January 16-17, 2022
Mixed Precipitation Event

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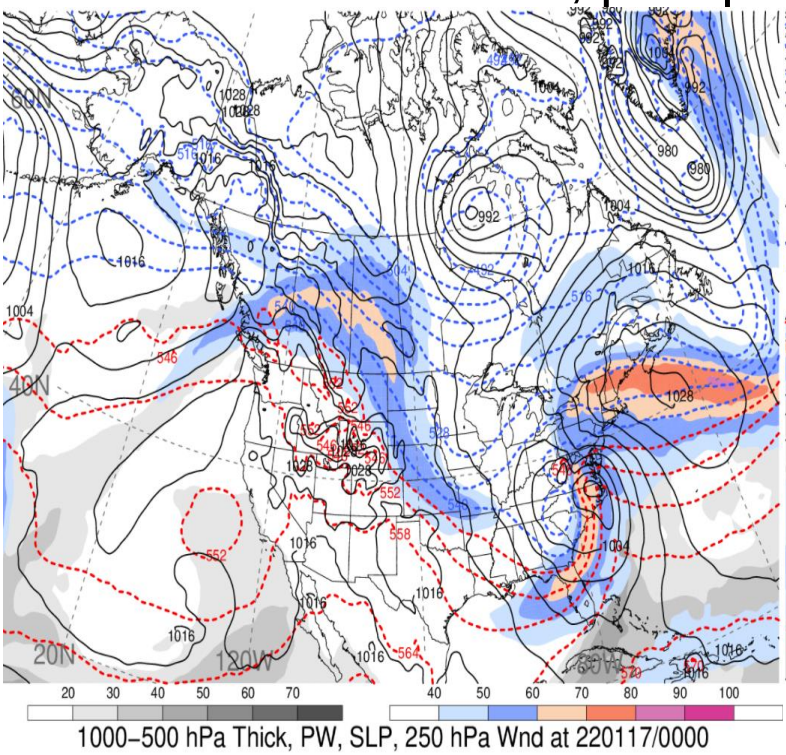
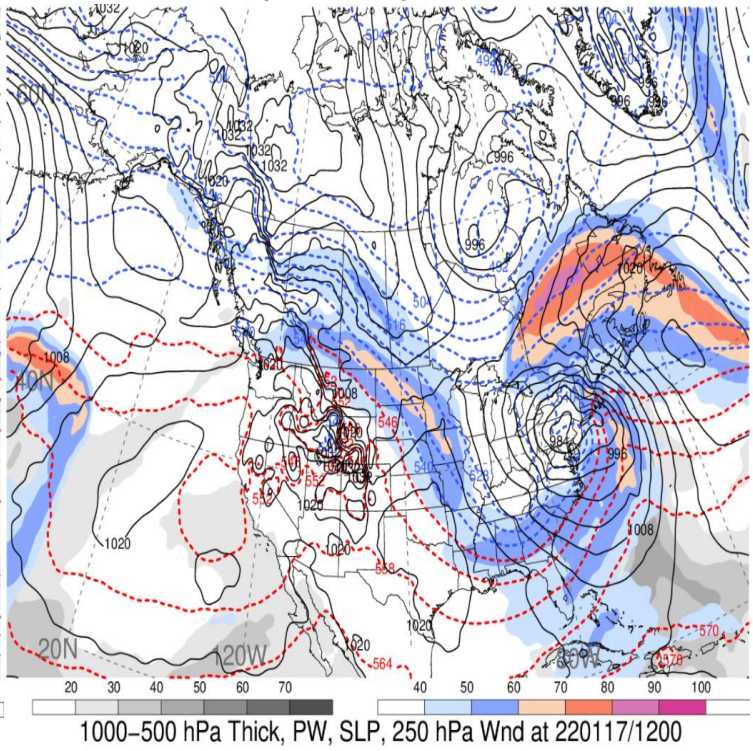
- Synoptic pattern
- Thermal profiles
- Frontogenesis and banding
- Precipitation/precipitation type forecasts
- Observations
- Terrain influences
- Model Forecasts
- Summary

1000-500 mb thickness, precipitable water, SLP, 250 mb wind



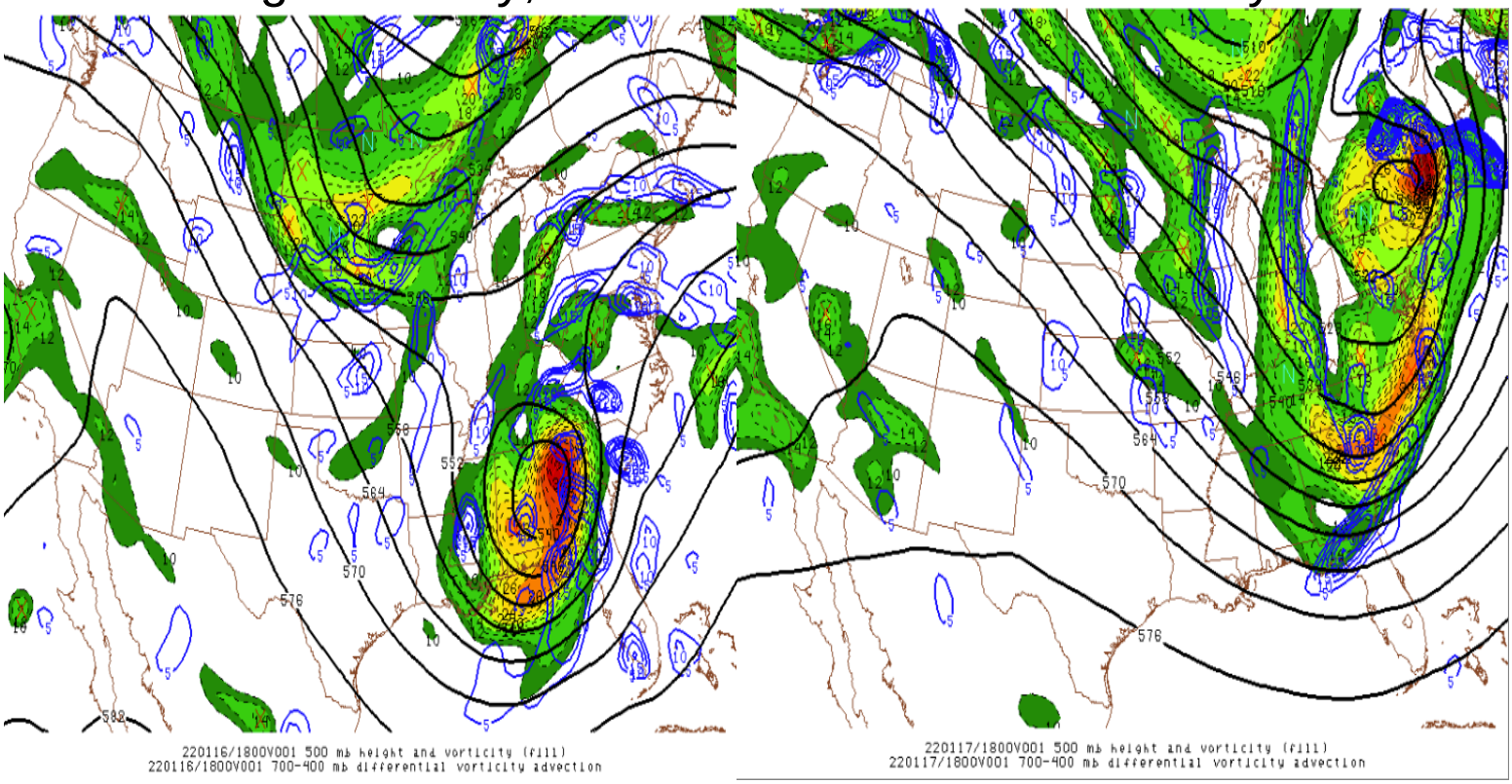


00z (left) and 12z (right) January 17, 2022

Plots courtesy of Dr. Heather Archambault, http://www.atmos.albany.edu/student/heathera/

A closed upper level trough and its associated surface low moved north from the Carolinas just west of the Atlantic coastline to the northeast United States region on January 17th, 2022. Between 00z and 12z, the surface low strengthened with support of the upper level low, a 70-80 kt jet streak to the north and east, and being located on the right entrance region of the jet streak. Around 12z, the low became vertically stacked and began to occlude.

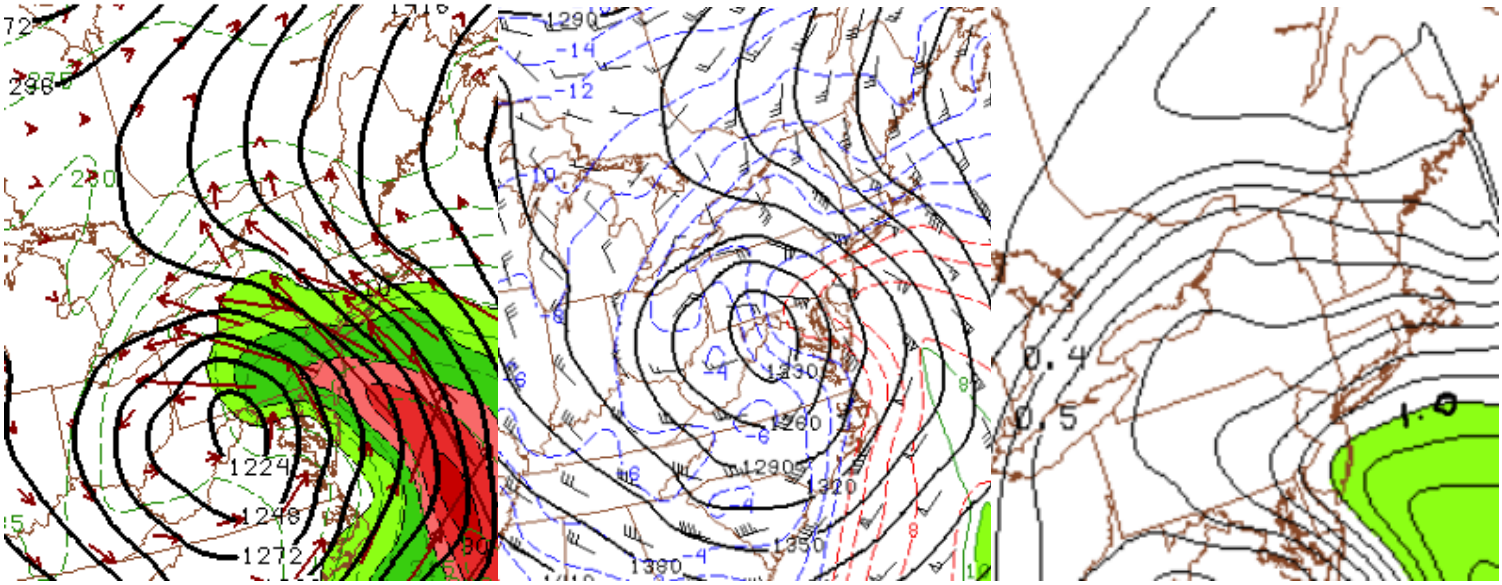
500 mb height/vorticity, 400-700 mb differential vorticity advection



18z January 16 and 18z January 17

Moderate to strong positive 700-400 mb cyclonic vorticity advection and negative tilting in the 500 mb trough contributed to the deepening of the cyclone. Deepening was somewhat limited due to the cyclone not completely merging with an arctic sub 510 dam trough to the northwest on time.

850 mb moisture transport, theta-e, winds, PWATs

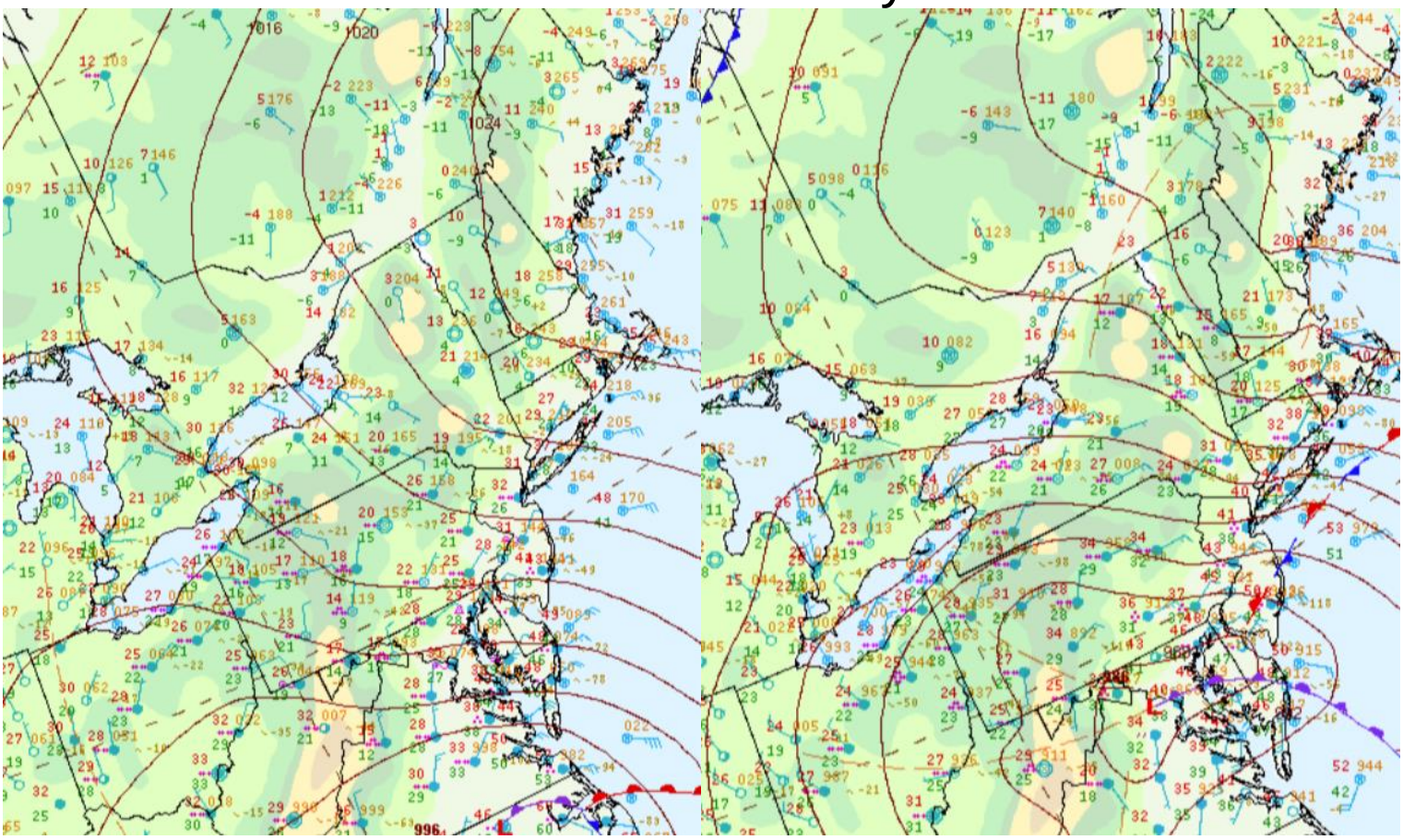


Left : transport/hght/theta-e, Middle : height/temp/dwpt/wind, Right : PWATs lowest 400 mb

06z January 17, 2022

850 mb warm, theta-e, and moisture advection on the warm sector wrapped around the surface low to provide moisture needed to produce wintry precipitation. Theta-E isentropic lift is evident by moisture transport vectors towards the Capital Region. A strong 850 mb low level jet of 60+ kts strengthened the moisture transport that was occurring at the time. Above normal precipitable water values between 0.6 and 0.8 inches were also present during the storm. The PWAT values indicated abundant moisture available for heavy precipitation to occur.

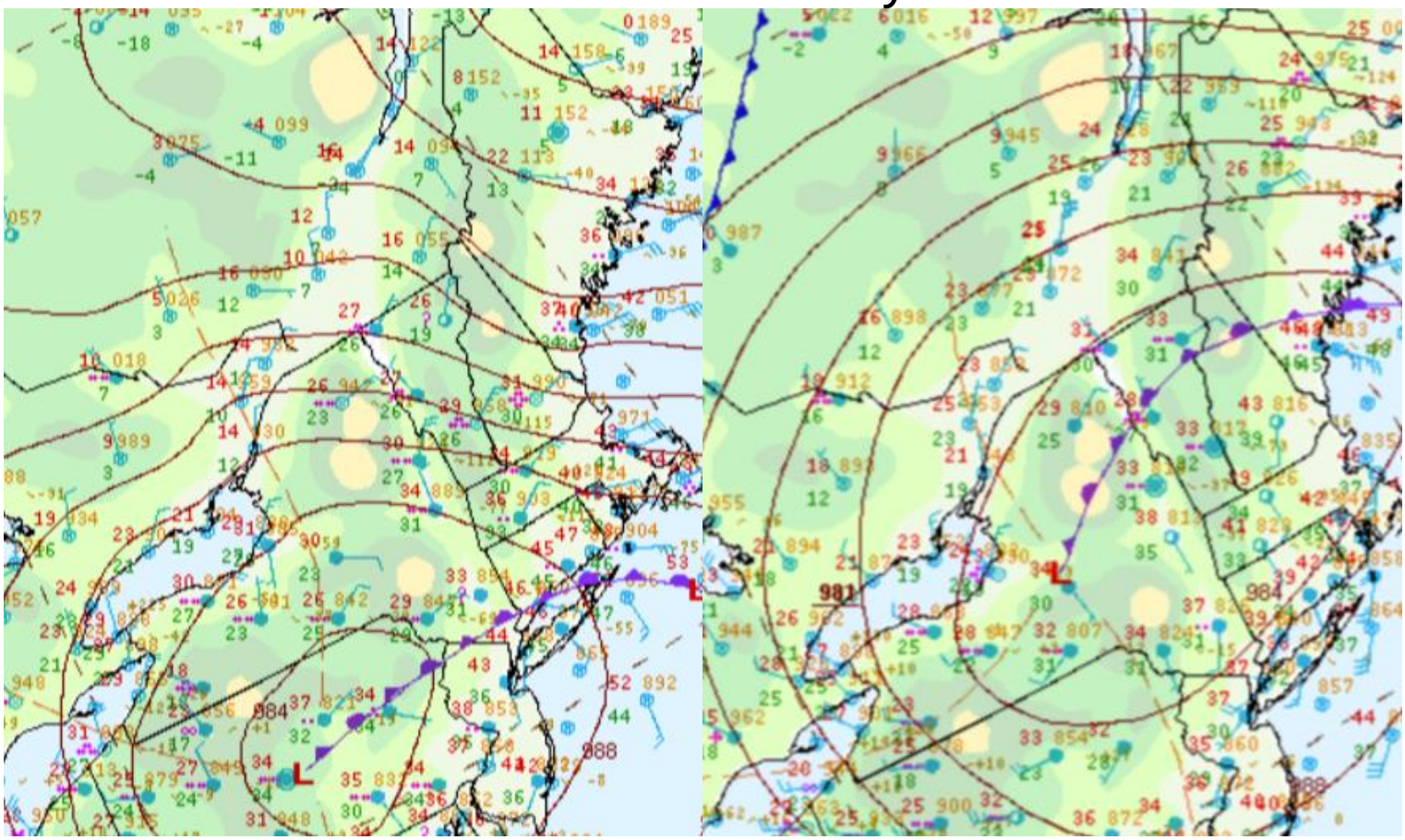
WPC Surface Analysis



00z January 17 (left), 06z January 17 (right)

While moving north just inland, the surface low began to occlude while deepening from 996 to 986 mb between 00z and 06z January 17. A very cold air mass, with temps in the lower teens to upper single digits, was in place for precipitation to initially begin as snow due to arctic high pressure east of Maine from earlier in the day.

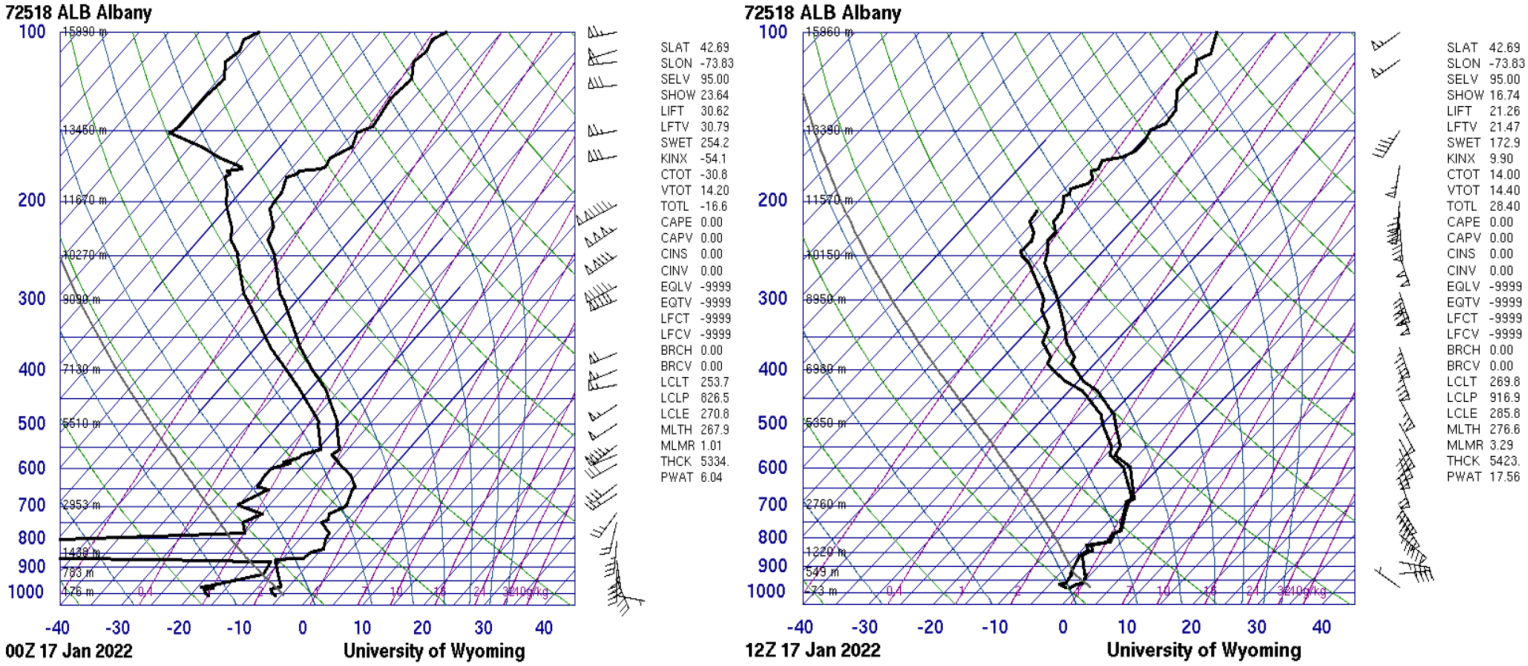
WPC Surface Analysis



12z January 17 (left), 18z January 17 (right)

By 18z January 17, the surface low pressure peaked around 981 mb while slowly moving north in Upstate New York. The decreasing pressure gradient resulted in a decrease of gusty winds between 12z and 18z.

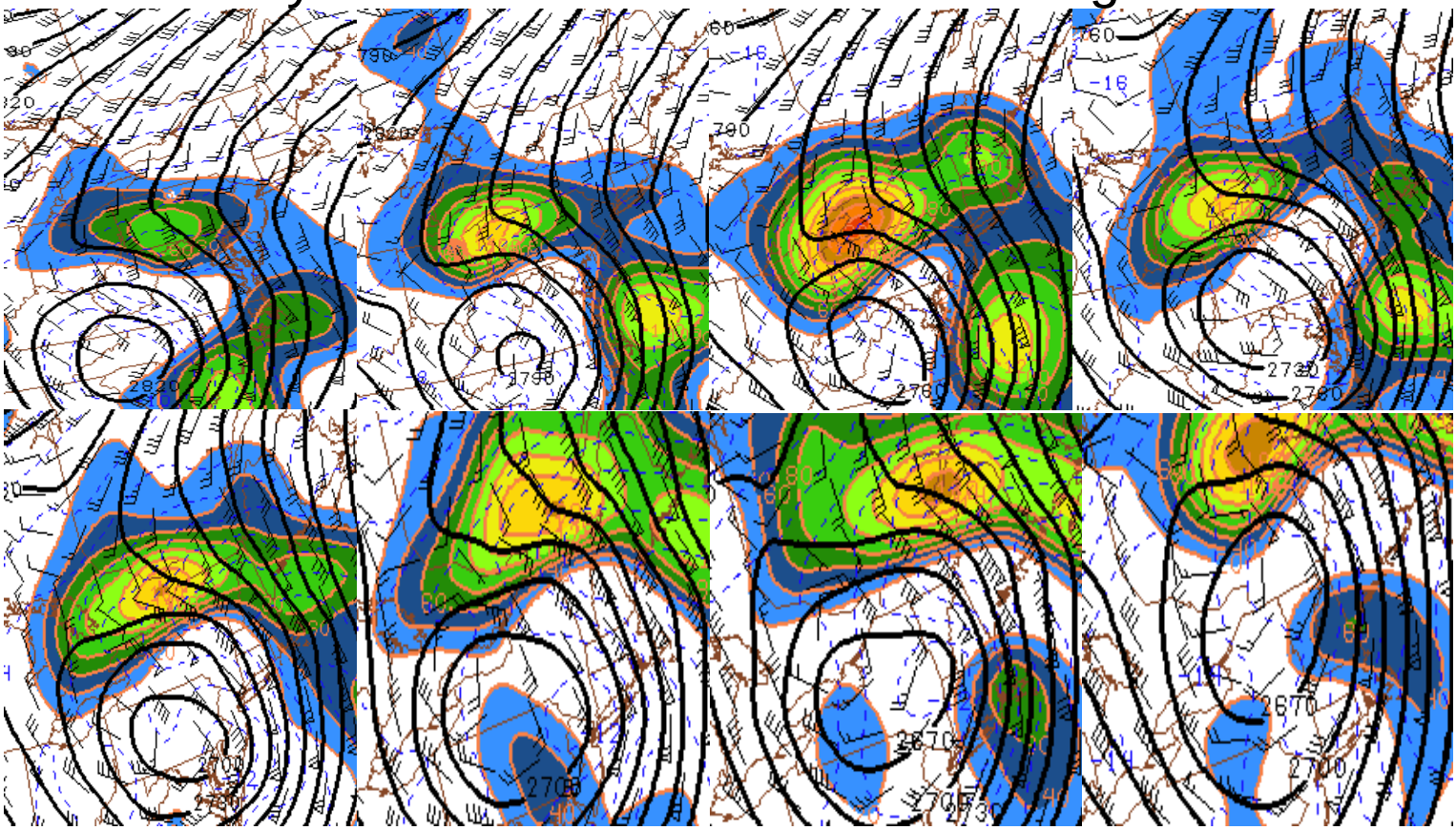
Skew-T at KALB



00z January 17 (left), 12z January 17 (right)

At 00z January 17, mid to low level dry air kept the Capital Region precipitation free with easterly winds at the surface. By 12z January 17, the atmospheric levels at 600 mb and below had saturated, providing relative humidity levels high enough for precipitation to reach the ground. The warm nose aloft had not approached the ALB site at the time, indicated by temps below freezing at all levels.

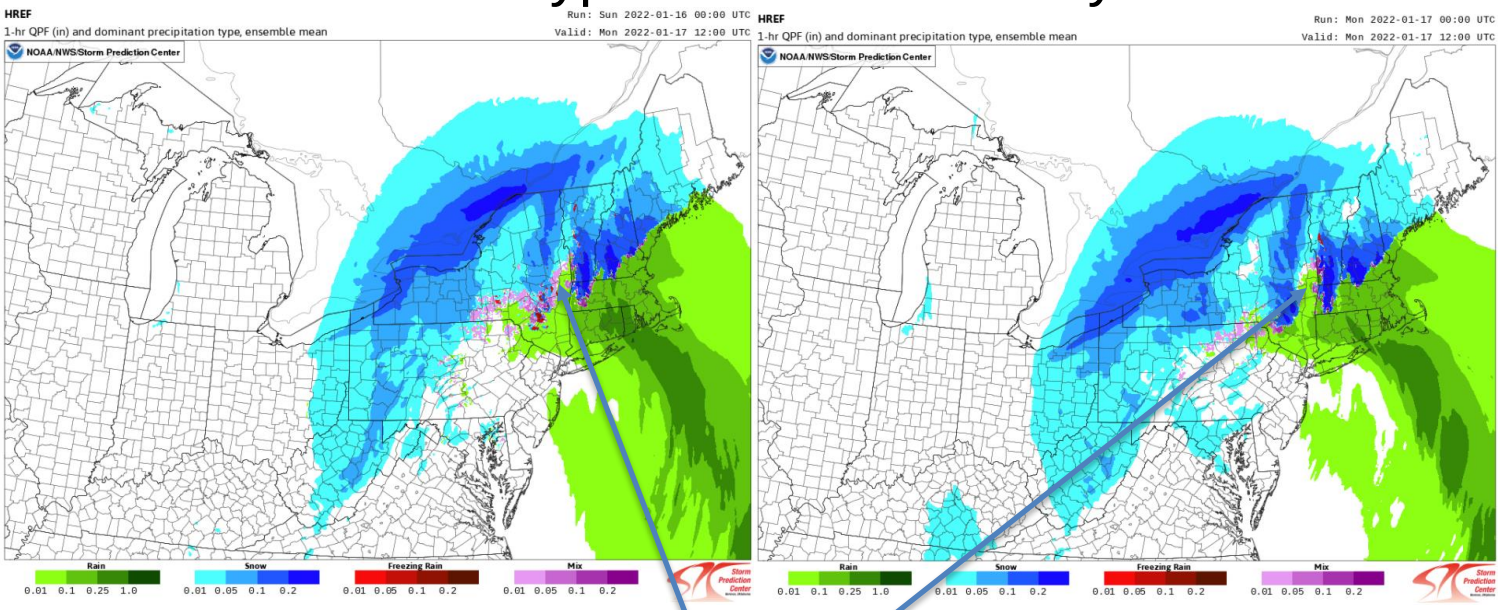
Analysis of 700 mb Petterssen frontogenesis



Top (left to right) : 00z, 03z, 06z, 09z January 17
Bottom (left to right) : 12z, 15z, 18z, 21z January 17

700 mb frontogenesis provided strong lift for moderate to locally heavy snow bands to develop in Upstate New York between 00z and 12z January 17. The forcing, along with stretching deformation, migrated to extreme northern New York and Canada by 15z, leaving existing snow bands with reduced support of lift. Reduced lift resulted in weakening of existing snowbands, with the precipitation becoming very scattered by 18z..

HREF P-type valid 12z January 17

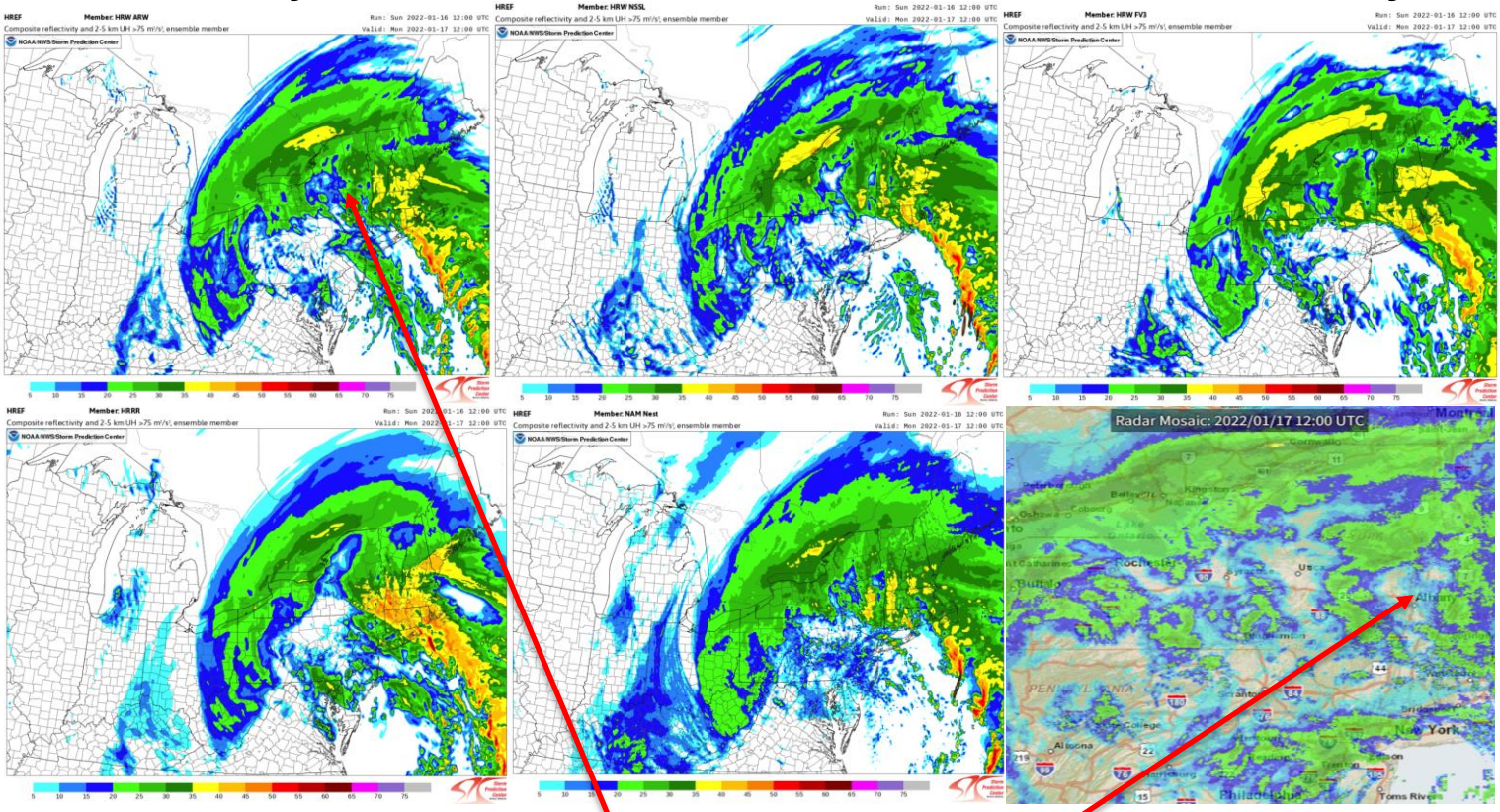


00z January 16 vs 00z January 17

ALBANY

Explicit forecasts of precipitation and precipitation-type from the 00z 16th and 00z 17th HREF and valid at 12z on the 17th, were rather consistent, showing rain in the Hudson Valley from the Capital District southward, with mostly snow north of the Capital District and over higher terrain to the west and east.

12z January 16 Model runs vs Radar valid 12z January 17



Top (left to right) : ARW, NSSL, FV3
Bottom (left to right) : HRRR, NAM, Observed

ALBANY / Capital District

Most high resolution models valid at 12 on the 17th, as shown above, simulated heavy precipitation still occurring in the Capital Region and northwestern New York. However, the main bands supported by frontogenesis had moved further up north and precipitation had diminished in the Capital Region faster than simulated due to the dendritic growth zone being lost in the warm nose dry slot.

Hourly Observations at KPOU

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
12:02 AM	26 °F	24 °F	92 %	N	6 mph	0 mph	29.60 in	0.0 in	Light Snow
12:20 AM	27 °F	25 °F	92 %	N	6 mph	0 mph	29.56 in	0.0 in	Light Snow
12:38 AM	29 °F	27 °F	92 %	NNE	7 mph	0 mph	29.53 in	0.0 in	Light Snow
12:53 AM	31 °F	28 °F	89 %	NE	8 mph	0 mph	29.51 in	0.0 in	Light Snow
1:02 AM	32 °F	29 °F	88 %	NE	9 mph	0 mph	29.49 in	0.0 in	Light Snow
1:10 AM	32 °F	29 °F	88 %	NE	10 mph	0 mph	29.48 in	0.0 in	Light Snow
1:53 AM	33 °F	30 °F	89 %	NE	8 mph	17 mph	29.42 in	0.0 in	Light Snow
2:16 AM	33 °F	30 °F	89 %	ENE	9 mph	0 mph	29.38 in	0.0 in	Light Snow
2:32 AM	33 °F	30 °F	89 %	ENE	15 mph	22 mph	29.34 in	0.0 in	Light Snow
2:38 AM	33 °F	30 °F	89 %	NE	12 mph	22 mph	29.32 in	0.0 in	Light Snow
2:41 AM	33 °F	30 °F	89 %	ENE	12 mph	22 mph	29.32 in	0.0 in	Light Snow
2:53 AM	33 °F	30 °F	89 %	ENE	13 mph	22 mph	29.29 in	0.0 in	Light Snow
2:59 AM	34 °F	29 °F	82 %	ENE	17 mph	28 mph	29.28 in	0.0 in	Light Snow
3:53 AM	36 °F	31 °F	82 %	ENE	12 mph	29 mph	29.17 in	0.0 in	Light Rain
4:35 AM	36 °F	32 °F	86 %	E	12 mph	22 mph	29.15 in	0.1 in	Rain
4:46 AM	36 °F	32 °F	86 %	ENE	13 mph	24 mph	29.11 in	0.1 in	Heavy Rain
4:53 AM	36 °F	32 °F	86 %	ENE	9 mph	20 mph	29.09 in	0.1 in	Rain
5:19 AM	36 °F	32 °F	86 %	ENE	7 mph	0 mph	29.06 in	0.1 in	Rain
5:28 AM	35 °F	32 °F	89 %	NE	7 mph	0 mph	29.05 in	0.1 in	Rain
5:41 AM	35 °F	32 °F	89 %	NNE	6 mph	0 mph	29.02 in	0.1 in	Light Rain
5:53 AM	34 °F	32 °F	92 %	NNW	7 mph	0 mph	29.01 in	0.1 in	Light Rain
6:00 AM	34 °F	32 °F	92 %	N	8 mph	0 mph	28.99 in	0.0 in	Light Rain
6:18 AM	33 °F	32 °F	96 %	N	5 mph	0 mph	28.97 in	0.0 in	Light Rain
6:43 AM	33 °F	31 °F	92 %	NNW	5 mph	0 mph	28.94 in	0.0 in	Wintry Mix
6:53 AM	33 °F	31 °F	92 %	VAR	6 mph	0 mph	28.93 in	0.1 in	Wintry Mix
7:53 AM	39 °F	36 °F	89 %	SE	6 mph	0 mph	28.92 in	0.0 in	Light Rain
8:23 AM	42 °F	37 °F	82 %	S	5 mph	0 mph	28.91 in	0.0 in	Cloudy
8:53 AM	40 °F	37 °F	89 %	CALM	0 mph	0 mph	28.91 in	0.0 in	Mostly Cloudy
9:13 AM	41 °F	36 °F	82 %	S	6 mph	0 mph	28.91 in	0.0 in	Cloudy
9:53 AM	41 °F	35 °F	79 %	S	10 mph	22 mph	28.90 in	0.0 in	Mostly Cloudy
10:53 AM	40 °F	33 °F	77 %	SW	9 mph	0 mph	28.89 in	0.0 in	Cloudy
11:53 AM	40 °F	31 °F	70 %	S	9 mph	18 mph	28.85 in	0.0 in	Mostly Cloudy
12:53 PM	37 °F	31 °F	79 %	SSW	9 mph	22 mph	28.86 in	0.0 in	Light Rain
1:53 PM	37 °F	30 °F	76 %	SSW	8 mph	16 mph	28.87 in	0.0 in	Cloudy
2:53 PM	37 °F	30 °F	76 %	SSW	10 mph	0 mph	28.89 in	0.0 in	Cloudy
3:53 PM	37 °F	30 °F	76 %	SSW	8 mph	0 mph	28.91 in	0.0 in	Cloudy
4:40 PM	37 °F	29 °F	73 %	SSW	9 mph	0 mph	28.92 in	0.0 in	Cloudy
4:53 PM	37 °F	29 °F	73 %	SW	13 mph	17 mph	28.93 in	0.0 in	Cloudy
5:18 PM	37 °F	29 °F	73 %	SSW	12 mph	17 mph	28.94 in	0.0 in	Cloudy
5:53 PM	36 °F	29 °F	76 %	SW	12 mph	23 mph	28.97 in	0.0 in	Cloudy
6:53 PM	37 °F	26 °F	65 %	W	10 mph	0 mph	29.02 in	0.0 in	Cloudy
7:53 PM	36 °F	23 °F	59 %	W	14 mph	0 mph	29.06 in	0.0 in	Cloudy
8:53 PM	34 °F	20 °F	56 %	W	14 mph	0 mph	29.10 in	0.0 in	Cloudy
9:53 PM	33 °F	19 °F	56 %	W	17 mph	25 mph	29.14 in	0.0 in	Cloudy

05z January 17 - 03z January 18

Hourly observations at Hudson Valley Region Airport (KPOU) in Poughkeepsie, NY, showed snow beginning around 05z January 17 and transitioning to Heavy Rain by 0935z January 17. The rain briefly mixed over with wintry precipitation between 1143 and 1200z as a result of the brief wind direction shift from NE to NNW before diminishing as light rain by 18z.

Hourly Observations at KALB

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
12:25 AM	18 °F	15 °F	88 %	NNW	7 mph	0 mph	29.56 in	0.0 in	Snow
12:41 AM	18 °F	15 °F	88 %	NNW	6 mph	0 mph	29.53 in	0.1 in	Snow
12:51 AM	18 °F	15 °F	88 %	NNW	6 mph	0 mph	29.52 in	0.1 in	Snow
1:23 AM	18 °F	15 °F	88 %	NNW	7 mph	0 mph	29.48 in	0.1 in	Heavy Snow
1:51 AM	18 °F	16 °F	92 %	NNW	7 mph	0 mph	29.43 in	0.1 in	Heavy Snow
2:26 AM	20 °F	17 °F	89 %	NNW	6 mph	0 mph	29.37 in	0.1 in	Snow
2:40 AM	20 °F	18 °F	92 %	NNW	6 mph	0 mph	29.35 in	0.1 in	Light Snow
2:51 AM	21 °F	19 °F	92 %	N	9 mph	0 mph	29.33 in	0.1 in	Light Snow
2:59 AM	21 °F	19 °F	92 %	N	8 mph	0 mph	29.31 in	0.0 in	Light Snow
3:08 AM	22 °F	19 °F	89 %	N	10 mph	0 mph	29.30 in	0.0 in	Light Snow
3:22 AM	22 °F	20 °F	92 %	N	10 mph	0 mph	29.27 in	0.0 in	Light Snow
3:27 AM	22 °F	20 °F	92 %	N	9 mph	0 mph	29.26 in	0.0 in	Snow
3:51 AM	23 °F	21 °F	92 %	N	13 mph	0 mph	29.23 in	0.1 in	Snow
4:08 AM	23 °F	21 °F	92 %	N	12 mph	0 mph	29.18 in	0.0 in	Light Snow
4:16 AM	24 °F	22 °F	91 %	N	10 mph	0 mph	29.17 in	0.1 in	Snow and Sleet
4:20 AM	24 °F	22 °F	91 %	NNW	12 mph	0 mph	29.17 in	0.1 in	Snow and Sleet
4:35 AM	25 °F	23 °F	92 %	N	10 mph	0 mph	29.14 in	0.1 in	Snow and Sleet
4:46 AM	27 °F	25 °F	93 %	N	9 mph	0 mph	29.12 in	0.1 in	Snow and Sleet
4:51 AM	26 °F	24 °F	92 %	N	12 mph	0 mph	29.11 in	0.1 in	Snow and Sleet
4:57 AM	27 °F	25 °F	92 %	N	12 mph	0 mph	29.09 in	0.0 in	Light Snow
5:00 AM	27 °F	25 °F	92 %	N	15 mph	0 mph	29.08 in	0.0 in	Light Snow
5:07 AM	27 °F	25 °F	92 %	N	12 mph	0 mph	29.07 in	0.0 in	Light Snow
5:17 AM	28 °F	25 °F	88 %	N	14 mph	0 mph	29.07 in	0.0 in	Light Snow
5:51 AM	31 °F	27 °F	85 %	N	16 mph	0 mph	28.99 in	0.0 in	Light Snow
5:58 AM	31 °F	27 °F	85 %	N	16 mph	0 mph	28.97 in	0.0 in	Light Snow
6:19 AM	33 °F	29 °F	85 %	NNE	13 mph	21 mph	28.93 in	0.0 in	Light Snow
6:32 AM	33 °F	31 °F	92 %	NNE	9 mph	0 mph	28.92 in	0.0 in	Light Snow
6:51 AM	34 °F	31 °F	89 %	N	13 mph	0 mph	28.90 in	0.0 in	Light Snow
7:51 AM	37 °F	30 °F	76 %	ENE	10 mph	17 mph	28.85 in	0.0 in	Wintry Mix
8:04 AM	36 °F	31 °F	82 %	N	6 mph	0 mph	28.85 in	0.0 in	Light Rain
8:51 AM	37 °F	31 °F	79 %	VAR	3 mph	0 mph	28.81 in	0.0 in	Light Rain
9:51 AM	34 °F	32 °F	92 %	NW	3 mph	0 mph	28.78 in	0.0 in	Cloudy
10:26 AM	34 °F	33 °F	96 %	CALM	0 mph	0 mph	28.75 in	0.0 in	Light Rain
10:51 AM	36 °F	33 °F	89 %	NNW	3 mph	0 mph	28.74 in	0.0 in	Cloudy
11:51 AM	37 °F	35 °F	93 %	WSW	3 mph	0 mph	28.68 in	0.0 in	Light Rain
12:34 PM	38 °F	35 °F	89 %	S	5 mph	0 mph	28.67 in	0.0 in	Mostly Cloudy
12:51 PM	38 °F	35 °F	89 %	S	6 mph	0 mph	28.67 in	0.0 in	Mostly Cloudy
1:20 PM	38 °F	34 °F	86 %	S	7 mph	0 mph	28.67 in	0.0 in	Mostly Cloudy
1:45 PM	39 °F	34 °F	81 %	S	15 mph	0 mph	28.67 in	0.0 in	Mostly Cloudy
1:51 PM	39 °F	32 °F	76 %	S	15 mph	0 mph	28.68 in	0.0 in	Mostly Cloudy
2:51 PM	39 °F	31 °F	73 %	S	16 mph	23 mph	28.70 in	0.0 in	Light Rain
3:51 PM	38 °F	31 °F	76 %	SSE	7 mph	0 mph	28.71 in	0.0 in	Light Rain
4:51 PM	37 °F	30 °F	76 %	S	12 mph	21 mph	28.74 in	0.0 in	Cloudy

05z-22z January 17, 2022

Hourly observations at Albany International Airport (KALB) showed moderate to heavy snow beginning by 0525z, mixing with sleet between 915 and 951z. The snow would then mix and change over to rain between 13z and 14z when the wind direction shifted from N to NE and eventually S to SSE. Generally cloudy skies with some light rain continued until around 21z.

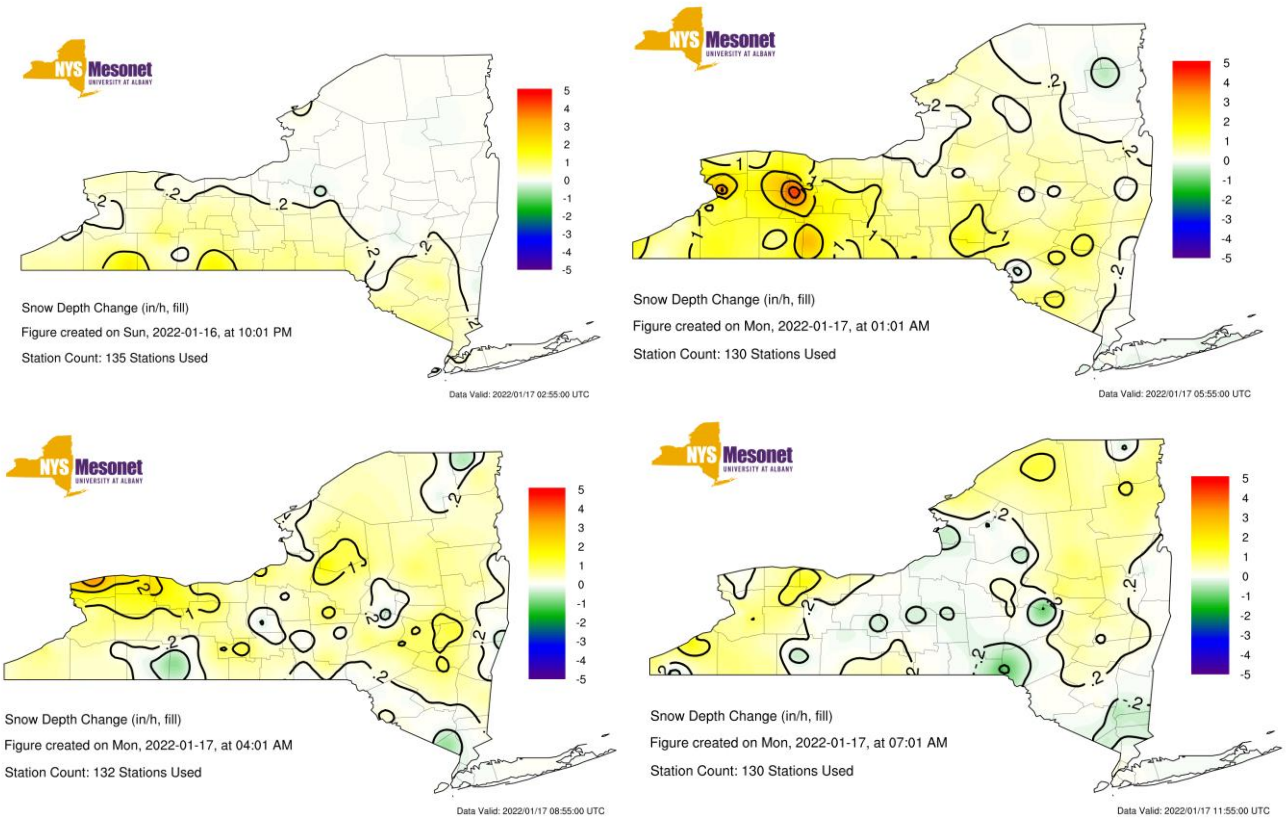
Hourly Observations at KGFL

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
12:02 AM	17 °F	13 °F	84 %	NNW	8 mph	0 mph	29.59 in	0.0 in	Light Snow
12:14 AM	17 °F	13 °F	84 %	N	9 mph	0 mph	29.58 in	0.0 in	Light Snow
12:53 AM	18 °F	14 °F	84 %	N	10 mph	0 mph	29.53 in	0.0 in	Light Snow
1:33 AM	20 °F	16 °F	85 %	N	9 mph	0 mph	29.48 in	0.0 in	Light Snow
1:53 AM	20 °F	17 °F	89 %	N	8 mph	0 mph	29.45 in	0.0 in	Light Snow
2:02 AM	20 °F	17 °F	89 %	N	9 mph	0 mph	29.45 in	0.0 in	Light Snow
2:34 AM	21 °F	18 °F	88 %	N	12 mph	0 mph	29.39 in	0.0 in	Light Snow
2:53 AM	22 °F	19 °F	89 %	N	10 mph	0 mph	29.35 in	0.0 in	Light Snow
3:03 AM	21 °F	18 °F	88 %	N	10 mph	0 mph	29.34 in	0.0 in	Snow
3:29 AM	22 °F	19 °F	89 %	N	10 mph	0 mph	29.29 in	0.0 in	Light Snow
3:40 AM	22 °F	19 °F	89 %	N	10 mph	0 mph	29.28 in	0.0 in	Light Snow
3:53 AM	22 °F	19 °F	89 %	N	13 mph	0 mph	29.25 in	0.0 in	Light Snow
4:10 AM	23 °F	20 °F	88 %	N	10 mph	0 mph	29.23 in	0.0 in	Light Snow
4:20 AM	23 °F	20 °F	88 %	N	13 mph	0 mph	29.22 in	0.0 in	Light Snow
4:34 AM	24 °F	20 °F	84 %	N	10 mph	0 mph	29.20 in	0.0 in	Light Snow
4:53 AM	24 °F	21 °F	88 %	N	10 mph	0 mph	29.16 in	0.0 in	Light Snow
5:07 AM	27 °F	23 °F	85 %	NNE	14 mph	0 mph	29.13 in	0.0 in	Light Snow
5:24 AM	29 °F	24 °F	82 %	NNE	18 mph	26 mph	29.11 in	0.0 in	Light Snow
5:53 AM	29 °F	24 °F	82 %	NE	20 mph	30 mph	29.05 in	0.0 in	Light Snow
6:27 AM	29 °F	25 °F	85 %	NE	18 mph	28 mph	28.99 in	0.0 in	Light Snow
6:45 AM	29 °F	26 °F	89 %	NE	18 mph	26 mph	28.94 in	0.0 in	Light Snow
6:53 AM	30 °F	27 °F	88 %	NE	21 mph	30 mph	28.92 in	0.0 in	Light Snow / Windy
7:27 AM	31 °F	27 °F	85 %	NE	16 mph	29 mph	28.88 in	0.0 in	Light Snow
7:53 AM	31 °F	28 °F	89 %	NE	15 mph	23 mph	28.88 in	0.0 in	Light Snow
8:10 AM	32 °F	28 °F	85 %	NE	14 mph	0 mph	28.87 in	0.0 in	Light Snow
8:22 AM	32 °F	29 °F	88 %	NE	12 mph	24 mph	28.86 in	0.0 in	Light Snow
8:40 AM	33 °F	29 °F	85 %	NE	16 mph	23 mph	28.84 in	0.0 in	Light Snow
8:53 AM	33 °F	29 °F	85 %	NNE	15 mph	0 mph	28.83 in	0.0 in	Light Snow
9:48 AM	34 °F	30 °F	87 %	NNE	13 mph	0 mph	28.78 in	0.0 in	Light Snow
9:53 AM	33 °F	31 °F	92 %	NNE	9 mph	0 mph	28.78 in	0.0 in	Light Snow
9:59 AM	34 °F	31 °F	89 %	NE	8 mph	0 mph	28.78 in	0.0 in	Light Snow
10:53 AM	33 °F	31 °F	92 %	N	9 mph	0 mph	28.74 in	0.0 in	Light Snow
11:53 AM	34 °F	32 °F	92 %	NNE	9 mph	0 mph	28.66 in	0.0 in	Wintry Mix
12:20 PM	33 °F	31 °F	92 %	NNE	6 mph	0 mph	28.64 in	0.0 in	Light Snow
12:29 PM	33 °F	31 °F	92 %	N	5 mph	0 mph	28.64 in	0.0 in	Light Snow
12:41 PM	33 °F	31 °F	92 %	N	3 mph	0 mph	28.63 in	0.0 in	Light Snow
12:51 PM	34 °F	30 °F	87 %	CALM	0 mph	0 mph	28.63 in	0.1 in	Light Snow
12:53 PM	33 °F	31 °F	92 %	CALM	0 mph	0 mph	28.63 in	0.1 in	Light Snow
1:08 PM	33 °F	32 °F	96 %	CALM	0 mph	0 mph	28.63 in	0.0 in	Light Snow
1:30 PM	32 °F	31 °F	96 %	NNE	3 mph	0 mph	28.63 in	0.0 in	Light Snow
1:39 PM	32 °F	31 °F	96 %	N	6 mph	0 mph	28.63 in	0.0 in	Light Snow
1:49 PM	32 °F	30 °F	93 %	CALM	0 mph	0 mph	28.63 in	0.0 in	Cloudy
1:53 PM	33 °F	31 °F	92 %	CALM	0 mph	0 mph	28.63 in	0.0 in	Cloudy
2:42 PM	33 °F	31 °F	92 %	CALM	0 mph	0 mph	28.65 in	0.0 in	Cloudy
2:53 PM	33 °F	32 °F	96 %	CALM	0 mph	0 mph	28.65 in	0.0 in	Light Snow

05z-20z January 17, 2022

Hourly observations at Floyd Bennett Memorial Airport (KGFL) in Glens Falls showed snow starting at 05z and continuing until around 20z. The snow only mixed briefly around 17z when surface temperatures reached the mid 30s before cooling back down to near the freezing mark.

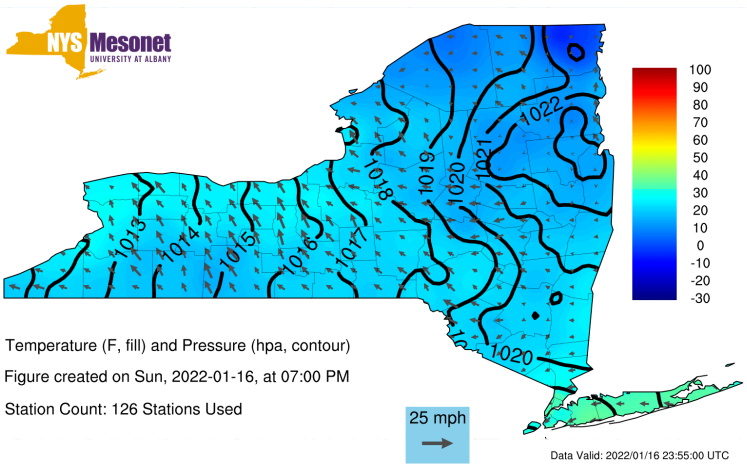
Mesonet 1 hr snow depth change

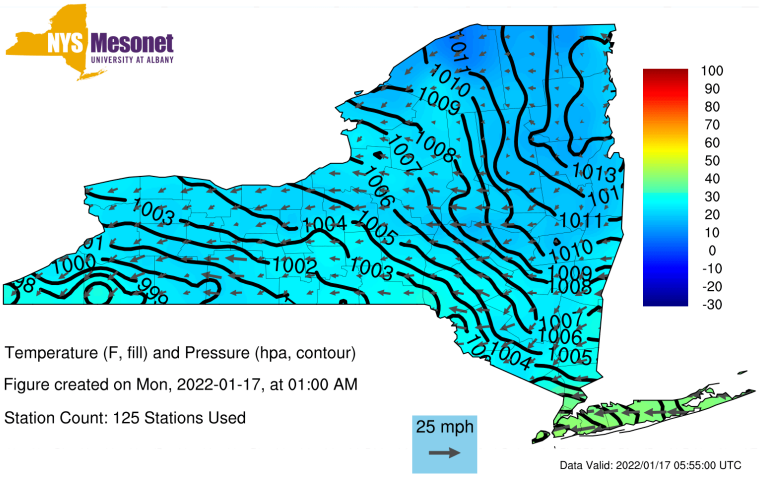


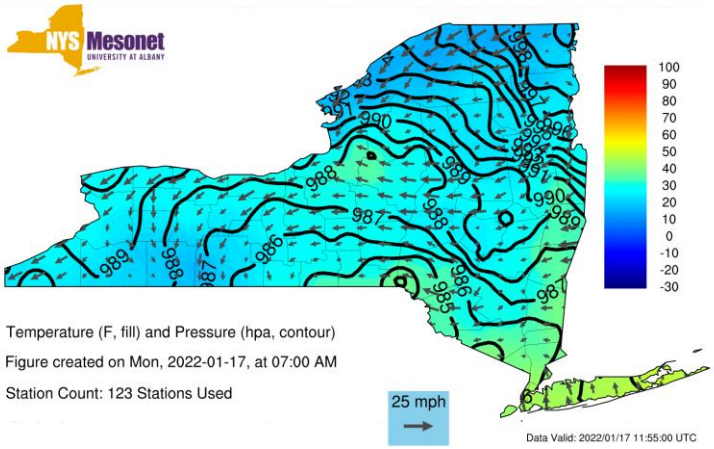
03z, 06z, 09z, 12z January 17, 2022

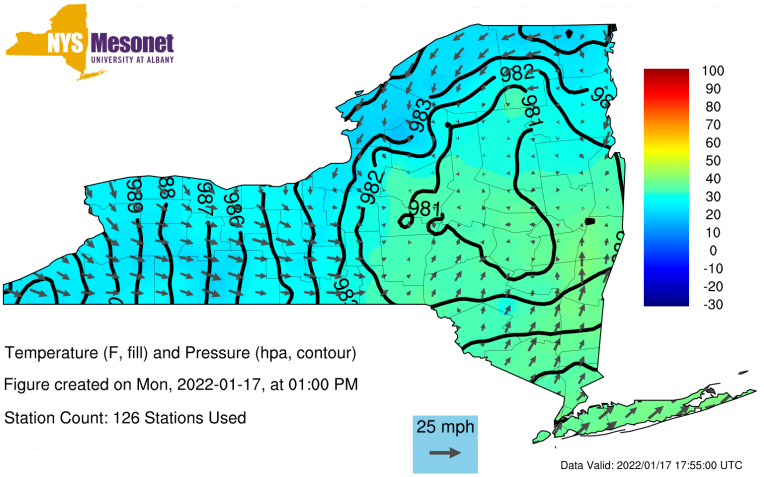
NYS Mesonet data showed a widespread area of moderate to heavy snow filling into the area between 03z and 06z before moving up north and weakening between 09z and 12z. The heaviest snowfall rates were shown at 06z and 09z to be near the Buffalo region as it was to the northwest of the low pressure center, the result of a pivoting snowband in the area. Snowfall rates in eastern New York were mainly an inch per hour or less.

Mesonet Air Temp/Sea Level Pressure





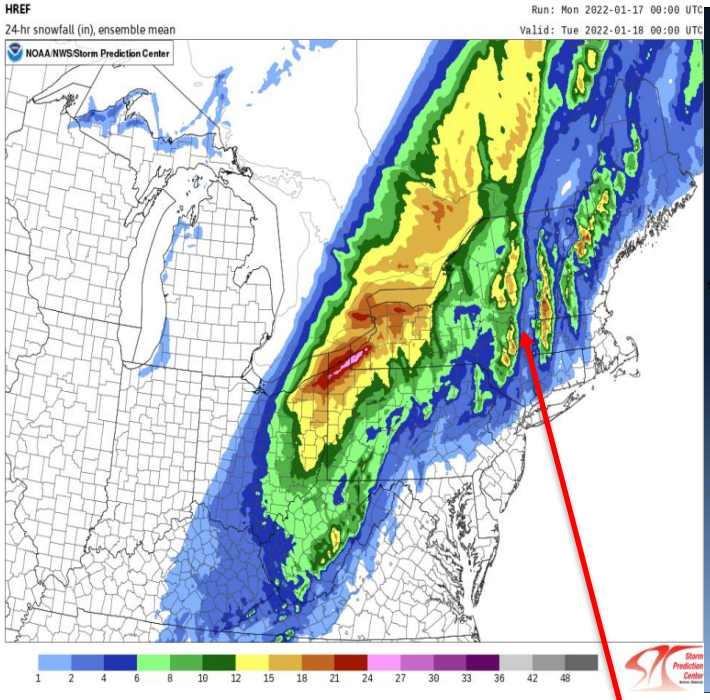


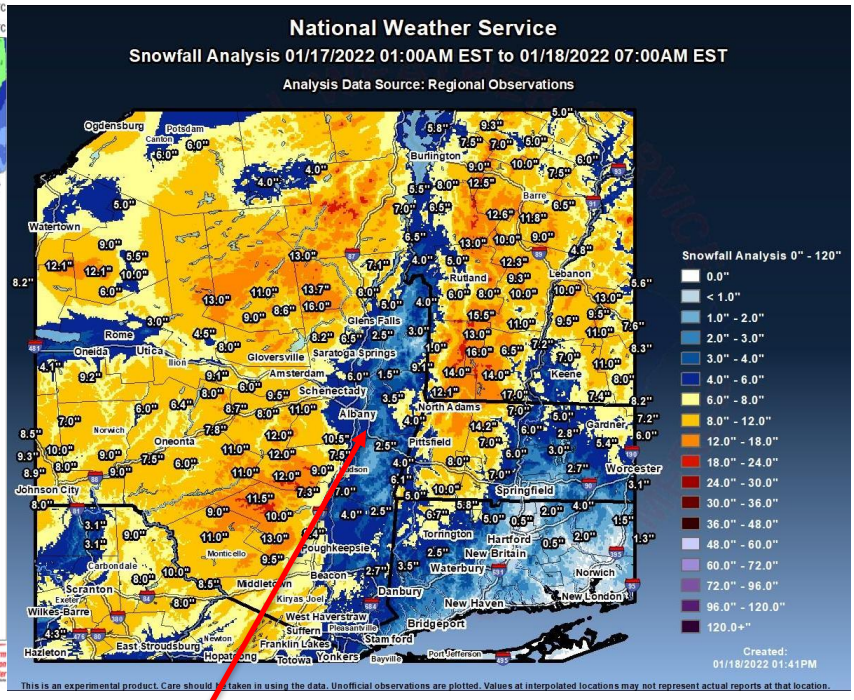


00z, 06z, 12z, 18z January 17, 2022

The sea level pressure decrease, tightening pressure gradient, and warming of 2m temperatures show significant erosion of the cold air mass in place prior to the storm. For southeastern New York, south to south-westerly flow between 12z and 18z resulted in temperatures going either above or remaining between the mid 30s and mid 40s.

HREF mean snowfall vs observed snowfall





00z January 17 run vs observed snowfall

ALBANY / Capital District

Looking at the comparison between the HREF mean and observed snowfall, the HREF runs performed well with orographic based snowfall totals with the exception of slight underdoing in the valleys by 1 to 2 inches.

ALY Public Weather Information Statement (CT, MA, NY)

CONNECTICUT

...Litchfield County...

Norfolk	6.7	945	AM	1/17	1.15 liquid equivalent.
Colebrook	5.8	930	AM	1/17	Social Media
1 WSW Winsted	5.1	730	AM	1/17	CoCoRaHS
Canaan	5.0	500	PM	1/17	WeatherNet6
3 SW New Hartford Ce	4.4	700	AM	1/18	CoCoRaHS
Bakersville	4.4	700	AM	1/18	Co-Op Observer
5 SSW New Milford	3.5	800	AM	1/17	CoCoRaHS
3 N Watertown	2.5	343	PM	1/17	CoCoRaHS
1 S Watertown	2.2	710	AM	1/18	CoCoRaHS

MASSACHUSETTS

...Berkshire County...

Savoy	15.7	502	PM	1/17	WeatherNet6
East Otis	10.0	905	AM	1/17	Social Media
1 NNW Cheshire	9.5	700	AM	1/18	CoCoRaHS
Clarksburg	8.0	622	AM	1/18	WeatherNet6
Becket	8.0	457	PM	1/17	WeatherNet6
Otis	8.0	905	AM	1/17	Social Media
Pittsfield	7.0	603	AM	1/18	WeatherNet6
4 SE Pittsfield	6.8	930	AM	1/17	Trained Spotter
N Great Barrington	6.1	1159	PM	1/17	CoCoRaHS
Great Barrington	6.0	745	AM	1/17	Trained Spotter
2 SE Pittsfield	5.7	932	AM	1/17	Trained Spotter
Williamstown	4.1	1137	AM	1/17	Social Media
Hancock	4.0	613	PM	1/17	WeatherNet6
Lanesborough	3.5	456	PM	1/17	WeatherNet6

NEW YORK

...Albany County...

Rensselaerville	12.0	525	PM	1/17	WeatherNet6
Altamont	11.0	830	AM	1/17	Facebook
4 NW Altamont	10.1	700	AM	1/18	CoCoRaHS
Knox	9.3	1012	AM	1/17	WeatherNet6
2 NNW Rensselaervill	9.2	700	AM	1/18	CoCoRaHS
3 SE Duanesburg	9.2	745	AM	1/17	NWS Employee
3 SSW Altamont	8.1	840	AM	1/17	CoCoRaHS
4 NNW CLARKSVILLE	7.0	722	AM	1/17	Amateur Radio
2 W Albany	6.5	940	AM	1/17	Social Media
Westmere	6.0	800	AM	1/17	Facebook
1 WNW Delmar	5.4	808	AM	1/17	Public
2 WNW Delmar	5.3	927	AM	1/17	Trained Spotter
Colonie	4.5	401	PM	1/17	WeatherNet6
NWS Albany	4.5	800	AM	1/17	CoCoRaHS
Albany	4.5	730	AM	1/17	NWS Albany Office
ESE Albany	4.4	745	AM	1/17	CoCoRaHS
Albany Intl AP	4.4	700	PM	1/17	ASOS
1 W Albany	4.4	745	AM	1/17	NWS Employee
Selkirk	4.3	821	AM	1/17	Twitter
Delmar	4.0	1044	PM	1/17	WeatherNet6
Boght Corners	3.6	934	AM	1/17	NWS Employee

...Columbia County...

6 S Hillsdale	4.2	800	AM	1/17	CoCoRaHS
3 N Austerlitz	4.0	900	AM	1/17	Trained Spotter
Germantown	3.6	526	PM	1/17	WeatherNet6
N Ancramdale	2.5	700	AM	1/18	CoCoRaHS
2 E Chatham	2.5	1107	AM	1/17	Trained Spotter
1 SW Chatham	2.3	739	AM	1/17	Trained Spotter
Taghkanic	2.2	554	PM	1/17	WeatherNet6
Ancramdale	1.9	547	PM	1/17	WeatherNet6

...Dutchess County...

Red Hook	4.0	915	AM	1/17	Trained Spotter
2 SSE Tivoli	3.0	935	AM	1/17	Trained Spotter
1 NW Poughkeepsie	3.0	730	AM	1/17	Social Media
2 SSE Poughkeepsie	2.8	519	PM	1/17	0.73 liquid equivalent.
1 WSW Poughquag	2.7	420	PM	1/17	Storm Total.
Rhinebeck	2.5	1031	AM	1/17	Trained Spotter

...Fulton County...

Perth	7.8	549	PM	1/17	WeatherNet6
5 ESE Broadalbin	7.0	900	AM	1/18	CoCoRaHS

...Greene County...

Windham	12.0	845	AM	1/17	Still snowing
East Jewett	12.0	1015	AM	1/17	Trained Spotter
Halcott Center	11.0	530	PM	1/17	WeatherNet6
1 E Greenville	10.5	530	AM	1/18	CoCoRaHS
Greenville Center	10.5	1228	PM	1/17	WeatherNet6
Acra	10.3	248	PM	1/17	Storm Total Snowfall
Freehold	9.0	517	PM	1/17	WeatherNet6
Cairo	9.0	1135	AM	1/17	WeatherNet6
3 E Freehold	7.5	530	AM	1/18	CoCoRaHS
Catskill	7.0	925	AM	1/17	24 hour total.

...Hamilton County...

Indian Lake	13.0	452	PM	1/17	WeatherNet6
10 SSW Speculator	11.0	700	AM	1/18	CoCoRaHS
Piseco	9.0	519	PM	1/17	WeatherNet6
2 WNW Hoffmeister	9.0	800	AM	1/17	CoCoRaHS
Wells	8.6	553	PM	1/17	WeatherNet6
4 ENE Piseco	8.0	932	AM	1/17	Trained Spotter

...Herkimer County...

2 NW Salisbury Cente	8.5	515	AM	1/18	CoCoRaHS
Dolgeville	8.0	815	PM	1/17	Trained Spotter
2 SSW Salisbury	8.0	1059	AM	1/17	Still snowing.
1 NW Ilion	7.0	1230	PM	1/17	Public
1 WSW Ilion	6.3	830	AM	1/18	CoCoRaHS
Herkimer	6.0	726	AM	1/17	Public

...Montgomery County...

Amsterdam	10.0	1000	PM	1/17	WeatherNet6
1 NNW Amsterdam	10.0	818	AM	1/18	CoCoRaHS
Fonda	9.2	451	PM	1/17	WeatherNet6
2 WSW Hessville	9.1	800	AM	1/18	CoCoRaHS
SE Fort Plain	8.3	600	AM	1/18	CoCoRaHS
Hessville	8.0	1006	AM	1/17	WeatherNet6
1 SW Rockton	7.9	1040	AM	1/17	Estimated by picture.
1 SE Amsterdam	7.0	922	AM	1/17	Social Media
Palatine Bridge	6.0	429	PM	1/17	WeatherNet6

...Rensselaer County...

Center Brunswick	3.5	1049	PM	1/17	WeatherNet6
Troy	3.2	553	PM	1/17	WeatherNet6
Speigletown	3.0	453	PM	1/17	WeatherNet6
2 NNE Troy	3.0	700	AM	1/18	CoCoRaHS
4 ESE Nassau	2.4	800	AM	1/17	CoCoRaHS
1 WNW Averill Park	2.0	800	AM	1/18	CoCoRaHS
Buskirk	1.5	410	PM	1/17	Trained Spotter

Total snowfall, reported by 1610z Tuesday January 18

Community observation reports submitted to NWS Albany confirmed a widespread 1 to 6 inches with amounts 6 to 13 inches in highest elevations for Connecticut, Massachusetts, and parts of New York.

ALY Public Weather Information Statement (NY, VT)

...Saratoga County...

Lake Desolation	8.2	1144 AM	1/17	WeatherNet6
Galway	7.8	948 PM	1/17	WeatherNet6
Ballston Spa	7.0	500 PM	1/17	WeatherNet6
Ballston Lake	6.7	153 PM	1/17	Estimated by picture
Day Center	6.5	200 PM	1/17	Social Media
2 W Greenfield Cente	6.5	830 AM	1/17	CoCoRaHS
3 W Charlton	6.0	1120 AM	1/17	Social Media
Corinth	6.0	530 PM	1/17	WeatherNet6
Malta	6.0	407 PM	1/17	WeatherNet6
Charlton	6.0	421 PM	1/17	WeatherNet6
1 S Saratoga Springs	5.8	600 AM	1/18	CoCoRaHS
Saratoga Springs	5.0	754 AM	1/17	WeatherNet6
2 S Clifton Park Cen	4.9	920 AM	1/17	Retired NWS Emp.
Clifton Park	4.5	954 PM	1/17	WeatherNet6
Wilton	4.4	830 AM	1/17	Trained Spotter
2 NW Waterford	4.1	801 AM	1/17	CoCoRaHS
3 ESE Ballston Spa	4.0	920 AM	1/17	CoCoRaHS
Halfmoon	4.0	759 AM	1/17	Social Media
3 NNW Malta	3.8	1000 AM	1/17	CoCoRaHS
3 S Clifton Park	3.7	600 AM	1/18	CoCoRaHS

...Schenectady County...

Delanson	11.0	550 PM	1/17	WeatherNet6
Duanesburg	8.0	538 PM	1/17	WeatherNet6
2 N Pattersonville	7.8	1100 AM	1/17	Twitter
3 SW Charlton	7.8	1111 AM	1/17	Social Media
Rotterdam	7.0	730 AM	1/17	Twitter
Glenville	7.0	448 PM	1/17	WeatherNet6
1 NW Scotia	6.0	600 AM	1/18	CoCoRaHS
1 SSW Aqueduct	5.2	800 AM	1/17	NWS Employee
2 ENE Schenectady	5.0	714 AM	1/17	CoCoRaHS
Niskayuna	5.0	925 AM	1/17	12 hour total.
Schenectady-GE Plot	4.8	839 AM	1/17	NWS Employee

...Schoharie County...

Gilboa	12.0	1055 PM	1/17	WeatherNet6
Jefferson	11.0	518 PM	1/17	WeatherNet6
Esperance	9.5	221 PM	1/17	Estimated by picture
Richmondville	8.7	458 PM	1/17	WeatherNet6
Schoharie	8.0	900 AM	1/17	Co-Op Observer
Charlotteville	7.8	553 PM	1/17	WeatherNet6

...Ulster County...

Accord	13.0	1048 AM	1/17	Social Media
Phoenicia	11.5	534 PM	1/17	WeatherNet6
Olivebridge	10.0	601 PM	1/17	WeatherNet6
Boiceville	9.0	930 AM	1/17	Social Media
2 WNW Rosendale Vill	8.4	800 AM	1/17	CoCoRaHS
Marbletown	7.5	917 AM	1/17	Trained Spotter
West Hurley	7.5	817 AM	1/17	Trained Spotter
5 NW Saugerties	7.3	800 AM	1/17	CoCoRaHS
New Paltz	7.0	818 AM	1/17	Light rain falling.
Saugerties	7.0	915 AM	1/17	Social Media
Woodstock	7.0	830 AM	1/17	Social Media
Rosendale	6.5	819 AM	1/17	Trained Spotter
2 S Hurley	6.4	700 AM	1/18	CoCoRaHS
Ulster Park	6.4	1022 AM	1/17	WeatherNet6
Highland	6.0	820 AM	1/17	Trained Spotter
1 NNW Ulster Park	5.2	730 AM	1/17	CoCoRaHS
Gardiner	5.0	755 AM	1/17	Social Media

...Warren County...

Stony Creek	16.0	940 AM	1/17	Social Media
Johnsburg	13.7	334 PM	1/17	Trained Spotter
Warrensburg	8.0	730 PM	1/17	WeatherNet6
2 WNW Warrensburg	7.3	800 AM	1/18	CoCoRaHS
2 ENE Brant Lake	7.1	700 AM	1/18	CoCoRaHS
1 N Lake George	6.5	600 AM	1/18	CoCoRaHS
Queensbury	6.0	636 PM	1/17	WeatherNet6
5 ESE Lake George	5.0	700 AM	1/18	CoCoRaHS
Glens Falls	3.8	912 AM	1/17	As of 9am.

...Washington County...

Granville	4.0	544 PM	1/17	WeatherNet6
6 WSW Pawlet	3.3	830 AM	1/17	CoCoRaHS
2 SSE Salem	3.0	600 AM	1/18	CoCoRaHS
Hartford	3.0	145 PM	1/17	Trained Spotter
Hebron	3.0	703 AM	1/18	WeatherNet6
Fort Edward	2.5	840 AM	1/17	Trained Spotter
Cossayuna	1.5	712 PM	1/17	WeatherNet6

VERMONT

...Bennington County...

Landgrove	15.5	549 AM	1/18	WeatherNet6
1 NNE Landgrove	14.0	700 AM	1/18	CoCoRaHS
Woodford	14.0	537 PM	1/17	WeatherNet6
3 ENE Manchester	13.1	700 AM	1/18	CoCoRaHS
Winhall	13.0	400 PM	1/17	Social Media
5 NNE Stamford	12.3	400 PM	1/17	CoCoRaHS
5 NW Readsboro	12.1	1252 PM	1/17	Social Media
WNW Shaftsbury	9.1	330 PM	1/17	CoCoRaHS
Stamford	8.0	408 PM	1/17	Social Media

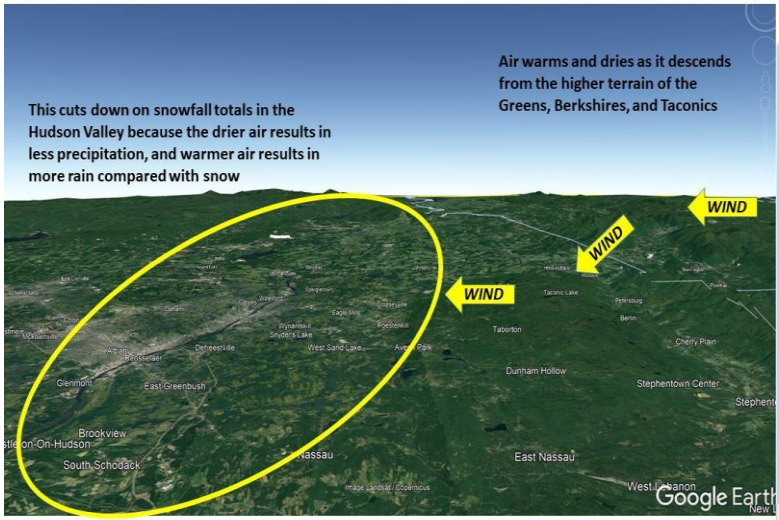
...Windham County...

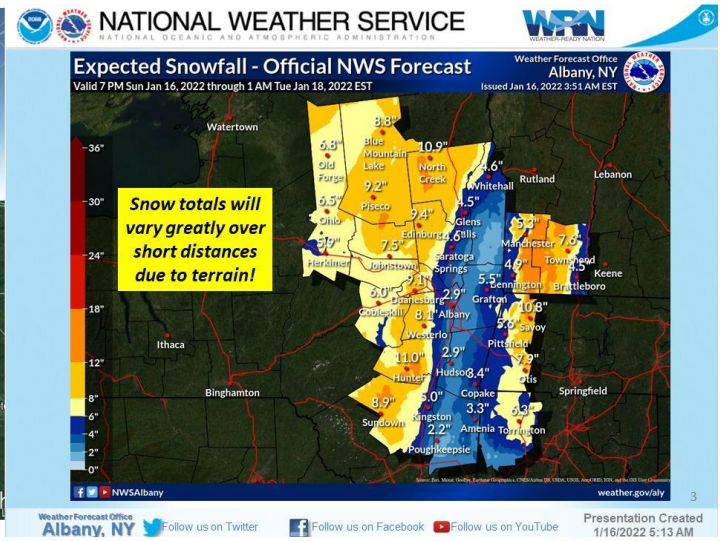
SE West Halifax	17.0	834 AM	1/18	CoCoRaHS
West Wardsboro	16.0	435 PM	1/17	Elevation 1800 feet
2 N East Dover	15.8	747 AM	1/18	CoCoRaHS
Wilmington	14.0	1211 PM	1/17	Social Media
3 SSW Halifax	13.5	410 PM	1/17	Trained Spotter
1 WNW Wilmington	13.0	1255 PM	1/17	CoCoRaHS
Londonderry	8.0	413 PM	1/17	Public
6 W West Brattleboro	7.5	800 AM	1/17	Co-Op Observer
2 NNE Marlboro	7.5	800 AM	1/17	CoCoRaHS
1 NNE Rockingham	7.2	700 AM	1/18	CoCoRaHS
Brattleboro	7.0	434 PM	1/17	Social Media
Townshend	6.5	1000 AM	1/17	Trained Spotter
West Brattleboro	6.2	100 PM	1/17	Social Media
1 S Brattleboro	4.9	700 AM	1/18	CoCoRaHS
2 WNW Putney	4.2	730 AM	1/17	CoCoRaHS
1 NE Putney	4.1	830 AM	1/17	CoCoRaHS
3 SSW Putney	4.1	810 AM	1/17	Trained Spotter
2 SSW Putney	4.1	818 AM	1/17	Trained Spotter

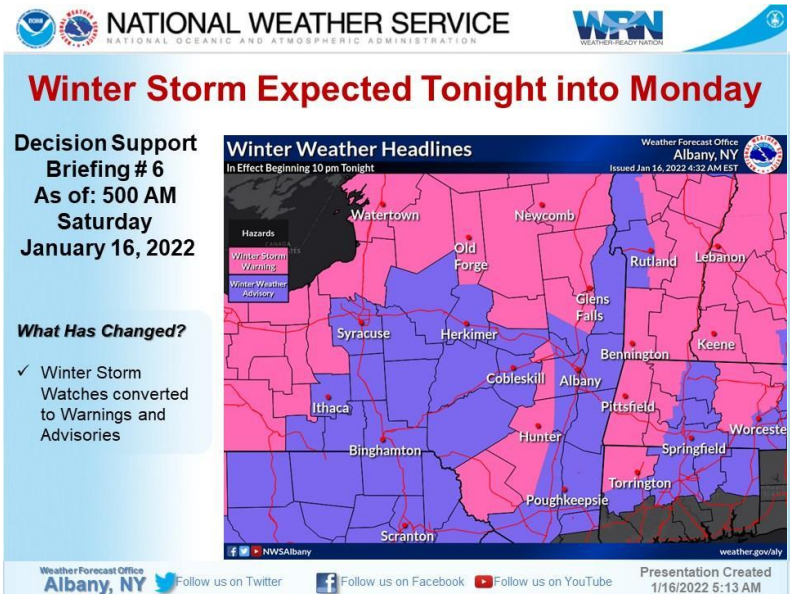
Total snowfall, reported by 1610z Tuesday January 18

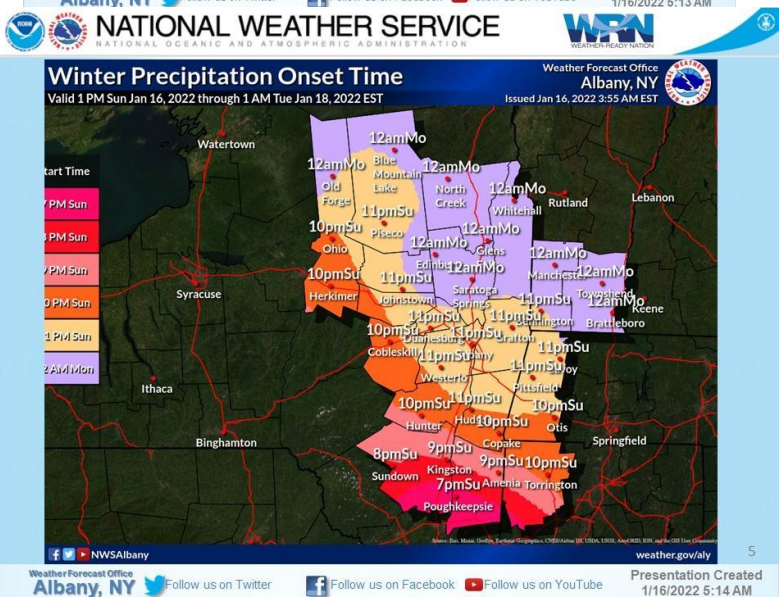
Community observation reports submitted to NWS Albany confirmed a widespread 1 to 6 inches with amounts 6 to 13 inches in highest elevations for Vermont, and parts of New York. Reports in Windham County reported highest amounts up to 17 inches, especially for elevations 1800 feet and above.

NWS Albany's messaging to the public





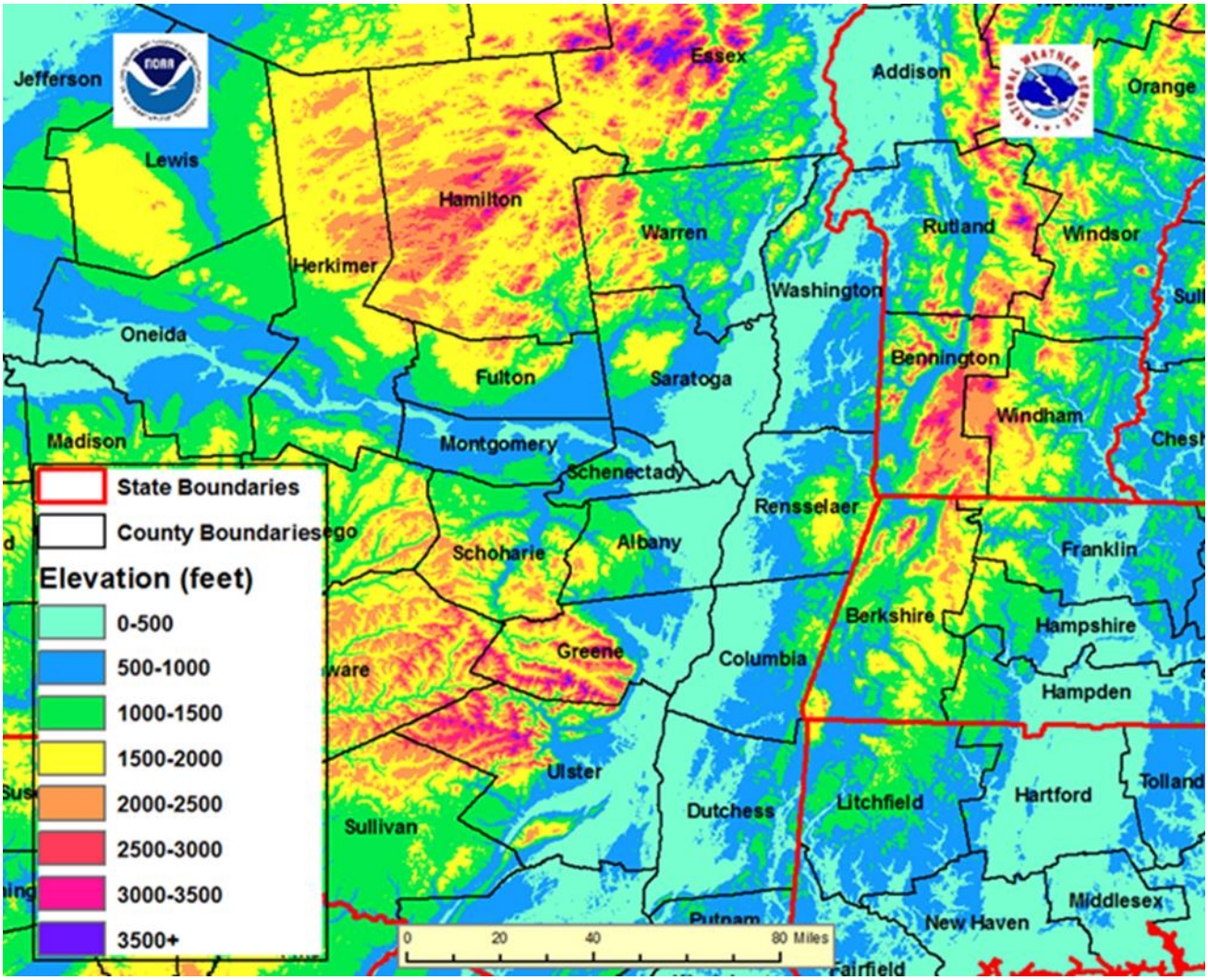




Weather Messaging posted on Facebook prior to the storm

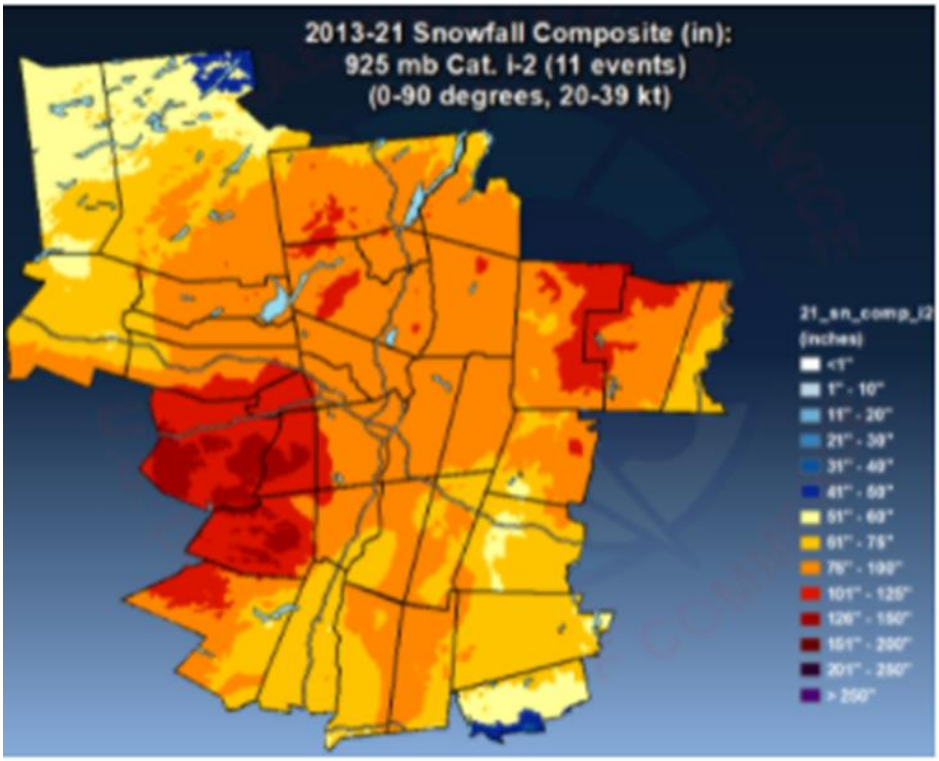
Prior to the storm, NWS Albany issued regular briefings consisting of Winter Weather headlines, concepts of orographic influence for snowfall, and onset time for snow. This kind of messaging helped the public stay informed on what to expect and when to expect it.

Terrain Influences



The forecast area covered by the National Weather Service Forecast Office in Albany features complicated terrain, including the north-south oriented Hudson Valley, the west-east oriented Mohawk Valley, areas of high terrain with elevations more than 3000 feet above the elevation of the major valleys.

Snowfall Patterns by 925 mb Wind Speed / Direction



0-90 degrees,
20-39 kt

Local research on snow events associated with northeast-to-easterly 925 mb winds shows a snowfall maximum over the higher terrain west of Albany including the Catskill Mountains, and also over the Green Mountains in southern Vermont.

Topography and enhanced snowfall

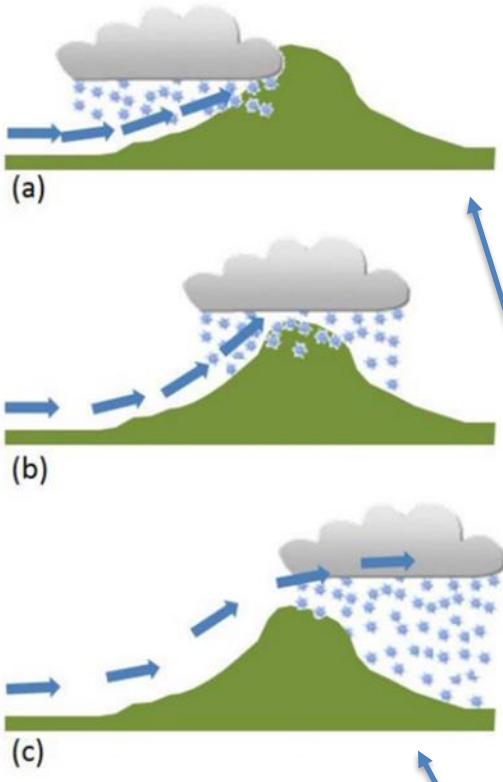
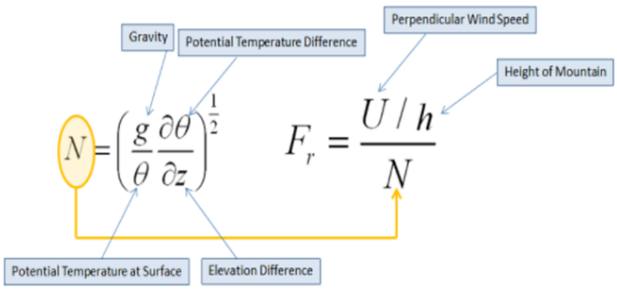


Figure 6. Blocked flow as seen on the top (a), contrasted with near critical flow in the middle (b), and unblocked flow on the bottom (c).

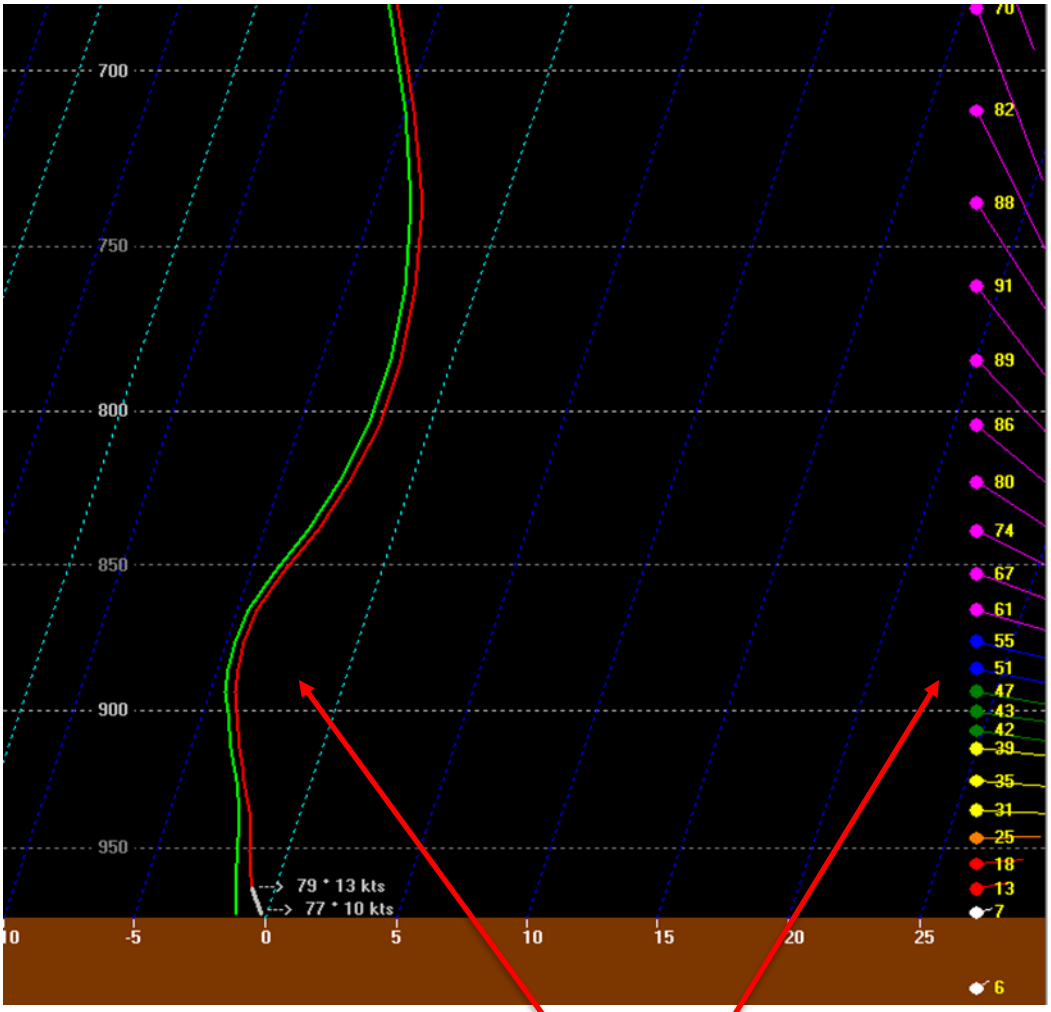
a) Froude number < 1. b) Froude number near 1. C) Froude number > 1

Low Froude Number – weak flow perpendicular to the ridge / stable

High Froude number – strong flow perpendicular to the ridge / less stable



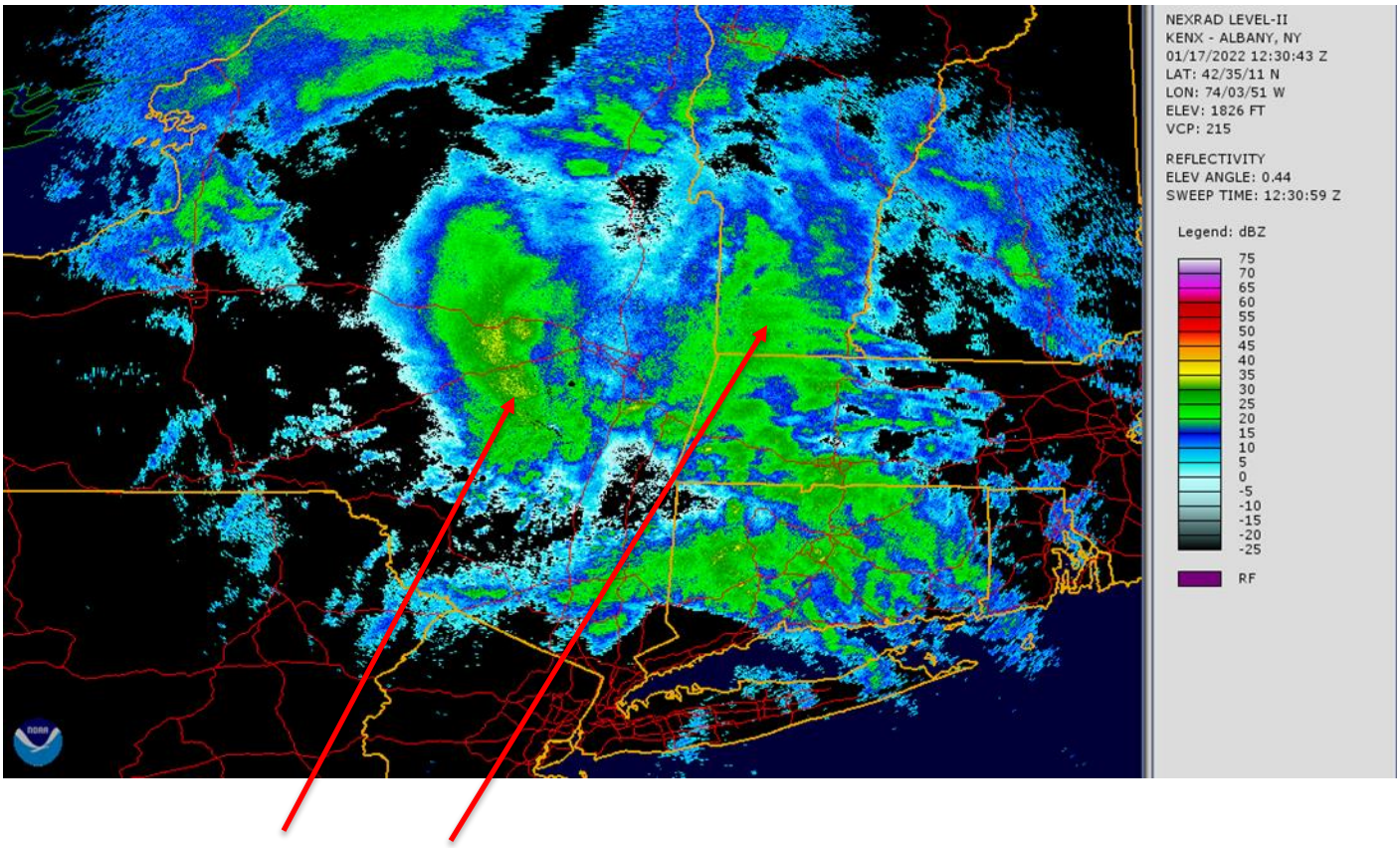
NAM forecast sounding at 12 UTC, 17 January, 2022



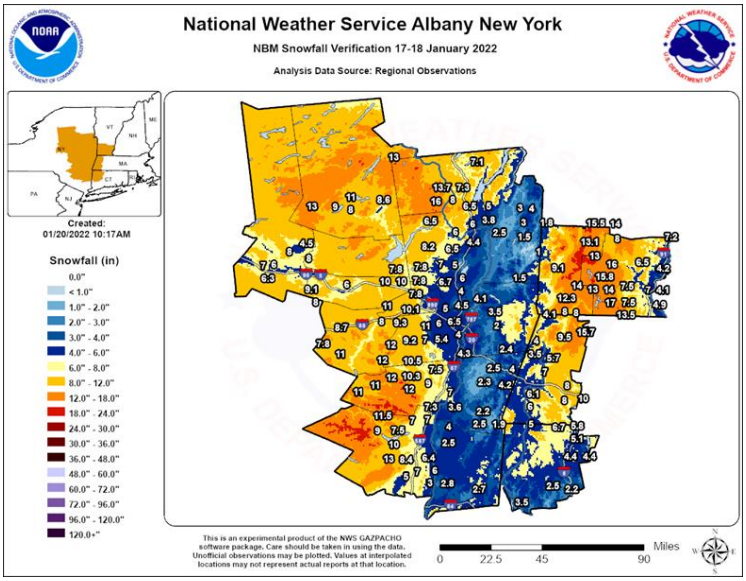
Conditions were favorable for snow to be enhanced at higher elevations west of the Hudson Valley (the Catskills and Helderberg mountains).

Froude number – 1.5
Ridge-top winds – easterly with slight veering
Surface winds from the northeast
Weak inversion near ridge-top (favors heaviest precipitation on upwind slopes).
Deep moisture
Surface temperatures near freezing

Observations at 12 UTC

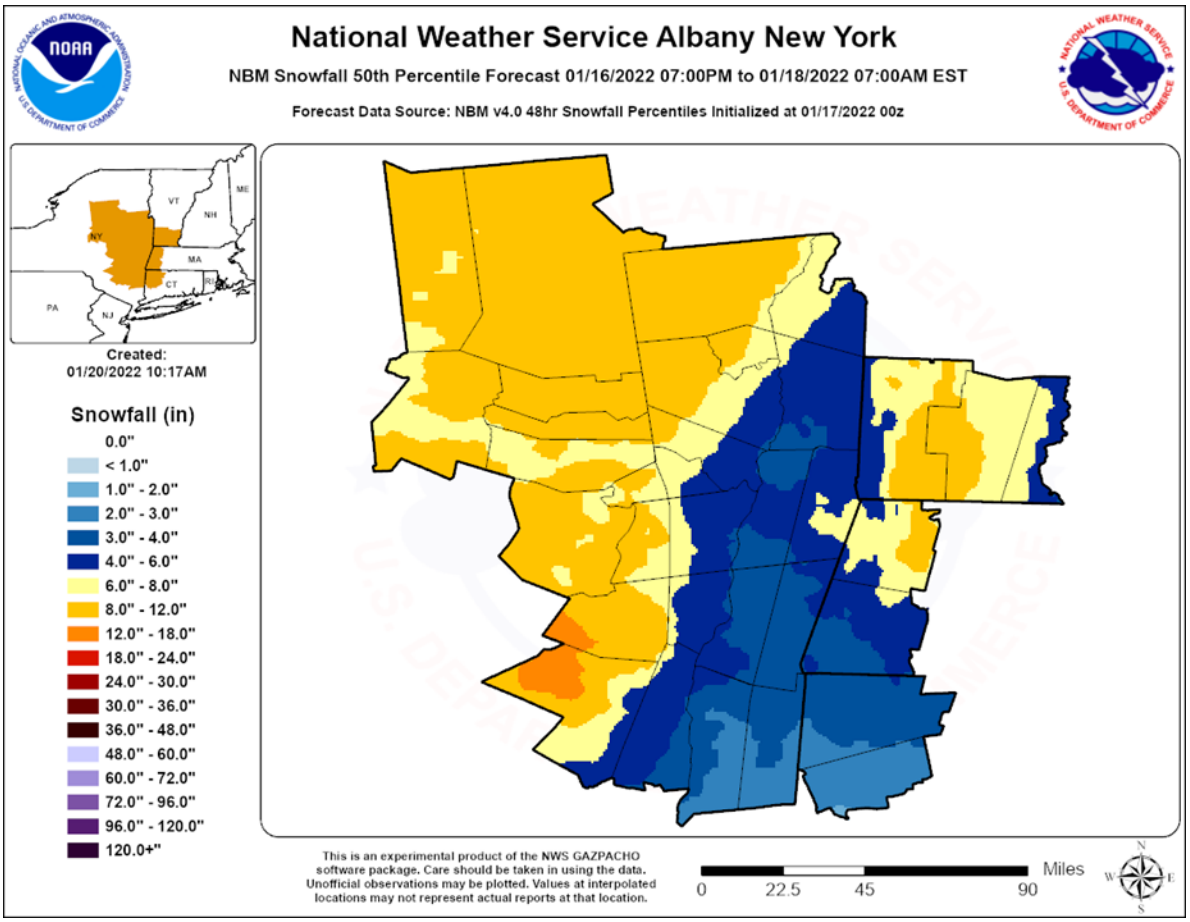


Enhanced snowfall over higher terrain



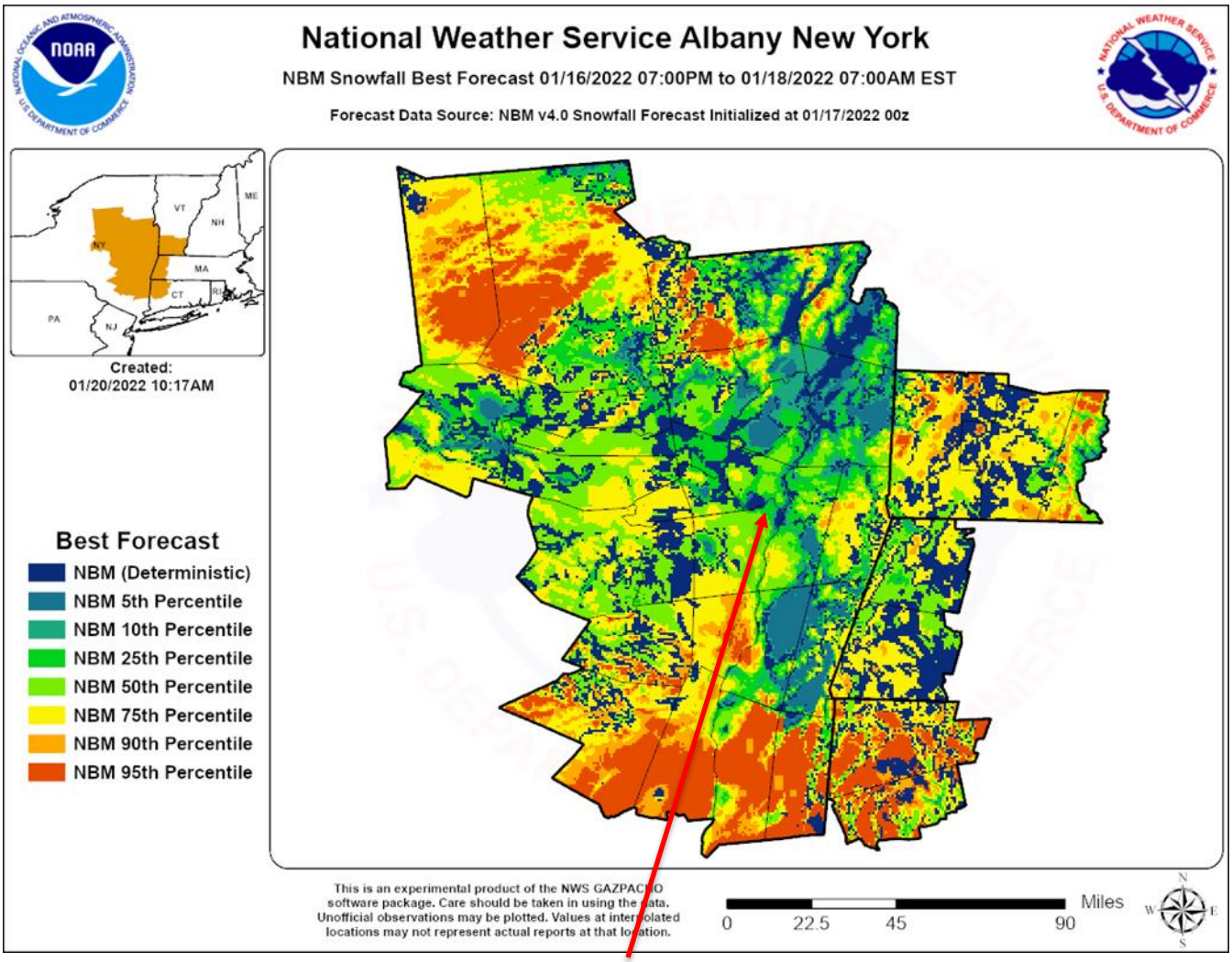
Observed snowfall – a minimum in the Hudson Valley with a maximum over higher terrain to the west and east.

National Blend of Models Forecast Snowfall



Snowfall from the National Weather Service's National Blend of Models indicated that the blend, which is dominated by high resolution models at short ranges, simulated the effects of the topography quite well.

The best NBM forecast



Albany / Capital District

For this case, the 50th percentile snowfall from the National Blend of models was the best forecast for much of our area, including the Capital District and nearby higher elevations. The NBM 95th percentile snowfall, which can be considered the heaviest reasonable scenario based on the ensemble, was best over the mid-Hudson Valley southern portion of the area) and Adirondacks (northwest portion of the area).

Summary

- A surface low pressure system developed in the evening hours of Sunday, January 16, 2022 around a closed upper level low. The low deepened to 981 mb by 18z January 17 as a result of support of a 250 mb 80-90 kt jet streak in Canada, strong surface temperature gradient, positive cyclonic vorticity advection, and a negatively tilted 500 mb trough.
- Snowfall amounts were influenced orographically by elevation as a result of strong winds blowing from the northeast.
- The wind direction caused a downslope flow into the Hudson Valley, resulting in locally warmer temperatures and slightly drier air in the valleys. This resulted in snowfall totals of 1 ½ to 6 inches in comparison to the mountains that observed 8 to 16 inches.
- Strong 850 mb moisture transport and low level jet winds of 60+ knots, 700 mb Petterssen frontogenesis, and ½-1” of precipitable water helped contribute to a period of ½-2” hourly snowfall rates in the entire region before precipitation changeover.
- High resolution models generally did a good job depicting the effects of topography for this case.