

Near Real Time SWH Applications at NCEP

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UNH: Doug Vandemark, H. Feng

JPL: Philip Callahan, Victor Zlotnicki

OSTST Meeting, Seattle, WA
June 22-24, 2009

Outline

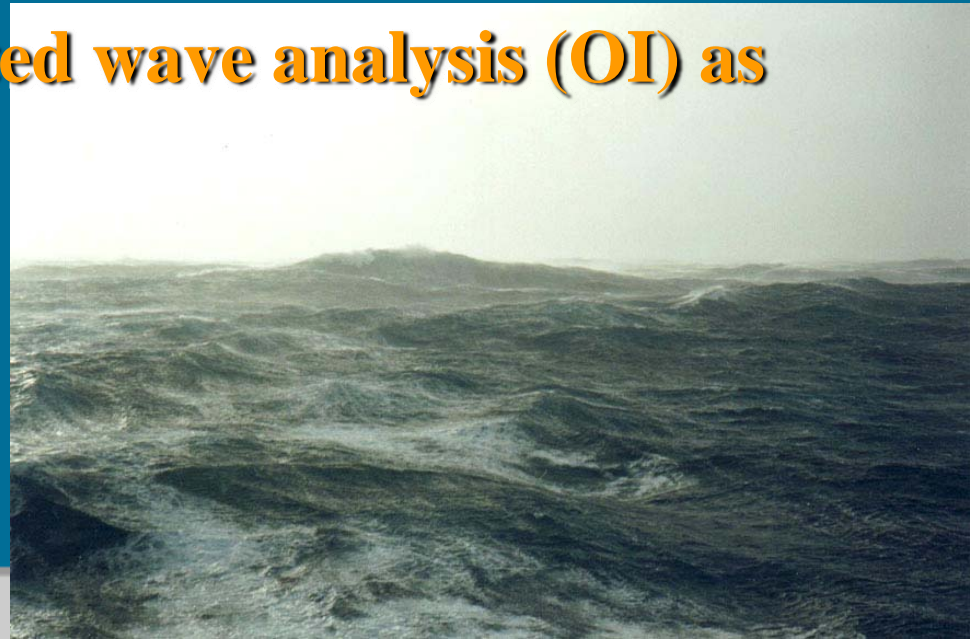
- NRT SWH in NCEP/OPC operations
 - *Sienkiewicz, Ji*
- Multi-grid wave model validation at NCEP/EMC
 - *Chawla*
- Altimeter observation of hurricanes
 - *Callahan*
- UNH efforts on enhanced operational use of altimeter data (e.g., winds, wave period)
 - *Vandemark, Feng*



New container M/V Ital Florida

Altimeter SWH in OPC Operations (Jason, Jason-2, ENVISAT)

- **NRT observations: Integrated into N-AWIPS operational workstations**
- **Diagnostics: Validate wave model output in real time**
- **Data source for automated wave analysis (OI) as guidance for forecasters**
- **Under Development: validation of high seas wave forecasts**



HAVE A SAFE DAY !!!

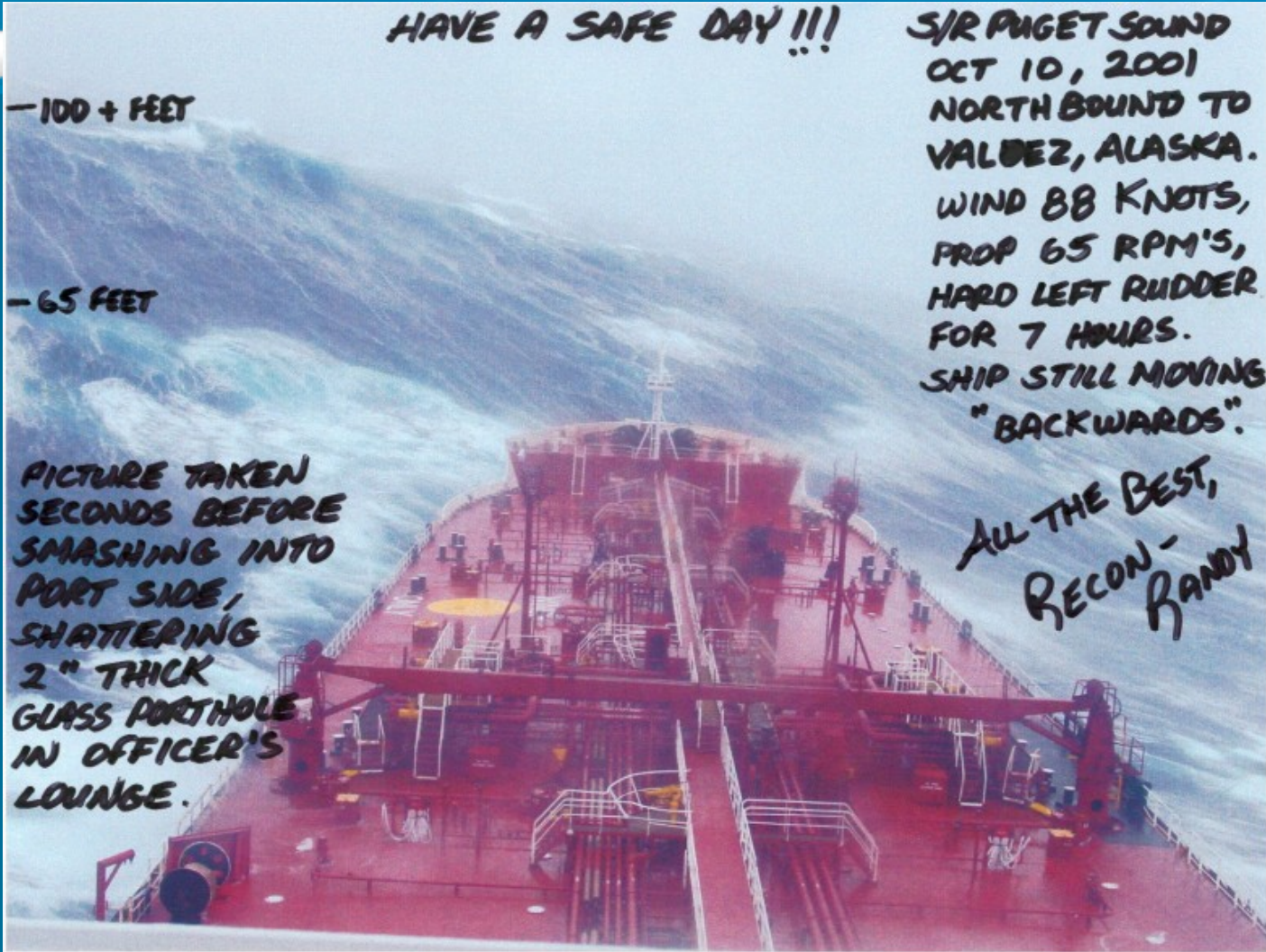
S/R PUGET SOUND
OCT 10, 2001
NORTH BOUND TO
VALDEZ, ALASKA.
WIND 88 KNOTS,
PROP 65 RPM'S,
HARD LEFT RUDDER
FOR 7 HOURS.
SHIP STILL MOVING
"BACKWARDS".

-100 + FEET

-65 FEET

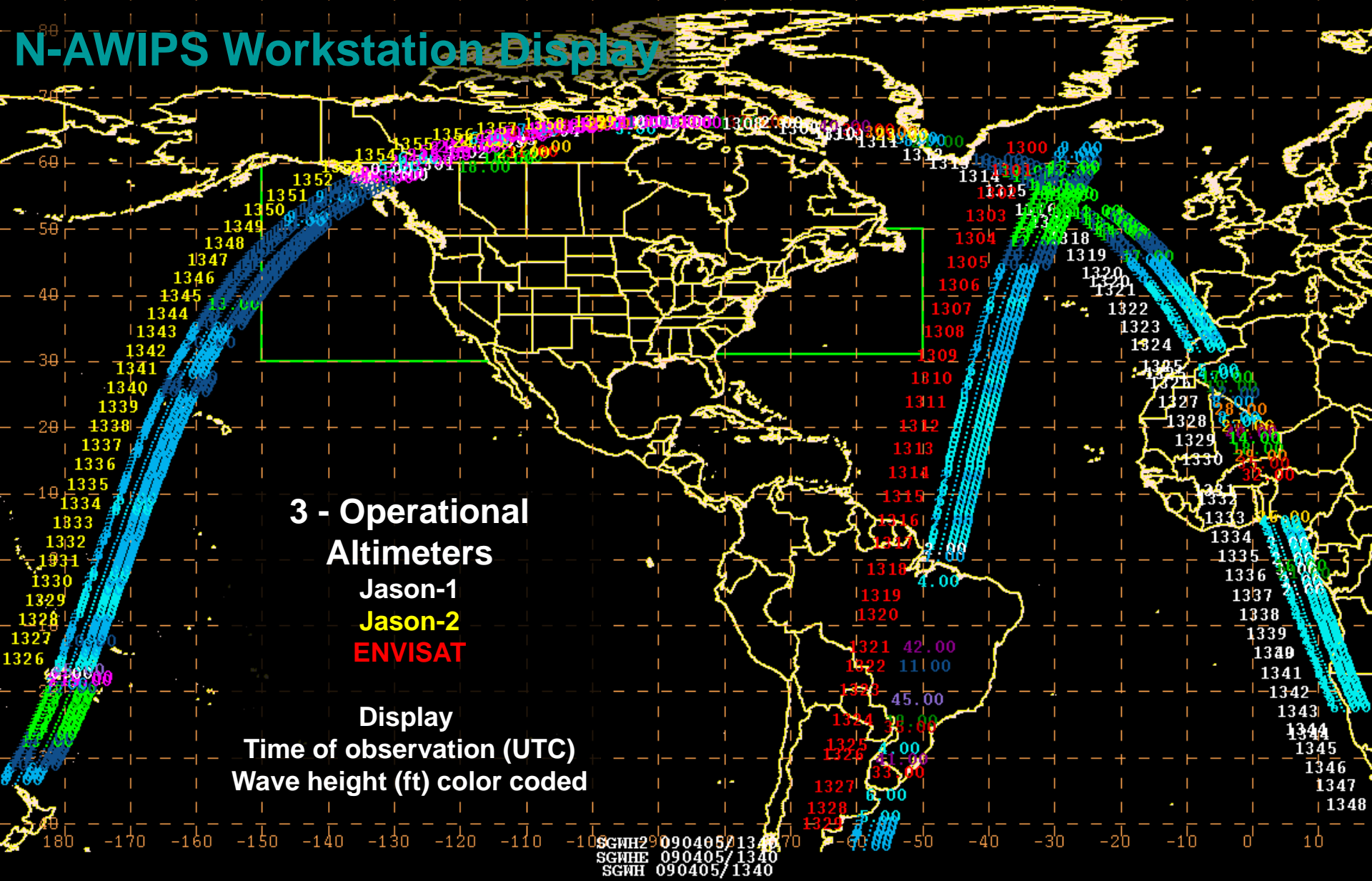
PICTURE TAKEN
SECONDS BEFORE
SMASHING INTO
PORT SIDE,
SHATTERING
2" THICK
GLASS PORTHOLE
IN OFFICER'S
LOUNGE.

ALL THE BEST,
RECON-
RANDY

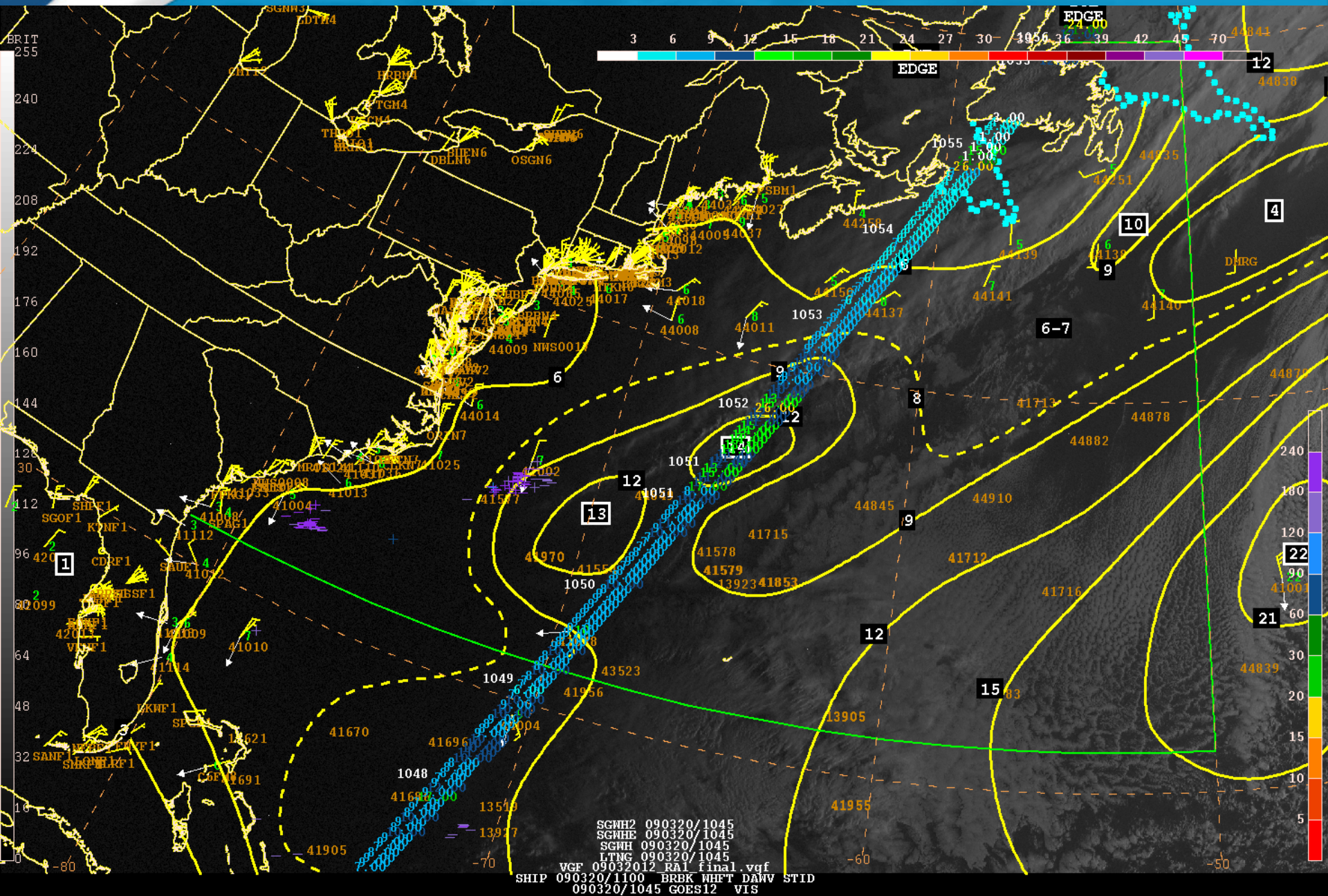


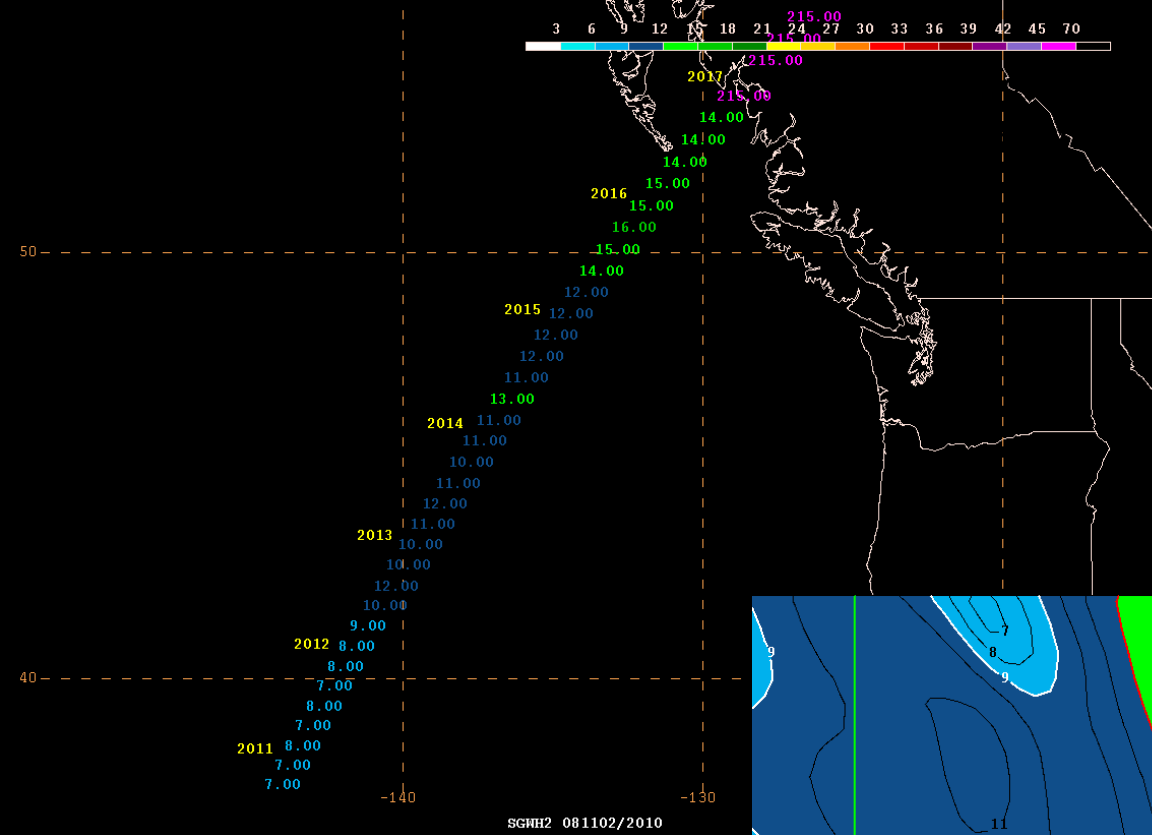


N-AWIPS Workstation Display

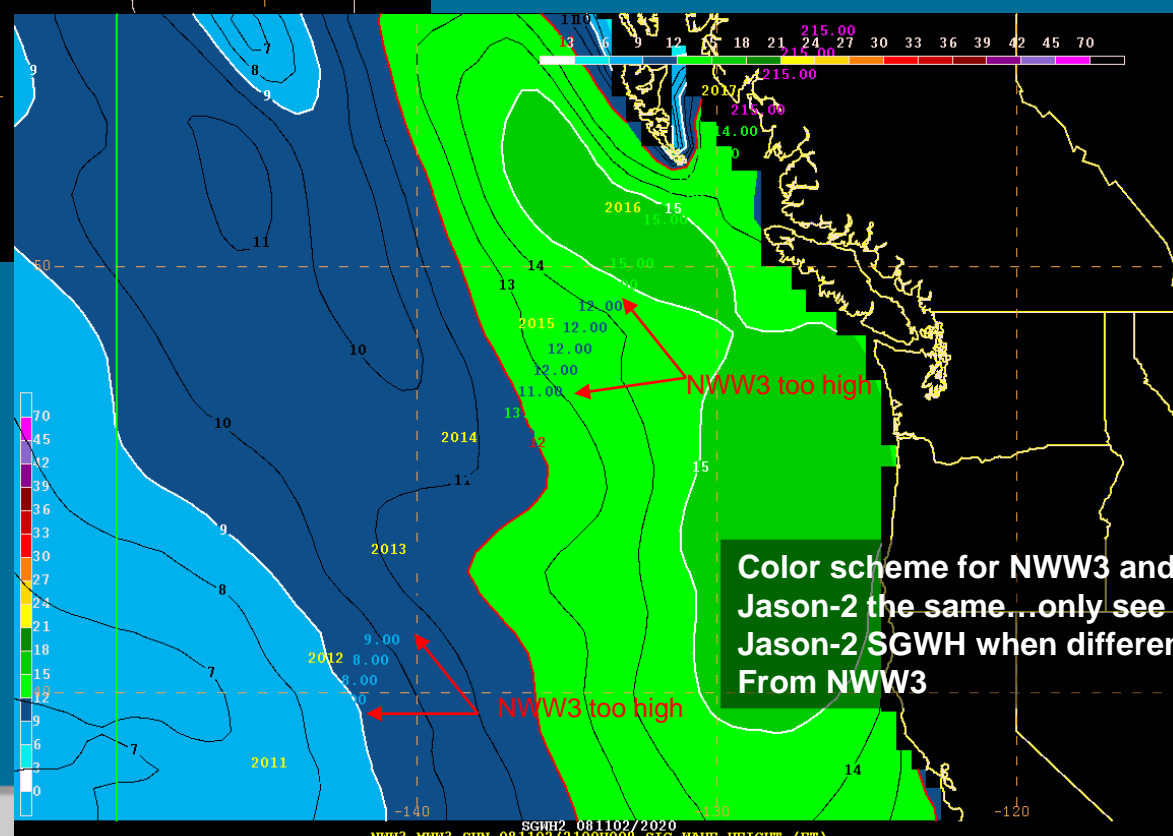


Additional source of data for forecaster analysis





**Jason-2
Sig Wave Height
(ft)
NOAA WAVEWATCH III
Model**



**Color scheme for NWW3 and
Jason-2 the same...only see
Jason-2 SGWH when different
From NWW3**

Diagnostic

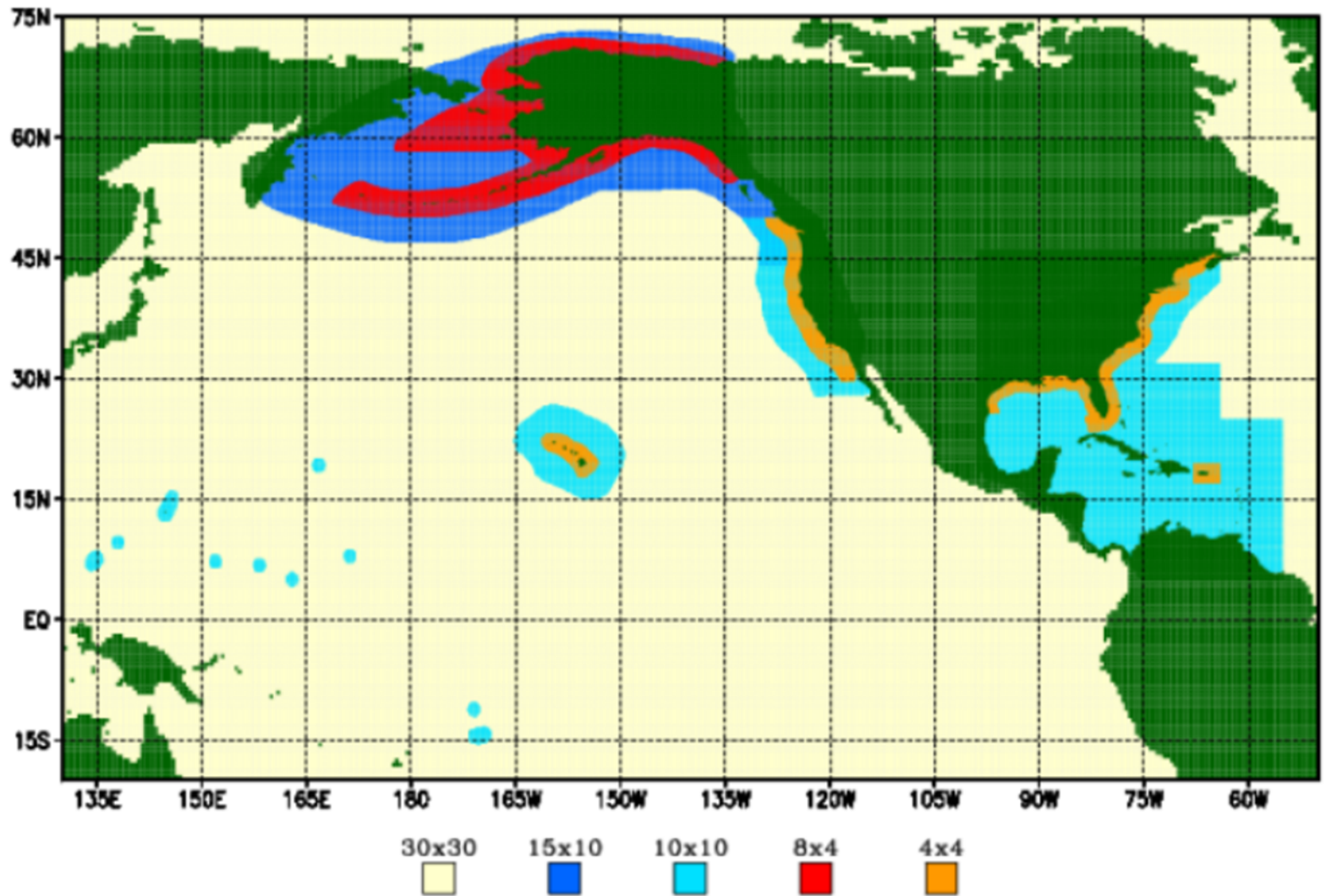
- Compare to NWW3
- Forecasters adjust forecasts
- Evidence of localized events
 - Gulf Stream
 - Cape Farewell
 - Cape Mendocino, CA
 - Gulf of Tehuantepec

Validation of Multi-grid Wave model

Arun Chawla

NCEP/EMC

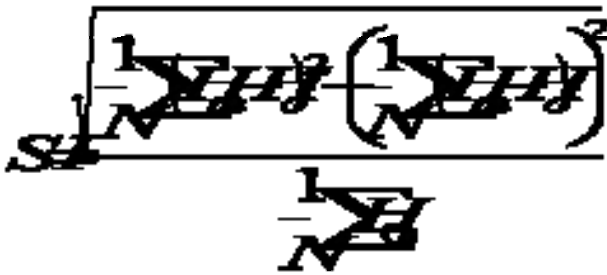
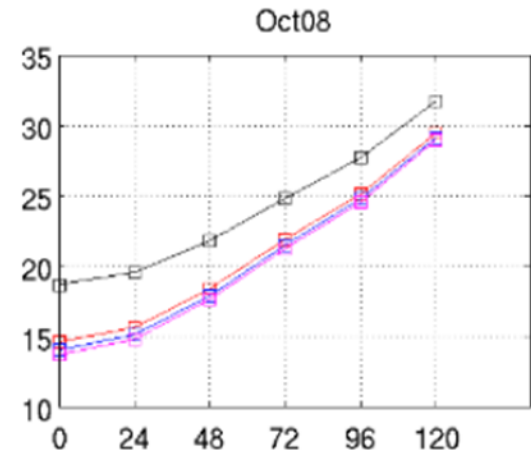
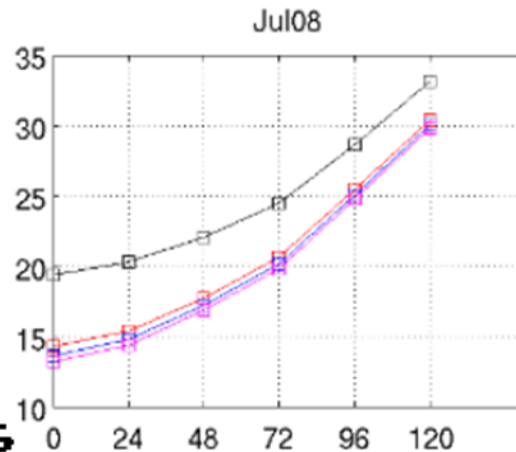
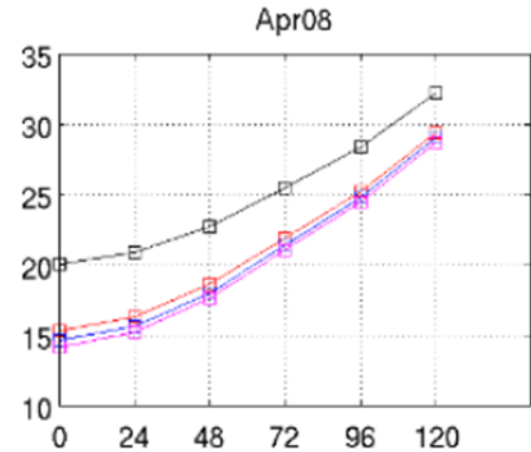
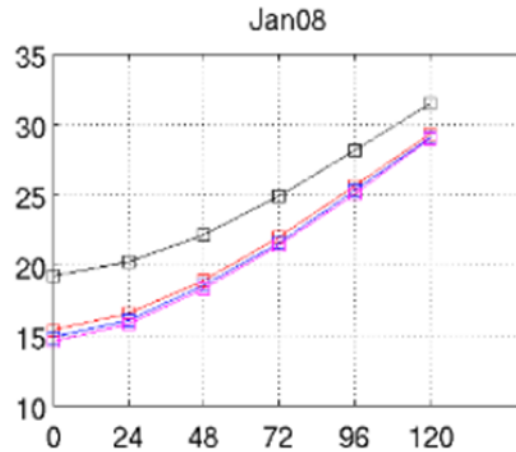
Multi-grid Wave Model (NWW-3)



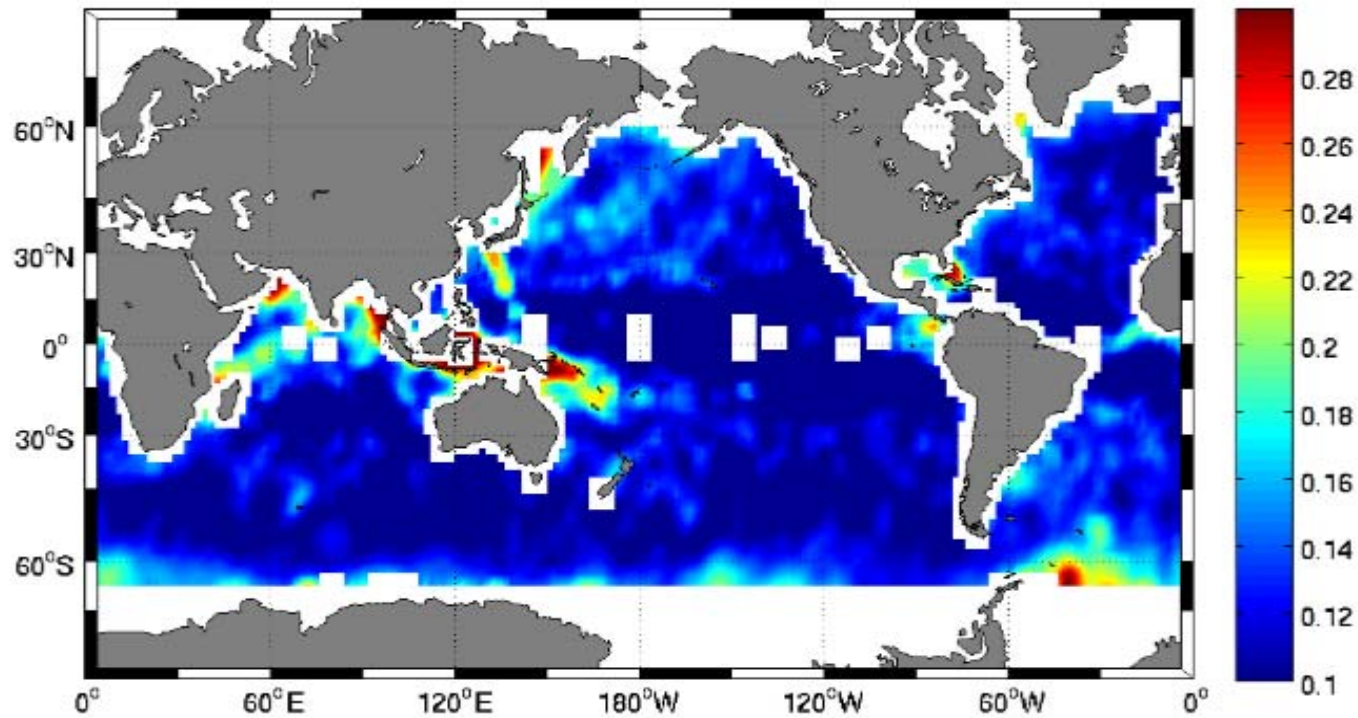
Altimeter Data for Wave Model Validation

- 1) Co-location using the altimeter data.
- 2) Altimeter data processing
 - *Removing outlier points*
 - *Removing spikes*
- 3) ***Running average*** (7"-15") before computing model – data statistics
- 4) Compute ***daily difference*** (mode-obs)
- 5) Combines into ***monthly/Quarterly records***
- 6) Define ***SI index – normalized standard deviation***

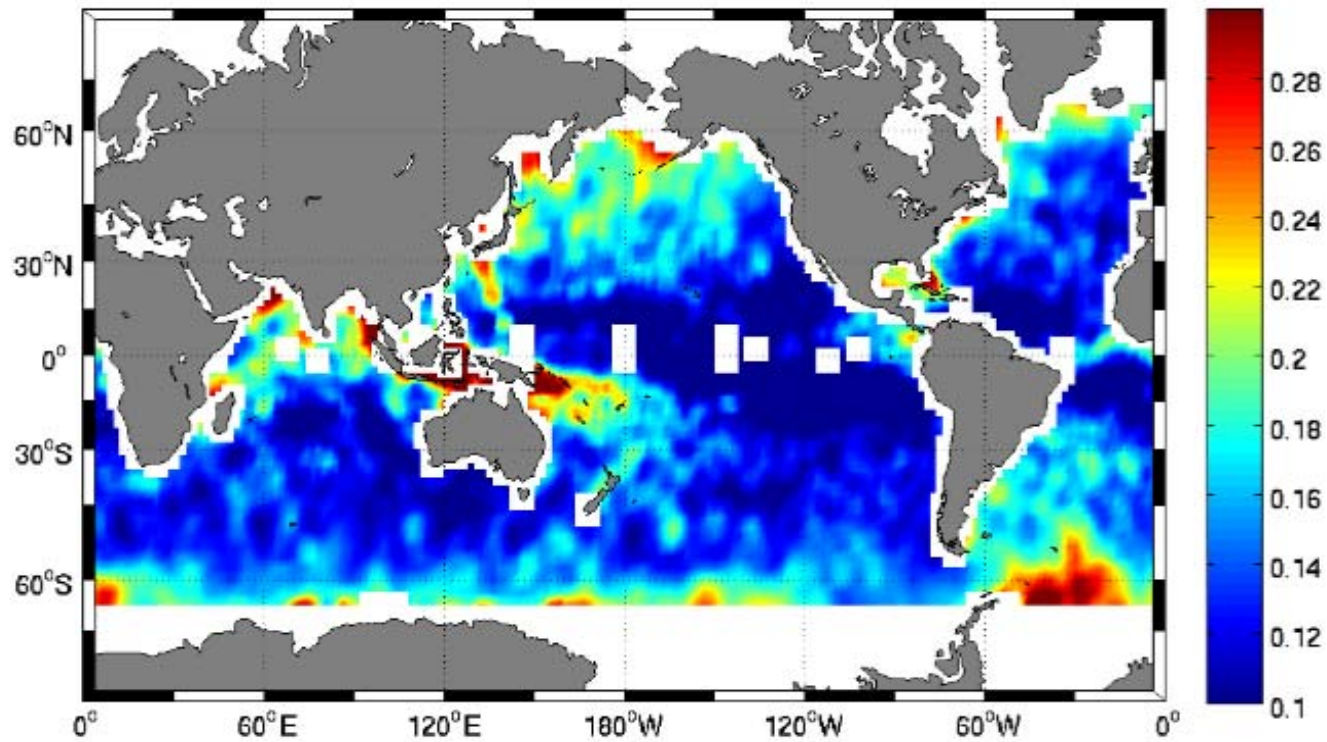
Scatter Index (SI) for Global Domain



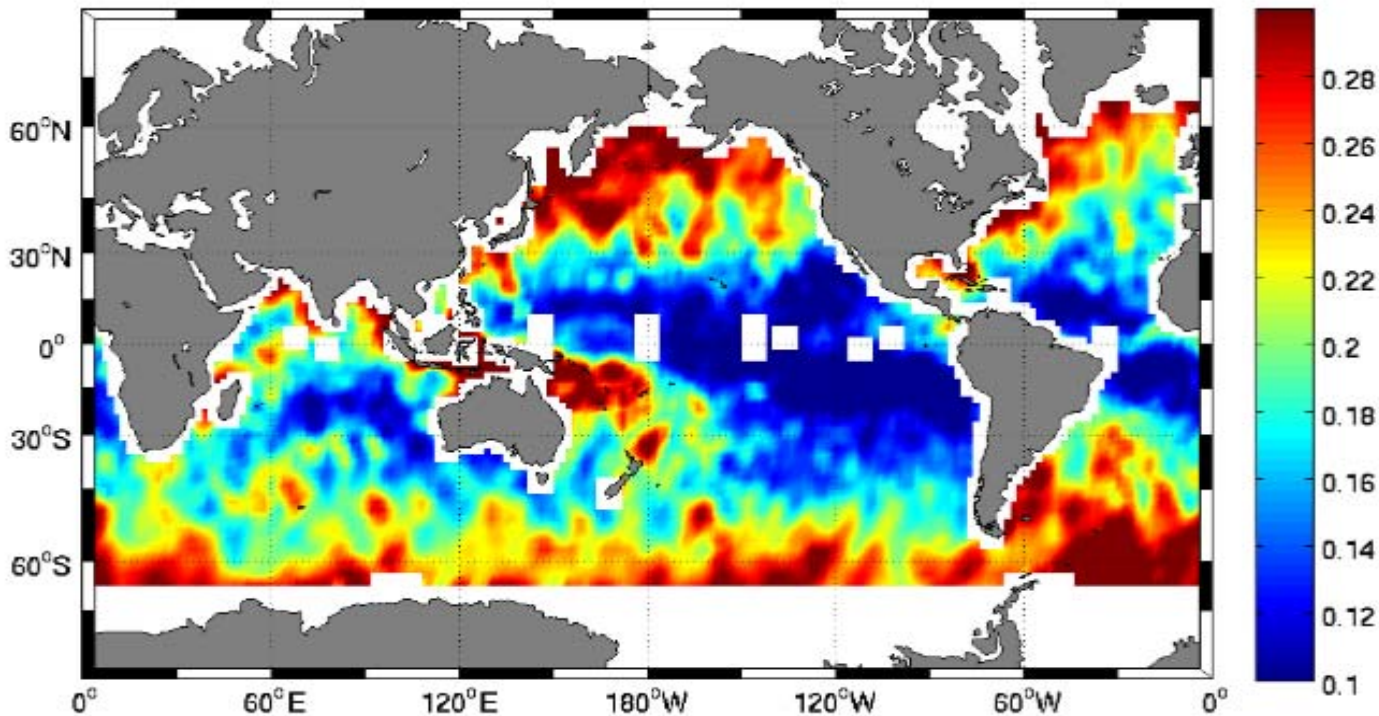
SI Map, hindcast Jan – Mar, '08



SI Map, 2 day forecast Jan – Mar, '08



SI Map, 4 day forecast Jan – Mar, '08

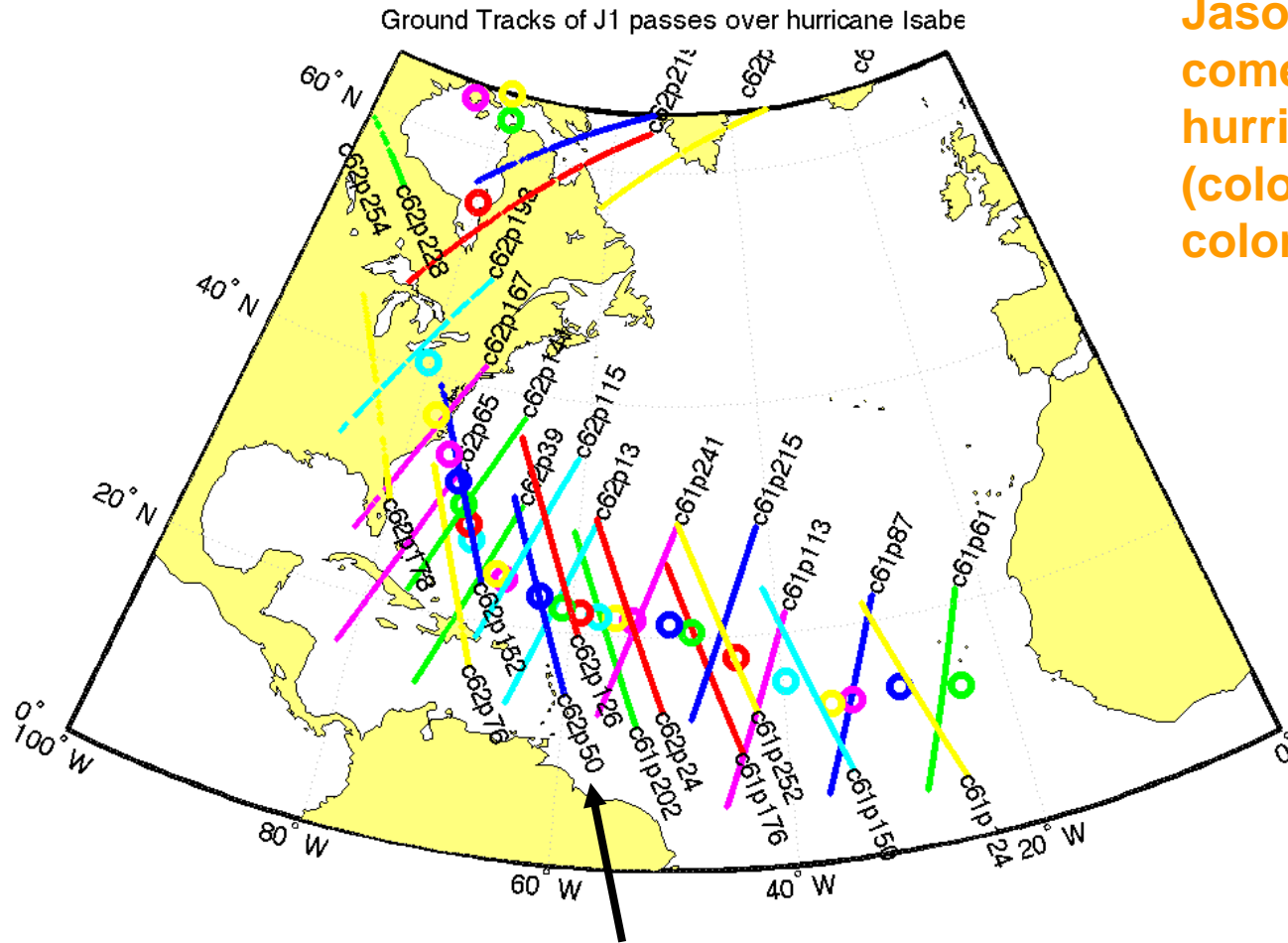


Altimeter Observation of Hurricanes

Phil Callahan

JPL

Jason-1 Overflights of Hurricane Isabel



Jason-1 tracks that come within 1000 km of hurricane Isabel (color of circles matches color of tracks).

Wave height and backscatter (inversely proportional to wind speed) profiles shown on next page

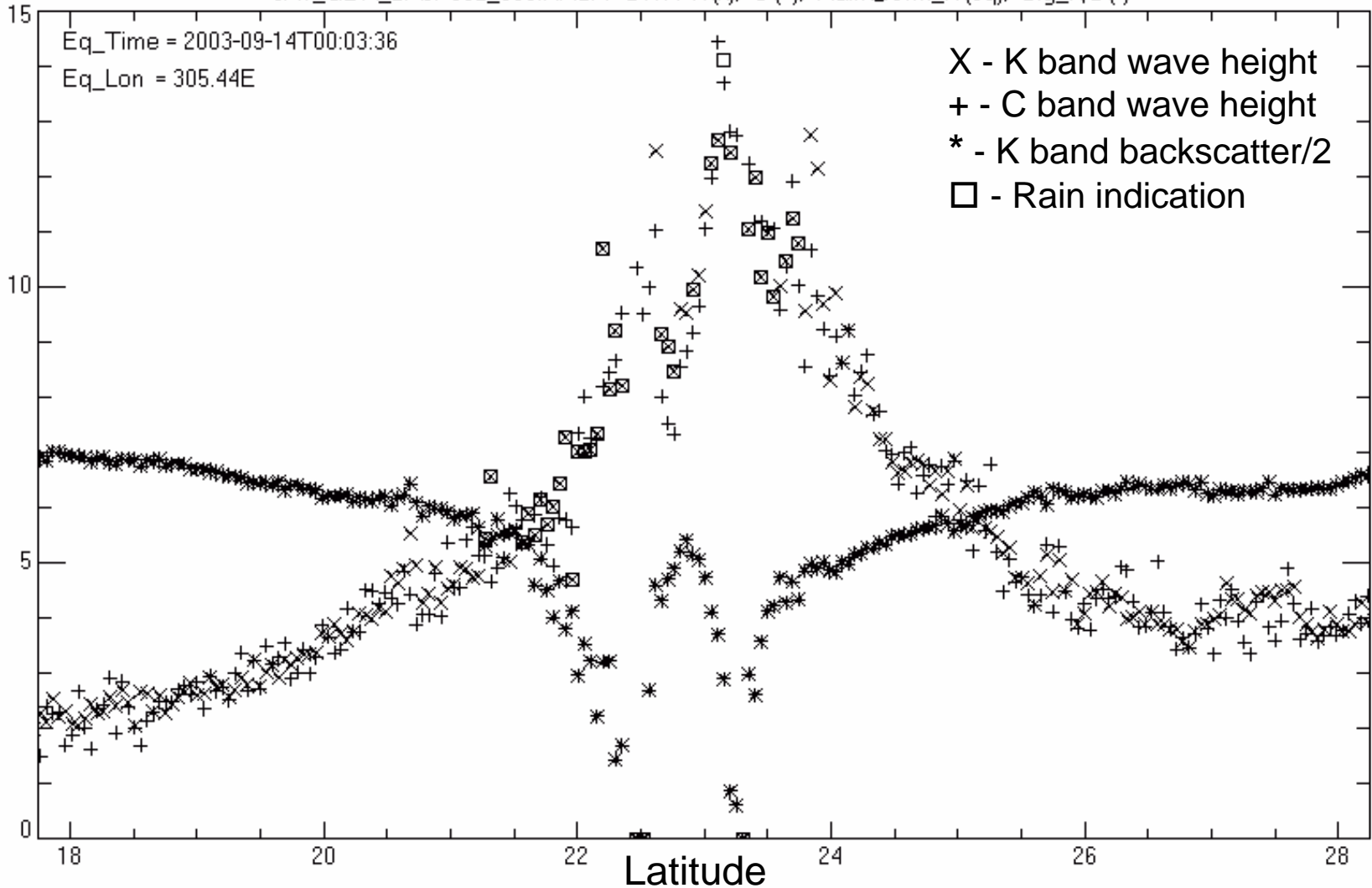
Jason-1 Cycle 062 Pass 050 – Isabel (2003)

JA1_GDR_2PbP062_050.NASA SWH K (x), C (+), Rain@swh_K (sq), Sig_K/2 (*)

Eq_Time = 2003-09-14T00:03:36

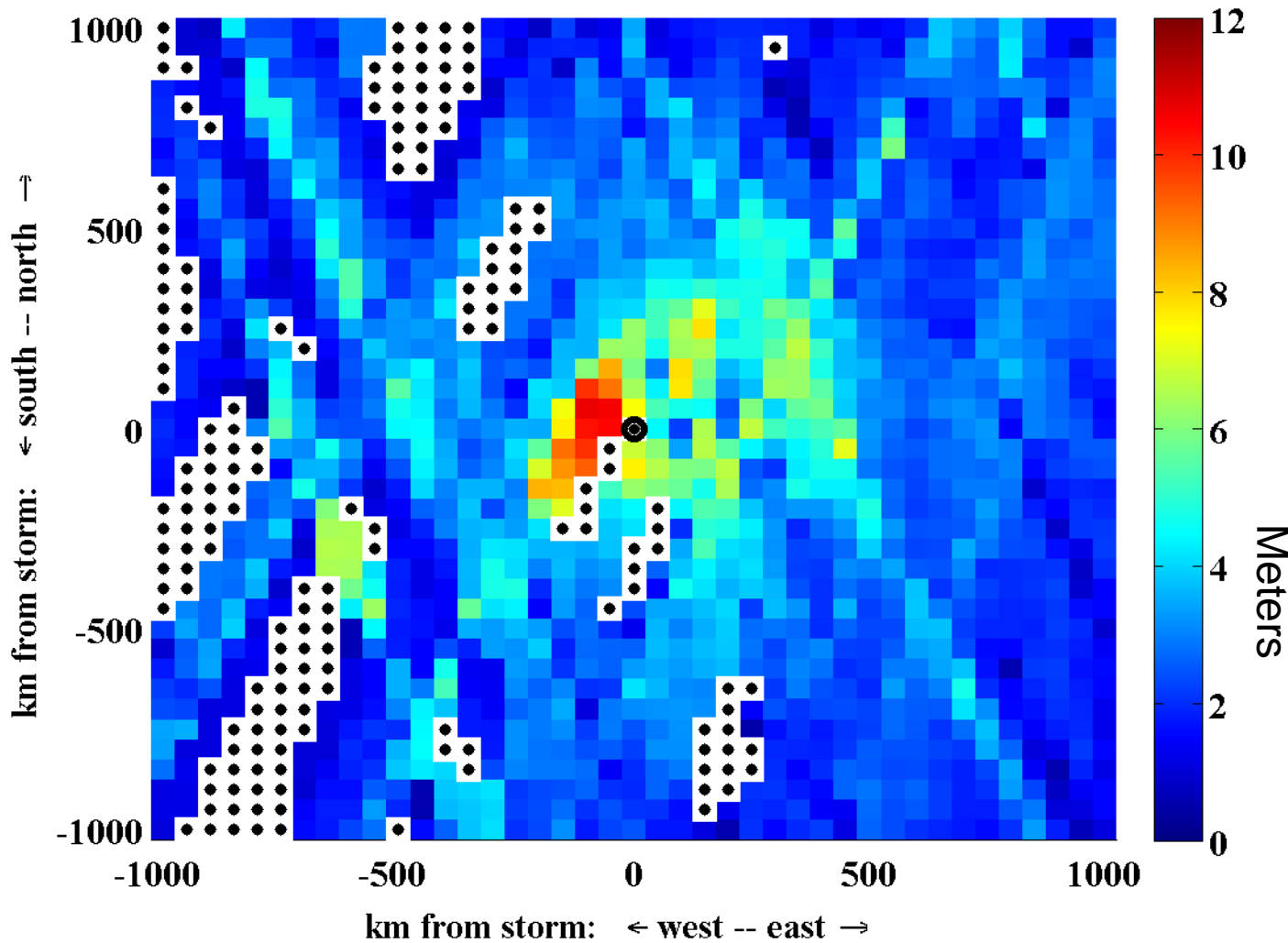
Eq_Lon = 305.44E

Wave Height in m; backscatter in dB



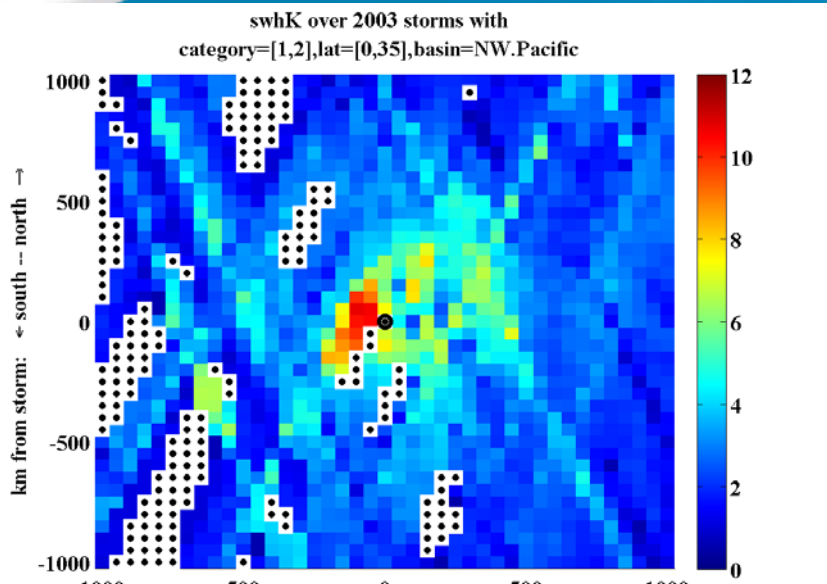
Wave Height Template of 2003 Cat 1, 2 Hurricanes, NW Pacific (Compass Coordinates)

swhK over 2003 storms with
category=[1,2],lat=[0,35],basin=NW.Pacific

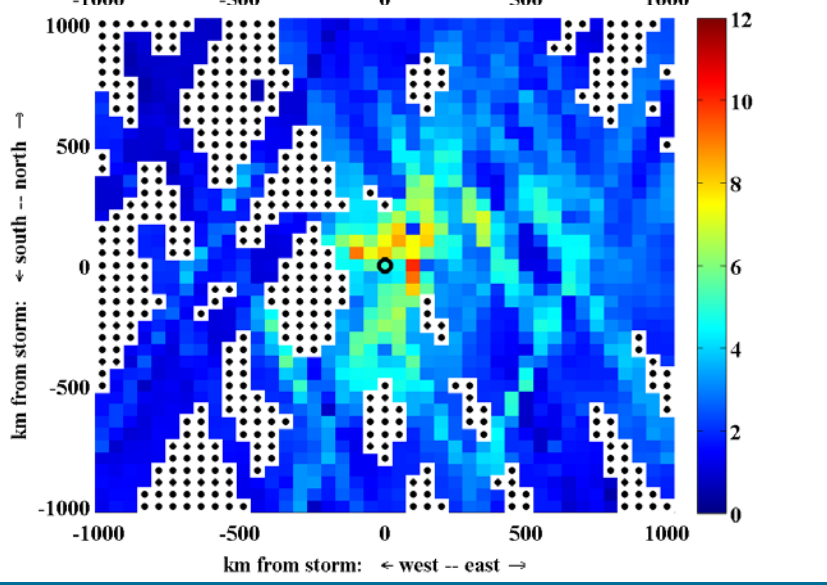


Average SWH in 50 km bins for TOPEX tracks passing within 1000 km of storm centers. (Most filled bins have 3 or more values in the avg; white/black dot bins have no data)

Wave Height Templates of Cat 1, 2 Hurricanes: 2003/2005, NW Pacific, Atlantic (Compass Coordinates)

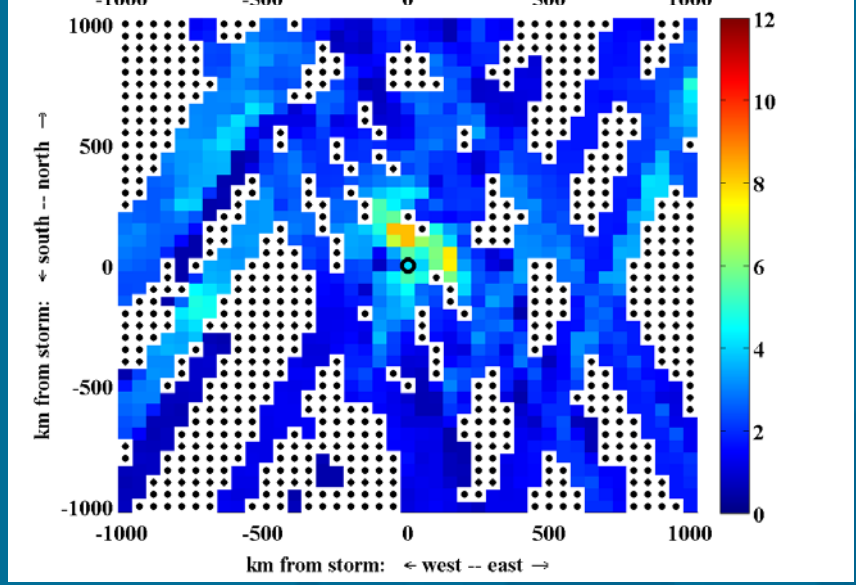
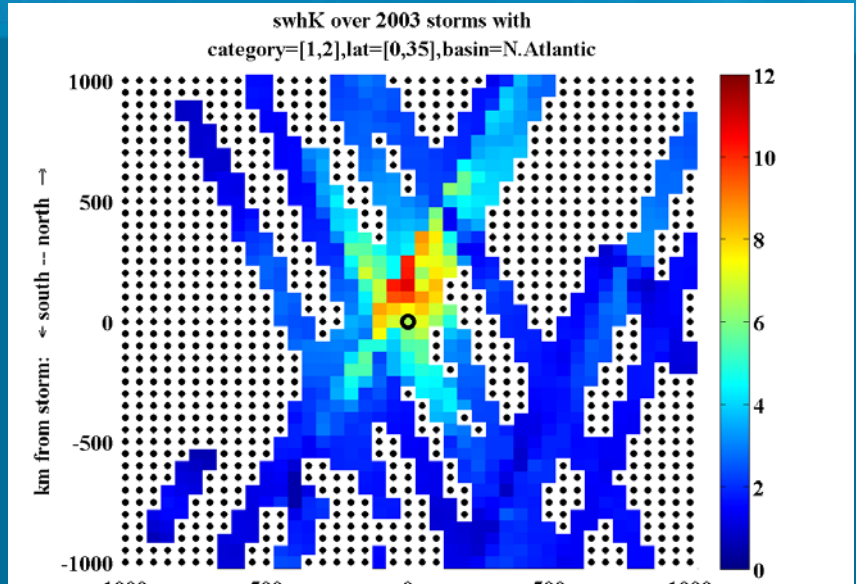


2003



2005

NW Pac



Atlantic

Enhanced use of satellite altimeter data at NCEP

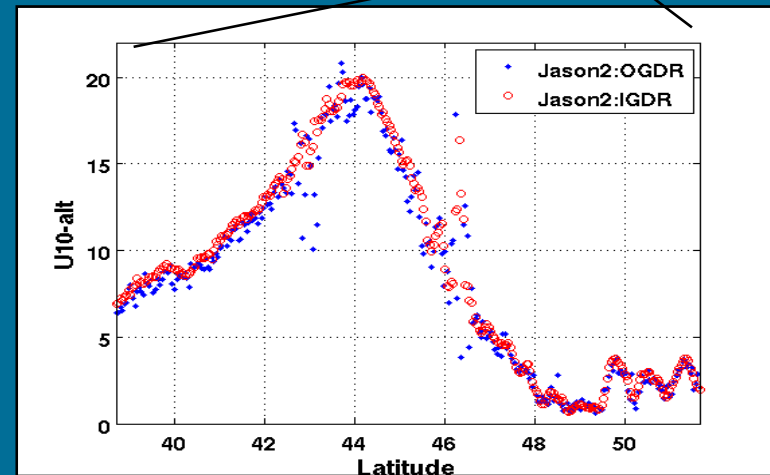
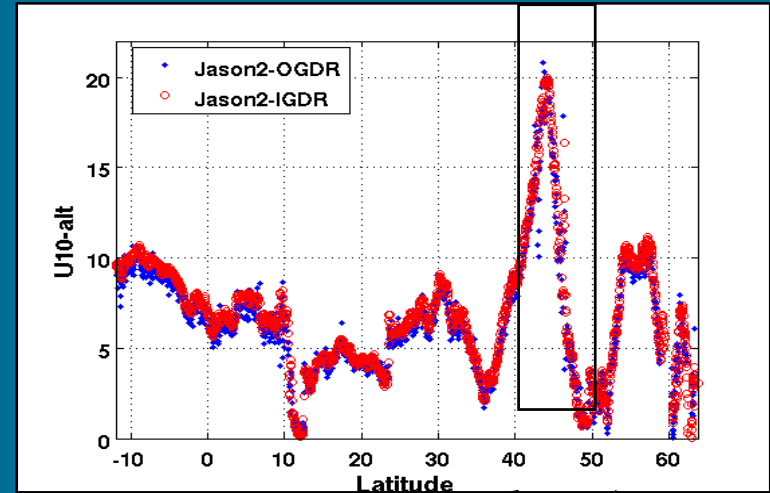
D. Vandemark and H. Feng
UNH

Ongoing Activities at UNH

- 1) **Altimeter wind speed data** - Implementation and evaluation for **forecast use**
- 2) **Altimeter wind speed archive** – Under development for long term NWP and wave **model validation**
- 3) **Altimeter-derived wave period** - Under evaluation for NCEP applications
- 4) **Overall NRT data quality** – Continued tests

Altimeter wind speed data for forecast guidance

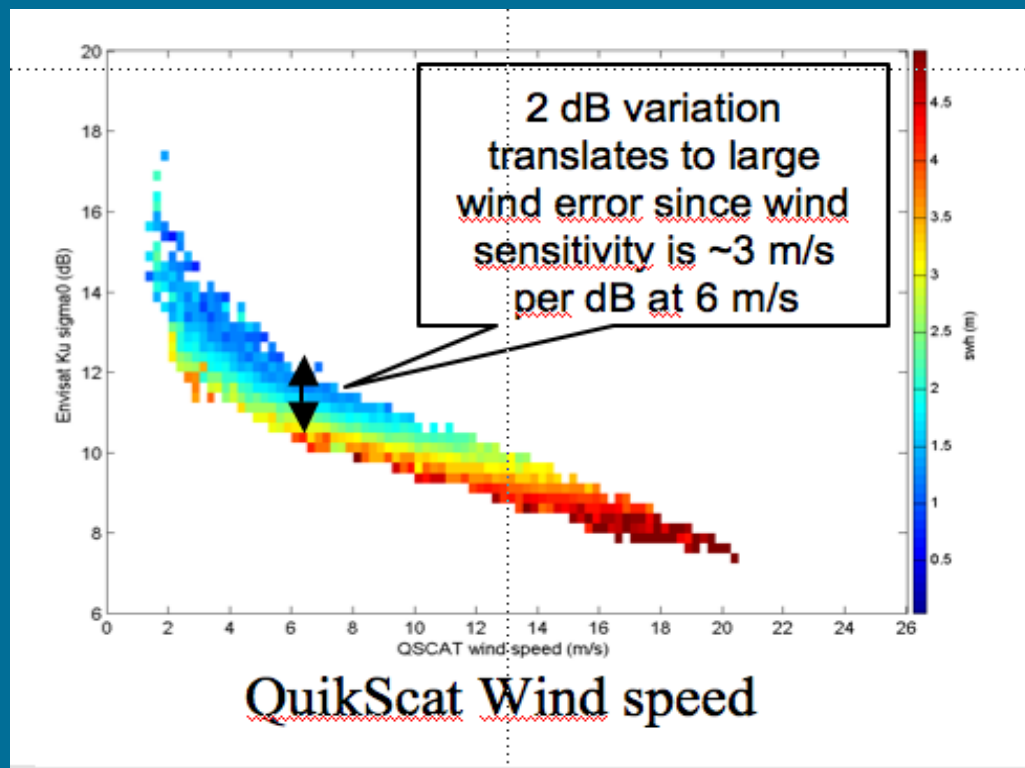
- NRT data quality for Jason-2 as well as Jason-1 and Envisat
- Assess use of tailored high wind speed model



Altimeter wind speed data for independent hindcast validation (Wavewatch III)

- 1) Revise Envisat NRT wind algorithm - (use CLS/ESA model)
- 2) Build quality controlled long term data base 1993-present (follow on to IFREMER SWH work)

Envisat multi-valued mapping between Cross section, Wind Speed and Sea State



Goal: To provide consistent altimeter wind data to NCEP for NRT (Jason 2 and Envisat) as well as all past missions.