Some additional remarks

I tried the 2CH method on a triple collocated data set that I have available. The dataset consists of zonal and meridional ocean surface wind components (*u* and *v*), measured by buoys (not blacklisted by ECMWF), ASCAT-A coastal, and predicted by ECMWF. The data cover January 2015.

The results for the error standard deviations are listed in the table below. The triple collocation calculation (TC) was done using the scatterometer as calibration reference and without taking representativeness errors into account.

Model	scatterometer		buoys		ECMWF	
	σ_u	σ_v	σ_u	σ_v	σ_u	σ_v
TC	0.56	0.79	1.20	1.15	1.45	1.44
2CH	0.43	0.76	1.27	1.19	--	--
2CH	1.31	1.60	--	--	0.86	-0.40

The table shows that the 2CH results for scatterometer and buoy agree well with the TC results, but the 2CH scatterometer and ECMWF results do not. This can be explained by calibration issues. The ASCAT scatterometer has been calibrated carefully with respect to buoys, and the calibration scalings are 1.000 for the zonal wind and 1.004 for the meridional wind. The calibration scalings for the ECMWF model w.r.t. the scatterometer are 0.967 and 0.946. These numbers appear close to 1, but their effect on the error estimates is considerable.

In the 2CH method, the error variance of system 2 is essentially the difference between system's 2 autocovariance minus its cross-covariance with system 1. For the scatterometer example above, covariances and cross variances are between 30 and 45. Lets assume it is 40 for the autocovariance and 39 for the cross-covariance, the difference being an error variance of 1 m^2s^{-2}. If we now scale the system 2 data by $a = 1.01$, a difference of 1% in the calibration scaling, the autocovariance scales with a^2 and becomes 40.804, while the cross covariance scales with a and becomes 39.39. The difference, the error variance in the 2CH model, now becomes 1.414. So a 1% difference in calibration scaling leads to a difference of more than 40% in the error variance estimate in this example.

In the 2CH method the error variances are the difference between two large numbers. Therefore the method is very sensitive to calibration and representativeness issues.

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