



Weather for the Mariner

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USNA 1982



Why Should You Care?

- Going to Sea is all about being prepared and....
- It's all about controlling risk.
- It's all about making preparations to maximize the things you can control and...
- It's all about making preparations to minimize the things you can't control.



My Point?

- [Click to link to BT Global Challenge video](#)
- www.youtube.com
 - BT Global Challenge 2000



Decisions Affected by Weather:

Crew

- Clothing.
 - Foul Wx gear
 - Tech vests
- Meals.
- Sea sickness medicine?
- Crew Training and Experience
- Crew Rotation. Who can stand watch?
 - Navigation or Helm or Deck?

A small icon in the top-left corner showing a yellow sailboat on a white base, set against a dark blue background.

Decisions Affected by Weather:

Equipment

- Sail combination?
- Reef , change head sail or rig storm sails?
- Missile hazards – are things lashed down or stowed properly?
- Is equipment in good repair?
- Is RACOR filter bowl clear of debris?



Decisions Affected by Weather:

Navigation

- Should you alter your route?
 - Go outside Long Island vs through New York City
- Are you Offshore?
 - Should you stay on track or head closer to shore?
- Are you in a Narrow Channel?
 - If the wind increases in strength or shifts in direction can you navigate safely?
 - If visibility decreases can you navigate safely?



Decisions Affected by Weather:

Departure Time and Date

- Departure time and date may very well be the most important decision you make!

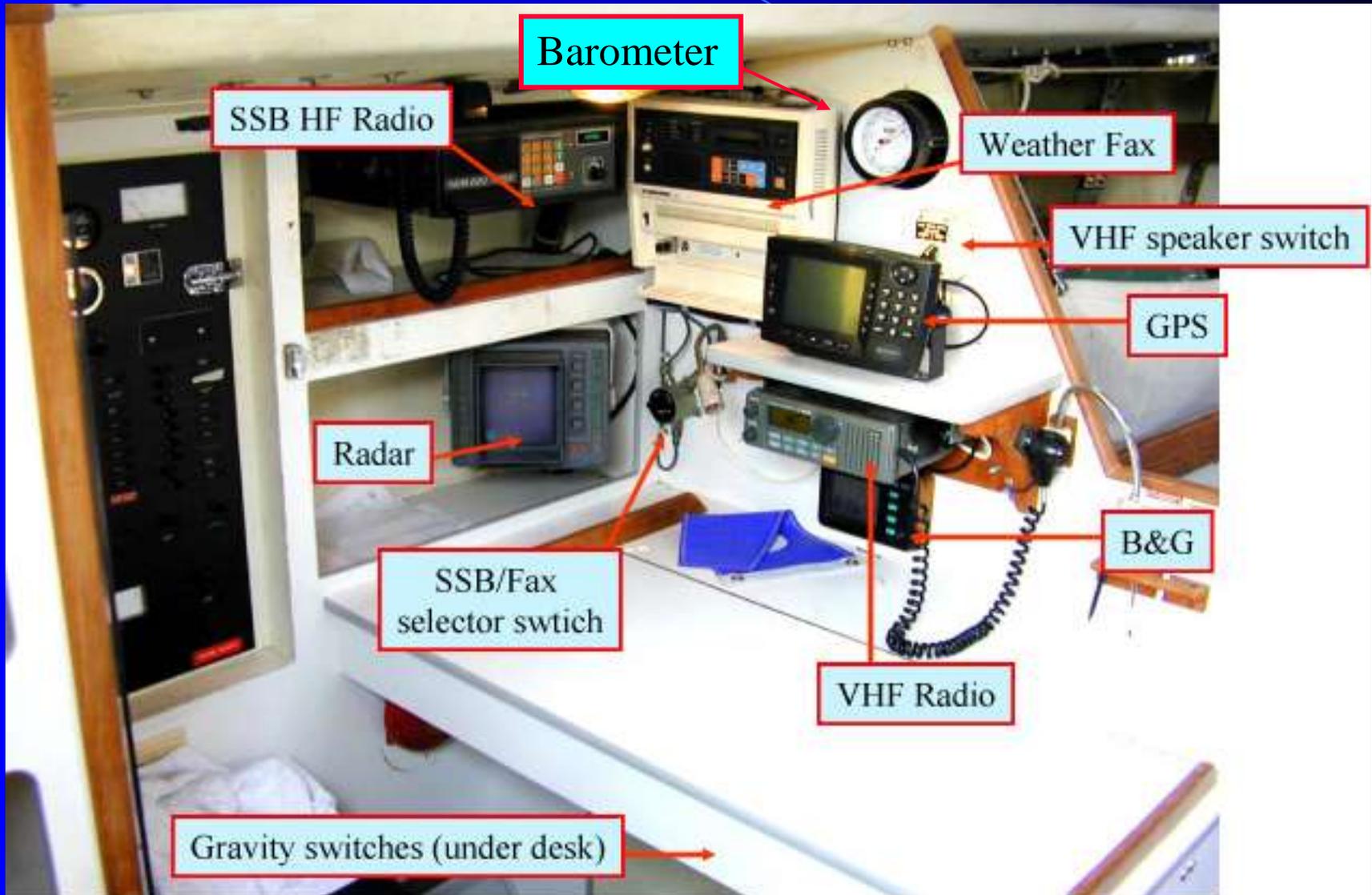


Weather Tools Available On Navy 44

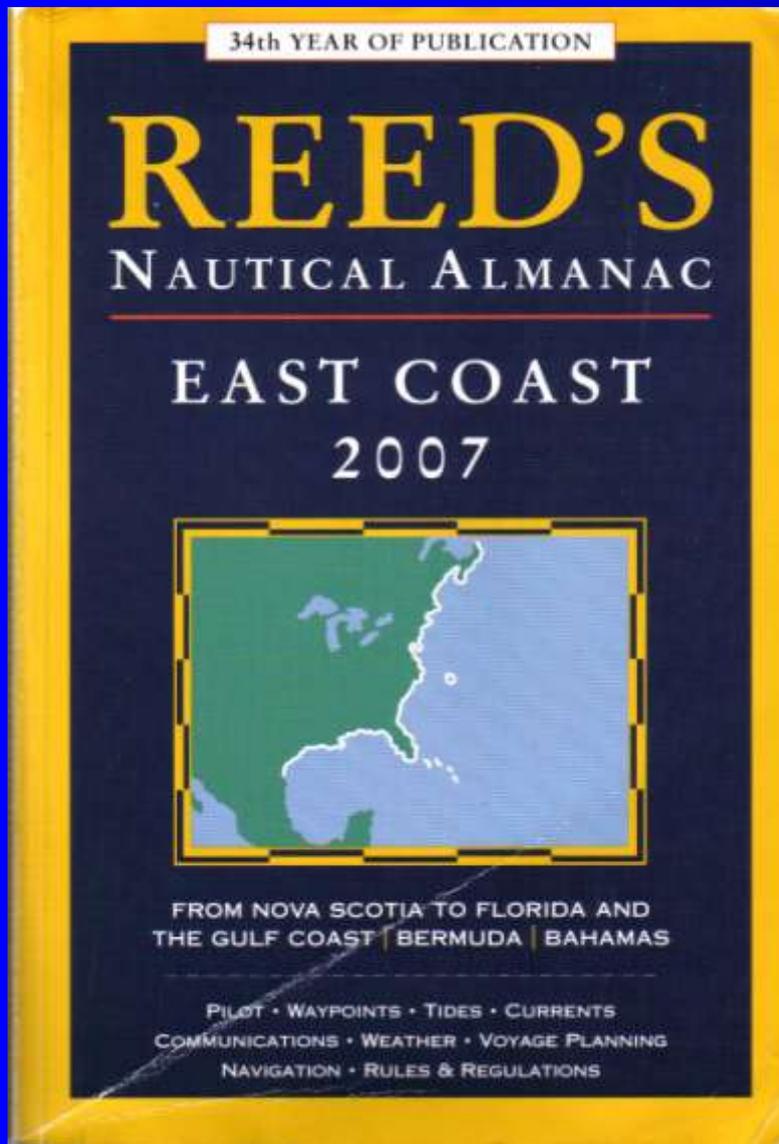
- *Barometer*
- *Wind Instruments*
- *Clouds and sea surface*
- *Weather facsimile – prints onboard weather charts*
- *VHF radio -- local area broadcasts*
- *SSB radio -- HF weather broadcasts*
- *Satellite phone or cell phone*
- *Reeds Nautical Almanac – provides weather fax schedules and frequencies*

Weather Tools Available On Navy

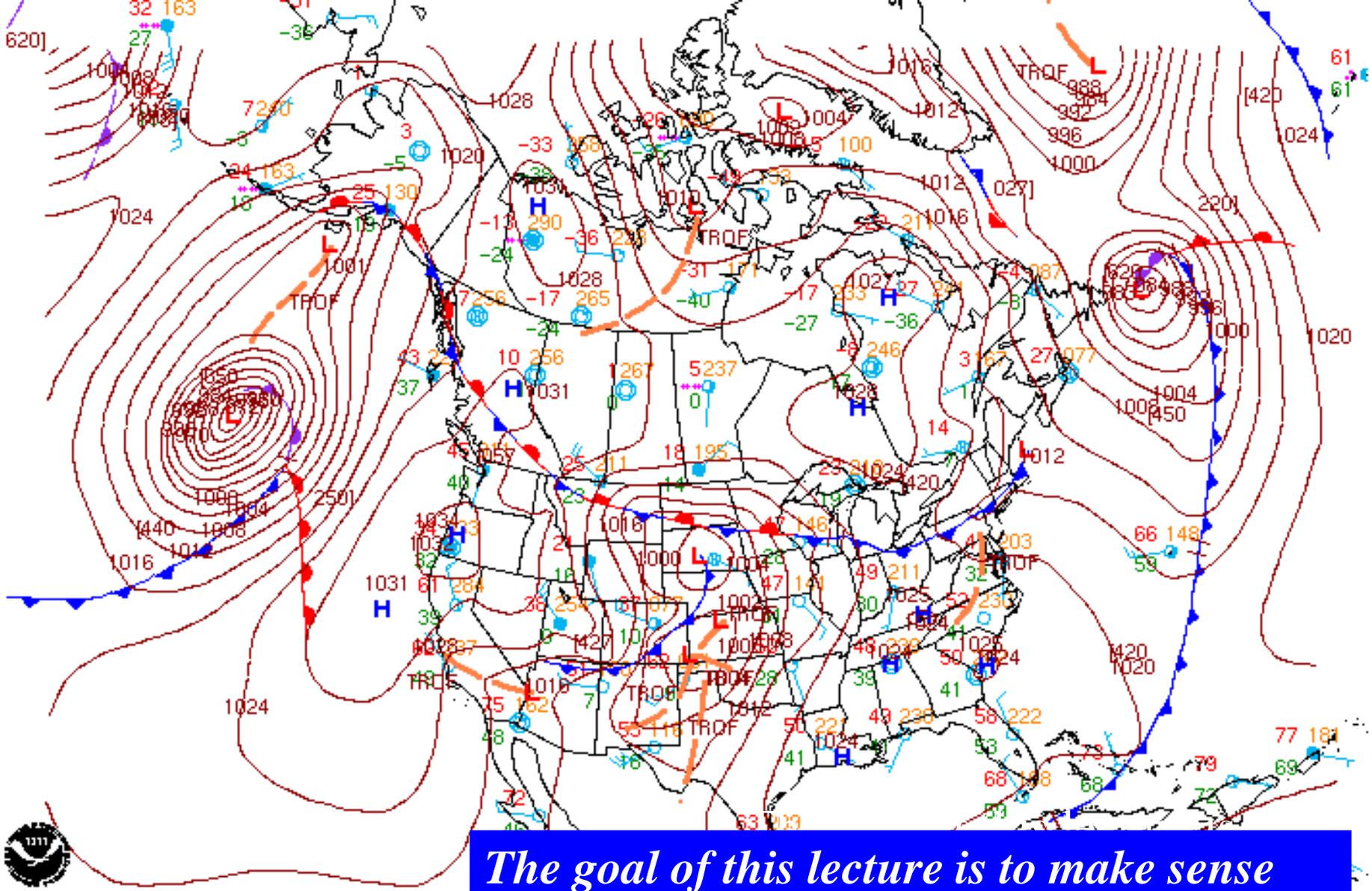
44



Weather Tools Onboard Navy 44



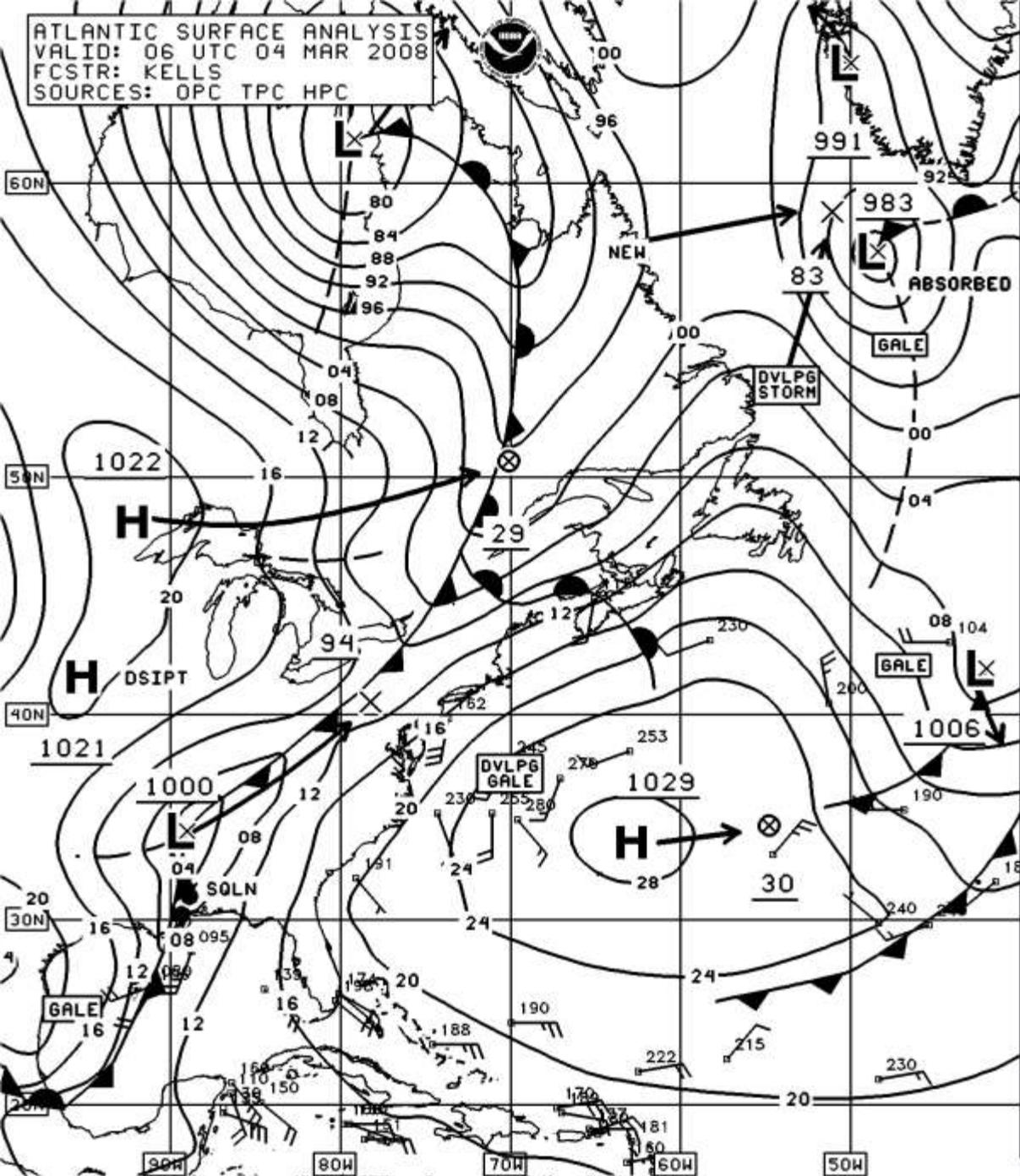
- *Chapter on Weather Fundamentals*
- *Provides Weather Fax Frequencies*
- *Provides photos of cloud types*
- *Provides photos of wind and sea state*
- *Herb Hilgenberg contact info*



The goal of this lecture is to make sense of weather information you have available.

DOC/NOAA/NWS/NCEP/HPC
0000Z SURFACE ANALYSIS
DATE: SAT FEB 09 2002
ISSUED: 0141Z SAT FEB 09 2002
ANALYST: ZIEGENFELDER

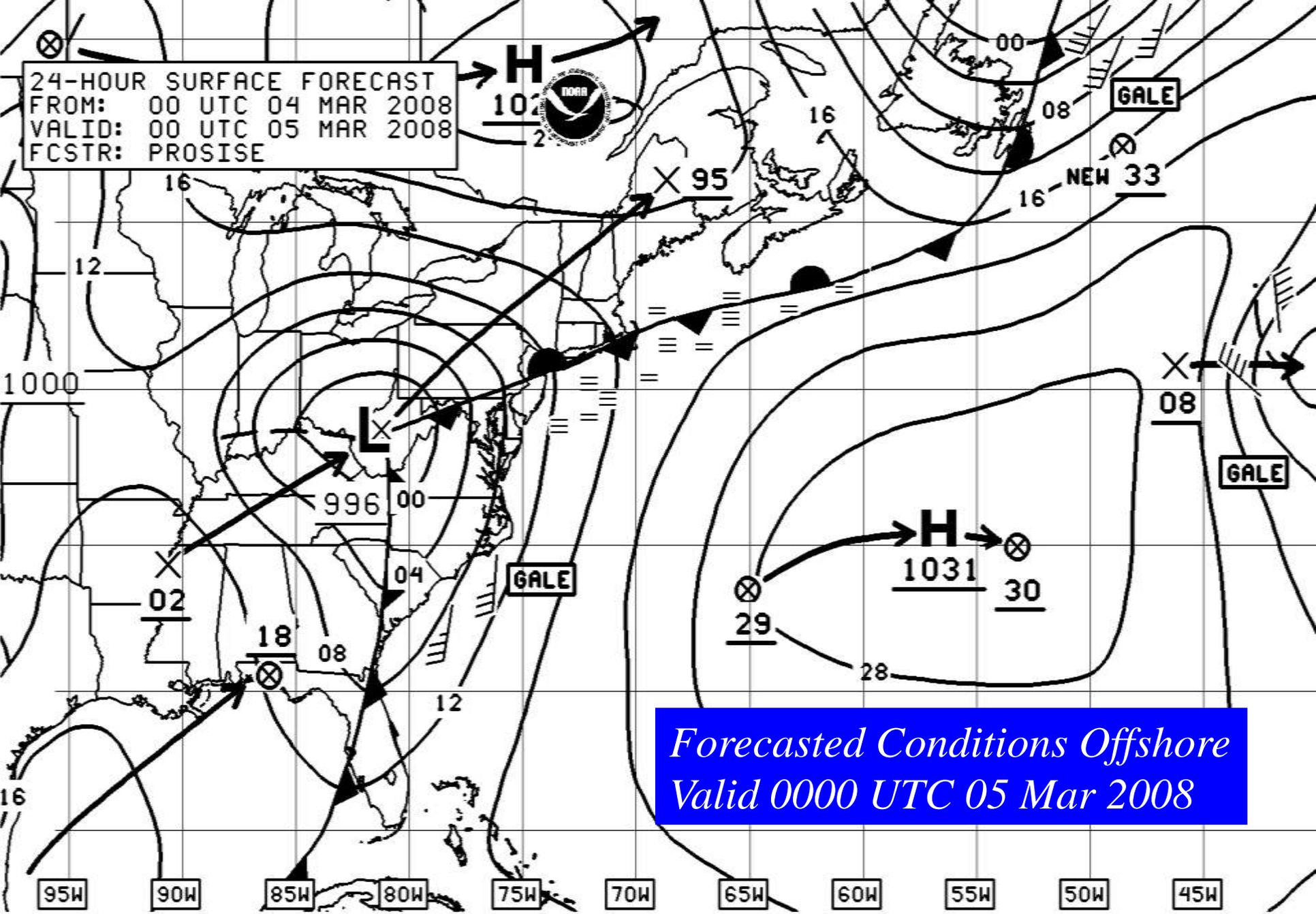
ATLANTIC SURFACE ANALYSIS
VALID: 06 UTC 04 MAR 2008
FCSTR: KELLS
SOURCES: OPC TPC HPC



Typical chart received onboard a Navy 44 via the weather fax.

Conditions off shore 0600 UTC 04 Mar 2008

24-HOUR SURFACE FORECAST
 FROM: 00 UTC 04 MAR 2008
 VALID: 00 UTC 05 MAR 2008
 FCSTR: PROSISE



*Forecasted Conditions Offshore
 Valid 0000 UTC 05 Mar 2008*

ICE
EDGE

24-HOUR WIND & WAVE FORECAST (FEET)

FROM: 00 UTC 04 Mar 2008

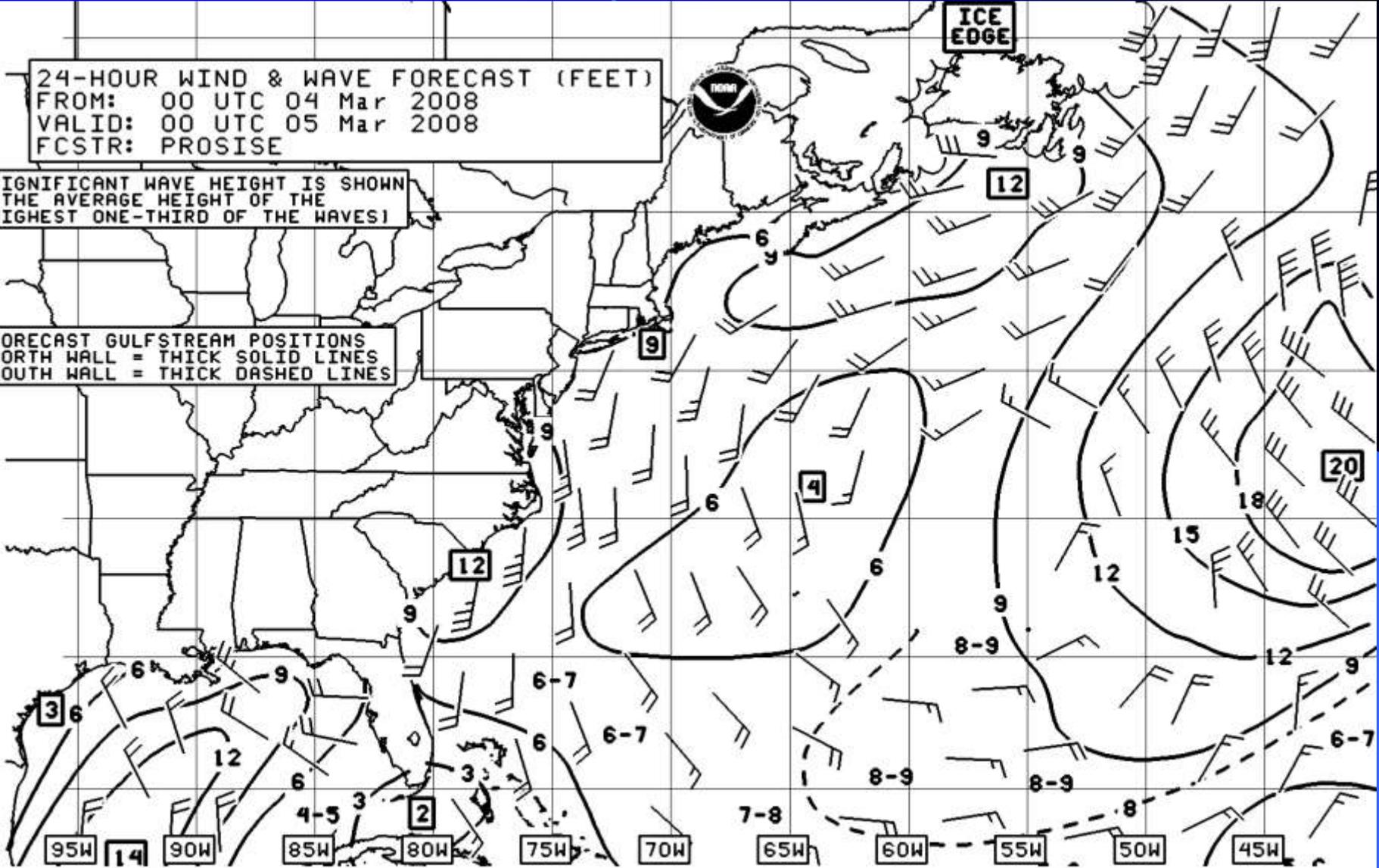
VALID: 00 UTC 05 Mar 2008

FCSTR: PROSISE



SIGNIFICANT WAVE HEIGHT IS SHOWN
(THE AVERAGE HEIGHT OF THE
HIGHEST ONE-THIRD OF THE WAVES)

FORECAST GULFSTREAM POSITIONS
NORTH WALL = THICK SOLID LINES
SOUTH WALL = THICK DASHED LINES





Nautical Weather Sayings

- *Red sky at night, sailor's delight. Red sky in the morning, sailor take warning.*
- *Mackerel skies and mare's tails make tall ships carry low sails.*
- *First rise after very low indicates a stronger blow.*
- *What do they mean?!!*



Marine Weather Thumb Rules

- *Be aware that your boat is moving relative to moving weather systems.*
- *Weather information is perishable information! Update and assess regularly. Make it a watch turnover item.*
- *Clouds are the mariner's best visual indicator of changing weather.*
- *Pay attention to changes in cloud formation and the direction from which clouds approach.*



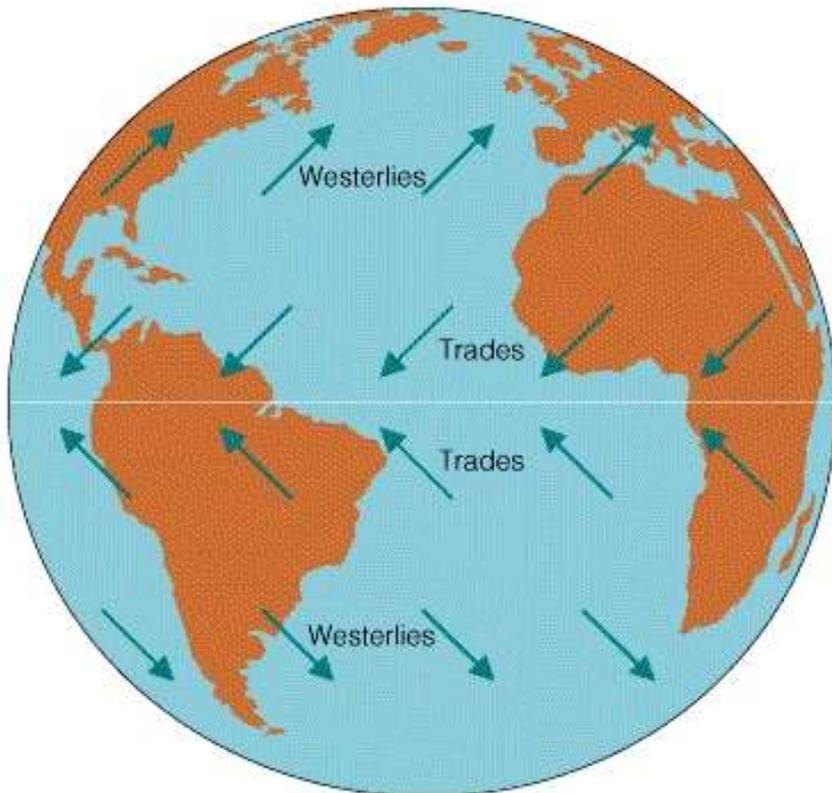
Marine Weather Thumb Rules

- *Pay attention to the speed and direction of the wind.*
- *Pay attention to the sea surface conditions and how it changes over time. Gradually increasing ripples on the water are first indication of increasing wind.*
- *Long parallel streaks in the water where foam and debris line up (called Langmuir Circulation) runs parallel with the wind and is a good indicator of true wind direction.*



Marine Weather Thumb Rules

- Weather systems (High/Low pressure centers) in the mid-latitudes move from west to the east in a band of wind called the prevailing Westerlies.*

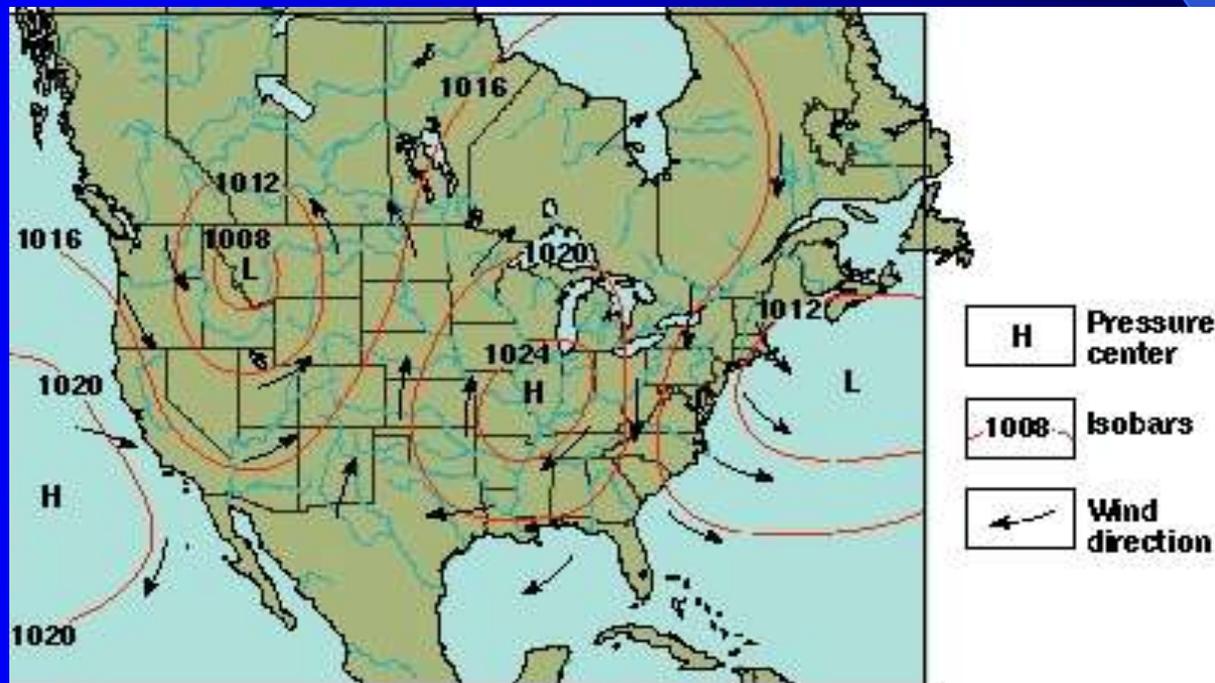




Marine Weather Thumb Rules

Low and High pressure centers generally move in sequence. High pressure replaced by low pressure and low pressure replaced by high pressure.

- Low Pressure systems are associated with storms and high pressure systems serve to block these storms.*





Marine Weather Thumb Rules

Warm, moist air fuels low pressure. Therefore warm currents such as the Gulf Stream can cause dying low pressure systems moving offshore to explosively redevelop.



Marine Weather Thumb Rules

- *Changes in air pressure, wind direction, humidity and temperature are excellent indicators of changing weather.*
- *If temperature and dew point differ by 5 degrees expect fog. If temperature and dew point differ by 3 degrees or less expect rain.*
- *Use Buys Ballot's law to locate general location of high and low pressure centers.*



Weather Fundamentals

- Air Masses
- Pressure
- Wind
- Fronts and Weather
- Clouds



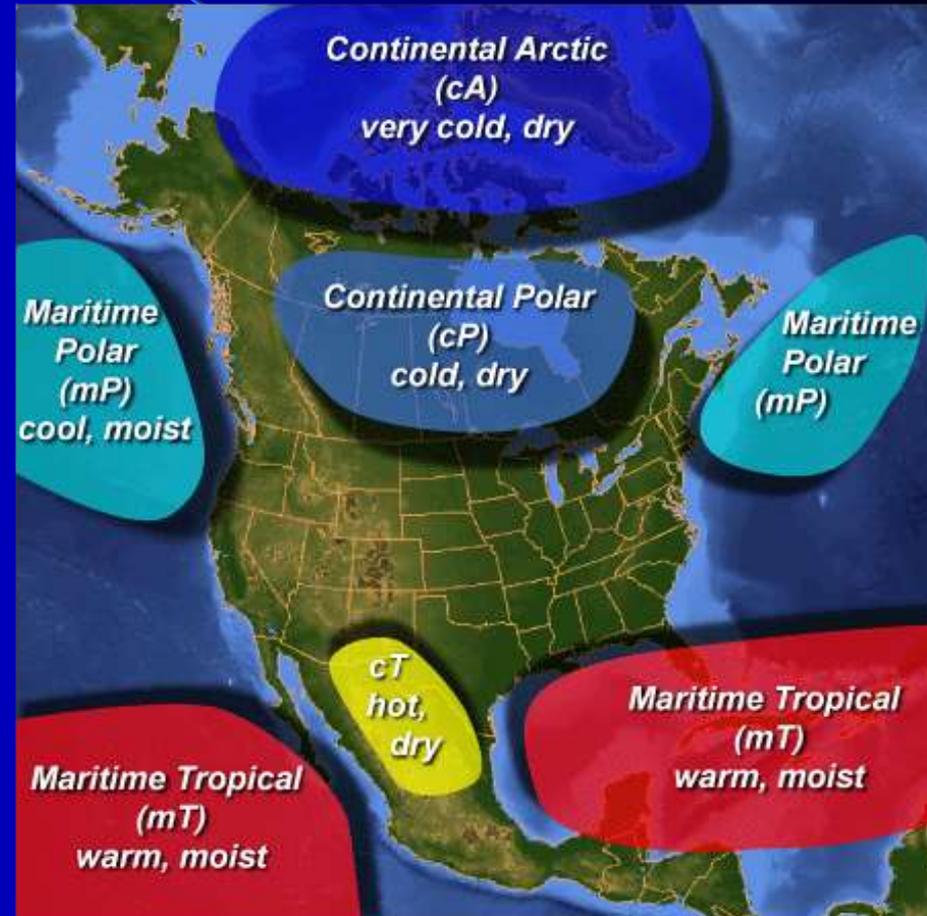
Air Masses

- Air masses are vast bodies of air with uniform temperature and moisture
- Air is modified based upon it's source region or in other words, where the temperature and moisture content modify the air.
- Modified to be:
 - Cold or warm
 - Continental (dry air) or Maritime (moist air)



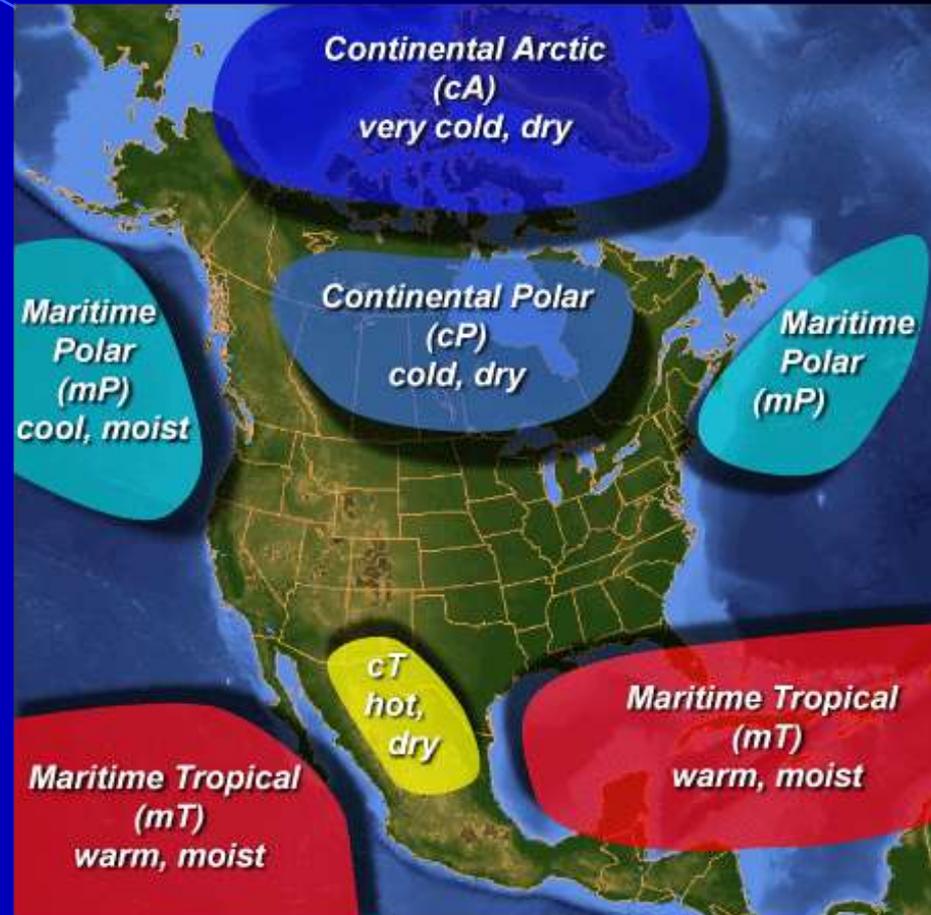
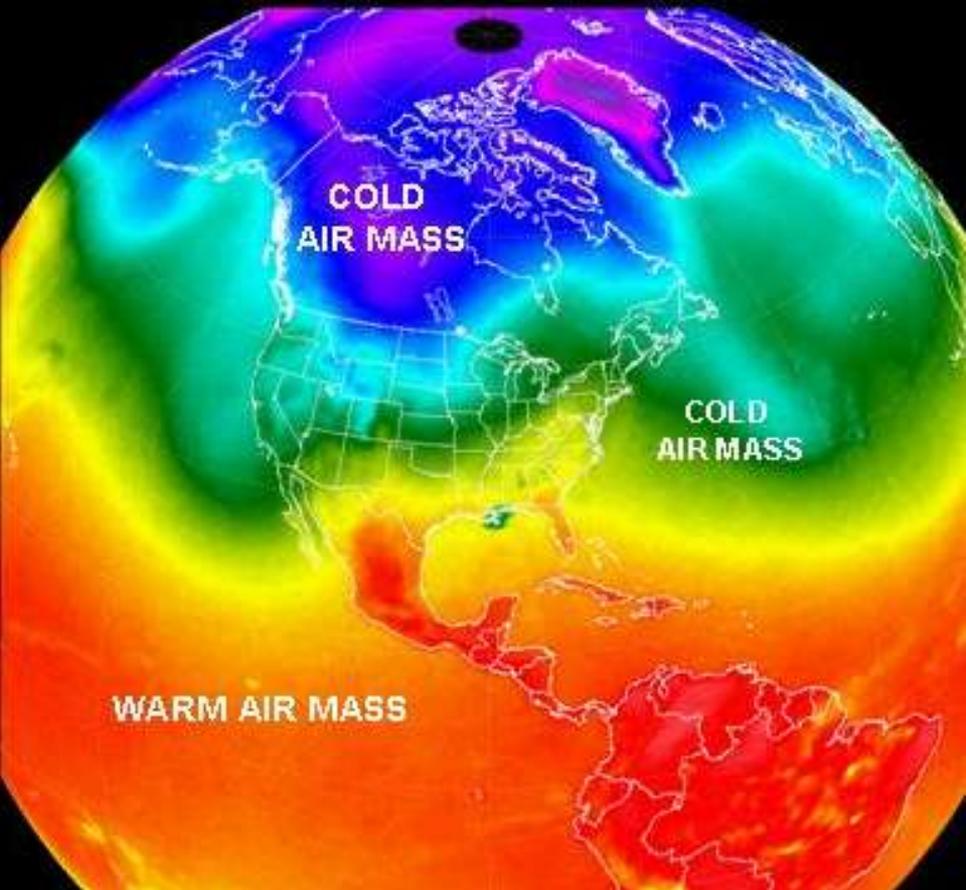
Air Masses

- The types of air masses are:
 - Arctic
 - very cold and dry
 - Continental polar
 - cold and dry
 - Continental tropical
 - Hot and dry
 - Maritime tropical
 - (always warm and moist)



Can you pick out the
5 types of air masses?

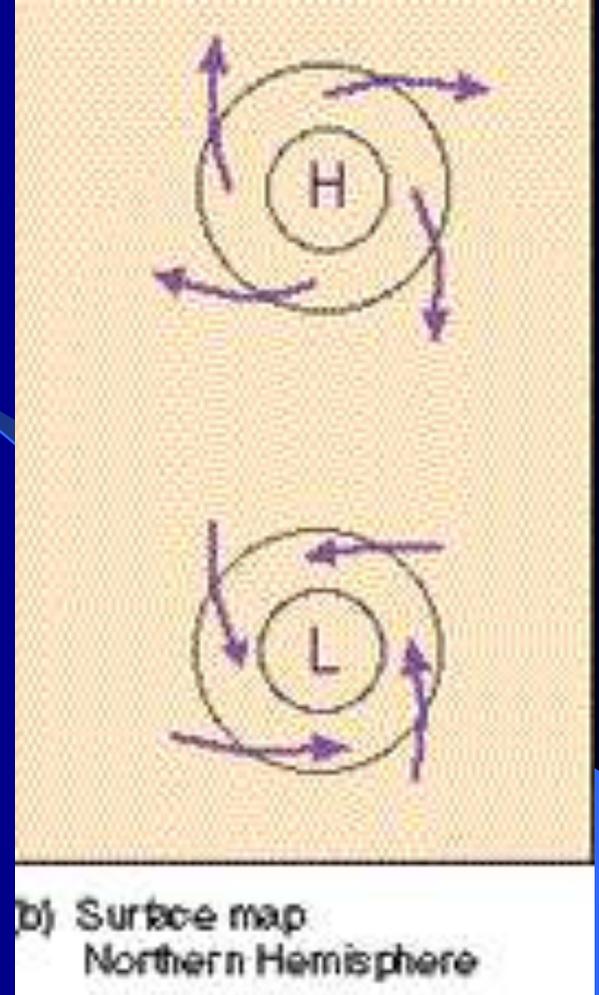
Air Masses



Infrared temperature gradient
showing air masses and
air mass boundaries

Pressure

Jet Stream moves pressure centers westward and causes them to meander north and south.



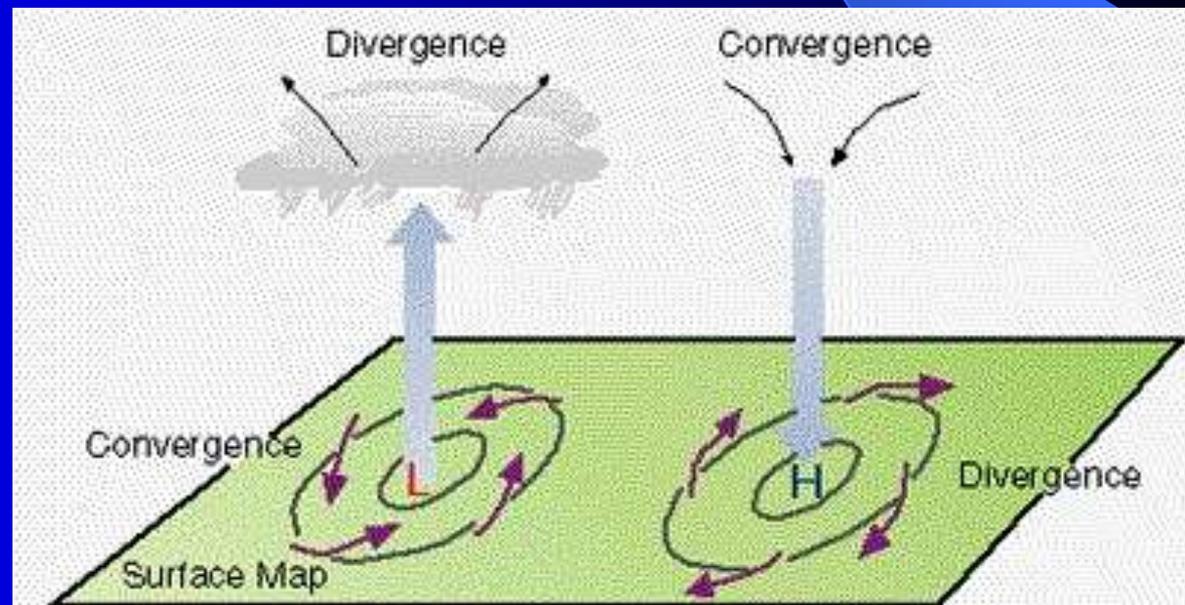
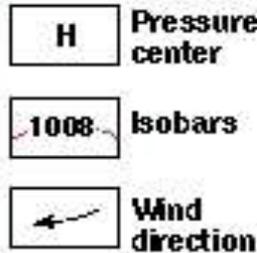
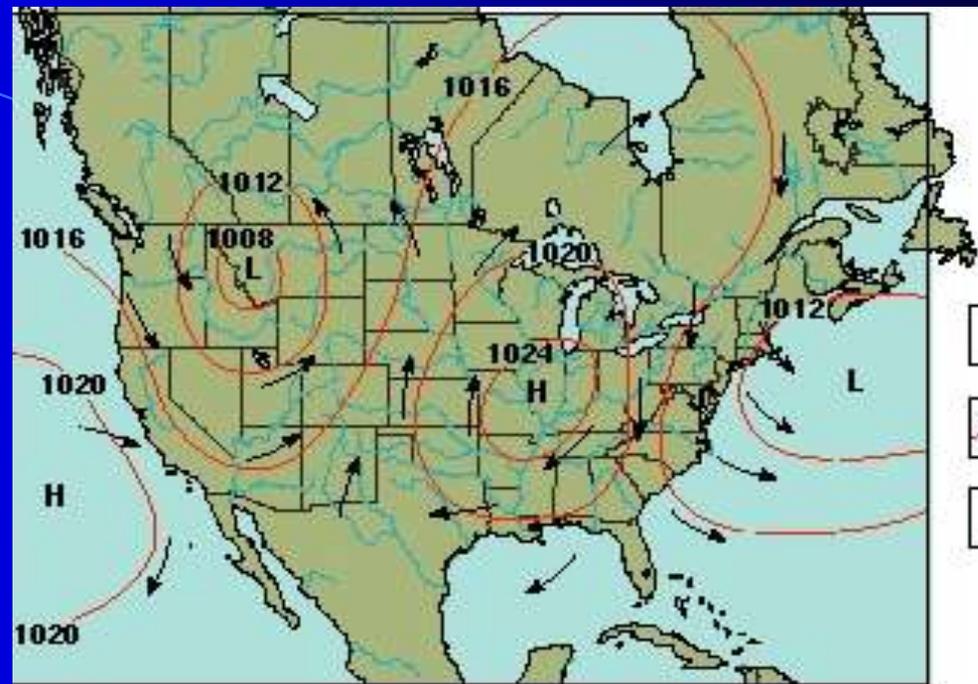
b) Surface map
Northern Hemisphere

Two Types:

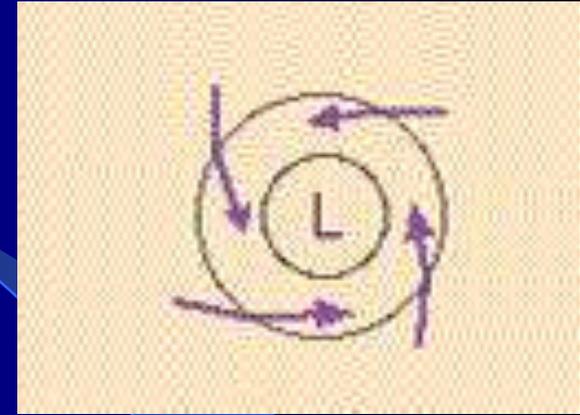
- *High Pressure*
- *Low Pressure*

Pressure

- *The Earth is always throwing the atmosphere out of balance and Mother Nature is always trying to restore balance.*
- *Lows and Highs act like gears to pull hot air toward the poles and cold air toward the equator.*



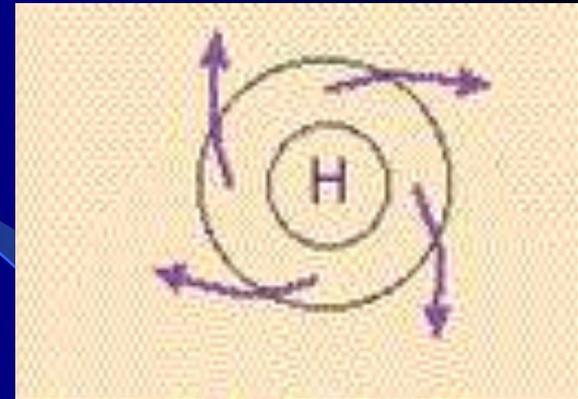
Low Pressure



- Air circulates around low pressure centers counter clockwise and pulls the surrounding air inward like a vacuum (or the drain in a bath tub)
- Air converges at the center of low pressure and rises to form clouds.
- Associate low pressure with storms or deteriorating weather
- Low pressure centers are the anchoring points for fronts.
 - 950 mb is a very deep low pressure system (results in an intense storm)
 - 988 mb is a moderately deep low pressure system



High Pressure



- Air circulates around high pressure centers clockwise and deflects the air outward.
- High pressure is a mound of dense sinking air.
- High pressure tends to block or deflect approaching bad weather
- High pressure indicates fair and dry weather
 - 1035 mb is a very strong high pressure center
 - 1012 is a moderately strong high pressure center



Pressure

- Barometers are instruments that measure air pressure.
- Barometric pressure is one of the best indicators of impending weather
- Barometric pressure should be logged hourly!





Pressure

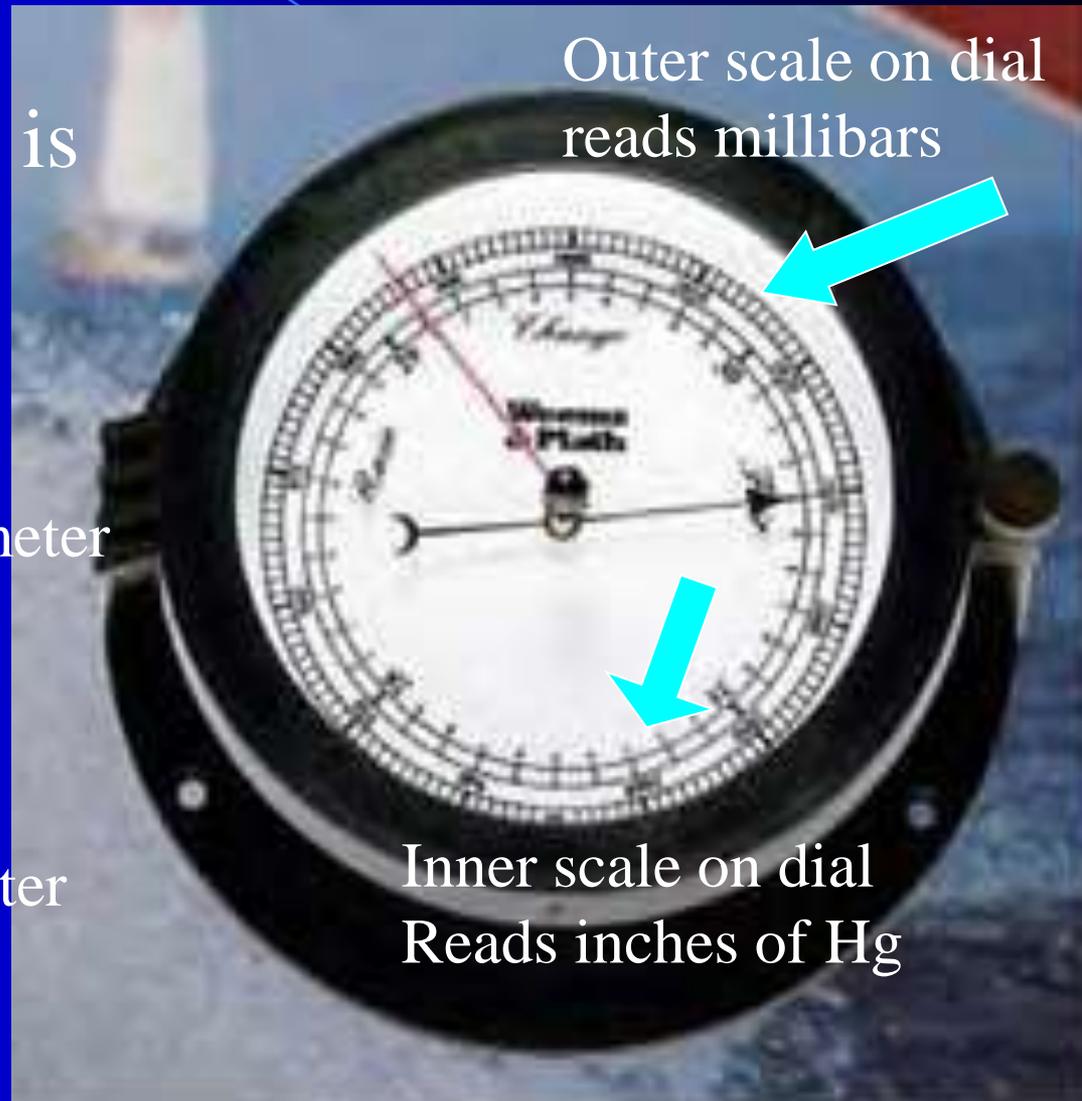
- Atmospheric pressure is measured either:

- Millibars (preferred)

- Outside scale of barometer
- NOAA weather charts

- Inches of mercury

- Inside scale of barometer





Pressure and P`essure Trends

- Watching barometric pressure *trends* is one of the best indicators of impending weather
- It is important to keep track of pressure trends— use a 3 hour trend with a barometer
- Rapid pressure changes
 - Over 6 mb fall (or rise) in 3 hours
- Moderate pressure changes
 - 3-6 mb fall (or rise) in 3 hours
- Slow pressure changes
 - 3 mb fall (or rise) in 3 hours



Pressure

- Two types of air pressure:
- High pressure
 - Think of high pressure as a mound or hill of air
- Low pressure
 - Think of low pressure as a depression of air or water as it goes down the bath tub drain



Wind and Pressure

- Wind is the result of high and low pressure differences and the atmosphere's attempt to equalize the pressure differences.
 - air will always flow from high pressure (mound of air) in toward low pressure (depression of air)



Wind and Pressure

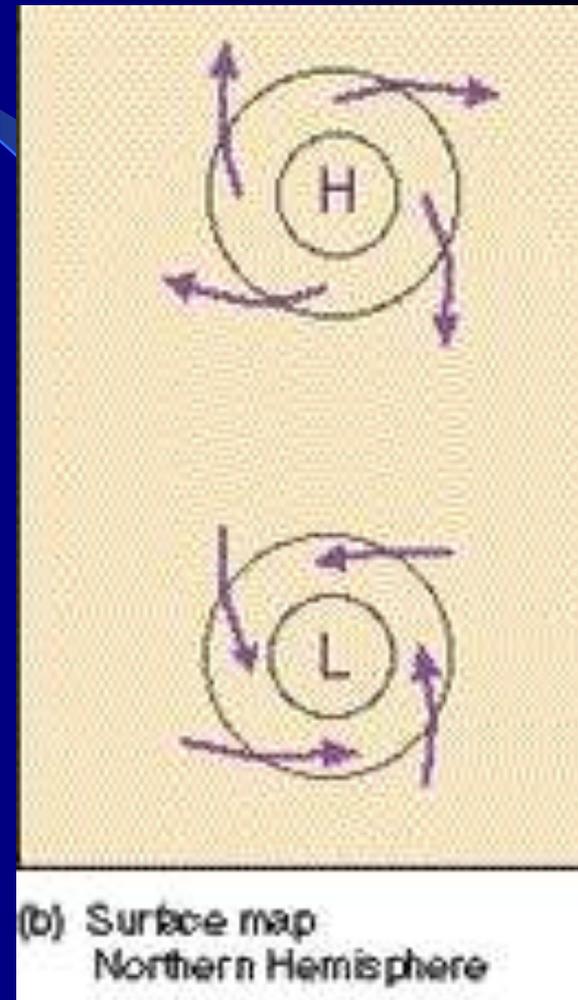
- The greater the pressure difference between high and low pressure, the greater the wind speed
- Wind direction is always indicated from the direction the wind is blowing
 - For example, NE wind blows from the NE
 - A southerly wind blows from the south

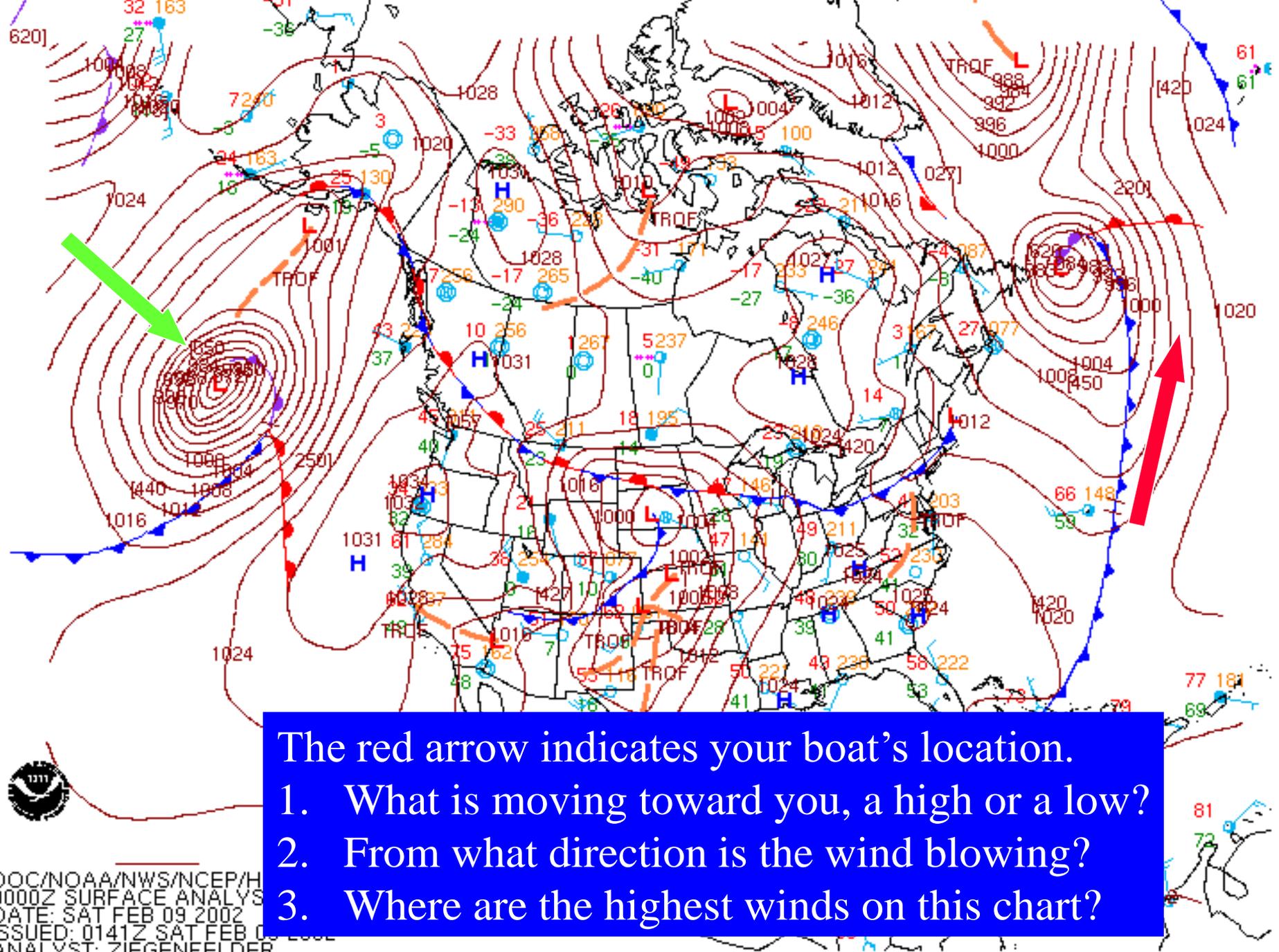
Wind and Pressure

- Weather charts are topographic charts of the atmosphere – made up of contours of hills, depressions and slopes (gradients).
- These contours are called *isobars* and indicate the pressure gradient around a high or low pressure center.
 - Tightly packed isobars indicate a steep slope or strong wind gradient.
- Isobars are indicated in millibars (mb) –
 - barometric pressure is lowest at the center of a low
 - barometric pressure is highest at the center of a high.

Wind and Pressure

- Wind flows around the contours of constant pressure (isobars).
- However... due to surface friction, wind cross the isobars slightly.
- Surface winds move clockwise around high pressure and are deflected outward.
- Surface winds move counterclockwise around a low and are pulled inward across the isobars.





The red arrow indicates your boat's location.

1. What is moving toward you, a high or a low?
2. From what direction is the wind blowing?
3. Where are the highest winds on this chart?

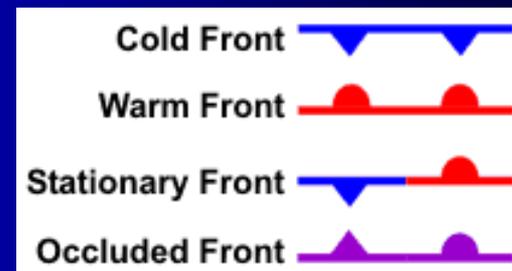


Buys Ballot Law

- Its important to know where the low pressure center is located.
- This is thumb rule to use to locate the low pressure system relative to your location.
 - Stand with the wind at your back
 - Turn 15 deg to your right
 - Low pressure will be to your left and high pressure will be to your right
 - In other words the storm center is to your left and clear weather to your right

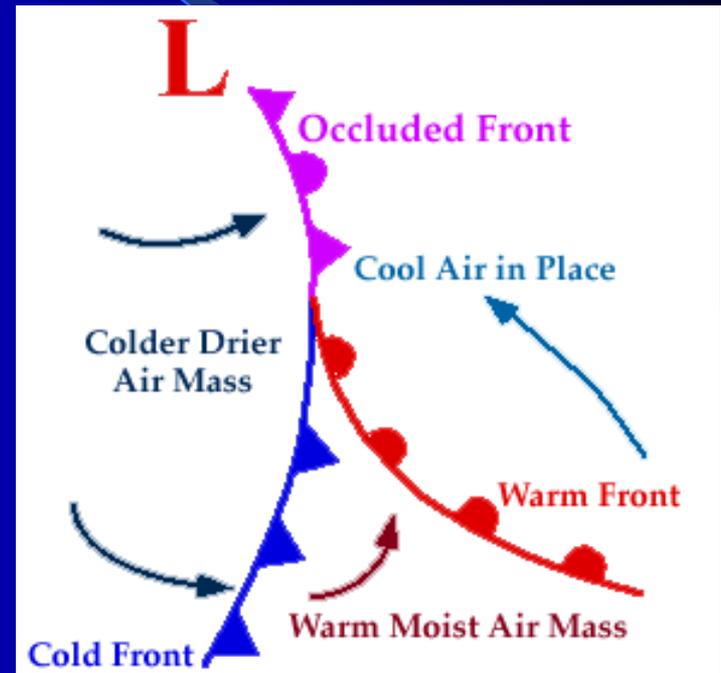
Air Masses and Frontal Systems

- When two different air masses collide, the boundary of the collision is called a front.
- Four types of fronts:
 - Cold front
 - Warm front
 - Stationary front
 - Occluded front



Air Masses and Frontal Systems

- Four Types of fronts:
 - Cold front
 - Warm front
 - Occluded front
 - Stationary front



Stationary Front 



Cold Front

- Cold Air pushes underneath warm air and causes the air to rise violently and rapidly
 - Cold fronts move fast 20- 35 kts
 - Generally move E-SE
 - Weather deteriorates rapidly
 - Approaching clouds seen 50-150 miles ahead of cold front





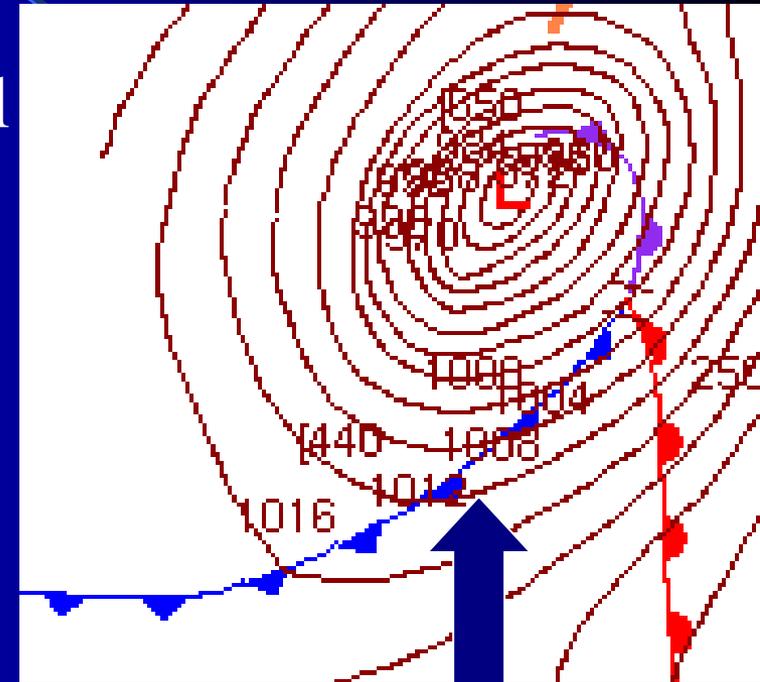
Cold Front Weather

- Heavy rain
- Thunder and lightning
- Tornados
- Hail
- White Squall (Microburst)



Cold Front Weather Sequence

- Winds steady from SW
- Altocumulus (**Ac**) clouds (mid-level puffy clouds) on W or NW horizon
- Barometer pressure falls
- Clouds progressively lower and thicken
- Cumulonimbus (**Cb**) clouds or Thunderheads form
- Symbol to mark the boundary of the front is a line with blue triangles (cold air is behind the line)

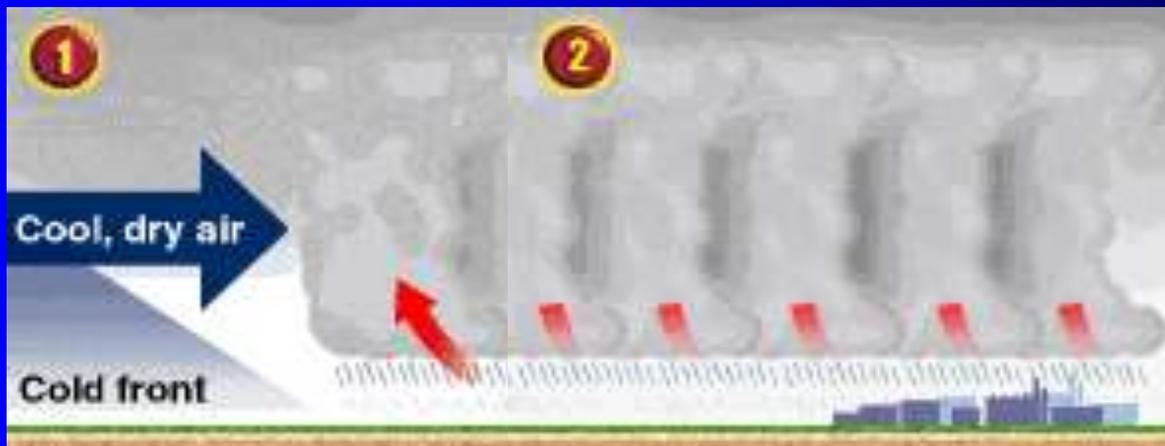


Cold front symbol



Cold Front Weather

- Squalls: precede cold front by 5-6 hours
 - Intense black clouds
 - Violent gusty winds
 - Cold blast of wind several miles ahead of front





Cold Front Weather Sequence

- As front passes, weather is as follows:
 - Wind veers (moves clockwise) from SW to W-NW
 - Barometer pressure at lowest
 - Rain or squall
 - Thunder and lightning
 - Rapid clearing of sky
 - Strong gusty winds from W-NW
 - Air temperatures become colder



Cirrus (Ci)



Altocumulus (Ac)

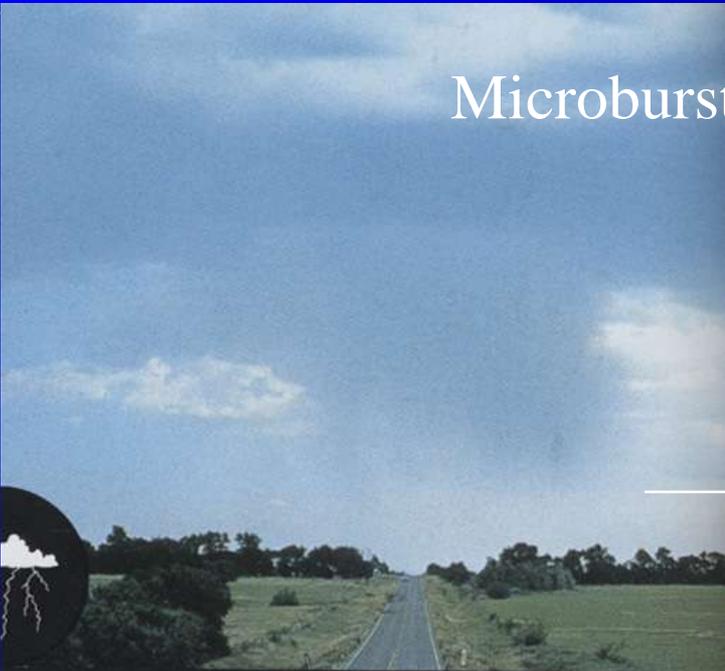


Cumulonimbus (Cb)

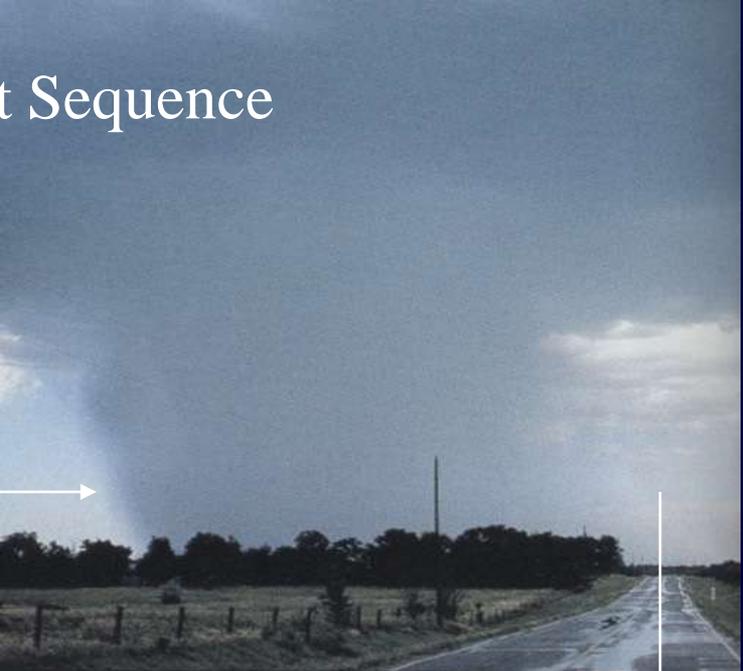


Cumulus congestus (Cc)

Microburst Sequence



202 Developing microburst, *p.* 508



203 Microburst series: 2 of 4, *p.* 508



205 Microburst series: 4 of 4, *p.* 508

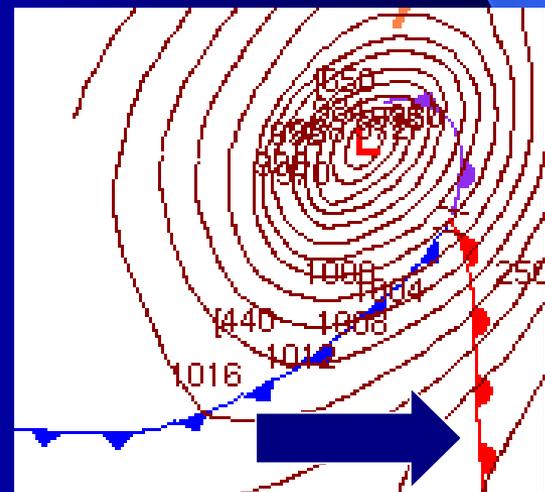


204 Microburst series: 3 of 4, *p.* 508



Warm Front

- Warm air slides over cold air
- Moves slowly 10-15kts
- Weather deteriorates gradually
- Approaching clouds seen from 1000+ miles
- Symbol marking the front is a line with red half circles (warm air is behind the line)



Warm front symbol



Warm Front Weather

- Cirrus clouds (**Ci**) (high clouds) thicken to Cirrostratus (**Cs**) then Altostratus (mid-level) clouds, then Ns (low dark rain clouds)
- Steady light rain
- Persistent fog
- Barometer pressure falls



Warm Front Weather Sequence

- Front passes gradually, less intense than cold front
- Wind veers (rotates clockwise) from S-SE to SW
- Drizzle and fog may persist
- Rain and thick clouds diminish
- Air temperatures become warmer



Cirrus (Ci)



Cirrostratus (Cs)



Nimbostratus (Ns)

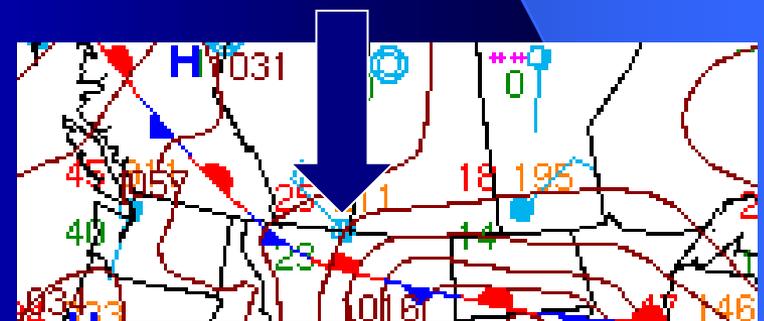


Altostratus (As)



Stationary Front

- Occurs when the frontal boundary either moves very slowly or does not move
- Notice that the symbol marking the stationary front is alternating red half circle on the warm air side and blue triangles on the cold air side

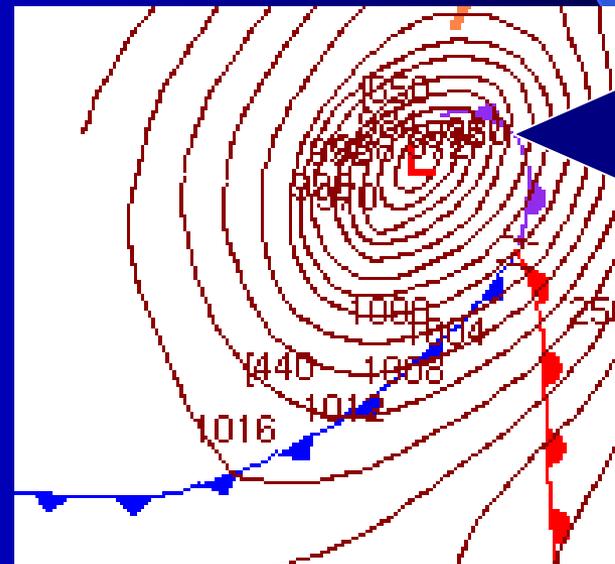
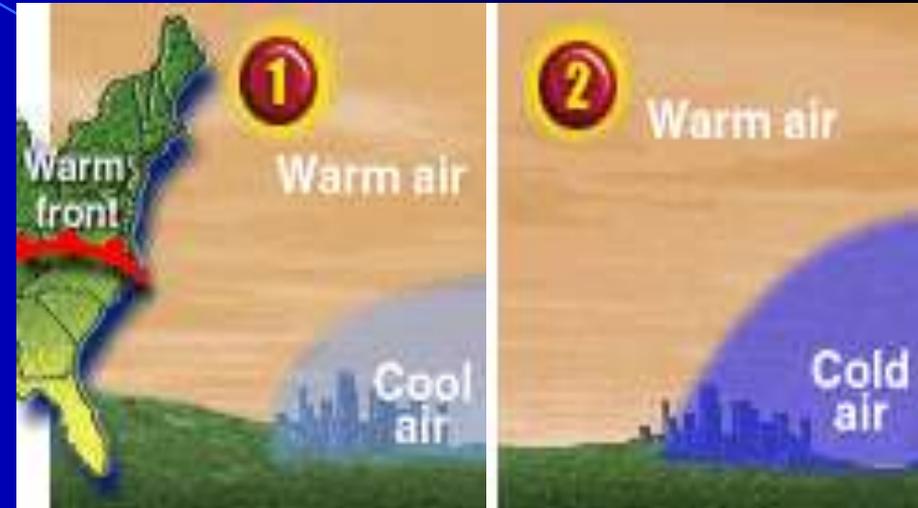


Stationary front symbol



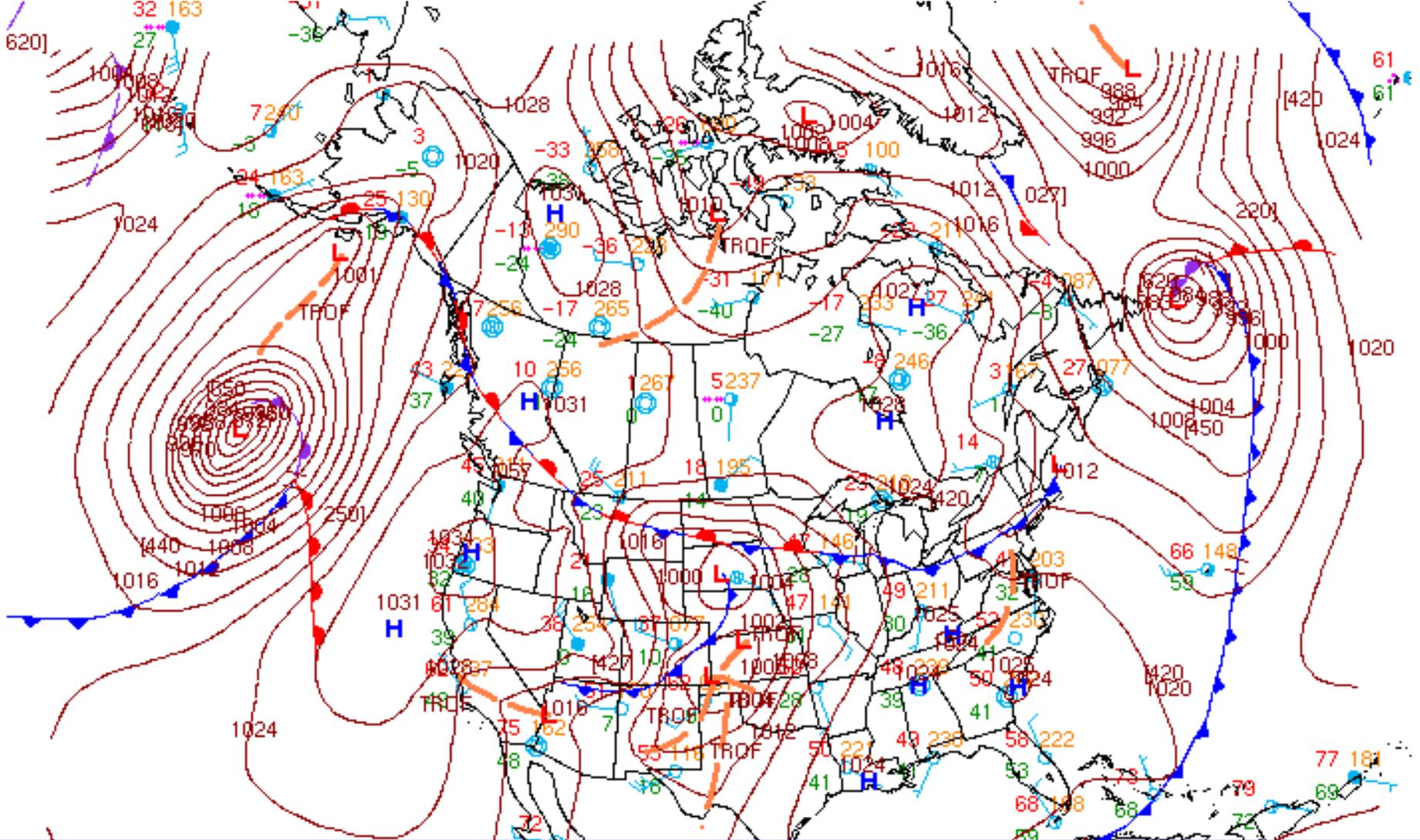
Occluded Front

- Occurs when cold front overtakes the warm front
- Weather is a combination of cold steady, misty rain and drizzle
- Notice the symbol to mark the occluded front is a purple combination of a cold and warm front symbol



Occluded
Front
symbol



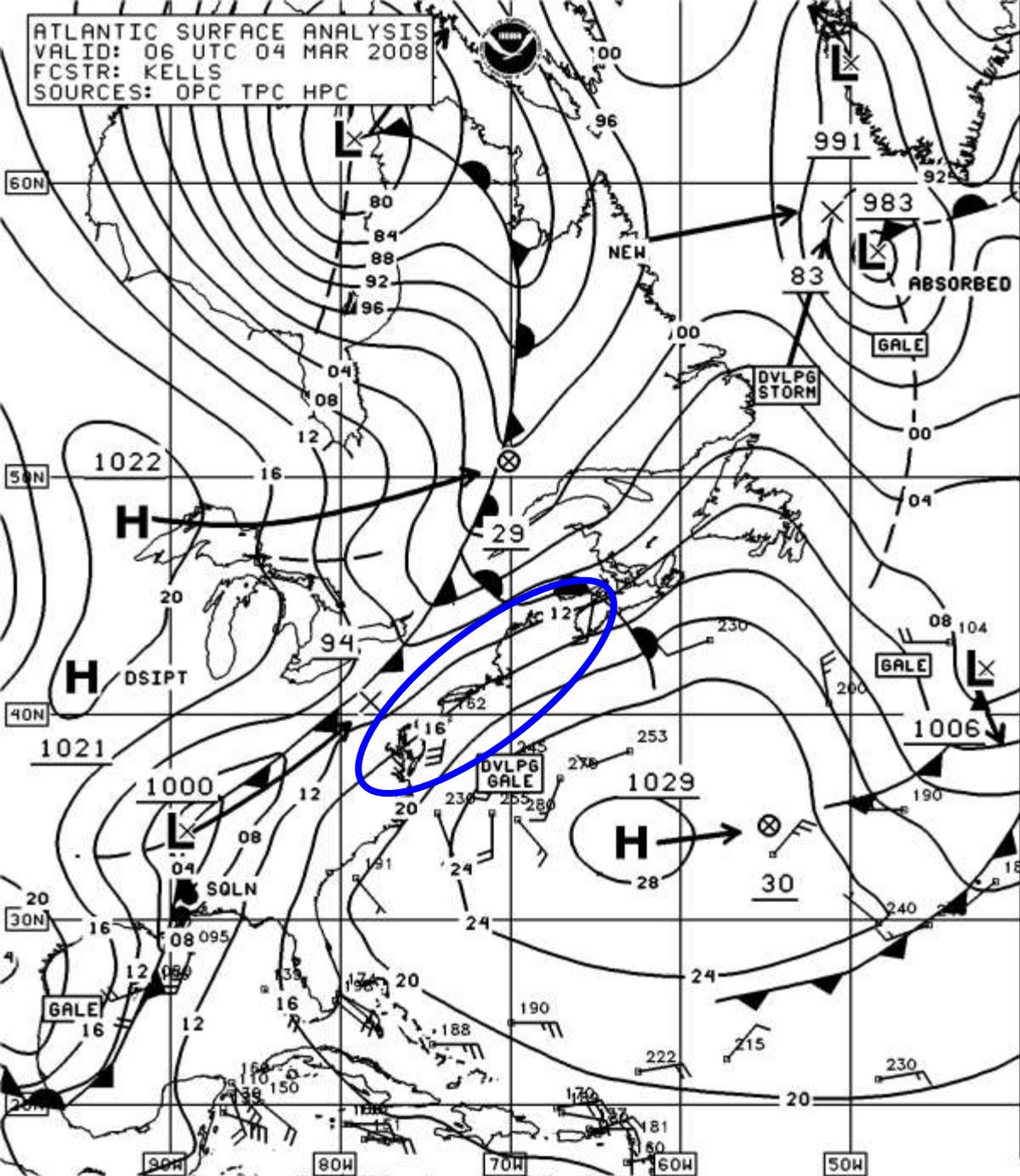


Can you pick out the cold fronts, warm fronts, occluded fronts and stationary fronts?

What type of weather is associated with each?

How does the wind shift with each type of frontal passage?

ATLANTIC SURFACE ANALYSIS
VALID: 06 UTC 04 MAR 2008
FCSTR: KELLS
SOURCES: OPC TPC HPC



Typical chart received onboard a Navy 44 via the weather fax.

If you were going north, what kind of weather would you expect?

Cape Hatteras

Conditions for the “Perfect Storm”?



Warm moist air from ocean currents will add fuel to low pressure systems moving offshore.

Therefore, the warm sector of the Gulf Stream can cause a dying low pressure system moving offshore to explosively redevelop.



Nautical Weather Sayings

- Red sky at night, sailor's delight. Red sky in the morning, sailor take warning.
- Mackerel skies and mare's tails make tall ships carry low sails.
- First rise after very low indicates a stronger blow.



Clouds

- To understand some of these nautical weather rhymes we need to talk about clouds
- Clouds are a mariner's best visual indicator of changing weather.

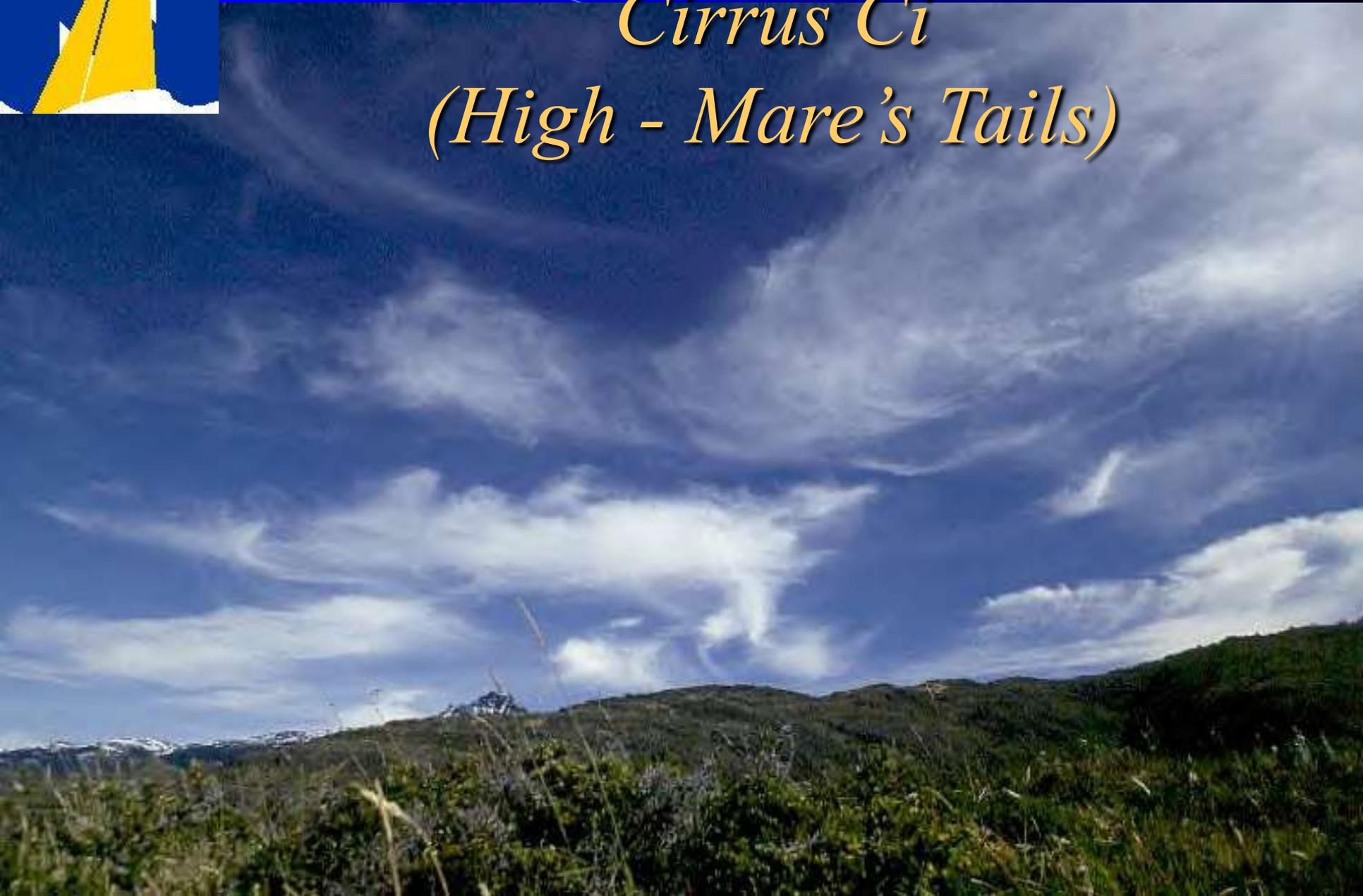


Forecasting weather using clouds

- If clouds appear high and then thicken (cumuloform clouds) and lower, a cold front is approaching.
- If clouds appear high and then flatten out and lower (strataform clouds), a warm front is approaching.



Clouds
Cirrus Ci
(High - Mare's Tails)





Clouds

Alto cumulus Ac

(mackerel skies)





Clouds
Stratus
(low flat)





Clouds

cumulus Cu (heap)





Cumulonimbus Cb (Thunderheads)
extreme vertical extent from surface to
~ 20,000 - 35,000 ft
anvil top indicates strong wind shear





Clouds

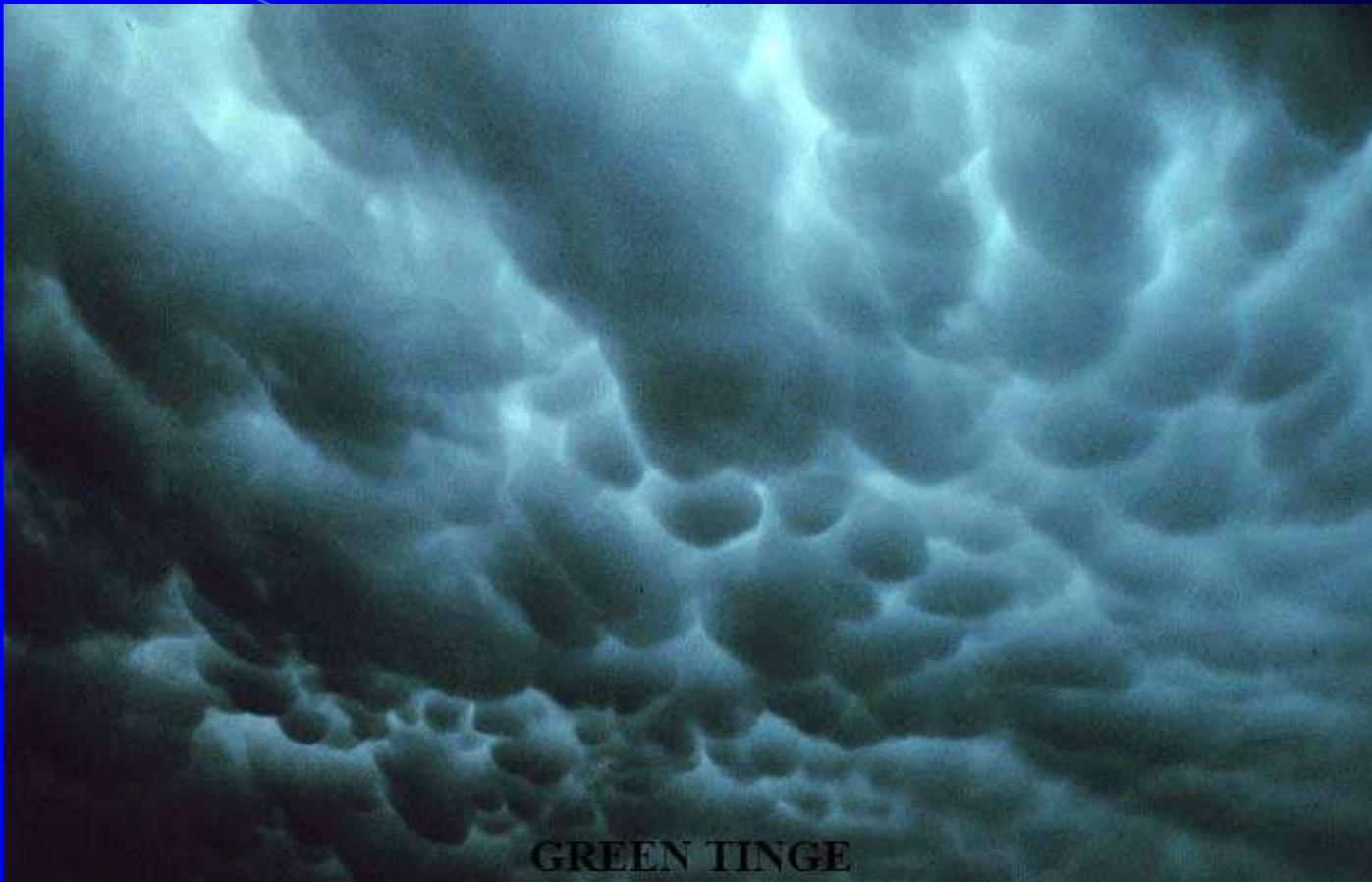
Cumulonimbus Cb





Clouds

Cumulonimbus Mammatus



GREEN TINGE



Clouds

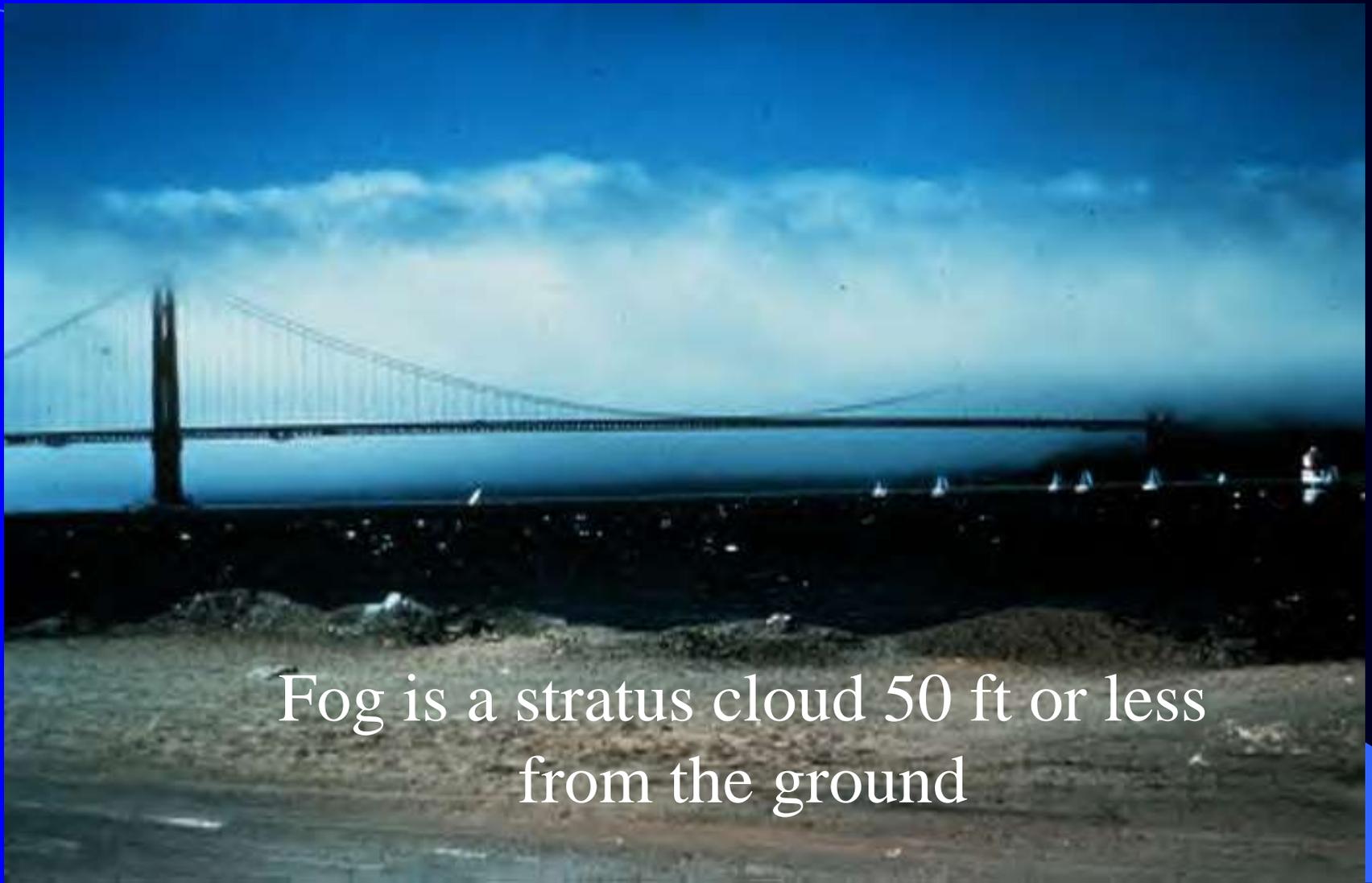
Cumulonimbus with waterspout





Clouds

Fog

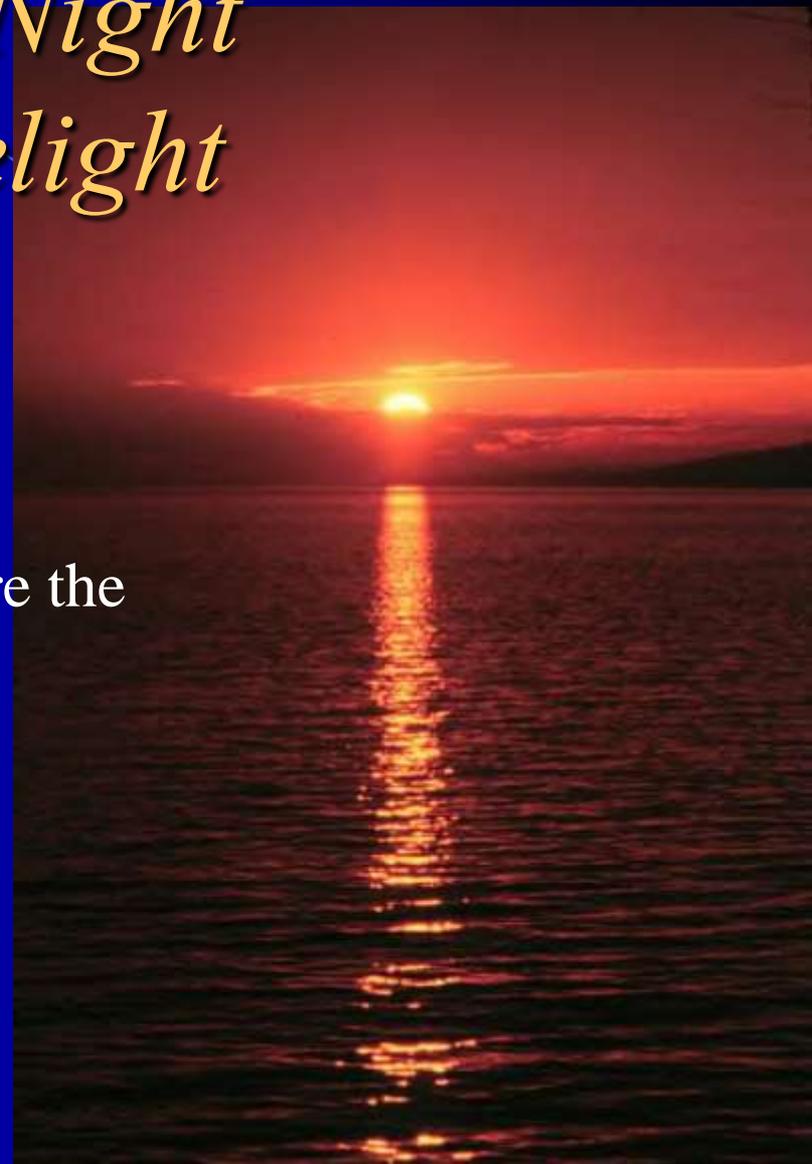


Fog is a stratus cloud 50 ft or less
from the ground



Red Sky at Night Sailor's Delight

- In evening sun sets in the west.
- A clear sky shows the colors of the spectrum.
- When sun is low in the sky the colors are the long wave colors red and orange.
- Weather moves from west to east.
- Therefore, clear sky (clear weather) is moving east.





Red Sky in the Morning... Sailor Take Warning



- In morning sun rises in the east.
- A clear sky shows the colors of the spectrum.
- When sun is low in the sky, the colors are the long wave colors red and orange.
- Weather moves from west to east.
- Therefore, clear skies in the east will be replaced by weather from the west.

*“Mackerel Skies and Mare’s Tails:
Make Tall Ships Carry Low Sails.”*

Mackerel Skies (Altostratus or cirrostratus Clouds) and Mare’s Tails (Cirrus Clouds) indicate an approaching cold front as warm air is rapidly pushed up in advance of the front.



Mare’s tails (Cirrus)

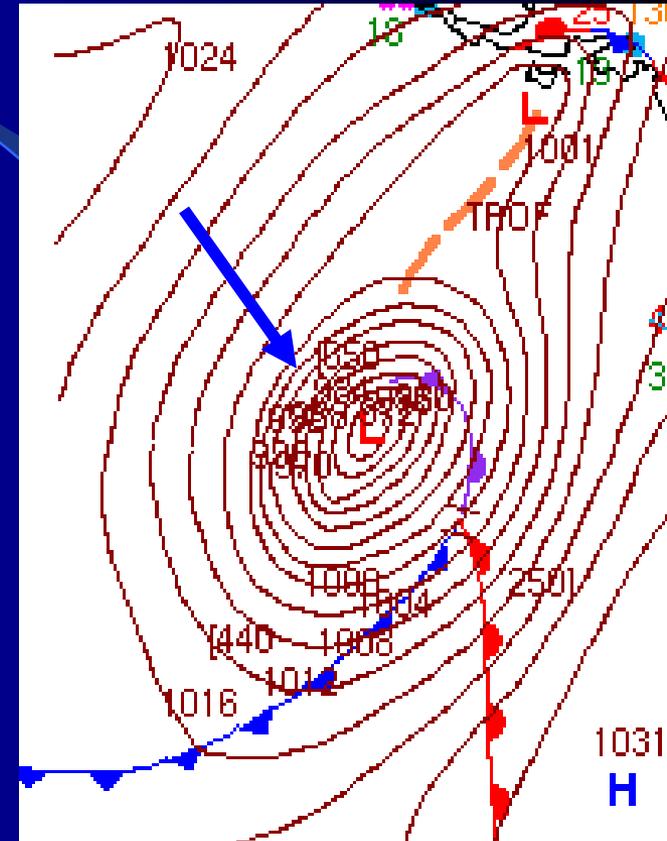


Mackerel Skies
(altostratus
or cirrostratus)



“First rise after a very low indicates a stronger blow.”

- Refers to the rise in barometric pressure following a period of low pressure.
- Wind is caused by the difference between high and low pressure and the atmosphere's attempt to equalize the two.
- The greater the pressure differences, the stronger the wind.



Steep gradient behind this low pressure center.
Steep pressure gradient = high winds.



USN Official Use Only Resources

Naval Atlantic Meteorology and Oceanography Center NLMOC
(Norfolk, VA) (757) 444-7750

Naval Atlantic Meteorology and Oceanography Detachment
(Patuxent River, MD) (301) 342-3174

Naval Atlantic Meteorology and Oceanography Detachment
(Brunswick, ME) (207) 921-2356

For Gulf Stream or Hurricane information

www.nlmoc.navy.mil

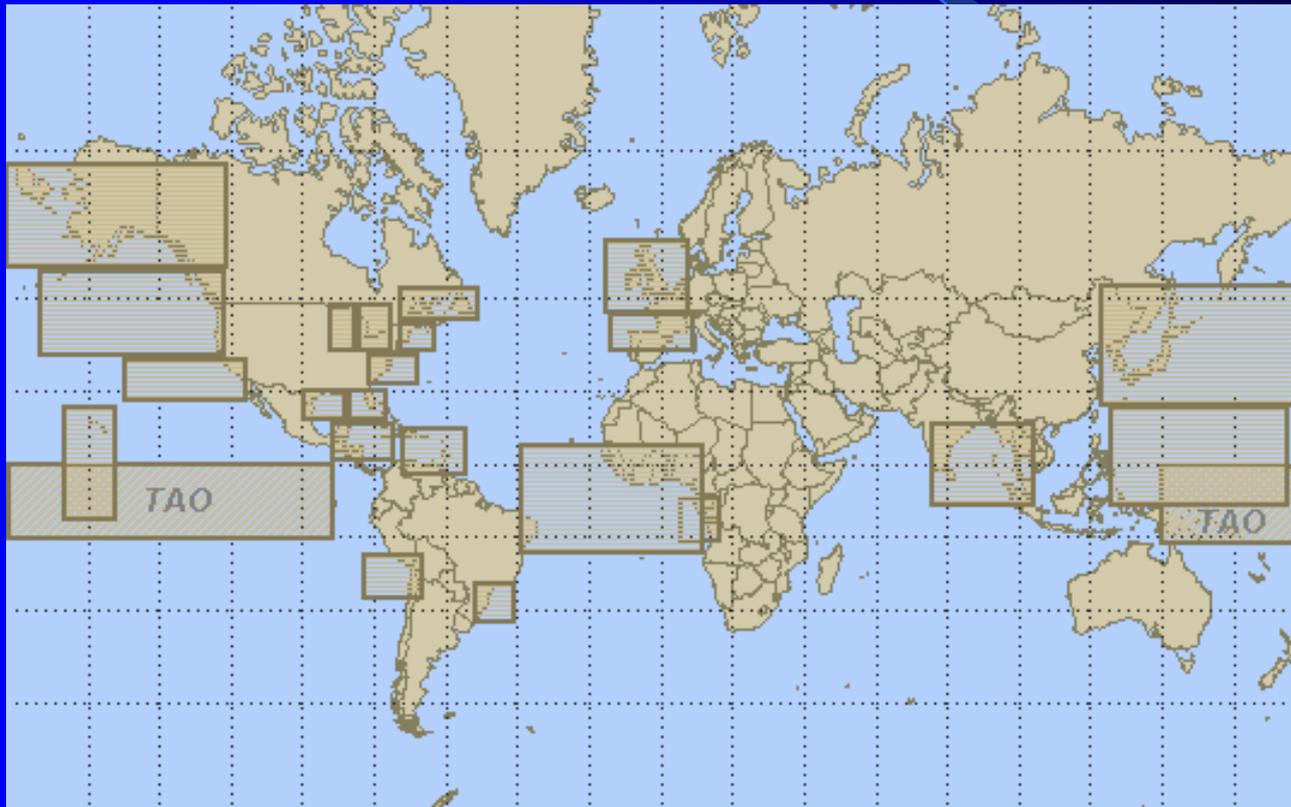


Other Weather Resources

Web Site Name	Internet Address (URL)	Description
NOAA Ocean Prediction Center	http://www.opc.ncep.noaa.gov/	Excellent source of analysis and forecast charts. Original source of weather fax charts
National Hurricane Center and Tropical Prediction Center	http://www.nhc.noaa.gov/	Excellent source of up-to-date information about existing and developing hurricanes. Also has marine weather for tropical areas.
National Data Buoy Center	http://www.ndbc.noaa.gov/	Real time weather conditions at offshore buoys, including historical data and graphical plots. Dial-a-Buoy.

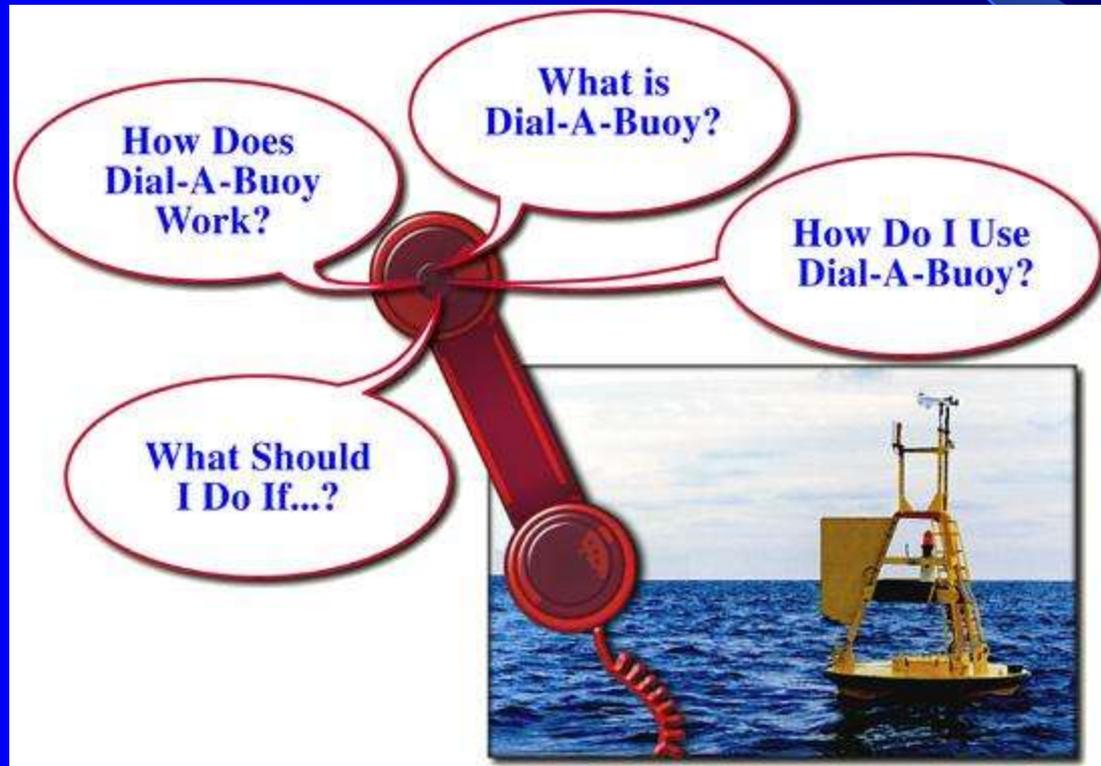


Location of NOAA Buoys

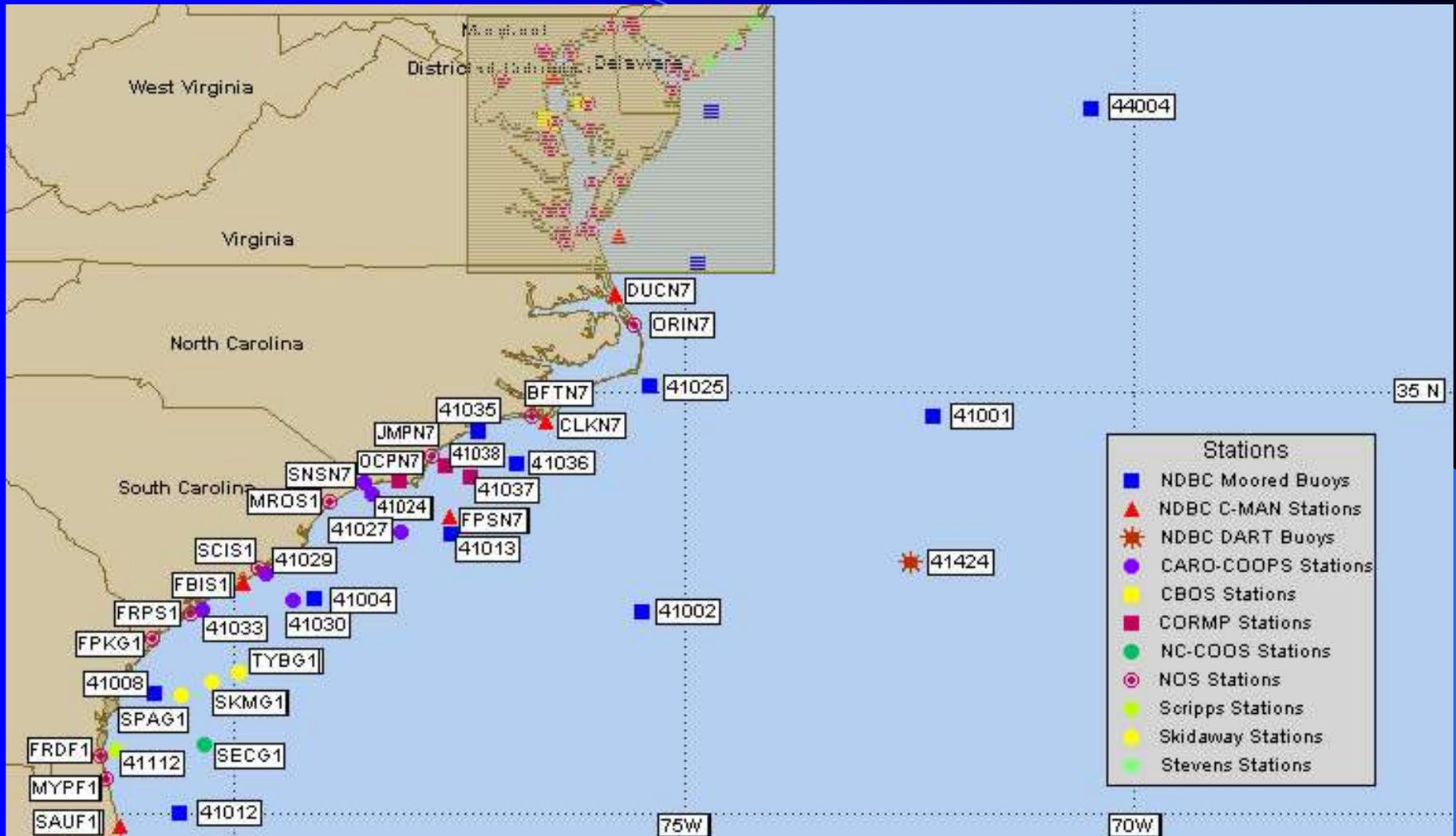


Dial-A-Buoy

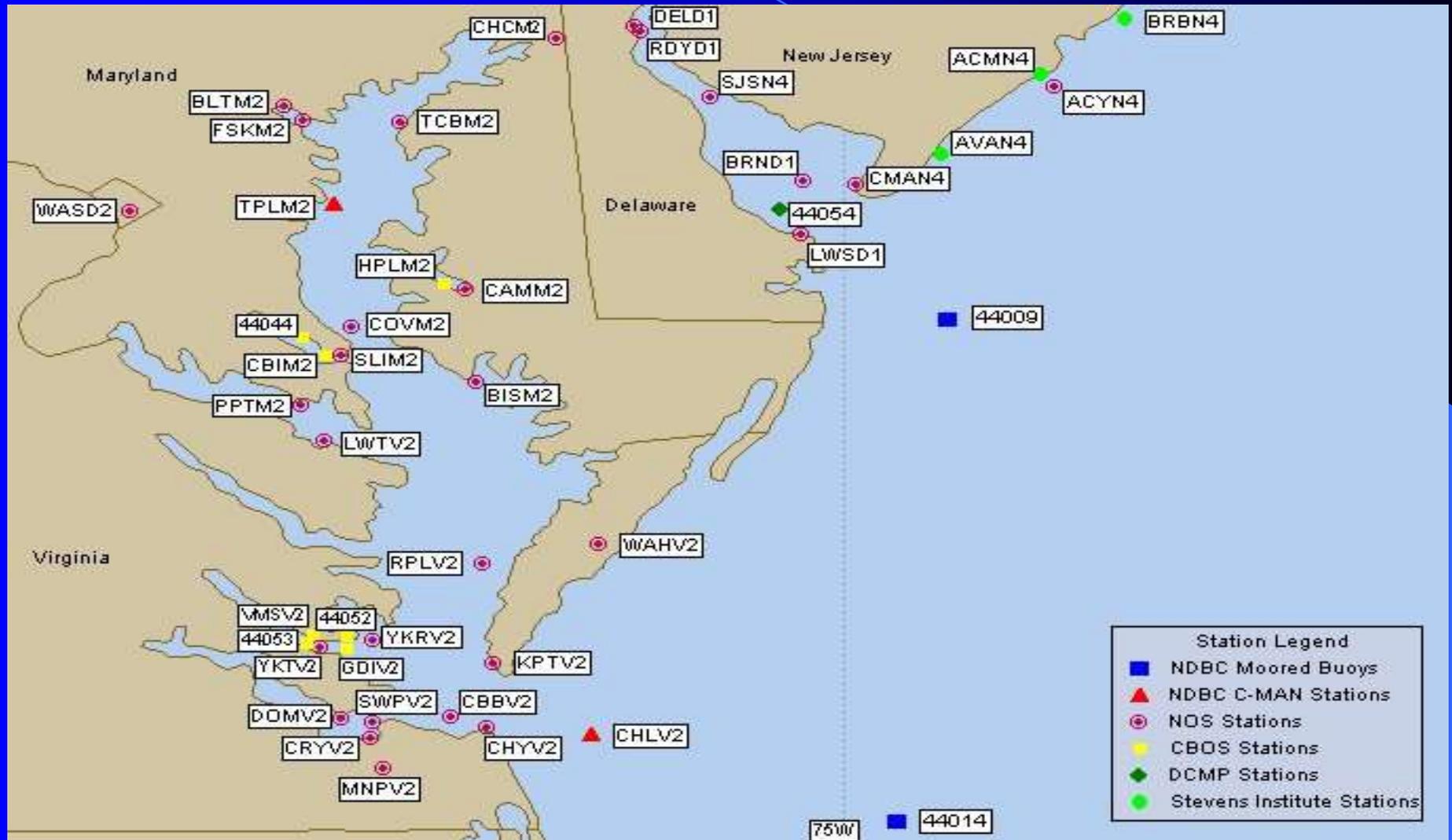
Call 888-701-8992



Location of NOAA Buoys



Location of NOAA Buoys



Location of NOAA Buoys





RHODE ISLAND

FOXR1

CPTR1

BLTM3

FRVM3

PTCR1

QPTR1

NWPR1

BUZM3

▲ NDBC C-MAN Station
● NOS Stations



- ▲ NDBC C-MAN Station
- NOS Stations
- MYSound Stations



VHF Radio



Wx button to access info quickly



Or dial weather info on VHF Channels 1-8

- Local area broadcasts are prerecorded messages provided by NOAA and provide current weather
- NOAA provides local area weather updates on channels 1-8.
- Caution: local area broadcasts are good only for a SPECIFIC AREA at a SPECIFIC TIME.



SSB or HF Radio

- Voice Broadcasts are also located on HF frequencies (Check Reeds Nautical Almanac for specific HF frequencies and times of broadcast)
- Caution: Weather information is perishable!
- Weather broadcasts are good only for a *SPECIFIC area* at a *SPECIFIC time*.
- Herb Hilgenberg
 - Begins broadcasts at 1600 EST
 - 12.359 MHz
 - Before voyage contact him by fax (905) 681-7114



Wind Warnings

- **Small Craft Warnings: 18 - 33 kts**
 - A *Small Craft Advisory* is issued to alert operators of small craft whenever sustained winds of 18 to 33 knots inclusive, and/or seas of 7 feet or greater, are either ongoing or forecasted to develop within the next 12 hours.

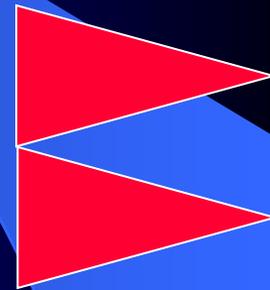




Wind Warnings

Gale Warnings: 34 - 47 kts

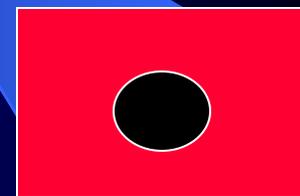
- A ***Gale Warning*** is issued to alert all mariners whenever sustained winds of 34 to 47 knots, associated with an extratropical system (not of tropical origin), are either ongoing or forecasted to develop within the next 12 hours.





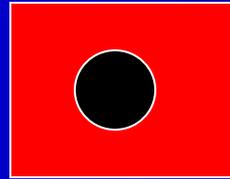
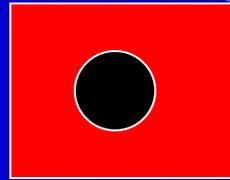
Wind Warnings

- Storm Warnings: 48 + kts.
- Sustained winds above 48 knots of extratropical (non-tropical) origin. Does not have closed cyclonic rotation.
- Such storms are infrequent within the Chesapeake, however when they do occur, happen in fall or early spring.



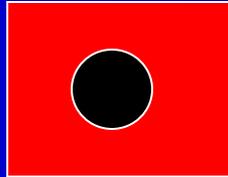
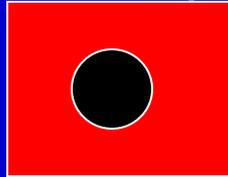


Hurricane Warnings



- Definite Closed Cyclonic (CCW) Rotation
- Winds in this range associated with a system developing from a tropical depression would be covered under a *Tropical Storm Warning* (34 to 63 knots). Differs from a midlatitudes or extratropical storm in that it has a closed cyclonic (CCW) rotation

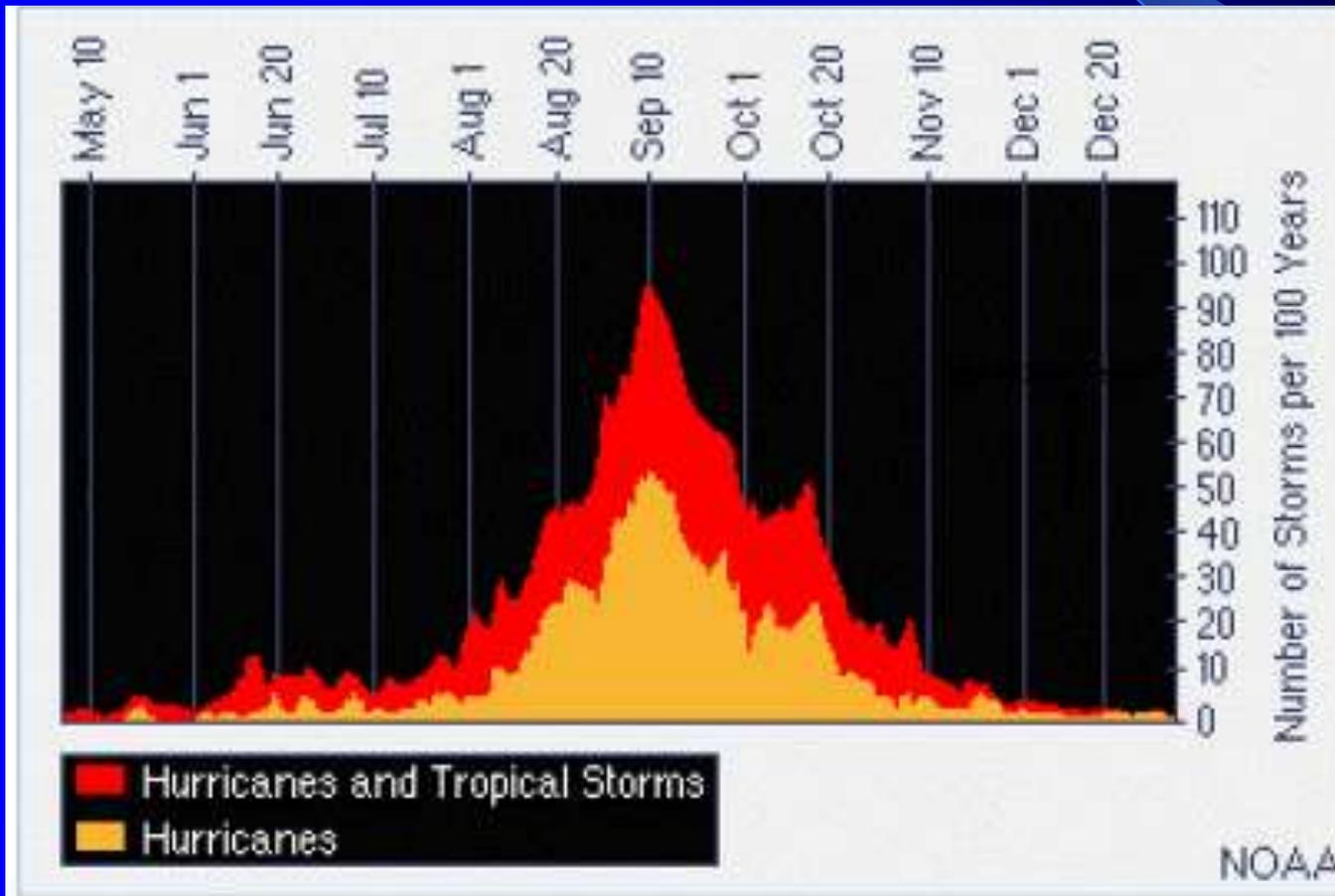
Hurricane Warnings



- Tropical Depression >34 kts
- Tropical Storm Warning 34-63 kts
- Hurricane Warnings: 64 + kts

Hurricanes and Tropical Storms

- Atlantic hurricane season lasts from June - Nov
- Peak time frame for Atlantic August - October



Direction of travel -

Hurricane Bonnie

First sign of a hurricane is the long period swell.

Dangerous Semicircle:

Right side of the hurricane's track.

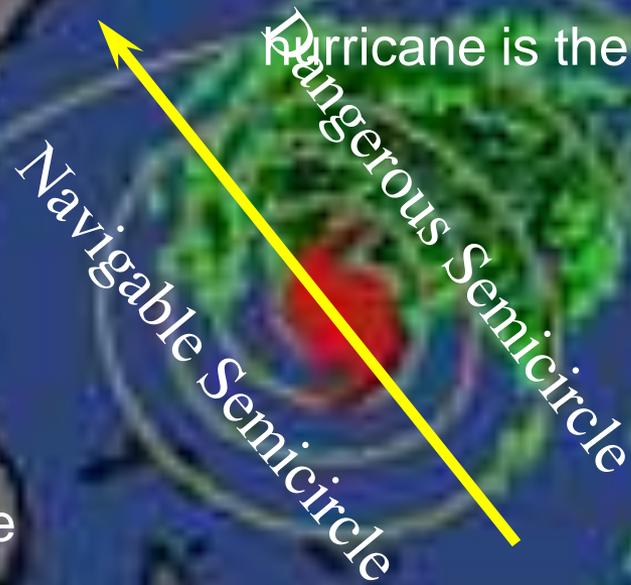
The most dangerous quadrant of a

hurricane is the NE quadrant.

Navigable Semicircle:

Left side of the hurricane's track.

To determine dangerous semicircle from navigable semicircle, determine hurricane's track and superimpose that track line over the storm.





Onboard Weather Charts

HF Facsimile

- Weather Charts can be accessed via HF facsimile
- Various weather charts are disseminated on a set schedule by NOAA.
- Reeds Nautical Almanac provides the schedule and HF frequencies from which these charts can be accessed.
- The Furuno Weather Facsimile machine can be preprogrammed to automatically access the HF signal at the time that these charts are broadcast.





Weather Charts

- Weather charts are 2 dimensional depictions of the atmosphere which is 3 dimensional.
- They are also snapshots in time.
- On a Navy 44 at sea, weather charts are obtained by weather facsimile.



Weather Charts

- Weather Charts can be divided into two types:
 - Analysis Charts (charts that tell you what the weather did)
 - Prognostic (Forecasting) Charts (charts that try to predict what the weather will do)



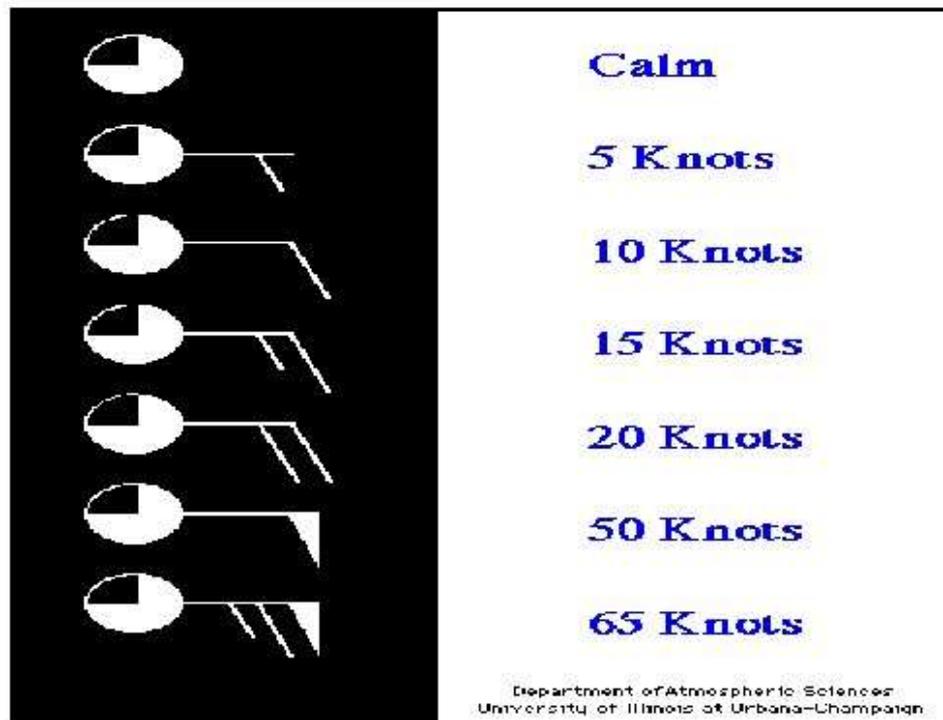
Weather Charts

- When reading a weather chart it is important to first check:
 - Is it an analysis or prognostic chart?
 - If it is an analysis chart, how old is the analysis?
 - If it is a prognostic chart, when is the forecast valid?



Weather Chart Symbols

World wide convention also uses the following wind vectors at all levels





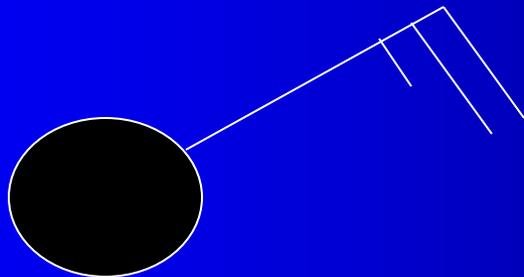
Weather Charts

- Surface charts will be titled surface and can give you information regarding different parameters
- For example: surface pressure, surface wind direction



Weather Charts and Symbols

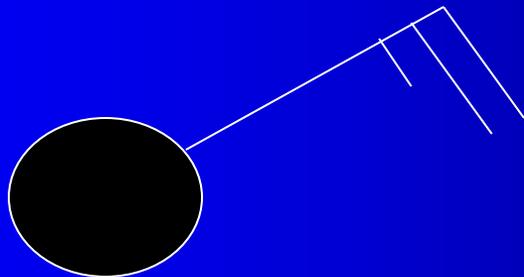
- Surface weather charts will show cold, warm, occluded and stationary frontal boundaries
- Wind barbs, which indicate wind direction and speed are also shown and look like





Weather Charts and Symbols

- Wind barbs are located on surface analysis charts and give the wind and weather conditions that occurred at various weather stations





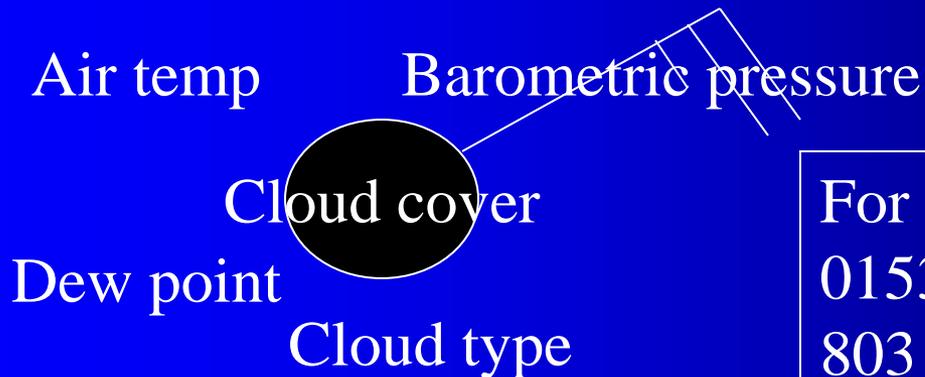
Deciphering Wind Barbs

- Wind barbs are found on sfc analysis charts and give information regarding
 - cloud cover
 - wind direction
 - wind speed
 - Barometric pressure
 - Air temperature
 - Dew point



Deciphering Wind Barbs

Wind direction and speed
(each long barb 10 kts; short barb 5kts)
Wind is from NE in this example



For Barometric Pressure:

0153 means **1015.3** mb

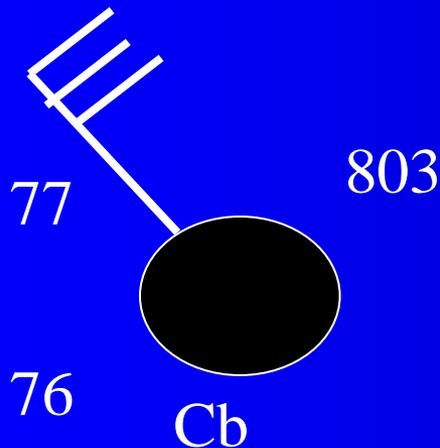
803 means **980.3** mb

(place a 1 or 9 in front of first digit, whatever makes the number closest to 1000)



Deciphering Wind Barbs

- What is the direction and speed of the wind?
- What is the temperature?
- What is the dewpoint?
- What is the pressure?
- What kind of weather can you expect?



For Barometric Pressure:

0153 means **1015.3** mb

803 means **980.3** mb

(place a 1 or 9 in front of first digit, whatever makes the number closest to 1000)



Weather Charts and Wind

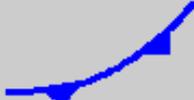
- Around a low pressure center, wind blows parallel, but slightly crosses the isobars in toward low pressure
 - Slightly inward and counterclockwise around a low
- Around a high pressure center, wind blows parallel, but slightly crosses the isobars outward from high pressure clockwise
 - Slightly outward and clockwise around a high

Weather Chart Symbols

GRAPHICAL PRODUCTS LEGEND (01 OCT 2002)

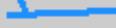
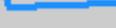
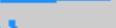
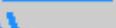
H → ⊗ 30
 1024
 24HR HIGH PRES MOVMT
 AND PRES IN MBS
 HIGH PRES CENTER
 WITH PRES IN MBS

⊗ → **X** 99
 996
 24HR LOW PRES MOVMT
 AND PRES IN MBS
 LOW PRES CENTER
 WITH PRES IN MBS

 COLD FRONT
 WARM FRONT
 STNRY FRONT
 OCCLUDED FRONT
 RIDGE
 TROF
 HURCN
 TRPCL STORM
 TRPCL WAVE

⊕ MODERATE ICING
⊕ HEAVY ICING

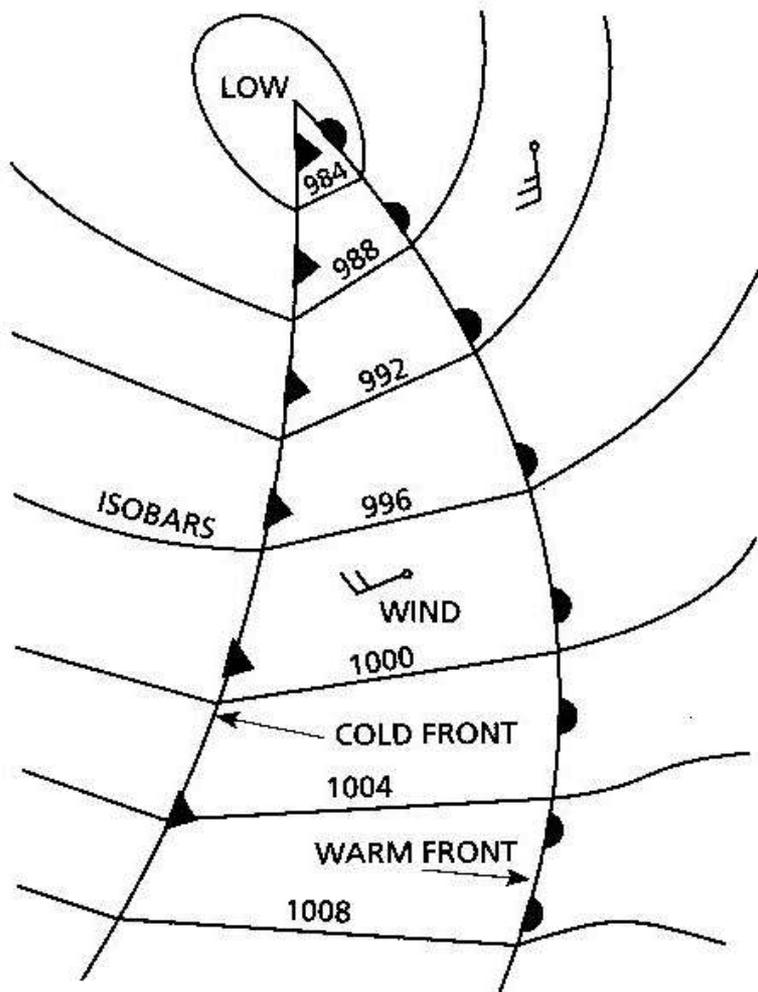
WIND BARBS:

 = 5 KT
 = 10 KT
 = 15 KT
 = 20 KT
 = 25 KT
 = 35 KT
 = 50 KT
 = 60 KT
 = 65 KT
 = 75 KT
 = 100 KT
 = 110 KT
 = 120 KT

TEXT ABBREVIATIONS:

GALE = 34-47 KT
 STORM = 48-63 KT
 HURCN => 64 KT
 KT = KNOTS, G = GUSTS
 HR = HOUR
 MBS = MILLIBARS
 PRES = PRESSURE
 HURCN = HURRICANE
 DSIPT = DISSIPATED
 STNRY = STATIONARY
 WKNG = WEAKENING
 RPDLY = RAPIDLY
 FRMG = FORMING
 MOVG = MOVING
 TROF = TROUGH
 INLD = INLAND
 TRPCL = TROPICAL
 DVLPG = DEVELOPING
 COMB = COMBINING
 DCRS = DECREASING
 INCR = INCREASING
 INTSFYG = INTENSIFYING
 PSN = POSITION

NOTE: WHEN APPROPRIATE THIS CHART MAY BE
 REPLACED WITH A BULLETIN DETAILING
 RADIOFAX PROGRAM CHANGES



- occluded
- stationary
- wind east 15k
- wind west 50k
- fog
- haze
- ice pellets
- freezing rain
- rain shower (light)
- rain shower (heavy)

- Thunderstorms**
- | | | |
|---------|--------|--------|
| thunder | normal | severe |
| | | |

- Drizzle**
- | | | |
|-------|----------|-------|
| light | moderate | heavy |
| | | |

- Rain**
- | | | |
|-------|----------|-------|
| light | moderate | heavy |
| | | |

- Snow**
- | | | |
|-------|----------|-------|
| light | moderate | heavy |
| | | |

Typical Station Plot

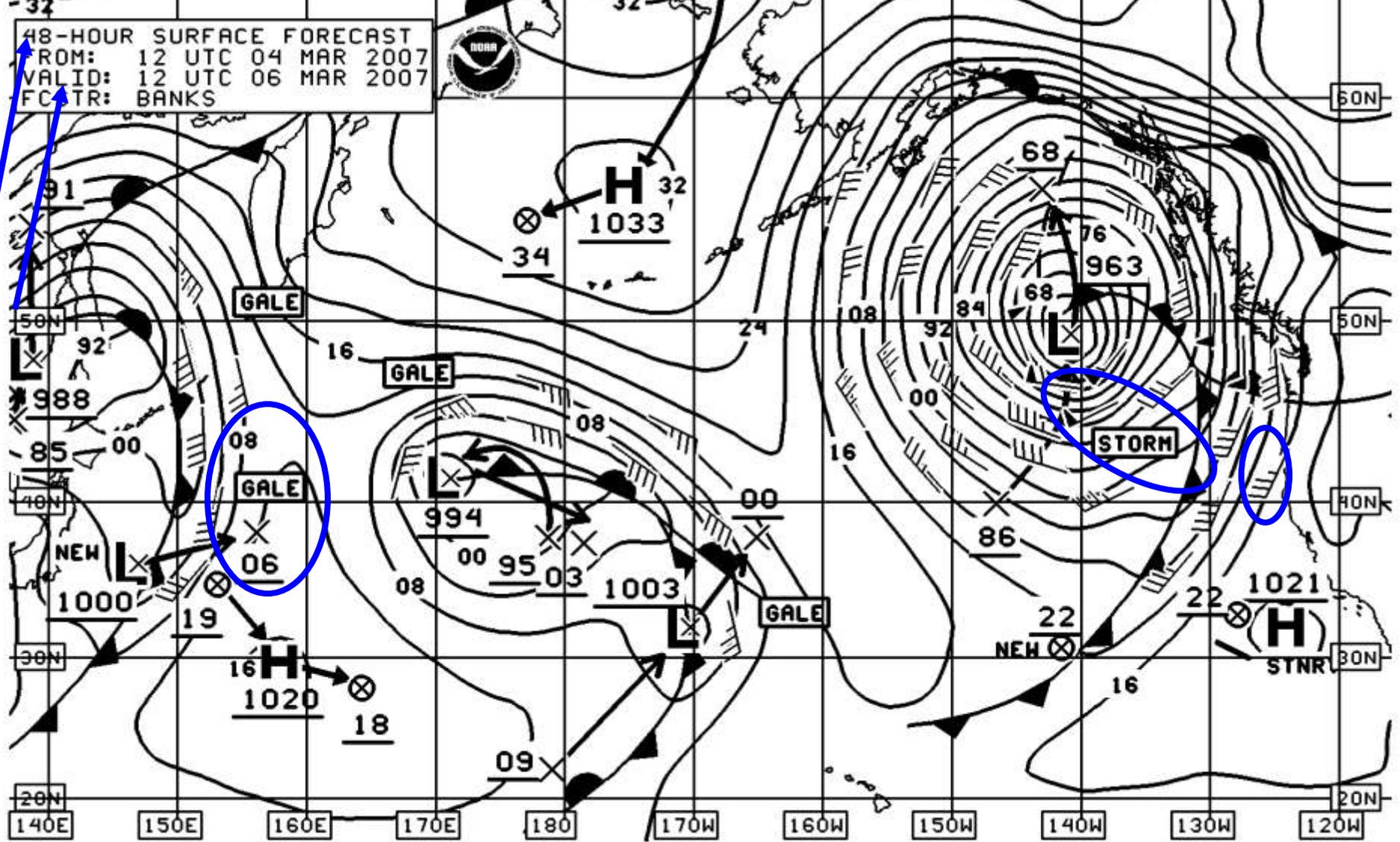


Mostly cloudy, temp 85, dewpoint 65, wind SE 25 knots, ceiling 25,000 feet

Cloud Cover

- clear
- scattered
- moderate
- overcast
- M** overcast

48-HOUR SURFACE FORECAST
FROM: 12 UTC 04 MAR 2007
VALID: 12 UTC 06 MAR 2007
FCSTR: BANKS



NWS/NCEP - Ocean Prediction Center
www.opc.ncep.noaa.gov

Surface Forecast Charts for 24 hr 48 hr and 96 hr forecasts

50N

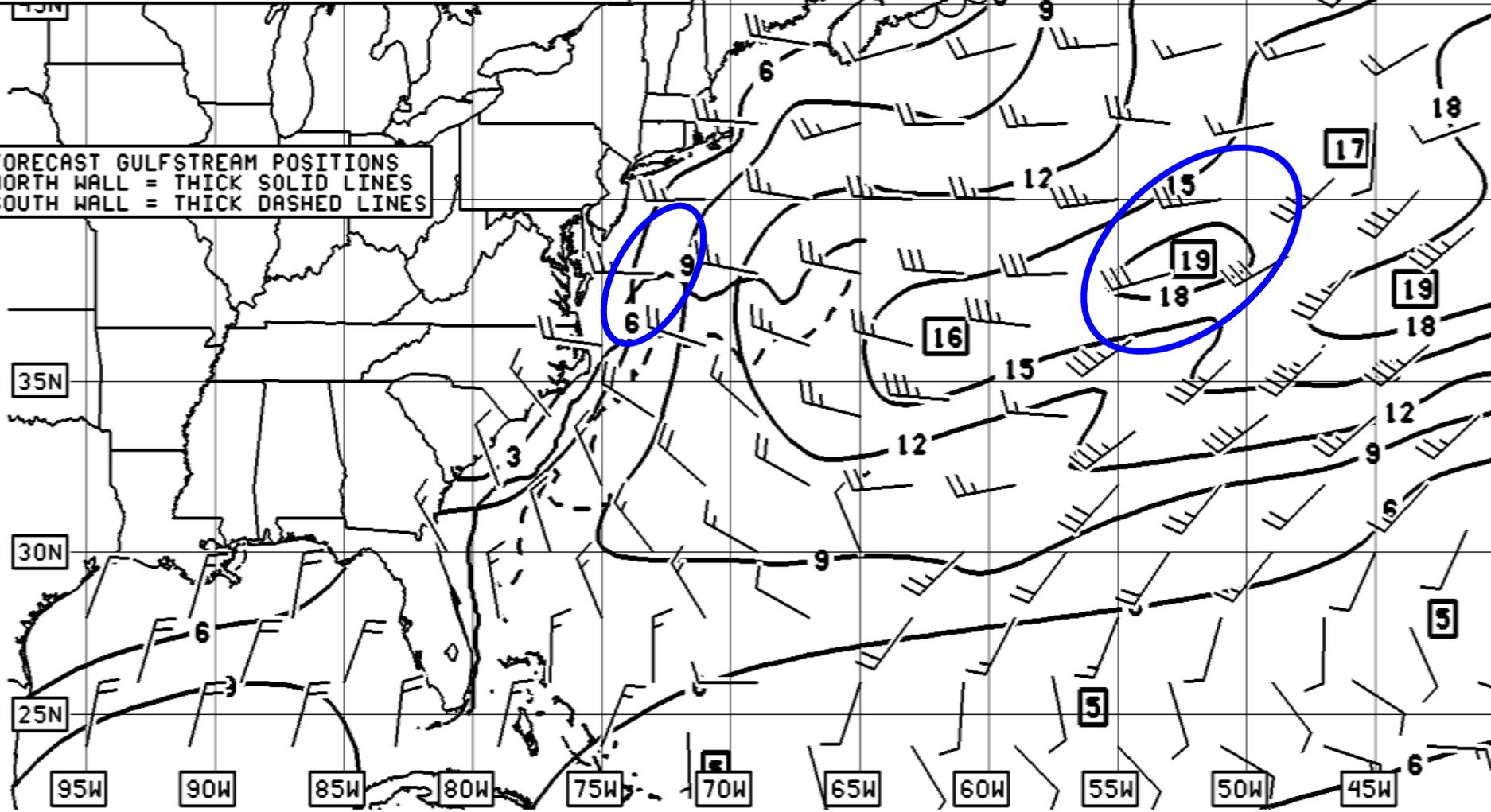
24-HOUR WIND & WAVE FORECAST (F) (F)
 FROM: 12 UTC 04 Mar 2007
 VALID: 12 UTC 05 Mar 2007
 FCSTR: SCOVIL



ICE
EDGE

SIGNIFICANT WAVE HEIGHT IS SHOWN (THE AVERAGE
 HEIGHT OF THE HIGHEST ONE-THIRD OF THE WAVES)

FORECAST GULFSTREAM POSITIONS
 NORTH WALL = THICK SOLID LINES
 SOUTH WALL = THICK DASHED LINES



35N

30N

25N

95W

90W

85W

80W

75W

70W

65W

60W

55W

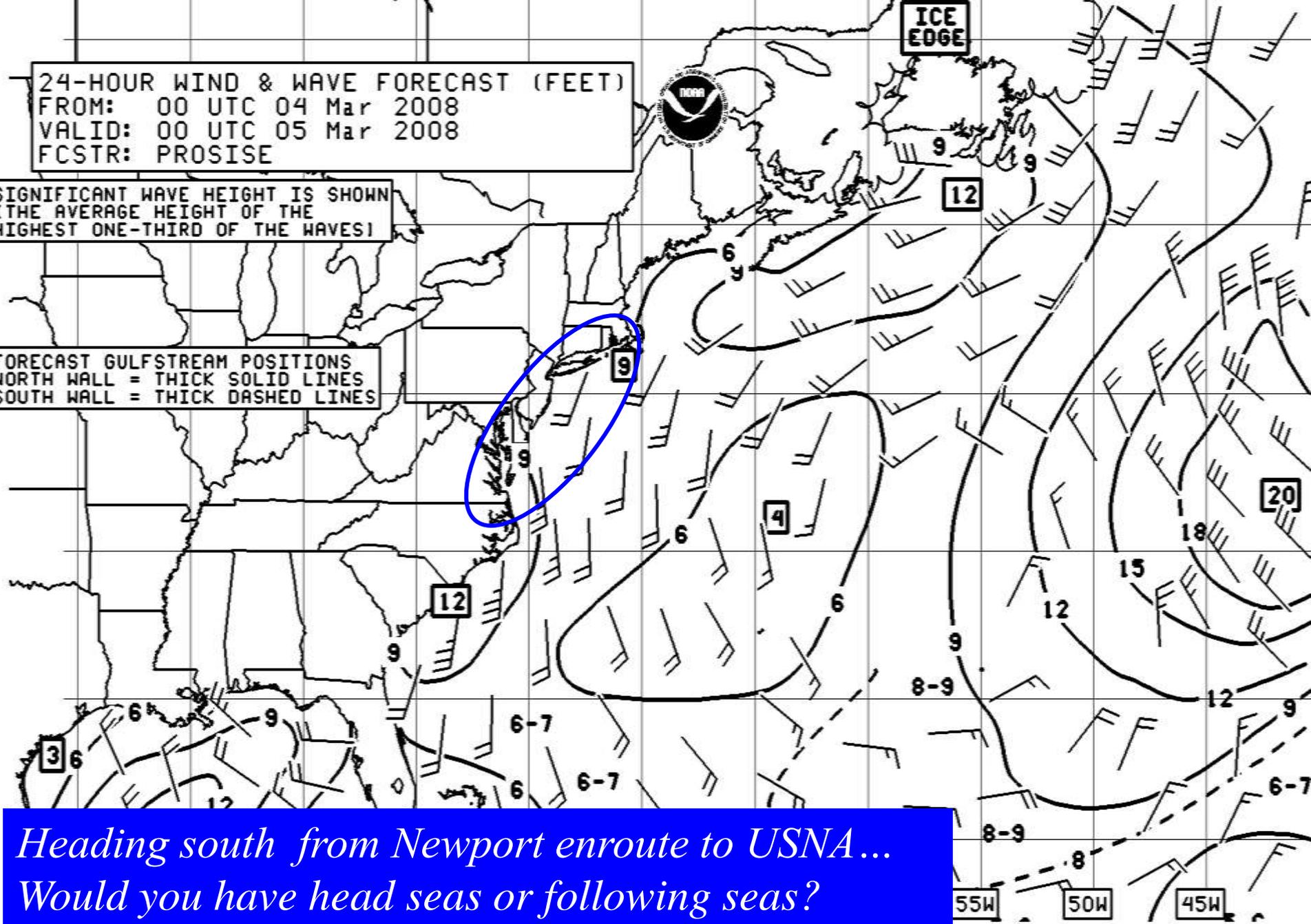
50W

45W

24-HOUR WIND & WAVE FORECAST (FEET)
FROM: 00 UTC 04 Mar 2008
VALID: 00 UTC 05 Mar 2008
FCSTR: PROSISE

SIGNIFICANT WAVE HEIGHT IS SHOWN
(THE AVERAGE HEIGHT OF THE
HIGHEST ONE-THIRD OF THE WAVES)

FORECAST GULFSTREAM POSITIONS
NORTH WALL = THICK SOLID LINES
SOUTH WALL = THICK DASHED LINES

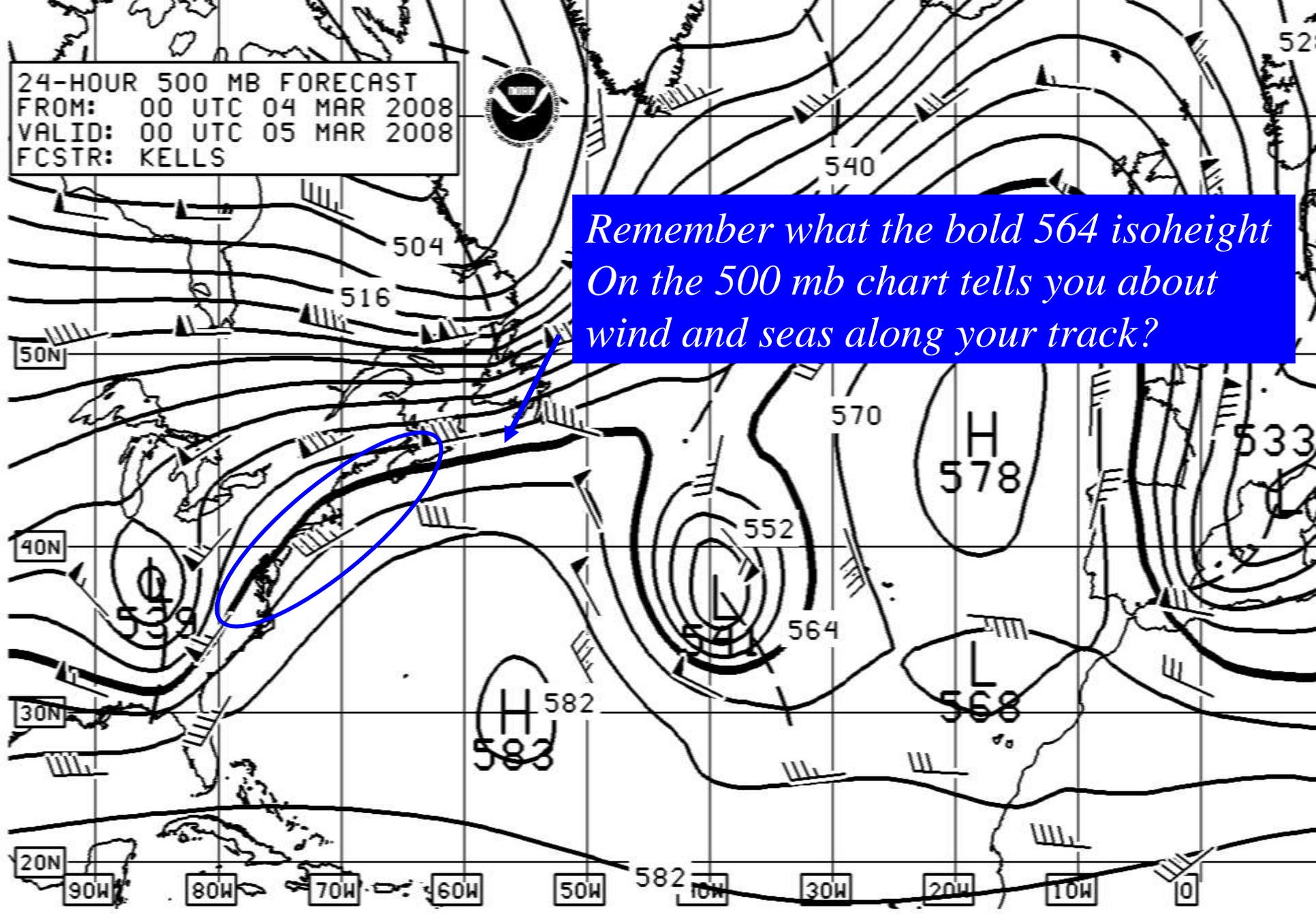


*Heading south from Newport enroute to USNA...
Would you have head seas or following seas?
What sea heights would you expect along the track?*

24-HOUR 500 MB FORECAST
FROM: 00 UTC 04 MAR 2008
VALID: 00 UTC 05 MAR 2008
FCSTR: KELLS



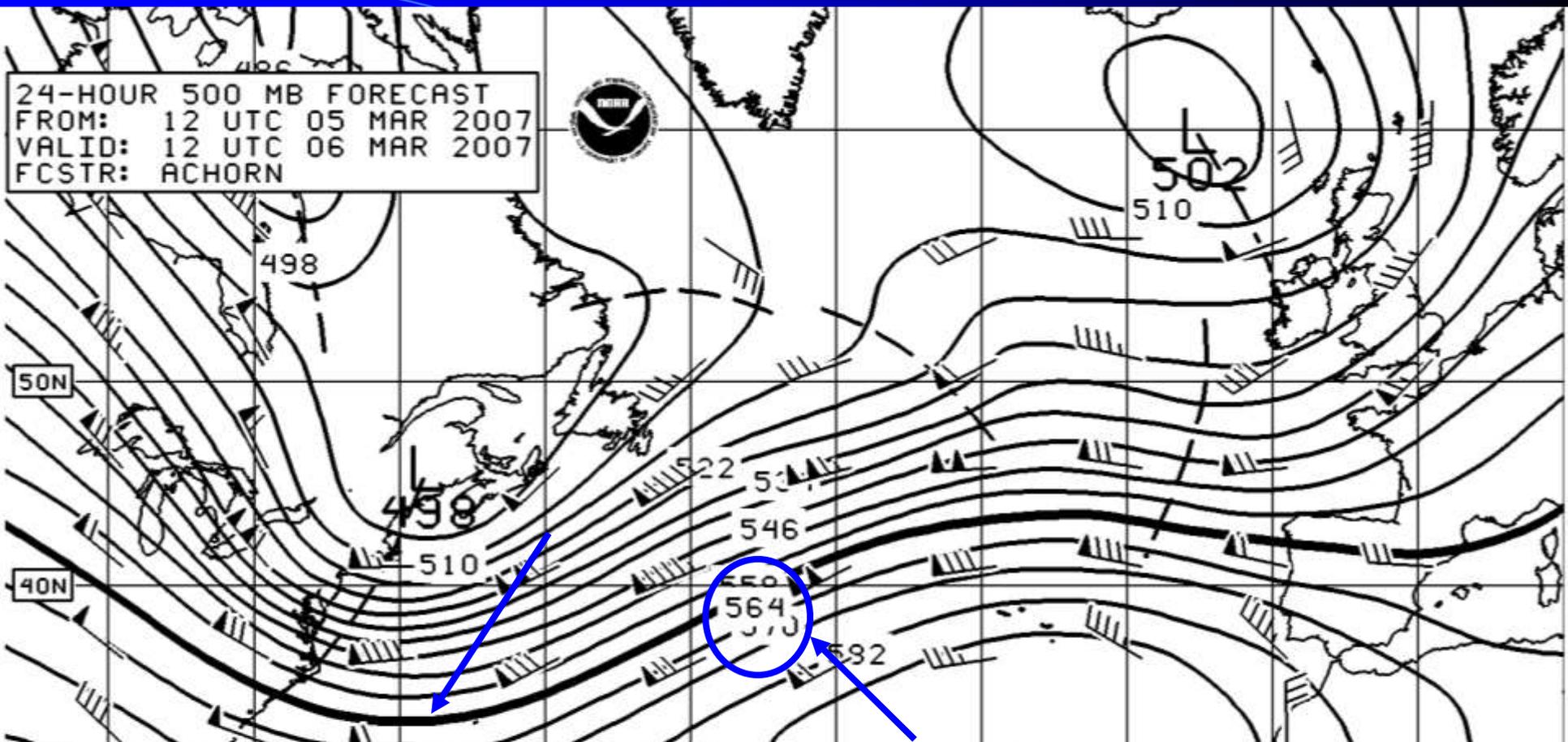
*Remember what the bold 564 isoheight
On the 500 mb chart tells you about
wind and seas along your track?*



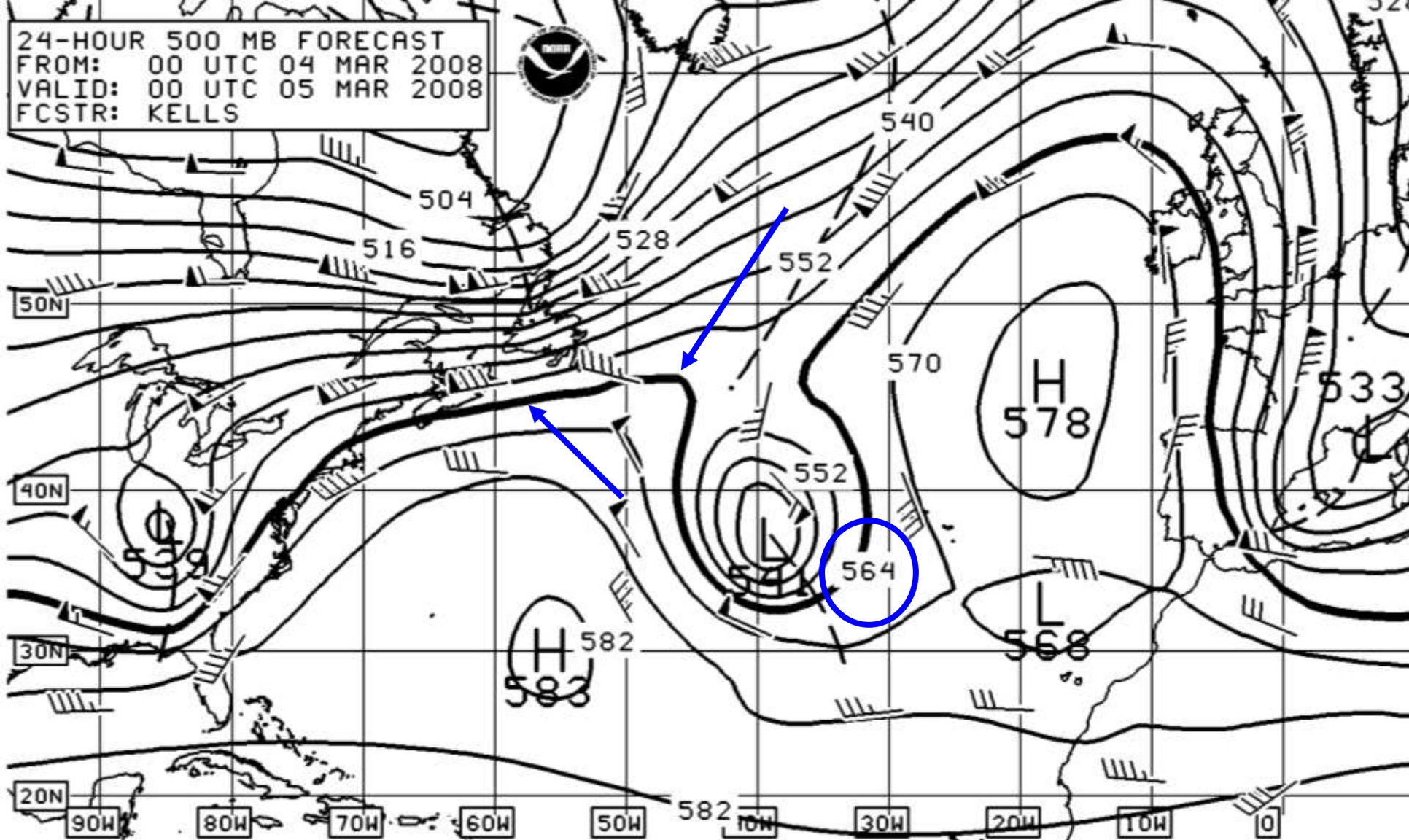


Upper Level Weather Charts

- Upper Level Charts are good forecasting tools because they show the general upper level flow which is unimpeded by surface friction.
- 500 mb chart available via weather fax. It shows the isoheight contours (meters) of 500mb pressure.
- The “bold” 5640 meter isoheight shows the southern extent of:
 - the Beaufort Force 7 seas (13.5-19 ft) and winds (28-33 kts) in winter
 - the Beaufort Force 6 seas (5-13 ft) and winds (22-27 kts) in summer.



*5640 isoheight (bold line) shows the southward extent of the:
Force 7 seas (13.5-19 ft) and winds (28-33kts) -- in winter
Force 6 seas (5-13 ft) and winds (22-27kts) -- in summer*



*5640 isoheight (bold line) shows the southward extent of the:
 Force 7 seas (13.5-19 ft) and winds (28-33kts) -- in winter
 Force 6 seas (5-13 ft) and winds (22-27kts) -- in summer*

Sea State

- Sea State is determined by the following factors:
 - Fetch:
 - Size of the area over which the wind blows.
 - Duration:
 - Length of time the wind has been blowing.
 - Wind speed:
 - How hard the wind blows
 - Areas where there are abrupt depth changes
 - such as Georges Banks off of the Grand Banks
- The larger the fetch area the higher the waves.

Why is Sea State Important?

- Because it's the seas that will kill you!!!
 - 1 gal of water = approximately 8 lbs per gal
 - 1,000,000 gals of water with the force of wind behind it can destroy a concrete building.



Force 0. Wind Speed less than 1 knot.
Sea: Sea like a mirror.



Force 2: Wind Speed 4-6 knots.
Sea: Wave height .2-.3m (.5-1 ft); Small wavelets, crests of glassy appearance, not breaking.



Force 1: Wind Speed 1-3 knots.
Sea: Wave height .1m (.25 ft); Ripples with appearance of scales, no foam crests.



Force 3: Wind Speed 7-10 knots.
Sea: Wave height .6-1m (2-3 ft); Large wavelets, crests begin to break, scattered whitecaps.



Force 4: Wind Speed 11-16 knots.

Sea: Wave height 1-1.5m (3.5-5 ft); Small waves becoming longer, numerous whitecaps.



Force 6: Wind Speed 22-27 knots.

Sea: Wave height 3-4m (9.5-13 ft); Larger waves forming, whitecaps everywhere, more spray.



Force 5: Wind Speed 17-21 knots.

Sea: Wave height 2-2.5m (6-8 ft); Moderate waves, taking longer form, many whitecaps, some spray.



Force 7: Wind Speed 28-33 knots.

Sea: Wave height 4-5.5m (13.5-19 ft); sea heaps up, white foam from breaking waves begins to be blown in streaks along direction of wind.



Force 8: Wind Speed 34-40 knots.

Sea: Wave height 5.5-7.5m (18-25 ft); Moderately high waves of greater length, edges of crests begin to break into spindrift, foam is blown in well marked streaks.



Force 9: Wind Speed 41-47 knots.

Sea: Wave height 7-10m (23-32 ft); High waves, sea begins to roll, dense streaks of foam along wind direction, spray may reduce visibility.



Force 10: Wind Speed 48-55 knots.

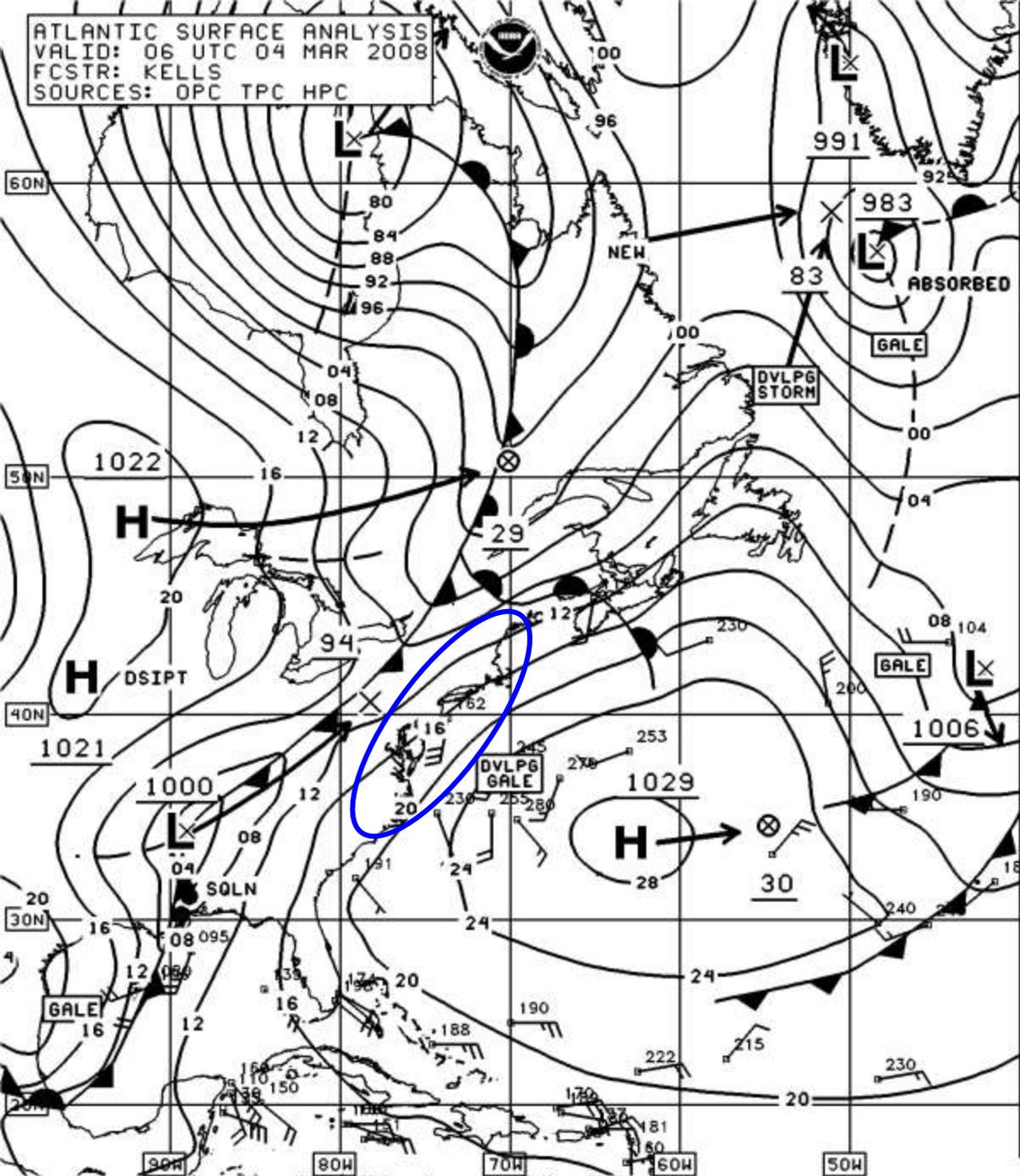
Sea: Wave height 9-12.5m (29-41 ft); Very high waves with overhanging crests, sea takes white appearance as foam is blown in very dense streaks, rolling is heavy and shocklike, visibility is reduced.



Force 11: Wind Speed 56-63 knots.

Sea: Wave height 11.5-16m (37-52 ft); Exceptionally high waves, sea covered with white foam patches, visibility still more reduced.

ATLANTIC SURFACE ANALYSIS
VALID: 06 UTC 04 MAR 2008
FCSTR: KELLS
SOURCES: OPC TPC HPC



These are the existing conditions off shore today

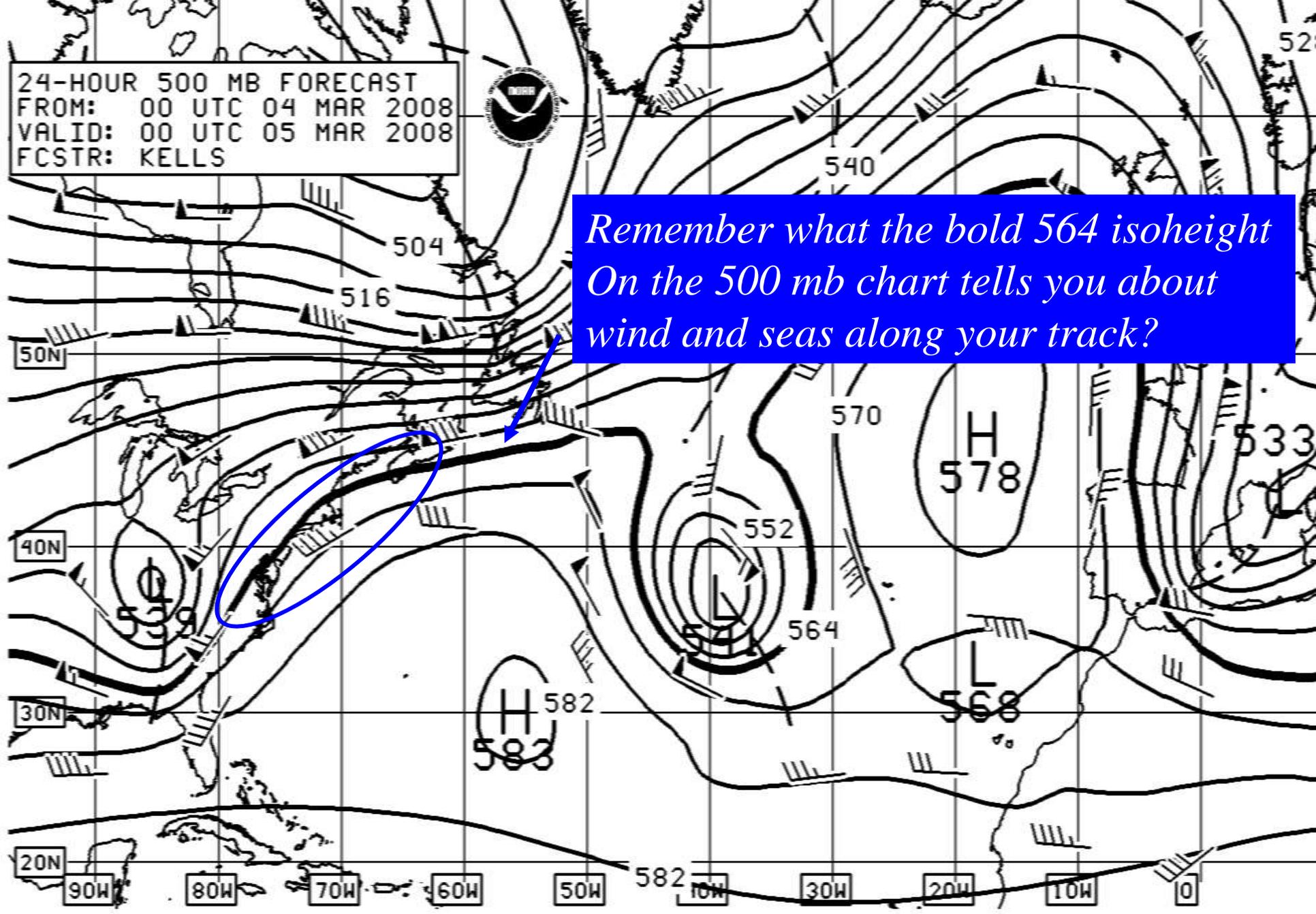
If you were to head south from Newport enroute to USNA, what kind of weather would you expect along your track?

What other weather resources could you use to help predict the conditions and plan ahead?

24-HOUR 500 MB FORECAST
FROM: 00 UTC 04 MAR 2008
VALID: 00 UTC 05 MAR 2008
FCSTR: KELLS



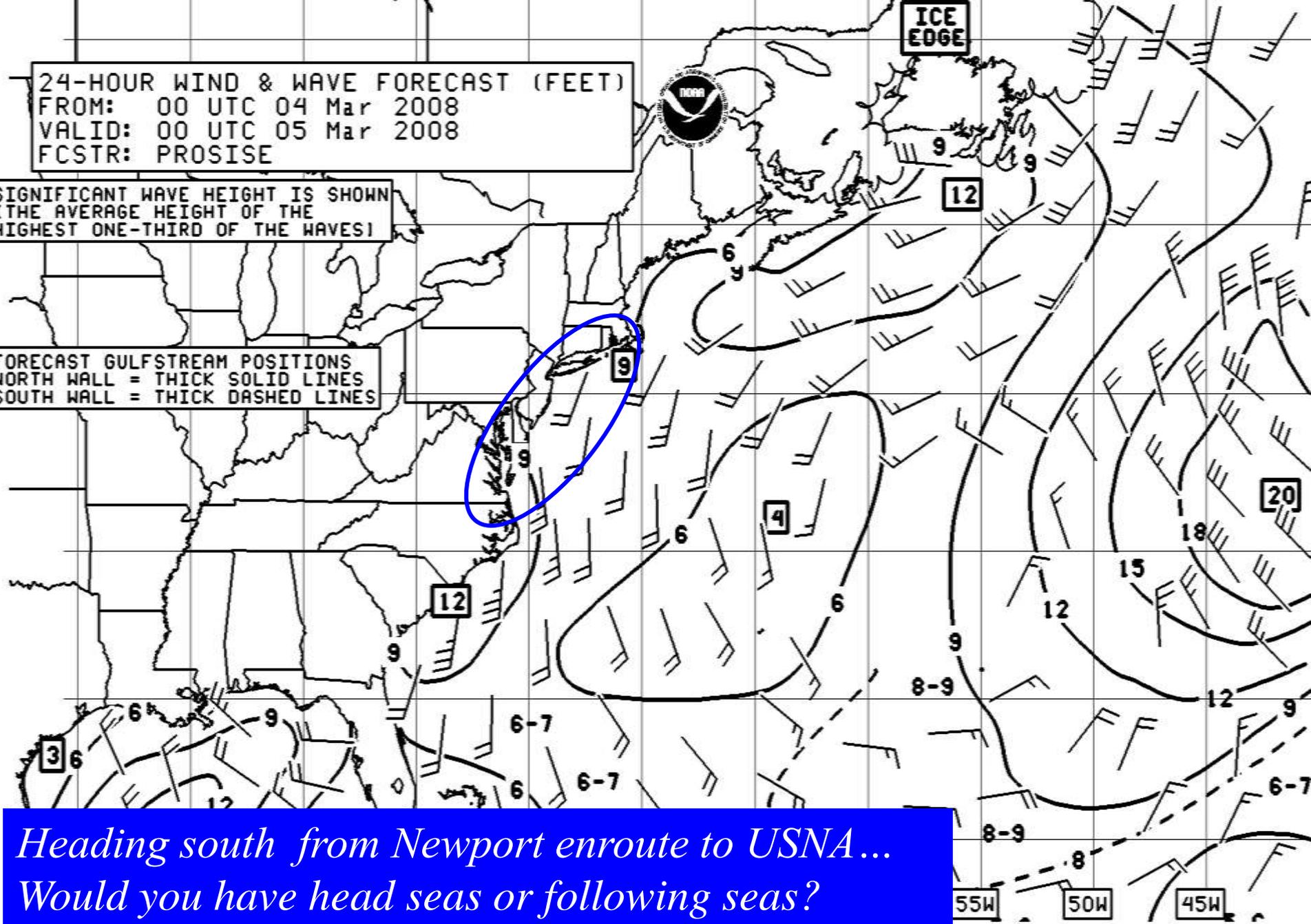
*Remember what the bold 564 isoheight
On the 500 mb chart tells you about
wind and seas along your track?*



24-HOUR WIND & WAVE FORECAST (FEET)
FROM: 00 UTC 04 Mar 2008
VALID: 00 UTC 05 Mar 2008
FCSTR: PROSISE

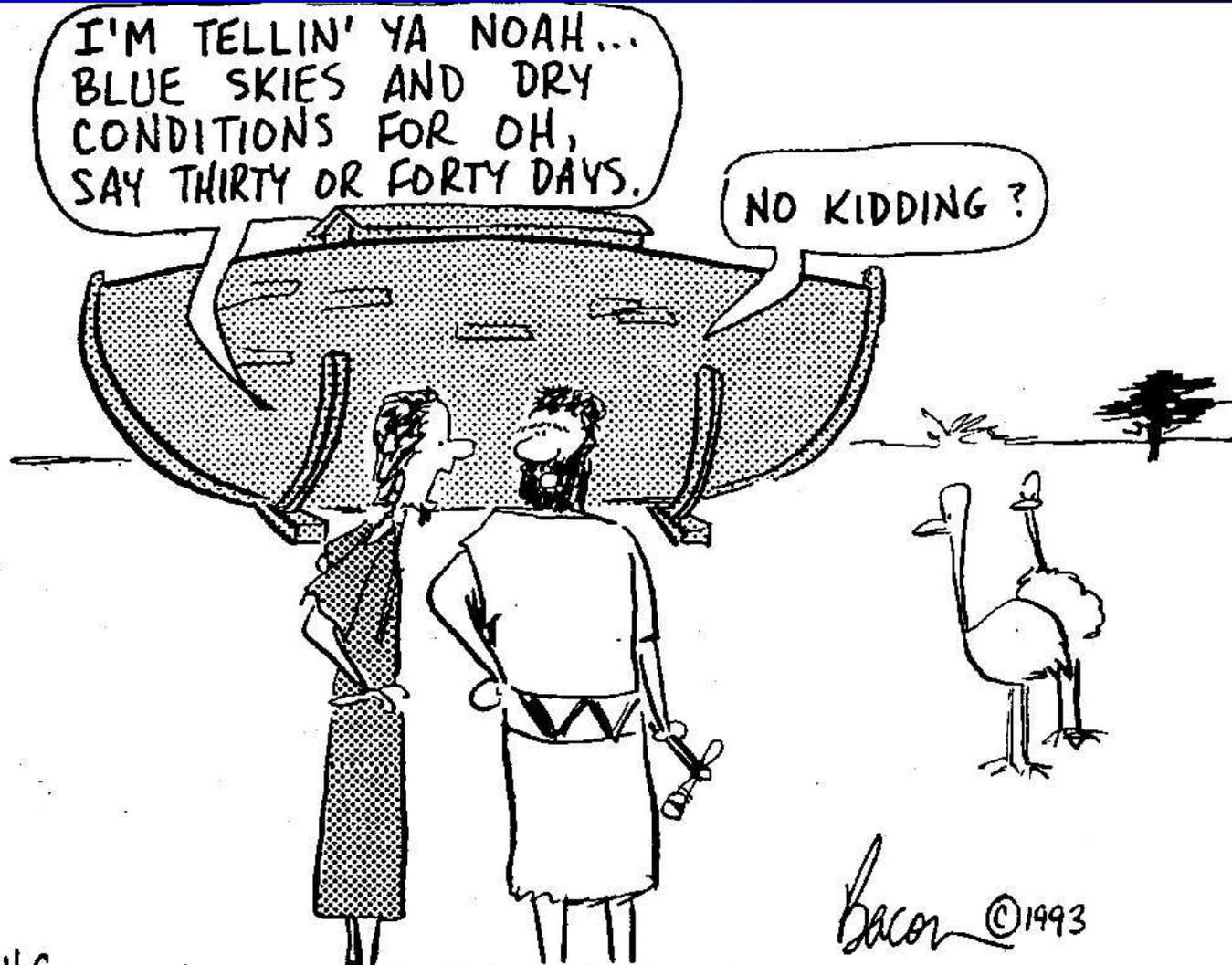
SIGNIFICANT WAVE HEIGHT IS SHOWN
(THE AVERAGE HEIGHT OF THE
HIGHEST ONE-THIRD OF THE WAVES)

FORECAST GULFSTREAM POSITIONS
NORTH WALL = THICK SOLID LINES
SOUTH WALL = THICK DASHED LINES



*Heading south from Newport enroute to USNA...
Would you have head seas or following seas?
What sea heights would you expect along the track?*

Questions???



H.C.

The first naval meteorologist