

The latest on DNI and Diffuse measurement options

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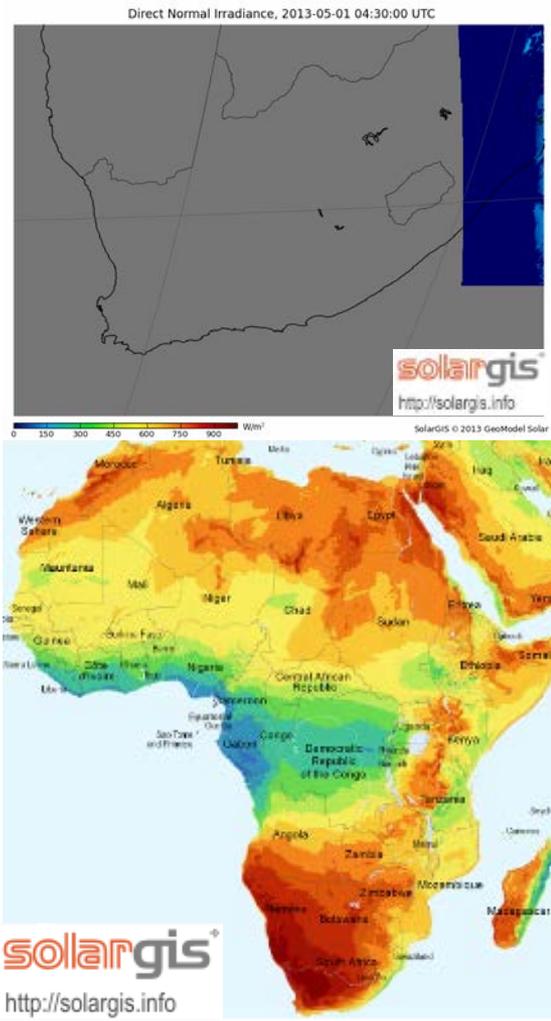


RENEWABLE & SUSTAINABLE
ENERGY STUDIES

The latest on DNI and Diffuse measurement options

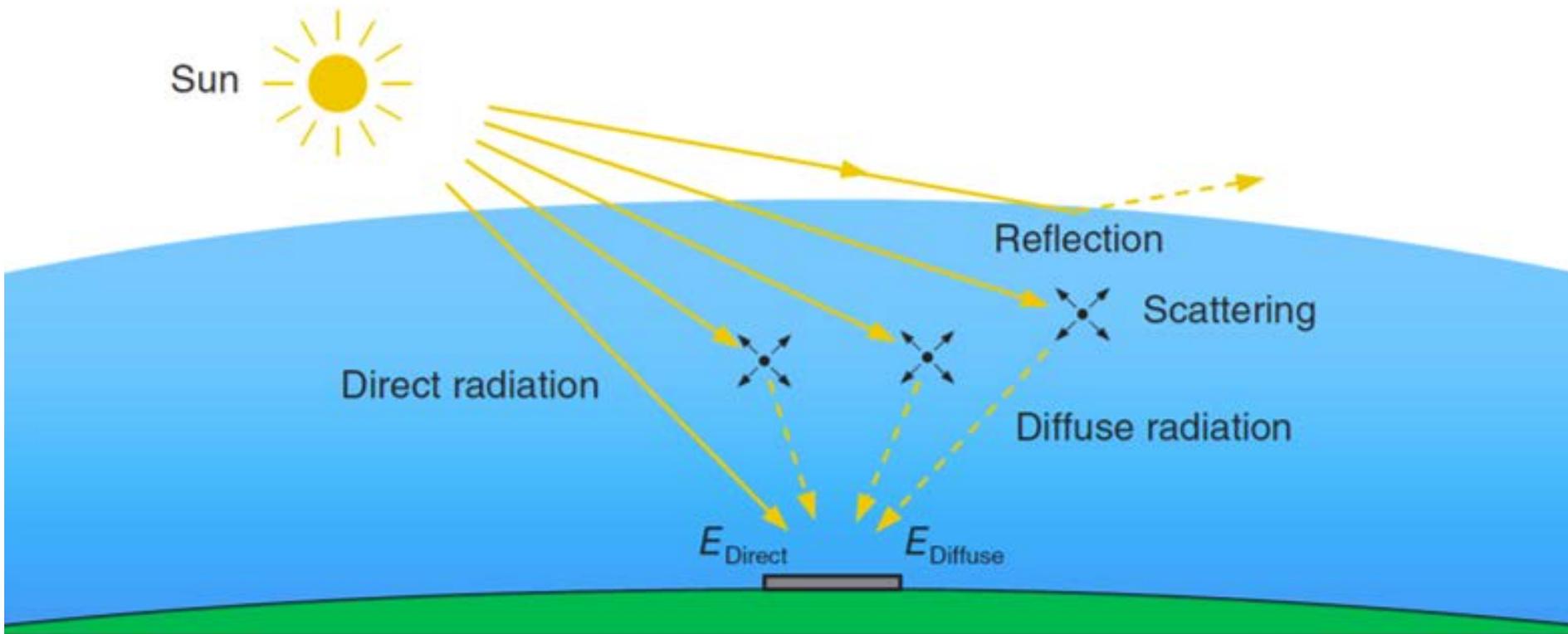
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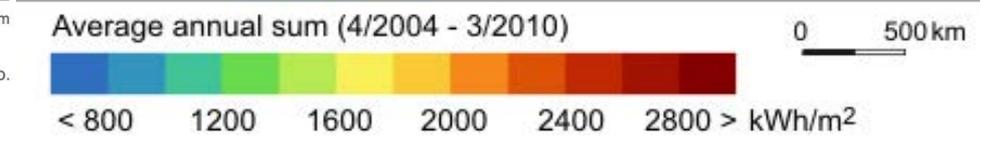
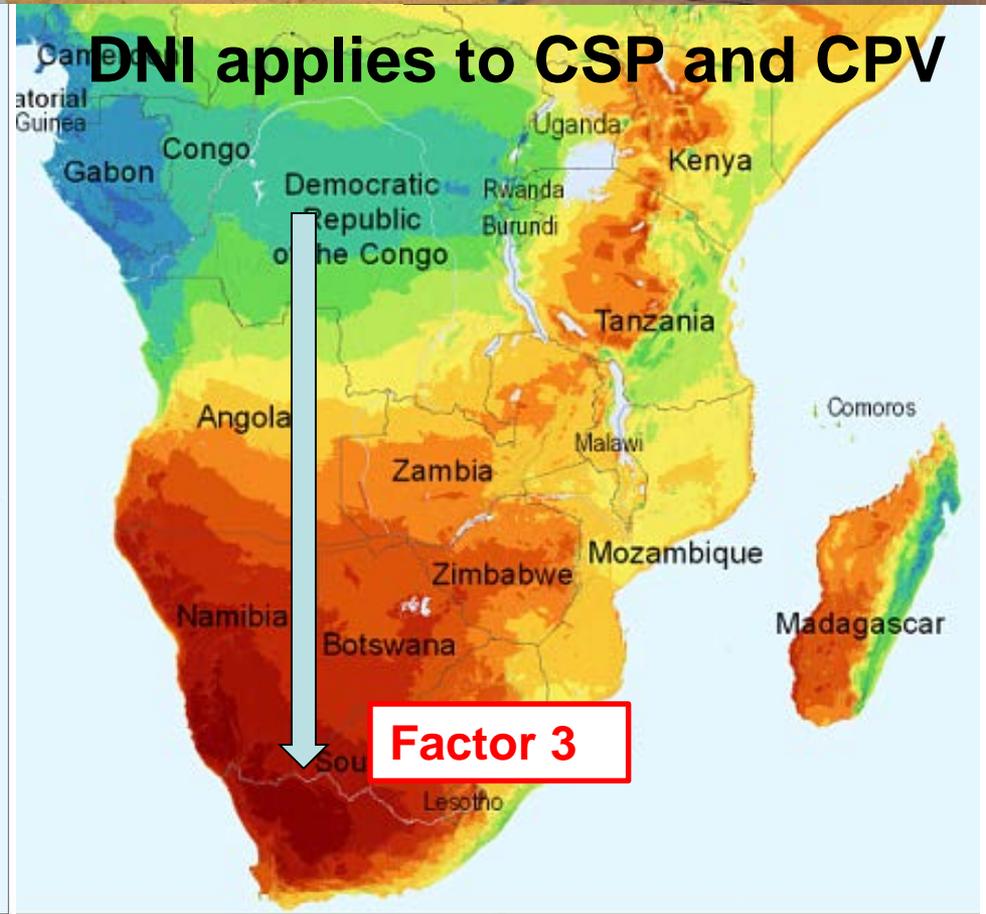
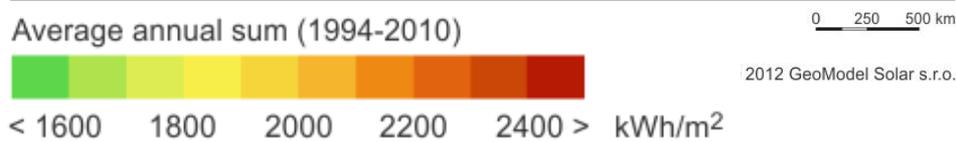
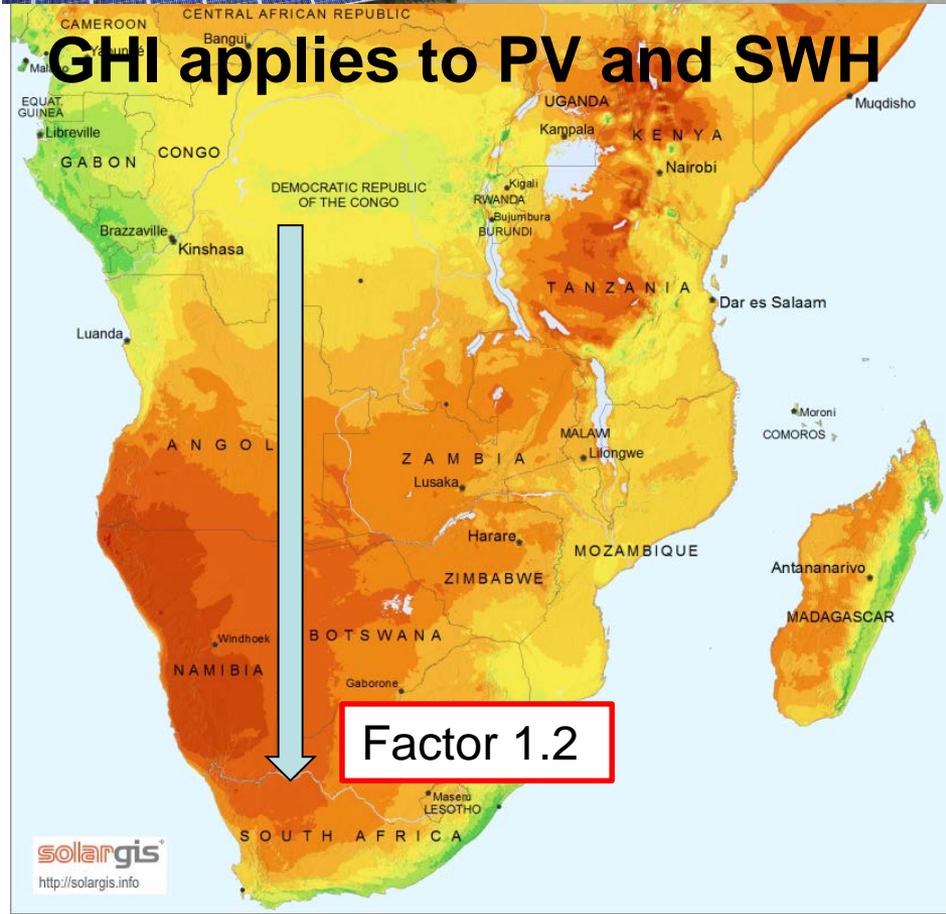


DNI and GHI

Direct Normal Irradiance and Global Horizontal

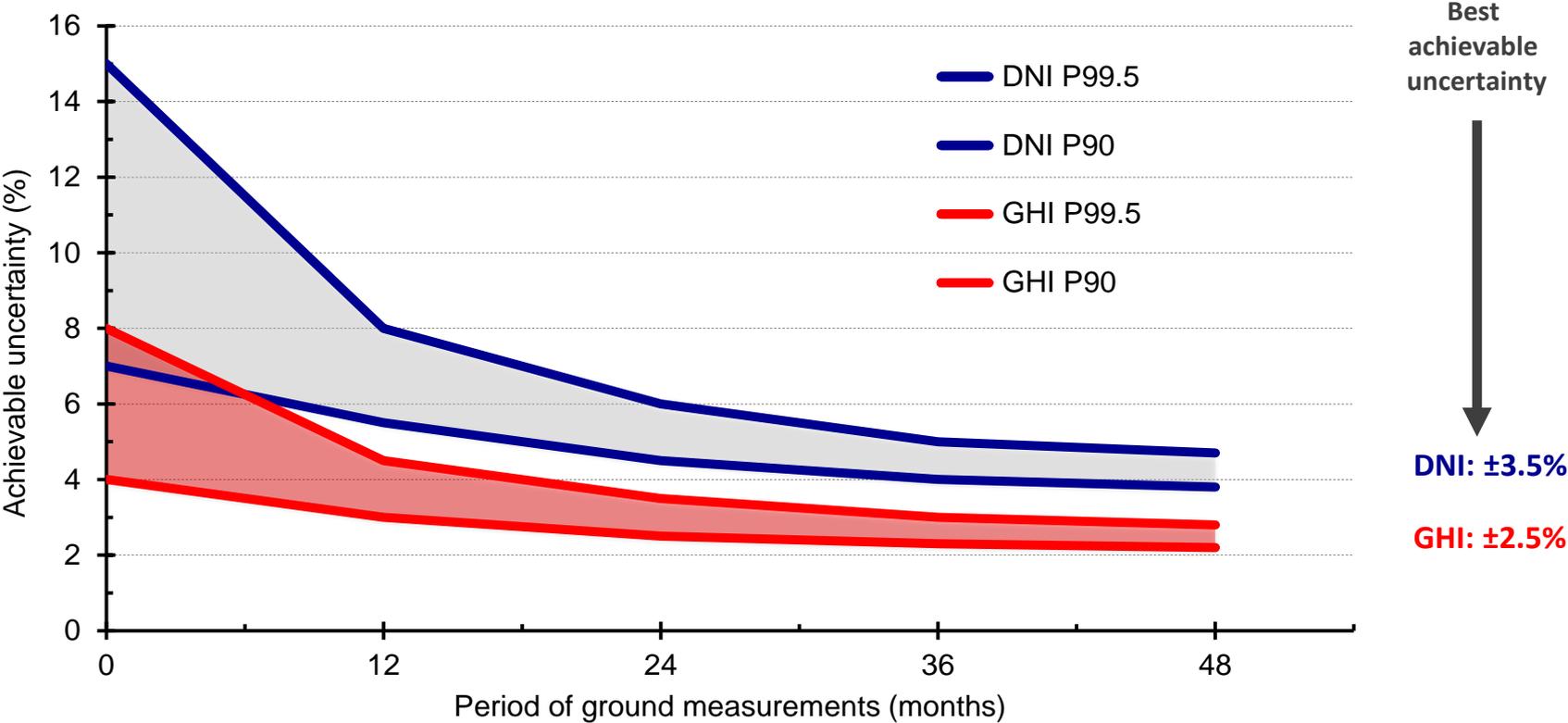


Source: K. Mertens, textbook-nv.org



Solar Resource - Reducing uncertainty

Values are indicative and represent long term annual averages.



Running a ground-monitoring campaign and combining measurements with satellite derived data is the way to obtain low uncertainties.

Source: SolarGIS



Solar Resource – Ground Measurements

- All CSP developers deploy on-site solar (and meteorological) measurements
- Mandated by RE-IPPPP (CSP) and required by banks
- Due to higher uncertainties of satellite derived data
- In established markets PV plants can rely on satellite derived data only (no ground measurements) for GHI. In new markets (mainly developing countries) ground measurements are required.



History



CORRECTION AND REDUCTION OF SUNSHINE CARDS

No correction is needed if the card is only scorched, without being burnt through.

For each hour's sunshine, when a correction is necessary, the Observer must apply it as follows:

- ① 1 rounded end in the hour: no correction.
- ② 2 rounded ends in the hour: subtract 0.1 of the hour from the total sunshine for the hour.
- ③ 3 or 4 rounded ends in the hour: subtract 0.2 of an hour sunshine for the hour.
- ④ For 6 rounded ends in the hour: subtract 0.3 of an hour from the total sunshine for the hour.

If a burn starts in an hour and finishes in a subsequent hour any corrections necessary must be made in which they occur.

After measuring the cards with the scale and applying any corrections necessary, the reductions must be entered onto page B of the Daily Register. The total must then be entered in column (72-74) of MO.49 ledger sheet.

ZIKOMO KWAMBIRI

SUNSHINE-CARD REDUCTION

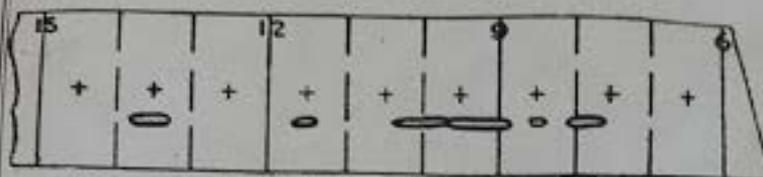


Fig. 1. Each one of these burns shows a rounded end at the start, and another rounded end at the finish.

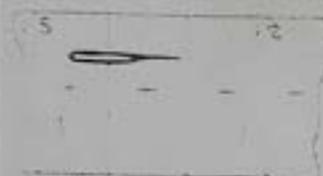


Fig. 2. This burn has a round end at the left and a pointed end at the right.

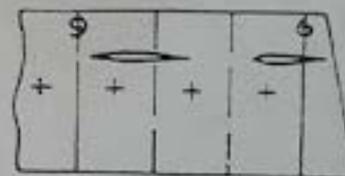


Fig. 3. Each of these burns has two pointed ends.

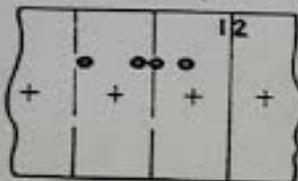


Fig. 4. A circular burn has a round end at the start and also a round end at the finish.

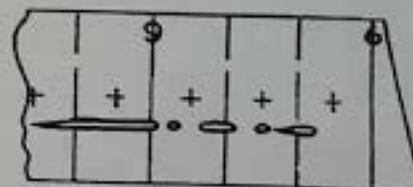


Fig. 5.
Number of round ends in each hour:-
0 0 4 3 1
Correction applied for round ends:-
0 0 -0.2 -0.2 0

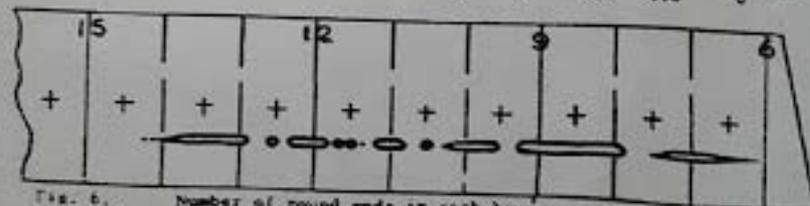


Fig. 6.
Number of round ends in each hour:-
0 4 0 3 2 0 1 0
Correction applied for round ends:-
0 -0.2 -0.3 -0.2 -0.1 0 0 0

History



History



DNI



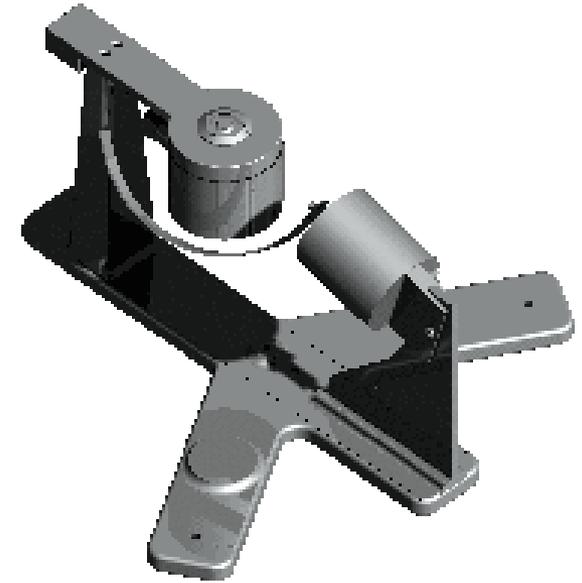
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Alternatives – Small trackers



Alternatives - RSR



Alternatives - RSR



Summary

| Option | Instrument | DNI uncertainty (daily) | Instrument + tracker (if required) | With additional equipment to obtain Modbus output |
|--------|--|-------------------------|------------------------------------|---|
| 1 | SPN1 | ~ 5 – 6 % | R 65 000 | R 80 000 |
| 2 | RSR | 4 % | R 100 000 | R 125 000 |
| 3 | Pyrheliometer (Second Class*) on small tracker | 2 % | R 130 000 | R 130 000 |
| 4 | Pyrheliometer (First Class*) on conventional tracker | 1 % | R 220 000 | R 235 000 |

*ISO 9060 classification

Search

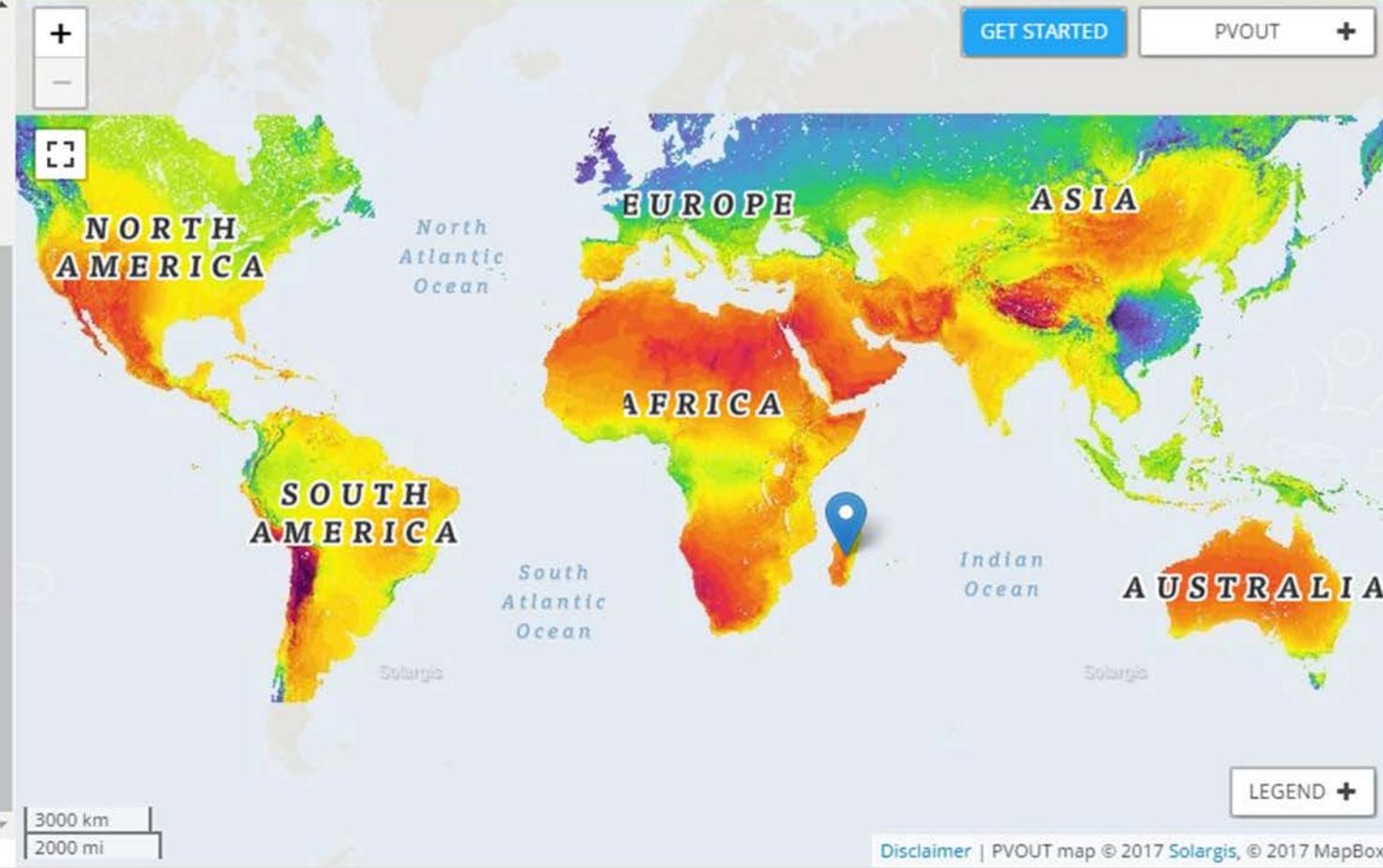
-19.642588, 46.582031

Betafo, Vakinankaratra, Madagascar

[GET STARTED](#)

Site Data PV Power Calculator

| | | |
|---------|----------------------------------|--------------------------|
| PVOUT ⚡ | 1852 kWh/kWp per year | <input type="checkbox"/> |
| GHI | 2188 kWh/m ² per year | |
| DNI | 2333 kWh/m ² per year | |
| DIF | 636 kWh/m ² per year | |
| GTI | 2348 kWh/m ² per year | |
| OPTA | 23° / 0° | |
| TEMP | 18.5 °C | <input type="checkbox"/> |
| ELE | 1136 m | <input type="checkbox"/> |



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Thank you for your attention



Contact Details

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