

# Validation in India: Vortex MAST



[www.vortex.es](http://www.vortex.es)

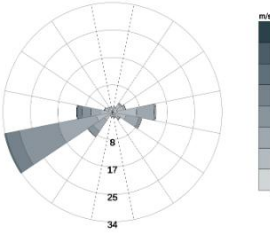
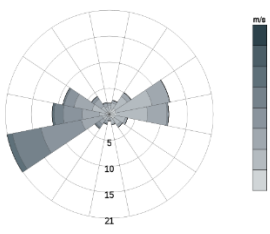
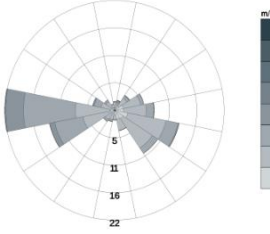
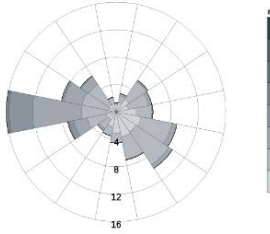
Wind measurement series from 13 different sites in India have been analyzed in this study. These sites are located as shown in the following figure. The main objective of the validation is to check how accurate VORTEX MAST data are compared to data from actual meteorological towers used in the wind industry.

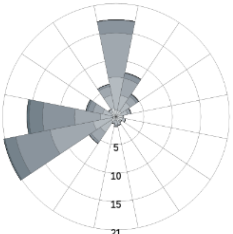
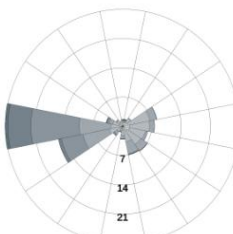
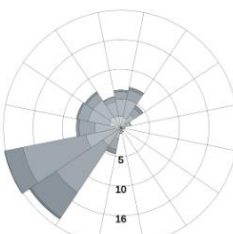
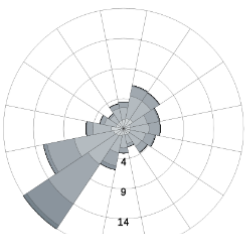
The purpose of this study was to compare Weibull parameters obtained from VORTEX MAST products against wind distribution from a real wind data period.

<u>Site</u>	<u>Region</u>	<u>Height data (meters)</u>	<u>Area</u>
Site 1	Karnataka	80	
Site 2	Maharashtra	90	
Site 3	Karnataka	10	
Site 4	Andhra Pradesh	10	
Site 5	TamilNadu	80	
Site 6	Andhra Pradesh	80	
Site 7	Madhya Pradesh	80	
Site 8	Rajasthan	80	
Site 9	Tamil Nadu	50	
Site 10	Tamil Nadu	50	
Site 11	TamilNadu	50	
Site 12	Maharashtra	50	
Site 13	Guyrat	50	

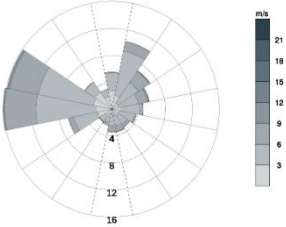


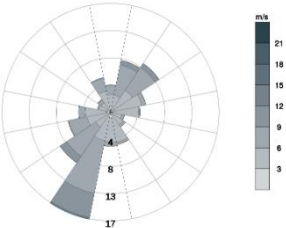
Site by site Errors detected (%) for the main magnitudes (mean speed, A, K parameters) and the wind rose generated between VORTEX MAST and actual meteorological station data, are shown site-by-site in the following plots:

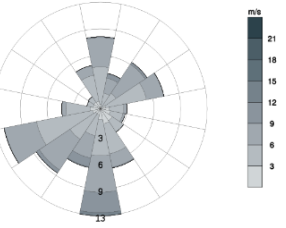
Site 01- Karnataka		
	Mean speed error %:	-7.4%
	A error %:	-6.04%
	K error %:	-7.43%
Site 02- Maharashtra		
	Mean speed error %:	-2.8%
	A error %:	-2.5%
	K error %:	-22.2%
Site 03- Karnataka		
	Mean speed error %:	-7.01%
	A error %:	-12.81%
	K error %:	11.7%
Site 04- Andhra Pradesh		
	Mean speed error %:	3.05%
	A error %:	-3.05%
	K error %:	17.77%

Site 05- Tamil Nadu		
	Mean speed error %:	-0.84%
	A error %:	-0.27%
	K error %:	-7.91%
Site 06- Andhra Pradesh		
	Mean speed error %:	-0.1%
	A error %:	0%
	K error %:	10%
Site 07- Madhya Pradesh		
	Mean speed error %:	5.76 %
	A error %:	7.23%
	K error %:	13.54 %
Site 08- Rajasthan		
	Mean speed error %:	2.13%
	A error %:	3.47%
	K error %:	7.12%

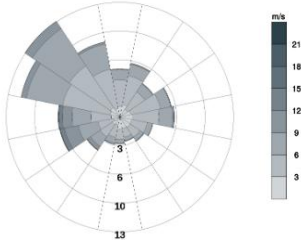
The accuracy of Vortex MAST has also been proved by comparing actual measurements for a 1 year period against 1 year of Vortex MAST data.

Site 09- Tamil Nadu		
	Mean speed error %:	-13.15%
	A error %:	Not available
	K error %:	Not available

Site 10- Tamil Nadu		
	Mean speed error %:	-0.34%
	A error %:	Not available
	K error %:	Not available

Site 11- Tamil Nadu		
	Mean speed error %:	-1.98%
	A error %:	Not available
	K error %:	Not available

## Site 12- Maharashtra



Mean speed error %:

-7%

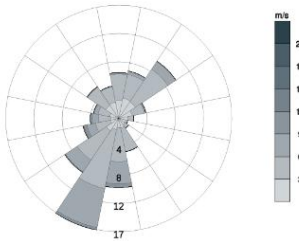
A error %:

Not available

K error %:

Not available

## Site 13- Gujrat



Mean speed error %:

-11.73%

A error %:

Not available

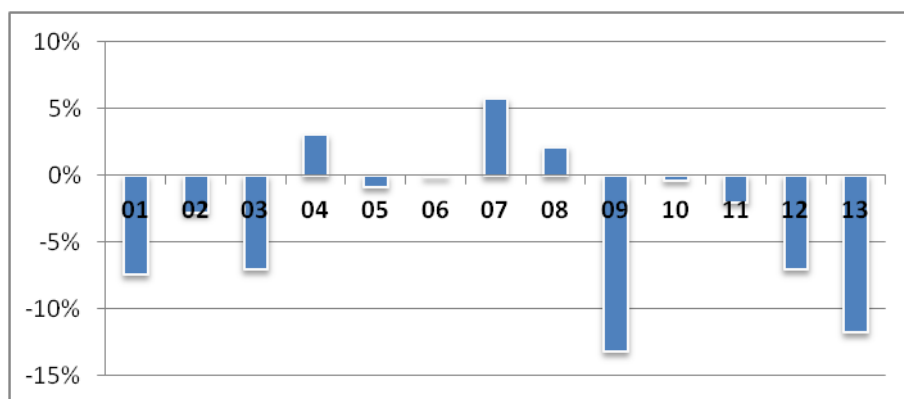
K error %:

Not available

The average errors for all eleven sites are shown in the table and plots below:

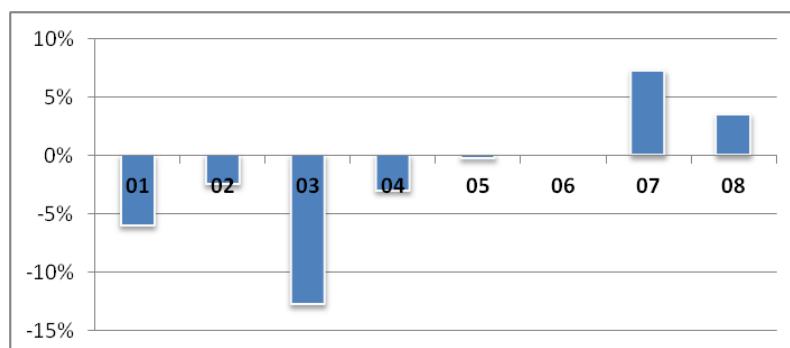
WEIBULL parameters errors (absolute value)			
	M error	A error	K error
Vortex MAST	4.87%	4.42%	12.21%

## Mean speed error

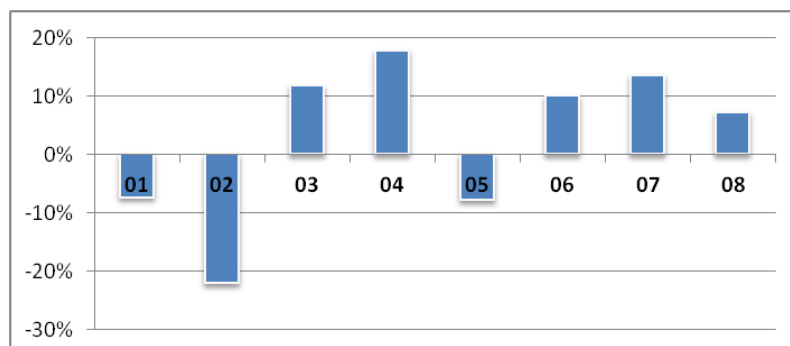


## Weibull parameters

### A error parameter



### K error parameter



In this study Vortex MAST are found to have an average speed error of 5%, hence, they are useful to be considered at prospecting stages to decide where to install a real met, in order to save time and money.

## ON GOING VALIDATION;

In case you want to participate in the validation we are performing in India between our MAST and real met. mast tower installed by the wind industry please contact us.

### Contact Information:

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