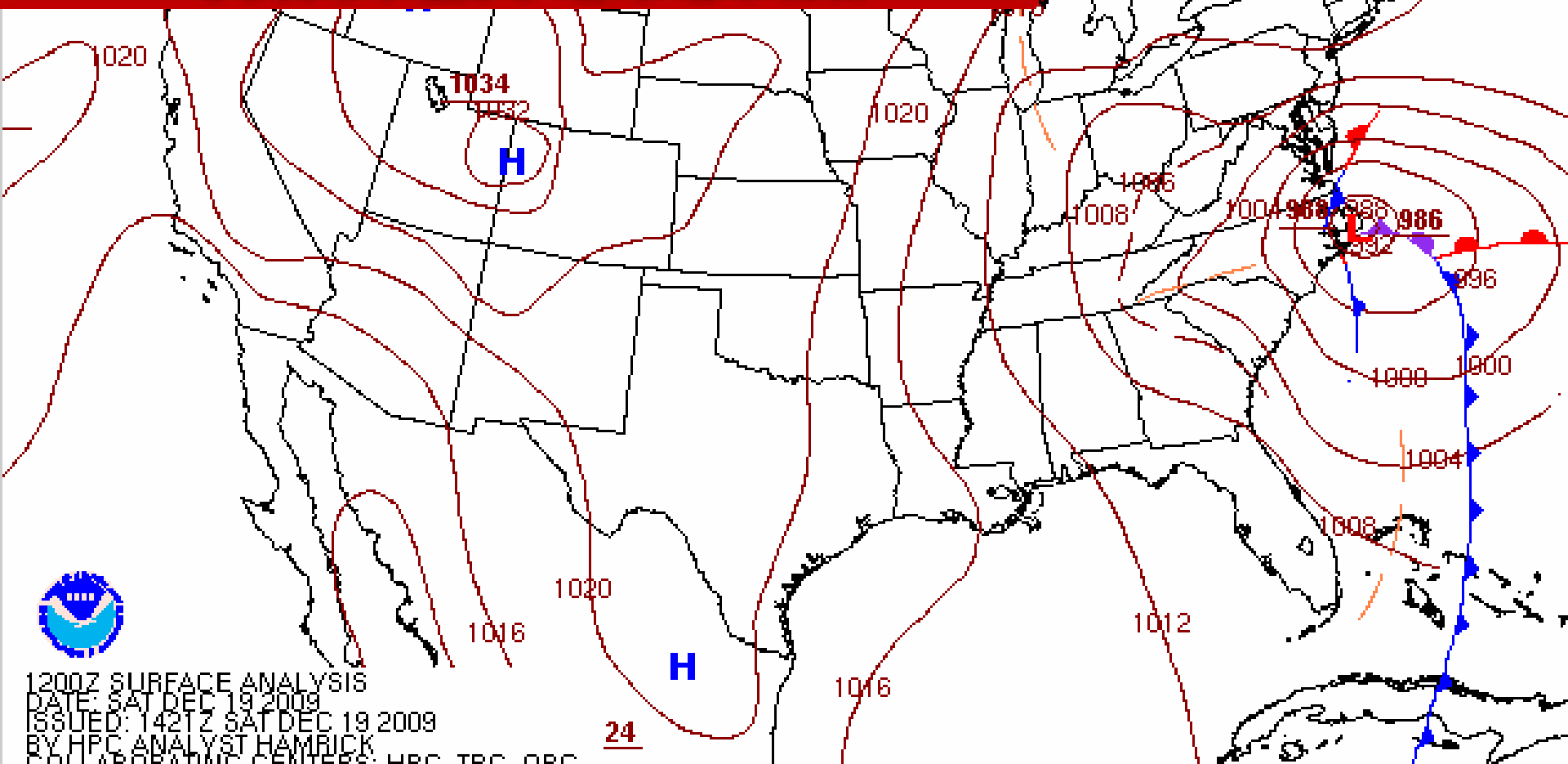


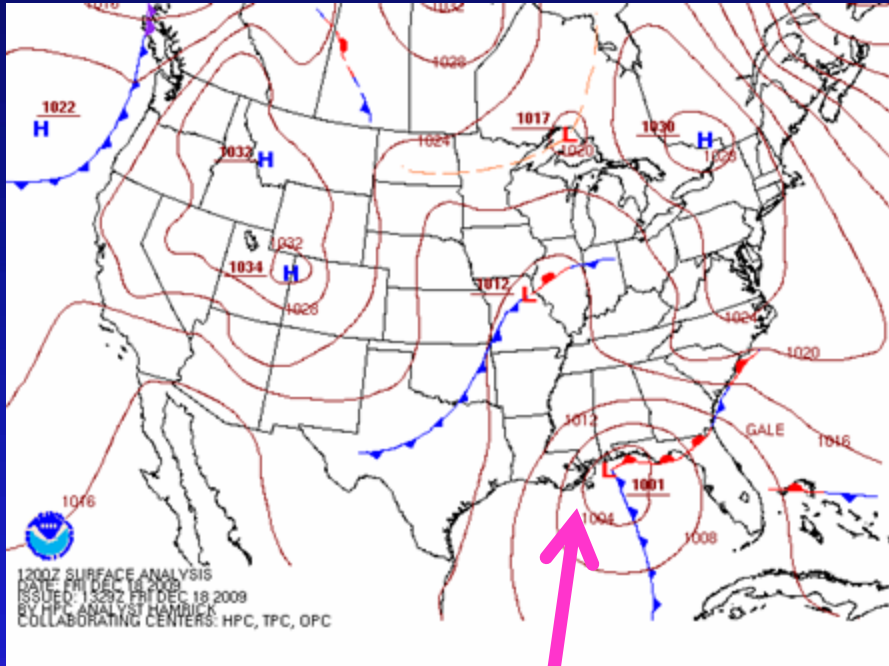
DECEMBER 18-19TH 2009 EAST COAST WINTER STORM



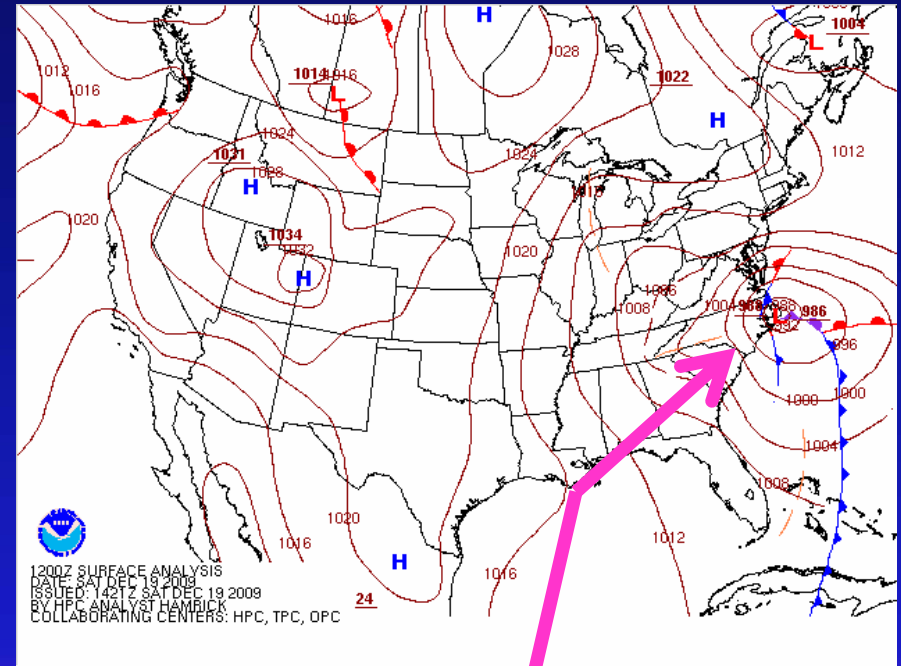
24

The Synoptic Setup (Surface)

12Z (7 am EST) Fri Dec 18th



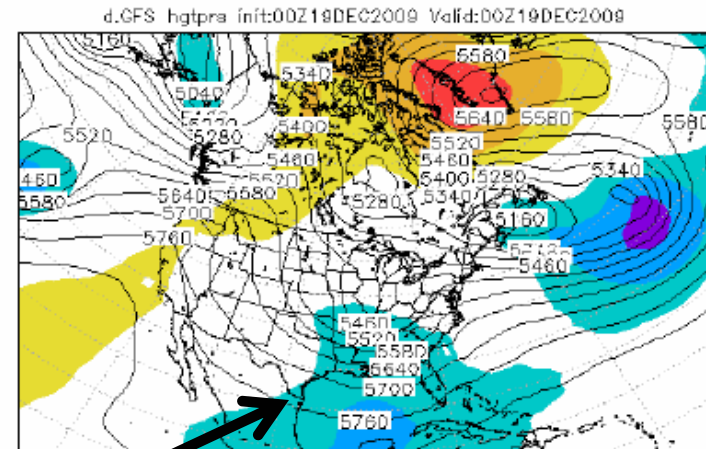
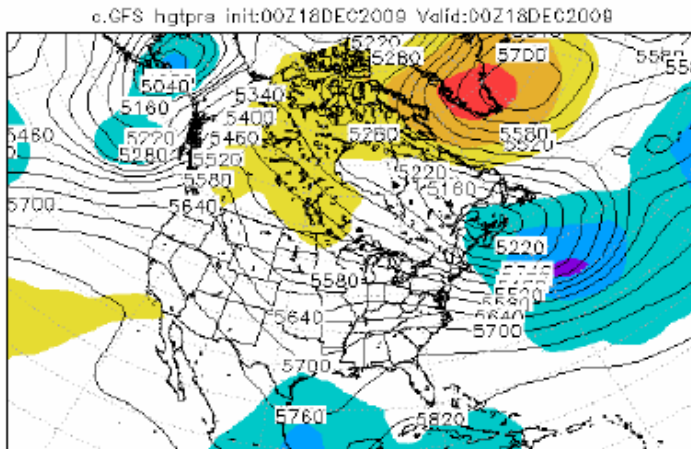
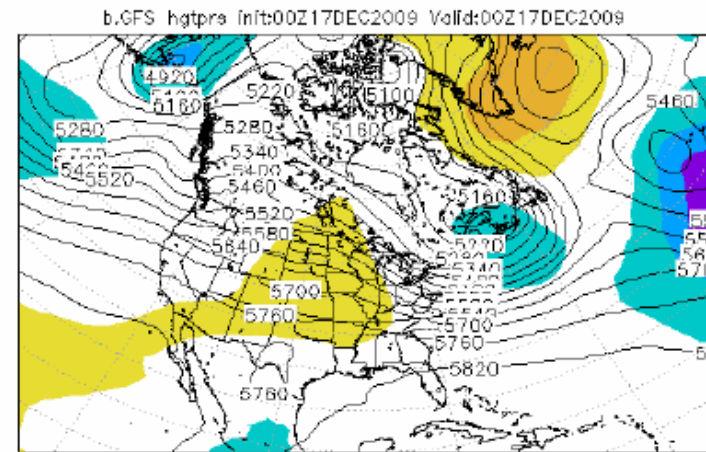
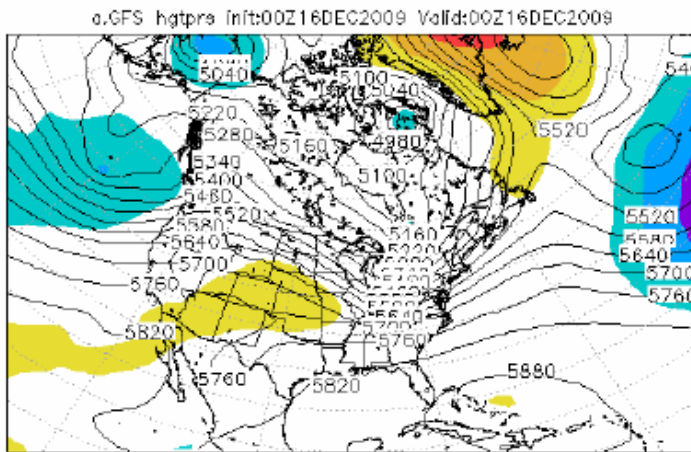
12Z (7 am EST) Sat Dec 19th



Weather across the Mid-Atlantic is quiet as low pressure moves along the Gulf Coast region Friday morning.

One day later... Low pressure has redeveloped and intensified off the Coastal Carolinas by early Saturday morning.

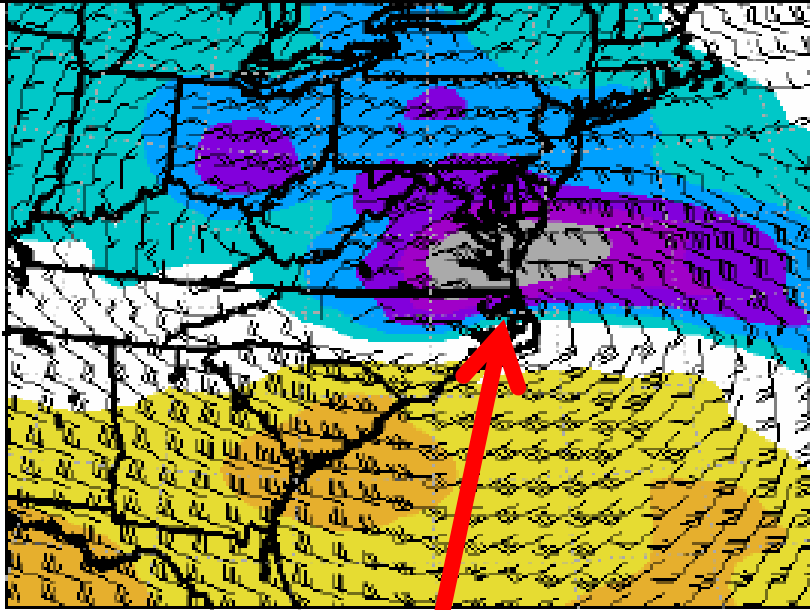
The Synoptic Setup (500 mb)



GFS 0-Hour 500mb height and anomalies from a) 00z/16Dec through d) 00z/19Dec.
Notice the deepening upper level trough over the southeastern U.S. denoted in figure d. Friday night (500 mb heights are between 1 and 2 standard deviations below normal).

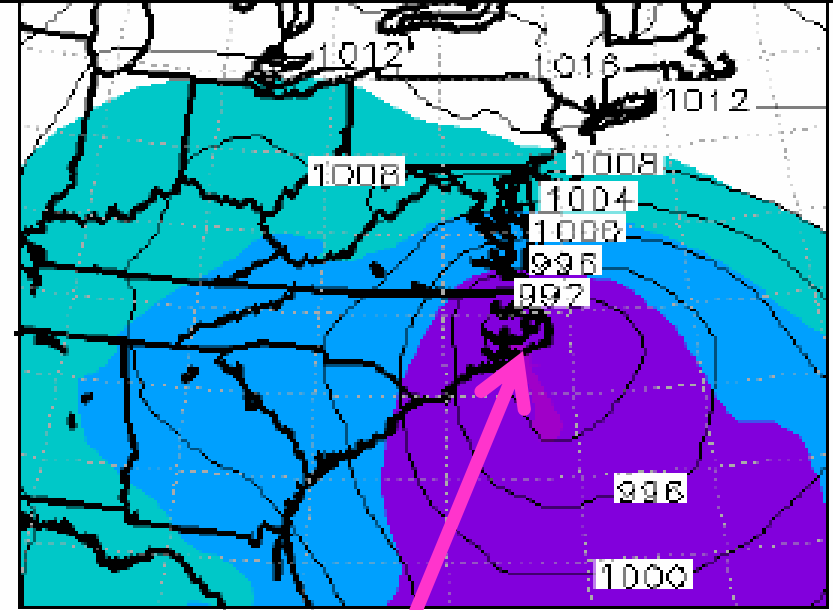
Significant/Anomalous

Valid 12Z (7 am EST) Sat Dec 19th



The map above depicts the (east-west component) of the 850 mb winds compared to climatology. Note the large area of eastern Virginia that is at least **5 standard deviations** outside of normal. This indicates the potential for an extreme “event”.

12Z (7 am EST) Sat Dec 19th



The map above is a model depiction of the mean sea level pressure (MSLP) compared to climatology. The combination of a positive anomaly (not shown/over eastern Canada) and a strong negative anomaly centered off the coastal Carolinas is a common setup for high winds and a potential extreme “event”.

Winter Storm
Watches posted
Thursday
afternoon the 17th
in advance of the
storm

Winter Weather Warnings / Watches / Advisories

Issued by NWS Wakefield, VA

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000
WWUS41 KAKQ 172053
WSWAKQ

URGENT - WINTER WEATHER MESSAGE
NATIONAL WEATHER SERVICE WAKEFIELD VA
353 PM EST THU DEC 17 2009

VAZ048-049-060>071-079-080-180500-
/O.NEW.KAKQ.WS.A.0005.091218T2100Z-091220T0500Z/
FLUVANNA-LOUISA-PRINCE EDWARD-CUMBERLAND-GOOCHLAND-HANOVER-
CAROLINE-MECKLENBURG-LUNENBURG-NOTTOWAY-AMELIA-POWHATAN-
CHESTERFIELD-HENRICO-BRUNSWICK-DINWIDDIE-
INCLUDING THE CITIES OF...LOUISA...FARMVILLE...GOOCHLAND...
ASHLAND...SOUTH HILL...CREWE...COLONIAL HEIGHTS...RICHMOND...
LAWRENCEVILLE
353 PM EST THU DEC 17 2009

...WINTER STORM **WATCH** IN EFFECT FROM FRIDAY AFTERNOON THROUGH
SATURDAY EVENING...

THE NATIONAL WEATHER SERVICE IN WAKEFIELD HAS ISSUED A WINTER
STORM **WATCH**...WHICH IS IN EFFECT FROM FRIDAY AFTERNOON THROUGH
SATURDAY EVENING.

A MIX OF RAIN AND SNOW IS EXPECTED TO DEVELOP OVER MUCH OF
CENTRAL AND SOUTHSIDE VIRGINIA LATER FRIDAY AFTERNOON...AS A LOW
PRESSURE SYSTEM STRENGTHENS ALONG THE SOUTHEAST UNITED STATES
COAST.

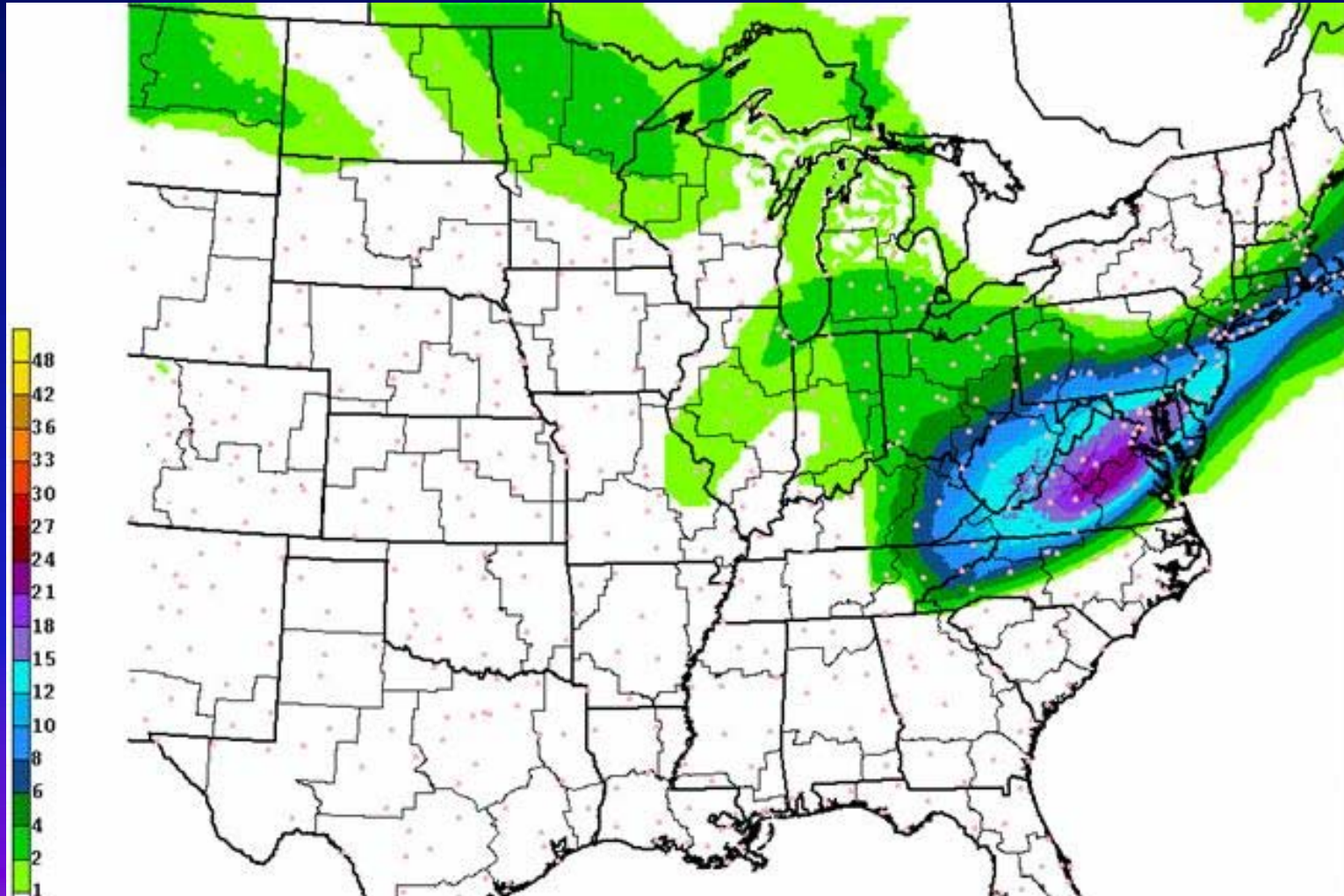
FOR FRIDAY NIGHT...MAINLY SNOW IS EXPECTED TO THE WEST OF
INTERSTATE 95...WITH THE SNOW POSSIBLY MIXING WITH RAIN OR SLEET
ALONG AND TO THE EAST OF INTERSTATE 95. AFTER DAYBREAK
SATURDAY...THE ENTIRE AREA SHOULD SEE A CHANGEOVER TO ALL SNOW.
SIGNIFICANT ACCUMULATIONS OF SNOW ARE EXPECTED...WITH 6 TO 12
INCHES MAINLY FROM LATER SATURDAY MORNING THROUGH SATURDAY
EVENING. THERE IS THE POTENTIAL FOR MORE THAN 12 INCHES OF SNOW
WELL TO THE WEST OF RICHMOND ACROSS THE PIEDMONT COUNTIES.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A WINTER STORM **WATCH** MEANS THERE IS A POTENTIAL FOR SIGNIFICANT
SNOW...SLEET...OR ICE ACCUMULATIONS THAT MAY IMPACT TRAVEL.
CONTINUE TO MONITOR THE LATEST FORECASTS.

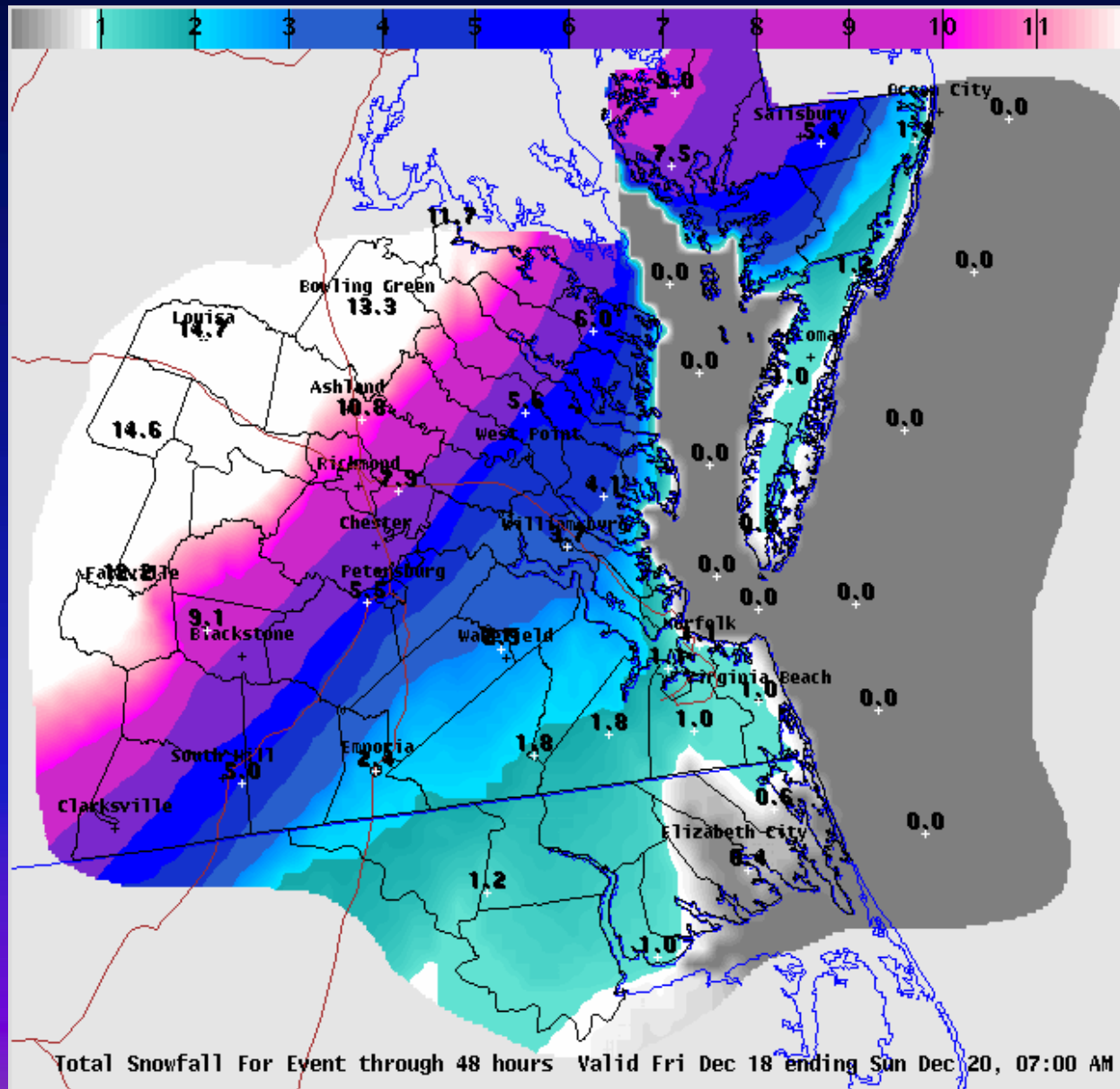
66

HPC Winter Storm Forecast



24 hour Forecast - Issued 7AM Fri 12/18 (6-18 Hours before event)

Wakefield Snowfall Event Forecast



Total Snowfall For Event through 48 hours Valid Fri Dec 18 ending Sun Dec 20, 07:00 AM



Issued Fri Dec 18th 1 am - (12-24 hrs before event)



SPC Mesoscale Discussion

MESOSCALE DISCUSSION 2258
NWS STORM PREDICTION CENTER NORMAN OK
0622 PM CST FRI DEC 18 2009

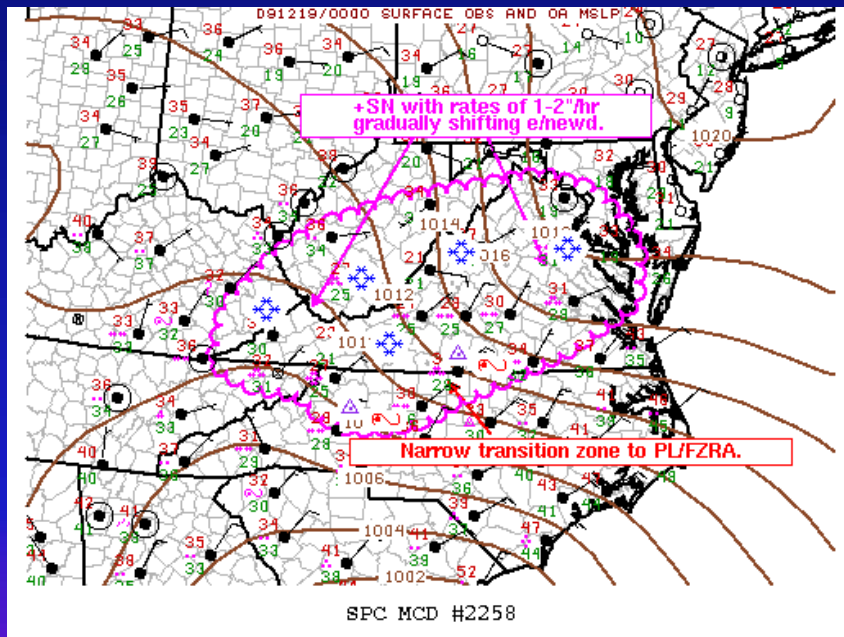
AREAS AFFECTED...PORTIONS OF THE CNTRL/SRN APPALACHIANS AND LOWER
MID-ATLANTIC

CONCERNING...HEAVY SNOW

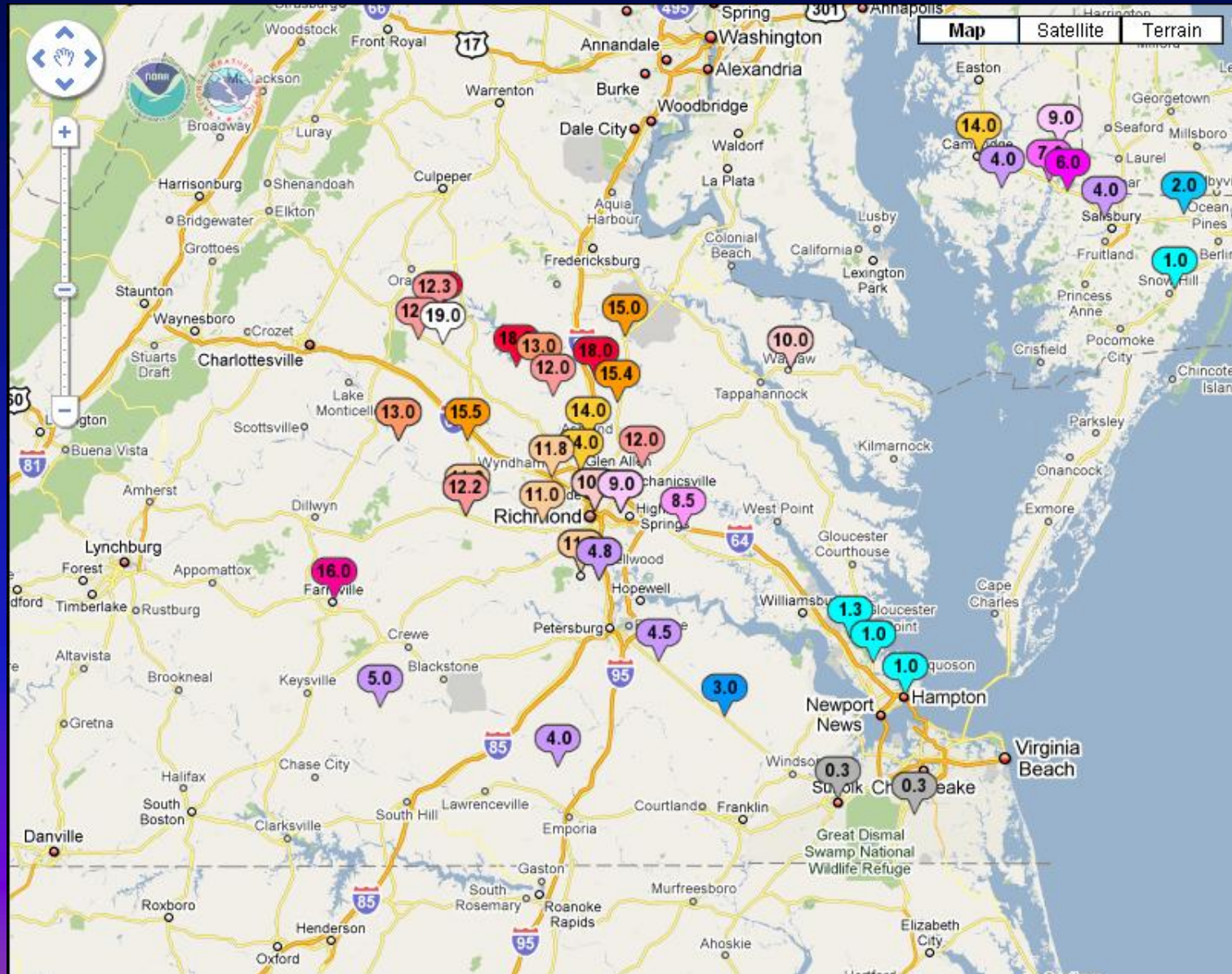
VALID 190022Z - 190515Z

HEAVY SNOW WITH RATES OF 1 TO 2 IN/HR WILL GRADUALLY TRANSLATE
E/NEWD THROUGH 06Z...TOWARDS THE I-95 CORRIDOR FROM THE WASHINGTON
D.C. TO RICHMOND METRO AREAS. LOCALIZED CONVECTIVE BURSTS MAY YIELD
RATES UP TO 3 IN/HR. A NARROW TRANSITIONAL CORRIDOR OF SLEET TO
FREEZING RAIN MAY DEVELOP ACROSS PORTIONS OF THE PIEDMONT IN WRN NC
TO S-CNTRL VA.

AS OF 0015Z...A BROAD SWATH OF MODERATE TO HEAVY SNOW PERSISTED FROM
PORTIONS OF THE CNTRL/SRN APPALACHIANS INTO THE PIEDMONT OF WRN NC
AND CNTRL/SRN VA. MULTIPLE HOURS OF SNOWFALL RATES FROM 1 TO 2 IN/HR
HAVE BEEN REPORTED SINCE 21Z ACROSS FAR ERN TN/KY...WRN NC AND SWRN
VA. LATEST MODEL FORECASTS ARE CONSISTENT WITH WEAKENING THE LEAD
SHORT WAVE TROUGH...WHICH EXTENDED FROM ERN TN/KY SWD INTO GA PER
WATER VAPOR IMAGERY. NEVERTHELESS...UPSTREAM SHORT WAVE TROUGH OVER
THE MID-MS VALLEY AND ASSOCIATED MID-LEVEL JET ARE EXPECTED TO
AMPLIFY AS THEY EJECT EWD ACROSS THE TN VALLEY. THIS WILL MAINTAIN
GRADUAL DEEPENING OF SURFACE CYCLONE ALONG COASTAL SC THROUGH 06Z.
STRONG LOW-LEVEL WAA...INFERRED BY LARGE VEEERED HODOGRAPHS IN
REGIONAL VWP DATA...SHOULD CONTINUE AS 18Z NAM/21Z RUC FORECASTS
DEPICT INTENSE LOW/MID-LEVEL ISENTROPIC/FRONTOGENETICAL ASCENT
GRADUALLY PIVOTING EWD TO THE N/NW OF THE SURFACE LOW TRACK. THIS
WILL SUPPORT SNOWFALL RATES OF 1 TO 2 IN/HR PERSISTING...WHILE THE
STRENGTH OF THE WAA MAY RESULT IN A NARROW CORRIDOR OF SLEET TO
FREEZING RAIN ACROSS PORTIONS OF WRN NC INTO S-CNTRL VA.



AKQ - Snowfall Totals



Snow Totals

*****STORM TOTAL SNOWFALL*****

LOCATION	STORM TOTAL SNOWFALL (INCHES)	TIME/DATE OF MEASUREMENT	COMMENTS
MARYLAND			
...DORCHESTER COUNTY...			
CAMBRIDGE	14.0	240 PM 12/20	
SEWARD	12.0	240 PM 12/20	
ELDORADO	9.0	241 PM 12/20	
VIENNA	7.0	700 AM 12/20	
...WICOMICO COUNTY...			
DISTRICT 9	4.0	700 AM 12/20	5" WEST SIDE OF TOWN
WILLARDS PARK AND	2.0	700 AM 12/20	
...WORCESTER COUNTY...			
DISTRICT 2 (SNOW)	1.0	1100 PM 12/20	8 MI WEST IN WHITESBURG
VIRGINIA			
...LOUISA COUNTY...			
LOUISA	19.0	800 PM 12/19	
BUMPASS	18.0	700 PM 12/19	
LAKE LOUISA	18.0	100 PM 12/19	7 MI NW OF LOUISA
...CAROLINE COUNTY...			
RUTHER GLEN	18.0	850 PM 12/19	
COVINGSTON CORNER	15.4	900 PM 12/19	
BOWLING GREEN	15.0	900 PM 12/19	4 MI WEST OF CITY
...PRINCE EDWARD COUNTY...			
FARMVILLE	16.0	1100 AM 12/20	
...GOOCHLAND COUNTY...			
SANDY HOOK	15.5	1000 AM 12/19	
MANAKIN-SABOT	15.5	700 PM 12/19	
...FLUVANNA COUNTY...			
COLUMBIA	15.0	200 PM 12/19	
...HANOVER COUNTY...			
GLEN ALLEN	14.0	830 PM 12/19	
ASHLAND	14.0	1000 AM 12/19	
BEAVERDAM	13.0	646 AM 12/19	TYLER STATION
COATESVILLE	12.0	730 AM 12/19	
...HENRICO COUNTY...			
SHORT PUMP	14.0	1000 AM 12/19	
HENRICO	13.0	700 PM 12/19	RT 6 NEAR PARHAM RD
HENRICO	11.3	700 PM 12/19	1-295 AND RTE 33
HENRICO	9.0	257 AM 12/19	GASKINS RD. @ I-64

...POWHATAN COUNTY...			
POWHATAN	12.2	700 PM 12/19	NEAR PINE TREE
POWHATAN	11.0	803 AM 12/20	20 WEST OF RICHMOND
...KING WILLIAM COUNTY...			
STUDLEY	12.0	220 PM 12/19	5 MILES N STUDLEY
...CITY OF RICHMOND...			
CITY OF RICHMOND W	11.5	100 PM 12/19	NEAR WILLOW LAWN MALL
CITY OF RICHMOND SW	10.0	100 PM 12/19	2 MI SW OF CIT
RICHMOND APRT	7.4	700 AM 12/20	RIC ASOS
...CHESTERFIELD COUNTY...			
CHIPPENHAM	11.5	700 PM 12/19	RTE 360 & 5 MI W CHIPPENHAM
SALISBURY LAKE DAM	11.0	630 PM 12/19	
CHESTERFIELD	9.0	1100 AM 12/19	1/4M E HULL ST RD/RTE 288
CHESTER	5.8	1245 AM 12/19	RT. 10 AT I-295
CHESTER	4.8	700 AM 12/19	WALTHALL
CHESTERFIELD	4.5	700 PM 12/19	SALEM CHURCH AND CENTRALI
...RICHMOND COUNTY...			
WARSAW	10.0	426 PM 12/20	
...NEW KENT COUITY...			
BOTTOMS BRIDGE	8.5	700 AM 12/20	2MI E OF RTE 249 & RTE 60
...LUNENBURG COUNTY...			
VICTORIA	5.0	630 PM 12/19	FIRE STATION
...PRINCE GEORGE COUNTY...			
DISPUTANTIA	4.5	438 PM 12/20	
...GREENSVILLE COUNTY...			
PURDY	4.0	350 PM 12/20	
...SUSSEX COUNTY...			
WAKEFIELD	3.0	630 PM 12/19	NWS OFFICE
...CITY OF HAMPTON...			
HAMPTON	1.3	1000 PM 12/19	LANCASTER TERRACE
HAMPTON	1.0	900 PM 12/19	NEAR HOLIDAY PARK
...NEWPORT NEWS...			
BEACONSDALE	1.2	700 PM 12/19	NEAR DEER PARK
...YORK COUNTY...			
TABB	1.0	700 AM 12/20	
...CITY OF CHESAPEAKE...			
WESTERN BRANCH	0.3	900 AM 12/20	EXIT 10 ON I-664
...CITY OF SUFFOLK...			
BURBAGE BRANT	0.3	900 AM 12/20	
...CITY OF NORFOLK...			
NORFOLK APRT	0.2	900 AM 12/20	NORFOLK ASOS

Richmond Top 5 December Snowfalls

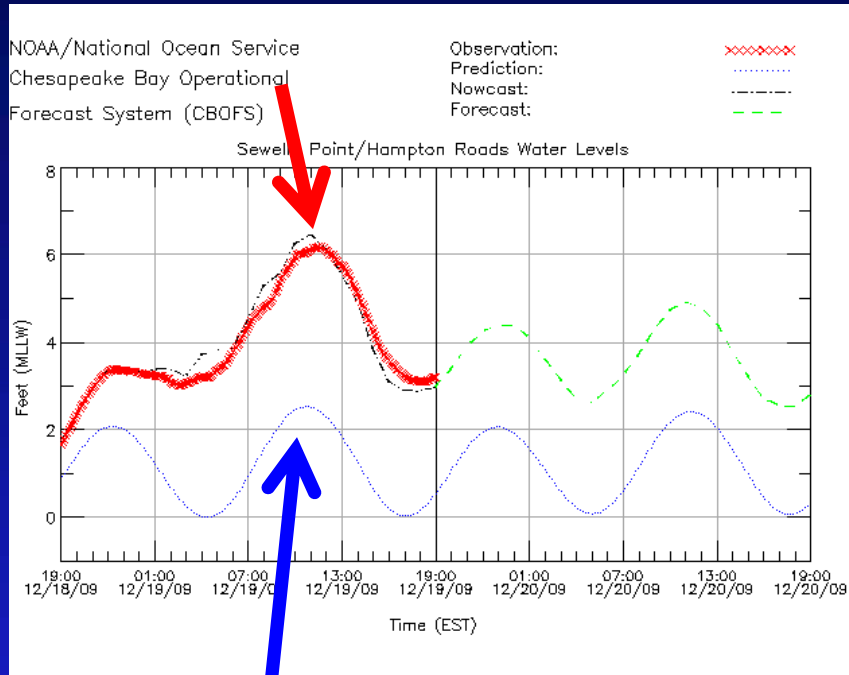
Rank	Date	Amount
1)	Dec 22-23, 1908	17.2"
2)	Dec 12-14, 1917	10.4"
3)	Dec 23-24, 1966	8.8"
4)	Dec 17, 1932	7.5"
5)	Dec 18-19, 2009	7.4"

Winds

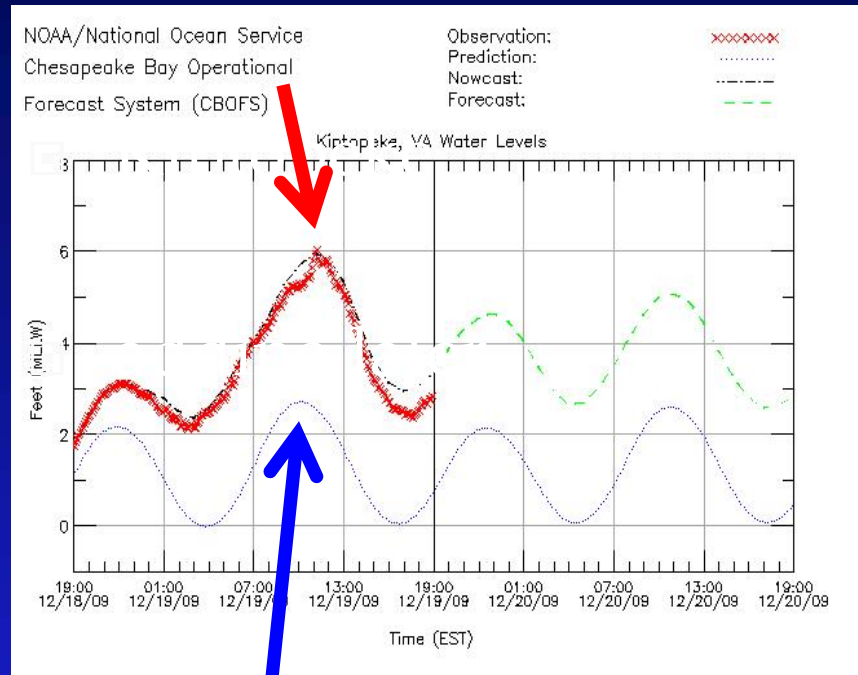
LOCATION	PEAK WIND GUST (MPH)*
CHLV2 (CHESAPEAKE LIGHT VA)	61 (1000 AM EST 12/19)
DUCN1 (DUCK PIER NC)	59 (1000 AM EST 12/19)
C9705 (DELTAVILLE VA)	56 (936 AM EST 12/19)
44009 (BUOY 15NM E OF FENWICK IS. DE)	54 (1250 PM EST 12/19)
CBBV2 (CHES. BAY BRIDGE TUNNEL VA)	53 (254 AM EST 12/19)
DUKN7 (DUCK COE PIER NC)	53 (1006 AM EST 12/19)
RPLV2 (RAPPAHANNOCK LIGHT VA)	52 (136 PM EST 12/19)
YKRV2 (YORK RIVER LIGHT VA)	50 (700 AM EST 12/19)
KWAL (WALLOPS ISLAND VA)	48 (1001 AM EST 12/19)
WAHV2 (WACHAPREAGUE VA)	47 (818 AM EST 12/19)
OCIM2 (OCEAN CITY INLET MD)	47 (848 AM EST 12/19)
KOXB (OCEAN CITY MD)	47 (1253 PM EST 12/19)
44014 (FALSE CAPE VA)	47 (350 AM EST 12/19)
KLFI (LANGLEY AFB VA)	40 (703 AM EST 12/19)
BBYV2 (BACK BAY/VA BEACH VA)	40 (827 AM EST 12/19)

Tidal Flooding

Sewells Point Tidal Gauge (near Norfolk)



Kiptopeke Tidal Gauge



Data shown above shows actual water levels (**red line**) compared to astronomical tides (**blue line**). The gauge peaked at **6.19 ft** above mean lower low water (MLLW) at 1142 am EST day December 19th. This was nearly 4 feet higher than the astronomical high tide. This value ranks as the **11th highest** water level on record since 1930. The highest level on record occurred with the 1933 Hurricane (8.9 ft MLLW).

Data shown above shows actual water levels (**red line**) compared to astronomical tides (**blue line**). The Kiptopeke gauge peaked at **6.04 ft** above mean lower low water (MLLW) at 1112 am EST Friday December 19th. This was more than 3.5 feet higher than the astronomical high tide. This water level compares to the Twin Nor'easter of Feb 5th 1998 (6.00 ft above MLLW) . The highest level on record occurred with the Ash Wednesday Storm March 8th, 1962 (7.1 ft MLLW).