WFO BTV Top 10 Weather Events of 2000 to 2009

Here you'll find an informal list of the Top 10 Weather Events to impact the North Country during the previous decade, as voted on by several of the staff members at WFO Burlington, VT. Our selection criteria were subjective: we simply chose those events that stood out most prominently in our minds from a forecasting point-of-view, and worked to put an order to them with the most memorable being on top. As always, our overarching goal with any look back is to form a more complete scientific understanding of what occurred, and to use that knowledge to help predict similar weather events in the future.

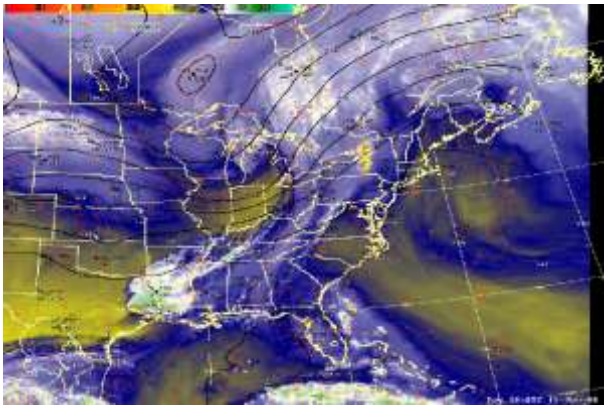
Acknowledgments
Write-up excerpts taken from the DOC/Storm Data publication and from past weather events write-ups performed by WFO BTV and available online at: http://www.weather.gov/btv/recentwx.

10.) June 10th 2008 Widespread Severe Weather Outbreak (over 50 reports) with every country reporting severe weather

On June 10, 2008, a significant severe weather outbreak occurred across northern New York as well as central and northern Vermont. This outbreak featured two major rounds of severe weather, which produced over 50 severe weather reports across the Weather Forecast Office (WFO) Burlington (BTV) forecast area, with severe weather occurring in every county in our area of responsibility. The severe weather reports included numerous trees and power lines being knocked down, from damaging thunderstorm winds up to 80 mph, along with up to golf ball size hail. The widespread severe thunderstorms produced over 50,000 power outages across northern New York and Vermont during the event. Click here to view the local storm report from the National Weather Service Office in Burlington, Vermont.

The large scale pattern on June 10th featured a departing mid/upper level ridge along the eastern seaboard, which provided our region with surface temperatures well into the 80s and lower 90s, along with very high humidity levels. On June 10th Burlington reached a high temperature of 93 degrees, before the thunderstorms arrived. Meanwhile, several potent disturbances in the fast jet stream winds aloft helped to enhance a mid/upper level trough across the central Great Lakes. This energy and associated cold pocket of air at 30,000 to 35,000 feet above the surface interacted with a very moist and unstable air mass at the surface to produce several rounds of significant severe weather across the WFO BTV county warning area (CWA).

Click to enlarge



The first round of severe thunderstorms occurred between noon and 4 PM and was associated with a weak pre frontal surface trough and embedded disturbance aloft. The second round of storms occurred between 6 PM and 10 PM, which featured a sharp cold front, along with another potent disturbance in the winds aloft. This setup of two rounds of significant severe weather is unusual across our forecast area; rain-cooled air associated with the first round often stabilizes the atmosphere and limits the overall severe weather threat associated with the second round of storms.

Figure 10-1 shows a water vapor loop, along with lightning activity (indicated in red/white), and movement of several disturbances aloft (shown in red) from 1225 PM through 700 PM on June 10th. The image shows two distinct rounds of storms across our county warning area, which is shown by the lightning activity. In addition, note the significant drying/subsidence aloft across the Ohio Valley and eastern Great Lakes associated with potent short wave energy and digging mid/upper level trough.

Click to enlarge

The first line of convection produced numerous trees down across St. Lawrence County in northern New York, along with damaging winds between Shelburne and Williston, Vermont. An Automated Weather Observing Station (AWOS) at Potsdam measured a 58 mph wind gust, while winds were estimated at 70 mph at North Hero, associated with the first line of convection. In addition to the damaging thunderstorm wind gusts, one inch diameter hail was observed at Shelburne, Vermont at 225 PM.

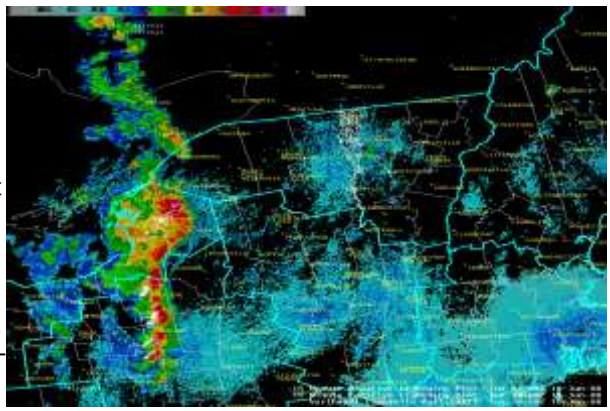


Figure 10-2 shows a composite reflectivity radar loop from Noon through 4 PM, along with lightning activity in white. First, note the very strong storm with (65 to 70 DBZ) the purple reflectivity returns across St Lawrence County in northern New York along with the associated cloud-to-ground lightning strikes. Then notice the line redeveloping across the Champlain Valley around 2 PM with more purple returns in the reflectivity structure.

Click to enlarge

The second line of damaging thunderstorm winds and up to golf ball sized hail occurred between 6:30 and 10:00 PM. Figure 10-3 is a composite reflectivity loop with lightning from 530 PM to 10:00 PM.

Note the several embedded lines of strong to severe thunderstorms that develop across our forecast area ahead of the approaching cold front. In addition, note all the lightning activity associated with these thunderstorms.

Click to enlarge

This severe weather event on 10 June 2008 produced over 50 reports of severe weather, along with widespread power outages across northern New York as well as central and northern Vermont.

In addition, damaging hail up to golf ball size and thunderstorm wind gusts to 60 mph occurred with this significant severe weather outbreak, ranking this outbreak among the top ten weather events of the past decade across WFO BTV. The photo in figure 10-4 shows a shelf cloud structure near South Burlington, Vermont associated with strong thunderstorm wind gusts.

Click to enlarge

Figure 10-5 shows thunderstorm wind damage near Williston, Vermont on 10 June 2008.

9.) December 2003 2 Top 10 snowstorms in 10 days 12-06-03 18.2 and 18.1 on 12-14-03

During a 10 day stretch in December 2003 the North Country received two significant east coast storms, which produced 2 top ten snowfalls at Burlington, Vermont. The first winter storm organized off the North Carolina coast Friday, December 5th and moved northeast to coastal Delaware Saturday, December 6th. The storm then intensified as it moved to Cape Cod by Sunday morning, December 7th, then into the Gulf of Maine by Sunday night. Snow developed across the area by late morning on December 6th, and became steady and heavy during the afternoon and evening. Another burst of heavy snow occurred overnight on December 6th into early Sunday, December 7th. Snow accumulations were generally between 12 and 20 inches across eastern and central Vermont, and between 18 and 30 inches in Champlain Valley and northern/central Mountains of Vermont. Meanwhile snow accumulations were generally between 12 and 20 inches across northern New York with numerous; mostly minor traffic accidents.

Click to enlarge

Figure 9-1 shows the 7 December 2003 surface analysis at 7 AM. Note the 992mb low pressure across the Gulf of Maine and the significant wrap around moisture over the North Country.

Several intense mesoscale snow bands moved across the region during this event, producing near zero visibilities and snowfall rates of 1 to 3 inches per hour.

Click to enlarge

Meanwhile, on 14 December 2003 a storm system organized along the coastal area of the Carolinas and provided the North Country with another significant snowfall. This system intensified and moved northeast to Cape Cod by early Monday, December 15th. The storm then moved into the Canadian Maritimes by Tuesday, December 16th. Snow developed Sunday afternoon, December 14th, and became heavy Sunday night into Monday morning, on December 15th. Snowfall amounts ranged from 10 to 30 inches across the region with isolated higher amounts across northern New York.

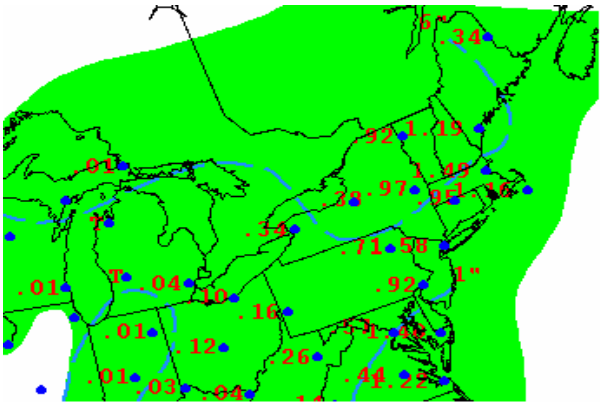
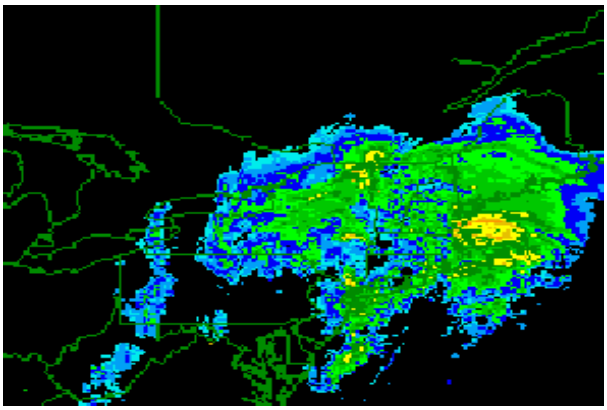


Figure 9-2 shows the 24 hour accumulated precipitation totals from 7 AM December 14th through 7 AM December 15th 2003. Many of the observation stations reported precipitation amounts associated with this very strong area of low pressure near 1.00".

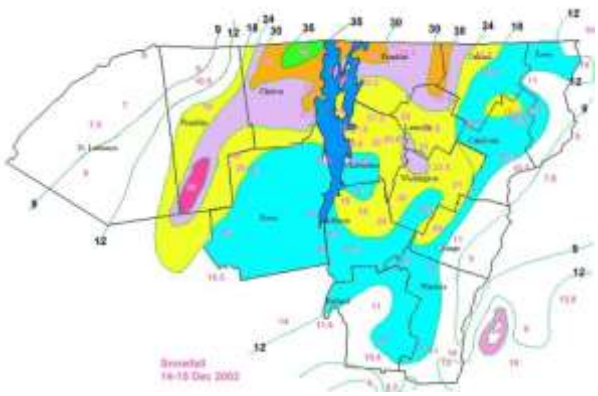
Click to enlarge

Figure 9-3 shows the northeast composite radar reflectivity during on 15 December 2003 at 5 PM.



Click to enlarge

Meanwhile, Figure 9-4 shows the storm total snowfall for the 15 December 2003 winter storm.



8.) July 18th 2008 Chazy to Plattsburgh to Cambridge (tornado) Severe Weather Outbreak

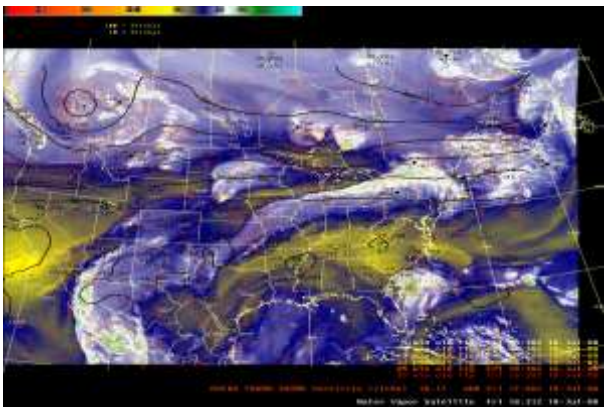
On July 18th, 2008, several meteorological ingredients came together to produce a significant severe weather outbreak across northern New York and central and northern Vermont. The highest concentration of damage occurred from the Saint Lawrence Valley in northern New York into the northern Champlain Valley, then into central and northern Vermont. This particular severe weather outbreak produced over two dozen severe weather reports, with the primary damage being caused by strong and damaging straight line wind gusts. However, a damage survey and video obtained by the National Weather Service in Burlington, confirmed a brief EF1 tornado touched down several times in the North Cambridge, Vermont area. It was determined by the survey and the damage; winds approached 100 mph with this tornado. In addition, several nickel to quarter size hail reports occurred during this event. The widespread severe thunderstorms resulted in over 20,000 customers losing power across northern New York and Vermont during the event.

Click to enlarge

Thunderstorms first developed across the northern Adirondack Mountains near Lyon Mountain on the afternoon of 18 July 2008, then traveled east into Chazy, New York, through Grand Isle County, Vermont, then down the Lamoille River Valley to Waterville, Vermont. A second cluster of storms developed across southern Ontario, Canada and tracked into western and central Saint Lawrence County, New York on 18 July 2008. It should be noted other areas of severe wind and hail damage occurred in Addison County, Vermont and across portions of eastern Vermont during this event.

Click here to view the local storm report of all the severe weather reports, which occurred in the National Weather Service Office Burlington, Vermont forecast area. Figure 8-1 shows a plot of the significant severe weather reports across our forecast area on 18 July 2008.

Click to enlarge



The pre-storm environment featured a very strong jet of 70 to 90 knots across the region, along with several embedded areas of enhanced lift from disturbances in the jet stream winds aloft. Figure 8-2 shows a water vapor loop on 18 July 2008, along with the cloud-to-ground lightning activity. Note how quickly the cluster of thunderstorms moves across our forecast area, which suggests very strong jet stream winds aloft. In addition to favorable conditions aloft, the surface featured a boundary draped across northern New York into Vermont, which helped to focus storm development. This boundary separated very warm and moist air to the south to relatively cooler and more stable air to the north.

Click to enlarge

Figure 8-3 shows a composite radar reflectivity loop, along with lightning data, on 18 July 2008.

Click to enlarge

Image 8-4 shows a Google Map outline of the damage, which occurred in the Cambridge to Waterville, Vermont area. From the map and the survey The National Weather Service determined the damage started on Pond Road in North Cambridge, then continued eastward across Kinsley Road, North Cambridge Road, Route 108, then Route 109 about 1 mile south of Waterville, and finally ended on Plot Road several miles southeast of Waterville. We determined the damage from Pond Road to Kinsley Road was caused by straight-line winds between 70 and 90 mph from the bow echo which also impacted the Grand Isle County area. Meanwhile, as the bow echo interacted with strong southerly winds moving up the North Cambridge Road Valley, and Route 108 Valley, two brief EF0 and EF1 tornadoes touched down. The first touch down on North Cambridge Road is labeled with a "T" in the image below and produced winds up to 80 mph. Meanwhile, the next touch down occurred near a farmstead located on Route 108 and produced winds up to 100 mph according to the amount of damage and is also labeled with a "T" on the image below. The lighter white areas represent winds of 50 to 60 mph with isolated to scattered trees down and minor damage was observed. Meanwhile, the brighter white color in figure 17 below indicates winds between 70 and 90 mph with isolated areas of winds approaching 100 mph based on the damage. The damage path was about 6 to 7 miles long and one third to one half mile wide. According to eyewitnesses the storm occurred between 3:27 PM and 3:35 PM on July 18th. The worst of the damage occurred near North Cambridge Road and Route 108, where 80 to 90 percent of the trees, mostly softwood, were blown over or snapped midway up. There was also significant structural damage which occurred to a farmstead along Route 108.

The Chazy, New York to Isle La Motte, Vermont damage was due to straight line thunderstorm winds of approximately 70 to 80 mph, based upon analysis of damage pictures and video, as well as radar analysis. The damage path was about 10 to 15 miles long. The damage started around 300 PM along Miner Farm Road (Route 191) between Olean and Ridge Roads and Continued east-southeast through Chazy, New York then moved over Lake Champlain, impacting some of the island communities before reaching the eastern shore of the lake and

finally affecting the residents between Saint Albans and Georgia between 320 and 325 PM. The hardest hit areas were around Chazy and the town of Isle La Motte, especially along portions of West Shore Road. The open waters of Lake Champlain allowed the winds to accelerate before coming ashore in Isle La Motte and caused damage to dozens of homes and downed hundreds of trees.

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Click to enlarge

This severe weather outbreak will be remember for producing a rare EF-1 tornado near Cambridge, Vermont and the significant amount of wind damage, which occurred from Chazy, New York to Isle La Motte, Vermont.

7.) March 6th 2001 Town Meeting Day Snowstorm. 23" at BTV and 36" at Jay Peak

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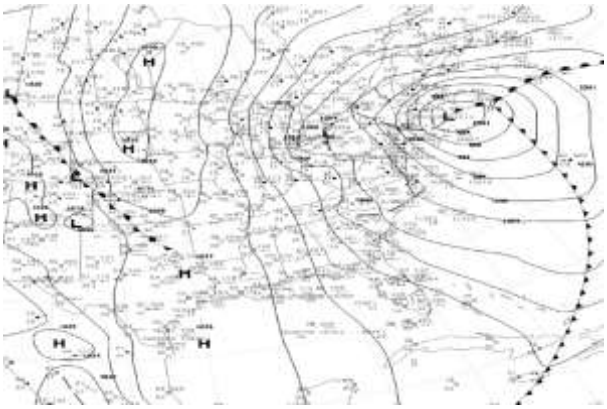


Early Monday, March 5th, 2001 a developing winter storm formed off the North Carolina Coast near Cape Hatteras and tracked toward Cape Cod and produced 15 to 30 inches of snow across the North Country. Figure 7-1 shows the surface analysis on 6 March 2001 at 8 PM with a deep 982mb area of low pressure near Cape Cod, which transported plenty of Atlantic moisture into our region.

This deep Atlantic moisture interacted with cold air supplied by surface high pressure across the northern Great Lakes, to produce favorable conditions for a historic and long duration late season snowfall across northern New York and Vermont.

Click to enlarge

Snow overspread Vermont and northern New York, Monday morning (March 5th) and became steady by afternoon and continued through the night before tapering off by late Tuesday, March 6th, 2001. The snow was heavy at times which produce near zero visibilities and extremely hazardous driving. Snowfall rates associated with this epic storm were between 2 and 4 inches per hour, especially across central and southern Vermont.

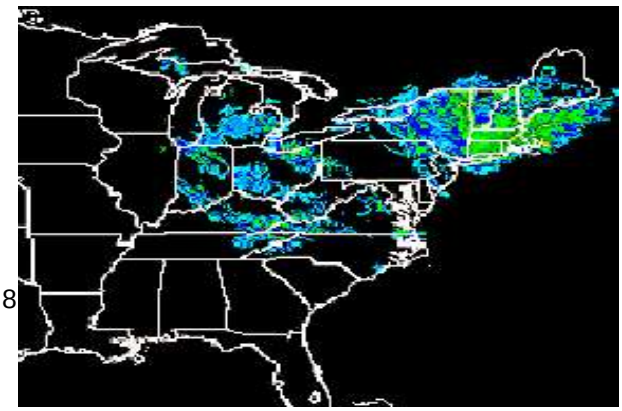
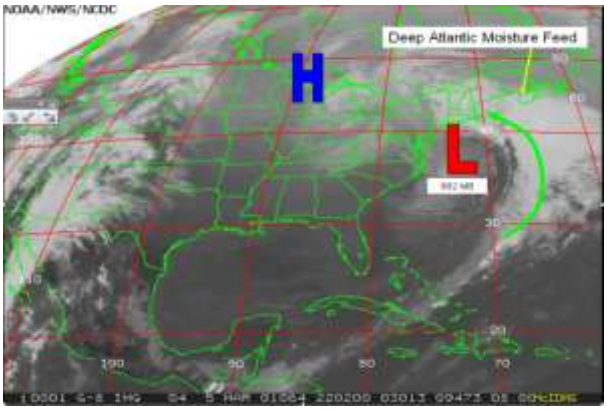


Figure 7-2 shows a northeast radar mosaic on 6 March 2001 at 8 PM. Note the dark greens and embedded yellows in the figure, showing very heavy snowfall rates, which occurred across the Champlain Valley.

Click to enlarge

Figure 7-3 shows an inferred satellite image on 5 March 2001 at 602 PM.



This image shows deep Atlantic moisture being transported into our region, around the cyclonic circulation near Cape Cod, which helped to produce very heavy snowfall across the North Country.

Some impacts included the following:
Many schools and businesses were closed, and numerous towns postponed their Town meeting day. A number of accidents were reported including some on I-89 and I-91 with a portion of I-91 closed in Windsor, County Vermont. Several building roofs collapsed (apparently due to the weight of the snow) across central and southern, Vermont. Snowfall amounts in Chittenden County included, Underhill 28.6 inches, South Burlington 22.9 inches, while amounts in Lamoille County, amounts ranged from 18 to 24 inches. Generally, between 15 and 30 inches of snow fell except between 8 and 18 inches of snow fell in southern St. Lawrence. A few snowfall reports in Northern New York included: In western Essex County, Wilmington received 26 inches, while in southwest Clinton County, Ellenburg Depot had 26 inches. This storm produced snowfall amounts similar to the Valentine's Day snowstorm of February 2007, both of which are in the top ten snowstorms in WFO BTV history. In addition, this storm produced the heaviest storm total snowfall ever at Burlington for the month of March. With a total of 47.6 inches of snow for the entire month, March 2001 was the snowiest March ever at Burlington, Vermont. In addition, Mount Mansfield had its snowiest March ever with 82.6 inches. The Town Meeting Day 2001 snow storm ranked 7th for greatest storms across the WFO BTV warning area during the past decade.

6.) July 9th-11th 2007 Duxbury VT Hail and Widespread Flooding in Barre VT

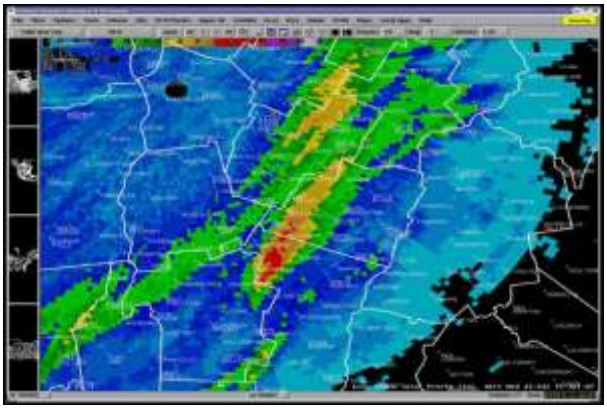
On the morning of Monday 9 July 2007 residents began hearing the first reports of severe weather across Essex and Franklin counties. This was the beginning of one of the more active three day stretches of severe weather across Vermont and northern New York in many years. This event included large and destructive hail from severe thunderstorms on July 9-10, to devastating flash flooding on July 11. Millions of dollars in damage occurred as a direct result.

Click to enlarge

The unusual set-up focused along a nearly stationary surface frontal boundary draped across the northern New York into Vermont, separating hot and humid air to the immediate southwest from cooler air across Northern New England. The flow aloft showed several embedded disturbances in the jet stream winds, helping in the development of severe thunderstorms with very heavy downpours.

Some highlights of the 3 day outbreak include: Hail the size of tomatoes occurred at Duxbury, Vermont (See figure 6-1 for hail pictures near Duxbury, VT), while quarter size hail was reported in Duane Center, New York on the evening of 9 July 2007. Click here to view the local storm report summary from July 9th.

Click to enlarge



On 10 July 2007 a mini supercell tracked from East Charleston to Morgan, Vermont during the late afternoon hours. This was clearly the strongest storm of the day, with a pronounced deep high-reflectivity core (greater than 60 dBZ) above 25,000 feet. Thunderstorm wind gusts to 60 mph produced tree damage and scattered power outages across northern Vermont.

By 11 July 2007 the threat switched from mainly severe weather to the potential for flash flooding. A strong surface cold front interacting with plenty of low level moisture from previous day's storms produced localized very heavy rainfall across central and eastern Vermont. As thunderstorms began to train along the eastern slopes of the Green Mountains, Flash Flood Warnings were issued for Windsor, Caledonia and Washington Counties on 11 July 2007. The one hour precipitation estimates from the KCXX (Burlington, VT) radar at the height of the event around 2 pm produced rainfall amounts in excess of 3 inches. Click here to view a 3 day listing of rainfall totals from July 9th through July 11th across the North Country. In addition, click here for a complete listing of severe weather reports on July 10th and 11th. See figure 6-2 for a radar storm total estimate of rain across eastern and central Vermont on 11 July 2007.

Click to enlarge

As the afternoon progressed, training thunderstorms continued to develop northward, affecting much of western Orange, and eastern Washington, Lamoille and Orleans counties. The heavy rains resulted in severe flooding across the area as streams and small rivers quickly became swollen. For example, the Ayers Brook in Randolph, recorded a peak water level of 9.55 ft, good for 3rd place on their crest history, ranking behind only the 1927 flood and an event in June 1998.

Numerous roads were reported to be flooded and damaged. Particularly hard hit was the city of Barre where a local state of emergency was declared when the main part of town became submerged under several feet of water. See image 6-3 below for damage near Barre. In nearby Williamstown, over 100 people

were evacuated from their homes. Certainly the three day period of July 9-11, 2007 will be remembered as one of the more noteworthy severe weather episodes in the past 10 years.

5.) Flash Flooding - Addison County, Vermont, August 6, 2008

During the morning hours of 6 August 2008, heavy rainfall (Fig. 5-1) produced flash flooding in southern Addison, northern Rutland, and northwest Windsor Counties in Vermont, and was most significant along the upper reaches of the White River in Hancock, Vermont. A mid-tropospheric vorticity maximum caused numerous heavy convective showers, which tracked eastward across the headwater basins of the Otter Creek (Middlebury River, Sucker Brook), and the White River (Hancock Branch) (see radar reflectivity loop in Fig 5-2). Warm rain processes contributed to rainfall amounts of 3 to 5 inches, with anecdotal reports of 6 to 7 inches of rain in some spots. Spot rainfall totals included 3.03” at Salisbury, VT.

Several road washouts and severe damage to some homes were reported. Many sections of U.S. Forest Service roads were destroyed, isolating campsites crowded with summer vacationers. U.S. Route 7 was closed south of East Middlebury, where the swollen Middlebury River inundated the highway.

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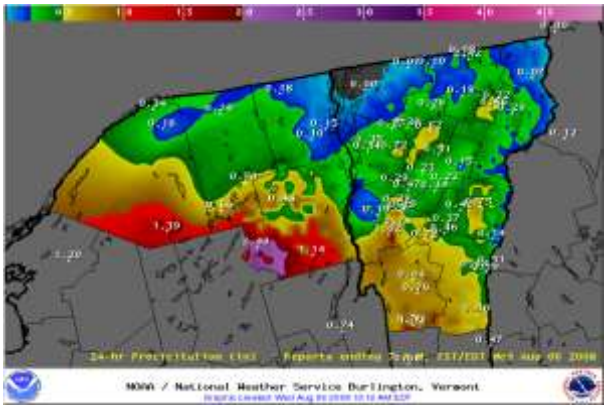

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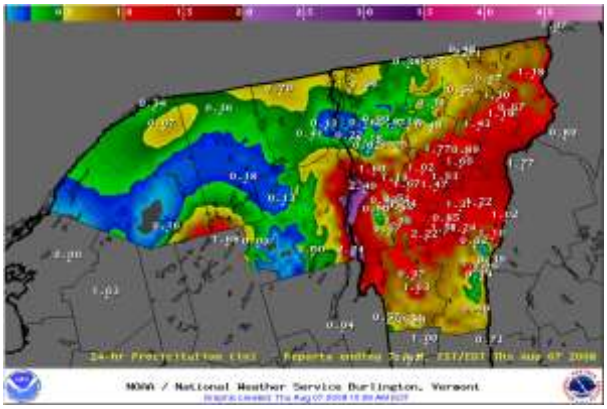

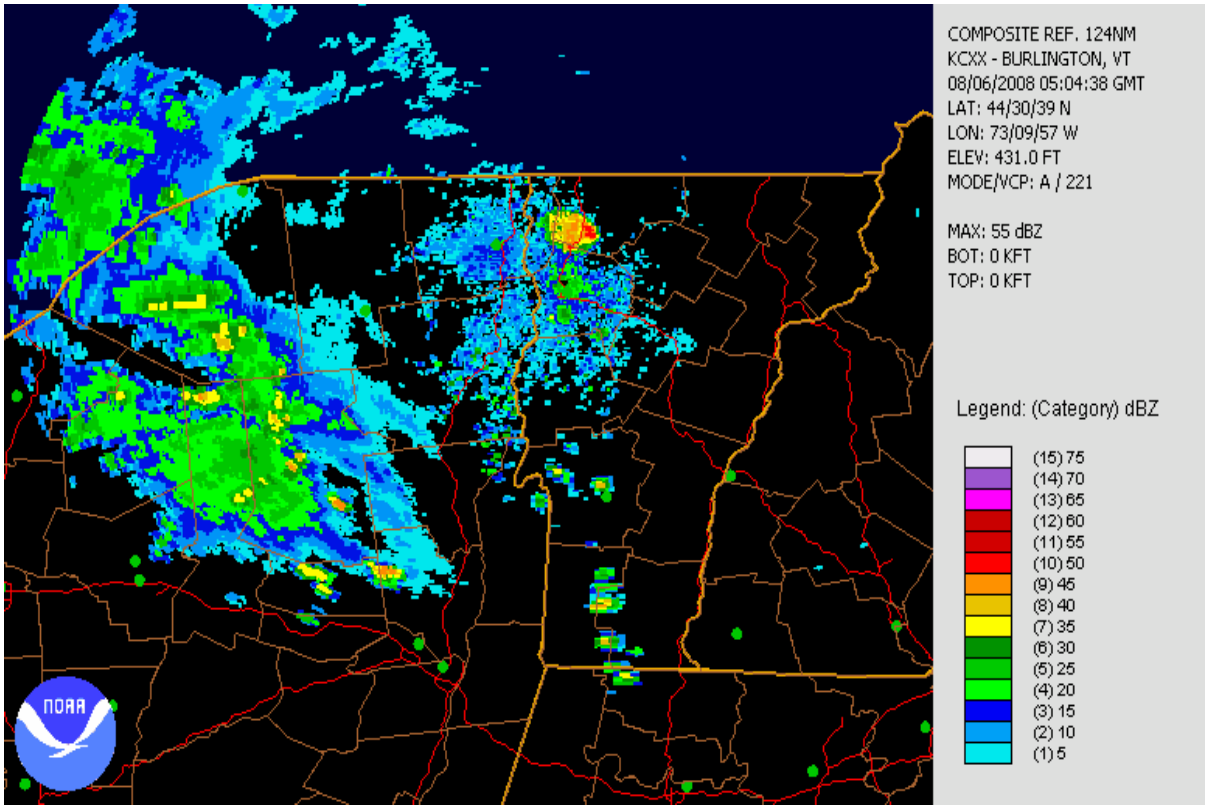

4.) North-Central and Northeast Vermont Flooding, June 11-13, 2002

A wave of low pressure tracking eastward along a strong, stationary 925 - 850 mb frontal boundary (Fig. 4-1) produced rainfall amounts ranging from 3″ to 5” in the Passumpsic River basin on June 11 through June 12, 2002. The runoff resulted in significant flooding, especially in and around the Lyndonville area on the 12th and 13th. Two-day rainfall totals for June 11-12 included 4.10″ at Jay Peak, 3.84” at Eden, 3.55” at Island Pond, and 3.46” at St. Johnsbury (STJV1). The river gauge at East Haven, Vermont (EHVV1) along the east branch of the Passumpsic river recorded its 2nd highest crest since 1939 (10.65') at 14 UTC (10am EDT) on June 12, 2002. As the flood wave moved downstream, the gauge at Passumpsic (PASV1) recorded its 3rd highest crest since 1928, reaching 19.30' at 02z (10pm EDT) on June 13, 2002. Four Vermont counties (Franklin, Orleans, Lamoille, and Caledonia) were declared eligible for individual assistance disaster programs.

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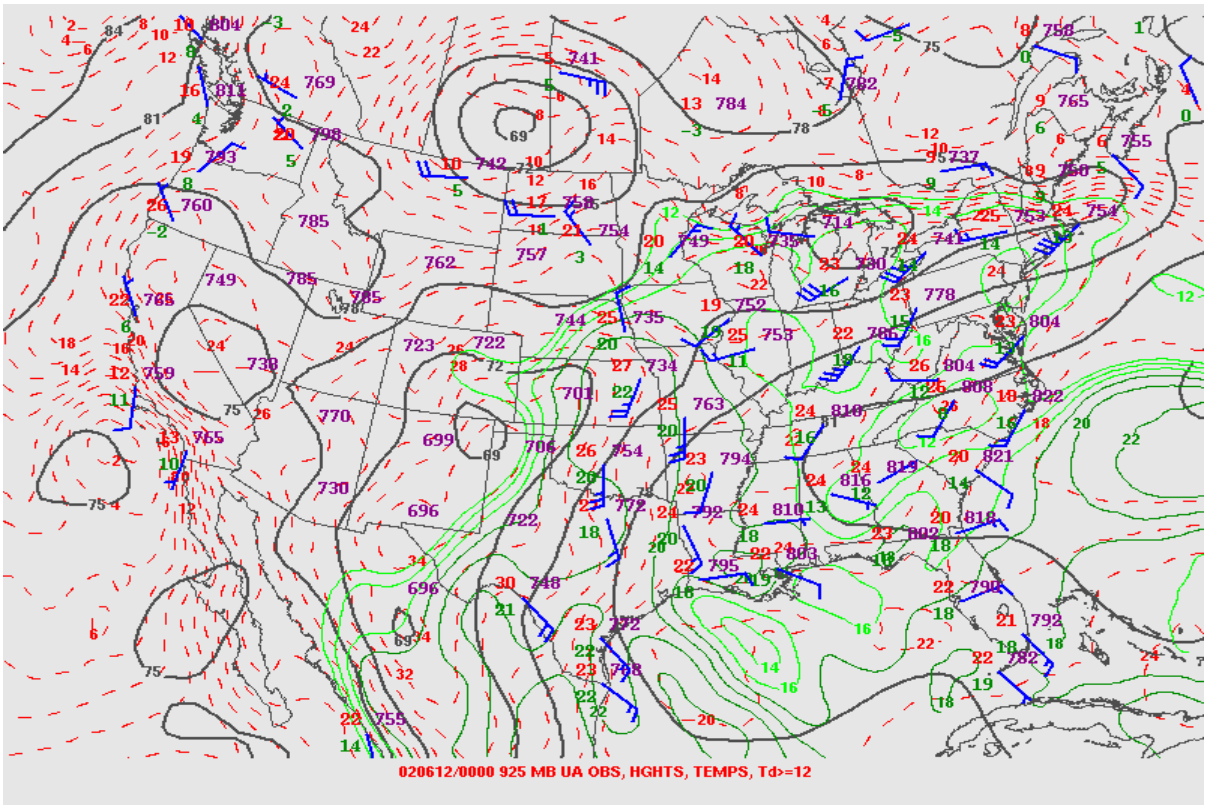

3.) High Elevation Snowstorm - 25-26 October, 2005

An unusual interaction between a tropical cyclone and a pre-existing mid-latitude trough of low pressure produced a heavy early season snowfall across the higher elevations of the North Country on 25-26 October, 2005. The weight of the snow resulted in downed trees and widespread power outages.

An unusual interaction between a tropical cyclone and a pre-existing mid-latitude trough of low pressure produced a heavy early season snowfall across the higher elevations of the North Country on 25-26 October, 2005. The weight of the snow resulted in downed trees and widespread power outages.

A rich source of moisture associated with hurricane Wilma interacted with a deep-layer trough of low pressure centered across the central Appalachians on 25 October 2005 (see 700mb analysis, Fig. 3-1). A well-defined deformation zone became established northeast from the upper low center across New York and northern Vermont, resulting in strong ascent and heavy precipitation. On the infrared satellite image loop, the deformation zone appeared as a band of enhanced/cold cloud tops which bisected the North Country from southwest to northeast over a period of 24-36 hours (Fig. 3-2).

Over time, steady rain on the 25th of October changed to snow by early afternoon in the higher terrain, owing to the effects of diabatic and dynamic cooling. The snow was very wet and became heavy at times, accompanied by gusty winds. Snow amounts included 19 inches in Killington, 16.5 inches in Barton, 14.8 inches in Underhill, 14 inches in Cambridge, and 10 inches in Ellenburg Depot. The lower elevations near Lake Champlain only received around 1 inch, with 0.9″ at Burlington International Airport. Which brings us to an obscure but interesting local climate fact: October 25, 2005 marked the first time in recorded history, that measurable snow occurred in Burlington prior to the first freeze of the season (the low temperature was 33oF during the snow event). The first freezing temperature at BTV would have to wait until October 29th!

With foliage still on the trees, the weight of the snow at higher elevations easily took many trees and tree limbs down with extensive power outages as a result. Traffic accidents were reported and some schools were closed. Property damage totaled $925,000 in Vermont and $290,000 in northern New York.

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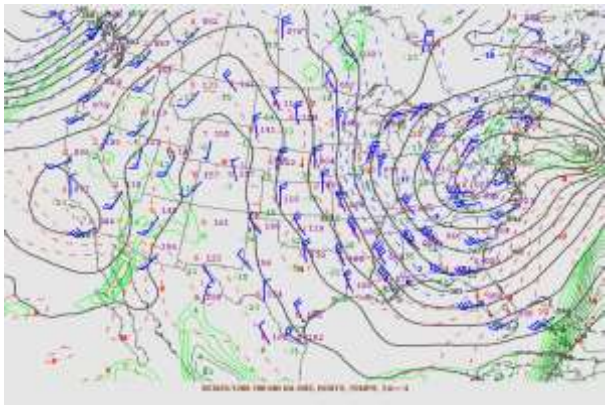

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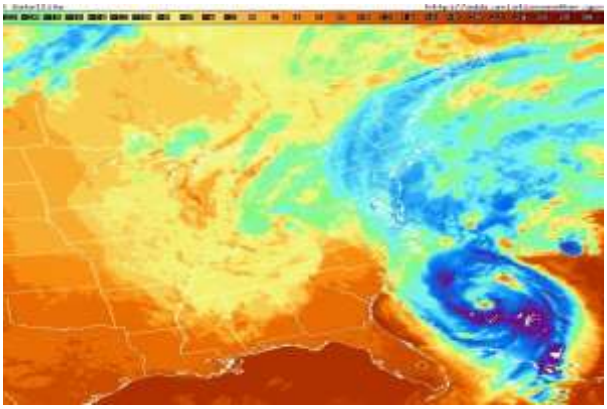

2.) Snow and Downslope Windstorm - 16 April 2007

An intense late season nor'easter (minimum sea-level pressure around 966 mb over Long Island, Fig. 2-1) produced over a foot of heavy wet snow in the higher elevations across the North Country and localized damaging winds over Vermont and northern New York on 15-16 April 2007. Particularly hard hit was the city of Rutland, Vermont, where strong easterly downslope winds resulted in widespread damage including uprooted trees and downed power lines beginning at approximately 16/1130 UTC (730 am EDT). The number of city owned trees downed were about 100, while over 1000 privately owned trees in the city were damaged, including towering maples and elms. The primary power utility in the Region, Central Vermont Public Service Corporation, reported nearly 60,000 customers without power, including around 19,000 outages in Rutland due to the high winds. On 18 April, a 400-foot broadcast tower operated by Mountain Lake PBS atop Lyon Mountain near Dannemora, New York collapsed, likely a delayed response from heavy snow build up and high wind from the storm two days earlier, causing a weakening of the structure. It took until early October for the tower to be rebuilt and normal transmission restored.

A total of eight counties in Vermont received a Federal Disaster declaration, with 3.6 million dollars in federal funds obligated to help in recovery efforts. Essex County, NY was also declared a Federal Disaster Area due to this storm. The Internal Revenue Service extended the filing deadline for federal income taxes by two days for citizens impacted by the storm. A peak wind gust of 156 mph (136 kt or 69.7 m/s) out of the East was recorded atop Mount Washington, NH at 1036 am EDT (1436 UTC), only the third time in the preceding ten years that a gust of that magnitude had been measured at the site. A peak gust of 52 knots (60 MPH) was recorded at the Morrisville, VT ASOS (KSLK) at 16/1742 UTC.

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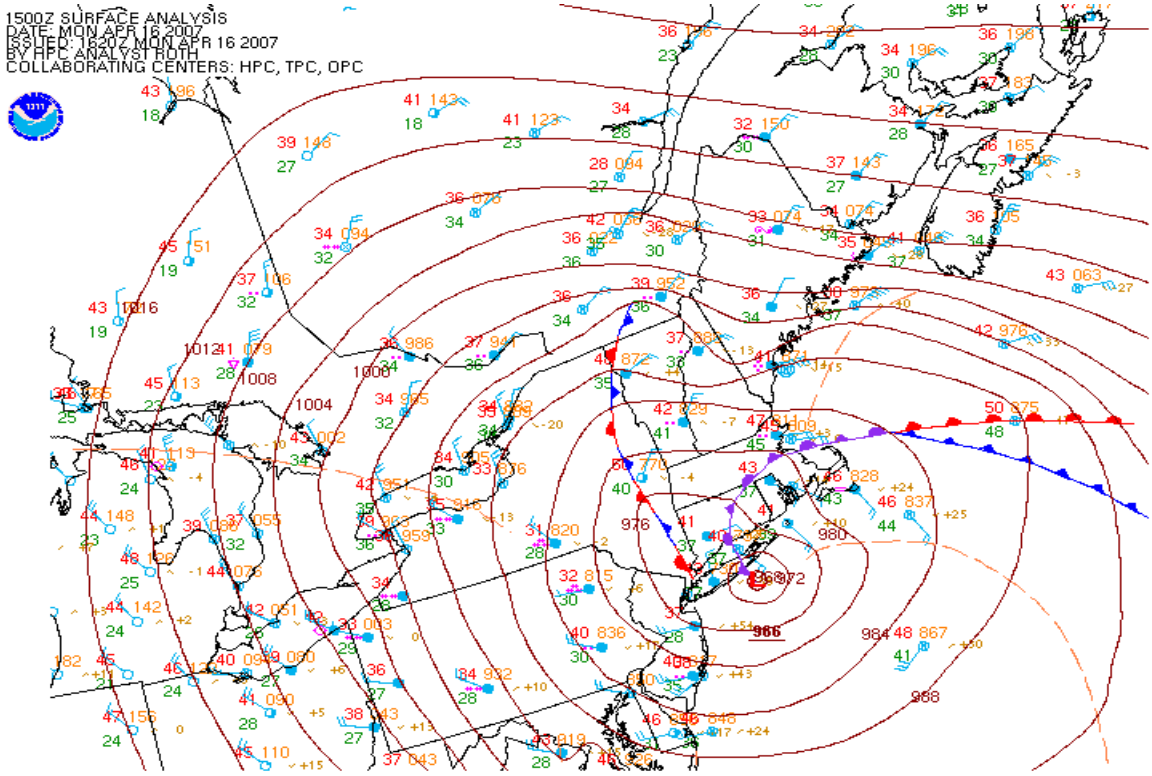

1.) Valentine's Day Snowstorm - 14 February 2007

The North Country receives its fair share of major snowstorms to be sure. But consider this: never in Burlington's weather records has a single February storm - rain, snow, or otherwise - produced as much liquid equivalent (1.94" at Burlington). Snow-water amounts at many locations across Vermont exceeded 2 inches, with isolated totals over 3 inches (Table 1-1).

Table 1-1. Liquid Equivalent, snowfall, and snow-to-liquid ratios for select locations across the North Country, 14-15 February 2007

Location	Liquid Equivalent Precipitation	Snowfall	Snow-to Liquid Ratio
Newcomb, NY	3.12"	26"	8.3 : 1
Chittenden, VT	2.99"	25"	8.4 : 1
Rochester, VT	2.93"	25"	8.5 : 1
Morrisville, VT	2.89"	28.5"	9.9 : 1
Rutland, VT	2.88"	24.5"	8.5 : 1
Northfield, VT	2.73"	25"	9.2 : 1
Waitsfield, VT	2.65"	33"	12.5 : 1
Elizabethtown, NY	2.56"	28"	10.9 : 1
Hanksville, VT	2.47"	29.2"	11.8 : 1
Jeffersonville, VT	2.38"	24"	10 : 1
South Lincoln, VT	2.34"	26.5"	11.3 : 1
Bethel, VT	2.24"	32"	14.3 : 1
St. Johnsbury, VT	2.06"	21.1"	10.2 : 1
West Burke, VT	2.00"	20.8"	10.4 : 1
Burlington, VT	1.94"	25.7"	13.2 : 1

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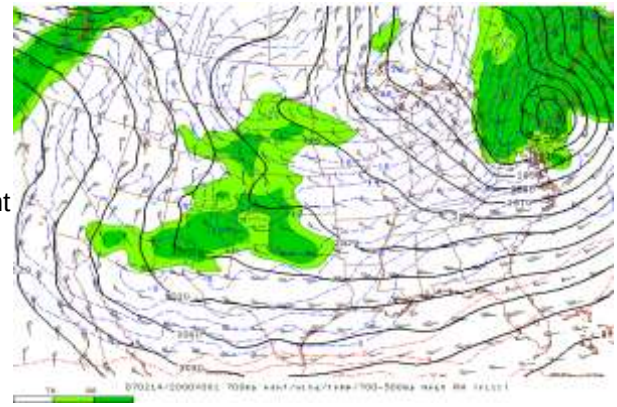

The occurrence of heavy precipitation while surface temperatures hovered in the single digits above zero is all the more astonishing.

A vigorous, closed 700 mb circulation over southwestern New England induced a strong southeast flow bringing rich Atlantic moisture, warm advection aloft, and strong synoptic-scale ascent across Vermont and portions of Northern New York (Fig. 1-1).

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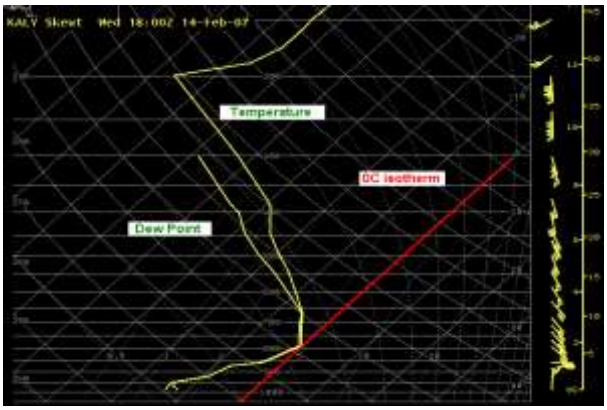

Combined with mesoscale banding, the necessary conditions were in place for an epic snow event. As seen in the special 18 UTC (1 PM EST) Albany, New York sounding, the nose of the temperature inversion was near freezing (Fig. 1-2).

The warm temperatures aloft resulted in a crystal habit favoring columns and needles rather than dendrites. And at times during that Wednesday afternoon, the atmosphere simply poured columns and needles, yielding relatively small snow-to-liquid ratios, averaging around 10:1.

The combination of cold temperatures and a heavy, moisture laden snow over a short period of time had a more severe impact than the run-of-the-mill winter storm. Widespread 20 to 30 inch snow amounts were observed from the Adirondacks eastward across much of central and northern Vermont, with isolated amounts near 3 feet (Figs. 1-3 and 1-4). Snowfall rates of 2 to 4 inches per hour and brisk winds of 15 to 25 mph caused near whiteout conditions at times that afternoon (Fig. 1-5), along with considerable blowing and drifting of the snow, making roads nearly impassable. The deep snow depths (18-30 inches) and deeper snow drifts (4-6+ feet) caused numerous problems, including the blocking of numerous heat vents that resulted in the build-up of carbon monoxide and sent dozens of people seeking treatment at area hospitals. There were additional indirect injuries resulting from this storm, including vehicle accidents and cardiac arrests due to overexertion during snow removal. Snow removal operations took several days and up to a week in some urban communities. In addition, the weight of the heavy snow on some weaker roofs resulted in the partial or total collapse of 20 or more barn roofs and the deaths of more than 100 cattle.

The storm set a new 24-hour snowfall record in Burlington, Vermont at 25.3 inches, exceeding the previous mark of 23.1 inches set on 14 January 1934. The Burlington storm total snowfall of 25.7 inches remains the third largest snowstorm on record behind the 33.1 inches received on 2 to 3 January 2010, and 29.8 inches received 25 to 28 December 1969.

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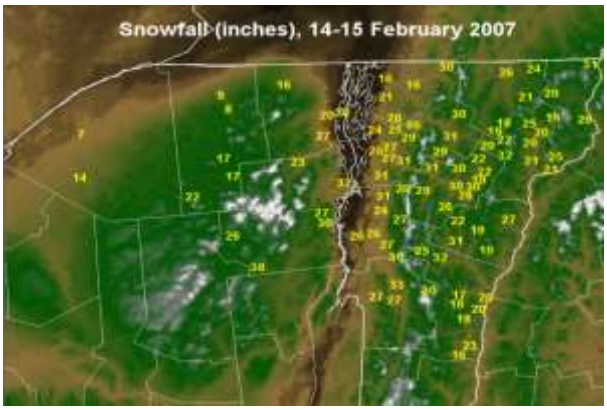

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