Scatterometer Ocean Surface Vector Wind Products at NOAA

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and

CEOS OSVW Virtual Constellation Update

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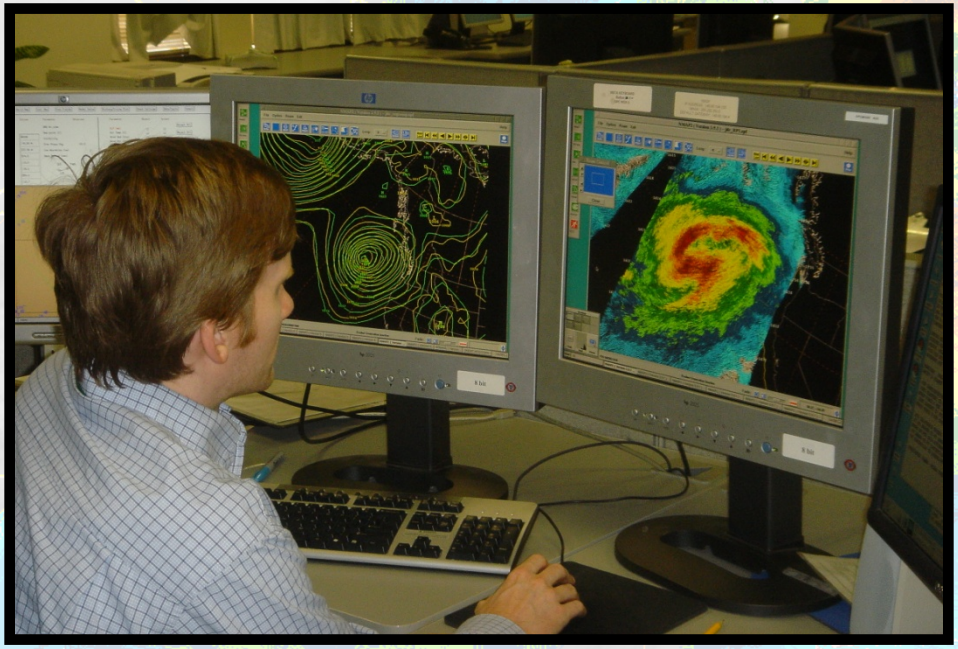
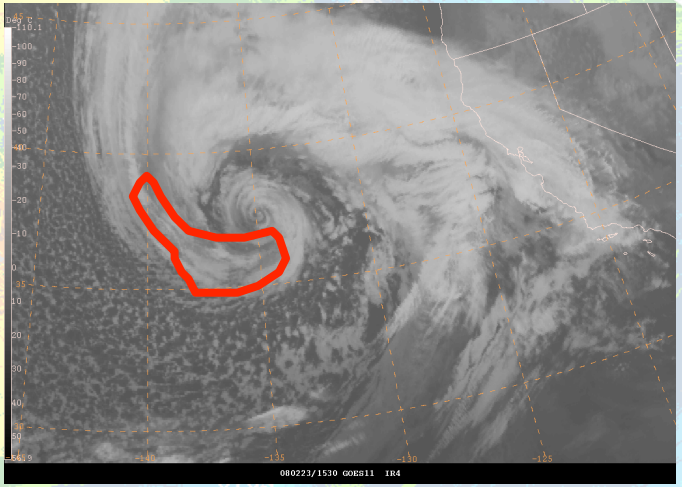
Primary Utilization

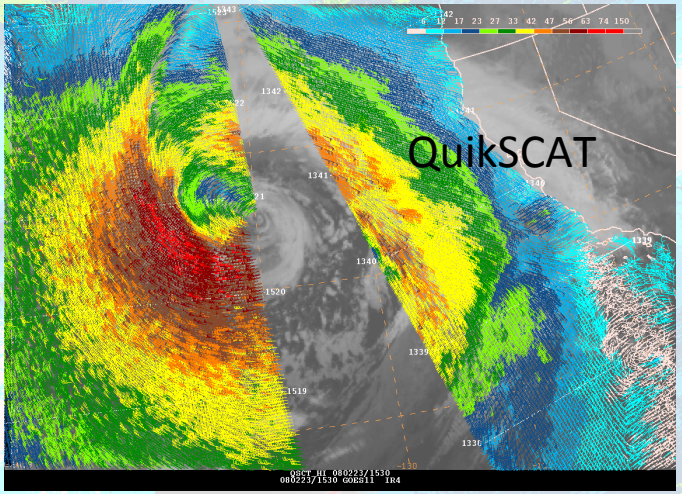
Scatterometer Ocean Surface Vector Wind (OSVW) Products

- Use in NWP models
- Use directly by human forecasters
  - Observational data of current conditions directly supports marine warnings and forecasts
  - Real-time NWP model verification

Use of Ocean Wind Vector Data at NWS Marine Weather Forecasting Offices and Centers







- Marine wind warnings
  - Issue, continue, terminate
- Identify weather features
  - Lows, highs, fronts
    - Intensity
    - Trends
- Short term marine forecasts
  - Aerial coverage of winds
- Real-time Verification
  - Comparison to NWP analyses
    - Feature intensity

OSVW of particular interest for extratropical cyclone (ETC) forecasting and warnings

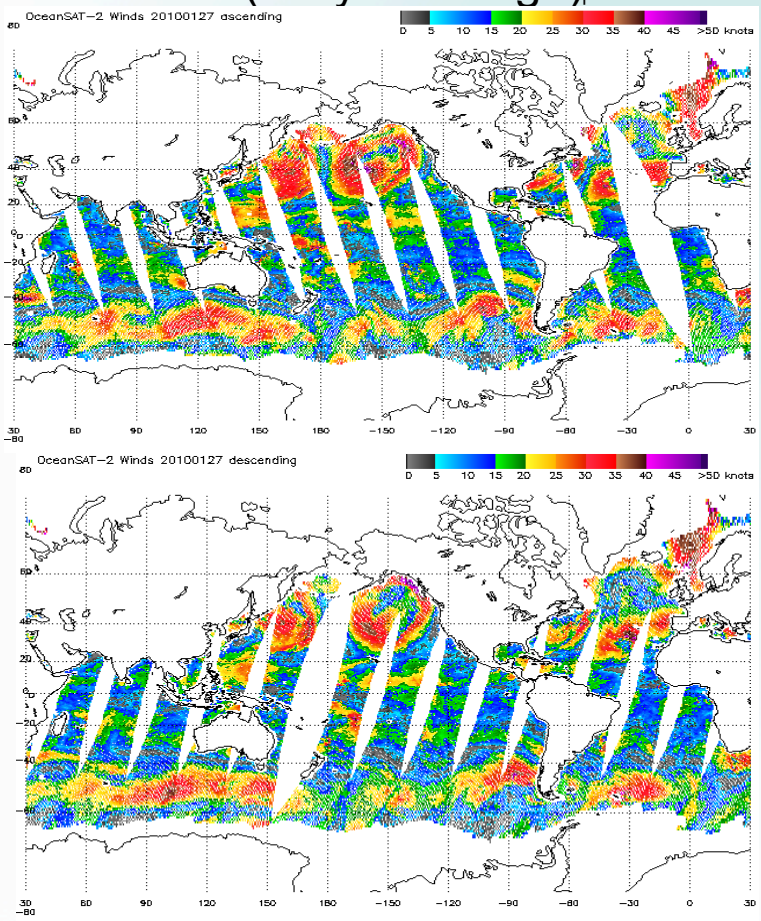
Resulted in the introduction of the HF wind warning category for extratropical cyclones

Current Scatterometer Missions

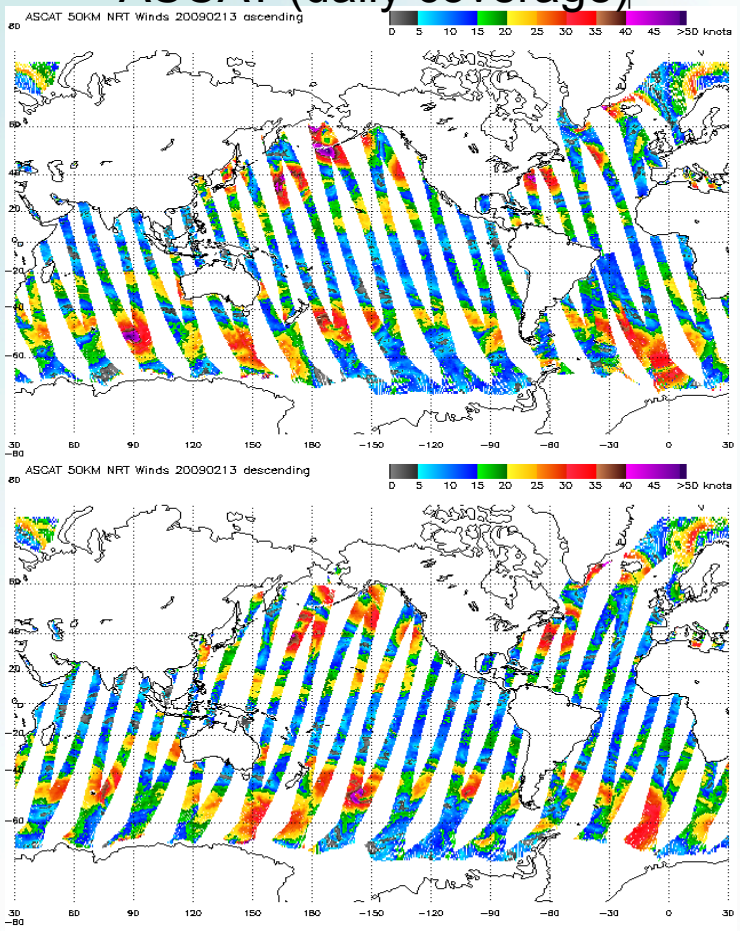
ASCAT(A&B)– Operational mission by EUMETSAT (data flow support operations)

OSCAT – Research mission by ISRO- ceased data flow in March 2014 after unrecoverable anomaly

OSCAT (daily coverage)

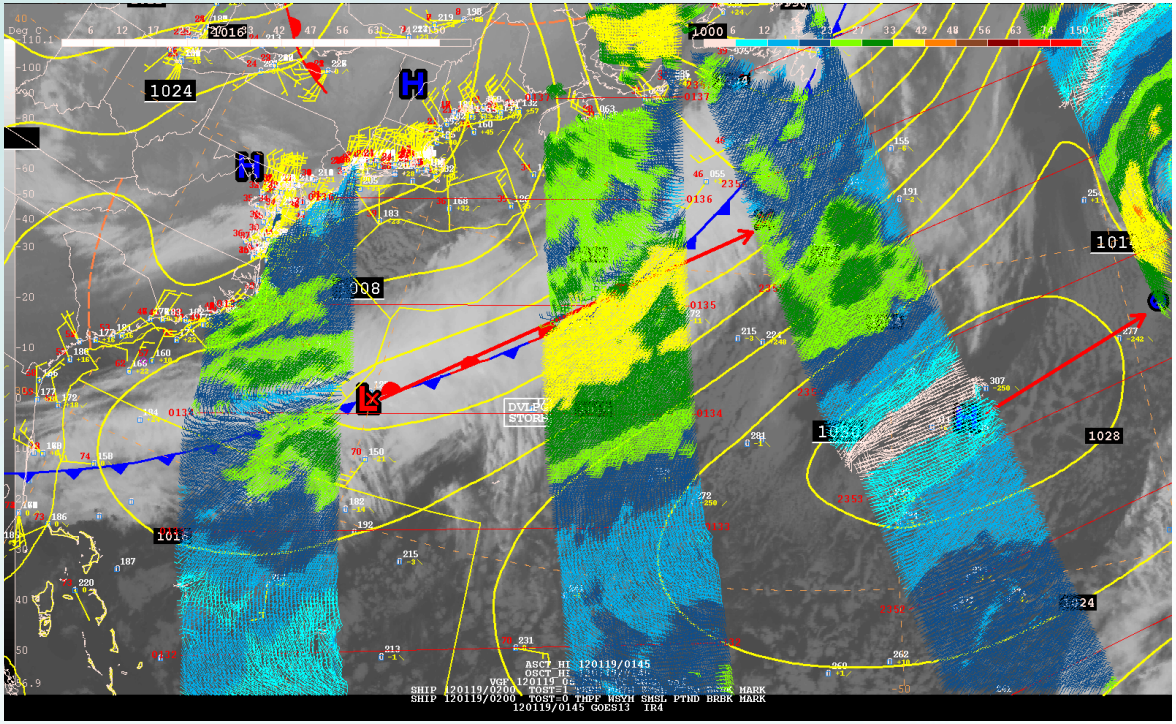


ASCAT (daily coverage)

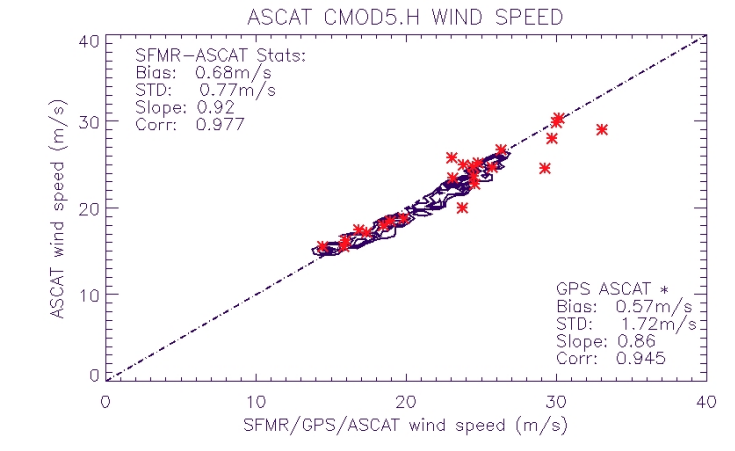


ASCAT Wind Product in NOAA Operations

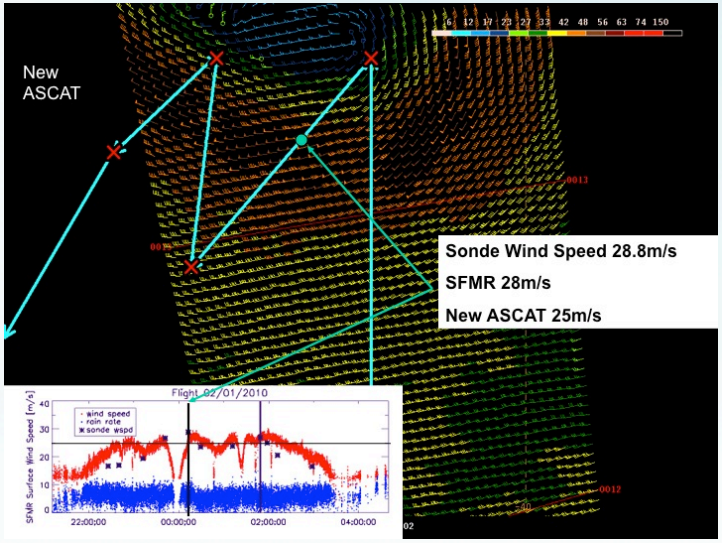
- ASCAT Coastal 12.5km product with high wind GMF fully integrated



ASCAT High Wind Speed Retrieval Improvement

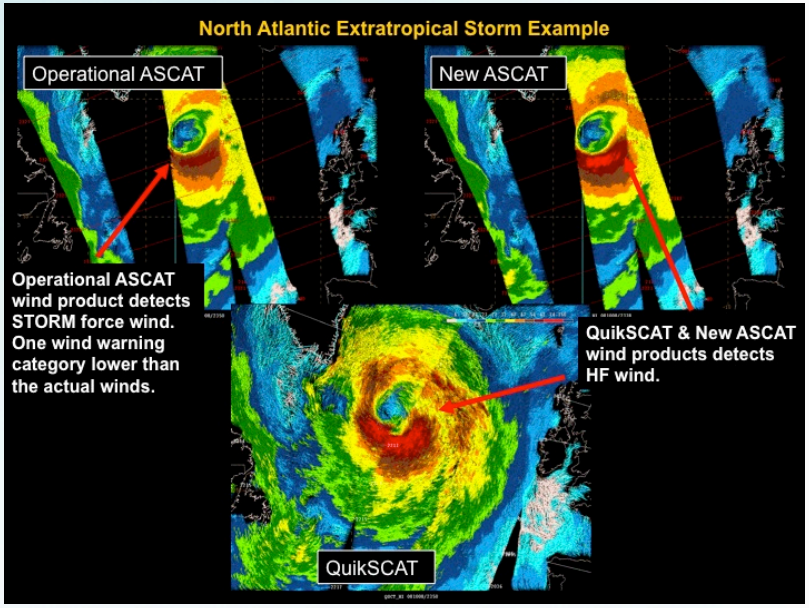


New ASCAT winds versus SFMR and GPS dropsonde winds



Flight track overlaid on ASCAT swath

- ASCAT high wind speed improvements developed utilizing aircraft and satellite data

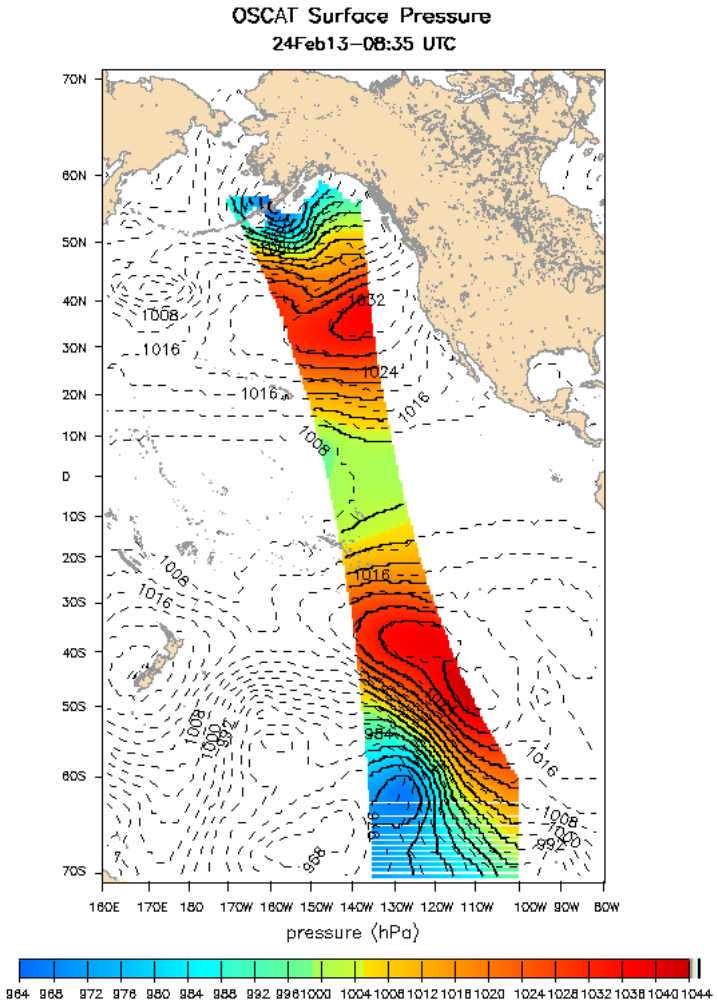


Hurricane force wind observations with NOAA's QuikSCAT and original and new ASCAT wind products

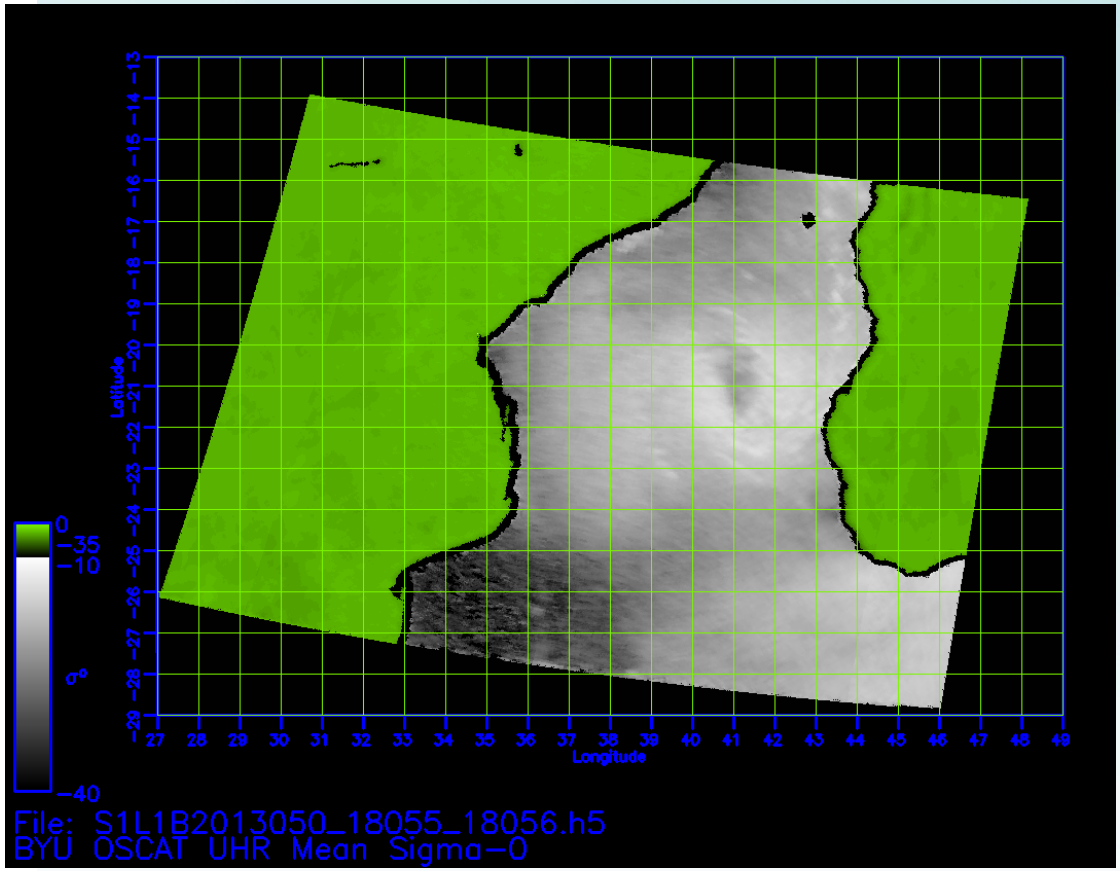
Enhanced Resolution Products implemented at NOAA

(Successful transition of International Ocean Vector Wind Science Team [IOVWST] research efforts into operations)

SLP courtesy of Jerome Patoux (University of Washington)

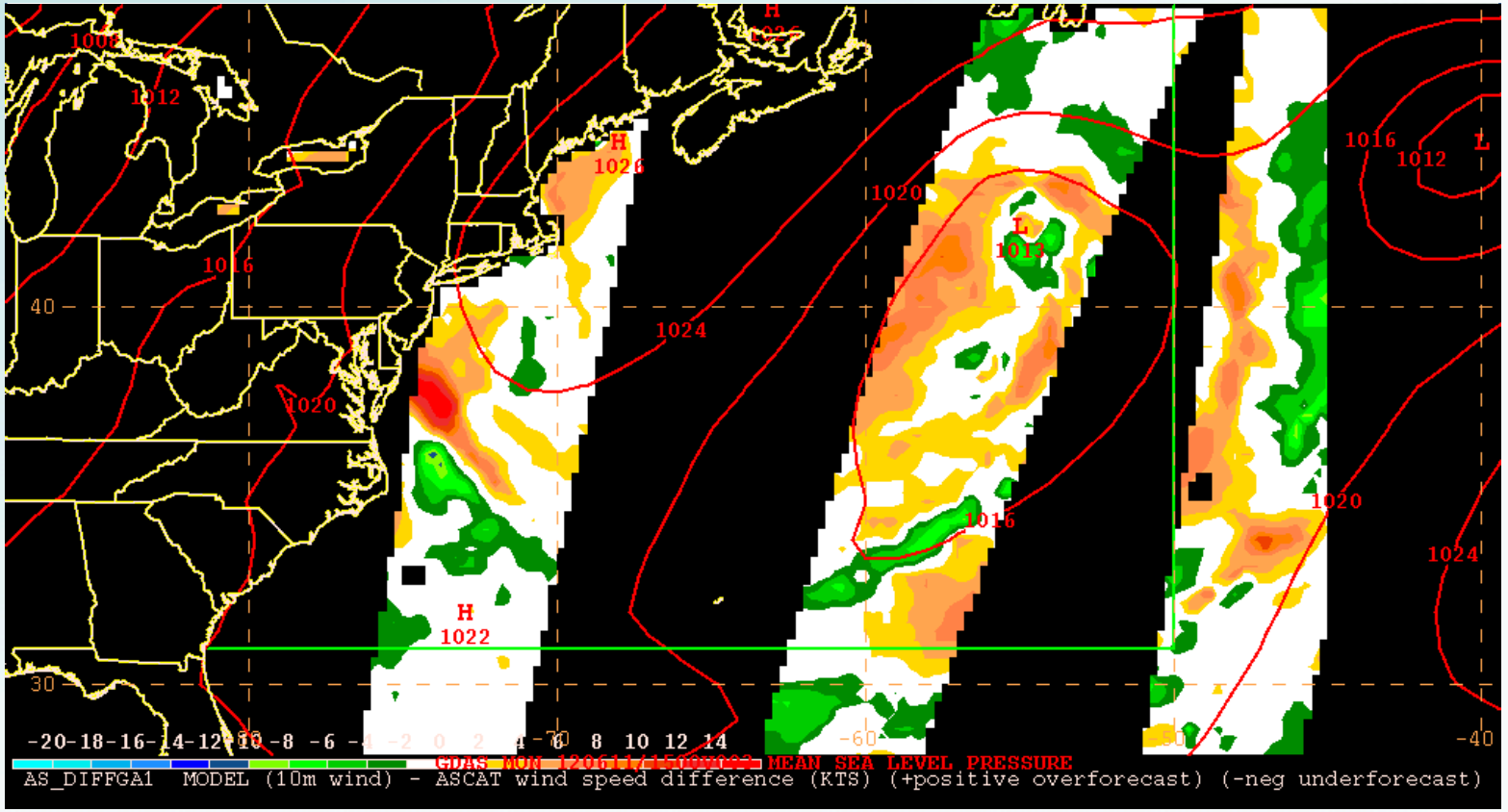


Enhanced resolution processing courtesy of David Long (BYU)

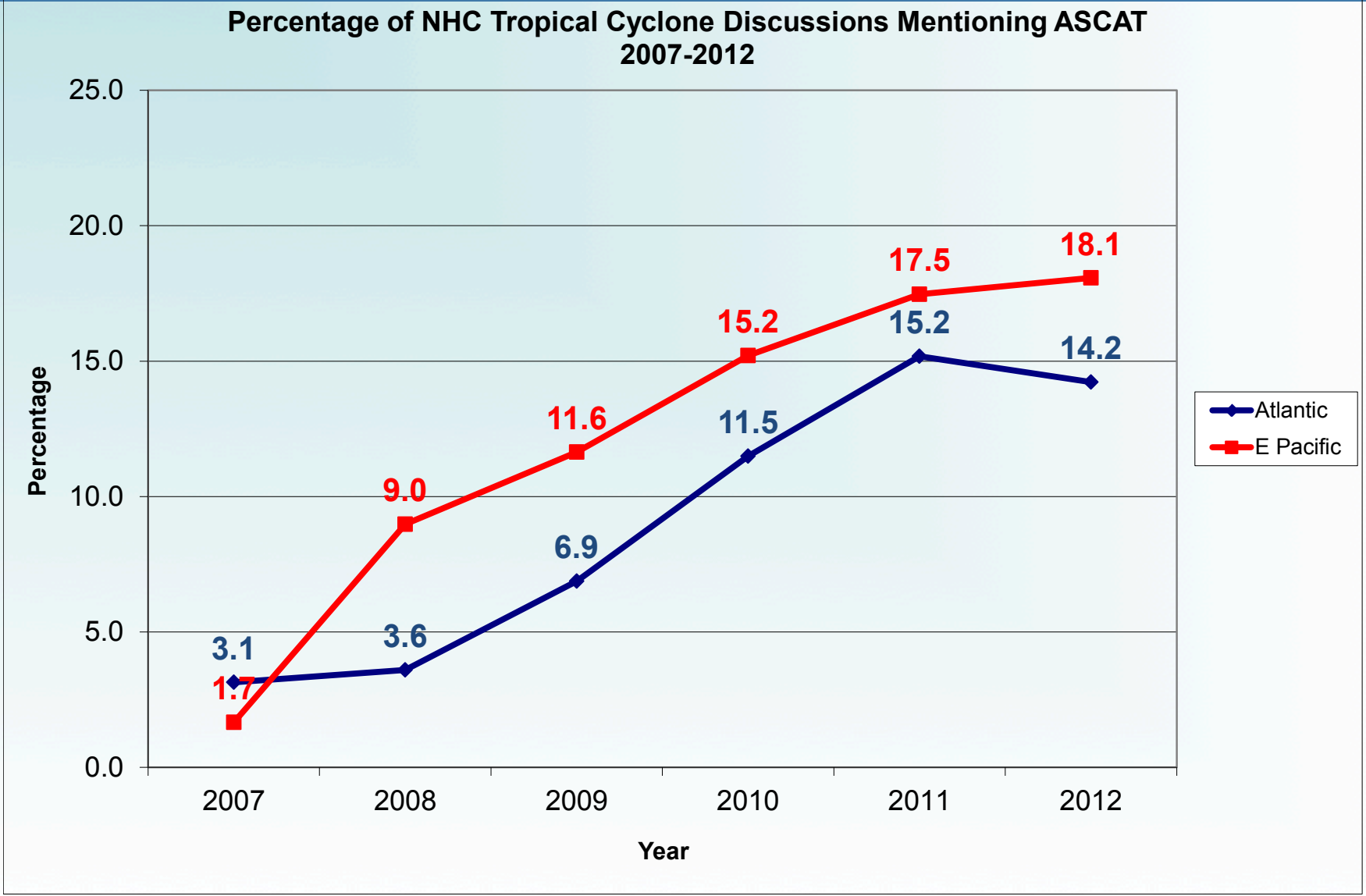


http://manati.star.nesdis.noaa.gov/datasets/ASCATData.php

Gridded ASCAT-GFS Wind Difference Fields



Use of ASCAT @ NHC



In search of wind fetch

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

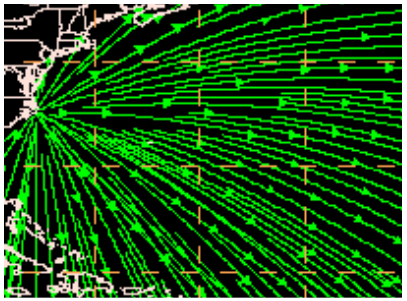
- ***GOAL*** – objective method to estimate the magnitude of fetch for favored wave generation areas relative to ***specific*** coastal sites
  - Applicable to both NWP and gridded OSVW products
  - Use as a diagnostic by comparing remotely sensed and NWP sources
  - Give forecasters an early indication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

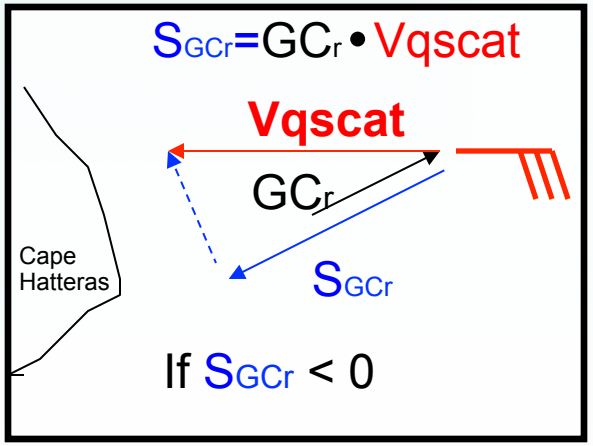
In search of wind fetch

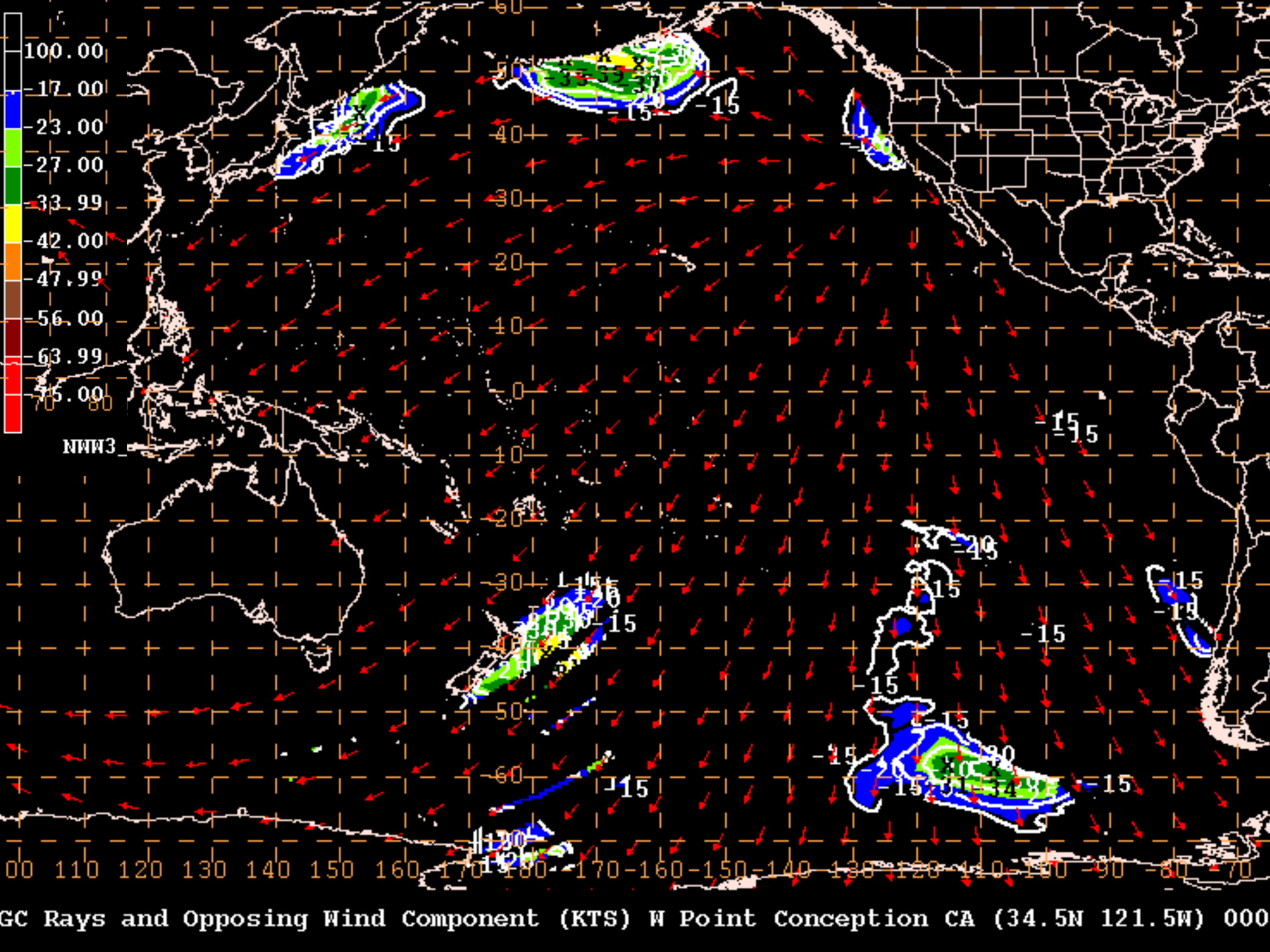
- ***Thoughts***
  - Forecasters rely ***very*** heavily on NWP sources for wave forecasts (weakness is NWP winds)
    - Present methods
      - subjective, limited scope (local)
      - inconsistent between offices/forecasters
  - Observing network (buoys) focused on nearshore and coastal areas (limits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

Approach

- Develop 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)



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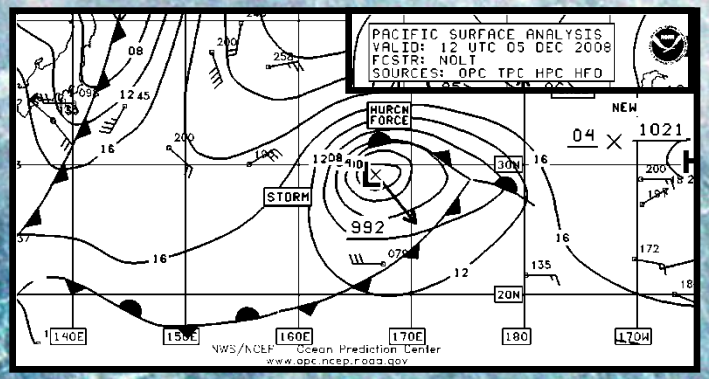
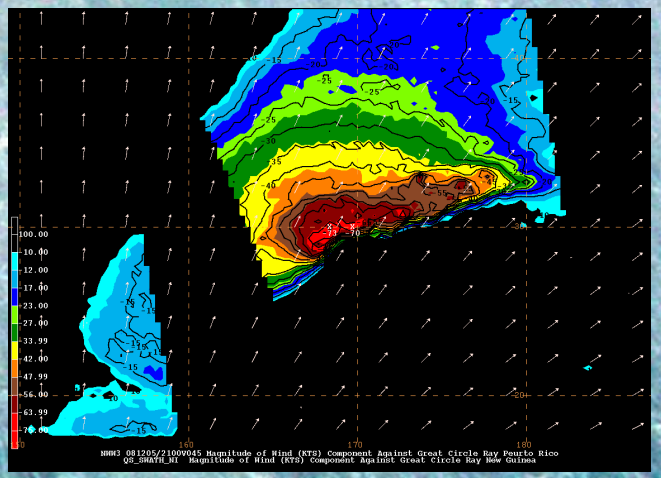
NWW3
GC Rays and Opposing Wind Component (KTS) W Point Conception CA (34.5N 121.5W) 000

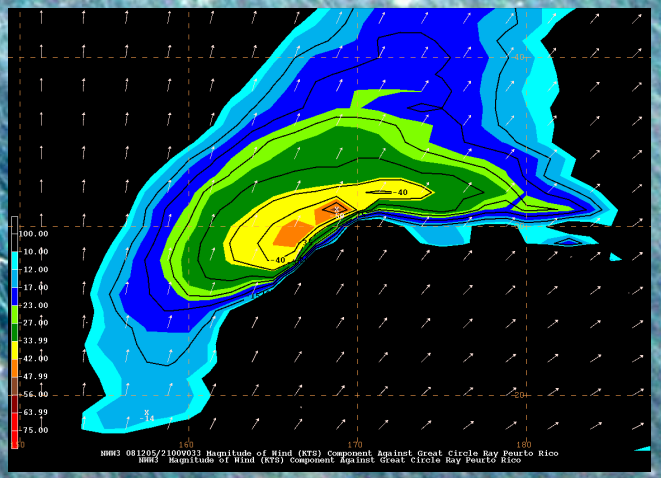
Wind is the destructive force



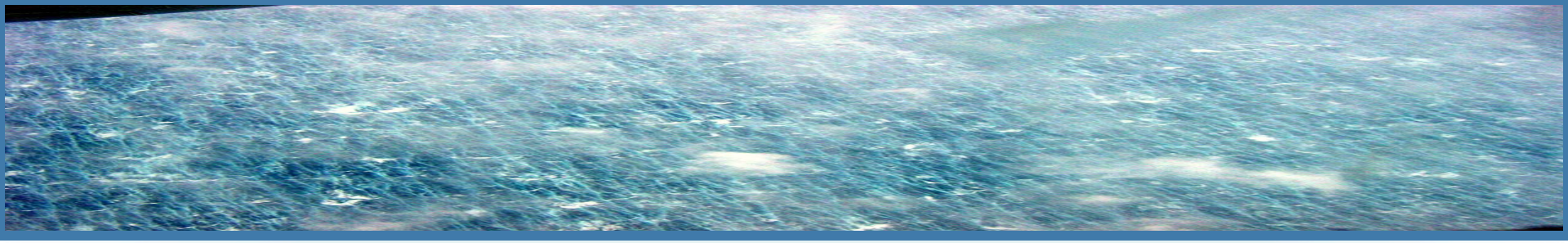
North Pacific Storm – the Source



QuikSCAT wind component – long fetch of Hurricane Force Winds



GFS wind component – fetch of Gale Force Winds



Committee on Earth Observation Satellites (CEOS)

- Strategic Implementation Team (SIT)
  - Ocean Surface Vector Winds – Virtual Constellation

CEOS Ocean Vector Surface Winds Virtual Constellation (OSVW-VC) Status of activities

Sustained operations assessment (advocate for timely and open data access)

- ASCAT on METOP-A and METOP-B operating nominally
- HSCAT on HY2-A operating nominally, no NRT data access
- OSCAT on OceanSat-2 discontinued operations
  - ISRO already has a gap filler OSVW mission (ScatSat) approved and scheduled for a late 2015 launch
- NASA RapidScat mission on the International Space Station scheduled for an early August 2014 launch

Optimization of the OSVW constellation (coordination of orbits)

- Analysis of the overall local time coverage from the constellation for different applications

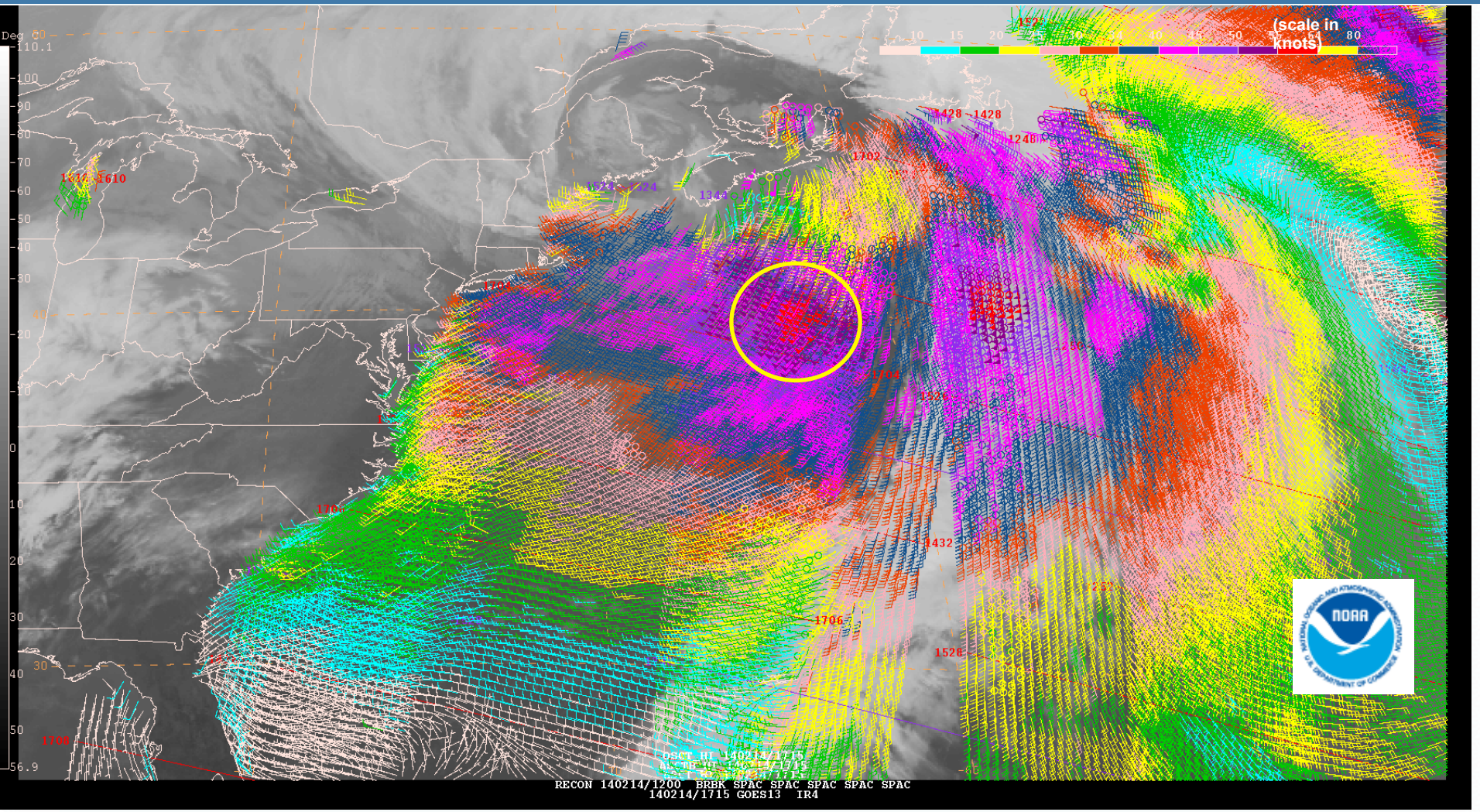
Bridging with the International Ocean Vector Winds Science Team

- IOVWST 2014 annual meeting in June 2014, planning an OSVW-VC side meeting
- Specific working groups will be kicked-off on Climate wind CDRs, Data Standards and Coastal Applications

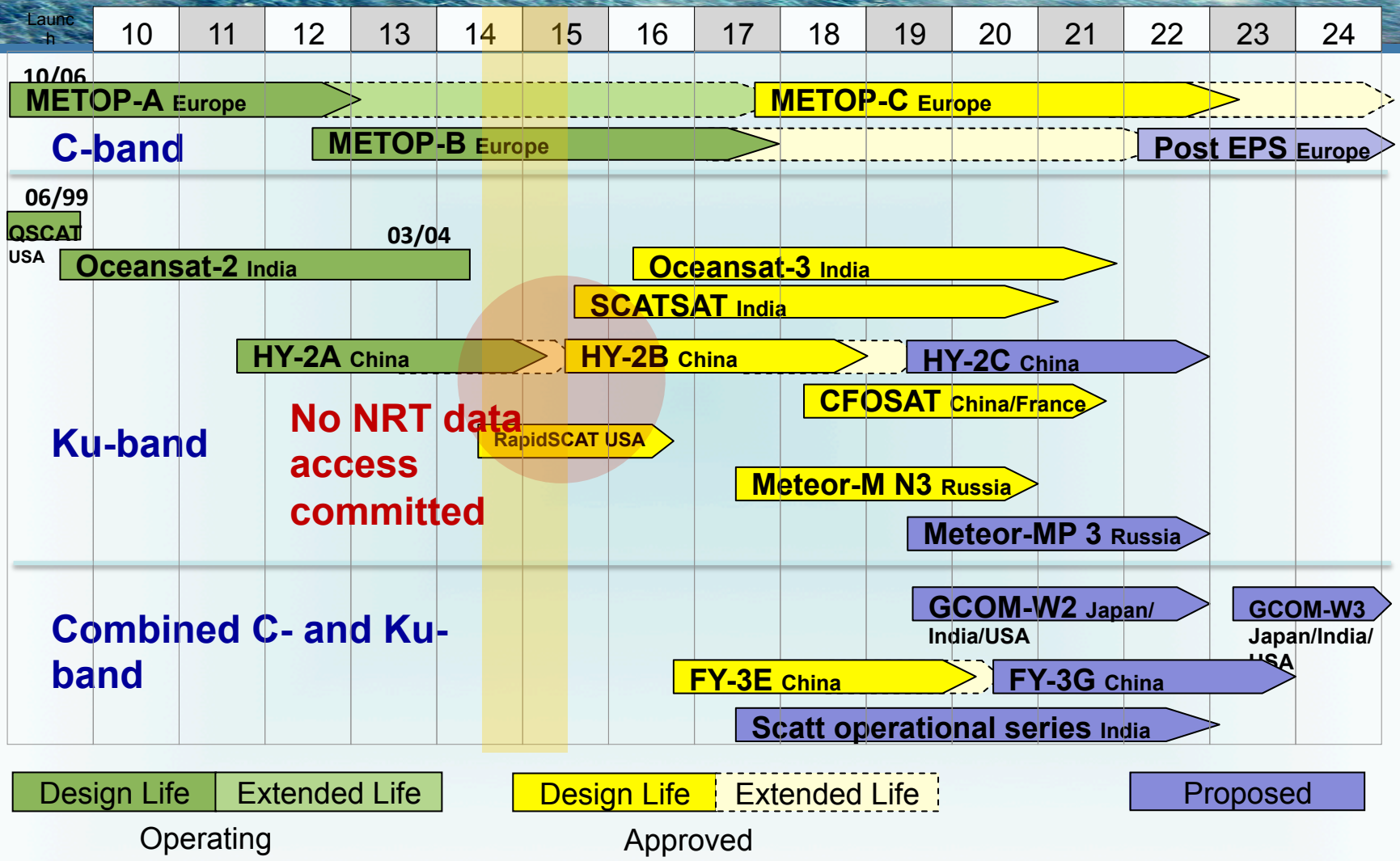
Outreach and training (focused on end users)

- Satellite winds and waves marine forecaster training workshop conducted in December 2013 with the South African Weather Service as part of the outreach and training effort

CEOS Ocean Vector Surface Winds Virtual Constellation (OSVW-VC)
The impact of OSCAT in marine forecast and warnings



CEOS Ocean Vector Surface Winds Virtual Constellation (OSVW-VC)
Current status and outlook – NRT data access



Summary

- Scatterometer OSVW products have a significant impact on operational weather forecasting and warning
- Need to keep pushing for timely and open data access
  - Build/maintain robustness of constellation
- Orbit selection needs to be coordinated to the extent possible to optimize coverage