EUMETSAT SAFs for high resolution coastal winds

NWP SAF

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EUMETSAT

esa

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Accuray on 50 km scale

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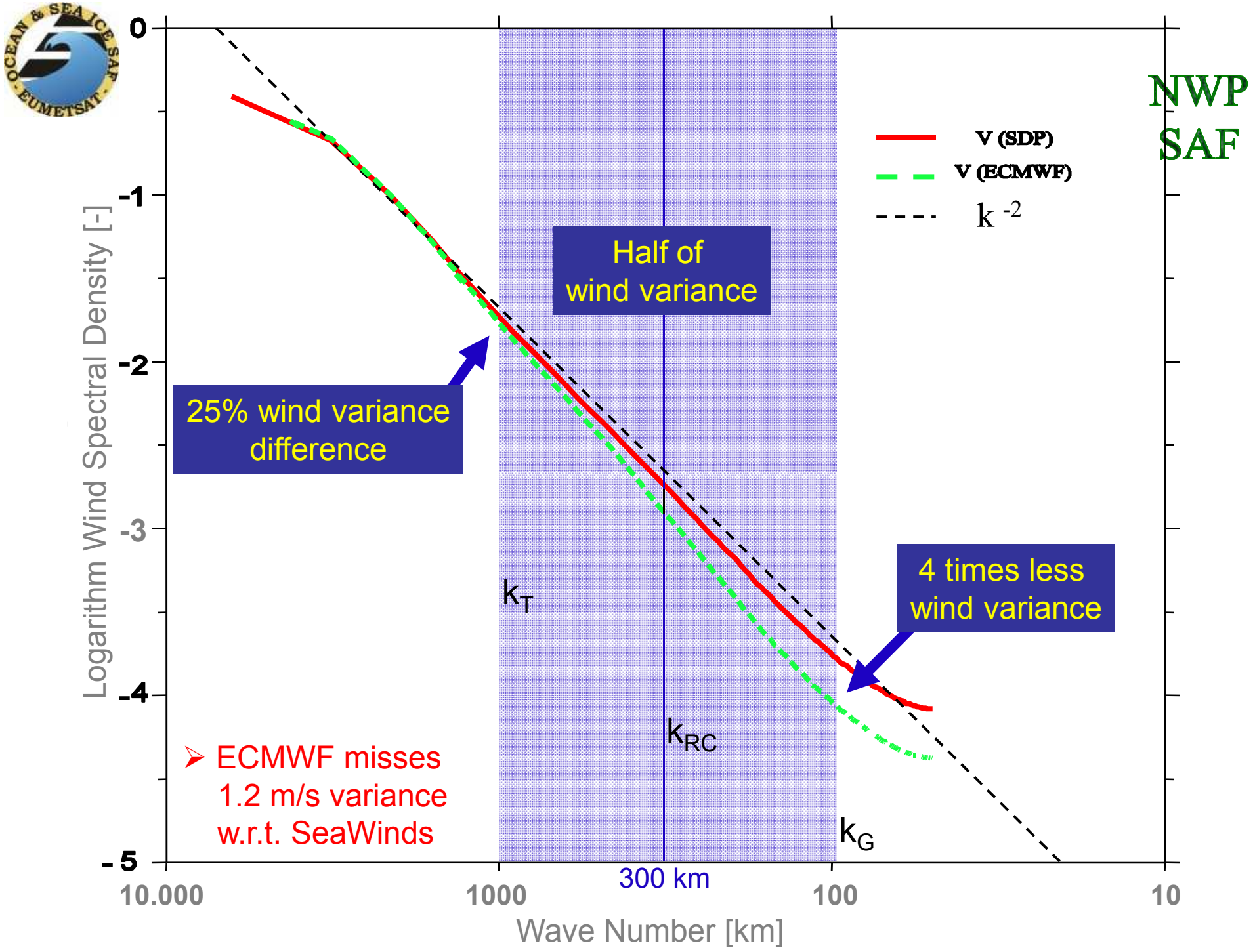
- Triple collocation analysis of buoy, scatterometer & NWP

Portabella and Stoffelen, 2008

Vector RMS error [m/s]	Tropical TAO/PIRATA	Extratropical NDBC/MEDS/UKMO
Buoy	1.5	1.5
Scatterometer	1.2	1.6
ECMWF model	2.0	2.1

- Scatterometer winds provide excellent forcing
- NWP is the worst ocean forcing, but exists everywhere !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V (SDP)
V (ECMWF)
k -2
Half of wind variance
25% wind variance difference
4 times less wind variance
ECMWF misses 1.2 m/s variance w.r.t. SeaWinds
kT
kRC
kG
300 km
Logarithm Wind Spectral Density [-]
Wave Number [km]
0
-1
-2
-3
-4
-5
10.000
1000
100
10

6-hourly ECMWF update

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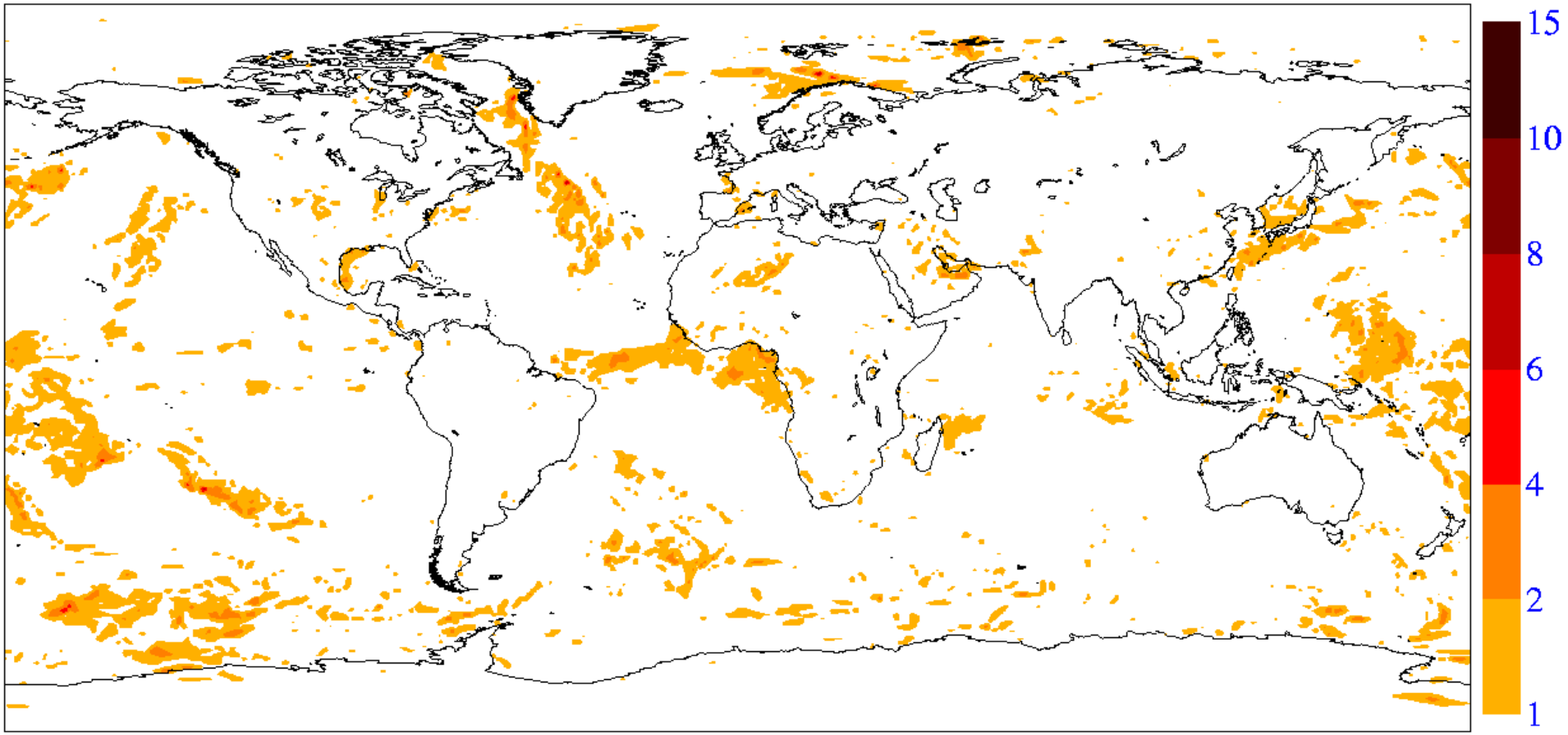
6-hour variance of 10-meter wind (m/s) analysis increment; N.Hemis 0.49, S.Hemis 0.54, Tropics 0.58



- ECMWF analysis increments are modest wrt spatial deficit
- Most mesoscale scatterometer information remains unexploited

6-hourly wind change

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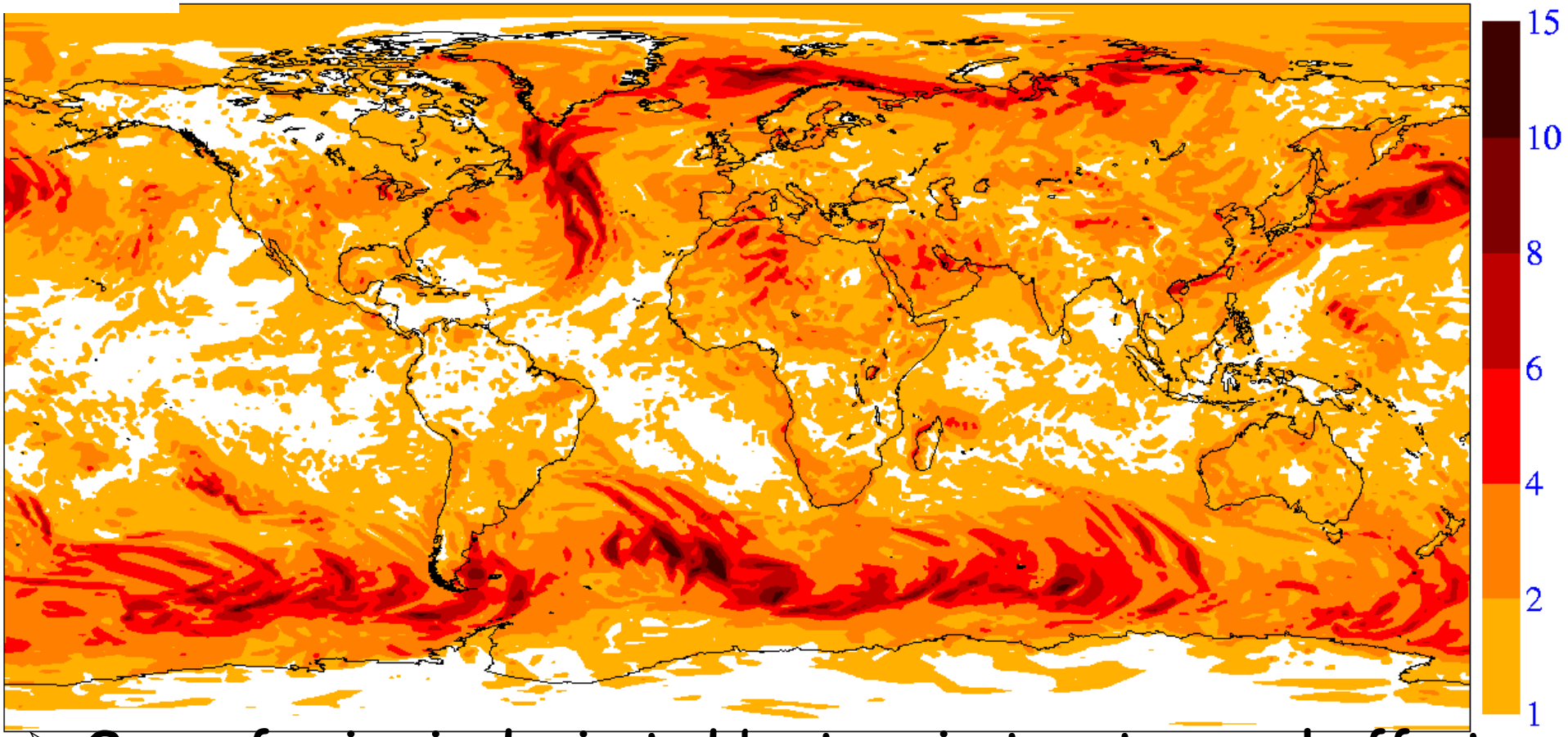
riance of 10-meter wind (m/s); N.Hemis 2.14, S.Hemis 2.48, Tropics 1.23



- Ocean forcing is dominated by transient or temporal effects
- Can eddy-scale ocean forcing be provided at hourly scale ?
- 2D-VAR provides scatterometer analyses; can the increments be advected in time? → Topic in EU GMES MyOcean project

EU Marine Core Services through MyOcean : Thematic Assembly Centers (TAC)

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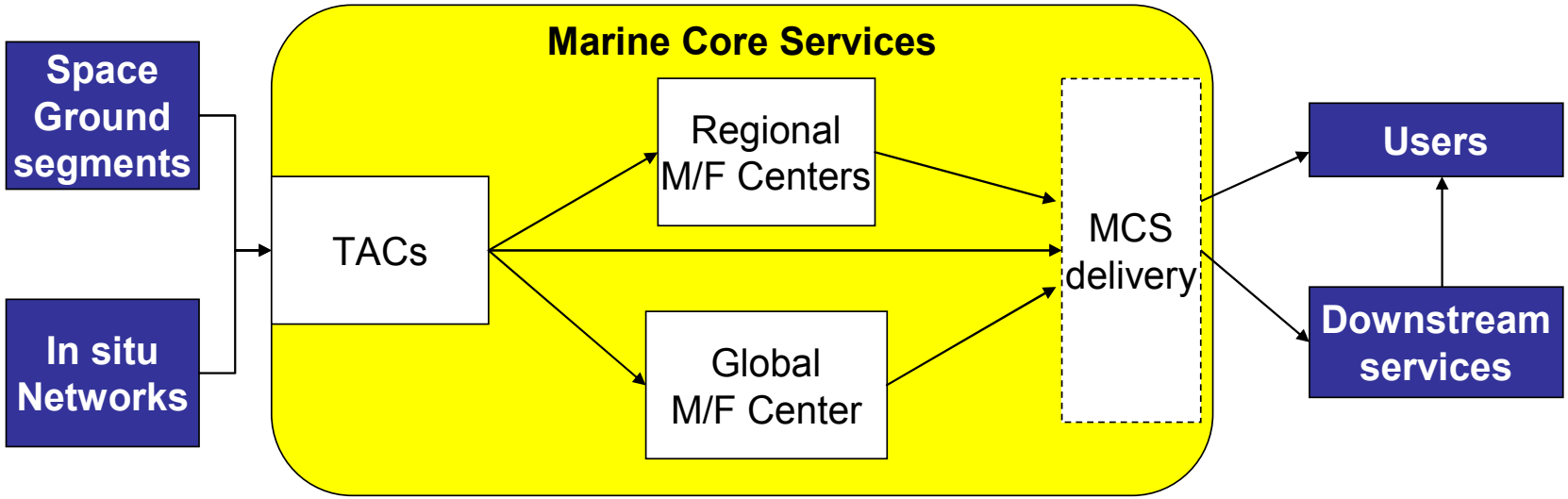

- TACs will feed the global and regional components of the MCS in observation products for space and in situ data.
- From observation systems to the service centres. Specific requirements from modelling and data assimilations centers as well as from users and downstream services.

Validation

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- L2 products (scat, radiometer)
  - Triple collocation (all players, NWP, buoys)
  - Spatial correlation/spectra
  - Consistency (e.g., MLE)
- L3/L4 product
  - O-A analyses (biases, RMS, An impact)
  - O-B analyses (Advection skill)
  - Including ancillary parameters (stability, current waves, etc.)

Sea state effect

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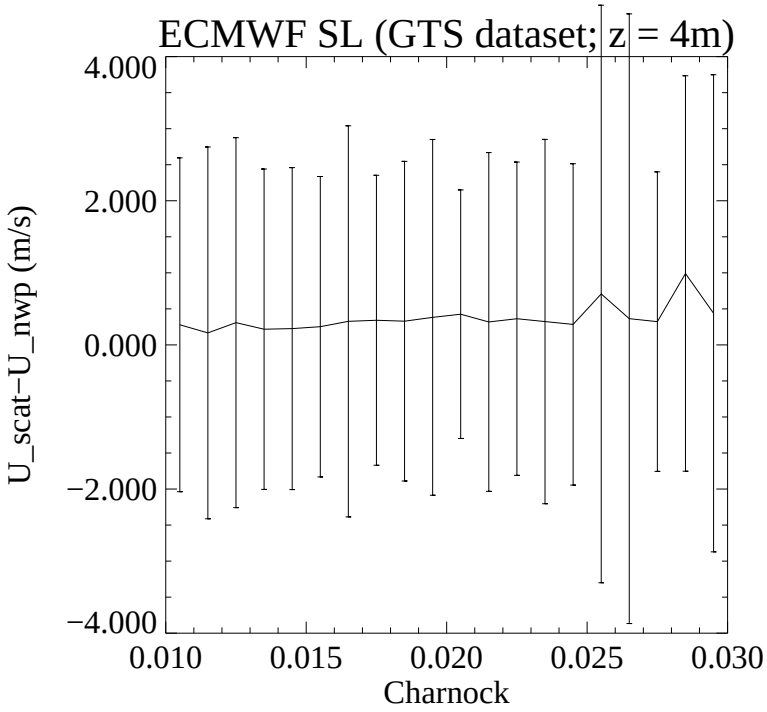
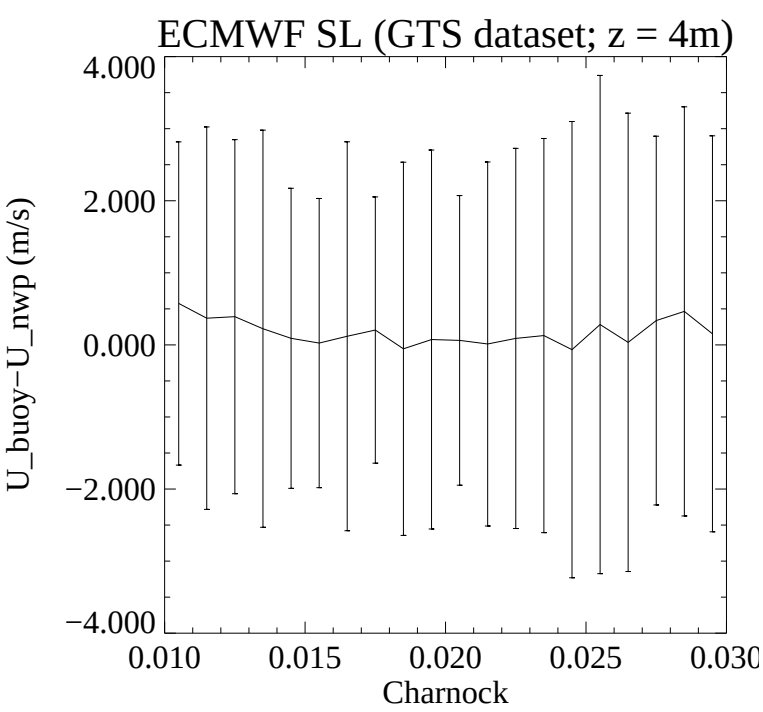
Extra-tropics





Stability Effect

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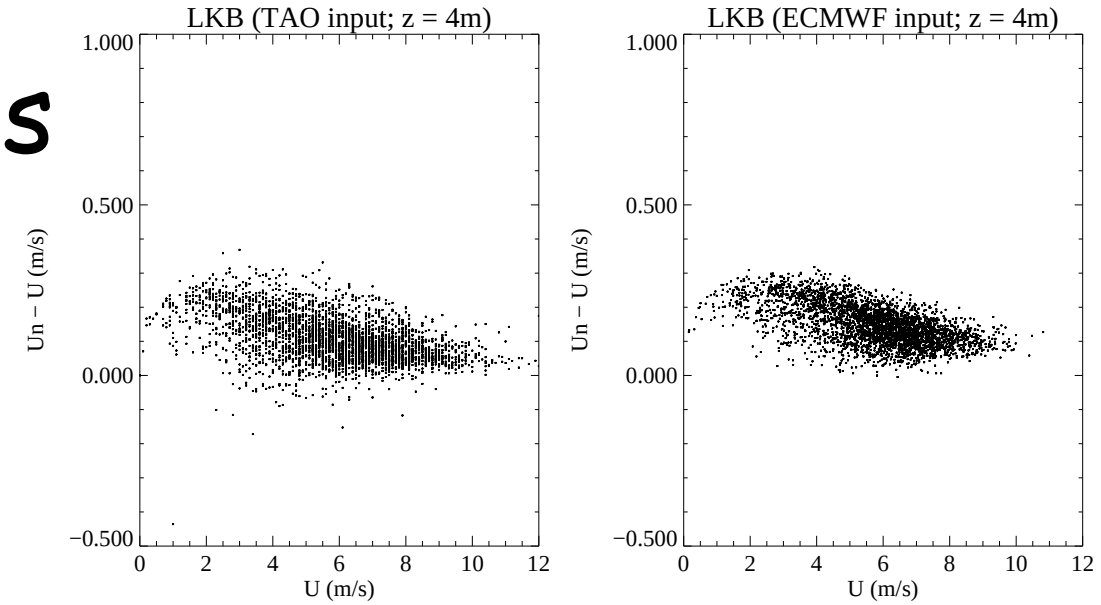
Tropics

Extra-tropics



Analysis of uncertainties in triple collocation exercise

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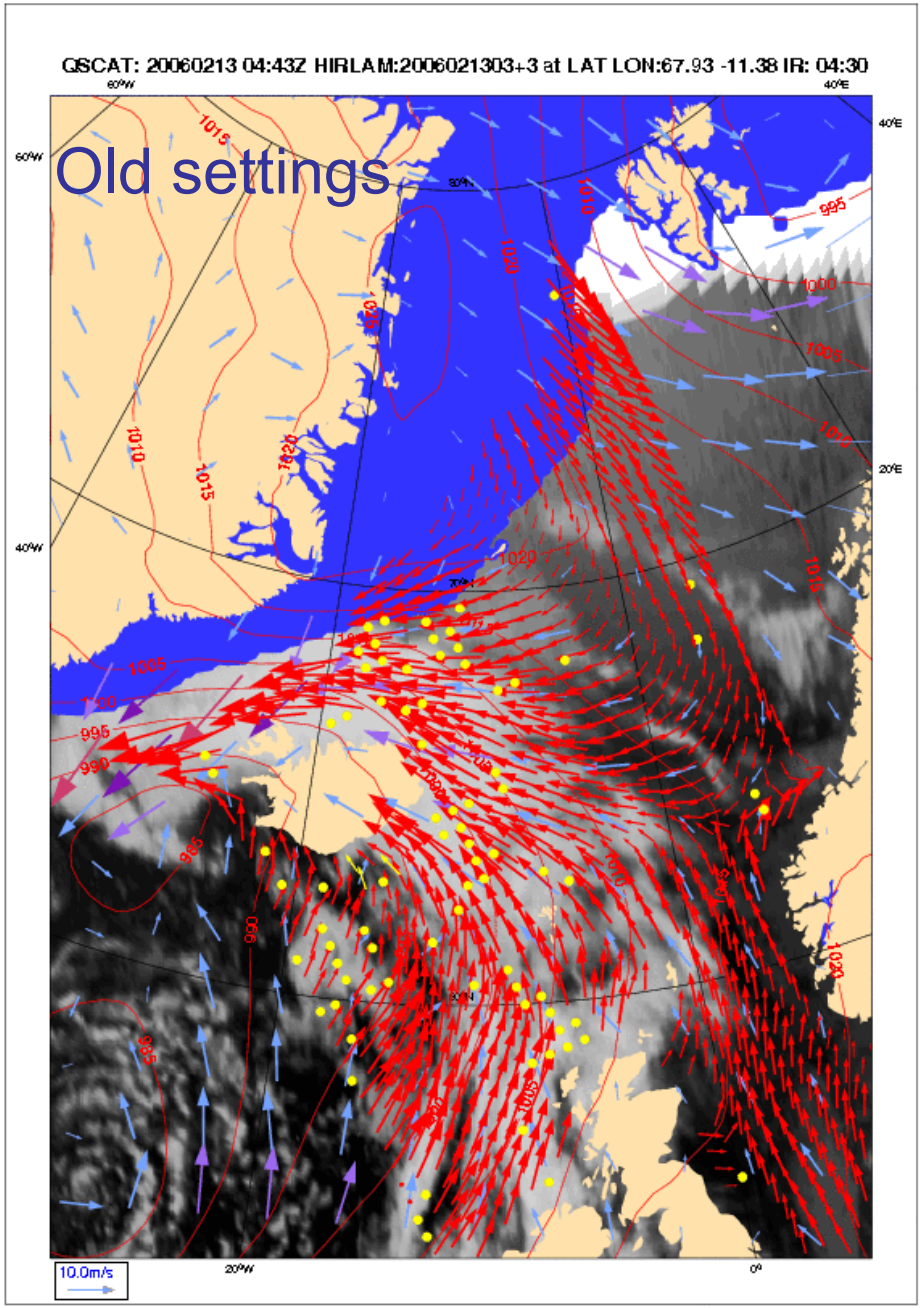
Table 5 Average and SD of wind component residual biases (after wind calibration) per buoy location, for buoy and ECMWF winds against scatterometer winds, at the Tropics / Extra-tropics

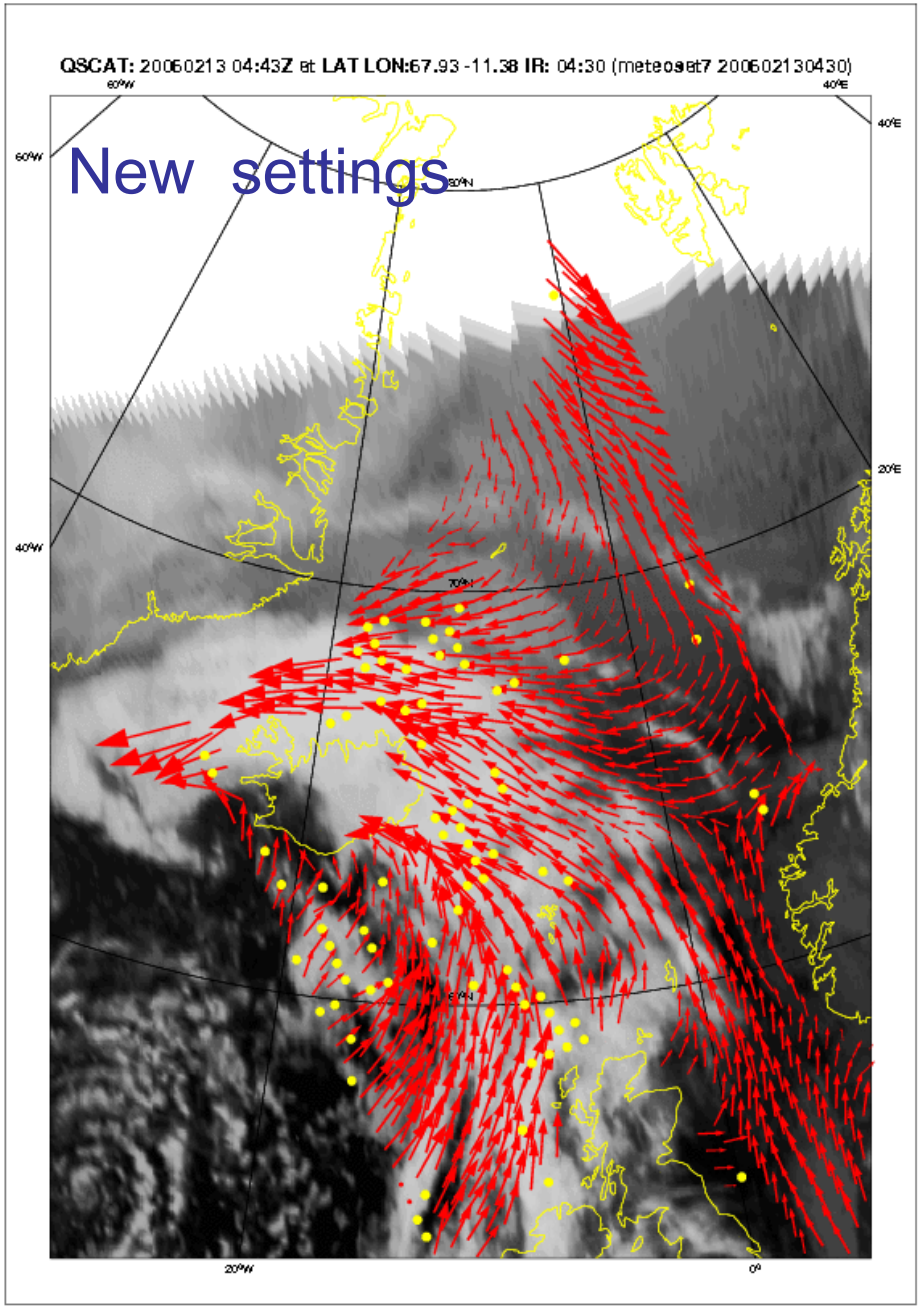
	Buoy-Scat. U comp.	Buoy-Scat. V comp.	ECMWF-Scat. U comp.	ECMWF-Scat. V comp.
BIAS (m/s)	0.09 / 0.03	-0.02 / -0.12	0.21 / 0.08	-0.02 / -0.06
SD (m/s)	0.27 / 0.16	0.13 / 0.24	0.27 / 0.26	0.22 / 0.24

Uncertainties in the Tropics (mainly due to current effects) are similar to uncertainties in the Extra-tropics (mainly due to wind variability)

Portabella and Stoffelen, 2008

compromise between noise & meteorological detail





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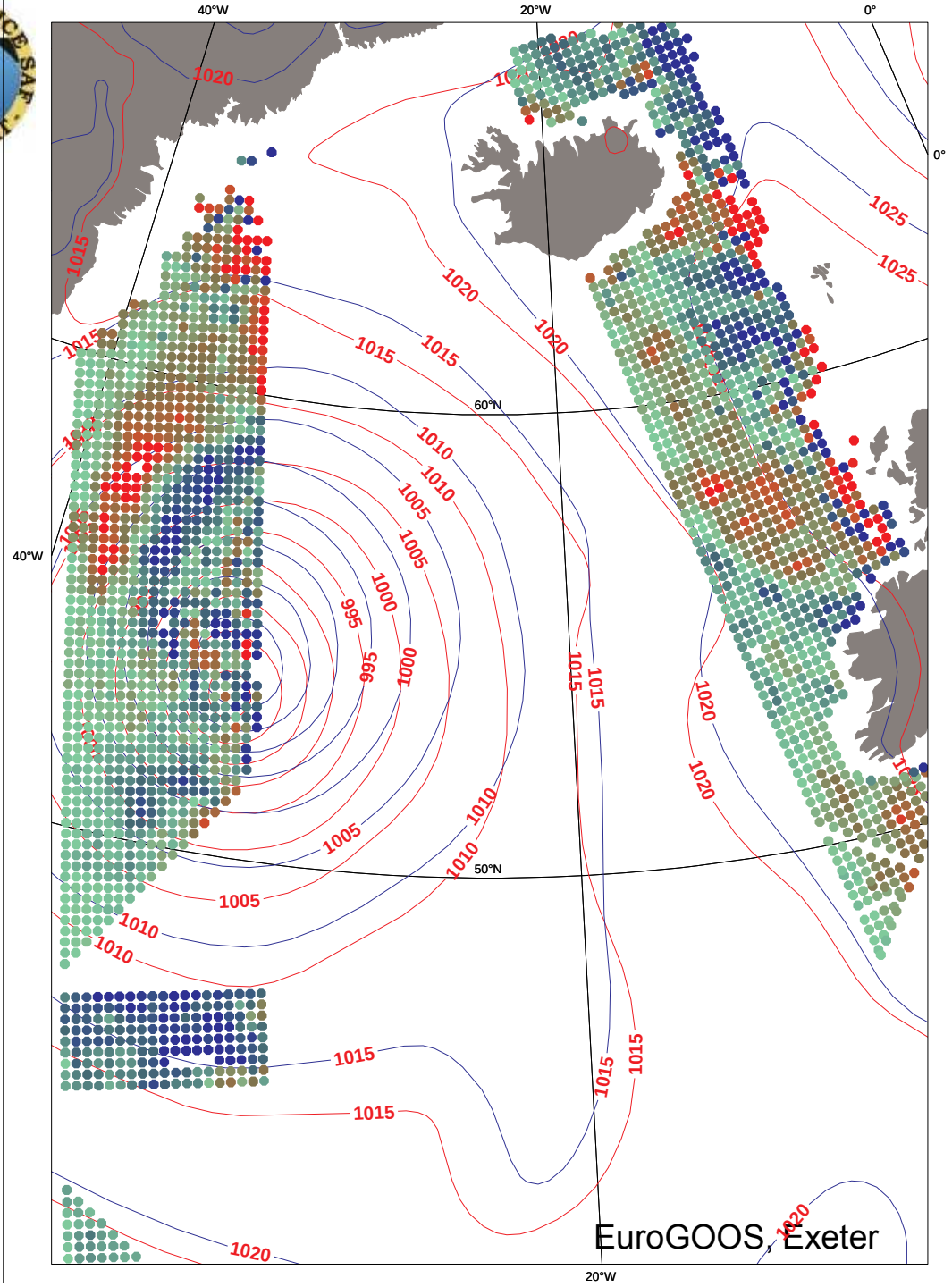

- Warm steady-flow air discerned from polar gusty air.
- Noise at edges of the swath

Buoy verification

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- ASCAT compares best
- ASCAT 25 compares best to ECMWF also
- For SeaWinds, 25 km best represents buoy, 100km best ECMWF
  → Hi-res scat works !

ASCAT 25		SeaWinds 25		SeaWinds 100	
SD u [m/s]	SD v [m/s]	SD u [m/s]	SD v [m/s]	SD u [m/s]	SD v [m/s]
1.76	1.79	1.84	1.83	2.19	2.00