ASCAT wind scaling

Jur Vogelzang and Ad Stoffelen*

Royal Netherlands Meteorological Institute
Ministry of Infrastructure and the Environment

ASCAT winds are known to contain biases that depend on incidence angle (or, equivalently, WVC number) and wind speed. These biases should be incorporated in the ASCAT GMF. In this work we try to estimate these biases using known facts on the errors of scatterometers, model forecasts, and in-situ measurements by buoys. It is shown that the method proposed yields slightly more accurate ASCAT winds.

1. Method

The method used is outlined in figure 1. It is a combination of triple collocation, regression, and CDF matching.

First, the background wind speed is scaled to the buoy speeds by applying the average scale for *u* and *v* found from triple collocation. Next, the scatterometer wind speed is scaled by regression to the background speed. In order to circumvent pseudobiases, the regression is performed as *o*-*b* against *o*+*b* and then transformed back to *o* against *b*.

If the winds are scaled properly, *o*-*b* should equal the total measurement error. The total error is divided over *b* (WVC independent) and *o* (WVC dependent). The errors are made equal by convolution with a Gaussian error distribution. Finally, CDF matching yields the desired scaling coefficients.

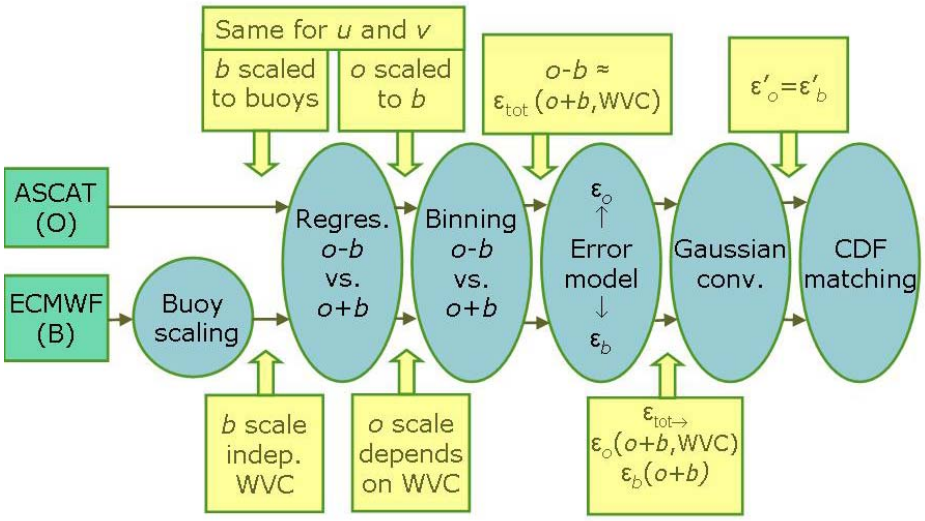

Figure 1. *ASCAT wind scaling procedure.*

2. Results

Figure 2 shows the resulting calibration curves. Note that these also contain a constant contribution. The calibration curves for the left and right hand swath show some differences. Note that the curves for u and v tend to cancel each other.

The calibration was applied on the triple collocation dataset, and the triple collocation exercise was redone. The resulting errors are shown in table 1.

Table 1 shows that the calibration procedure resulted in slightly more accurate scatterometer winds, whereas the changes in buoy and background errors are not significant. However, the improvement in the scatterometer winds is only a few cm/s.

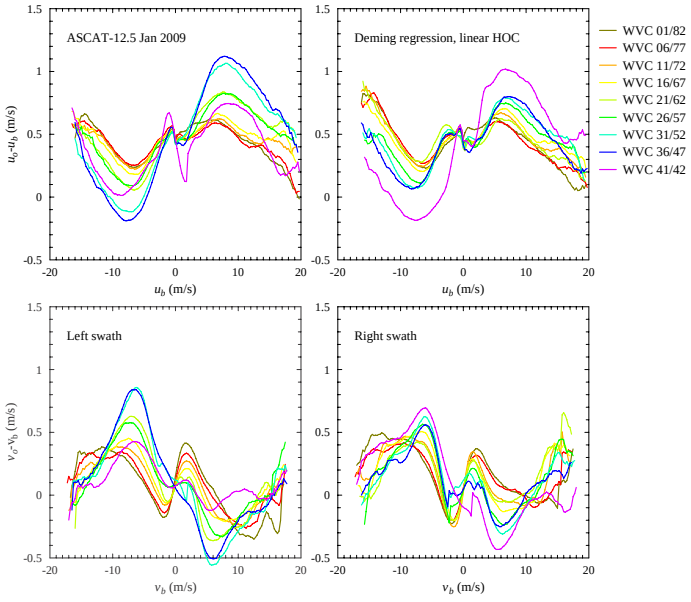

Figure 2. *Calibration curves for ASCAT wind components u and v (calibration period Jan 2009).*

3. Conclusion

The method presented here for scaling ASCAT winds has potential, but needs some more research on its statistical and physical interpretation.

	Buoy		ASCAT		ECMWF	
	σ_u	σ_v	σ_u	σ_v	σ_u	σ_v
Old	1.171	1.201	0.665	0.794	1.476	1.506
New	1.170	1.203	0.647	0.764	1.482	1.503

Table 1. *Standard deviation of the triple collocation errors (in m/s) for calibrated ASCAT-12.5 (collocation period Oct 2008 - March 2012).*

* Royal Netherlands Meteorological Institute. PO Box 201, 3730 AE De Bilt, The Netherlands, E-mail: vogelzan@knmi.nl