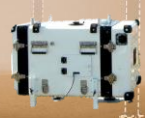


WindCube®

World's most accurate vertical wind lidar, delivering bankable wind resource data for your utility scale wind projects



Pioneering wind lidar development



2006

1.0



2010

2.0



2019

2.1

2025



2.1 XP

[Extended Performance]

+500

Organizations using
WindCube products

+3000

Units delivered

VAISALA

Versatile installation options

Offshore
buoy



Complex terrain



Trailer integration



Remote locations



Desert areas



Offshore
platform



Cold conditions



WindCube benefits compared to met masts



Covers the full rotor sweep height with measurements from 20 configurable heights



Can be relocated quickly



Faster to deploy and lower cost



Deployable in offshore, complex terrain and remote locations



Does not require permitting



Lidars in operational phase



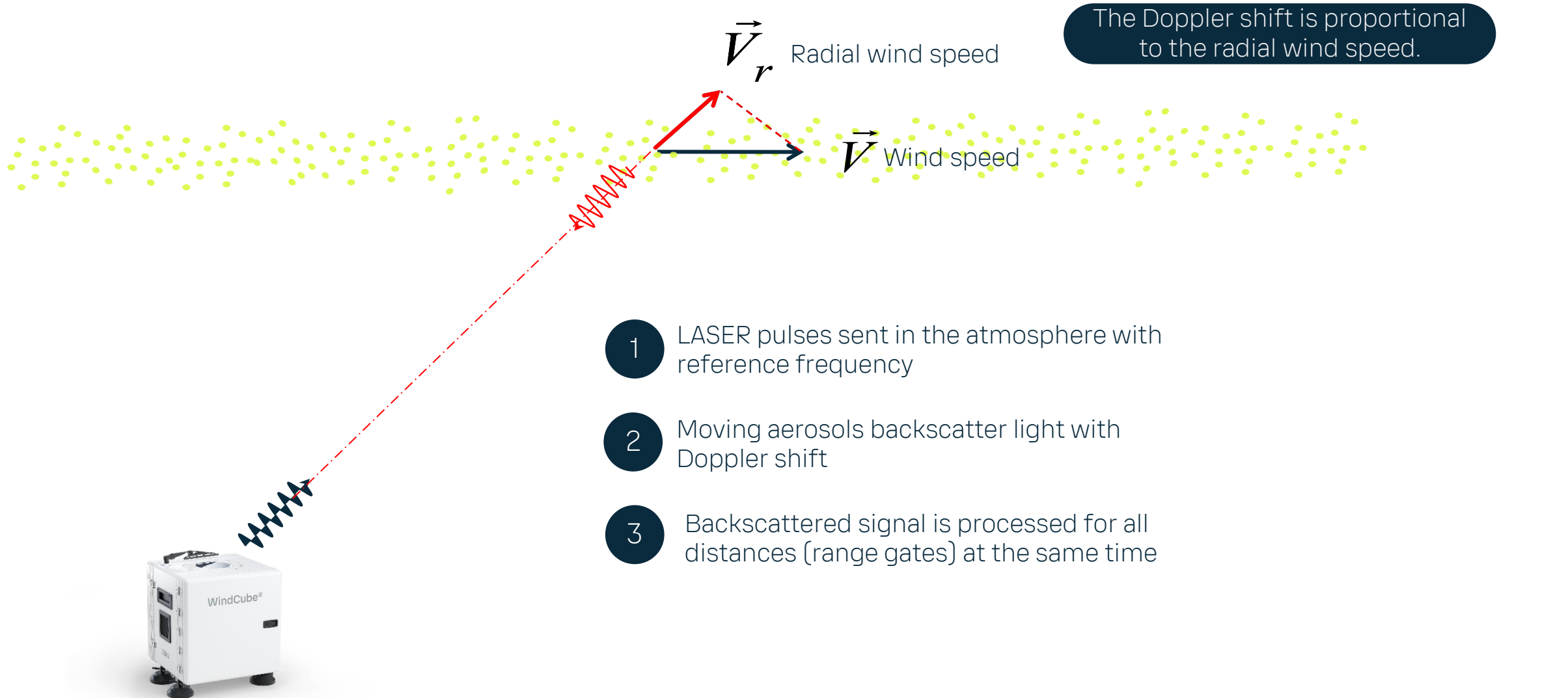
Bankable wind data up to 400m



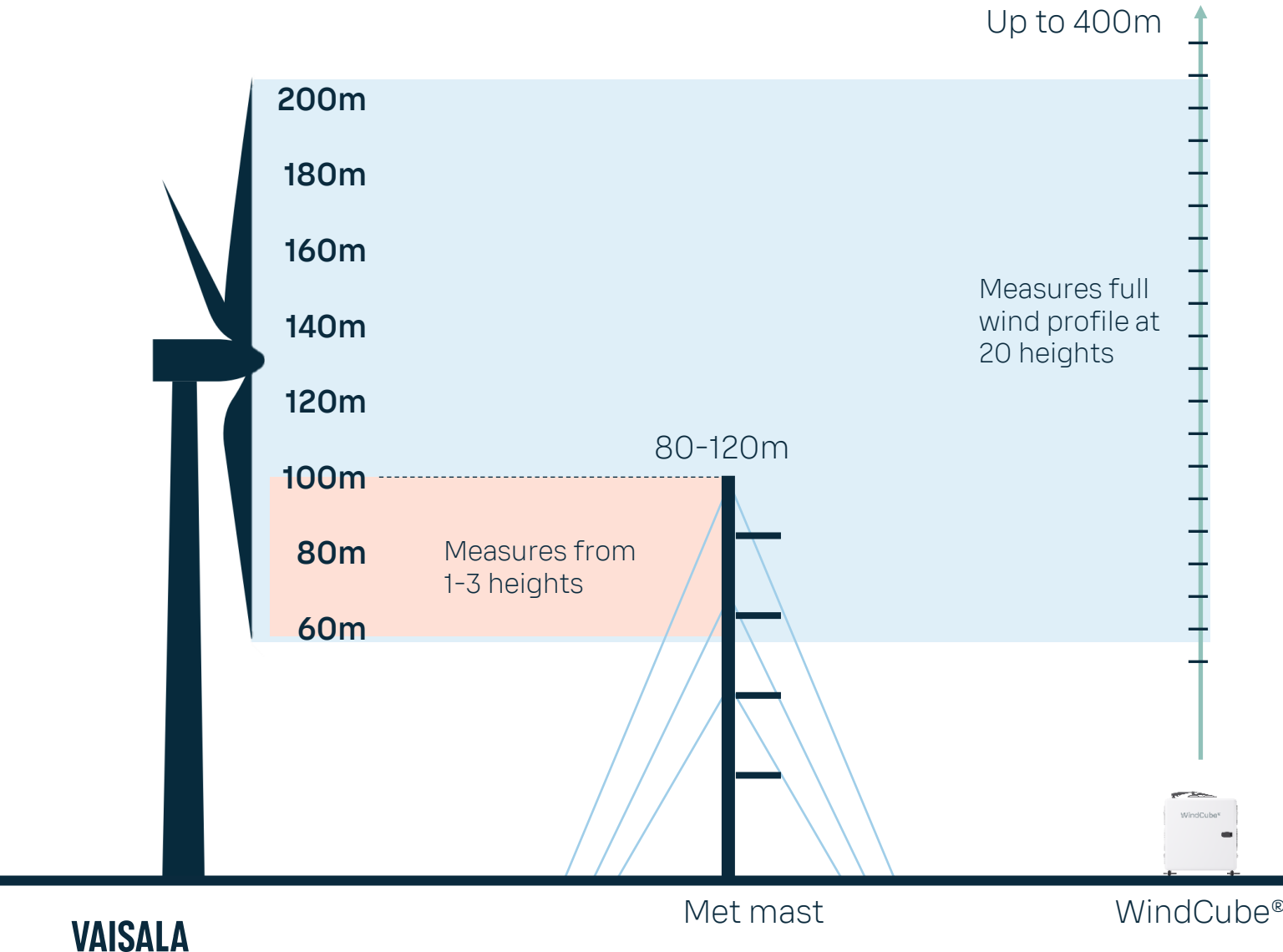
Withstands extreme weather

How it works

Pulsed doppler lidar principle



Measure the full range for your WRA



"The higher the turbine hub heights we're getting, the more uncertain extrapolating shear is from met towers. Today we have at least one Vaisala WindCube at every development project we have."

– **Phillip Hurlbut**

Meteorologist, Pattern Development

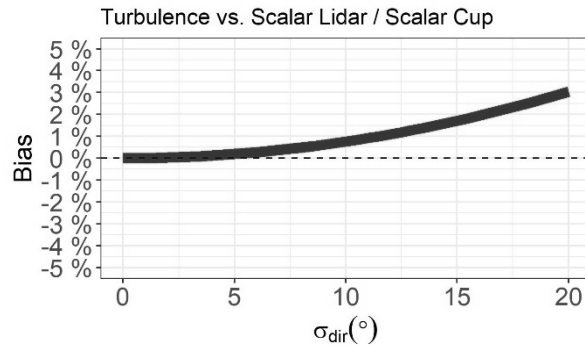
If we're not using remote sensing devices, we're at risk to actually introduce bias. For most of these met masts, we've seen what we call shear relaxation – a 0.9% over-prediction when we use the mast alone, and 1.8% in energy."

– **Philippe Pontbriand**

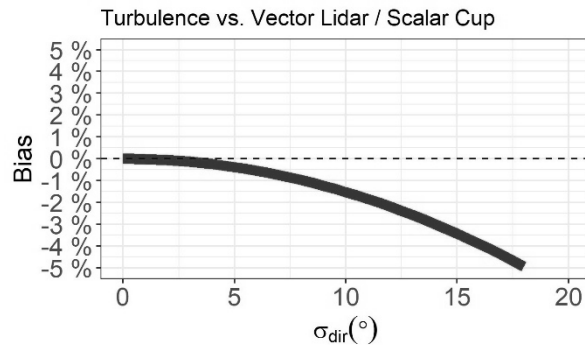
Smarter windfield reconstruction

Conventional reconstruction methods

Scalar averaging introduces positive bias

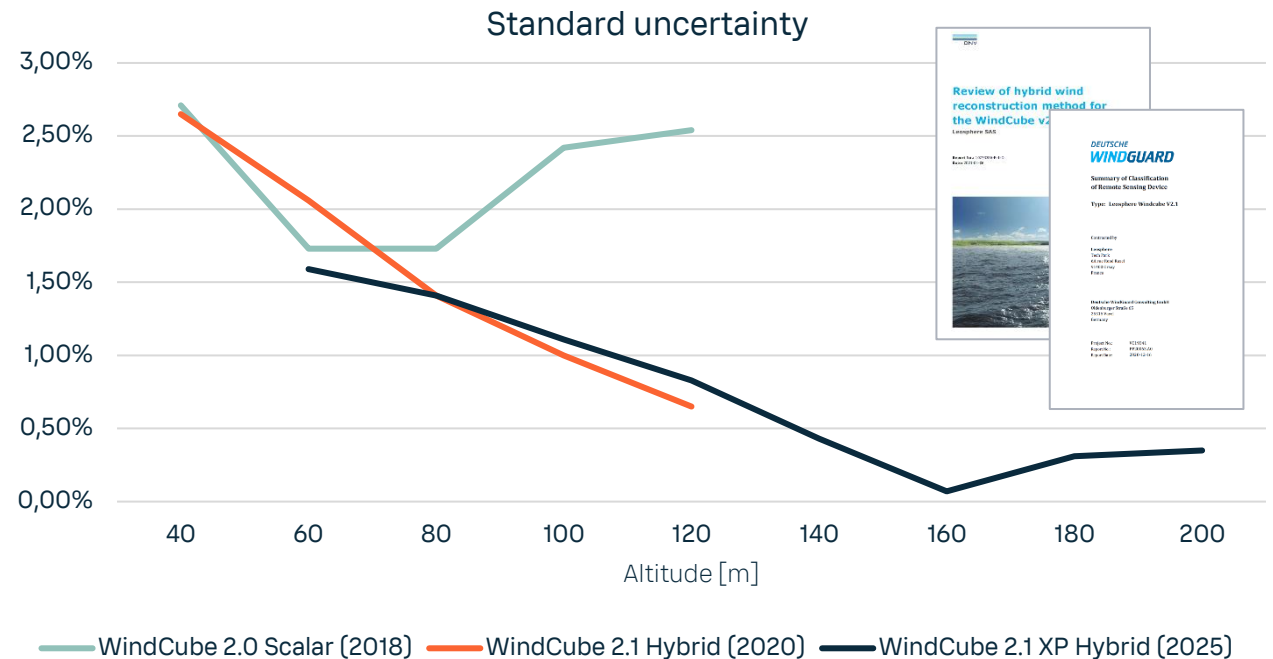


Vector averaging introduces negative bias



WindCube's hybrid wind reconstruction algorithm

- This patented algorithm blends scalar and vector averaging together
- Reduces the biases caused by atmospheric turbulence by an order of magnitude
- Leading to more accurate lidar wind speed measurements



Detailed view of the improvements

WindCube 2.1 vs. WindCube 2.1 XP

Description	WindCube 2.1	WindCube 2.1 XP
Data Availability	Drops in Clean Air	Major improvement
Measurement height	40m to 300m	40m to 400m
Digital platform	Insight Fleet - lidar management	Compass Connect - Lidar management Compass Renewable- Lidar management & advance data postprocessing
Maintenance cycle	3-years maintenance cycle & warranty	5-years maintenance cycle & warranty
Robustness to environment	Sensible to heavy snow and high temperature	Improvement in high temperature environment
Probe length	Constant measuring probe (spatial resolution) : 20 meters	Constant measuring probe (spatial resolution) : 20 meters
Power consumption	45 – 110 W Nominal: 45 W (-5 to +30 °C)	35 – 95 W Nominal: 35 W (-5 to +30 °C)
Connectivity		Addition of local API and Modbus TCP
WS Uncertainty	60m : 2% / 120m : 0.6%	60m : 1.6% / 120m : 0.8% / 200m : 0.35%
IEC Classification	40m to 135m	60m to 200m
IEC Classification	3 sensibilities (on 10)	1 sensibility (on 10)
Measurement Heights	Max 20 heights	Max 20 heights
Customer usage	Input Voltage Range (24.5 – 27 VDC)	Wider voltage range (18 – 32 VDC)
Operating Temperature range	-30 to +50°C	-30 to +55°C
Training	Only face to face training	L1 e-Learning or face to face training

IEC classified to 200m



VAISALA

Trusted by the industry



An aerial photograph of a wind farm with several white wind turbines spaced out over a deep blue ocean. The sun is low on the horizon to the right, creating a bright, shimmering reflection on the water's surface and casting long, dark shadows of the turbines across the sea. The text "Data availability" is written in a clean, white, sans-serif font on the left side of the image.

Data availability

What's limiting data availability?



Met masts

Icing and cold climates

Mechanical wear and tear

Shadowing effects



Wind lidars

Low aerosol presence

Low level clouds

Heavy rain / snow



Improvements in WindCube 2.1 XP



Increased laser power output



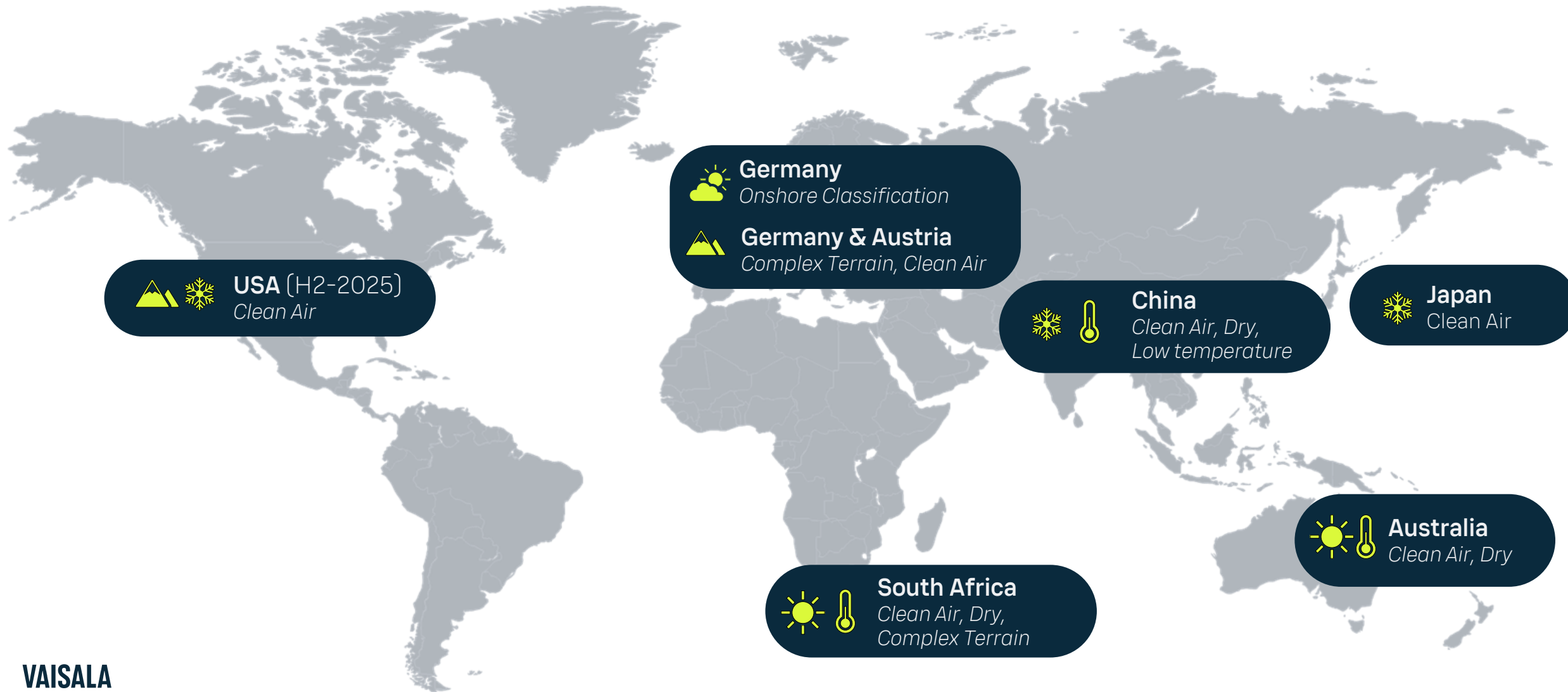
Enhanced detection sensitivity



New algorithms for improved data availability



Testing in the most difficult conditions

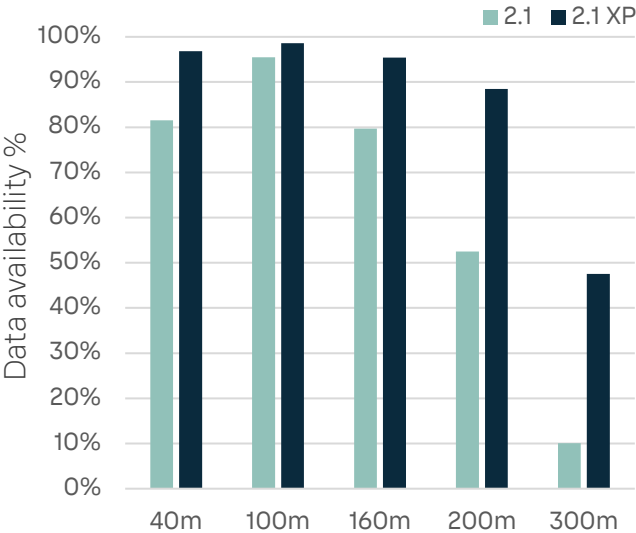


Performance validation results



South Africa

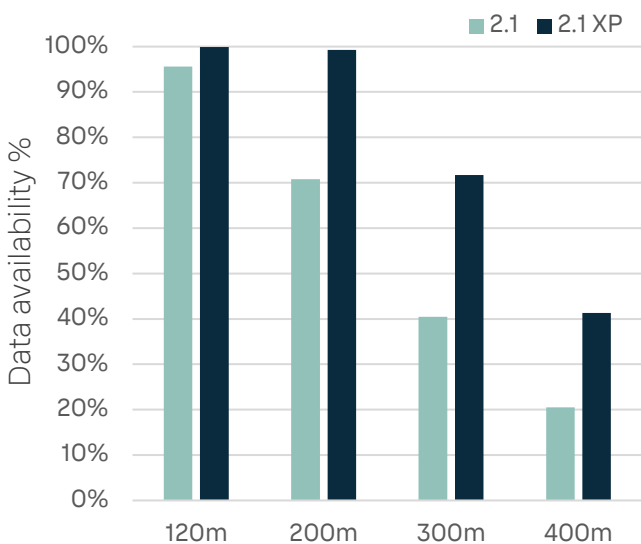
Desertic, dry, high temperature





China

Desertic, low temperature



"The results from this trial show, that the WindCube 2.1XP has a significantly improved data availability with equal wind speed measurement accuracy."
Statement from DNV report



Austria

Complex Terrain, altitudes

