Improved Near Real-Time Hurricane Ocean Vector Winds Retrieval using QuikSCAT

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JHT Project Overview

➢ Two-year development to provide improved QuikSCAT hurricane wind retrievals in Near Real-Time (NRT)

☐ Year-1

- Optimize new Extreme-Winds (*X-Winds*) algorithm to process NRT Merged Geophysical Data Record (MGDR)

- Develop operational software to be ported to NOAA/STAR computers for testing during 2010 hurricane season

☐ Year-2

- Validate *X-Winds* hurricane product using 2010 data

- Demonstrate as prototype operational OVW product for TPC/NHC & JTWC centers during 2011 season

Background: NASA Funded Research

➢ NASA Ocean Vector Winds Science Team sponsored CFRSL to develop improved QuikSCAT wind retrieval algorithm for extreme wind events

➢ This PI OVW product is known as *Q-Winds*

☐ Combines active/passive measurements from SeaWinds

☐ Tuned to HRD's H*Wind surface wind analysis from hurricanes
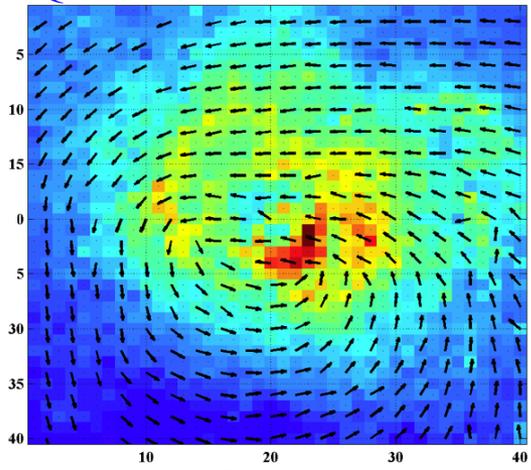
☐ Provides rain effects correction

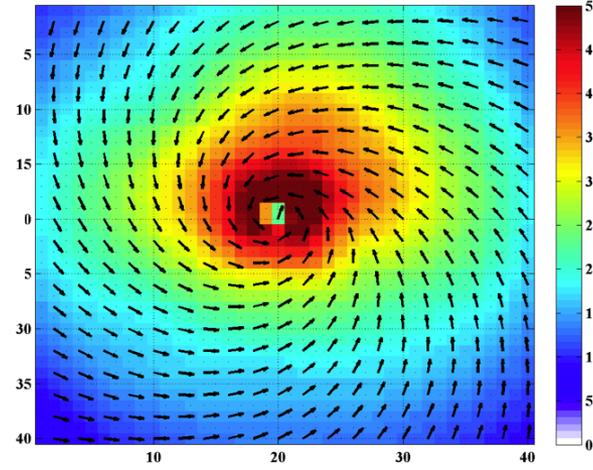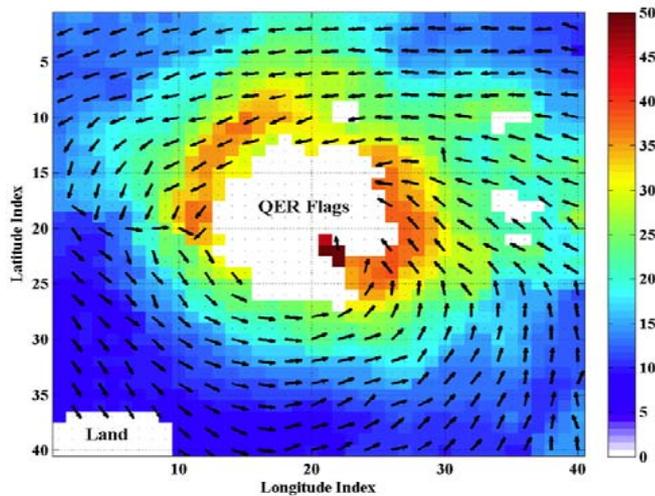# Q-Winds Example: Hurricane Fabian 2003
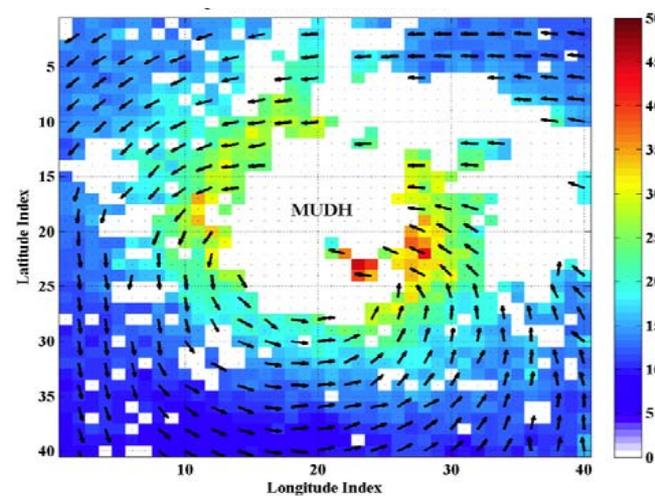
Q-Winds
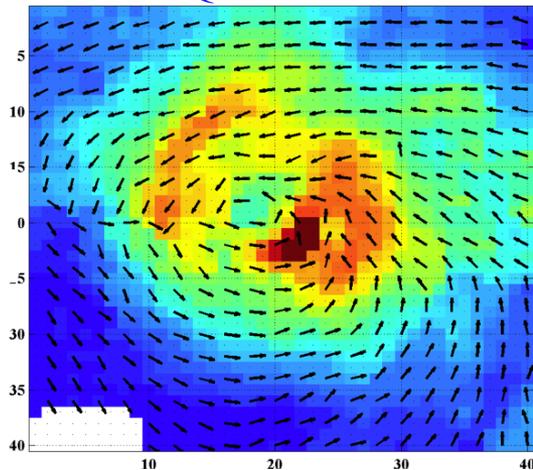
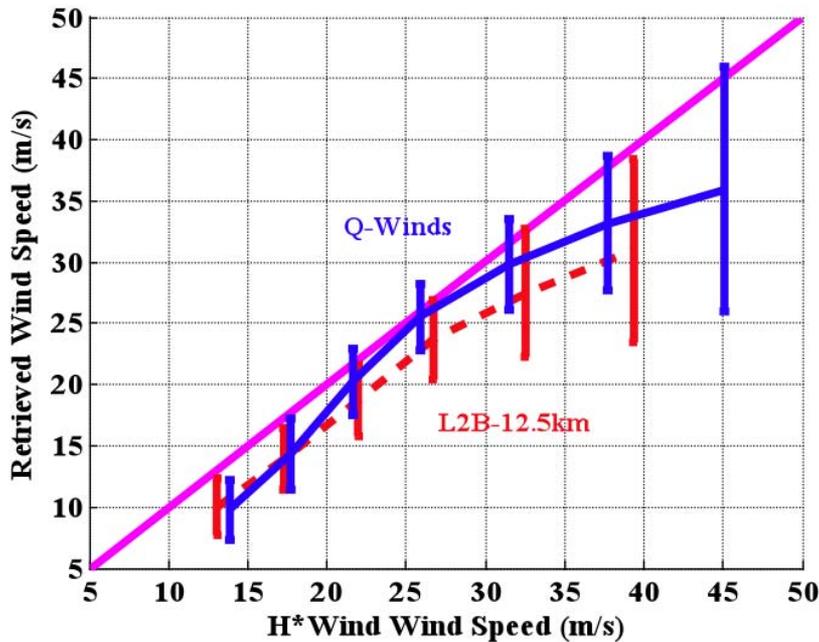QuikSCAT L2B-12.5 km

H*Wind

Q-Winds with rain flags

QuikSCAT L2B-12.5 km with rain flags
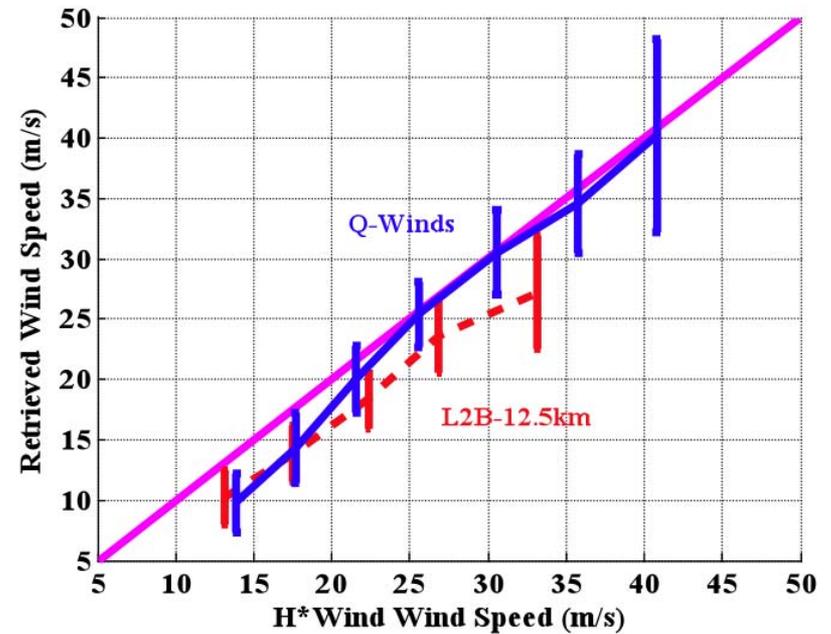
Q-Winds & SeaWinds L2B-12km Validation

Wind Speeds Comparison

Without rain flags

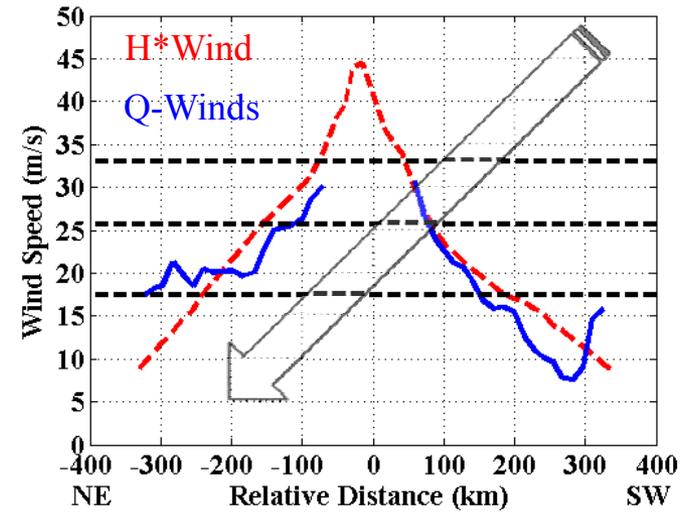With rain flags
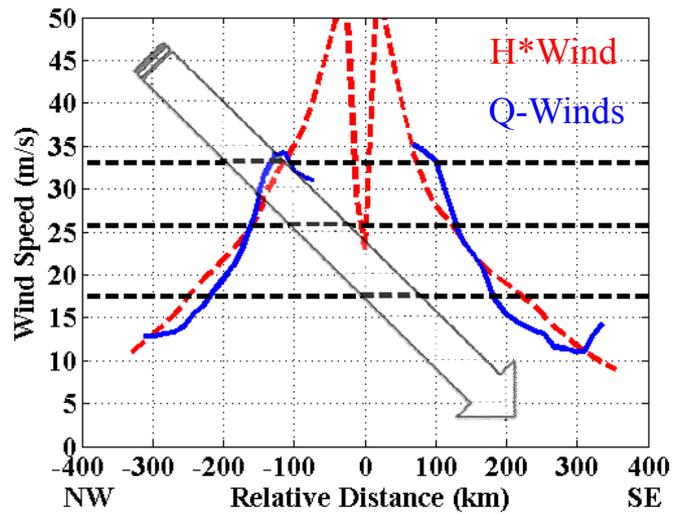
Fabian 2003 (#21898)
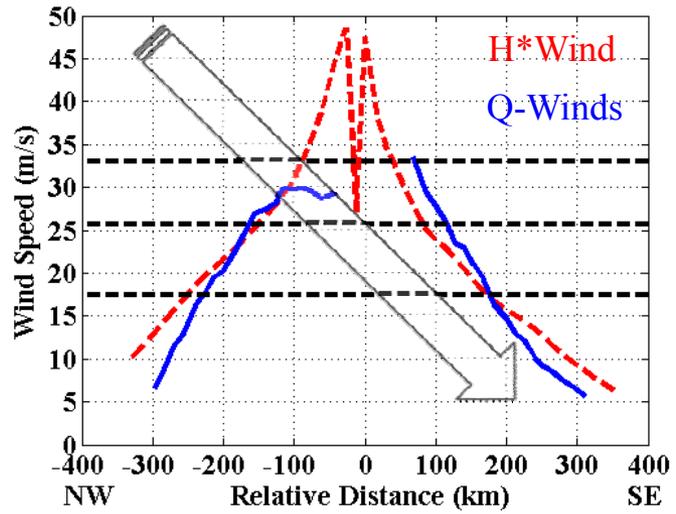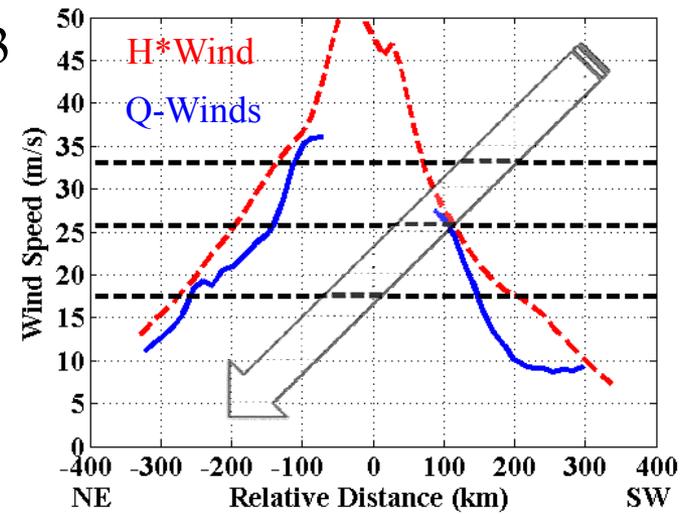
Ivan 2004 (#27217)

JHT: X-Winds Algorithm Development

➢ <u>Storm Detection</u>

☐ Near Real Time algorithm for autonomous storm detection

■ Locates clusters of high sigma-0 in MGDR

➢ <u>Storm Eye Location</u>

☐ Locates center of circulation by searching for the minimum gradient of σ^0 differences

➢ <u>Initial Wind Direction Estimation</u>

☐ Estimates wind direction field from σ^0 contrast

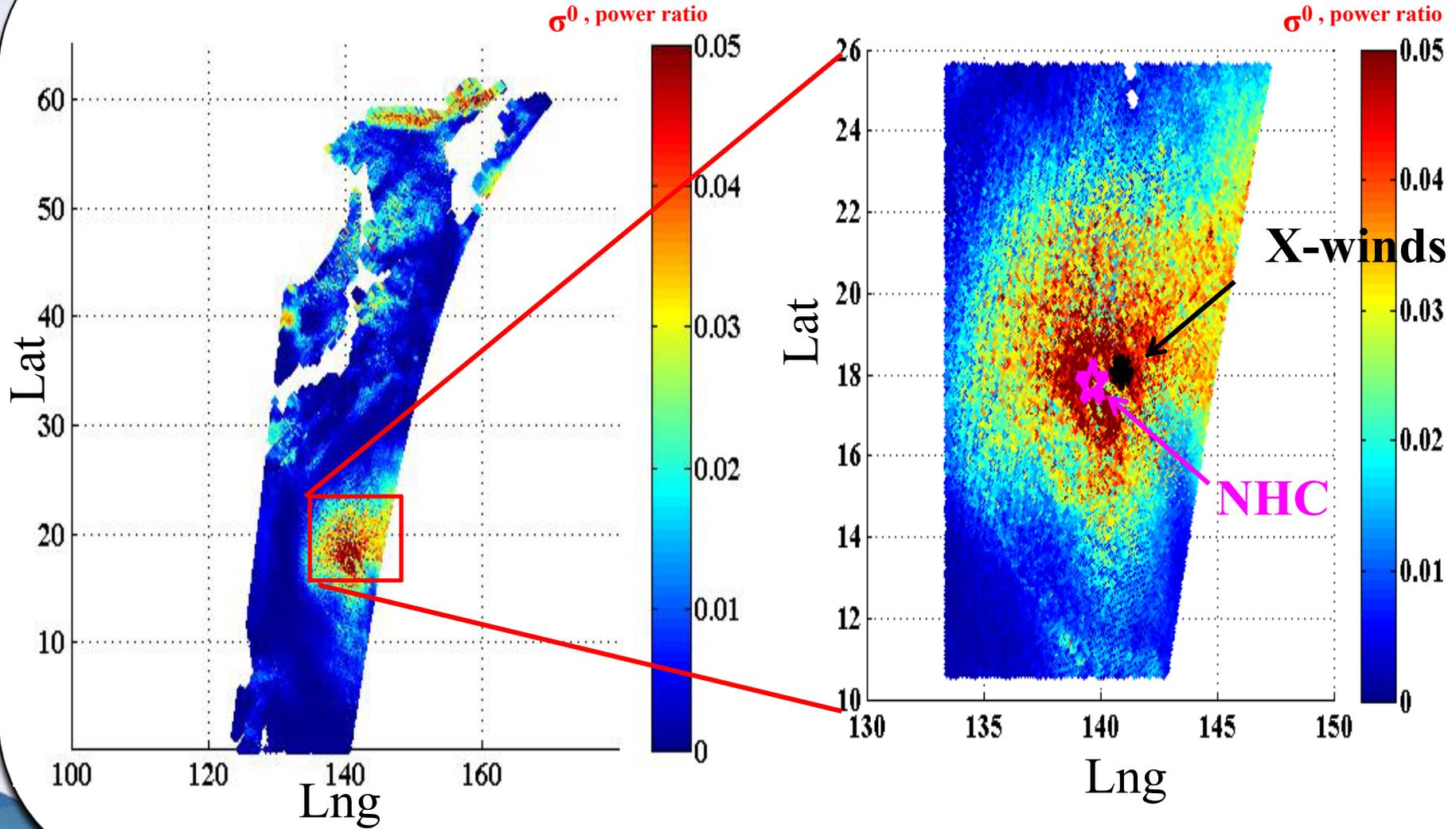■ Provides initial Wind direction estimation for ambiguity selection

➢ <u>Rain Correction</u>

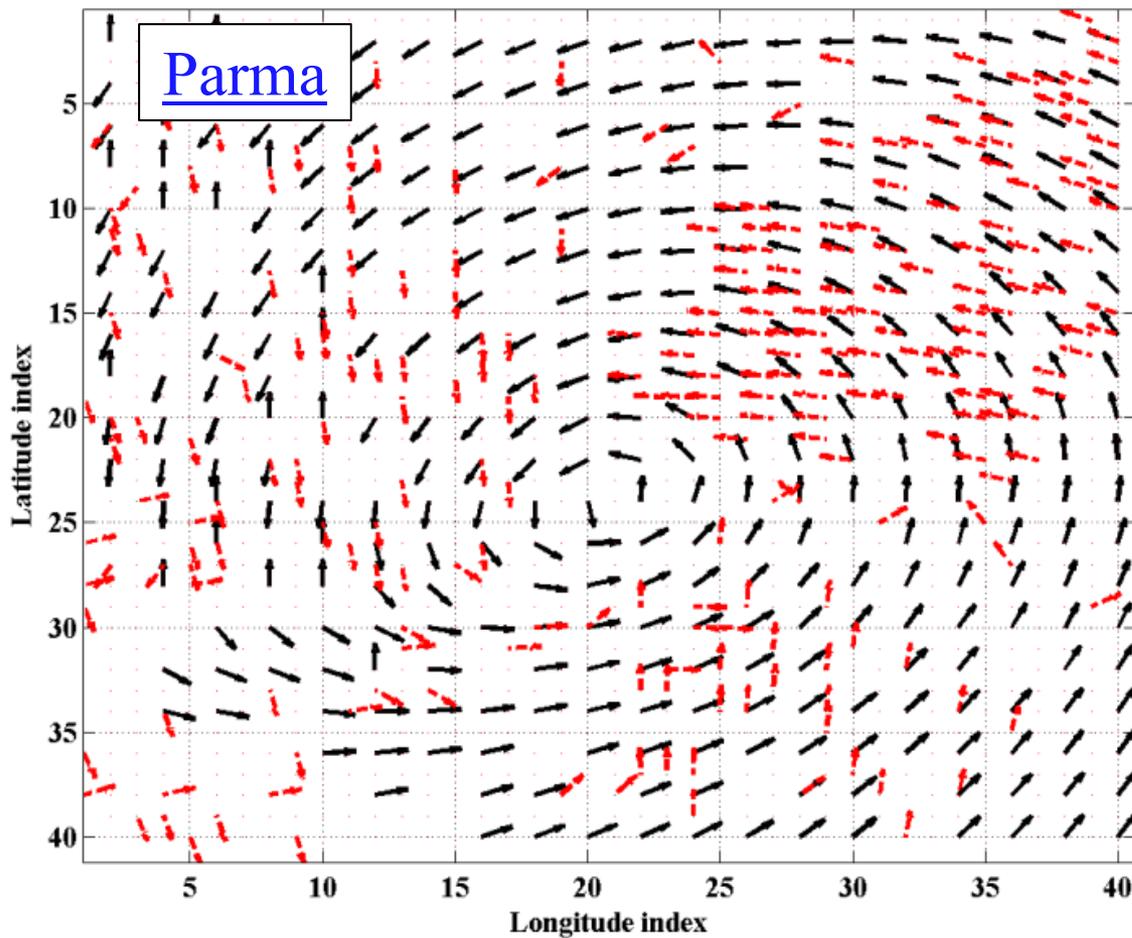☐ Uses QuikSCAT Radiometer (*QRad*) brightness temperatures

Super Typhoon Melor, 2009

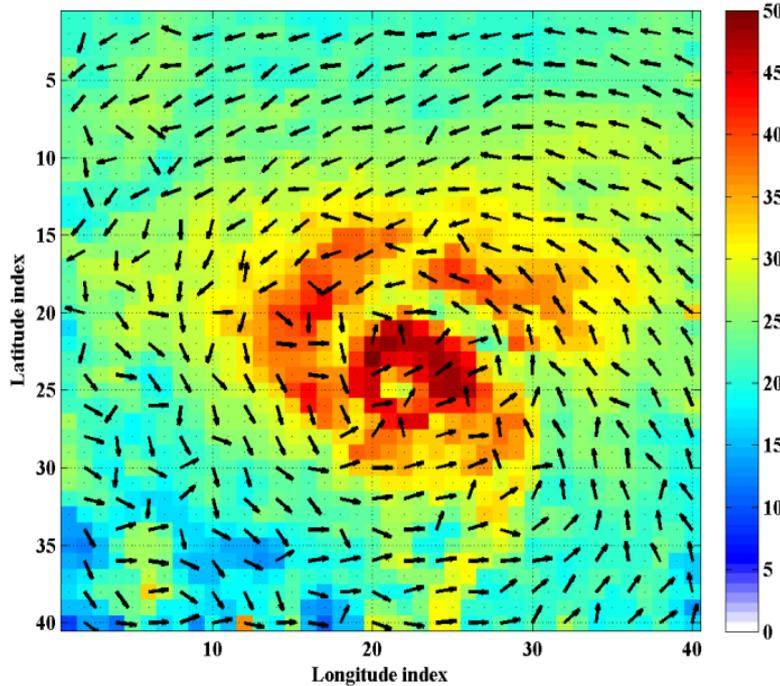# Wind Direction Initialization

Retrieved *Q-Winds*
Initial directions

Validation of X-Winds Algorithm through Comparisons with NASA developed Q-Winds
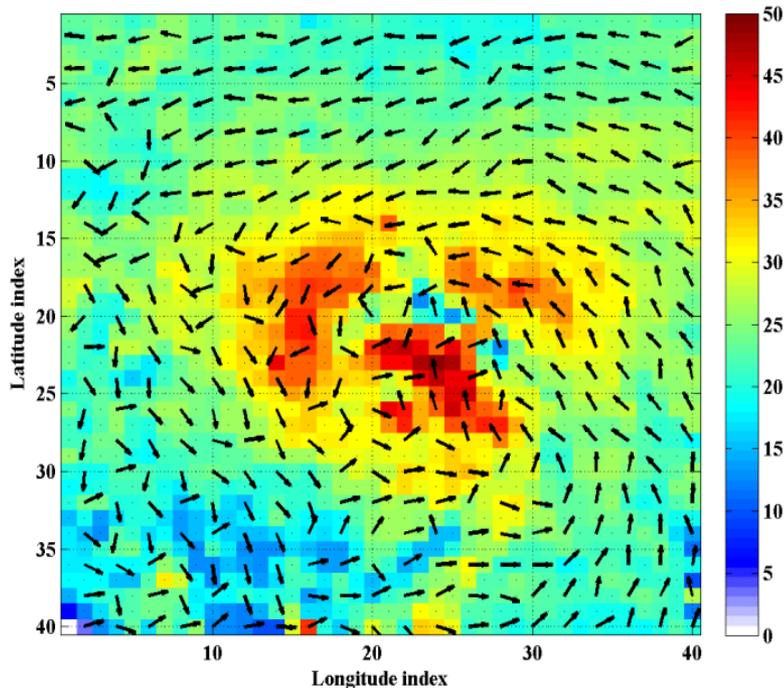
Super Typhoon Melor
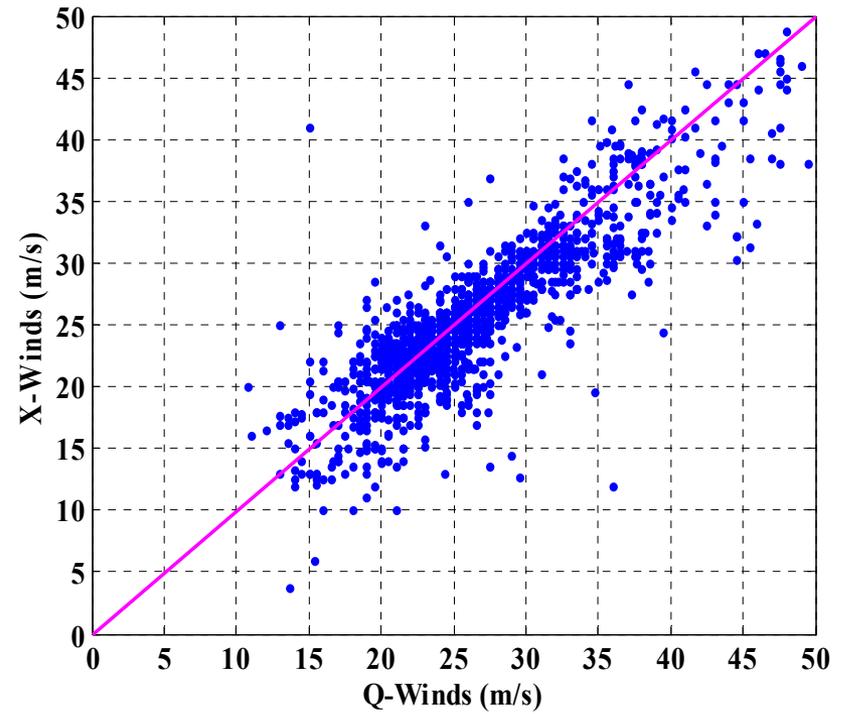
X-Winds Comparison with QuikSCAT NRT MGDR

Super Typhoon Melor
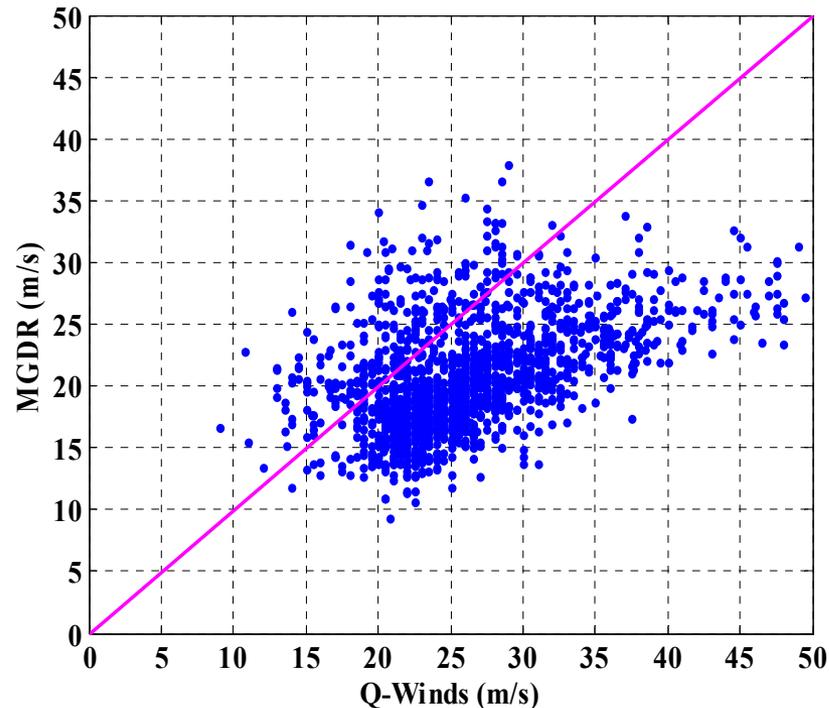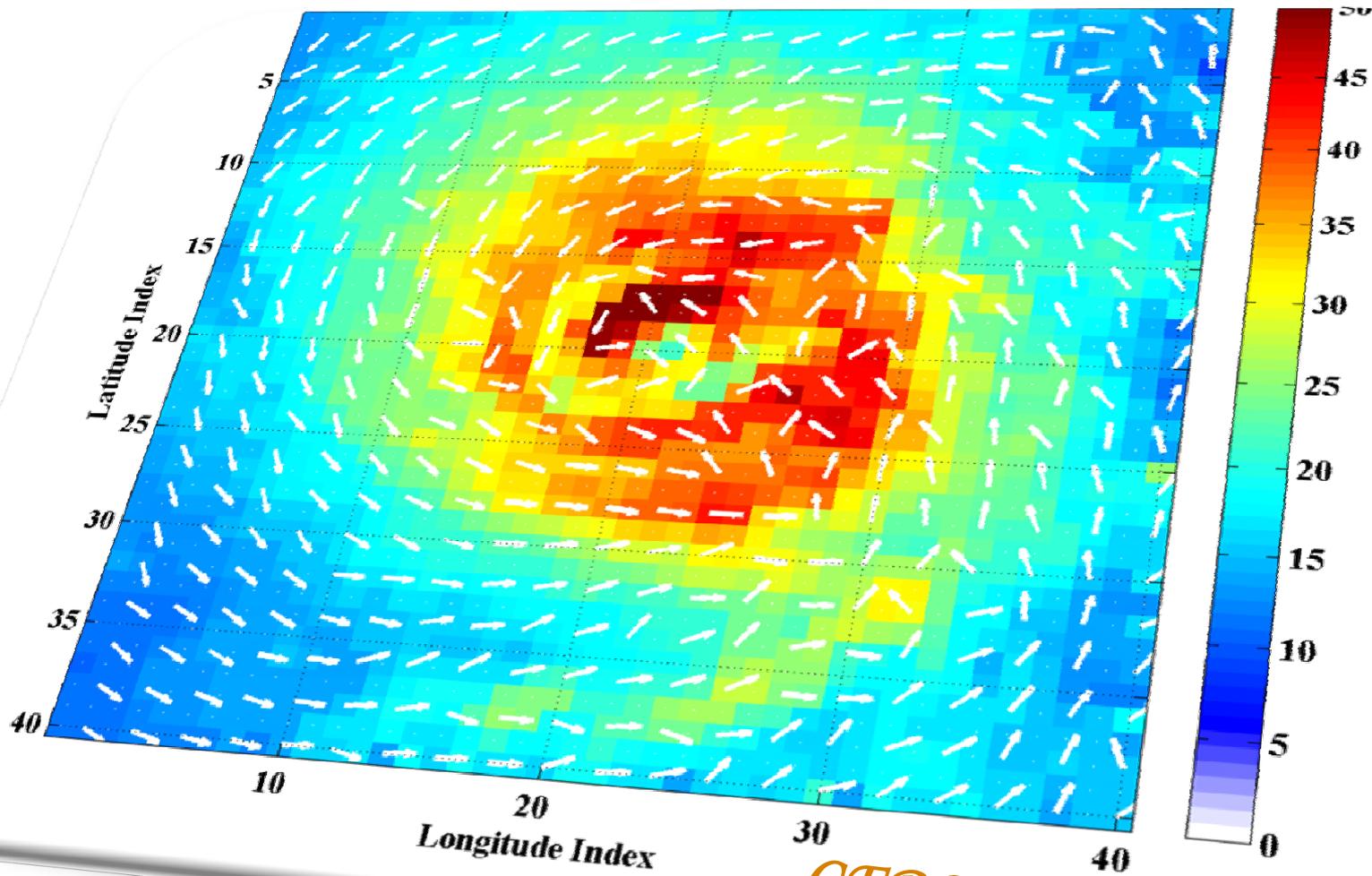
Summary

- QuikSCAT NRT & non-NRT OVW retrievals significantly underestimate hurricane peak winds

- Preliminary results for CFRSL *X-Winds* NRT MGDR are encouraging

  - ☐ *X-Winds* peak wind speeds are 10 – 15 m/s greater than conventional QuikSCAT MGDR

  - ☐ Future effort to compare *X-Winds* with *H*Wind*

- CFRSL active/passive algorithm is candidate for future NOAA/NASA dual frequency scatterometry missions

CFRSL '2010