VOST Weather Brief

LCDR Jodi Beattie

Motivation

- Safety
  - Minimize risk to crew and boat
  - Weather has a role in every sailing scenario
- Efficiency
  - Understand how and when the weather changes, as it can be used to your advantage (strategy and tactics)

Weather Basics

- Pressure
- Wind
- Fronts

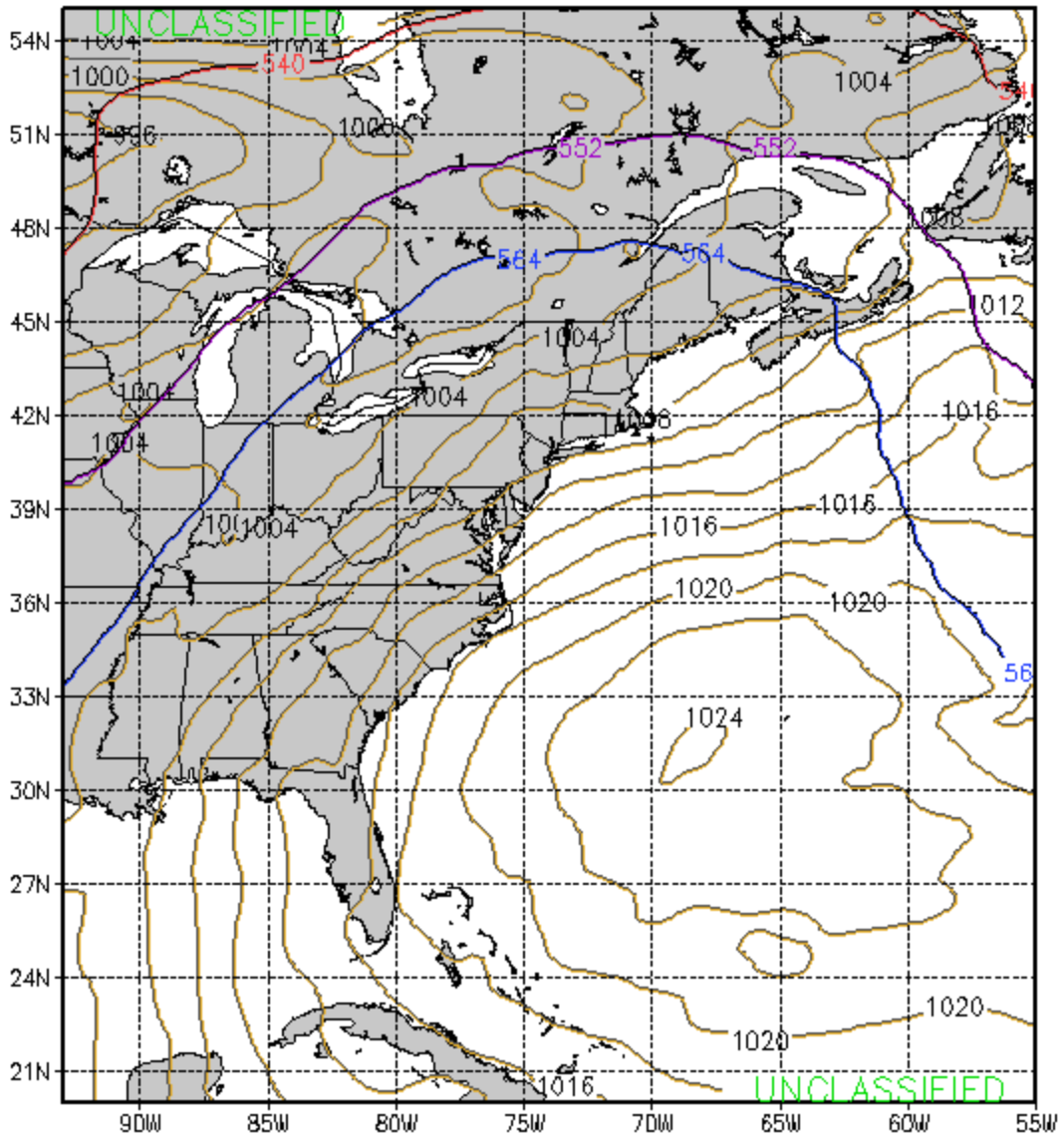
Pressure

- Isobaric (constant P) charts are analogous to terrain contours

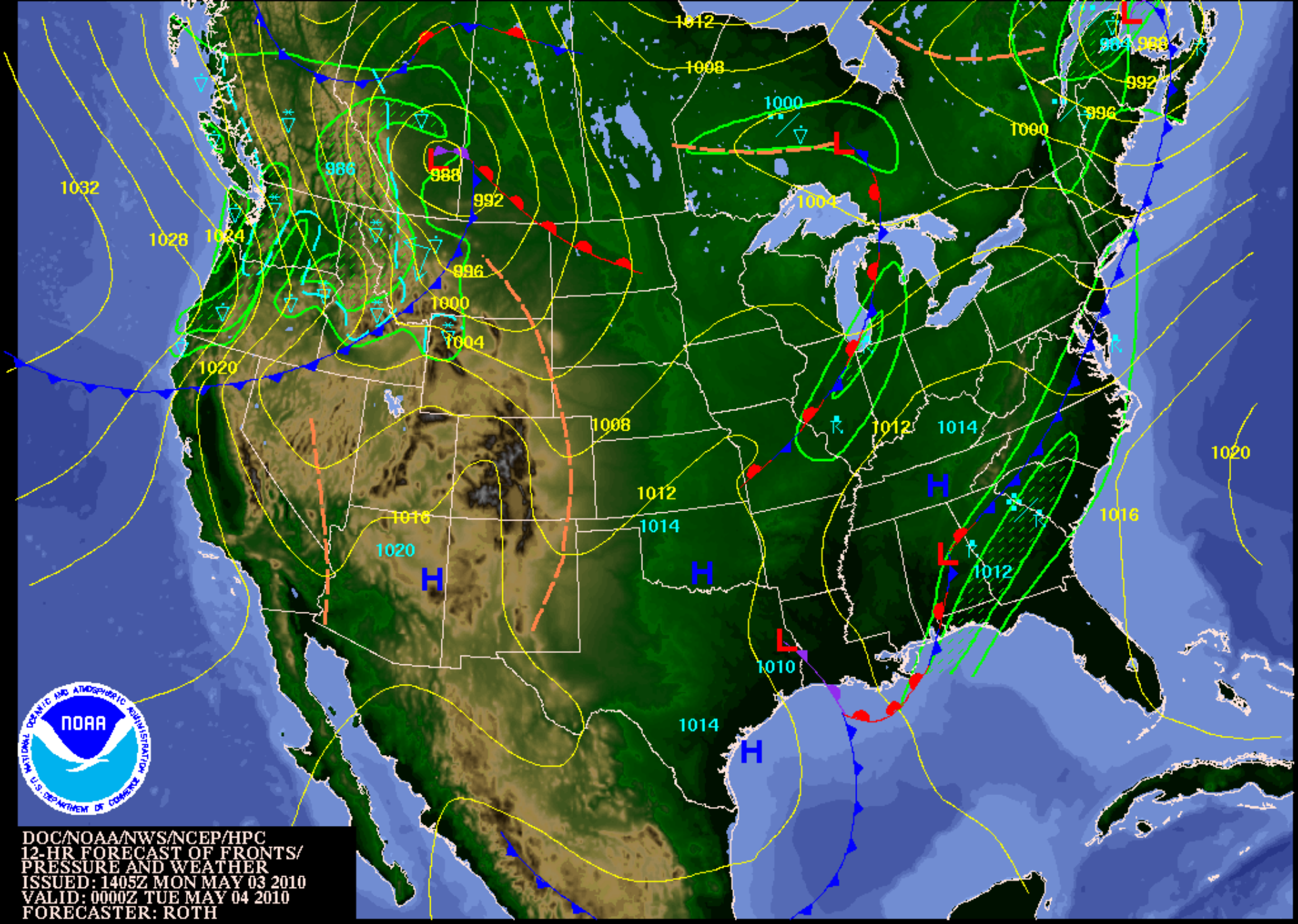
- Pressure tells us about winds
  - Wind is caused by differences in pressure, or pressure gradients
  - Air flows from **high to low**, deflected by the Coriolis force

Pressure

- Low Pressure
  - Falling P
  - CCW winds
  - Convergence
    - Upward vertical motion
  - Strong winds
  - Precipitation
- High Pressure
  - Rising P
  - CW winds
  - Divergence
    - Downward vertical motion
  - Light winds
  - Clear skies



VT: Mon 00Z 03 MAY 10
FNMOC 27km COAMPS (U): SLP[hPa]/540,528 thk 564,552 thk Line
Run: 2010050300Z Tau: 0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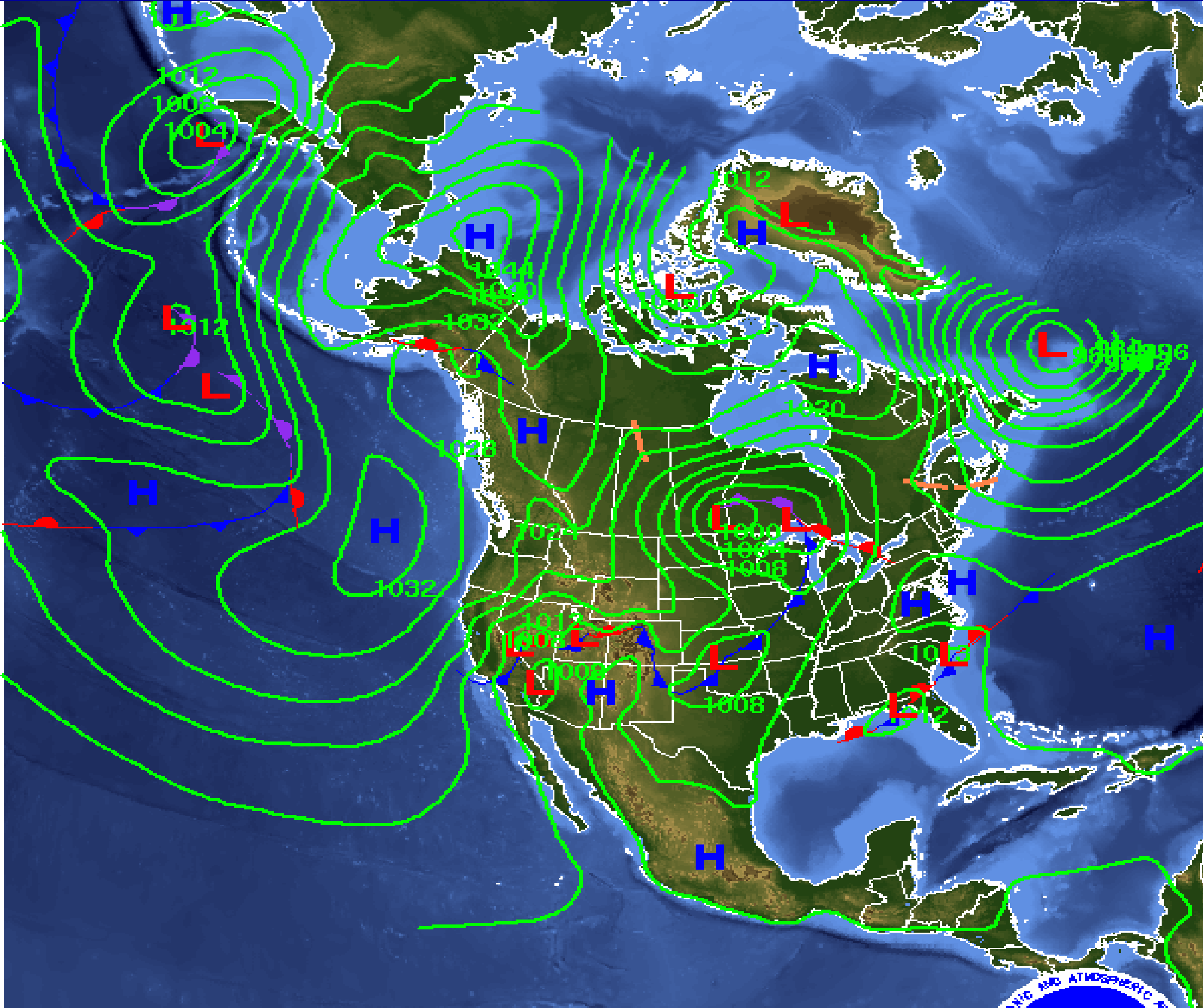
NOAA
DOC/NOAA/NWS/NCEP/HPC
12-HR FORECAST OF FRONTS/
PRESSURE AND WEATHER
ISSUED: 1405Z MON MAY 03 2010
VALID: 0000Z TUE MAY 04 2010
FORECASTER: ROTH


1012
1008
1004
1012
1044
1032
1012
1020
1028
1024
1032
1000
1004
1008
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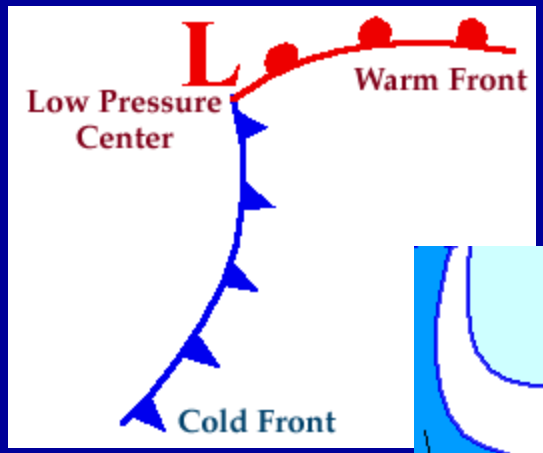
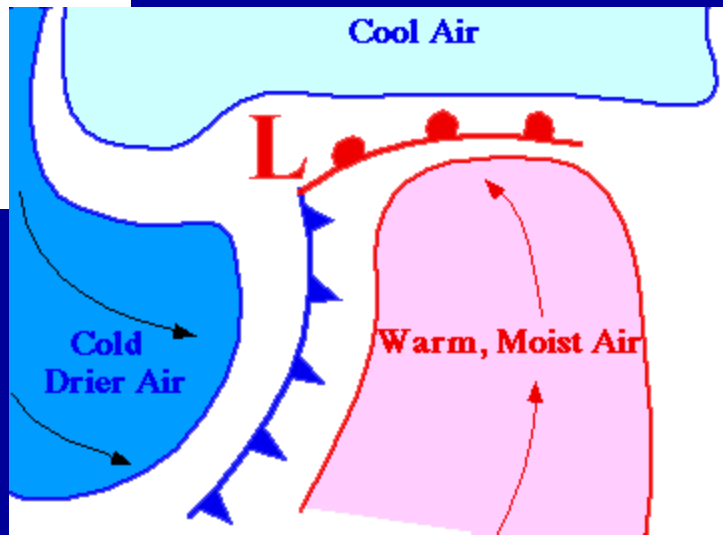
1008
1008
1008

Fronts

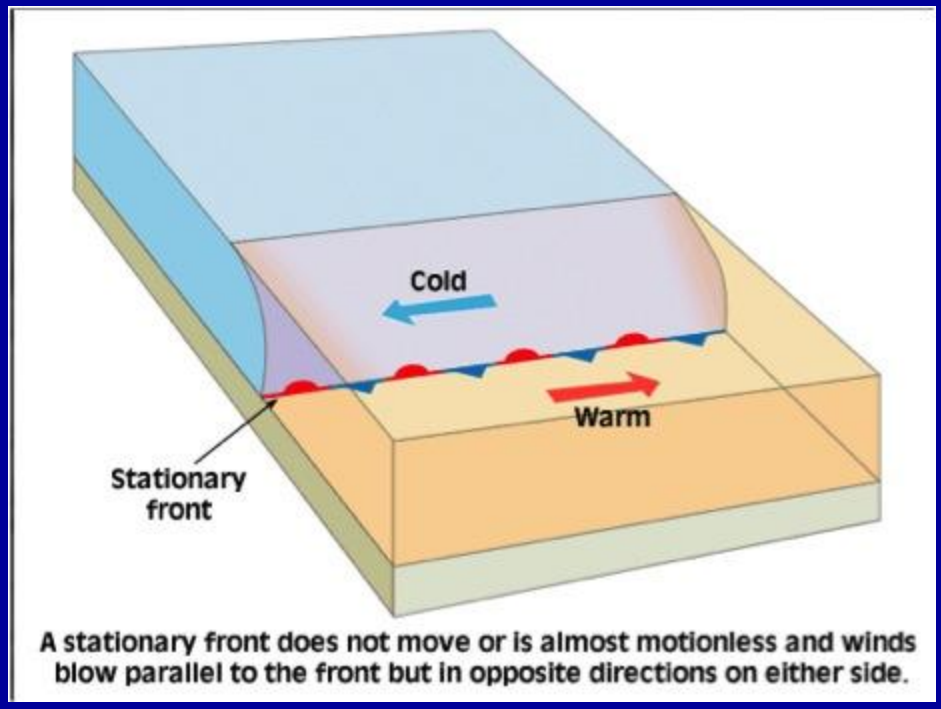
- Transition zone of two air masses of different temperatures
  - 4 types
    - Stationary
    - Cold
    - Warm
    - Occluded





Stationary Front

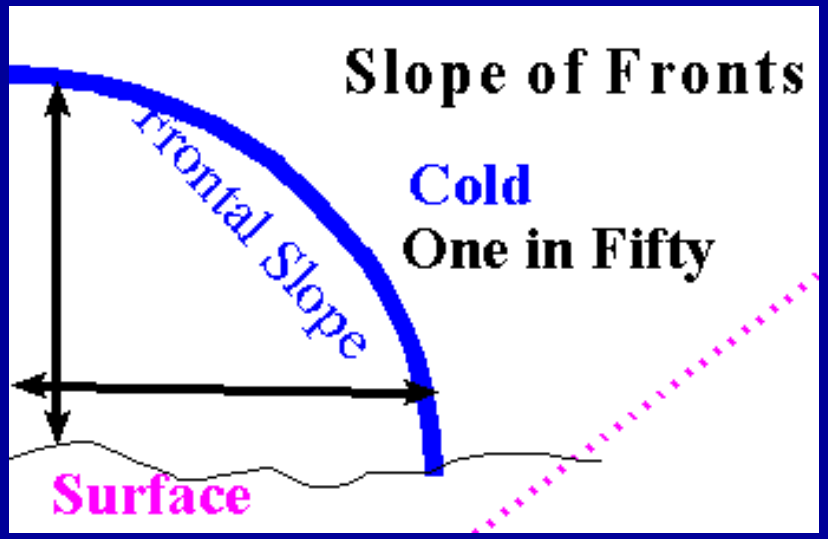
- Neither air mass moves
- Associated weather
  - Partly cloudy
  - Little precip
- Winds
  - ***Parallel*** to the front
  - Opposite directions



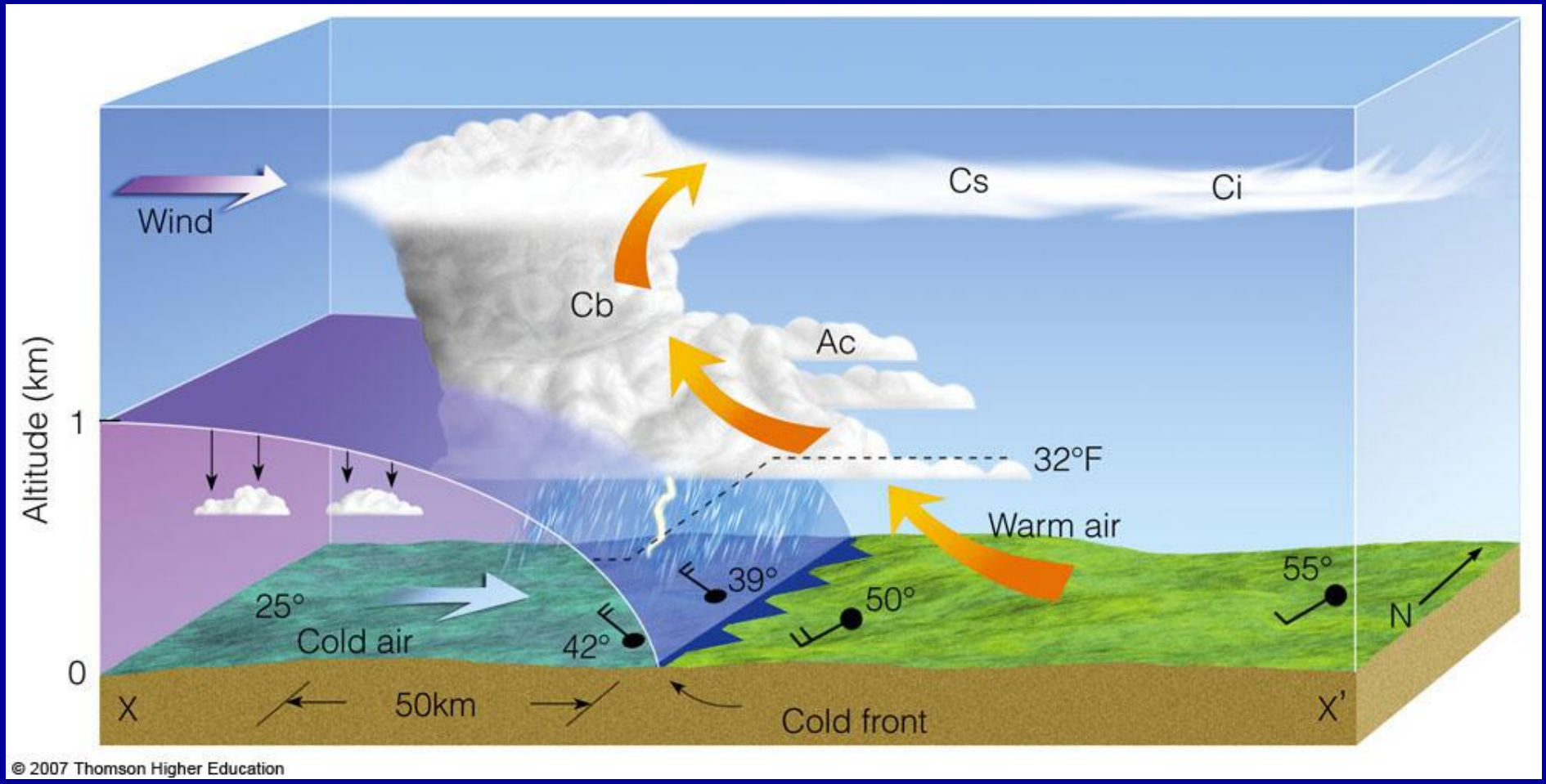
A stationary front does not move or is almost motionless and winds blow parallel to the front but in opposite directions on either side.

Cold Front

- Cold, dry (stable) air replaces warm, moist (unstable) air
- Associated weather
  - Narrow, strong precip bands (Cu)
  - Thunderstorms
  - Strong winds
- Winds
  - S component ahead
  - N component behind



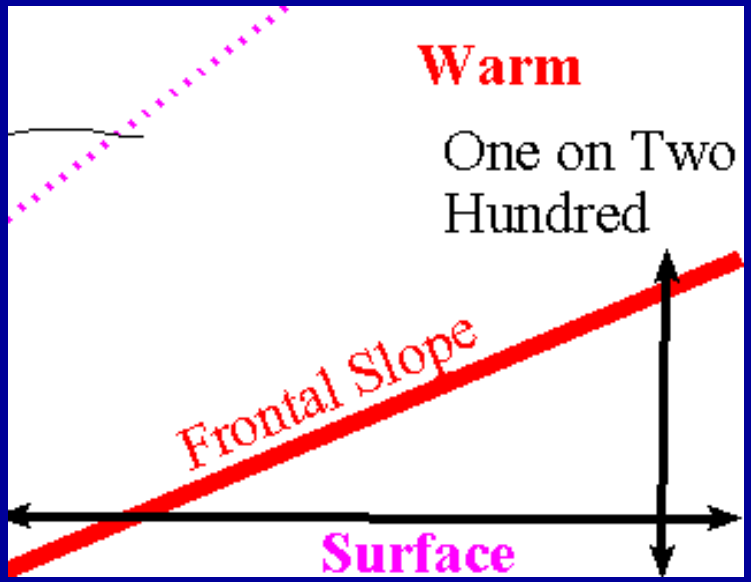
Cold Front



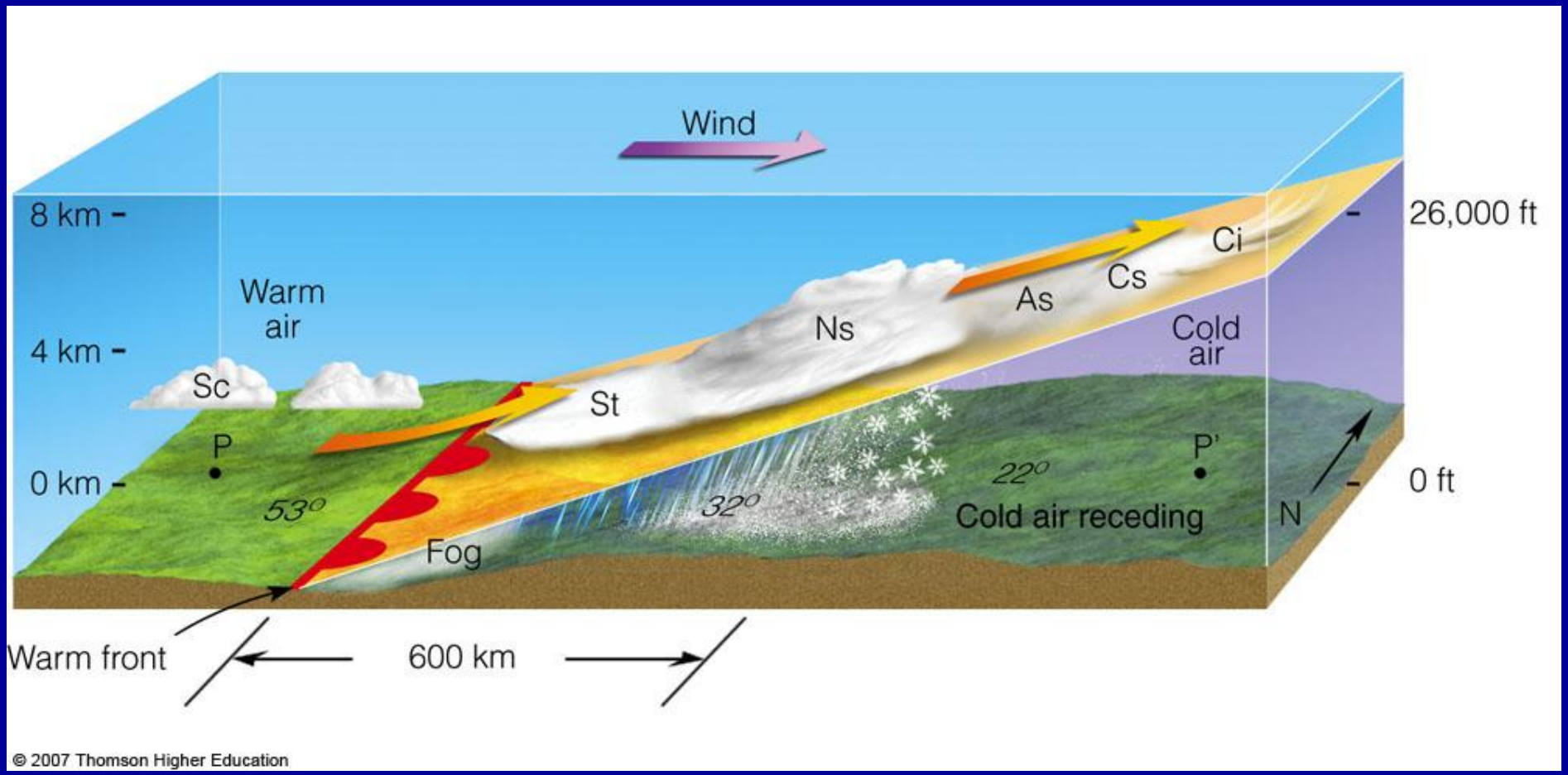
ww2010 weather tutorial: 3-D Animation of cold front clouds and precipitation

Warm Front

- Warm air overrides the cold receding air
- Associated weather
  - Broad stratoform precip bands
  - Increased wind speeds
- Winds
  - E component ahead
  - S component behind



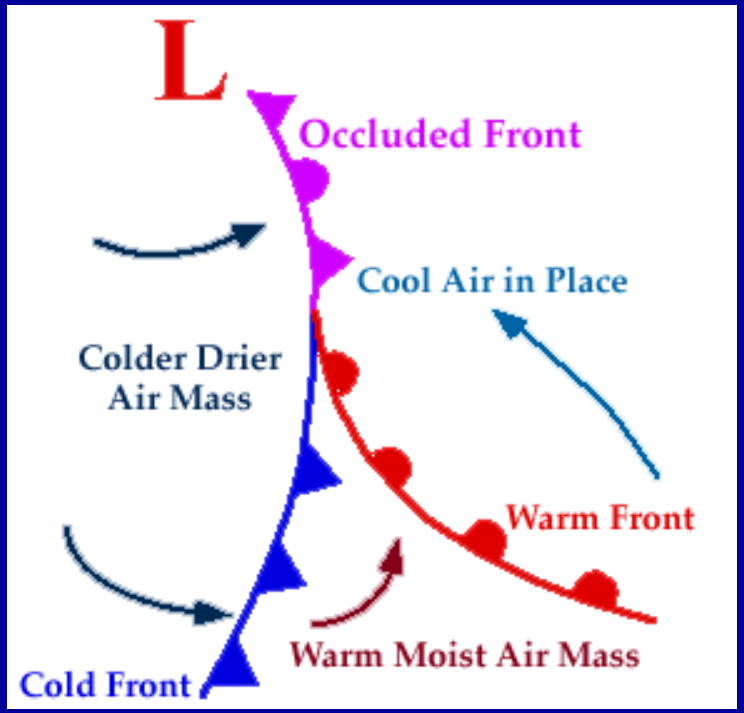
Warm Front



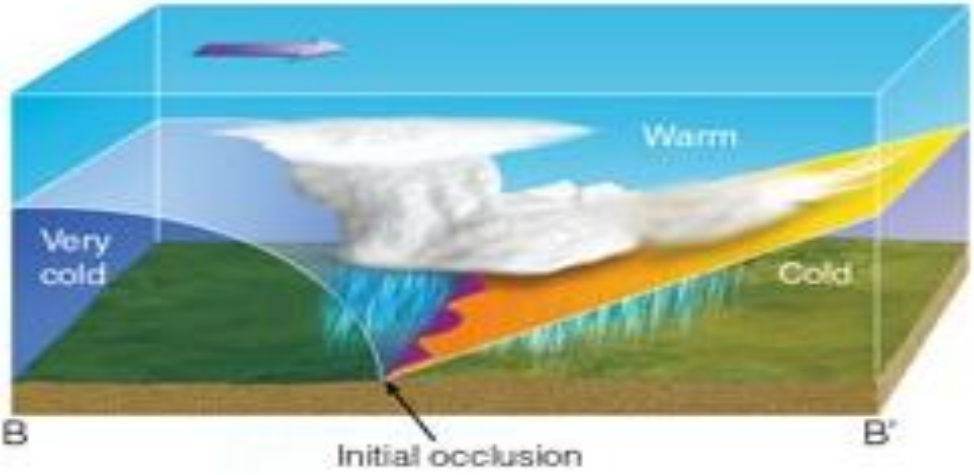
ww2010 weather tutorial: [3-D Animation of warm front clouds and precipitation]

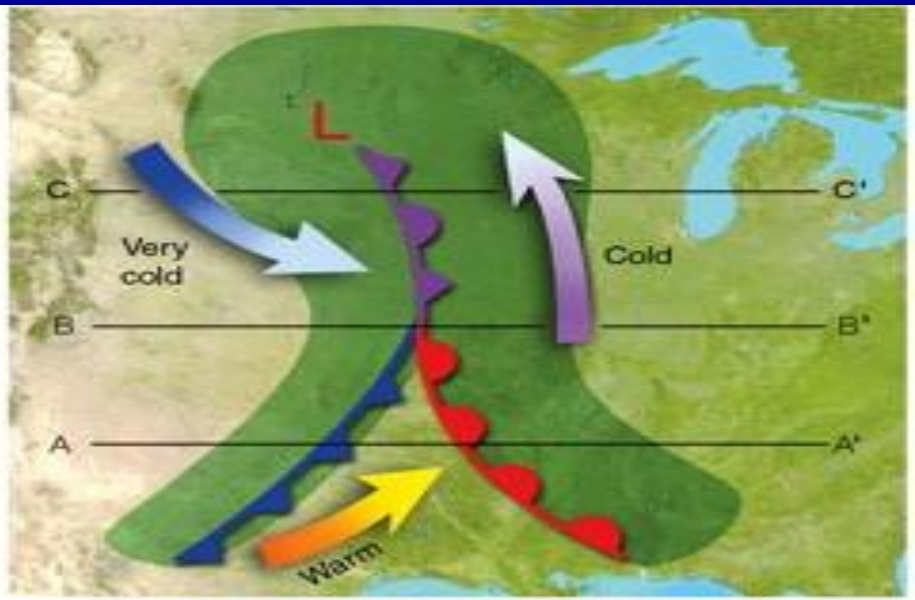
Occlusion / Occluded Front

- When a cold front overtakes a warm front
- Potential to produce severe weather
- Winds
  - S component ahead
  - N component behind

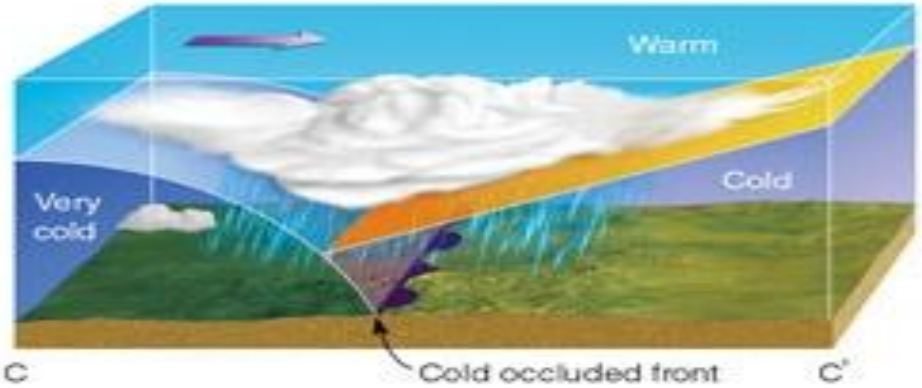


Occlusion


Warm
Very cold
Cold
B
B'
Initial occlusion

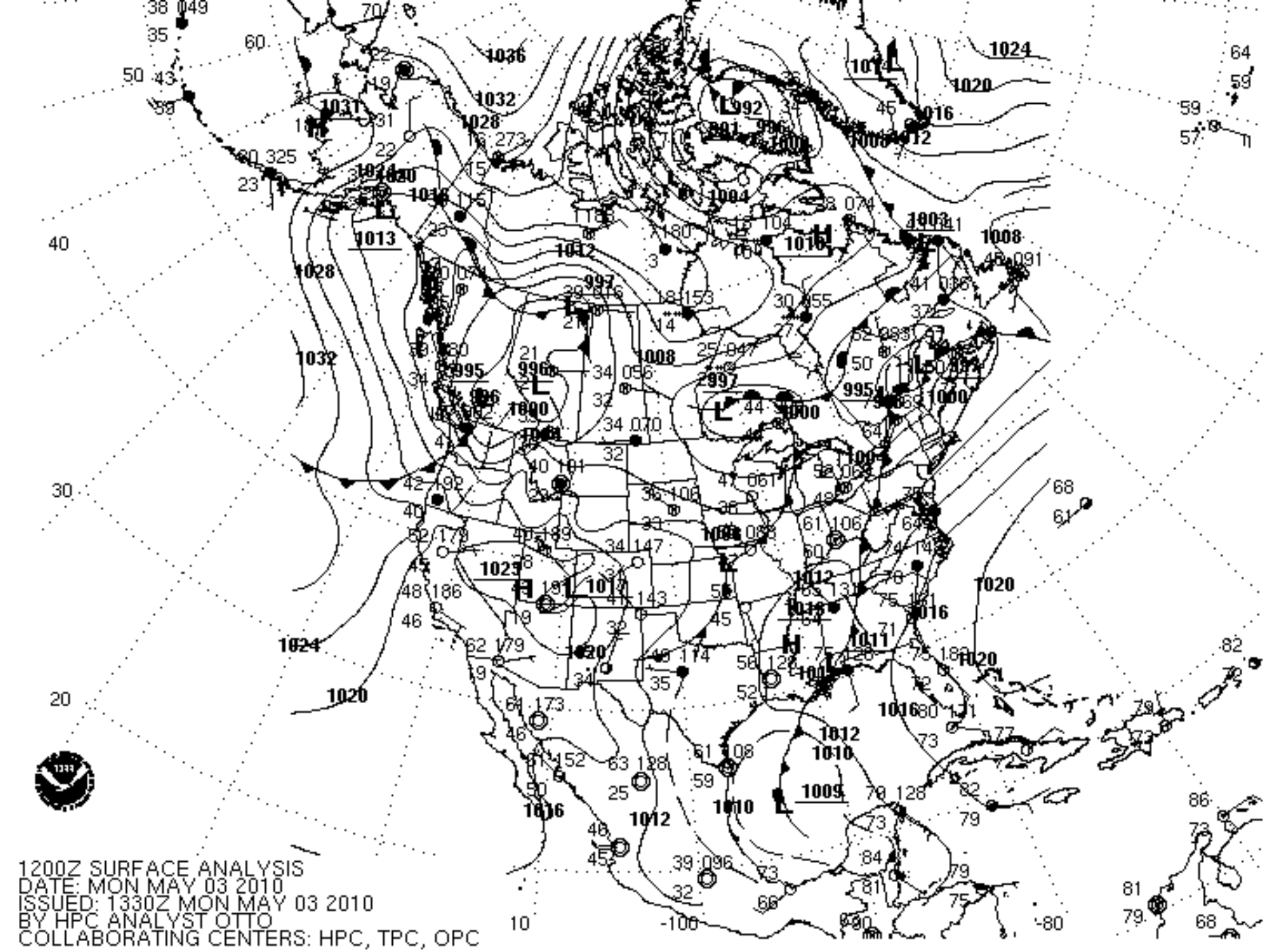

L
C
C'
Very cold
Cold
B
B'
A
A'
Warm

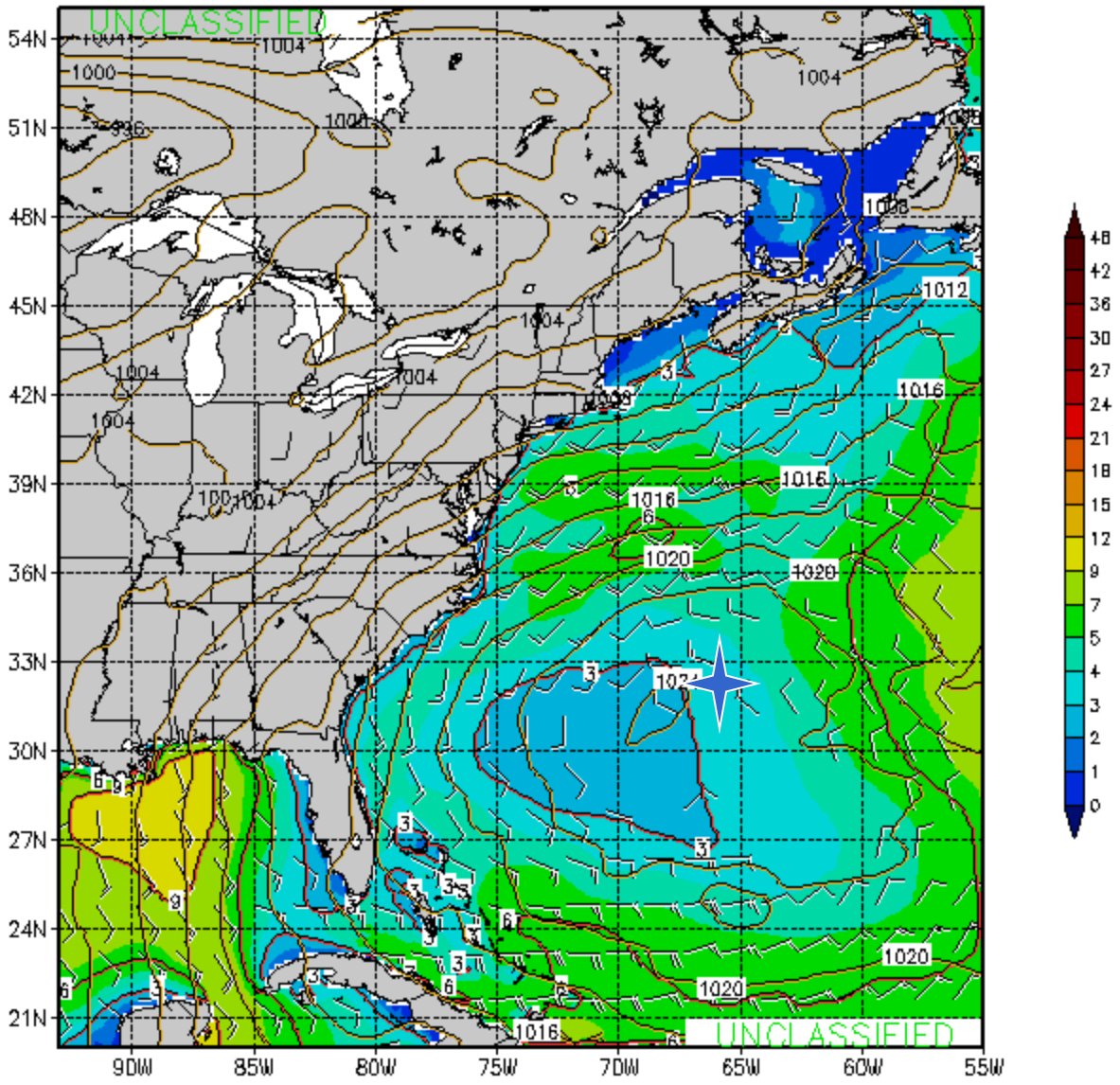

Warm
Very cold
Cold
A
A'


Warm
Cold
Very cold
C
Cold occluded front
C'

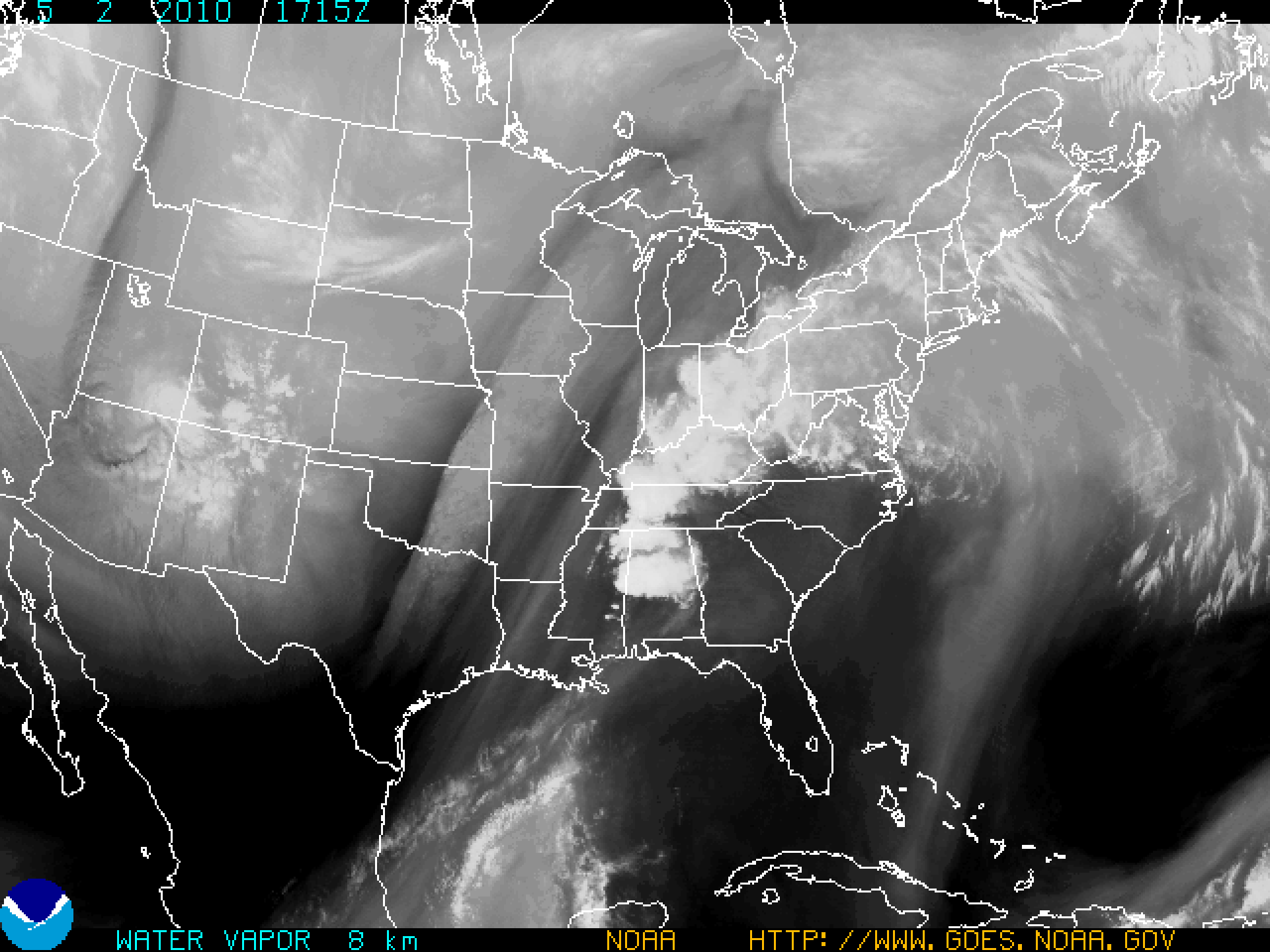
Front Identification

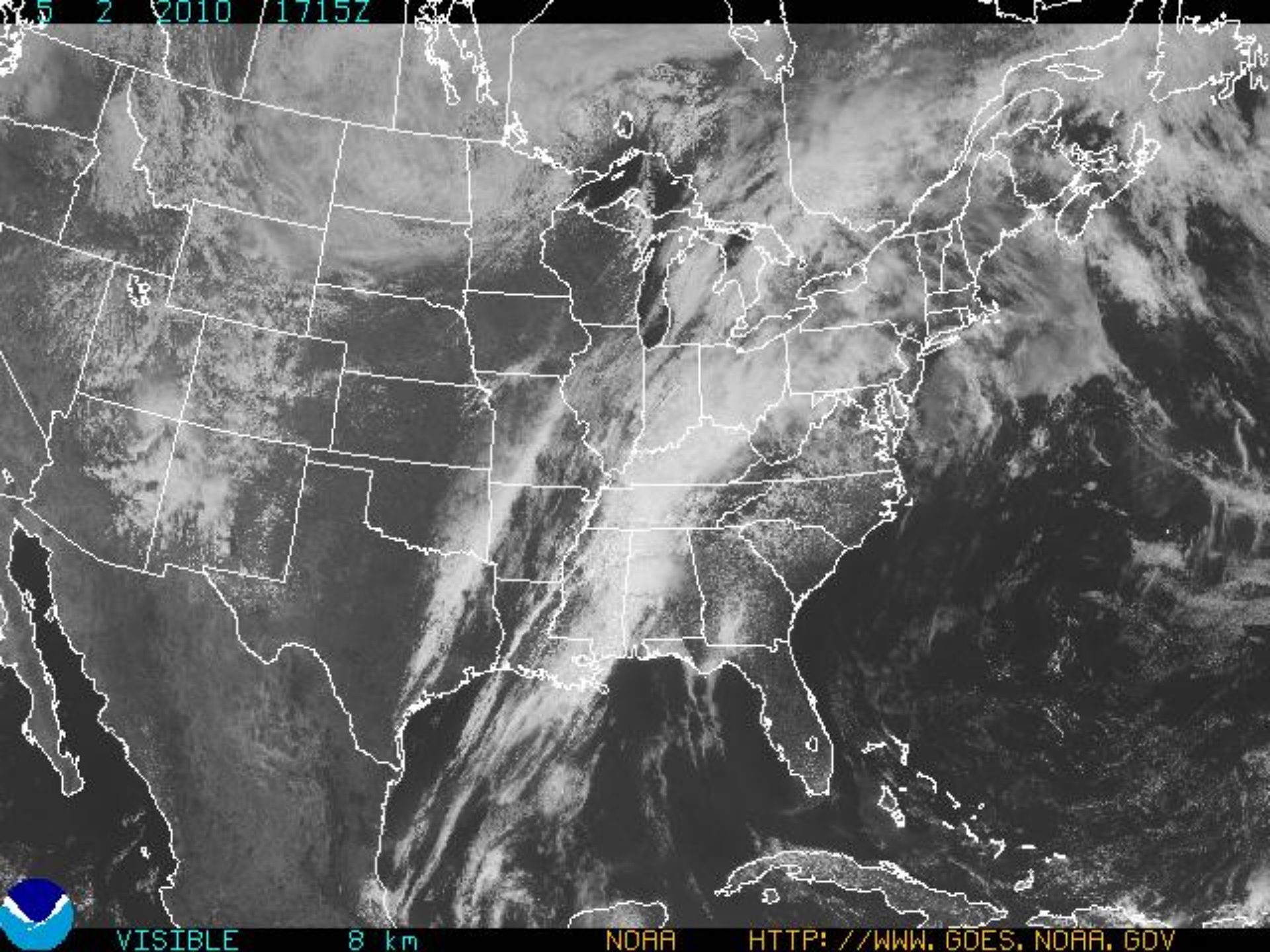
- Locating fronts on surface weather charts
  - Large temperature changes over small distances
  - Shifts in wind direction
  - Pressure and pressure changes
  - Cloud and precipitation patterns

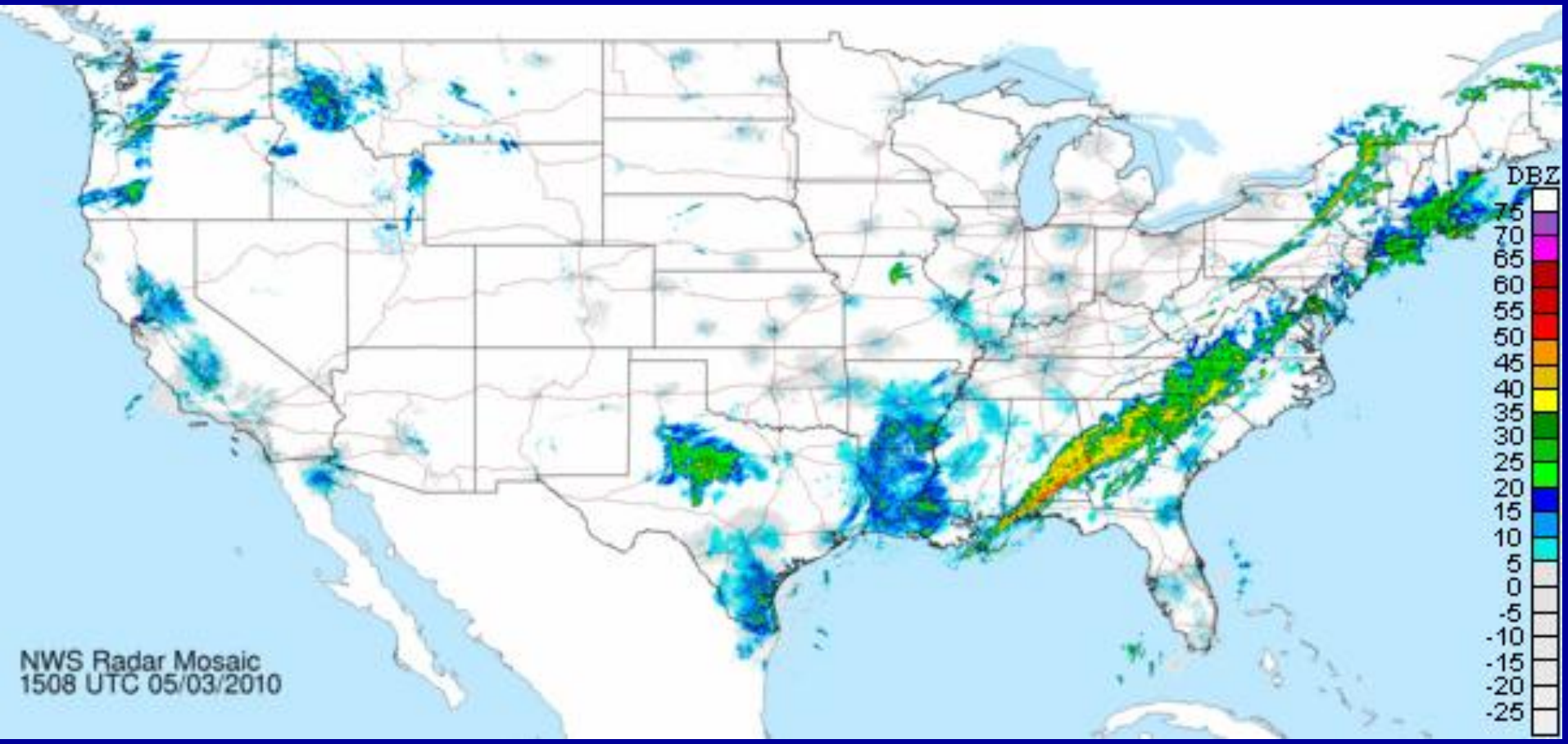

1200Z SURFACE ANALYSIS
DATE: MON MAY 03 2010
ISSUED: 1330Z MON MAY 03 2010
BY HPC ANALYST OTTO
COLLABORATING CENTERS: HPC, TPC, OPC

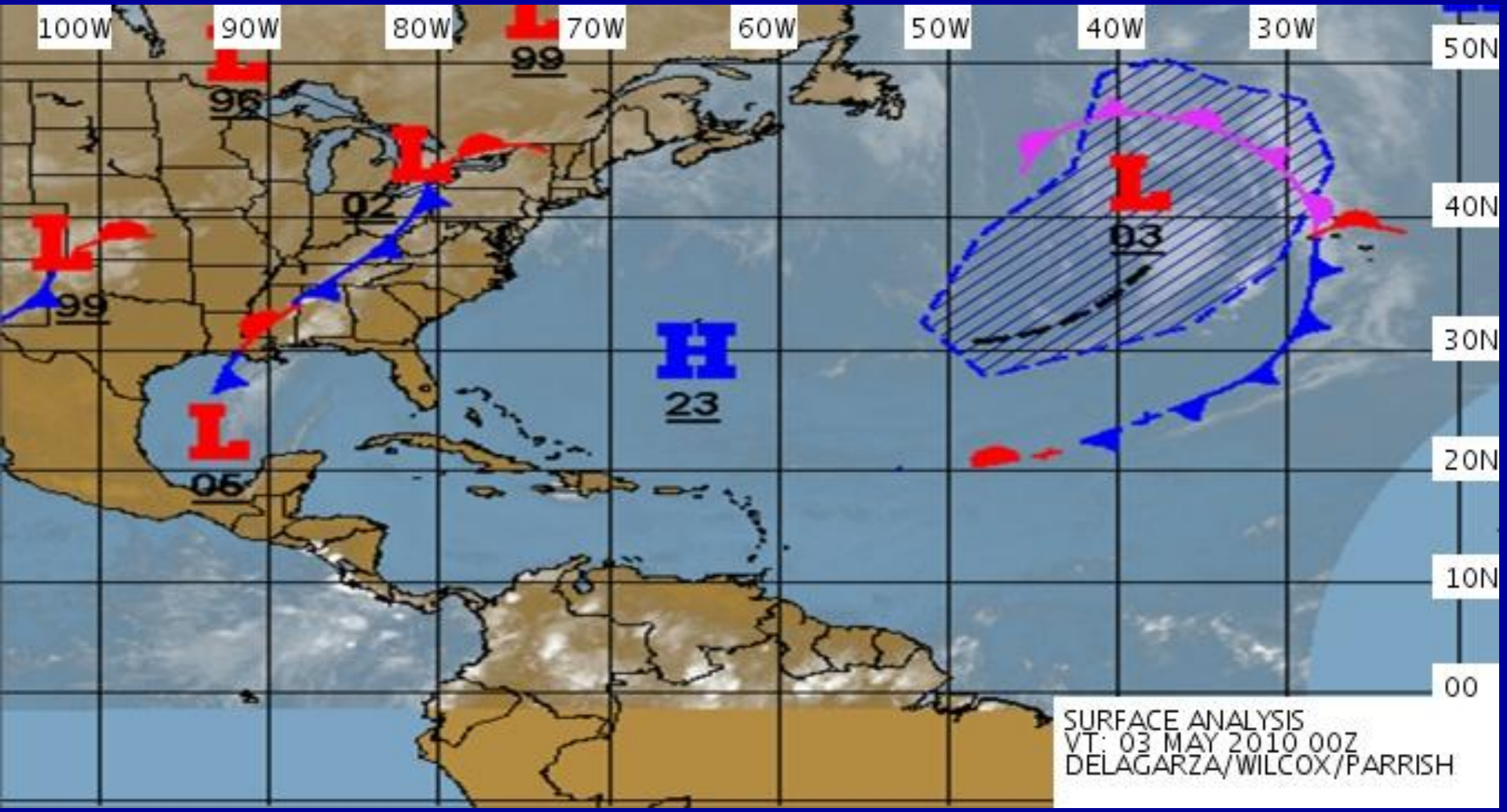


VT: Mon 00Z 03 MAY 10
FNMOC 27km COAMPS (U): FNMOC Wave Watch 3 Sig Wave Heights [ft] / Sfc Winds [kts]
Run: 2010050300Z Tau: 0


5 2 2010 1715Z
WATER VAPOR 8 km
NOAA
HTTP://WWW.GOES.NOAA.GOV


5 2 2010 1715Z
VISIBLE 8 km NOAA HTTP://WWW.GOES.NOAA.GOV


NWS Radar Mosaic
1508 UTC 05/03/2010
DBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25


100W
90W
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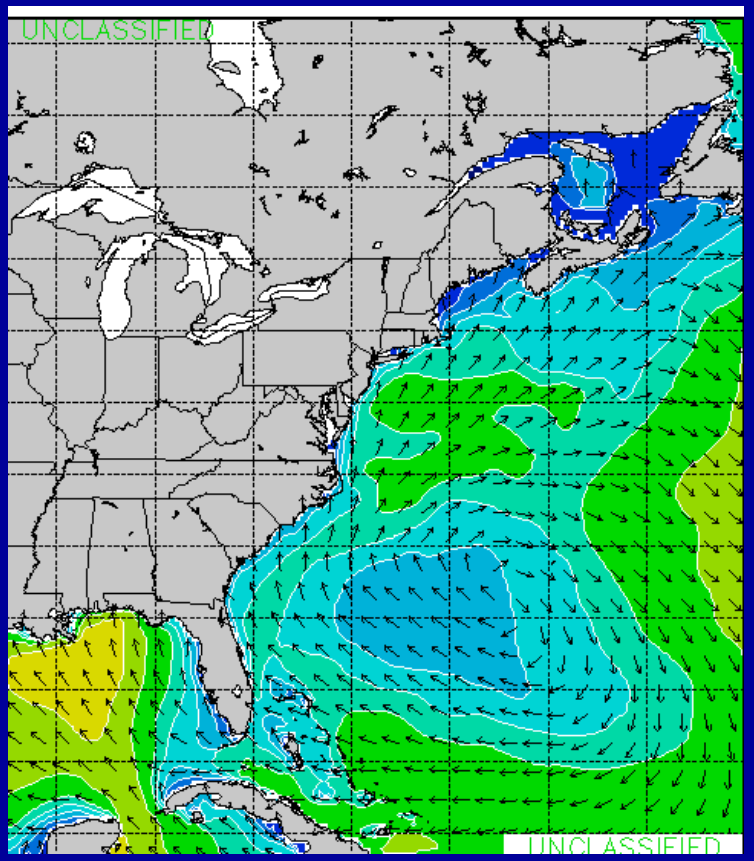
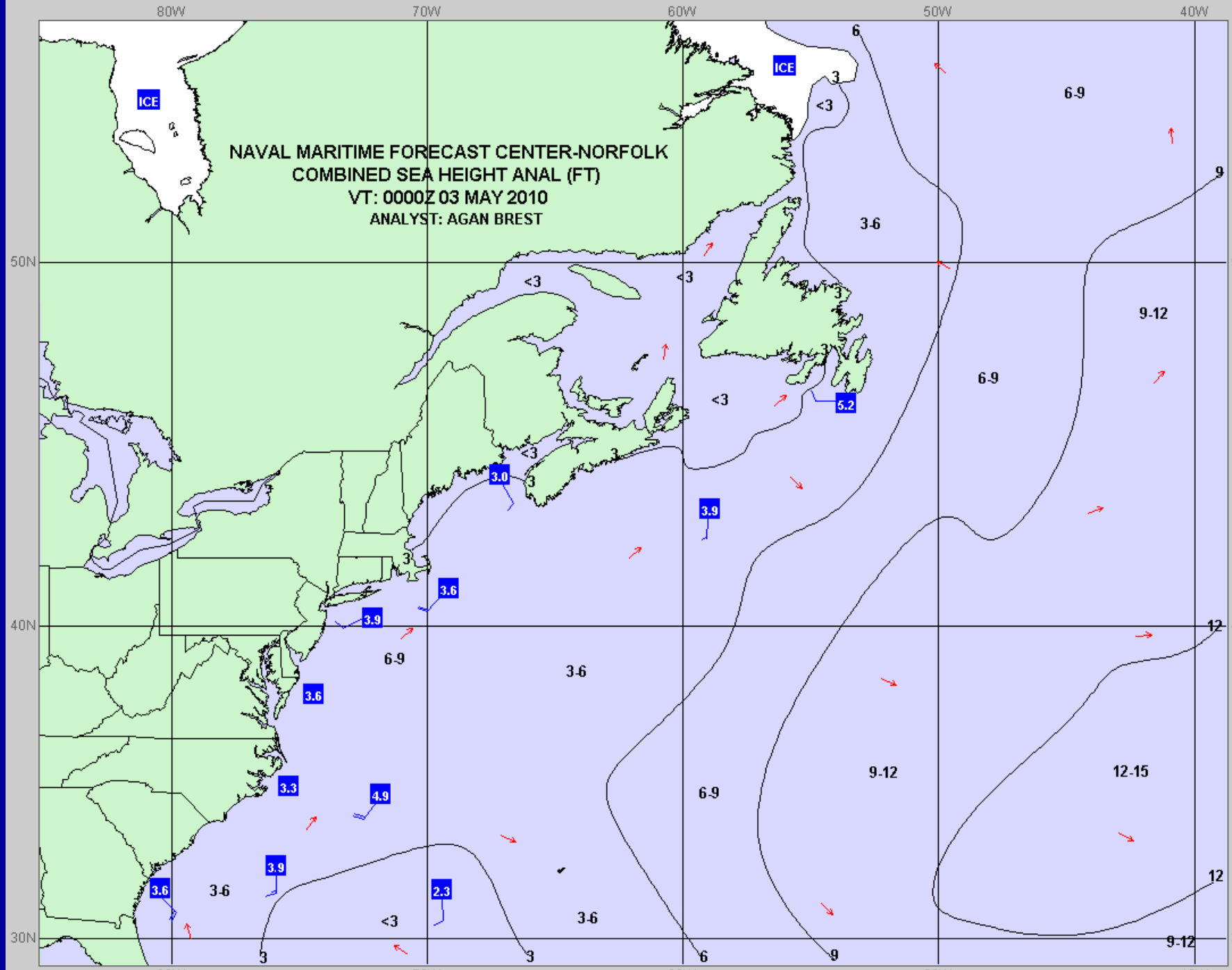
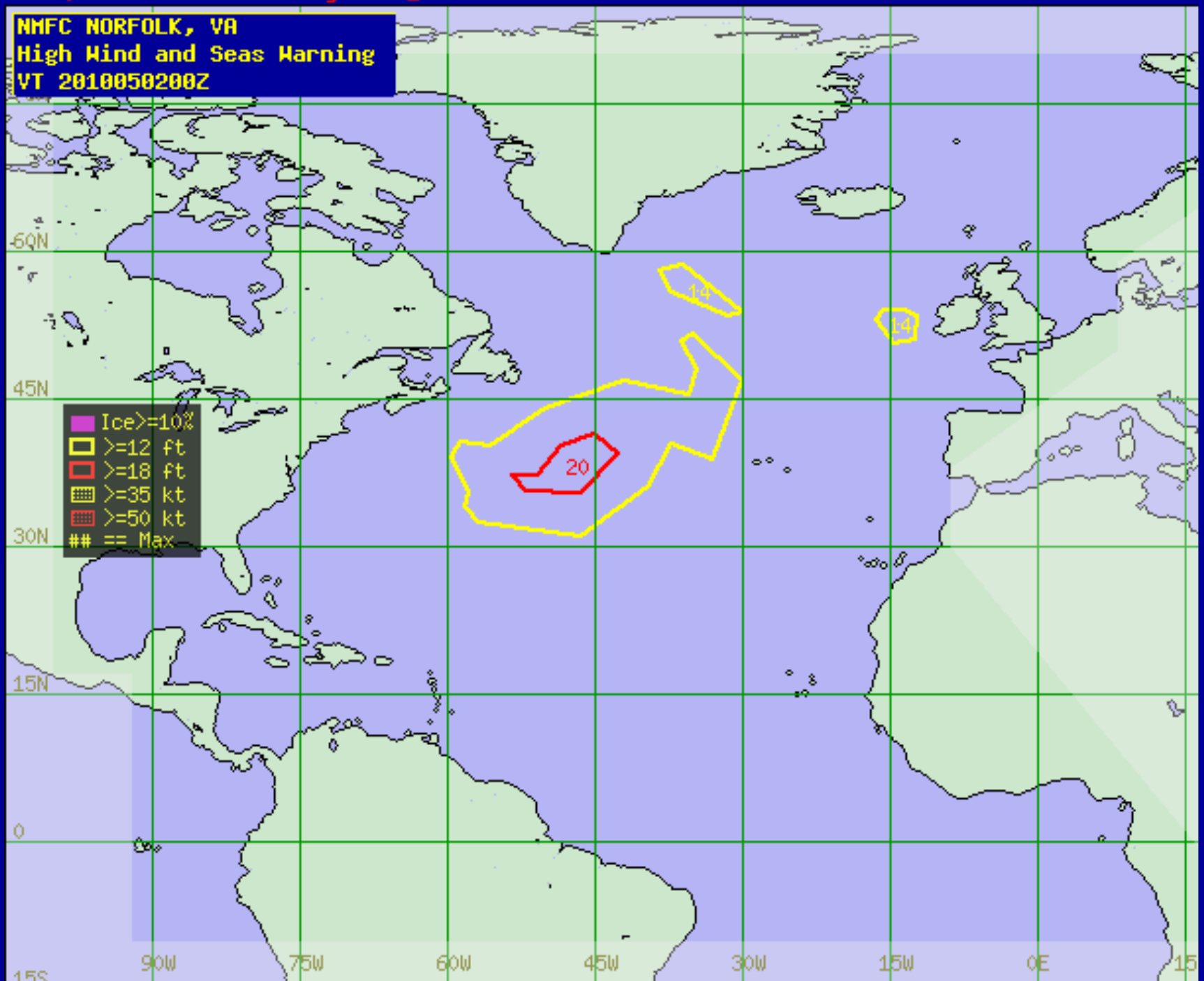
70W
60W
50W
40W
30W
50N
40N
30N
20N
10N
00
L
99
L
96
L
02
L
99
L
06
H
23
L
03
SURFACE ANALYSIS
VT: 03 MAY 2010 00Z
DELAGARZA/WILCOX/PARRISH

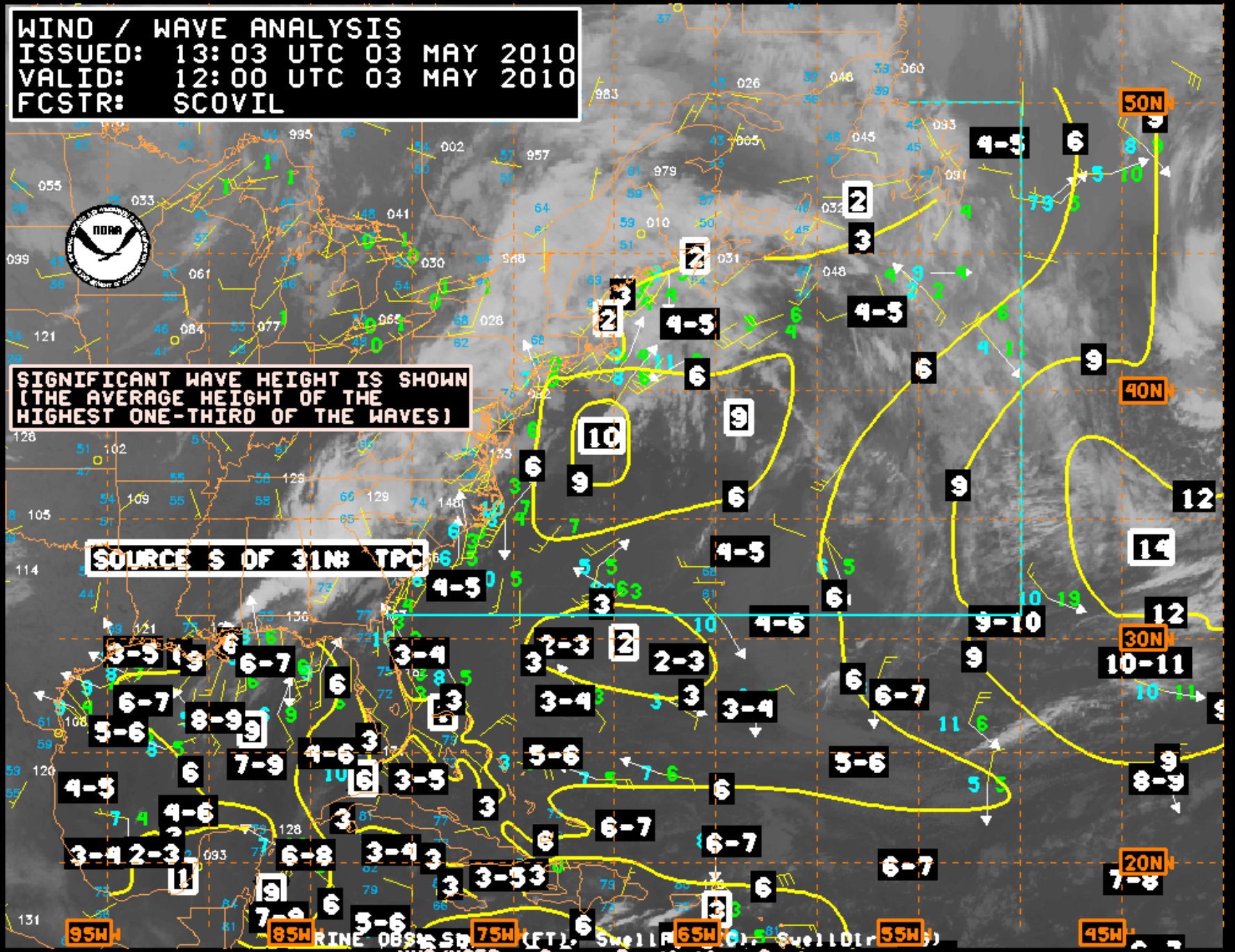
Oceanography

- Currents
  - Local weather
- Wind waves
- Swell




NAVAL MARITIME FORECAST CENTER-NORFOLK
COMBINED SEA HEIGHT ANAL (FT)
VT: 0000Z 03 MAY 2010
ANALYST: AGAN BREST
80W
70W
60W
50W
40W
50N
40N
30N
ICE
ICE
<3
3
6
6-9
9
3-6
9-12
12
12-15
5.2
3.9
3.0
3.6
3.9
3.6
3.3
4.9
3.9
3.6
2.3


lant: Tau=024 Revised by NMFC_VA @20100501095901
NMFC NORFOLK, VA
High Wind and Seas Warning
VT 20100502002
60N
45N
30N
15N
0
15S
90W
75W
60W
45W
30W
15W
0E
15
14
14
20
Ice>=10%
>=12 ft
>=18 ft
>=35 kt
>=50 kt
== Max

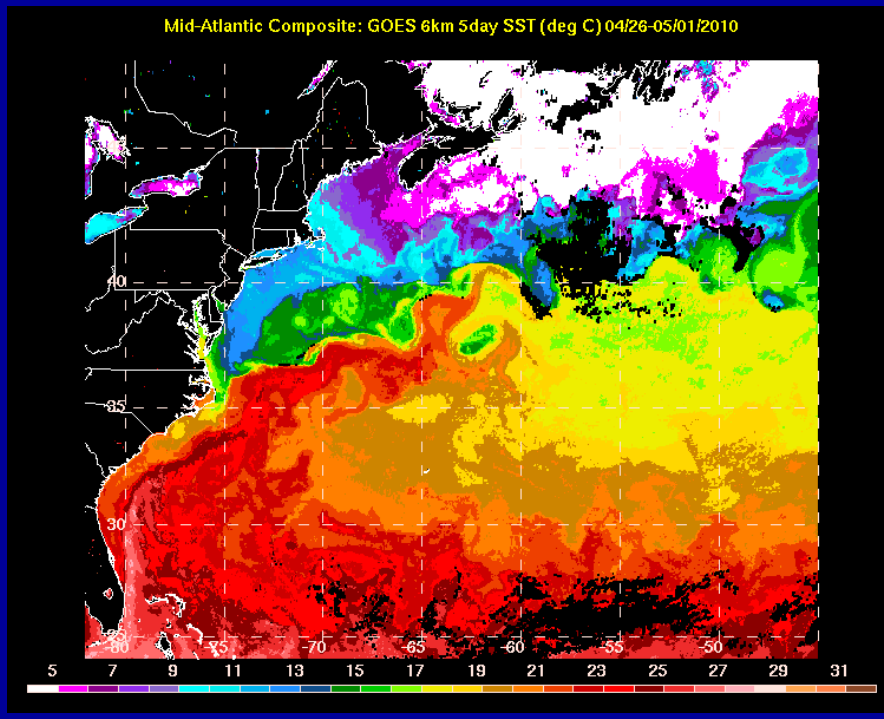

WIND / WAVE ANALYSIS
ISSUED: 13:03 UTC 03 MAY 2010
VALID: 12:00 UTC 03 MAY 2010
FCSTR: SCOVIL
SIGNIFICANT WAVE HEIGHT IS SHOWN
(THE AVERAGE HEIGHT OF THE
HIGHEST ONE-THIRD OF THE WAVES)
SOURCE S OF 31N: TPC
50N
40N
30N
20N
95W
85W
75W
65W
55W
45W
NWS/NCEP - Ocean Prediction Center
www.opc.ncep.noaa.gov

- .WARNINGS.

- ...GALE WARNING...
- .LOW 55N60W 989 MB MOVING SW 15 KT. FRONT EXTENDS FROM 57N56W TO
- 53N41W TO 42N40W TO 34N43W. BETWEEN 180 NM AND 480 NM NE
- QUADRANT AND WITHIN 240 NM E OF FRONT WINDS 25 TO 40 KT. SEAS 8
- TO 16 FT.
- .24 HOUR FORECAST LOW DISSIPATED INLAND. WITHIN 180 NM NE AND E
- OF A LINE FROM 65N57W TO 59N49W TO 49N37W WINDS 20 TO 30 KT.
- SEAS 8 TO 13 FT.
- .48 HOUR FORECAST E OF A LINE FROM 62N39W TO 57N37W AREA OF S TO
- SE WINDS TO 25 KT. SEAS 8 TO 12 FT.

Gulf Stream

- Warm, fast moving current
  - Impacts weather
    - TC; low development; localized Convection
- Eddies
  - Cold core
    - CCW
    - South side (water from north)
  - Warm core
    - CW
    - North side (water from south)



Mesoscale (Local) Effects

- Friction
  - Decreases velocity and deflects wind to the left
- Clouds
  - Type and wind
- Sea/Land breeze
  - Chesapeake Bay; Long Island Sound
- Thunderstorms

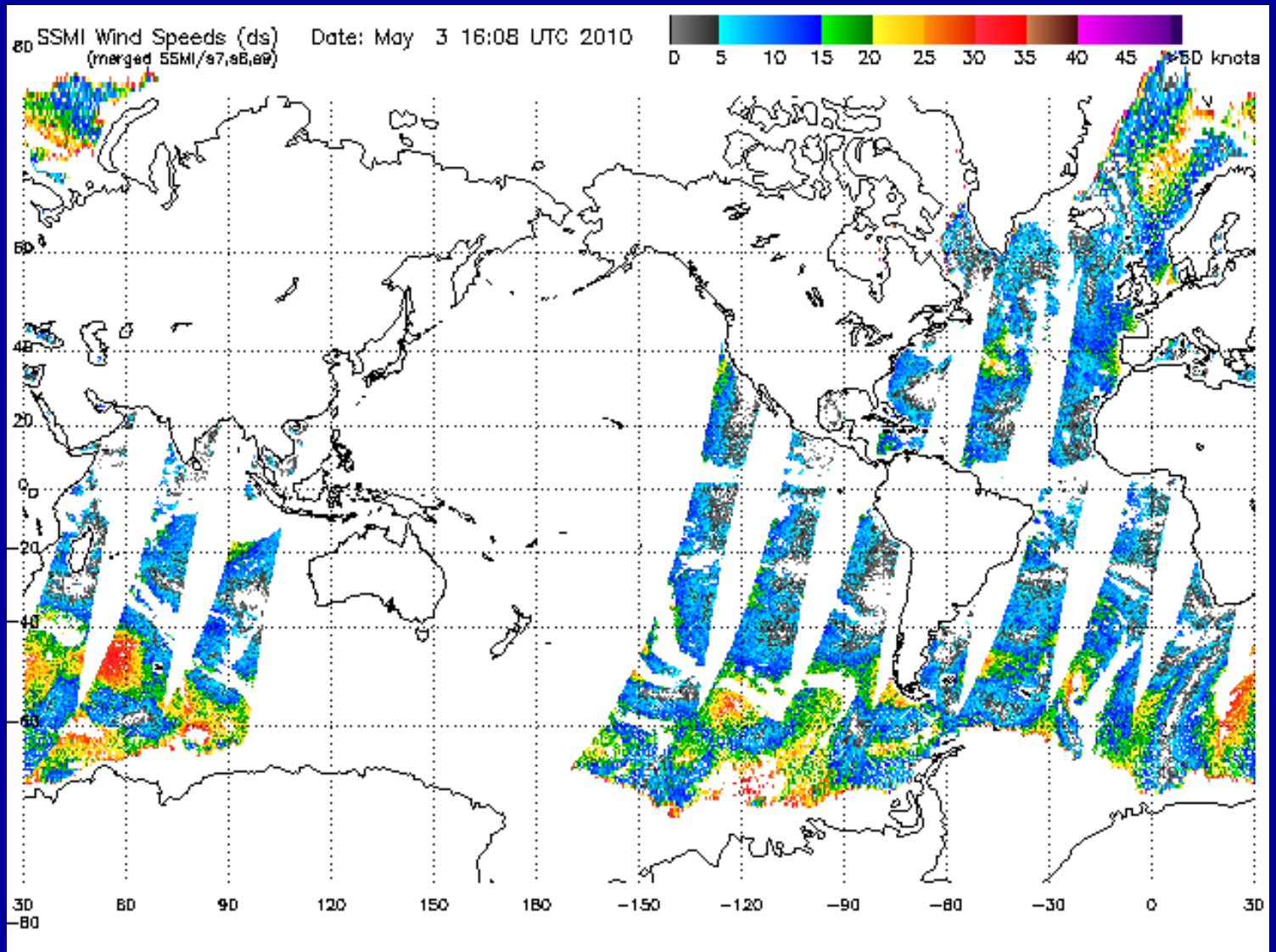
Where to Find High Winds

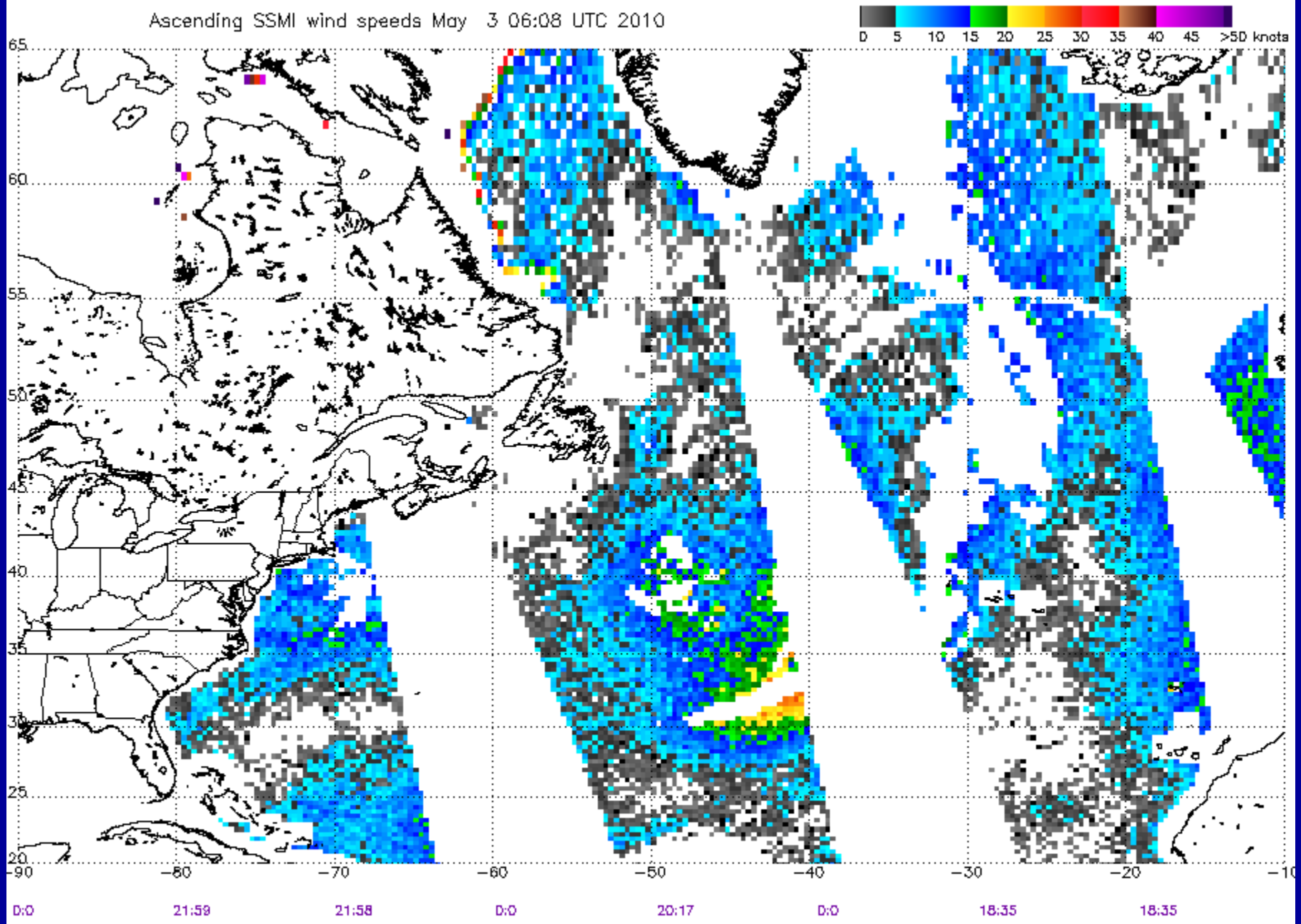
- Closely spaced isobars
- Curved isobars
- Cold fronts
- Vertically developed (tall) clouds

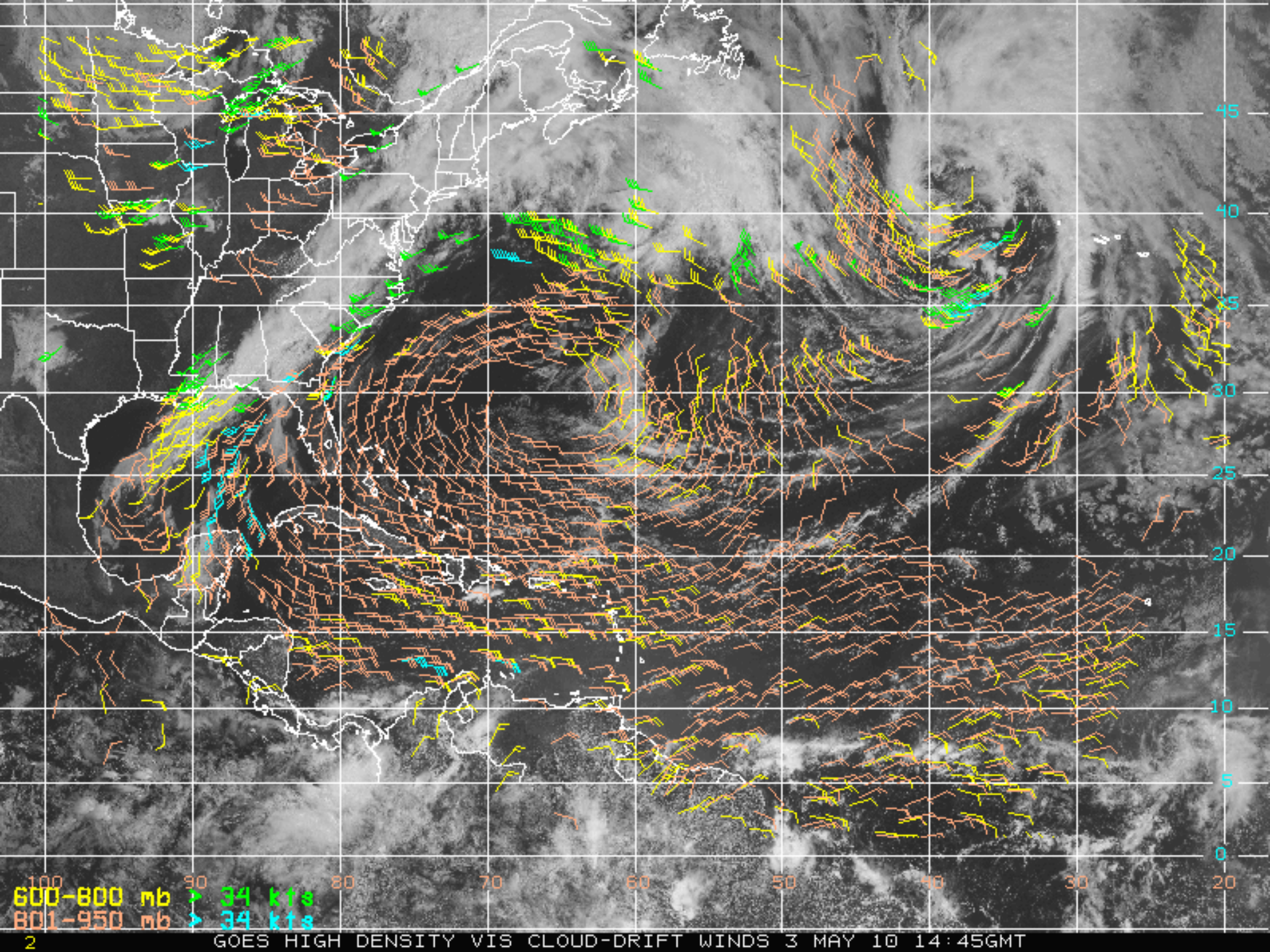
Where to Find Low Winds

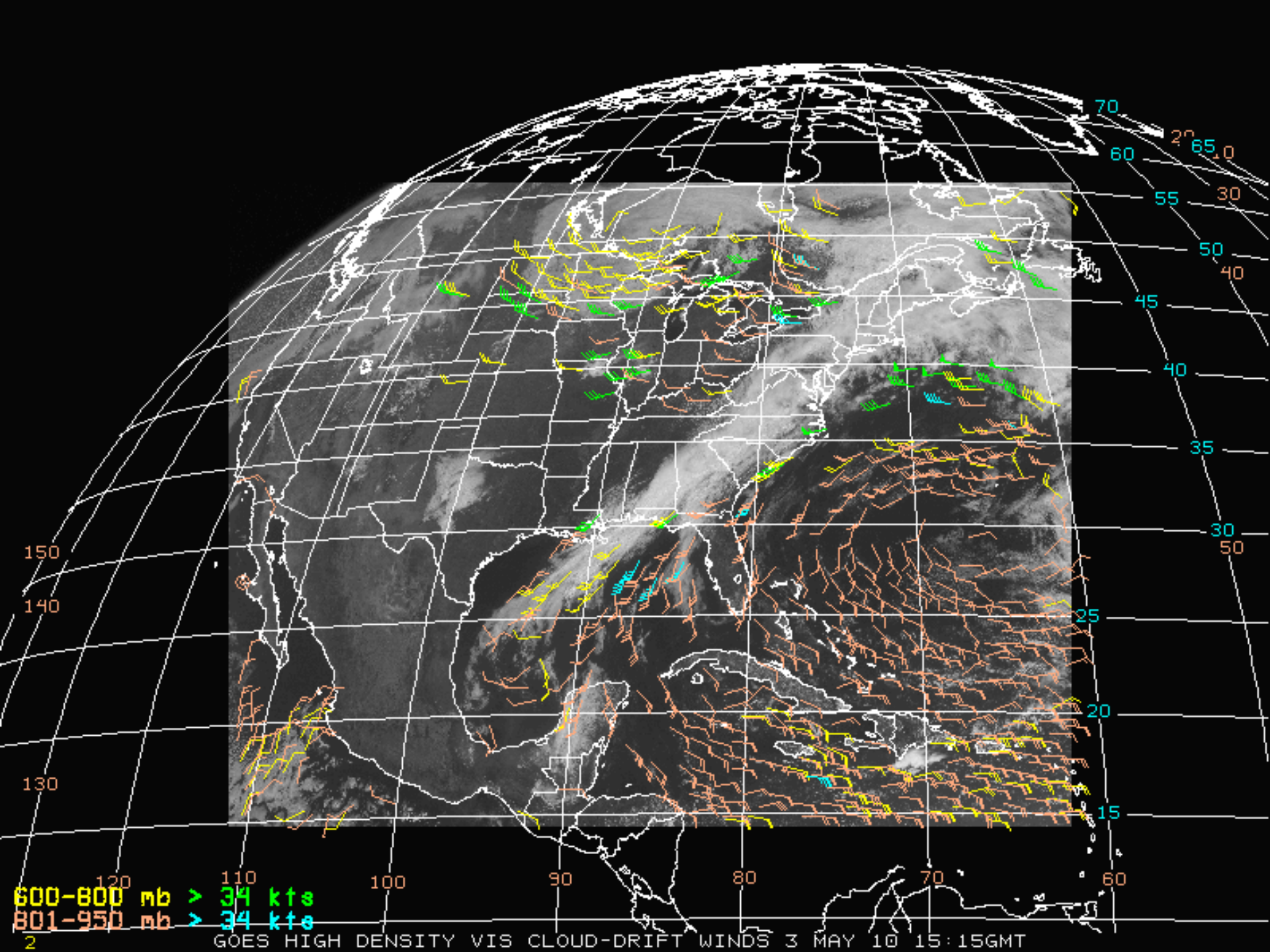
- Centers of high pressure
- Ridges (where the flow is clockwise)
- Between low pressures
- Below center of large clouds

Satellite Derived Winds




Ascending SSMI wind speeds May 3 06:08 UTC 2010
0 5 10 15 20 25 30 35 40 45 >50 knots
65
60
55
50
45
40
35
30
25
20
-90 -80 -70 -60 -50 -40 -30 -20 -10
D:0 21:59 21:58 D:0 20:17 D:0 18:35 18:35
Note: 1) Times are GMT 2) May 3 06:08 UTC 2010−18 hrs
3) Ascending merged data time tags (red line), every 10 deg one tag on lat. 40N from lonmin to lonmax
NOAA/NESDIS/Office of Research and Applications

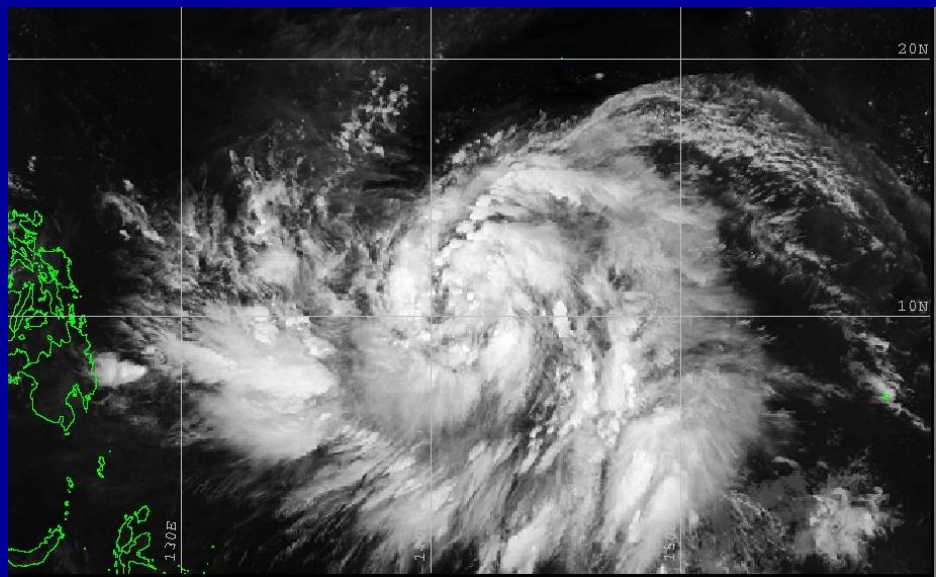

45
40
35
30
25
20
15
10
5
0
100
90
80
70
60
50
40
30
20
600-800 mb > 34 kts
801-950 mb > 34 kts
2
GOES HIGH DENSITY VIS CLOUD-DRIFT WINDS 3 MAY 10 14:45GMT

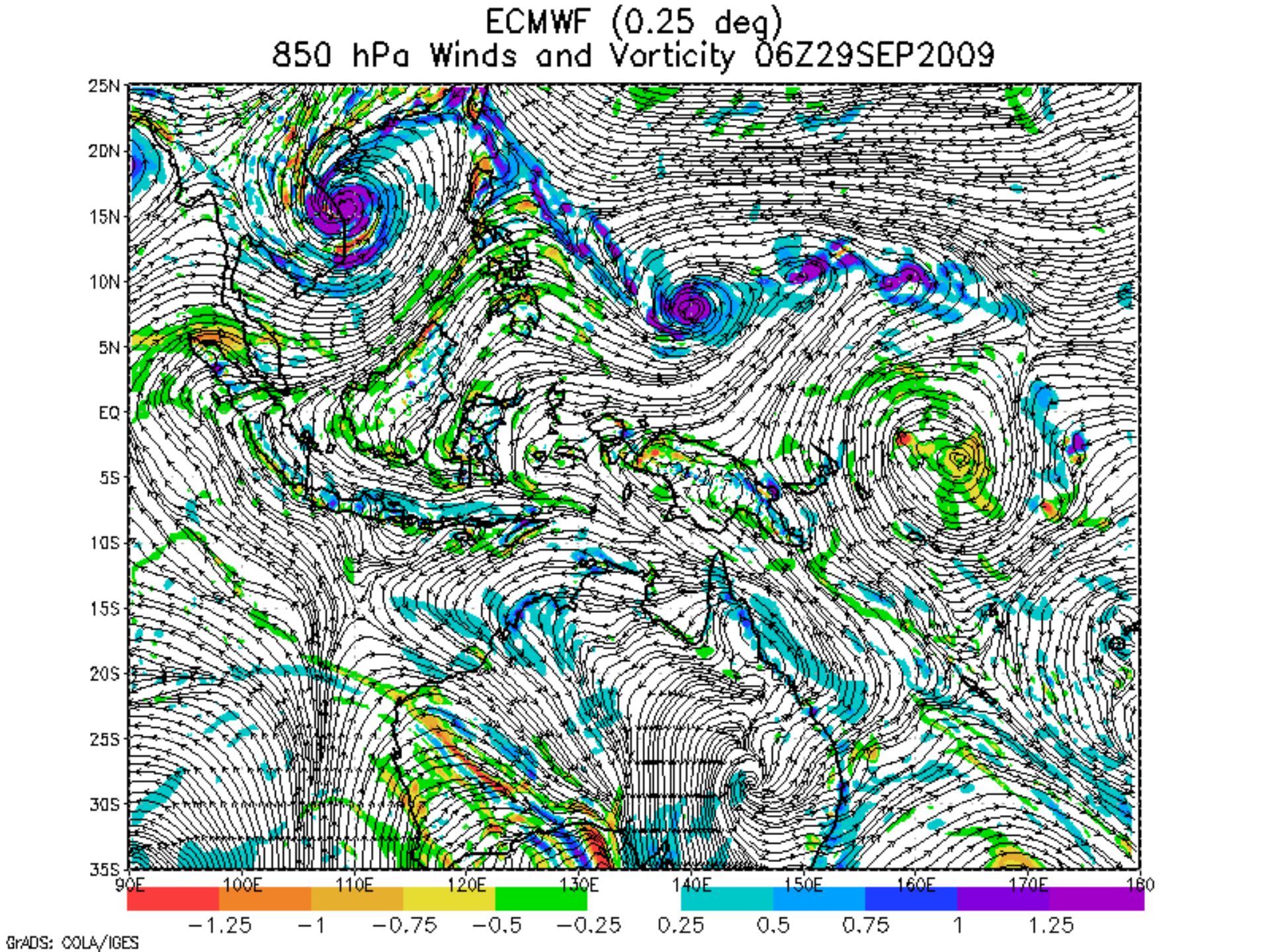

600-800 mb > 34 kts
801-950 mb > 34 kts
GOES HIGH DENSITY VIS CLOUD-DRIFT WINDS 3 MAY 10 15:15GMT

Tropical Cyclones

- Move westward and poleward
- Do not “cross the T”
  - i.e., do not sail across the projected path

- Isobaric analysis (Pressure)
  - Concentric closed circles




ECMWF (0.25 deg)
850 hPa Winds and Vorticity 06Z29SEP2009
25N
20N
15N
10N
5N
EQ
5S
10S
15S
20S
25S
30S
35S
90E
100E
110E
120E
130E
140E
150E
160E
170E
180
−1.25
−1
−0.75
−0.5
−0.25
0.25
0.5
0.75
1
1.25
GrADS: COLA/IGES

Resources/Products

- NWS
  - Atmospheric and Oceanic products
  - ***Watches and Warnings*** - includes coastal waters
  - Marine Forecasts (observations)
- OPC
  - Chart interpretation
  - Gulf Stream forecasts
  - ***Atlantic briefing package***
- NMFC
  - ***Warnings***
  - Tides, sea height analysis (graphical and text)
- Unisys
  - Models, radar, satellite imagery
- FNMOC
  - Atmospheric and Oceanic products

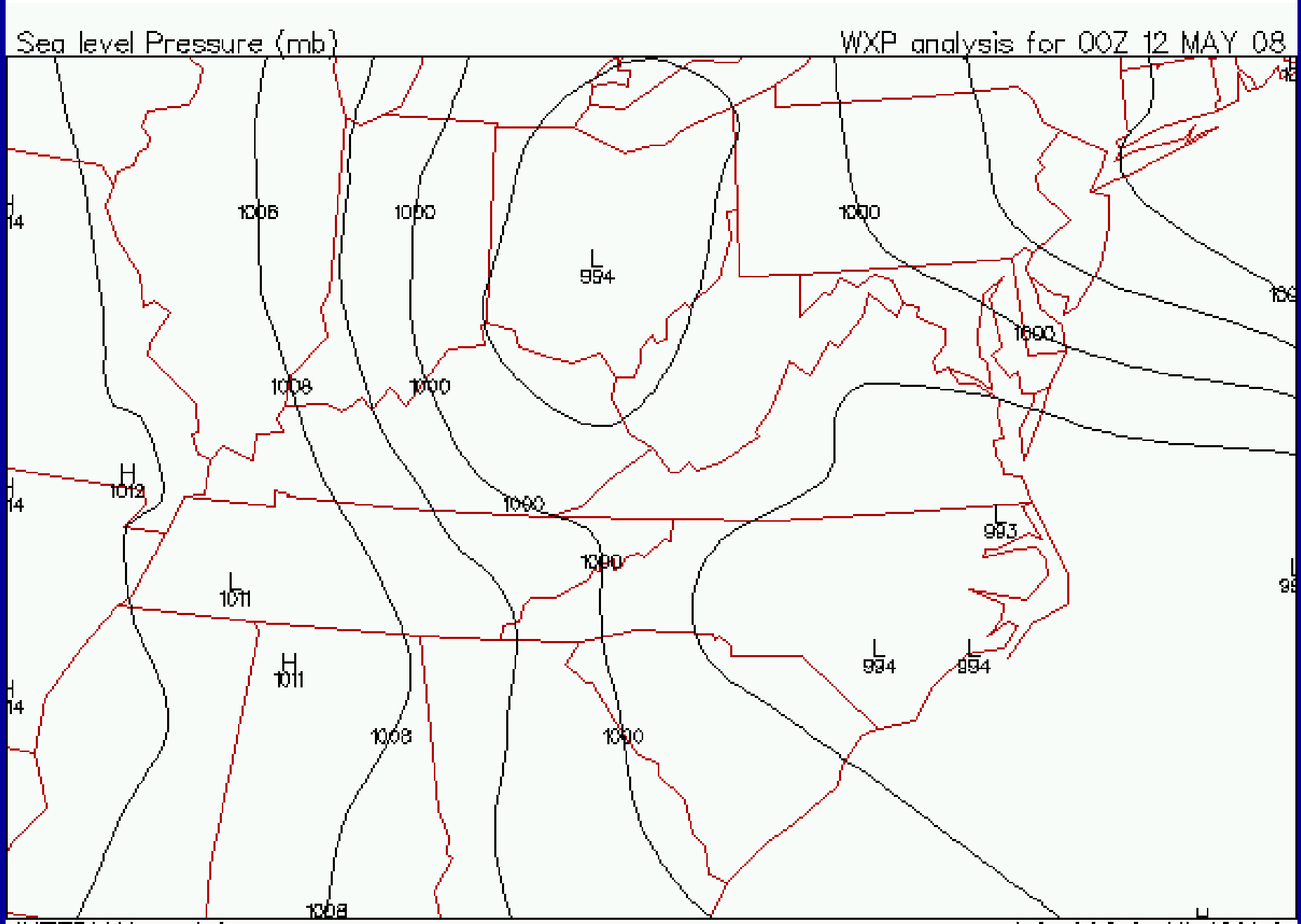
Weather and VOST

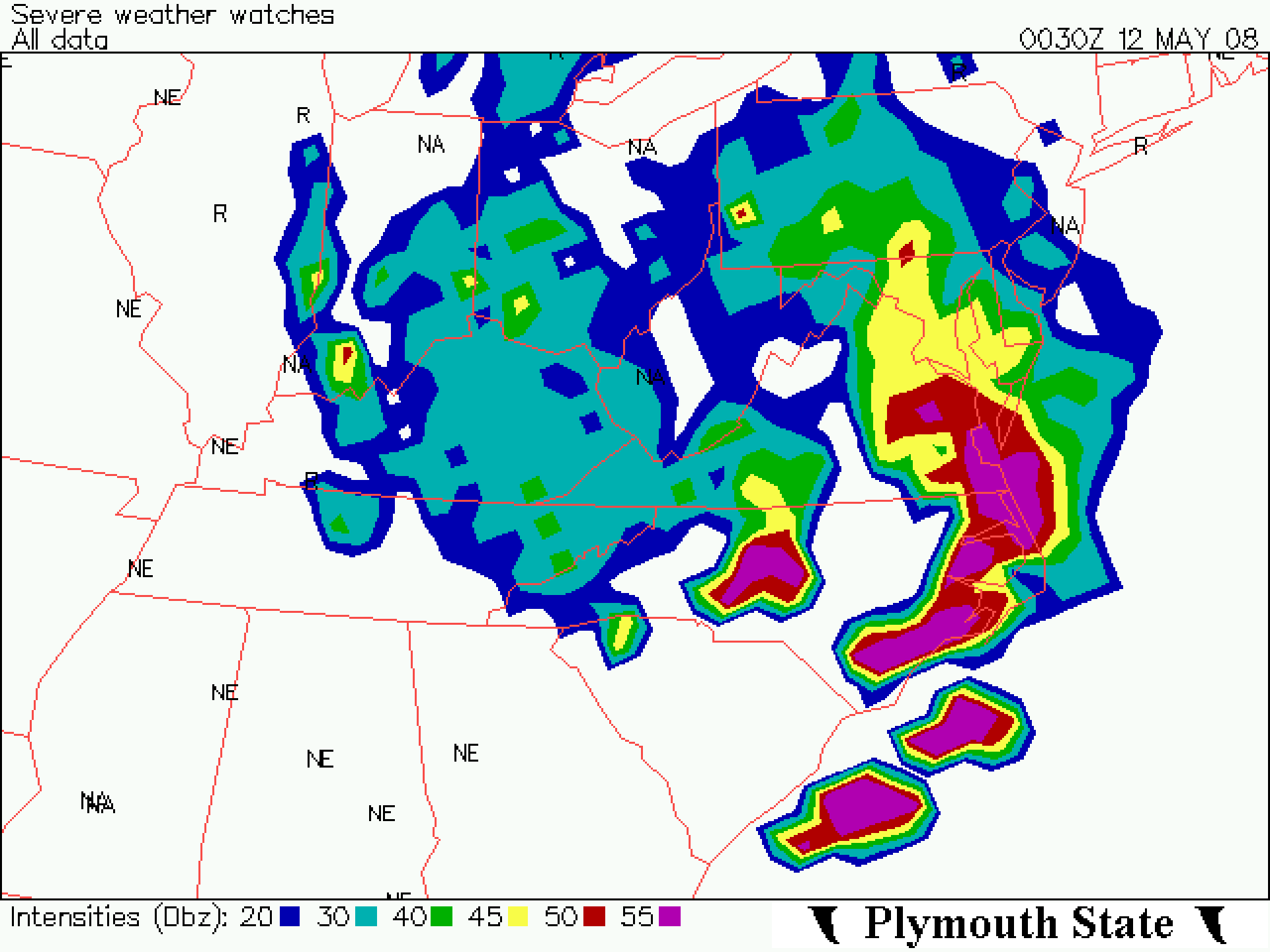
- 11 May 2008
- 23 Feb 2009
- 14 May 2009
- 28 Apr 2010

11 May 2008

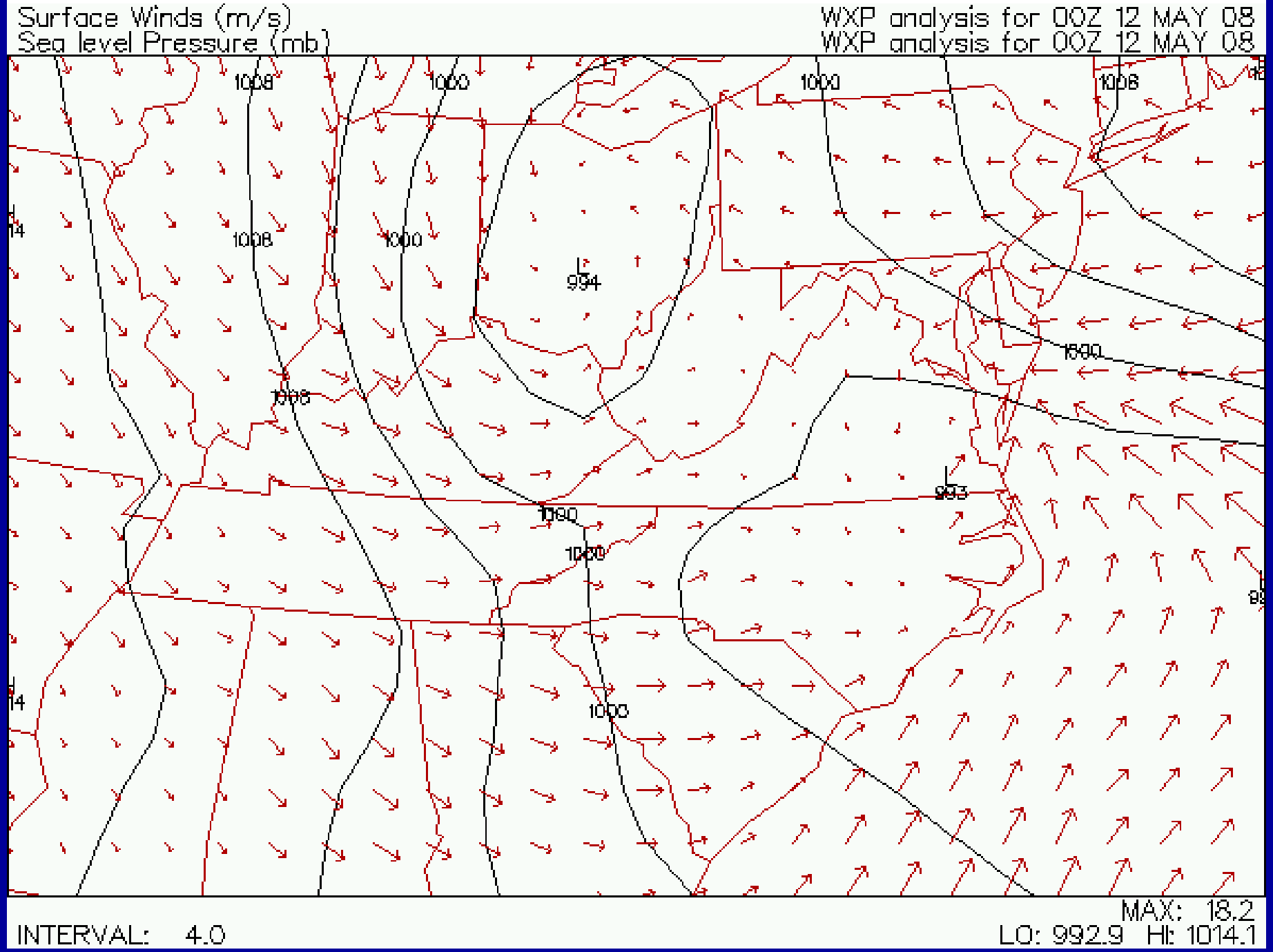

GOES-E Infrared Imagery
1830Z 11 MAY 08
Plymouth State Weather Center

Plymouth State Weather Center

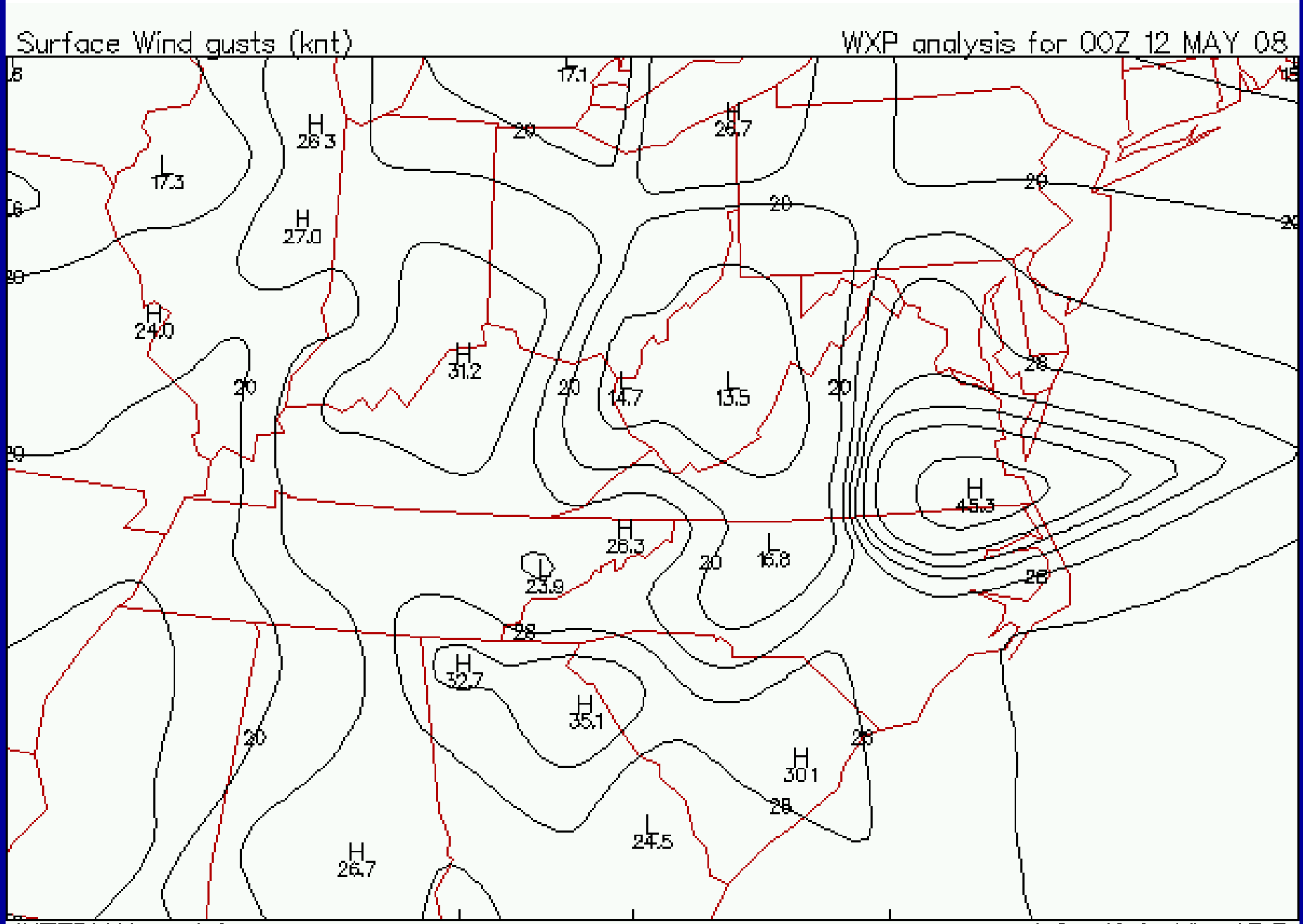



Severe weather watches
All data
0030Z 12 MAY 08
NE
R
NA
Intensities (Dbz): 20 30 40 45 50 55
Plymouth State

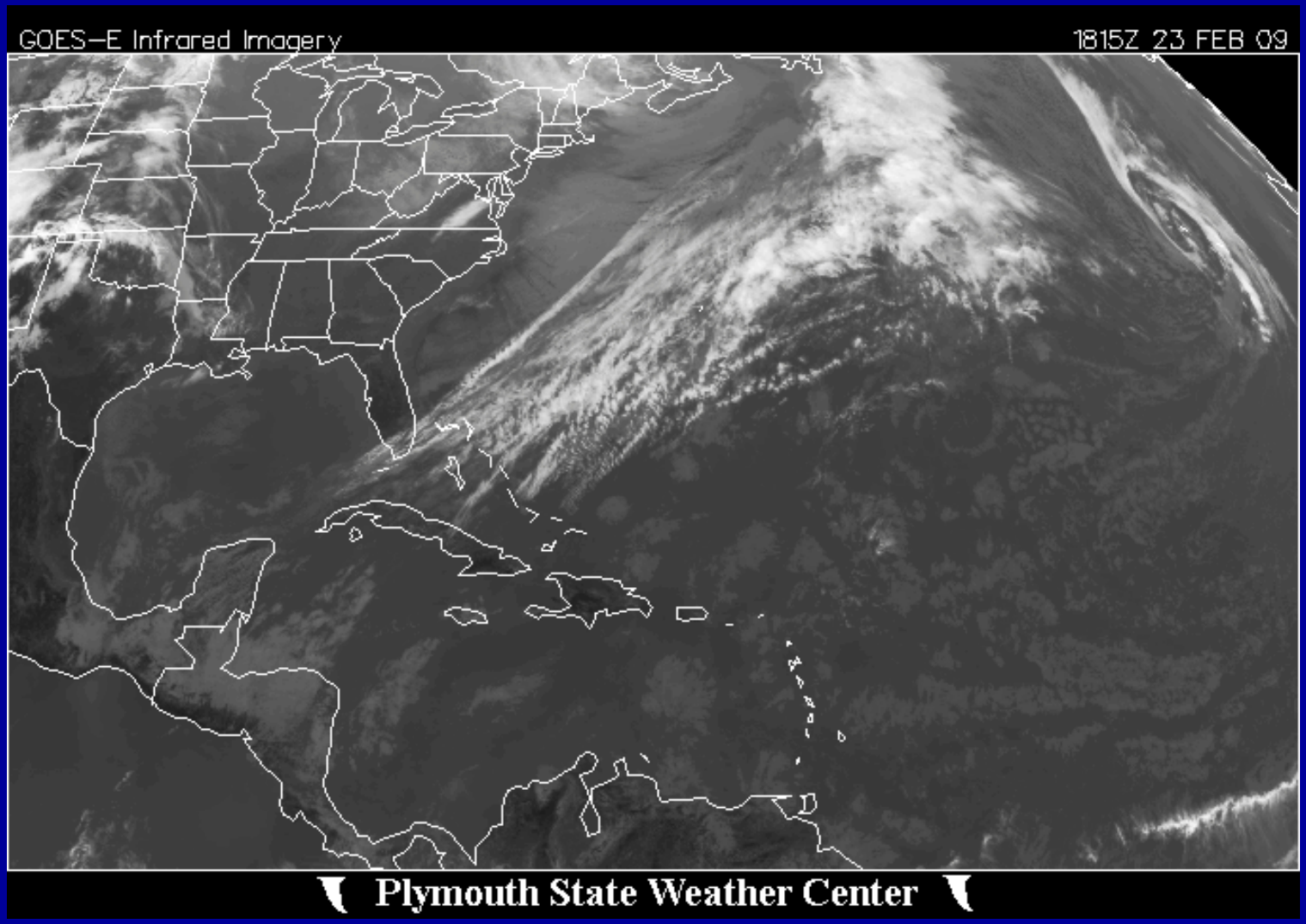
Plymouth State Weather Center



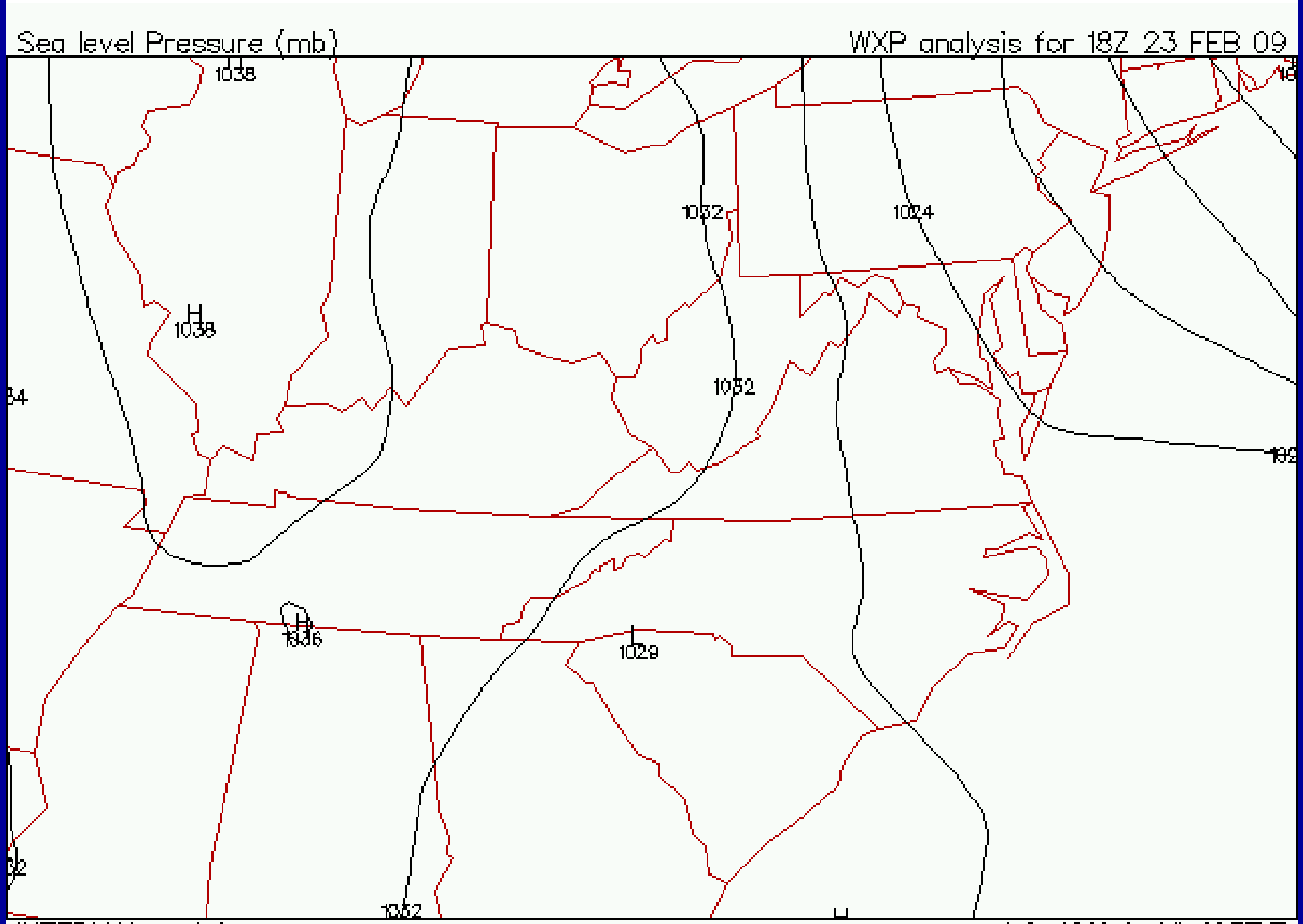
Plymouth State Weather Center



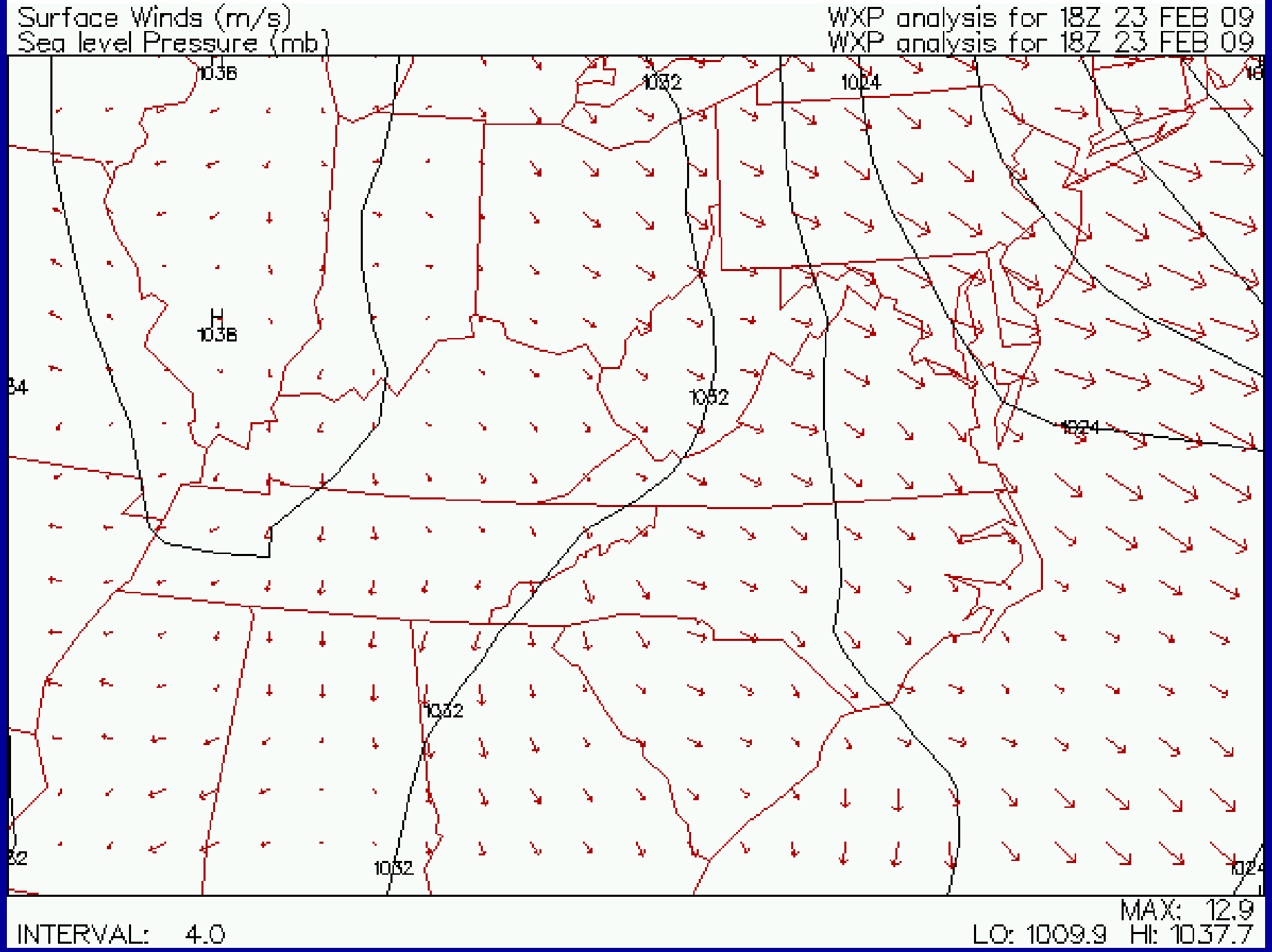
23 Feb 2009


GOES-E Infrared Imagery
1815Z 23 FEB 09
Plymouth State Weather Center

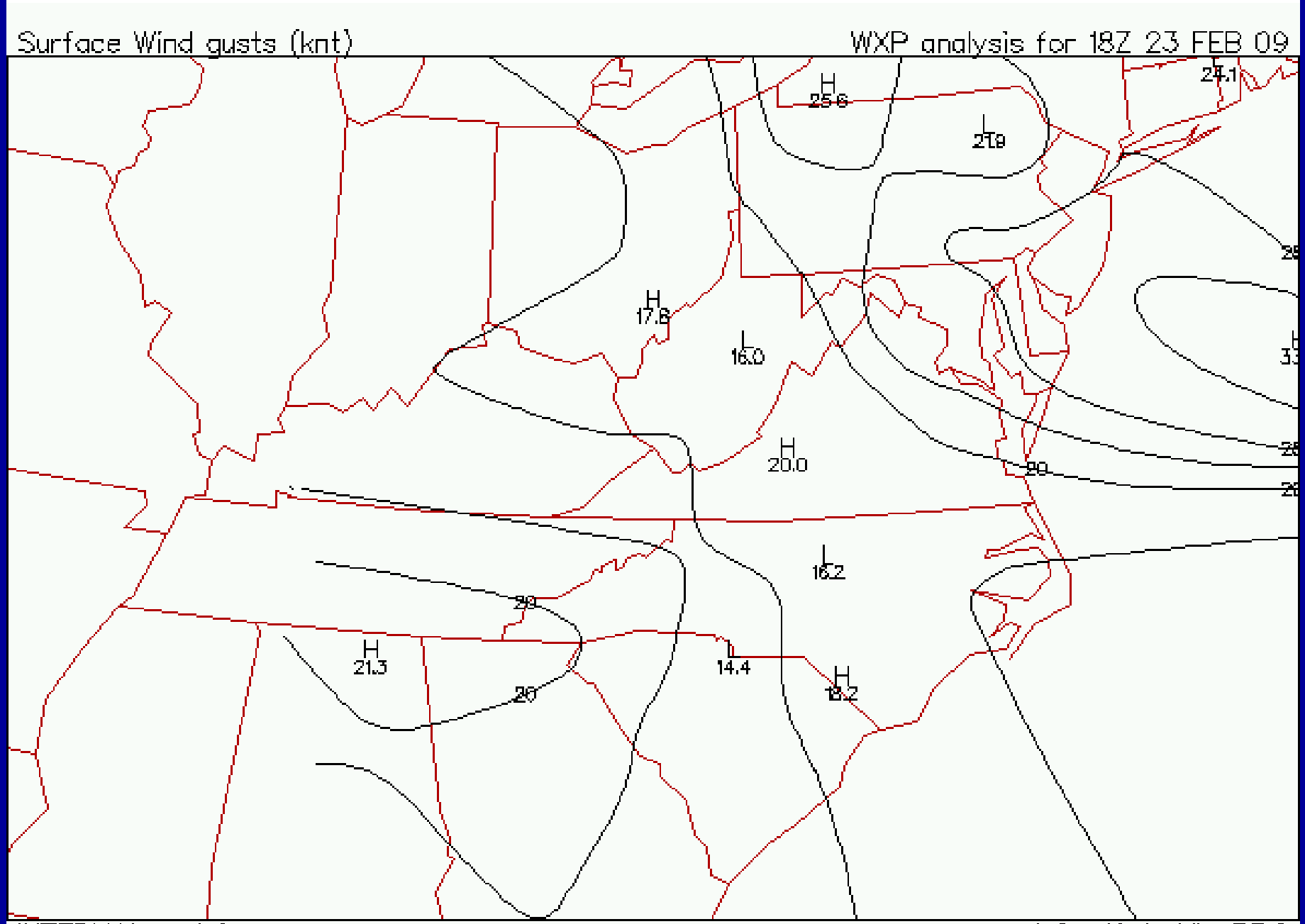
Plymouth State Weather Center



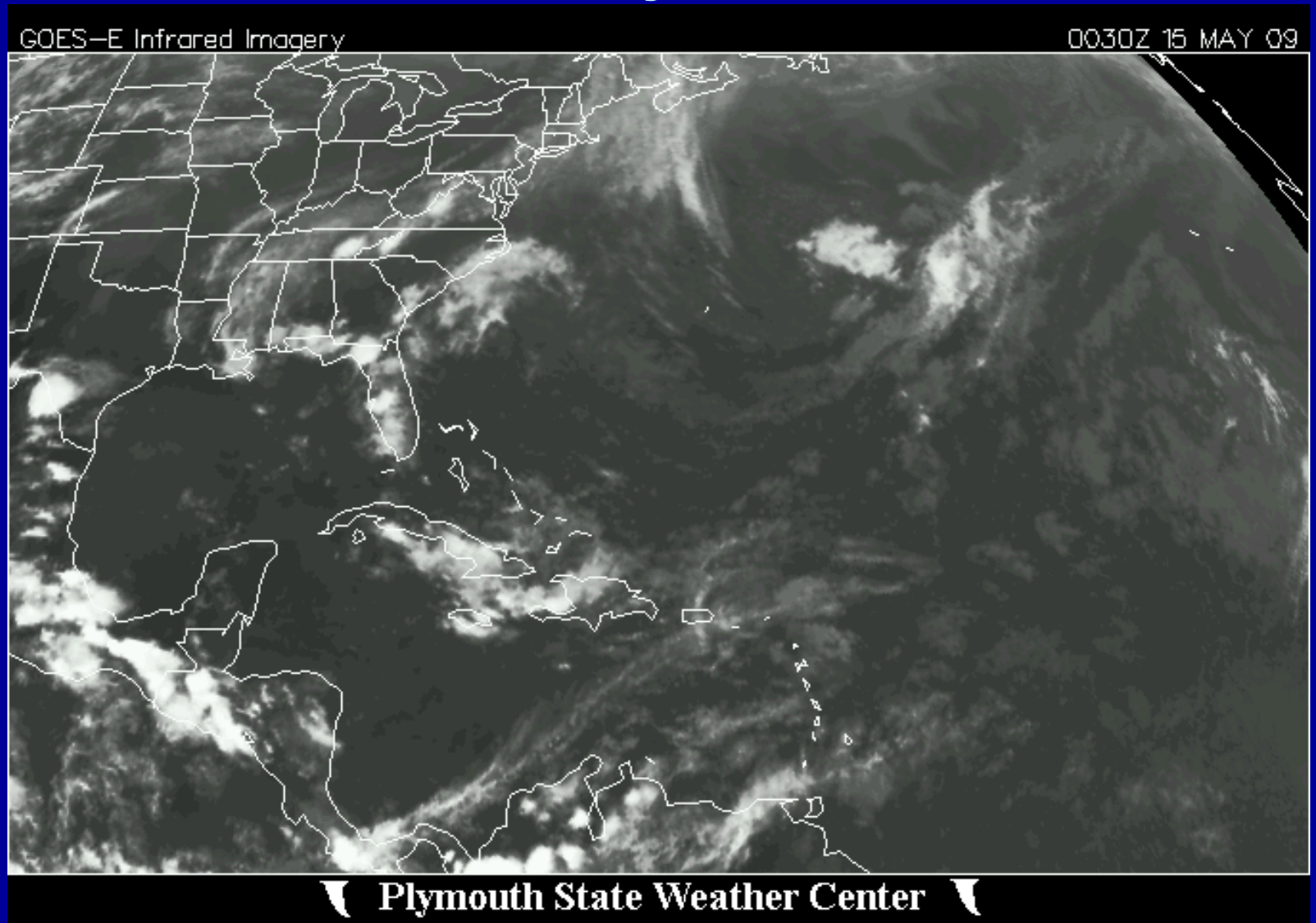
Plymouth State Weather Center



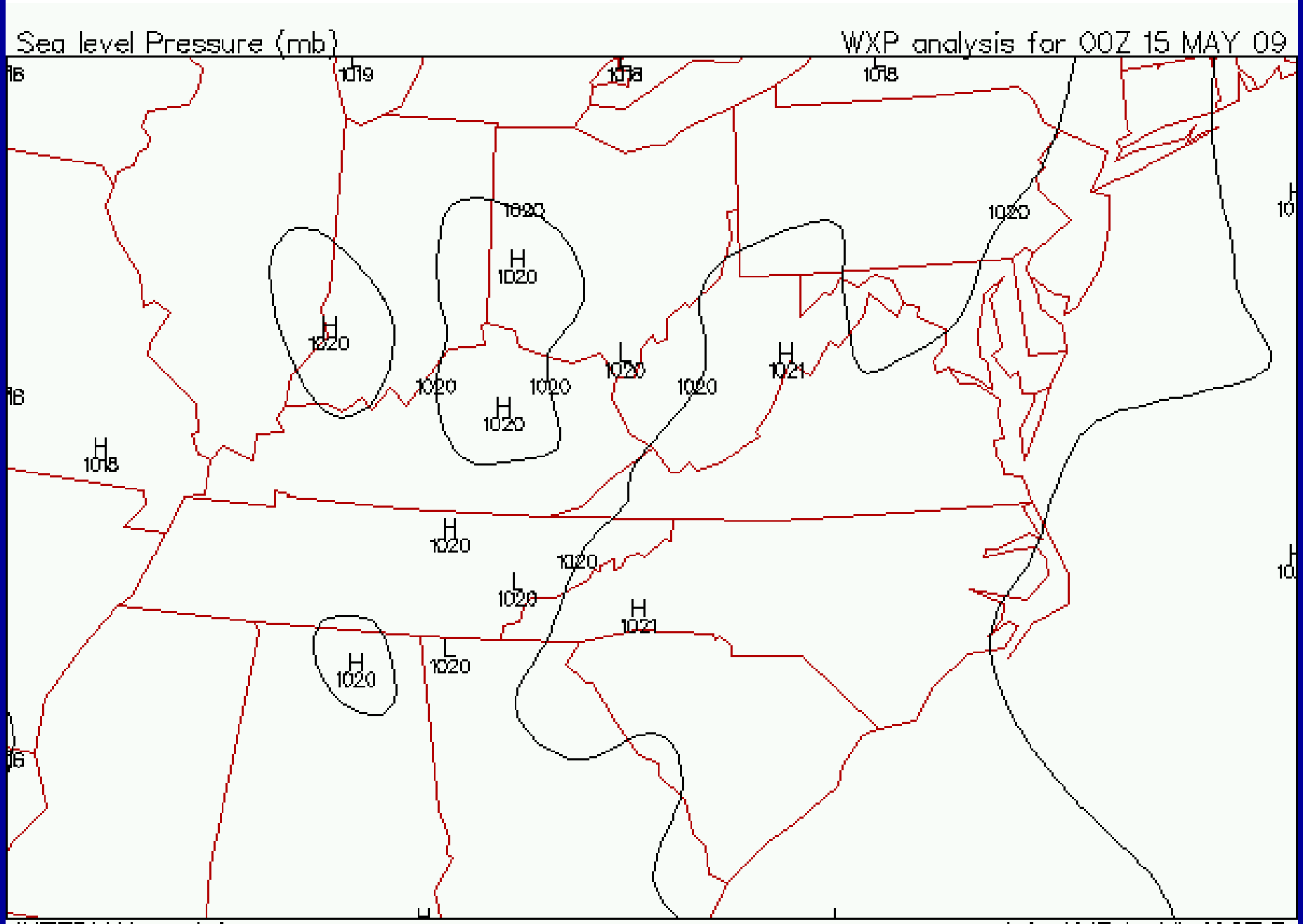
Plymouth State Weather Center

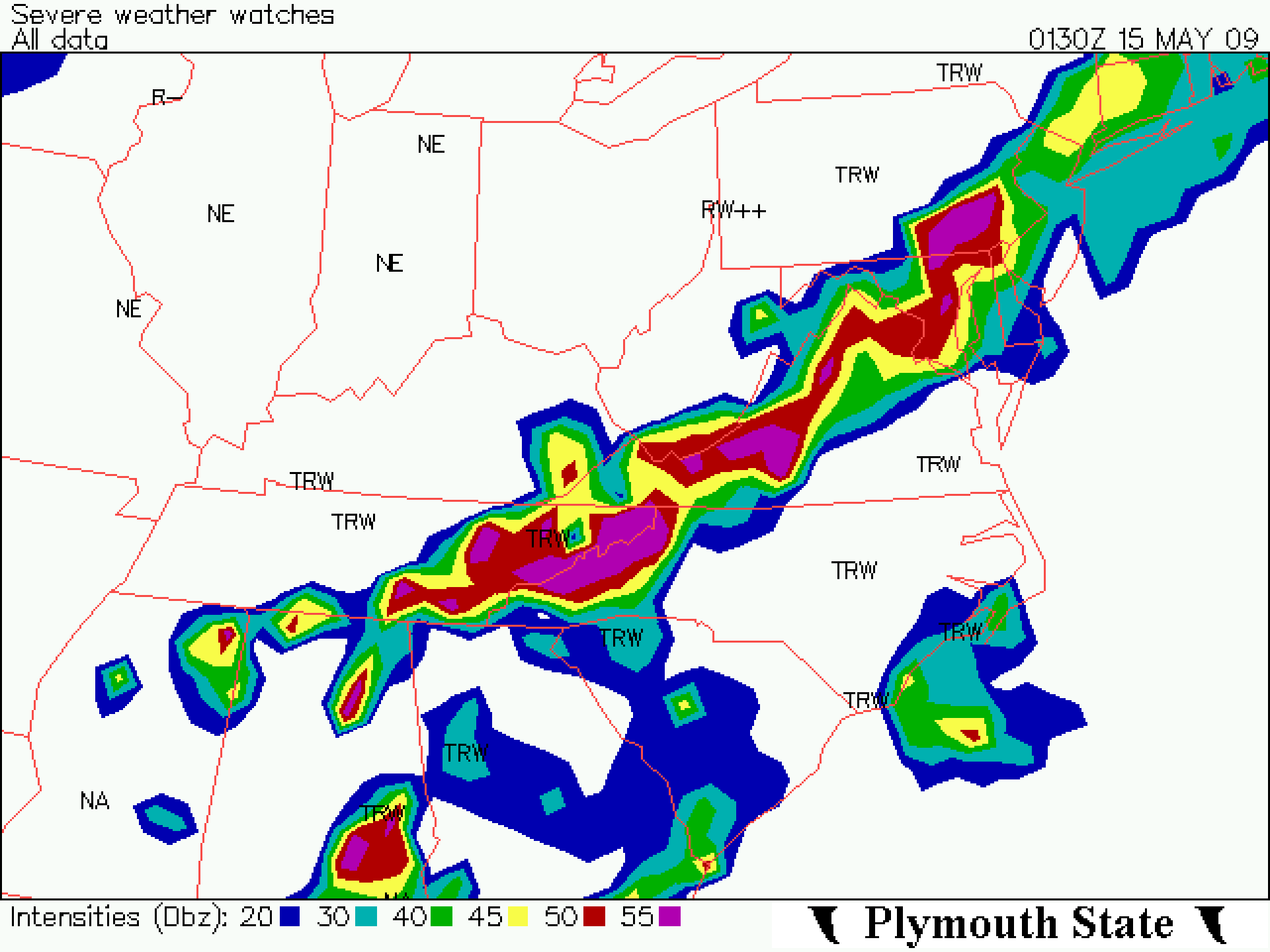


14 May 2009


GOES-E Infrared Imagery
0030Z 15 MAY 09
Plymouth State Weather Center

Plymouth State Weather Center

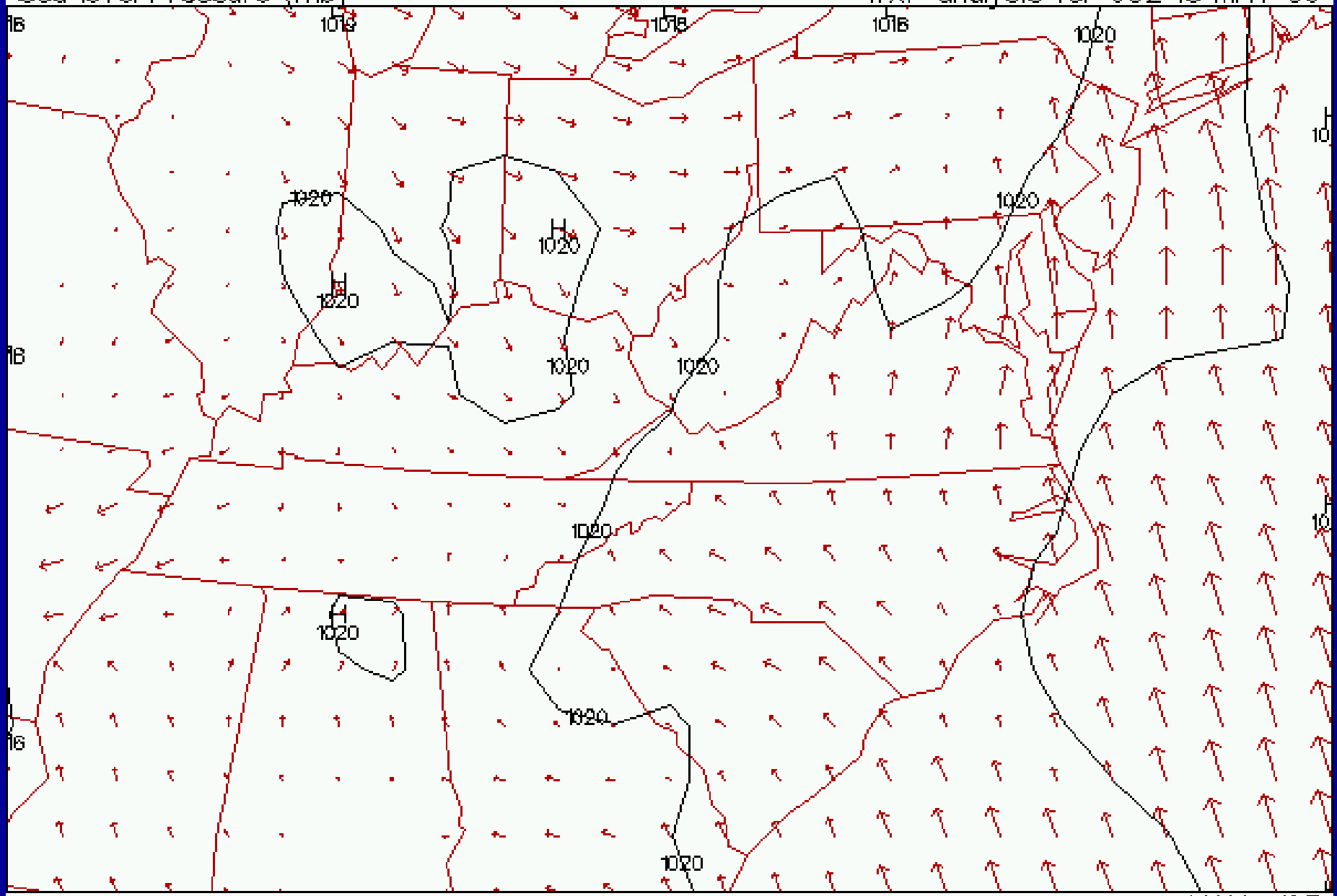



Severe weather watches
All data
0130Z 15 MAY 09
R—
NE
NE
NE
NE
RW++
TRW
TRW
TRW
TRW
TRW
TRW
TRW
TRW
TRW
TRW
TRW
TRW
NA
Intensities (Dbz): 20 30 40 45 50 55
Plymouth State

Plymouth State Weather Center

Surface Winds (m/s)
Sea level Pressure (mb)

WXP analysis for 00Z 15 MAY 09
WXP analysis for 00Z 15 MAY 09



INTERVAL: 4.0

MAX: 11.5
LO: 1016.0 HI: 1027.5

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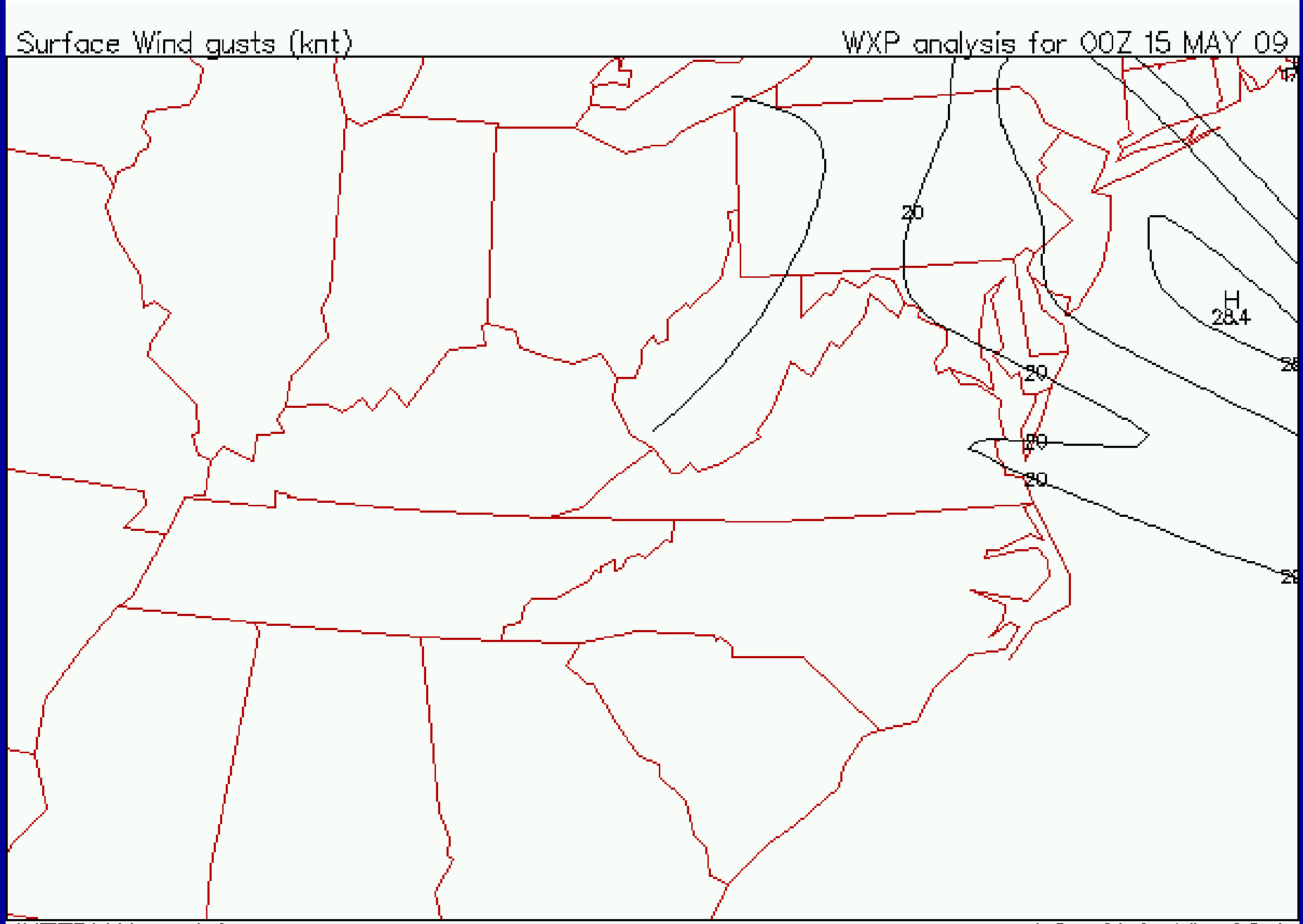
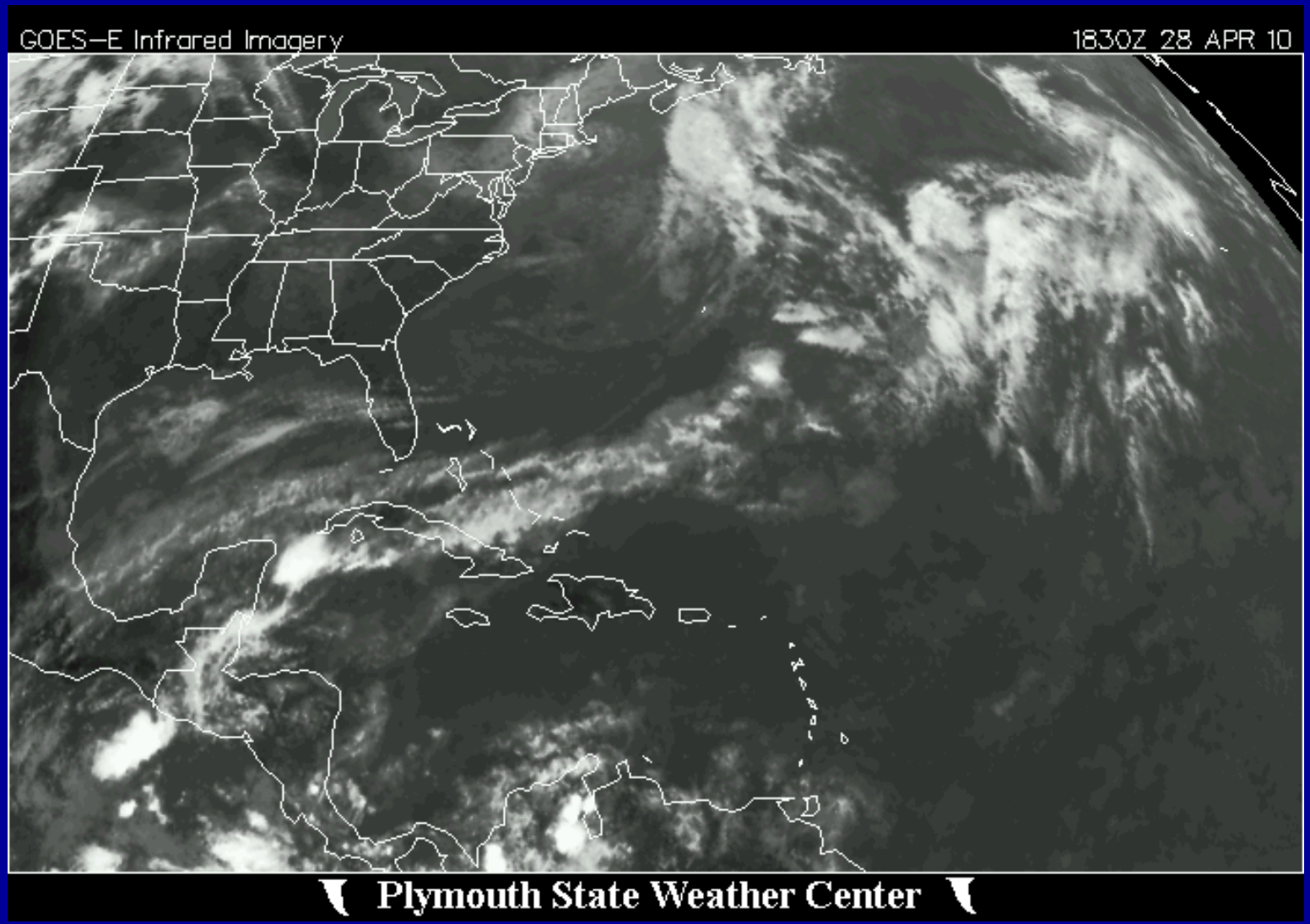
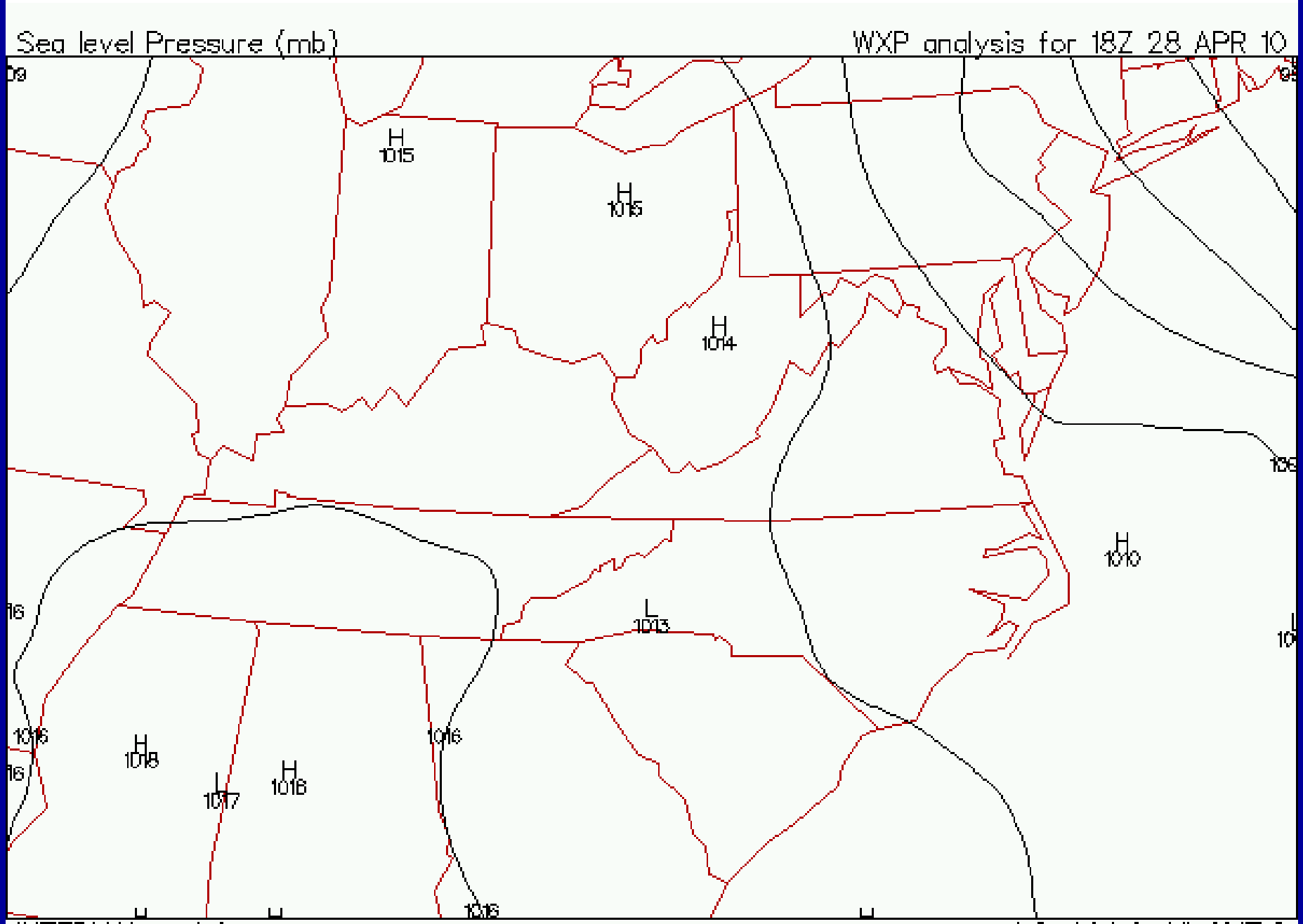
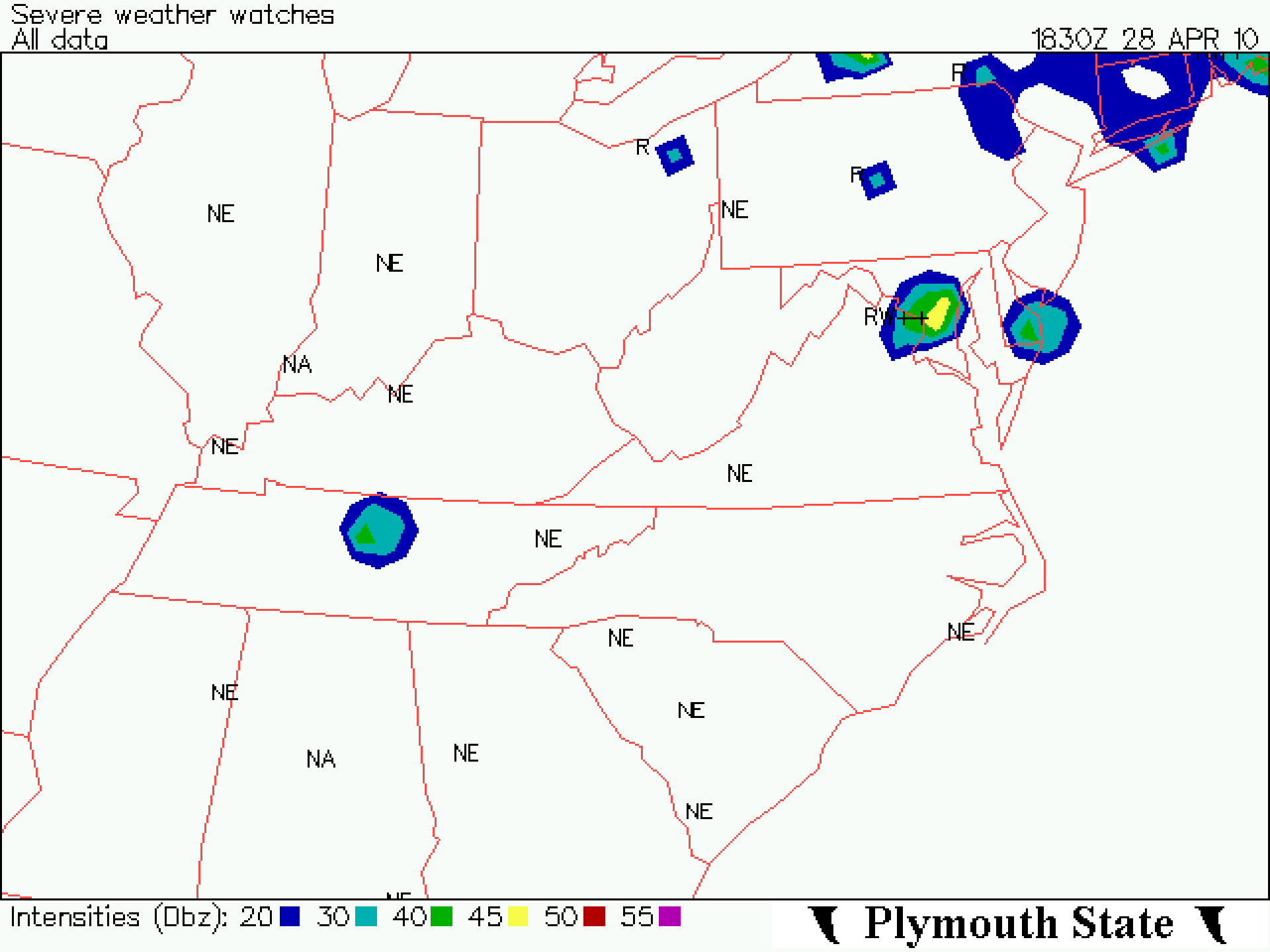


28 Apr 2010

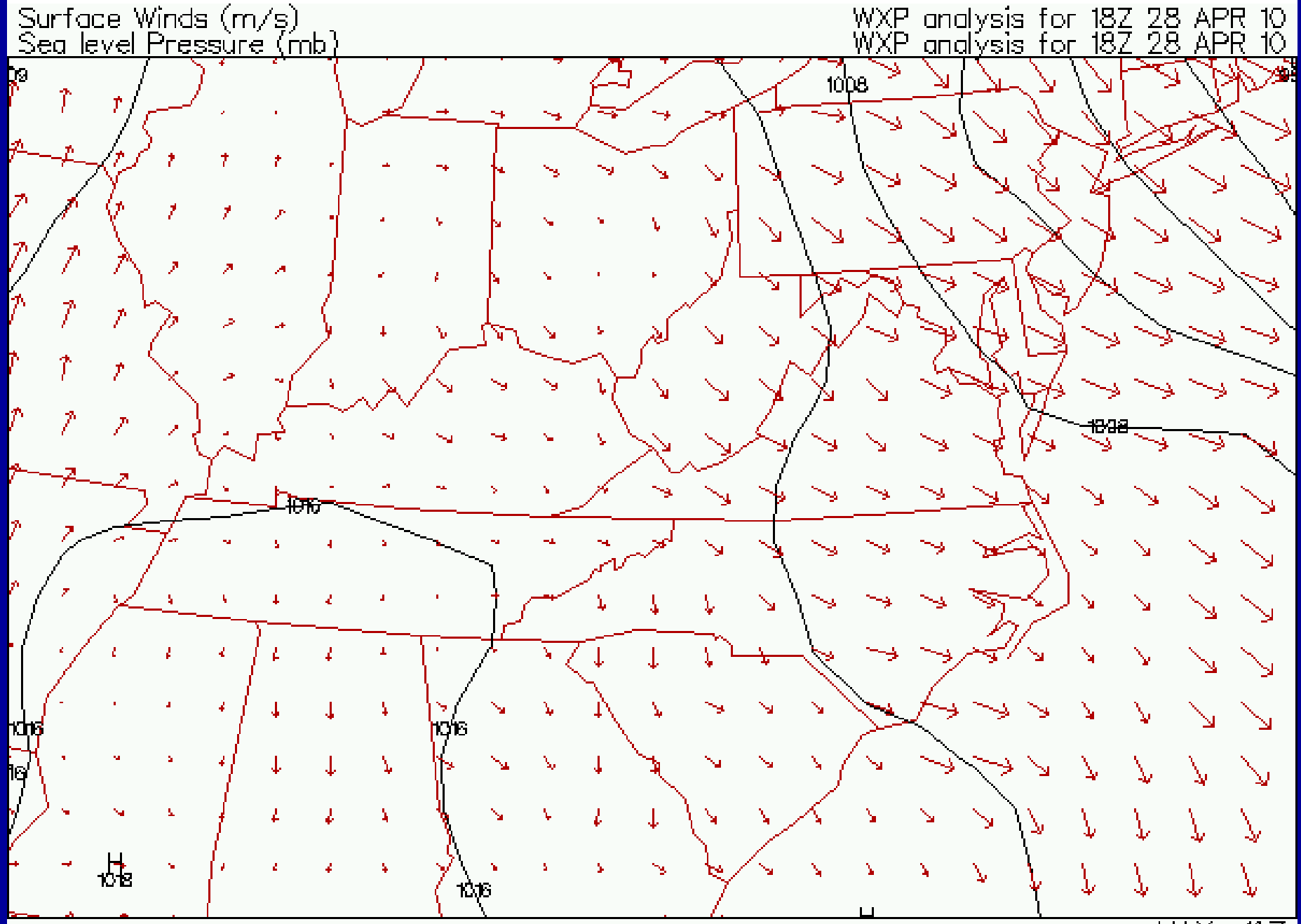

GOES-E Infrared Imagery
1830Z 28 APR 10
Plymouth State Weather Center

Plymouth State Weather Center




Severe weather watches
All data
1830Z 28 APR 10
R
R
R
NE
NE
NE
NE
NE
NE
NE
NE
NE
NE
NE
NE
NE
NE
NA
NA
Intensities (Dbz): 20 30 40 45 50 55
Plymouth State

Plymouth State Weather Center



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