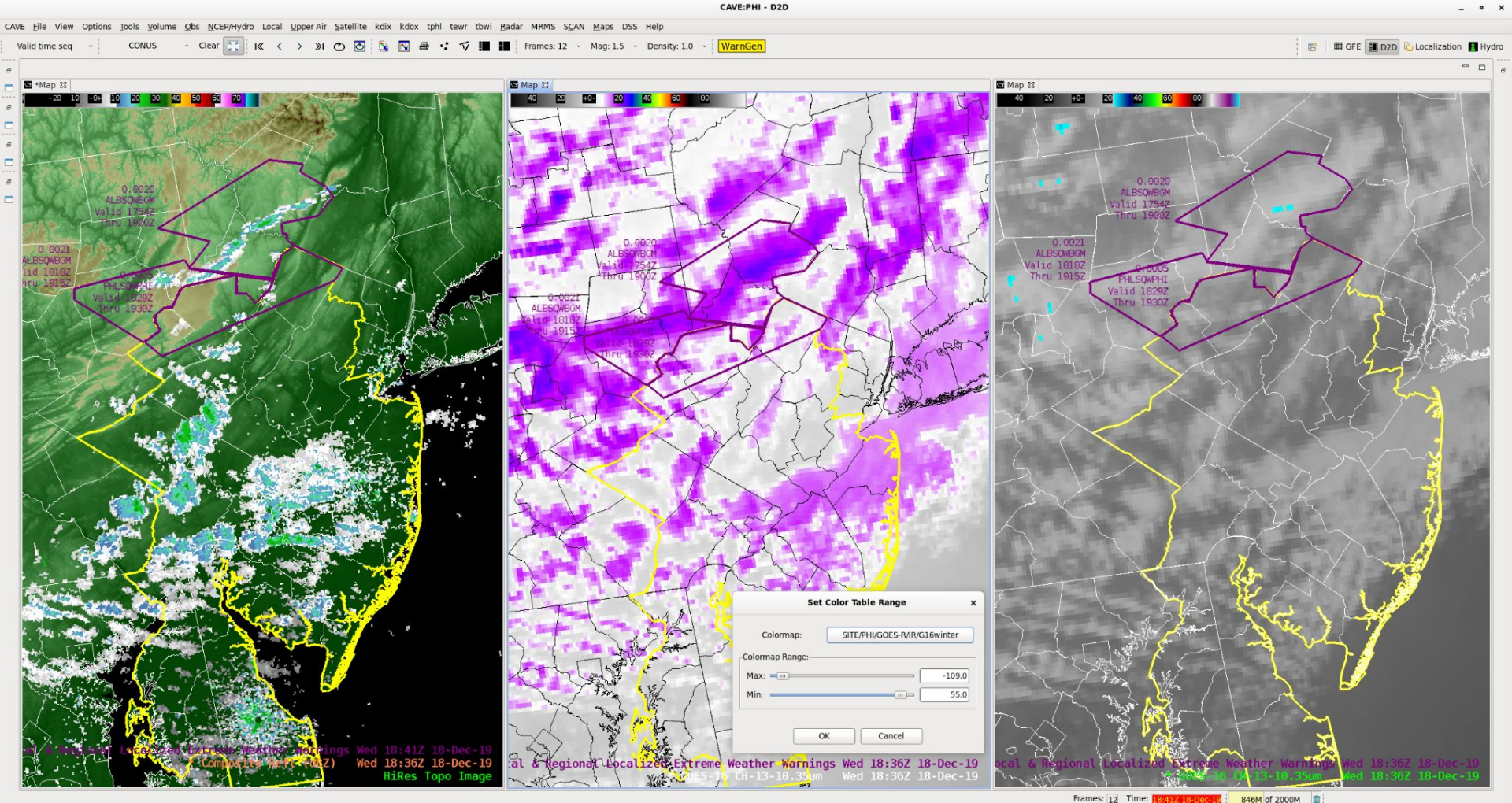
CONVECTIVE MODE: LINEAR VS. CELLULAR



LINEAR	CELLULAR
- Most organized & intense	- Less organized & less intense
- Low level frontogenesis maximum	- Absence of frontogenesis maximum
- Well defined pressure rise/fall couplet	- Absence of defined pressure rise/fall couplet

Above: GOES-16 Day Cloud Phase Distinction paired with radar
Below: Radar matched with webcam view





Knowledge Sharing During Operations



Primary Snow Squall Warning Desk

Least experienced meteorologist
given primary warning duties

Secondary Snow Squall Warning Desk

Most experienced meteorologist
provides guidance, mesoanalysis,
and ability to scale-up warnings

NWS Strategic Goals - People



- Using the research and training from previous experiences helps share the skills and knowledge needed to issue life saving warnings.
- Opportunities to help lead and teach others builds the needed knowledge and experience to promote career growth.

GOAL 1

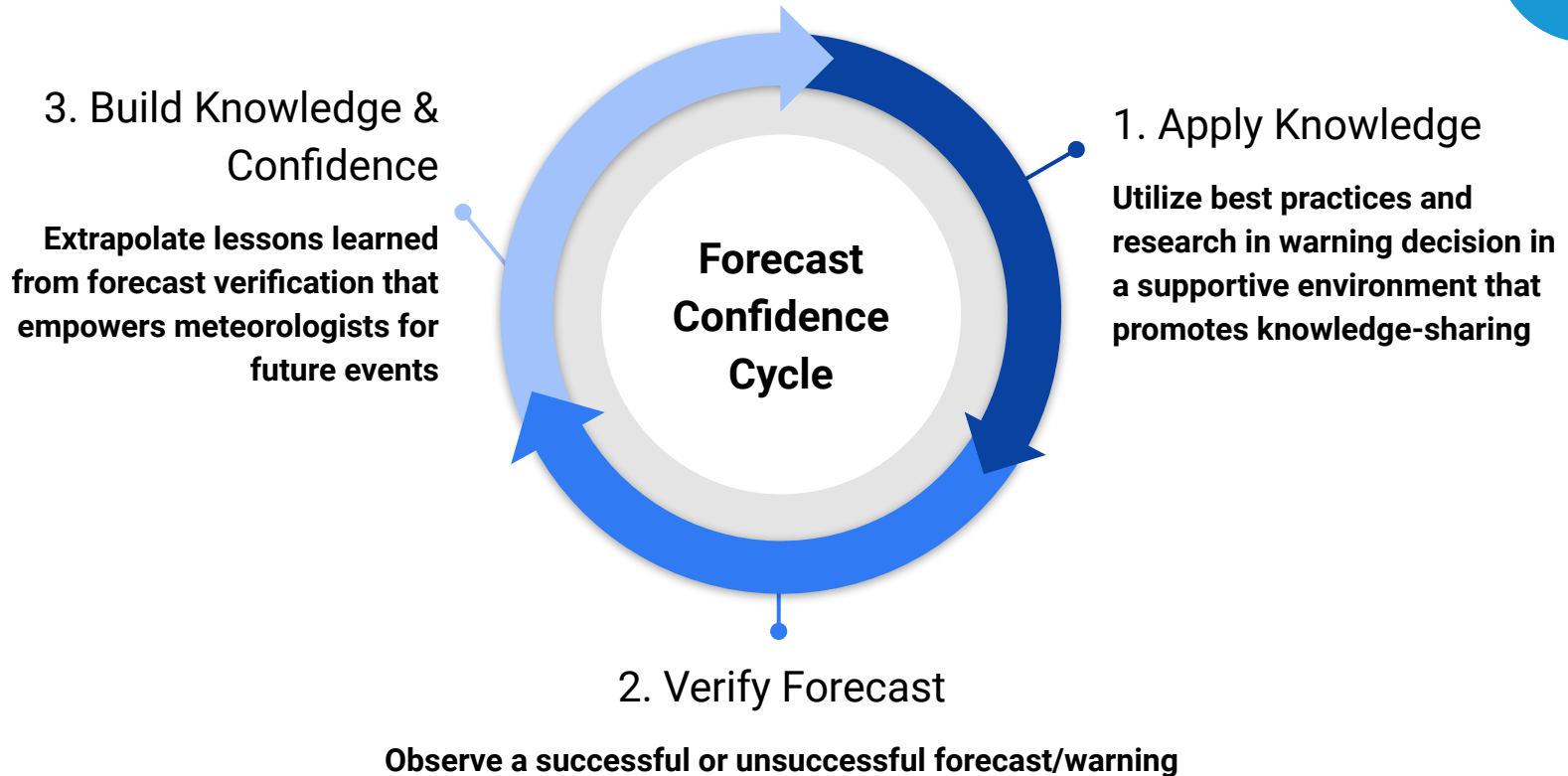
People As Top Priority—Always!

Ensure employees work in an inclusive, empowering, safe, and flexible environment that enables us to best serve our mission to save lives, protect property, and enhance the national economy.

- 1.1 **Implement** a comprehensive workforce training and development plan to advance both scientific and workplace skill sets, promote career path opportunities, and meet current and future mission needs.
- 1.2 **Recruit** and **Retain** a diverse and highly skilled workforce with improved recruitment and retention of the best available talent, representative of the diverse communities we serve.
- 1.3 **Strengthen** leadership skills of the entire NWS staff to allow a mindset to lead people and manage change in a results-driven environment that promotes Diversity, Equity, Inclusion, and Accessibility as core to success.



Building Forecaster Confidence

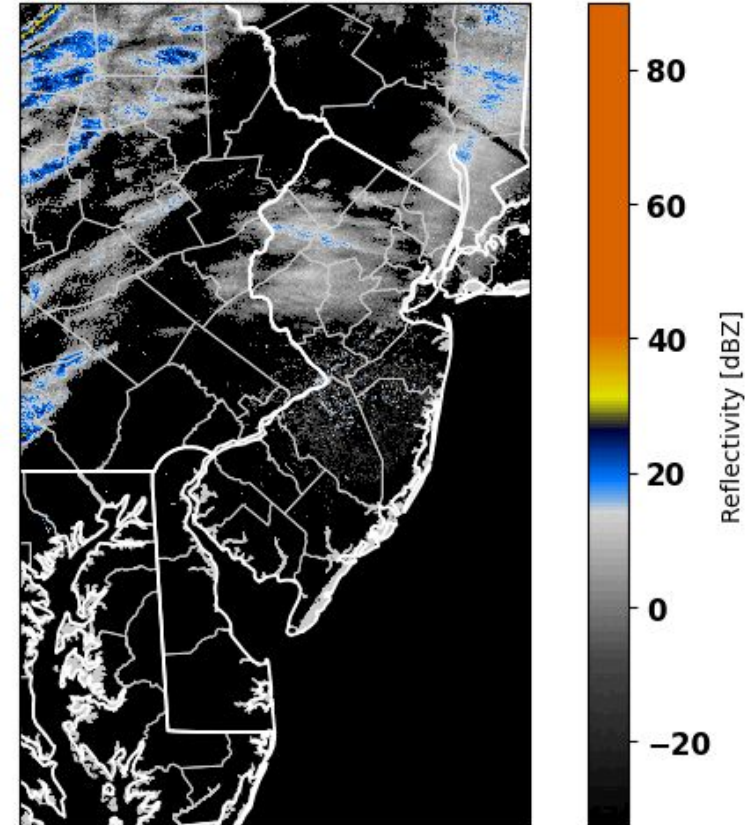


Mike's Experience as Primary Warning Desk



Jan 14, 2024 -- 10:10 AM EST

- Worked primary warning desk during the snow squall event on January 14th, 2024
- Meteorologist with more experience in snow squalls worked the secondary warning desk
- Utilized best practices learned in training and guidance provided by secondary warning desk: ***"This is what I'm seeing, does that make sense?"***
- Sought real-time warning verification using traffic cams and METAR observations to verify satellite cloud-top IR temperature strategy



Cam's Experience as Primary Warning Desk

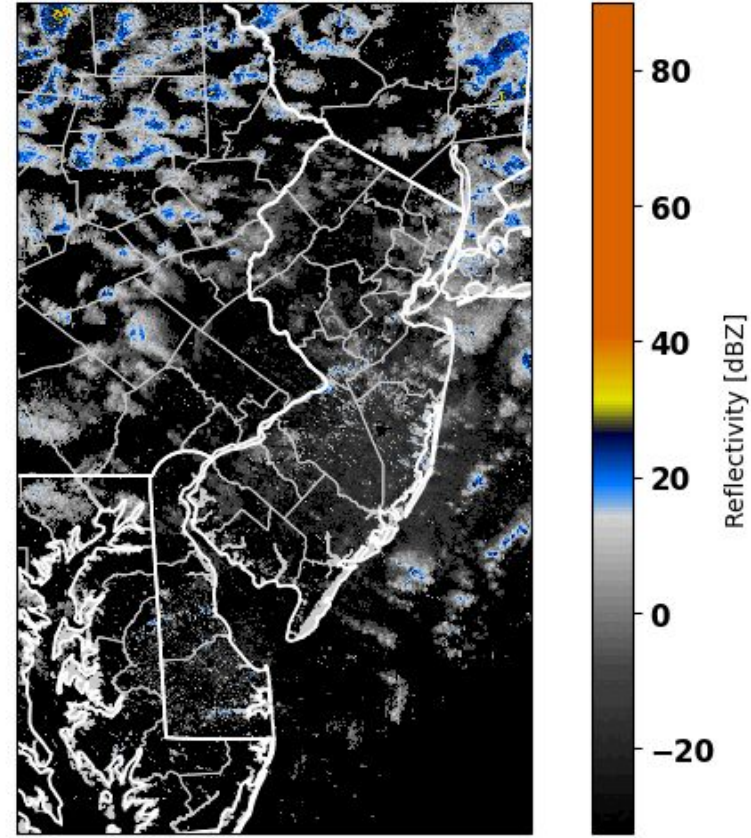


Feb 17, 2024 -- 01:40 PM EST

- Worked primary warning desk during the snow squall event on February 17th, 2024 with more experienced met working secondary
- Utilized best practices learned in training along with listening and appreciating guidance provided by secondary warning desk and SOO
- Used traffic cams and METAR observations to verify satellite cloud-top IR temperature strategy for real-time warning verification

"I'm not comfortable with issuing a Warning based on what I'm seeing" - Cam W

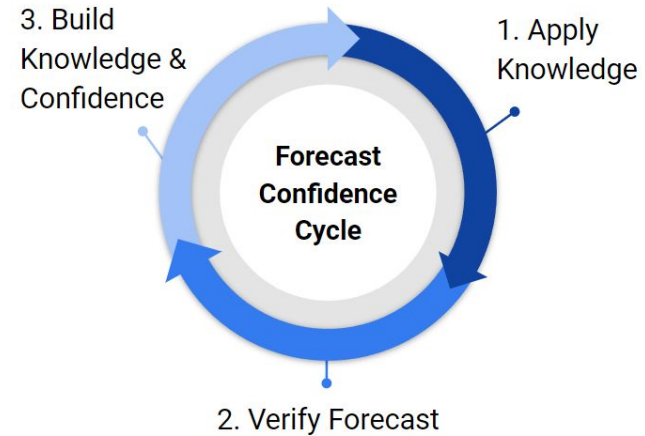
"We are, and we support you issuing it now" - ML and SOO



Mike's Experience as Secondary Warning Desk



- Valuable leadership opportunity during the snow squall event on February 17th, 2024
- Provided real-time mesoanalysis and guidance to meteorologist on primary warning desk: ***"Here's what I'm seeing and why it matters"***
- Passed along lessons learned from my previous experience
 - Was able to show primary warning forecaster validation based on traffic cams and METAR observations to provide confidence in issuing downstream
- Ensured the primary warning desk was issuing most of the warnings





Mesoscale Discussion

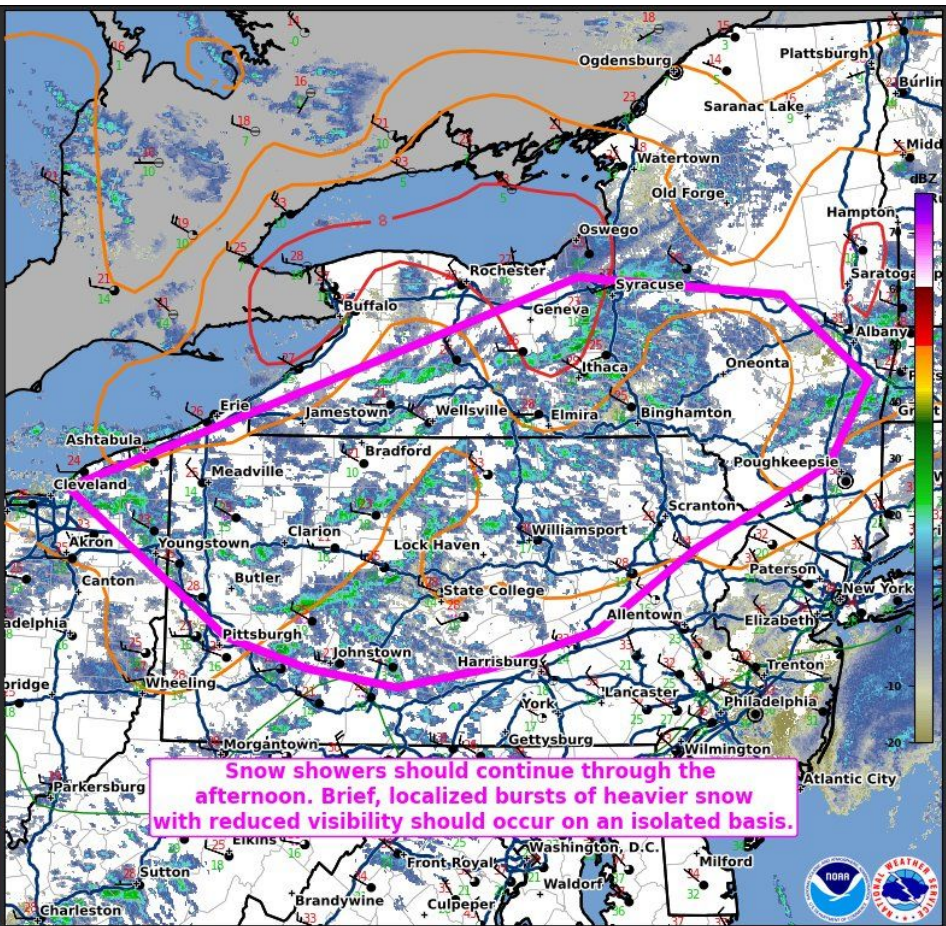
#150

Valid Until:
02/17/24 4:30 PM EST

Concerning:
Snow Squall

Fields Plotted

16Z22 MRMS RALA
Latest Surface Observations
16Z 0-3 km Lapse Rate ($C km^{-1}$)
Interstate Highways



Snow showers should continue through the afternoon. Brief, localized bursts of heavier snow with reduced visibility should occur on an isolated basis.



Mesoscale Discussion 0150
NWS Storm Prediction Center Norman OK
1034 AM CST Sat Feb 17 2024

Areas affected...portions of western into eastern New York...extreme northeast Ohio...western into central Pennsylvania

Concerning...Snow Squall

Valid 171634Z - 172130Z

SUMMARY...Snow showers should persist over the next several hours in tandem with diurnal heating across much of central NY into PA. Brief bursts of heavier snow may support very localized reductions in visibility.

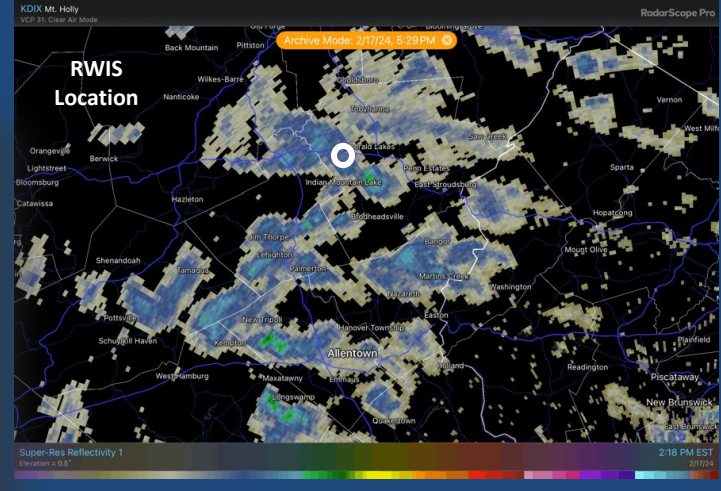
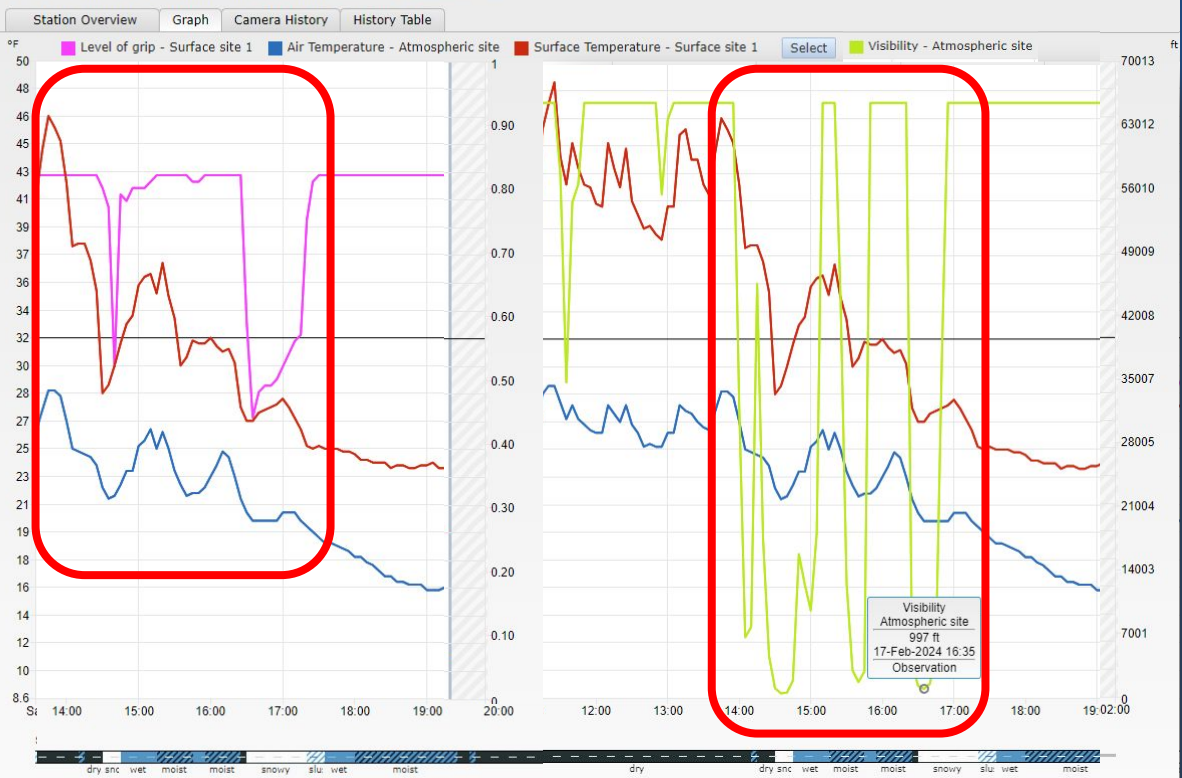
DISCUSSION...Boundary-layer heating is supporting the generation of steep (i.e. 8 C/km) low-level lapse rates, which is encouraging the generation and sustenance of scattered, low-topped convective snow showers over portions of central NY into PA. A mid-level trough is traversing the region, providing enough deep-layer ascent for continued snow-shower development through the afternoon. Based on reports over the last couple of hours, brief bouts of reduced visibility (as low as a quarter to half a mile) have occurred. Given the convective nature of these snow showers, brief and localized bursts of heavier snow will remain possible through the afternoon on an isolated basis, until the steep low-level lapse rates diminish later today.

..Squiteri.. 02/17/2024

...Please see www.spc.noaa.gov for graphic product...

ATTN...WFO...OKX...ALY...PHI...BGM...BUF...CTP...PBZ...CLE...

LAT...LON 41558151 42407897 43187649 43017443 42367360
41747404
41157536 40567633 40307734 40147827 40277914 40507992
41558151



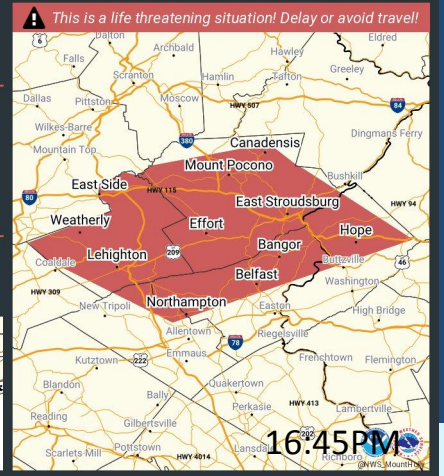
Snow Squall Warning

Valid Until
5:30 PM EST Saturday
February 17, 2024

- Threat Information**
- Hazard**
White out conditions in heavy blowing snow
 - Impact**
Dangerous life-threatening travel

Potential Exposure

Population: 317,714
Highways: I-380
I-476
I-80



Snow Squall Warning

Valid Until
5:30 PM EST Saturday
February 17, 2024

Threat Information

- Hazard**
White out conditions in heavy blowing snow
- Impact**
Dangerous life-threatening travel

Potential Exposure

Population: 317,714
Highways: I-380
I-476
I-80

14:17PM

Snow Squall Warning

Valid Until
5:30 PM EST Saturday
February 17, 2024

Threat Information

- Hazard**
White out conditions in heavy blowing snow
- Impact**
Dangerous life-threatening travel

Potential Exposure

Population: 317,714
Highways: I-380
I-476
I-80

14:49PM

Snow Squall Warning

Valid Until
5:30 PM EST Saturday
February 17, 2024

Threat Information

- Hazard**
White out conditions in heavy blowing snow
- Impact**
Dangerous life-threatening travel

Potential Exposure

Population: 317,714
Highways: I-380
I-476
I-80

15:11PM

Snow Squall Warning

Valid Until
5:30 PM EST Saturday
February 17, 2024

Threat Information

- Hazard**
White out conditions in heavy blowing snow
- Impact**
Dangerous life-threatening travel

Potential Exposure

Population: 317,714
Highways: I-380
I-476
I-80

15:58PM

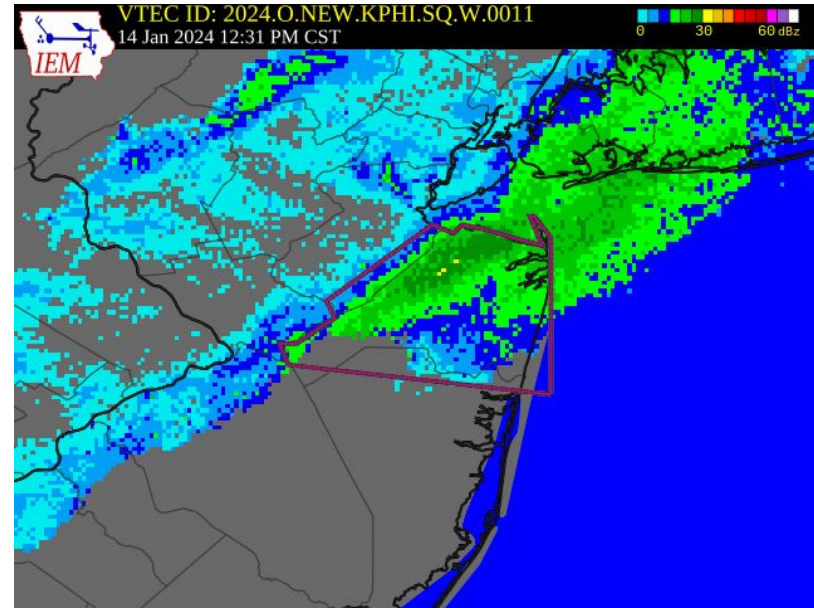
Snow Squalls “Down The Shore”

 The Lakewood Scoop
@LakewoodScoop

Snowing now on the GSP in the area of Holmdel, exit 114



Last edited 1:59 PM · Jan 14, 2024 · 1,190 Views



Garden State Parkway near Exit 144 Holmdel, NJ
Saturday, January 14, 2024

Difference of 10 Minutes



Route 33 at Wind Gap
Saturday, February 17, 2024

Difference of 20 Minutes



I-80 Exit 293; I-380 Junction

Saturday, February 17, 2024

Feedback from the Public



Thanks External Misc x



Chris Saitta [redacted]

Tue, Feb 20, 11:54 AM ☆ ← Reply ⋮

to me ▾

Was not sure what email address to use but wanted to fire off a note of thanks! I was traveling back from VT on Sat via rt 88 in NY and then RT 81 to Pa Turnpike in PA. Hit some minor snow in NY, nothing to bad. But when we hit the PA Turnpike South of Wilkes Barre and just N of of the tunnel we hit a BAD snow squall. Right before the snow hit, and I mean maybe one minute, I got the alert on my phone. We went from 70 mph to under 25 mph in minutes. I've been in a snow squall before near Buffalo but never one that came on so fast. While I can't speak for some of the other cars on the road at the time, if they got them and just did not heed the warnings, I know I was grateful for the heads-up. even if only a minute or so of waring. I was able to turn off cruise control and level set my surroundings before I was in the snow with very limited visibility. It only lasted a few minutes and then I was back in bright blue skis! So again, thanks for the heads up. Job well done!

Chris Saitta
(CHPA-120)



39

Total Snow Squall Warnings

Issued by WFO Mount
Holly in 2024 across four
events

34

Snow Squall Warnings

Issued by two
meteorologists navigating
snow squall warning desk
for the first time



Thank You!

Mike Lee - michael.lee@noaa.gov

Cameron Wunderlin - cameron.wunderlin@noaa.gov

