Accuracy enhanced solar maps for South Africa, Zambia and Malawi

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- Solar 101: Matching Solar Maps and Solar Technologies
- Accuracy Enhanced Solar Maps for South Africa
- Solar Maps: Zambia & Malawi
- Solar Development in Africa
Global Horizontal Irradiance (GHI): applies to PV and SWH

Direct Normal Irradiance (DNI): applies to CSP and CPV

-20%

-65%
Global Horizontal Irradiance (GHI) applies to PV and SWH.

Direct Normal Irradiance (DNI) applies to CSP and CPV.
DNI Solar Map: NREL data obtained from the SWERA website

Adapted from: NASA (2008)
DNI Solar Map: NREL data obtained from the SWERA website.
Ground Measurements
Accuracy-Enhanced Solar Resource Maps of South Africa

Direct Normal Irradiation
Global Horizontal Irradiation

Technical report

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giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
S Stellenbosch University
GeoSUN Africa
Geomodel Solar
Upington (+10.8%):
- Old: 2612 kWh/m²/a
- New: 2894 kWh/m²/a

Phalaborwa (-0.3%):
- Old: 1695 kWh/m²/a
- New: 1690 kWh/m²/a

For free download from [www.sauran.net](http://www.sauran.net) or [www.geosun.co.za](http://www.geosun.co.za).
High resolution Maps, Google Earth and GIS layers to follow soon.
High resolution Maps, Google Earth and GIS layers to follow soon.

Upington (+1.7%):
- Old: 2229 kWh/m²/a
- New: 2266 kWh/m²/a

Phalaborwa (+0.1%):
- Old: 1830 kWh/m²/a
- New: 1832 kWh/m²/a

For free download from [www.sauran.net](http://www.sauran.net) or [www.geosun.co.za](http://www.geosun.co.za).
Solar Resource Mapping Malawi & Zambia
Solar Resource Mapping
Malawi & Zambia

• Funded by World Bank – ESMAP
• Client: DoE (both Zambia and Malawi)
• Project Period of 2.5 – 3 years
• Scope:
  – Installation of 6 high accuracy solar and meteorological stations in Zambia and 3 in Malawi
  – Detailed accuracy enhanced maps: GHI (PV&SWH) and DNI (CSP&CPV)
  – Workshops, training and knowledge transfer
• Project Team: GeoModel Solar (primary consultant) – (satellite data modelling)
  GeoSUN Africa (ground stations), SGS Zambia/Malawi (local partner)
Ground Measurements in Tanzania

www.african-utility-week.com | www.clean-power-africa.com
SolarGIS satellite data uncertainty (Malawi)

DNI: $\pm 4\%$

GHI: $\pm 2.5\%$

Best Achievable uncertainty today
ESMAP Solar Maps for Zambia and Malawi

**Phase 1**
- **Zambia**: Initial Maps (Dec. 2014)
- **Malawi**: Initial Maps (June 2015)

**Phase 2**
- **Zambia**: Ground Measurements – 3 stations (Dec. 2015 to June 2016)
- **Malawi**: Ground Measurements – 6 stations (Dec. 2015 to June 2016)

**Phase 3**
- **Zambia**: Accuracy-improved maps and data (Dec. 2016 to June 2017)
- **Malawi**: Accuracy-improved maps and data (Dec. 2017)

Solar Atlas for Malawi

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www.african-utility-week.com | www.clean-power-africa.com
The African Solar Market
Thank you for your attention

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