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

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Presented by

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JHT Project Overview

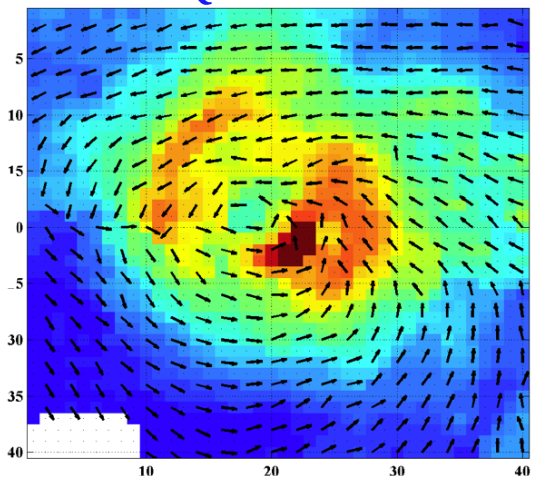
- Two-year development to provide improved QuikSCAT hurricane wind retrievals in Near Real-Time (NRT)
  - Year-1
    - Optimize new Extreme-Winds (***X-Winds***) algorithm to process NRT Merged Geophysical Data Record (MGDR)
    - Develop operational software to be ported to NOAA/STAR computers for testing 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

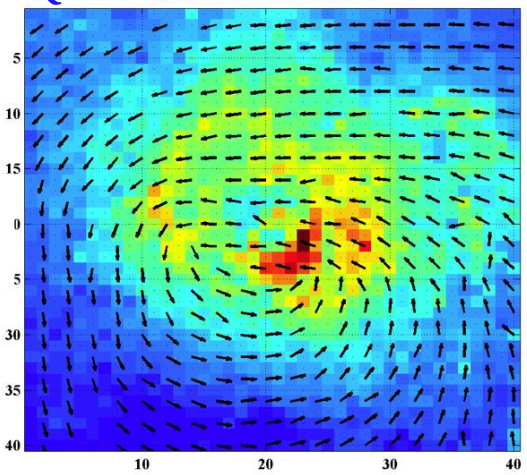
- NASA Ocean Vector Winds Science Team sponsored CFRSL to develop improved QuikSCAT wind retrieval algorithm for extreme wind events
- This PI OVW product is known as ***Q-Winds***
  - Combines active/passive measurements from SeaWinds
  - Tuned to HRD's H*Wind surface wind analysis from hurricanes
  - Provides rain effects correction

Q-Winds Example: Hurricane Fabian 2003

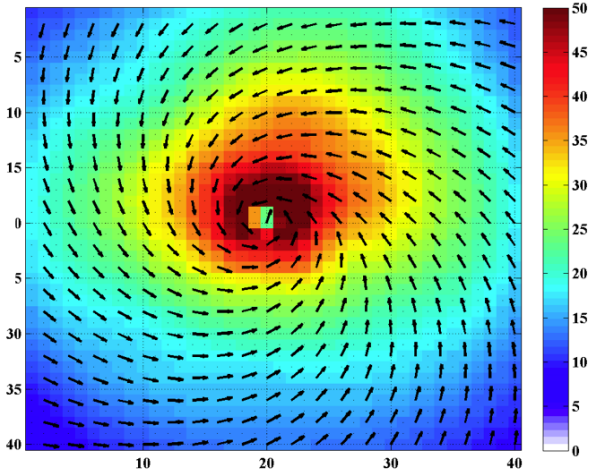
Q-Winds



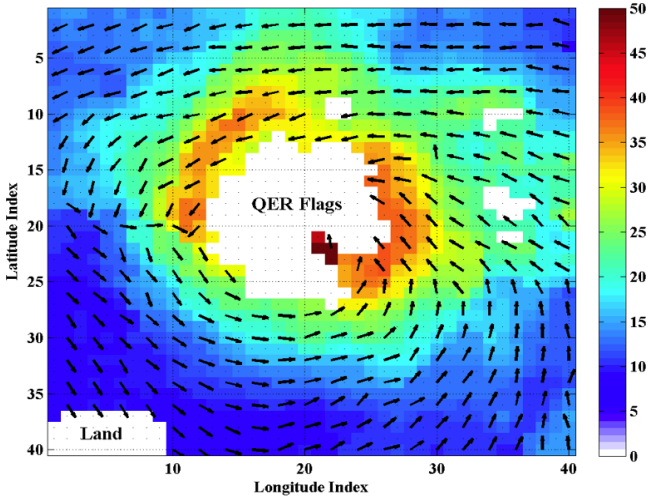
QuikSCAT L2B-12.5 km



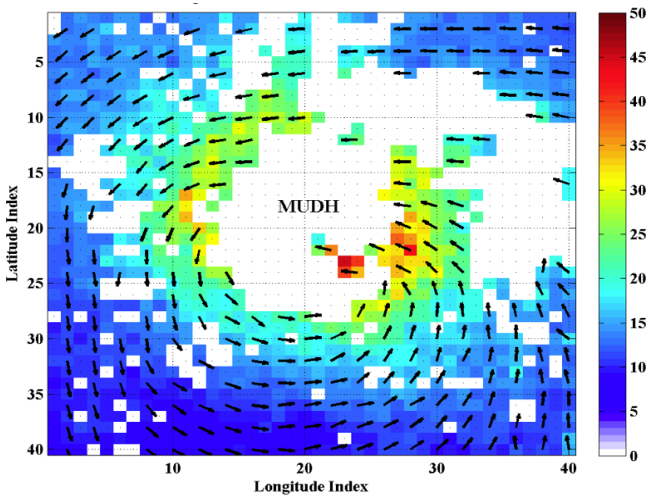
H*Wind



Q-Winds with rain flags



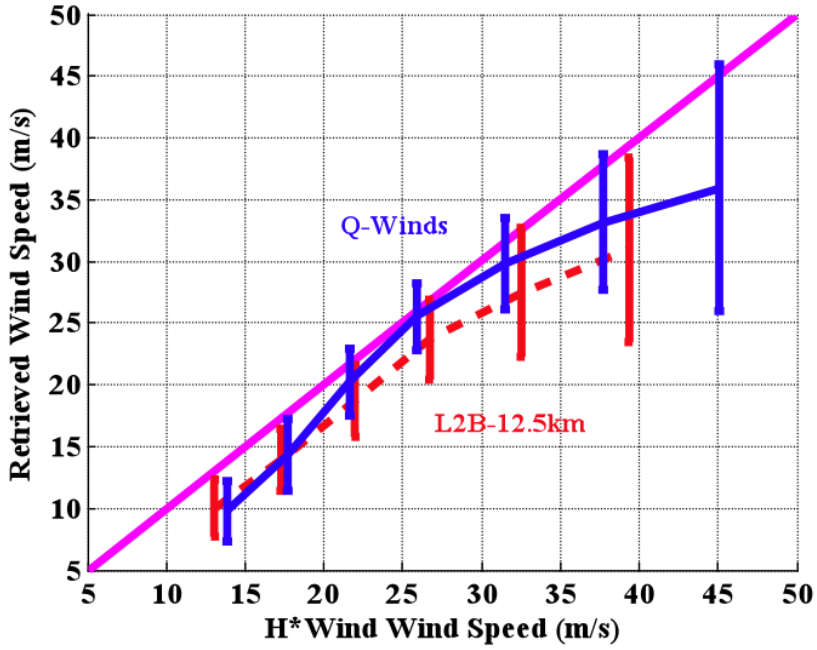
QuikSCAT L2B-12.5 km with rain flags



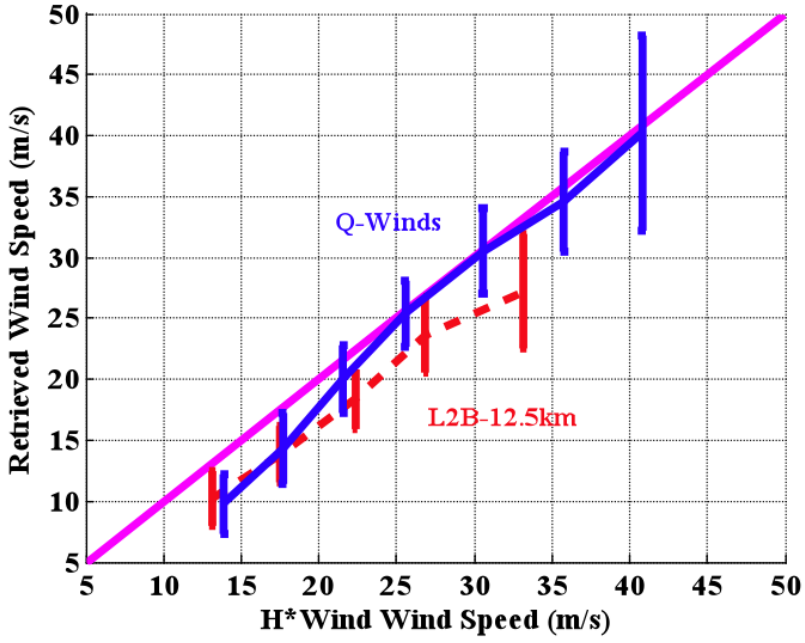
Q-Winds & SeaWinds L2B-12km Validation

Wind Speeds Comparison

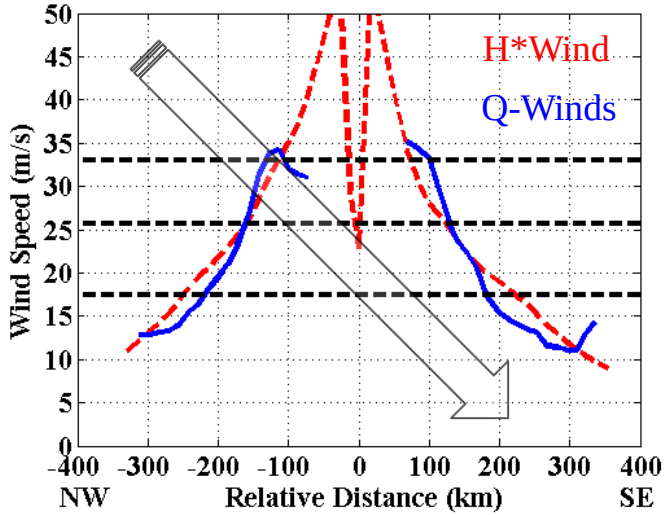
Without rain flags



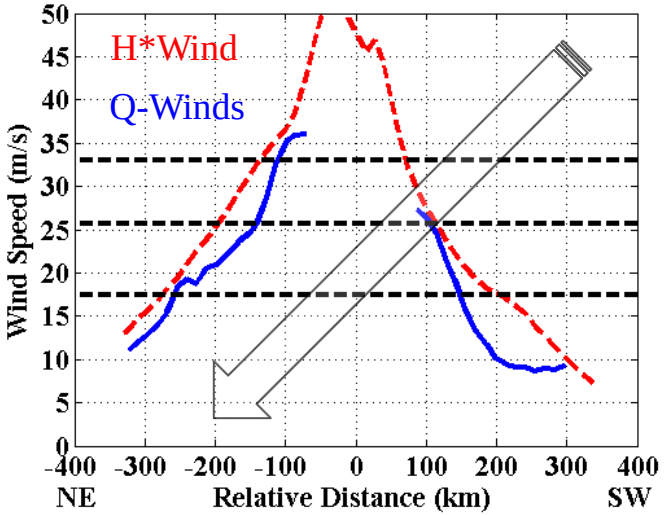
With rain flags

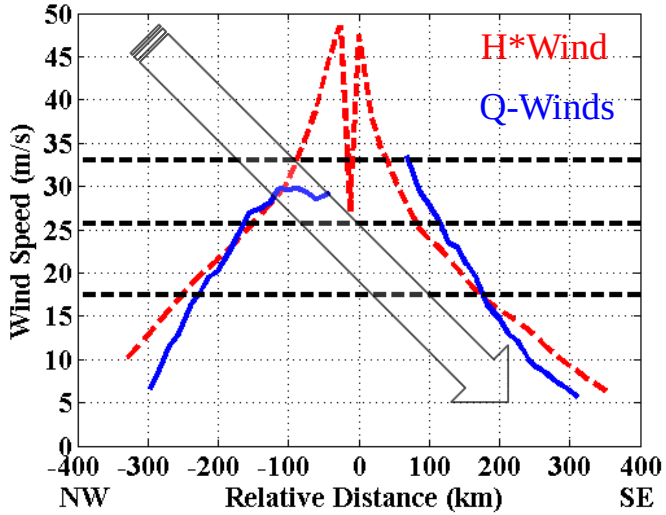


Wind Speed Radii Comparisons: Q-Winds / H*Wind



Fabian 2003
(#21898)





Ivan 2004
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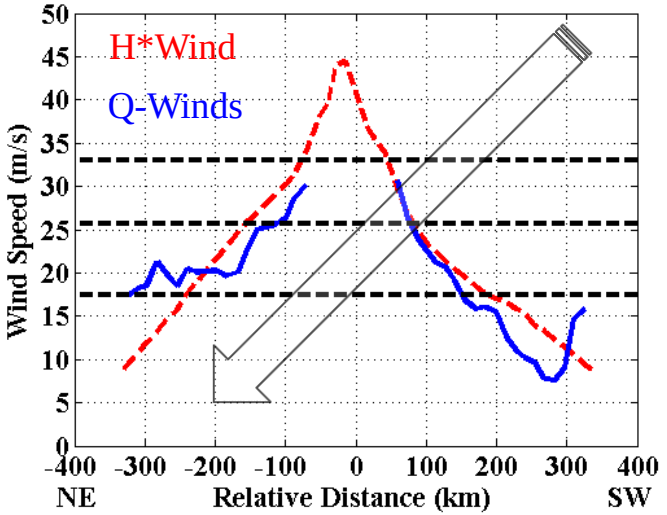
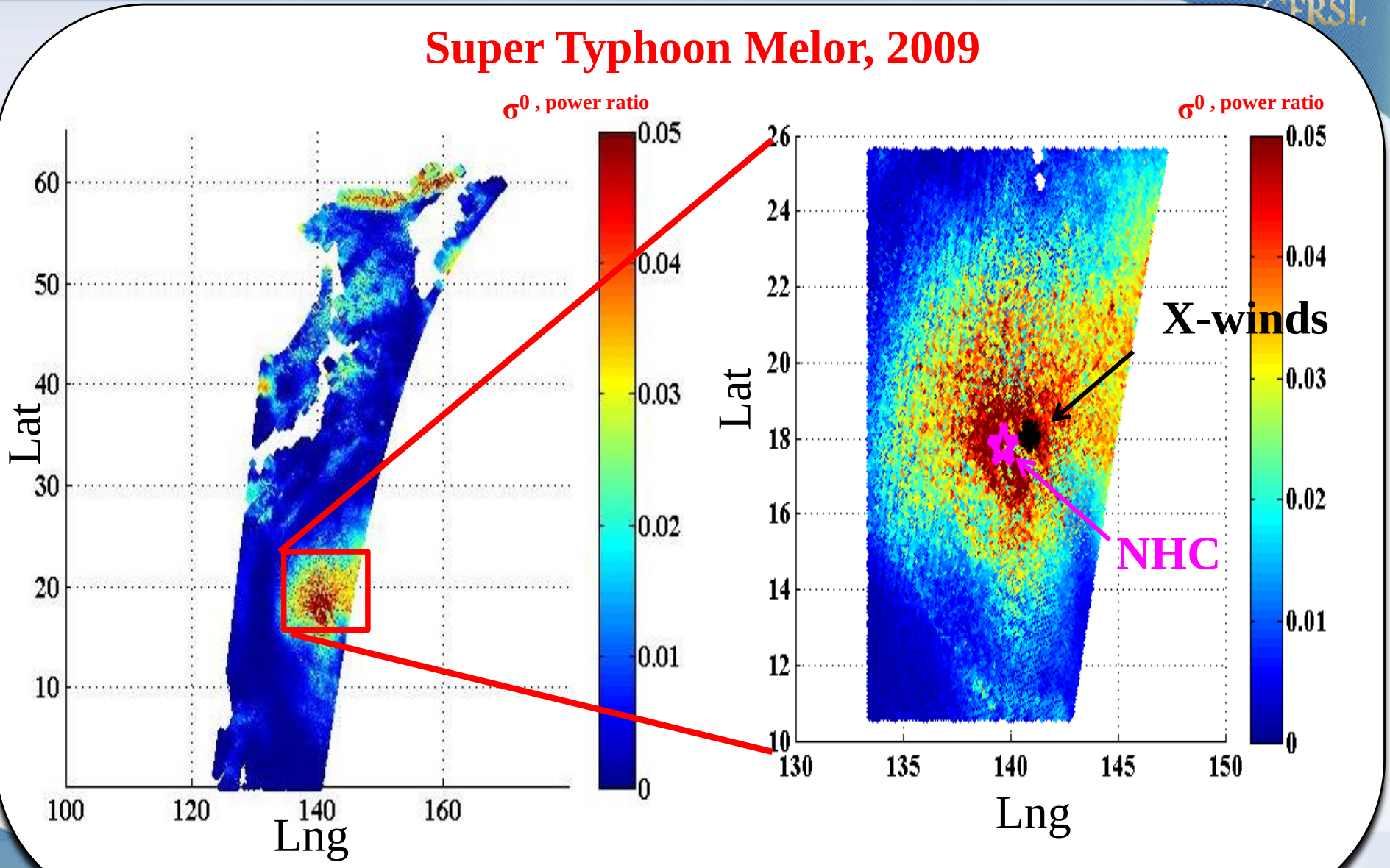


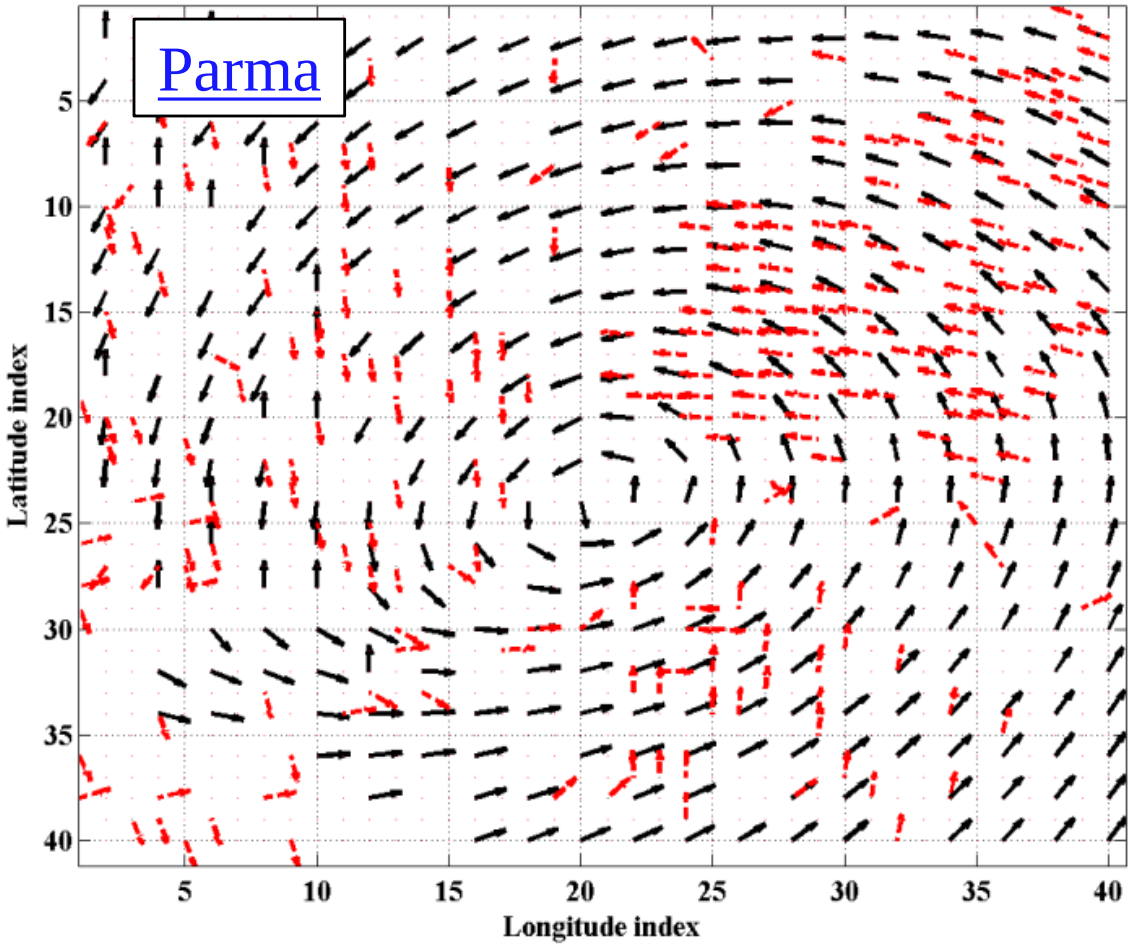
JHT: X-Winds Algorithm Development

- Storm Detection
  - Near Real Time algorithm for autonomous storm detection
    - Locates clusters of high sigma-0 in MGDR
- Storm Eye Location
  - Locates center of circulation by searching for the minimum gradient of σ^0 differences
- Initial Wind Direction Estimation
  - Estimates wind direction field from σ^0 contrast
    - Provides initial Wind direction estimation for ambiguity selection
- Rain Correction
  - Uses QuikSCAT Radiometer ***(QRad)*** brightness temperatures

Example: Storm Detection & Center Location



Wind Direction Initialization

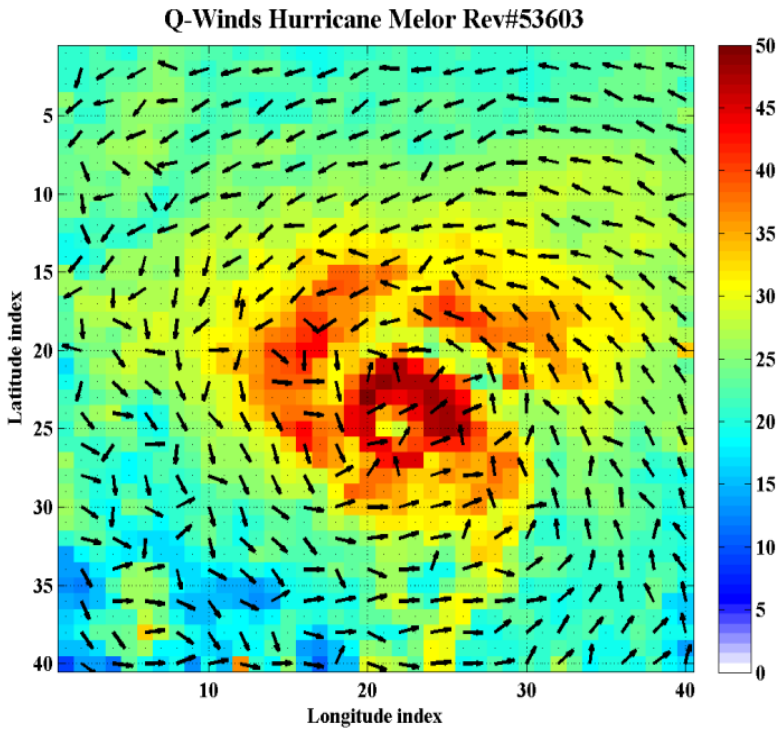


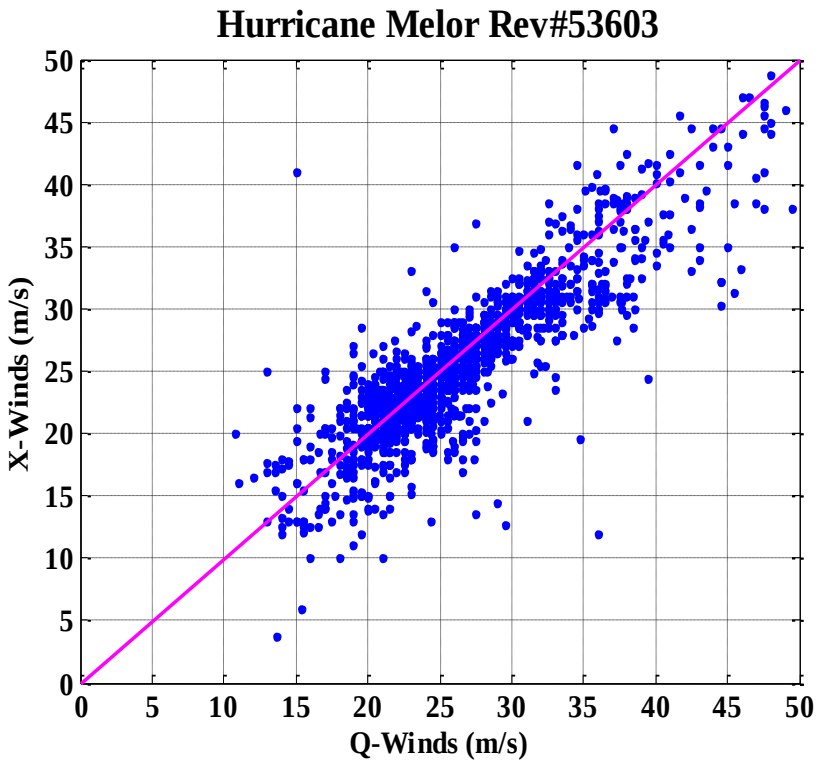
Retrieved *Q-Winds*

Initial directions

Validation of X-Winds Algorithm through Comparisons with NASA developed Q-Winds

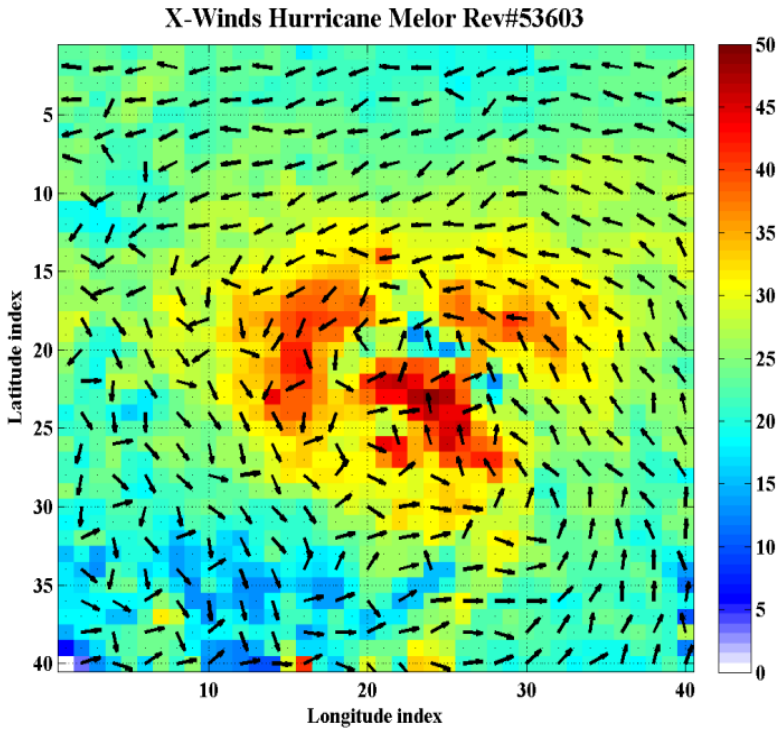
Super Typhoon Melor

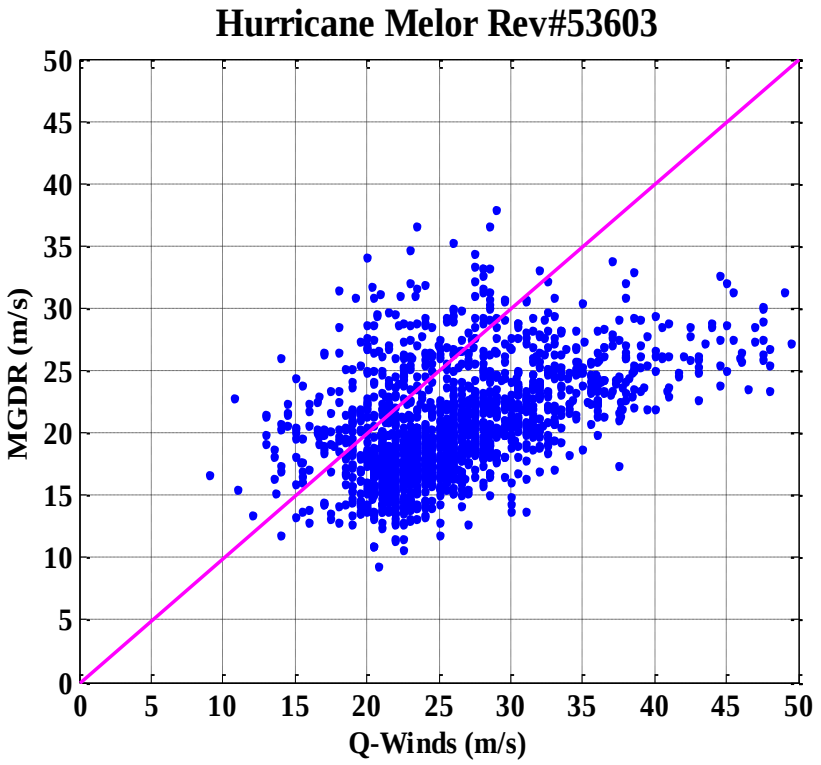




X-Winds Comparison with QuikSCAT NRT MGDR

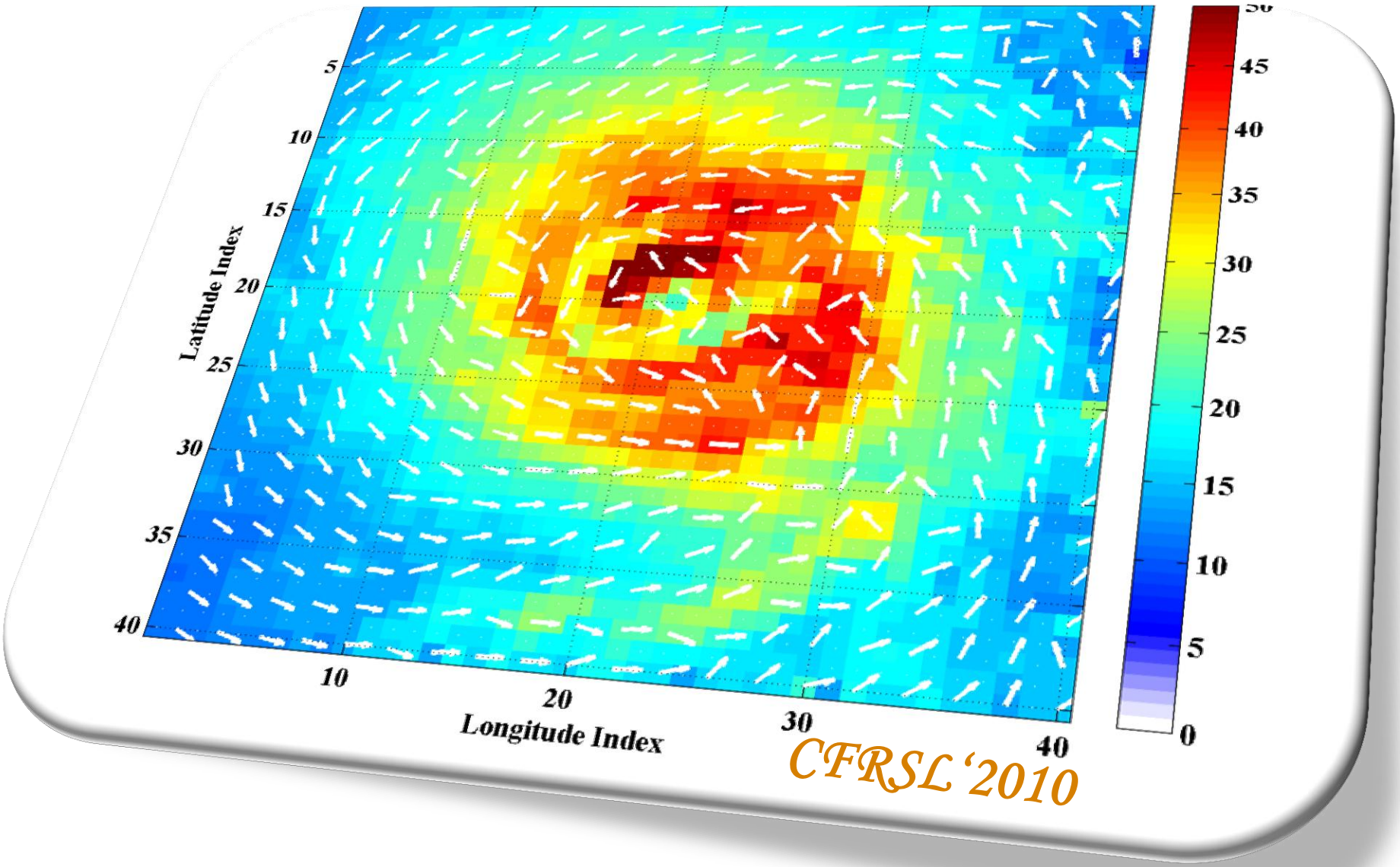
Super Typhoon Melor





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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