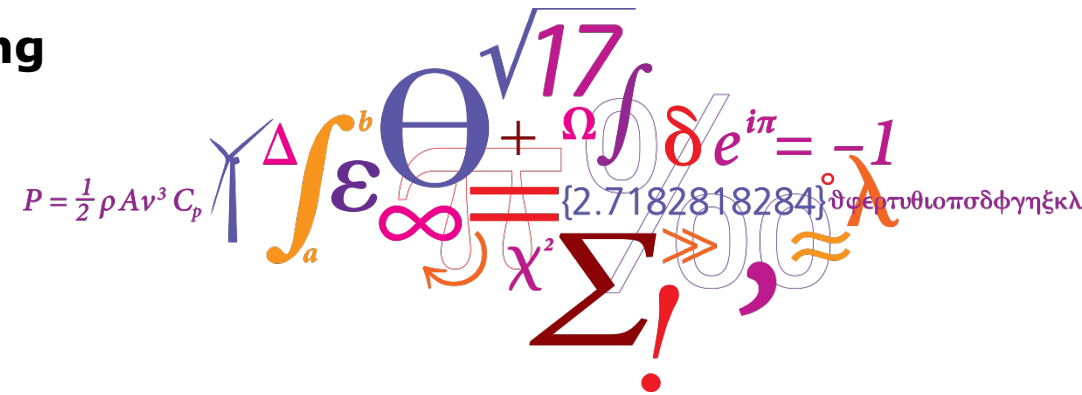


The Global Wind Atlas: *Investigating Country Wind Resources*

Presented by Jake Badger

Head of Section, Wind Resource Assessment Modelling

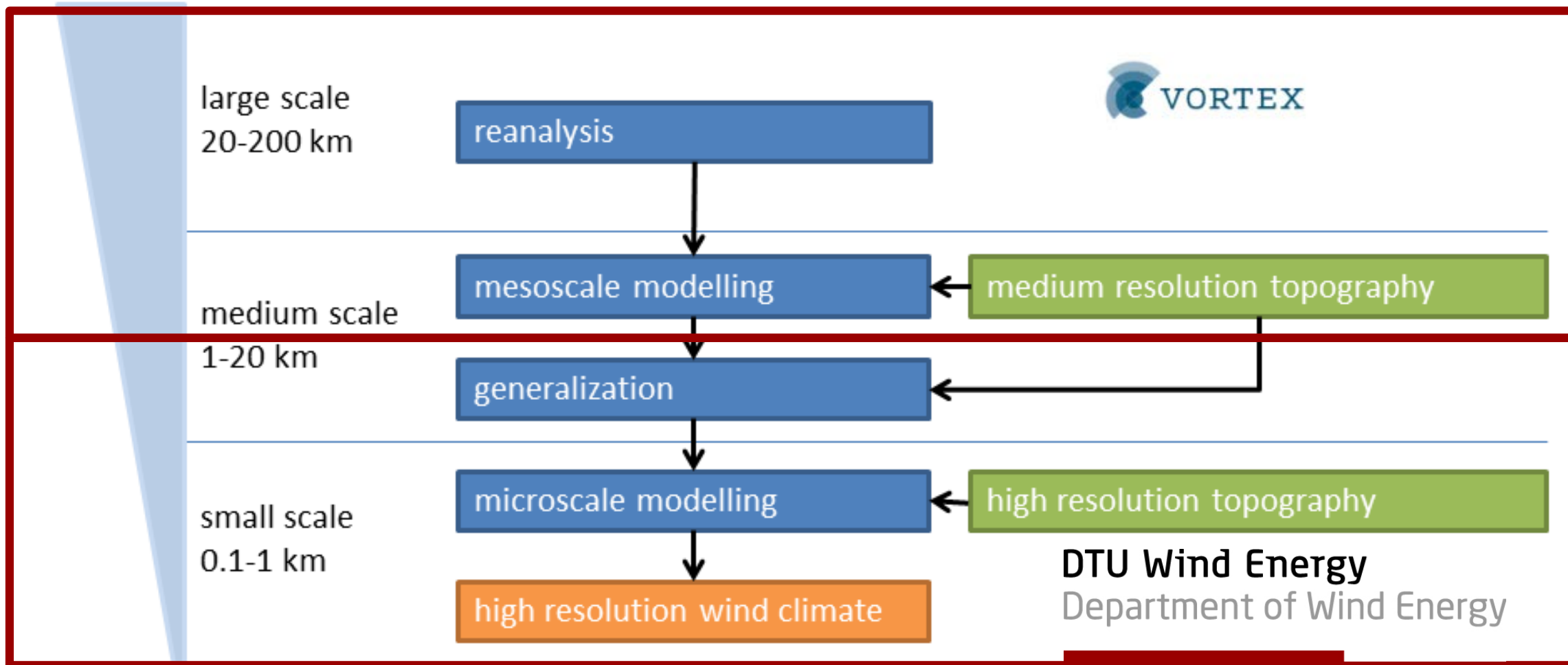
DTU Wind Energy



Introduction to Global Wind Atlas Webinar

DTU Wind Energy
Department of Wind Energy

Global Wind Atlas model chain



The Team

DTU Wind Energy Department of Wind Energy



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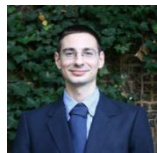
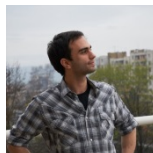
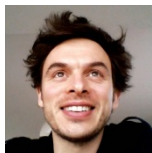
J Badger, B Hansen, N Davis, B Olsen, A Hahmann, N Mortensen, J Hansen

- World in a Box



D Heathfield, M Onninen

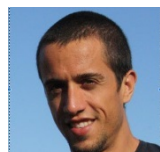
- Nazka Mapps



I Bauwens, I Dautashvil, D Codrescu, A Vaidya



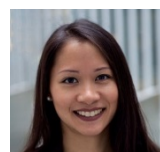
Vortex



O Lacave, P Casso, G Lizcano, A Bosch



World Bank



O Knight, T P Nguyen, S Krohn, A v Loon



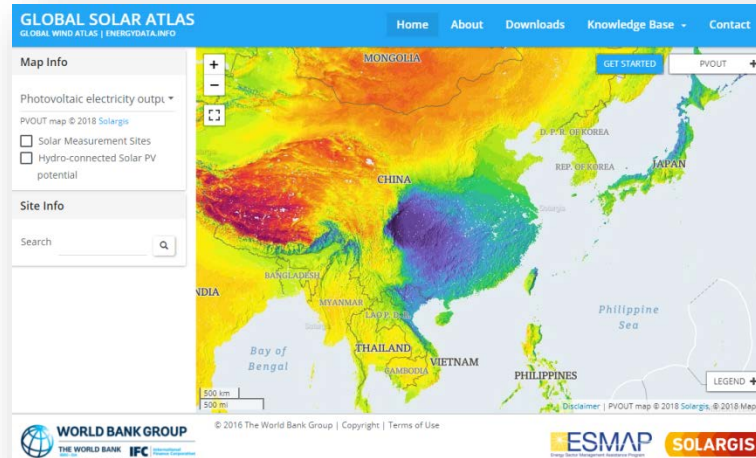
Context of the Global Wind Atlas



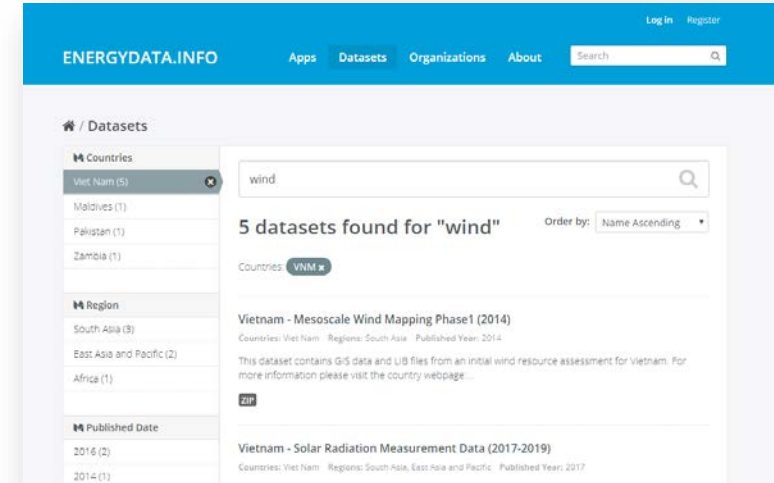
www.globalwindatlas.info



www.globalsolaratlas.info

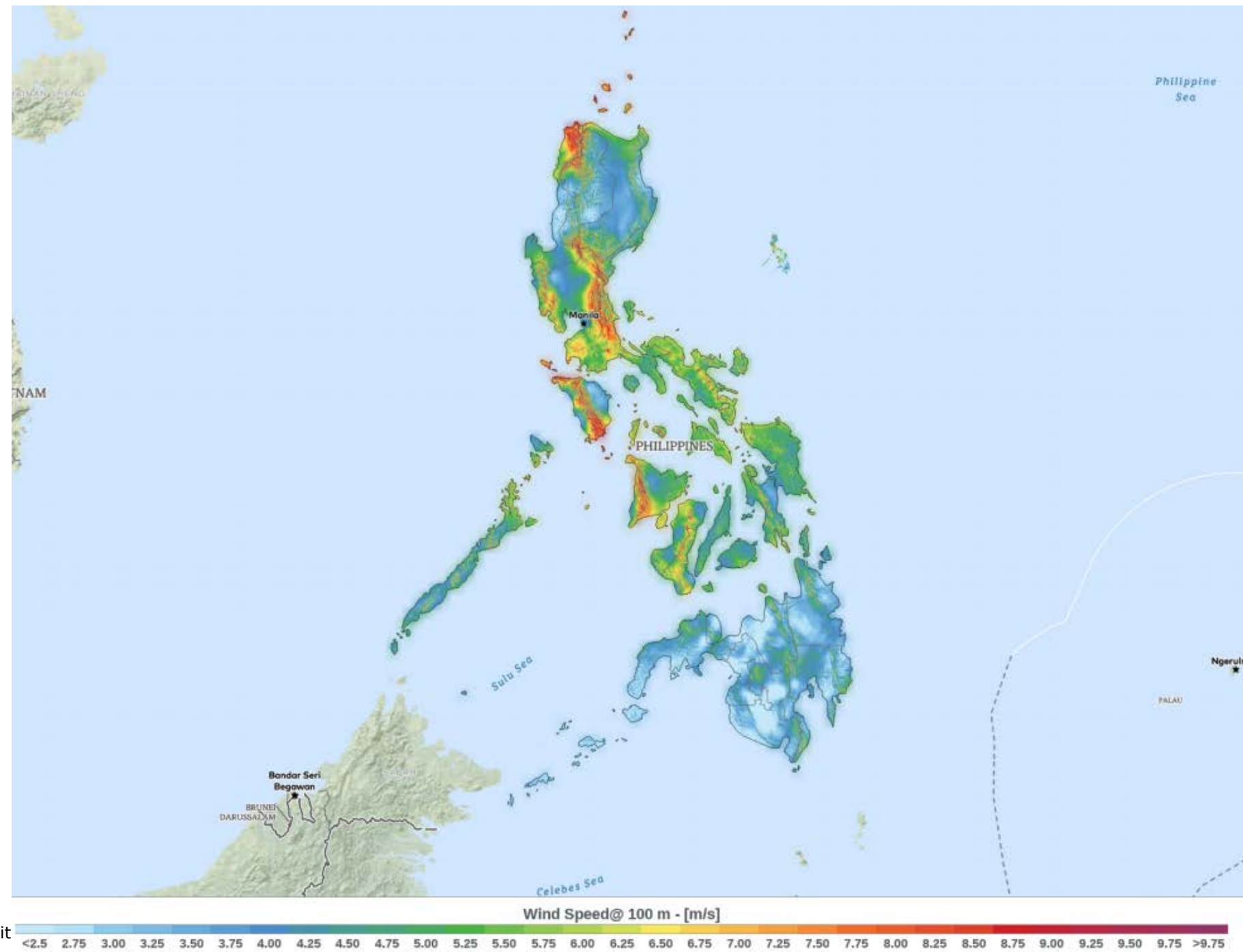


www.energydata.info

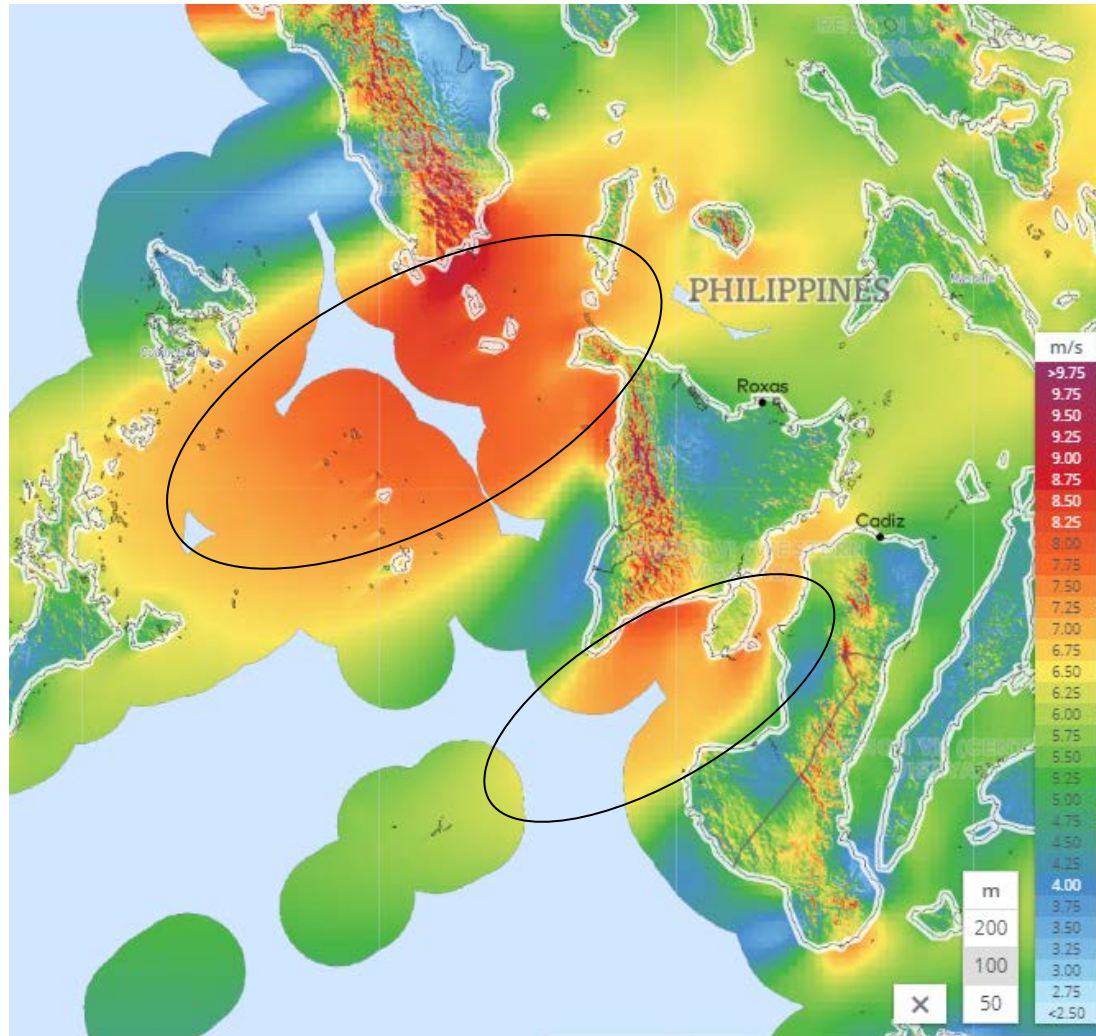


Philippines

Wind speed at 100 m

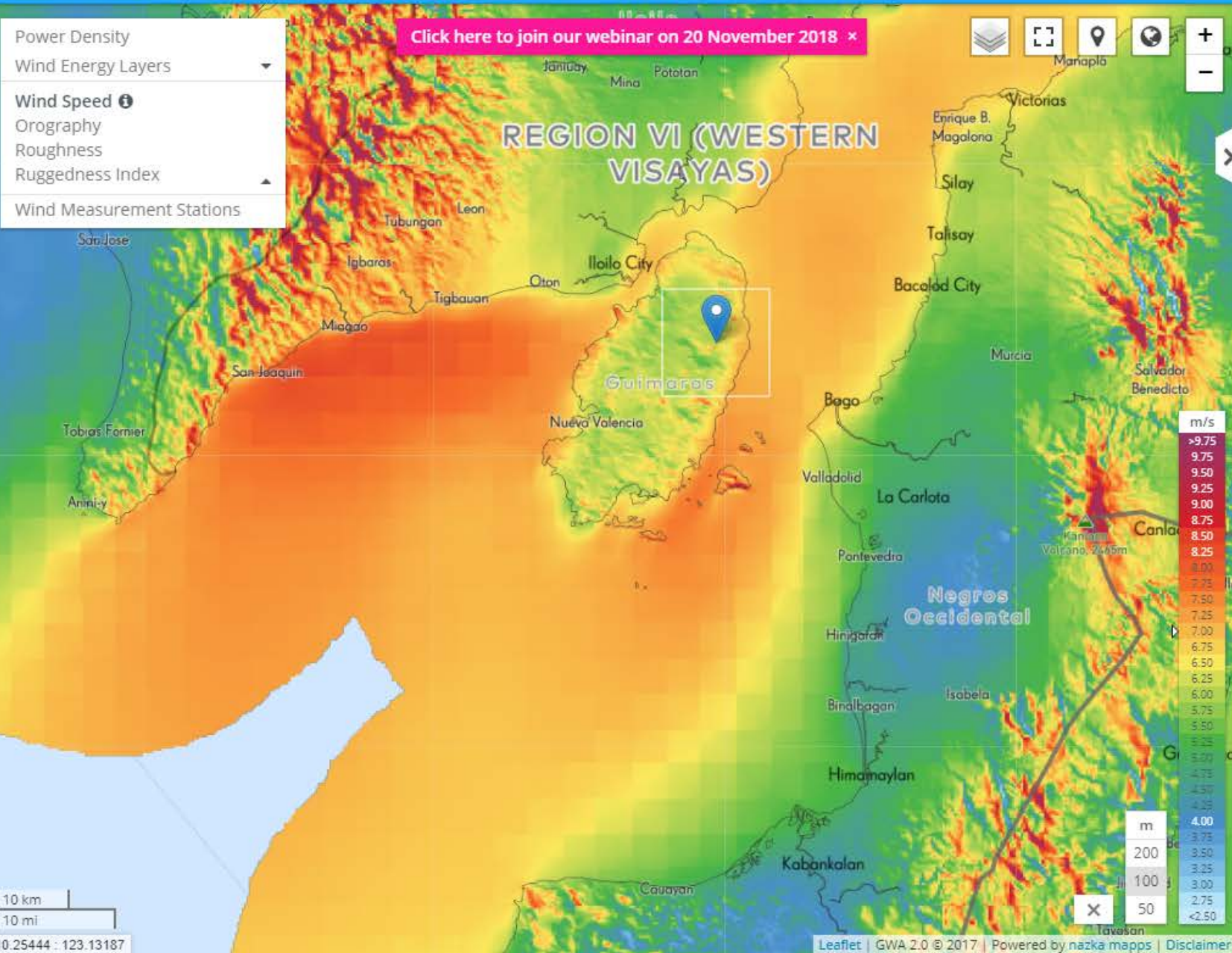


Philippines example features: flow between high terrain



- Power Density
- Wind Energy Layers
- Wind Speed**
- Orography
- Roughness
- Ruggedness Index
- Wind Measurement Stations

Click here to join our webinar on 20 November 2018 ✕



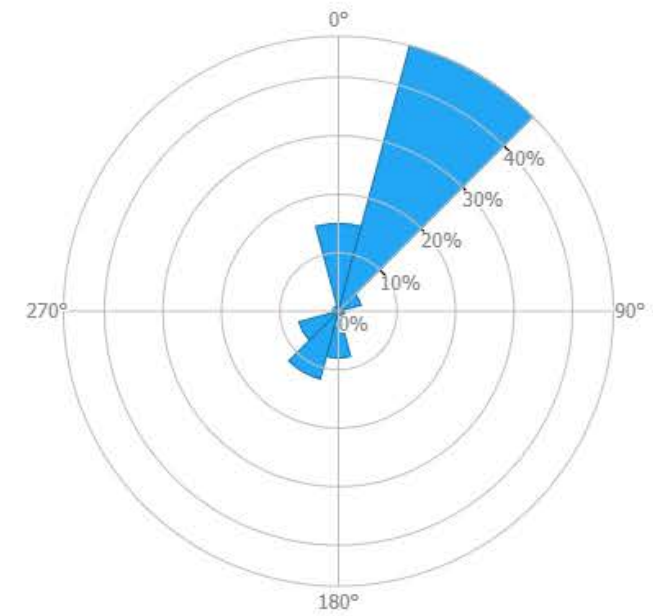
CUSTOMIZED AREAS COUNTRY AND REGIONS ✕

- POINT (10*10 KM)
- RECTANGLE
- POLYGON

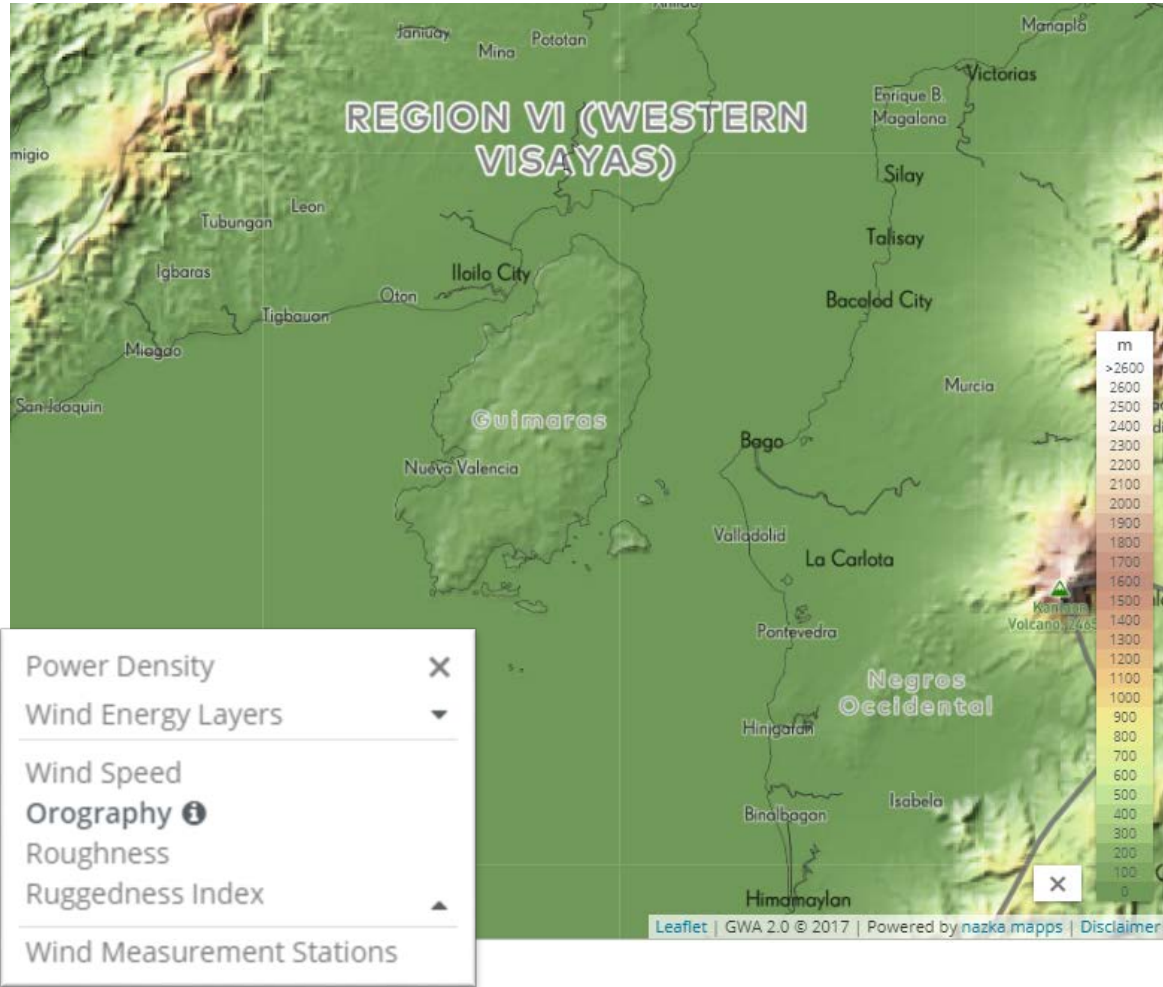
Unnamed area 📄 🔄 📄 🗑️
 Center: 10.62269°, 122.68384°
 Address: San Lorenzo, Guimaras, Western Visayas, Philippines

Data for 10% windiest areas 📄 Plot data GWC file
 📍 388 W/m² 🌬️ 7.1 m/s What is a GWC file?
Height: 100m ▾

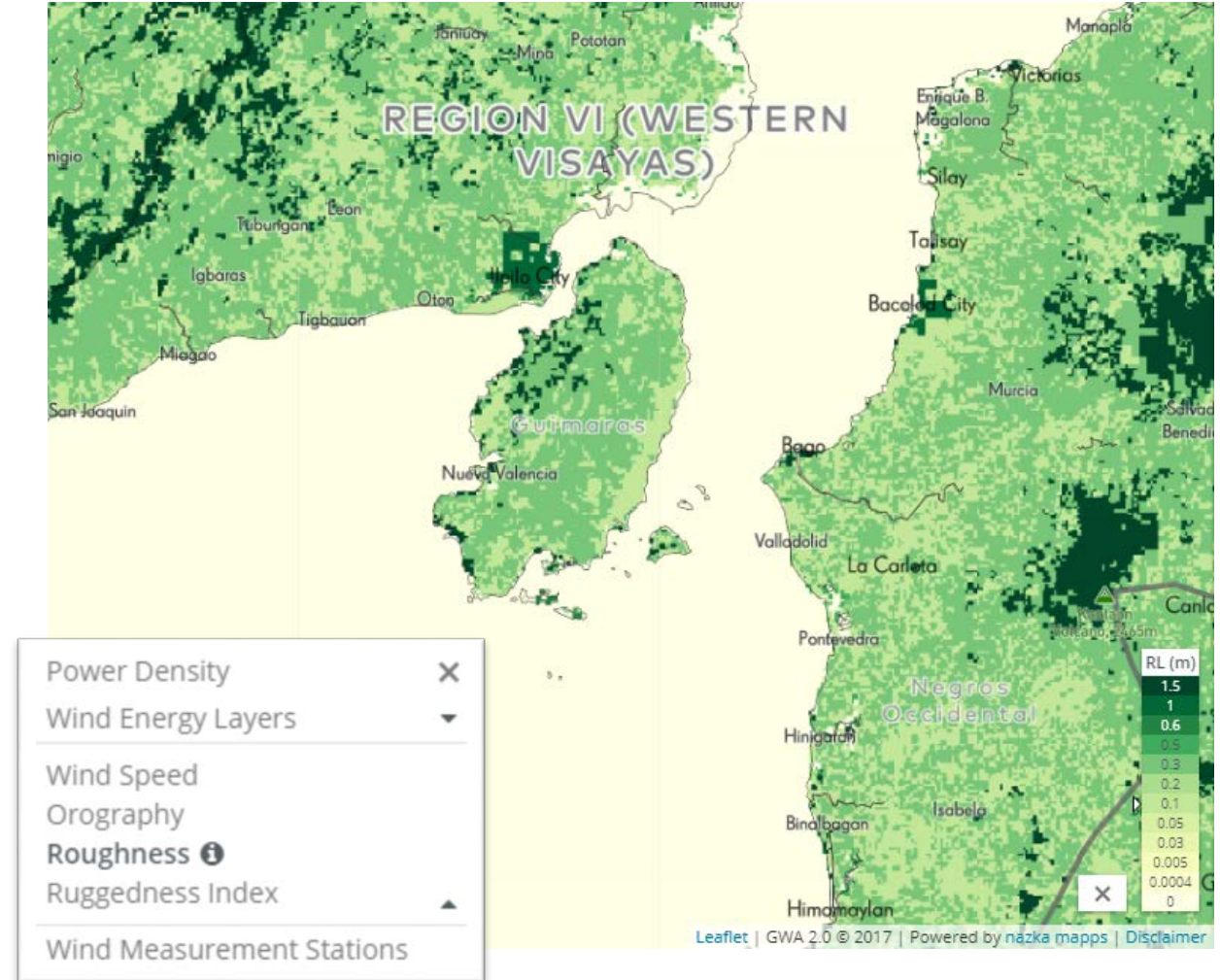
< Power Density | **Wind Roses** | Wind Speed >
 < Wind Frequency Rose >



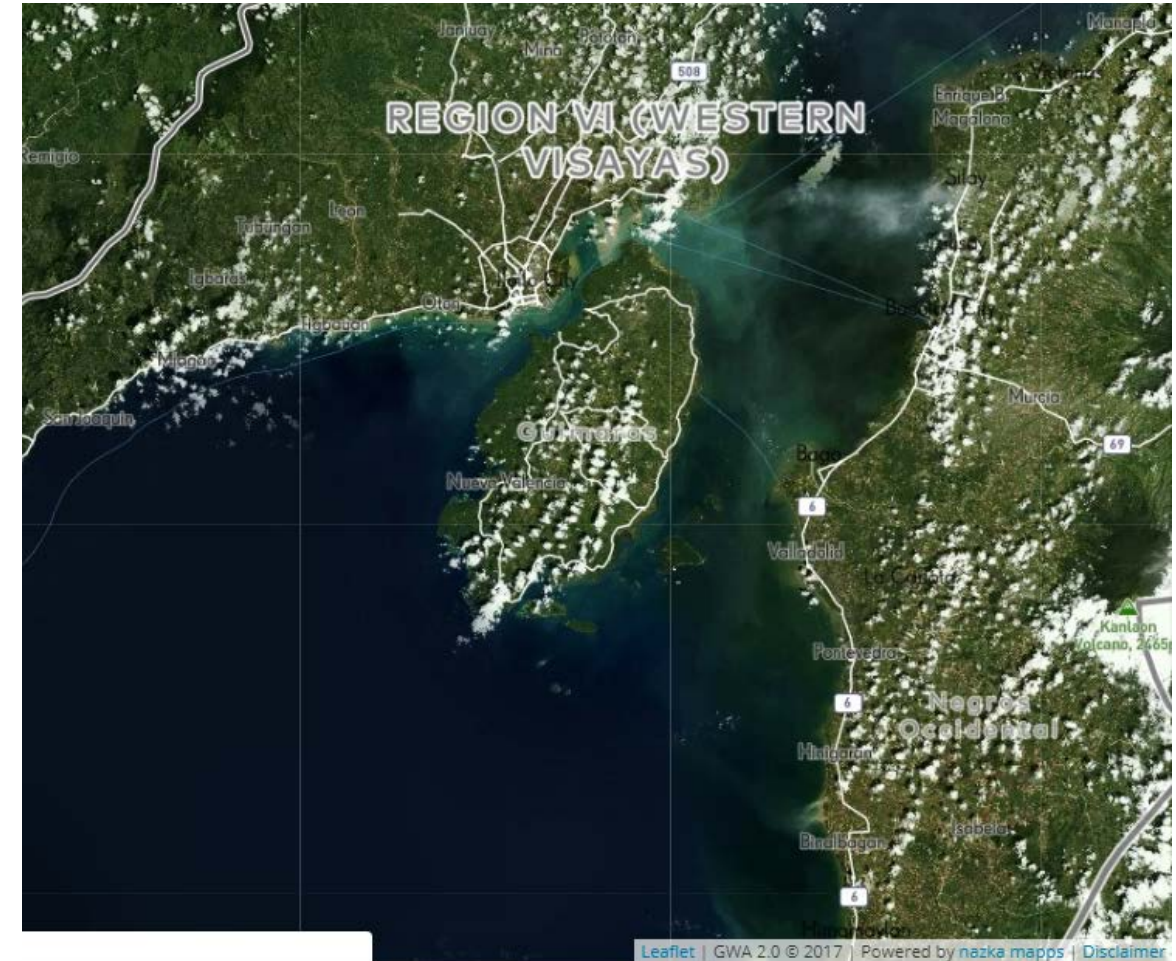
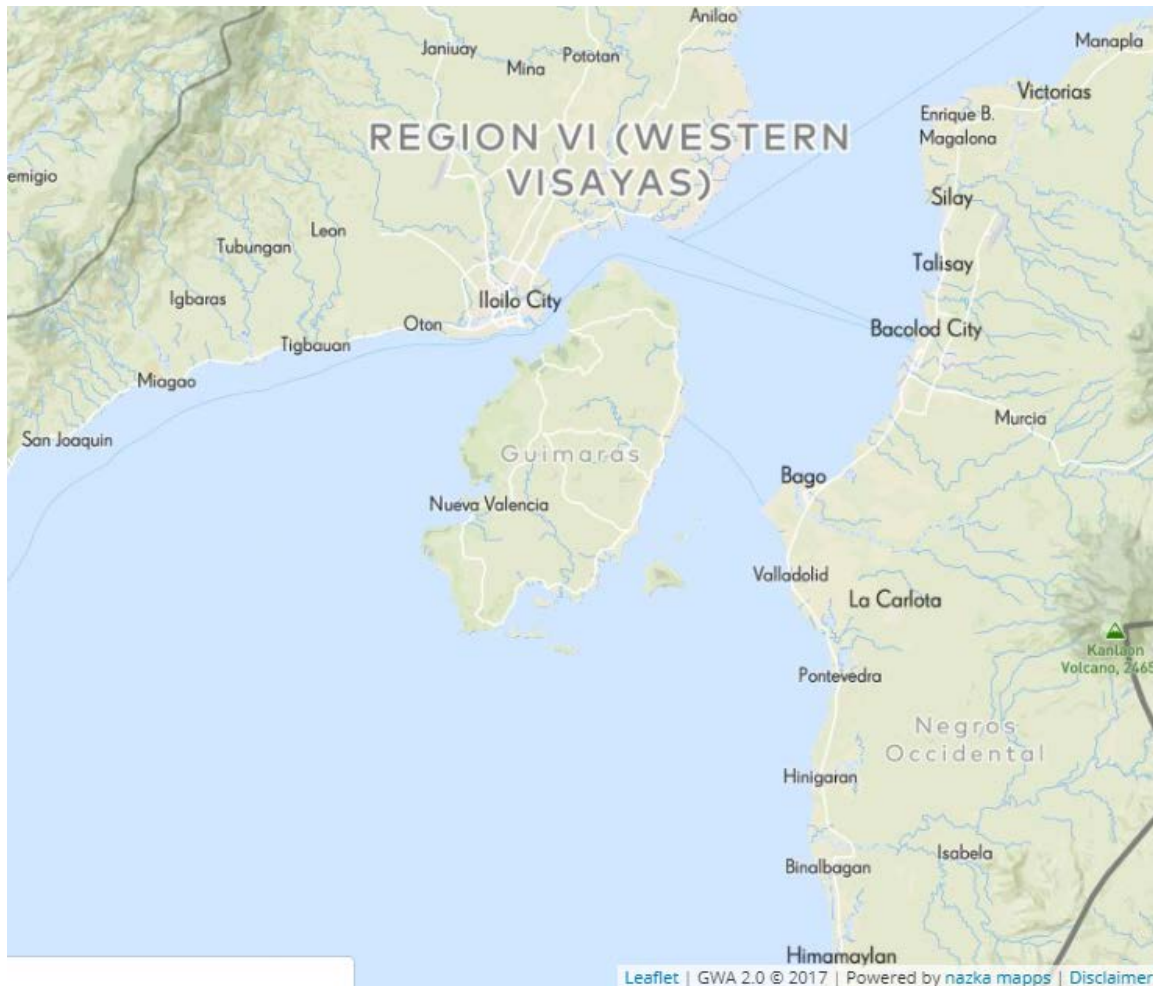
Elevation



Roughness



Map and Satellite imagery



Capacity Factor

Power Density ×

Capacity Factor IEC Class I ⓘ

Capacity Factor IEC Class II

Capacity Factor IEC Class III ▲

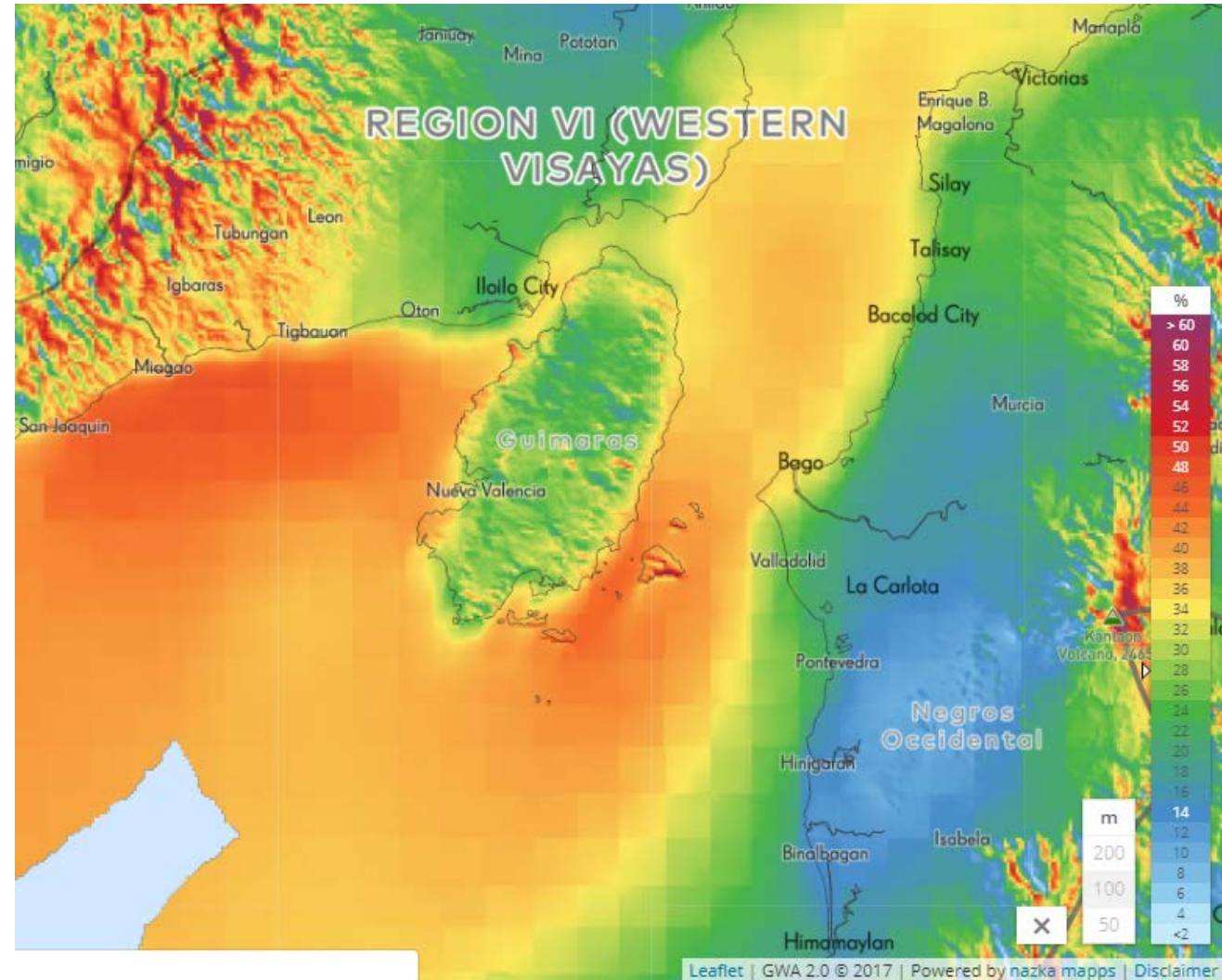
Wind Speed

Orography

Roughness

Ruggedness Index ▲

Wind Measurement Stations



Capacity Factor and ruggedness index

Power Density ✕

Capacity Factor IEC Class I ℹ

Capacity Factor IEC Class II

Capacity Factor IEC Class III ▲

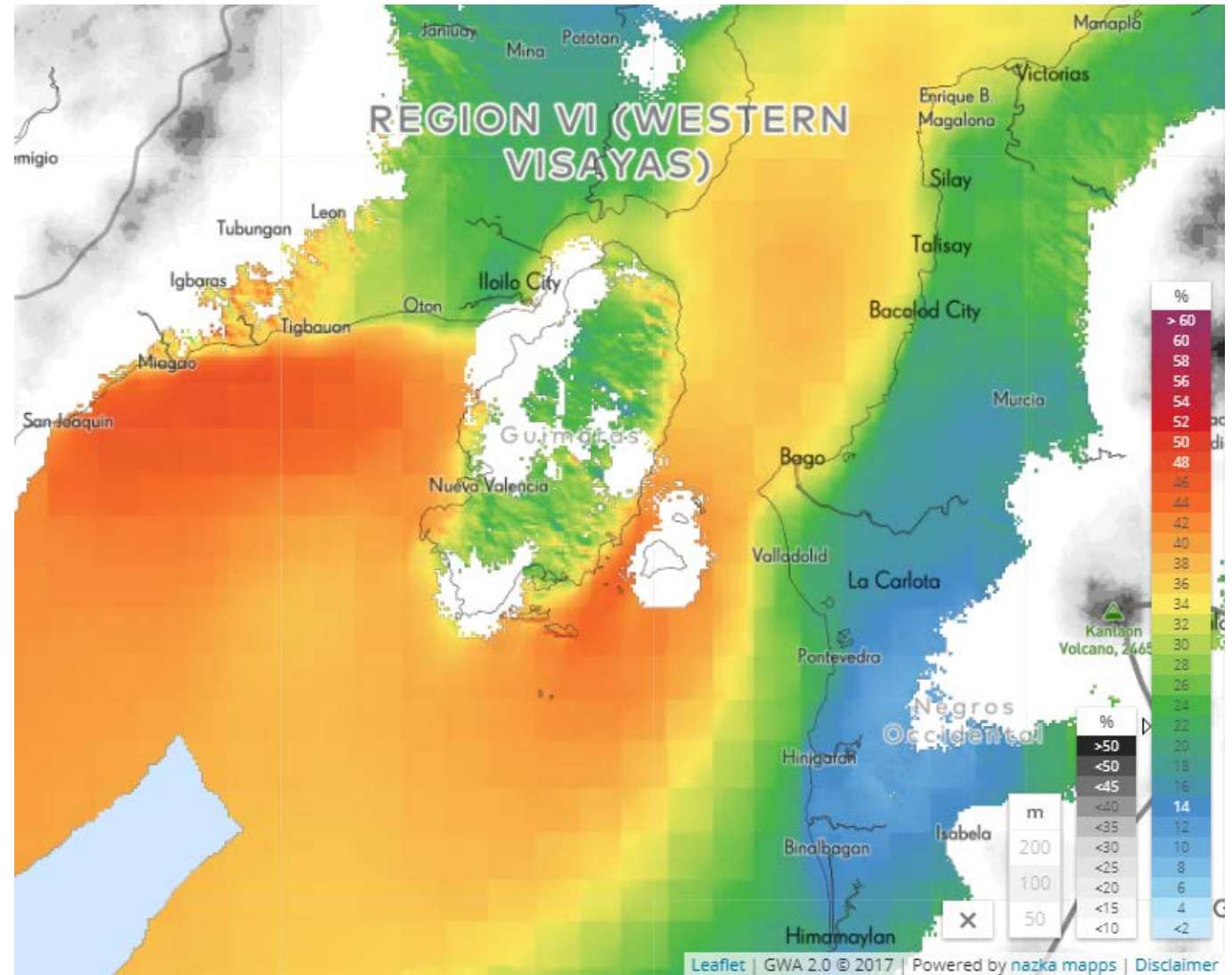
Wind Speed

Orography

Roughness

Ruggedness Index ℹ ▲

Wind Measurement Stations

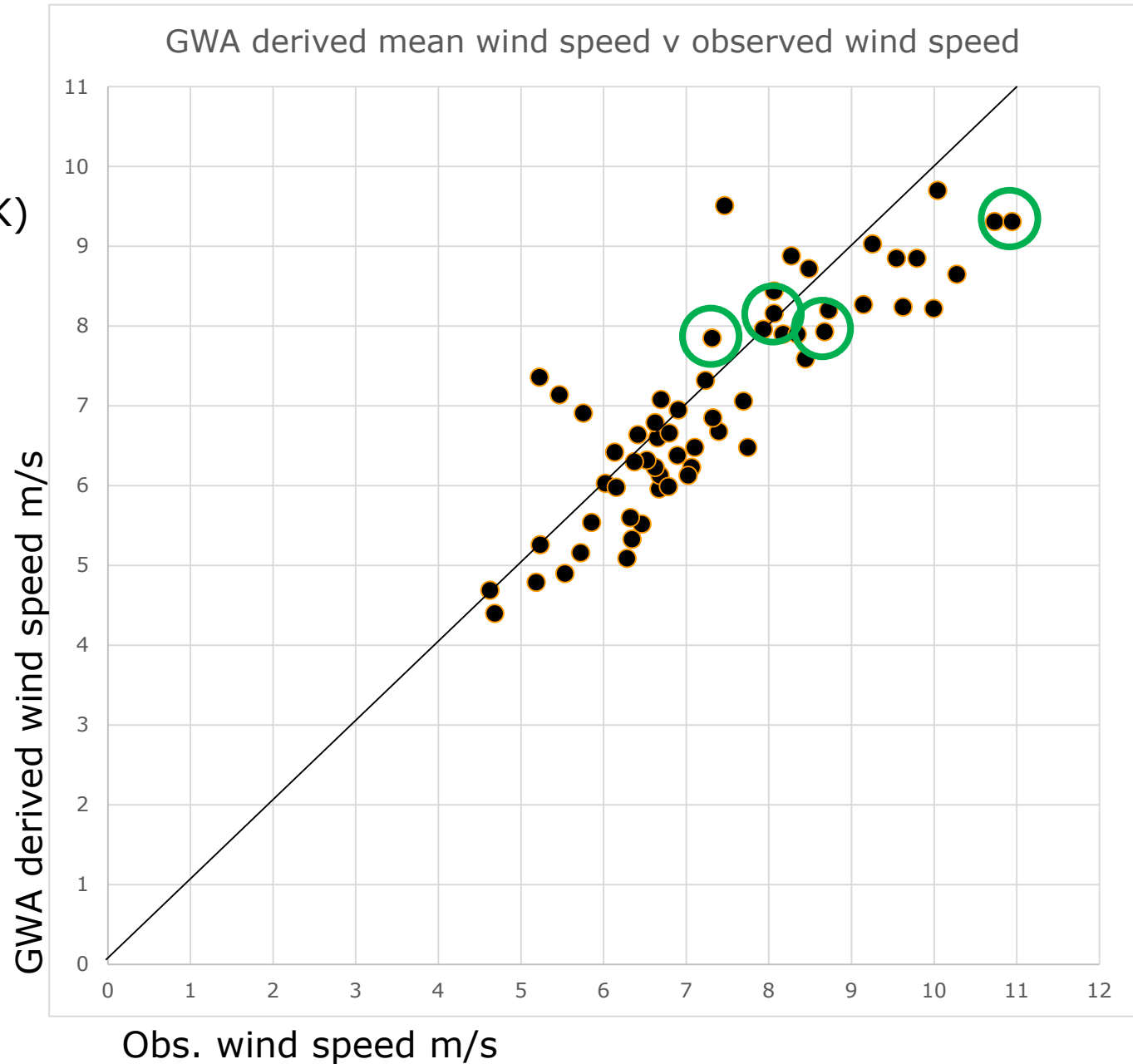


Validation GWA2

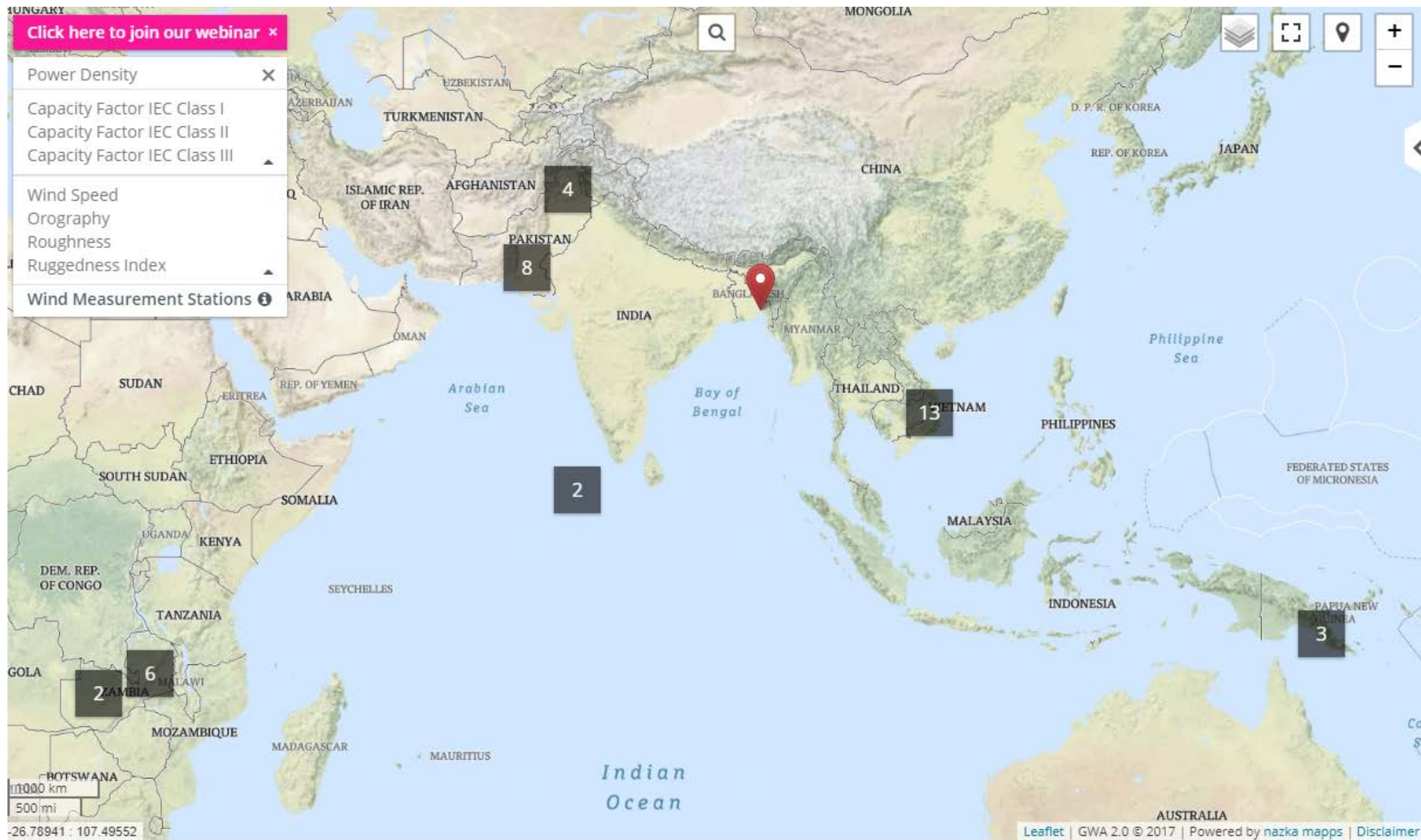


60 wind measurement stations
7 countries (UK, CN, MX, EG, CV, ZA, DK)

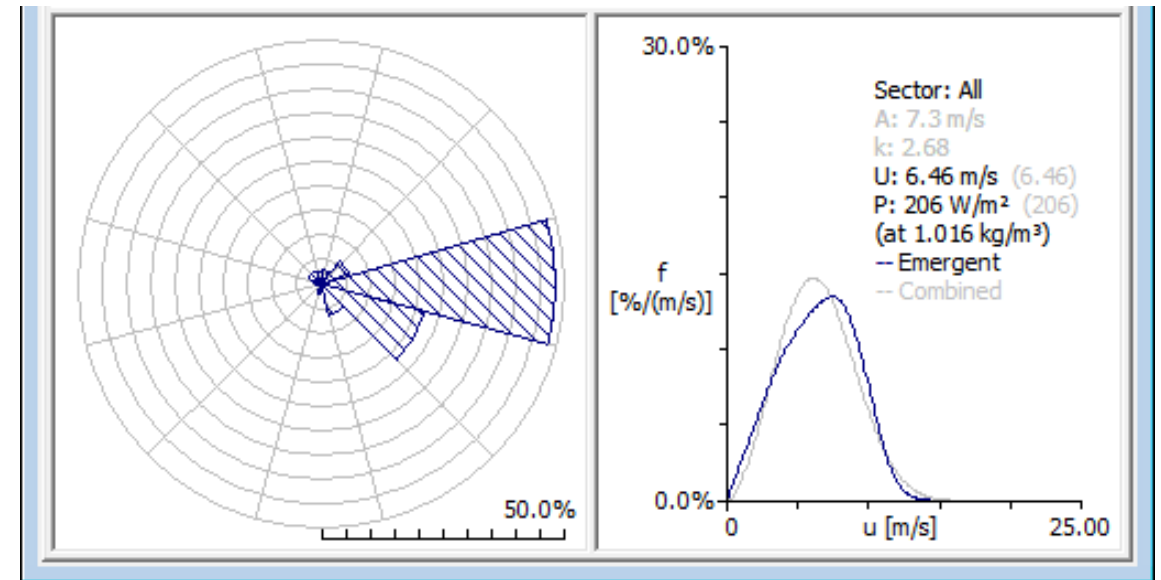
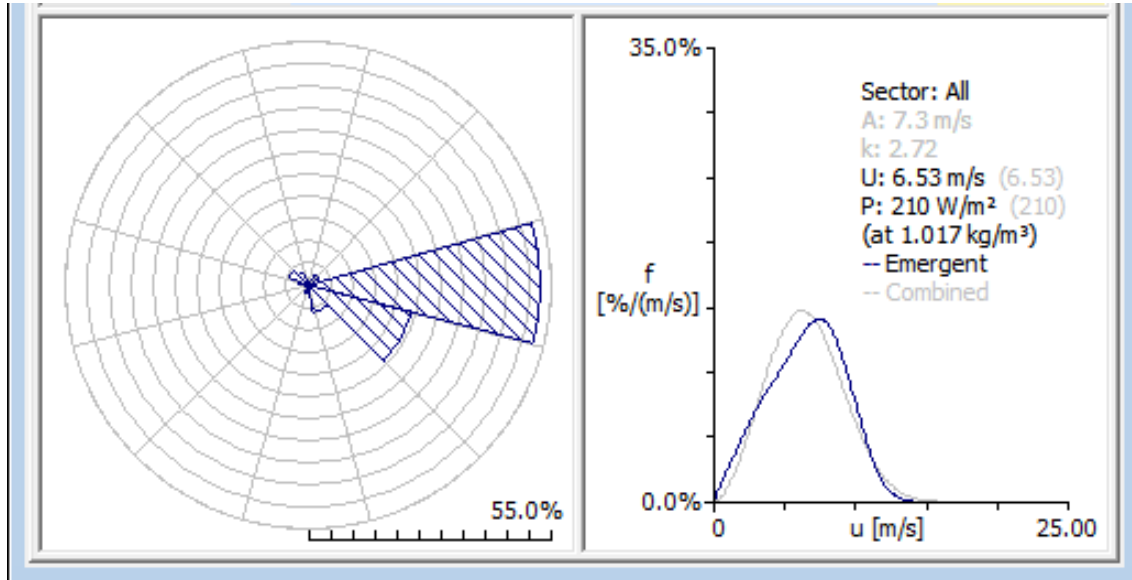
Mean error = -3 %
Mean absolute error = 9 %
Standard deviation = 11%



Validation



Example: Observed vs Predicted wind climate 80 m a.s.l. Site: Chanka, Zambia



Predicted by GWA3 model chain

Mean wind speed **6.53** m/s

Mean power density **210** W/m²

Observed

Mean wind speed **6.46** m/s

Mean power density **206** W/m²

Site reporting and resource assessment source:



Sergio Roldan, Jean-Marc Bernier, Shant Dokouzian;
Commissioning Report for Chanka, Zambia; DNV GL, 2017

Summary

With the Global Wind Atlas you can

- understand physical phenomena that give wind resources
 - mesoscale effects
 - microscale effects
 - wind speeds and wind roses
- quantify the resource
 - wind power density
 - capacity factors
- estimate level of uncertainty
 - ruggedness index
 - *integrated validation results for the future*

