Comparison of QuikSCAT and ASCAT Spatial Variability

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Overview

- Motivation
- Methodology
- 25 km winds
- 12.5 km winds
- Summary

Motivation

- Typical comparisons involve colocated data from in situ measurements, atmospheric models or between satellites.
- Freilich and Chelton (1986) pointed out the importance of intermediate spatial scale winds.
- Are the spectral densities similar?

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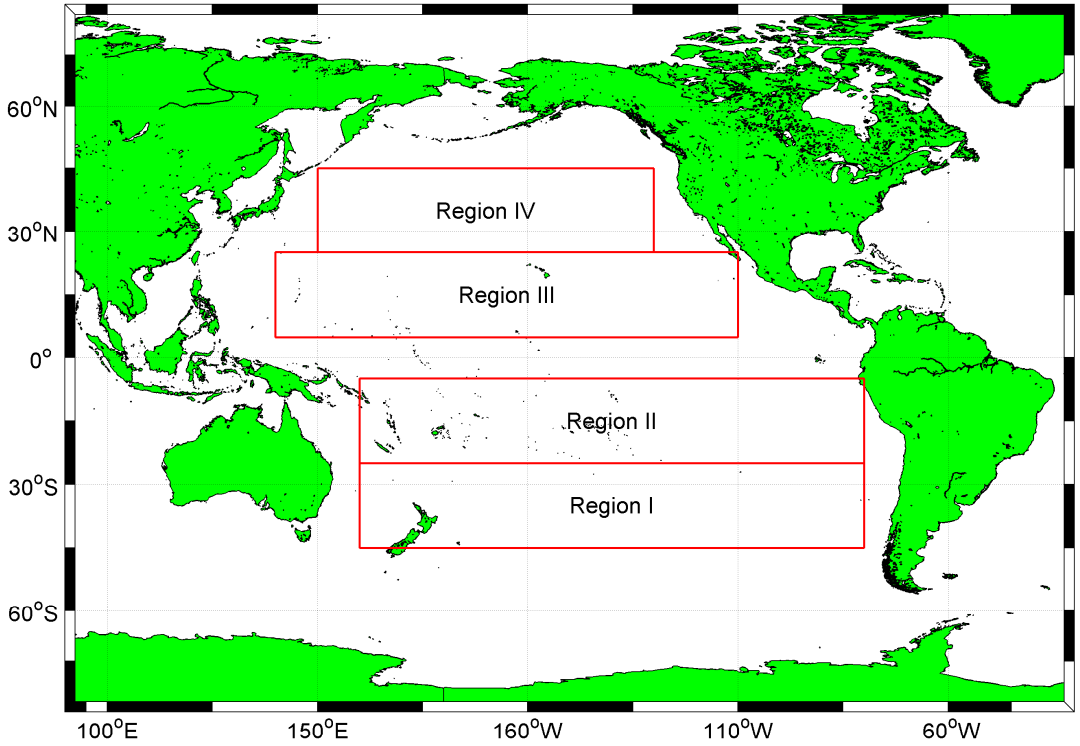
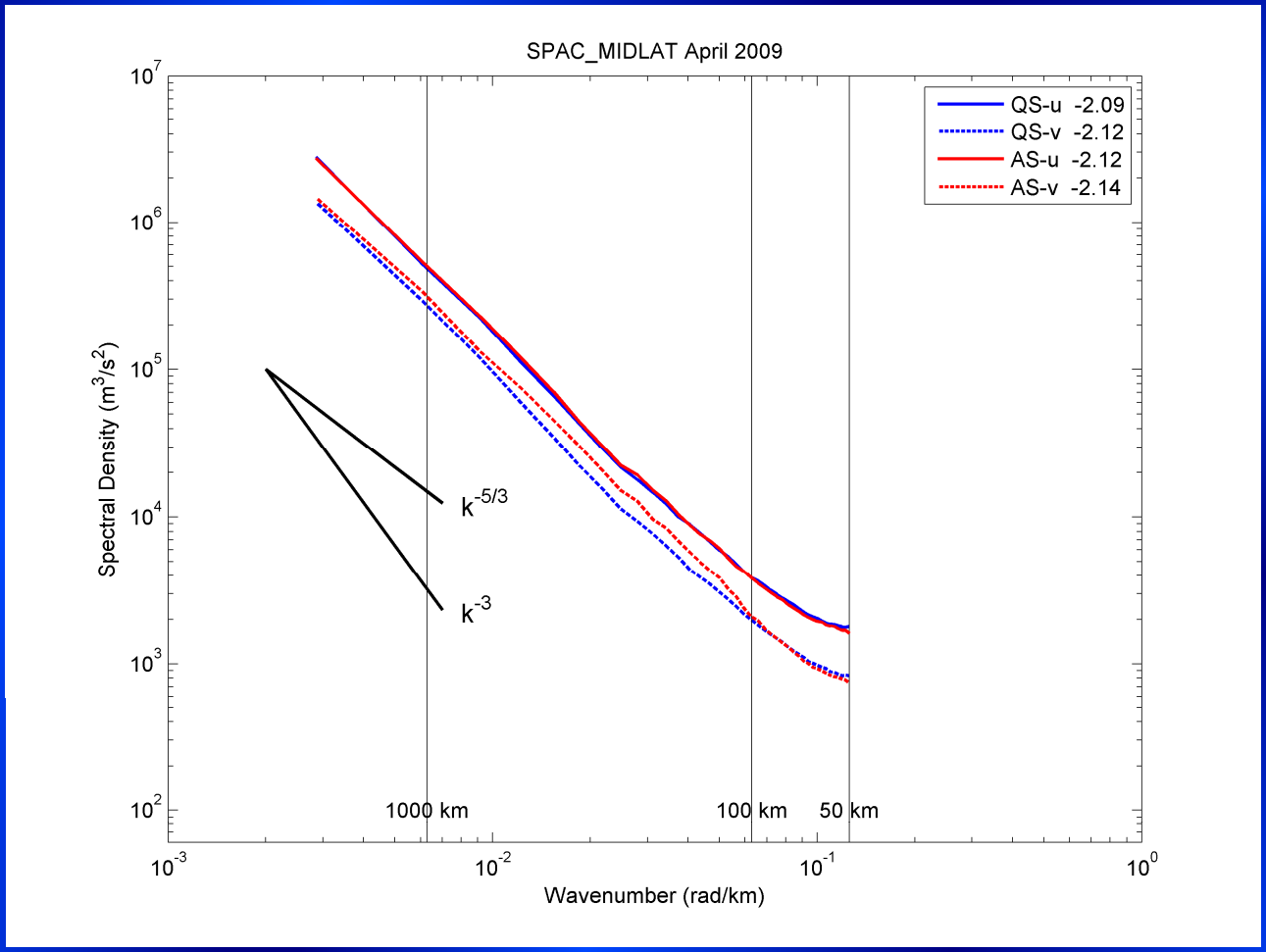
Methodology

- Sort winds by region
- Apply standard QC flags
- Discard along-track data with any gaps present
- Compute power spectrum
- Compute average power at each spectral bin

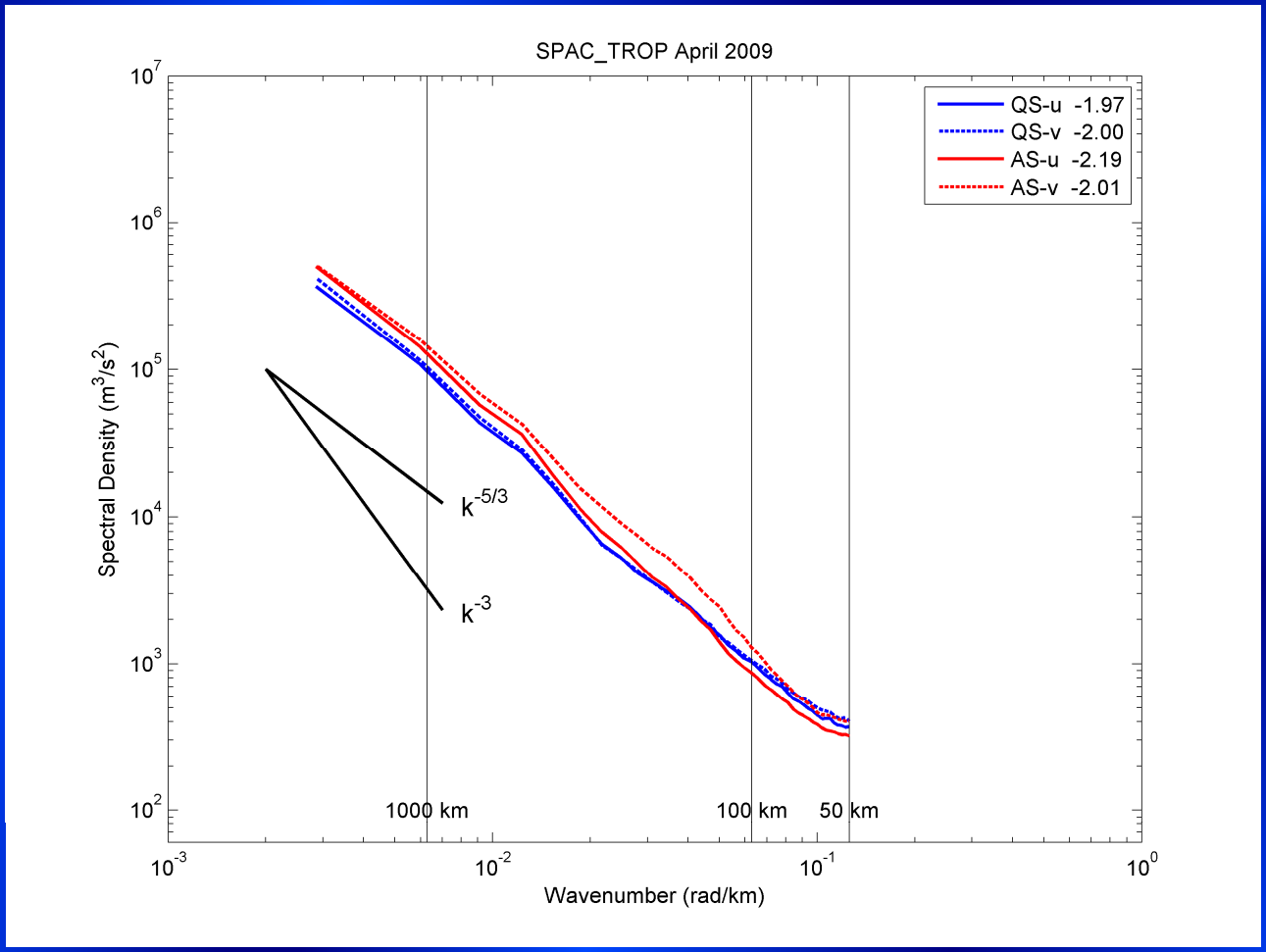
Regions


60°N
30°N
0°
30°S
60°S
100°E
150°E
160°W
110°W
60°W
Region IV
Region III
Region II
Region I

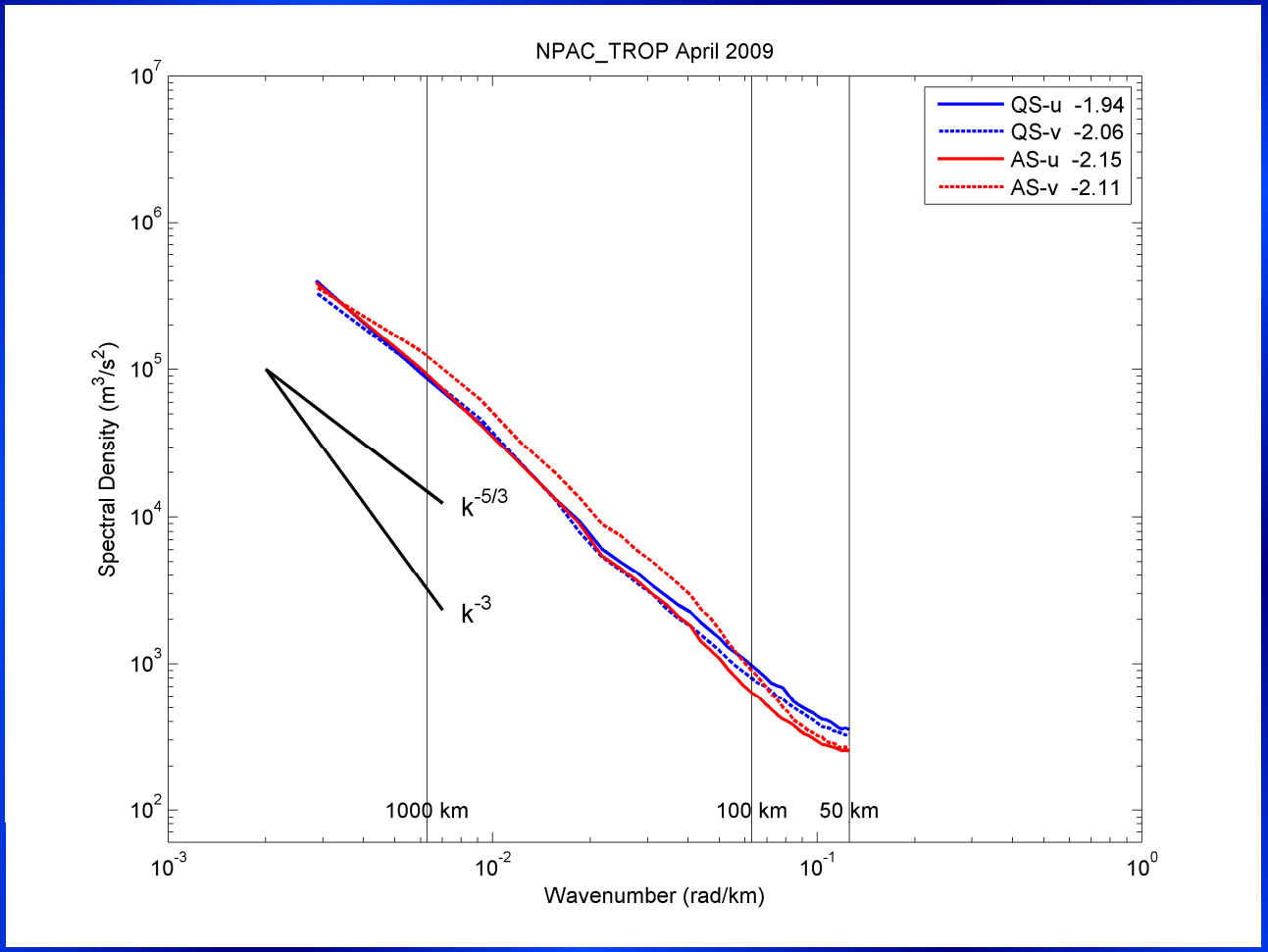
Region I 45° – 25°S 25 km



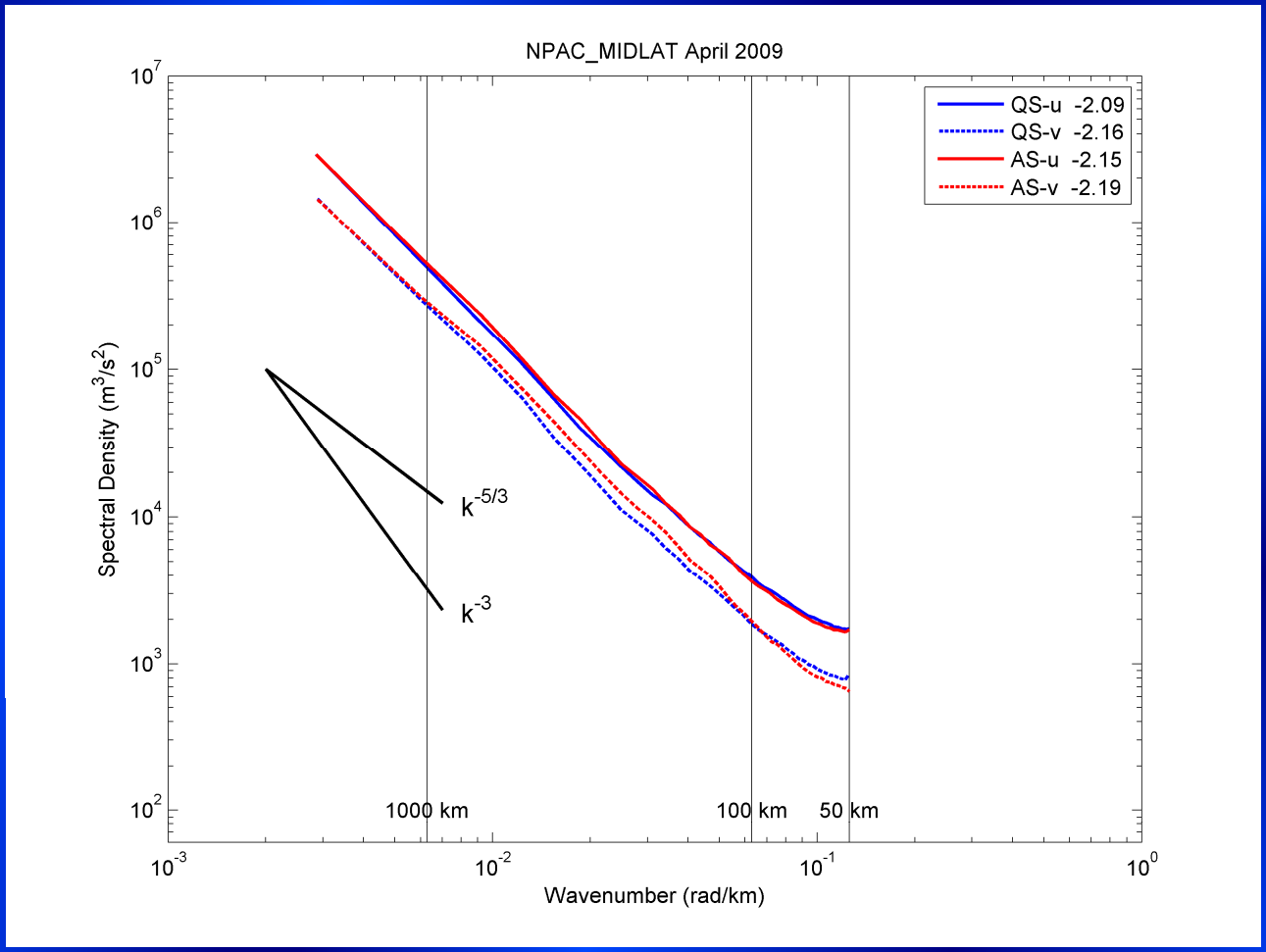
Region II 25° – 5°S 25 km



Region III 5° – 25°N 25 km



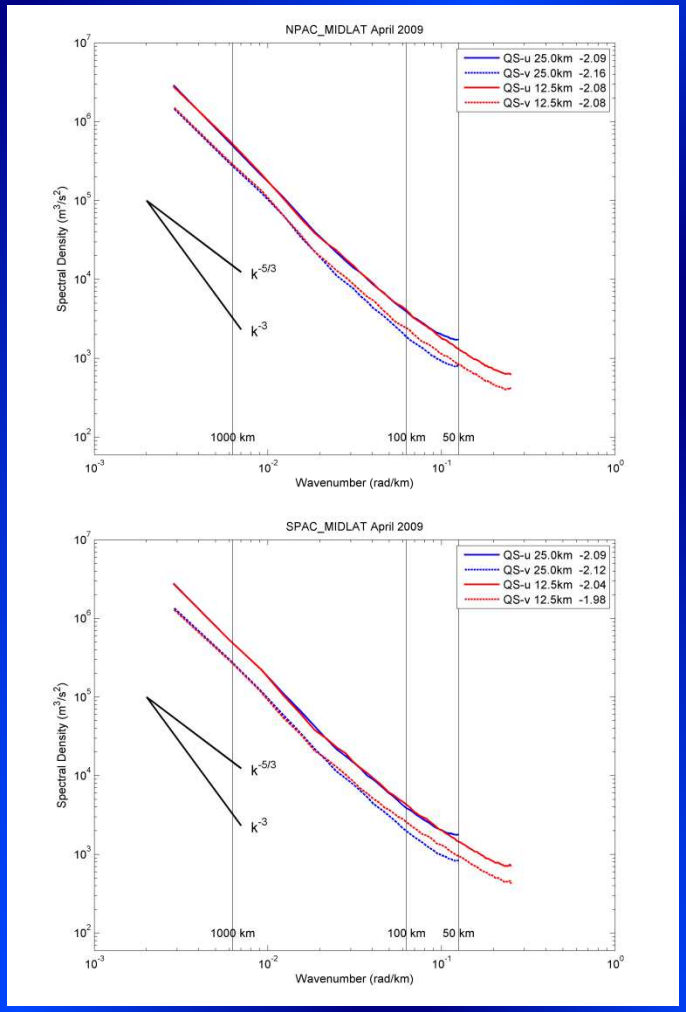
Region IV 25°– 45°N 25 km

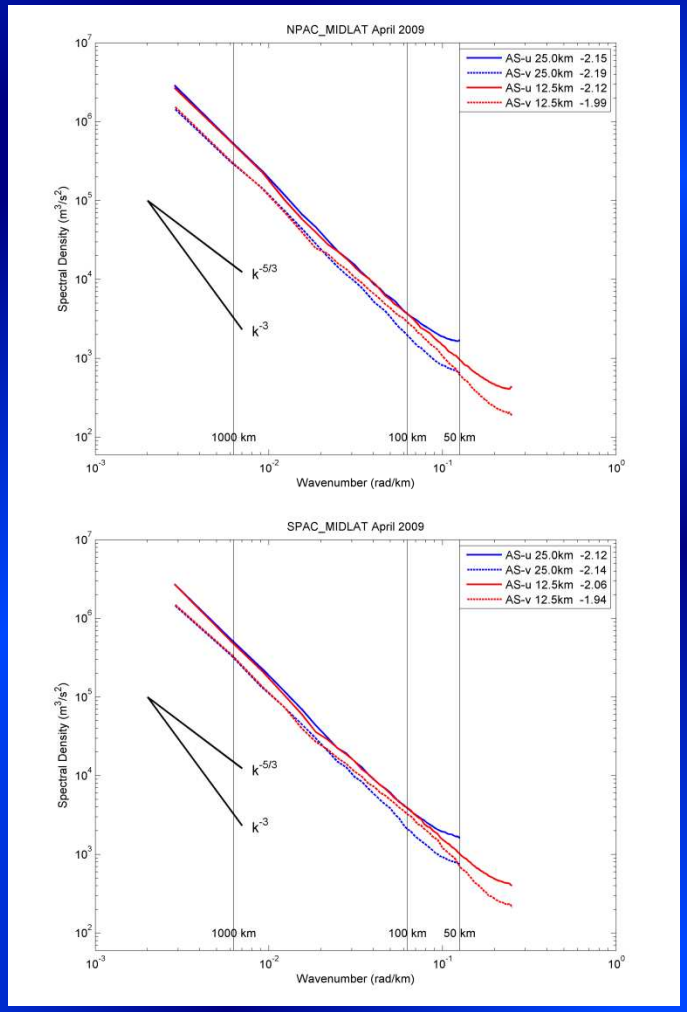


Mid-Latitude 12.5 vs 25 km

QS AS

IV





I

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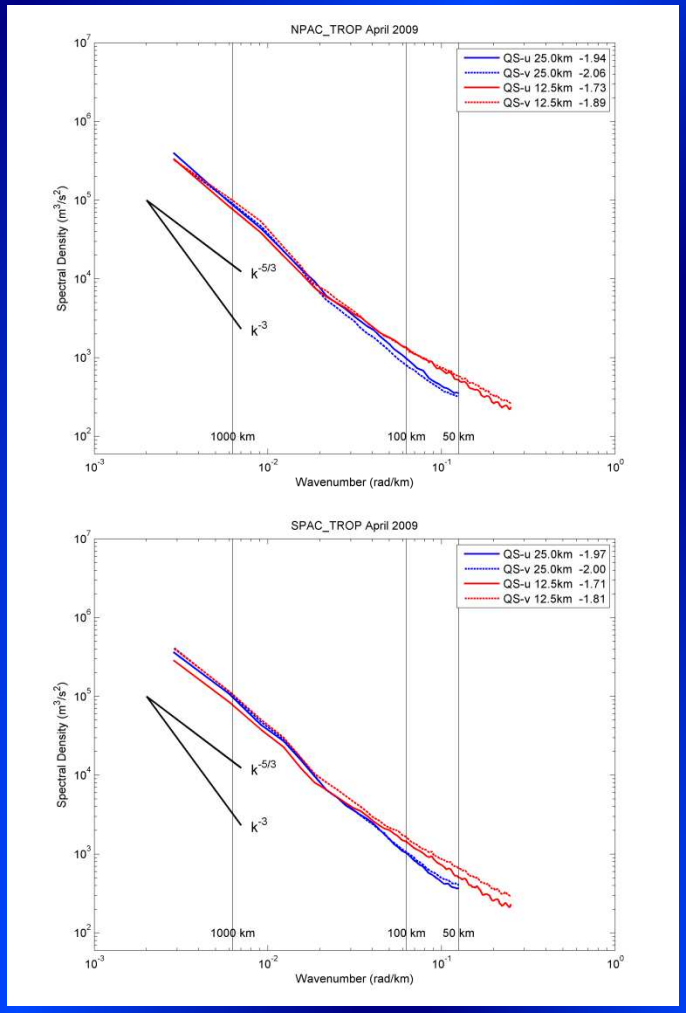
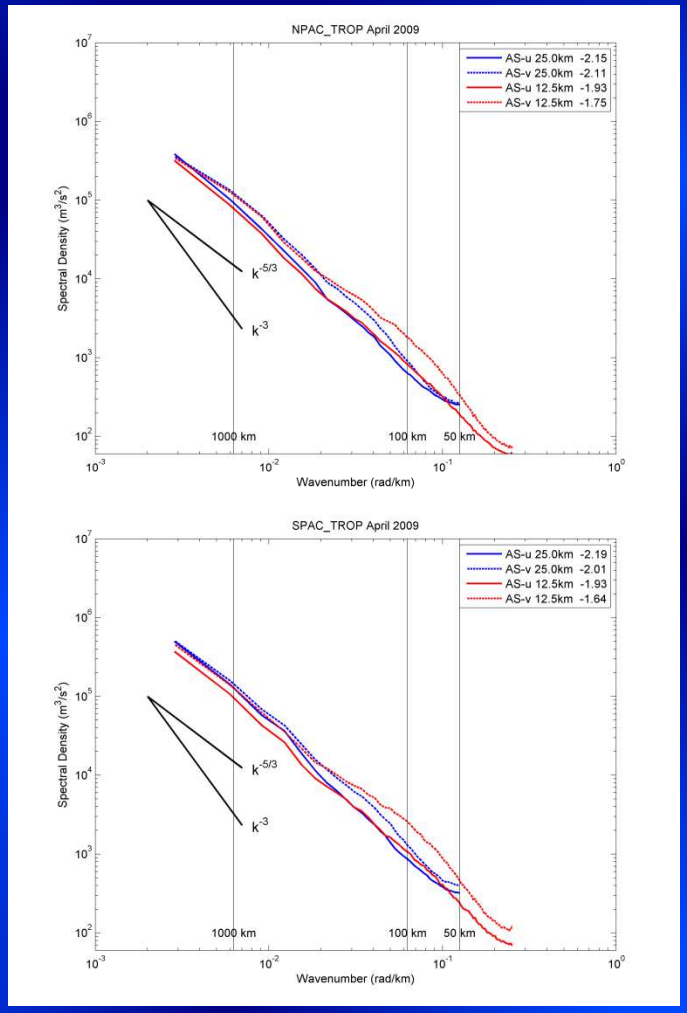
Tropics 12.5 vs 25 km

QS AS

III





II

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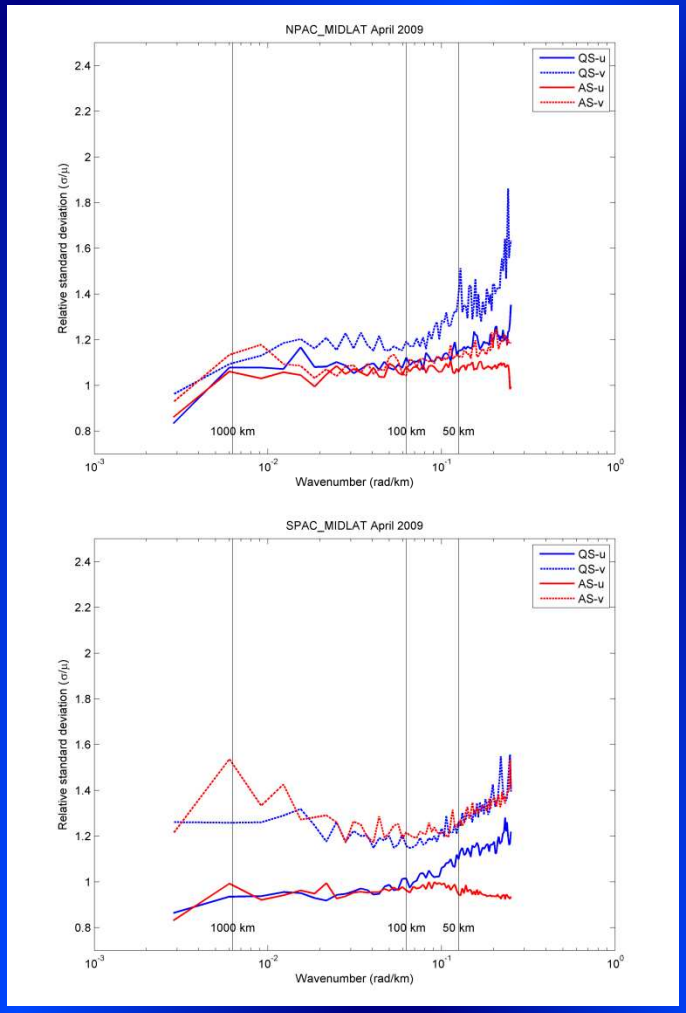
Relative Std Dev σ/μ

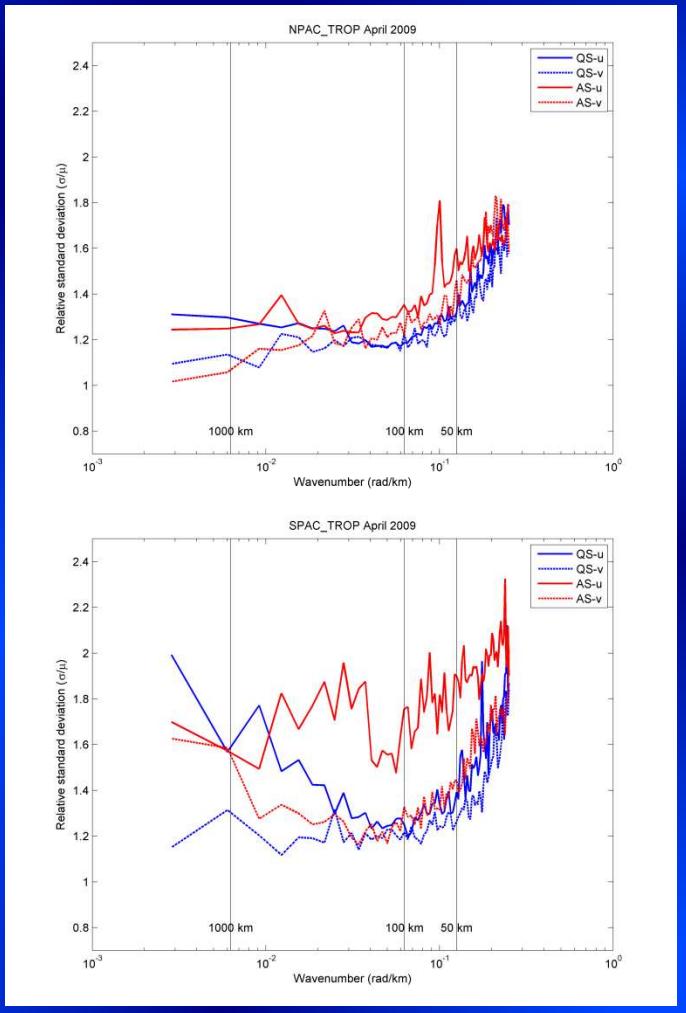
Mid-latitude

Tropics

IV



III



I

II

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Summary April 2009

Data set	Region	Zonal exponent	Meridional exponent	Mean ratio
QS 25.0 km	I	-2.09 ± 0.01	-2.12 ± 0.01	1.97
AS 25.0 km	I	-2.12 ± 0.01	-2.14 ± 0.01	1.77
QS 12.5 km	I	-2.04 ± 0.02	-1.98 ± 0.02	2.01
AS 12.5 km	I	-2.06 ± 0.02	-1.94 ± 0.02	1.67
QS 25.0 km	II	-1.97 ± 0.02	-2.00 ± 0.02	0.90
QS 12.5 km	II	-1.71 ± 0.02	-1.81 ± 0.02	0.73
AS 25.0 km	II	-2.19 ± 0.01	-2.01 ± 0.01	0.91
AS 12.5 km	II	-1.93 ± 0.01	-1.64 ± 0.02	0.74
QS 25.0 km	III	-1.94 ± 0.01	-2.06 ± 0.02	1.12
QS 12.5 km	III	-1.73 ± 0.02	-1.89 ± 0.02	0.92
AS 25.0 km	III	-2.15 ± 0.01	-2.11 ± 0.02	0.90
AS 12.5 km	III	-1.94 ± 0.01	-1.75 ± 0.02	0.77
QS 25.0 km	IV	-2.09 ± 0.01	-2.16 ± 0.01	1.91
QS 12.5 km	IV	-2.09 ± 0.02	-2.08 ± 0.02	1.79
AS 25.0 km	IV	-2.15 ± 0.01	-2.19 ± 0.01	1.89
AS 12.5 km	IV	-2.12 ± 0.01	-1.99 ± 0.01	1.67

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Summary

- 25 km
  - Good agreement in spectral density at mid-latitudes (regions I&IV)
  - Larger differences in the tropics (regions II&III)
- 12.5 km
  - Similar results in mid-latitudes
  - QuikSCAT had slightly more energy at higher wavenumbers
  - ASCAT meridional winds had more energy at wavelengths above 50 km and less energy below 50 km
- Relative standard deviations were typically higher in the tropics and wavelengths below 50 km

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Future work

- Cross-track spectrum analysis
- Temporal variability
- SAR winds
- Investigate tropical discrepancies

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Thank you.