The January 30, 2019 Northeast US Snow Squall Event: An Operational Perspective

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Background

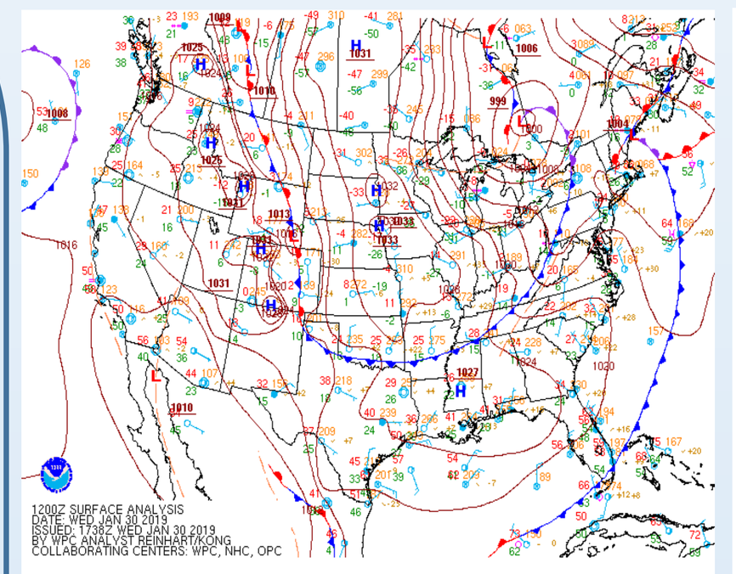
*Intense, long lived snow squalls impacted a large portion of the mid-Atlantic and Northeast on 1-30-19

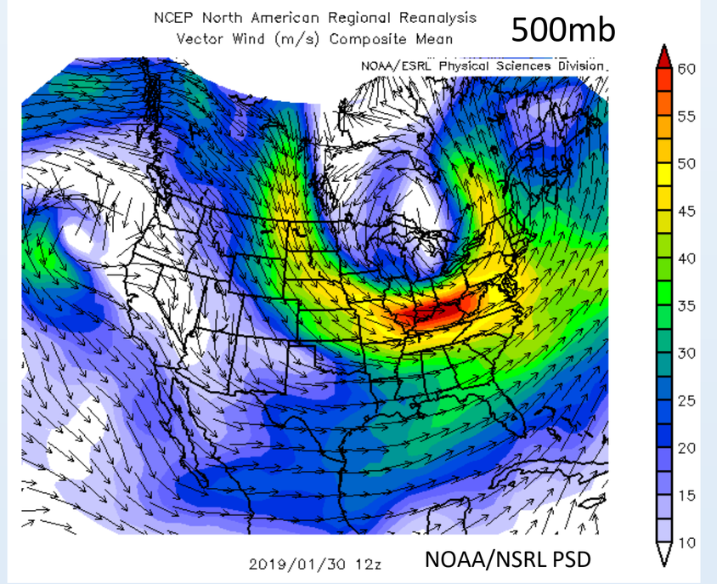
*This project performs a case study on this event at NWS WFO Mount Holly, NJ and attempts to draw conclusions for operational best practices regarding snow squalls

*Squalls formed on a sharp Arctic front ~24 hours after another cold front/mixed precipitation event

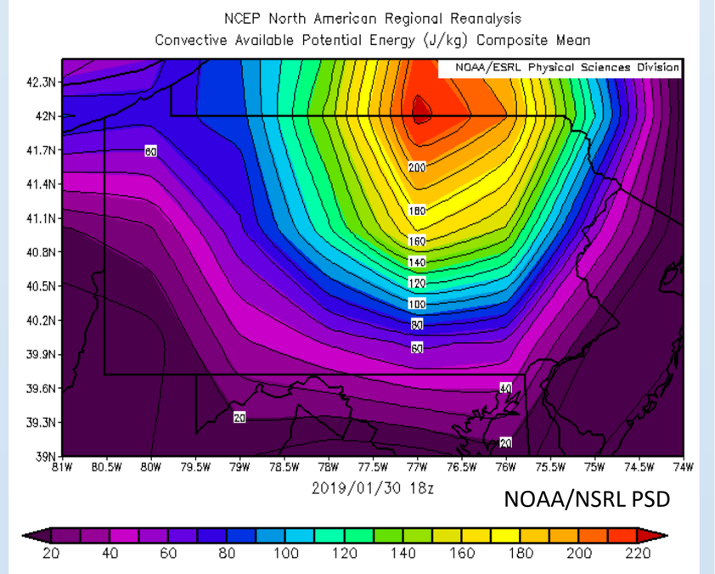
*"Primer" front prevented ptype issues: precip was all snow, cold enough for instant accumulation

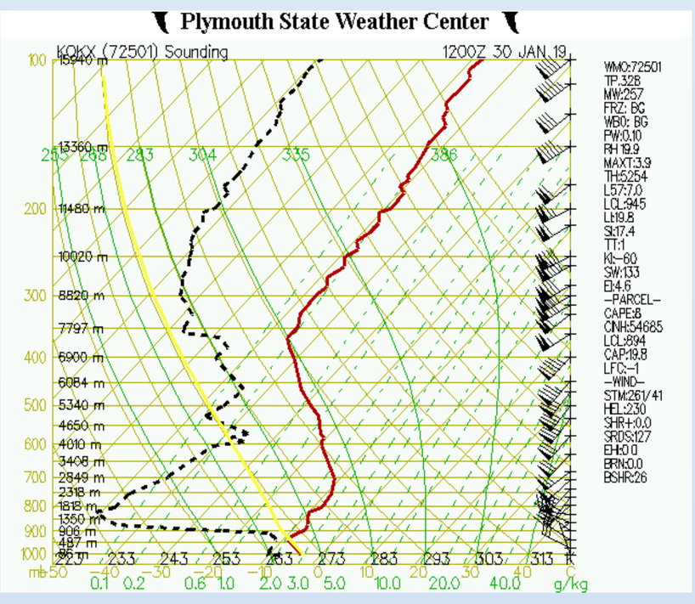
*Optimal environment ahead of Arctic front (>100J CAPE, high RH in BL, strong forcing, lift in DGZ)





Convective mindset





Forecast Funnel

*Well forecast event! Snow squall potential mentioned in forecast/AFD 4 days ahead of time

*Well handled by global and hi-res models, likely due in part to strong forcing

*Morning SPS, multiple postings on social media

*Messaging challenge due to preceding storm, impending extreme cold

1/26/19 PM AFD

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Any steady precipitation should be offshore by Wednesday morning.
Wednesday is a transition day as despite initial cold front moving
offshore, there is a trailing secondary front which will not cross
the region until late Wednesday. Thus, chilly but not especially
cold during the day. In addition, ahead of the true Arctic front,
looks like some instability develops and believe there is decent
potential for snow showers or squalls Wednesday afternoon. Moisture
is limited but have introduced a chance of snow showers across the
region as even relatively coarse global models including the GFS and
EC are keying in on this potential. By Wednesday night, this front
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Leveraging products

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853 AM EST Wed Jan 30 2019

...A Band of Heavy Snow may Impact Travel from about Noon through
Afternoon...

A narrow but solid line of heavy snow moving through central
Pennsylvania this morning is forecast to move into eastern
Pennsylvania and the far northern portions of the Delmarva around
noon, then into New Jersey during the afternoon hours. This line
of snow represents the leading edge of arctic air that will invade
the area later today through Friday. Snow squalls associated with
this line have a history of producing heavy and blowing snow for
periods of 10 to 15 minutes, resulting in a rapid reduction of
visibility, along with wind gusts in the range of 30 to 50 MPH and
a quick coating to around an inch of snow accumulation. Motorists
are urged to use caution if encountering any of these squalls
from late this morning through the afternoon.
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As it Happened

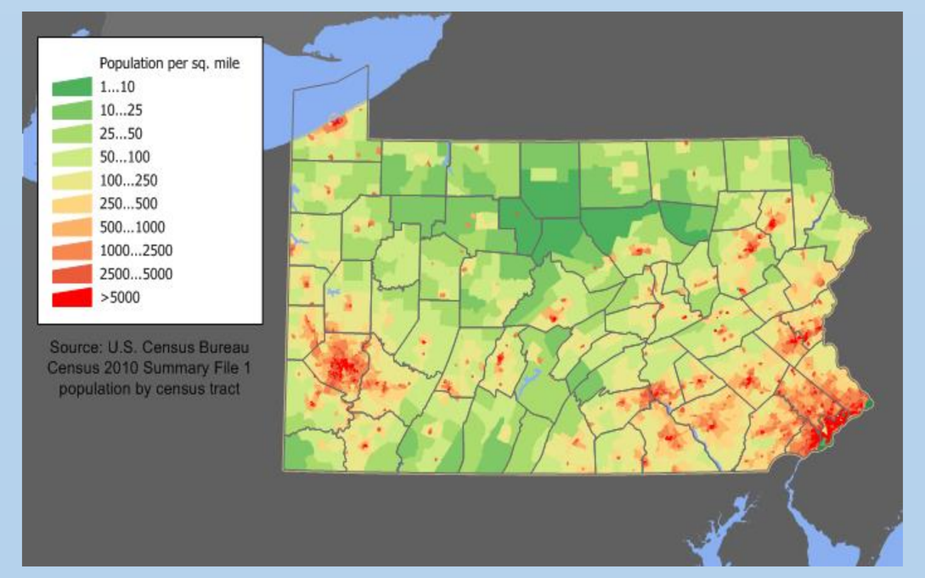
*Squalls too shallow (~7-10kft) to be seen by either KCCX or KDIX radar for an extended period over PA

*Dramatic changes in radar appearance even as squall intensity didn't change; satellite presentation much more consistent

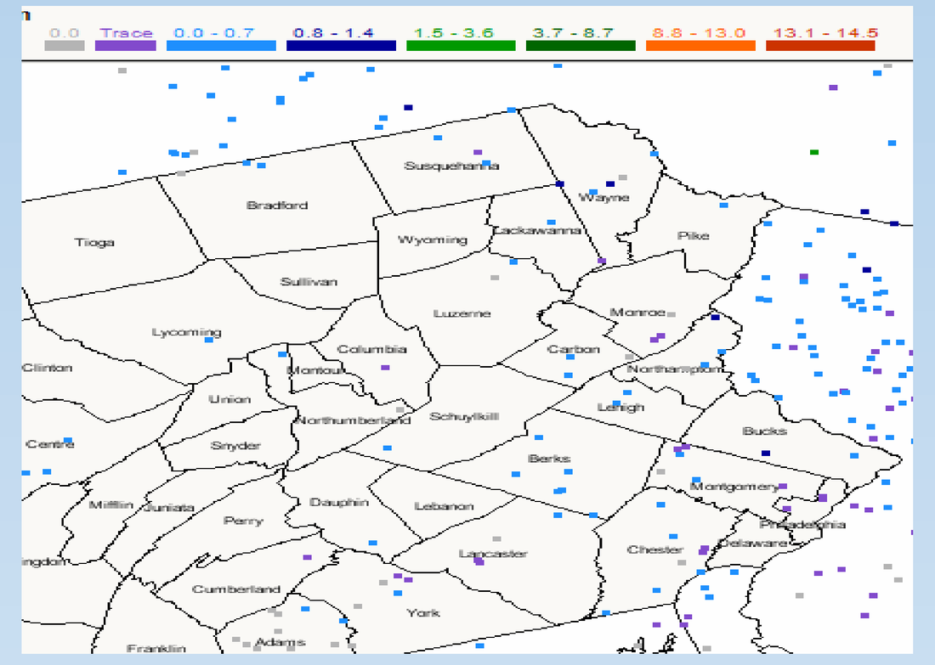
*Limited observations (especially ASOS/AWOS) over interior PA, few spotter/public reports, some webcams but of varying use

*~90 minute "radar drop out" in which squalls became invisible to radar; a long time with convection!

How would you feel if you couldn't see a severe thunderstorm on radar for an hour and a half?



Total observation concept



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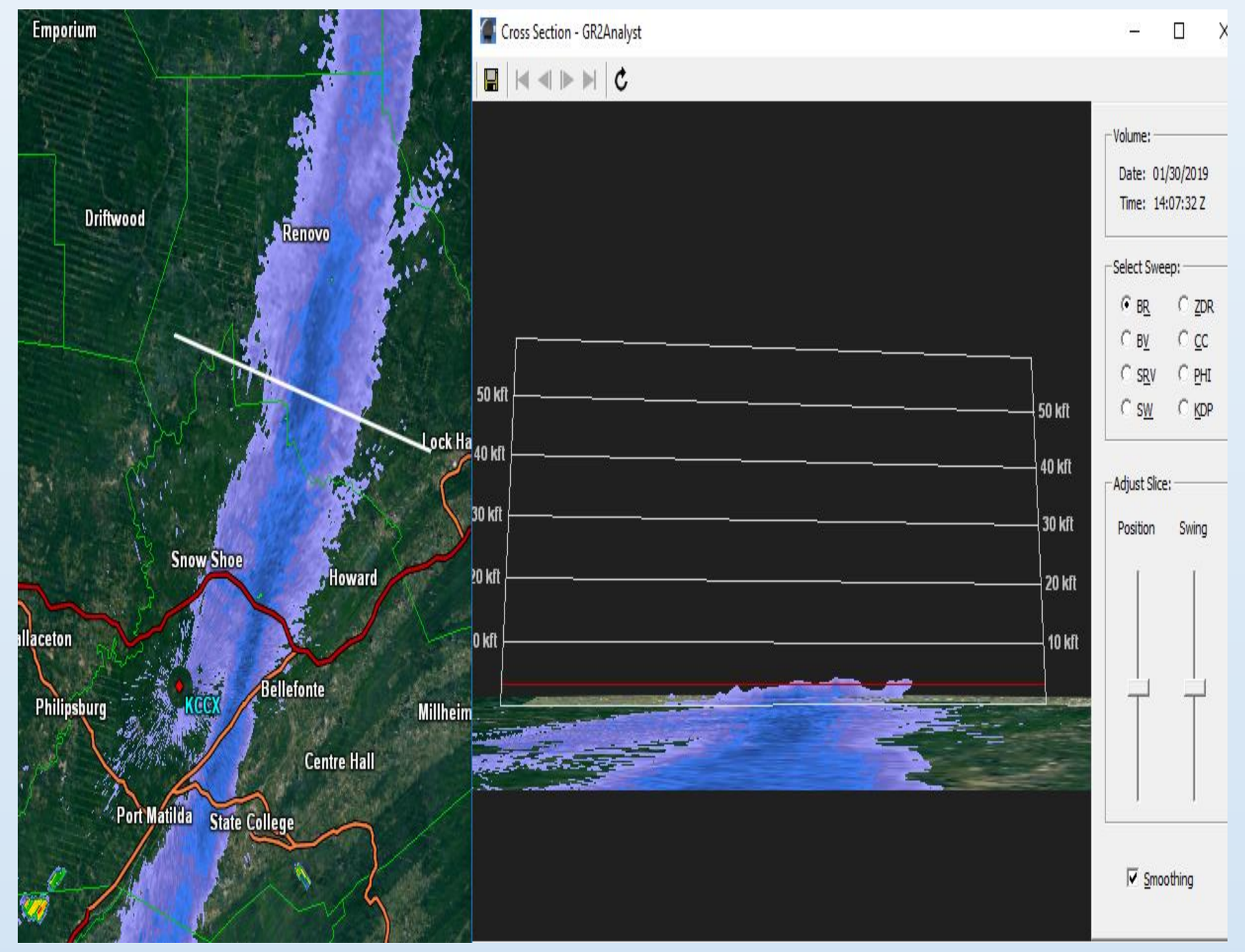


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KUNV 301453Z 25011G20KT 4SM -SN SCT003 BKN016
KUNV 301553Z 25012G18KT 6SM -SN SCT010 BKN020
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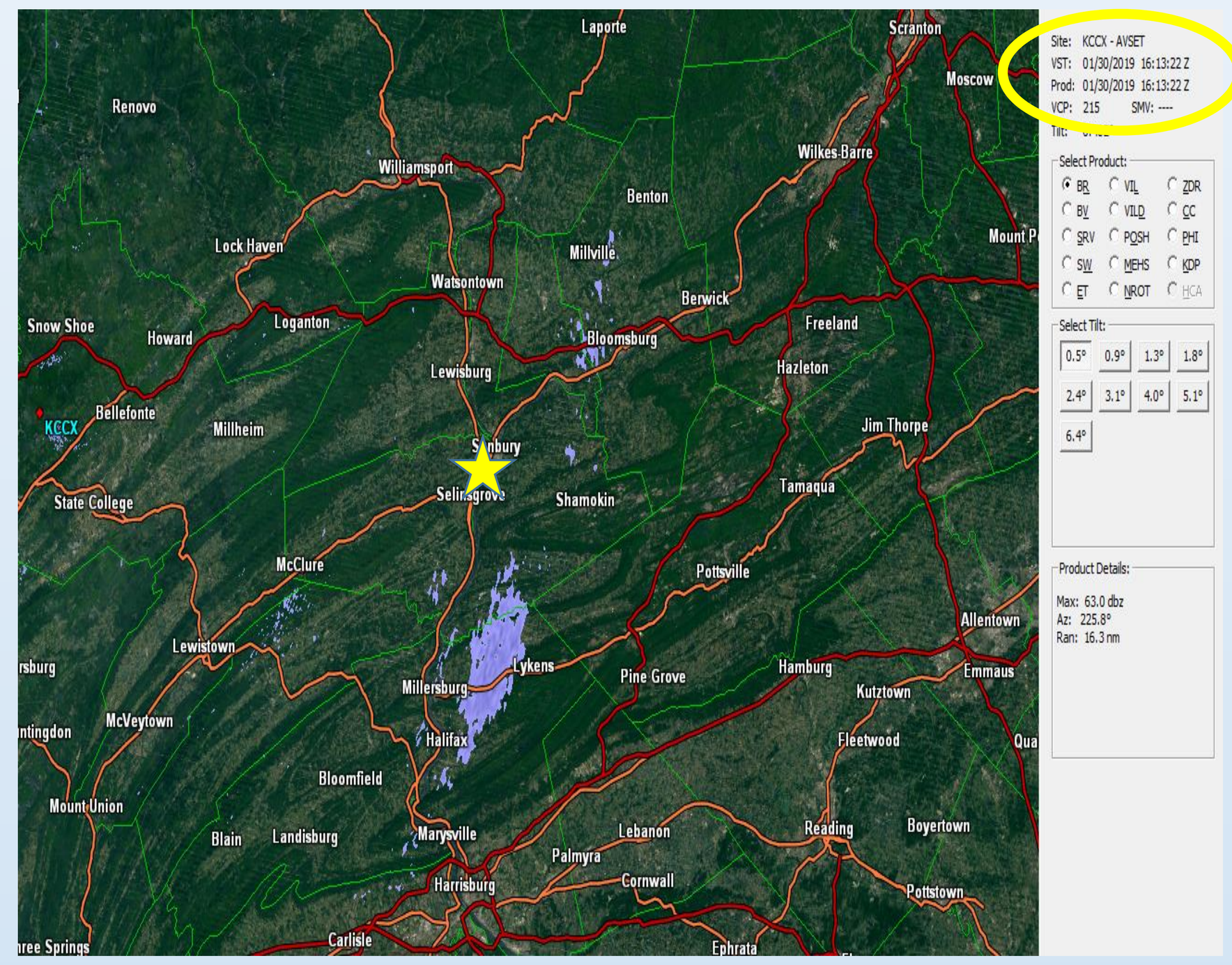
*"Classic" snow squall appearance on radar

*Sharp, narrow line of higher reflectivity with short burst of heavy snow

2

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     AO2 SNB06 PRESRR P0000 T10721128
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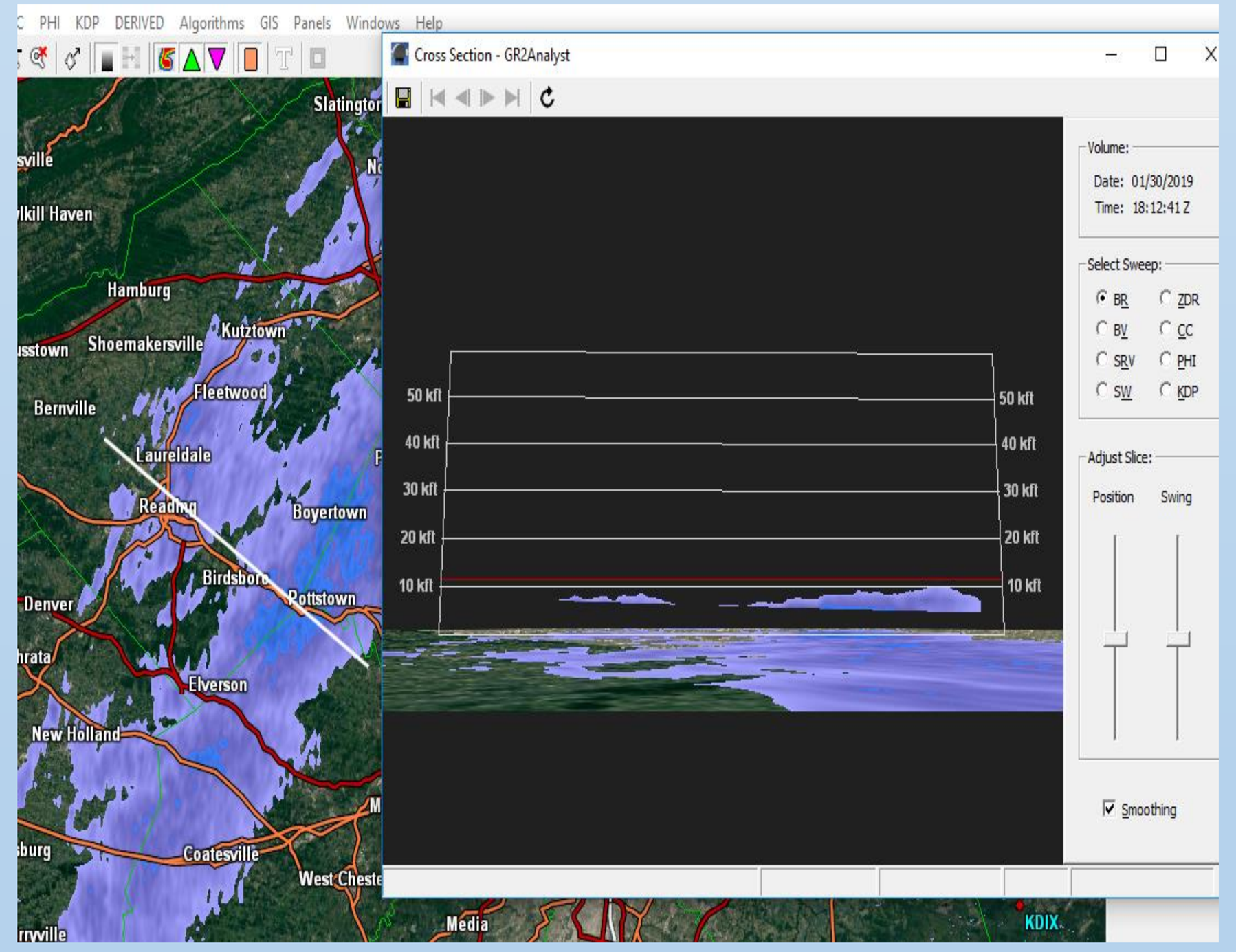
*Looking at the squalls from the closest radar

Are the observations what you would expect without other context?

3

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     PK WND 20026/1724 SNB21 P0000
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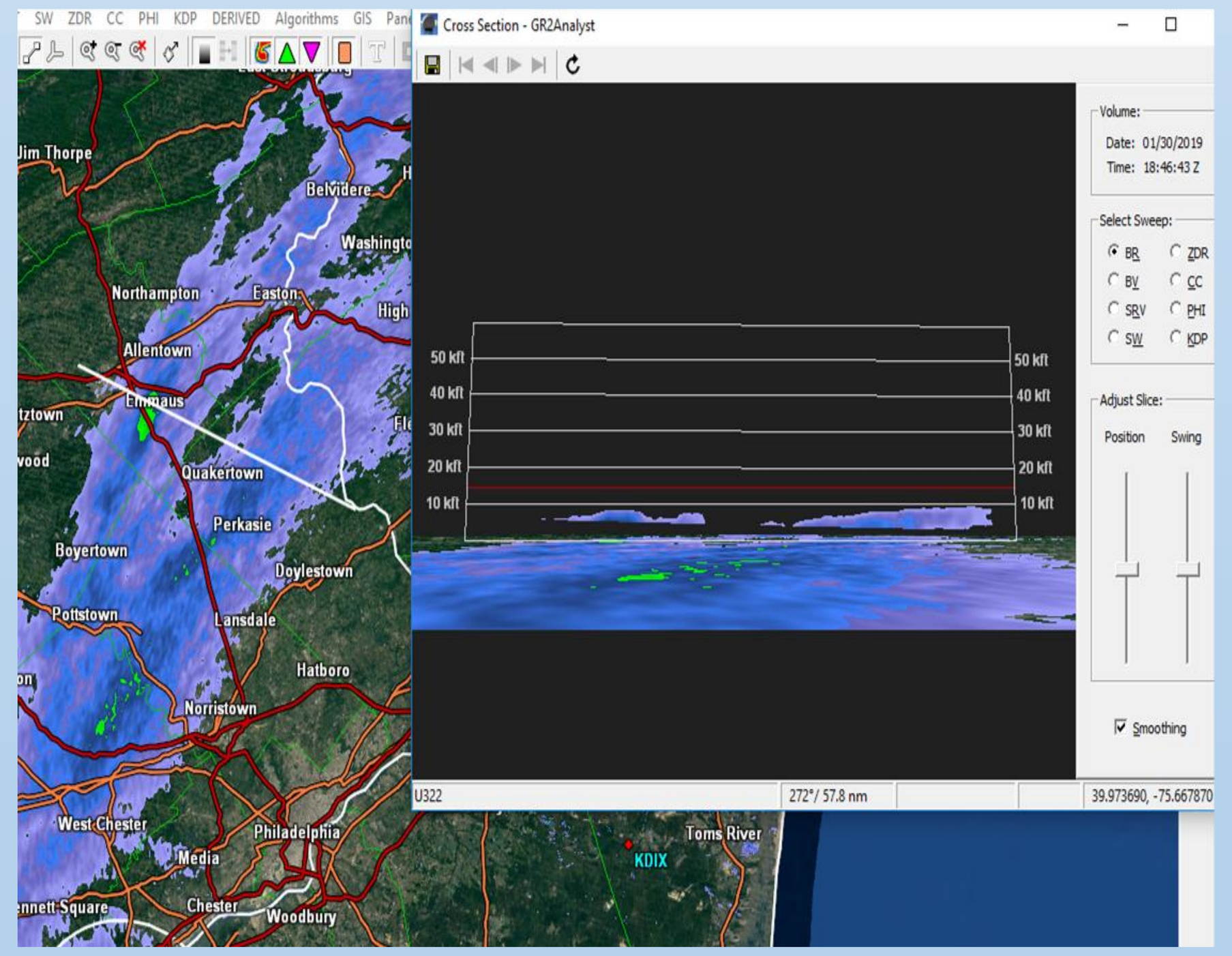
*"Double maximum" developed along parts of the squall line

*Trailing maximum was stronger of the two

4

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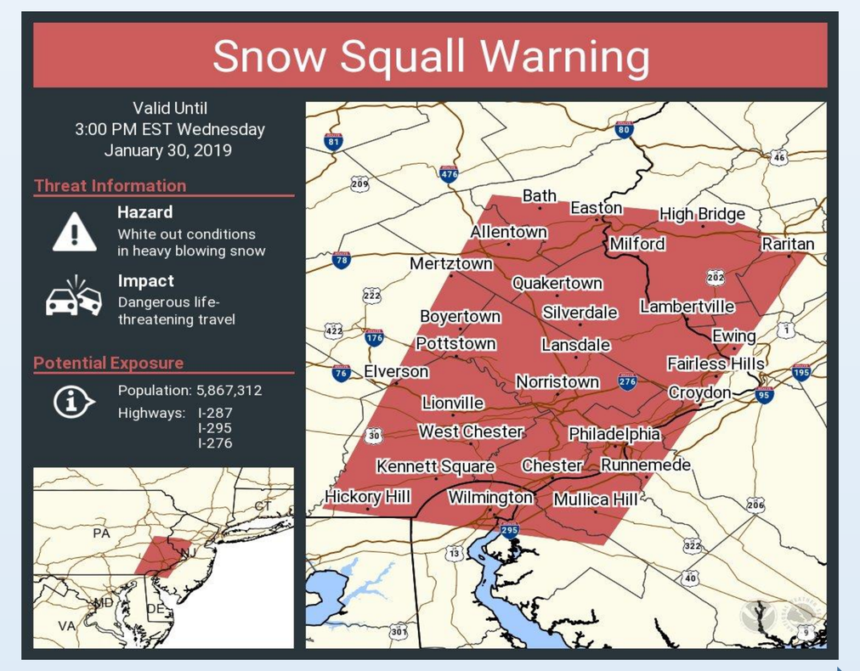
*Reflectivity increased as squalls approach KDIX

*Double maximum not as distinct at ABE as RDG but still shows gradual ramp-up in intensity



Operational challenges

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083
WWUS51 KPHI 301909
SQWPHI

BULLETIN - IMMEDIATE BROADCAST REQUESTED
Snow Squall Warning
National Weather Service Mount Holly NJ
Issued by National Weather Service Baltimore MD/Washington DC
205 PM EST Wed Jan 30 2019
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Snow Squall Warnings

*2018-2019: First full winter of operational snow squall warnings: forecasters still getting a feel for the product

*Differences in how adjacent WFOs handled squalls (SPS vs. SQW); communication important in active weather

*Technical problems at PHI prevented SQW issuances

*Warnings issued by LWX; unfortunate but unforeseeable; SQW would not have even been an option a year prior

*SQW (via LWX) still issued with 30+ minute lead time for Philly/suburbs

Credit: Reading Eagle, Natalie Kolb

Why it matters

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Impacts

*Widespread 0.5-1" of snow in 20-40 minutes with <1/4 mile visibility and subsequent rapid freeze

*Multiple accidents in PA including 27 vehicle fatal pileup on Route 222 in Berks County just after 1PM

*Downstream warnings were vital! Less impact in Philadelphia area; widespread social media, broadcast attention as squalls approached the metro area

What's next

Lessons and Conclusions

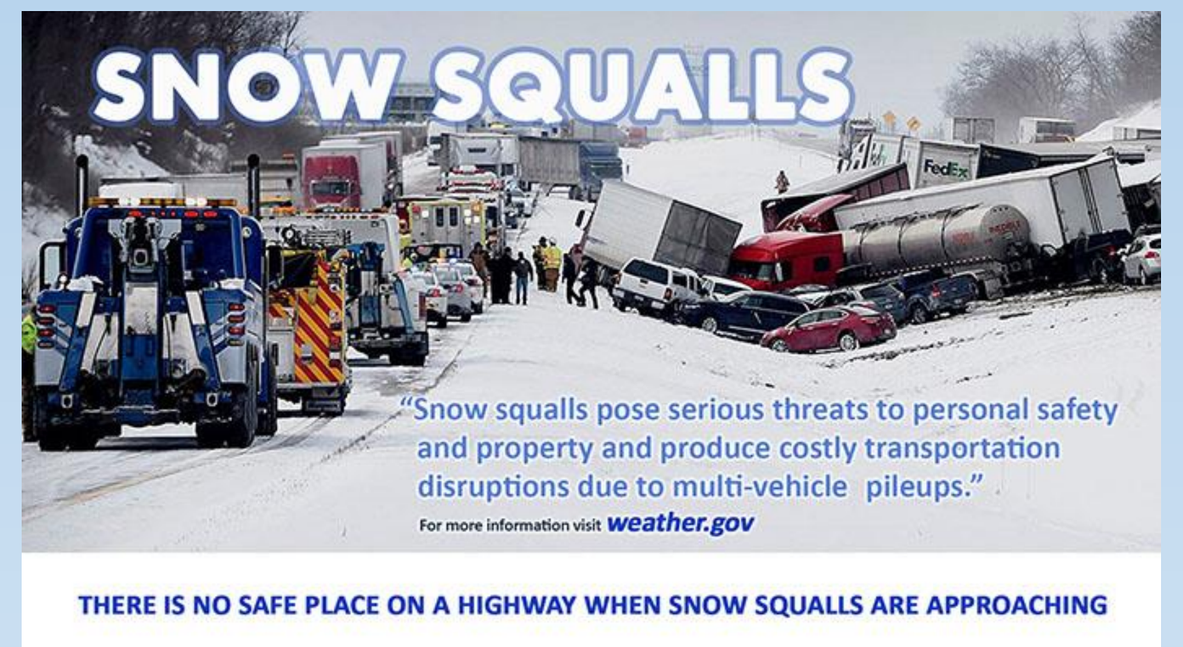
*Forecasters must think in a convective mindset when dealing with snow squalls!

*Antecedent conditions are critical for squall impact

*For shallow squalls, radar has severe limitations; aggressive sourcing of other observations (satellite, webcams, EMS scanners) and ground truth is critical

*SQW is a fantastic product! Let's increase awareness + visibility of it; social media is a great tool for this

*We still face challenges with snow squall communication and improving public understanding



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Contact

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