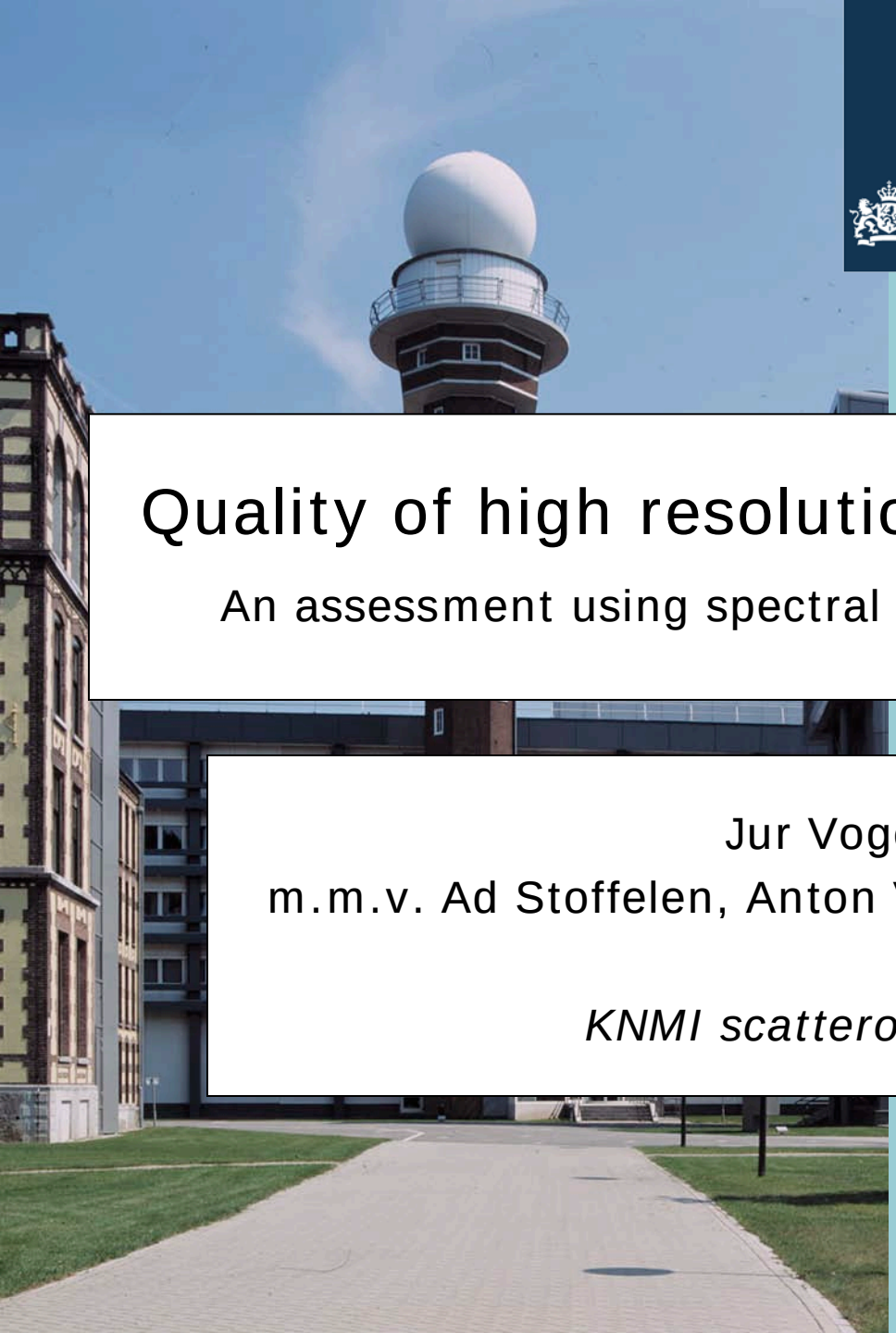

Royal Netherlands
Meteorological Institute
Ministry of Transport, Public Works and Water Management

Quality of high resolution scatterometer winds

An assessment using spectral analysis and triple collocation

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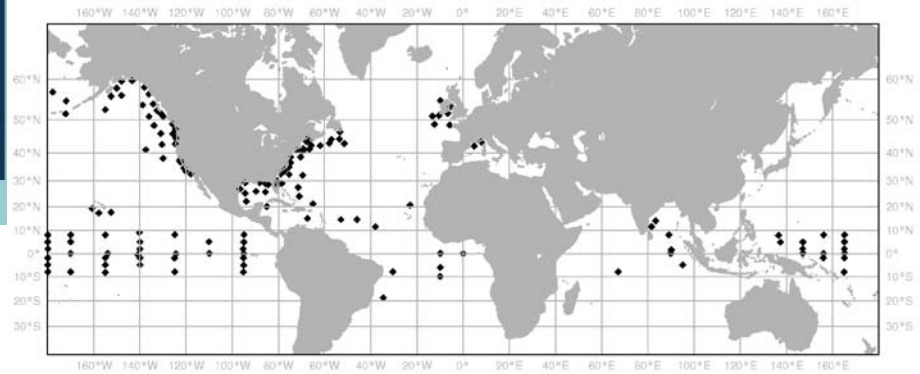
KNMI scatterometer group



Data used

For spectra – all operational data from January 2009

- ASCAT-12.5 and ASCAT-25
- SeaWinds-KNMI and SeaWinds-NOAA (25 km)

For triple collocation

- All ASCAT-12.5 buoy collocations 01-10-2008 / 30-11-2009
- All ASCAT-25 buoy collocations 01-11-2007 / 30-11-2009
- All SeaWinds-KNMI and SeaWinds-NOAA buoy collocations 01-11-2007 / 30-11-2009

Only buoys not blacklisted by ECMWF (mostly TOA, coastal US, and coastal Europe). No floating buoys!

Level 1

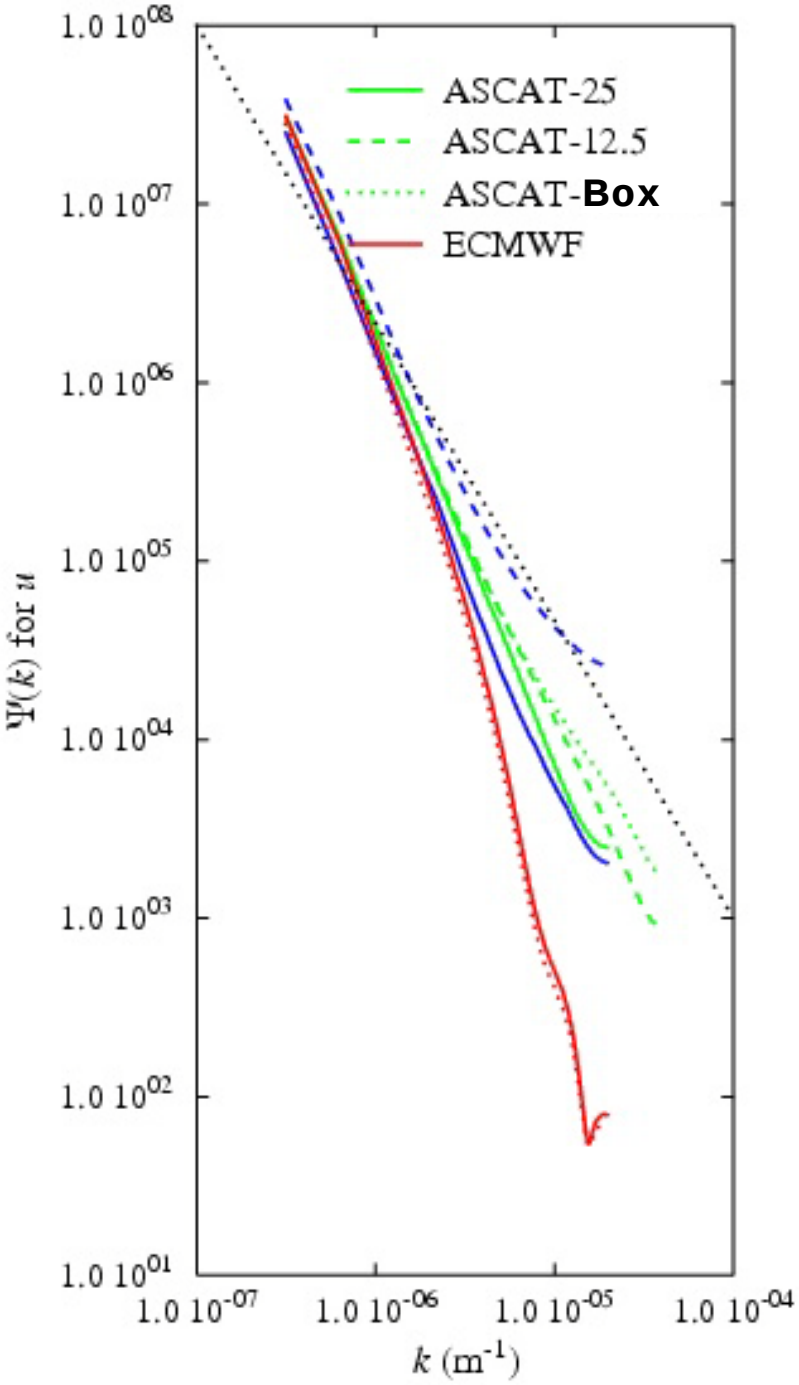
Box

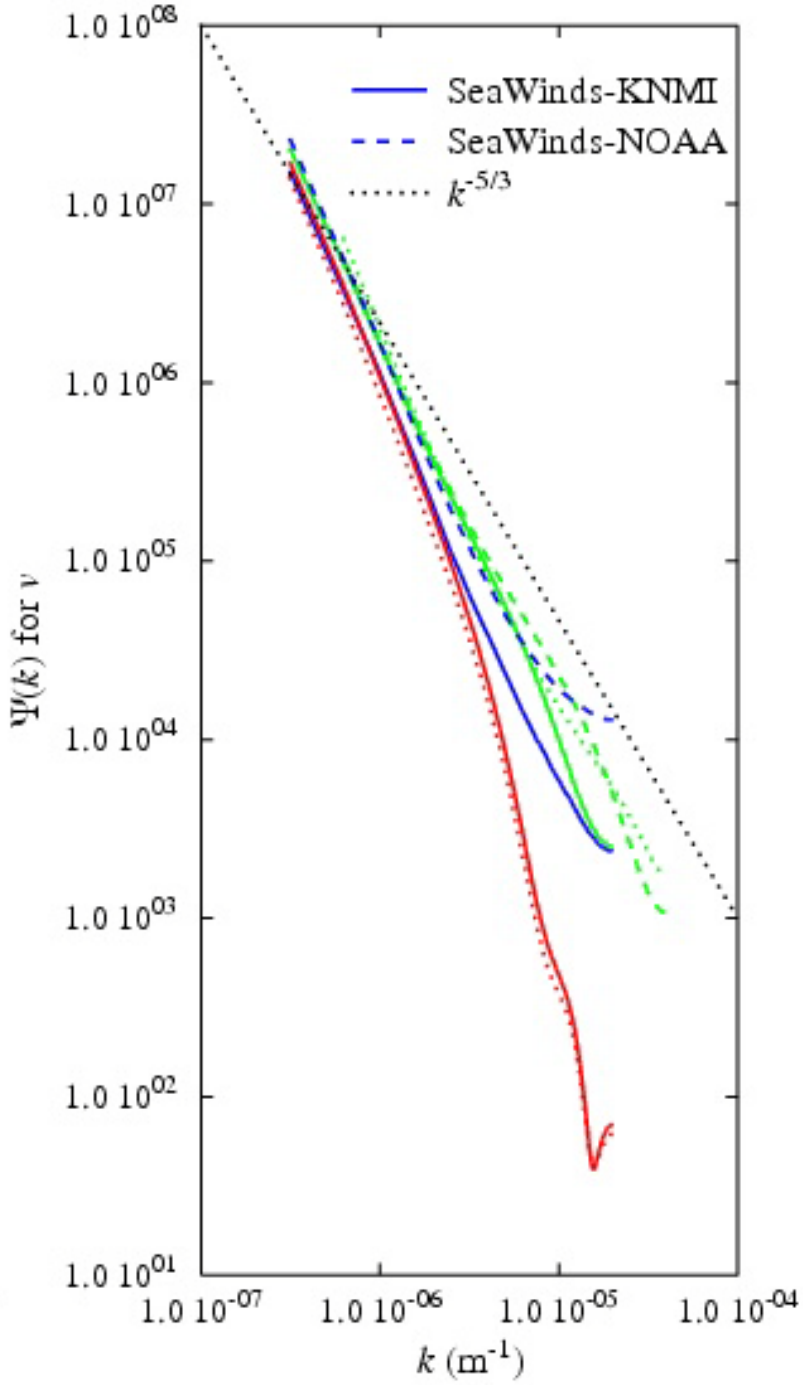
product

by

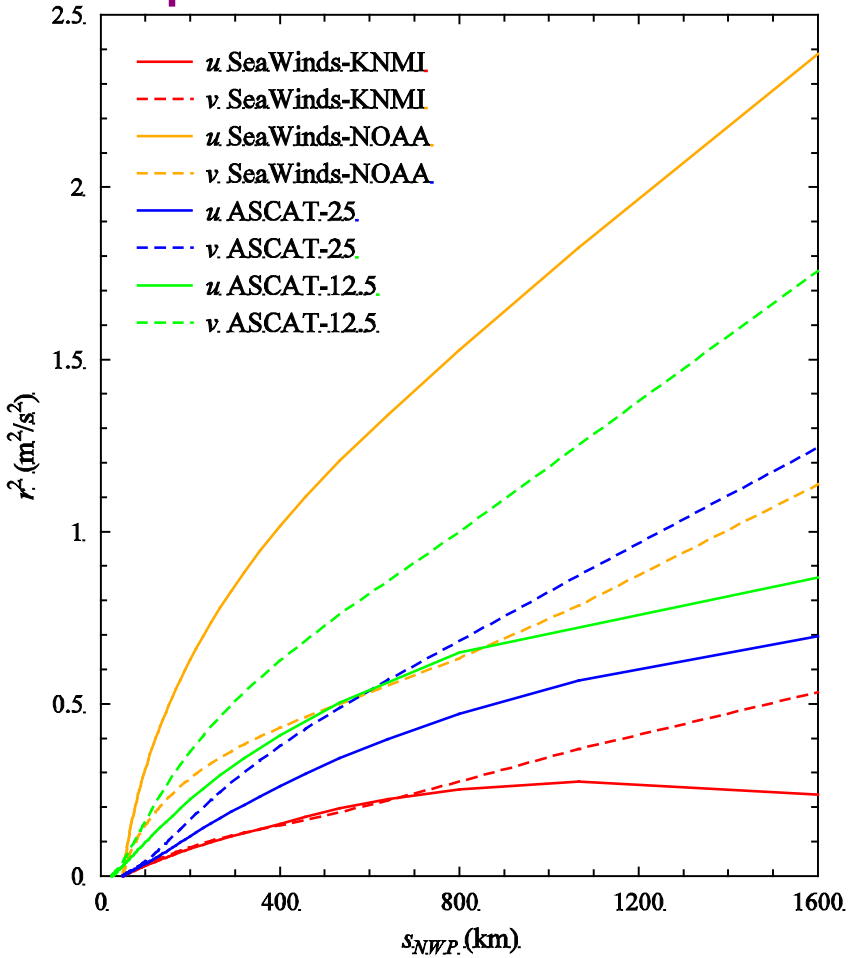
Julia Figa

EUMETSAT





Representation error r^2 vs s_{NWP}

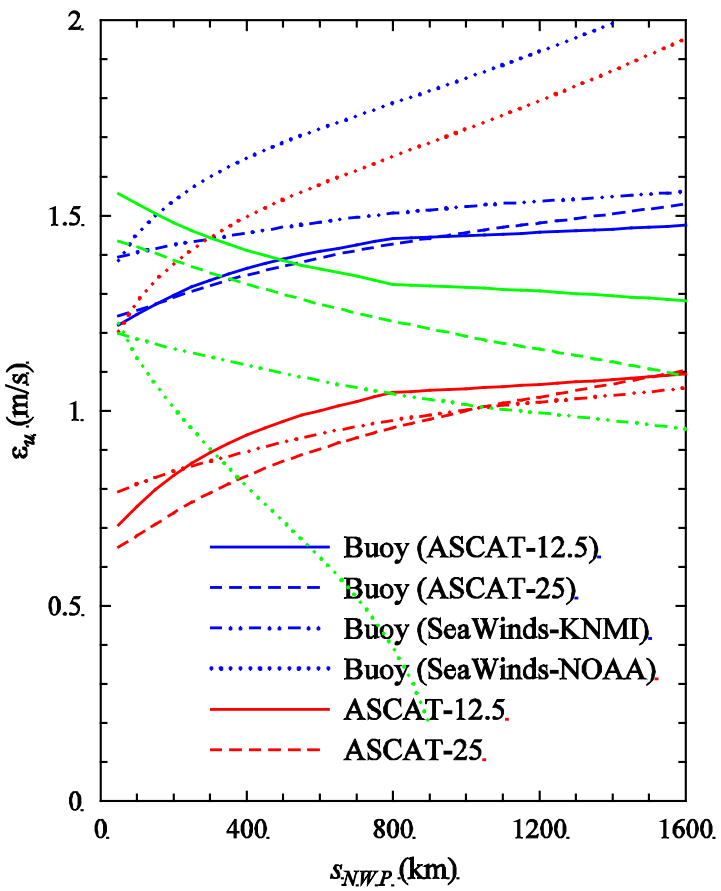


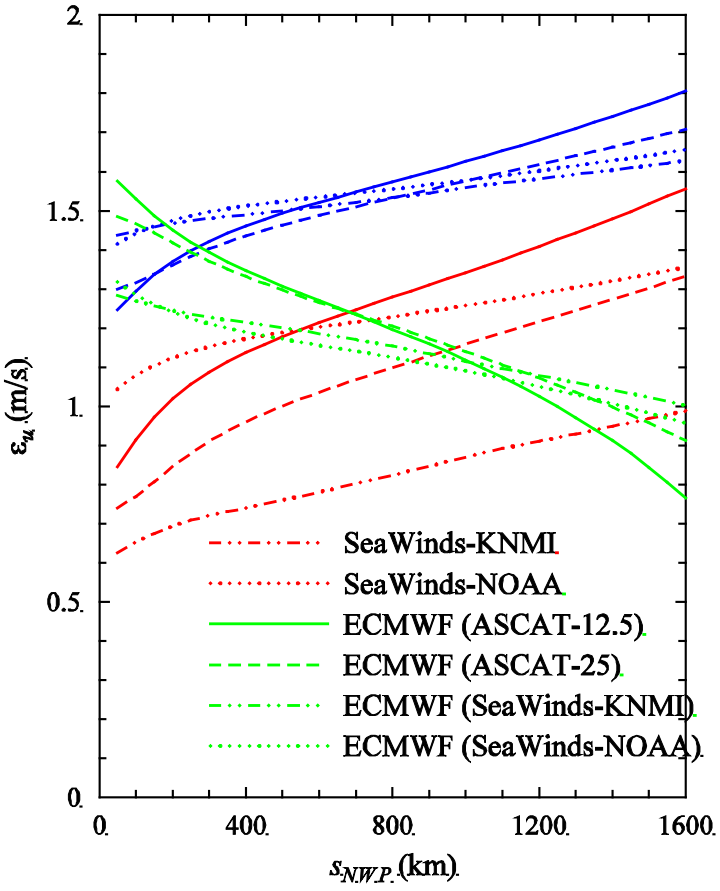
ECMWF spectrum has less small-scale structure than scatterometer spectrum.

Spectrally integrated difference from maximum spatial frequency to k_{NWP} is the representation error, i.e., variance not contained in ECMWF due to small-scale cutoff

Representation error needed in Triple Collocation

Error standard deviation against s_{NWP} (w.r.t. ECMWF resolution scale)





Error standard deviation from triple collocation (w.r.t. scatterometer resolution scale)

Product	Buoy		Scat		Back	
	u	*v*	*u*	*v*	*u*	*v*
ASCAT-12.5	1.21	1.20	0.69	0.82	1.54	1.55
ASCAT-25	1.24	1.30	0.65	0.74	1.42	1.45
SeaWinds-KNMI	1.39	1.44	0.79	0.63	1.19	1.27
SeaWinds-NOAA	1.39	1.41	1.20	1.04	1.20	1.30

Precision in error standard deviation ~ 0.02 m/s

Conclusions

- ASCAT-Coastal product is coming near $k^{-5/3}$ spectrum found from aircraft measurements
- ECMWF misses small scales
- ASCAT-12.5 product contains more detail than ASCAT-25, but also a little bit more noise
- SeaWinds-KNMI product is better than SeaWinds-NOAA product
- SeaWinds products lie closer to background than ASCAT

- Combination of spectral analysis and triple collocation yields consistent results