Analysis of Small-scale Coastal Wind Features Using Scatterometers and Synthetic Aperture Radars

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Regional Wind Characteristics

- Sulu/South China Sea
  - Gap winds
    - Mexico/Central America
    - Alaska
    - Islands and straits
  - Seasonal and episodic
    - Monsoon driven
  - Time scales of 2 days, length scales of several hundred kilometers

- Western North Atlantic
  - Little orographic influence
  - Seasonal and episodic
  - West to east storm tracks
  - Internal waves, oceanic and atmospheric fronts
Data

- QuikSCAT L2B12 winds
  - 12.5 km resolution winds
- Envisat ASAR
  - 150 m resolution $\sigma_0$
  - 300 m resolution winds
Sulu/South China Seas
Northwest Atlantic
Monsoon winds

June 2008  December 2008
QuikSCAT Spectra

- Open Ocean
  - Spectral Density (m$^3$/s$^2$)
  - Wavenumber (rad/km)
  - Distances: 200 Km, 100 Km, 50 Km, 20 Km

- Coastal
  - Spectral Density (m$^3$/s$^2$)
  - Wavenumber (rad/km)
  - Distances: 200 Km, 100 Km, 50 Km, 20 Km

Chorus
Wind speeds

Open

Coastal

Distance (km)

Wind Speed (m/s)
Spectral density

[Spectral density graph with logarithmic axes showing different scales for distance in km and spectral density in $m^3/s^2$, with a linear trend line labeled $K^{-1.2}$]
Summary

• QuikSCAT and SAR winds consistent between 25 and 300 km
• QuikSCAT wind speeds indicate noise floor above 25 km
• SAR wind speeds indicate a noise floor between 10 – 25 km in open ocean
• SAR wind speeds indicate noise floor of ~3 – 5 km in coastal regions.
Thank you
Supporting slides
Overview

- Wind features
- Sulu/South China Seas
- Western Atlantic
- Example wind fields
- Summary
- Future work
Small scale gap winds

Vexcel

ESA
Wind speeds

Distance (km)

Wind Speed (m/s)

ESA - 4.67 (2.51)

Vexcel - 4.84 (1.47)
Fine scale gap winds

Vexcel

ESA
Mindoro Elevation
Spectral density

![Graph showing spectral density with K^{-5/3} trend and markers at 15 km, 9 km, and 6 km.](CSTARS)