Wind Data Analysis and Verification Report

Windy Projects Ltd.

Windy Sites
New Zealand

Big Hill

April 2009

Report Prepared: 08 February 2010

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Reviewed By: Tom Cameron

Report Information

Client	Windy Projects Ltd.
Client Contact	B. Windy
Report Number	April 2009

Project	Windy Sites
Site Name	Big Hill
Location	New Zealand

Mast Summary

Type of mast	NRG TT 50m			
Type of logger	NRG Symphonie			
Mast Coordinates	Lat	2279350E	Lon	5730610N
Height above sea level [m]	50			
Date of Installation	13/05/2007			
Programmed Time Zone	12			
Date of First Record	13/05/2007 8:00			

General Comments

No issues found this month - all sensors functioning well.

Instrument Configuration and Parameters

Instrument	*Channel*	*Height [mAGL]*	*Azimuth [deg]*	*Type*	*Slope*	*Offset*
Anemometer	C1	50	305	NRG #40	0.765	0.350
Anemometer	C2	49	200	NRG #40	0.765	0.350
Anemometer	C3	40	200	NRG #40	0.765	0.350
Anemometer	C4	30	205	NRG #40	0.765	0.350
Anemometer	C5	10	210	NRG #40	0.765	0.350
Vane	A7	49	80	NRG 200P	0.351	260.000
Vane	A8	40	266	NRG 200P	0.351	86.000
Temperature	A9	2	0	SWI 10k	0.136	-86.383

Logging Configuration

Instrument	Height [mAGL]	Interval	Mean	St Dev	Max(gust)	Min
Anemometer	50	10min	✓	✓	✓	✓
Anemometer	49	10min	✓	✓	✓	✓
Anemometer	40	10min	✓	✓	✓	✓
Anemometer	30	10min	✓	✓	✓	✓
Anemometer	10	10min	✓	✓	✓	✓
Vane	49	10min	✓	✓	✓	✓
Vane	40	10min	✓	✓	✓	✓
Temperature	2	10min	✓	✓	✓	✓

General Comments

Standard logging configuration as per NRG datalogger standards.

Data Recovery for Period: ***1/04/2009*** ***to*** ***30/04/2009***

Sensor	Height [mAGL]	Start [dd/mm/yy hh:mm]	Finish [dd/mm/yy hh:mm]	Recovery Rate [%]	Extended RR [%]
Anemometer	50	1/04/2009	30/04/2009 23:50	100.00%	100.00%
Anemometer	49	1/04/2009	30/04/2009 23:50	100.00%	100.00%
Anemometer	40	1/04/2009	30/04/2009 23:50	100.00%	100.00%
Anemometer	30	1/04/2009	30/04/2009 23:50	100.00%	100.00%
Anemometer	10	1/04/2009	30/04/2009 23:50	100.00%	100.00%
Vane	49	1/04/2009	30/04/2009 23:50	100.00%	100.00%
Vane	40	1/04/2009	30/04/2009 23:50	100.00%	100.00%
Temperature	2	1/04/2009	30/04/2009 23:50	100.00%	100.00%

Comments on Data Recovery

Data recovery rate is excellent. No action required.

Wind Statistics - Summary

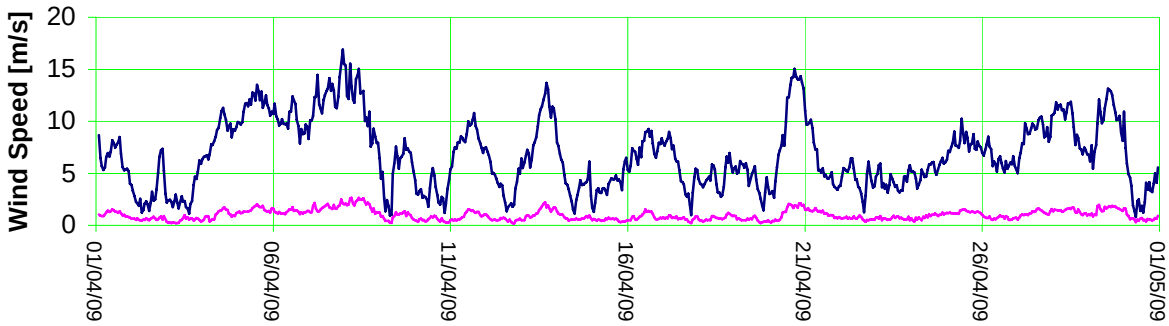
Channel	C1	C2	C3	C4	C5
Sensor Type	NRG #40	NRG #40	NRG #40	NRG #40	NRG #40
Height [m]	50	49	40	30	10
Minimum wind speed [m/s]	0.40	0.40	0.40	0.40	0.40
Average wind speed [m/s]	6.79	7.00	6.57	6.15	5.57
Maximum wind speed [m/s]	17.70	18.00	17.00	16.40	14.20
Gust wind speed [m/s]	26.00	26.30	26.30	26.00	25.20
Average std deviation [m/s]	0.98	0.96	0.98	1.03	1.10
IEC(15m/s) TI [%]	14.4%	13.7%	15.3%	17.1%	0.0%
Wind Power Density [W/m^2]	326.12	347.71	286.94	249.90	169.04
AverageTI [%]	15.9%	15.2%	16.4%	18.9%	20.6%

Environmental Statistics - Summary

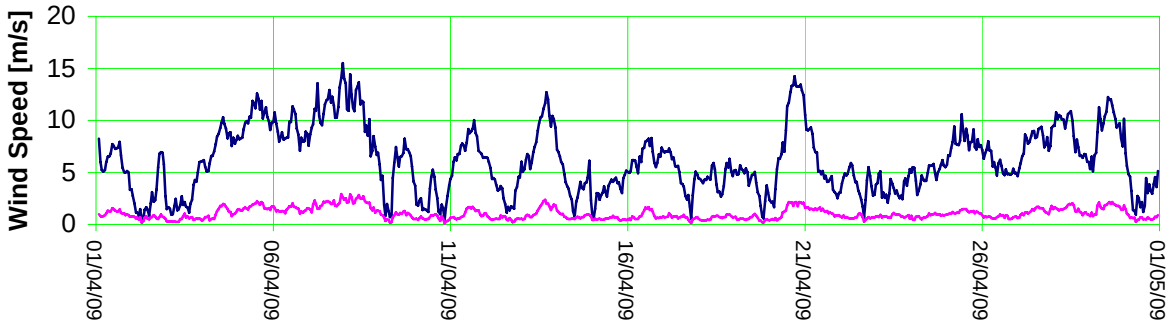
	Minimum	Mean	Maximum
Temperature [°C]	3.20	10.97	19.30
Pressure [kPa]	-	-	-
Humidity [%]	-	-	-
Air Density [kg/m^3]	1.13	1.16	1.20

Time Traces

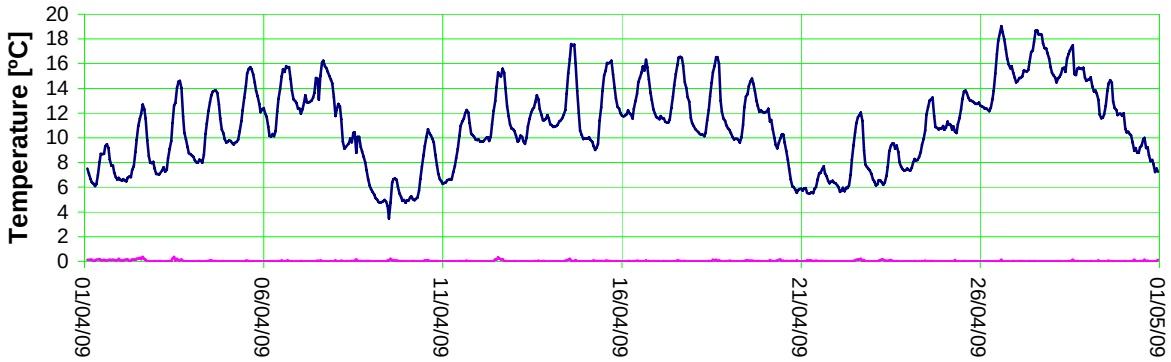
Time Traces of Wind Speed and Standard Deviation 50m



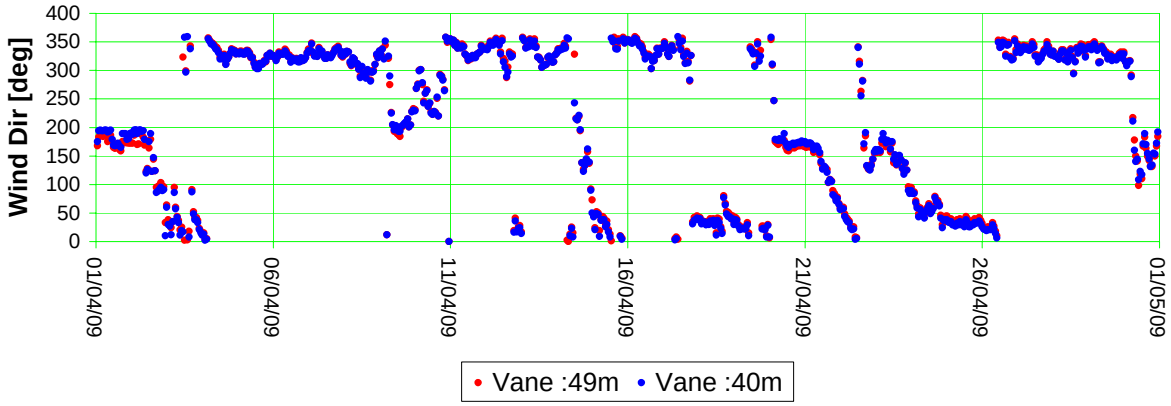
Time Traces of Wind Speed and Standard Deviation 30m



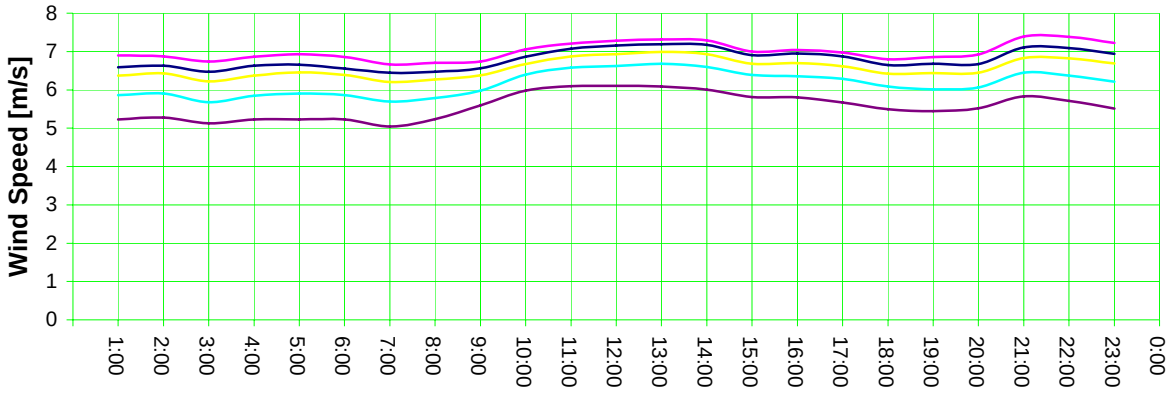
Time Traces of Temperature



Time Trace of Wind Directions (49m 40m)



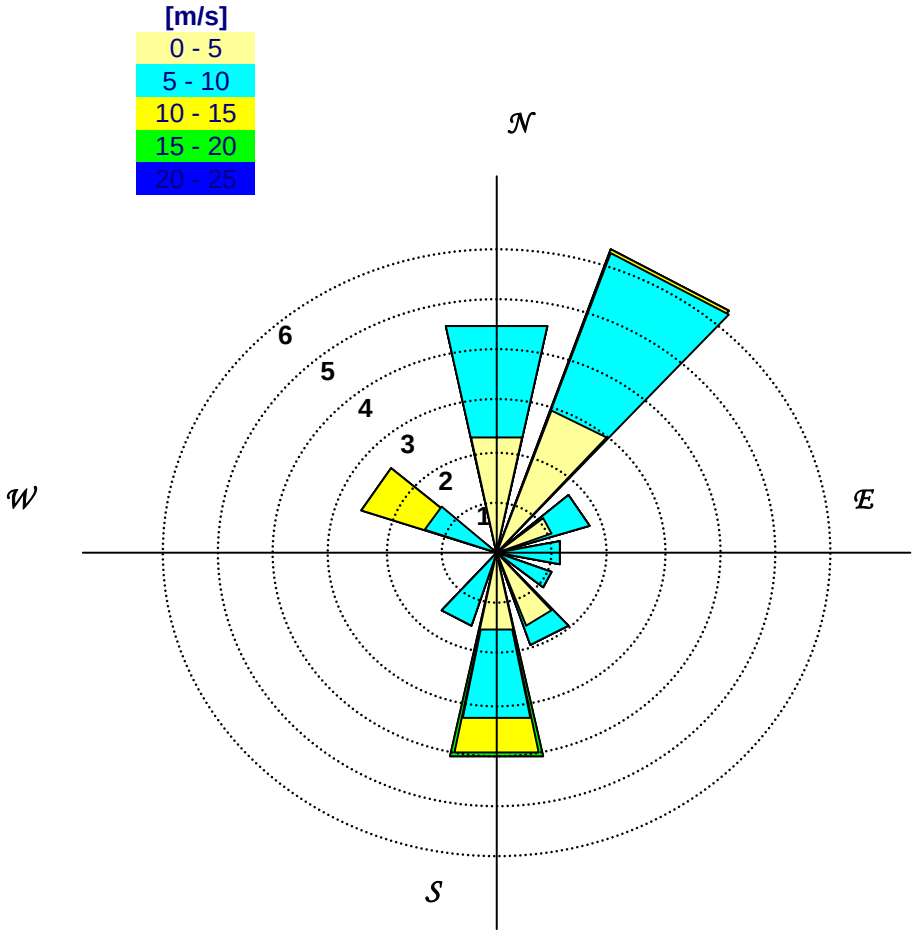
Diurnal Patterns of Wind Speed (all levels)



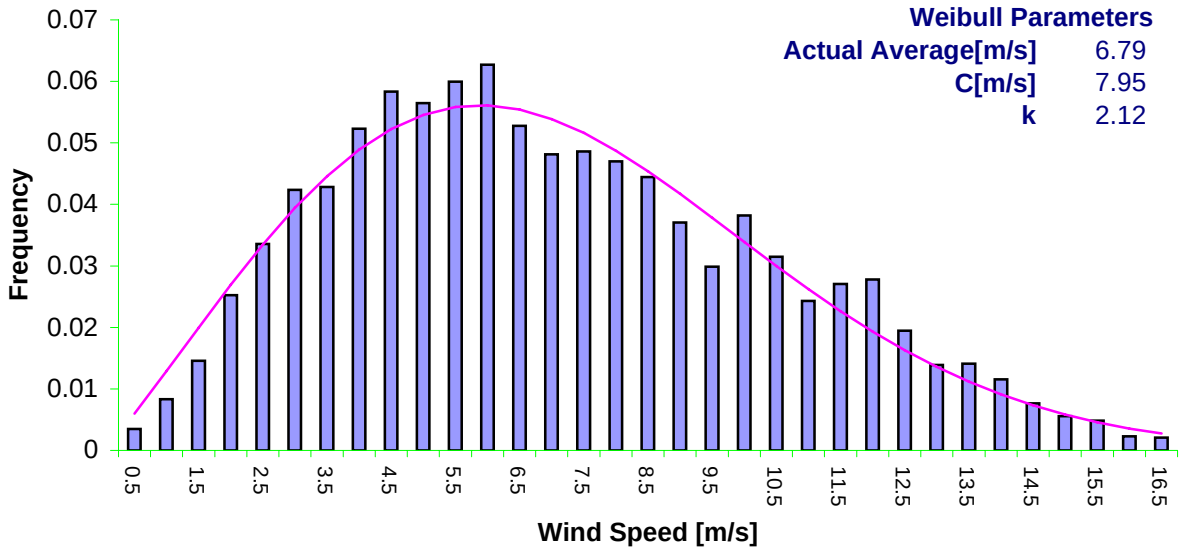
Comments on Sensor Traces

Sensor traces all demostrate 100% data recovery.

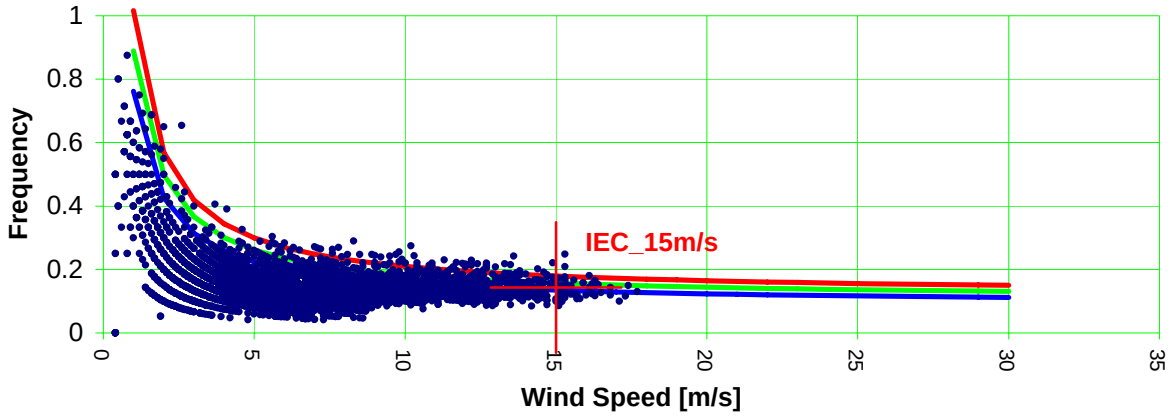
Wind Rose



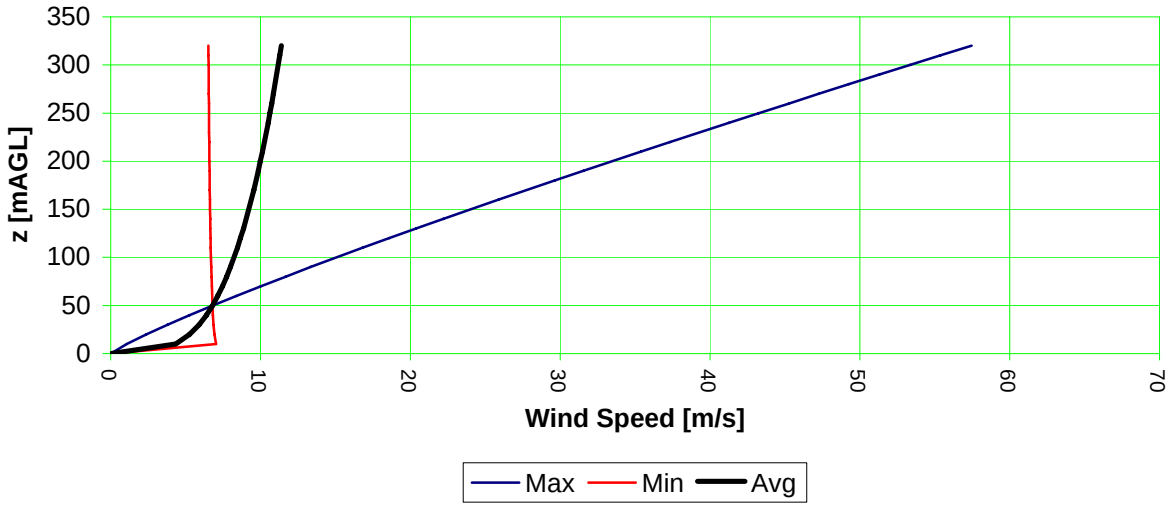
Wind Speed Distribution and Weibull Curve 50m



Turbulence Intensity Distribution 50m



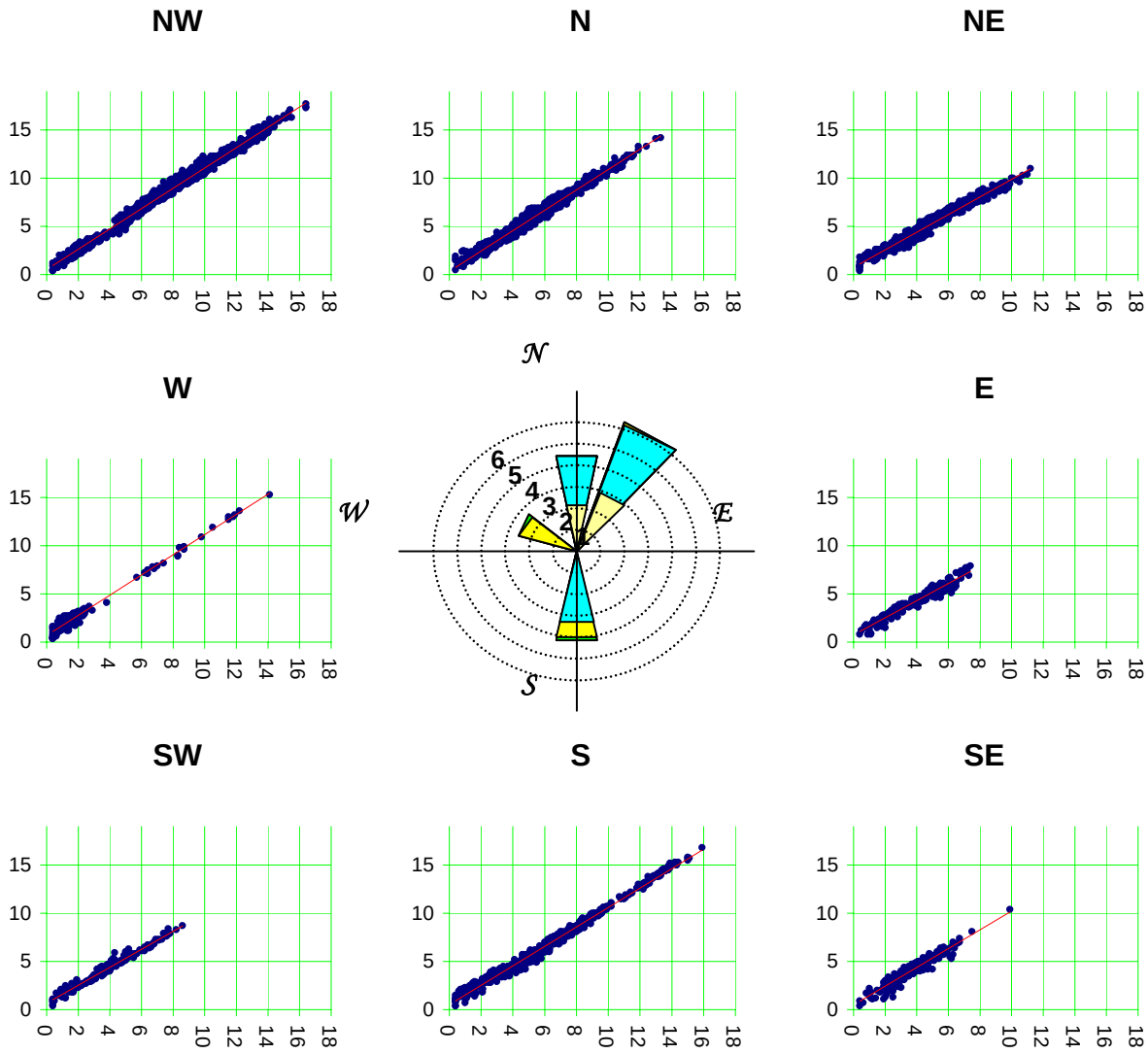
Wind Shear Ranges



Direction wind shear exponents

Direction sector [centre]	% of data	50v40	50v30	50v10	49v40	49v30	40v30
N	*22.3%*	0.09	0.24	0.11	0.22	0.30	0.35
NE	*17.8%*	-0.01	0.20	0.06	0.61	0.46	0.36
E	*4.1%*	-0.02	0.22	0.07	0.12	0.30	0.42
SE	*6.6%*	0.00	0.21	0.07	0.15	0.28	0.37
S	*12.2%*	0.22	0.28	0.10	0.06	0.22	0.34
SW	*3.1%*	0.22	0.34	0.04	0.25	0.36	0.44
W	*3.0%*	0.32	0.79	0.29	0.43	0.85	1.15
NW	*30.9%*	0.23	0.24	0.17	0.33	0.28	0.24
Total/Means	***100%***	*0.13*	*0.31*	*0.11*	*0.27*	*0.38*	*0.46*

Wind Shear - directional inter-sensor correlations for 50m & 30m



Notes

- Axes in [m/s]
- Correlations shown in **red**

Comments on Shear Plots

- inter-sensor shear was checked and appears normal

Data Quality Report :

Sensor QA info for :Anemometer at height: 50m, serial :0001
(No significant issues found)
Sensor QA info for :Anemometer at height: 49m, serial :0002
(No significant issues found)
Sensor QA info for :Anemometer at height: 40m, serial :0003
(No significant issues found)
Sensor QA info for :Anemometer at height: 30m, serial :0004
(No significant issues found)
Sensor QA info for :Anemometer at height: 10m, serial :0005
(No significant issues found)
Sensor QA info for :Vane at height: 49m, serial :0007
(No significant issues found)
Sensor QA info for :Vane at height: 40m, serial :0008
(No significant issues found)
Sensor QA info for :Temperature at height: 2m, serial :0009
(No significant issues found)