

A Look Back at the Winter Storms Affecting Central North Carolina During the 2003-2004 Winter Season



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Overview

The 2003-2004 winter season will be remembered as a rather stormy and snowy year across central North Carolina. Numerous winter storms threatened and impacted the region. Raleigh (RDU) had 11 days with a trace or more of snow (7 days had measurable snow.) Greensboro (GSO) had 11 days with a trace or more of snow (including 6 days with measurable snow.)

Raleigh reported 14.9 inches of snow during the 2003-2004 winter season, this marked the sixth snowiest season ever at RDU (see figure 1 below). Charlotte (CLT) reported 14.5 inches of snow which was the fourth snowiest season ever at CLT (see figure 2 below).

On the following pages you will find information on the significant winter storms that affected central North Carolina during the 2003-2004 season. A brief summary or overview of the storm along with an appropriate accumulation map of the storm is shown. A surface map is also provided for a snap shot view of the weather pattern.

The information is not intended for technical audiences but rather for our users who desire a quick look back at the winter.

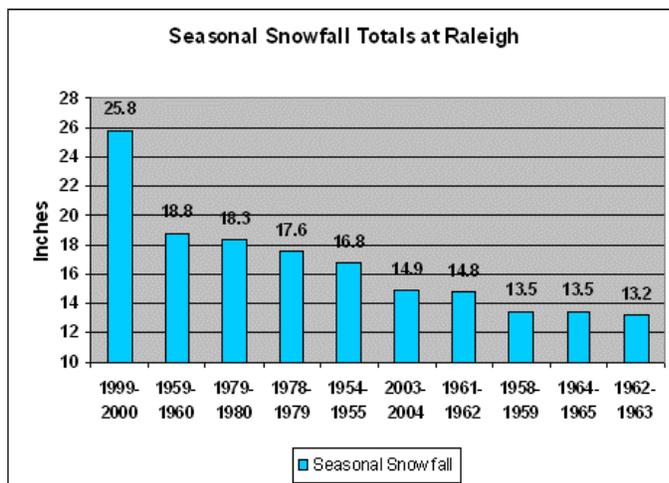


Figure 1 – seasonal snowfall totals at Raleigh (the Raleigh-Durham International Airport)

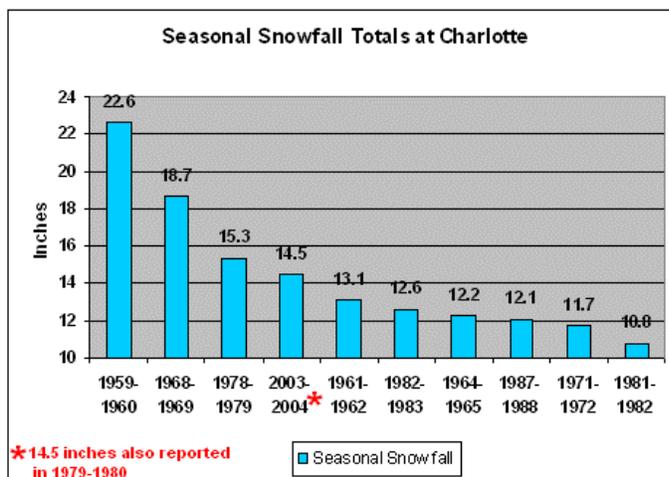
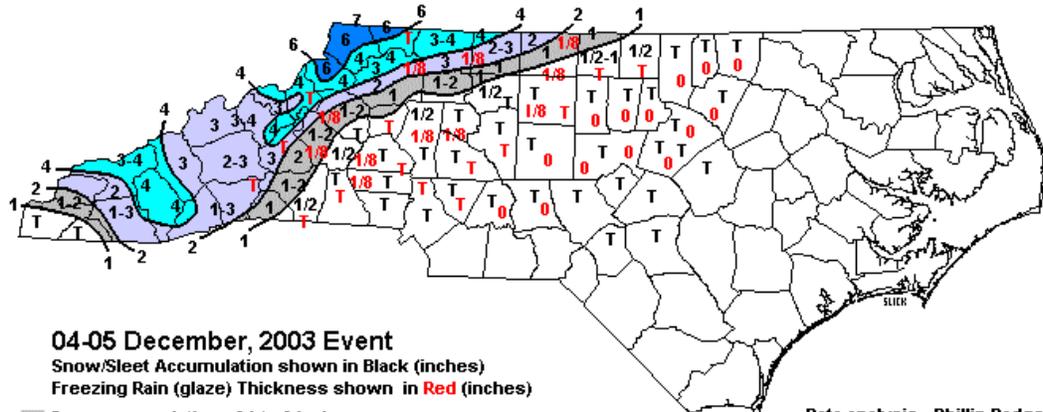


Figure 2 – seasonal snowfall totals at Charlotte (the Charlotte-Douglas international Airport)

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December 04-05, 2003 Event...

A highly amplified upper air pattern developed over the U.S. during the first week of December 2003. A significant trough was located over the eastern U.S. with a ridge across the west. A storm system in the southern branch of the jet stream moved across California and then east through the Rockies. The polar jet stream dropped south over the eastern states allowing cold air to move into the Mid Atlantic states ahead of the approaching storm. At the surface, a cold air damming high moved over Pennsylvania during the 3rd and 4th, allowing cold dry air to be pushed south into central North Carolina. At the same time a weak storm system moved from the southern plains to the central Gulf coast. During the 4th and 5th, this storm system moved up the Southeast U.S. coast and then out to sea east of Cape Hatteras on the 5th. Heavy wet snow developed over the N.C. Mountains early on the 4th then changed to sleet and freezing rain late in the day. The precipitation began as a mix of snow and sleet across the Piedmont, but then changed to freezing rain mixed with rain. Behind the storm, temperatures remained in the 30s for 3 consecutive days during and after the storm across much of western and central N.C.

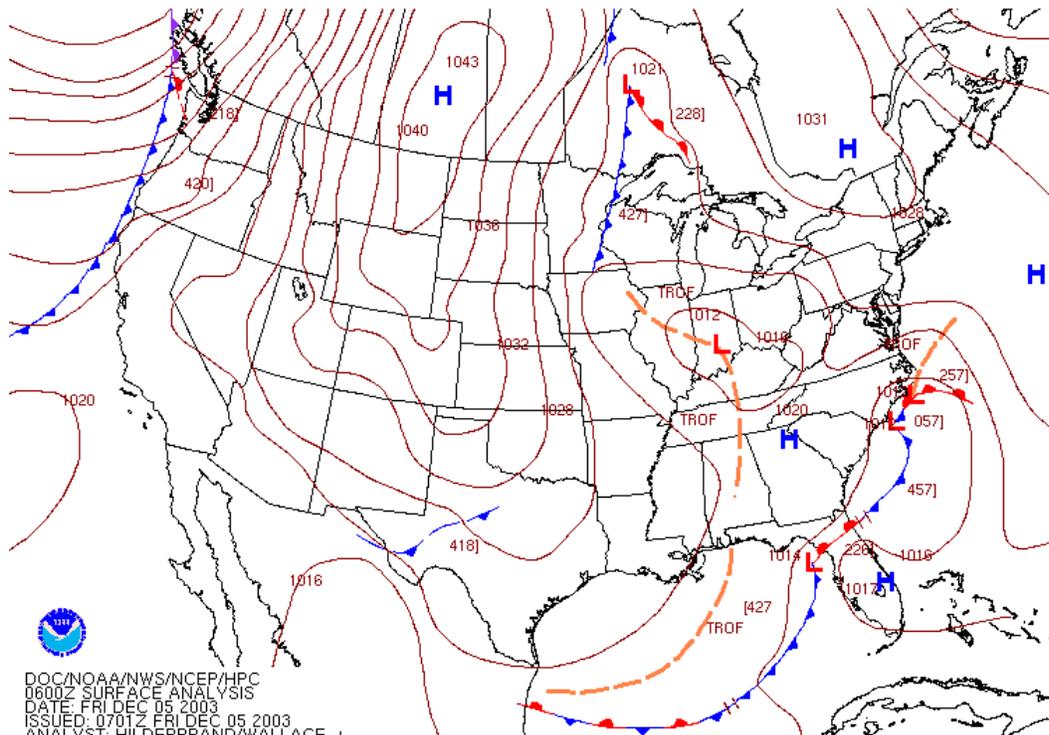


04-05 December, 2003 Event

Snow/Sleet Accumulation shown in Black (inches)
Freezing Rain (glaze) Thickness shown in Red (inches)

- Snow accumulation of 1 to 2 inches
- Snow accumulation of 2 to 4 inches
- Snow accumulation of 4 to 6 inches
- Snow accumulation greater than 6 inches

Data analysis - Phillip Badgett
Graphic - Jonathan Blaes
MWS Raleigh, NC
www.erh.noaa.gov/rah



DOC/NOAA/NWS/NCEP/HPC
0600Z SURFACE ANALYSIS
DATE: FRI DEC 05 2003
ISSUED: 0701Z FRI DEC 05 2003
ANALYST: HILDEBRAND/WALLACE

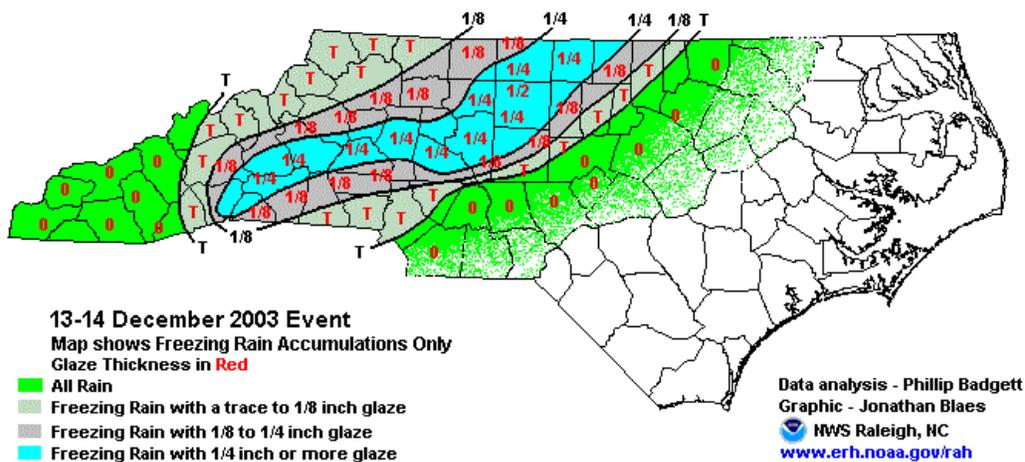
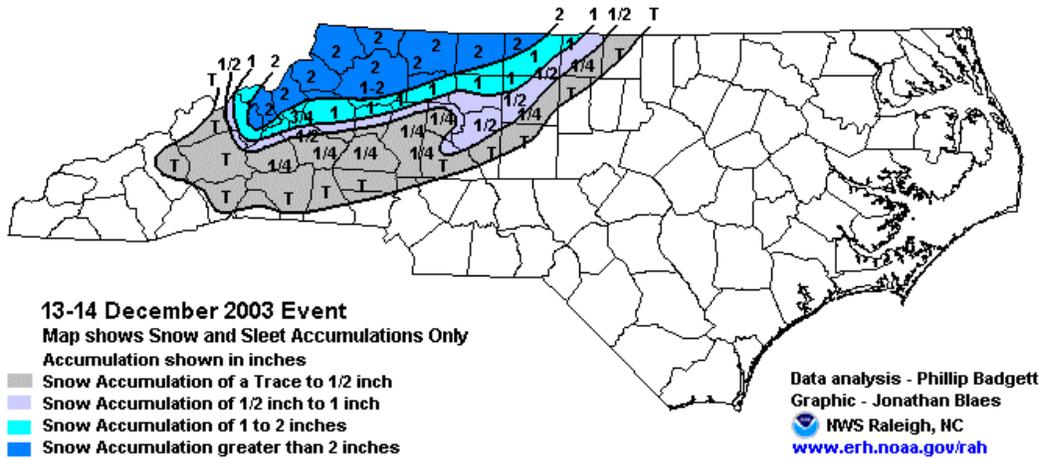
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December 13-14, 2003 Event...

A split upper flow pattern over the central and eastern U.S. developed during the 12th and 13th of December. The polar jet extended over the Great Lakes into New England, with a strong subtropical jet noted from the Desert Southwest region of the U.S. across to the Southeast. A cold and strong (1032 MB) surface high was anchored over New England on the 12th. As a disturbance associated with the subtropical jet moved out of the Southern Plains toward North Carolina, a surface low developed over the northwestern Gulf of Mexico early on the 13th. A large shield of precipitation spread across Texas and the Gulf Coast States toward North Carolina.

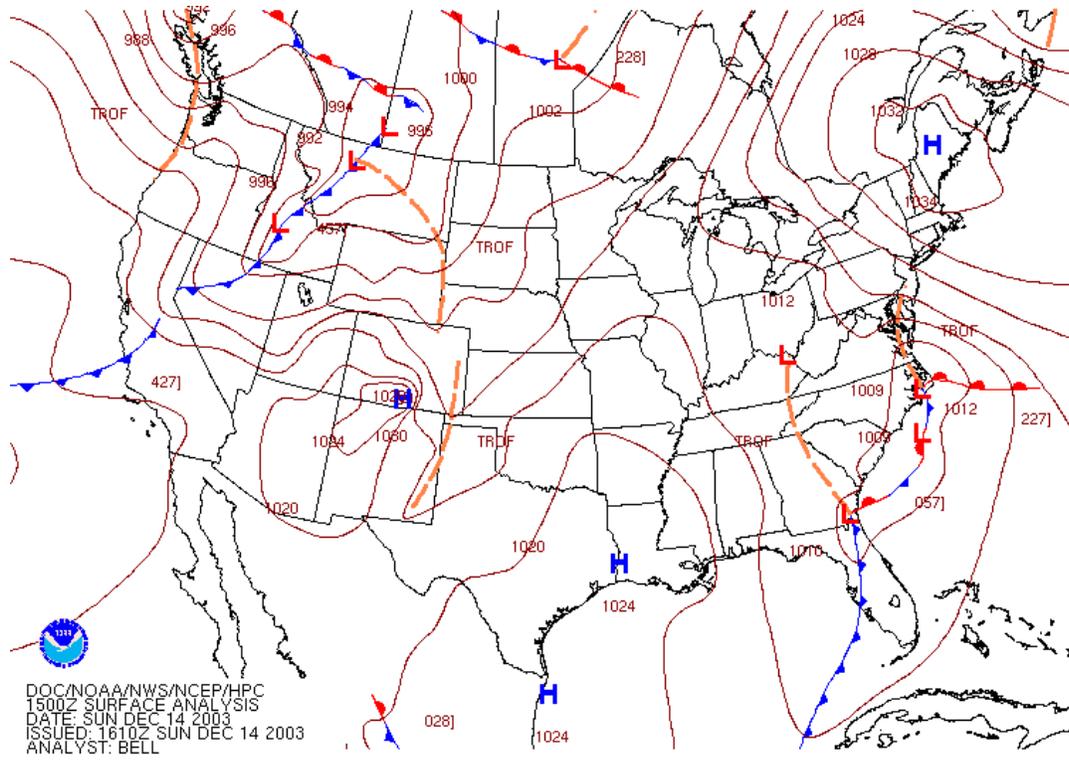
Late on the 13th, snow and sleet had already developed across the North Carolina Mountains and spread east into the Piedmont as a surface low pressure moved along the Gulf Coast. The low pressure system reached southern Georgia early on the 14th, as another low pressure system rapidly developed near Wilmington.

Precipitation across the northwest mountains and foothills changed to sleet during the evening. The sleet that was falling across the western Piedmont changed to freezing rain during the evening and overnight hours. Rain fell across the remainder of the Piedmont and eastern North Carolina.



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December 13-14, 2003 Event (continued) ...

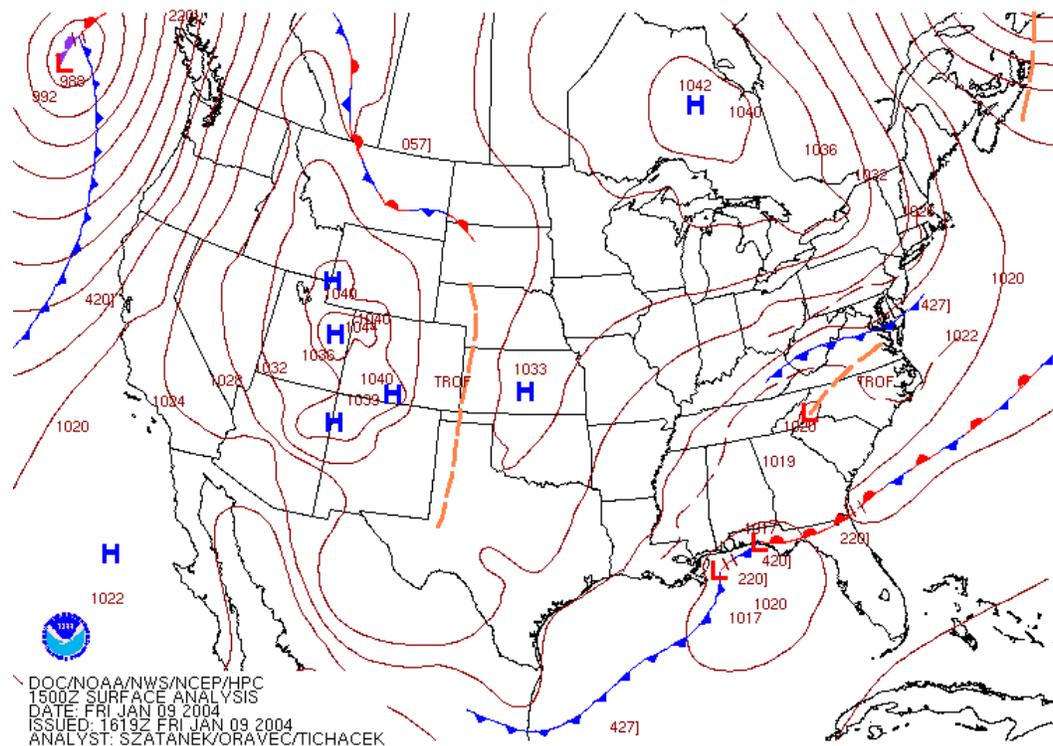
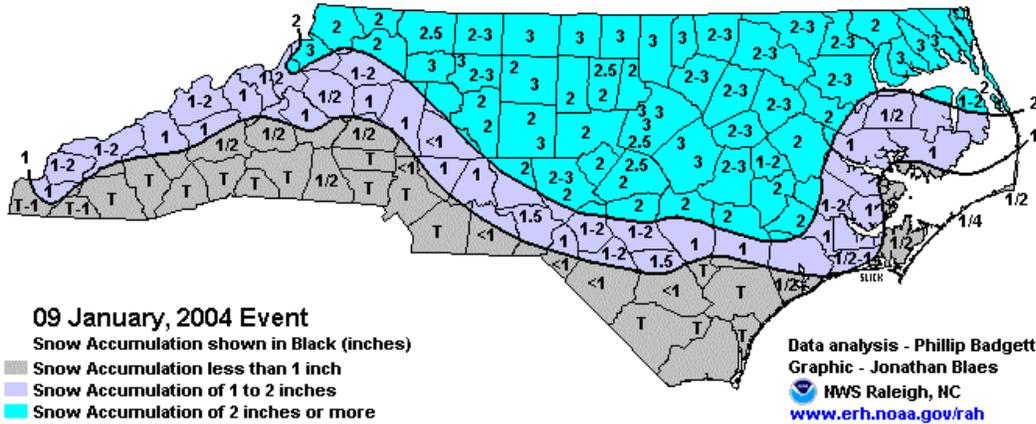


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January 9, 2004 Event...

Very cold arctic air spilled south into the eastern U.S. on January 5th and 6th as an upper trough centered over the Plains states shifted east. The leading edge of the arctic air, marked by a cold front, pushed off the N.C. coast on the morning of January 6th, ending a period of unusually warm weather across most of N.C. The warm weather was replaced by very cold temperatures on the 7th and 8th with high temperatures remaining below freezing across the mountains and in the 30s to lower 40s across the remainder of N.C.

A disturbance in the polar jet stream over the Northern Plains states on 8th, moved southeast into the Tennessee Valley on the 9th. A weak surface low developed east of Appalachians near Greenville-Spartanburg, SC early on the 9th and then moved across southern N.C. during the day. Snow developed across the mountains and overspread much of the state on the 9th before quickly tapering off late in the day. Very cold air followed behind the storm as temperatures dipped into the single digits and teens on the morning of the 11th. Despite a lot of sunshine, high temperatures remained below freezing across nearly all of the state with the exception of the immediate coast on the 11th.



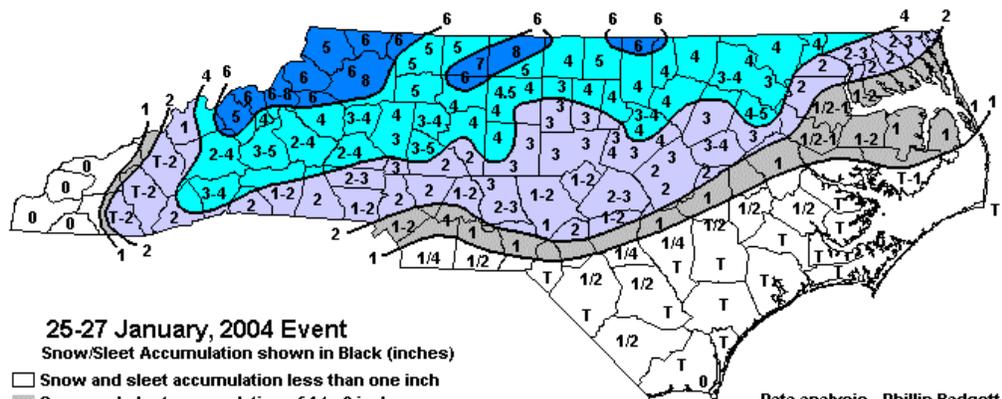
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January 25-27, 2004 Event...

An arctic cold front pushed south across N.C. late on the 25th and early on the 26th of January. Across the Piedmont high temperatures reached the upper 50s to around 60 on the afternoon of 25th but fell into the 20s by midnight on the 26th. A surface low developed on the arctic cold front across the Southern Plains, as a strong upper level trough over the Rockies moved east. The surface low moved across the southeast and then offshore on the 26th. A second low pressure system coming out of the northeastern Gulf of Mexico moved up the Southeast coast on the 27th.

Snow rapidly developed over the Mountains and the southwestern Piedmont during the 25th, and then spread east. As warmer air surged into the region at mid levels of the atmosphere, the snow changed to sleet from south to north during the afternoon and early evening of the 26th. The precipitation eventually changed to freezing rain across eastern and southeastern N.C. late on the 26th before ending on the 27th.

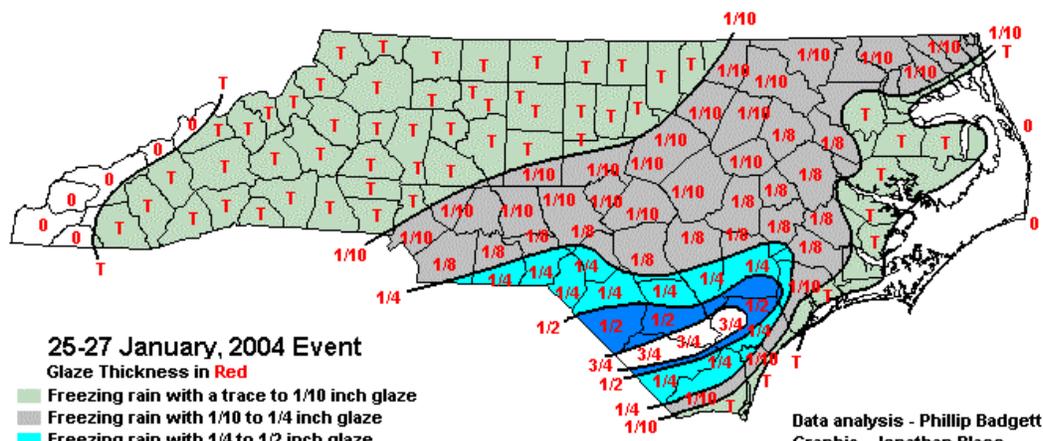
Snow accumulations were greatest across far northern and northwestern N.C. where the precipitation fell primarily as snow. Freezing rain accumulated between 3/4 of an inch to 1 inch across interior portions of southeastern N.C. Many trees and power lines were downed in areas near Whiteville, Elizabethtown and Burgaw.



25-27 January, 2004 Event
 Snow/Sleet Accumulation shown in Black (inches)

- Snow and sleet accumulation less than one inch
- Snow and sleet accumulation of 1 to 2 inches
- Snow and sleet accumulation of 2 to 4 inches
- Snow and sleet accumulation of 4 to 6 inches
- Snow and sleet accumulation greater than 6 inches

Data analysis - Phillip Badgett
 Graphic - Jonathan Blaes
 MWS Raleigh, NC
www.erh.noaa.gov/rah

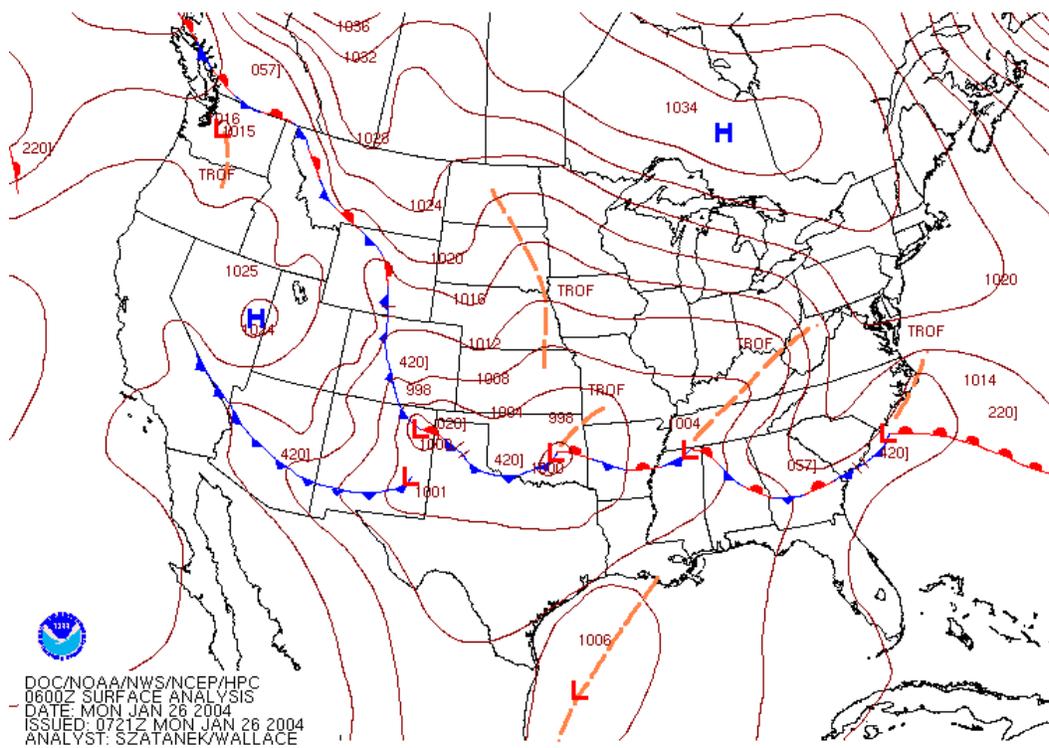


25-27 January, 2004 Event
 Glaze Thickness in Red

- Freezing rain with a trace to 1/10 inch glaze
- Freezing rain with 1/10 to 1/4 inch glaze
- Freezing rain with 1/4 to 1/2 inch glaze
- Freezing rain with 1/2 to 3/4 inch glaze
- Freezing rain with 3/4 inch glaze or greater

Data analysis - Phillip Badgett
 Graphic - Jonathan Blaes
 MWS Raleigh, NC
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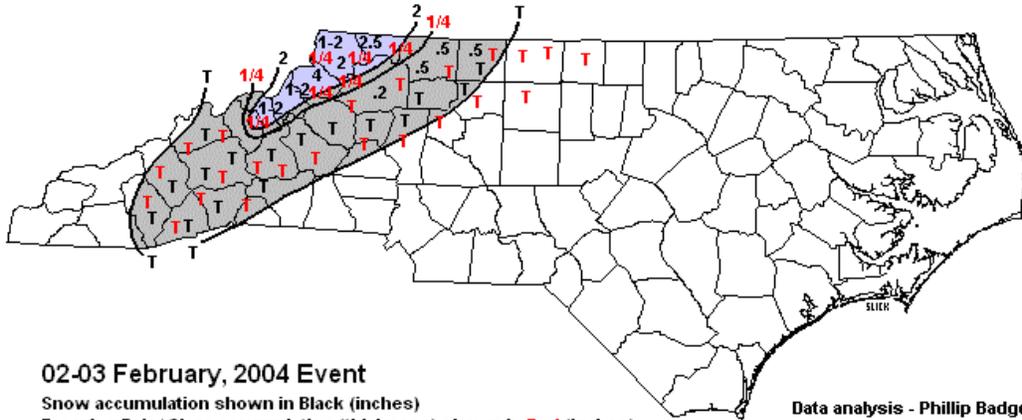
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February 2-3, 2004 Event...

Cold air damming was well established over N.C. on February 2 as a 1032 MB surface high was located over the Northeastern U.S. Meanwhile, an upper level disturbance in the southern branch of the jet stream was moving across the Central U.S. with a weak low pressure system over the lower Mississippi Valley. As the upper level disturbance approached the Appalachians early on the 3rd, a low pressure system redeveloped over the N.C. Piedmont. Generally light snow fell across the central and northern Mountains, with some snow as far east as the Triad region. Across northwestern N.C., the snow changed to freezing rain before ending while the precipitation south and east of the mountains changed to freezing rain and then all rain.



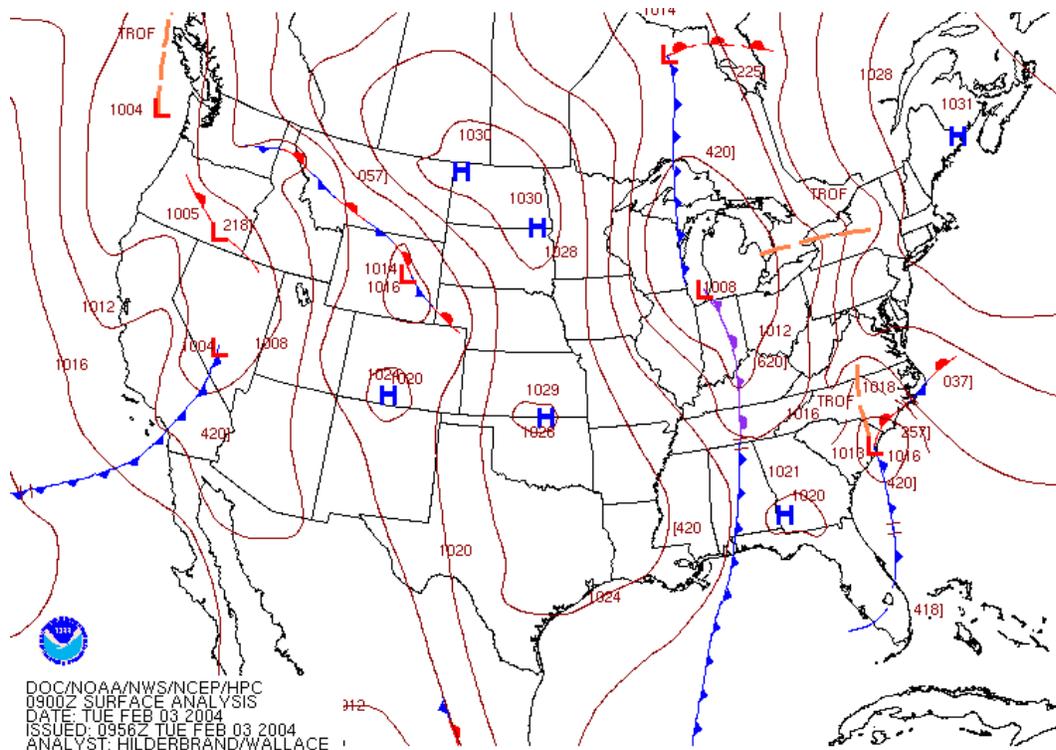
02-03 February, 2004 Event

Snow accumulation shown in Black (inches)

Freezing Rain/ Glaze accumulation (thickness) shown in Red (inches)

- Snow accumulation of a trace to 2 inches
- Snow accumulation of 2 inches or more

Data analysis - Phillip Badgett
 Graphic - Jonathan Blaes
 NWS Raleigh, NC
www.erh.noaa.gov/rah



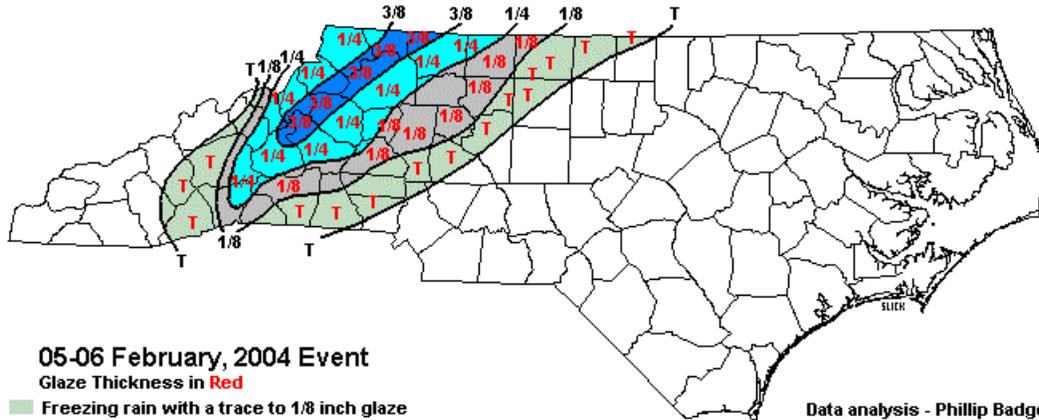
DOC/NOAA/NWS/NCEP/HPC
 0900Z SURFACE ANALYSIS
 DATE: TUE FEB 03 2004
 ISSUED: 0956Z TUE FEB 03 2004
 ANALYST: HILDERBRAND/WALLACE

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February 5-6, 2004 Event...

On February 5th, a cold high pressure system centered over the Great Lakes region extended south into the Carolinas. An upper level disturbance was located over western Kansas with a weak low pressure system developing over Texas and Louisiana. On the morning of the 6th, the low pressure system had moved northeast into the Ohio Valley while a coastal front was moving west across the coastal plain of the Carolinas.

By the early morning hours of the 6th, freezing rain had developed over the northern and central Mountains and the Northwest Piedmont. During the morning, the freezing rain quickly changed to rain across the Piedmont with freezing rain changing to a mix of rain and freezing rain across the Foothills. Freezing rain continued to fall for much of the day across the northern and central mountains. Up to ¾ of an inch of freezing rain accumulated across portions of the Mountains resulting in downed tree limbs, trees, and power lines.

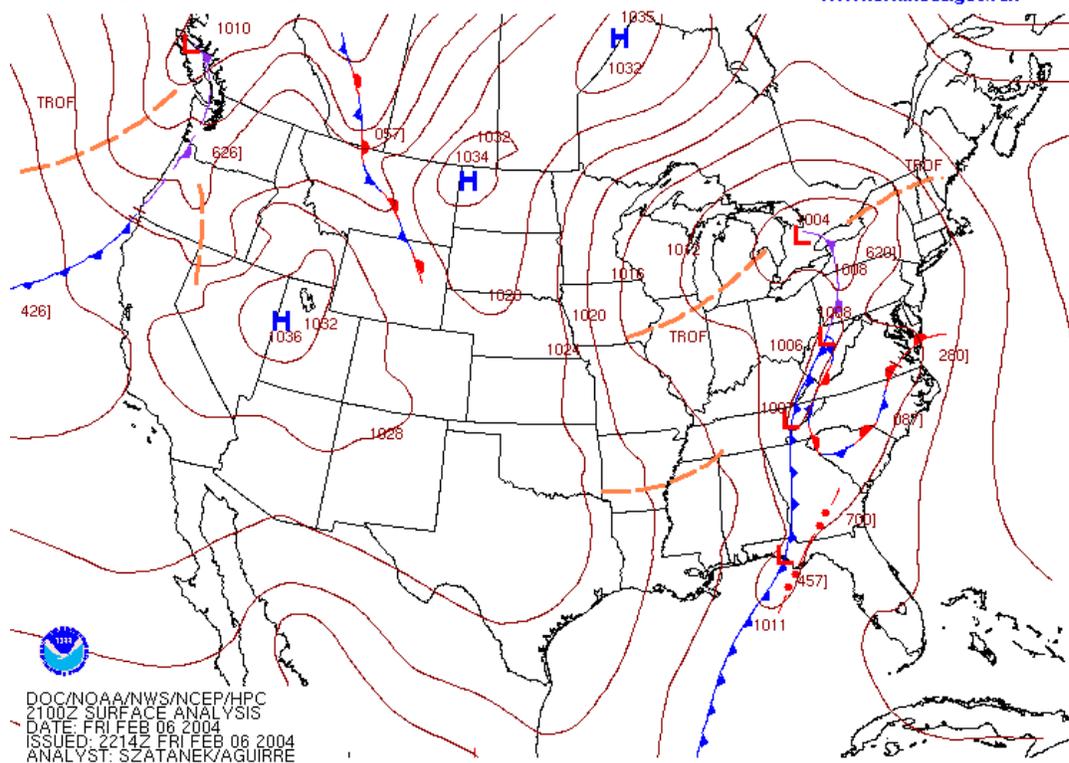


05-06 February, 2004 Event

Glaze Thickness in Red

- Freezing rain with a trace to 1/8 inch glaze
- Freezing rain with 1/8 to 1/4 inch glaze
- Freezing rain with 1/4 to 3/8 inch glaze
- Freezing rain with 3/8 inch glaze or greater

Data analysis - Phillip Badgett
Graphic - Jonathan Blaes
NWS Raleigh, NC
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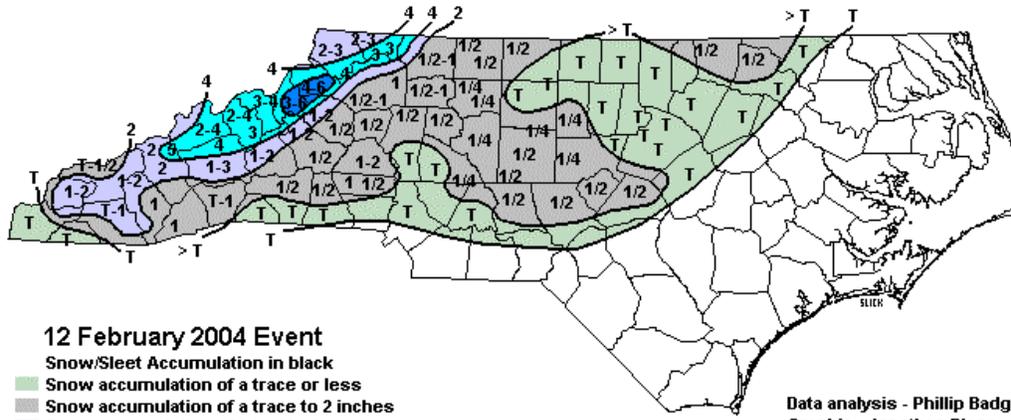
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2100Z SURFACE ANALYSIS
DATE: FRI FEB 06 2004
ISSUED: 2214Z FRI FEB 06 2004
ANALYST: SZATANEK/AGUIRRE

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February 12, 2004 Event...

A very active southern branch of the jet stream brought a period of active weather across the Southeast U.S. during the second and third week of February. An area of low pressure developed along the Gulf Coast early on the 12th while a weak surface high was moving off the New Jersey coast.

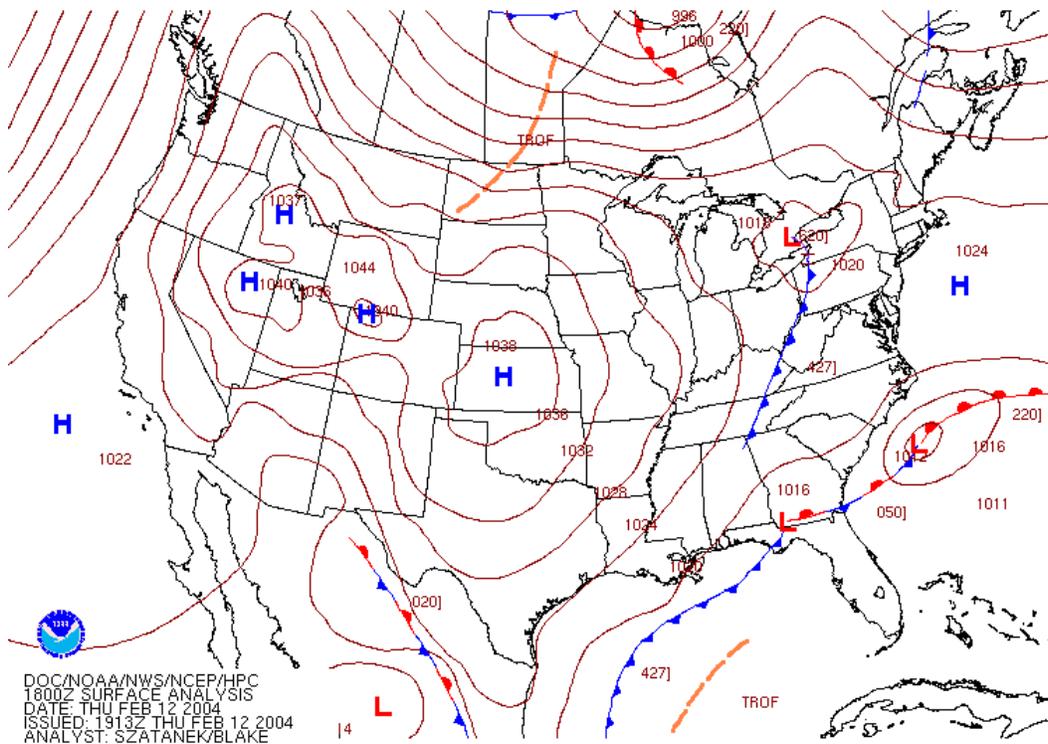
Snow developed across the mountains and Northwestern Piedmont early on the 12th. Generally light precipitation spread east across the central and eastern N.C. during the day. The precipitation generally fell as rain east of the mountains, but it occasionally mixed with and briefly changed to snow during bursts of moderate precipitation. Snow accumulations were mainly limited to the mountains, with some locations across the Foothills, Piedmont and Sandhills getting a dusting of snow.



12 February 2004 Event

- Snow/Sleet Accumulation in black
- Snow accumulation of a trace or less
- Snow accumulation of a trace to 2 inches
- Snow accumulation of 2 to 4 inches
- Snow accumulation of 4 to 6 inches

Data analysis - Phillip Badgett
 Graphic - Jonathan Blaes
 NWS Raleigh, NC
www.erh.noaa.gov/rah



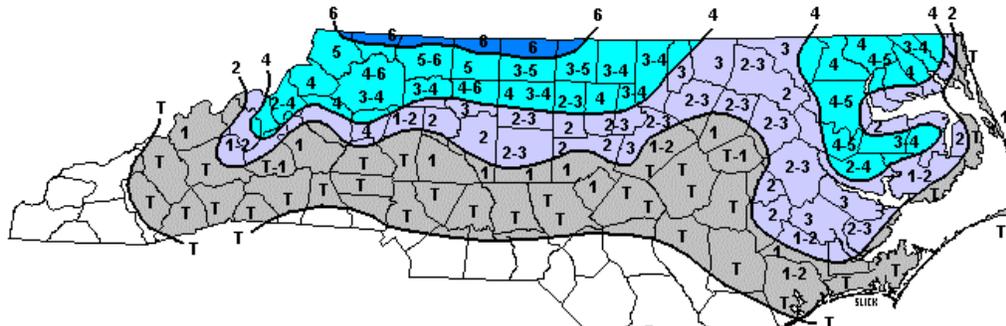
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 1800Z SURFACE ANALYSIS
 DATE: THU FEB 12 2004
 ISSUED: 1913Z THU FEB 12 2004
 ANALYST: SZATANEK/BLAKE

A Look Back at the Winter Storms Affecting Central North Carolina during the 2003-2004 Winter Season

February 15-16, 2004 Event

A significant winter storm affected the state on the 14th and 15th of February. A strong upper level low in the southern branch of the jet stream moved east across Mississippi and Alabama on the 14th, then across N.C. on the 15th. An arctic high pressure system nosed south from Minnesota into N.C. on the 14th as precipitation moved into the state. The precipitation tapered off during the evening of the 15th.

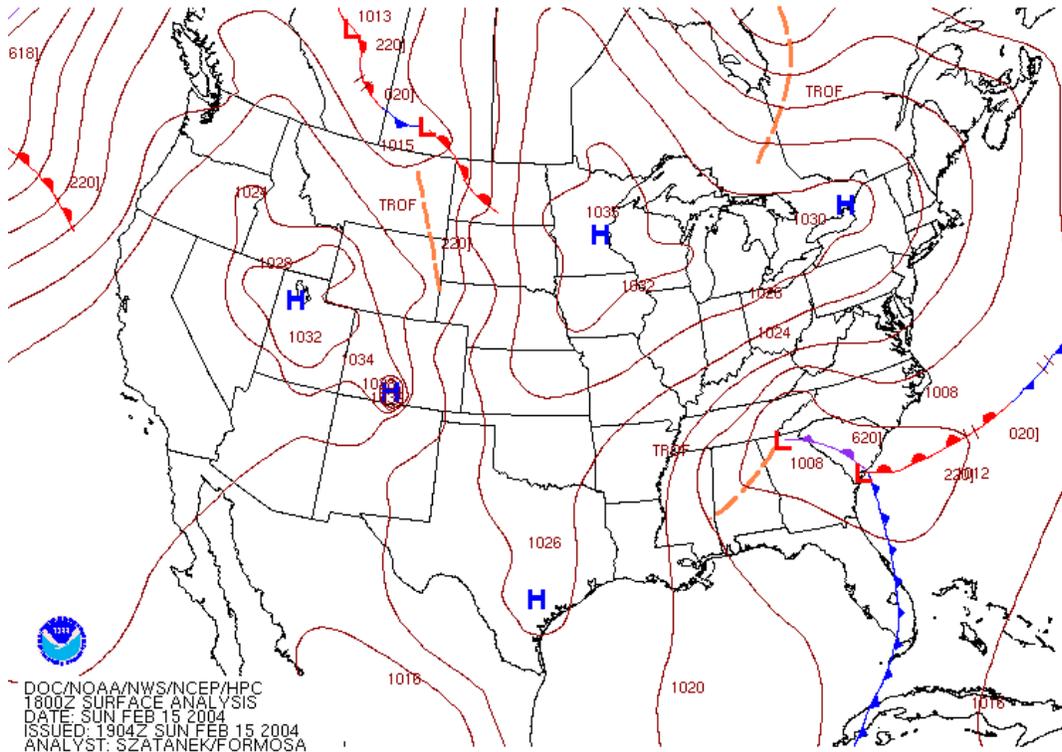
The precipitation fell predominately as snow with the greatest accumulations across the northern sections of the state. The snow accumulations were variable due to some snow banding.



15-16 February, 2004 Event

- Snow/Sleet Accumulation shown in Black (inches)
- Snow and sleet accumulation of a trace to 2 inches
 - Snow and sleet accumulation of 2 to 4 inches
 - Snow and sleet accumulation of 4 to 6 inches
 - Snow and sleet accumulation of 6 inches or more

Data analysis - Phillip Badgett
Graphic - Jonathan Blaes
MWS Raleigh, NC
www.erh.noaa.gov/rah



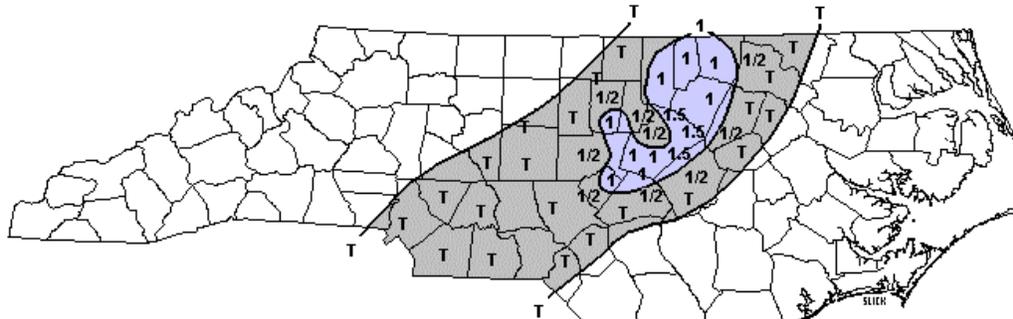
DOC/NOAA/NWS/NCEP/HPC
1800Z SURFACE ANALYSIS
DATE: SUN FEB 15 2004
ISSUED: 1904Z SUN FEB 15 2004
ANALYST: SZATANEK/FORMOSA

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February 17, 2004 Event...

The storm system that affected the region earlier in the week was lingering offshore on the 17th. A cold high pressure system extended south from New England south into the Carolinas. A moist southwesterly flow aloft transported moisture into the region at mid and upper levels of the atmosphere.

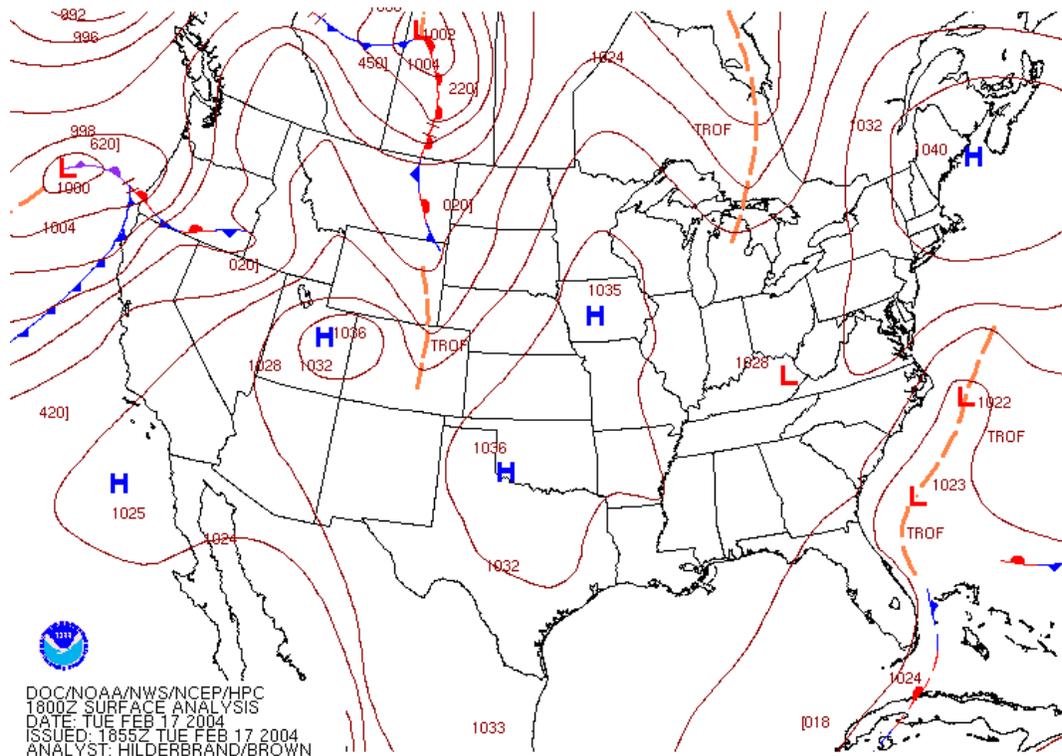
A disturbance in the southern jet stream moved northeast from Florida into eastern North Carolina on the 17th. Snow developed over the Southern Piedmont before dawn on the 17th then spread rapidly northeast across the eastern Piedmont and Coastal Plain before tapering off during the early afternoon. Snowfall amounts of 1 to 1.5 inches were common from Sanford northeast to Henderson.



17 February, 2004 Event

- Snow accumulation shown in black (inches)
- Snow accumulation of a trace to 1 inch
- Snow accumulation greater than 1 inch

Data analysis - Phillip Badgett
Graphic - Jonathan Blaes
NWS Raleigh, NC
www.erh.noaa.gov/rah



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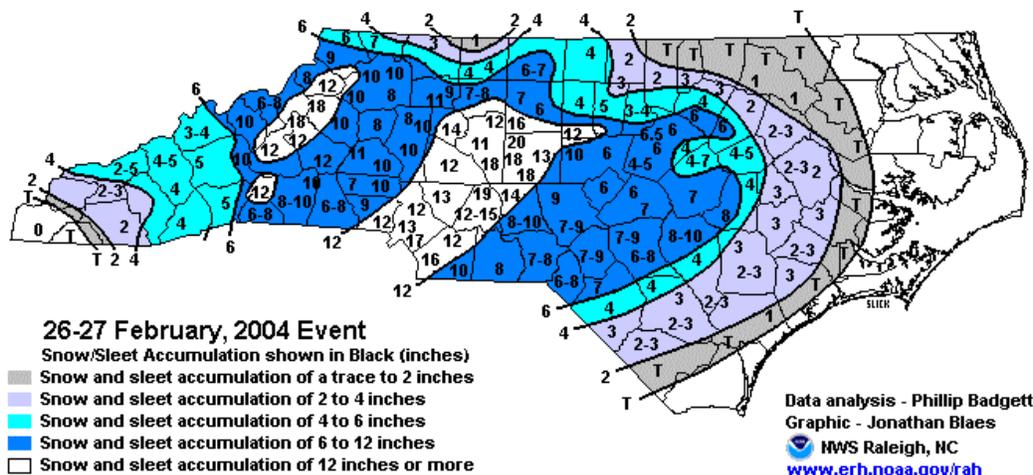
February 26-27, 2004 Event...

The most significant winter storm of the season occurred on February 26th and 27th. This storm arrived in two waves; the first wave primarily impacted the southern and southeastern sections of the state during the morning and early afternoon hours of the 26th. The second wave arrived during the evening of the 26th across western and southwestern portions of the state and then spread east late on the 26th and into the morning of the 27th across much of the Foothills and Piedmont.

Snow, moderate to heavy at times, spread north from S.C. into southern N.C. during the predawn hours on the 26th. Significant snow fell for several hours across the southern Piedmont and Sandhills during the morning. Generally light snow fell across the Piedmont, Foothills and Mountains. The snow spread slowly northward and diminished in intensity during the morning, its northward progress inhibited by a very dry atmosphere across northern N.C. The snow was diminishing during the late afternoon as it finally reached portions of the northern Piedmont and northern coastal plain.

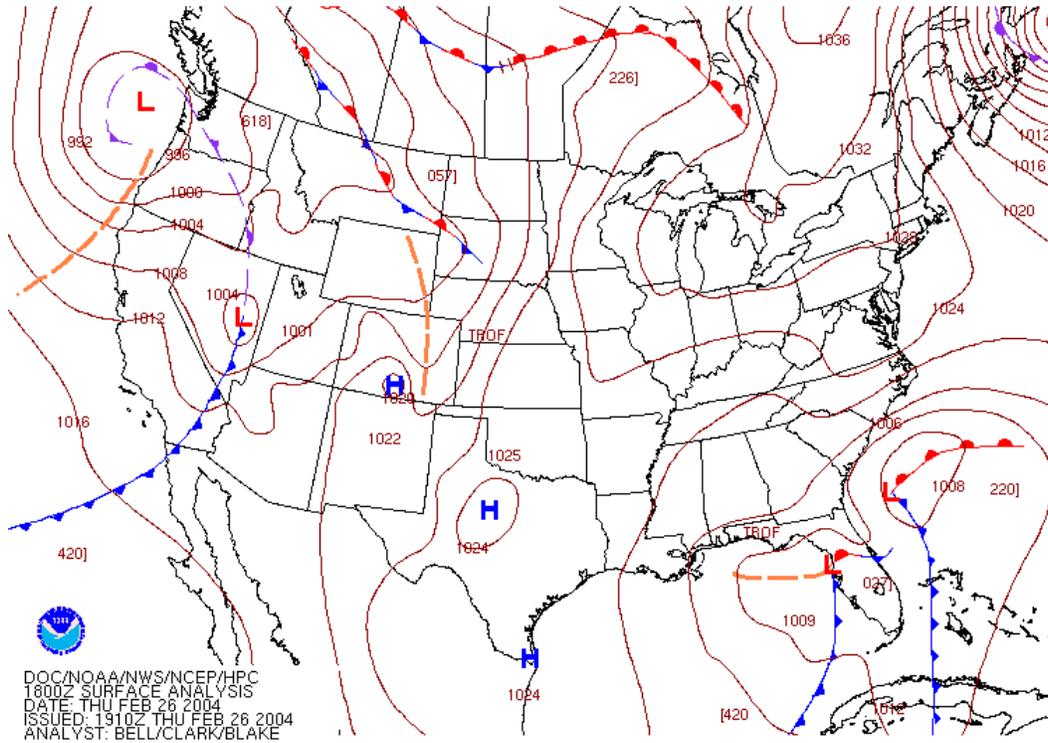
During the late afternoon, a second area of snow was developing across southwestern N.C. ahead of an upper level low pressure system. Heavy convective snow bands developed ahead of this feature as it moved slowly northeast across the southwestern Piedmont during the evening. The convective bands dumped 2 to 3 inches of snow per hour across portions of Davidson, Randolph, Stanly, Forsyth, Guilford, and Alamance counties. Storm totals reached as high as 18-22 inches across portions of Davidson, Stanly, southwestern Guilford, southern Forsyth, and Montgomery counties.

As the system slowly pushed east through the central Piedmont overnight, the snow gradually decreased in areal coverage and intensity. The precipitation rates became light by daybreak on the 27th across much of central and eastern N.C. Lingering light precipitation, a mix of rain and sleet across the Piedmont and just rain across locations east of the Piedmont fell for much of the morning before tapering off to drizzle by afternoon.



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February 26-27, 2004 Event (continued) ...



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