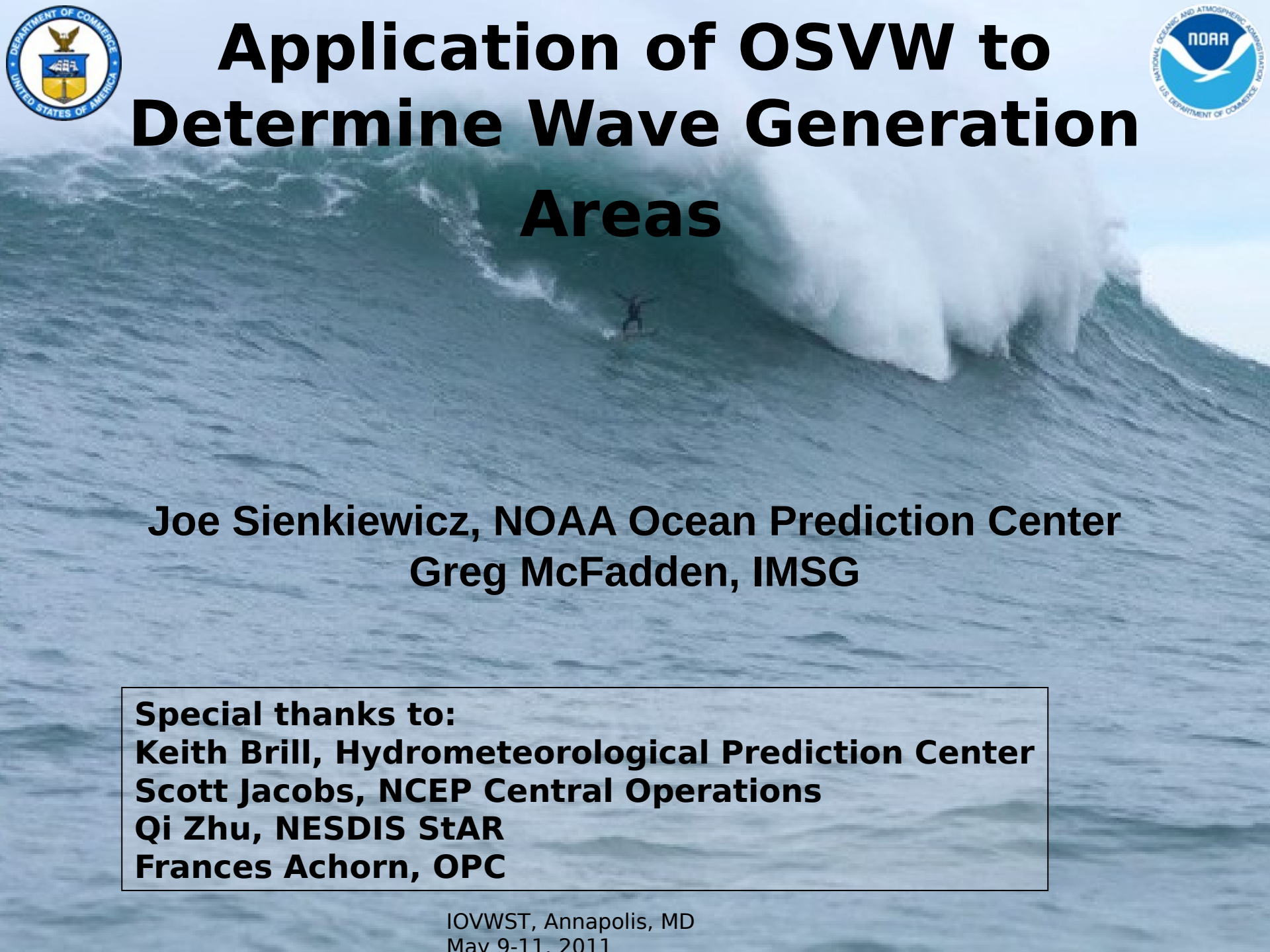
Application of OSVW to Determine Wave Generation Areas



Joe Sienkiewicz, NOAA Ocean Prediction Center
Greg McFadden, IMSG

Special thanks to:
Keith Brill, Hydrometeorological Prediction Center
Scott Jacobs, NCEP Central Operations
Qi Zhu, NESDIS StAR
Frances Achorn, OPC

IOVWST, Annapolis, MD
May 9-11, 2011

In search of wind fetch

- NOAA/NWS - increasing focus on coastal effects: near shore waves, **rip currents**, inlets, water level, inundation

- ***GOAL*** – objective method to estimate the magnitude of fetch for favored wave generation areas relative to ***specific*** coastal sites
  - Applicable to both NWP and gridded OSVW products
  - Use as a diagnostic by comparing remotely sensed and NWP sources
  - Give forecasters an early indication of potential threat, validity of NWP wind and wave predictions

In search of wind fetch

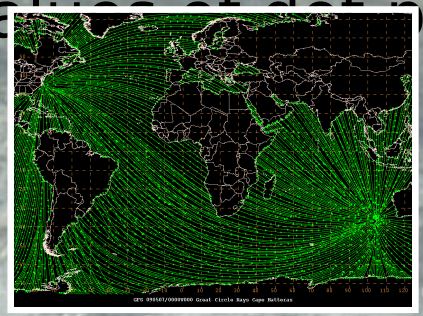
- ***Thoughts***
  - Forecasters rely ***very*** heavily on NWP sources for wave forecasts (weakness is NWP winds)
  - Present methods
    - subjective, limited scope (local)
    - inconsistent between offices/forecasters
  - Observing network (buoys) focused on nearshore and coastal areas (limits warning time for U.S.; other areas - no warning)
  - Opportunity to:
  - Optimize use of OSVW (full vector, global)
  - Extend awareness of wave generation and threat potential seaward
  - Provide objective and consistent methodology to understand and estimate wind/wave system

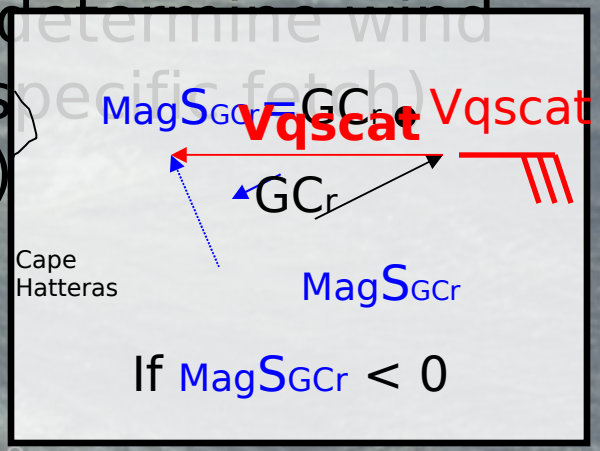
Approach

- Developed a function in GEMPAK to calculate unit vectors of great circle paths emanating from a given Lat, Lon point (Great Circle Rays)

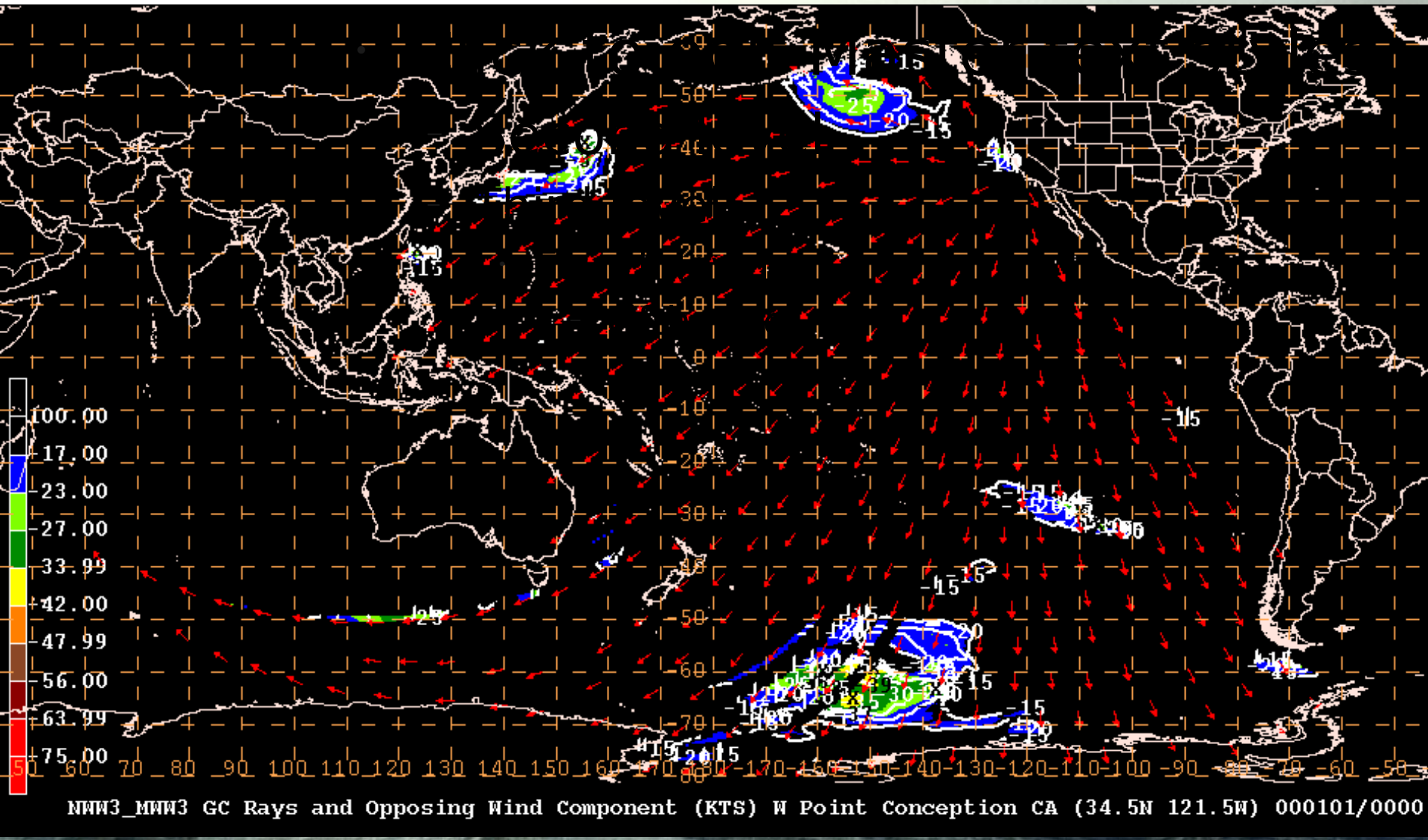
- Terminate rays when strike land (GEMPAK function)

- Apply unit vector field to gridded sources of wind (NWP and/or remotely sensed OSVW) to determine wind component opposing GC ray (site specific fetch)
  (negative values of dot product)

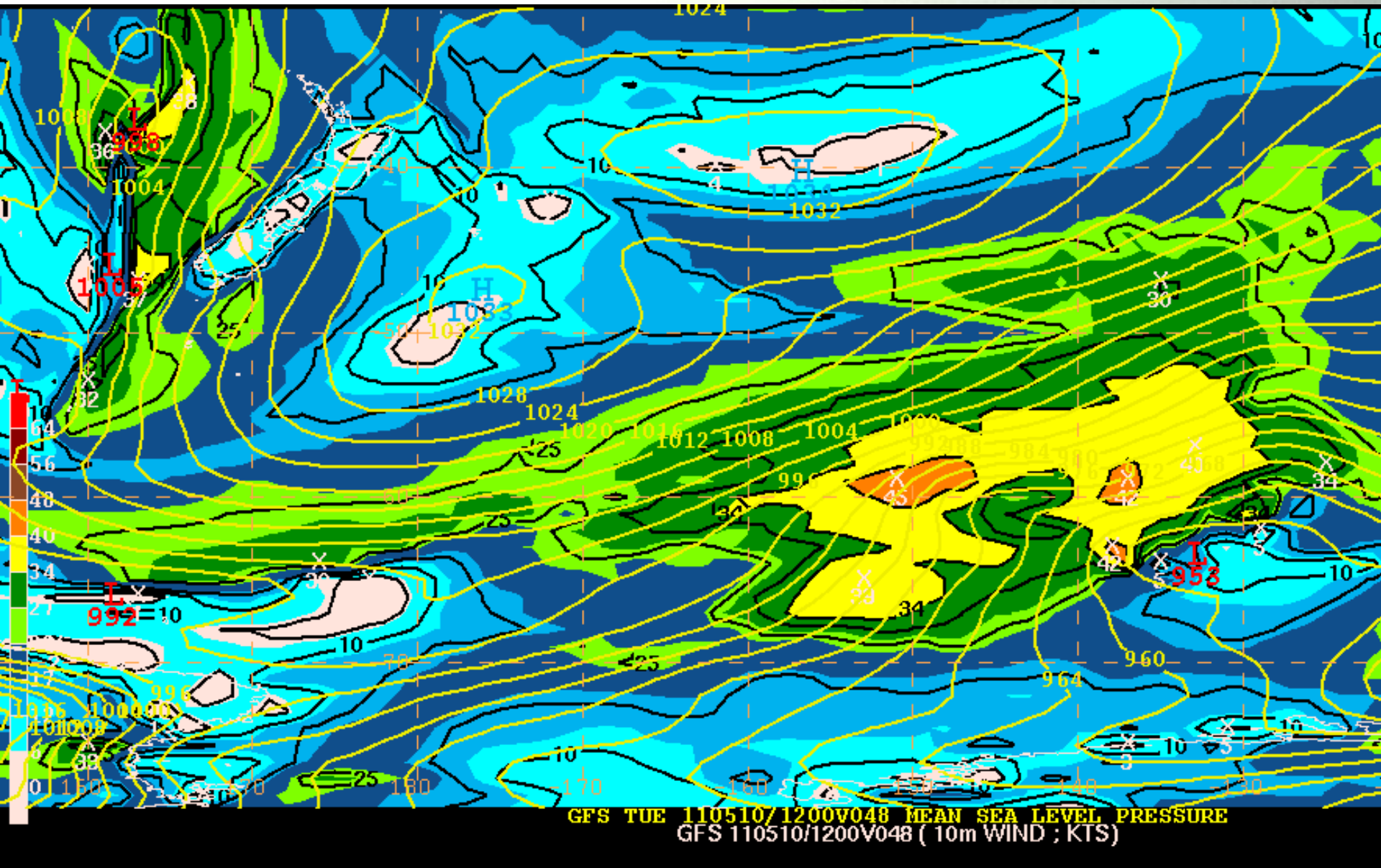




Fetch – Point Conception, CA



Fetch – Point Conception, CA



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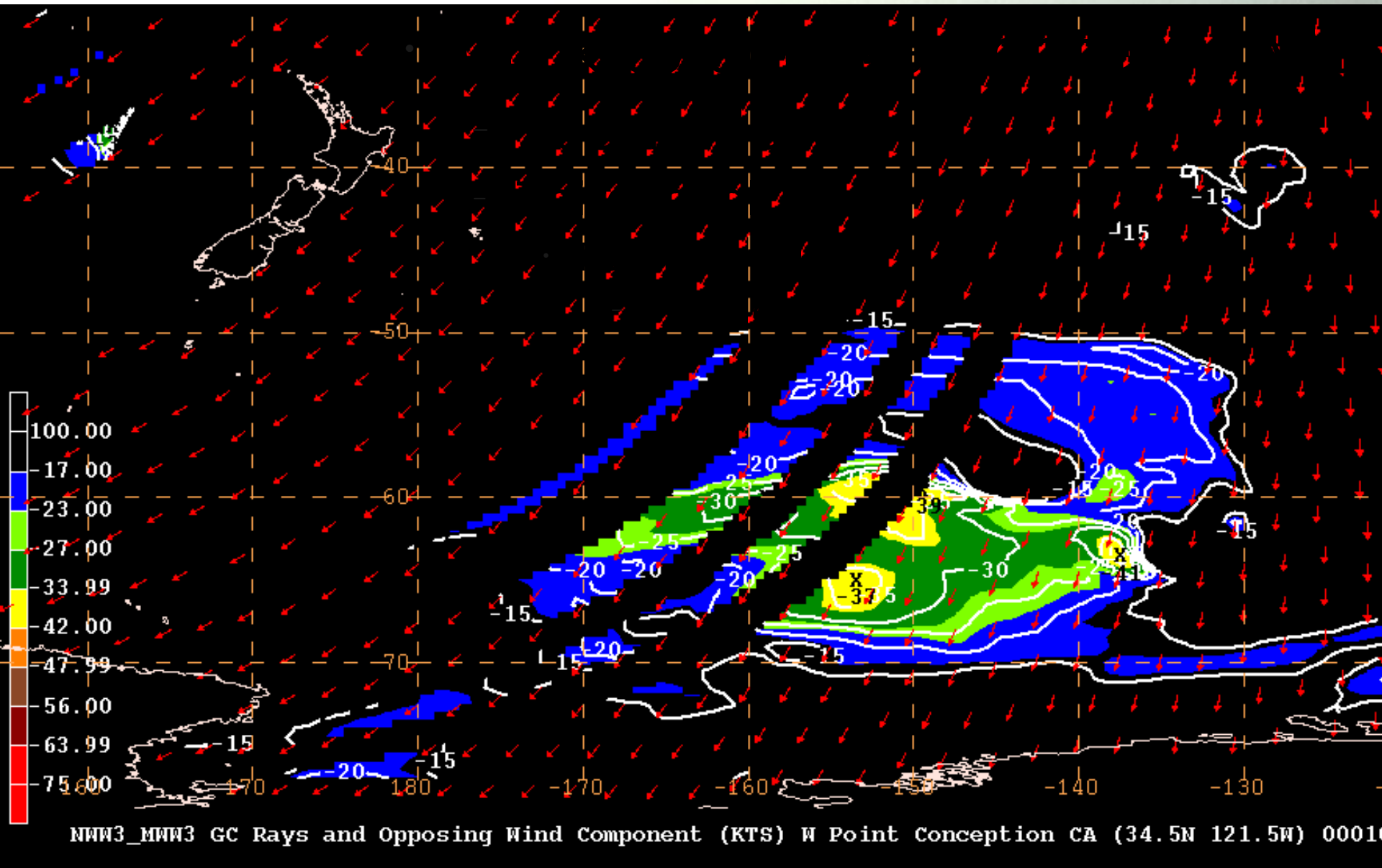
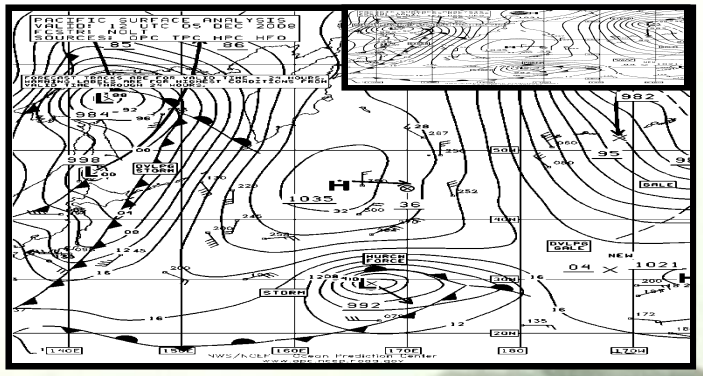


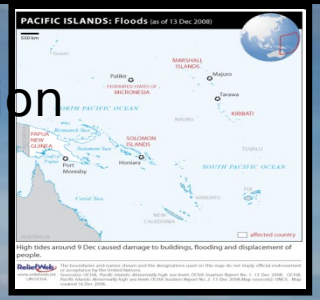
Distant Storm Impacts

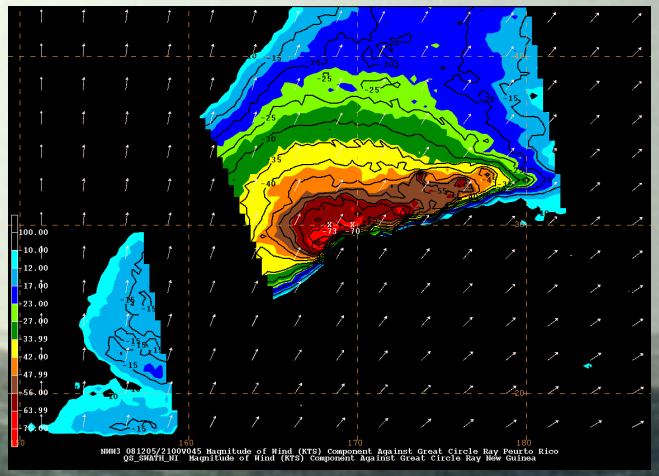


North Pacific Storm – the Source

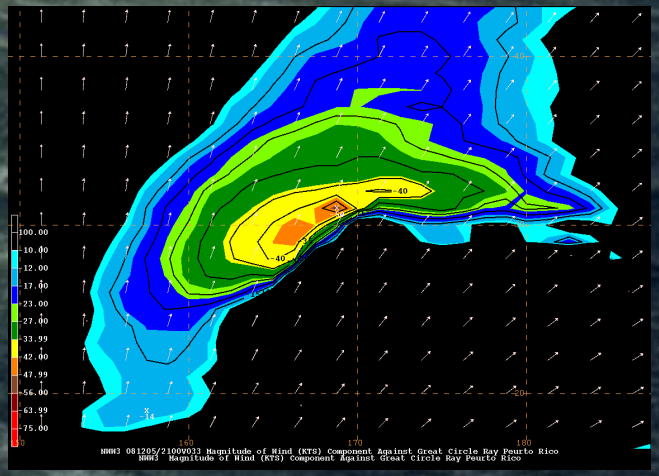
4 days later

New Guinea – Wave Inundation

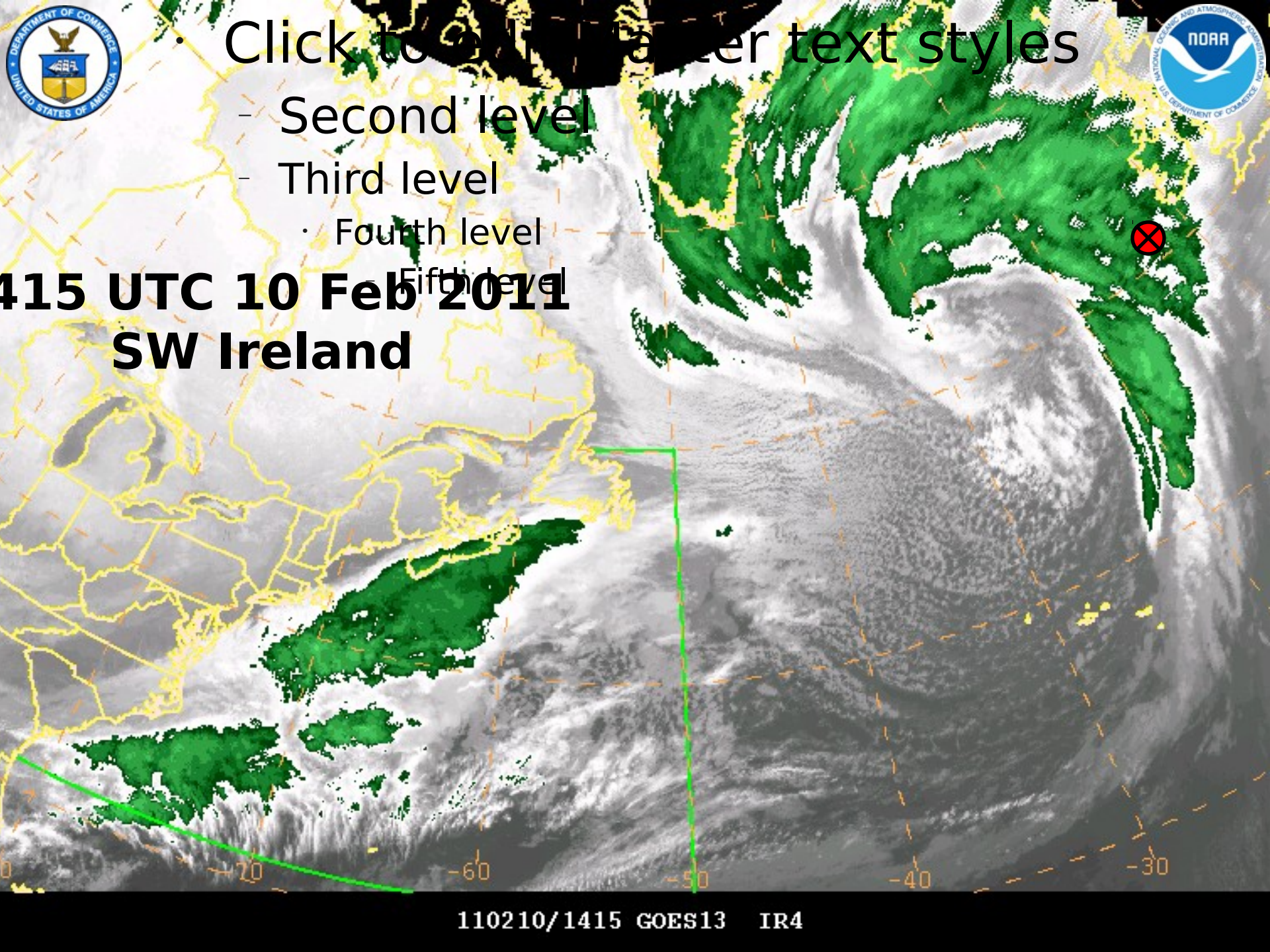




QuikSCAT wind component – long fetch of Hurricane Force Winds



GFS wind component – fetch of Gale Force Winds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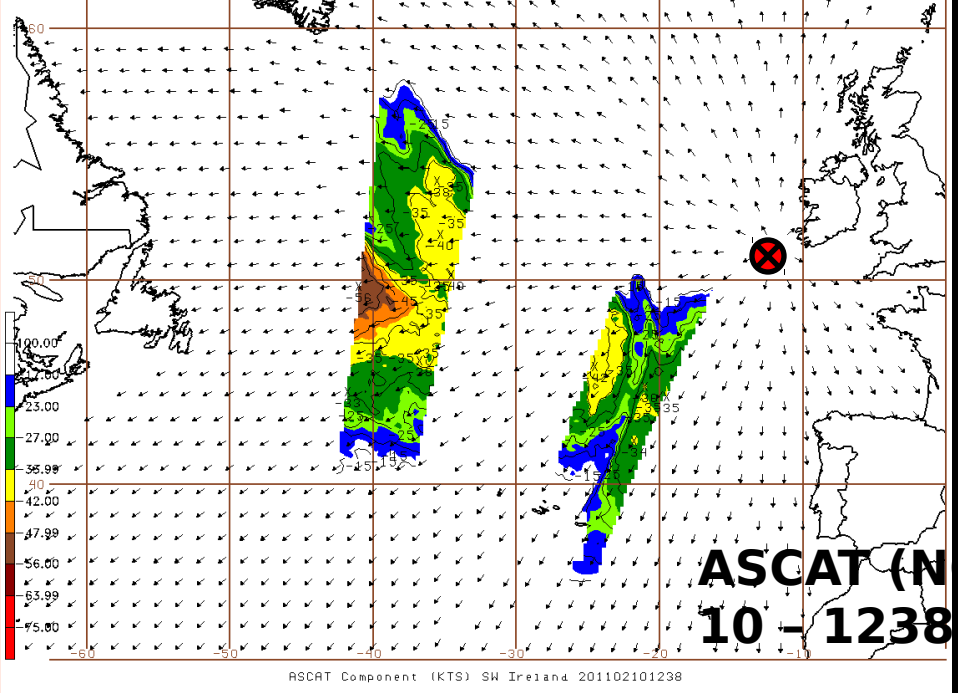

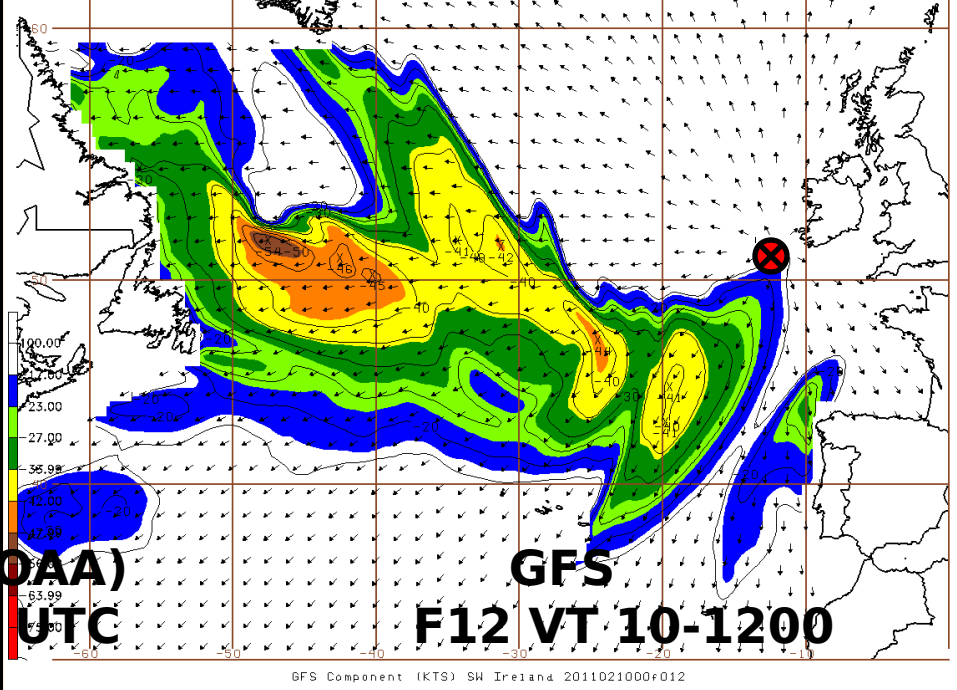

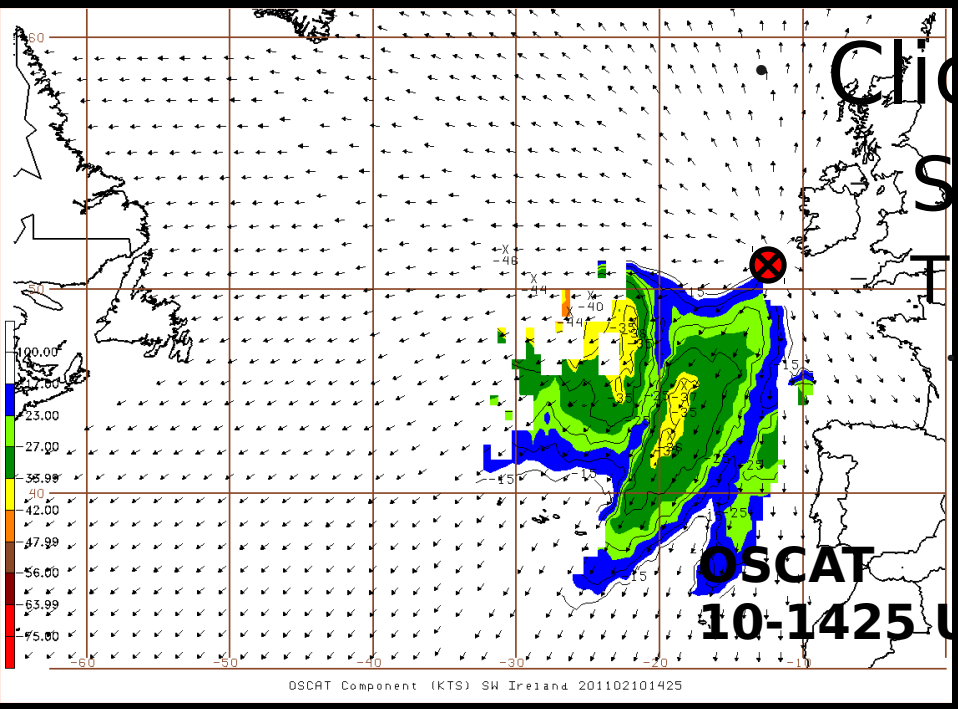

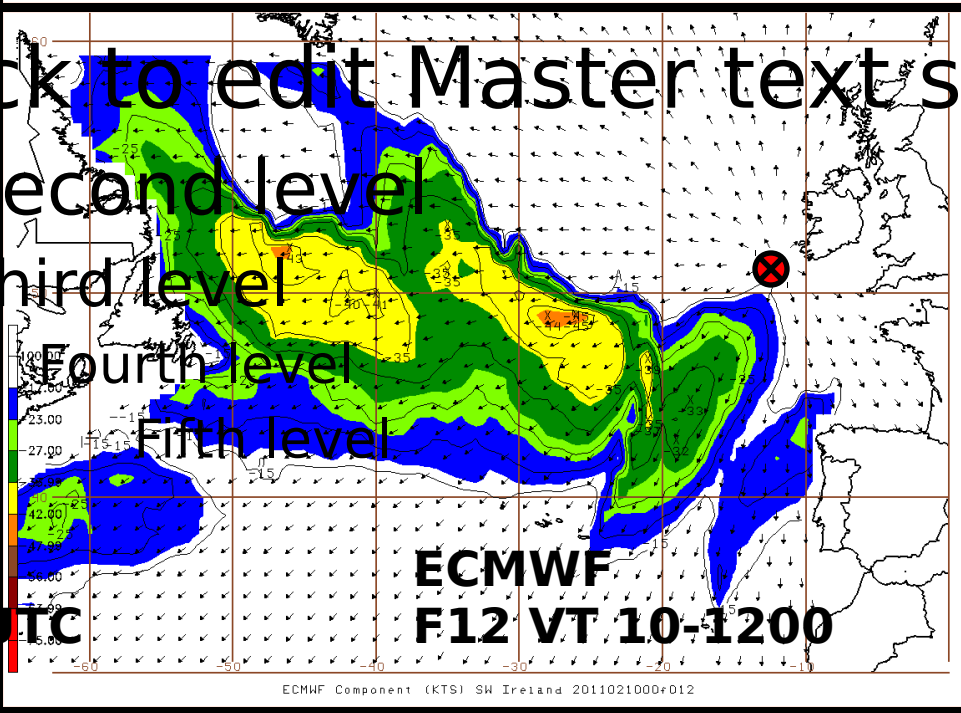

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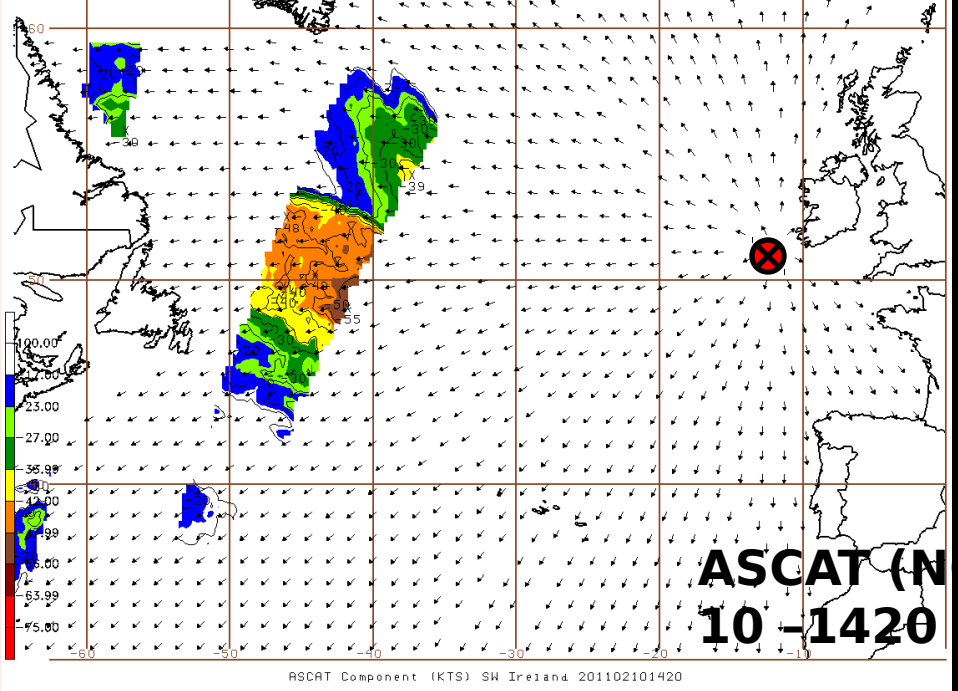

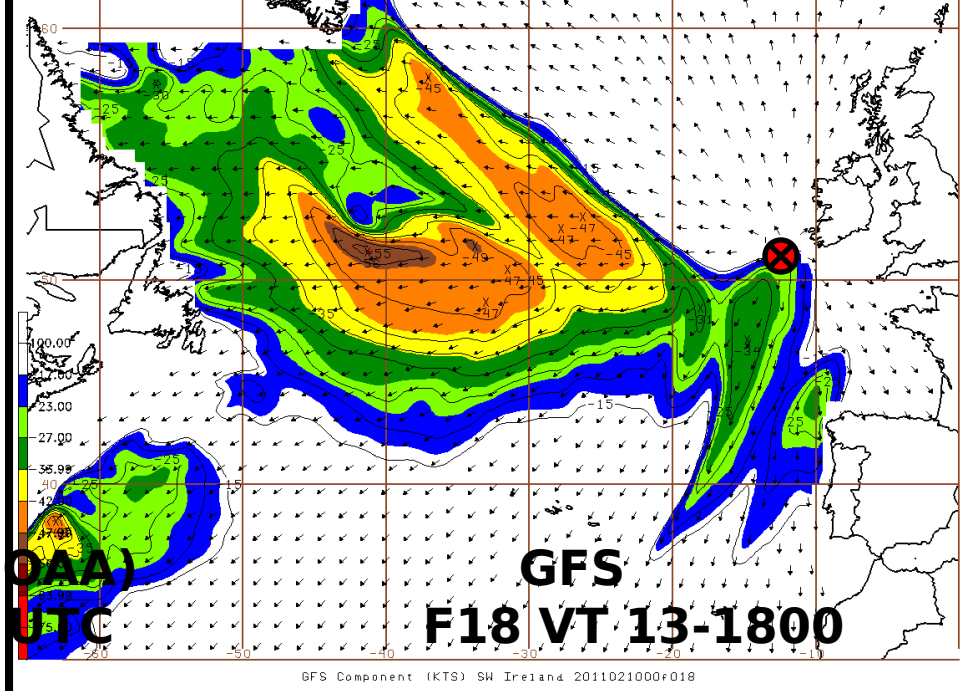

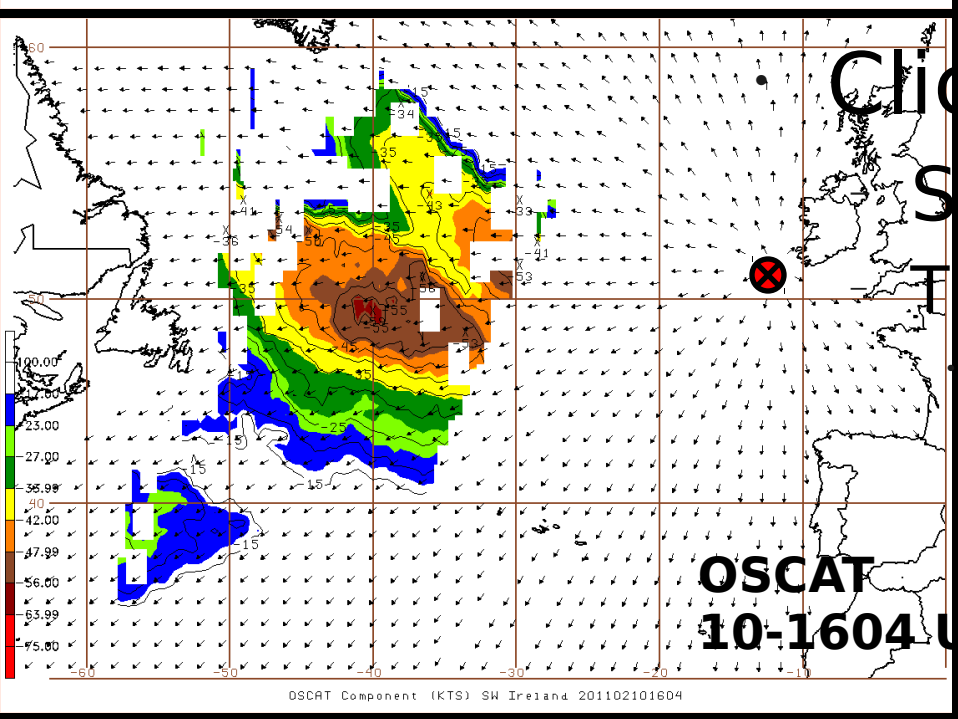

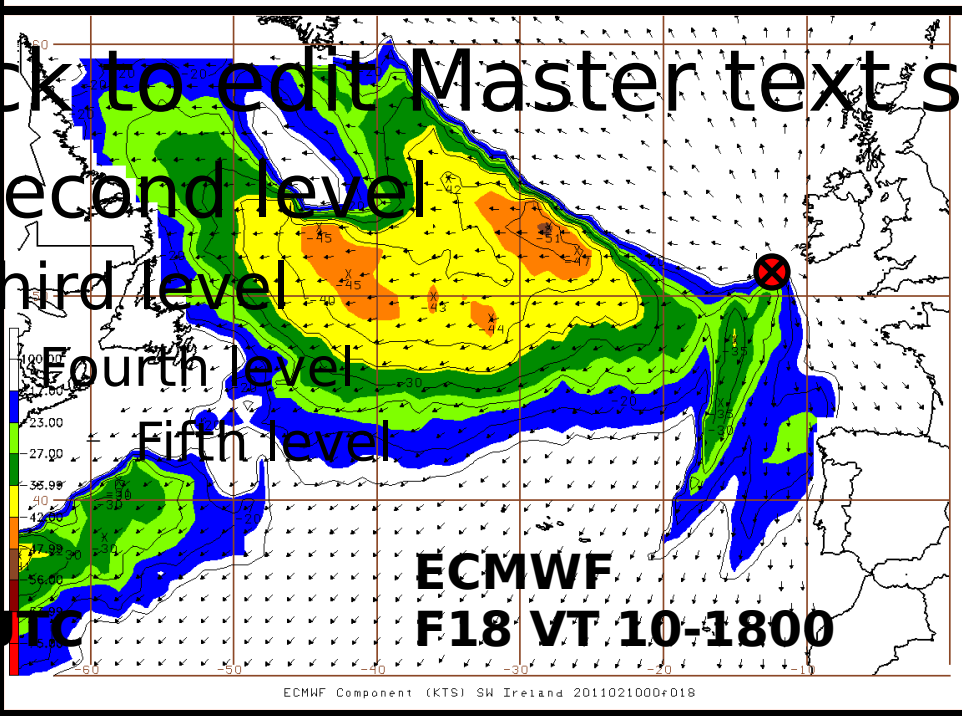

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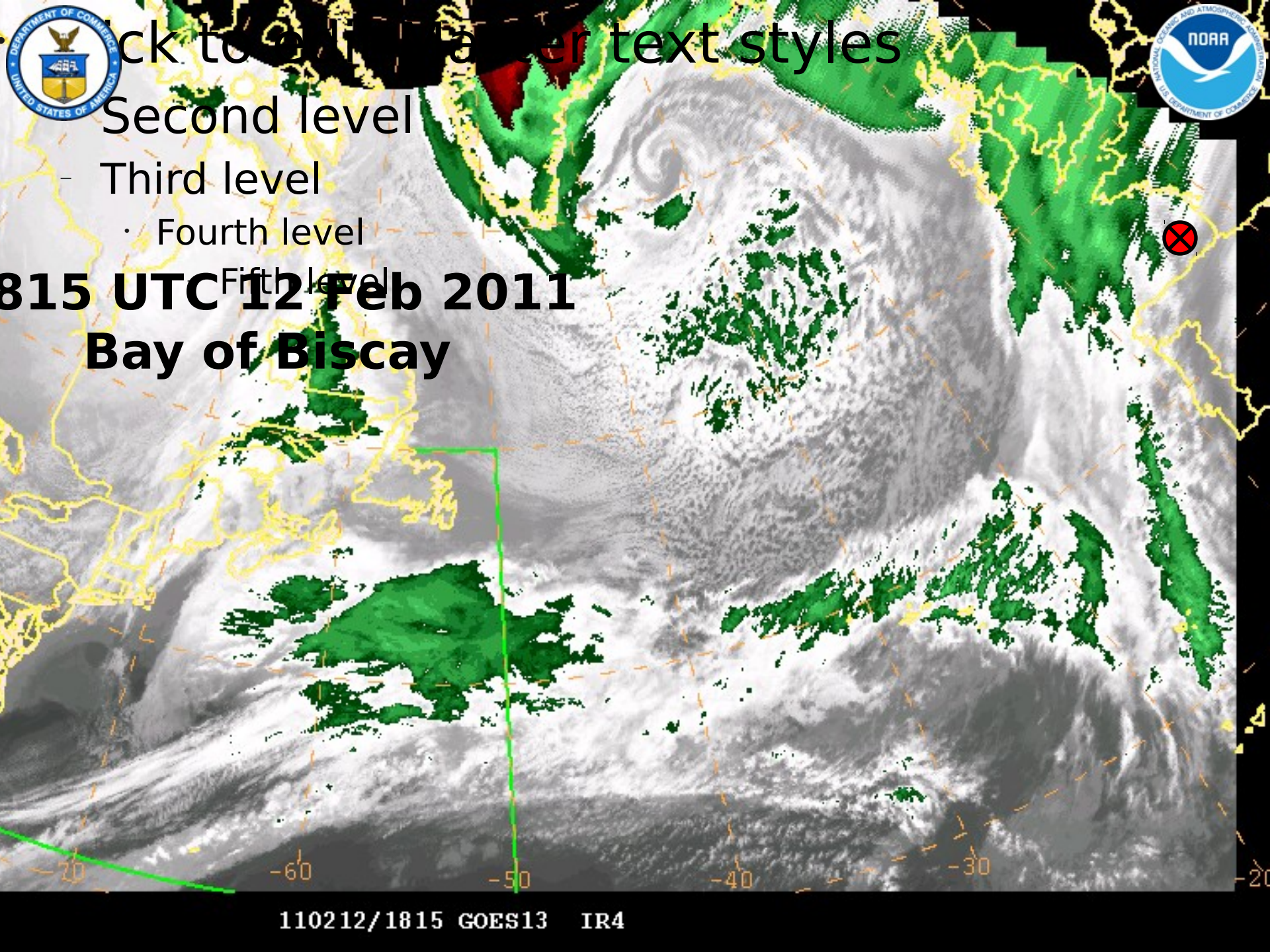
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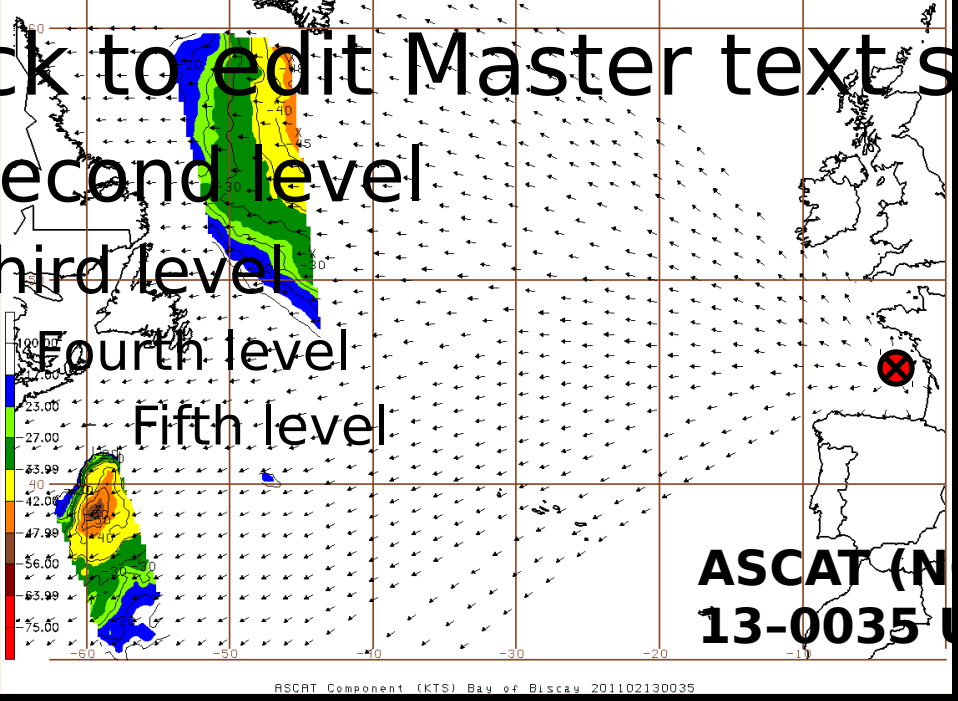

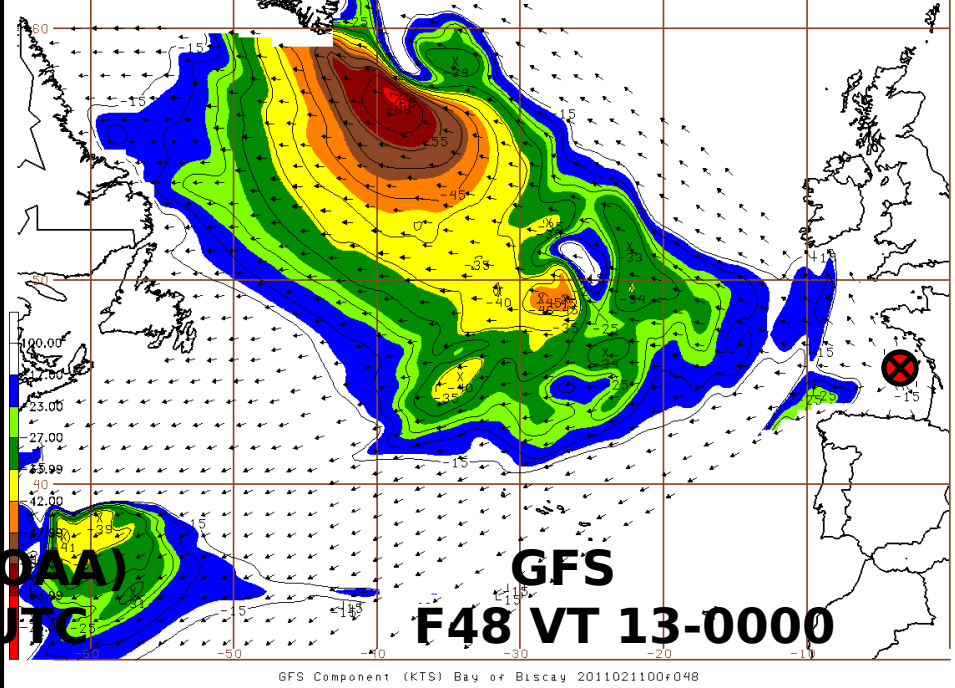

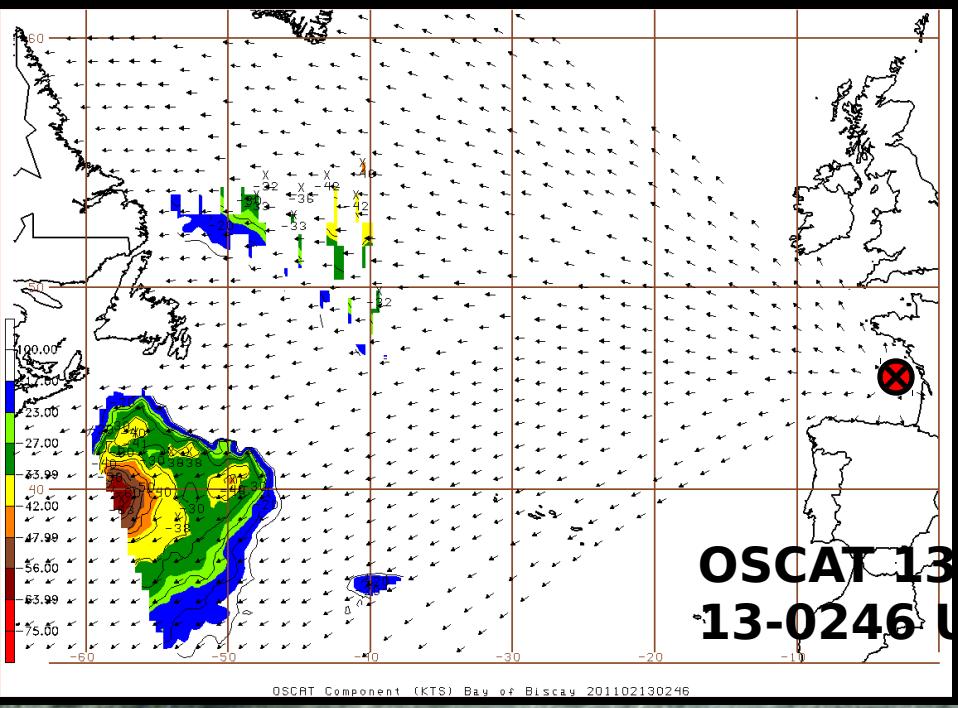

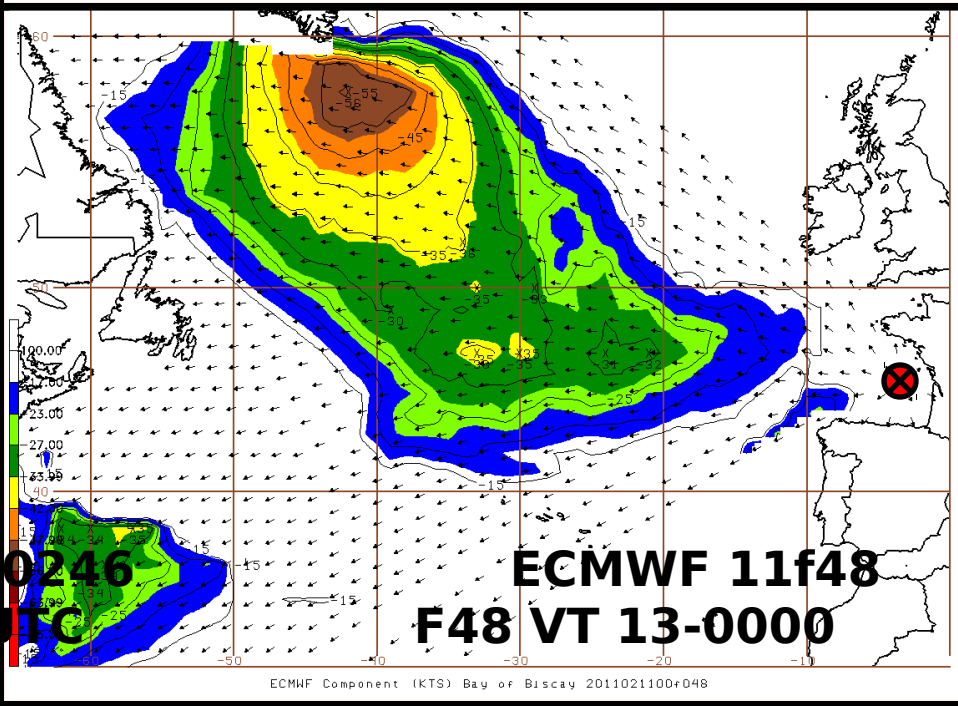

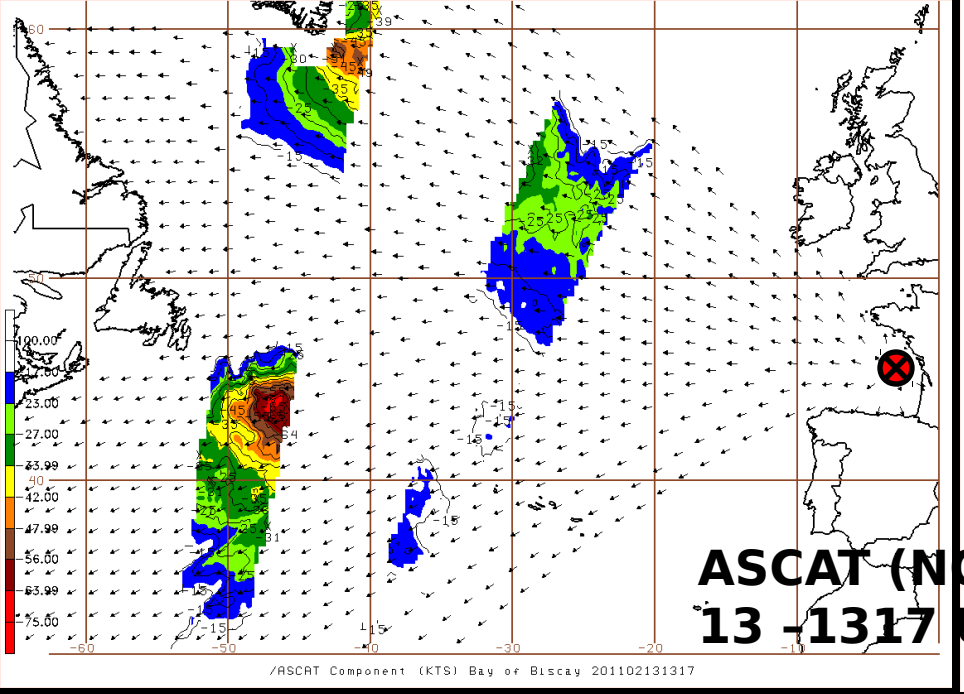
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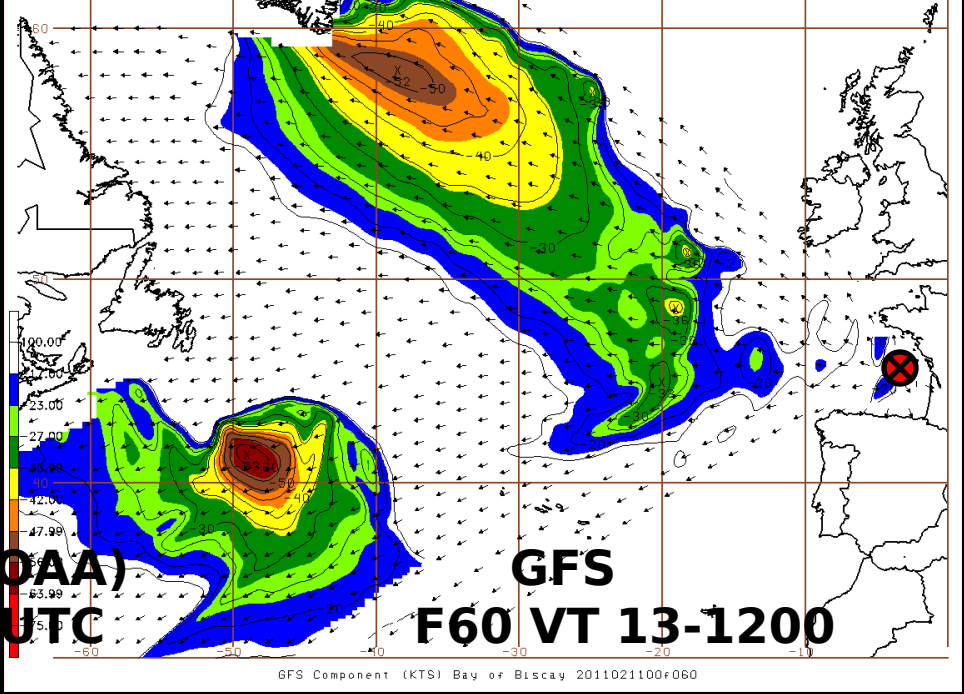
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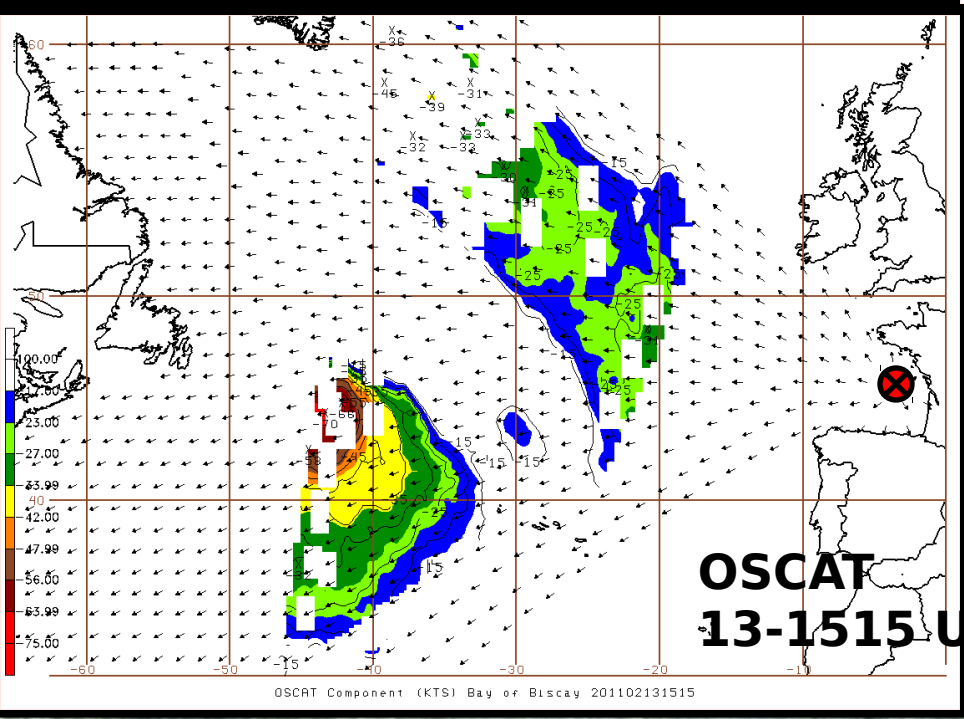
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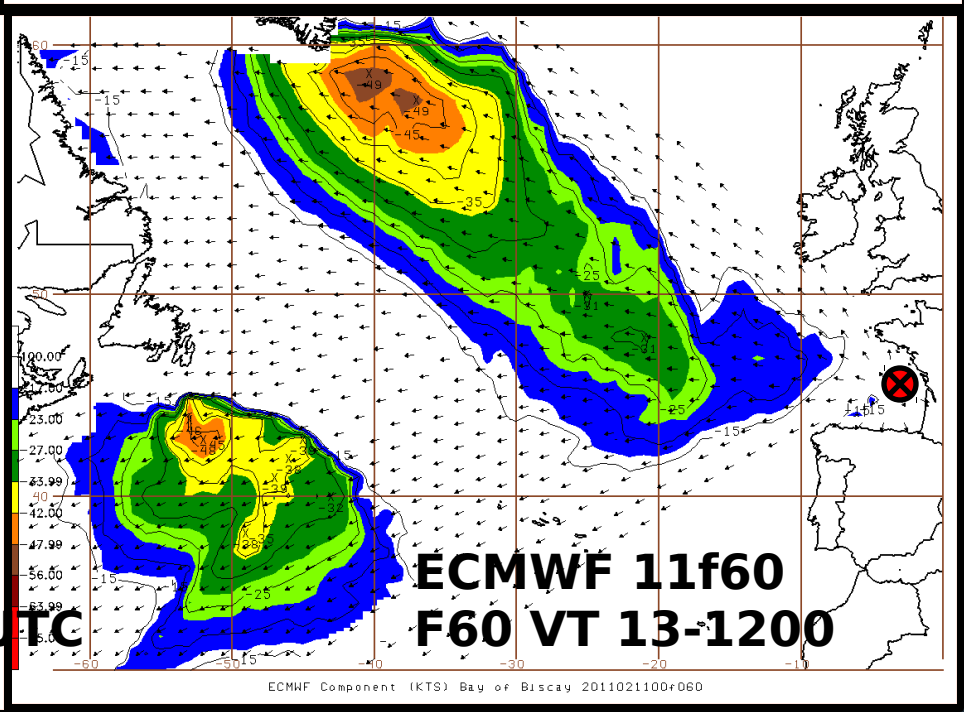
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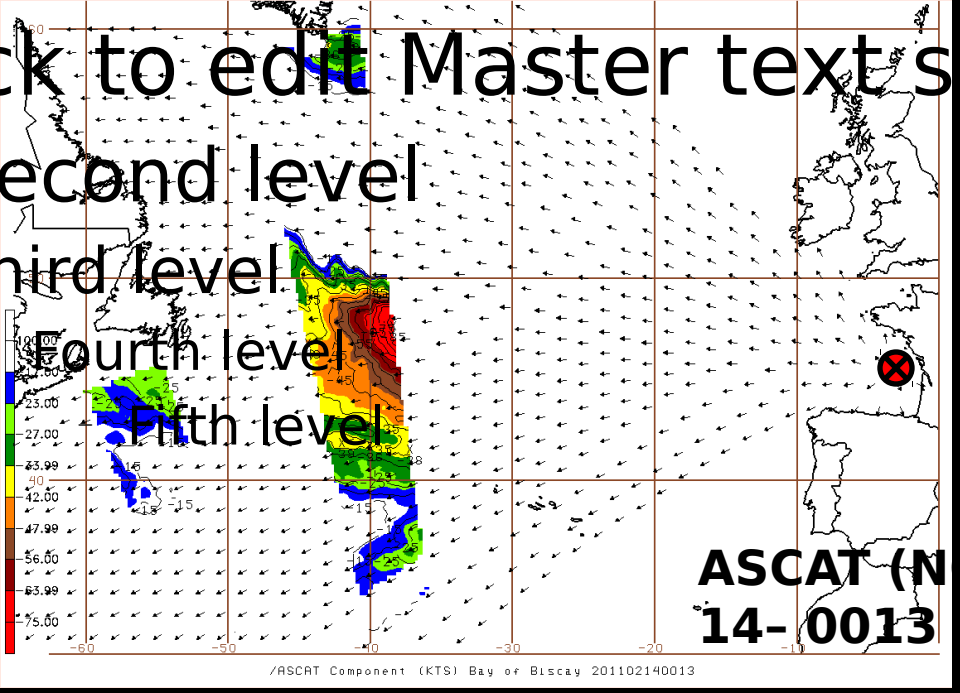

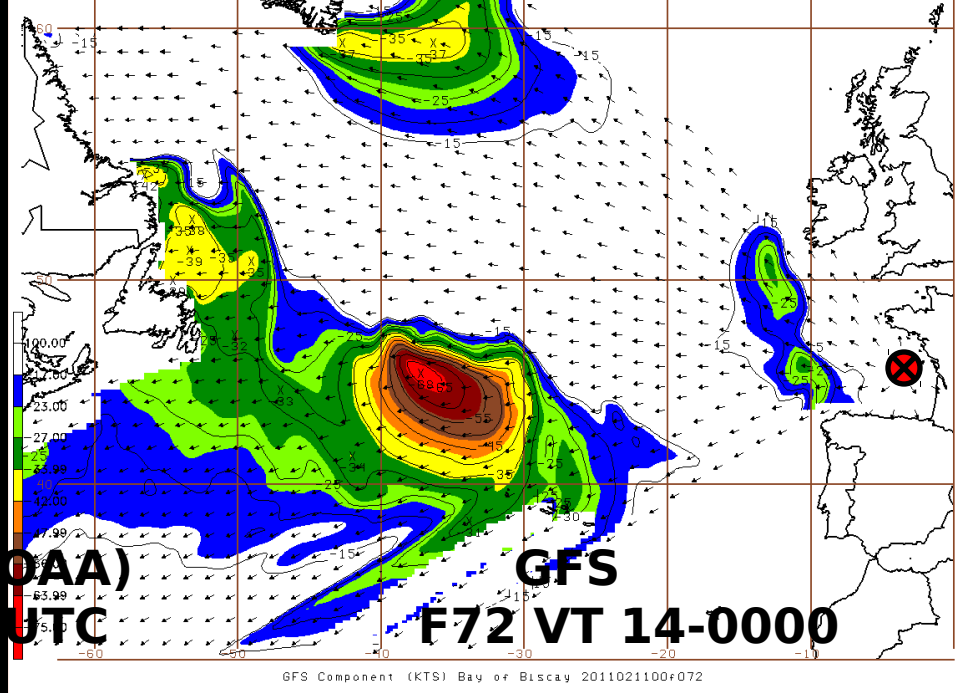

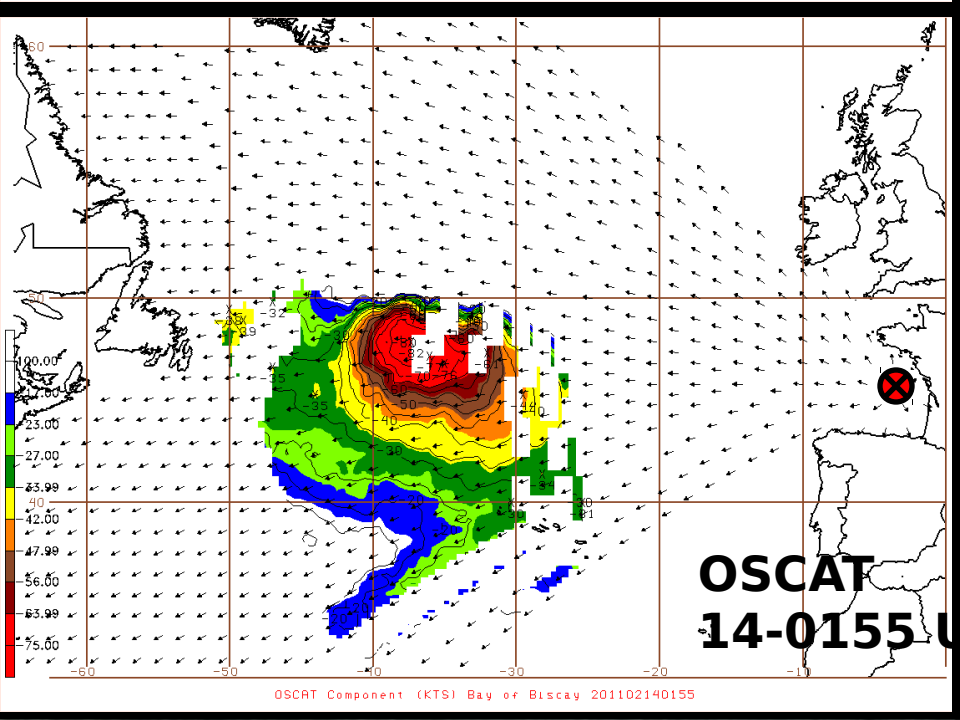

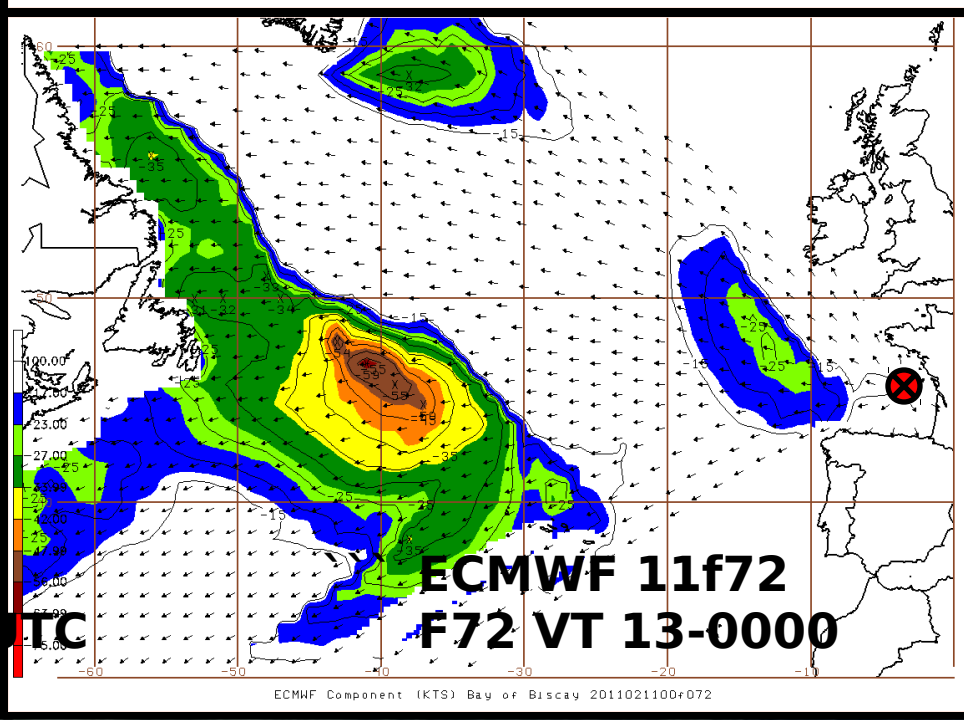

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esa Contact

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SAR Ocean Products Demonstration FIREWORKS - Mozilla Firefox

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SAR Ocean Products Demonstration FIREW...

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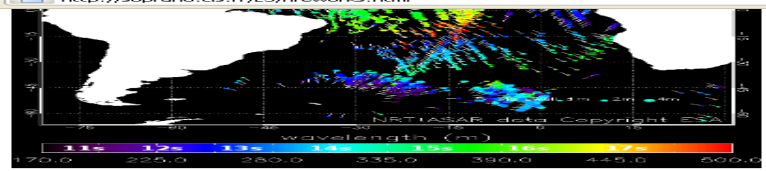
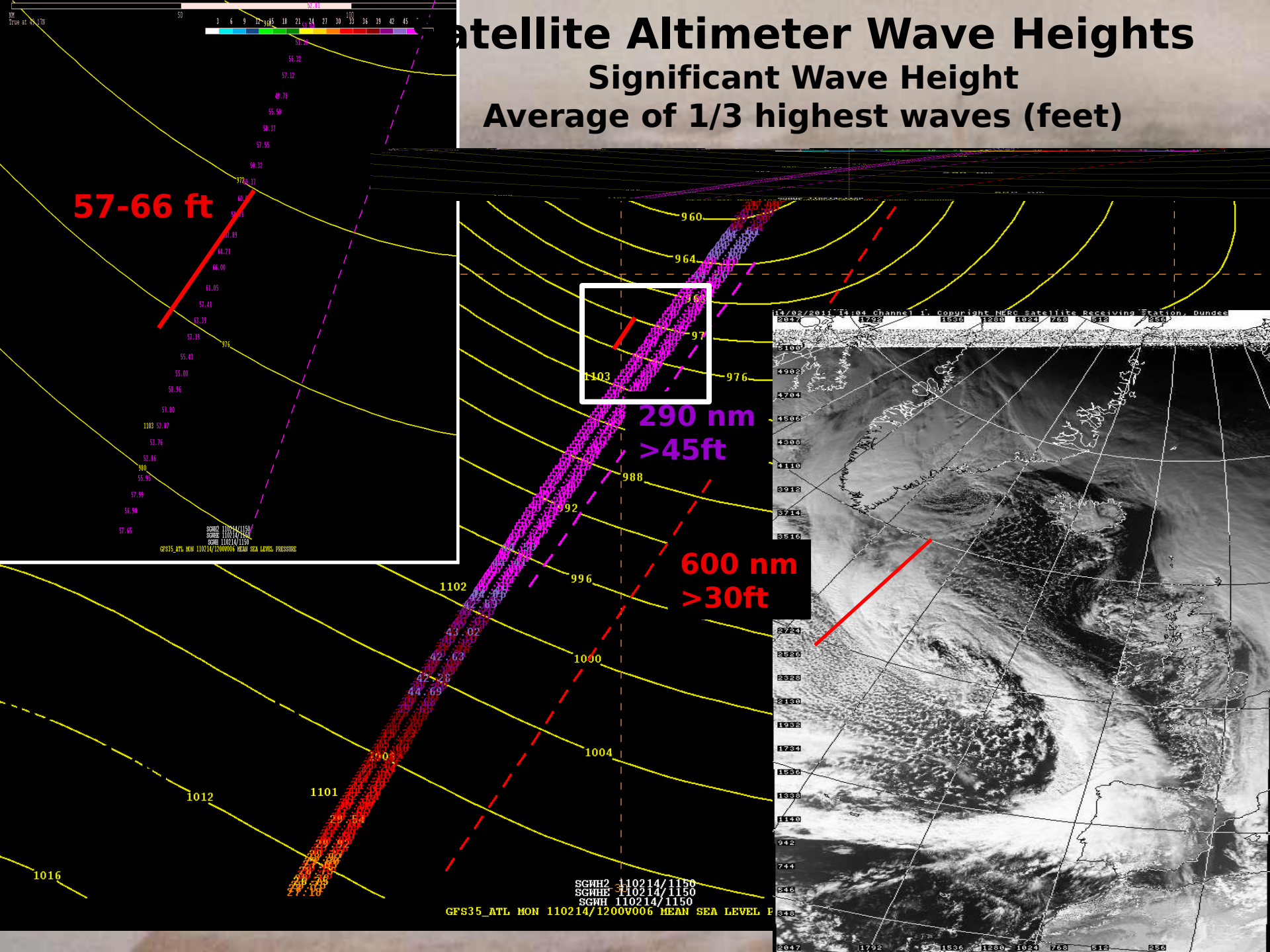


INDIAN OCEAN

atellite Altimeter Wave Heights

Significant Wave Height

Average of 1/3 highest waves (feet)



Summary

otential as tool for wave generation areas

- OSVW
  - Threat Assessment
  - Diagnostic in comparison with NWP output
- NWP (winds and waves)
  - Education tool for forecasters to objectively estimate sensitive areas (fetch windows)
  - Learning curve as how best to use (fields / displays)

ogress

- Distribute GC grids and technique to NWS Coastal Offices working with WFO Juneau, AK
- OPC web based displays for coastal areas of interest for OSVW and NWP - completed for ASCAT and GFS
- Guidance to serve coastal areas (education needed)


Thank You!