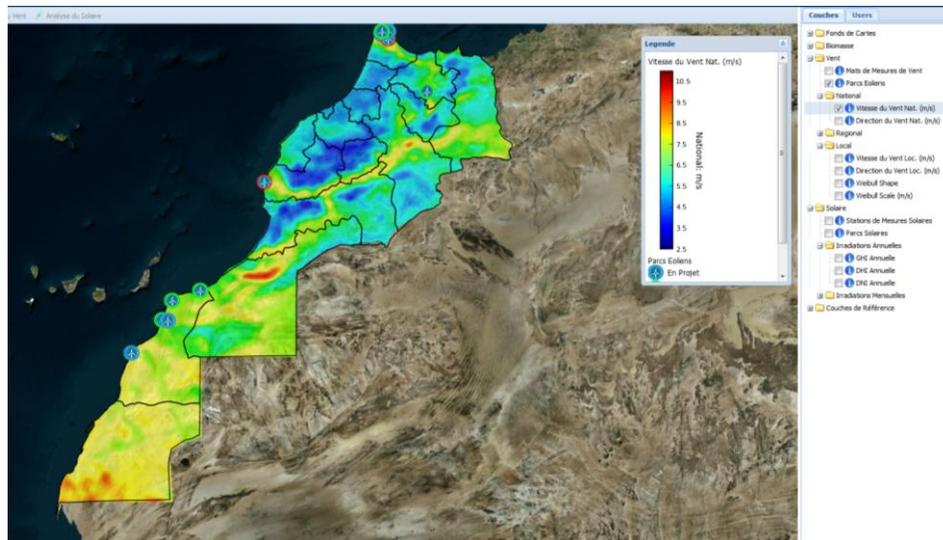


The role of GIS in Energy planning



Vincent Maupas



- An independent private company, created in 1998
- 52 employees, including 43 PdDs and engineers
- Working in close relationship with academic research
- Business core:
 - ▶ Providing high level Scientific and technical expertise for space domain
 - ▶ Performing innovative applications and services in social and environmental domains
- Involved as a coordinator or partner in various large-scale European and International projects



A vertical collage of four images: a galaxy, a coastline, solar panels, and a signal waveform.

SPACE: NOVELTIS significantly contributes to the development of new satellite missions, for the atmosphere, oceans or land surfaces observations.

ENVIRONMENT: NOVELTIS implements innovative tools aimed at protecting the living environment.

SUSTAINABLE DEVELOPMENT: NOVELTIS supplies its customers with validated scientific information in the area of sustainable development.

TECHNOLOGICAL INNOVATION: measurement physics, modelling, simulation, signal and image processing, data compression.



- Renewable Energy GIS
- The content
- The presentation
- Examples

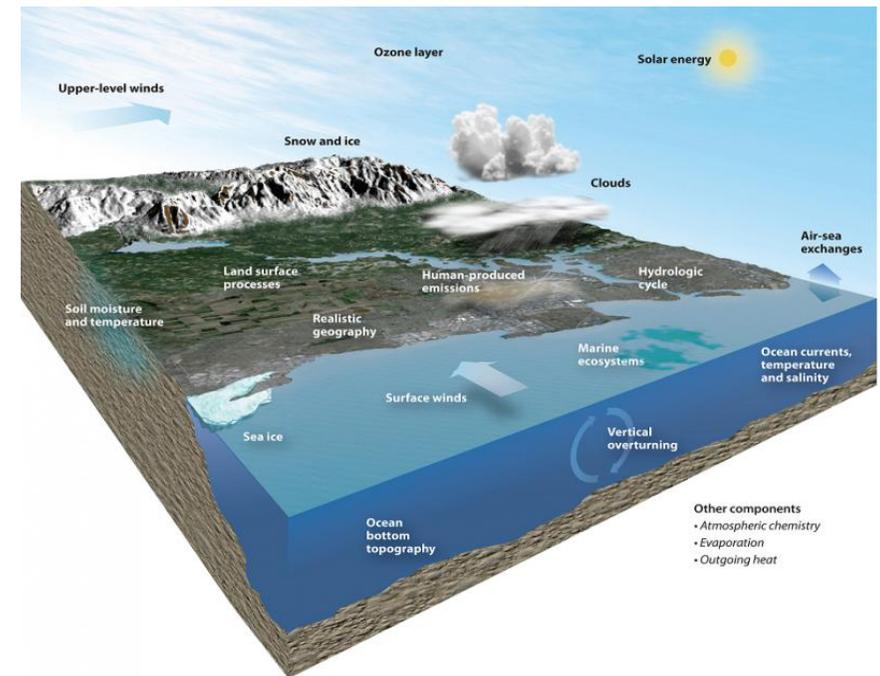
- GIS enables users to visualize digital geographical information
- GIS allows to overlay additional information:
 - ▶ demographic, topographic, social, infrastructure, land use and protected areas.
 - ▶ Renewable energy resource and information
- GIS facilitates the collection, storage, manipulation, analysis.
- Identify areas of interest for further prospection.
- Integrate tools to allow advanced energy or economic calculations.

- Energy agencies and rural electrification agencies
 - ▶ Spatial planning
 - ▶ Setup objectives
 - ▶ Plan Energy mix
 - ▶ Prioritize public investments
 - ▶ Identify gaps & opportunities
 - ▶ Anticipate the grid load and variability
- Local authorities
- Developers & private companies
 - ▶ Market prospection
 - ▶ Site screening
- General public
 - ▶ Expand knowledge on RE resources
 - ▶ Training purposes.

- Field information
 - ▶ Measurements
 - ▶ Surveys
- Satellites
 - ▶ Land
 - ▶ Weather
- Modelling
 - ▶ Simulating the atmosphere
 - ▶ Meso-scale : Resolution suitable for GIS
 - ▶ Long term simulations → climatology
 - ▶ TMY simulation → maps, GIS



- Measurement campaigns
- Methodology
- Validation:
 - ▶ Measurements vs. Model
 - ▶ Time coverage
- Consistency
- Cross-check
- Estimate uncertainties



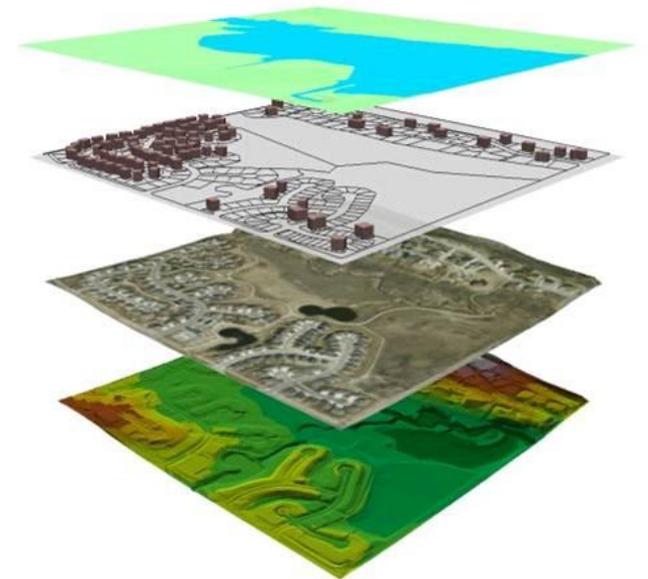
The importance of Meta-data :

- Data description
 - ▶ Who?
 - ▶ When?
 - ▶ How?
- Documentation

The importance of Openness:

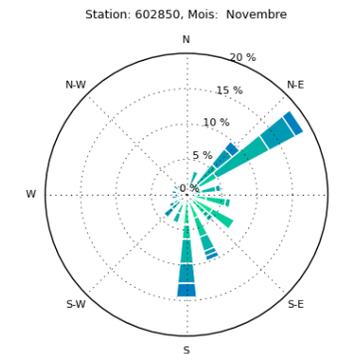
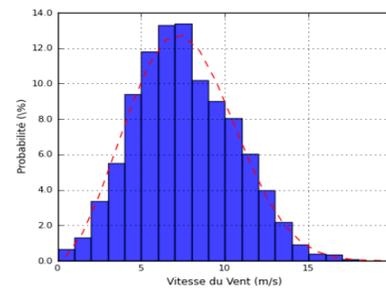
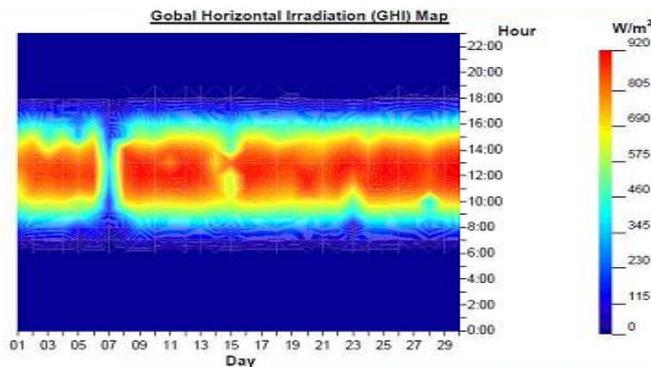
- Web Mapping technologies
- Standard formats
- Links, references...

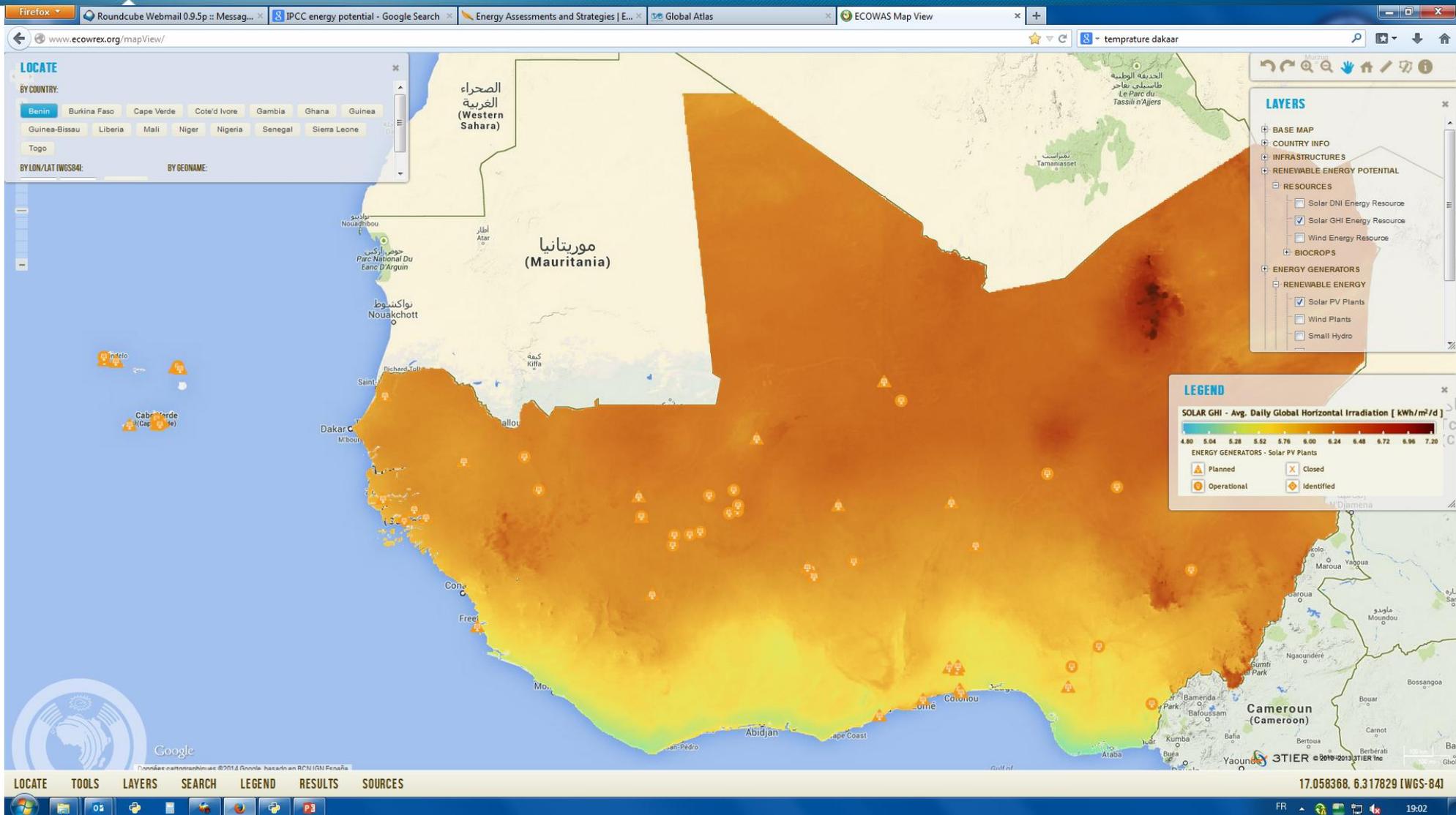
- Interactive maps
 - ▶ Zoom
 - ▶ Opacity
 - ▶ Vertical levels
- Legend
 - ▶ Color scheme
- Overlays
 - ▶ Topography
 - ▶ Roads & infrastructure
 - ▶ Built areas
 - ▶ Environmental constraints

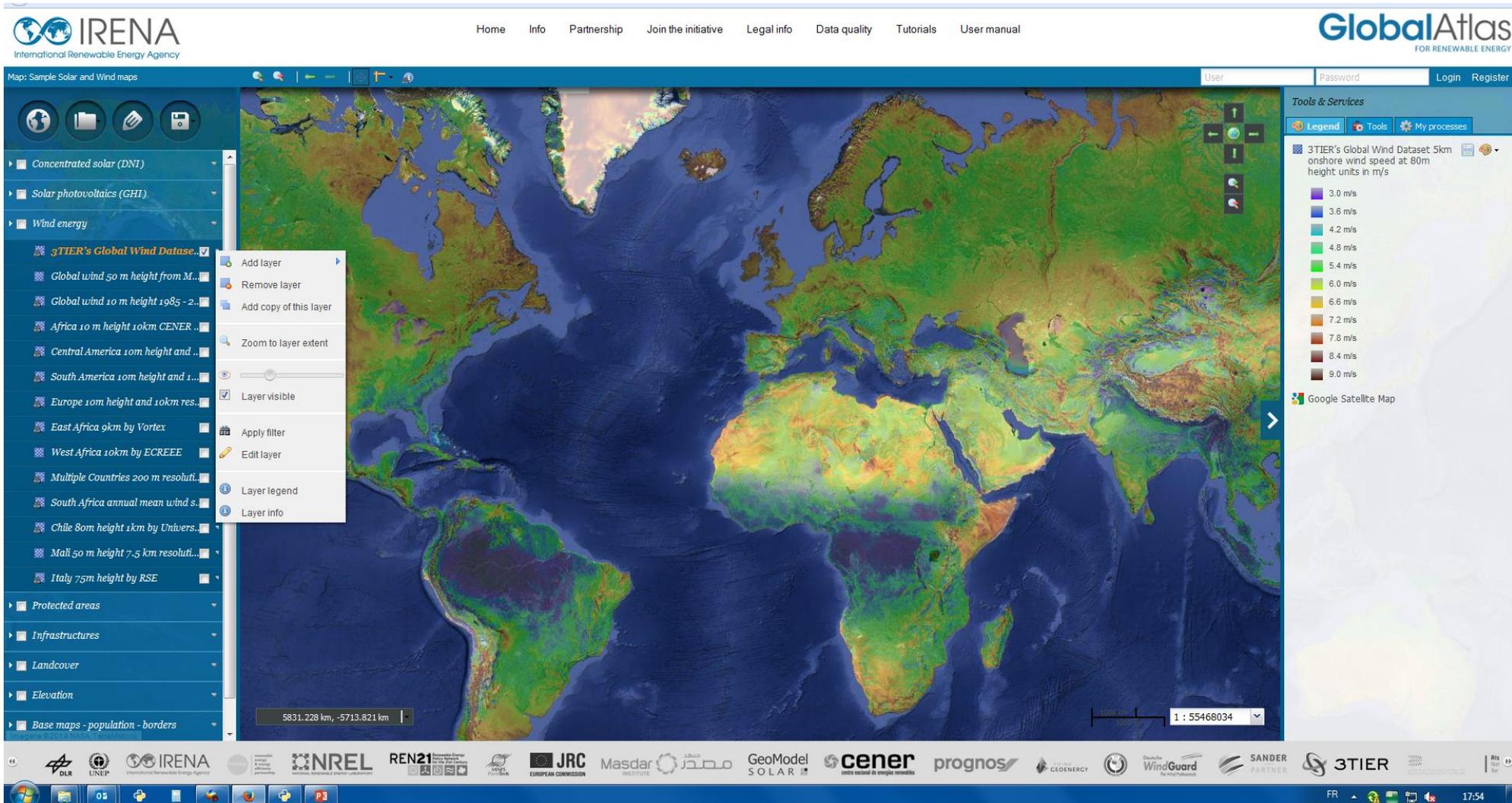


- Solar:
 - ▶ Irradiation : GHI, DNI, DHI
- Wind:
 - ▶ Wind speed & Prevailing direction
 - ▶ Air density for power density
- Terrain:
 - ▶ Topography
 - ▶ Roughness
 - ▶ Land use
- Several heights
- Existing parks, farms and projects
- Annual, monthly maps

- Territory, Area potential
- Point data analysis:
 - ▶ If time series available
 - ▶ Wind rose, distribution
 - ▶ Statistics, variability







The screenshot displays the IRENA Global Atlas web application. At the top, the IRENA logo and navigation menu (Home, Info, Partnership, etc.) are visible. The main area features a world map with a color-coded wind speed overlay. A left sidebar lists various data layers, including '3TIER's Global Wind Dataset'. A context menu is open over the map, offering actions like 'Add layer', 'Remove layer', and 'Zoom to layer extent'. On the right, a legend for the selected layer shows a color scale for wind speeds from 3.0 m/s to 9.0 m/s. The bottom of the interface contains a row of partner logos and a system tray with the date 'août 14' and time '17:54'.

(root)

NOVELTIS
ADEREE

Atlas des Énergies Renouvelables

[Info](#) [Déconnexion](#) [Aide](#)

[Naviguer](#)
[Maroc](#)
[Region Guelmim](#)
[Analyse du Vent](#)
[Analyse du Solaire](#)

Couches **Users**

- [-] Fonds de Cartes
- [-] Biomasse
- [-] Vent
 - Mats de Mesures de Vent
 - Parcs Eoliens
 - [-] National
 - [-] Regional
 - [-] Local
 - Vitesse du Vent Loc. (m/s)
 - Direction du Vent Loc. (m/s)
 - Weibull Shape
 - Weibull Scale (m/s)
- [-] Solaire
 - Stations de Mesures Solaires
 - Parcs Solaires
 - Irradiations Annuelles
 - GHI Annuelle
 - DHI Annuelle
 - DNI Annuelle
 - Irradiations Mensuelles
 - [-] Couches de Référence

Legende

DHI Annuelle

DHI (kWh/m²)

Parcs Solaires

- En Projet
- En Cours
- Réalisé

Analyse du Solaire

Paramètres

Latitude: Longitude:

Graphes Statistiques

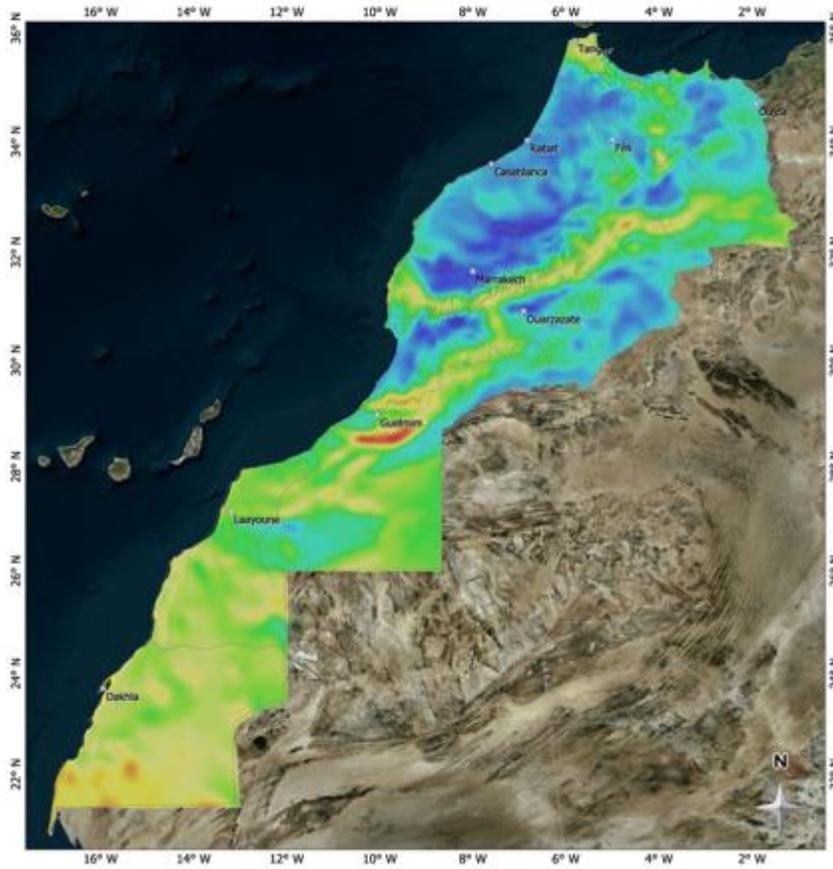
Lat: 27.83, Lon: -10.5015

DHI GHI DNI

Mois

Observations et ... d'Atlas Énergétique au Maroc.

Atlas des Énergies Renouvelables du Maroc Vitesse moyenne du vent à 30 m - Maroc



- ▶ NOVELTIS 2013
- ▶ For ADEREE
- ▶ Solar, Wind, biomass
- ▶ URL:
Aderee.noveltis.com

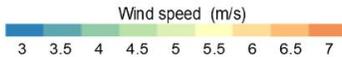
+

- ▶ Wind, solar, biomass
- ▶ Public and protected access
- ▶ Existing plants and parks
- ▶ User friendly interface
- ▶ Hosted at NOVELTIS
- ▶ Documentation

-

- ▶ No infrastructure layers
- ▶ No environmental constraints layers
- ▶ Hi resolution wind maps on one region only
- ▶ Biomass incomplete
- ▶ No hydro and marine energies layers

Annual average Wind Speed at 40 meters



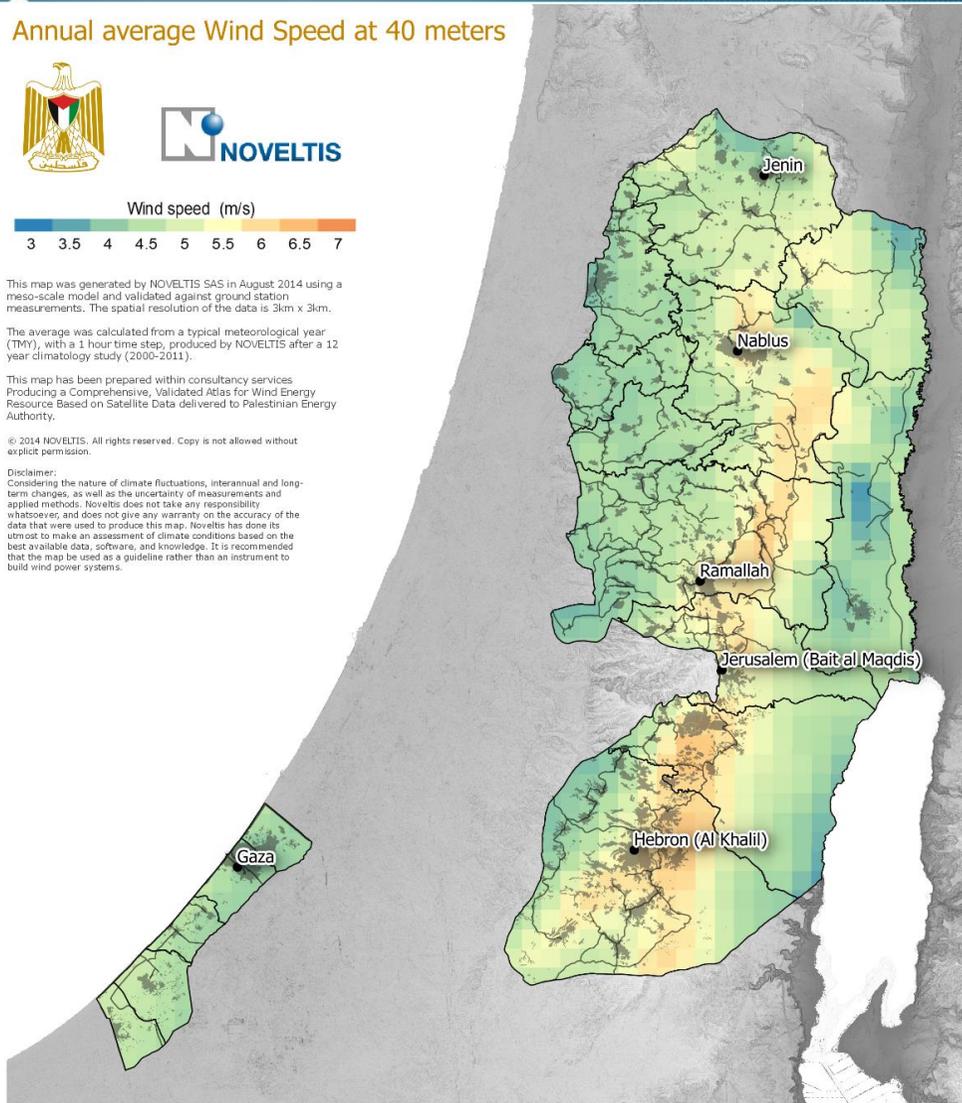
This map was generated by NOVELTIS SAS in August 2014 using a meso-scale model and validated against ground station measurements. The spatial resolution of the data is 3km x 3km.

The average was calculated from a typical meteorological year (TMW), with a 1 hour time step, produced by NOVELTIS after a 12 year climatology study (2000-2011).

This map has been prepared within consultancy services Producing a Comprehensive, Validated Atlas for Wind Energy Resource Based on Satellite Data delivered to Palestinian Energy Authority.

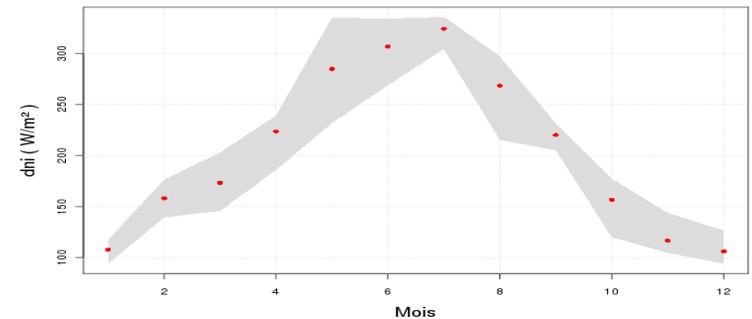
© 2014 NOVELTIS. All rights reserved. Copy is not allowed without explicit permission.

Disclaimer:
Considering the nature of climate fluctuations, interannual and long-term changes, as well as the uncertainty of measurements and applied methods, NOVELTIS does not take any responsibility whatsoever, and does not give any warranty on the accuracy of the data that were used to produce this map. NOVELTIS has done its utmost to make an assessment of climate conditions based on the best available data, software, and knowledge. It is recommended that the map be used as a guideline rather than an instrument to build wind power systems.



- ▶ Cover the whole country
- ▶ Include infrastructure and built areas

- Site assessment
 - ▶ Micro-scale modelling
 - ▶ Statistical downscaling
 - ▶ CFD
- Energy yield assessment
- Variability and uncertainties studies
 - ▶ Daily, monthly
 - ▶ P50, P75, P90
- Due Diligence documents



Contacts

Dimitri BOULZE

*Department manager,
environment, sustainable
development*

Email: dimitri.boulze@noveltis.fr

Phone: +33 562 88 11 07

Vincent Maupas

Renewable energies consultant

Email: vincent.maupas@noveltis.fr

Phone: +33 562 88 11 11