



# SECONDWIND a VAISALA company



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# Vaisala in Brief

- Vaisala is a global leader in environmental and industrial measurement
- We serve customers in weather and controlled environment markets
- The Vaisala Group
  - Employs over 1400 professionals
  - Has 30 offices worldwide
  - Net sales of 293.3 million euros (2012)
  - Main markets EMEA (37%), Americas (37%), APAC (26%)
  - Products used in over 150 countries
  - A-series shares quoted in NASDAQ OMX Helsinki stock exchange

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# Market Segments We Serve


## Weather




Meteorology



Airports



Roads and Rail



Defense



New Weather Markets

## Controlled Environment

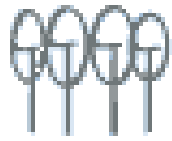


Life Science



Targeted Industrial Applications

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# Second Wind

## 30+ Years of Innovation in Wind Information

- Anemometry:
  - First data logger designed specifically for wind (1980 to present -Nomad 2)
  - Anemometers and vanes designed specifically for wind energy applications (1981 - present)
- Wind Farm Monitoring:
  - First independent, scalable SCADA system (ADMS - 1994, sold in 2010)
- Remote Sensing:
  - First wind industry accepted SoDAR (Triton / SkyServe - 2008)



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# Triton Wind Profiler

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# Triton Wind Profiler

- Since 2008, over 500 units and 9M+ hours of wind data
- Over 2000 deployments around the world



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# Validations

Independently assessed and accepted by:



C-WET (India)



China Hydroelectric Corporation

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# Triton Customers

- Triton is used by about 200 companies in over 30 countries and include developers, owner operators, and service providers. Customers include:

## Wind Developers

## Electric Utilities

## Service Providers



# Key features

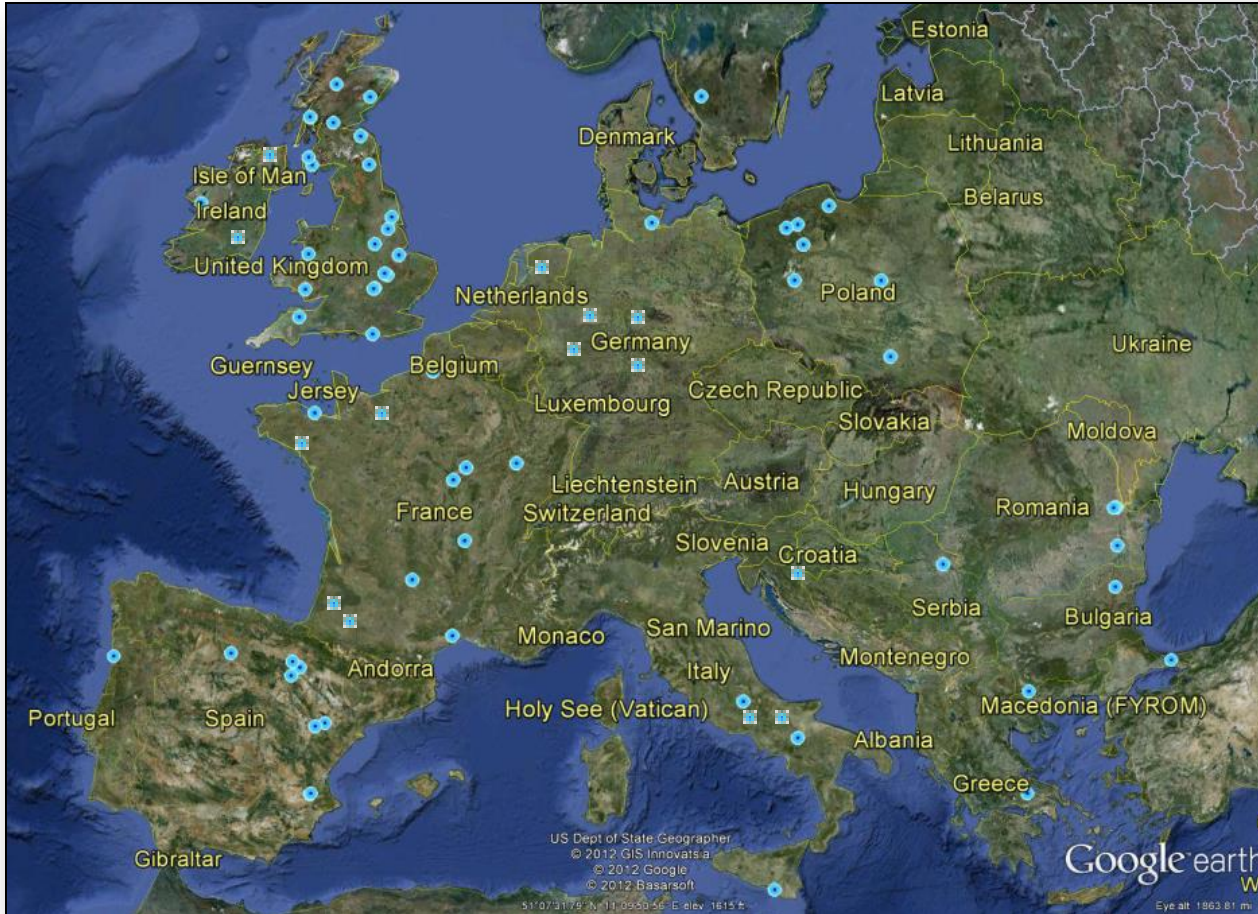
- Specifications
  - No calibration required
  - Accuracy +/-2%
  - 7 to 10 Watts ultra-low power
  - >85% data availability at 140m
  - Fully autonomous, no external power
- Low cost of ownership
  - 5 years of operation for under \$100K
- Durability
  - Expected 20+ year field-life
  - No moving parts
  - -40C to +65%
  - 100% field serviceability, over 97% uptime



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# Regions Europe – 80+ Units



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# Additional Regions

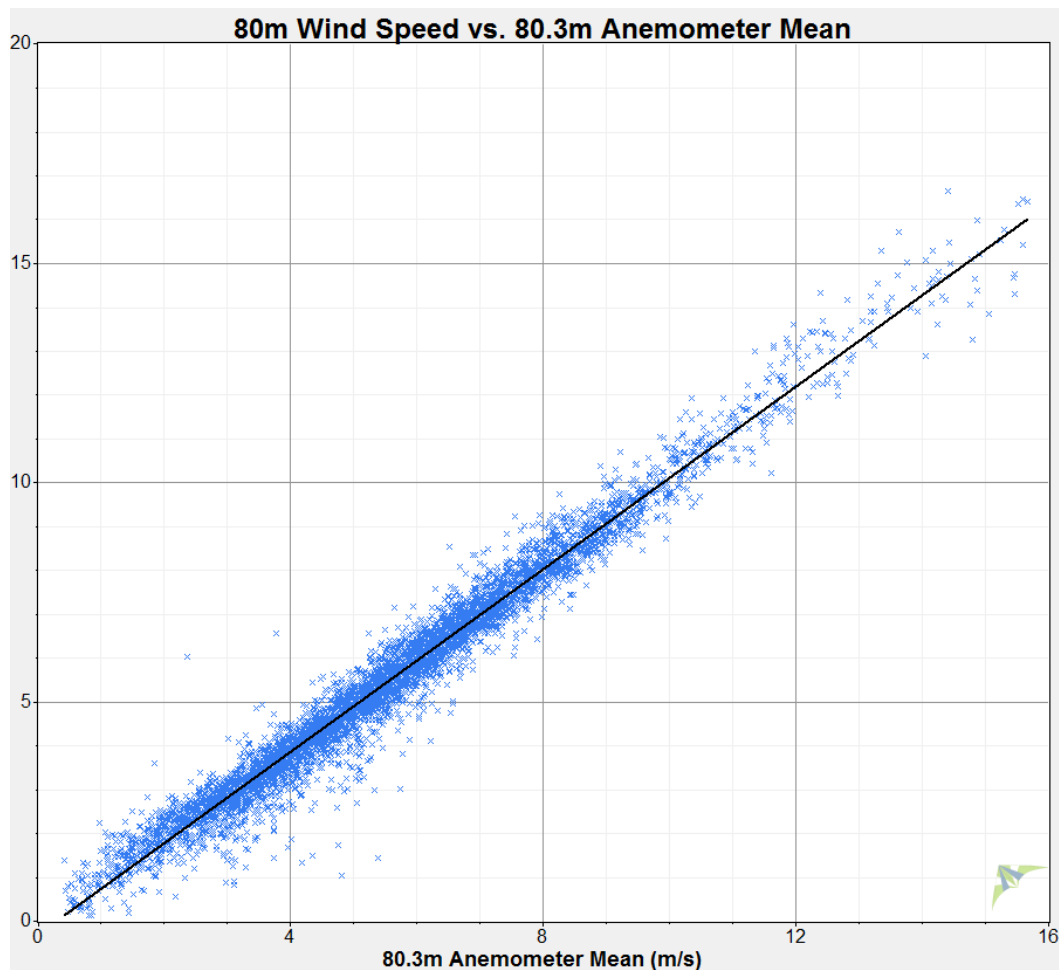
Turkey, Brazil, South Africa,  
Chile, Peru, Panama,  
Australia, Indonesia,  
New Zealand, China, India,  
Sri Lanka, Maldives...



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# Accuracy

## Complex terrain with forestry in UK



### Results

Number of points : 5,348

Mean x value : 5.60 m/s

Mean y value : 5.53 m/s

Show line of best fit

Force zero intercept

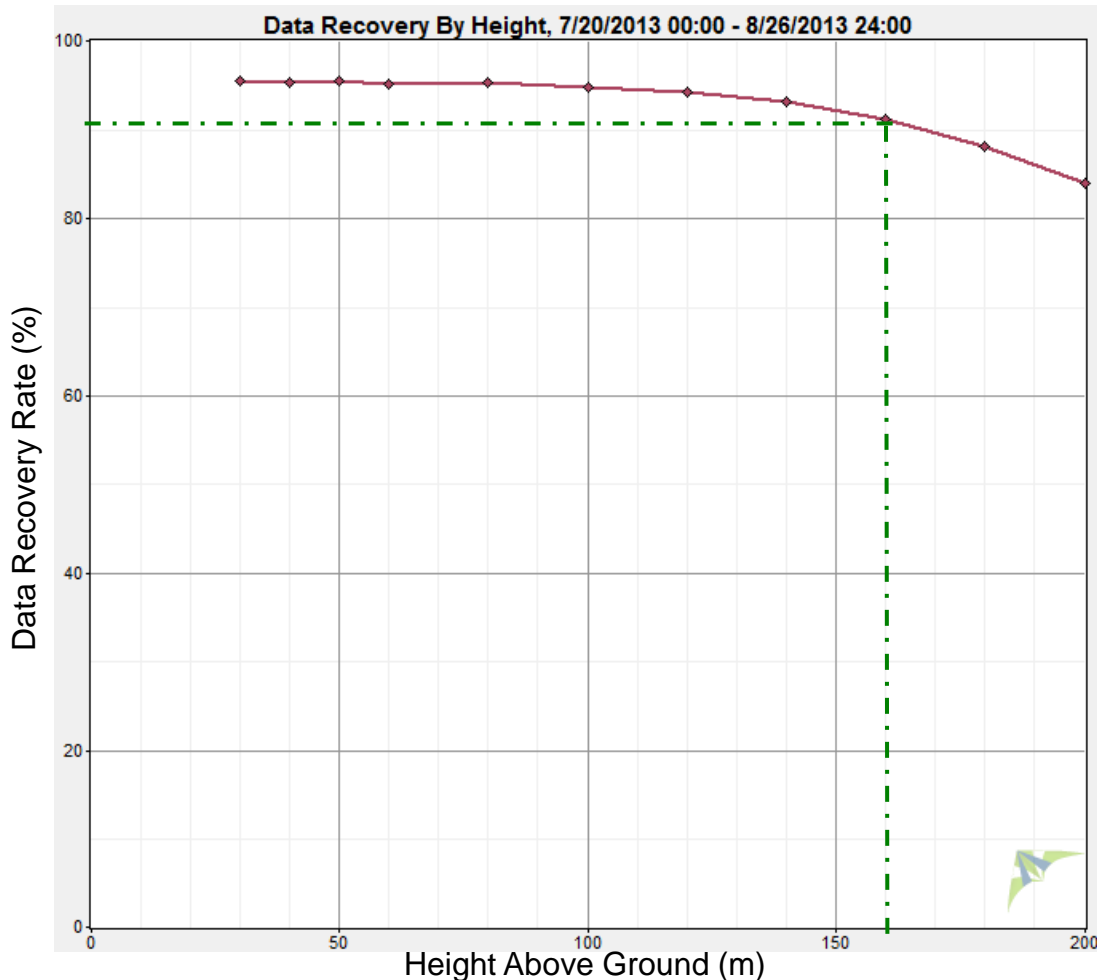
$y = -0.29493 + 1.0398x$  (R2 = 0.9689)

- MWS within 1.2% of 80m Vector anem.
- Correlation coefficient R= 0.984

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# Data Availability

## Complex terrain with forestry in UK

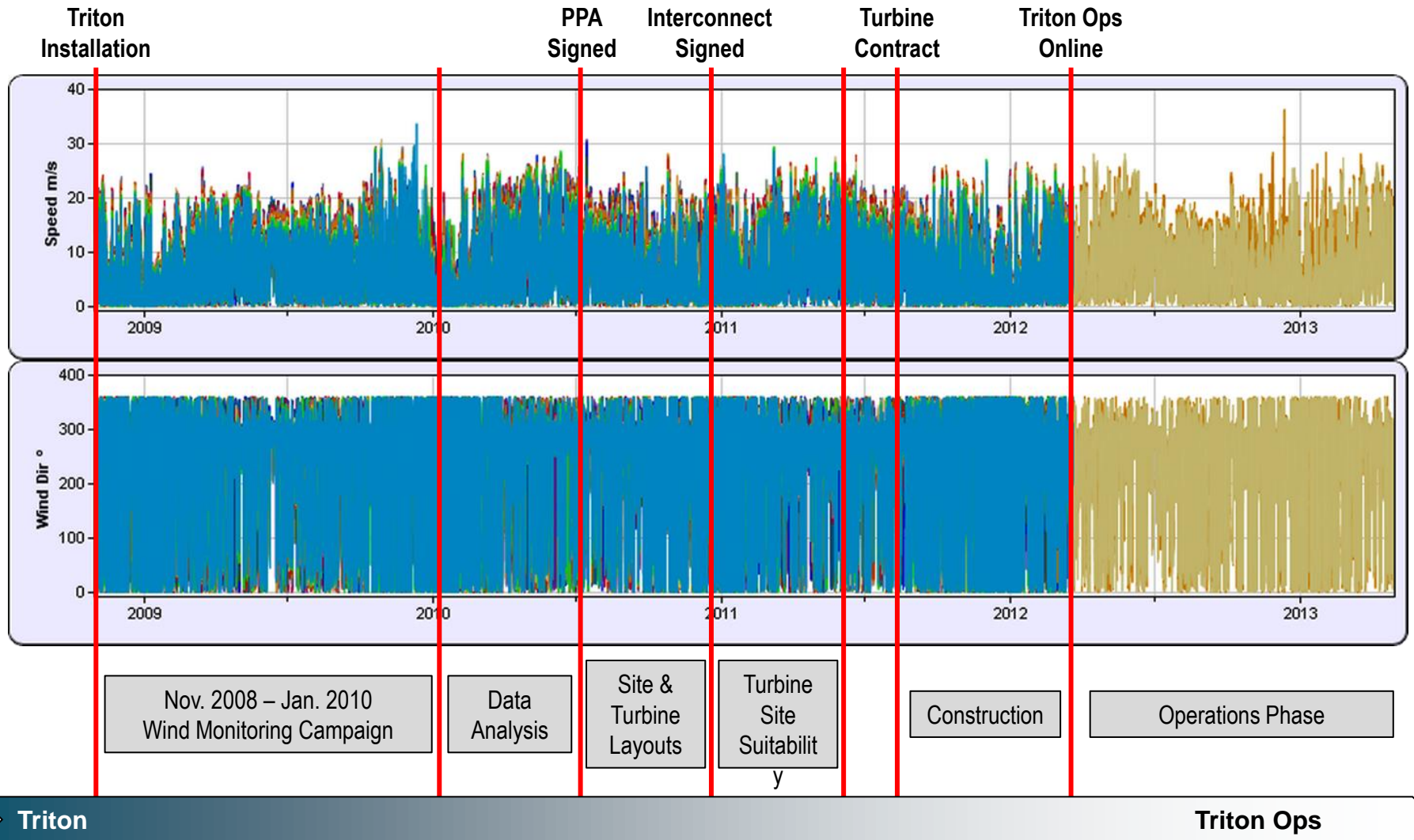


### Data Recovery after filtering

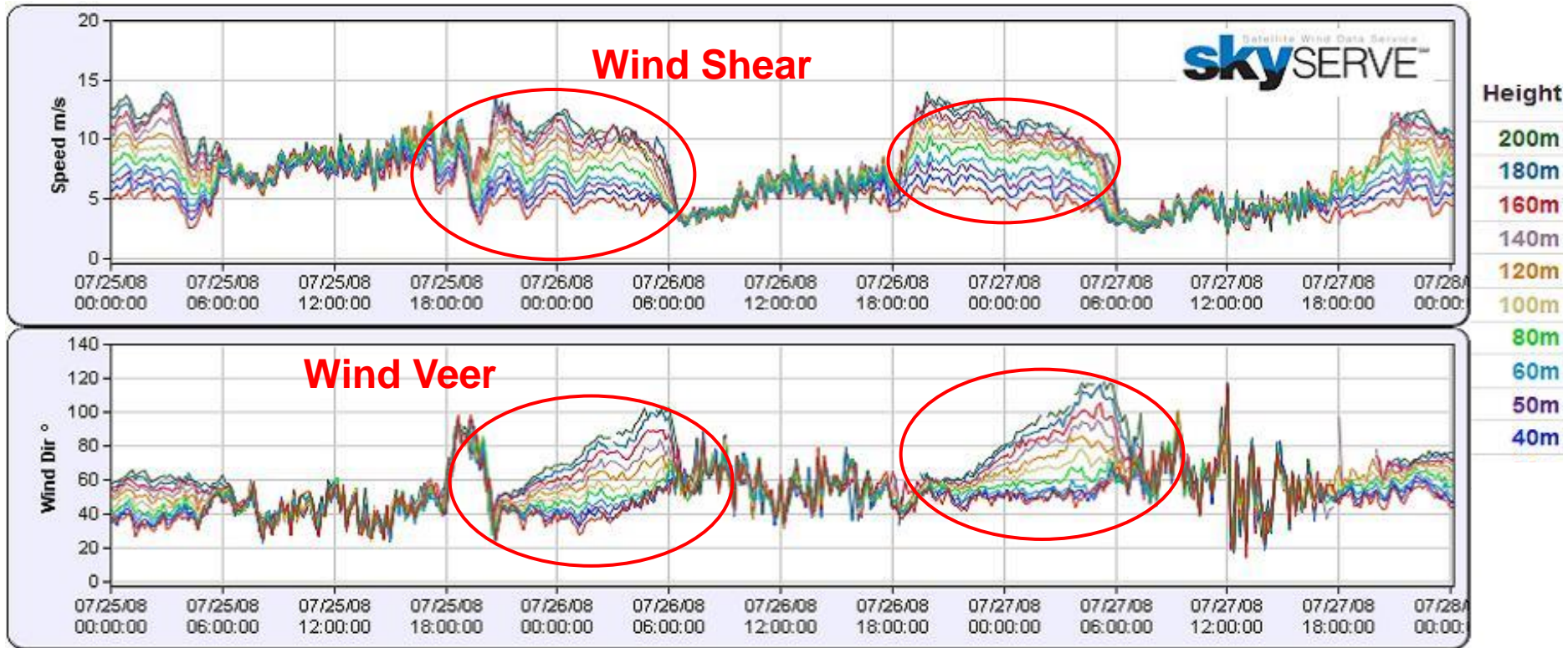
#	Height (m)	Data Columns	Valid Data Points	Possible Data Points	Data Recovery Rate (%)
1	40	1	5,219	5,472	95.376
2	50	1	5,222	5,472	95.431
3	60	1	5,201	5,472	95.048
4	80	1	5,215	5,472	95.303
5	100	1	5,189	5,472	94.828
6	120	1	5,154	5,472	94.189
7	140	1	5,093	5,472	93.074
8	160	1	4,990	5,472	91.192
9	180	1	4,819	5,472	88.067
10	200	1	4,595	5,472	83.973

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# Reliability – continuous use, 4+ years

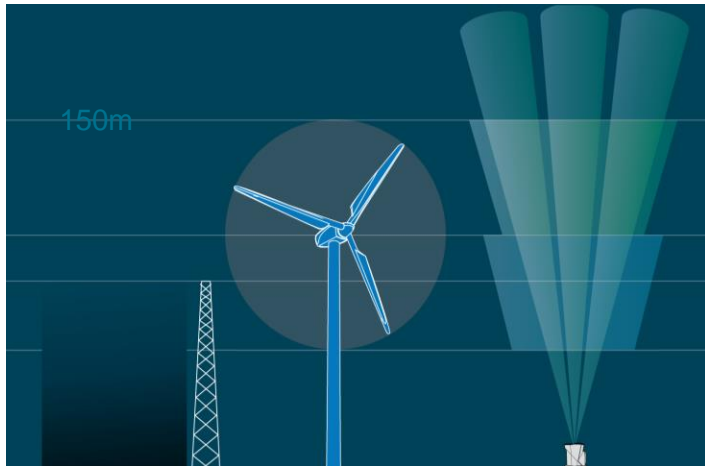


# Clear accessible data



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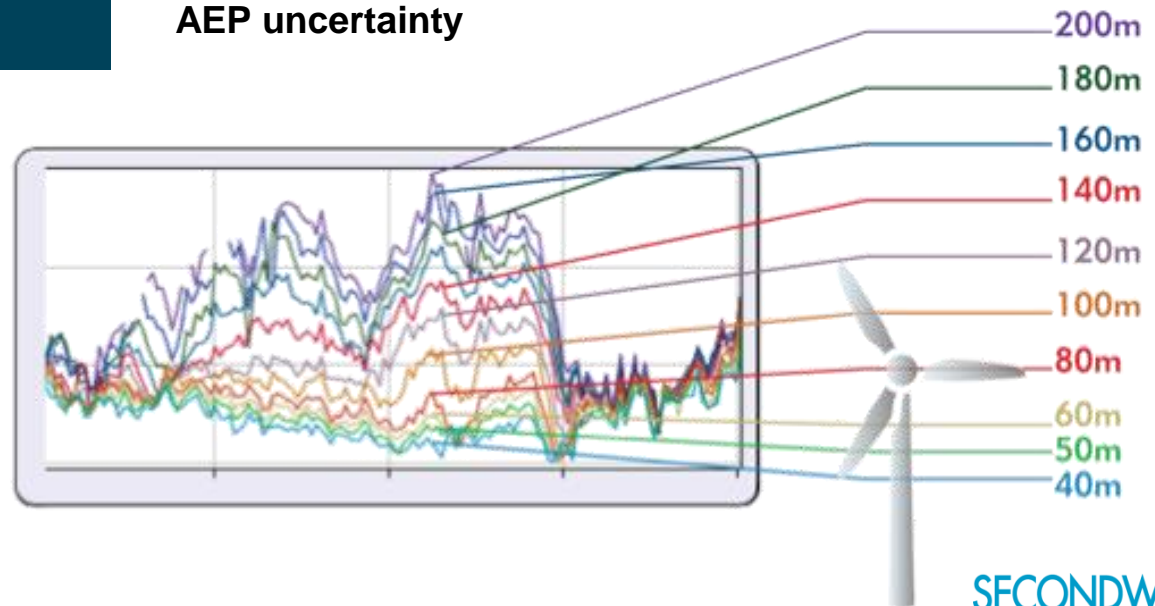
# Reducing Uncertainty



Rotor sweep area  
wind data to  
measure shear profile



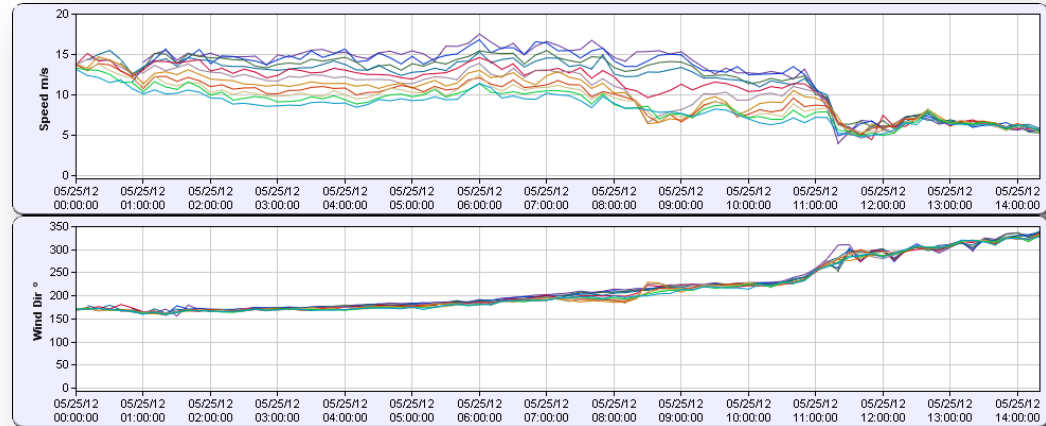
Met style hub height  
data to reduce  
AEP uncertainty



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# Applications

- Short term
  - Noise assessment studies
  - Green field prospecting
  - Site pre-assessment
  - Micro-siting/site optimization
  - Power curve verification
  - Wake effect verification
  
- Long term
  - Met mast alternative
  - Permanent met reference station



# Triton OPS

Permanent met station for operating wind farms

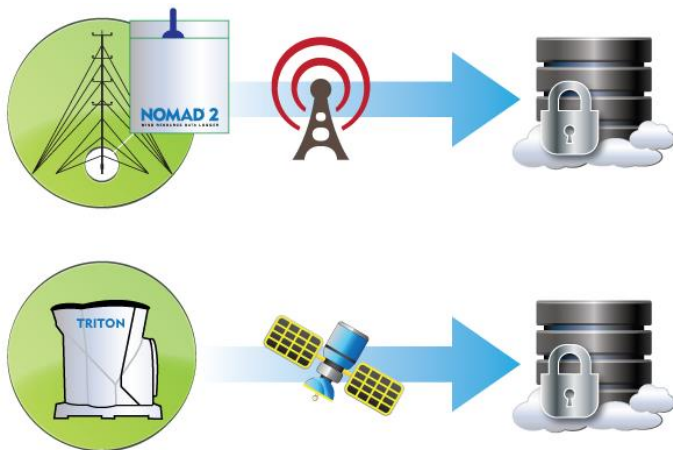
- 20+ year life, full SCADA integration. Accepted by NA ISO's



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# SkyServe – Full Service Coverage

- SkyServe is:
  - Secure data
  - Asset management
  - Daily monitoring
  - Bundled field service
  - Annual or multi-year packages



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**Thank you**



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