

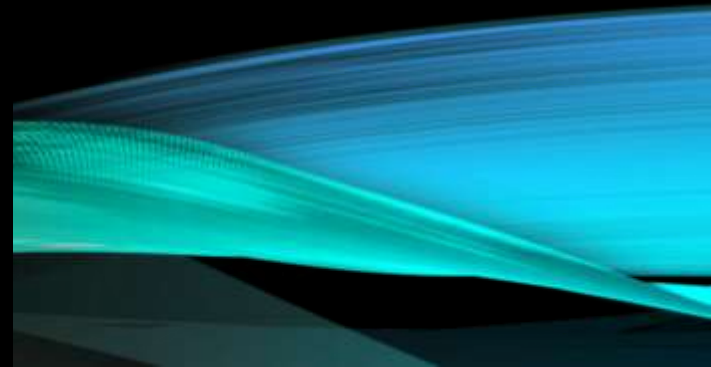


WEATHER TO GO

Presented by- Ralph Naranjo



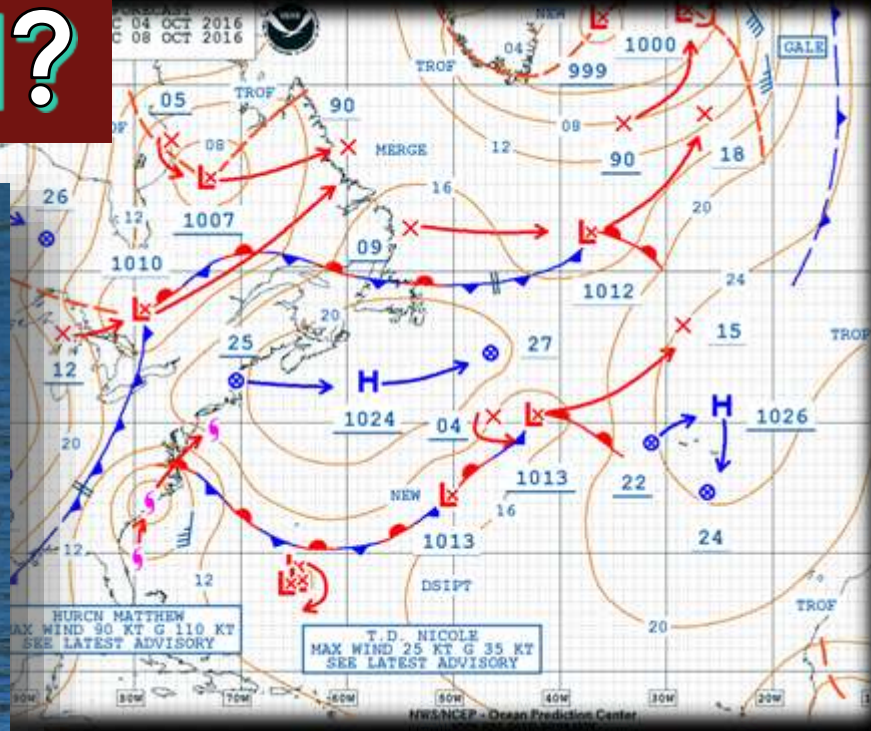
WHAT
TO
EXPECT



CREW - VESSEL - ITINERARY



What lies ahead?



.....**50 knots**

THE ART OF SEAMANSHIP

EVOLVING SKILLS, EXPLORING OCEANS,
AND HANDLING WIND, WAVES, AND WEATHER

RALPH NARANJO

FORMER VANDERSTAR CHAIR, U.S. NAVAL ACADEMY



**WEATHER AWARENESS
AND
FORECAST FEATURES**

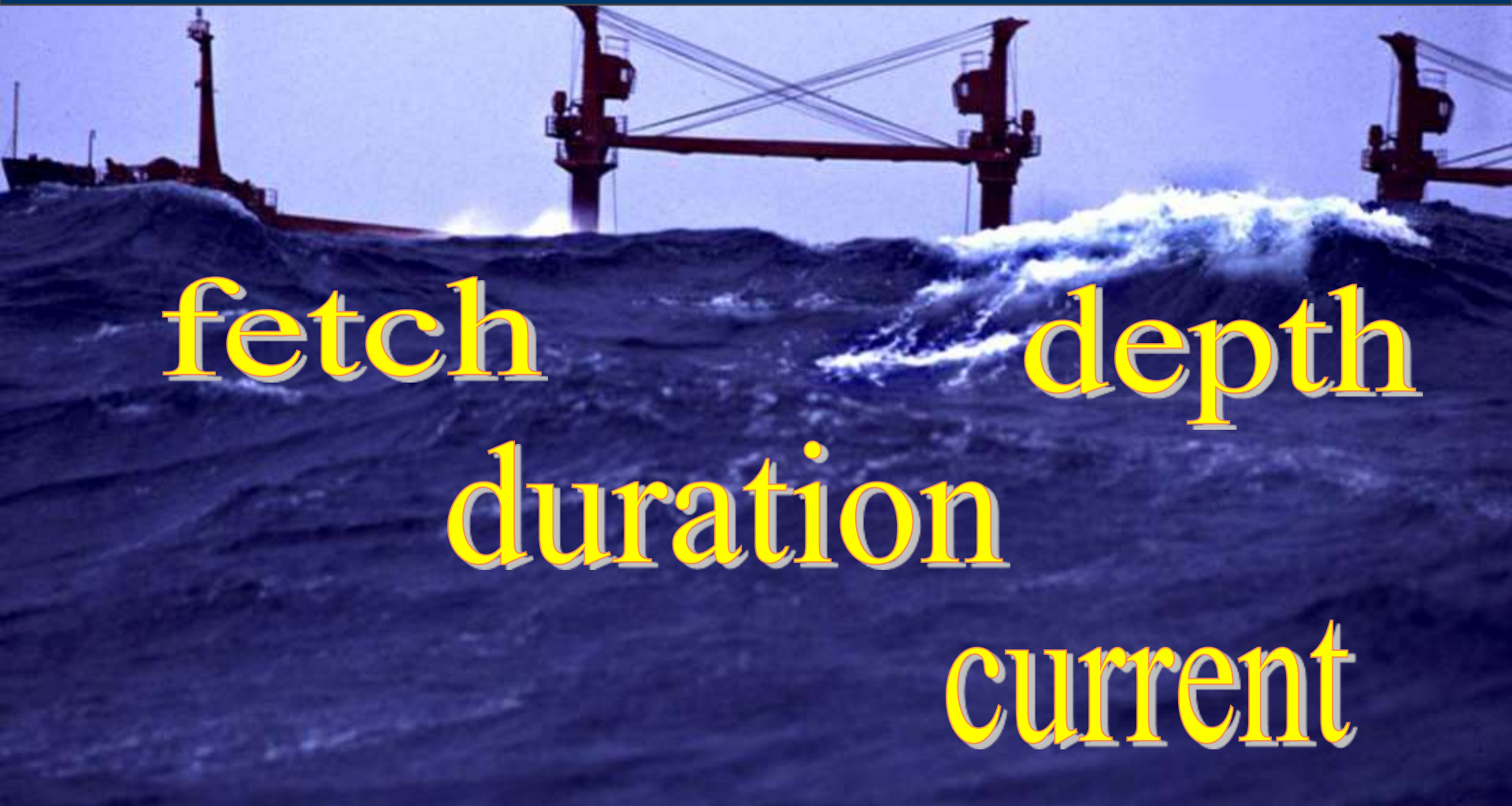
STAY FOCUSED ON THE SEA STATE

fetch

depth

duration

current



Coastal Sailors

never underestimate a lee shore inlet!



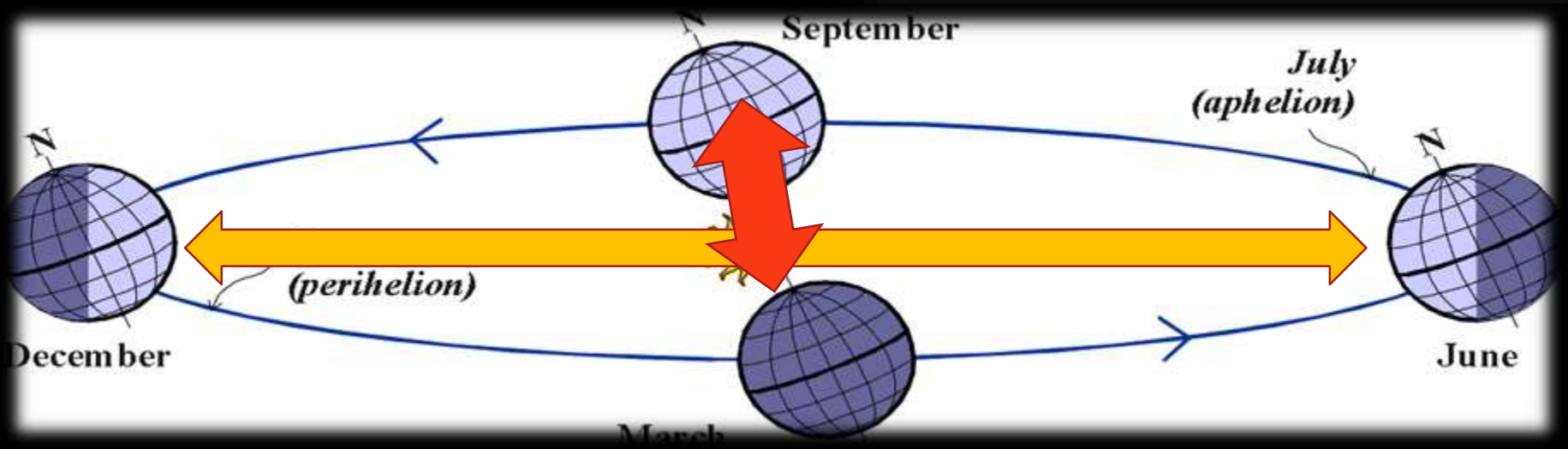
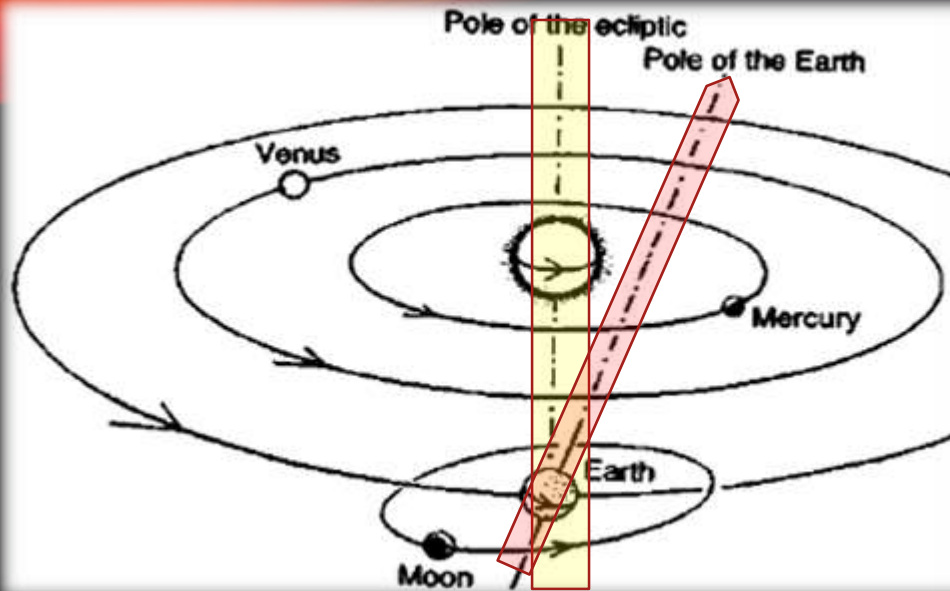
THE ATMOSPHERE--POLAR, TEMPERATE AND TROPICAL

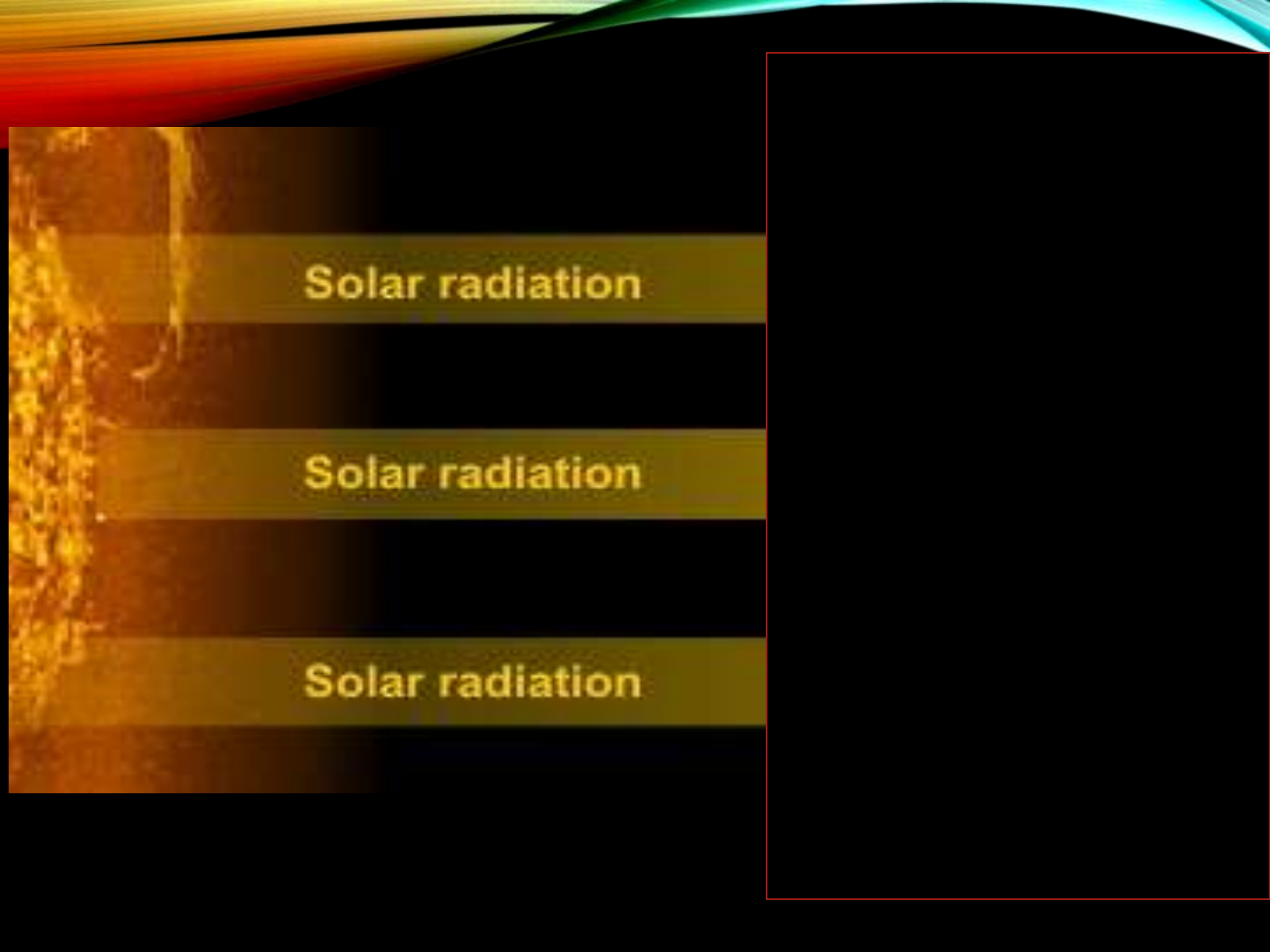




CLIMATE IMPLICATIONS

Annual changes
and
longer period oscillations





Solar radiation

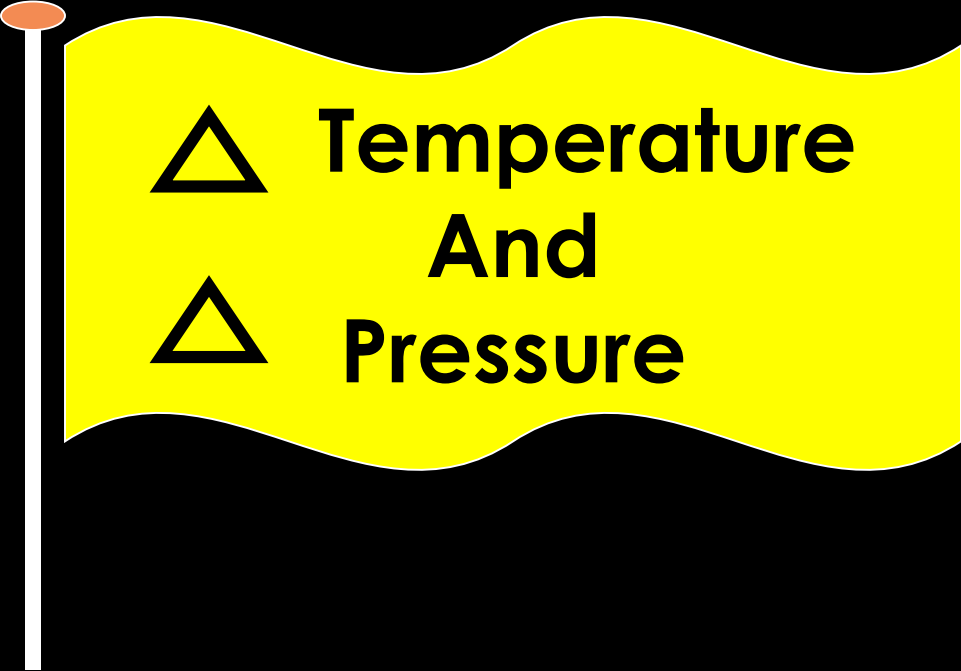
Solar radiation

Solar radiation

SUN DRIVEN ATMOSPHERE

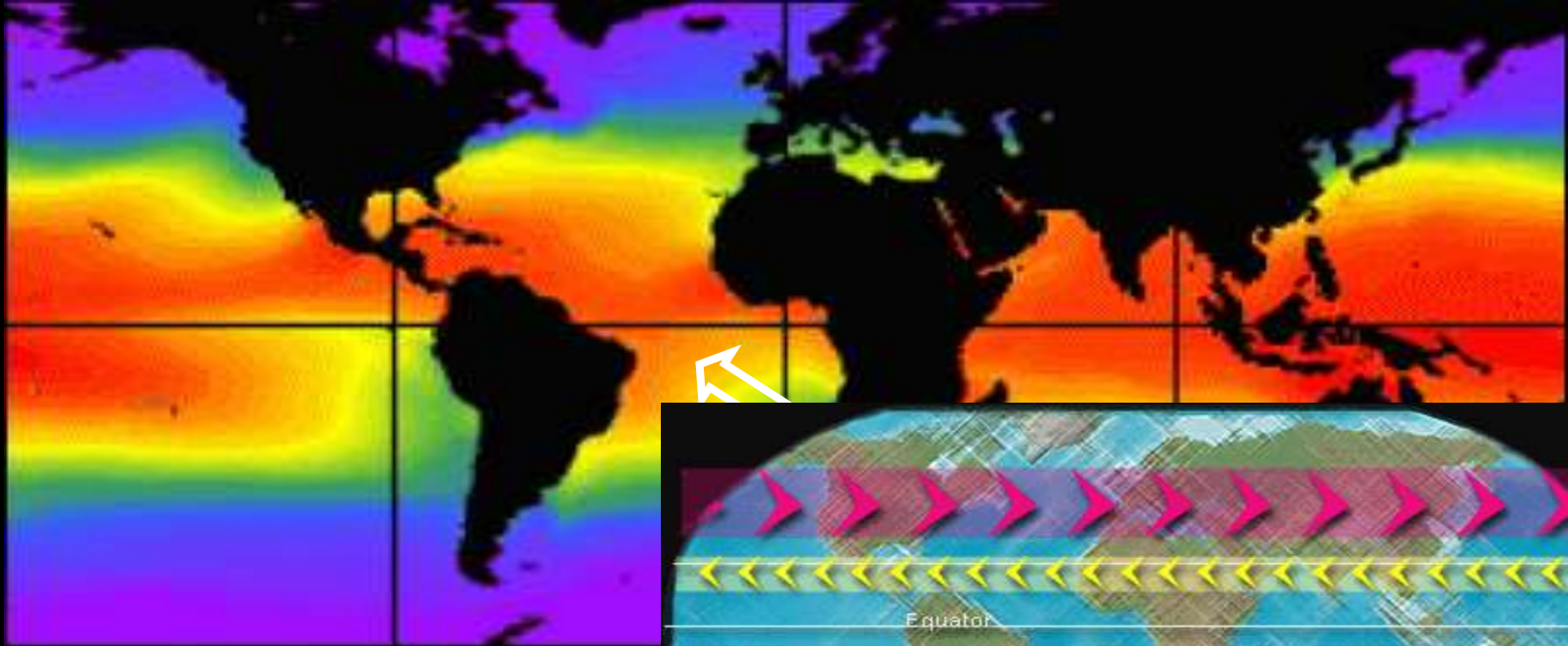


- Uneven heating
- Evaporation / condensation
- Coriolis effect
- Wind belts



**△ Temperature
And
△ Pressure**

OCEAN/AIR INTERFACE



SURFACE AIR MASS INTERACTION

Polar Maritime—

Cold air moving over a warmer sea. An unstable airflow bringing squalls and very good visibility.

Polar Maritime—Not very common and in the winter is colder than Polar Maritime air on the Pacific coast.

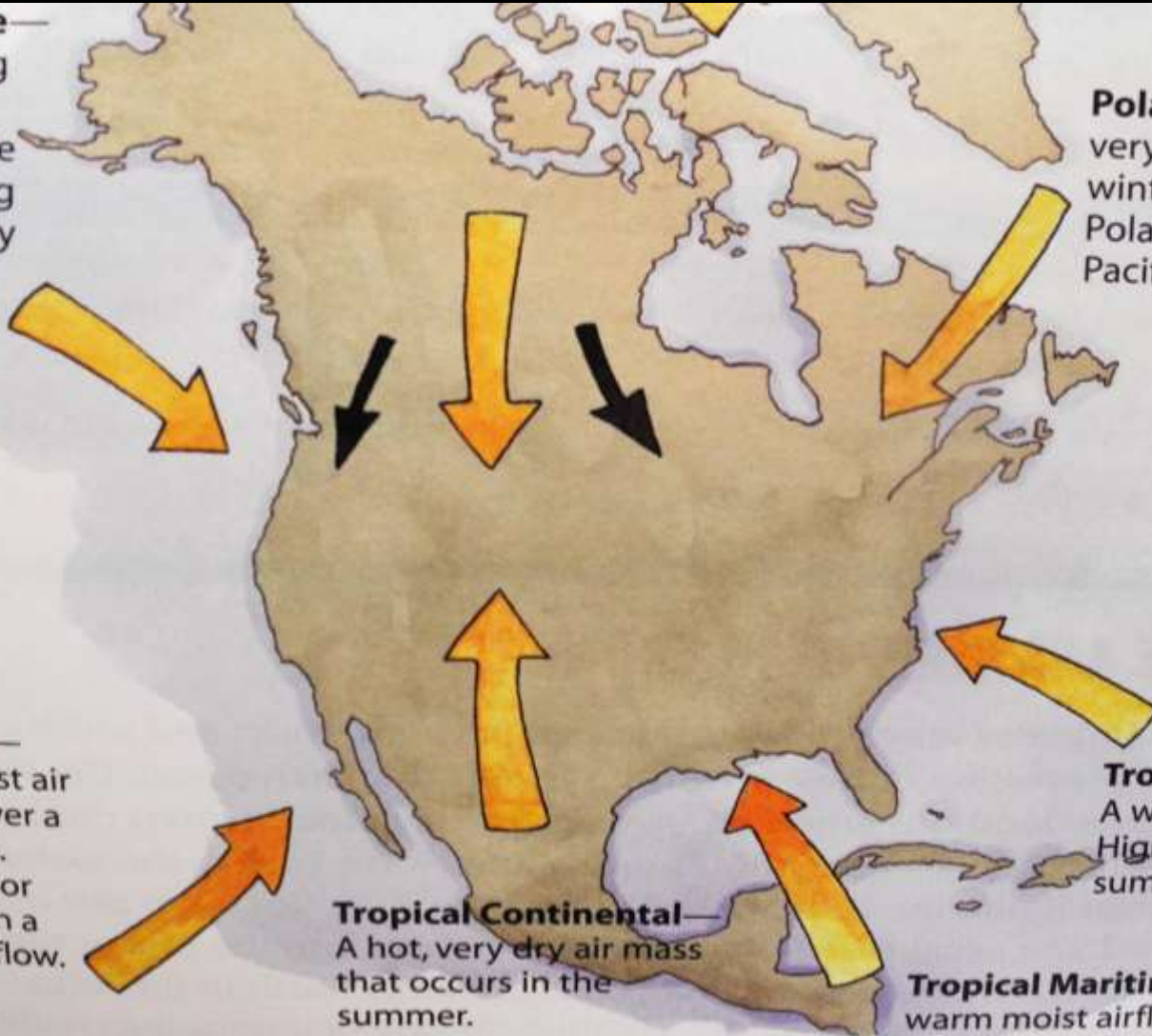
Tropical Maritime—

Warm moist air moving over a colder sea. Expect poor visibility in a stable airflow.

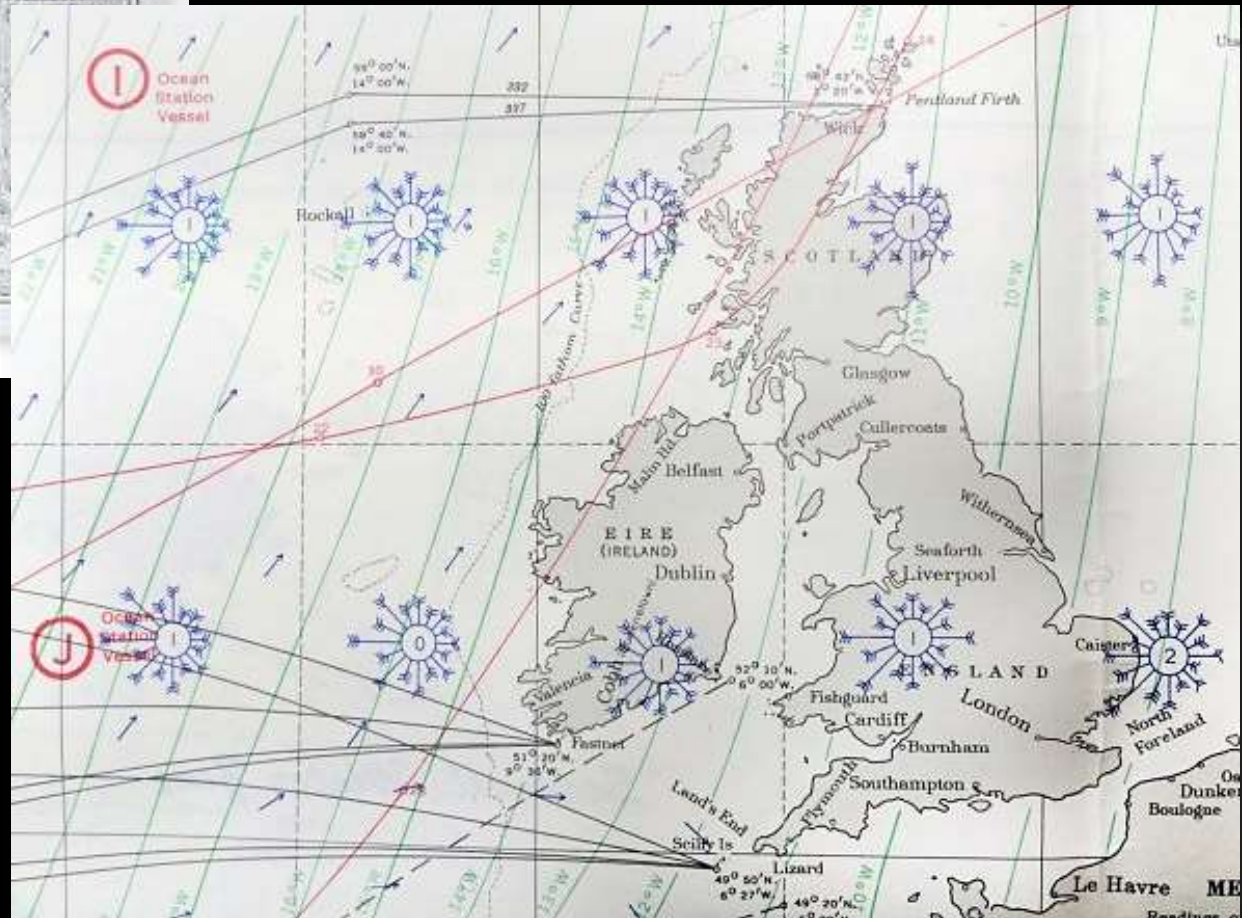
Tropical Maritime—A warm moist airflow. High humidity in the summer.

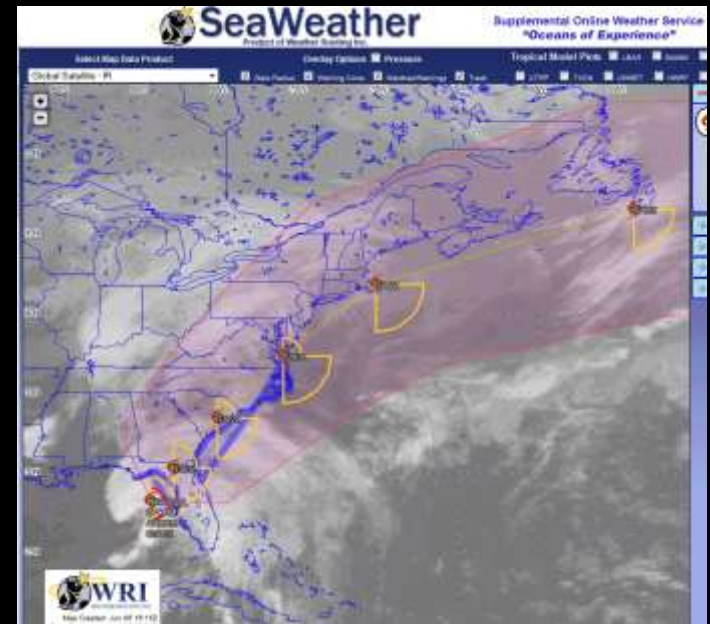
Tropical Continental—A hot, very dry air mass that occurs in the summer.

Tropical Maritime—A warm moist airflow.

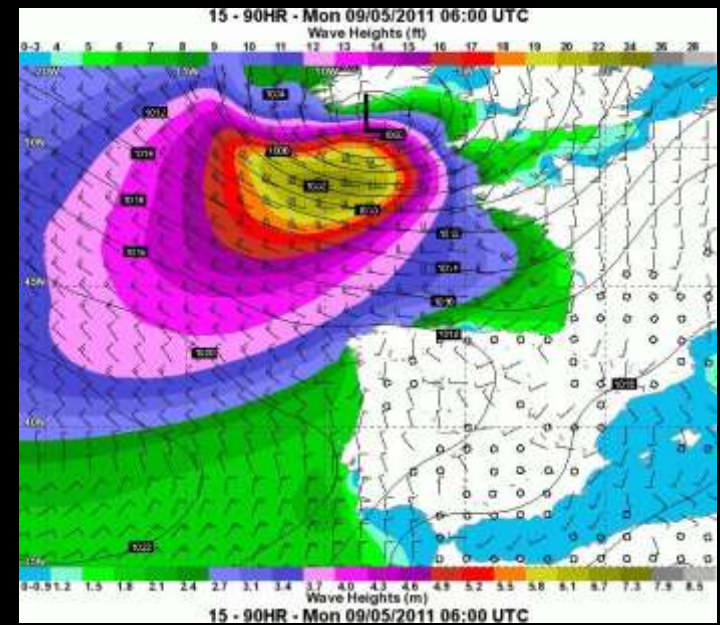
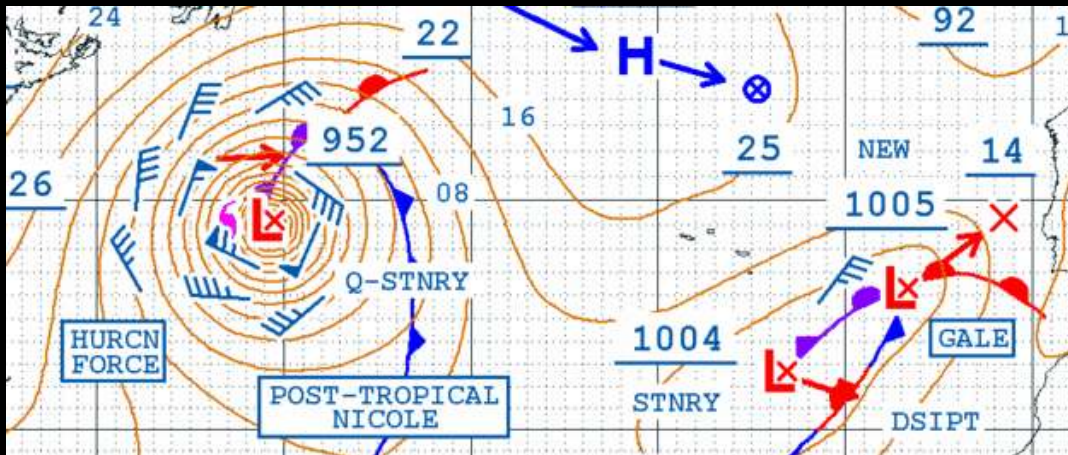


PILOT CHARTS





WEATHER



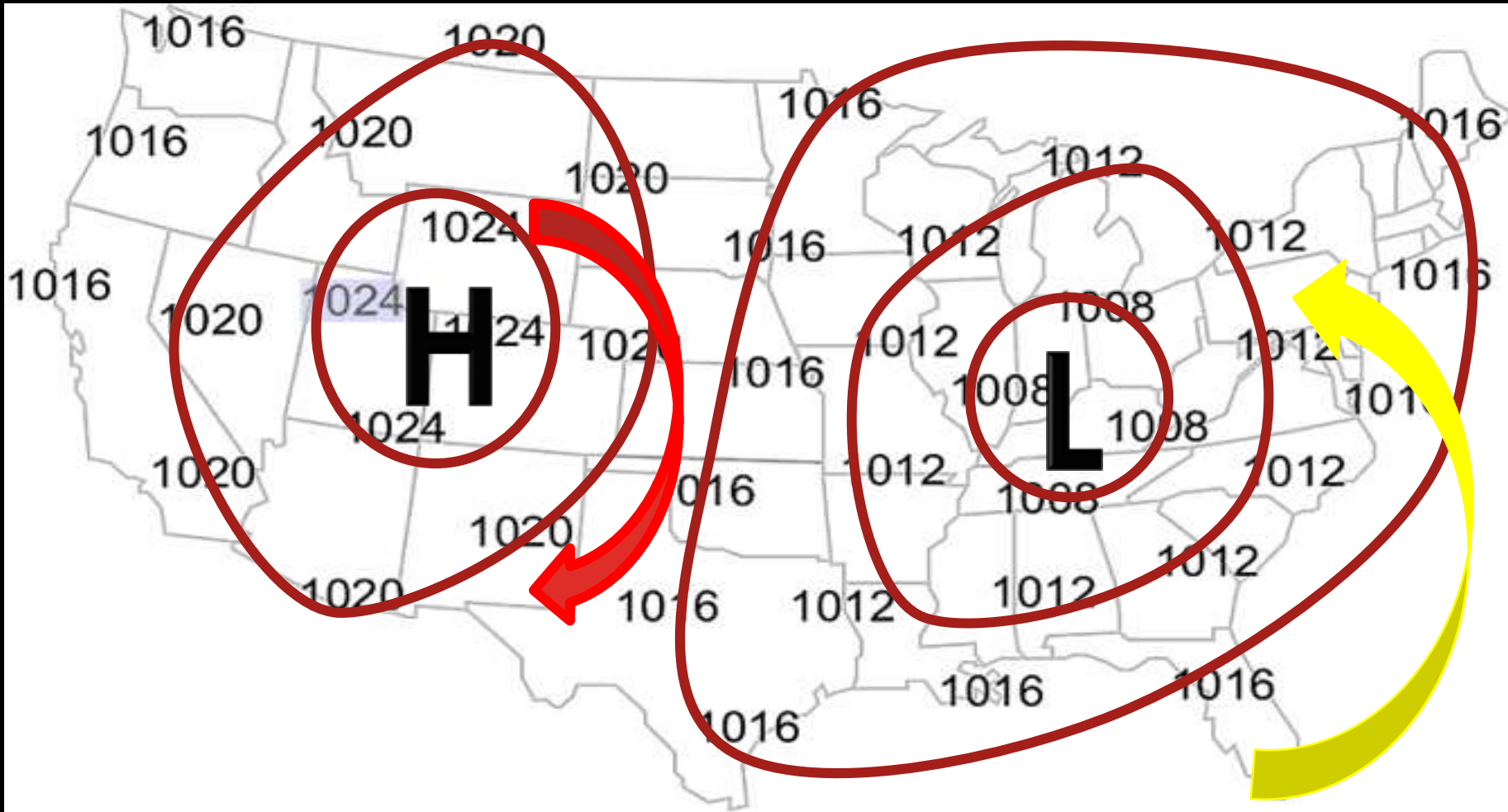


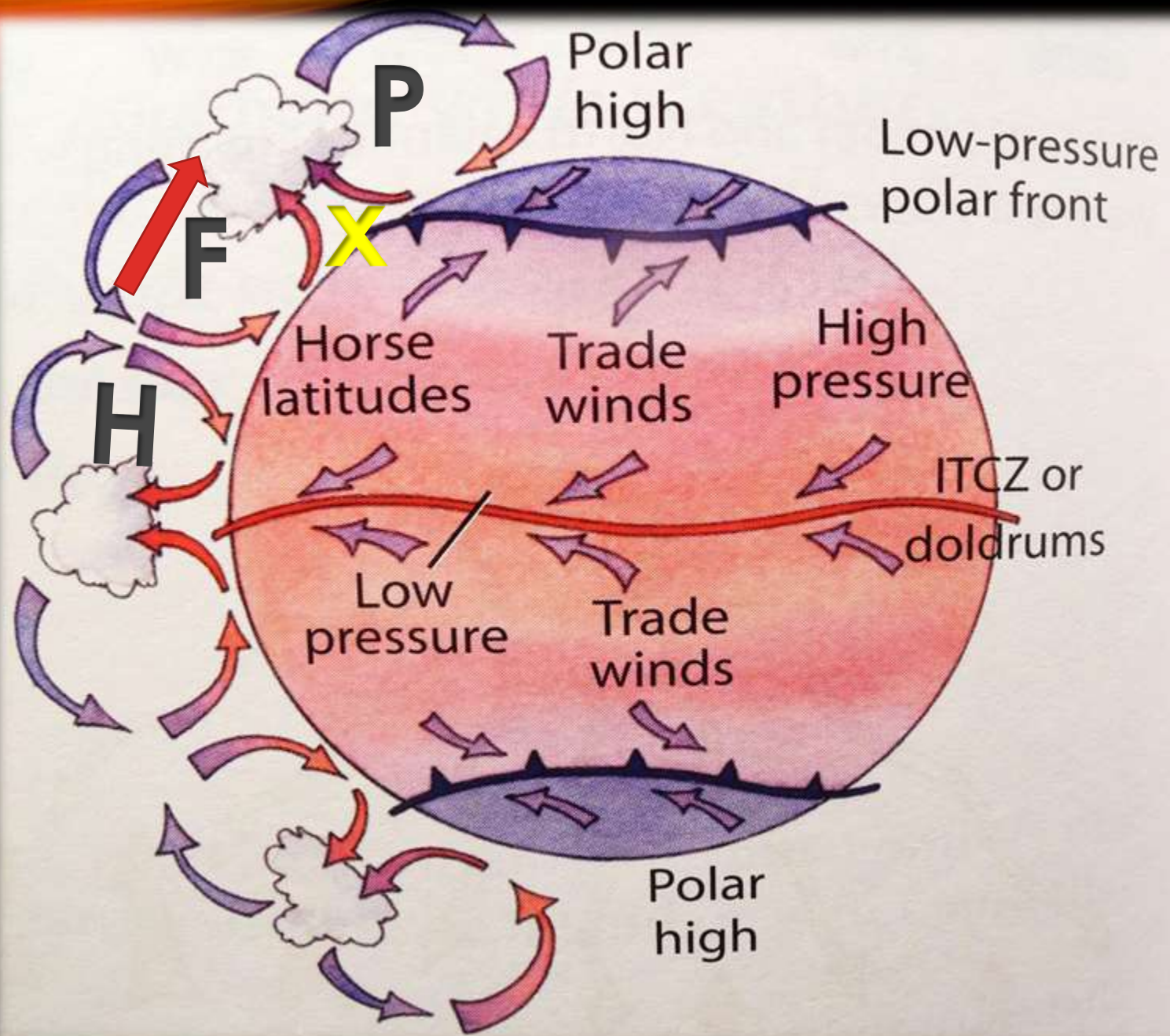
GADGETS AND GRIB FILES

temperature



isobars





A diagram illustrating the Polar Front. It shows a cross-section of the Earth with a purple shaded area representing cold air and a red shaded area representing warm air. The purple area is labeled 'cold air' and the red area is labeled 'warm air'. The boundary between them is the Polar Front. Arrows indicate the movement of air masses: purple arrows show cold air moving from the top left towards the bottom right, and red arrows show warm air moving from the bottom left towards the top right. The text 'The Polar Front' is written in red with a white outline, and 'cold air' is written in white with a red outline.

The Polar Front
cold air

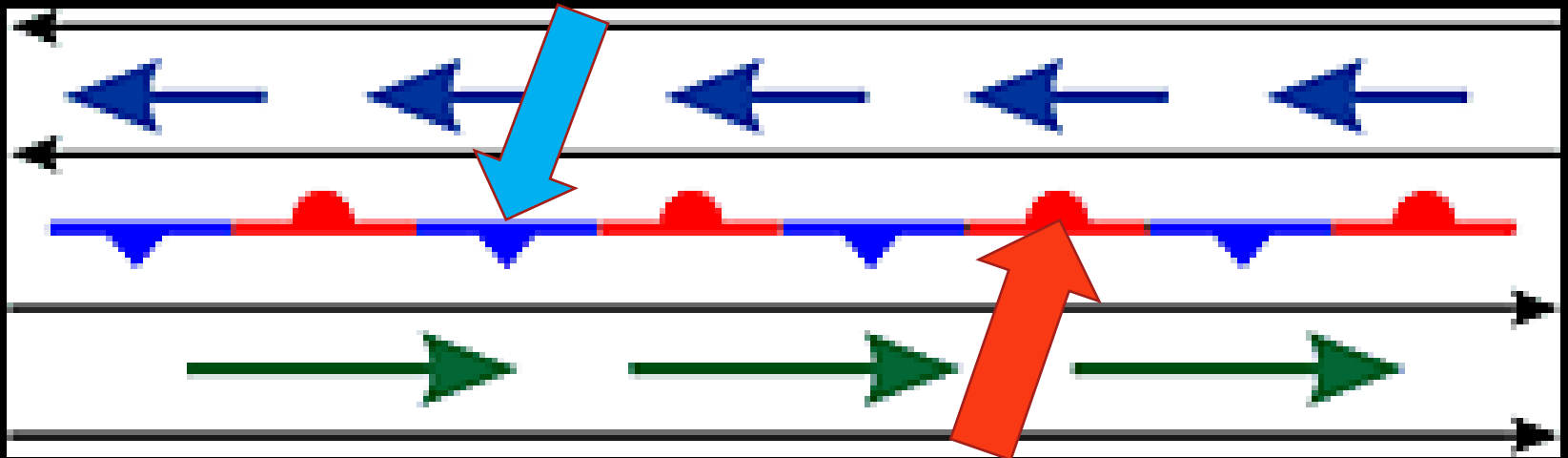
warm air

WINDS ALOFT AND THE FERREL CELL

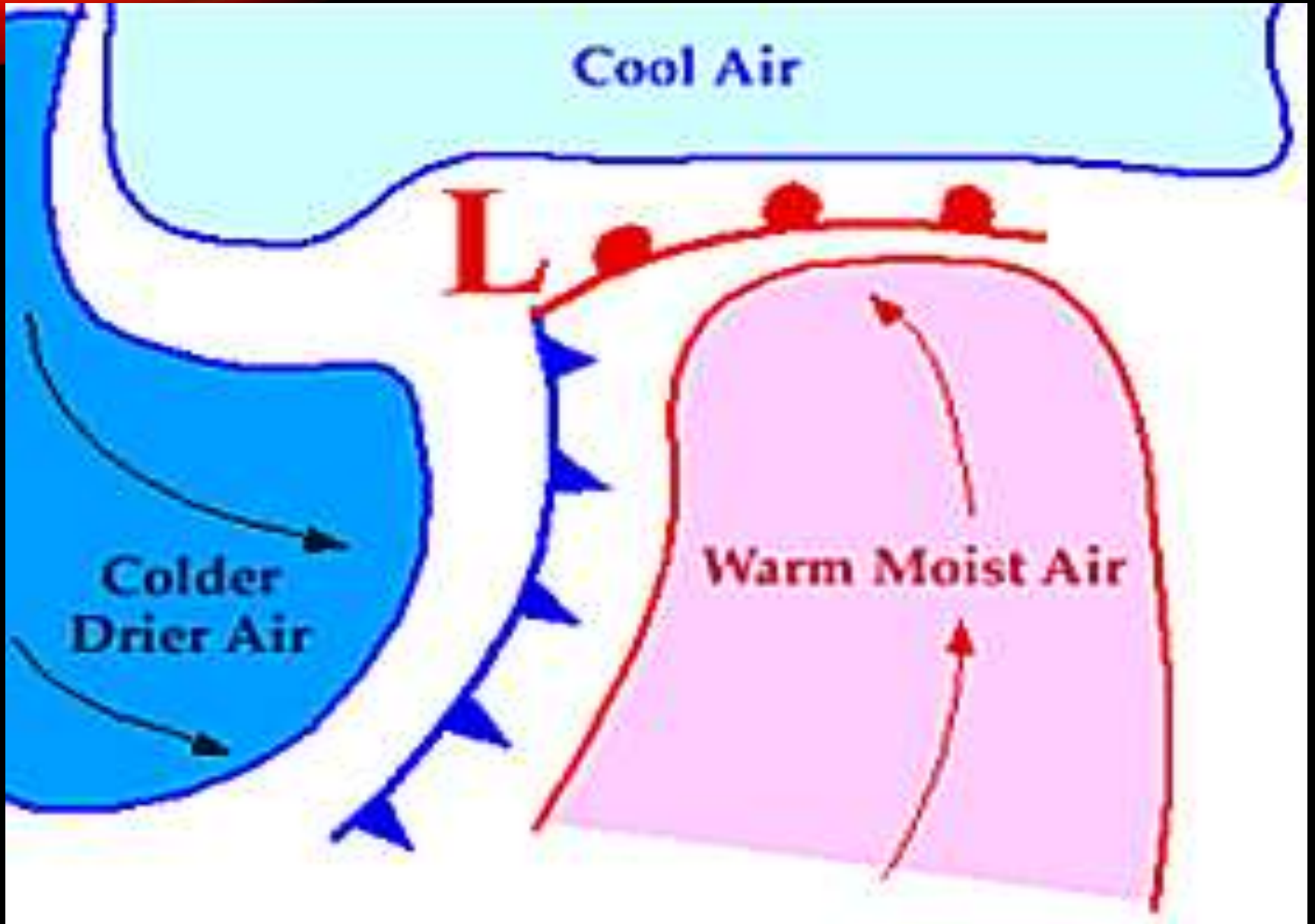
- Poleward flow aloft and on surface
- Coriolis bends winds to the right
- Creates west wind above highs
- Keeps midlevel air masses moving eastward
- Ferrel Cell balancing heat distribution
- Defining storm tracks – Rossby Waves
- Short waves and surface weather effects

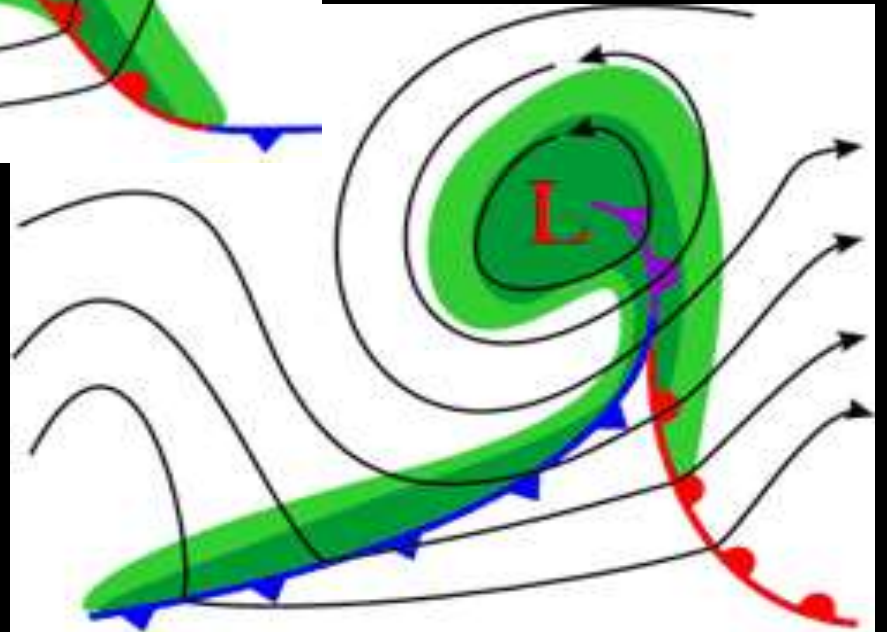
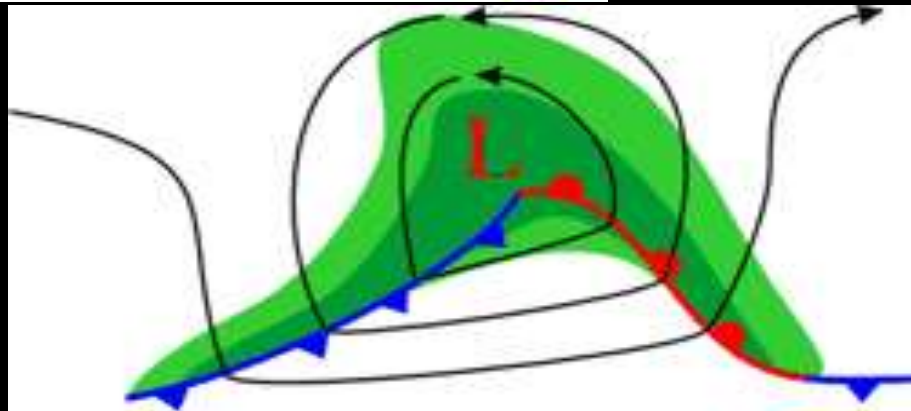
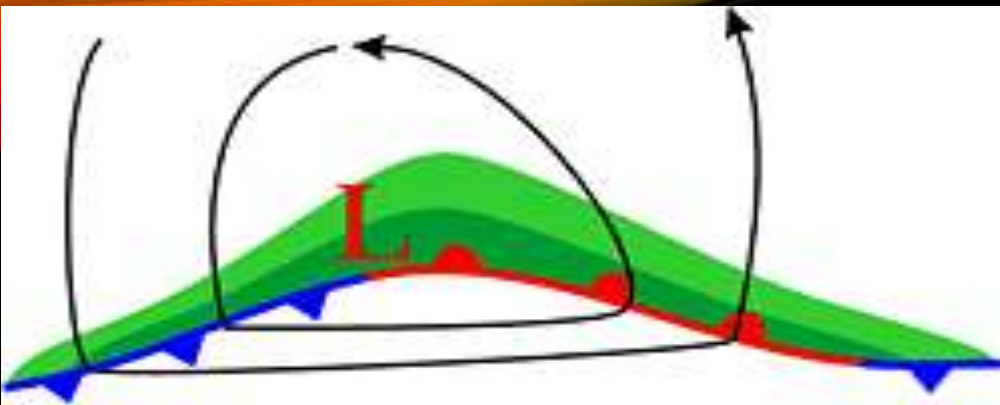


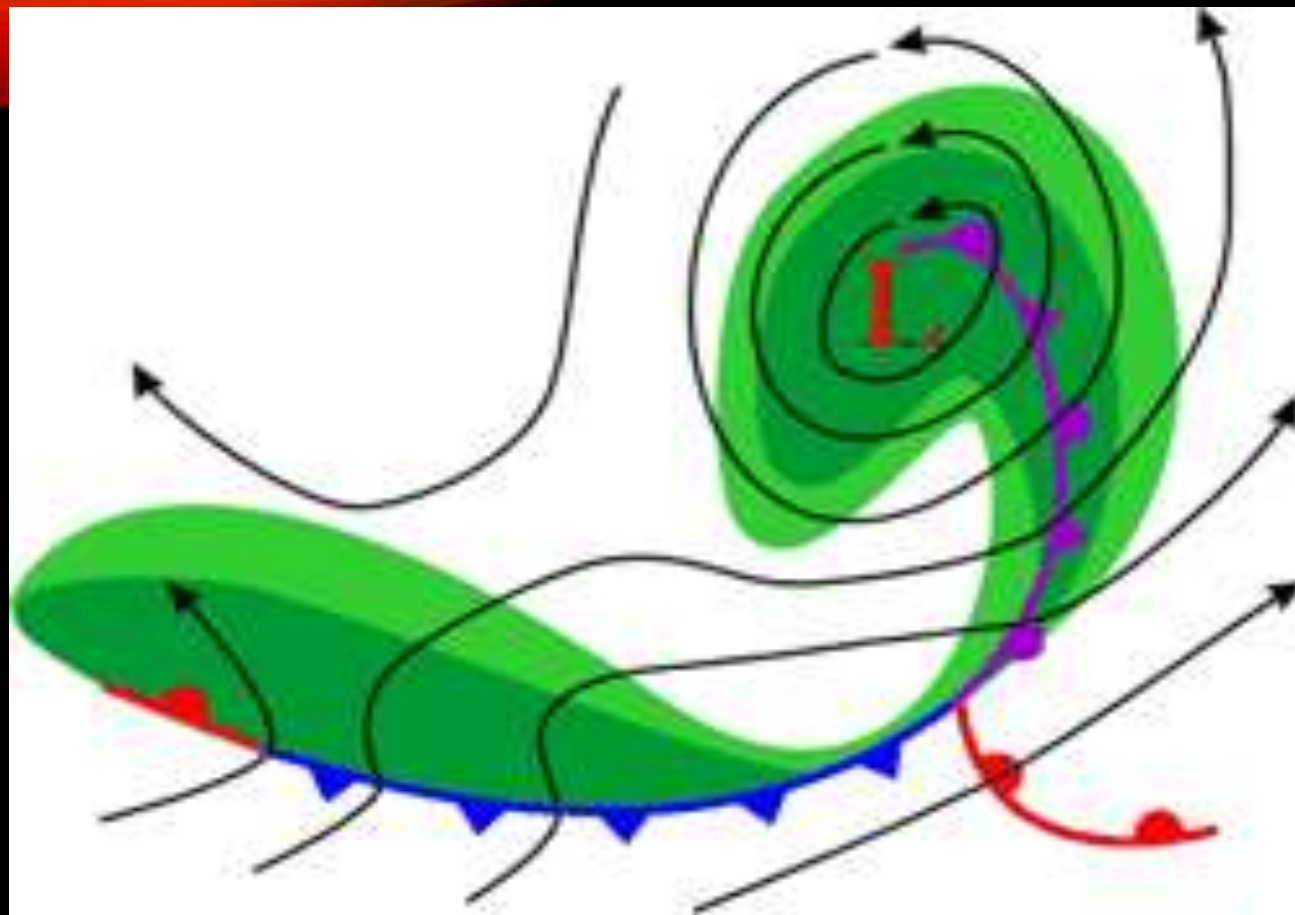
Polar easterly



Mid latitude westerly



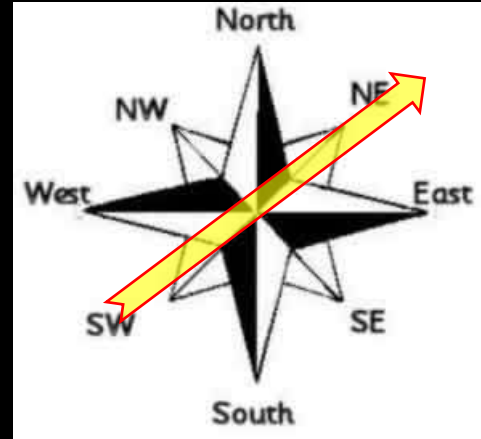
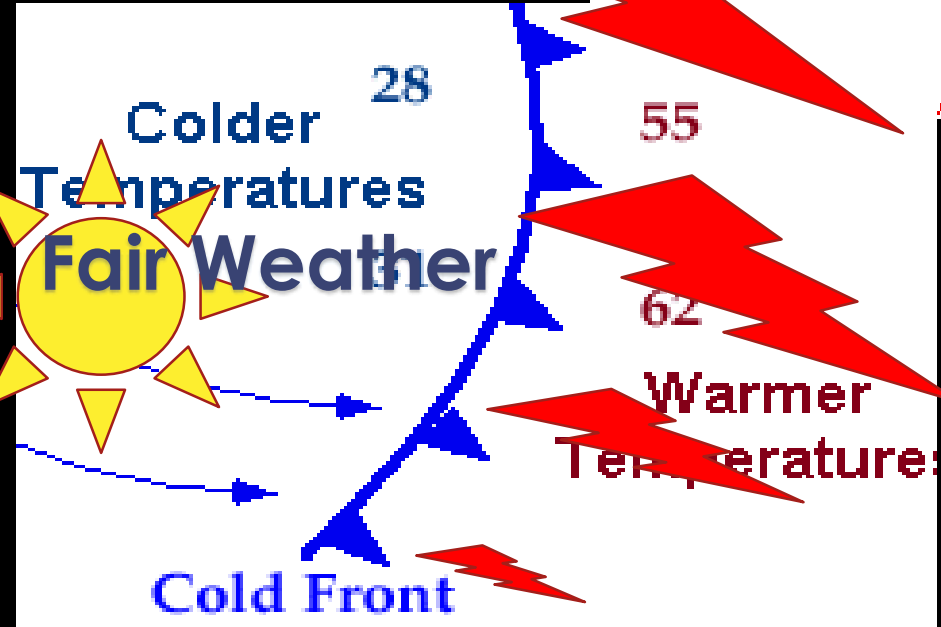
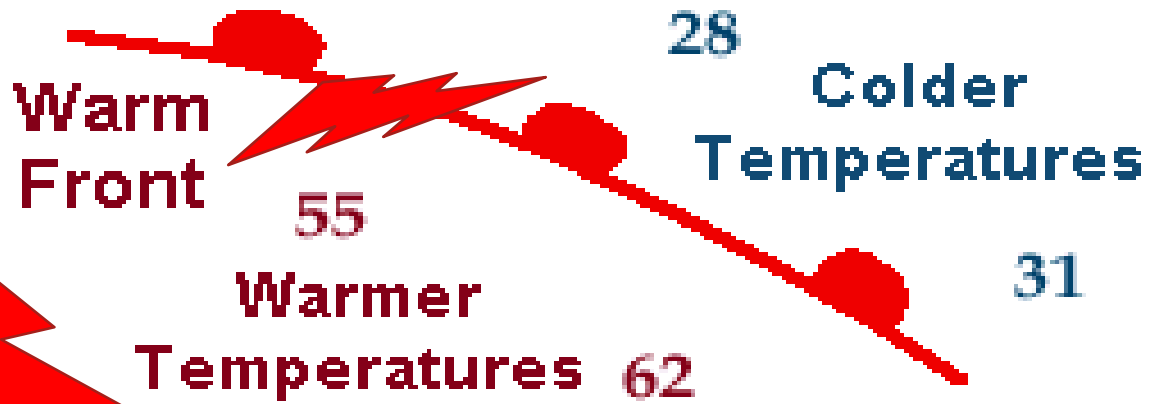




Extratropical low



LOW

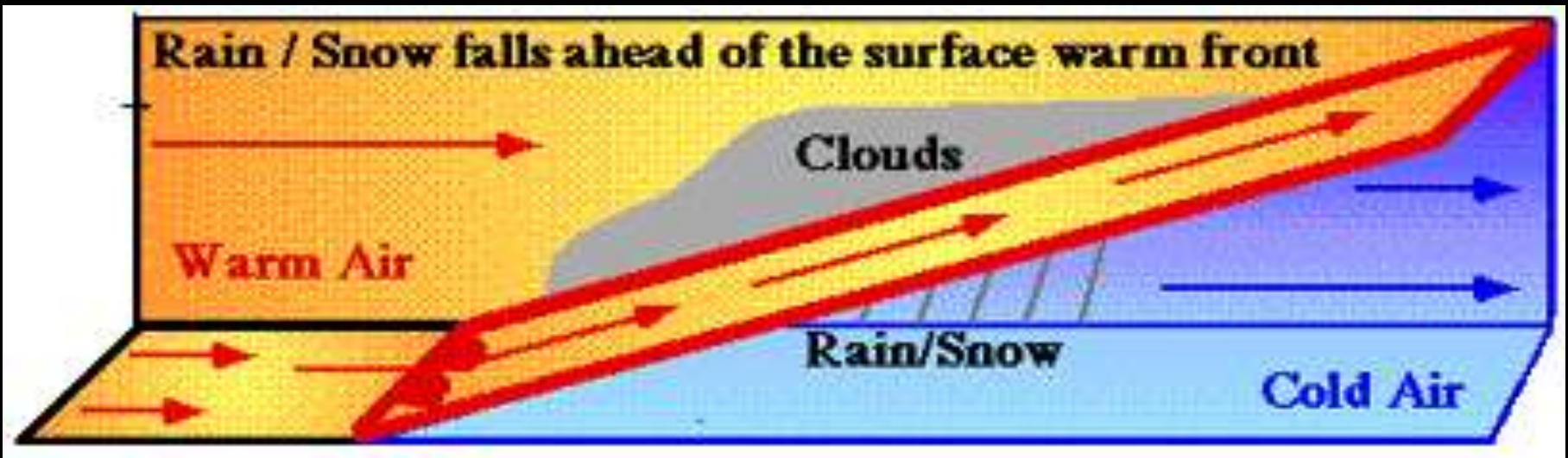




CLOUDS
COMMUNICATE

WARM FRONT

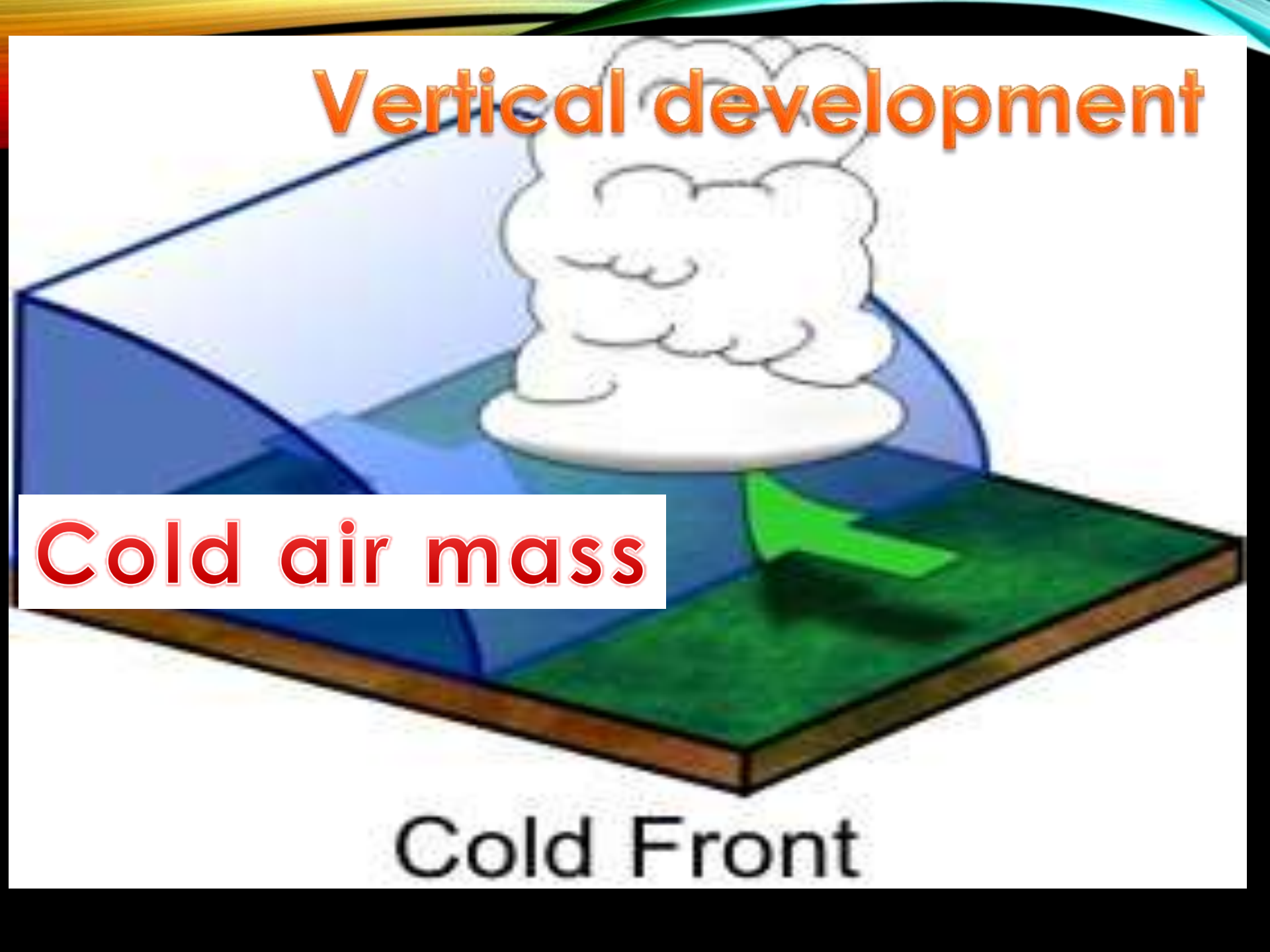
Overrides colder air



Vertical development

Cold air mass

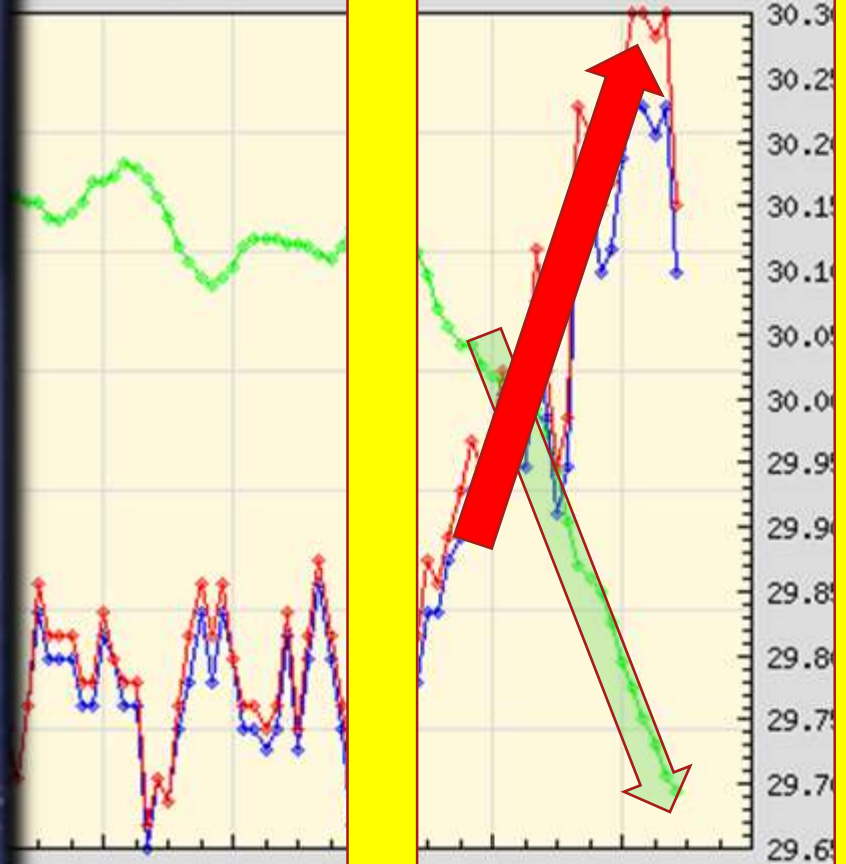
Cold Front





Air Pressure at TPLM2

edit: NOAA/NWS/NDBC

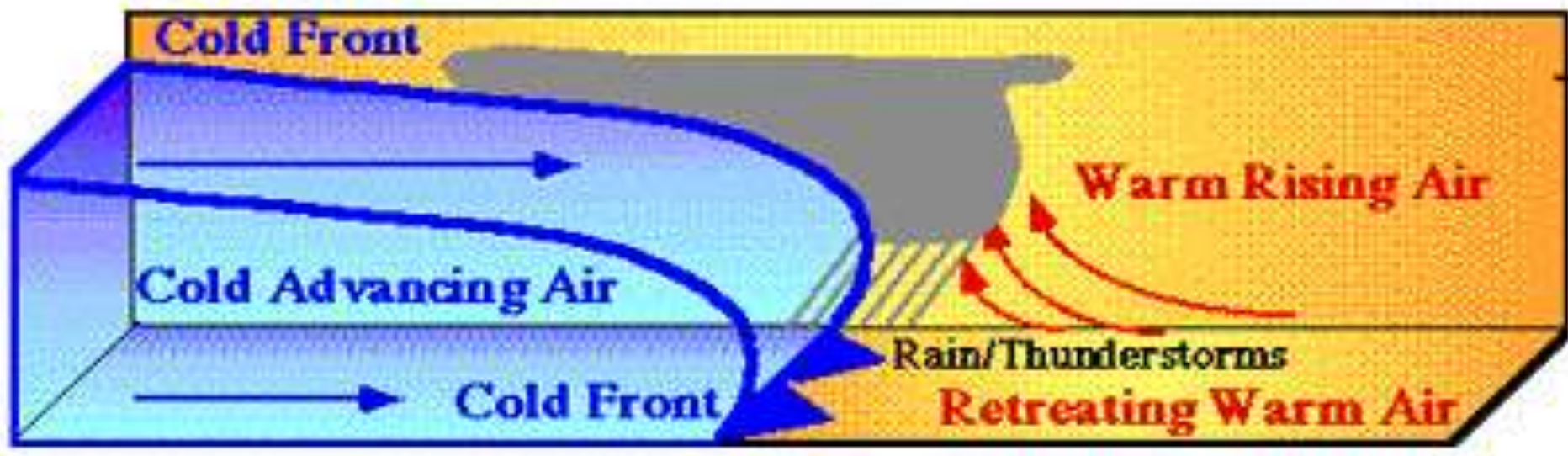


09/16 12 GMT	09/17 00 GMT	09/18 12 GMT	09/18 00 GMT	09/18 12 GMT	09/19 00 GMT
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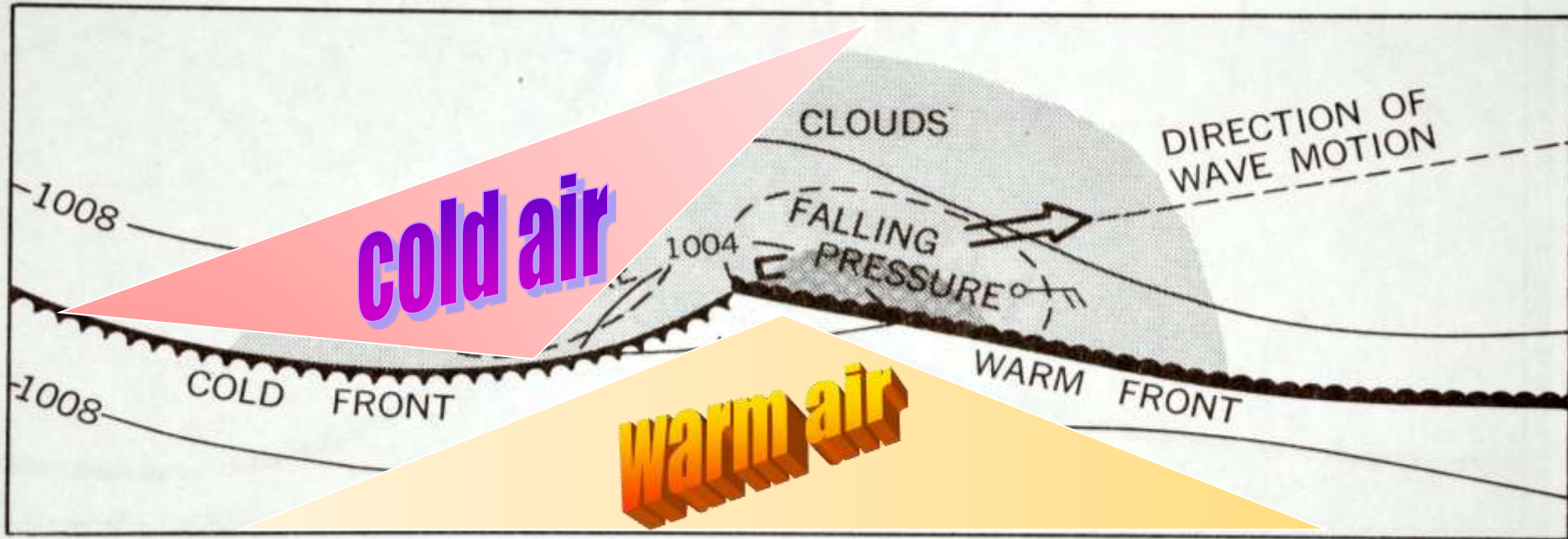
09/16 08 EDT	09/16 20 EDT	09/17 08 EDT
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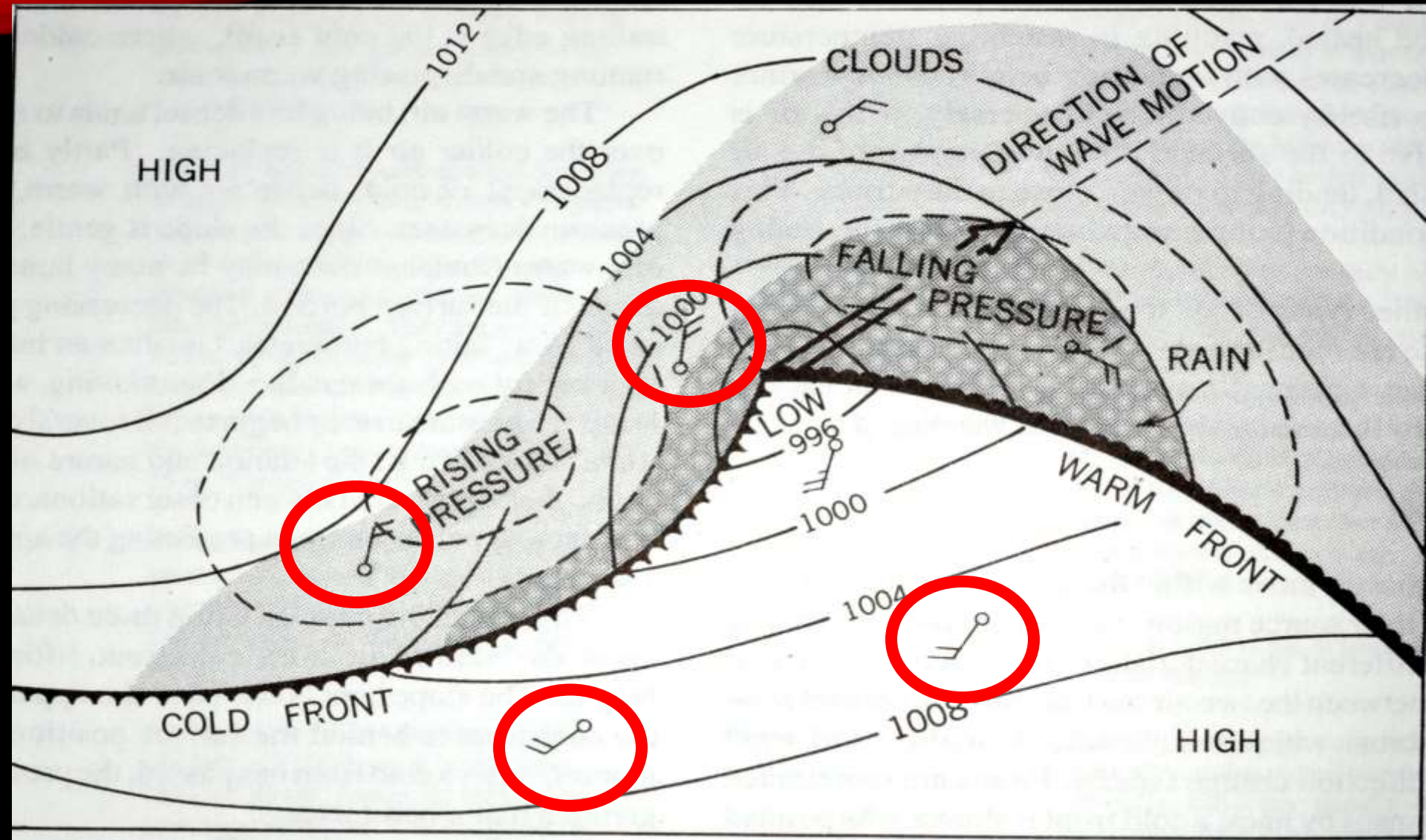
Wind Gust Air Pressure

COLD FRONTS



AIR MASS BOUNDARIES





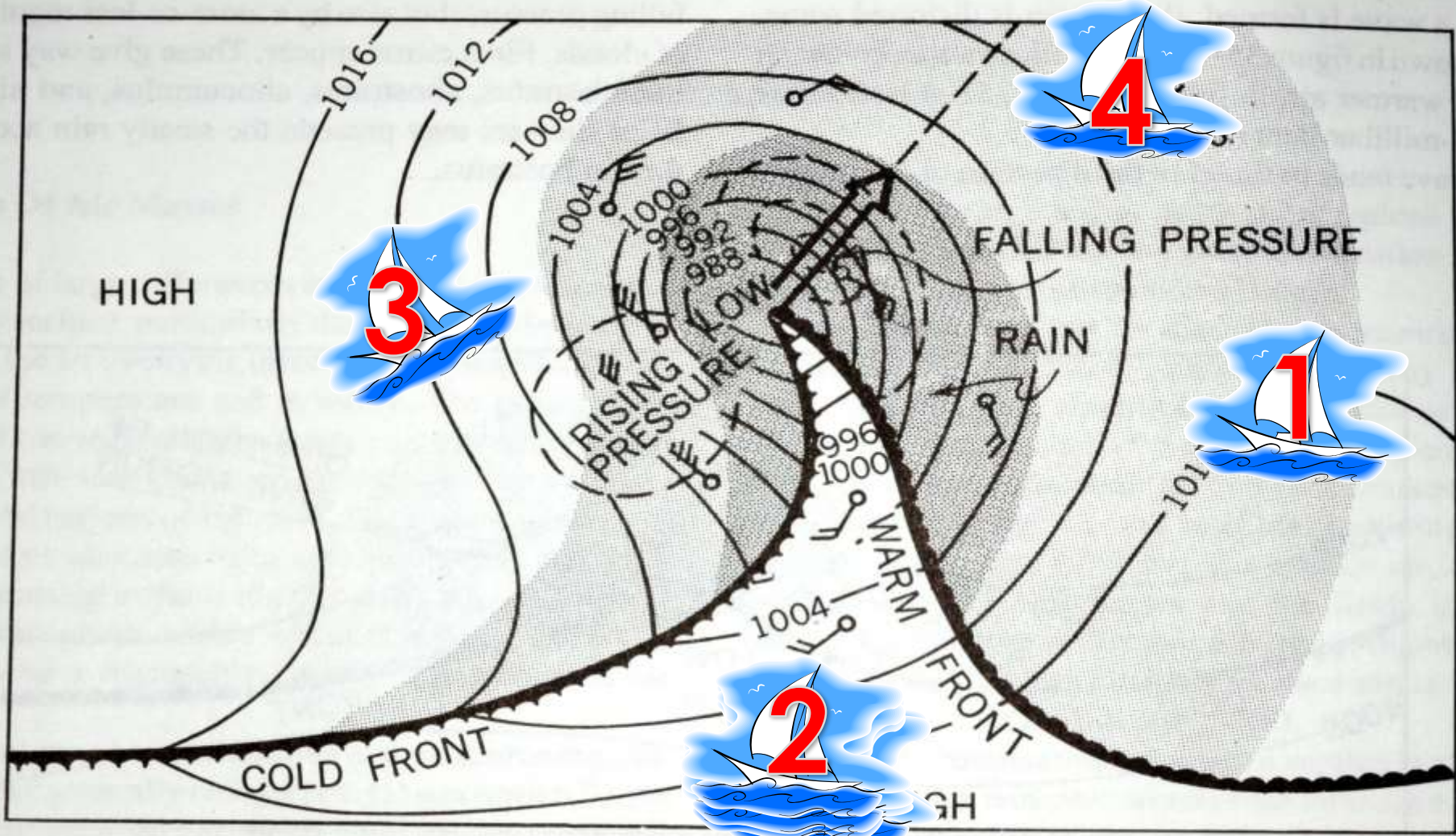
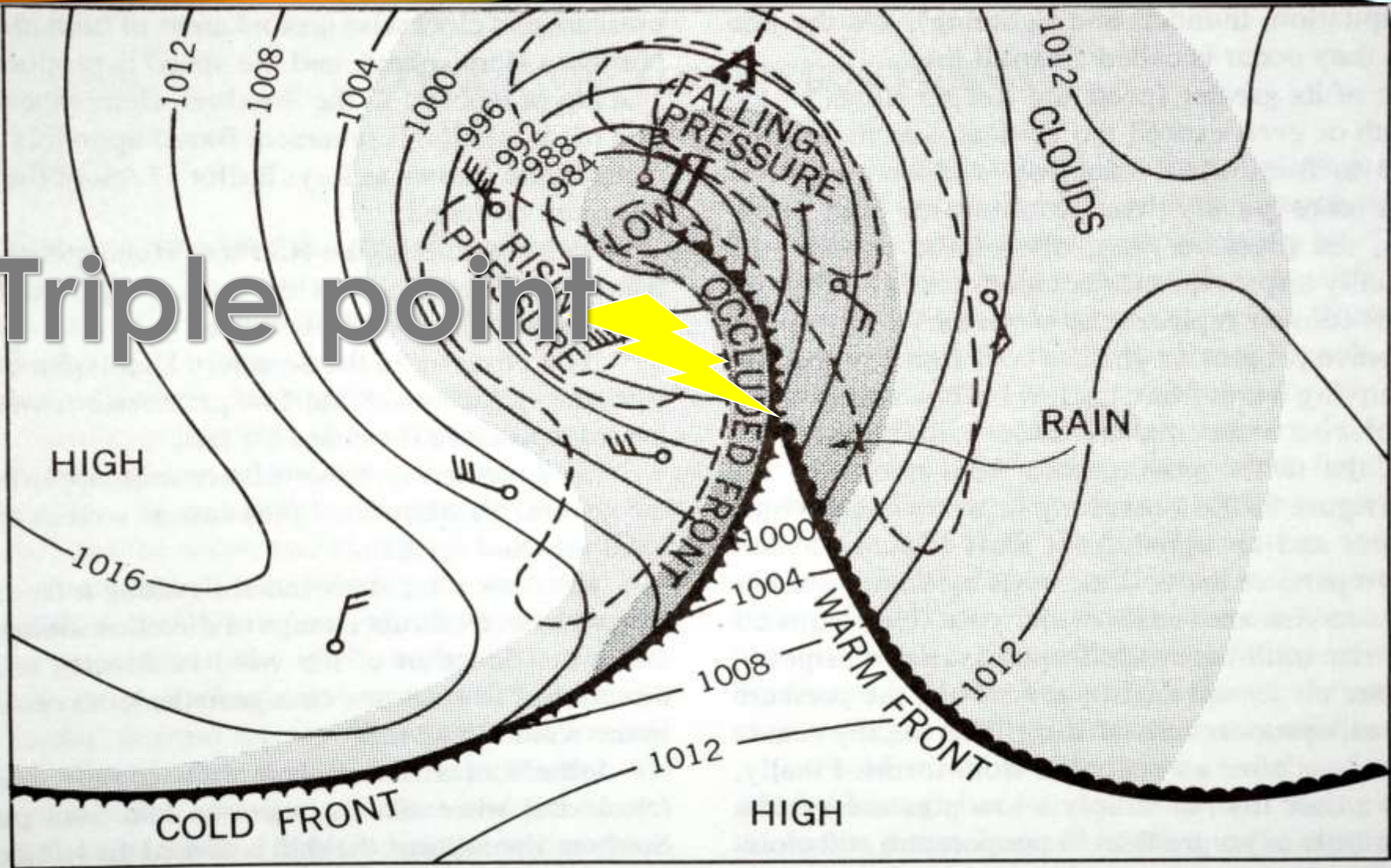
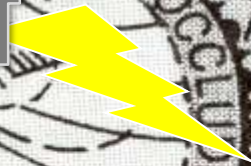


Figure 3510c. A frontal wave nearing occlusion (top view).

Triple point

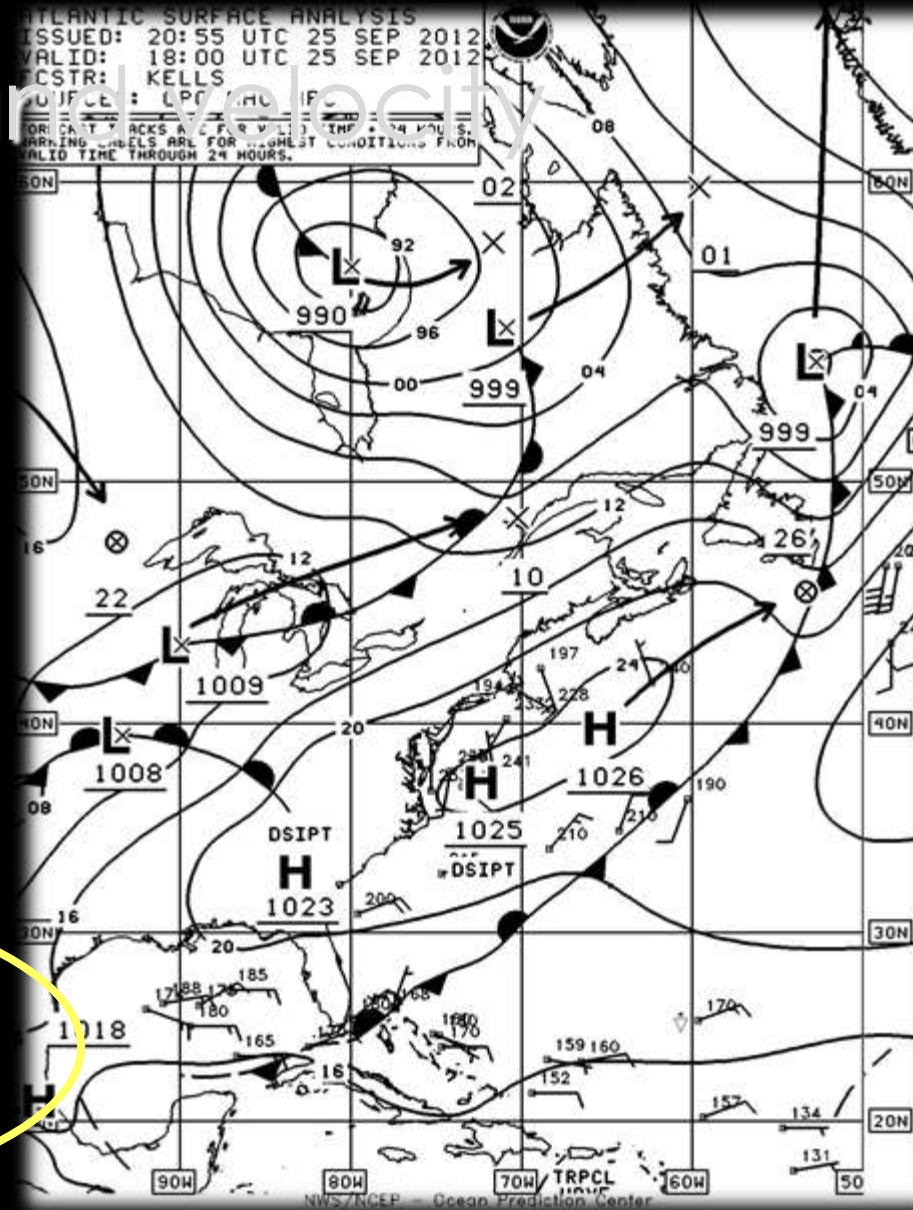


Beware of tightening Isobars = rapidly falling barometer

Wind direction and velocity

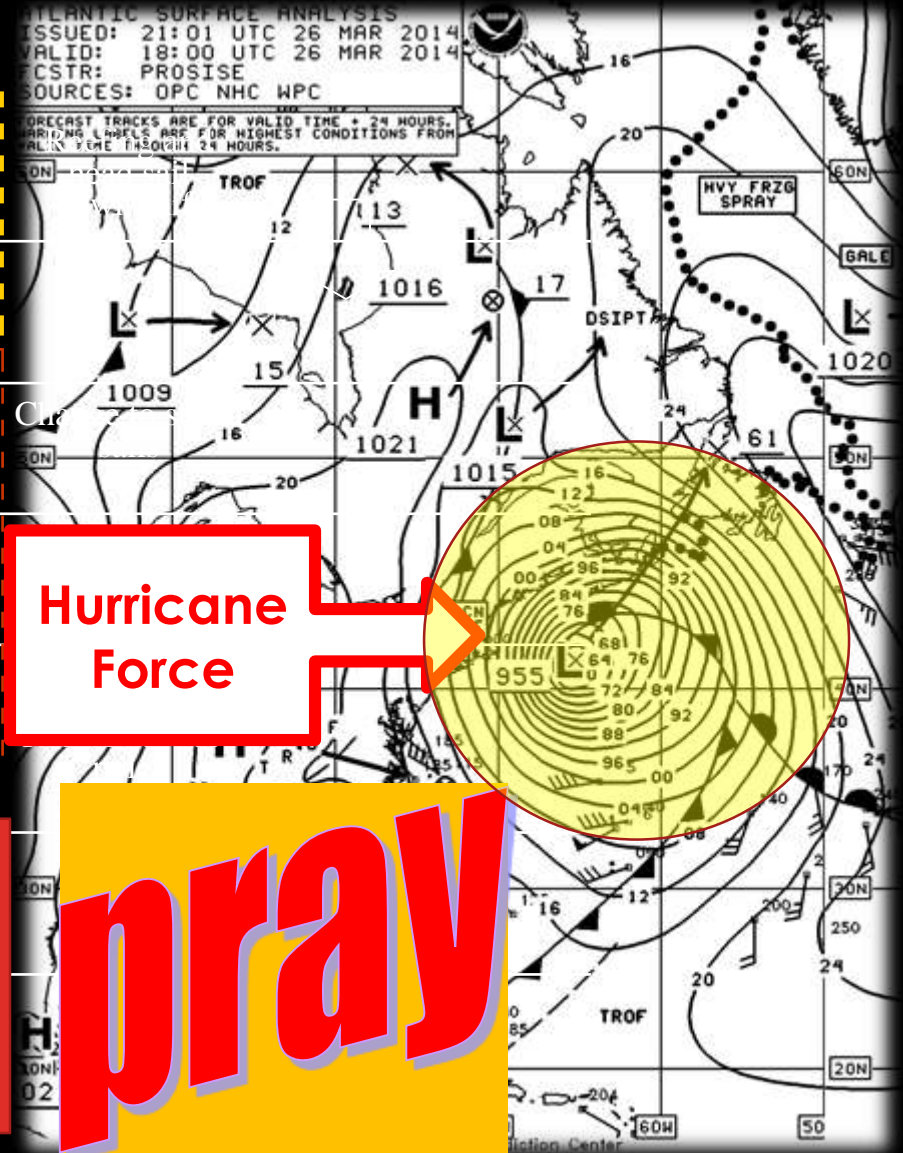
BEAUFORT SCALE

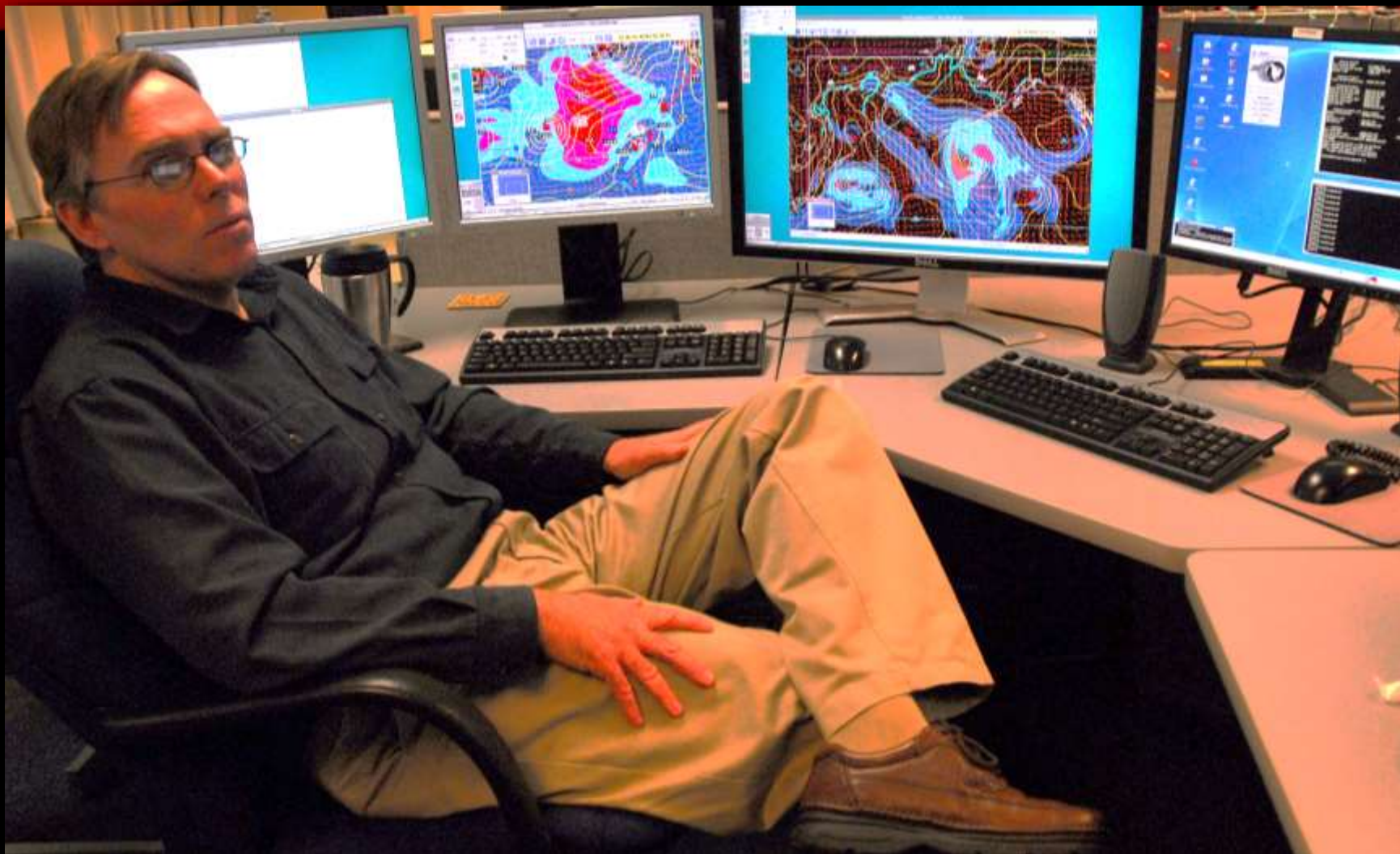
BEAUFORT #	NAME	WIND SPEED (MPH)
0	calm	<1
1	light air	1-3
2	light breeze	4-7
3	gentle breeze	8-12
4	moderate breeze	13-18
5	fresh breeze	19-24



Unfriendly side of the Beaufort Scale

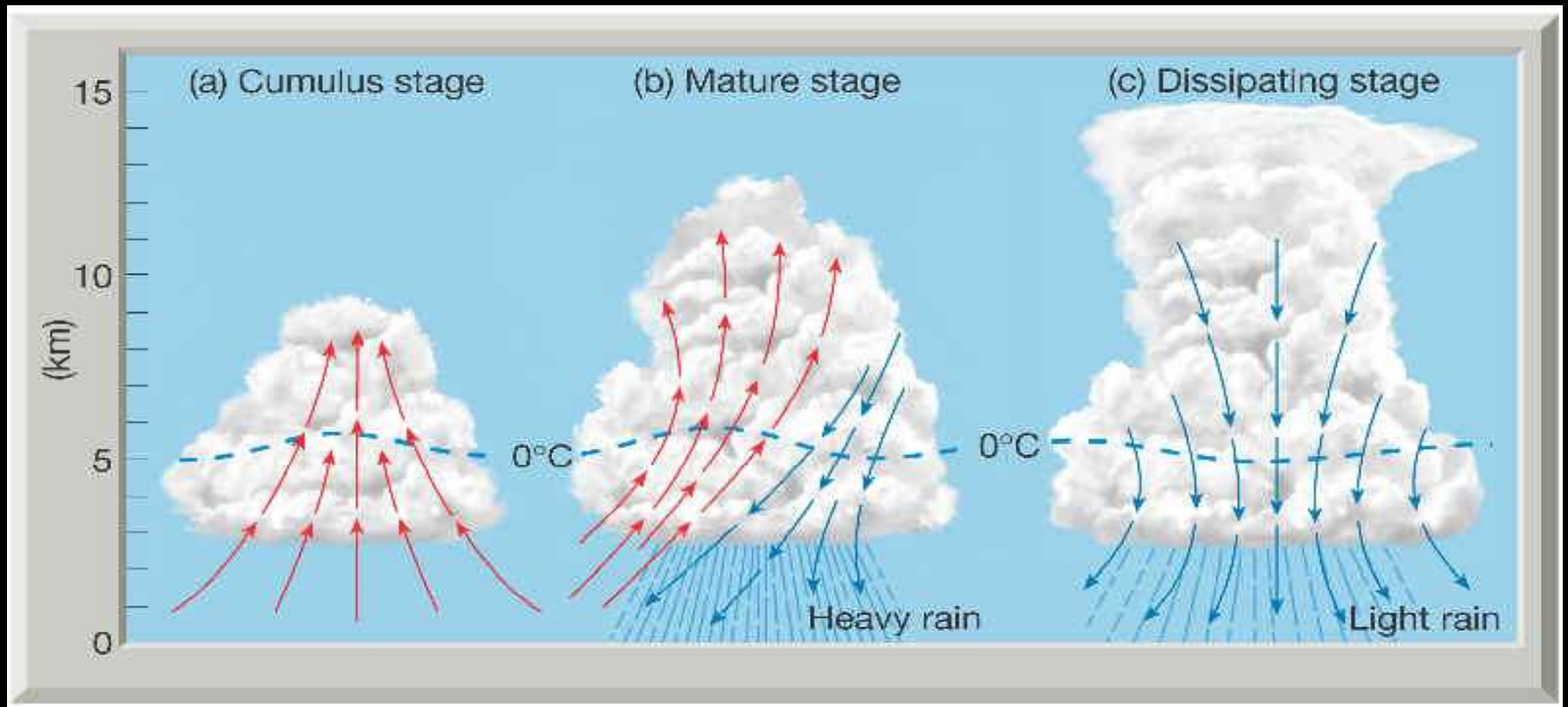
6	strong breeze	25-31
7	moderate gale <i>or near gale</i>	32-38
8	fresh gale <i>or gale</i>	39-46
9	strong gale	47-54
10	whole gale <i>or storm</i>	55-63
11	storm <i>or violent storm</i>	64-72
12	hurricane*	>72



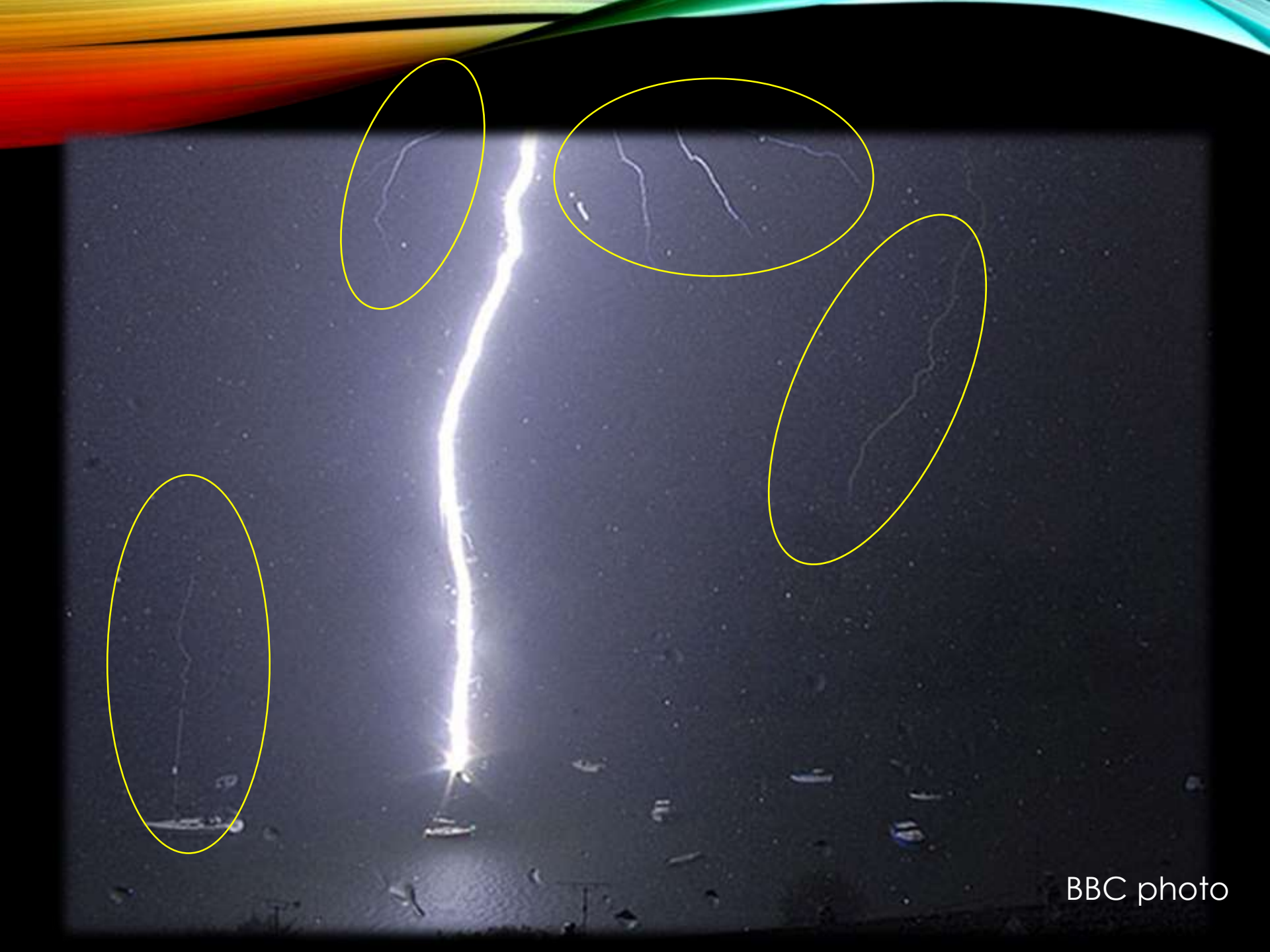




Thunderstorms



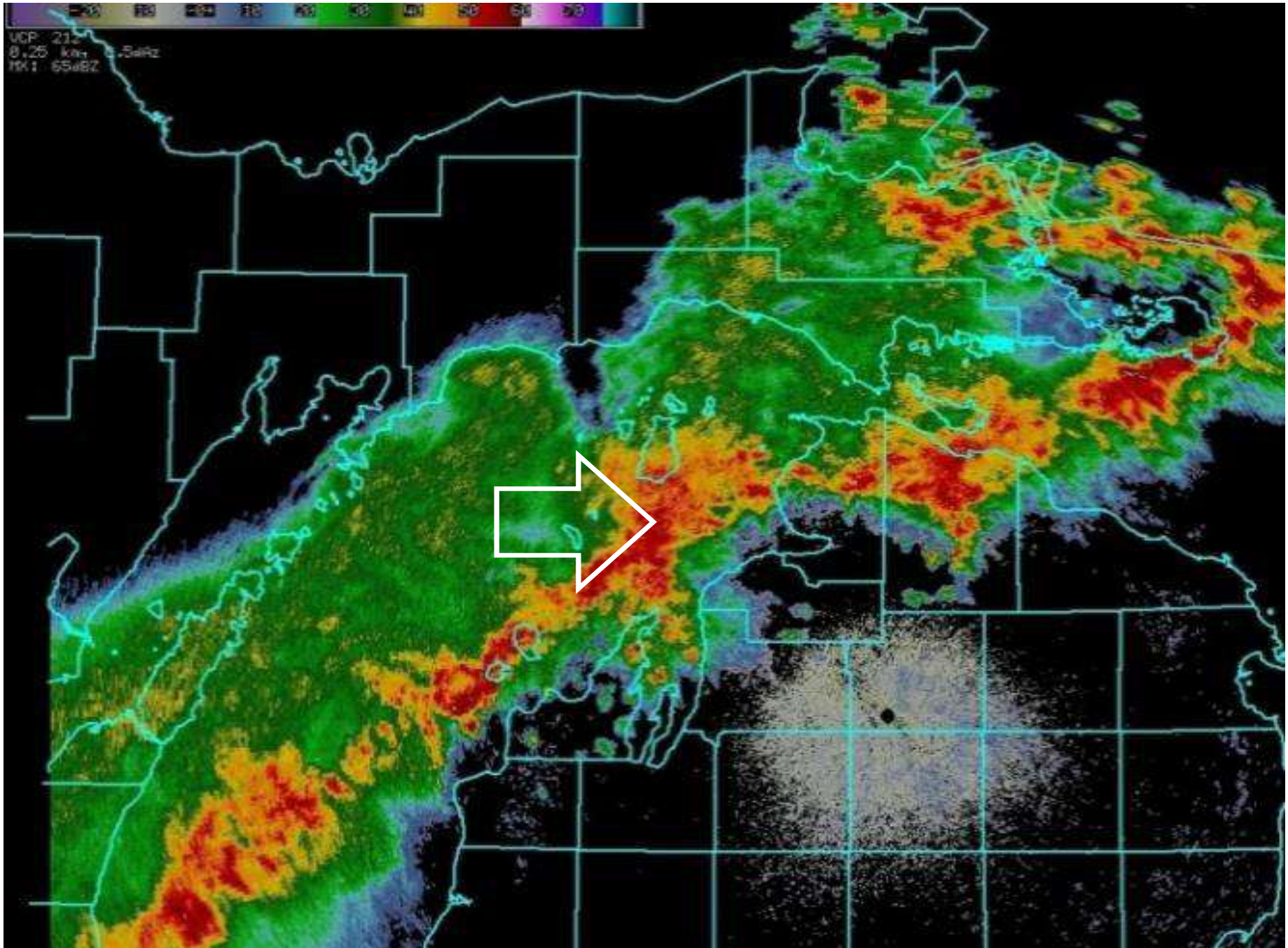




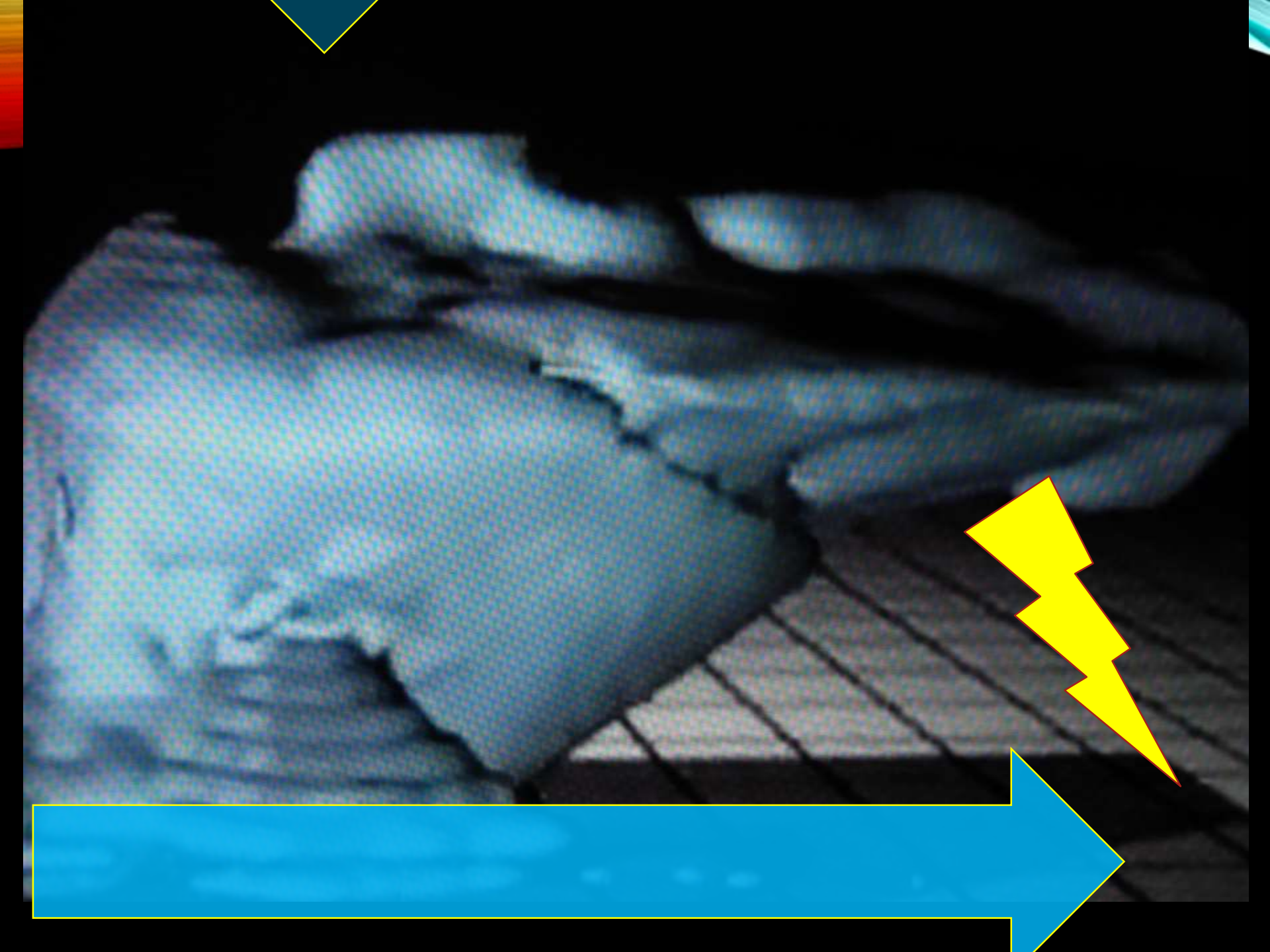
BBC photo

08:40 AM EDT Thu Jun 13

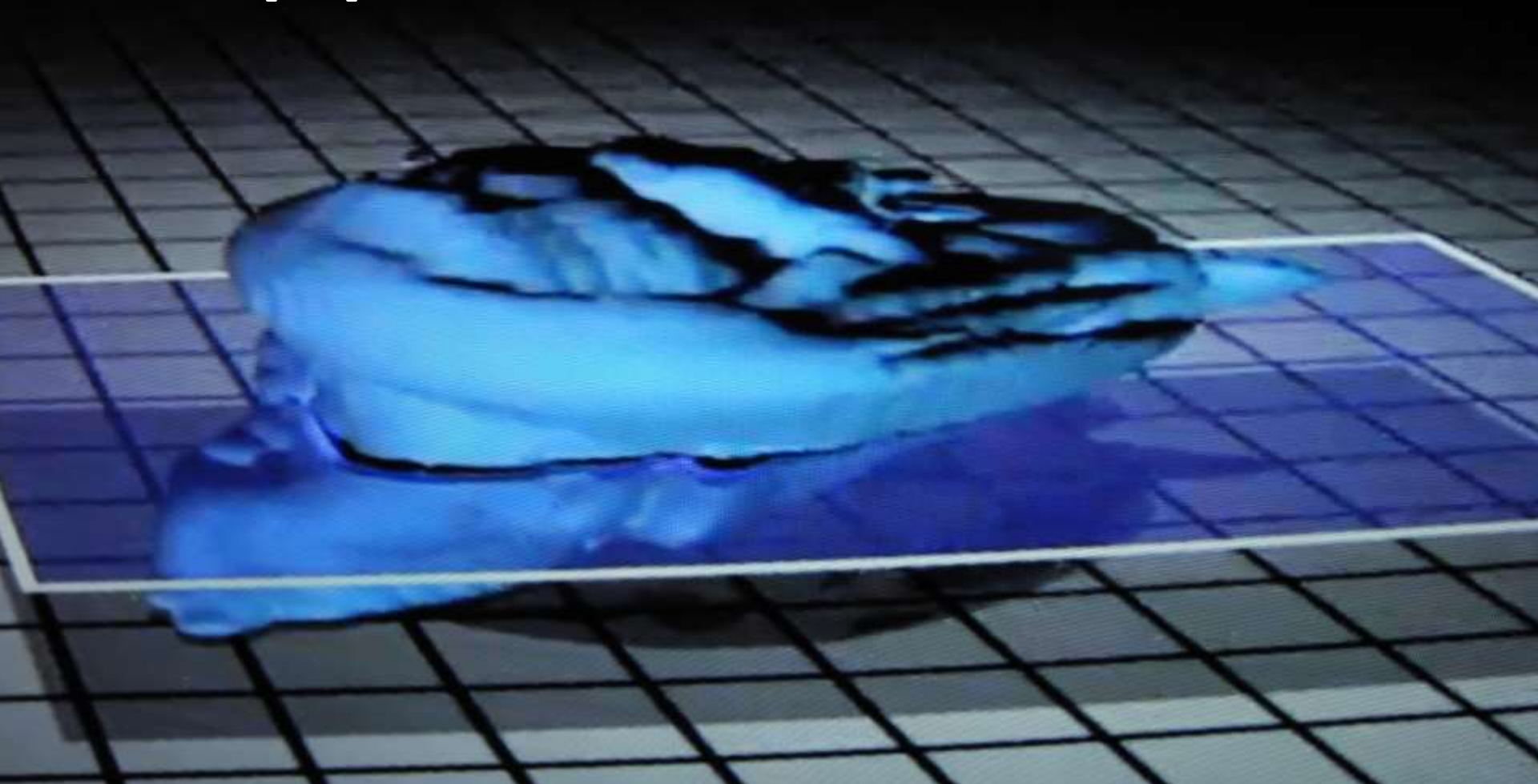








Doppler Radar Transect





Gust front



TROPICAL WEATHER SYSTEMS

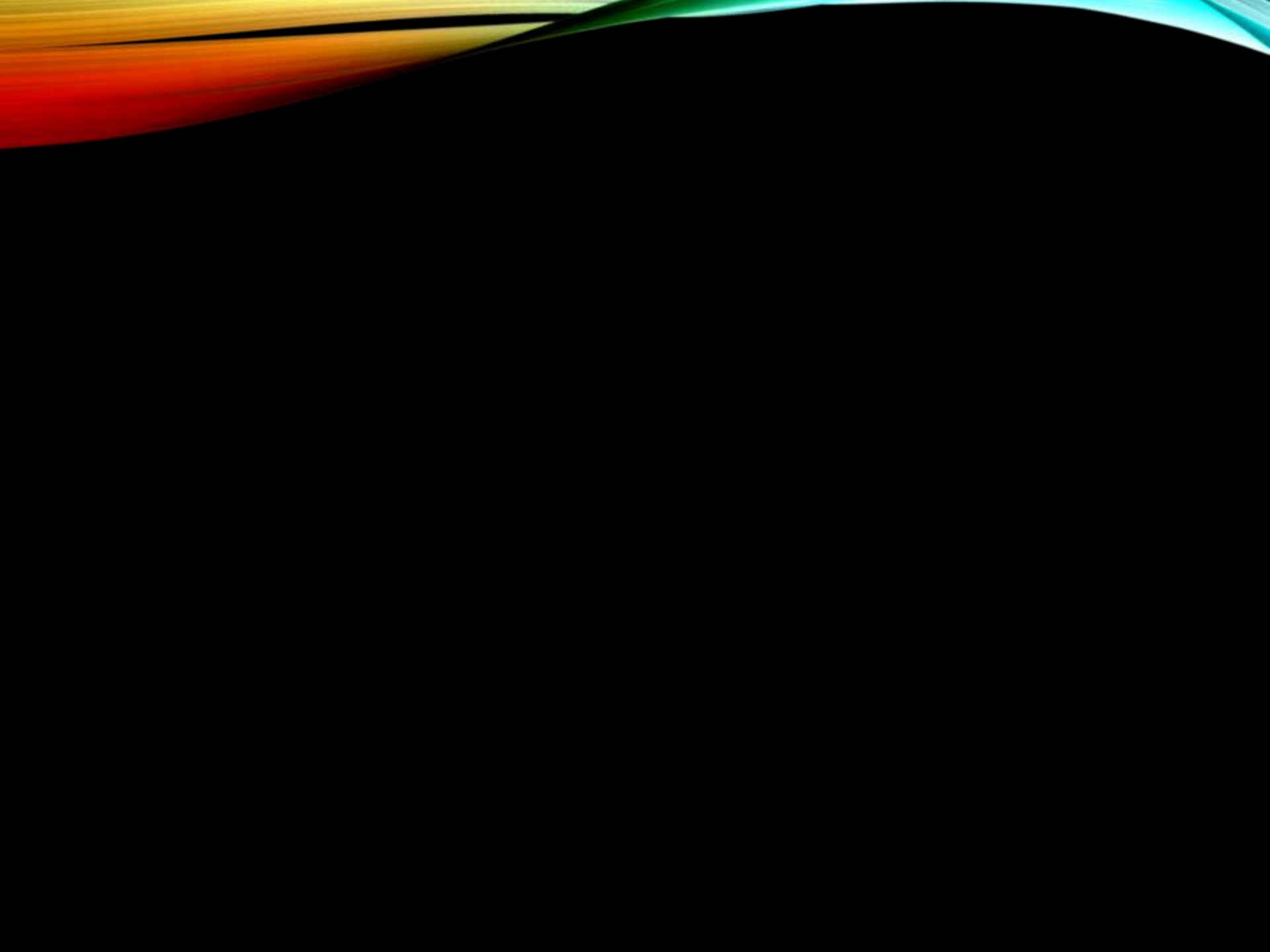
Tropical Depression: winds of 38 mph (33 knots) or less.

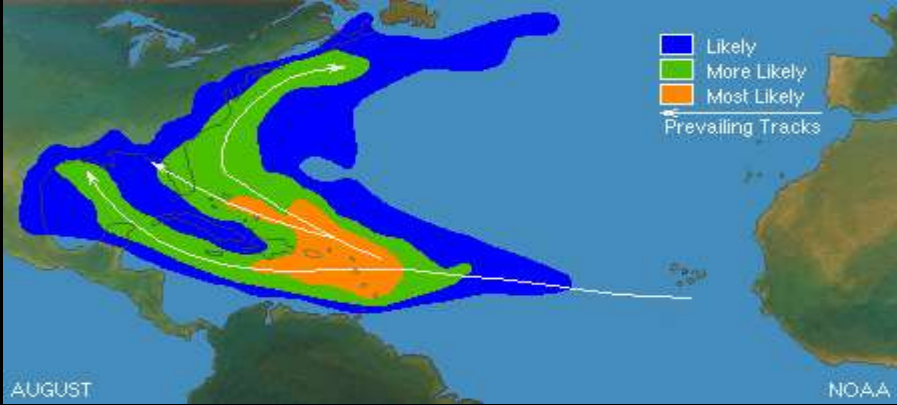
Tropical Storm: winds of 39 to 73 mph (34 to 63 knots).

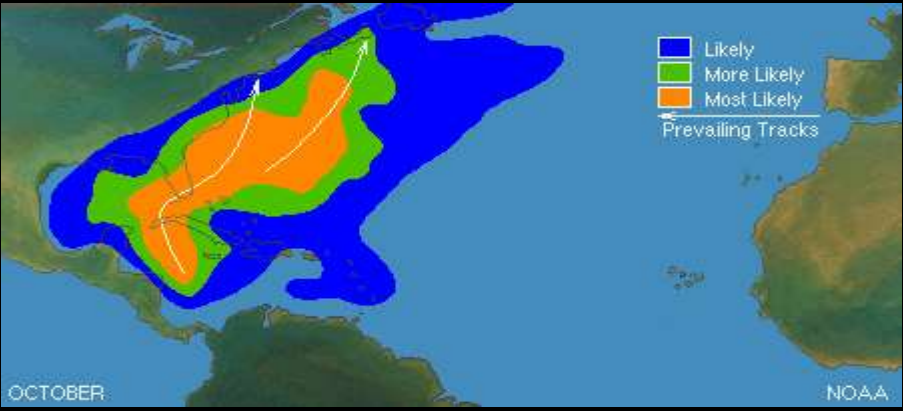
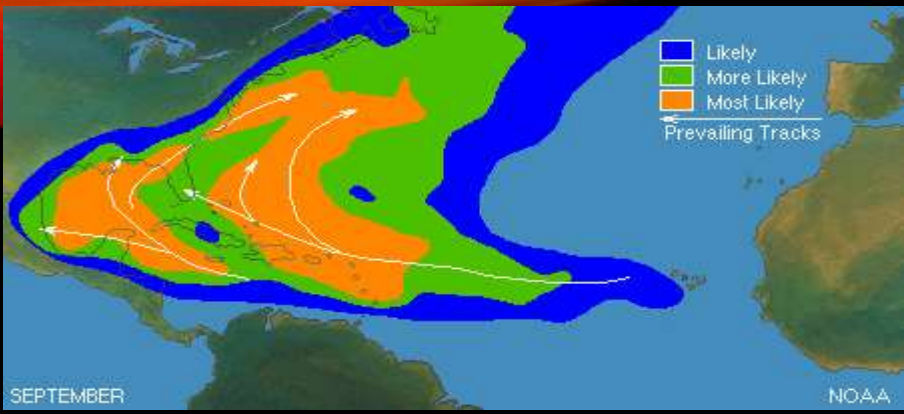
Hurricane: winds of 74 mph (64 knots) or higher.

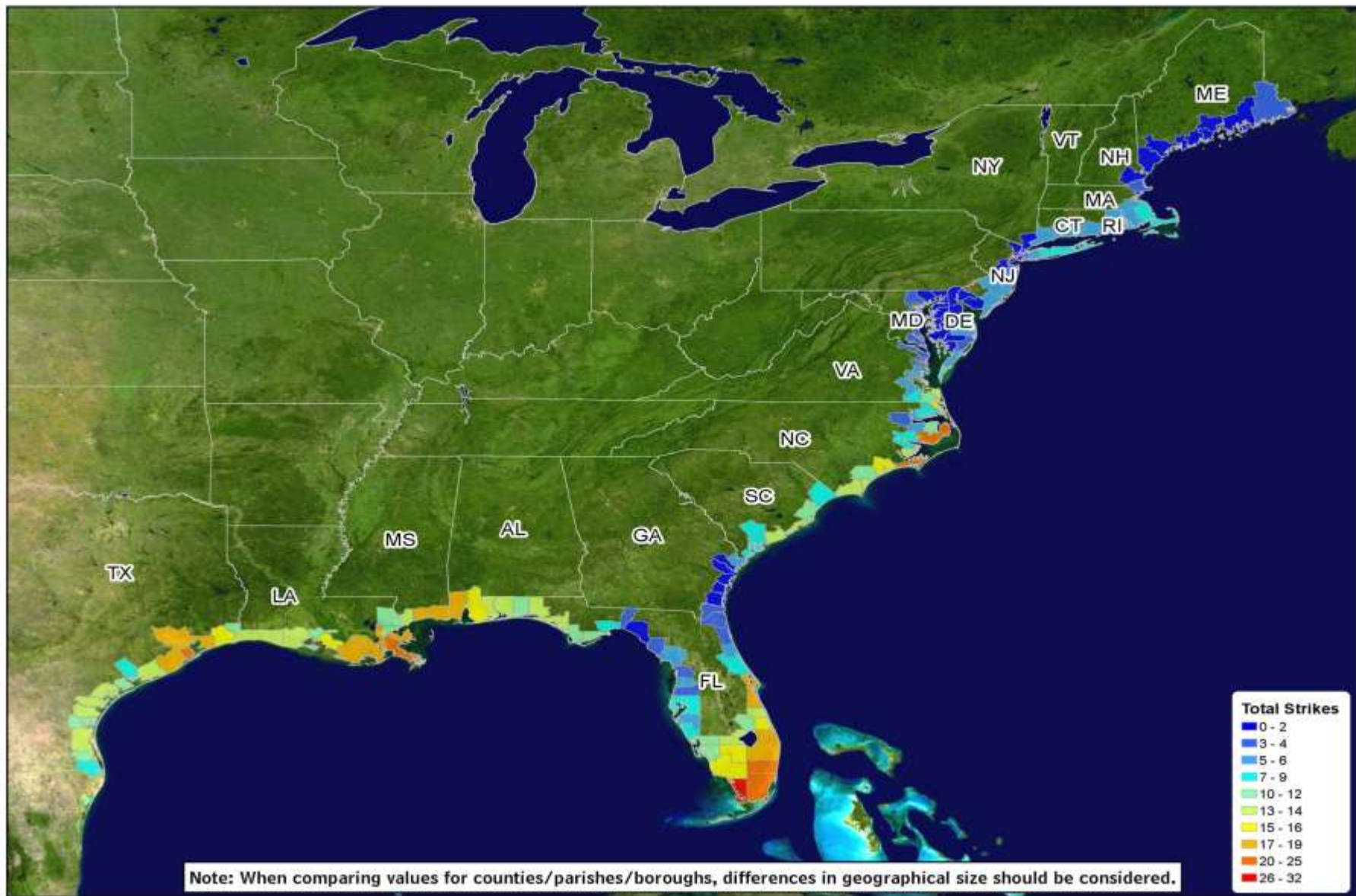
Major Hurricane: winds of 111 mph (96 knots) or higher
Category 3, 4 or 5 on the Saffir-Simpson Scale.

In the western North Pacific, hurricanes are called typhoons; similar storms in the Indian Ocean and South Pacific Ocean are called cyclones.







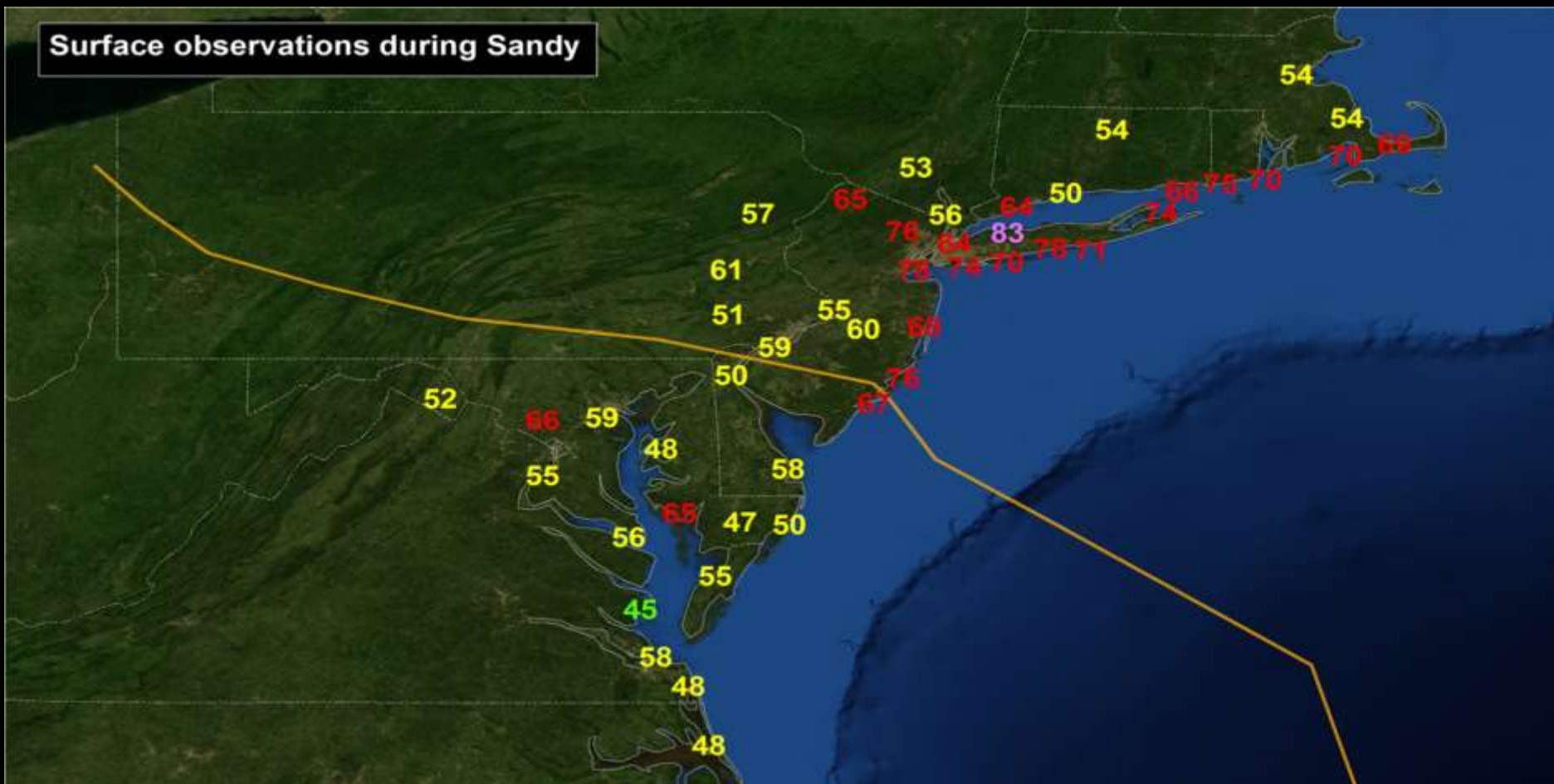


Total number of hurricane strikes by counties/parishes/boroughs, 1900-2010

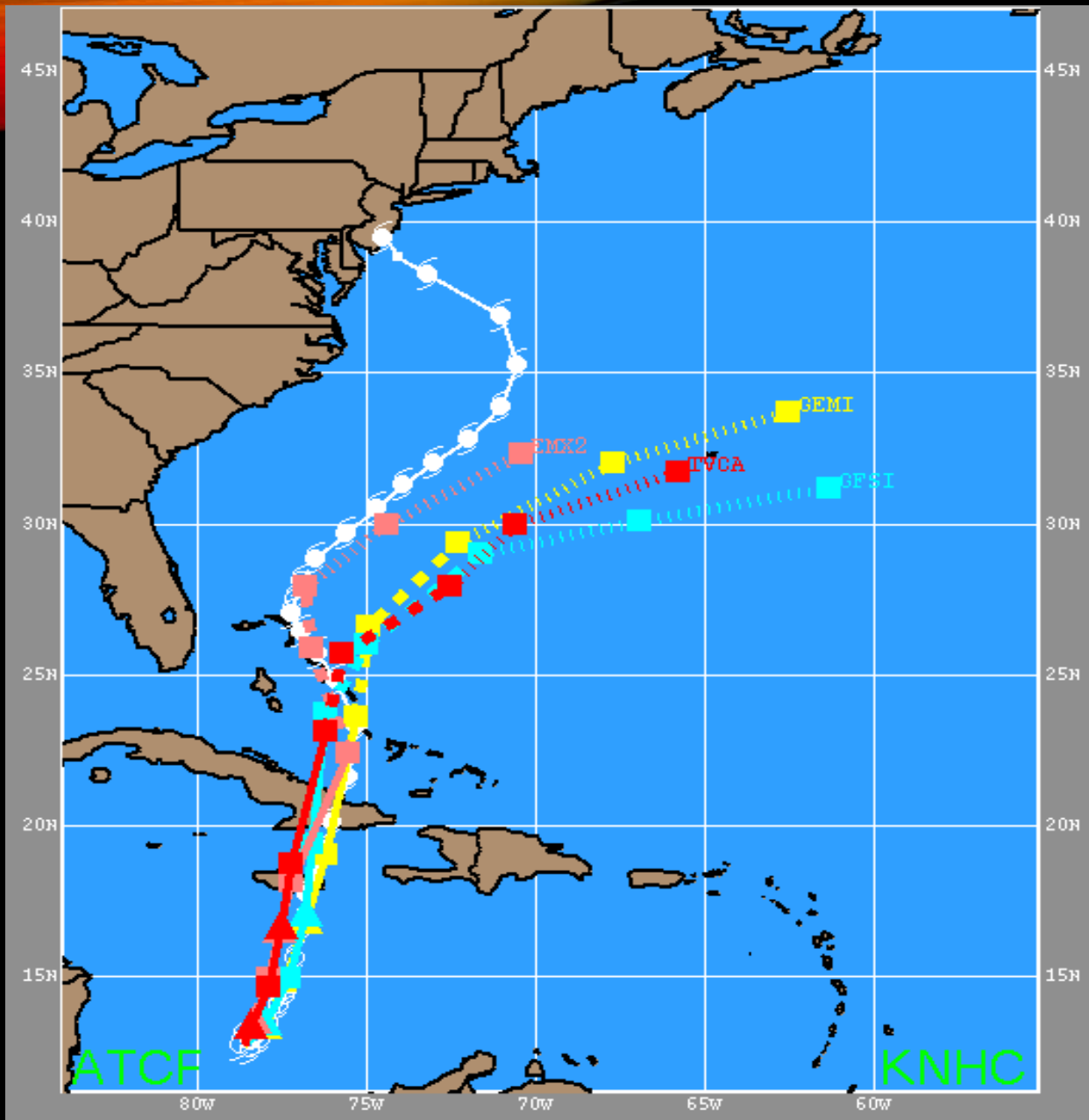
Data from NWS NHC 46: Hurricane Experience Levels of Coastal County Populations from Texas to Maine. Jerry D. Jarrell, Paul J. Hebert, and Max Mayfield. August, 1992, with updates.

Hurricane Sandy

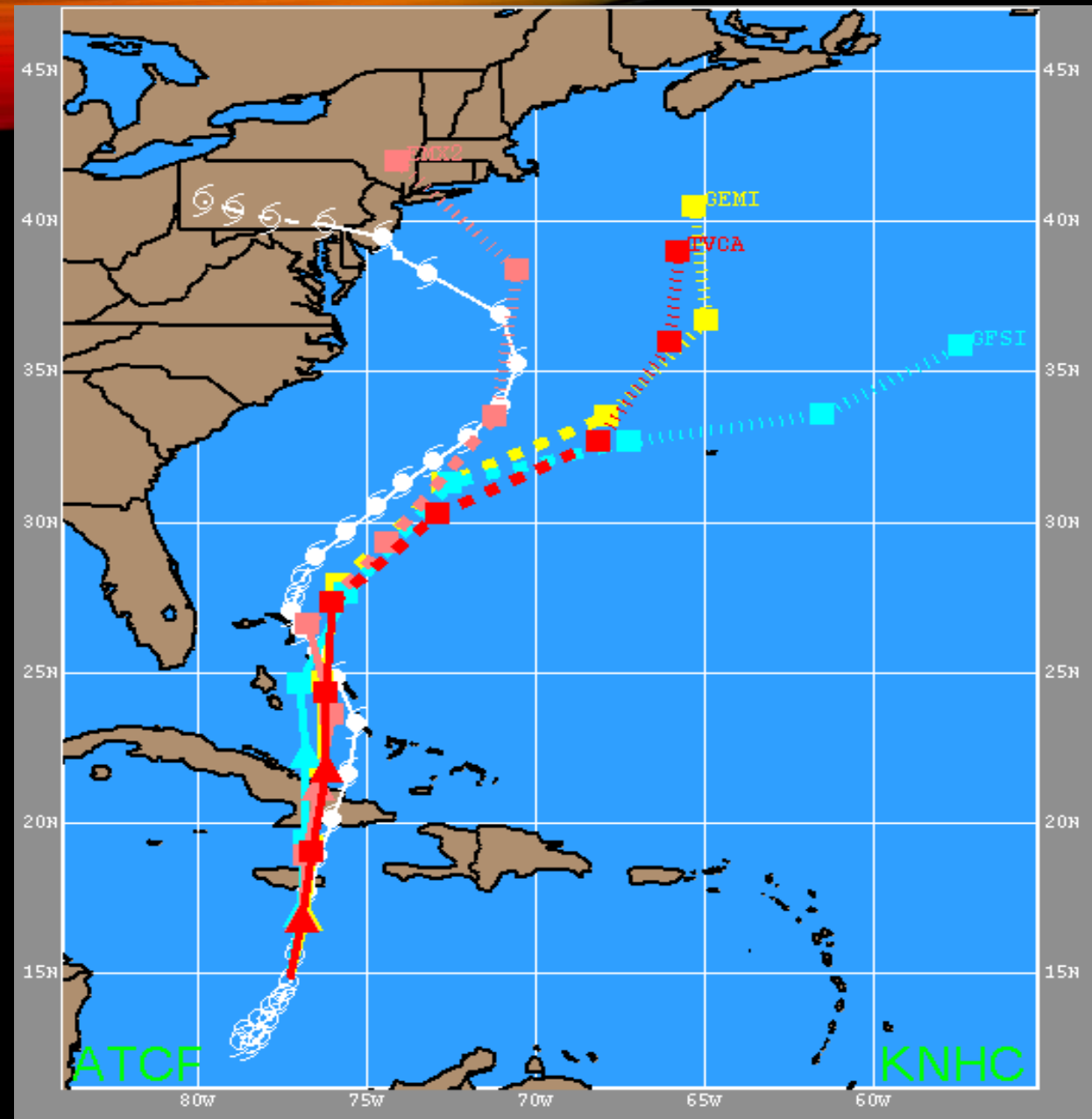
Surface observations during Sandy

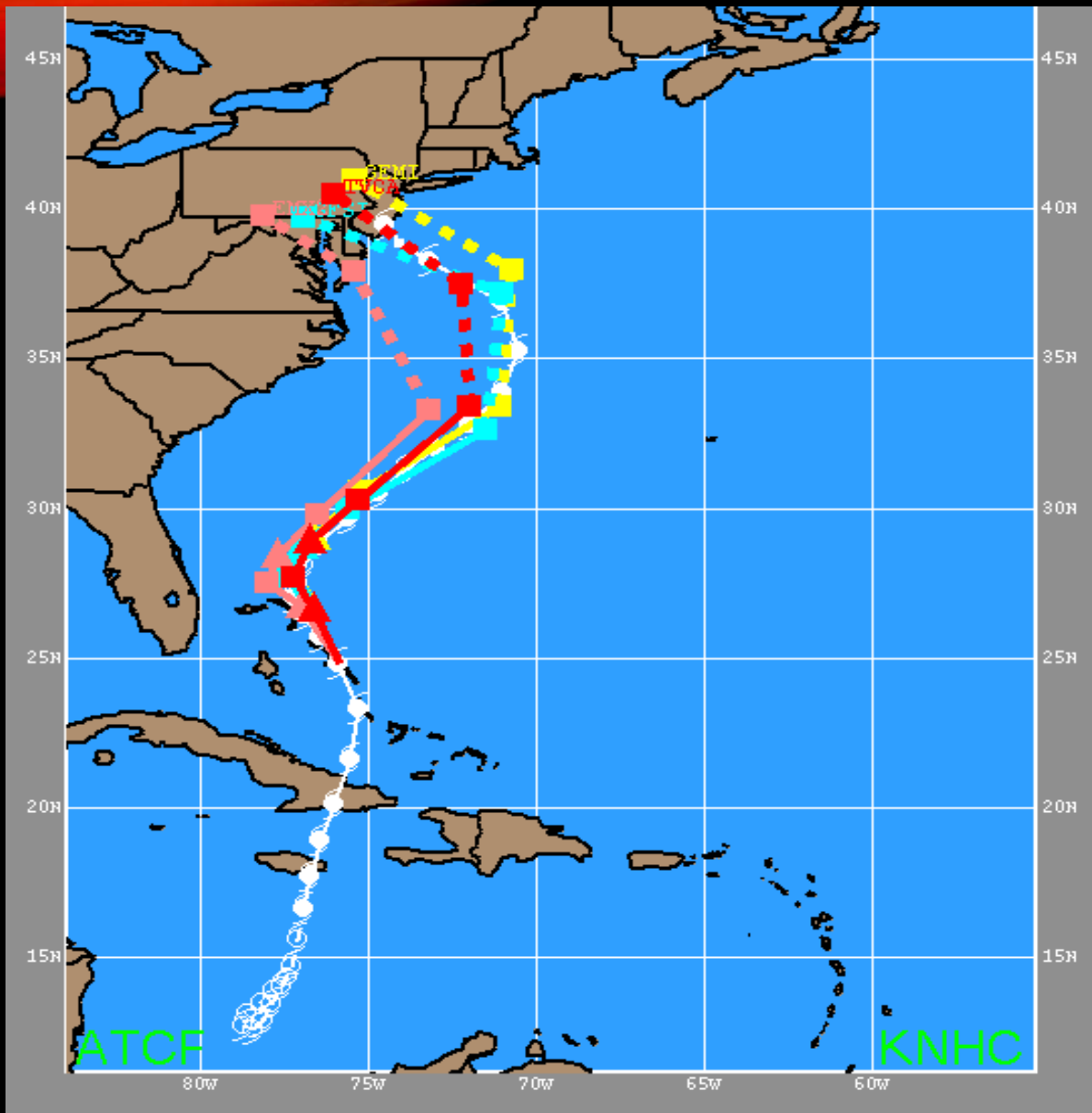


7 days
out

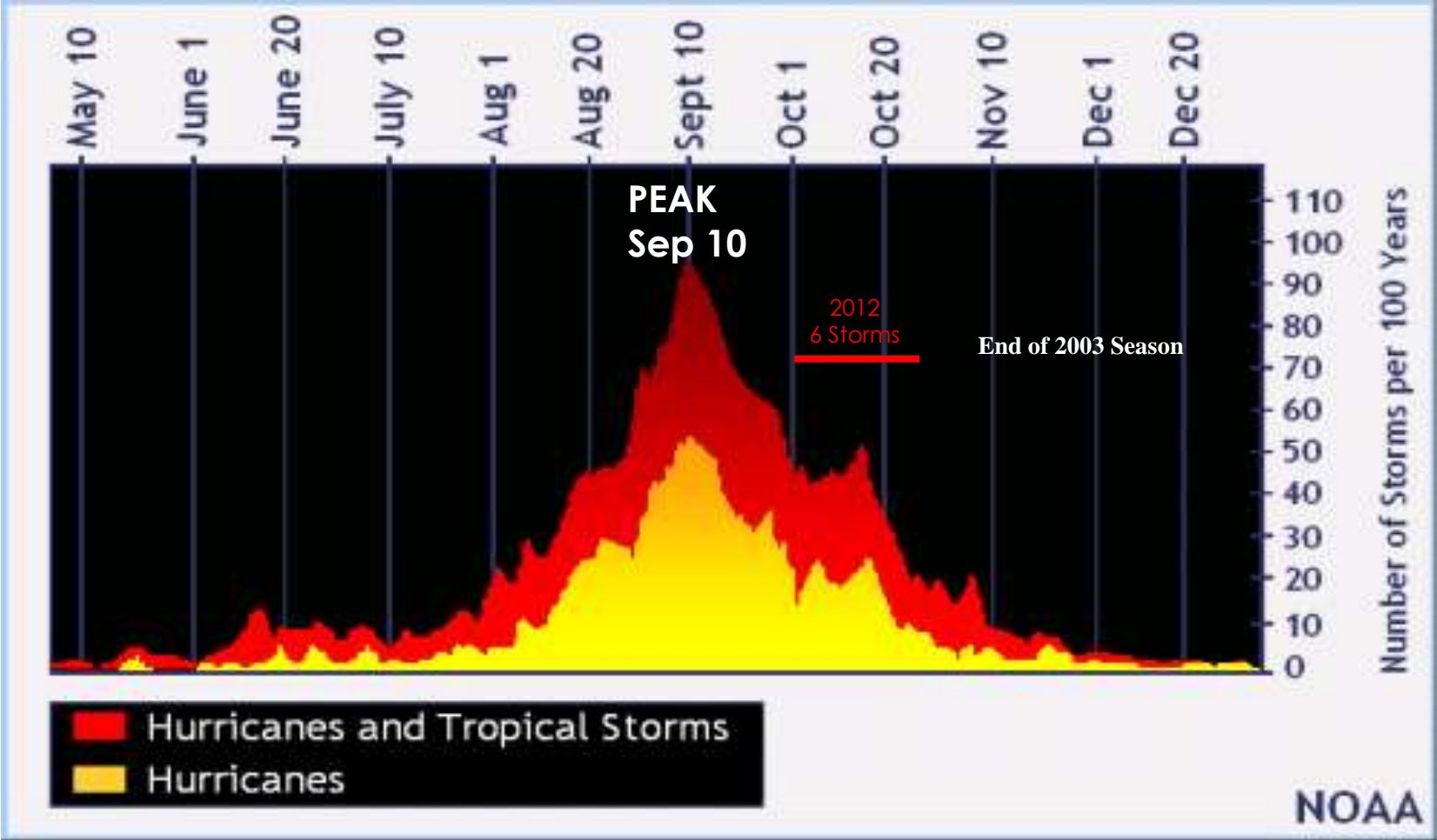


6 days
out





4 days
out



<http://www.nhc.noaa.gov/climo/>



Two-Day Graphical Tropical Weather Outlook

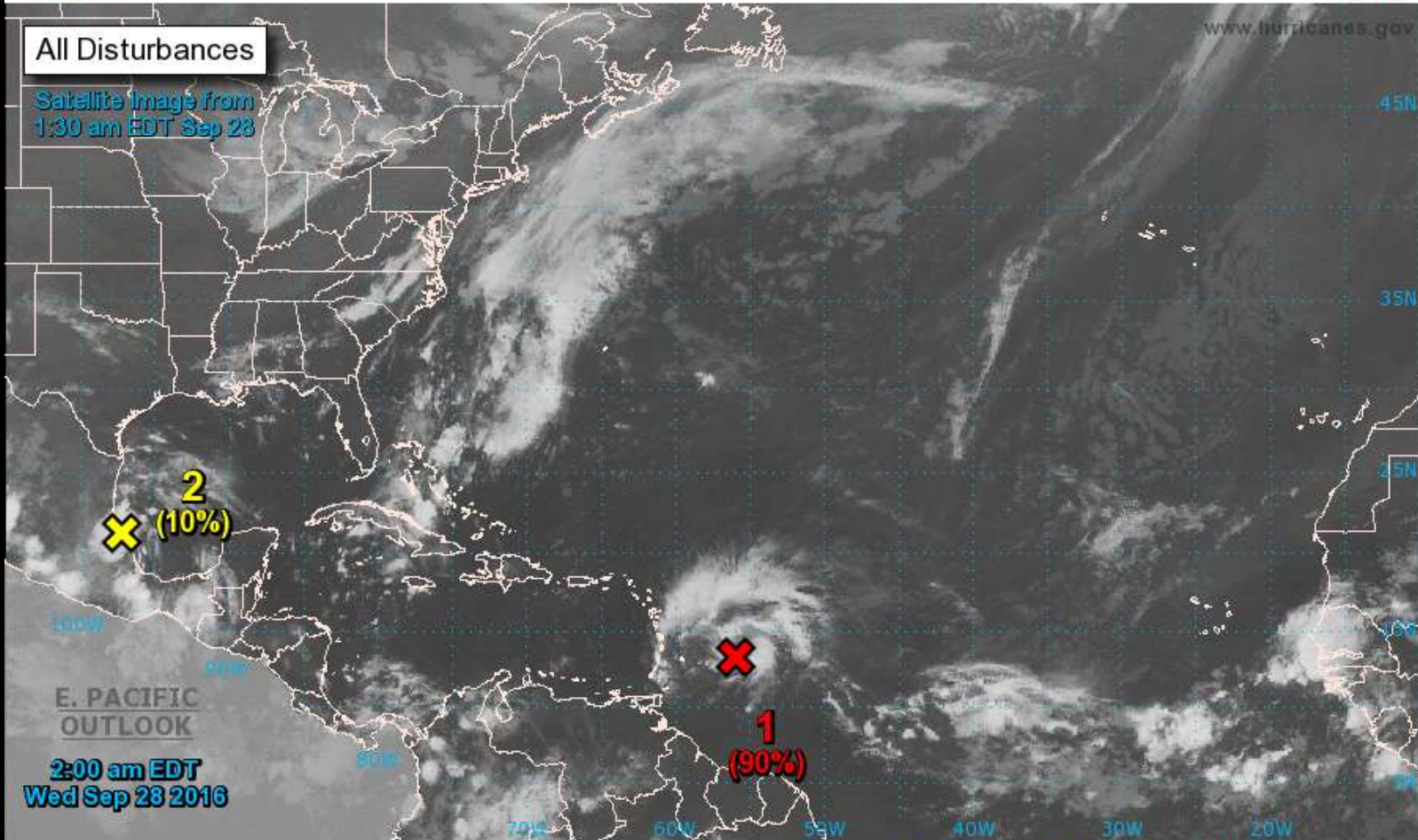
National Hurricane Center Miami, Florida



www.hurricanes.gov

All Disturbances

Satellite Image from
1:30 am EDT Sep 28



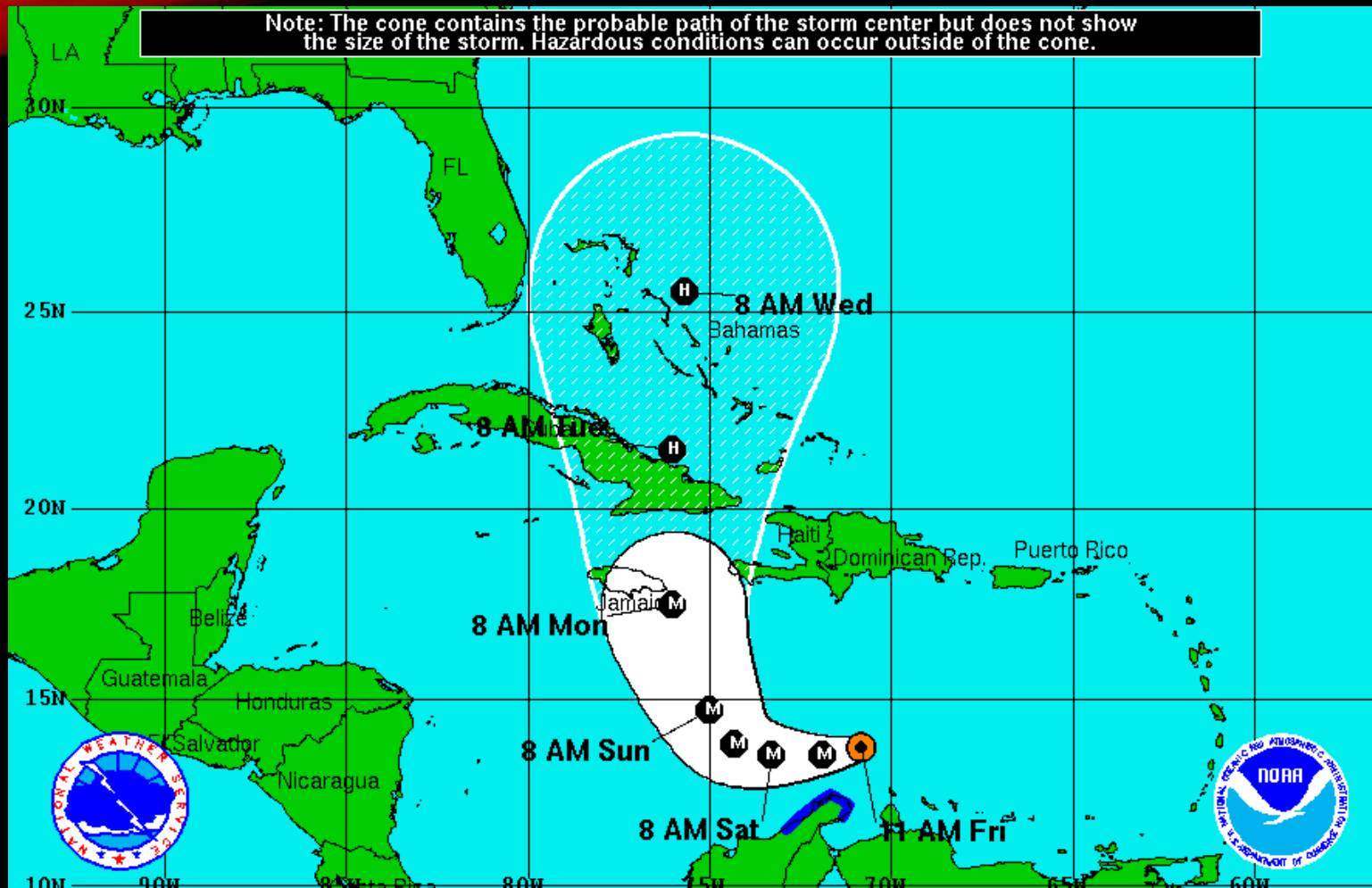
2:00 am EDT
Wed Sep 28 2016

Current Disturbances and Two-Day Cyclone Formation Chance: < 40% 40-60% > 60%

Tropical or Sub-Tropical Cyclone: Depression Storm Hurricane

Post-Tropical Cyclone Remnants

Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.



Hurricane Matthew

Friday September 30, 2016
 11 AM EDT Advisory 10
 NWS National Hurricane Center

Current Information: ●

Center Location 13.7 N 70.8 W
 Max Sustained Wind 115 mph
 Movement WSW at 12 mph

Forecast Positions:

● Tropical Cyclone ○ Post-Tropical
 Sustained Winds: D < 39 mph
 S 39-73 mph H 74-110 mph M > 110mph

Potential Track Area:

▭ Day 1-3 ▭ Day 4-5

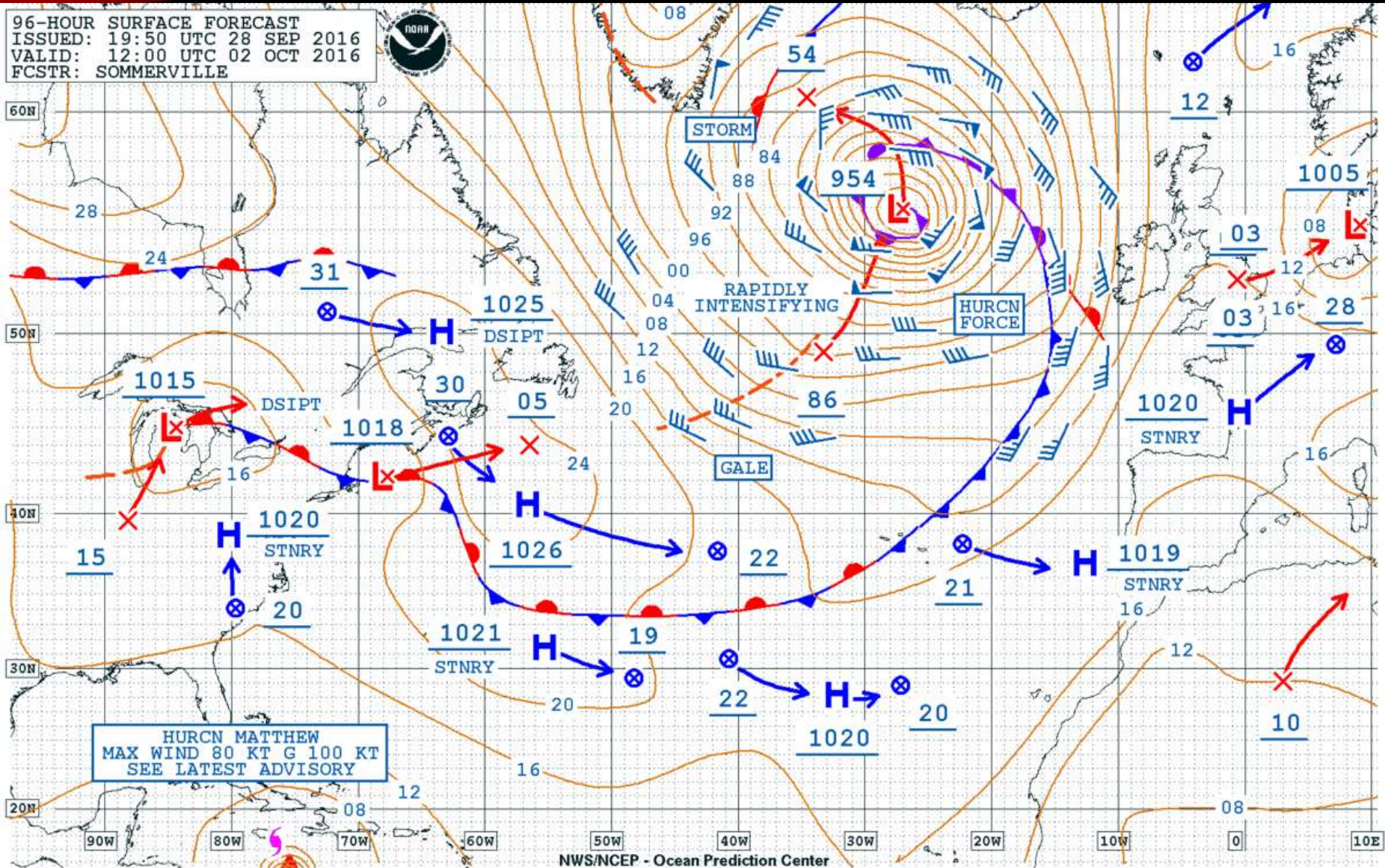
Watches:

▭ Hurricane ▭ Trop.Storm

Warnings:

▭ Hurricane ▭ Trop.Storm

96-HOUR SURFACE FORECAST
 ISSUED: 19:50 UTC 28 SEP 2016
 VALID: 12:00 UTC 02 OCT 2016
 FCSTR: SOMMERVILLE



HURCN MATTHEW
 MAX WIND 80 KT G 100 KT
 SEE LATEST ADVISORY

Hurricane Matthew

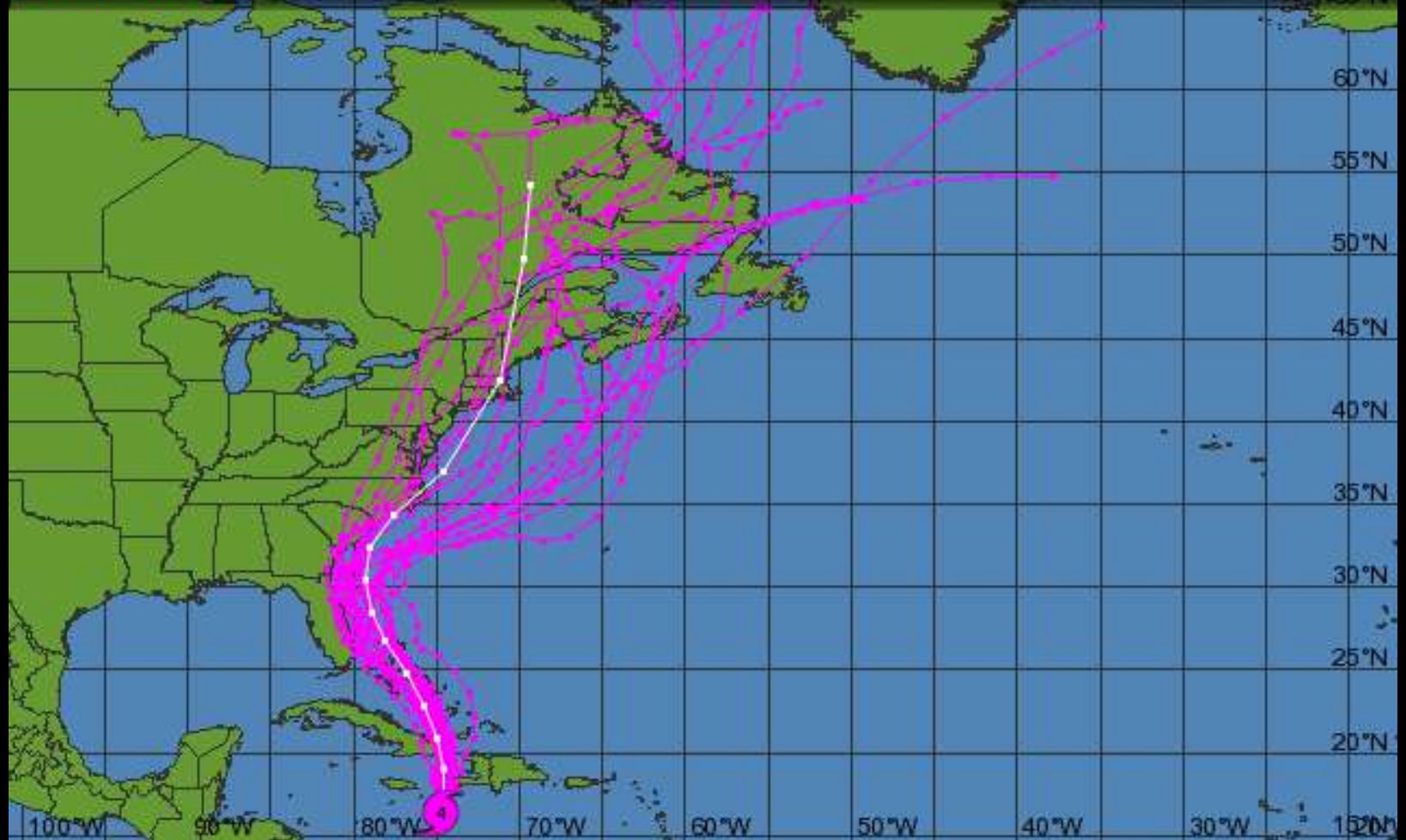
5 PM EDT Mon Oct 03 2016

Models: Points 12 hours apart

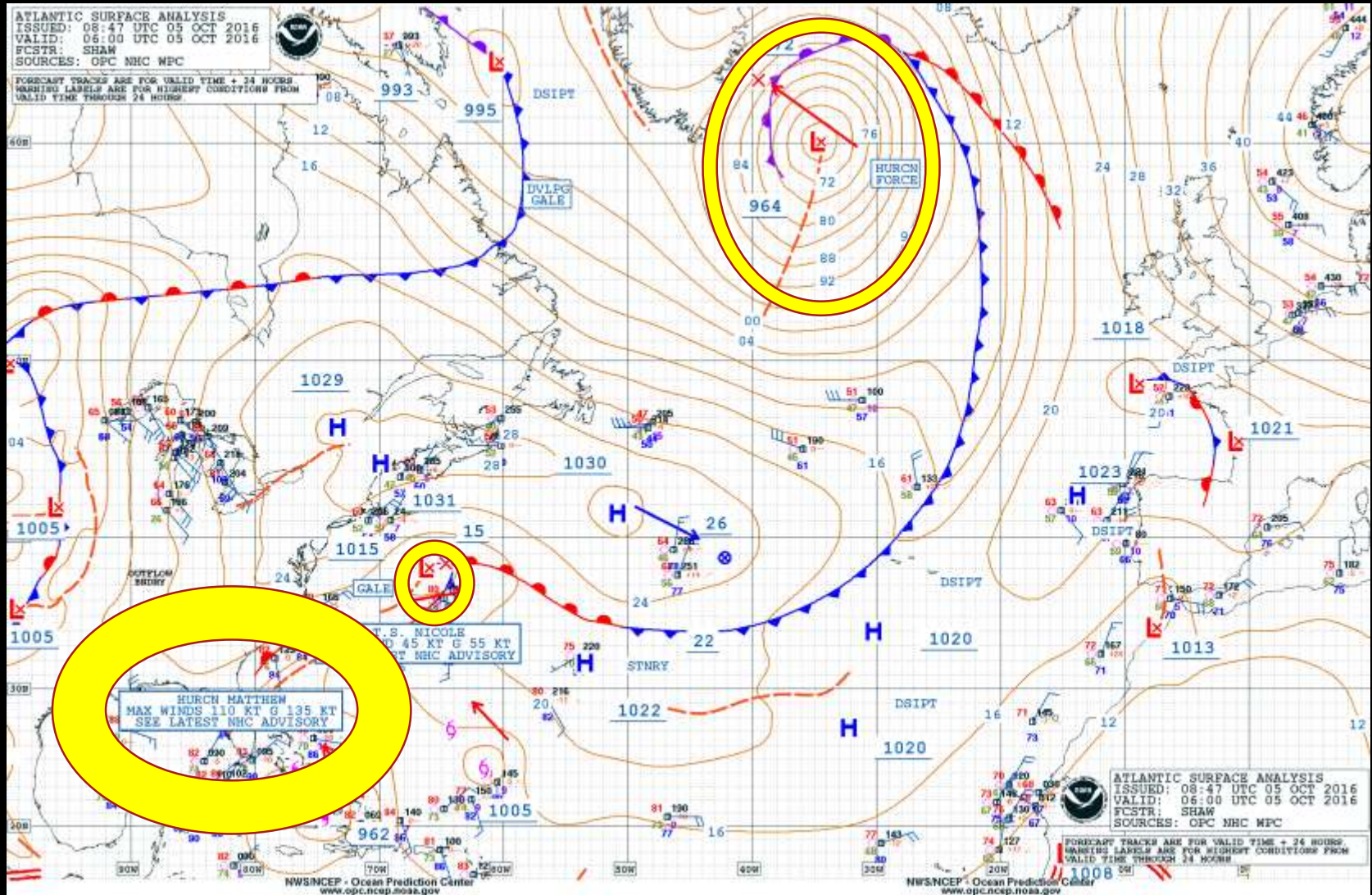
Initialized on Mon 2:00 PM EDT

GFS

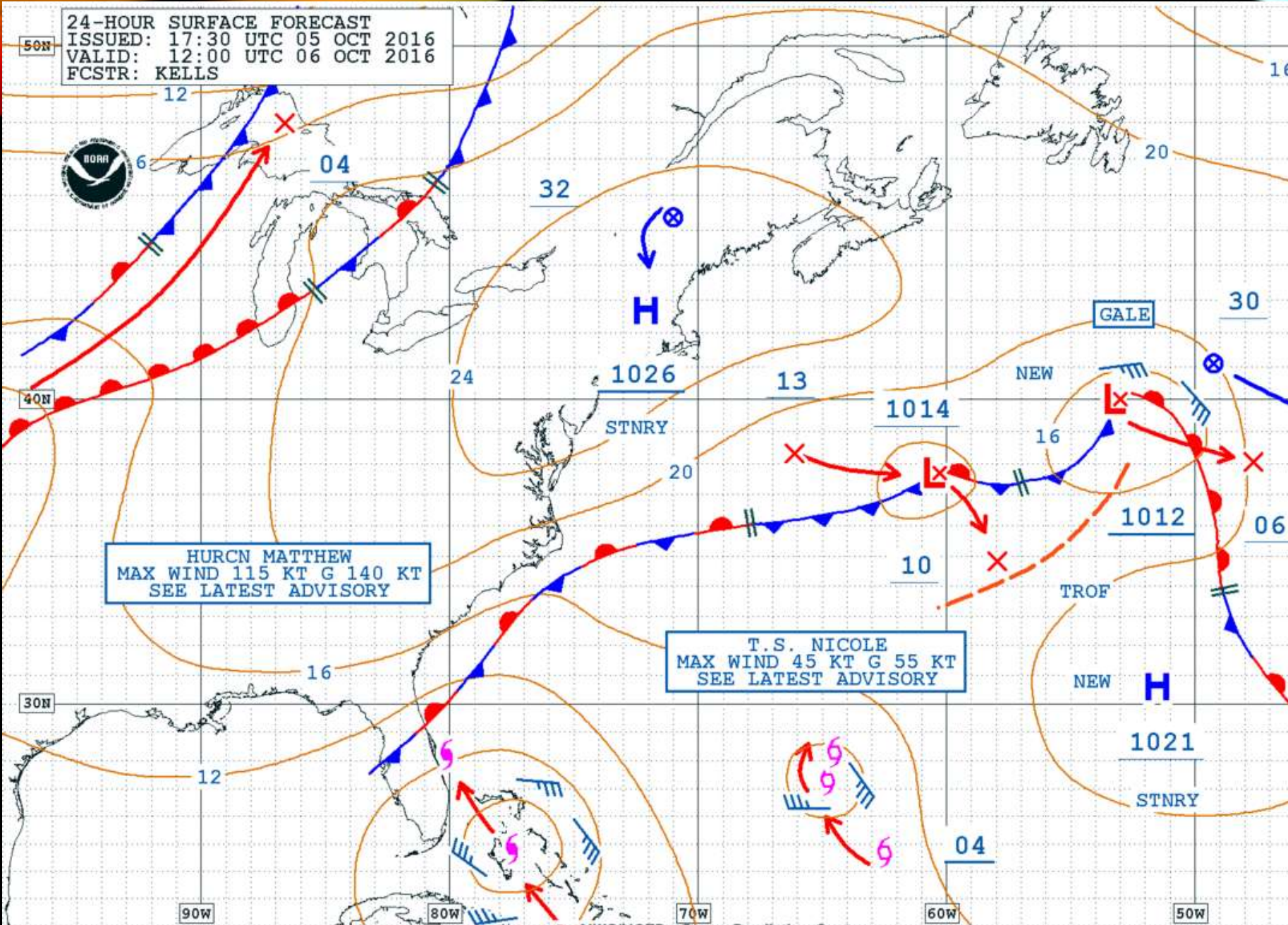
Ensemble Members



THE ROCK AND A HARD SPOT



24-HOUR SURFACE FORECAST
ISSUED: 17:30 UTC 05 OCT 2016
VALID: 12:00 UTC 06 OCT 2016
FCSTR: KELLS



HURCN MATTHEW
MAX WIND 115 KT G 140 KT
SEE LATEST ADVISORY

T.S. NICOLE
MAX WIND 45 KT G 55 KT
SEE LATEST ADVISORY

24-HOUR WIND & WAVE FORECAST (FEET)

ISSUED: 18:27 UTC 05 OCT 2016

VALID: 12:00 UTC 06 OCT 2016

FCSTR: KELLS

FORECAST GULFSTREAM POSITIONS

NORTH WALL = THICK GREEN LINE
SOUTH WALL = THIN GREEN LINE

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



50N

40N

30N

HURCN MATTHEW
MAX WIND 115 KT G 140 KT
SEE LATEST ADVISORY

90W

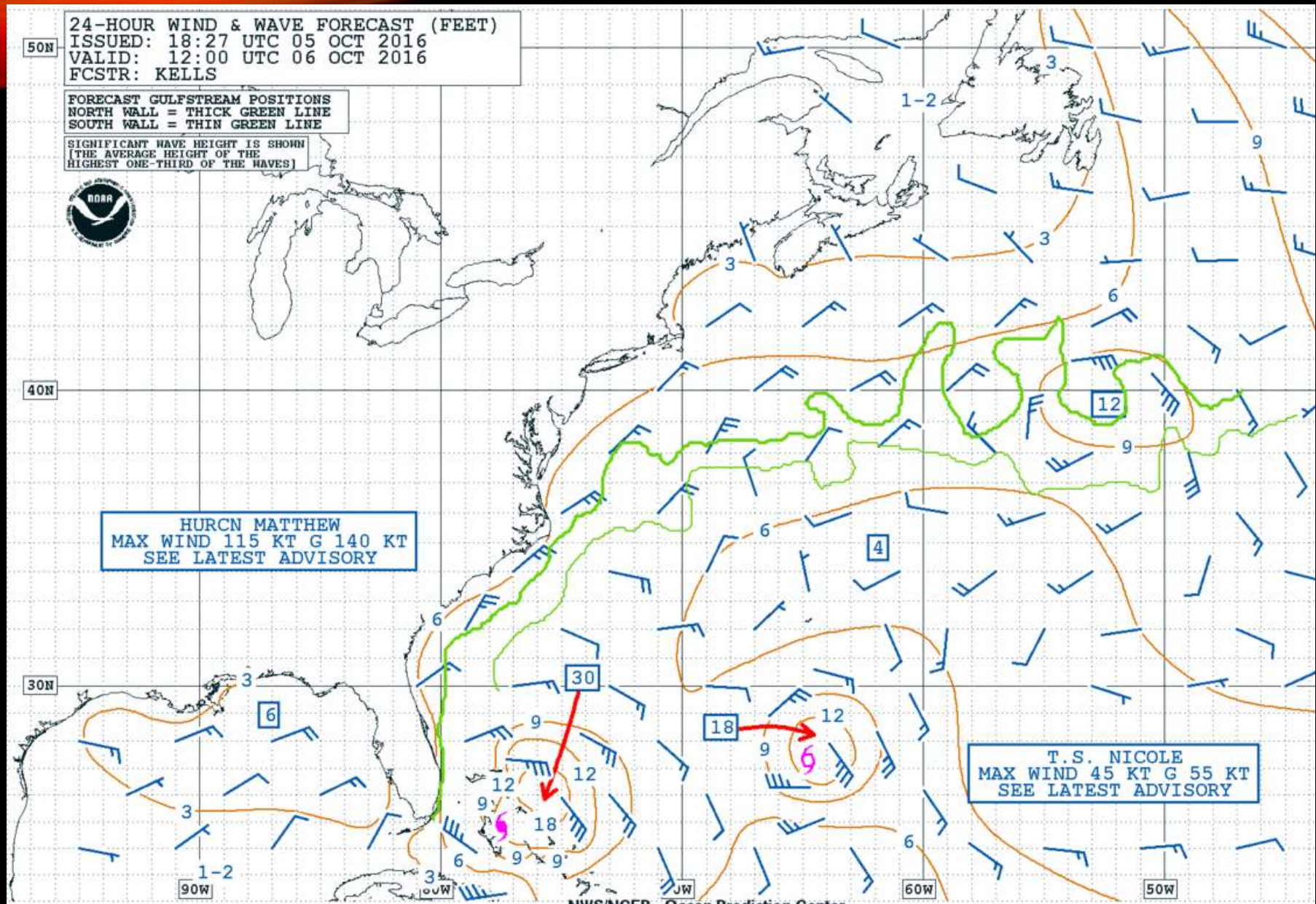
80W

70W

60W

50W

T.S. NICOLE
MAX WIND 45 KT G 55 KT
SEE LATEST ADVISORY





Five-Day Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida



www.hurricanes.gov

All Disturbances

ALL DISTURBANCES

8:00 am EDT
Wed Oct 5 2016

100°W 90°W 80°W 70°W 60°W 50°W 40°W 30°W 20°W

Tropical Cyclone Formation Potential for the Five-Day Period Ending at 8:00 am EDT Mon Oct 10 2016

Chance of Cyclone Formation in Five Days: ■ Low < 40% ■ Medium 40-60% ■ High > 60%

X indicates current disturbance location; shading indicates potential formation area.



HURRICANE MATTHEW

7:00 AM EDT

Savannah

LAT: 28.6°N LON: 80.1°W
35 MI ENE OF CAPE CANAVERAL FLORIDA

Jacksonville

WINDS: 120 MPH
PRESSURE: 938 mb
MOVING: NNW at 14 MPH

Melbourne

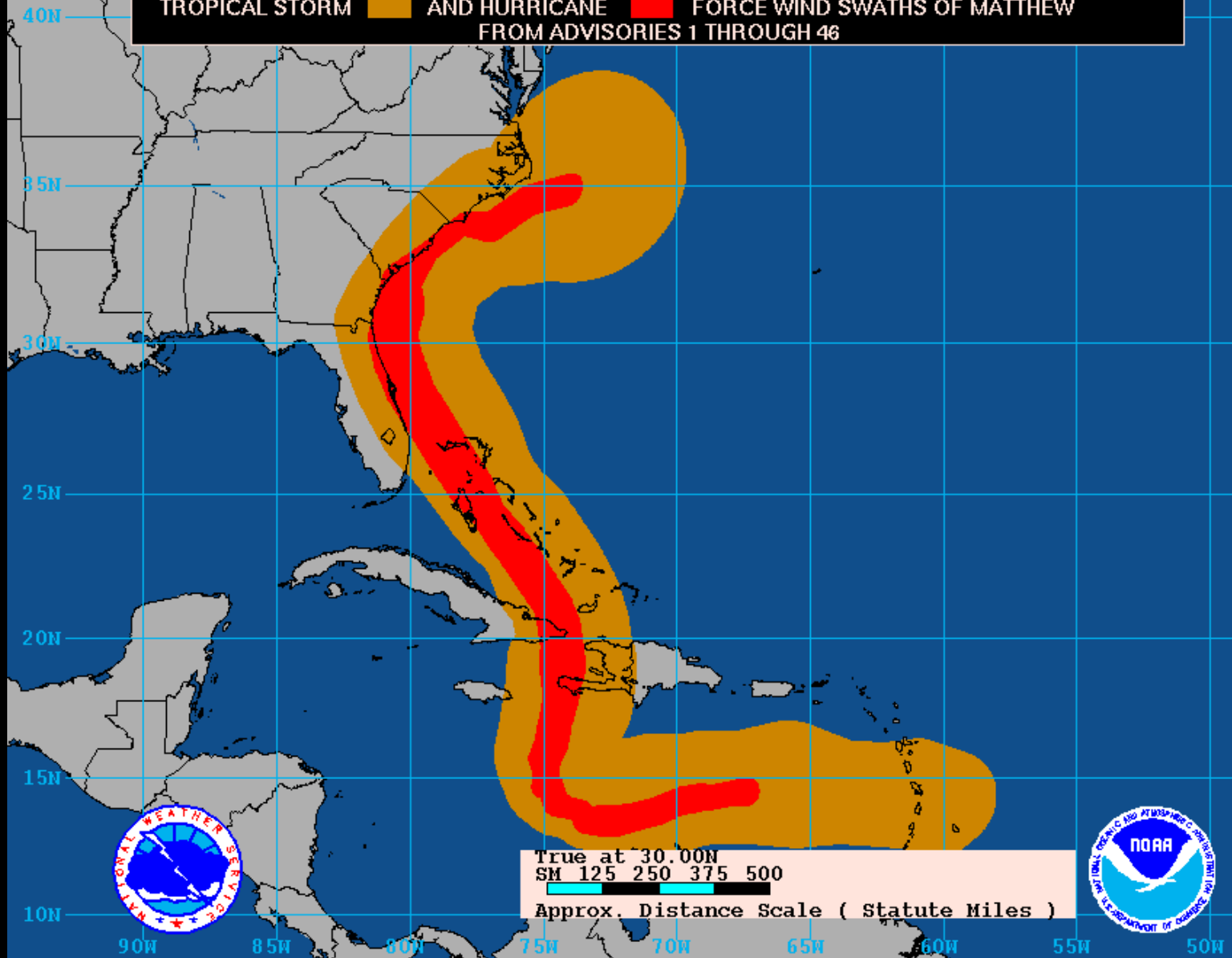
Miami

Nassau

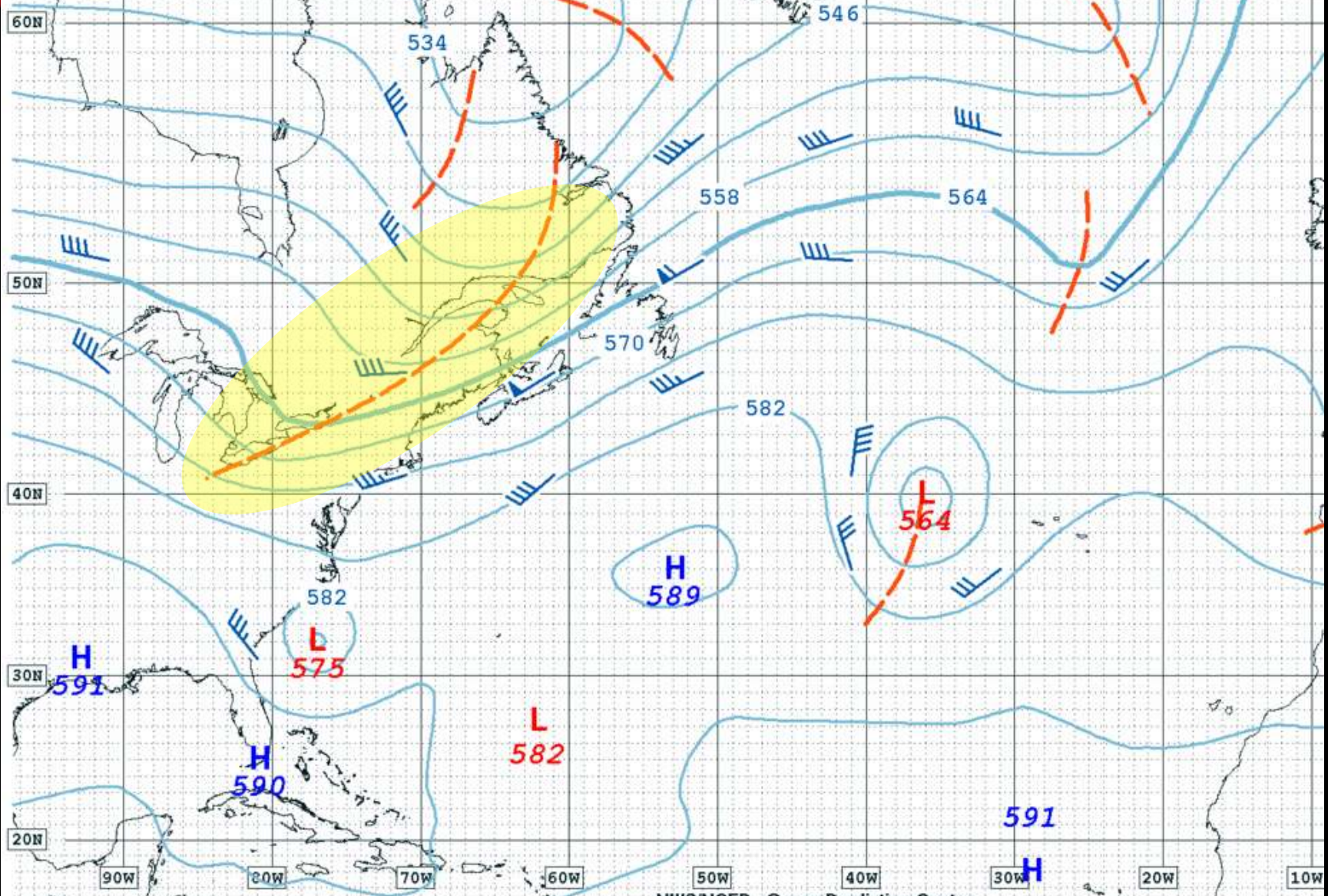
7-Oct-16 6:56 EDT

NATIONAL WEATHER SERVICE/NATIONAL HURRICANE CENTER

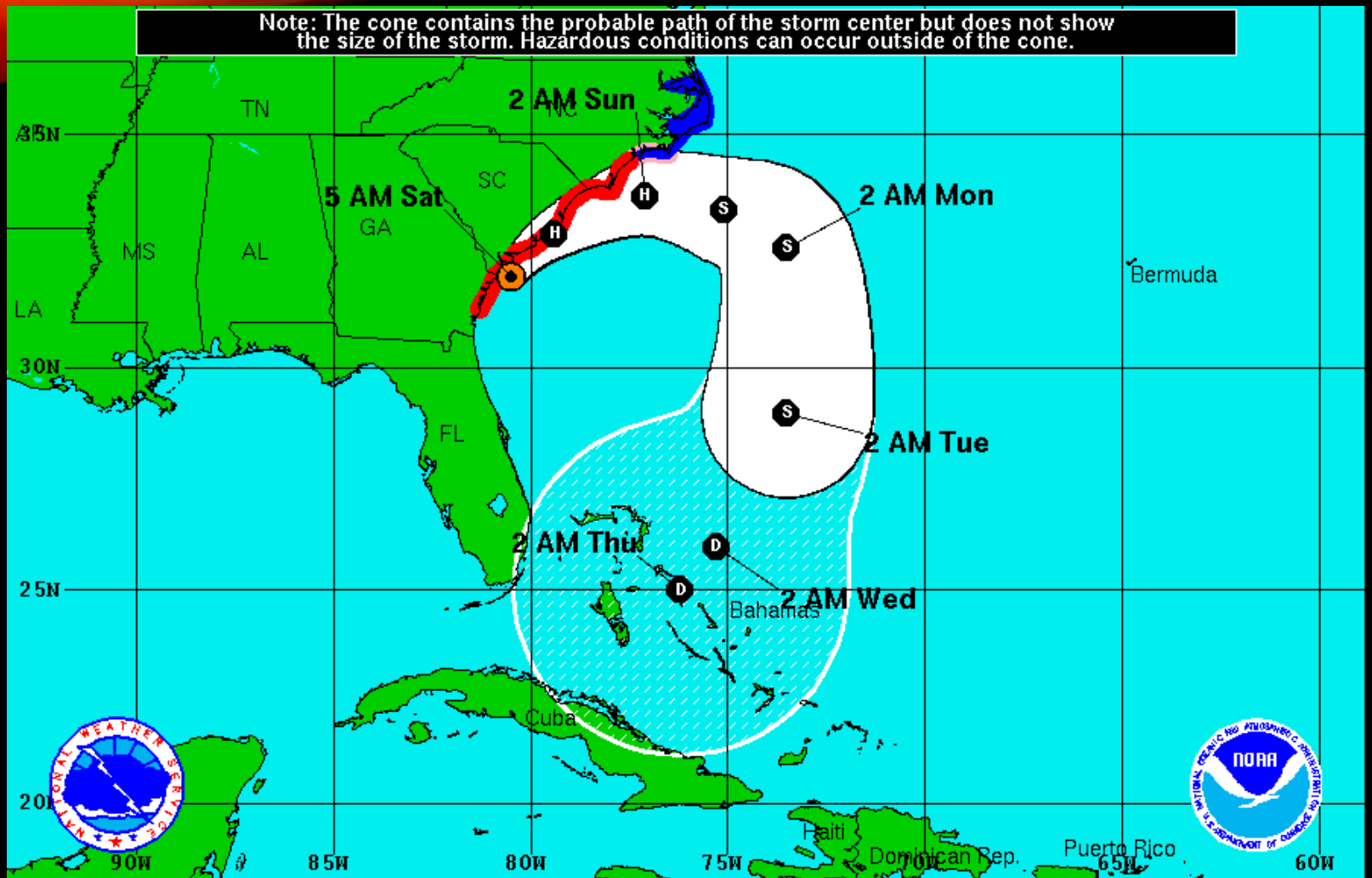
TROPICAL STORM AND HURRICANE FORCE WIND SWATHS OF MATTHEW
FROM ADVISORIES 1 THROUGH 46



96-HOUR 500 MB FORECAST
ISSUED: 16:19 UTC 05 OCT 2016
VALID: 12:00 UTC 09 OCT 2016
FCSTR: REINHART



Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.



Hurricane Matthew
 Saturday October 8, 2016
 5 AM EDT Advisory 41
 NWS National Hurricane Center

Current Information: ●
 Center Location 32.0 N 80.5 W
 Max Sustained Wind 105 mph
 Movement NNE at 12 mph

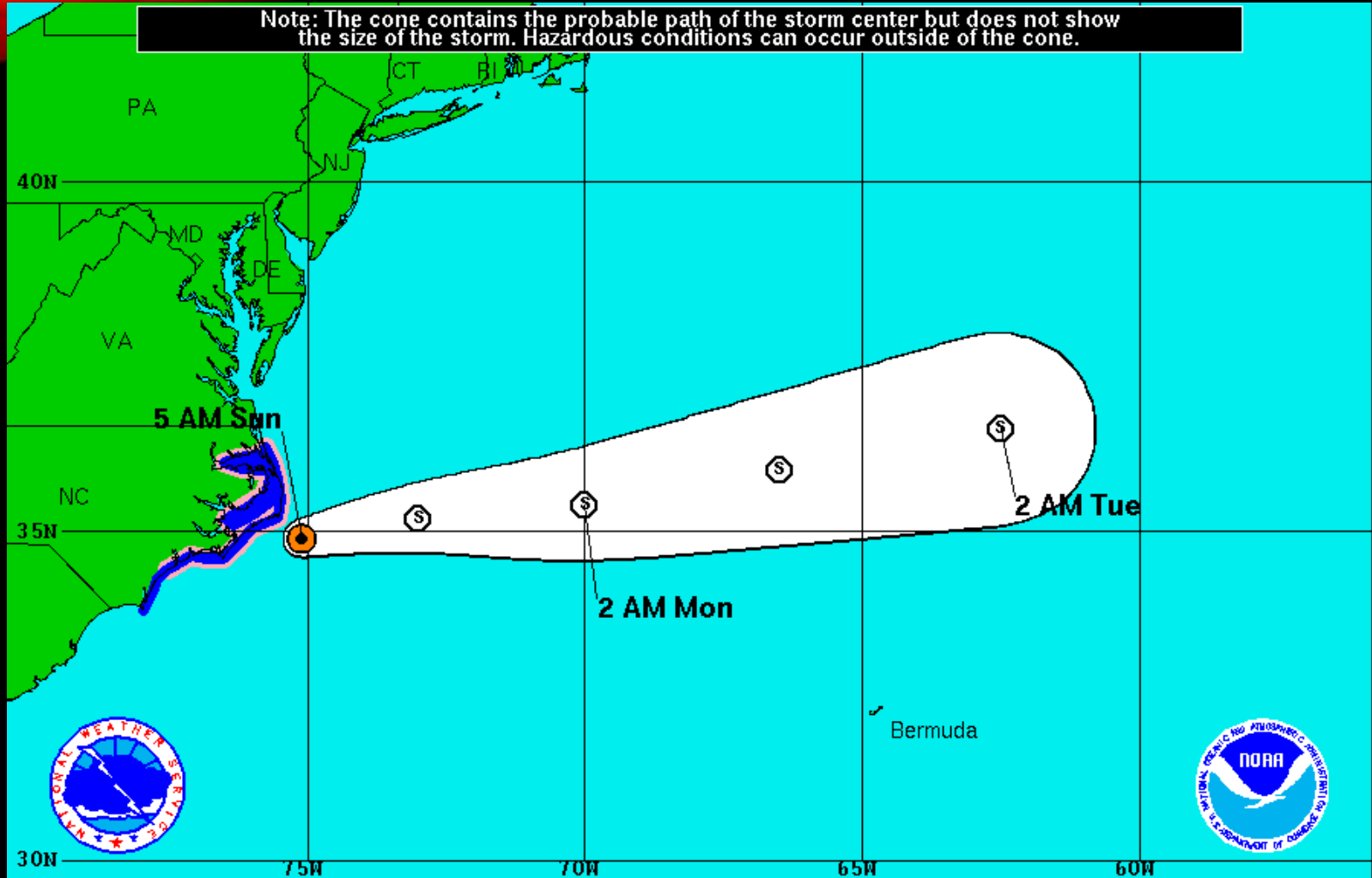
Forecast Positions:
 ● Tropical Cyclone ○ Post-Tropical
 Sustained Winds: D < 39 mph
 S 39-73 mph H 74-110 mph M > 110mph

Potential Track Area:
 ▽ Day 1-3 ▽ Day 4-5

Watches:
 ■ Hurricane ■ Trop. Storm

Warnings:
 ■ Hurricane ■ Trop. Storm

Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.





Post-Tropical Cyclone Matthew

Sunday October 9, 2016
 5 AM EDT Advisory 45
 NWS National Hurricane Center



Current Information: 

Center Location 34.9 N 75.1 W
 Max Sustained Wind 75 mph
 Movement E at 14 mph

Forecast Positions:

 Tropical Cyclone  Post-Tropical
 Sustained Winds: D < 39 mph
 S 39-73 mph H 74-110 mph M > 110mph

Potential Track Area:

 Day 1-3  Day 4-5

Watches:

 Hurricane  Trop. Storm

Warnings:

 Hurricane  Trop. Storm

For the latest on
Matthew and Nicole
visit: hurricanes.gov

*Very heavy rainfall with
life-threatening and
catastrophic flash
flooding likely.*

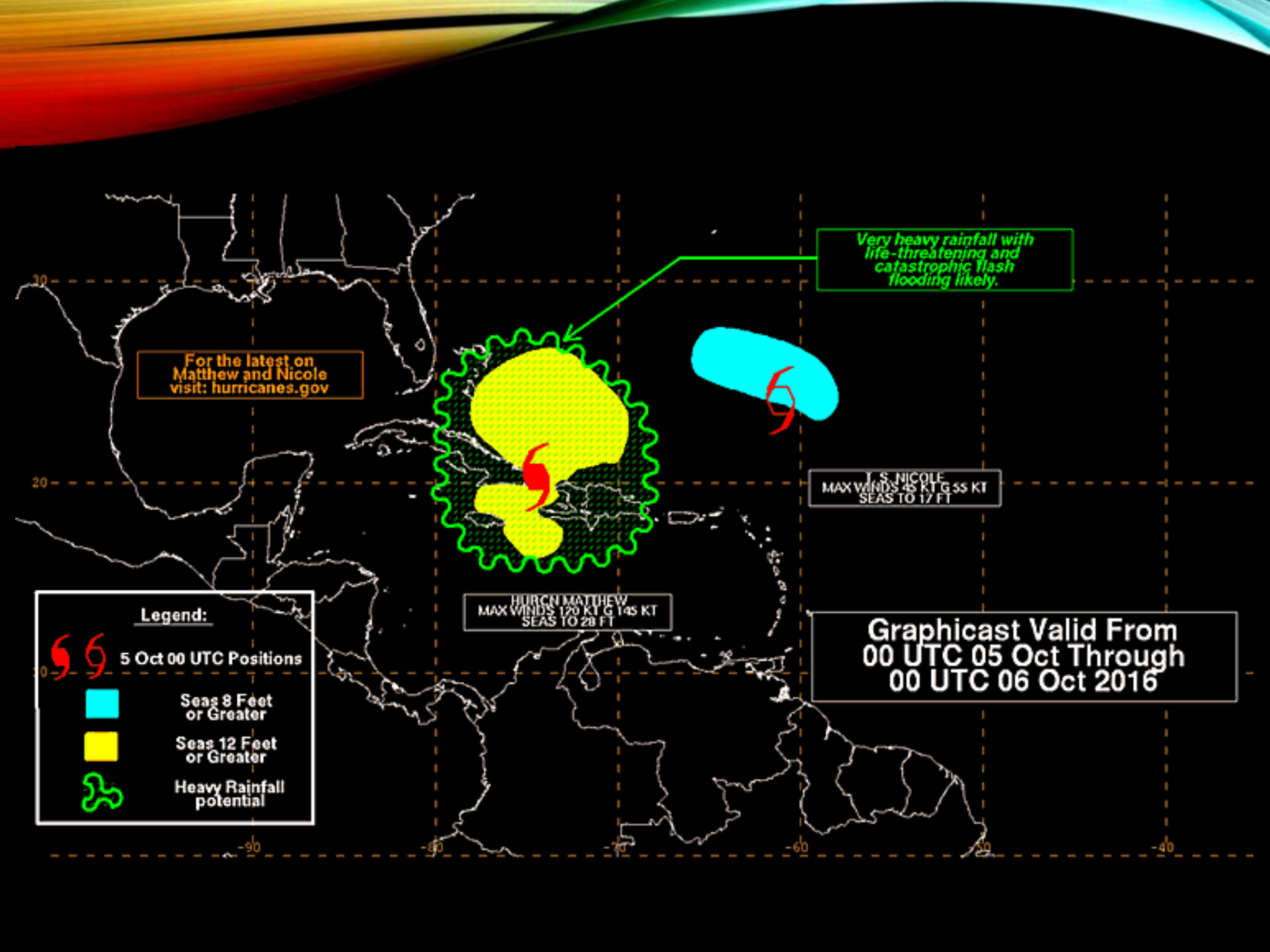
J.S. NICOLE
MAX WINDS 45 KT G 55 KT
SEAS TO 17 FT

HURCN MATTHEW
MAX WINDS 120 KT G 145 KT
SEAS TO 28 FT

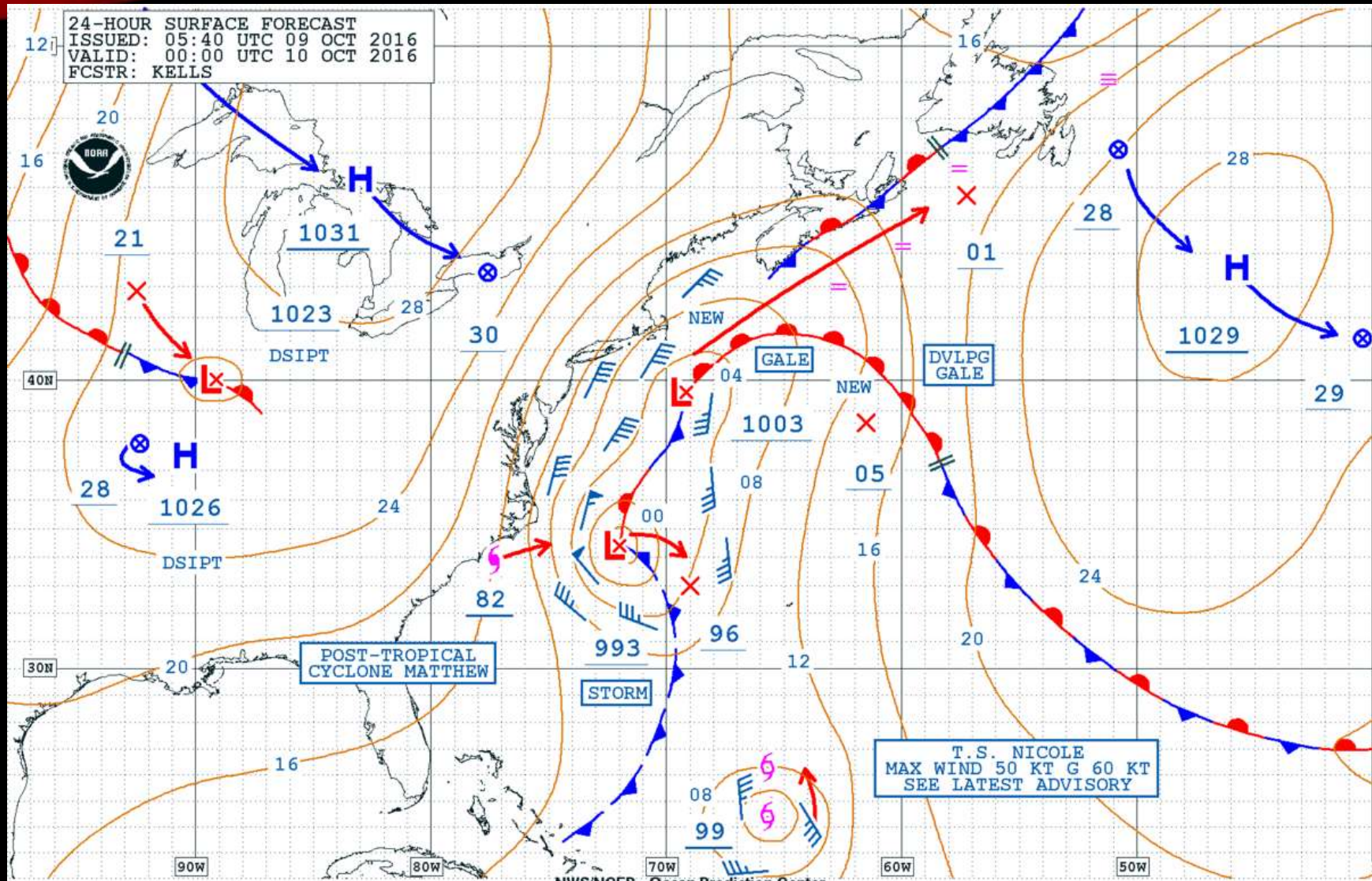
**Graphicast Valid From
00 UTC 05 Oct Through
00 UTC 06 Oct 2016**

Legend:

-  5 Oct 00 UTC Positions
-  Seas 8 Feet or Greater
-  Seas 12 Feet or Greater
-  Heavy Rainfall potential

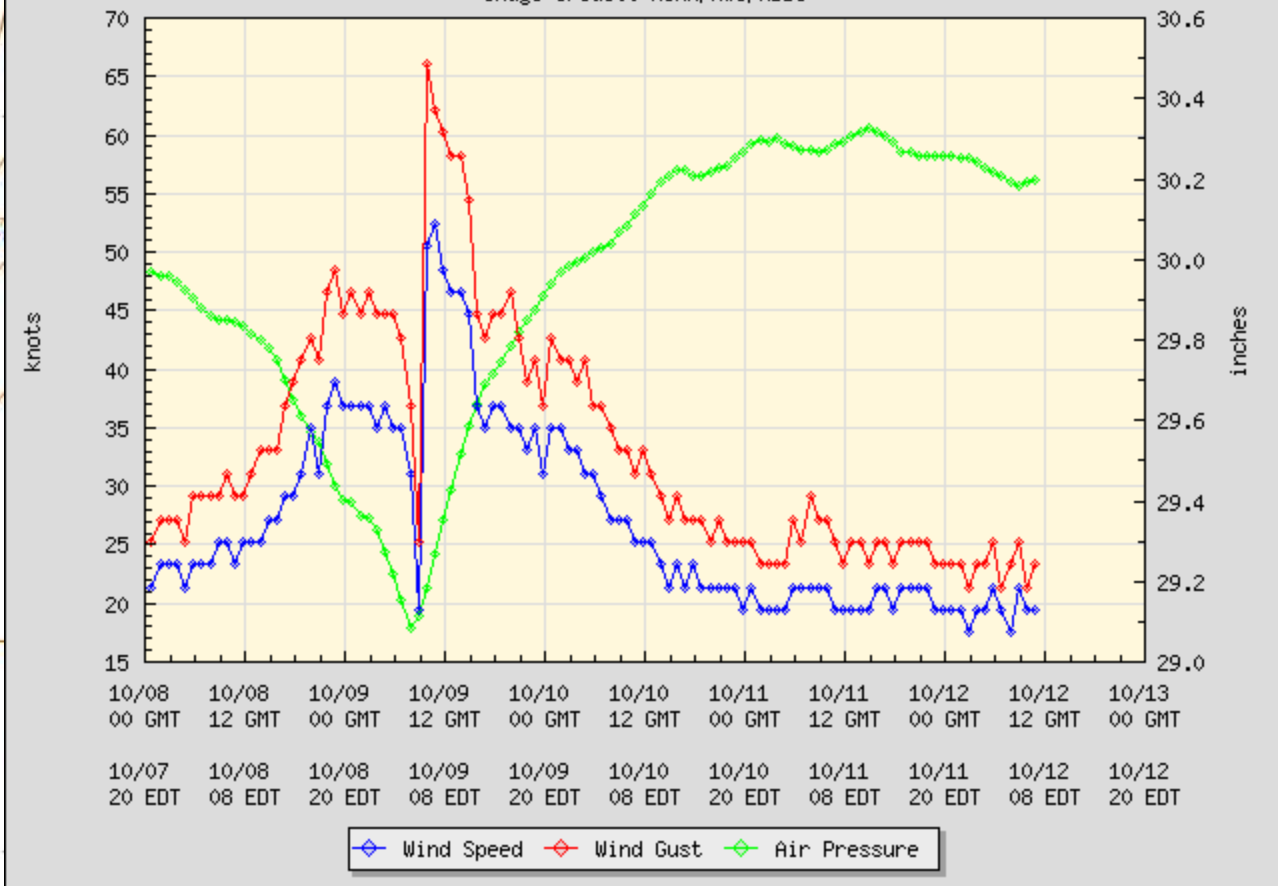


24-HOUR SURFACE FORECAST
ISSUED: 05:40 UTC 09 OCT 2016
VALID: 00:00 UTC 10 OCT 2016
FCSTR: KELLS

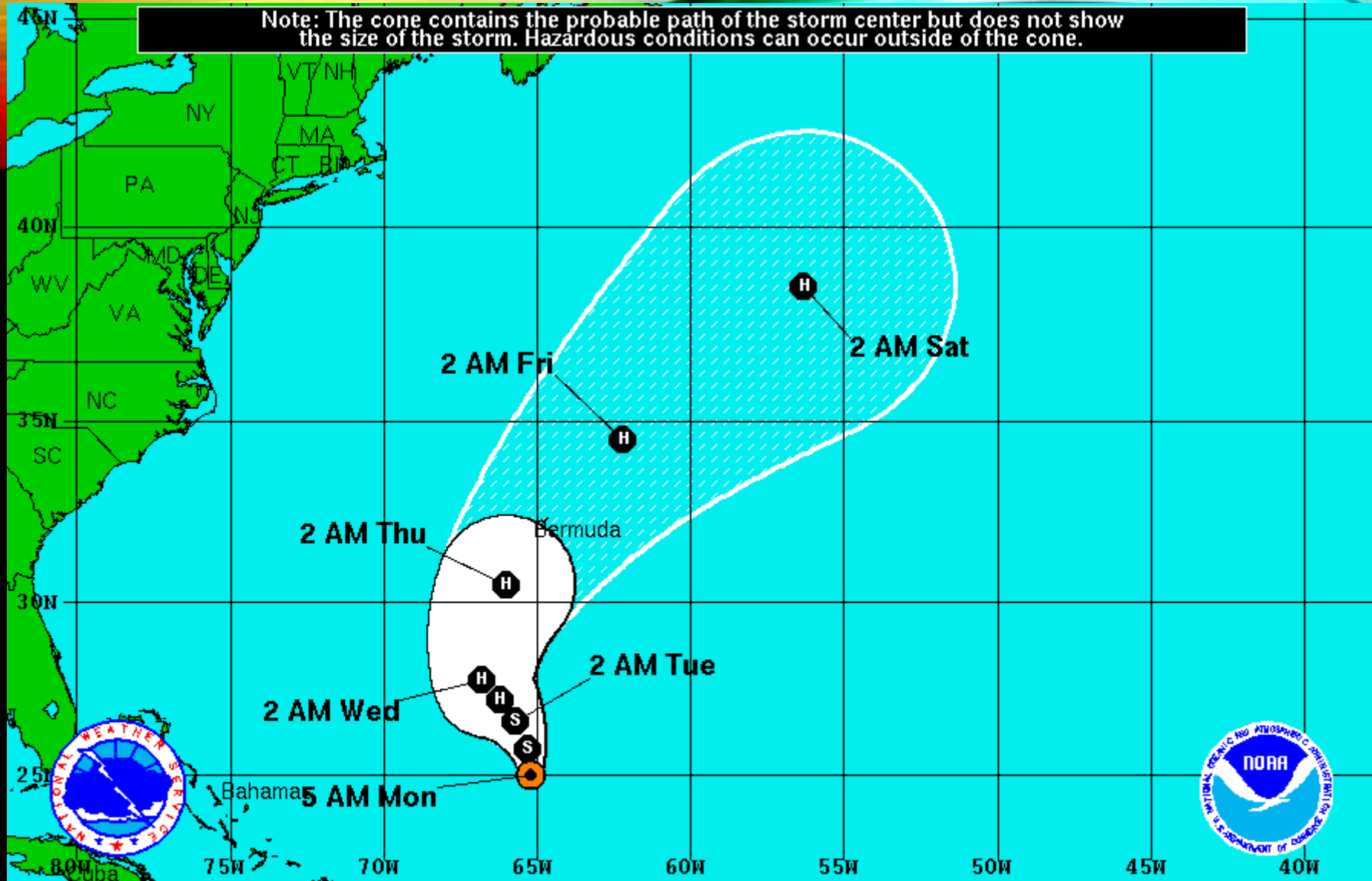


Wind Speed/Air Pressure at 41025

Image Credit: NOAA/NWS/NDBC



Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.





Tropical Storm Nicole

Monday October 10, 2016
 5 AM EDT Advisory 25
 NWS National Hurricane Center



Current Information:

Center Location 25.0 N 65.2 W
 Max Sustained Wind 65 mph
 Movement N at 7 mph

Forecast Positions:

 Tropical Cyclone  Post-Tropical
 Sustained Winds: D < 39 mph
 S 39-73 mph H 74-110 mph M > 110mph

Potential Track Area:

 Day 1-3  Day 4-5

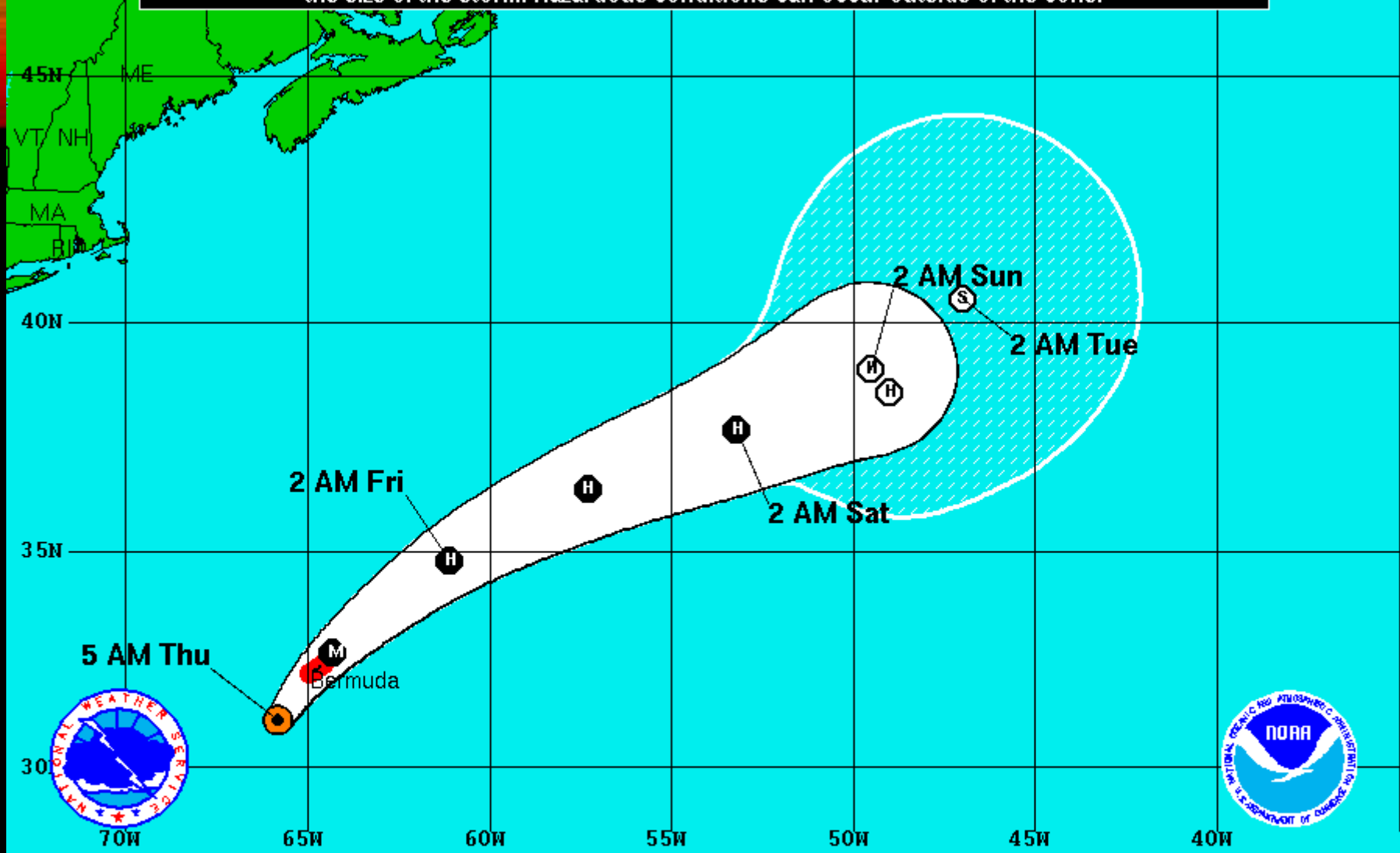
Watches:




 Hurricane  Trop.Storm

Warnings:

 Hurricane  Trop.Storm

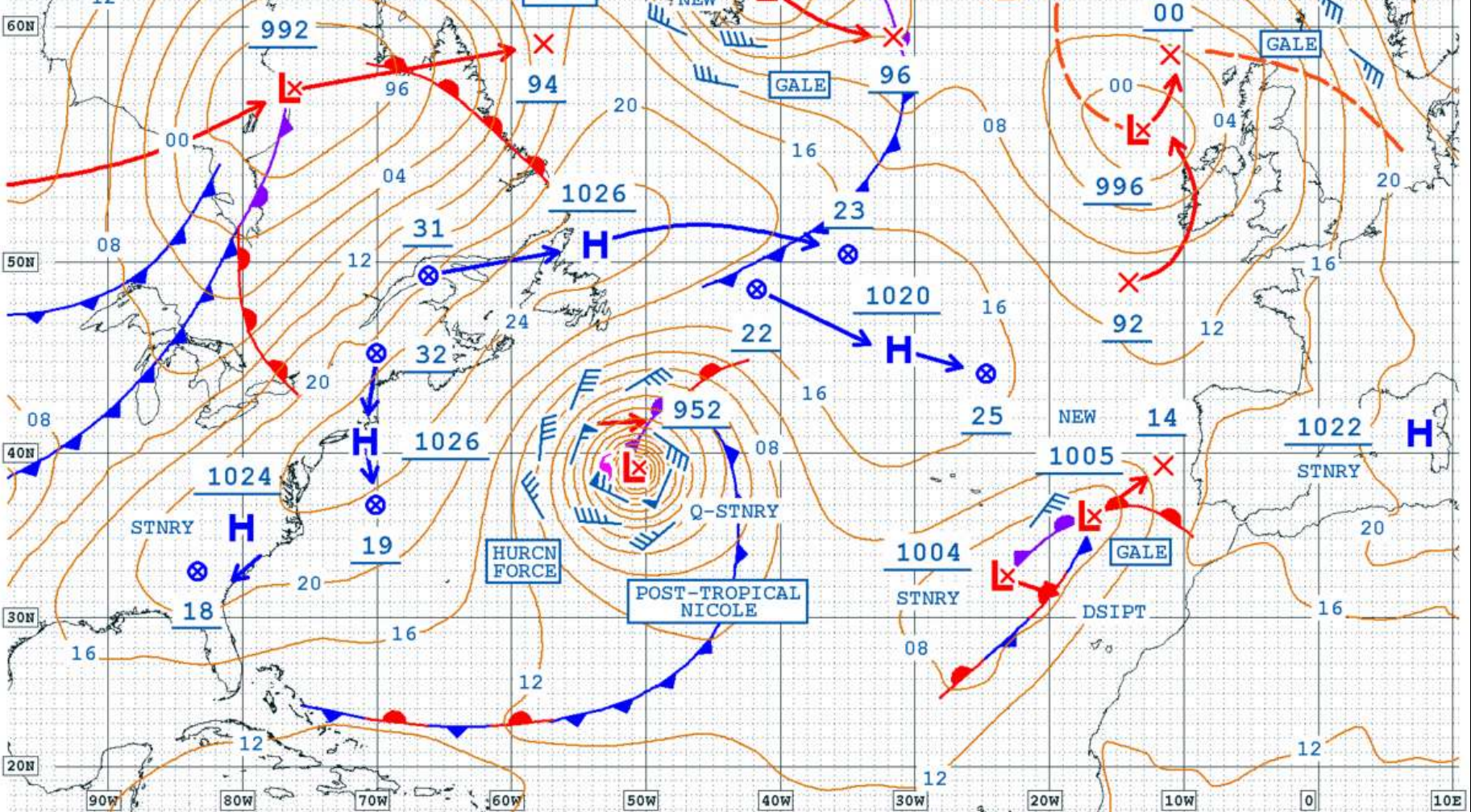
Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.



<p>Hurricane Nicole <i>Thursday October 13, 2016</i> 5 AM EDT Advisory 37 NWS National Hurricane Center</p>	<p>Current Information:  Center Location 31.1 N 65.8 W Max Sustained Wind 130 mph Movement NNE at 15 mph</p>	<p>Forecast Positions:  Tropical Cyclone  Post-Tropical Sustained Winds: D < 39 mph S 39-73 mph H 74-110 mph M > 110mph</p>
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<p>Potential Track Area:  Day 1-3  Day 4-5</p>	<p>Watches:  Hurricane  Trop.Storm</p>	<p>Warnings:  Hurricane  Trop.Storm</p>
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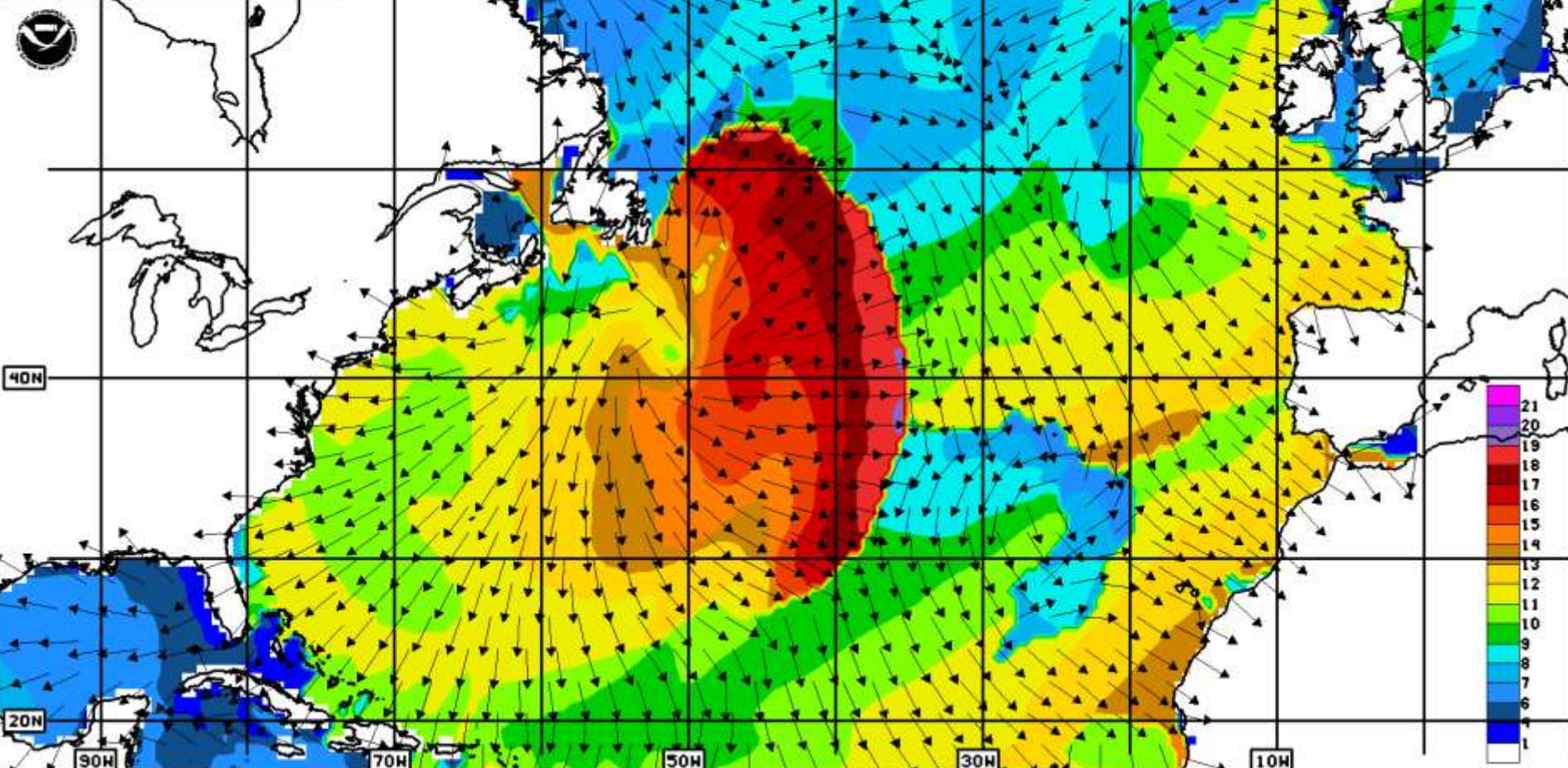
96-HOUR SURFACE FORECAST
ISSUED: 18:52 UTC 12 OCT 2016
VALID: 12:00 UTC 16 OCT 2016
FCSTR: REINHART



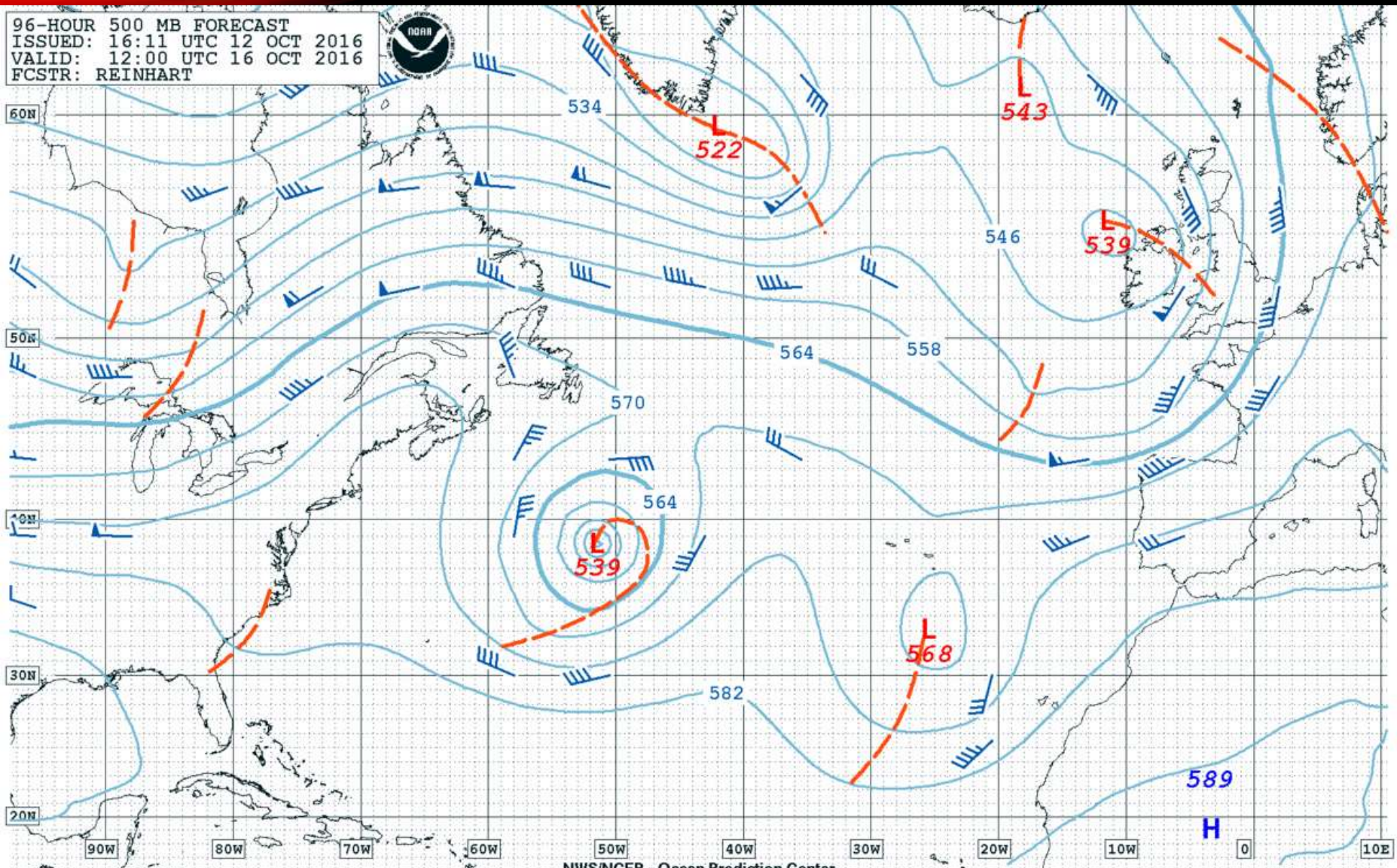
096 HR WAVE PERIOD FCST/DIRECTION
ISSUED: 04:57 UTC 12 OCT 2016
VALID: 00:00 UTC 16 OCT 2016

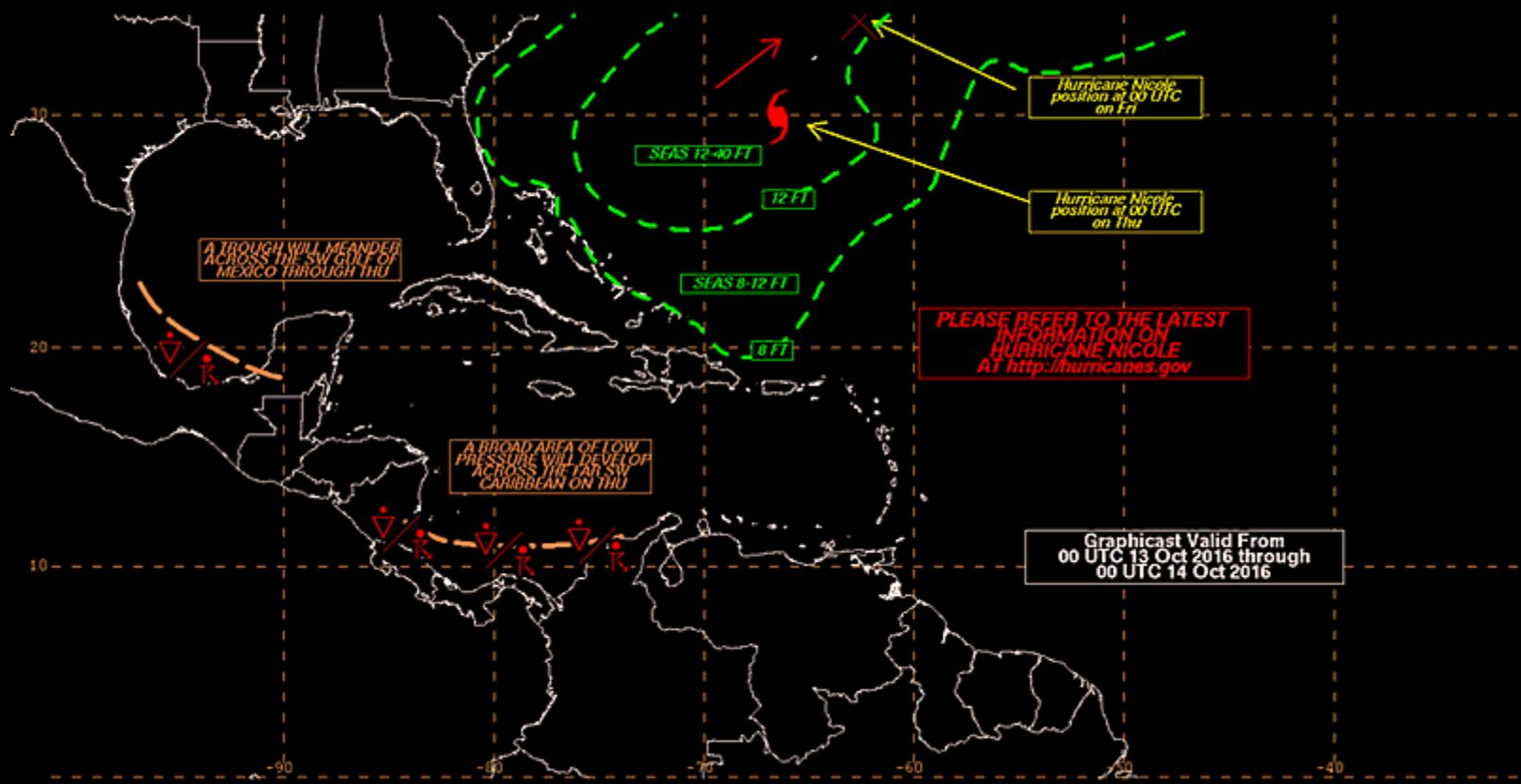
VALUES INDICATE THE
DOMINANT WAVE PERIOD
IN SECONDS

ARROWS SHOW DIRECTION
OF DOMINANT WAVES



96-HOUR 500 MB FORECAST
ISSUED: 16:11 UTC 12 OCT 2016
VALID: 12:00 UTC 16 OCT 2016
FCSTR: REINHART





A TROUGH WILL MEANDER ACROSS THE SW GULF OF MEXICO THROUGH THU

A BROAD AREA OF LOW PRESSURE WILL DEVELOP ACROSS THE FAR SW CARIBBEAN ON THU

Hurricane Nicole position at 00 UTC on Fri

Hurricane Nicole position at 00 UTC on Thu

PLEASE REFER TO THE LATEST INFORMATION ON HURRICANE NICOLE At <http://hurricanes.gov>

Graphicast Valid From 00 UTC 13 Oct 2016 through 00 UTC 14 Oct 2016