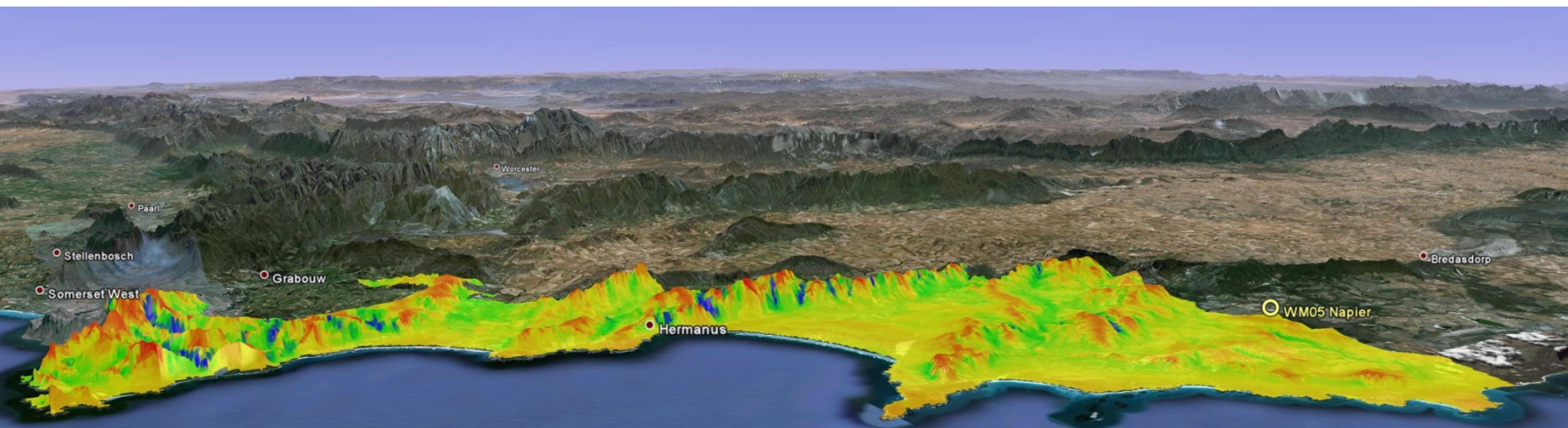
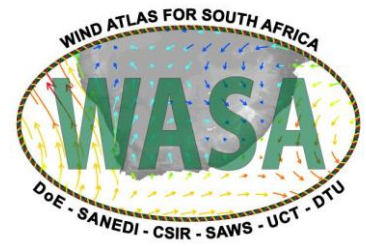


# Results of the Wind Atlas for South Africa (WASA)

WASA Project Team

*08 April 2014, Cape Town, South Africa*





# The WASA Project Team

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**SANEDI** *South African National Energy Development Institute*

- executing agency – contracting the implementing partners
- coordination and dissemination



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**UCT CSAG** *Climate System Analysis Group, University of Cape Town*

- mesoscale modelling



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**CSIR** *Built Environment, Council for Scientific and Industrial Research*

- measurements and microscale modelling



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**SAWS** *South African Weather Service*

- extreme wind assessment



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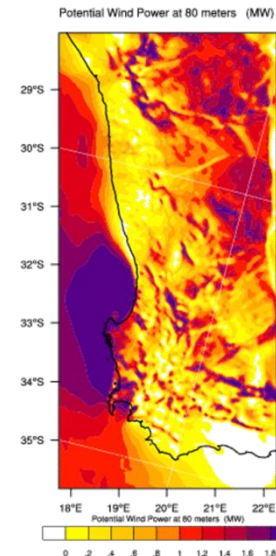
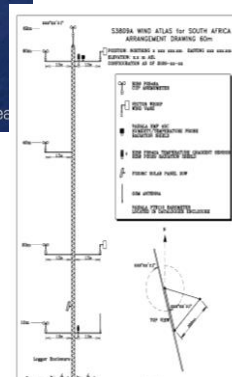
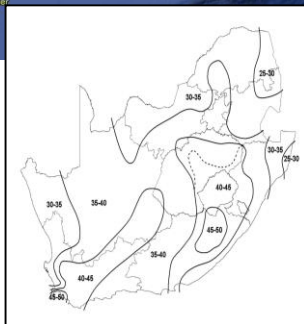
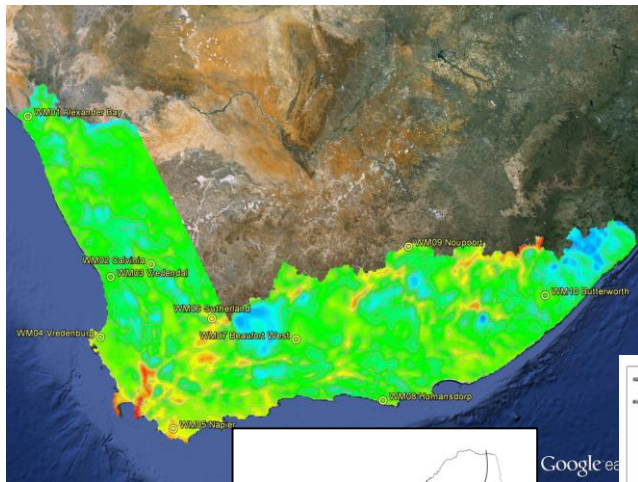
**DTU Wind Energy** *Dept of Wind Energy, Technical University of Denmark*

- partner in all activities



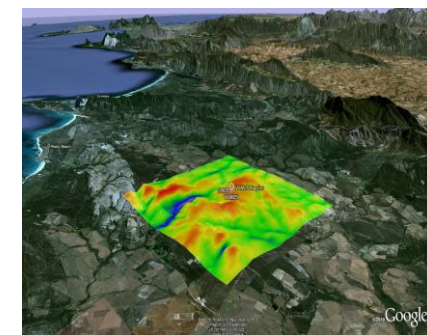
# The WASA project

Producing much more than a wind atlas



WASA	$U_{\text{mean}}$ @ 61.9 m - 1 YEAR	$U_{\text{mean}}$ @ 61.9 m - 3 YEARS*	$\Delta U$	Data recovery
	[m/s]	[m/s]	[%]	[%]
WM01	5.86	6.06	2.7	100
WM02	6.21	6.14	-1.8	93.4
WM03	7.09	7.14	0.0	100
WM04	6.59	6.71	0.9	100
WM05	8.64	8.56	-0.8	98.6
WM06	7.02	7.36	1.6	99.9
WM07	6.85	6.93	0.3	97.0
WM08	7.36	7.34	0.3	100
WM09*	7.58	8.22	3.0	99.7
WM10*	6.55	6.55	0.0	98.8

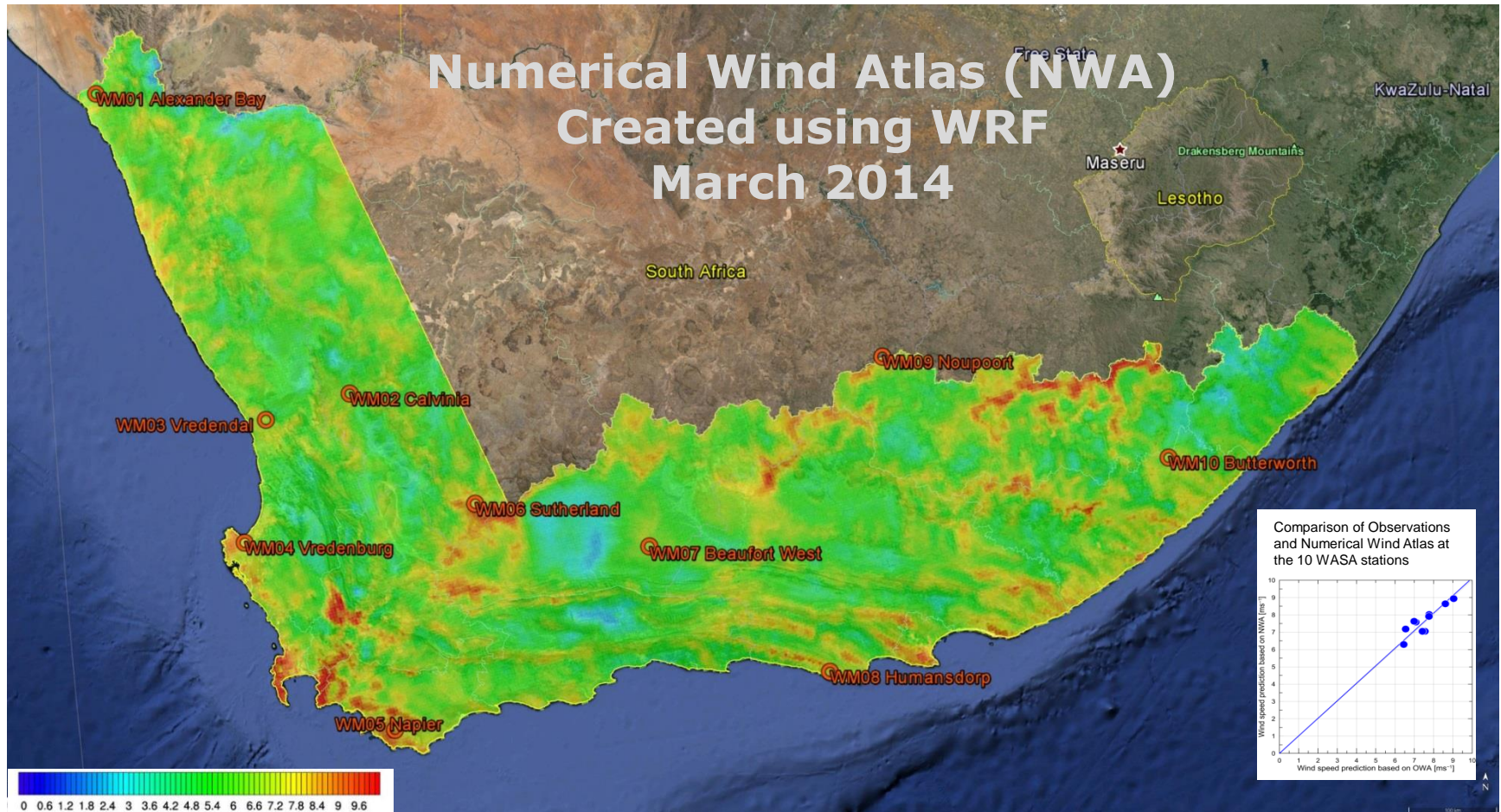
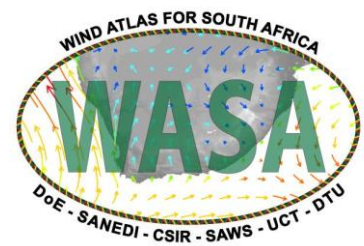
\* 2-year periods for WM09 and WM10:  
 WM09: 2010-10 to 2013-09 minus the year 2011.  
 WM10: 2011-03 to 2012-02 plus 2012-10 to 2013-09.



The WASA project



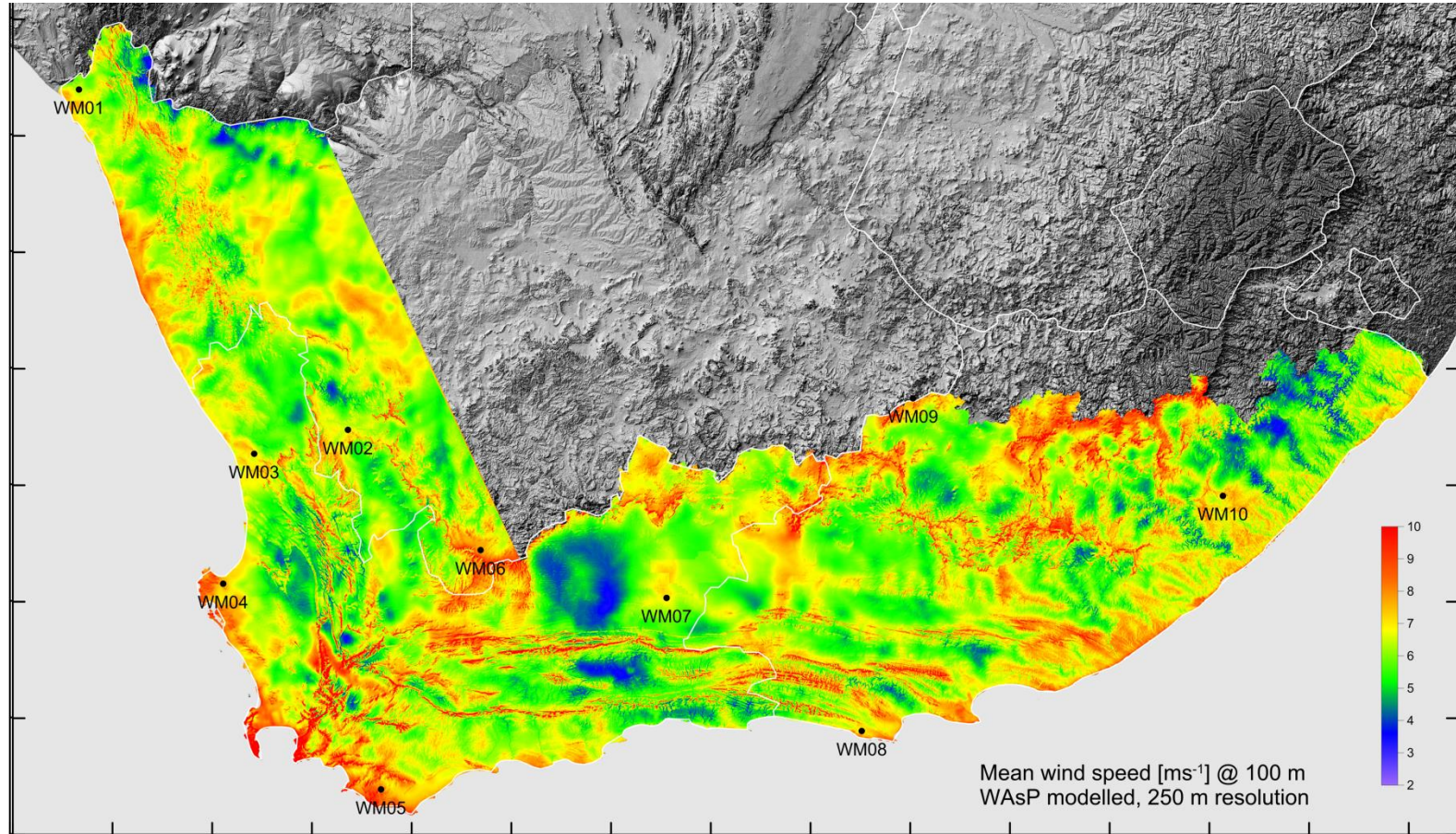
# Numerical Wind Atlas for South Africa a map and much more – **wind climate**



**Generalised wind speeds – based on WRF mesoscale modelling**  
mean wind speed [m/s] 100 m above ground level, flat terrain, 3 cm roughness everywhere



# High-Resolution Wind Resource Map



**High-Resolution Wind Resource Map using WRF-based NWA, March 2014  
mean wind speed (m/s) at 100 m agl in a grid spacing of 250 m.**

# Extreme Wind Atlas for South Africa a map and much more – **design winds**

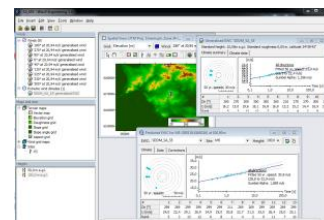
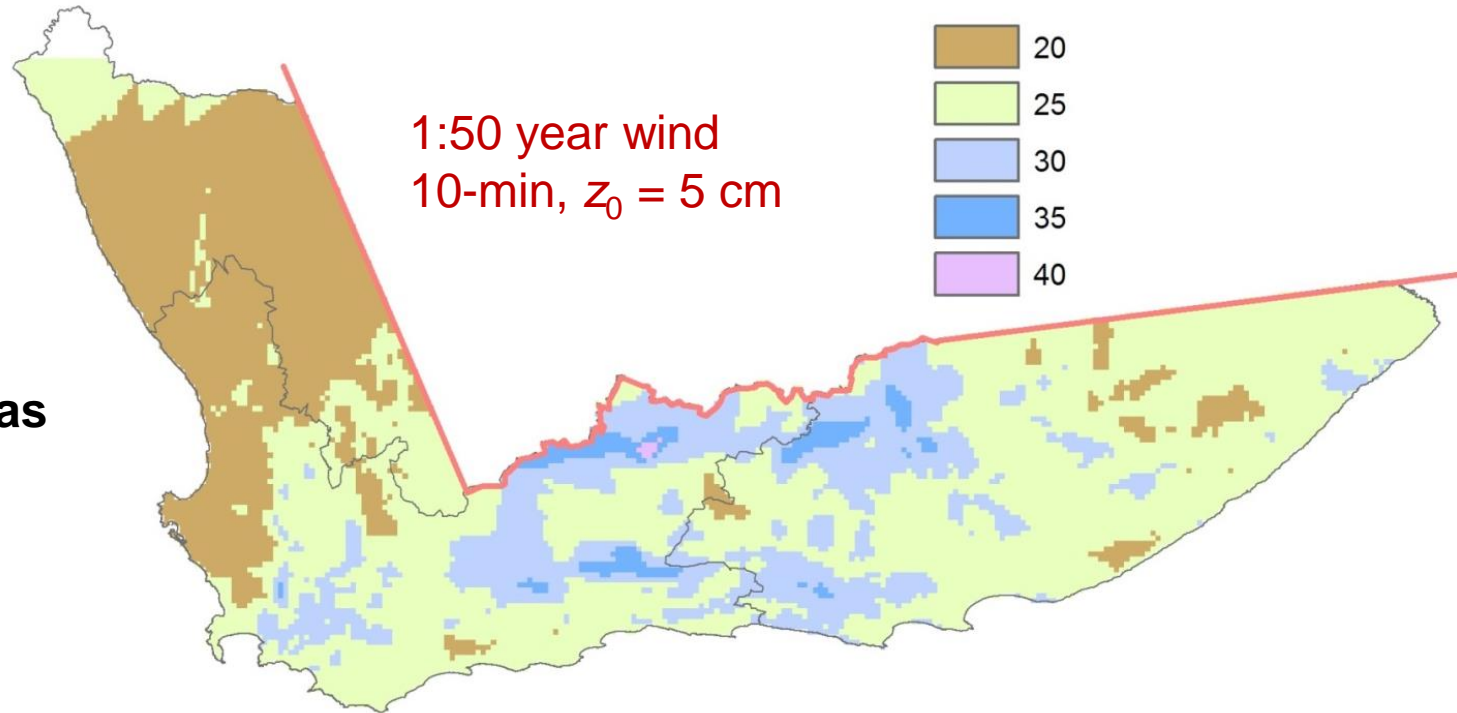
Model Chain



Extreme Wind Atlas

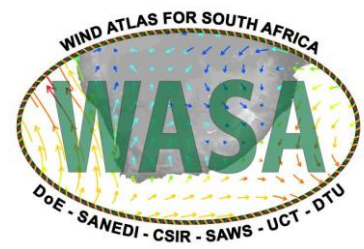


Calculation of design parameters at site





# Verification - 10 WASA masts

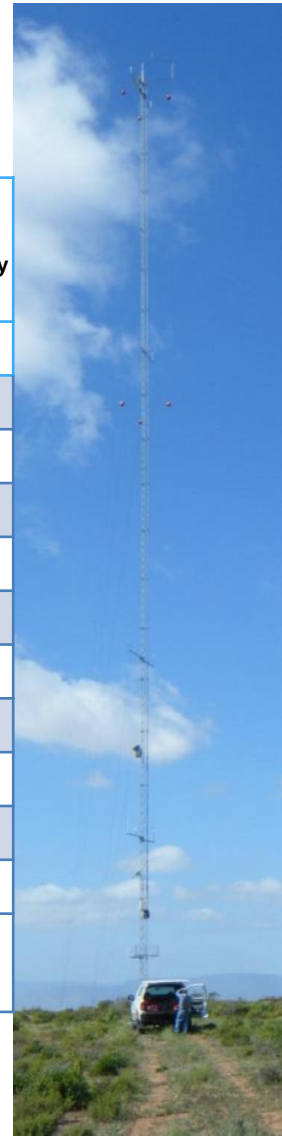


High quality wind measurements for verification of modelling

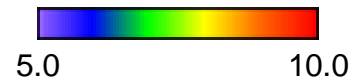
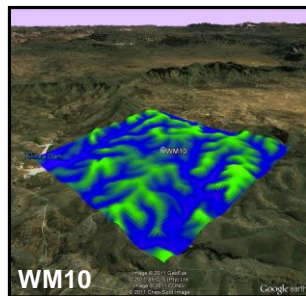
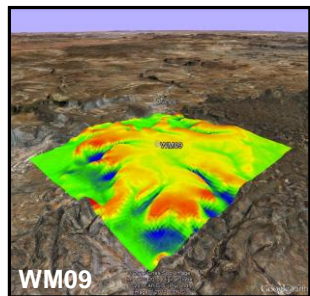
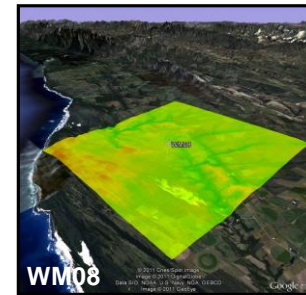
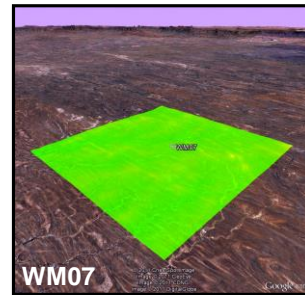
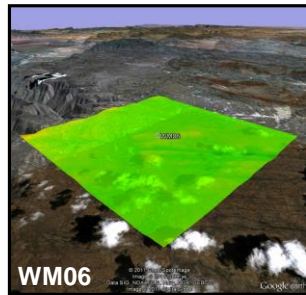
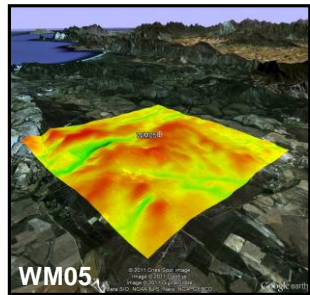
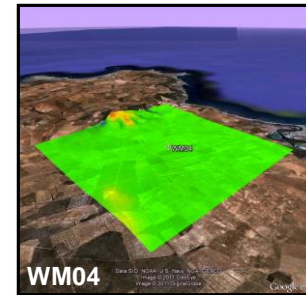
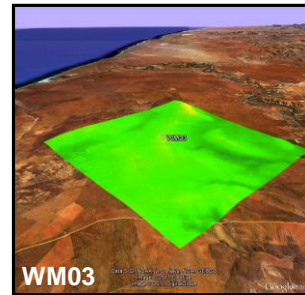
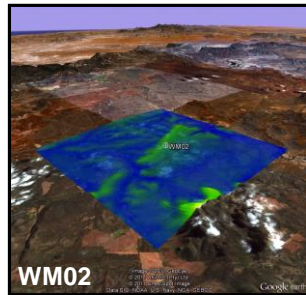
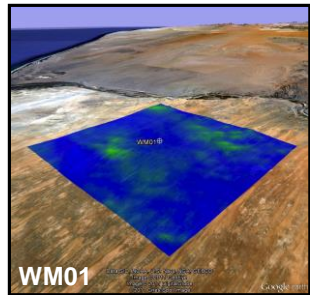


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\* 2-year periods for WM09 and WM10:  
WM09: 2010-10 to 2013-09 minus the year 2011.  
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# Observational Wind Atlas



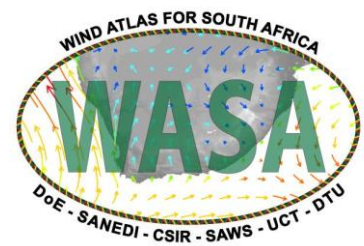
Wind speed at 80 m above ground level

WAsP resource grids from Observational Wind Atlas

- 10 x 10 km<sup>2</sup> grid
- 100 meter grid spacing

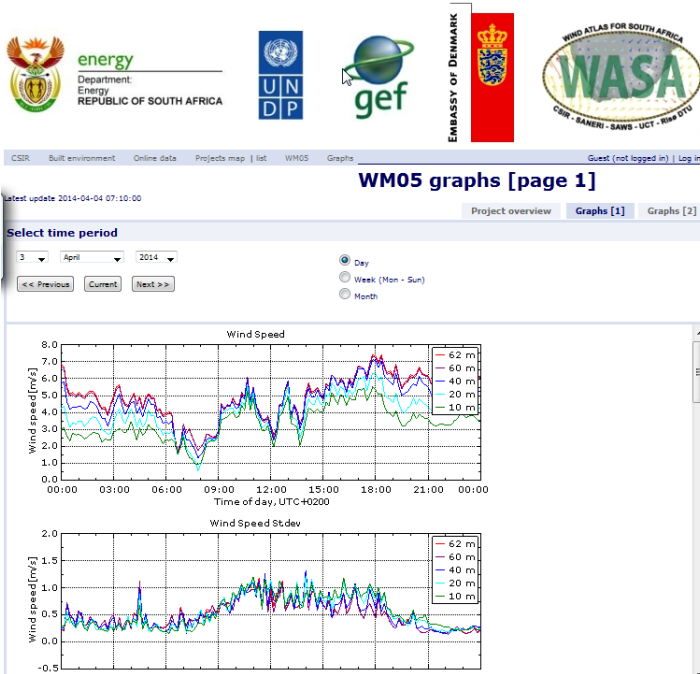


# WASA information and databases

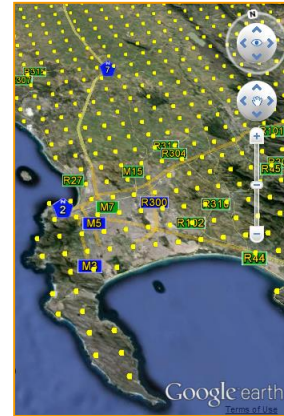


## WASA products

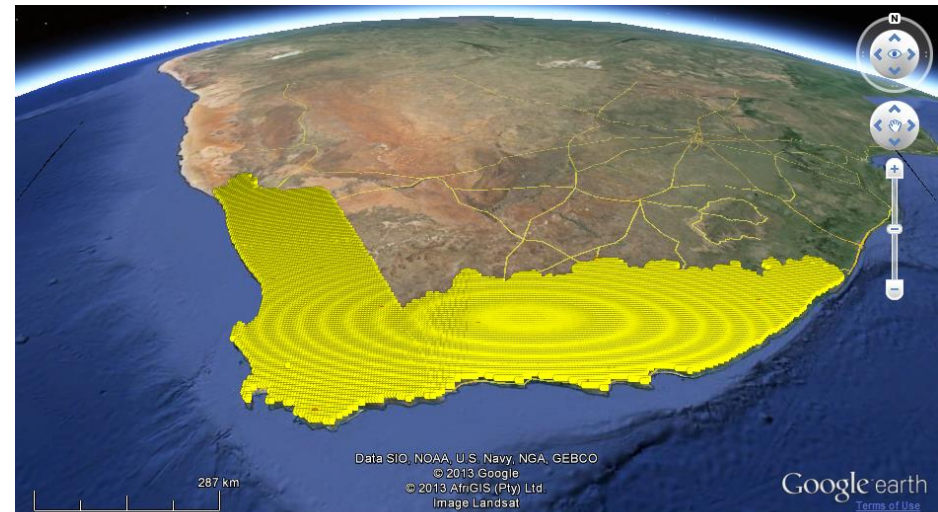
- Reports and presentations  
[www.wasaproject.info](http://www.wasaproject.info)
- Data, methods, tools, guidelines  
[www.wasa.csir.co.za](http://www.wasa.csir.co.za)

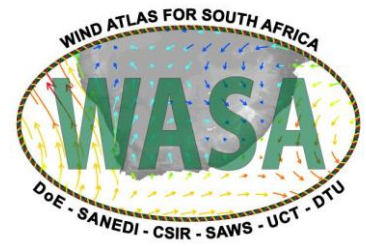


Wind Atlas for South Africa (WASA)



In the WASA modelling domain wind climate data is available in grids of 3, 4 and 5 km spacing – virtual masts.



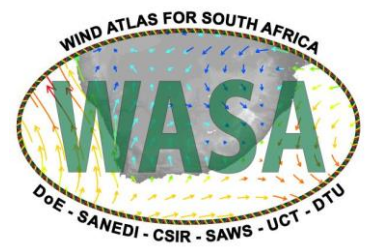


# WASA fundamentals and guiding principles

- Public domain
- Traceable and transparent
- Industry-standard
- Uncertainties assessed
- Platform for future development



# Acknowledgements



The Wind Atlas for South Africa (WASA) project is an initiative of the South African Government - Department of Energy (DoE) and the project is co-funded by

- UNDP-GEF through South African Wind Energy Programme (SAWEP)
- Royal Danish Embassy

WASA Project Steering Committee:

DoE (chair), DEA, DST, UNDP, Danish Embassy, SANEDI



**energy**

Department:  
Energy

**REPUBLIC OF SOUTH AFRICA**



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Resilient nations.*



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