Oceanic Cyclone Analysis and Forecasting at the NCEP/Ocean Prediction Center: The Role of Observations & Progress in Medium Range Forecasting

James Clark

Ocean Prediction Center

National Weather Service/NCEP

ECMWF

Twelfth Workshop on Meteorological Operational Systems

2 – 6 November 2009

I. NWS Marine Weather Services/Ocean Prediction Center Overview

A. Coastal/Offshore/High Seas

II. Role of Observations/Hurricane Force Extratropical Cyclone Analysis & Forecasting

A. Ocean Surface Vector Wind (Quikscat, Ascat)
B. Radar Altimeter

III. Medium Range Forecasting

A. Warning Criteria ‘Probabilities’ through use of Ensembles
B. Model Blending
C. Use of ECMWF products

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280 Ny.Rn. 22

S S Amerika via S S Titanic and Cape Race N.F. April,14,1912

Hydrographic Office,Washington DC

Amerika passed two large icebergs in 41 27 N 50 8 W on the 14th of April

Knutp,10;51p

62496 filed with 2995 | HYDRO. OFFICE Rec'd APR 15 1912 | Enclosures.

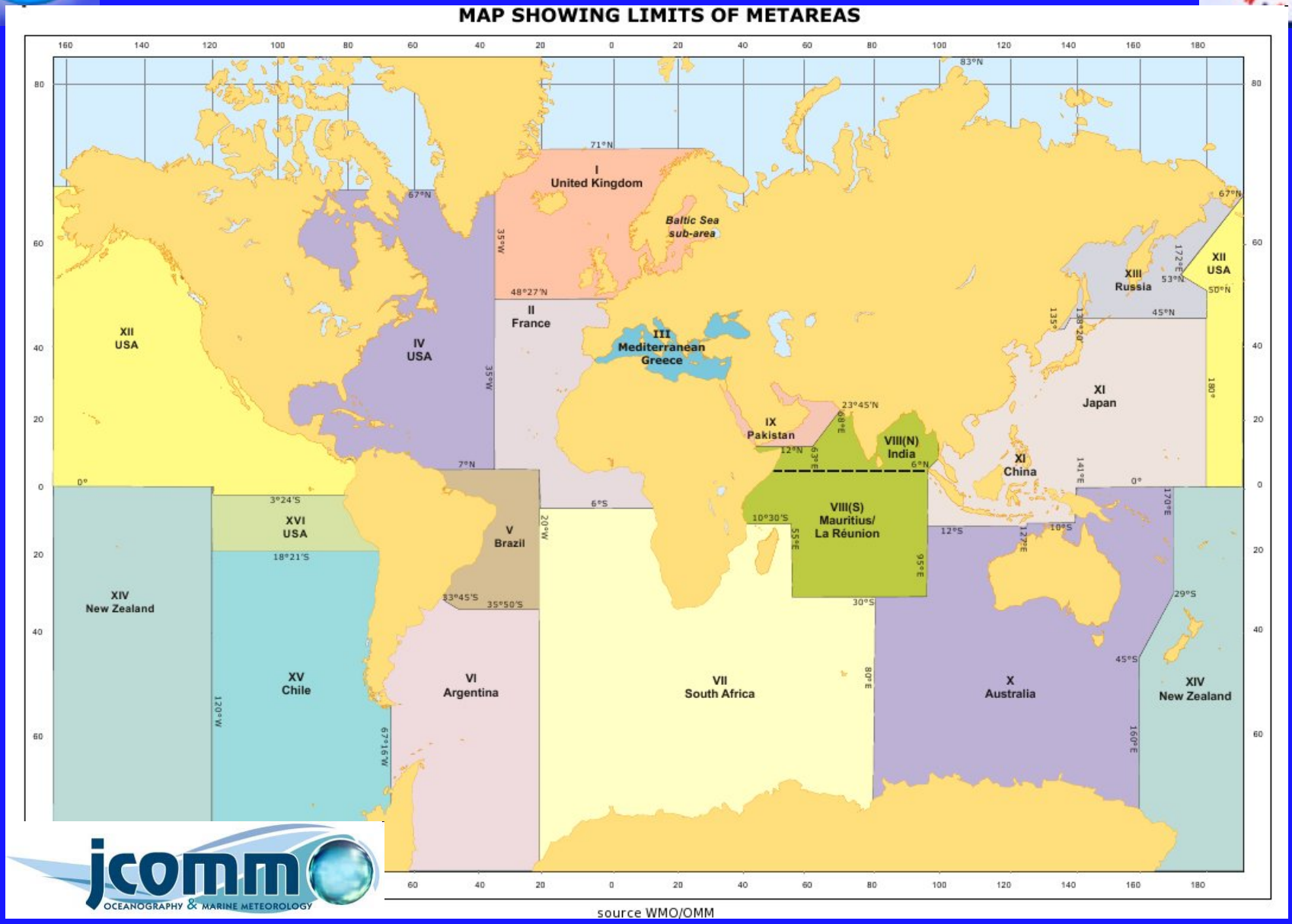
Telegraphed 13 10 New york April 15, 1912

R.C.

Jam

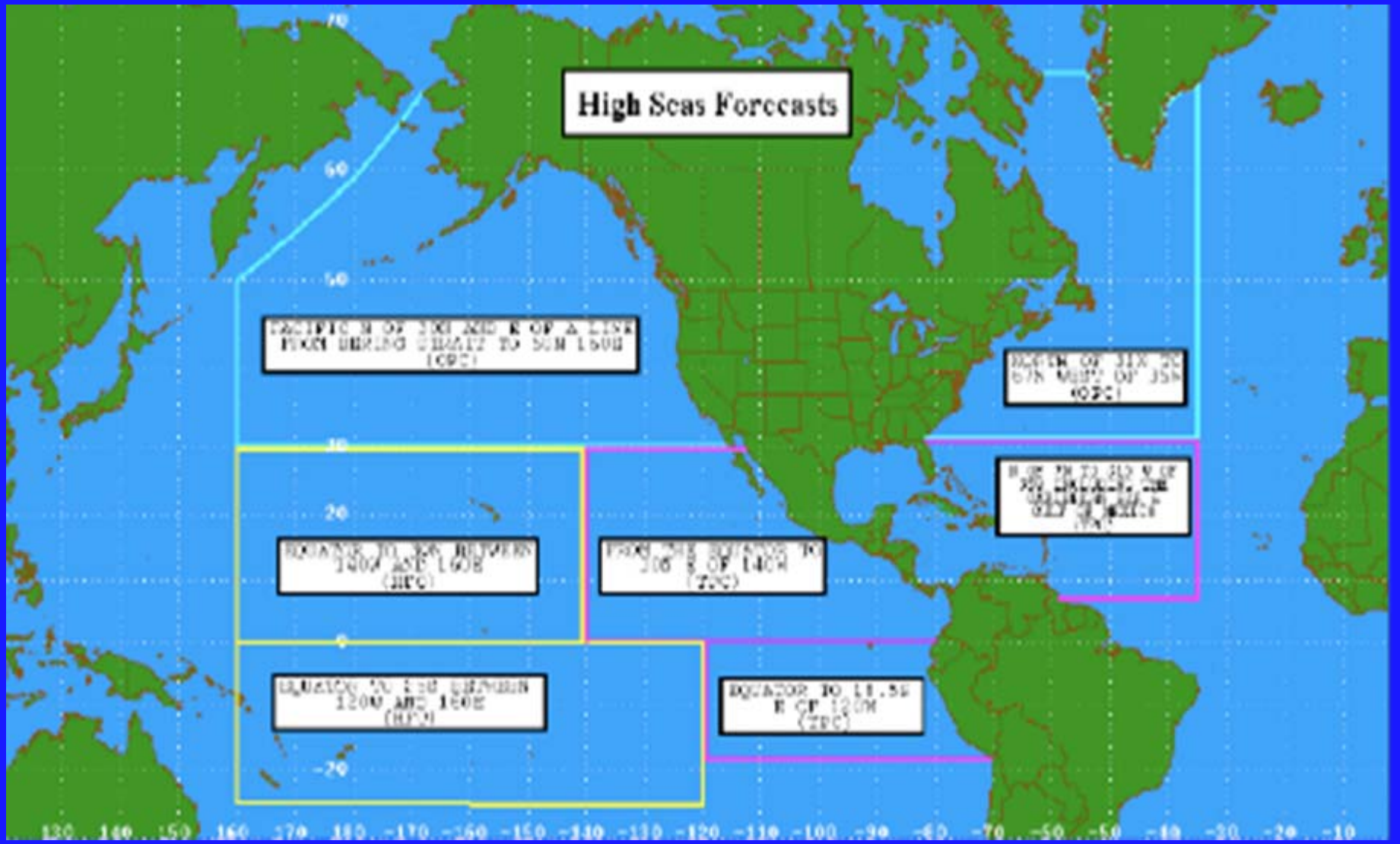
WVM

MARITIME SAFETY INFORMATION

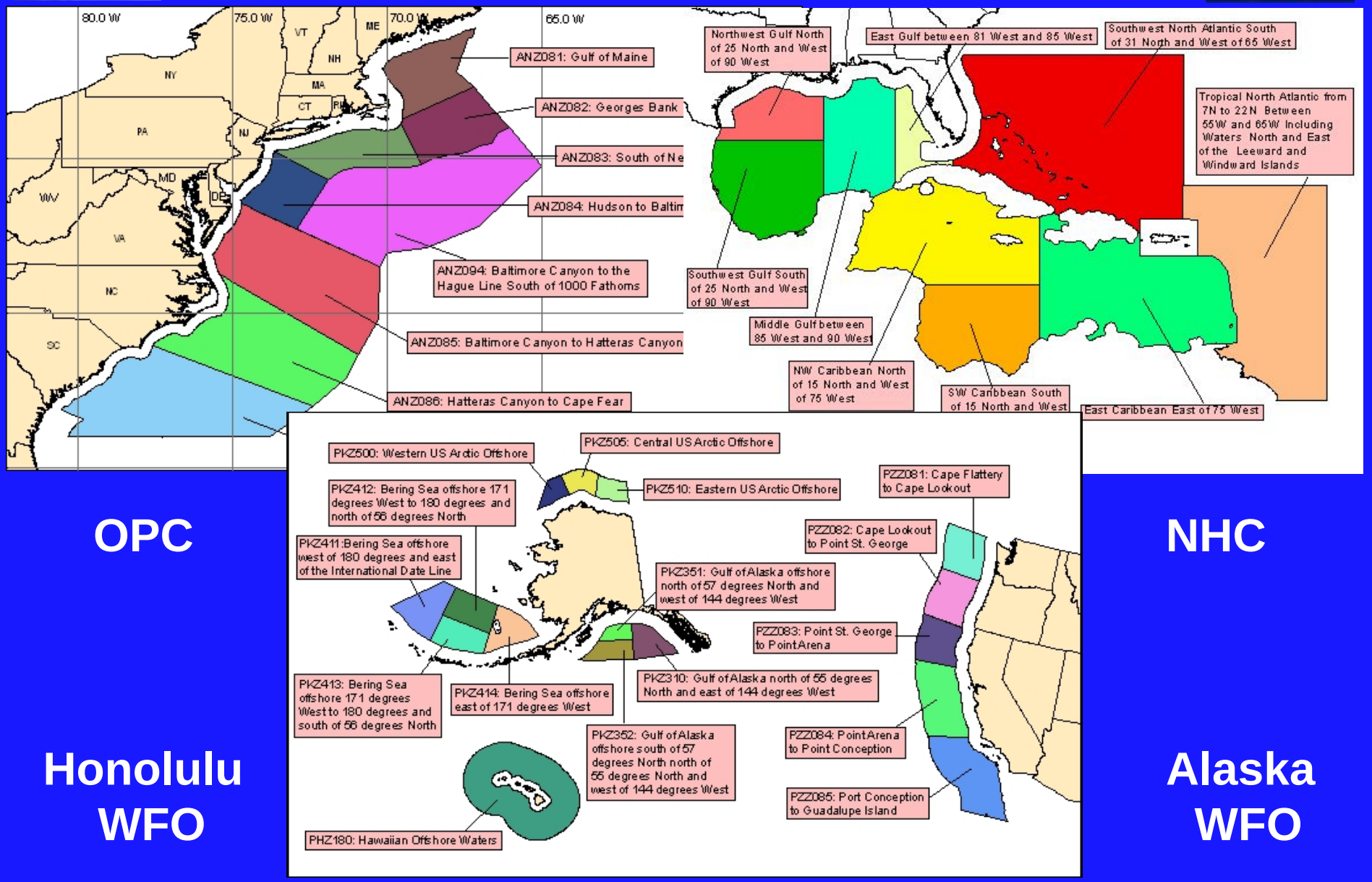


source WMO/OMM

NOAA/NWS High Seas Forecast Areas



NOAA/NWS Offshore Forecast Zones



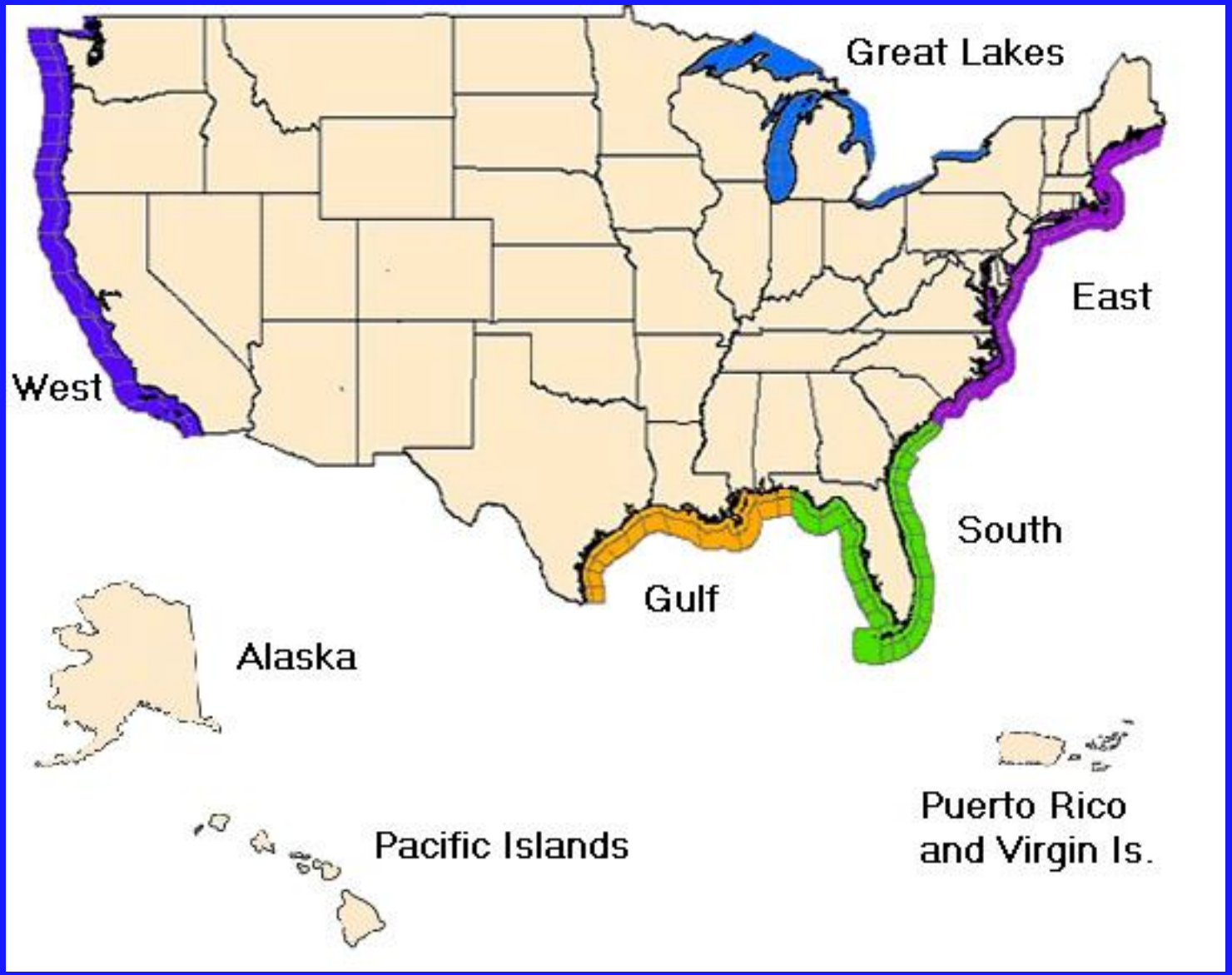
OPC

NHC

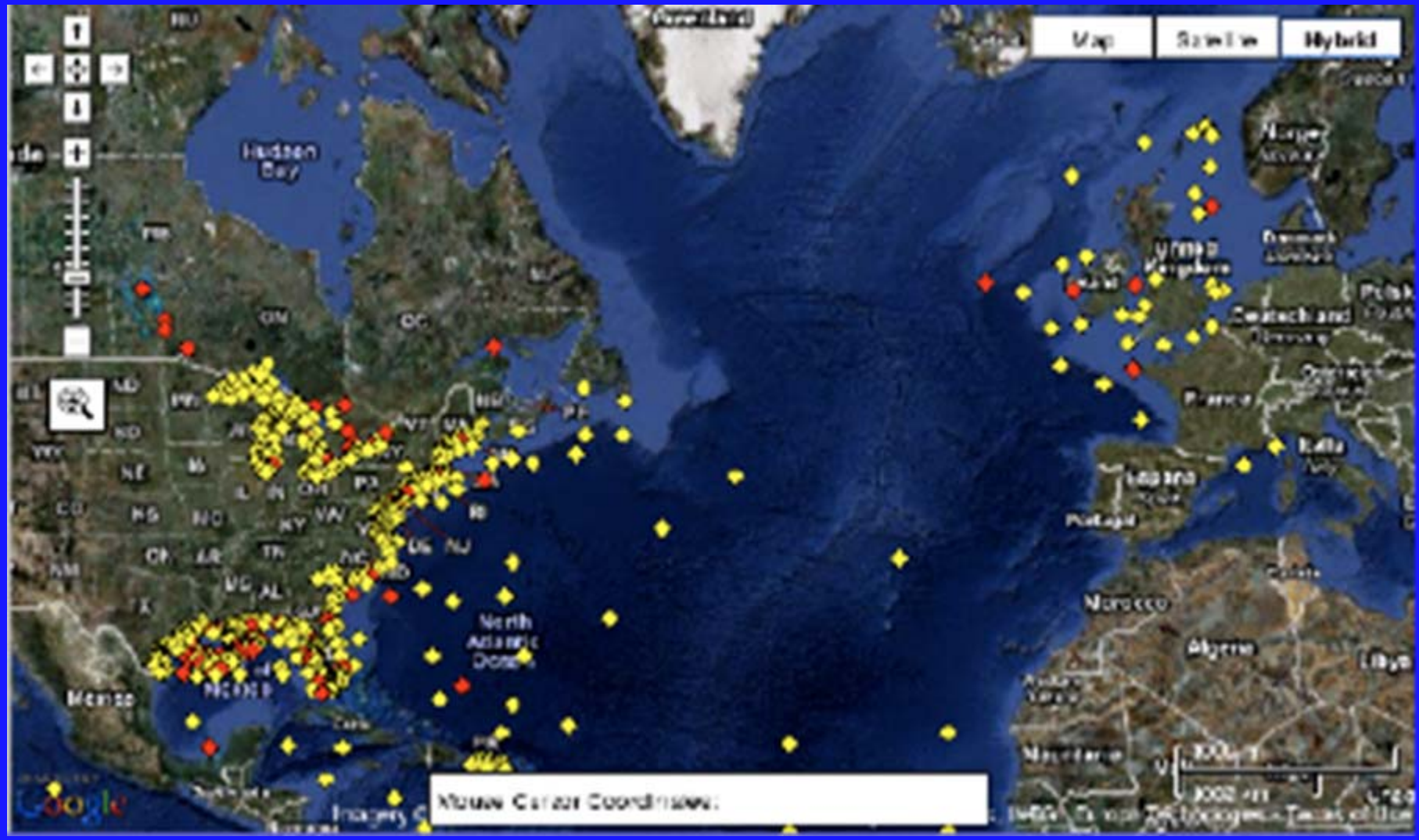
Honolulu WFO

Alaska WFO

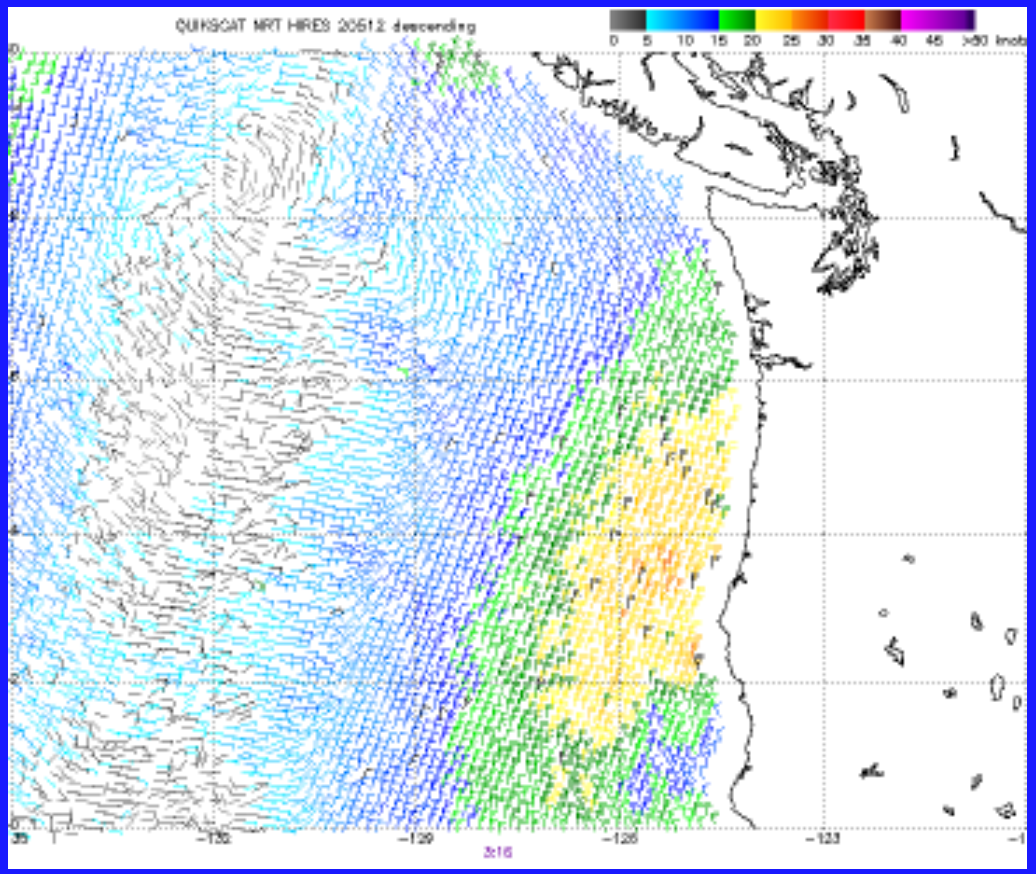
46 Coastal/Great Lakes Weather Forecast Offices



In Situ Observations: Fixed Platforms

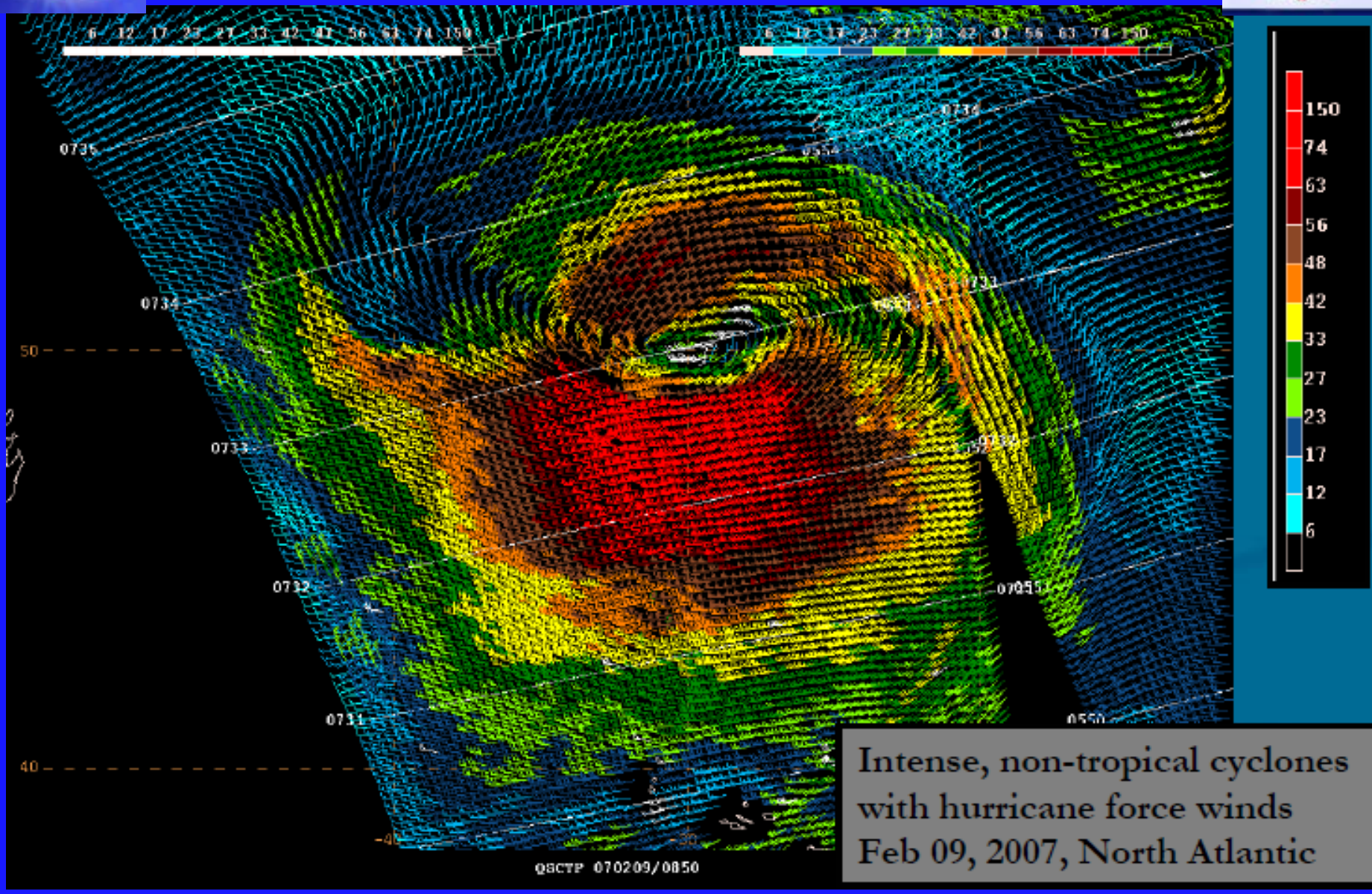


II. Role of Observations/Hurricane Force Extratropical Cyclone Analysis & Forecasting



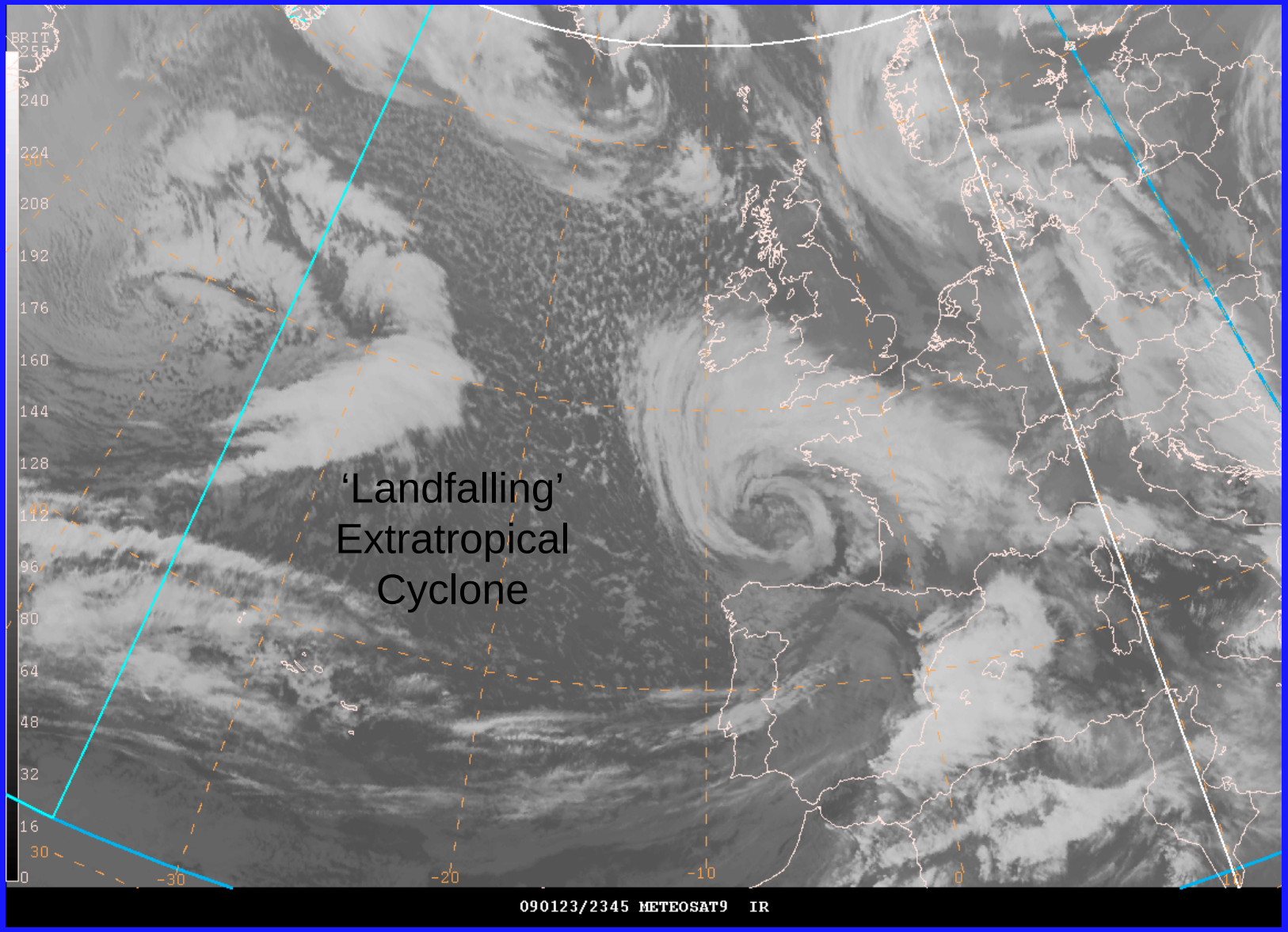
Satellite Observations

- Forecaster Application
- Diagnose Initial Conditions
- Determine warning criteria
- Placement of synoptic features

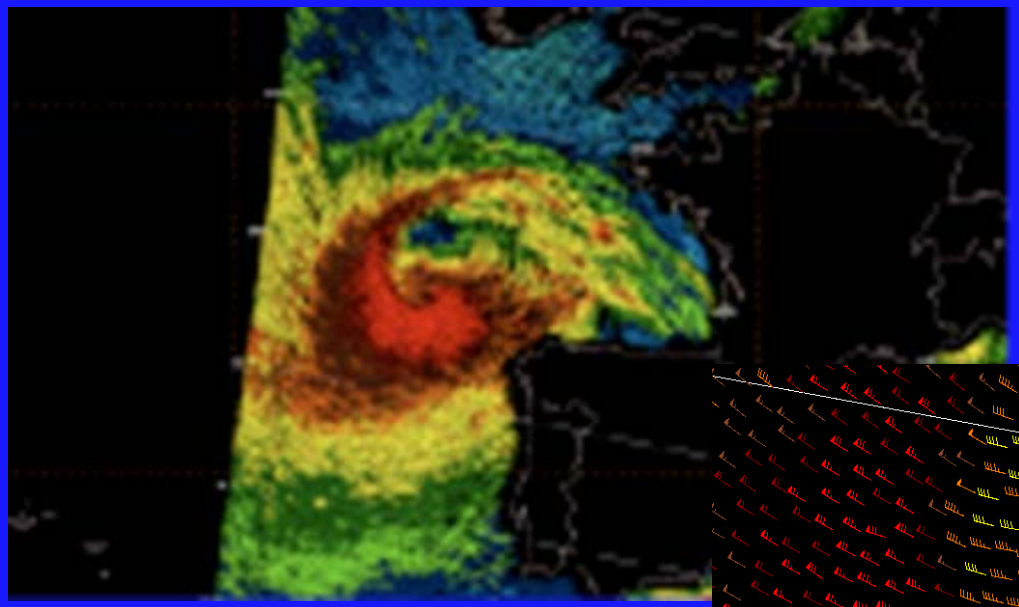


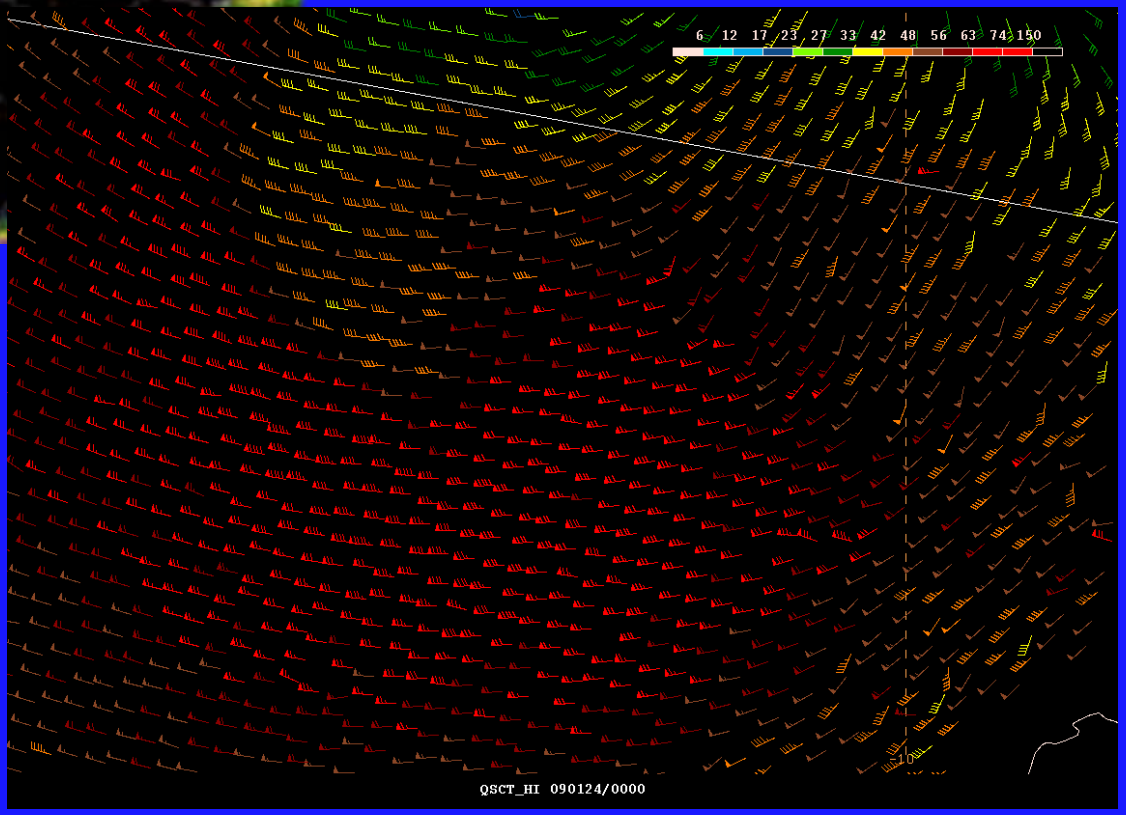
Intense, non-tropical cyclones with hurricane force winds
Feb 09, 2007, North Atlantic

Pre-Scatterometer



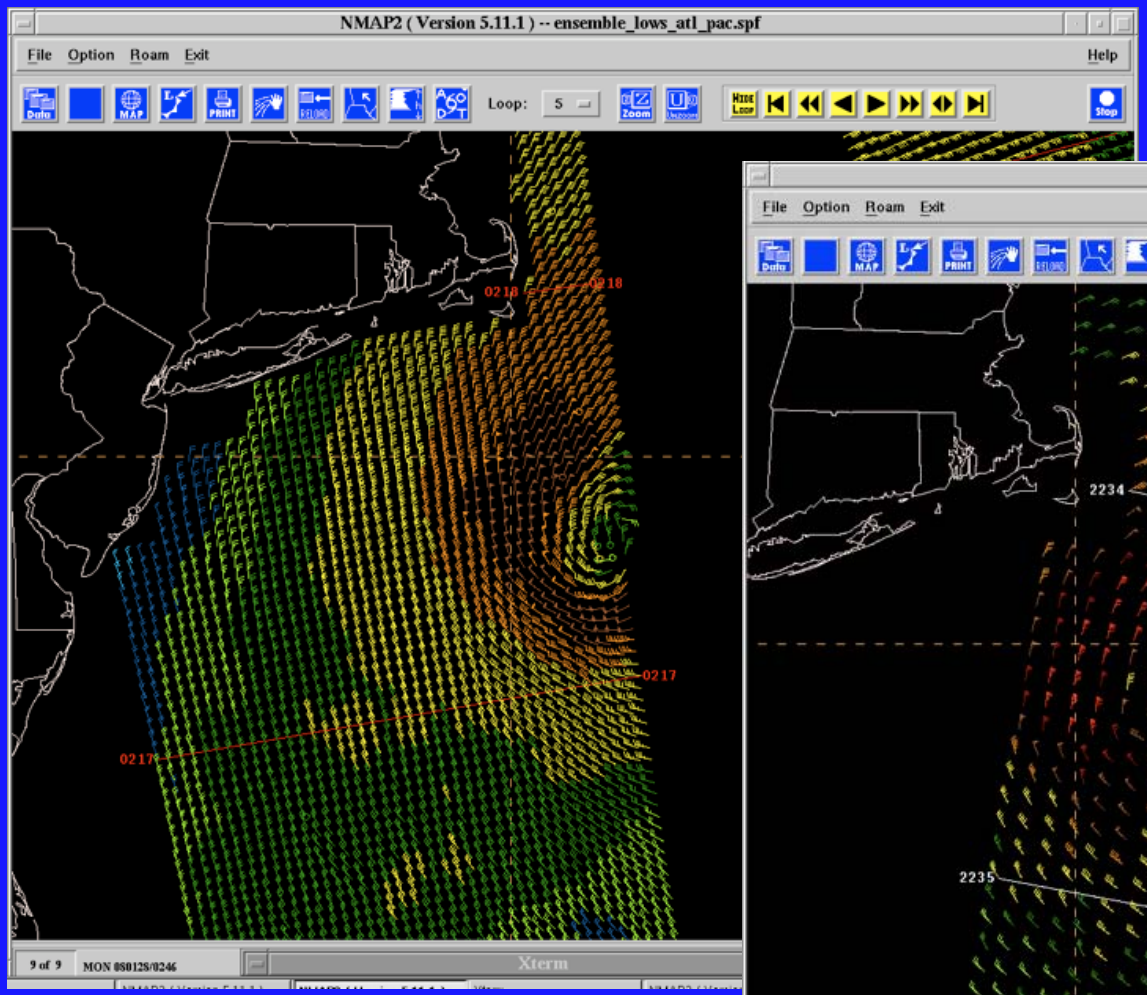
With Scatterometer

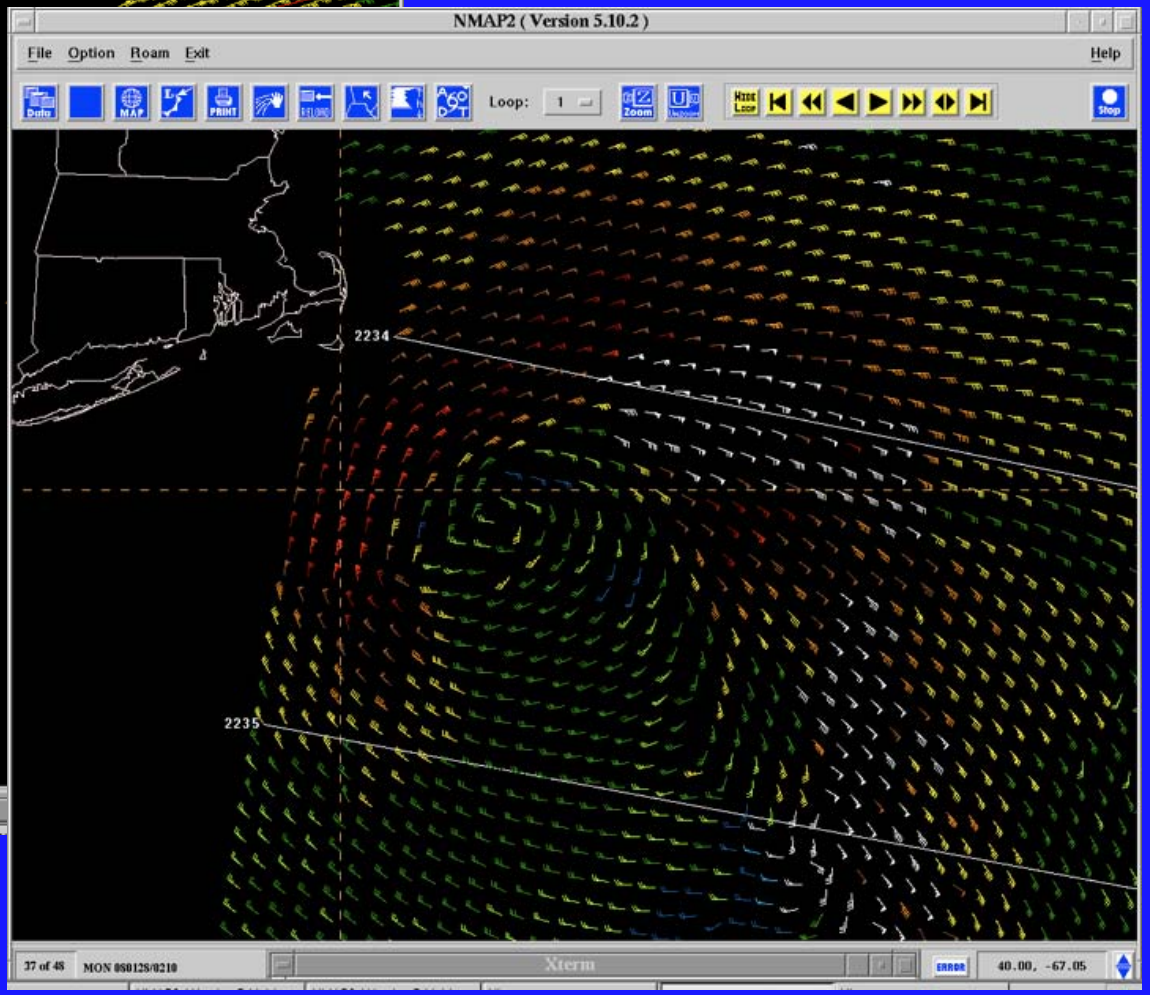


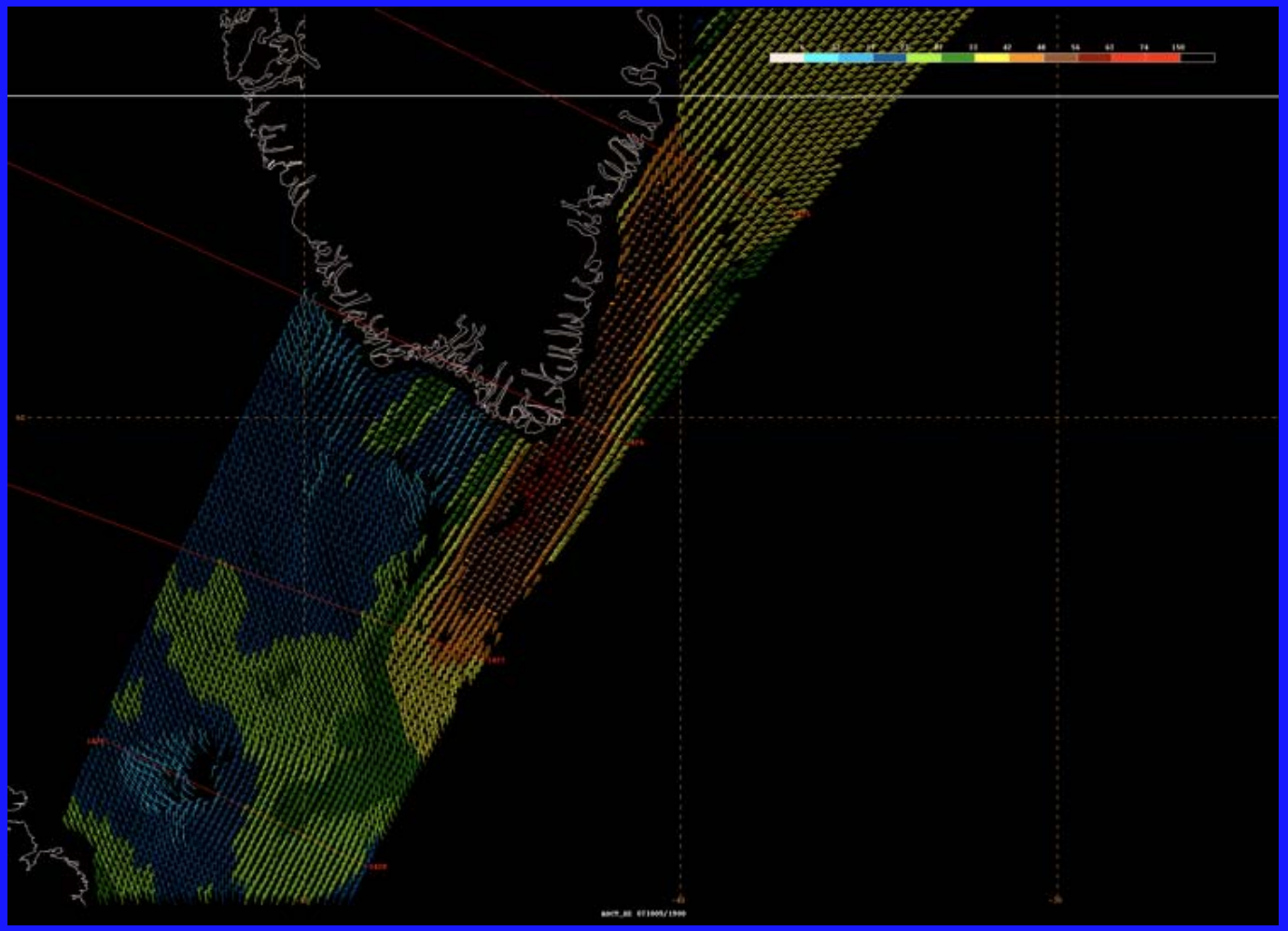


Quikscat returns in 80 – 90 kt range!

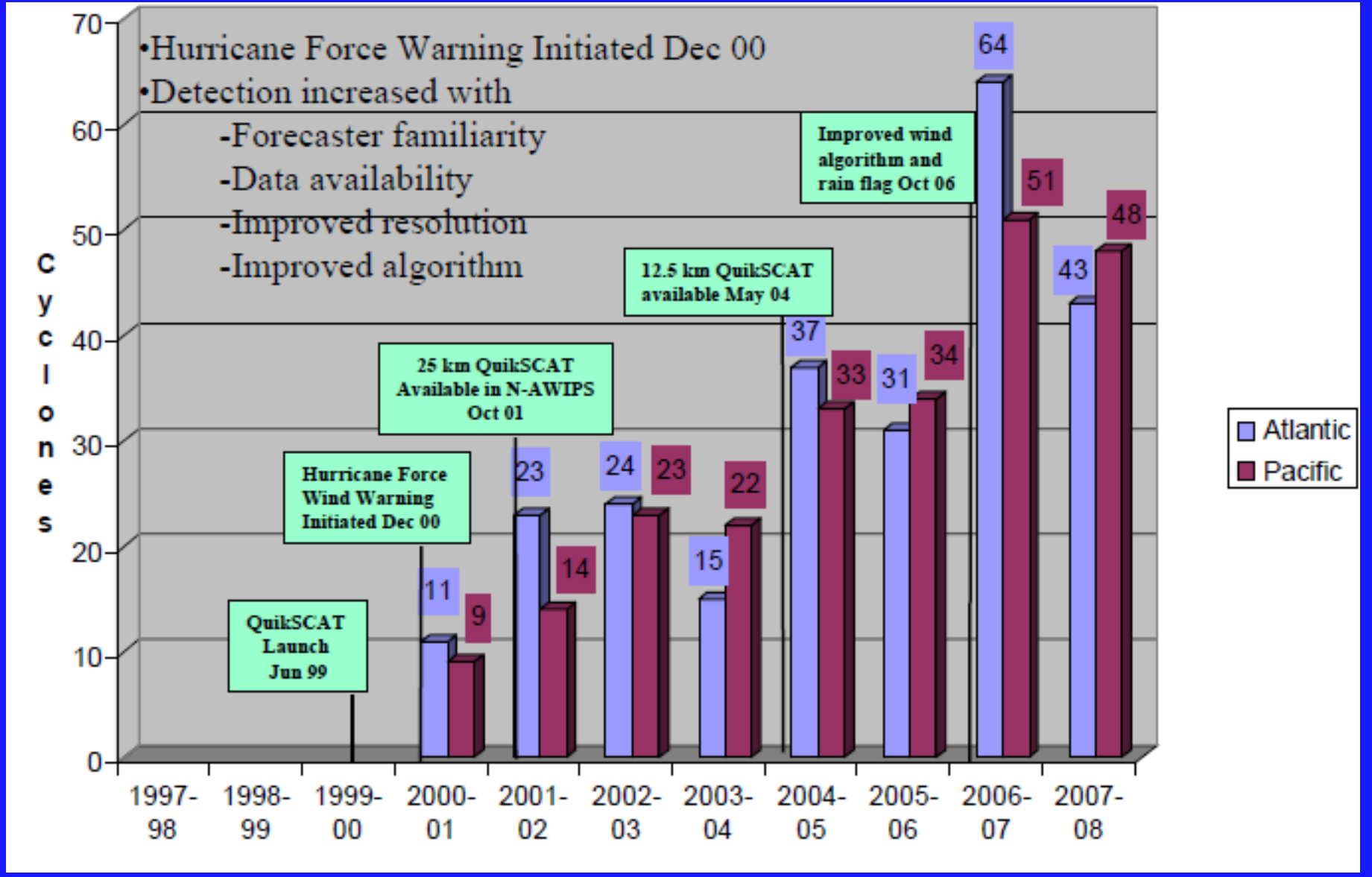
Quikscat + ASCAT = Happy Marine Forecasters!!



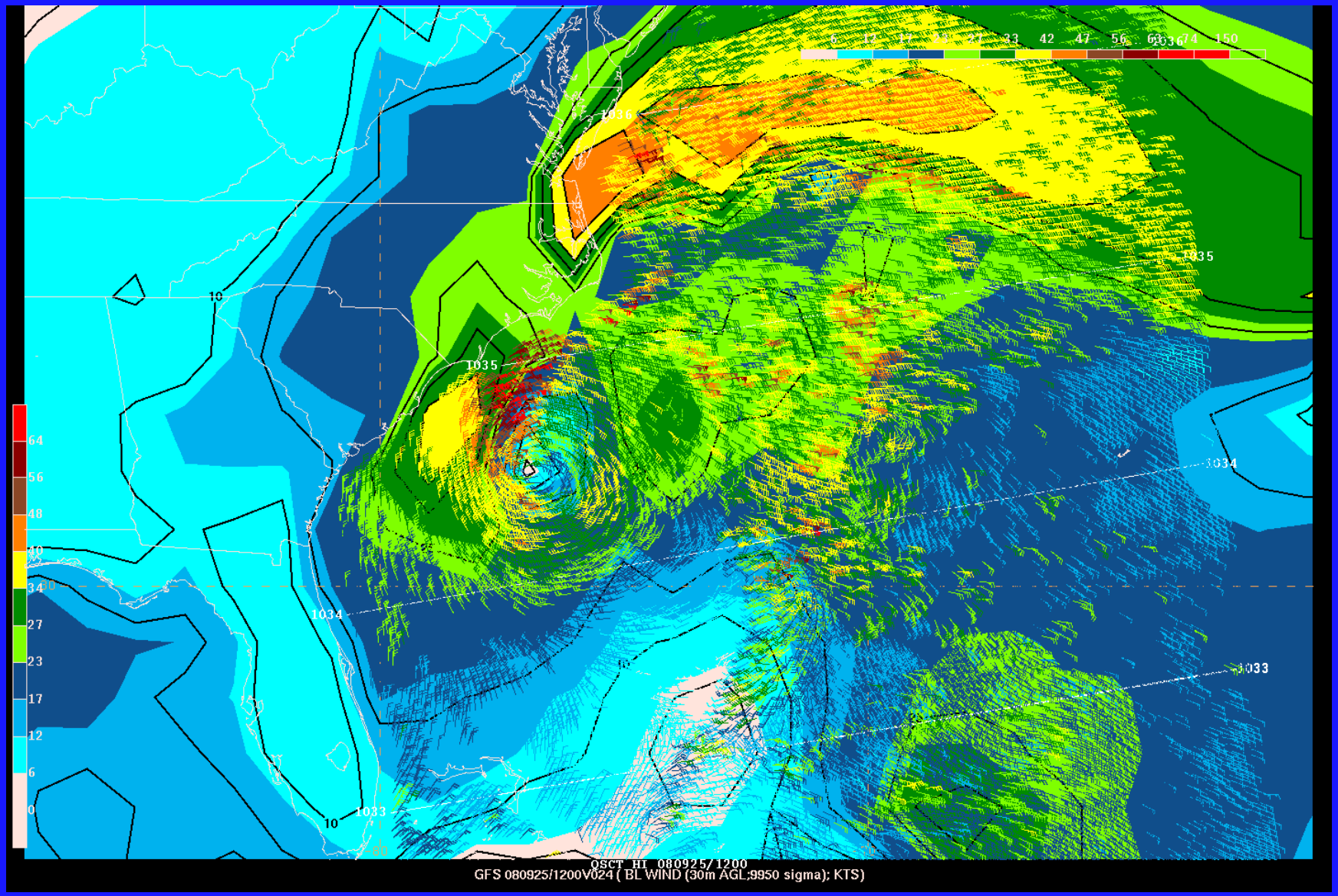


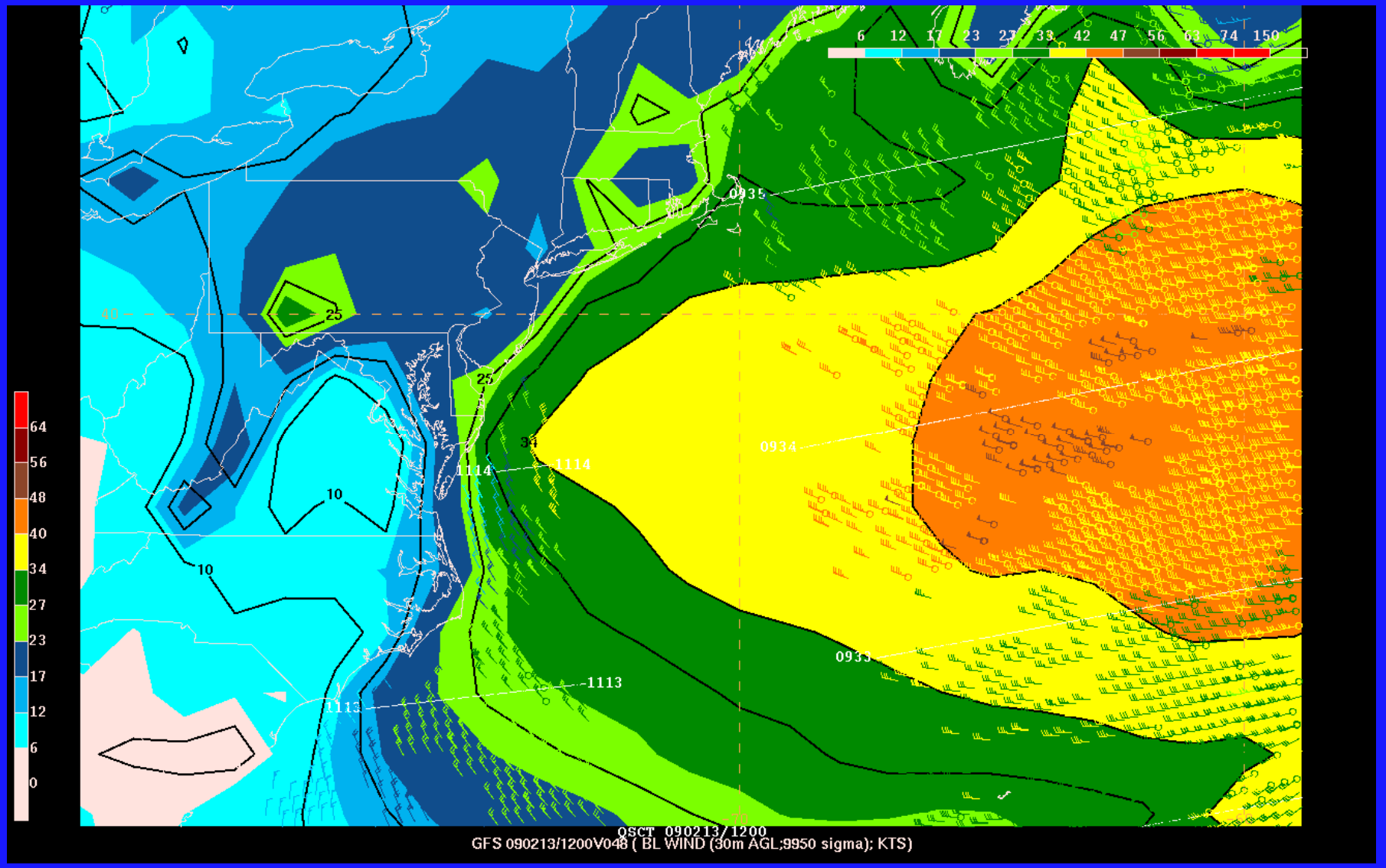


Hurricane Force Extratropical Cyclones Detected Using Quikscat

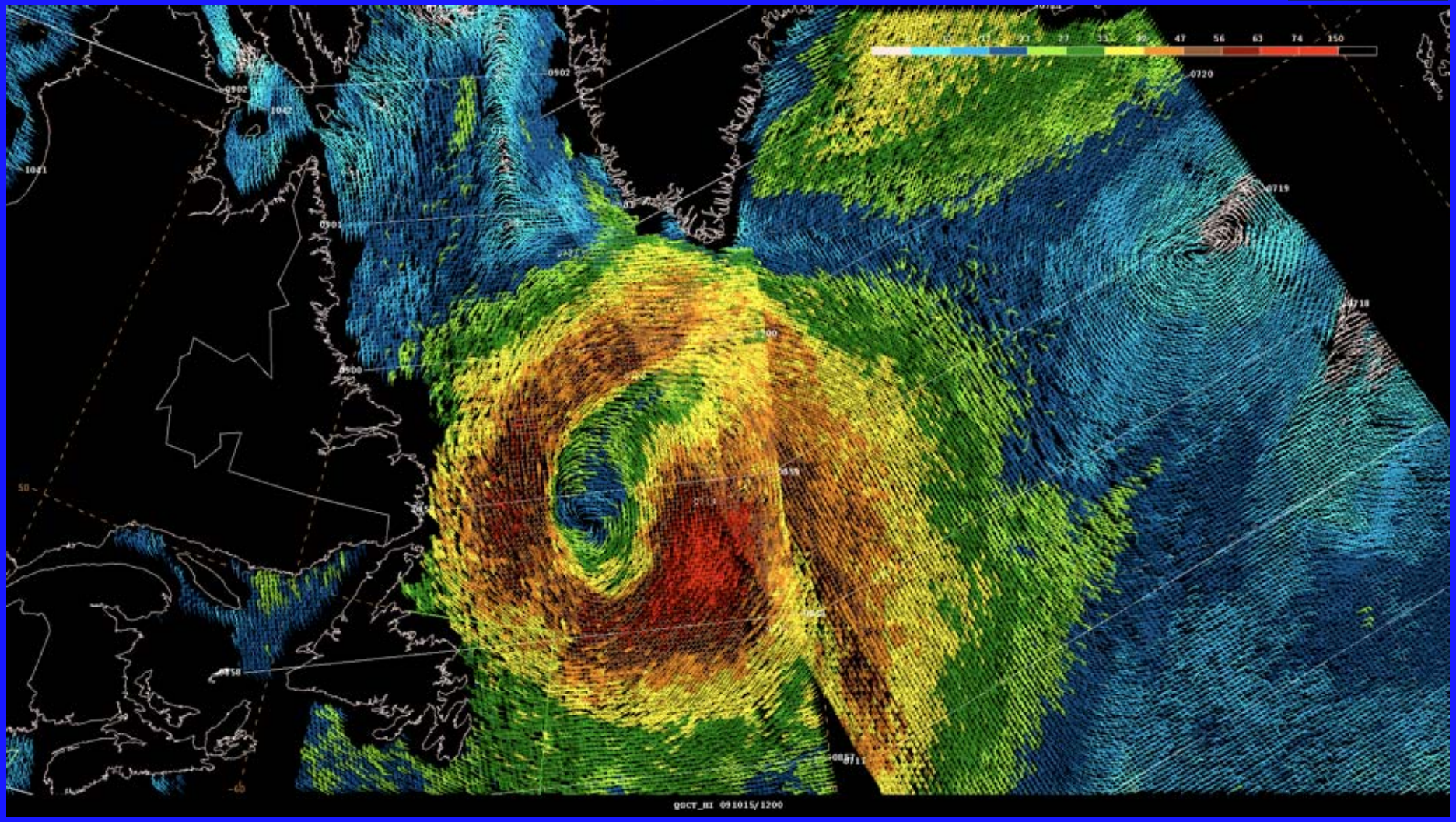


Quikscat vs GFS winds
25 September 2008 1200 UTC

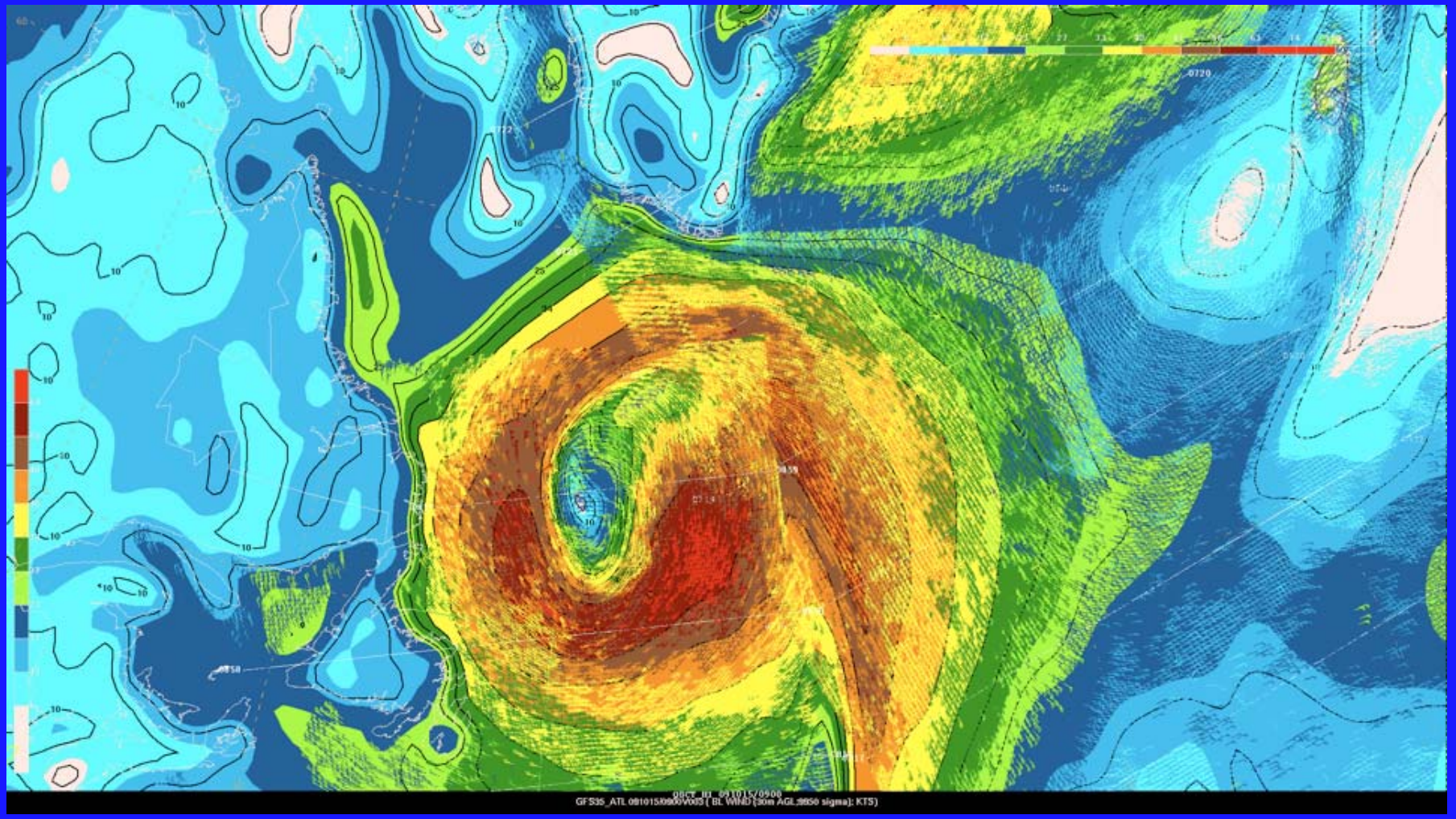



6 12 17 23 27 33 42 47 56 63 74 150
64
56
48
40
34
27
23
17
12
6
0
0935
0934
0933
1114
1113
10
25
QSCT 090213/1200
GFS 090213/1200V048 (BL WIND (30m AGL;9950 sigma); KTS)

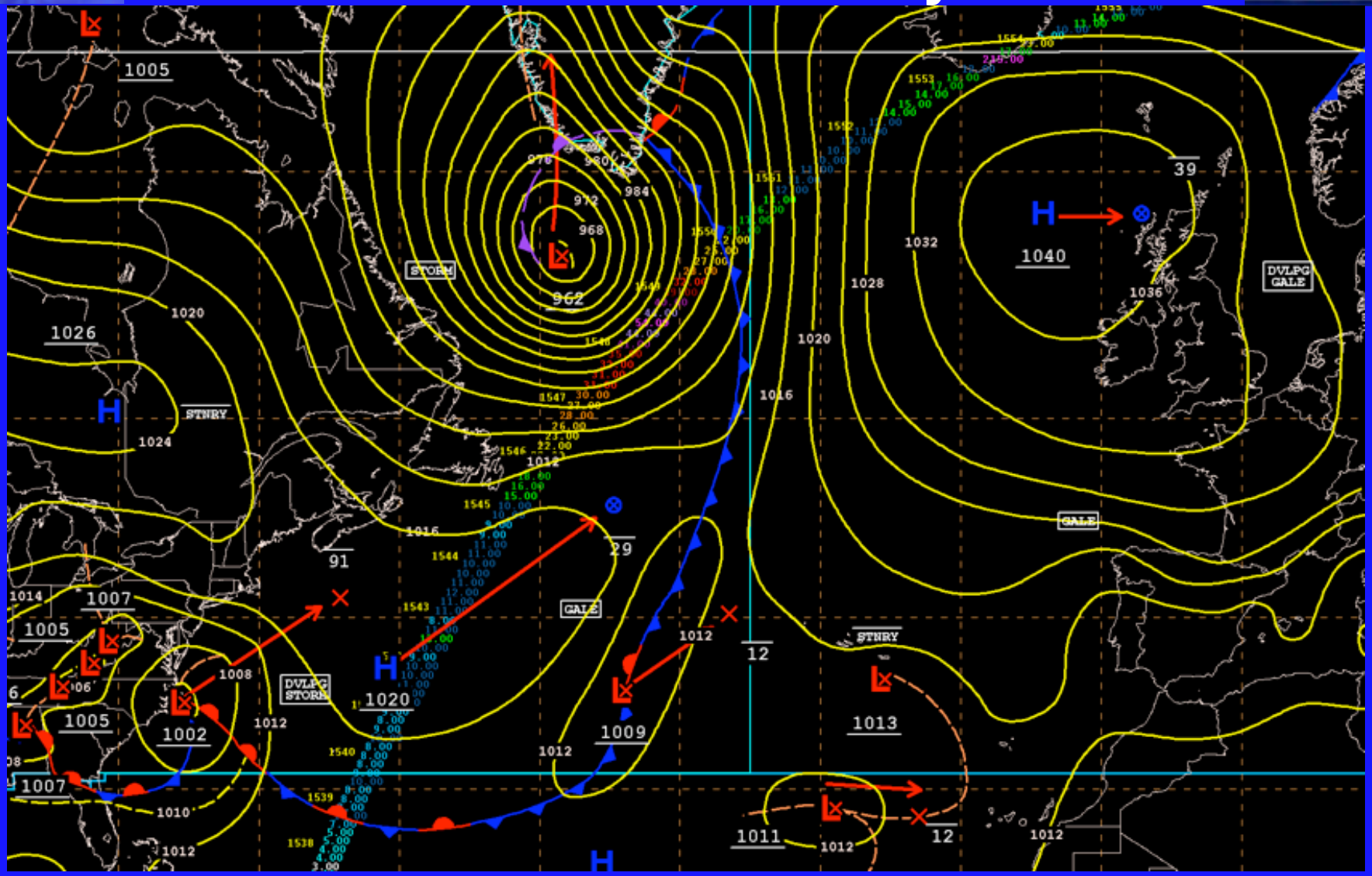
15 October 2009 Hurricane Force Extratropical Cyclone

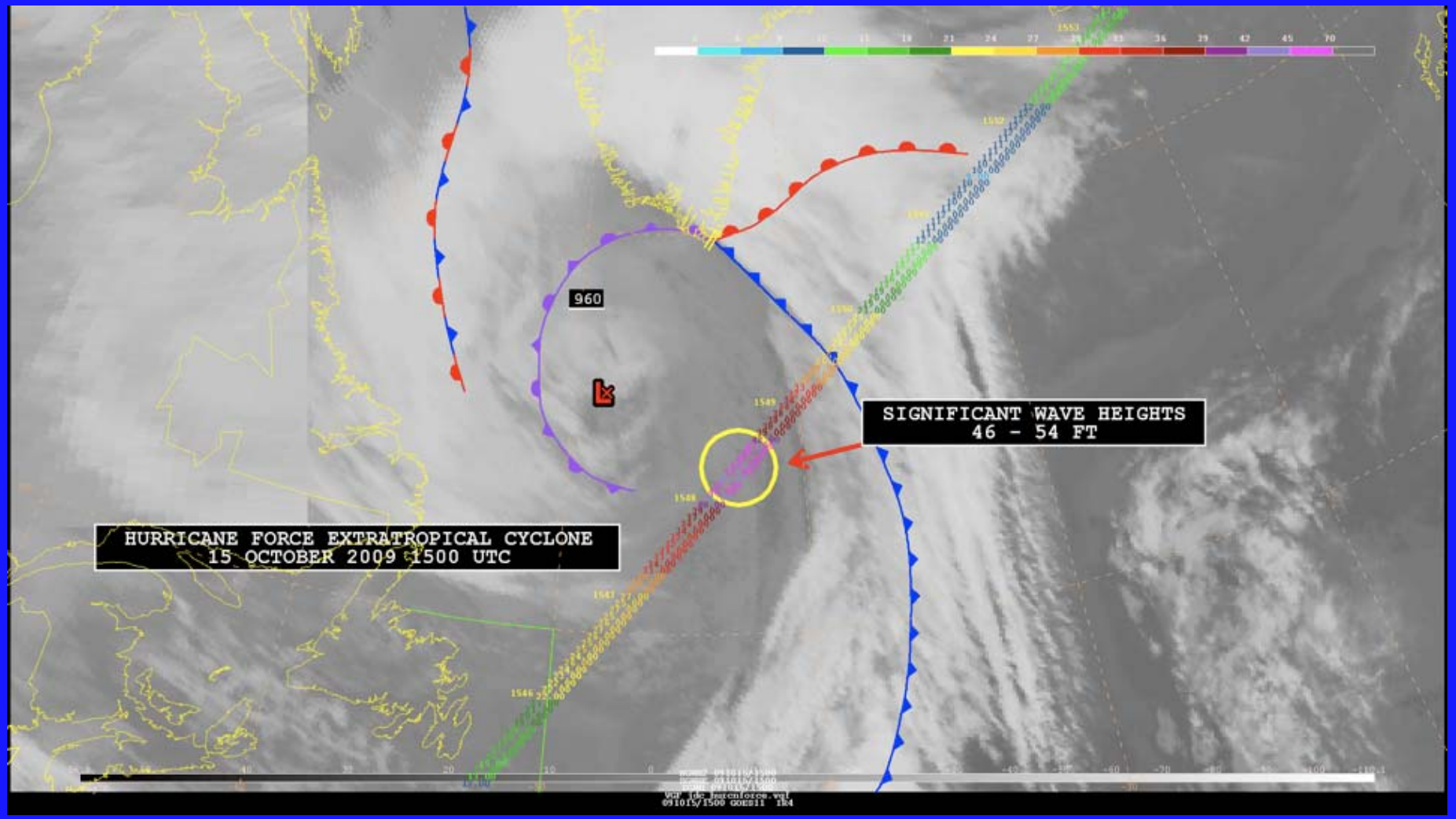


Quikscat vs GFS boundary layer winds for 15 October 2009 HF cyclone

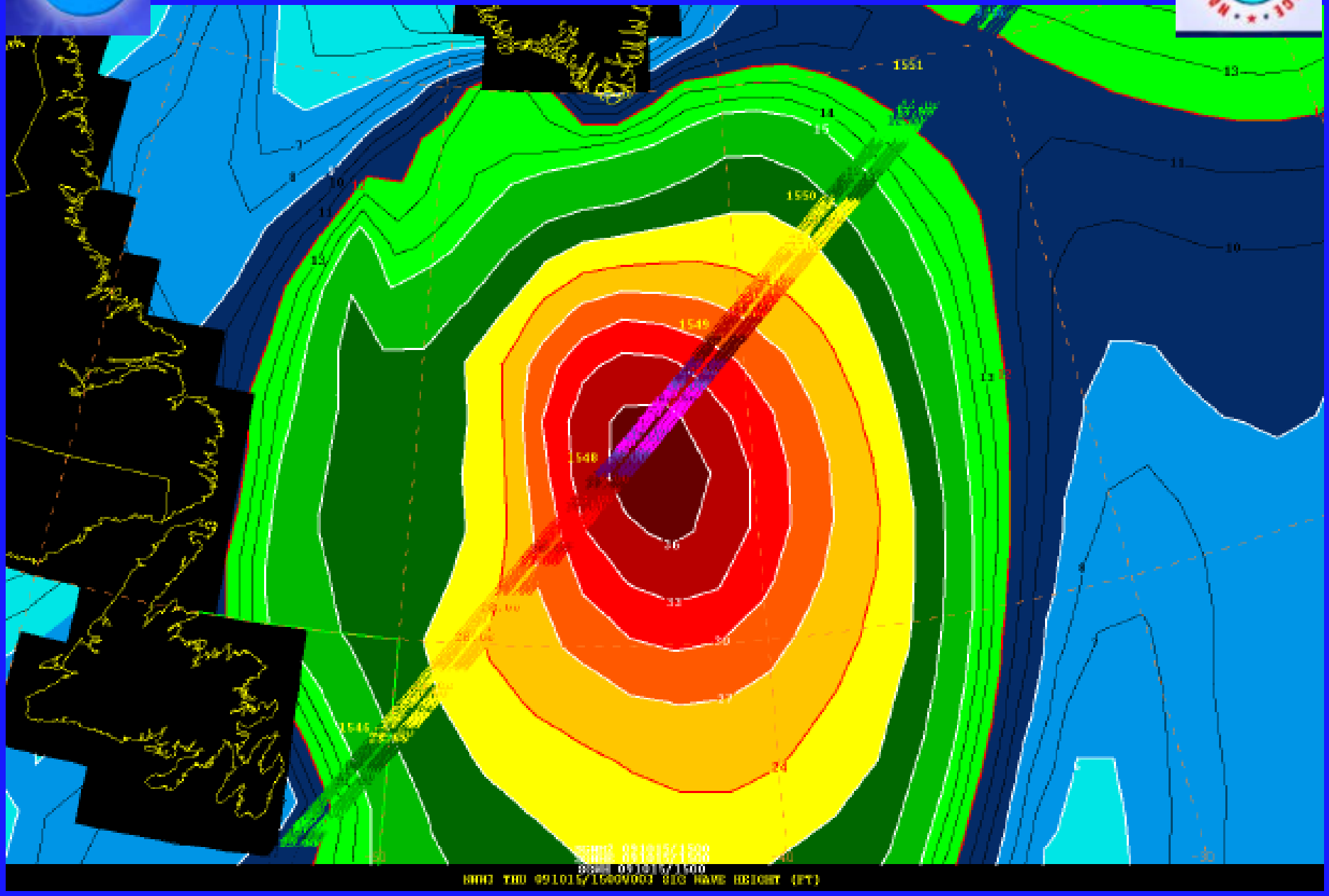


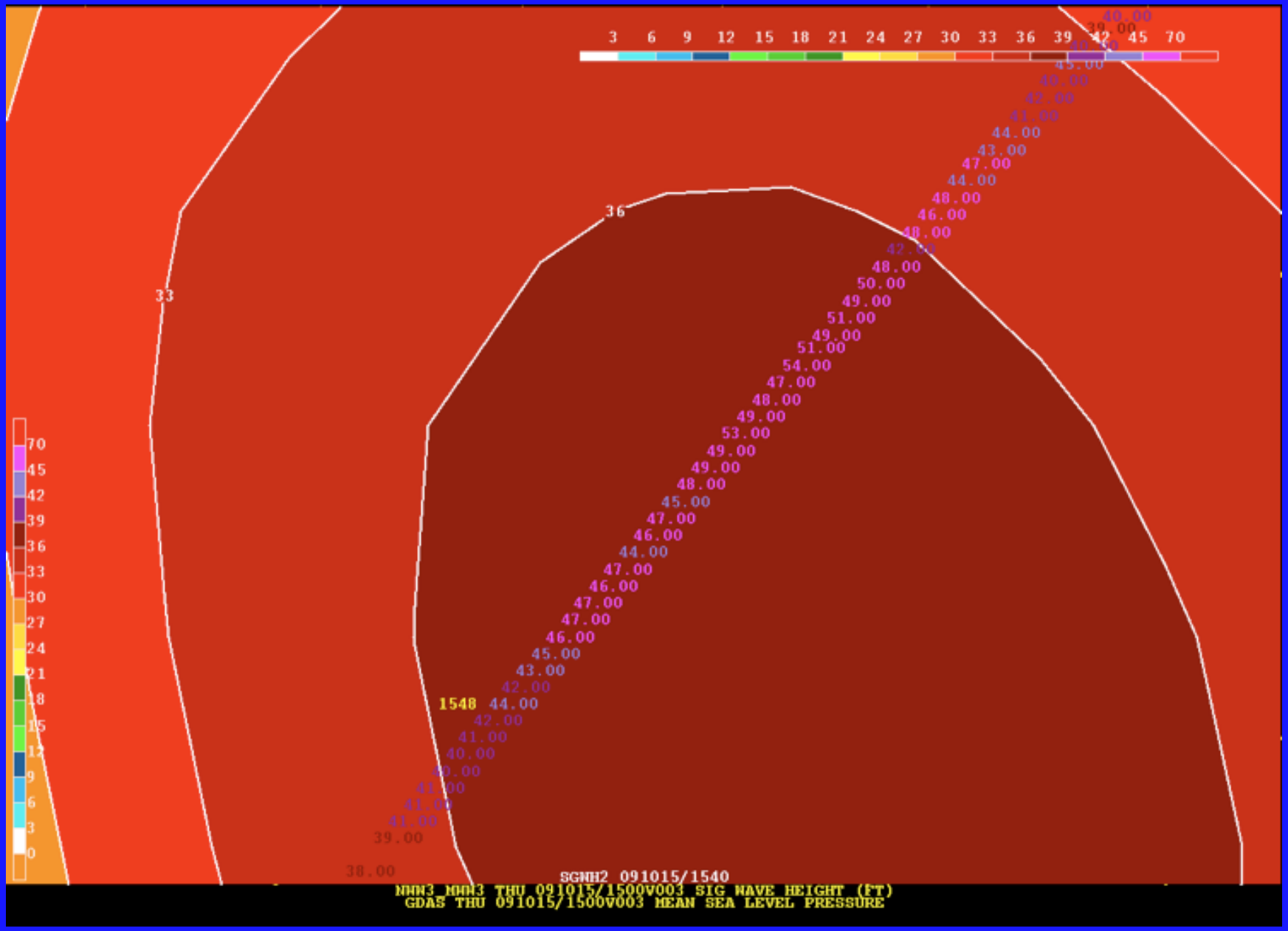
1800 UTC 15 October 2009
Atlantic Surface Analysis




960
SIGNIFICANT WAVE HEIGHTS
46 - 54 FT
HURRICANE FORCE EXTRATROPICAL CYCLONE
15 OCTOBER 2009 1500 UTC

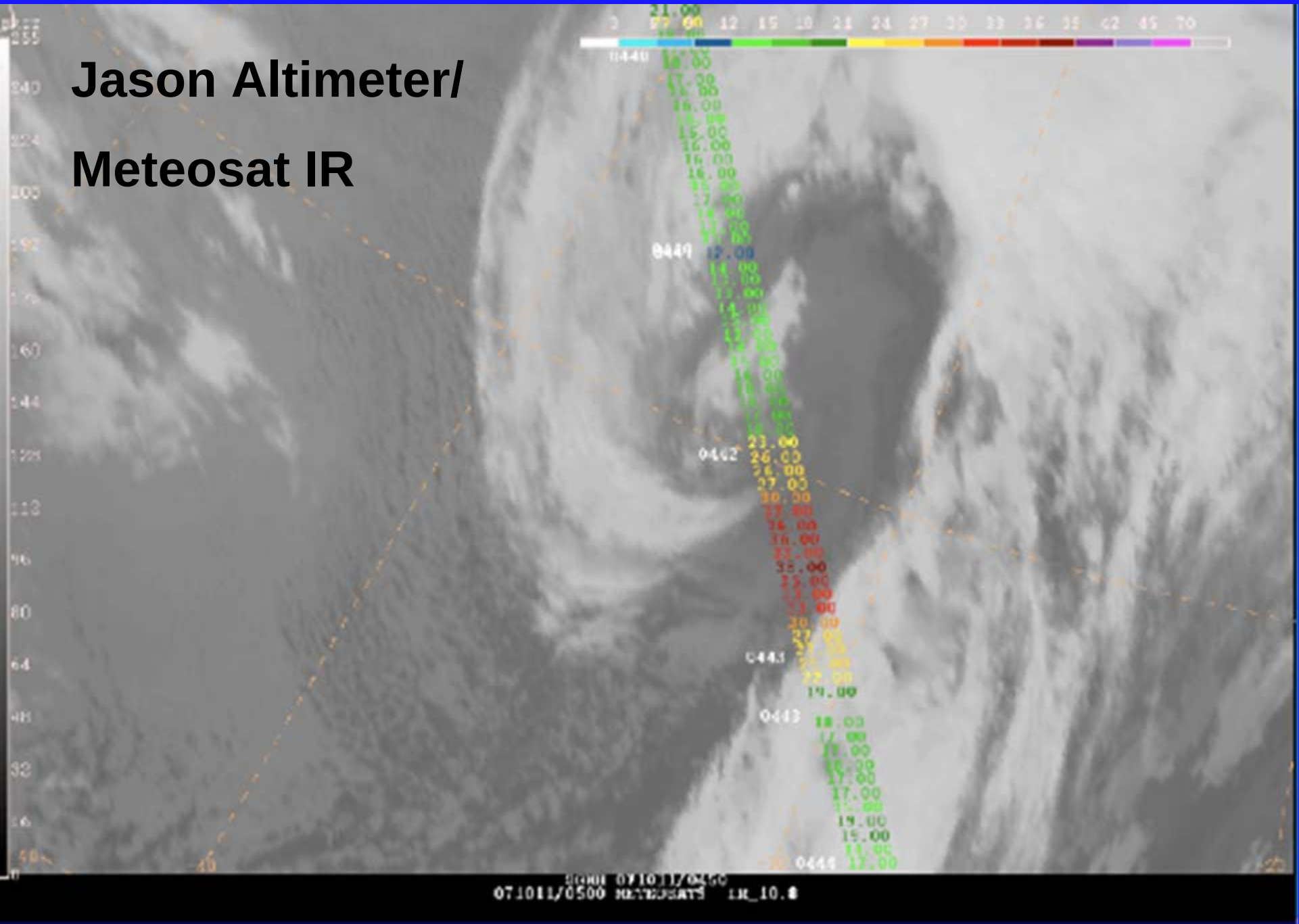
Jason Altimeter Pass vs NOAA Wavewatch III

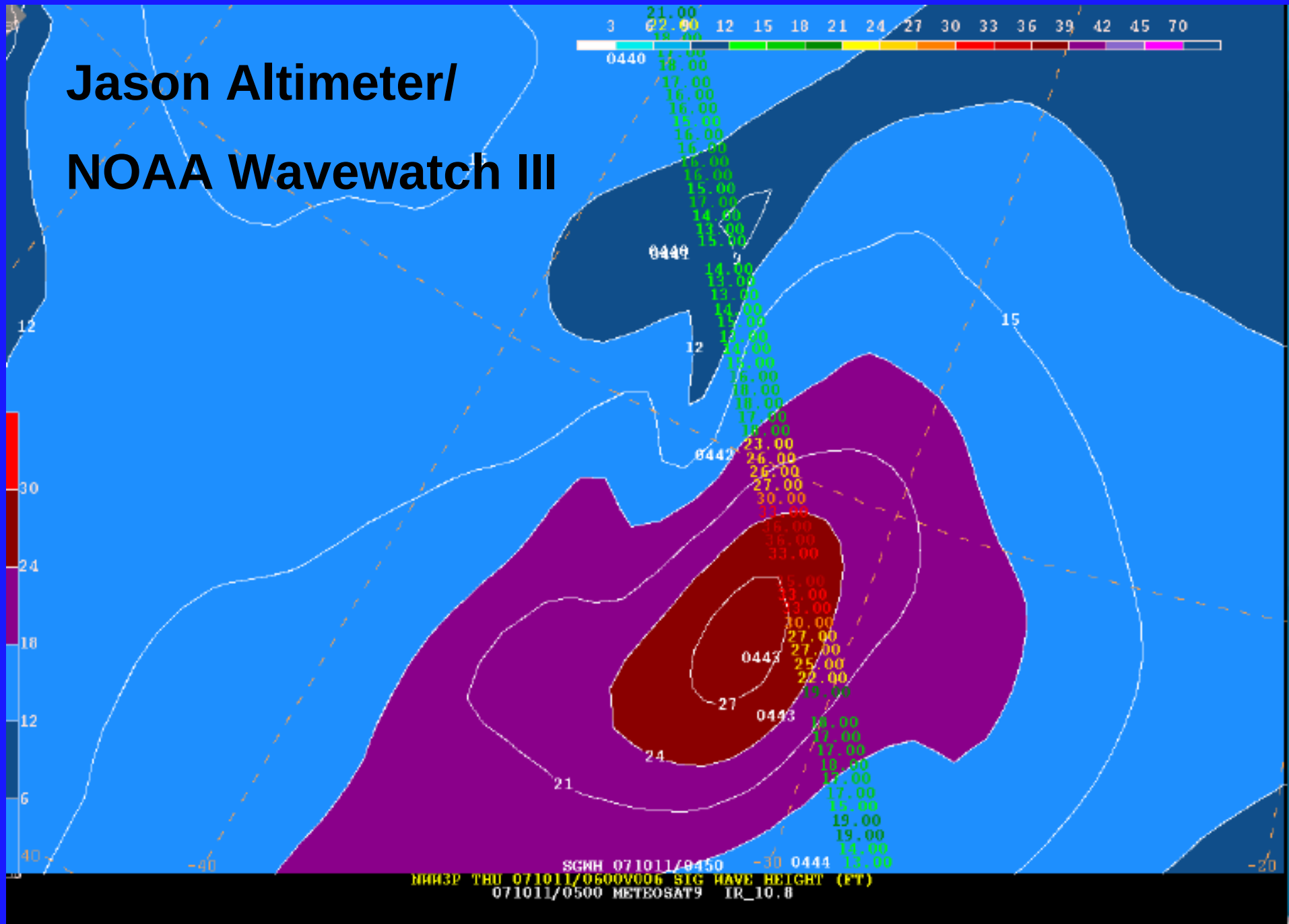



3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 70
70 45 42 39 36 33 30 27 24 21 18 15 12 9 6 3 0
36
33
1548 44.00
SGWH2 091015/1540
NWW3 NWW3 THU 091015/1500V003 SIG WAVE HEIGHT (FT)
GDAS THU 091015/1500V003 MEAN SEA LEVEL PRESSURE

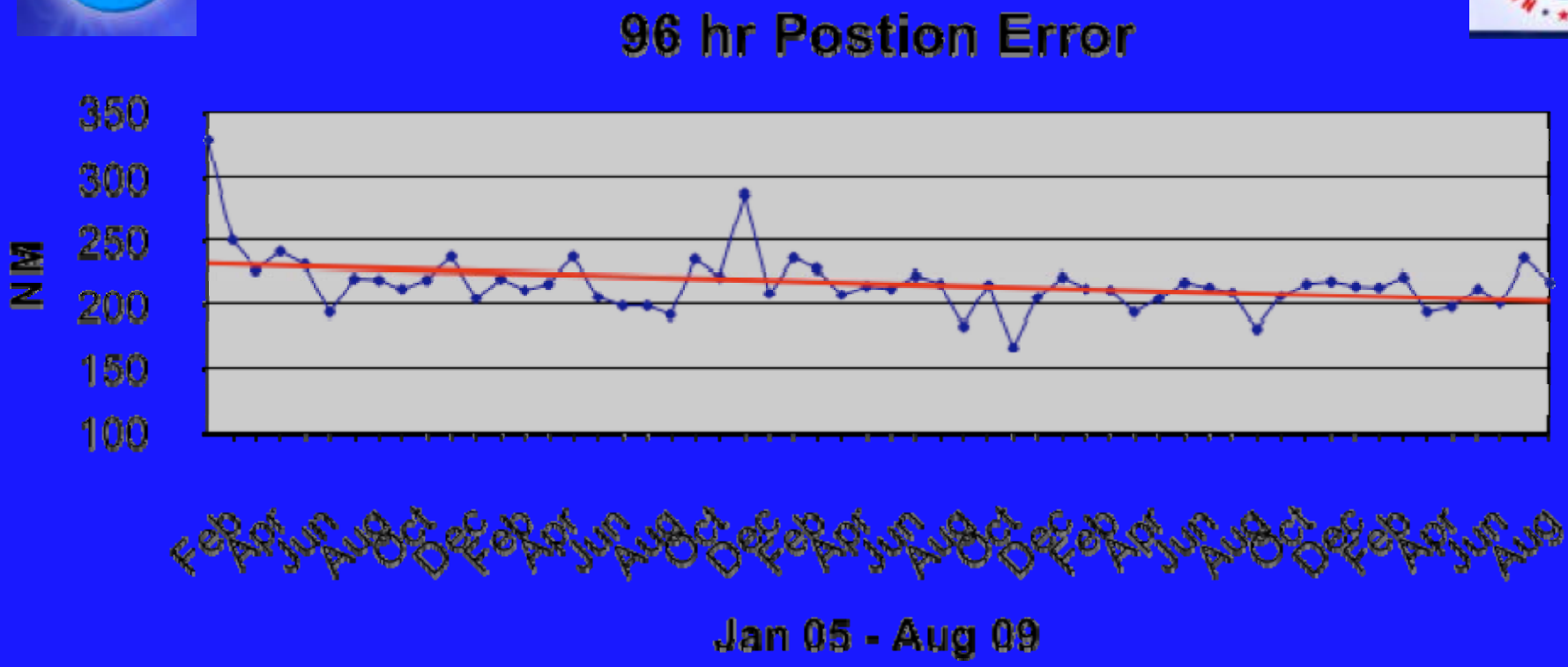
Jason Altimeter/

Meteosat IR

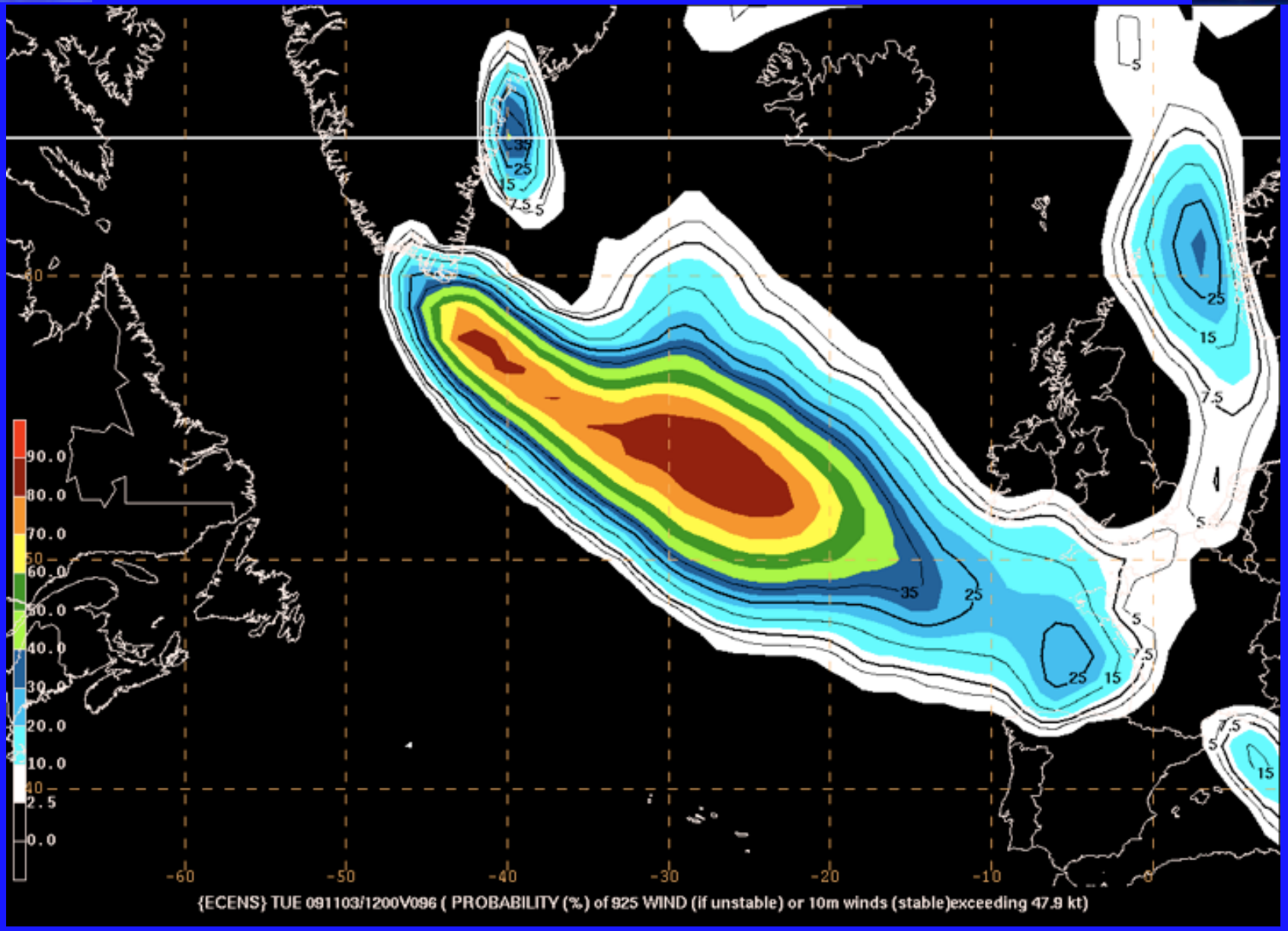



Jason Altimeter/
NOAA Wavewatch III
3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 70
0440
0441
0442
0443
0444
12
15
21
24
27
30
-40
-30
-20
SGWH 071011/0450
NWW3P THU 071011/0600V006 SIG WAVE HEIGHT (FT)
071011/0500 METEOSAT9 IR_10.8

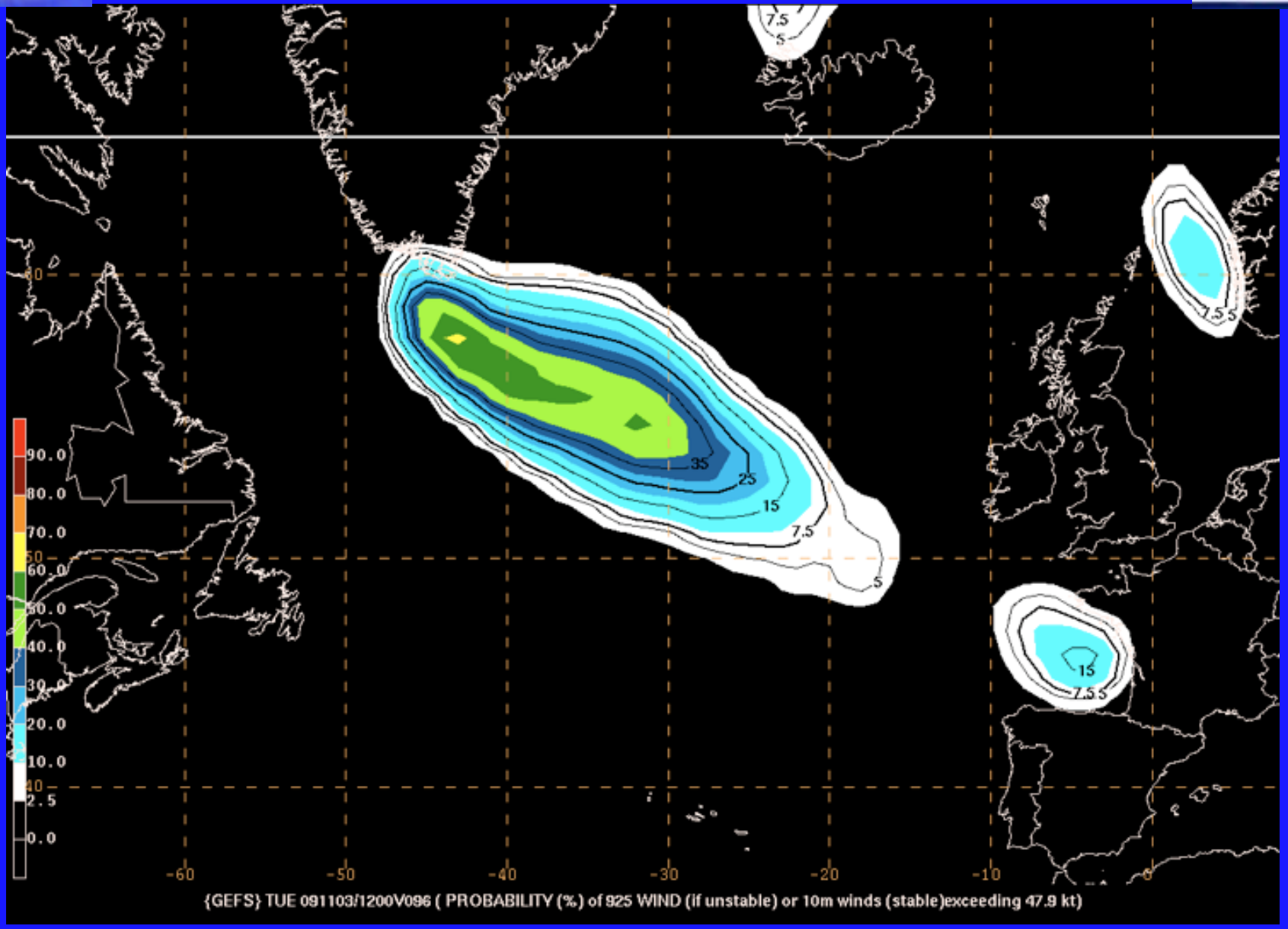
North Atlantic/North Pacific



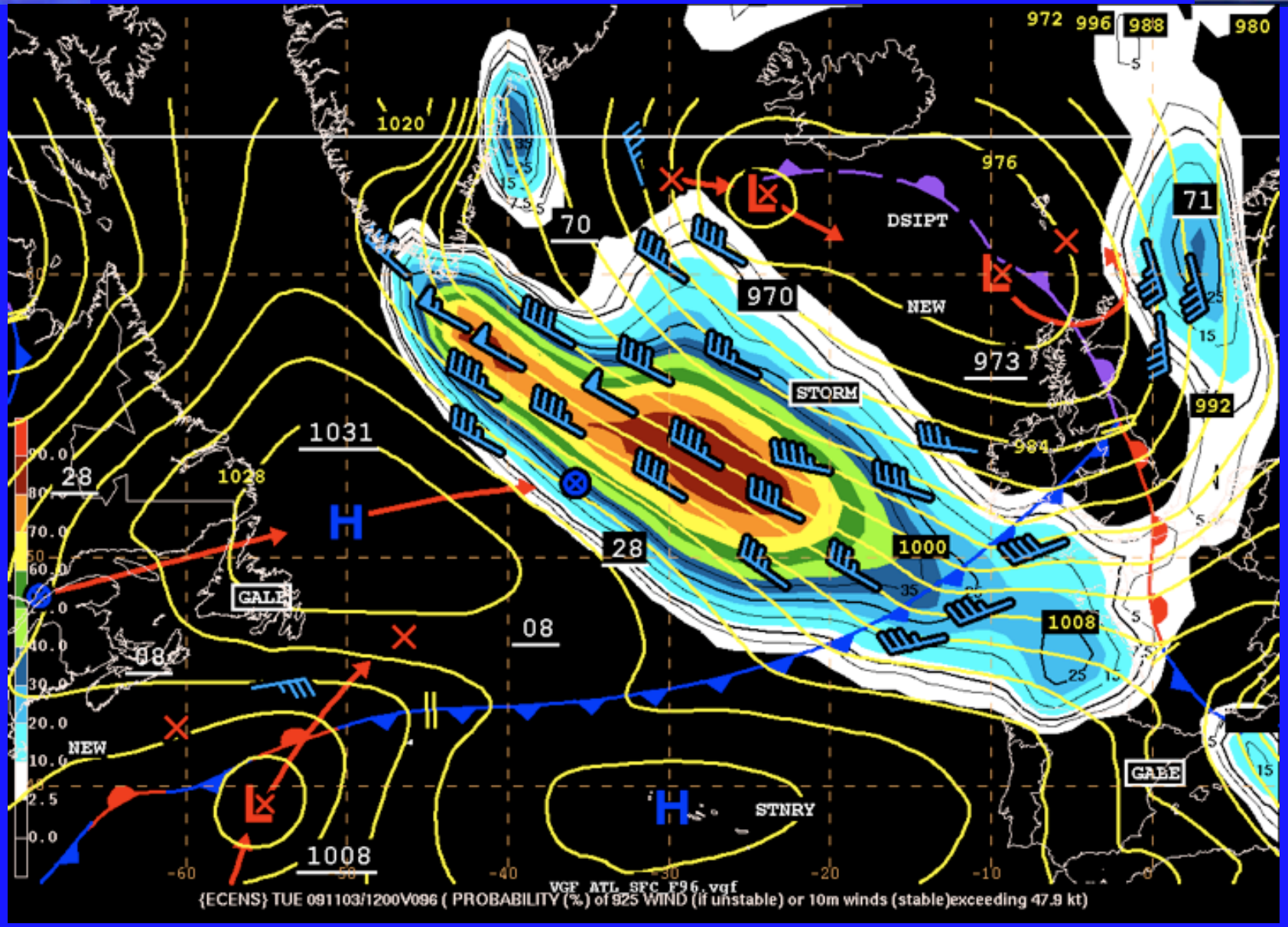
‘Probability’ of ECMWF EFS members’ winds



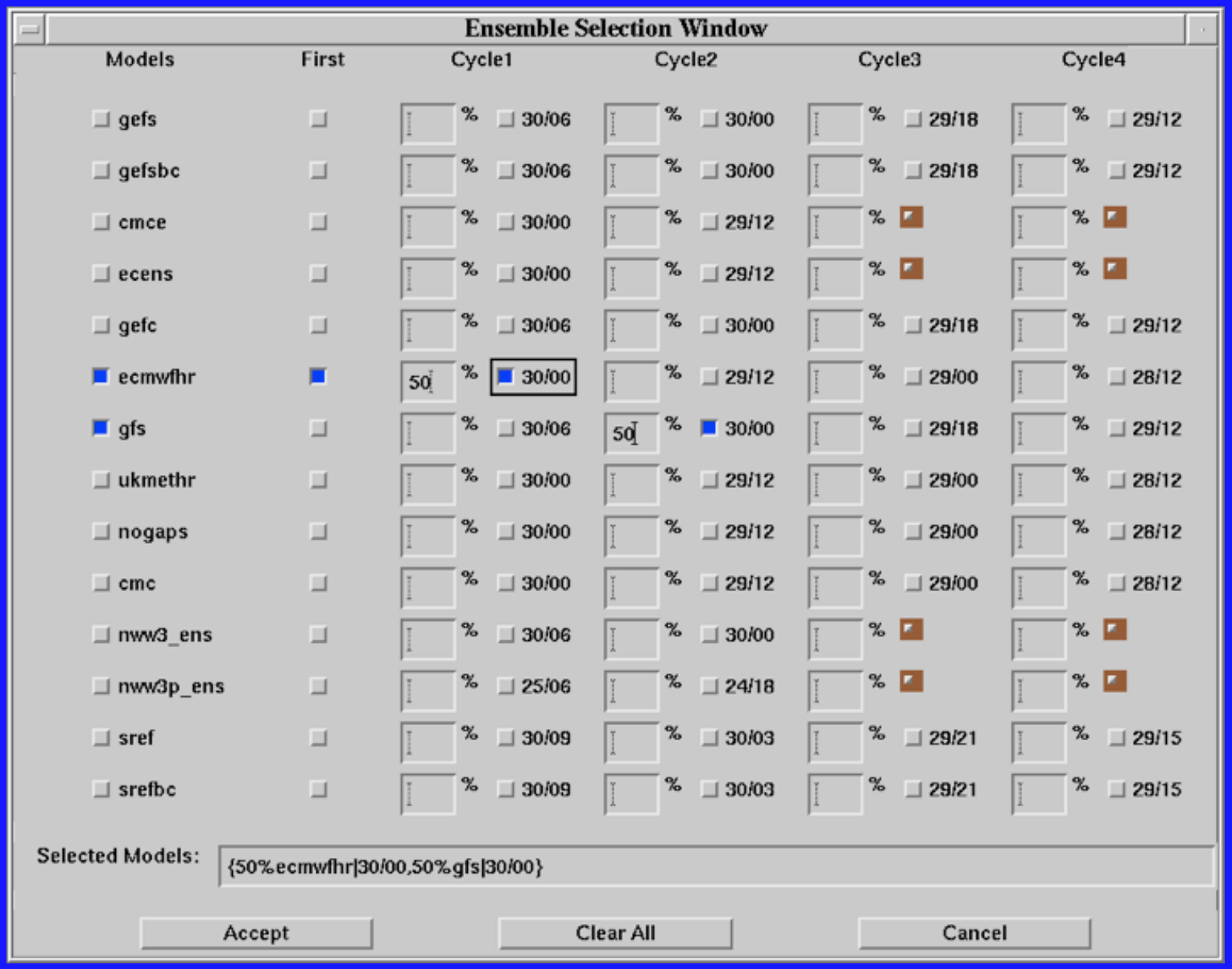
‘Probability’ of GEFS members’ winds

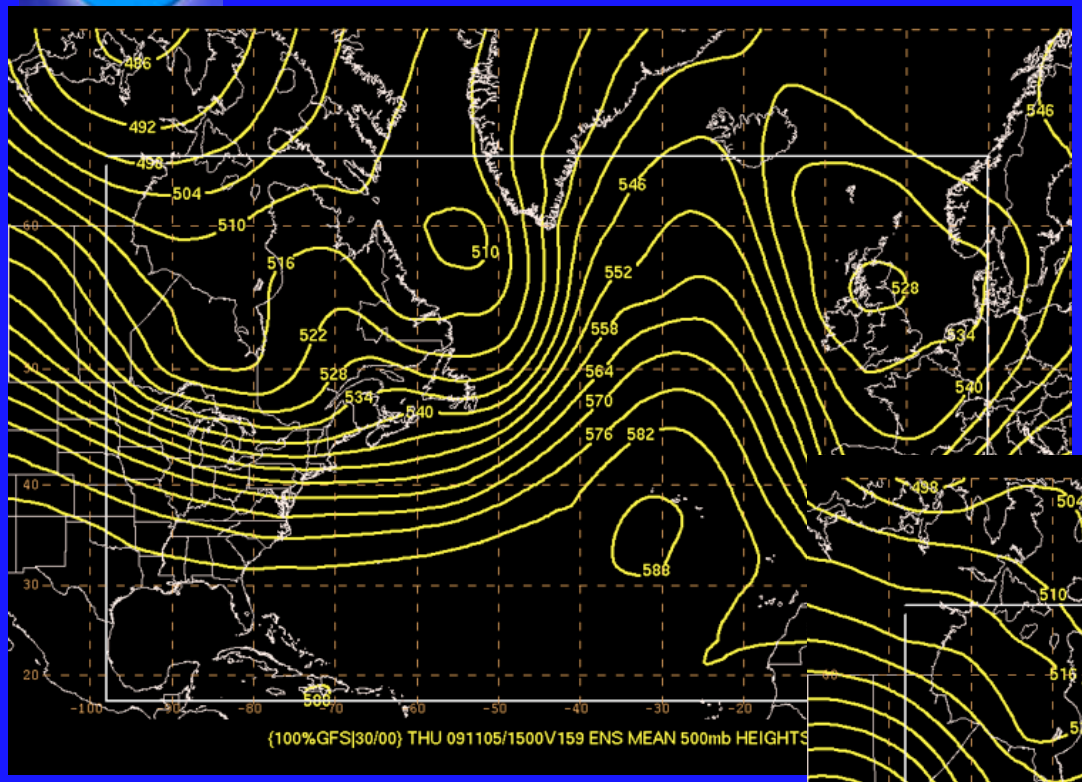


‘Probability’ of ECMWF EFS members’ winds with OPC Day 4 Forecast



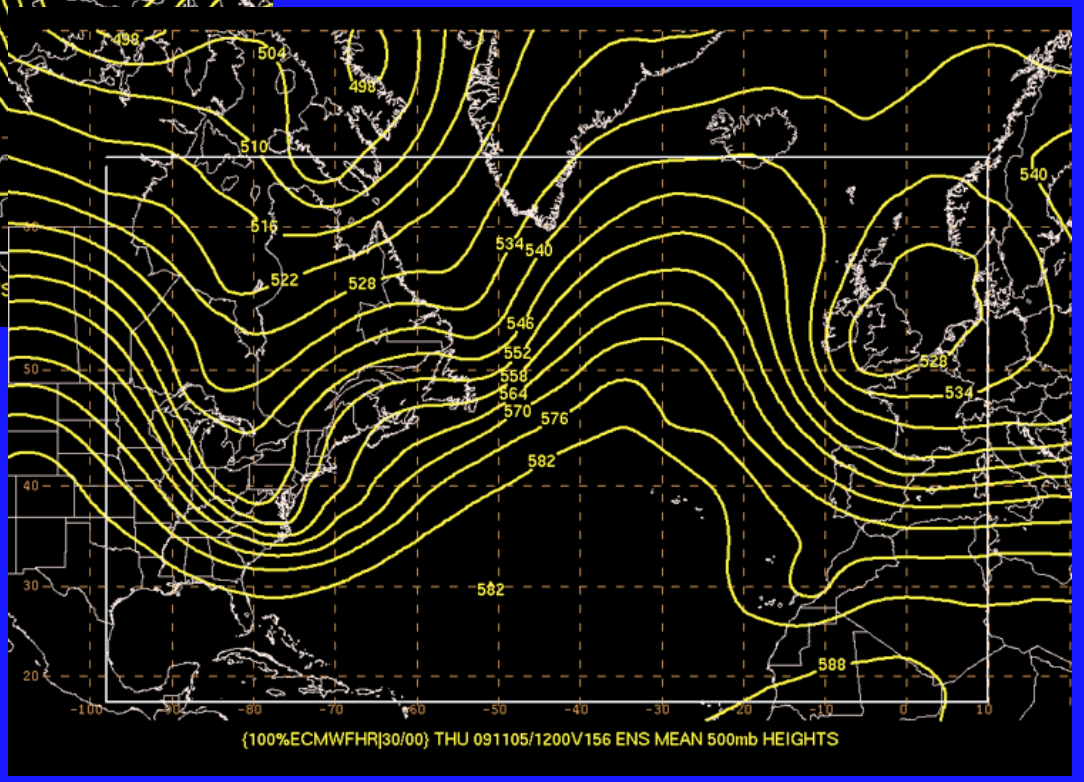
Model Blender Menu from GEMPAK NMAP2



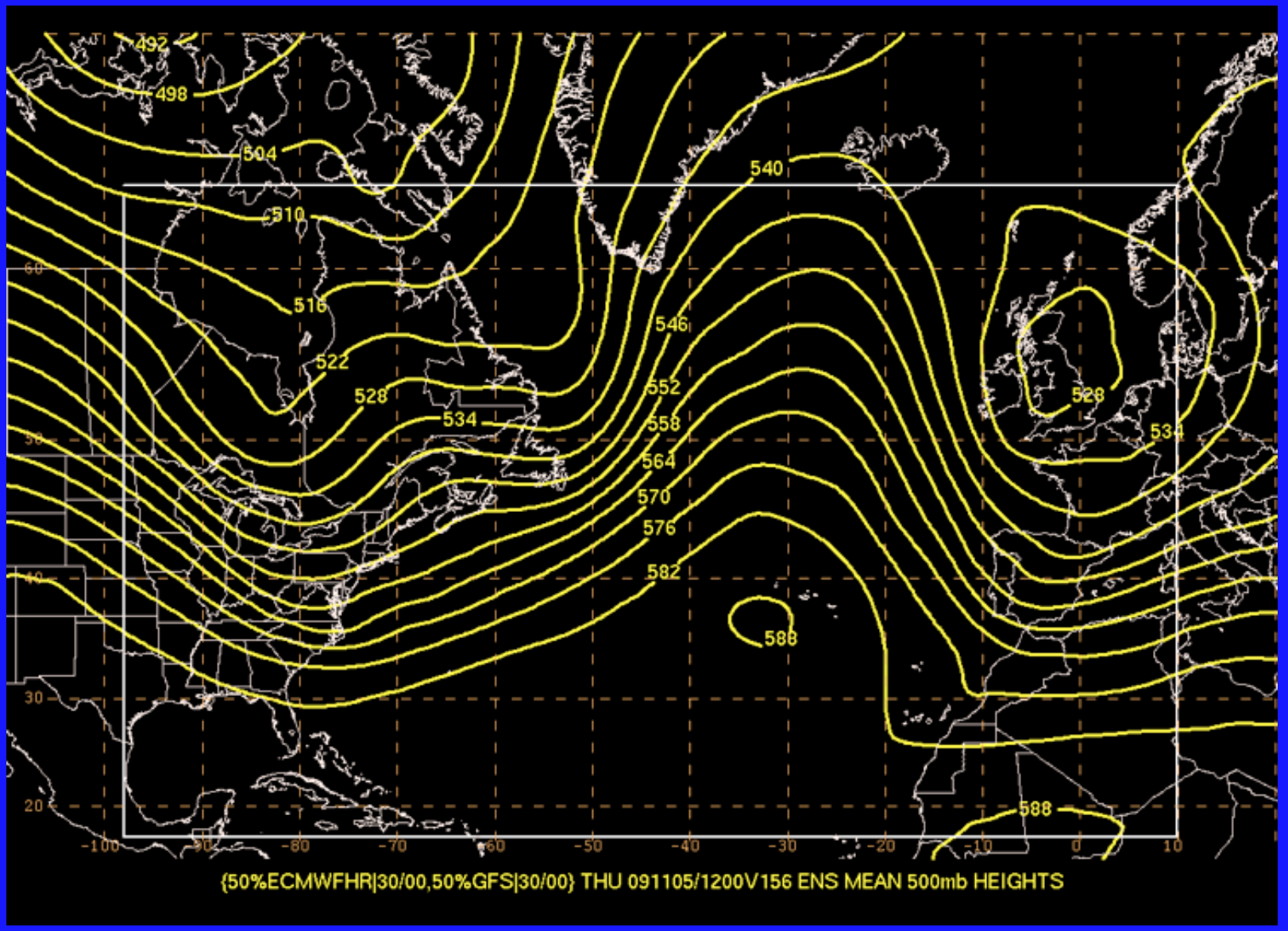

{100%GFS|30/00} THU 091105/1500V159 ENS MEAN 500mb HEIGHTS

GFS

ECMWF


{100%ECMWFHR|30/00} THU 091105/1200V156 ENS MEAN 500mb HEIGHTS

50/50 Blend between GFS and ECMWF 500mb Heights



NWS Ocean Prediction Center Science Priorities

- Improved numerical weather prediction of marine boundary layer
- Improved numerical weather prediction of explosive extratropical cyclogenesis
- Improved numerical weather prediction of hazardous mesoscale marine conditions in the vicinity of the Gulf Stream
- Improved techniques for use of ensemble products in the forecast process

Questions/Comments

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