Scatterometer Wind Services in Europe

NWP SAF

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myOcean

GMES
Observing our planet for a safer world

OVWST, 18-20/5/'09

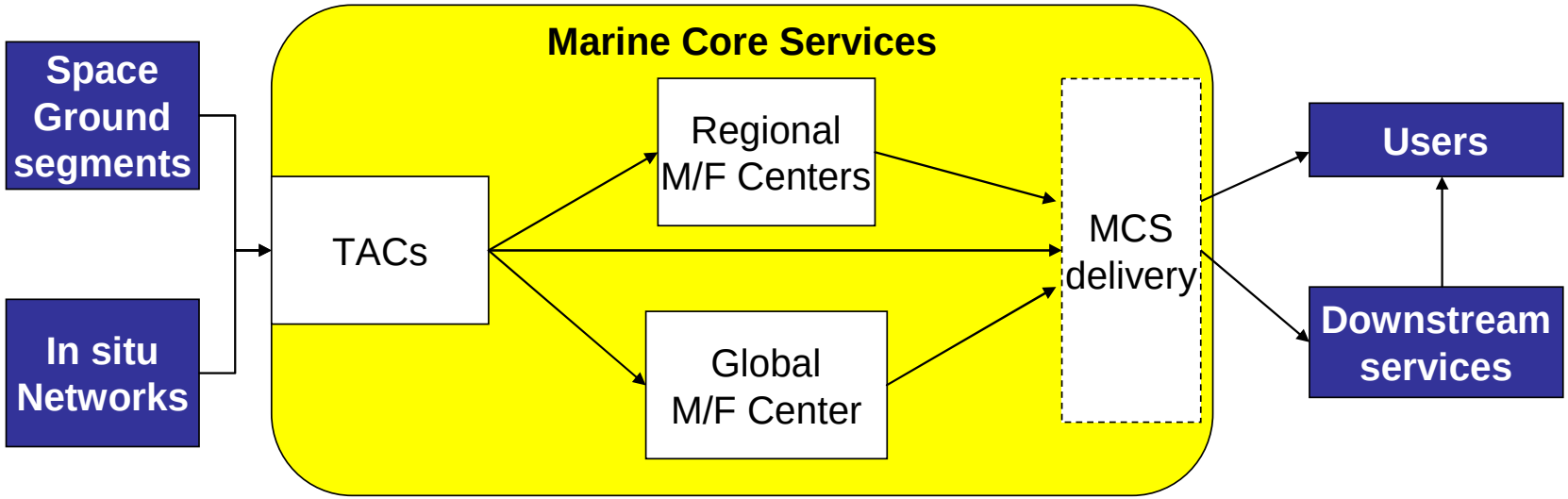
Status SAF activities

NWP SAF

- Available NWP SAF software
  - AWDP1.0 released (ERS and ASCAT)
  - SDP2.0 released (SeaWinds)
  - 2D-Var settings and NWP guidance
  - Coastal AWDP prototype (@25km, 12.5 km in 2009)
- OSI SAF winds and services
  - ASCAT Cal/Val
  - ASCAT 25 km since March 2007 (first L2); operational in Dec 2008
  - ASCAT 12.5 km operational
  - ASCAT are equivalent neutral winds now - CMOD5.n (0.2 m/s)
  - Box averaged product / coastal product validation
  - Geophysical modeling (e.g.,MLE and CMOD6)
  - SeaWinds stream updated for new BUFR (after updated NOAA stream)
  - NetCDF defined and available shortly
- EARS 30 minutes service
  - ERS data in ASCAT format
  - ASCAT 25 km & 12.5 km (ascending orbits)
- CM SAF ERS scatterometer ocean stress fields climexp.knmi.nl
- NWP and OSI SAF support European contribution ISCAT

MyOcean EU Marine Core Services Thematic Assembly Centers (TAC)

L3 and L4 wind products



- **TACs will feed the global and regional components of the MCS in observation products for space and in situ data.**
- **Wind products from Sea Ice and Wind TAC**
- **www.myocean.eu.org/, en.wikipedia.org/wiki/MyOcean**
- **KNMI manages wind products**
- **V0 contains the L4 MERSEA project wind maps of IFREMER**
- **V1 (2010) contains L3 products and V2 (2012) improved L4**

OSI SAF ASCAT product release schedule

NWP SAF

Product	Coverage	Demonstration	Operational
25 km	Global	2007	2008
12.5 km	Global	2008	2009
Coastal 12.5 km	Global	2009	2011

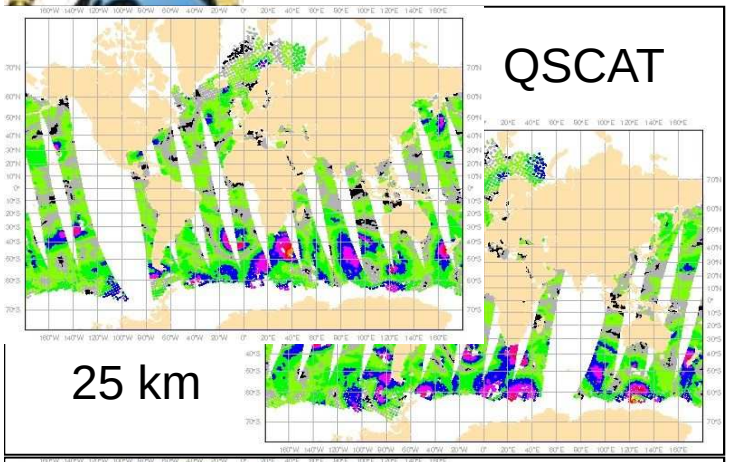
- Integration of regional EARS products into global OSI SAF products in 2010
- EUMETSAT looks into box filtering of L1B data to support coastal

Wind Products at

www.knmi.nl/scatterometer

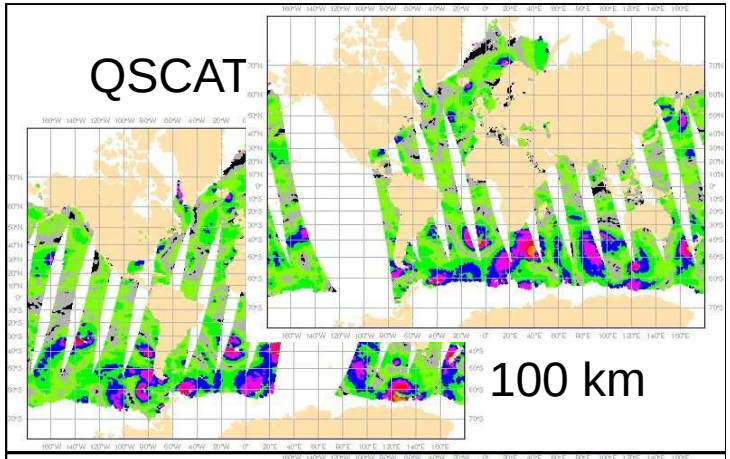
scat@knmi.nl

QSCAT



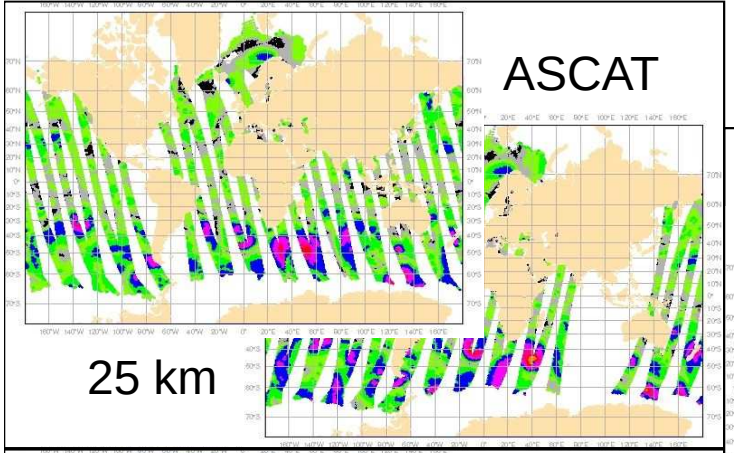
25 km

QSCAT



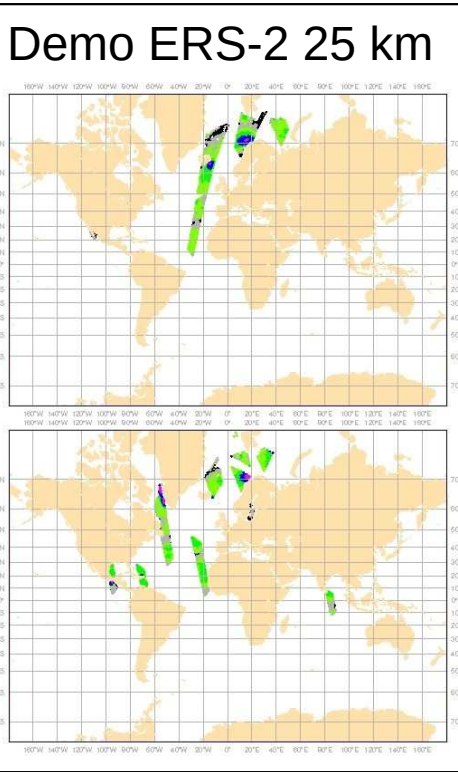
100 km

ASCAT

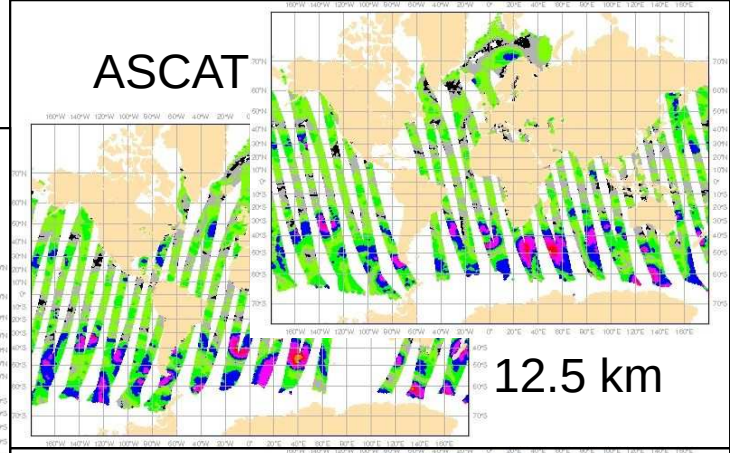


25 km

Demo ERS-2 25 km

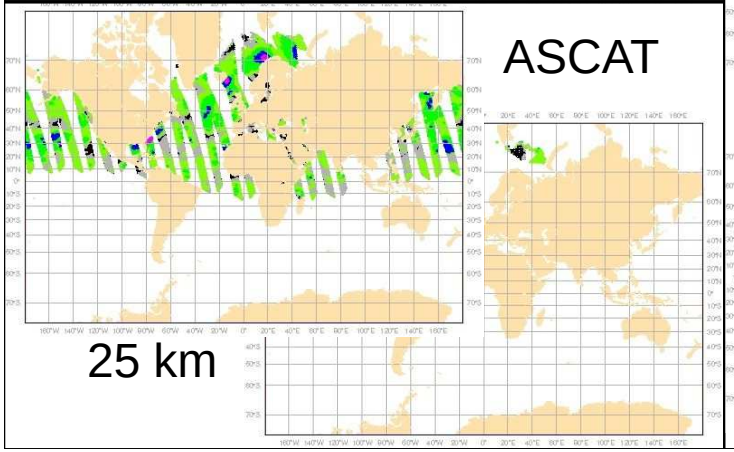


ASCAT



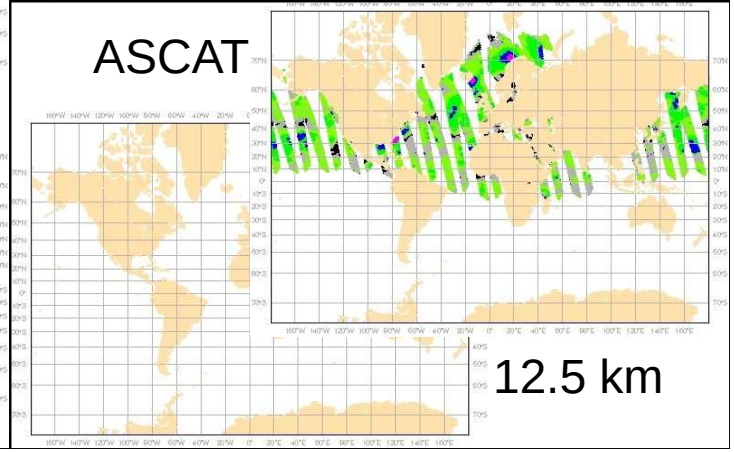
12.5 km

ASCAT



25 km

ASCAT



12.5 km

Monitoring of each product

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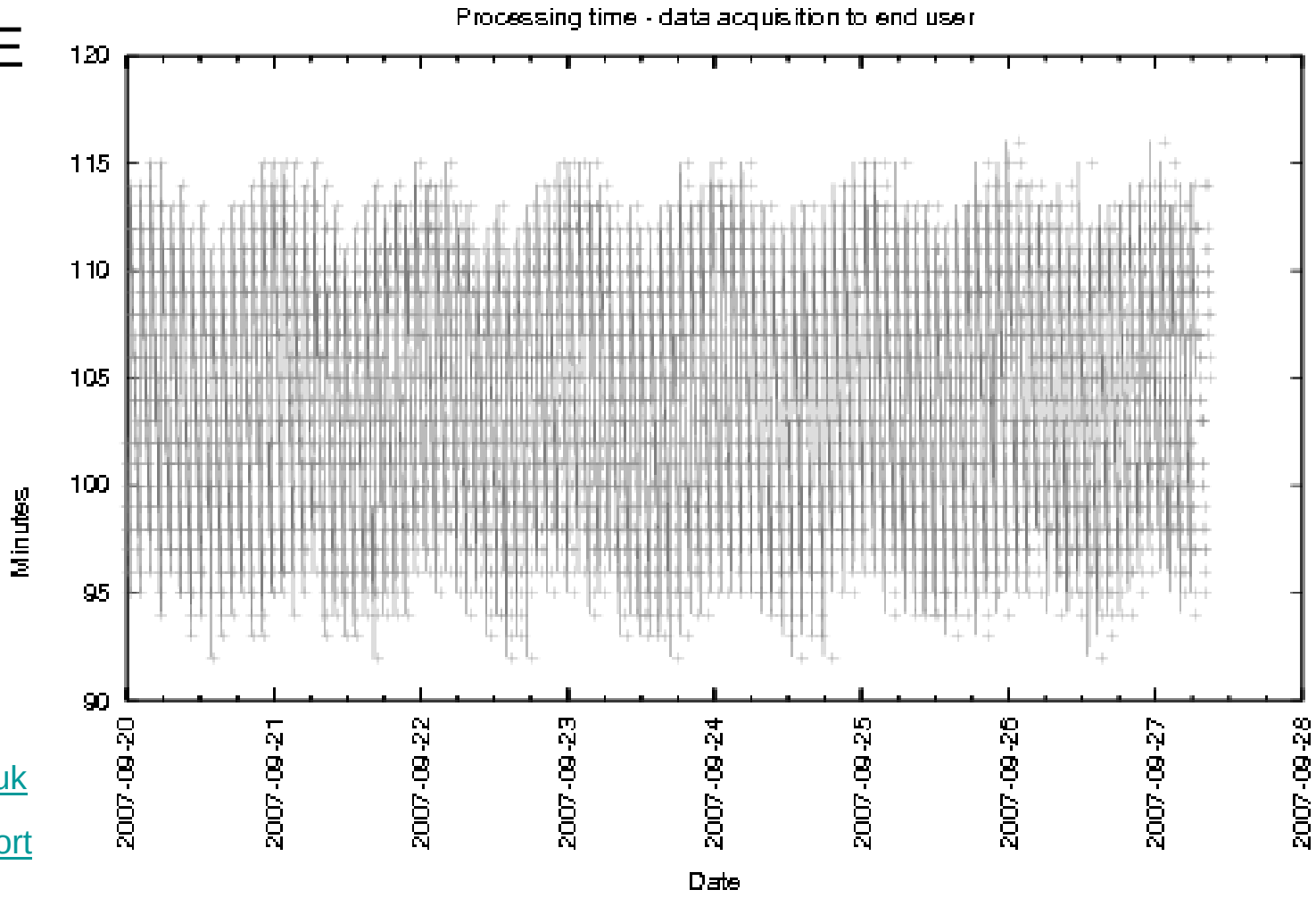
- 1st rank MLE
- Speed bias
- RMS u&v scat - EC
- Timeliness
- On-line, NRT

- NWP SAF integrated monitoring at www.metoffice.gov.uk/research/interproj/nwpsaf/scatter_report



ASCAT calibration

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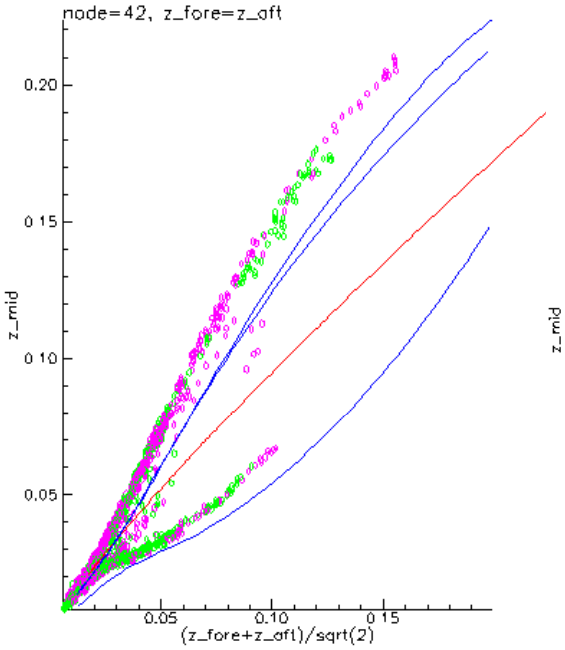
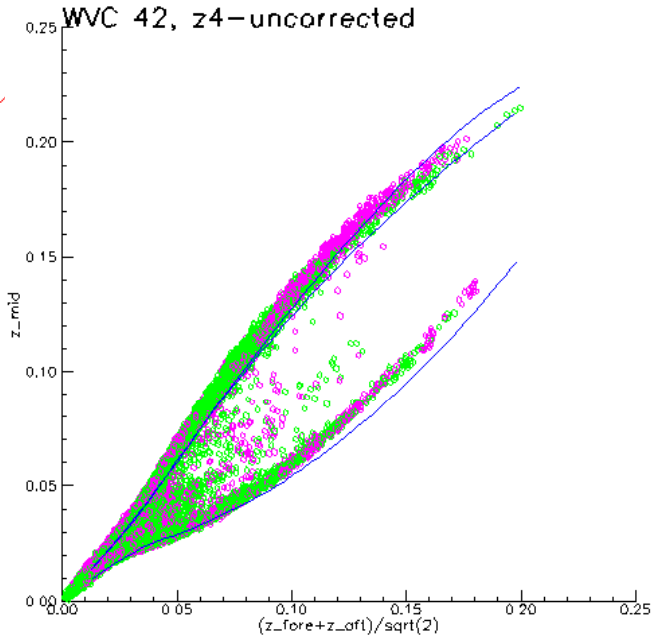
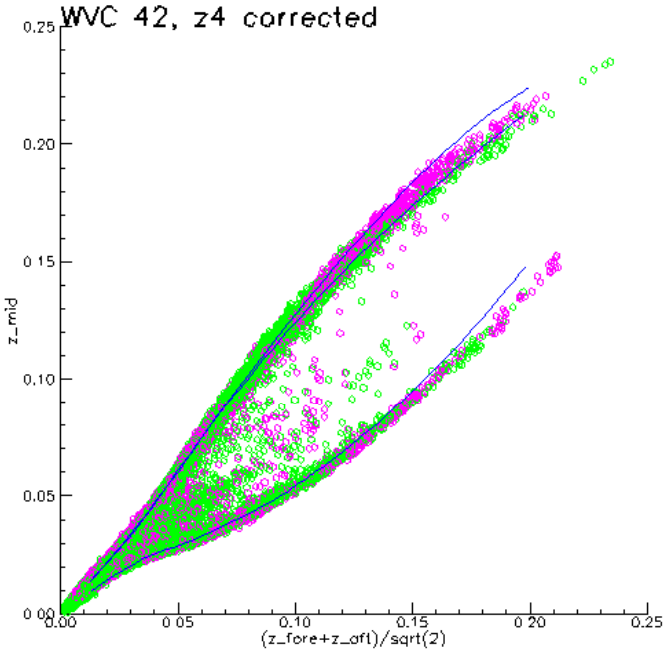
Vertical cut for WVC #42





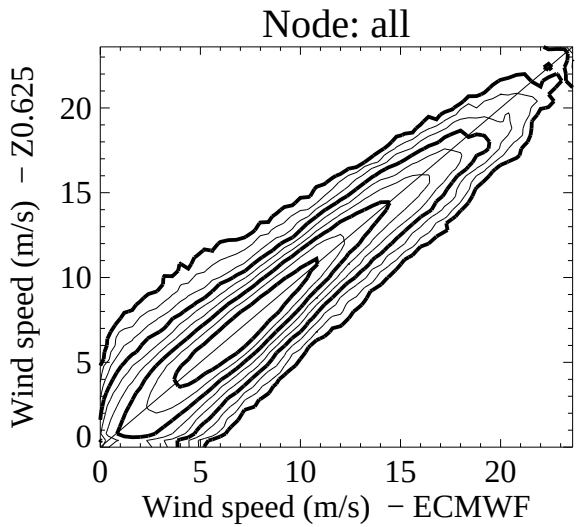


Level 1b 1st release ***Level 1b current release*** ***KNMI total correction***

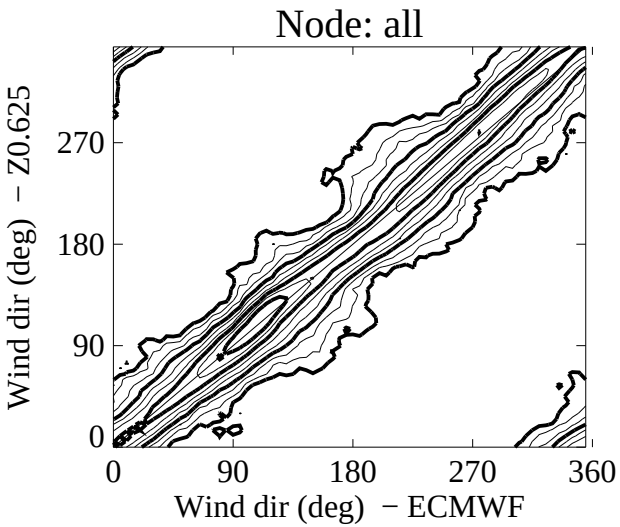
- ASCAT L2 winds have been of constant high quality since Feb 2007
- A backscatter calibration table is used, different for each L1B release
- A CMOD6 is being constructed following the L1B 3-transponder calibration

ASCAT

- Unprecedented overall wind statistics after ocean σ^0 correction
- Both against buoys and NWP



N=3267229
mx= 7.66 my= 7.64
m(y−x)= −0.02 s(y−x)= 1.26
cor_xy= 0.94



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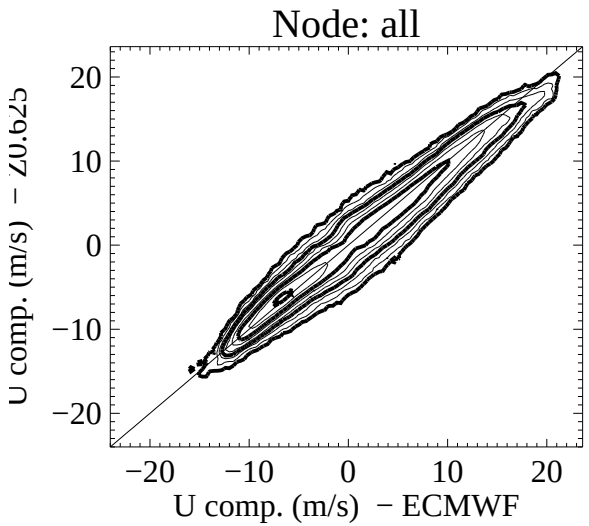
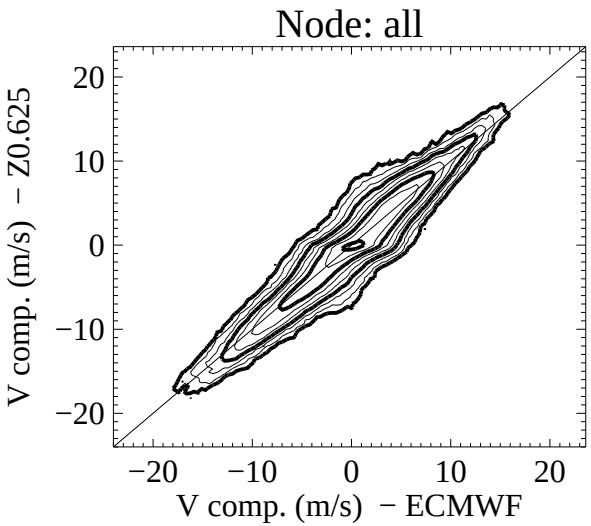
mx= 177.72 my= 178.57
m(y−x)= 0.86 s(y−x)= 14.94
cor_xy= 0.99



N=3267229
mx= −0.15 my= −0.26
m(y−x)= −0.12 s(y−x)= 1.45
cor_xy= 0.98



N=3267229
mx= 0.78 my= 0.73
m(y−x)= −0.05 s(y−x)= 1.62
cor_xy= 0.95

Box versus Hamming

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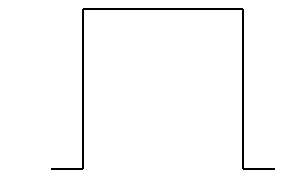
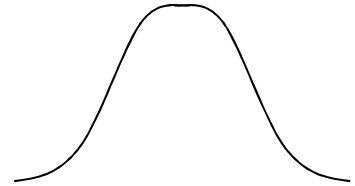


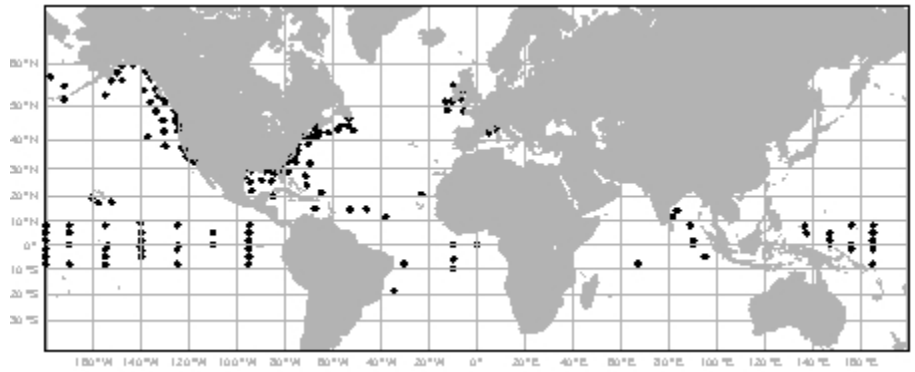
Box window filter



Hamming window

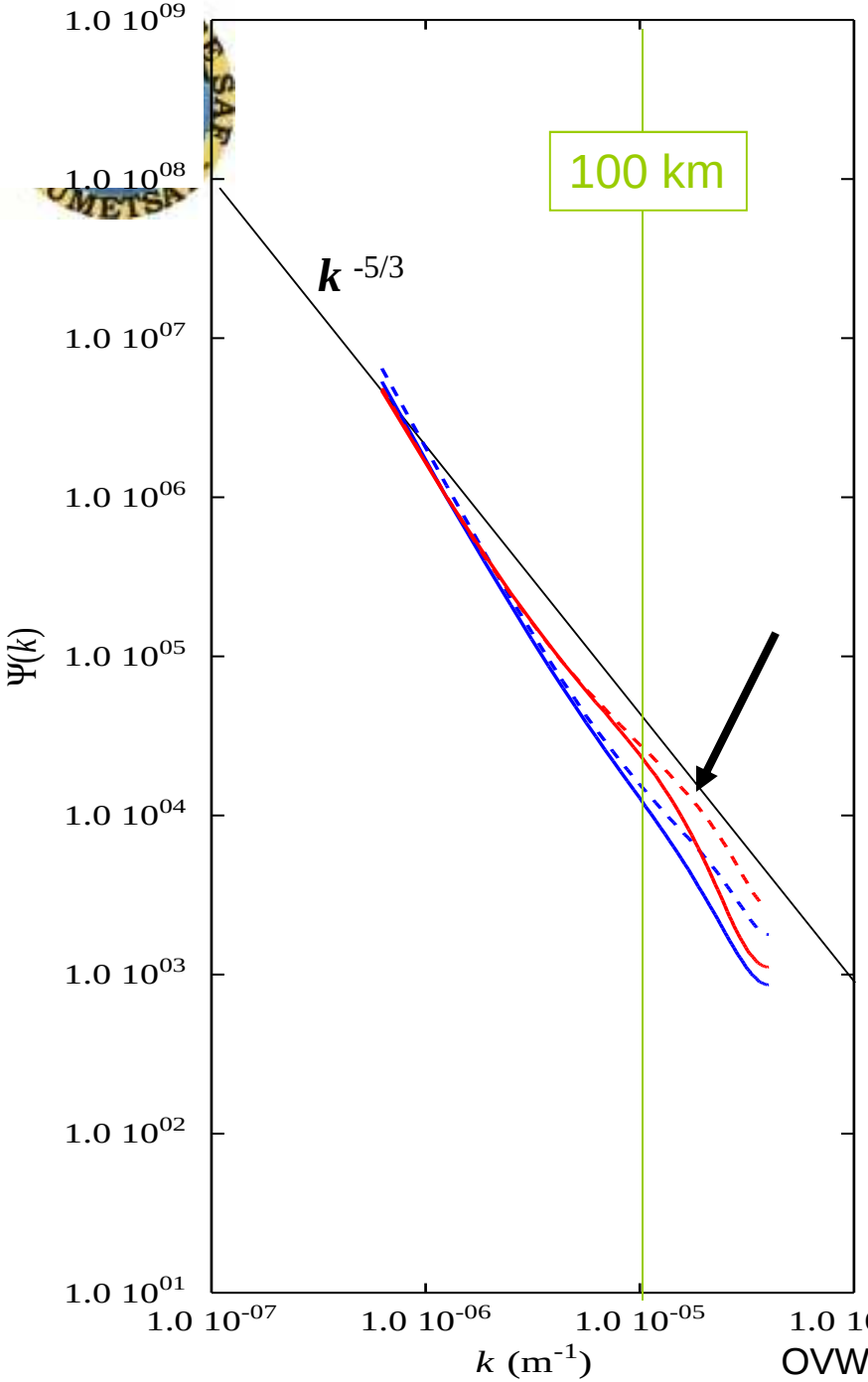
- Operational ASCAT σ^0's include a spatial Hamming window filter; a box-filtered set has now also been provided by EUMETSAT
- Elaborated 2 tests for product comparison:
  - Dual product collocation with a representative set of buoy data (kindly provided by ECMWF), and NWP data
  - Spectral analysis (as in monday presentation)

Buoy verification



ASCAT 12.5-km product	# wind vectors	speed bias	stdev *u*	stdev *v*
Hamming filtered, operational	2025	-0.11	1.88	1.84
Box filtered, test set	2002	-0.11	1.89	1.91
Hamming, collocated with Box winds	1795	-0.09	1.92	1.87
Box filtered, Hamming collocated	1795	-0.09	1.91	1.88
Box, hi-res land/sea mask applied	2053	-0.11	1.88	1.92

- QC and quality of Hamming and Box filtered sets appear slightly different
- Collocated Hamming and Box WVCs have very similar buoy verification
- A more accurate land/sea mask provides here some more good-quality WVCs for Box averaging nearer to the coast



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Box AWDP@12.5

- Box averaging leaves more tail variance
- No apparent noise floor or aliasing effect
- Bump remains, but at lower wavelength (?)
- $k^{-1.8}$, pretty close to -1.67 for 3D turbulence Nastrom and Gage 1987

➢ Box product is excellent

Conclusions

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- ASCAT winds are stable and of very good quality
- Box-filtered ASCAT σ^0 data appear preferable over Hamming-filtered data
- ASCAT - ERS continuity after ESA's ERS reprocessing
- L2 NetCDF winds being released; distribution foreseen through KNMI (NRT), EUMETSAT and PODAAC
- MyOcean Wind TAC; higher level wind products to spatially and temporally contain eddy-scale winds
- ISRO SCAT on OceanSat-2 at 12 LST nicely complements SeaWinds at 6 LST and ASCAT at 9:30 LST; KNMI will be involved in cal/val
- Plan work on SAR hi-res winds (sparse) using SAF scatterometer methodology

➢ We support visiting scientists that support us to develop our products to the standards of the international OVWS community; please contact us

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www.knmi.nl/scatterometer

scat@knmi.nl

Bias due to σ^0 averaging

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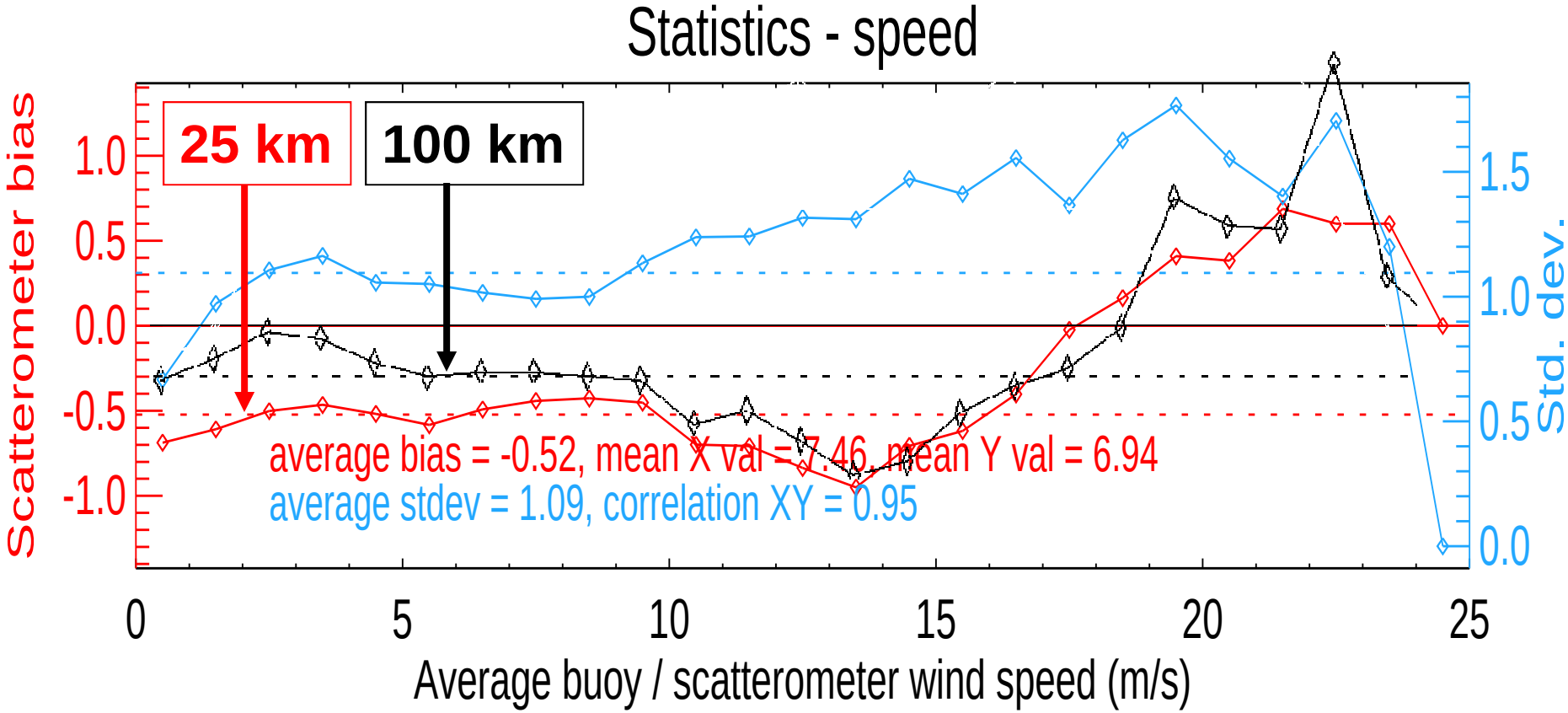
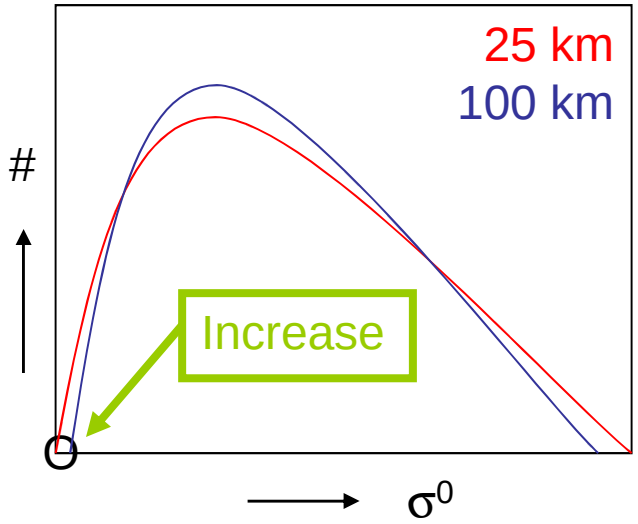
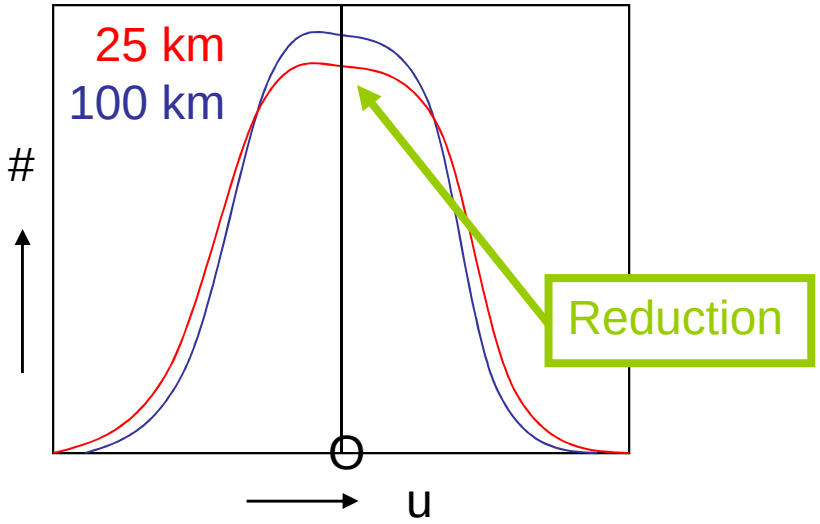
- 100-km product increases low speeds
- At coarser resolutions speeds should be lower instead ?



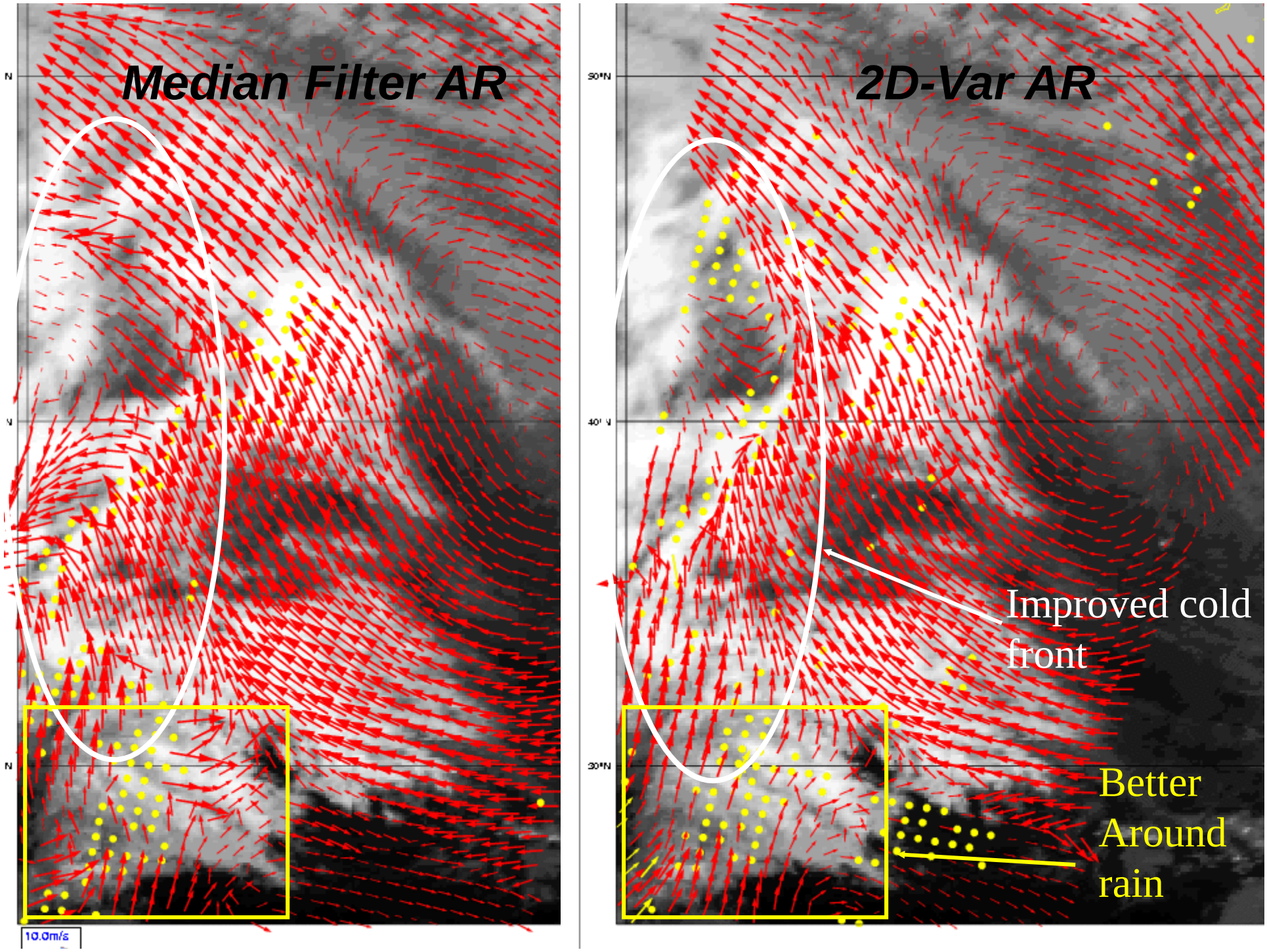
Bias due to σ^0 averaging

NWP SAF





- σ^0 distribution is steep for low values; a low value at a 25-km WVC most likely has a neighbour WVC σ^0 value that is higher; this removes low (extreme) values when averaging to 100 km
- The wind vector distribution is flat for low values; a low 25-km WVC most likely has similarly low WVC neighbour amplitudes at varying direction; more low wind vector amplitudes are expected at 100 km
- 25-km GMF will not provide good 100-km winds !
- We verified that noisier (>Kp) σ^0 data indeed provide speed bias as well


Median Filter AR
2D-Var AR
Improved cold front
Better Around rain
10.0m/s

Buoy and NWP verification

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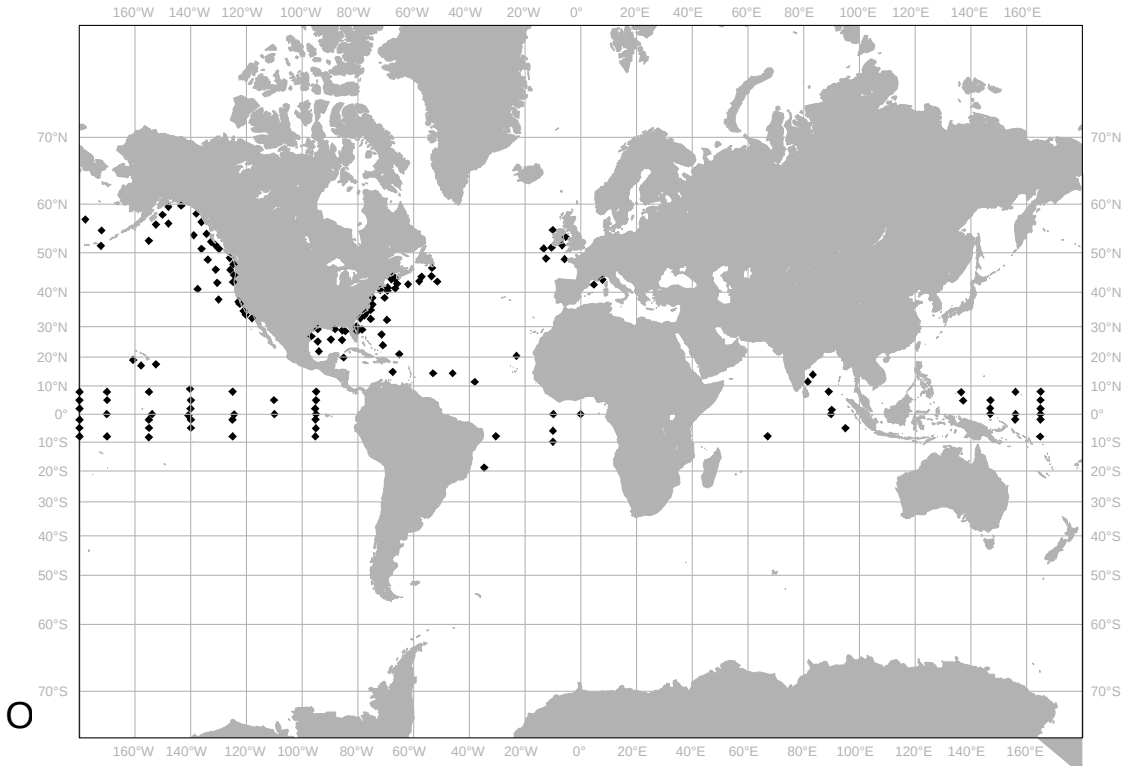
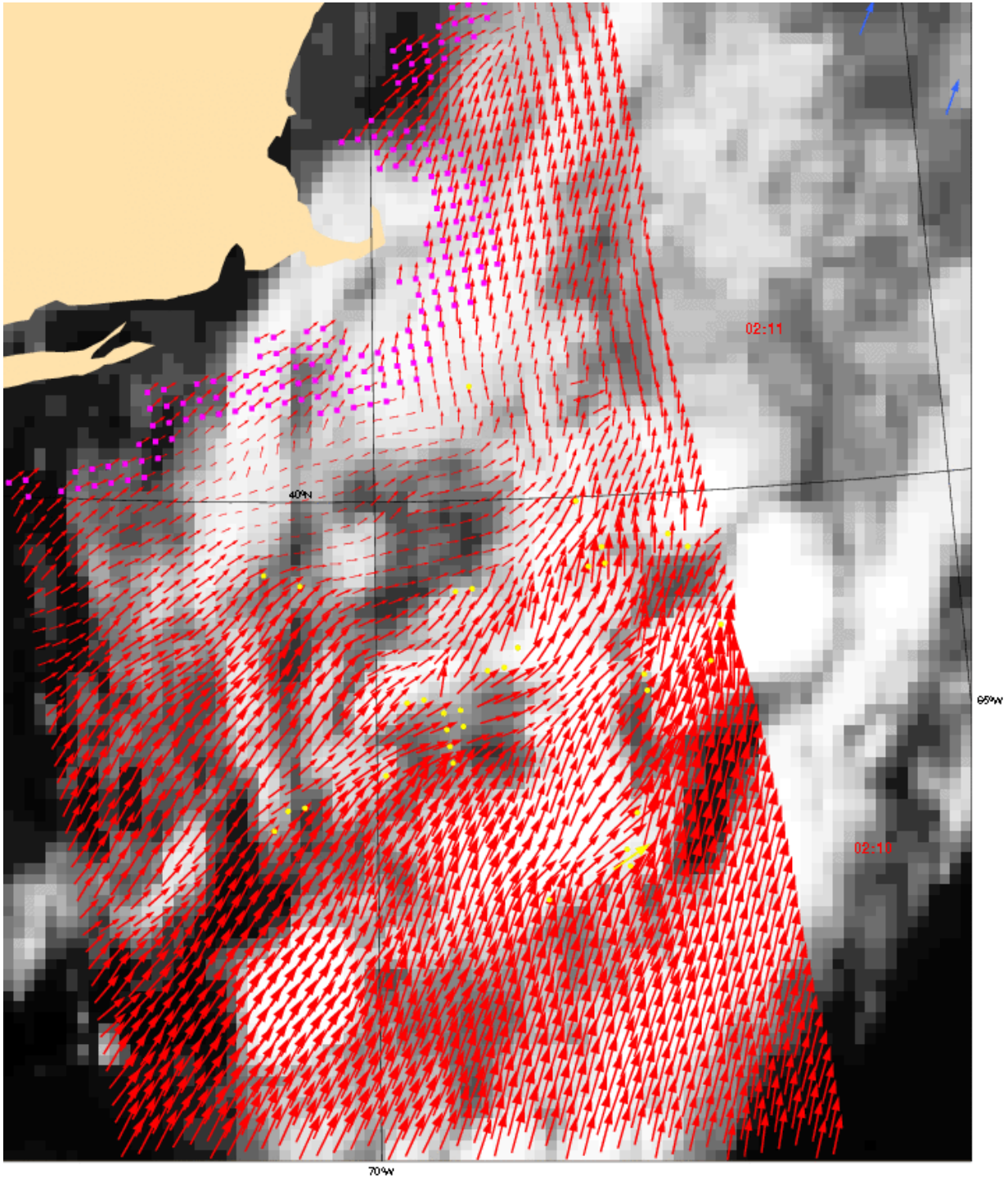
- ASCAT 25 compares best to buoys; ASCAT 25 compares best to ECMWF as well
- SeaWinds 25 is slightly noisier than ASCAT 25; SeaWinds 100 compares much better to ECMWF winds than SeaWinds 25
- Low-res products good for global NWP; Hi-res for ocean applications and nowcasting

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





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Experimental 12.5-km product

- See yesterday's talk

QuikSCAT vs ECMWF

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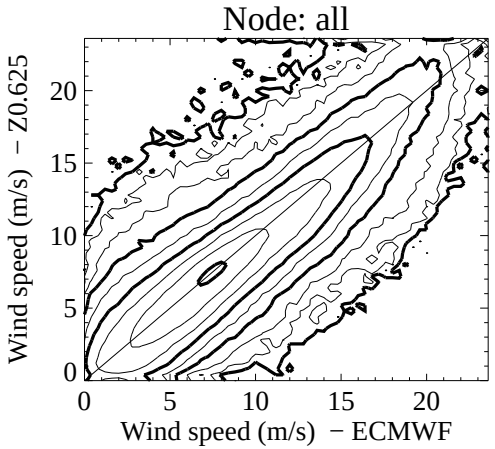
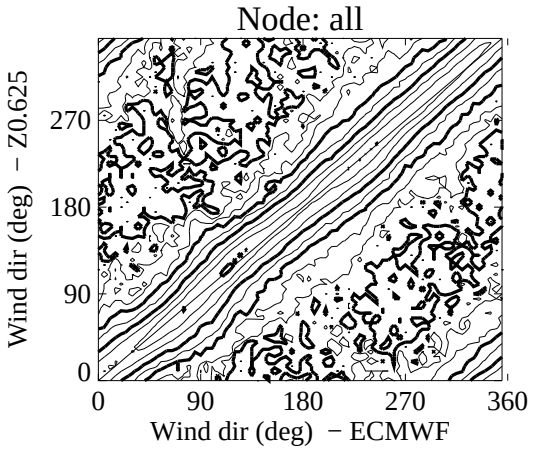


N=4540535
mx= 7.50 my= 7.26
m(y−x)= −0.24 s(y−x)= 1.49
cor_xy= 0.91



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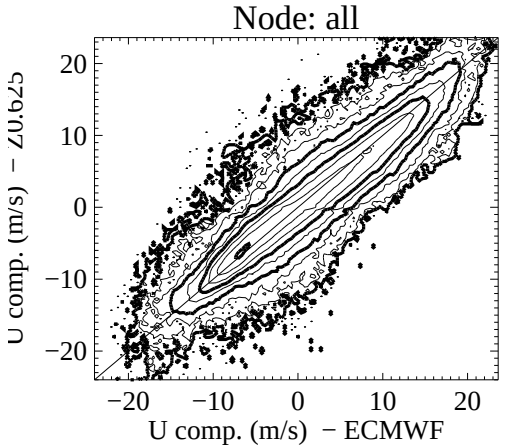

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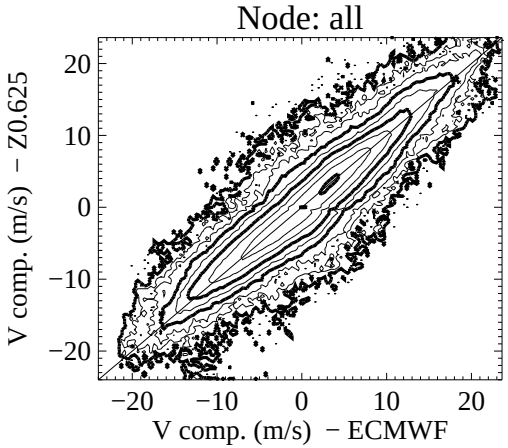

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mx= 0.74 my= 0.70
m(y−x)= −0.04 s(y−x)= 1.58
cor_xy= 0.96

ASCAT vs ECMWF

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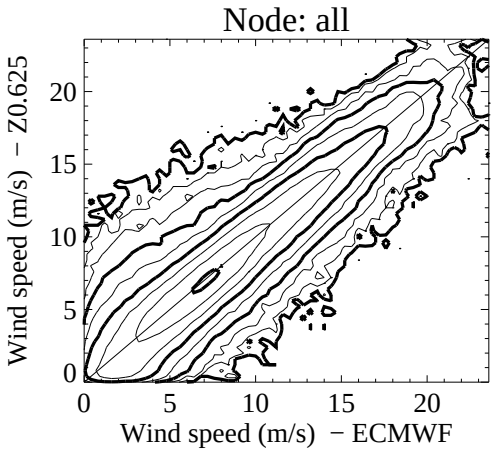

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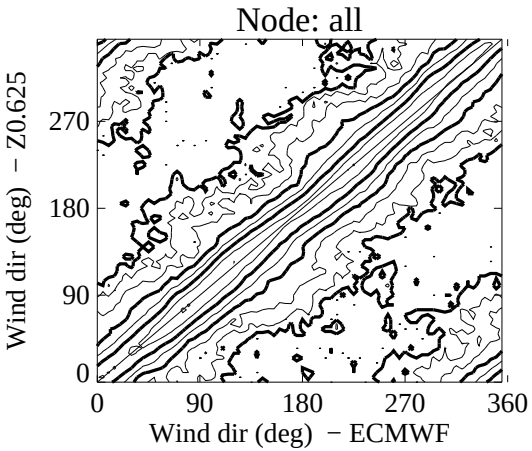

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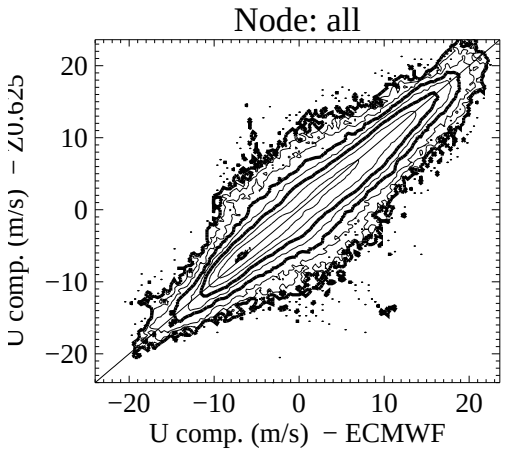

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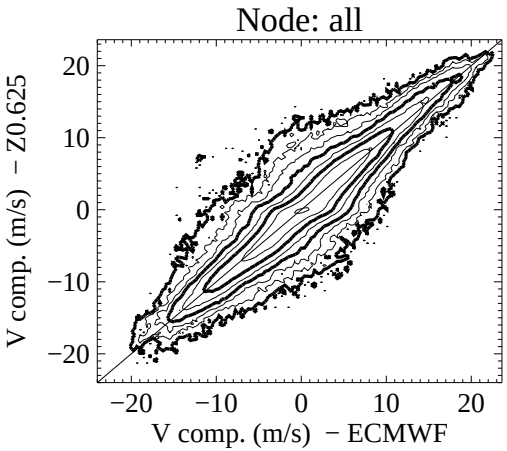

N=2305231
mx= 0.75 my= 0.72
m(y−x)= −0.03 s(y−x)= 1.62
cor_xy= 0.96

OVWST, 18-20/5/'09