Wind Atlas for South Africa (WASA)

Project overview and current status of work packages 3 and 4

DoE WASA Workshop

11 December2012

Work Package 3
Microscale Modelling

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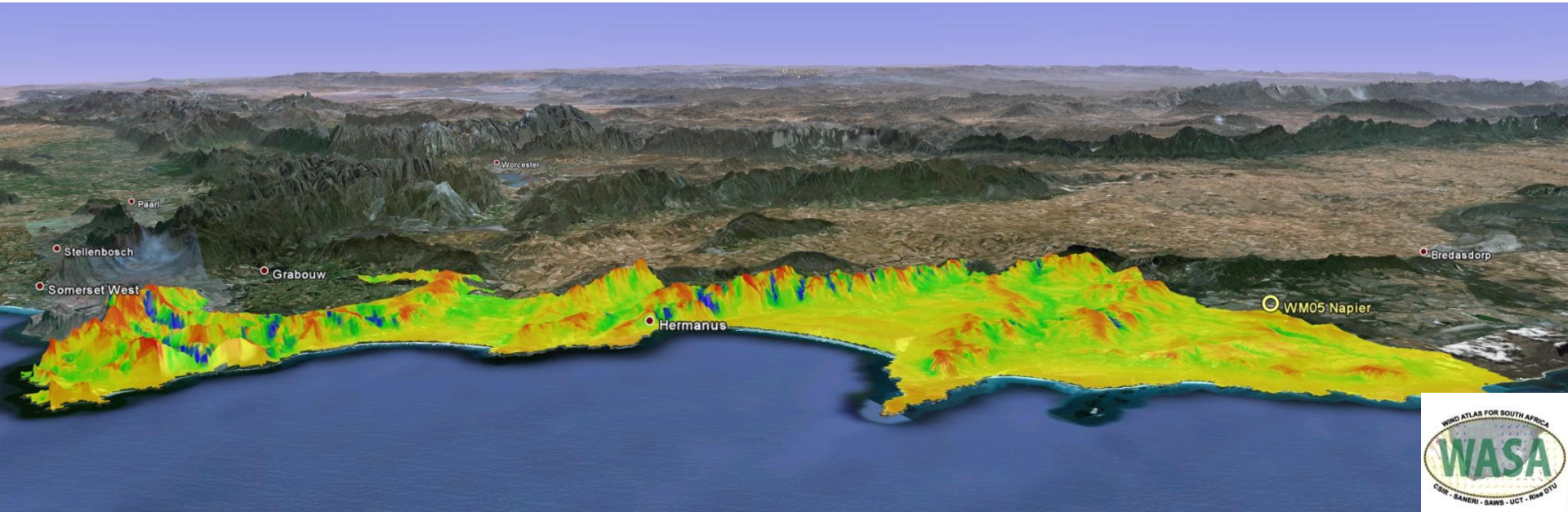
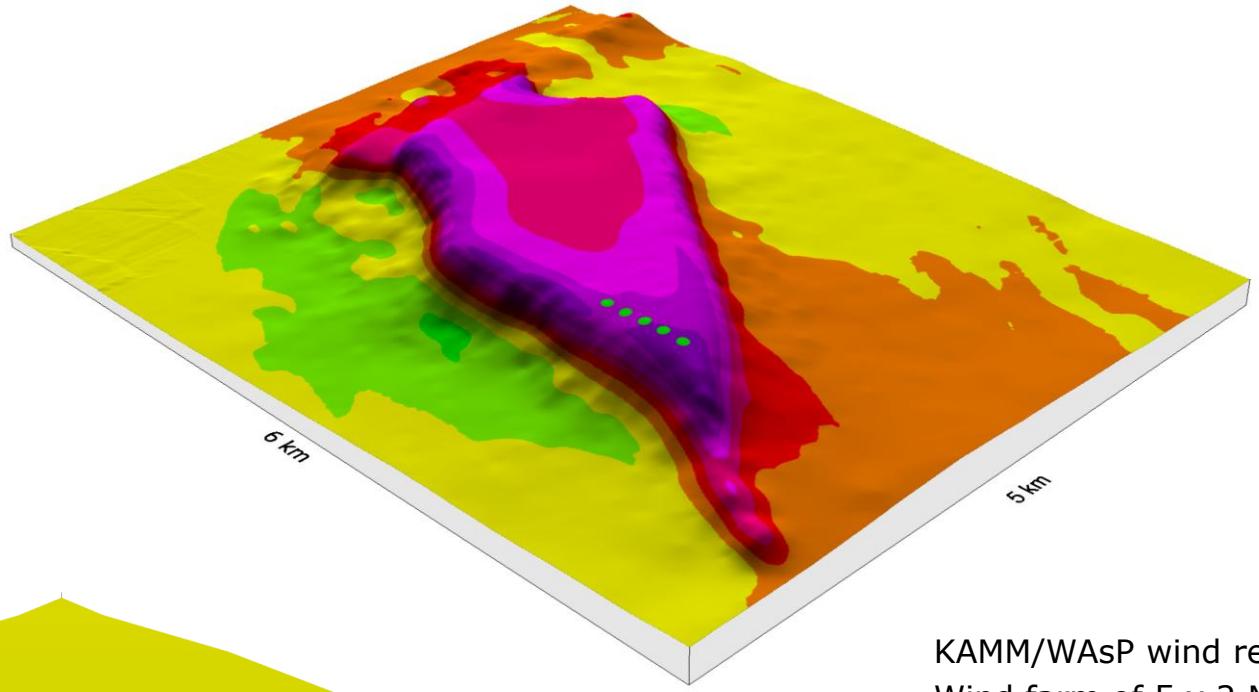
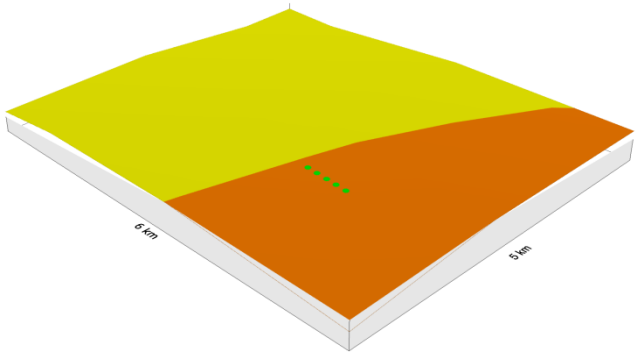


Resolution is key in applications

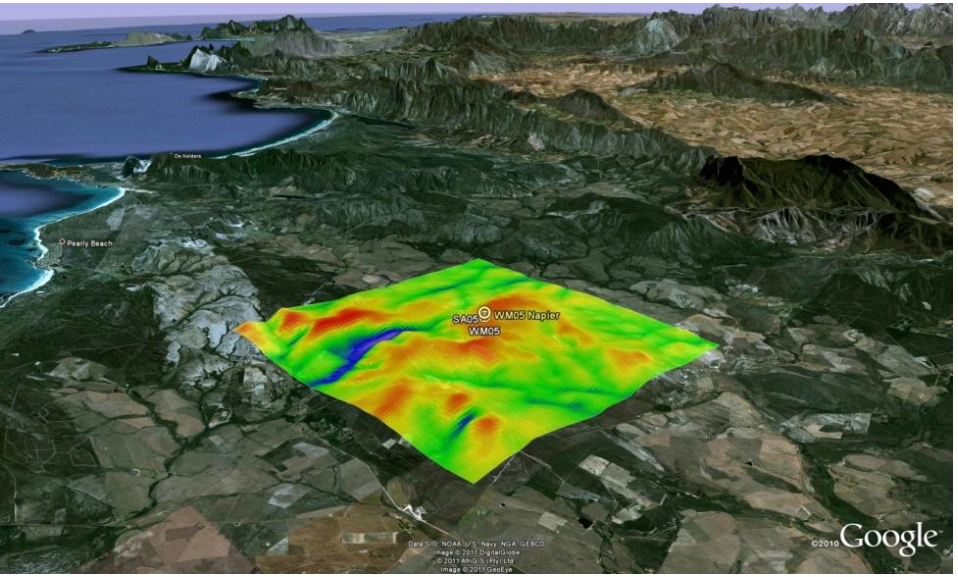


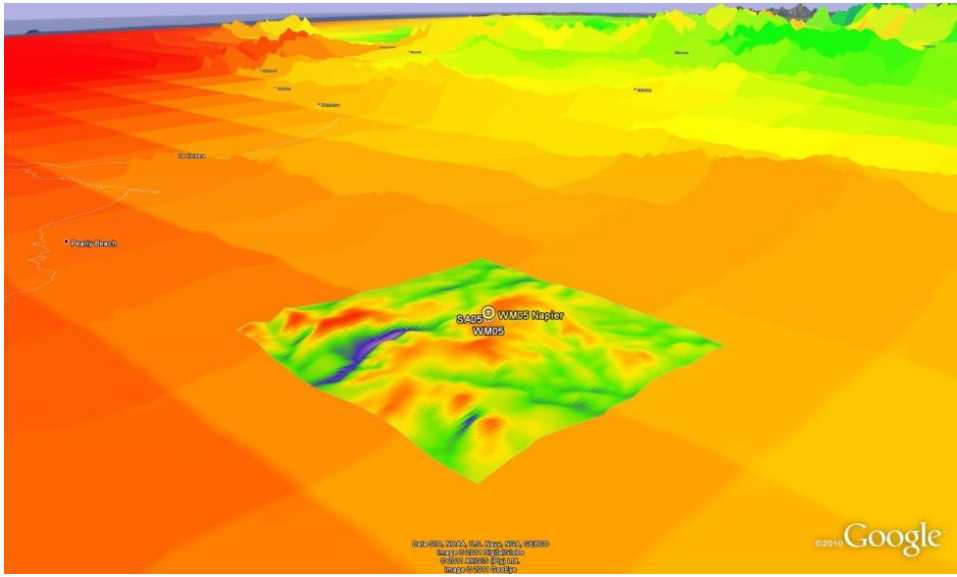


KAMM/WAsP wind resource map
Wind farm of 5 x 2 MW turbines

Grid cell size	Estimated AEP
20 m	55 GWh
5120 m	39 GWh

Microscale modelling vs Mesoscale modelling





- Site WM05
- Created from Observational Wind Climate
- Single dataset
- Single colour grading

Wind Atlas Method

Inputs

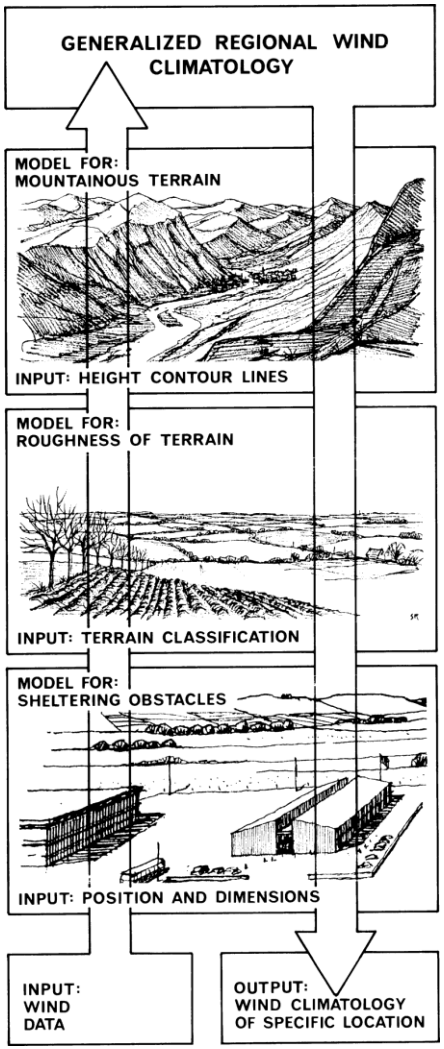
- measured time-series of wind speed and direction – observed wind climate *(Observational Wind Atlas)*
- terrain topography – elevation, roughness and obstacles – from digitised maps, SRTM data, Google Earth

Outputs

- generalised *regional wind climate* for the **specific location**

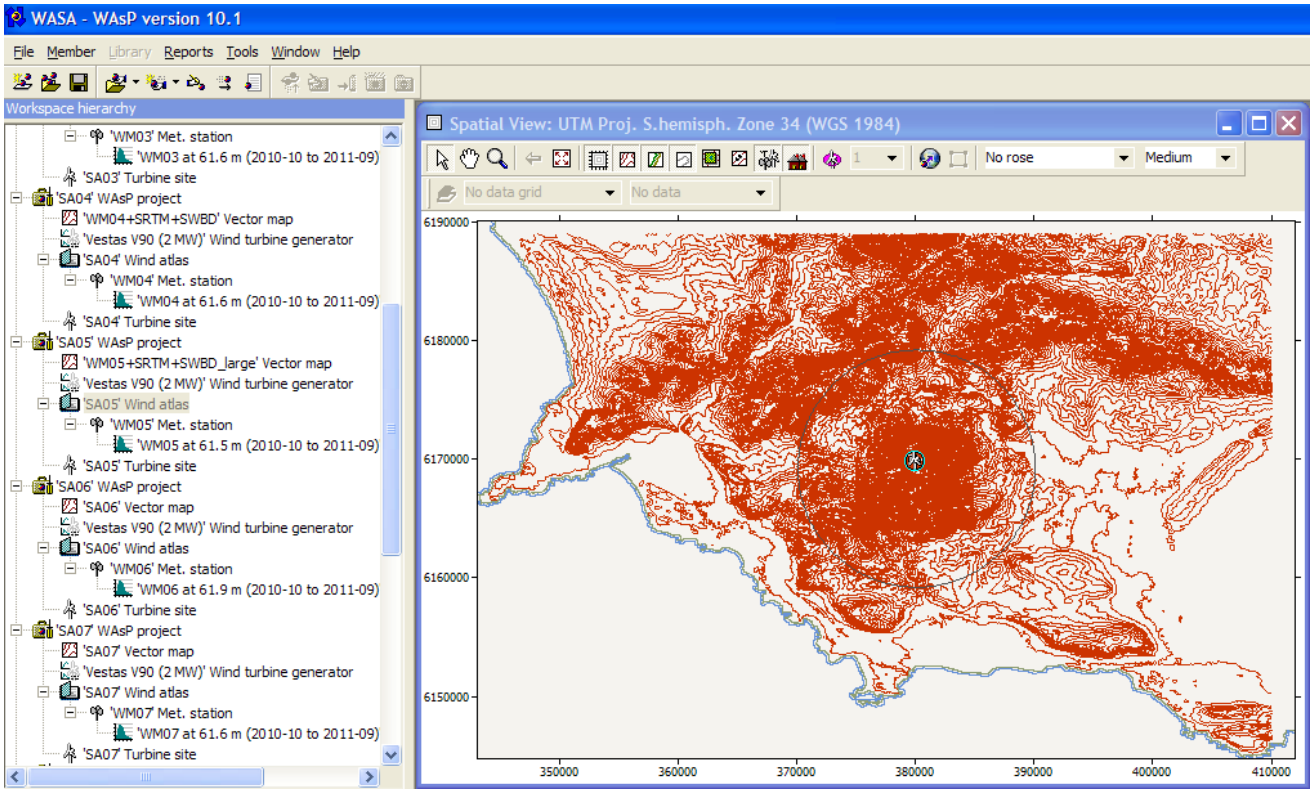
Applications

- energy production estimates for wind farms in the region **near the meteorological station**
- Wind climate at a specific location using the WASA files as input



Progress to date

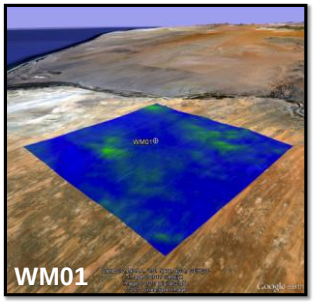
- Comprehensive site description of the selected sites
- Orthographic maps at 5 metre resolution created from SRTM data for the selected sites (10x10 km)
- Observational Wind Atlas created for the selected sites based on observed data

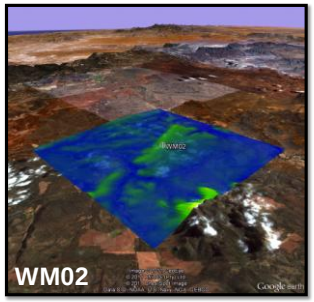


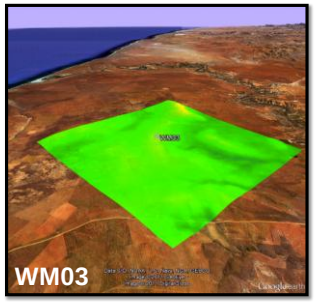
- Observational Wind Atlas published on the WASA web site
- Microscale modelling capacity and competance developed at CSIR
  - WAsP and WAsP Eng

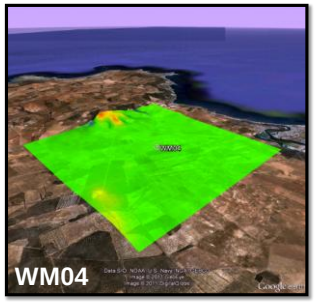
Resource Grids

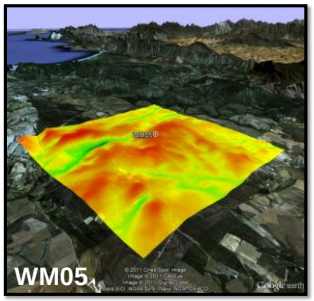
database and report available through wasadata.csir.co.za/wasa1/WASAData

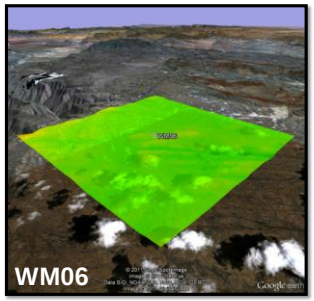


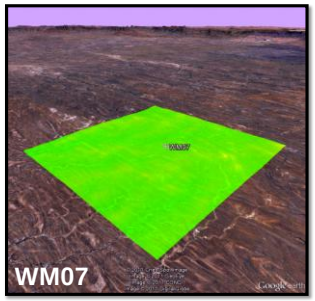


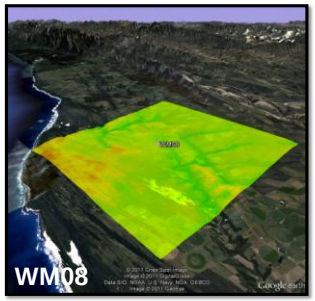


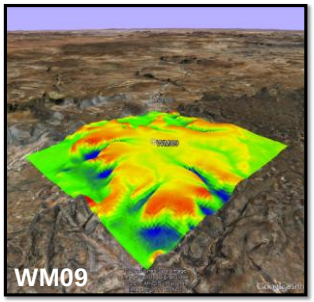


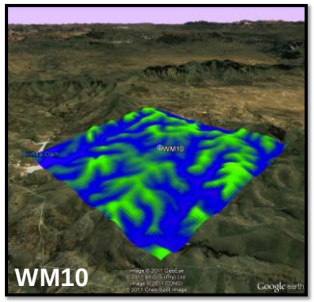












Wind speed at 80 m above ground level

WAsP resource grids from Observational Wind Atlas

- 10 x 10 km^2 grid
- 100 meter grid spacing

Work Package 4
Application for Wind Resource Assessment

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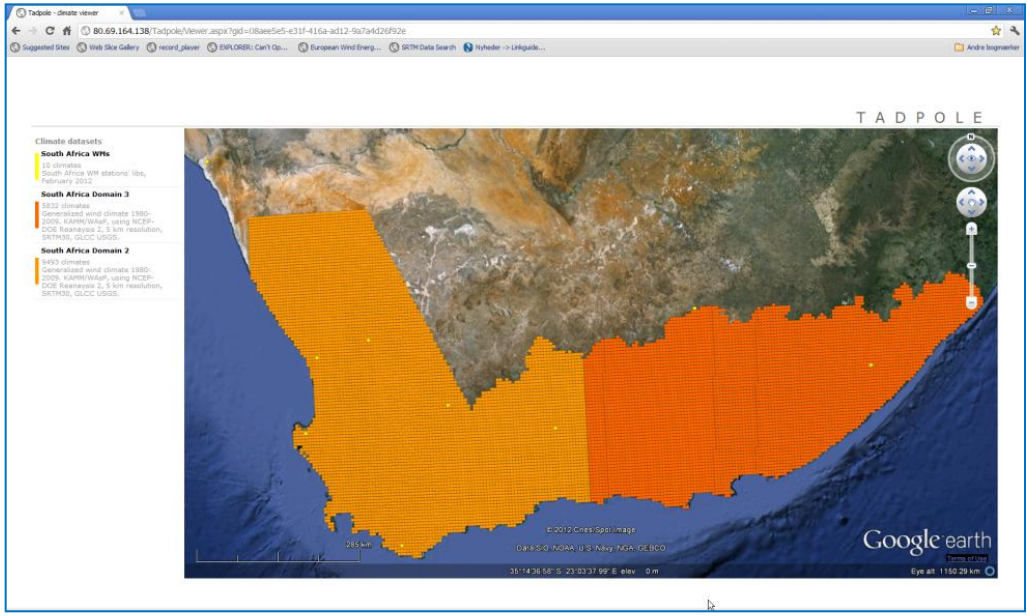
WIND ATLAS FOR SOUTH AFRICA
WASA
CSIR - SANERI - SAWS - UCT - Riso DTU

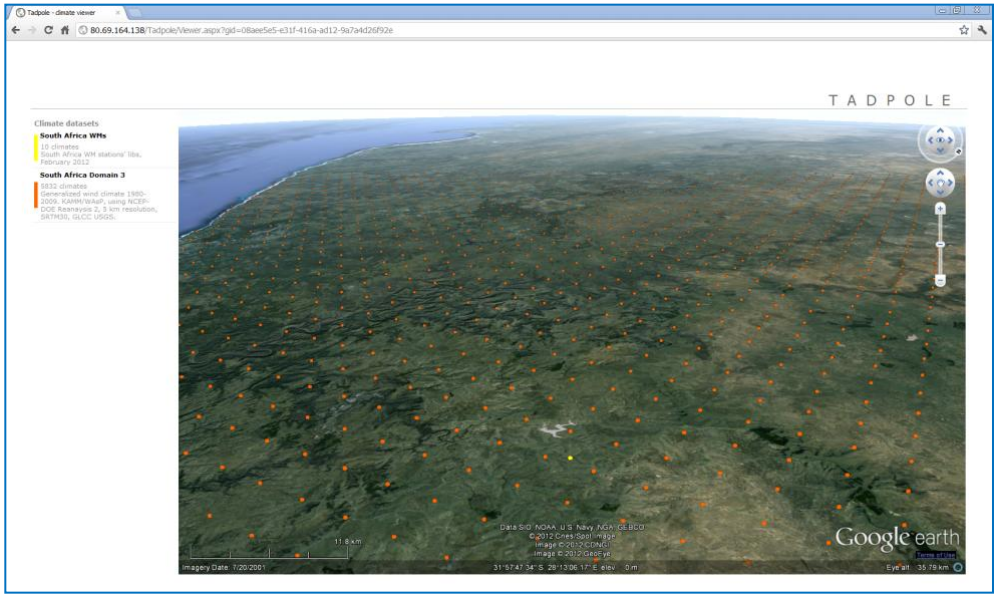
Progress to date

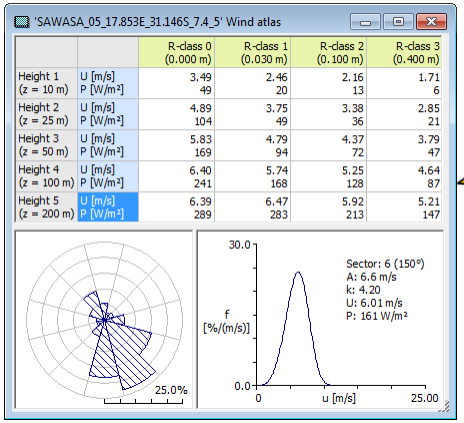
- Launch of first Verified Numerical Wind Atlas for South Africa (March 2012)
- Guides developed to assist users
  - South African Wind Atlas (WASA) Guide
  - Brief Introduction to Working with WASA Files
- Innovative tools and GUIs developed to disseminate and display data (Tadpole and Frogfoot).
- Microscale modelling of the WASA domain



VNWA – the database (Tadpole)

- In the WASA modelling domain wind climate data is available every 5x5 km – corresponding to approximately 15000 virtual masts
- VNWA data are available through a graphical interface (Tadpole)
- Guide on how to download data and use the VNWA is available online from the main web page





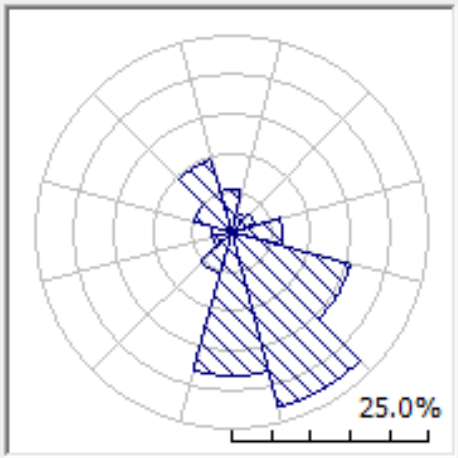
9. Click on the wind atlas grid point closest to your area/point of interest.

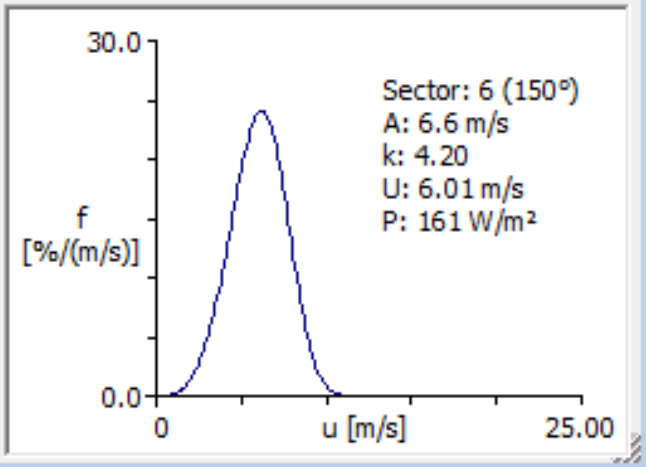
10. Download the .lib file and save on your hard disk

The Wind Atlas file (.lib file)

'SAWASA_05_17.853E_31.146S_7.4_5' Wind atlas

		R-class 0 (0.000 m)	R-class 1 (0.030 m)	R-class 2 (0.100 m)	R-class 3 (0.400 m)
Height 1 (z = 10 m)	U [m/s]	3.49	2.46	2.16	1.71
	P [W/m²]	49	20	13	6
Height 2 (z = 25 m)	U [m/s]	4.89	3.75	3.38	2.85
	P [W/m²]	104	49	36	21
Height 3 (z = 50 m)	U [m/s]	5.83	4.79	4.37	3.79
	P [W/m²]	169	94	72	47
Height 4 (z = 100 m)	U [m/s]	6.40	5.74	5.25	4.64
	P [W/m²]	241	168	128	87
Height 5 (z = 200 m)	U [m/s]	6.39	6.47	5.92	5.21
	P [W/m²]	289	283	213	147





www.wasa.csir.co.za