

Automobile Accident Investigation

12 March 2010

OVERVIEW

This investigation was assigned to Weather.Lawyer by the ABC Law Firm. On 21 January 2010, their client was involved in an automobile accident near 257 Main Street in Bethel, VT at approximately 1 pm. The opposing driver claimed snow and ice caused her to lose control over her vehicle.



The following data collection, analysis, and conclusions are in regards to this specific investigation only. Data consists of National Weather Service (NWS) Meteorological Terminal Air Reports (METARs), NWS Five-Minute Observations (FMOs), NWS NEXRAD images, National Ocean and Atmospheric Administration (NOAA) satellite images, and various surface analyses. Special algorithms were applied to METARs and FMOs to estimate atmospheric conditions for the given address at the geographical point of 43.831639,-72.634215243.831639.

Weather Synopsis

Radar shows no evidence of precipitation at the time of the incident (Image A). There was approximately 8 inches of snow cover on untreated surfaces (Image B). The skies appeared to be covered by thin overcast clouds (Image C). The surface analysis indicates (Image D) a low pressure system was located in the lower Mississippi Valley, with a front extending through the southeastern states. These features are also indicated on the radar and satellite images. However, high pressure was building into New England (Image E). These background images were used for this weather synopsis and as guidance for the remainder of the investigation.

DATA COLLECTION

The following data artifacts were collected to perform the Meteorological Analysis. The collected data are official government records known to exist that the time of analysis. Any additional weather information that becomes available may be included into this report at a later time. Data was collected from the National Center for Environmental Information (NCEI). NCEI is responsible for hosting and providing access to world weather archives, with comprehensive oceanic, atmospheric, and geophysical data. NCEI is the leading government authority for environmental information.

Daily Weather Summaries

Daily weather summaries are archived data for hundreds of stations throughout the United States. High and low temperatures, significant weather conditions, and precipitation are typical measurements recorded in daily summaries. Daily weather summaries for January 19-21 are included in this report.

METARs/FMOs

METARs typically come from airports or permanent weather observation stations. Reports are generated once an hour or half-hour, but if conditions change significantly, a report known as a special (SPECI) may be issued. Some METARs are encoded by automated airport weather stations located at airports, military bases, and other sites. Some locations use augmented observations, which are recorded by digital sensors, encoded via software, and then reviewed by certified weather observers or forecasters prior to being transmitted. Observations may also be taken by trained observers or forecasters who manually observe and encode their observations prior to transmission. FMOs are the five-minute observation component to METARs, and are recorded separately. METARs and FMOs for the following locations were used in this analysis: Rutland, VT (KRUT), Middlebury, VT (K6BO), Lebanon, NH (KLEB), and Montpelier, VT (KMPV).

NEXRAD

NEXRAD is a network of 159 high-resolution S-band Doppler weather radars operated by the NWS. NEXRAD detects precipitation and atmospheric movement. Electro-magnetic beams return data which when processed can be displayed in a mosaic map, and show patterns of precipitation and its corresponding movement. The radar system operates in two basic modes, selectable by the operator: a slow-scanning *clear-air mode* for analyzing air movements when there is little or no activity in the area, and a *precipitation mode*, with a faster scan for tracking active weather. NEXRAD has an increased emphasis on automation, including the use of algorithms and automated volume scans. For this analysis the Burlington, VT (CXX) radar was used. CXX was in clear-air mode at the time of the incident.

NOAA Satellite

The Geostationary Operational Environmental Satellite system (GOES), operated by the United States' National Oceanic and Atmospheric Administration (NOAA)'s National Environmental Satellite, Data, and Information Service division, supports weather forecasting, severe storm tracking, and meteorology research. Spacecraft and ground-based elements of the system work together to provide a continuous stream of environmental data. The NWS uses the GOES system for North American weather monitoring and forecasting operations, and scientific researchers use the data to better understand land, atmosphere, ocean, and climate interactions. For this analysis, GOES-E (the satellite covering the eastern portion of the United States), was used.

METEOROLOGICAL ANALYSIS

Overview

Daily, hourly, and 5 minute data show stable meteorological conditions. All observed weather parameters were homogeneous throughout the area near Bethel, VT. Our algorithms were applied to determine the estimated conditions for Bethel, VT using data from the surrounding area. The distance to Bethel and elevation differences are taken into consideration by the algorithms.

Table 1 - Site Comparisons

Site	Distance to location	Elevation	Elevation Difference
KRUT	27.1 miles	541 feet	-32 feet
K6BO	33.6 miles	427 feet	-146 feet
KMPV	34.6 miles	525 feet	-48 feet

KLEB	28.7 miles	581 feet	+8 feet
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Table 1a - Daily Weather Summaries (January 19)

Site	Significant Wx	High	Low	Precipitation	Snow Depth
KRUT	None	34 F	19 F	0.00	7 inches
K680	None	33 F	18 F	0.00	9 inches
KLEB	None	35 F	20 F	0.00	6 inches
KMPV	None	31 F	17F	0.00	10 inches
Bethel	None	32 F	20 F	0.00	8 inches

Table 1b - Daily Weather Summaries (January 20)

Site	Significant Wx	High	Low	Precipitation	Snow Depth
KRUT	None	31 F	22 F	0.00	6 inches
K680	None	30 F	21 F	0.00	8 inches
KLEB	None	34 F	24 F	0.00	6 inches
KMPV	None	30 F	20F	0.00	9 inches
Bethel	None	31 F	21 F	0.00	8 inches

Table 1c - Daily Weather Summaries (January 21)

Site	Significant Wx	High	Low	Precipitation	Snow Depth
KRUT	Trace of Snow	32 F	24 F	T	6 inches
K680	None	30 F	22 F	0.00	8 inches
KLEB	None	33 F	23 F	0.00	5 inches
KMPV	Trace of Snow	30 F	21 F	T	9 inches
Bethel	None	31 F	22 F	0.00	7 inches

Table 2 - METARS (1 pm)

Site	Conditions	Temperature	Dew Point	Visibility	Wind Speed	Wind Direction
KRUT	Overcast	27 F	19 F	10 miles	6 mph	North
K6BO	Overcast	28 F	19 F	10 miles	6 mph	North
KLEB	Clear	32 F	21 F	10 miles	8 mph	North
KMPV	Overcast	26 F	18 F	10 miles	7 mph	North
Bethel	Overcast	27 F	19 F	10 miles	6 mph	North

Table 3 - FMOs (1-1:05 pm)

Site	Conditions	Temperature	Dew Point	Visibility	Wind Speed	Wind Direction
KRUT	Overcast	27 F	19 F	10 miles	7 mph	North
K6BO	Overcast	27 F	20 F	10 miles	7 mph	North
KMPV	Clear	32 F	20 F	10 miles	6 mph	North
KLEB	Mostly Cloudy	25 F	18 F	10 miles	6 mph	North
Bethel	Overcast	26 F	19 F	10 miles	6 mph	North

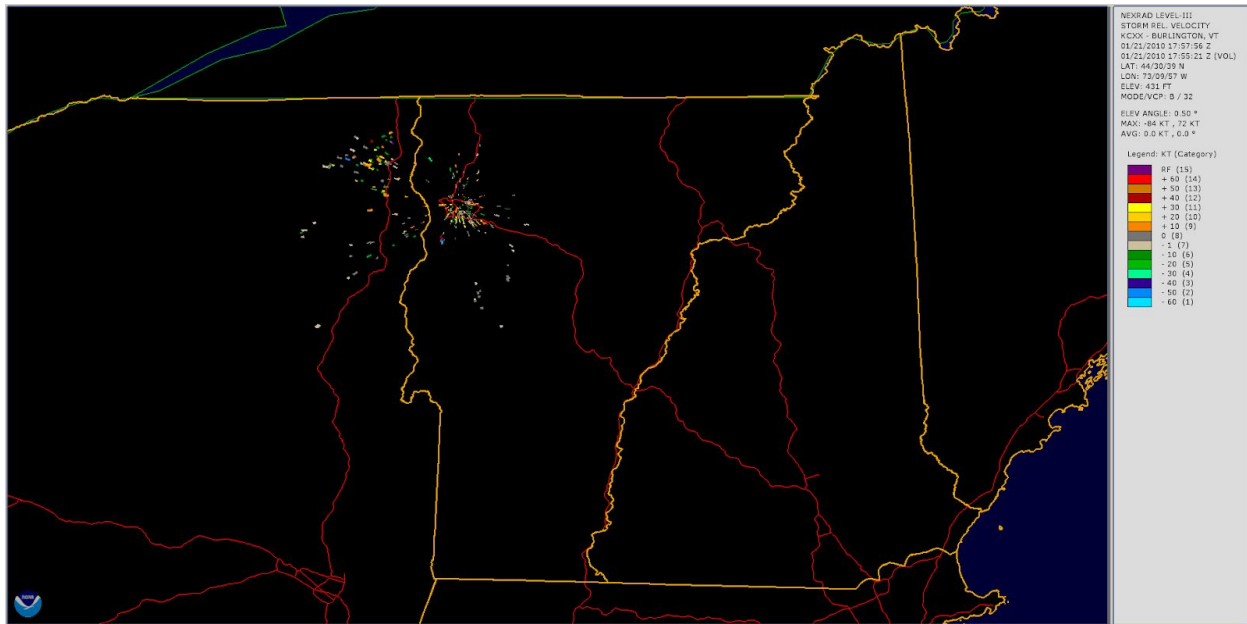
Temperatures

The high temperature was estimated to be 31 F. At the time of the incident, the temperature was estimated to be 26 F, with a dewpoint of 19 F. The dewpoint is a measure of moisture in the atmosphere. Based on the dewpoint and temperature, the relative humidity can be estimated to be approximately 75%.

Precipitation

The radar covering Bethel, VT was in clear-air mode at the time of the incident. However, that mode does not preclude precipitation from falling. Based on the echos on the radar image below, it was determined that no precipitation was falling at the time. The echoes present on the image were determined to be clutter artifacts. Clutter can be any moving or stationary target that reflects the radar beam (e.g. mountain tops, airplanes, insects, birds).

NEXRAD - Burlington, VT (CXX)



Sun Angle

Based on the date, time, and geographic position, the sun angle was estimated to be approximately 25 degrees. Typically, sun glare begins at 10 degrees and becomes severe at 5 degrees and below. However, other factors may contribute to sun glare, including the road elevation, the road angle, and atmospheric conditions.

Soil Temperature

Soil records were obtained for Vermont. The 4 inch soil temperature for Bethel, VT was estimated to be approximately 33 F.

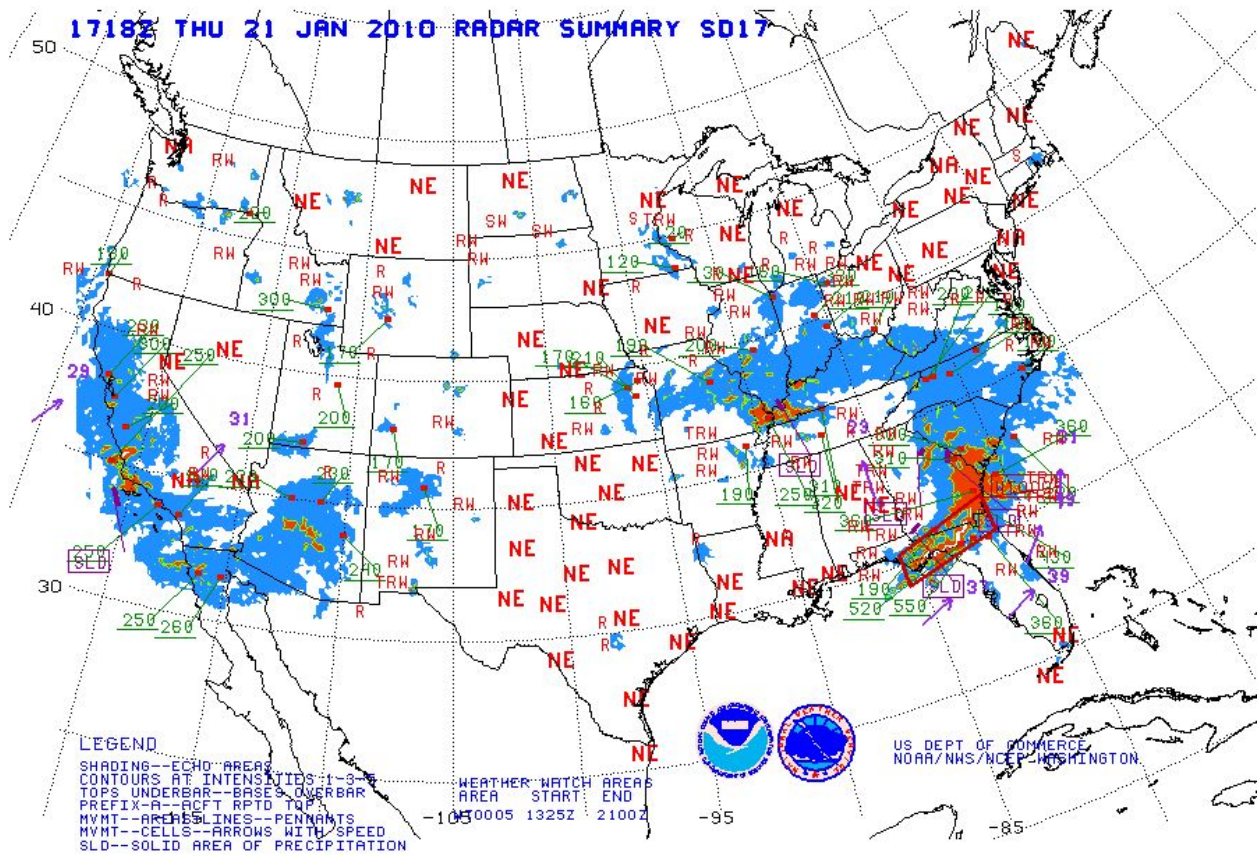
CONCLUSION

A low pressure system was located in the Ohio Valley, with high pressure over New England. Although a trace of snow fell in the area, there is no evidence of snow falling near Bethel, VT during a 24 hour period leading up to the incident. The radar shows no precipitation falling over Vermont during the incident. Based on data from nearby stations, our algorithms determined that the temperature was slightly below freezing at the time of the incident. The relative humidity was 75% with overcast skies and light northerly winds. The soil temperature was approximately 33 F. Given these conditions, and since calcium chloride is effective to -20F, it is not likely that snow or ice would be present on treated road surfaces under these circumstances.

CERTIFICATION

I certify the information contained in this report is accurate to the best of my professional ability and that all expressed opinions, findings, estimations, and interpolations were made within a reasonable degree of meteorological certainty.

BACKGROUND MAPS



1718Z THU 21 JAN 2010 RADAR SUMMARY S017

Image A - Radar Summary

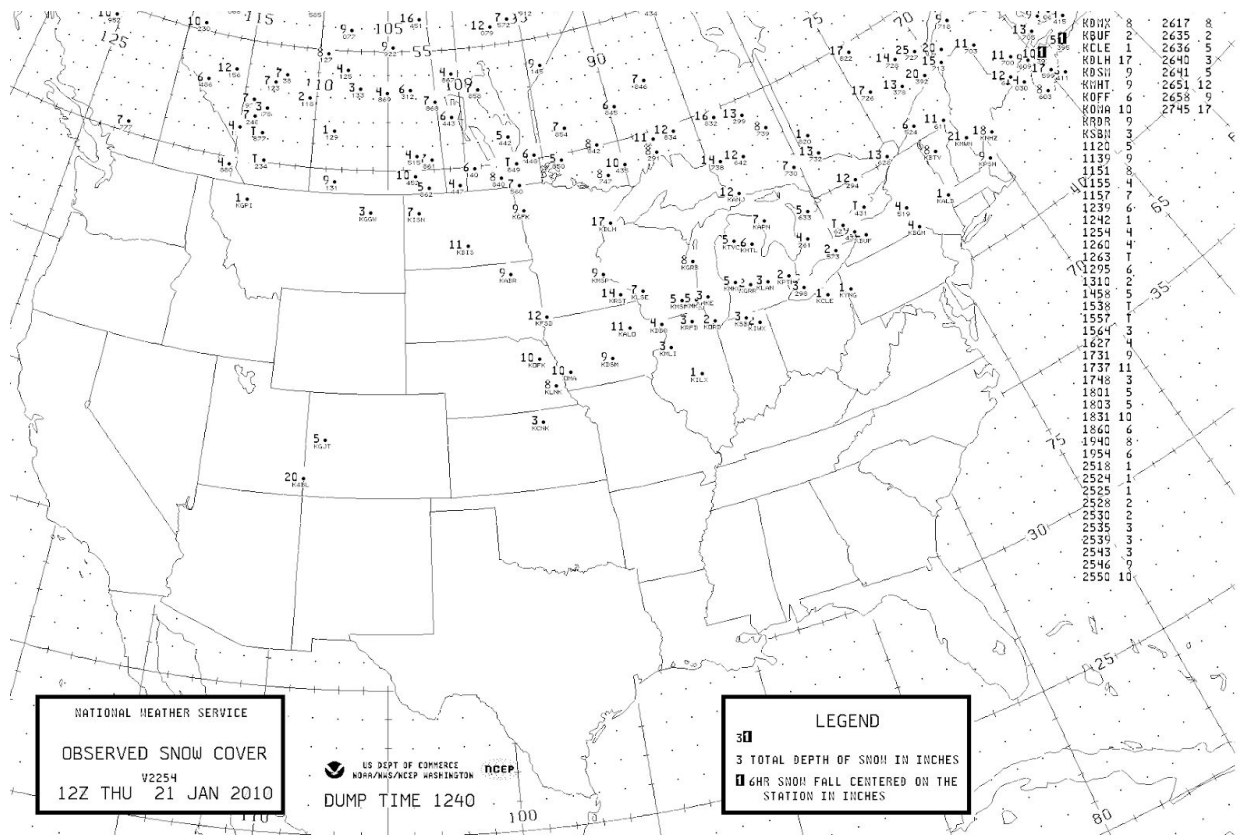


Image B - Observed Snow Cover

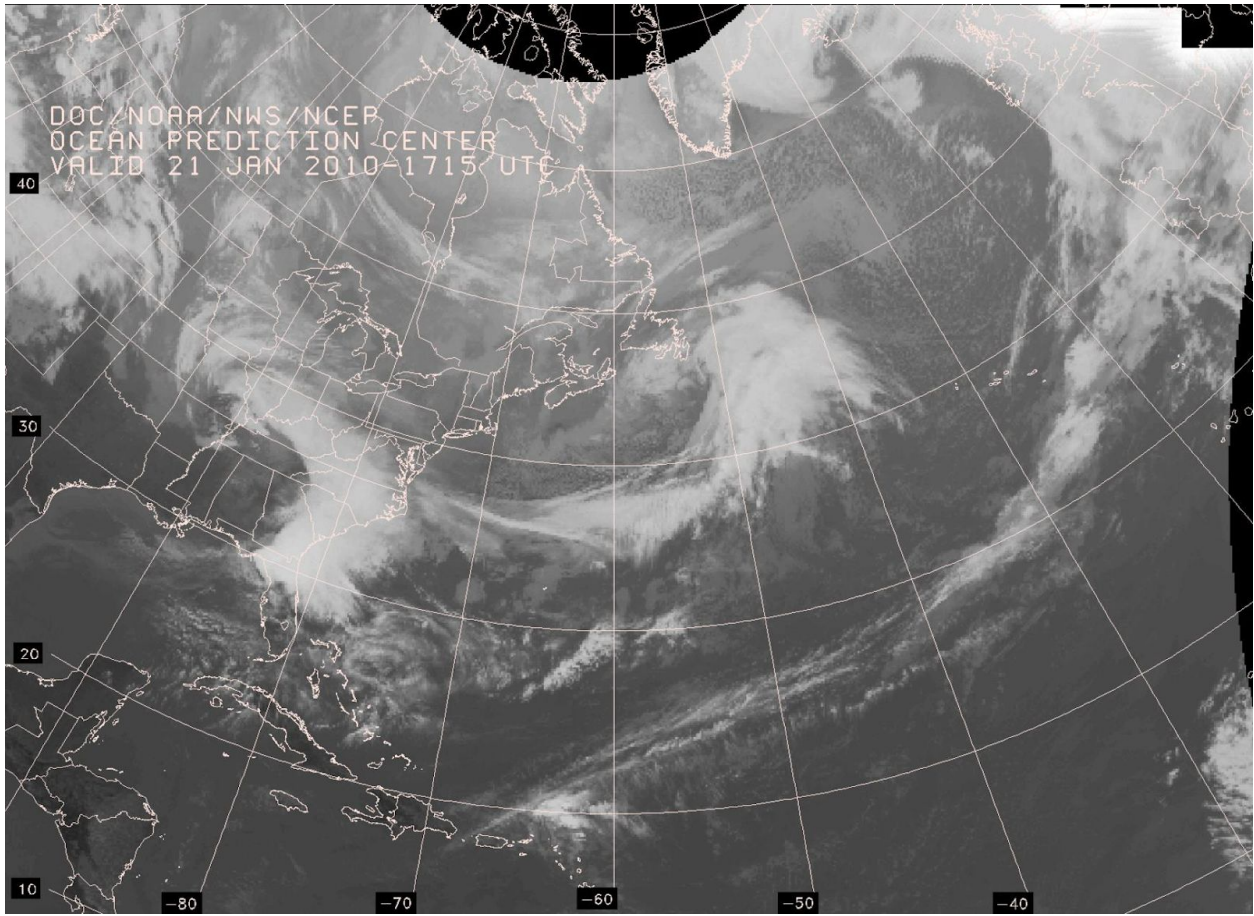


Image C - US Satellite

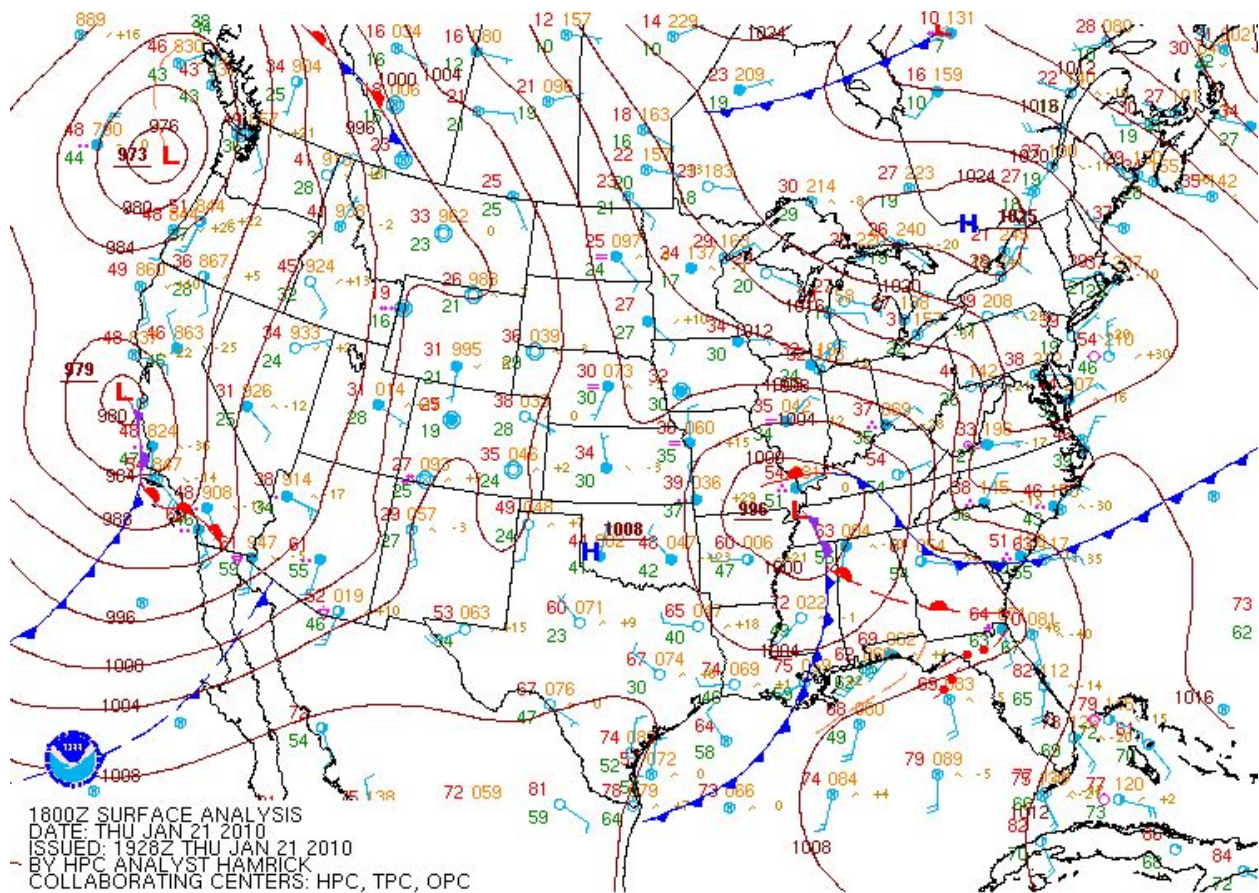


Image D - US Surface Analysis

1800Z SURFACE ANALYSIS
DATE: THU JAN 21 2010
ISSUED: 1928Z THU JAN 21 2010
BY HPC ANALYST HARRICK
COLLABORATING CENTERS: HPC, TPC, OPC

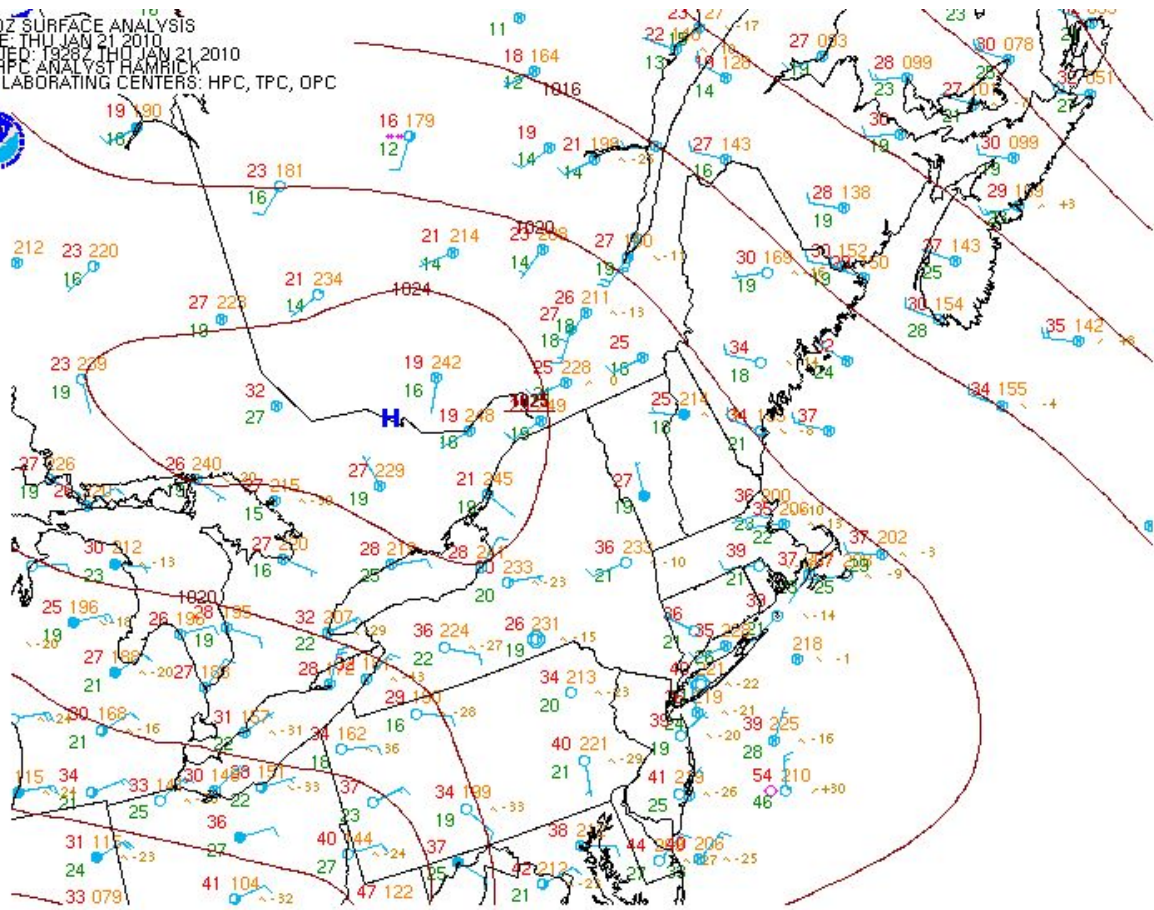


Image E - Northeast Surface Analysis