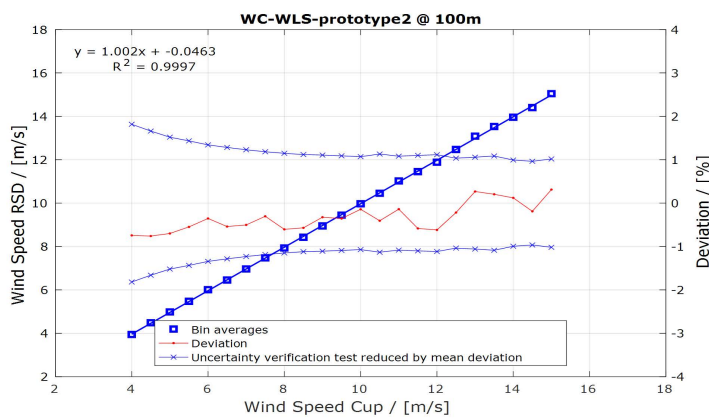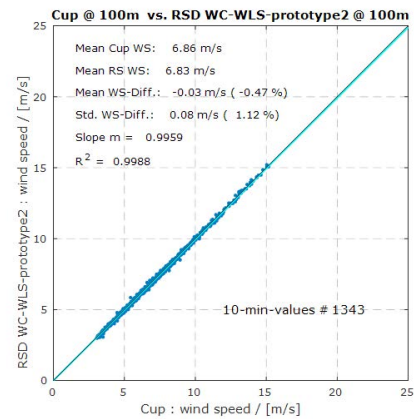# WINDCUBE

New Windcube performance verification

The metrology of the Windcube has been thoroughly studied since its first release in 2007 and a multitude of independent validations have been published along the years. It reached DNV GL's Stage 3 in 2012 and completed full IEC compliance early 2018 with the publication of 3 independent classifications campaigns performed at Deutsche Windguard.

The new Windcube is in line with these proven performances and brings further sensitivity reduction with the implementation of vector averaging.

Low uncertainty verified against IEC met mast at DNV GL test site

Bins averaged deviations (red line) and verification uncertainty (blue line): the Windcube deviation is better than the calibration uncertainty.

Scatter plot of deviations and linear regression (blue line): all points are aligned showing high precision.

> " In terms of accuracy, precision and data availability, the new Windcube v2.1 performance is consistent with the results achieved in more than ninety independent Windcube v2 performance verification campaigns done by DNV GL to date. It confirms the Windcube's suitability for energy yield assessment and power curve validations. We were also able to confirm the benefits brought by vector averaging, which reduces the wind speed measurement sensitivity of the system to turbulence intensity. "

Bastian Schmidt, Team Leader Remote Sensing, DNV GL

DNV·GL

High accuracy & precision across all heights at DNV GL test site

Height (m)	Slope	R^2
57	-0.3%	99.8%
75	-0.7%	99.8%
100	-0.5%	99.9%

- Very low uncertainty with a maximum mean deviation of -0.67% (in line with best practice acceptance criteria)
- High consistency across heights
- Very precise measurements with R^2 above 99.8% at all heights

Classification: low sensitivities to environmental parameters at all heights

Height	Accuracy class	Standard uncertainty
131 meters	0.4%	0.23%
101 meters	0.7%	0.41%
82 meters	1.0%	0.58%
61 meters	0.9%	0.52%

- Results from Windcube v2.0 vector averaged classification campaign at Deutsche Windguard test site
- Accuracy classes of 0.4 to 1.0 across all heights up to 131 meters

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