Meso-scale Mapping of Solar Resource

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http://geomodelsolar.eu
http://www.crses.sun.ac.za/

What is required?

PV

GHI (Global Horizontal Irradiation) or related e.g. GTI (Global Tilt Irradiation)

CSP/CPV

DNI (Direct Normal Irradiation)

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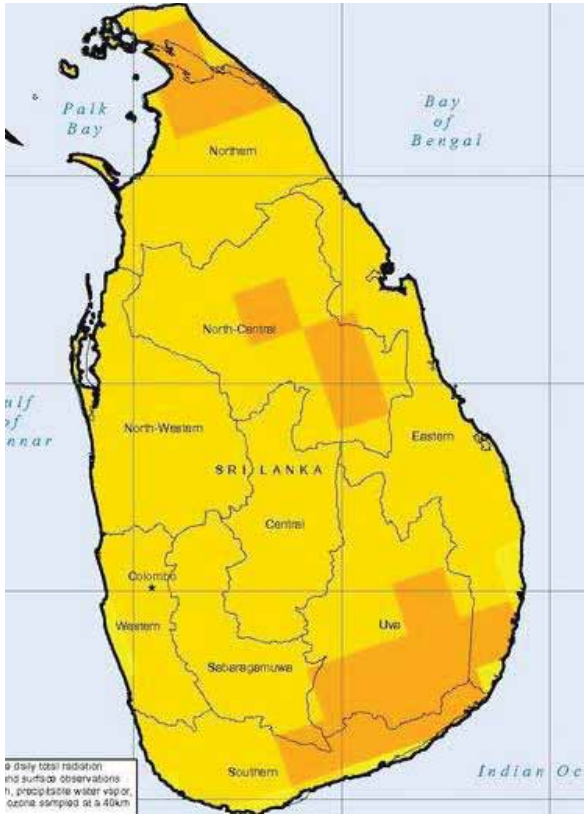
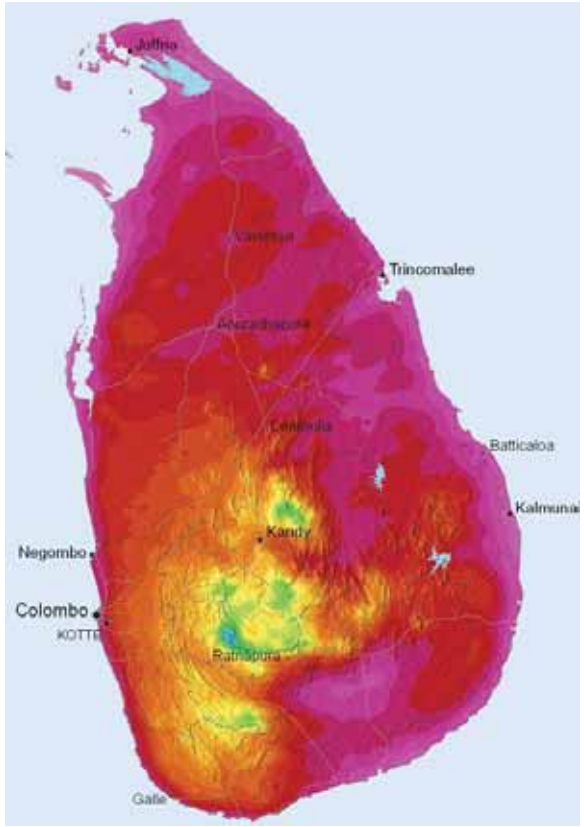
Traditionally Well-known Solar Resource Databases



Modern Satellite-based Solar Resource Databases



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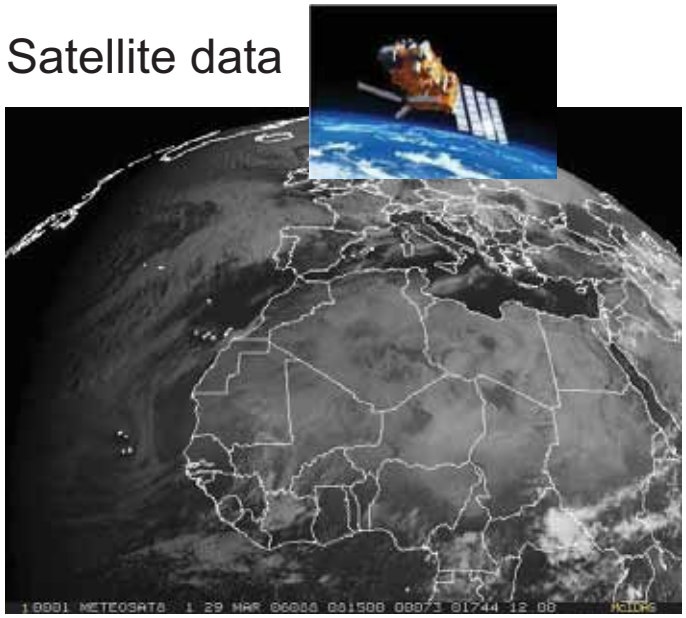
Modern Solar database – inputs (real-time)

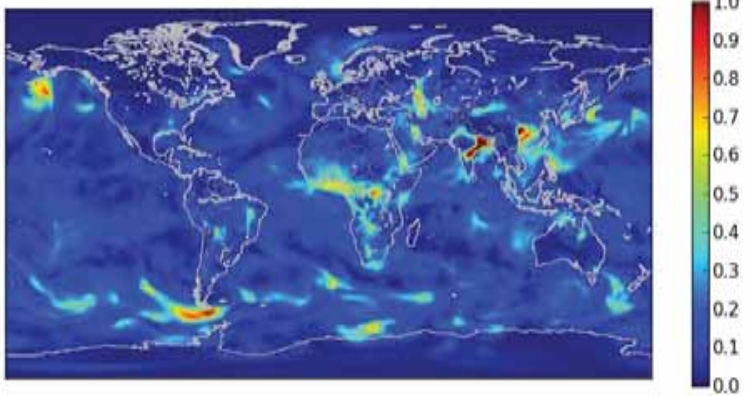
Satellite data



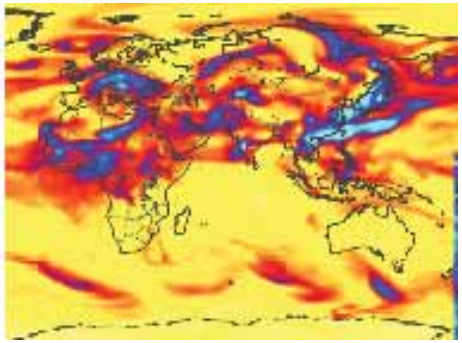
Temporal resolution: 15 or 30 min
Spatial resolution: 3 km

Daily AOD

Aerosol Optical Depth (AOD)
125 km (6 hours)



Water vapour
35 km (6 hours)



High-resolution terrain
90 meters

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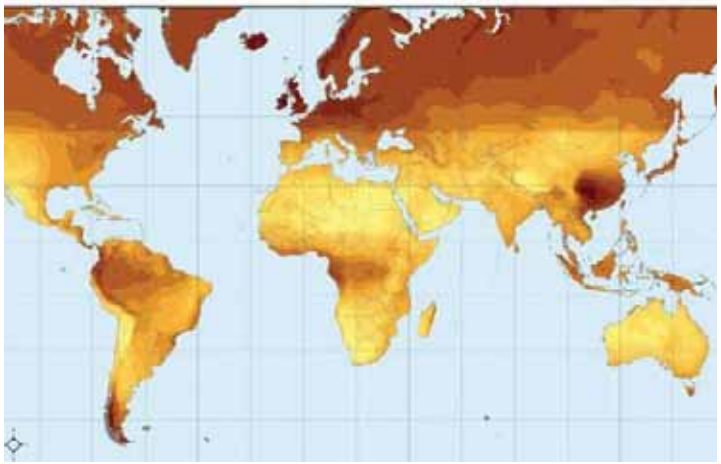
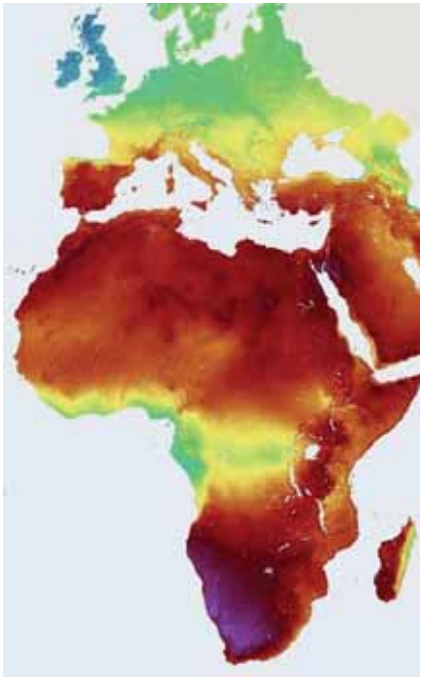
Uncertainty? Which Data is Bankable?

1% - 4%



GHI – 5% to 12%
DNI – 10% to 50%



GHI – 3% to 6%
DNI – 6% to 12%

(Uncertainty of annual values)

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Satellite vs. ground measurements??

OR

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Satellite vs. ground measurements??

AND

~~OR~~

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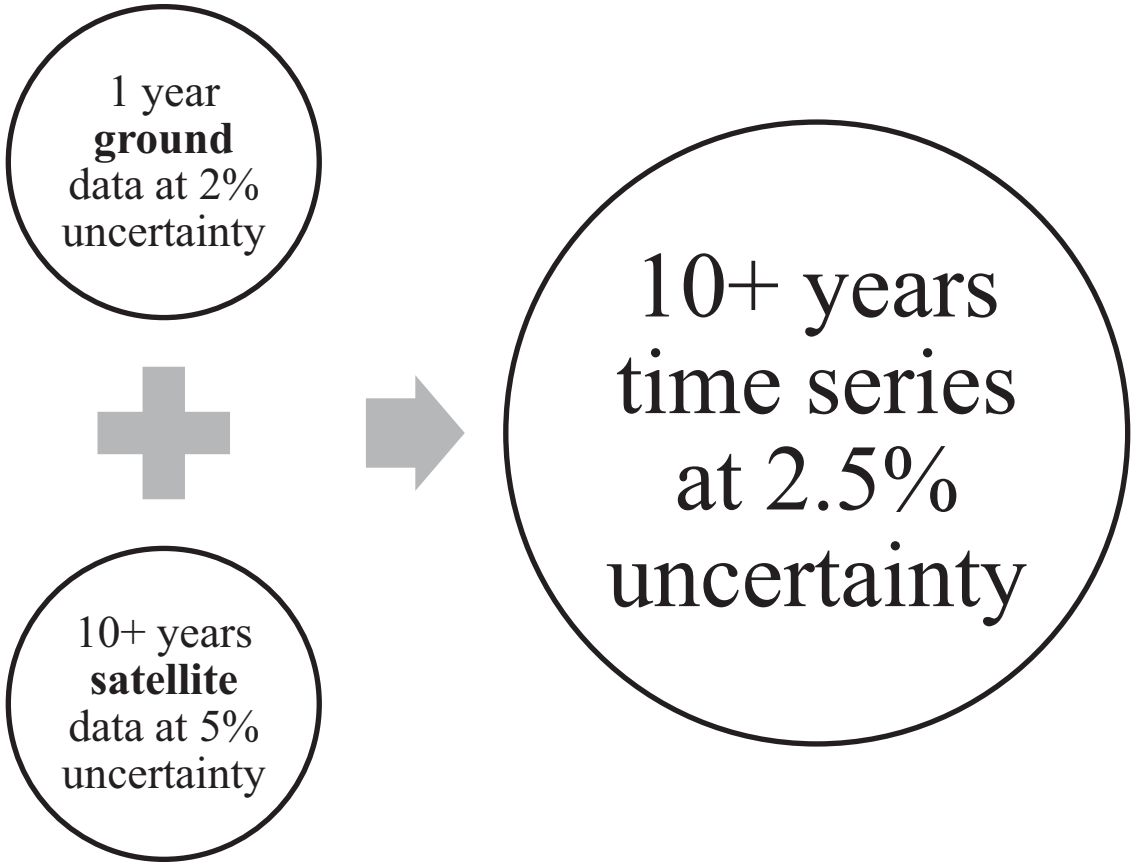
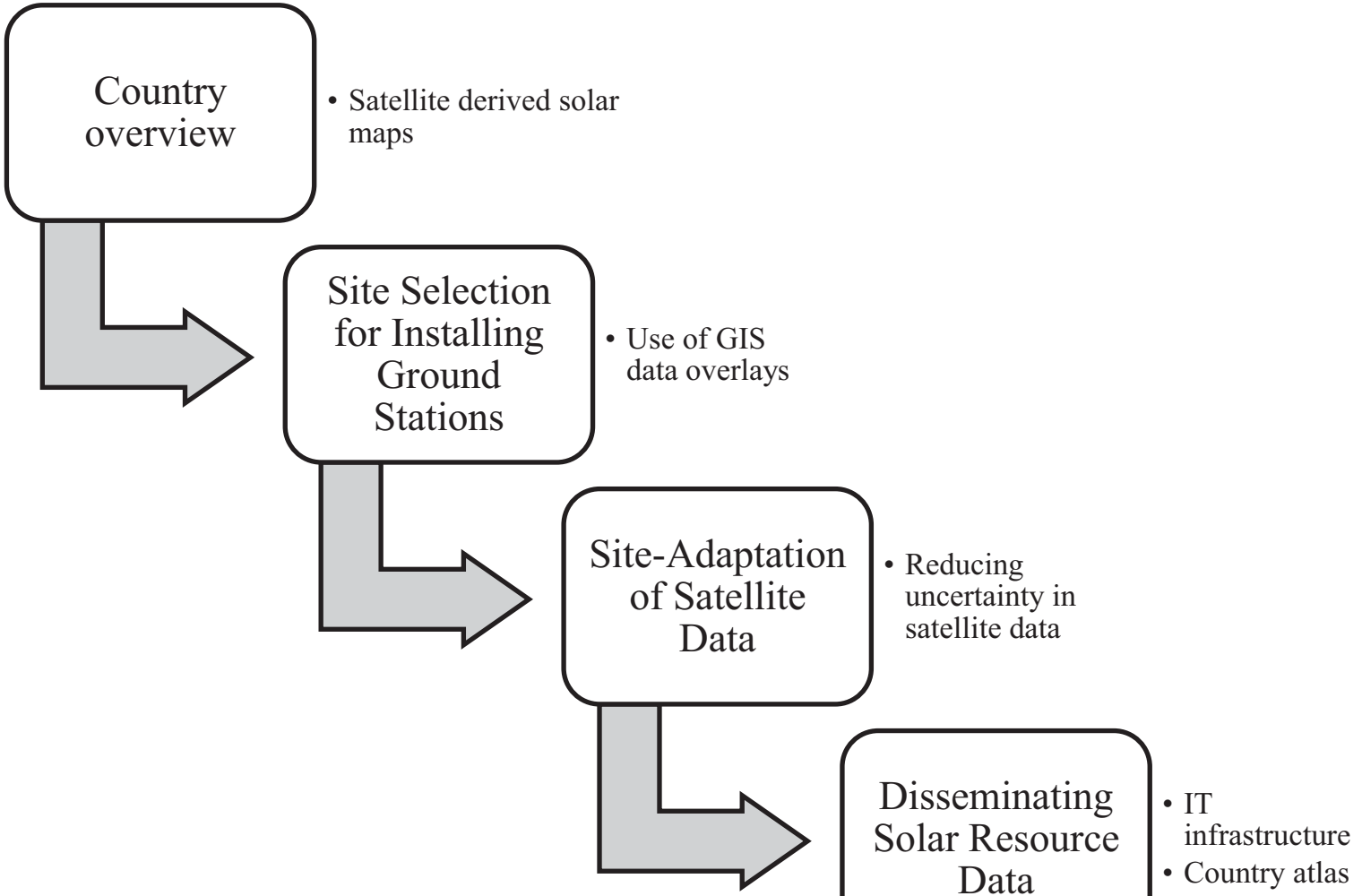

1 year
ground
data at 2%
uncertainty
10+ years
satellite
data at 5%
uncertainty
10+ years
time series
at 2.5%
uncertainty

Meso-scale Solar Resource Mapping in 4 Steps



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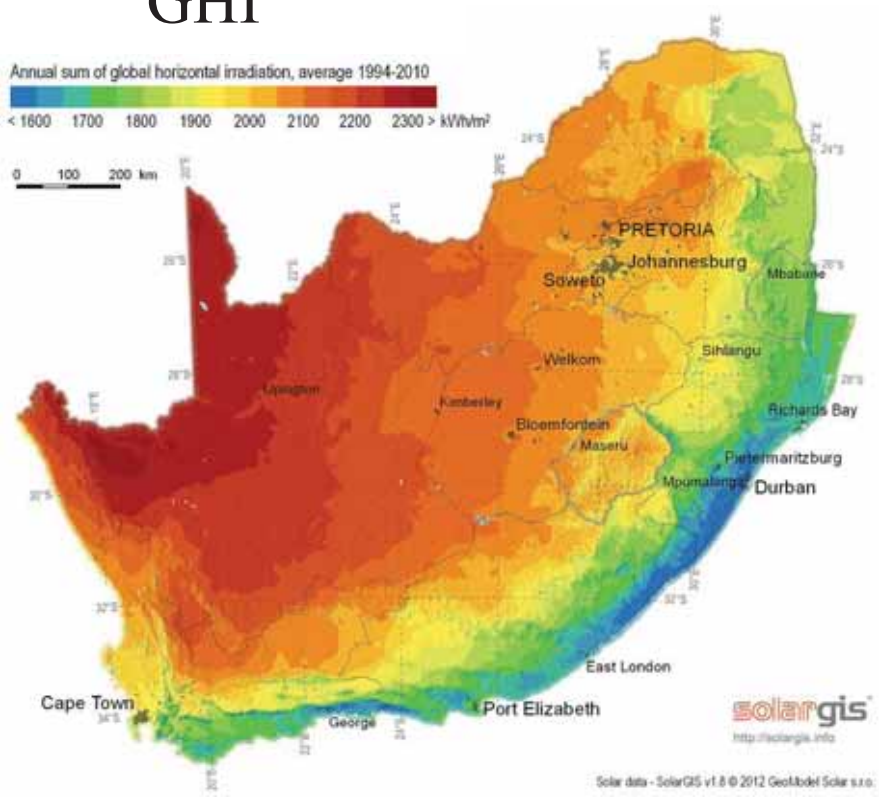
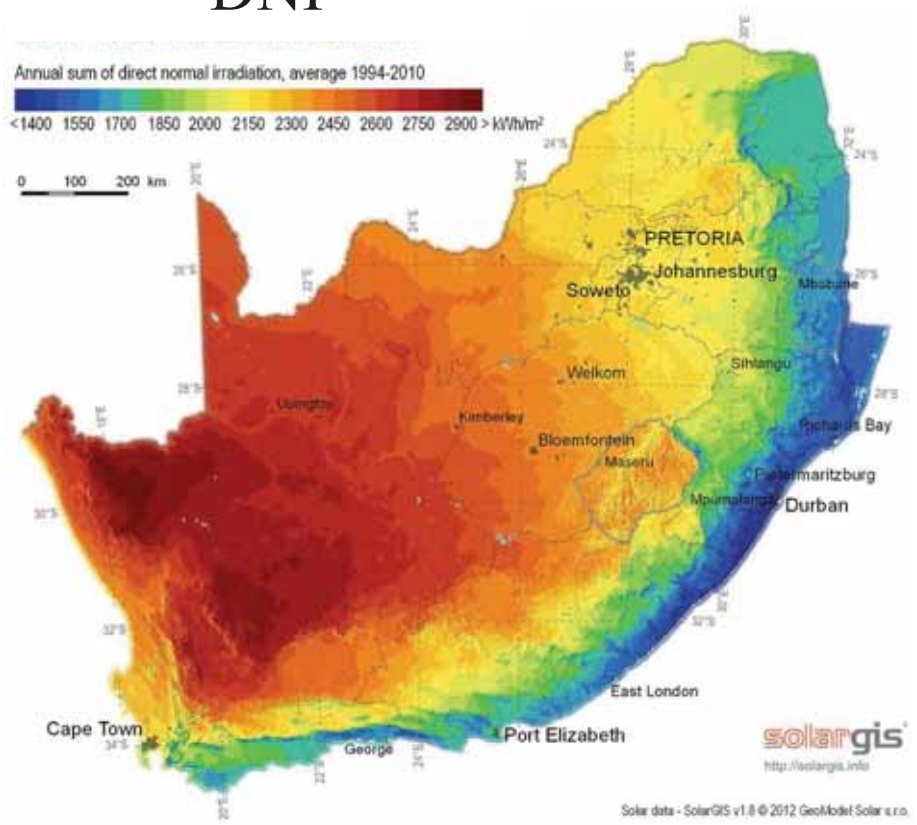
Step 1: Country overview

GHI



DNI



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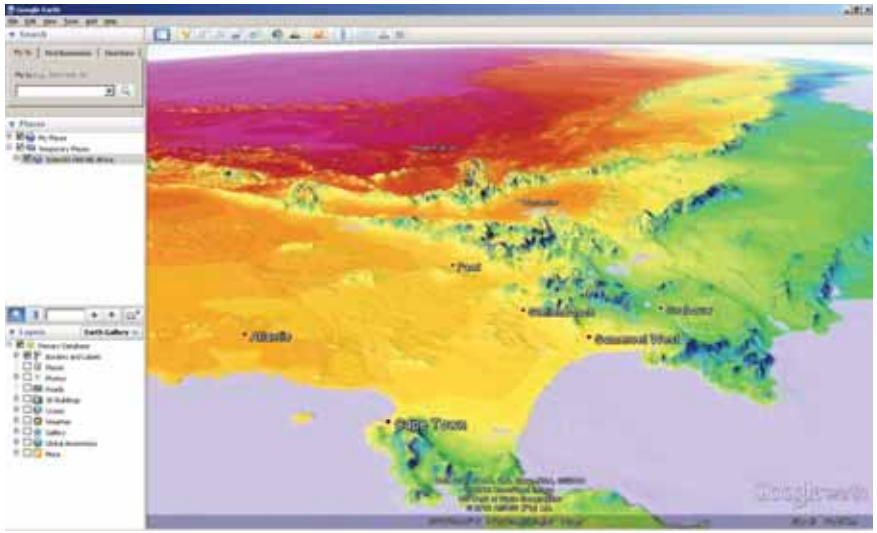
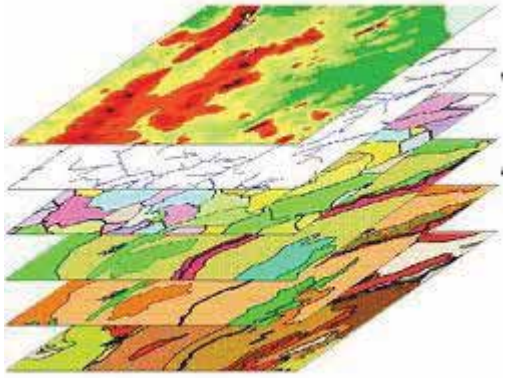
Step 2: Site Selection for Installing Ground Meteo Stations





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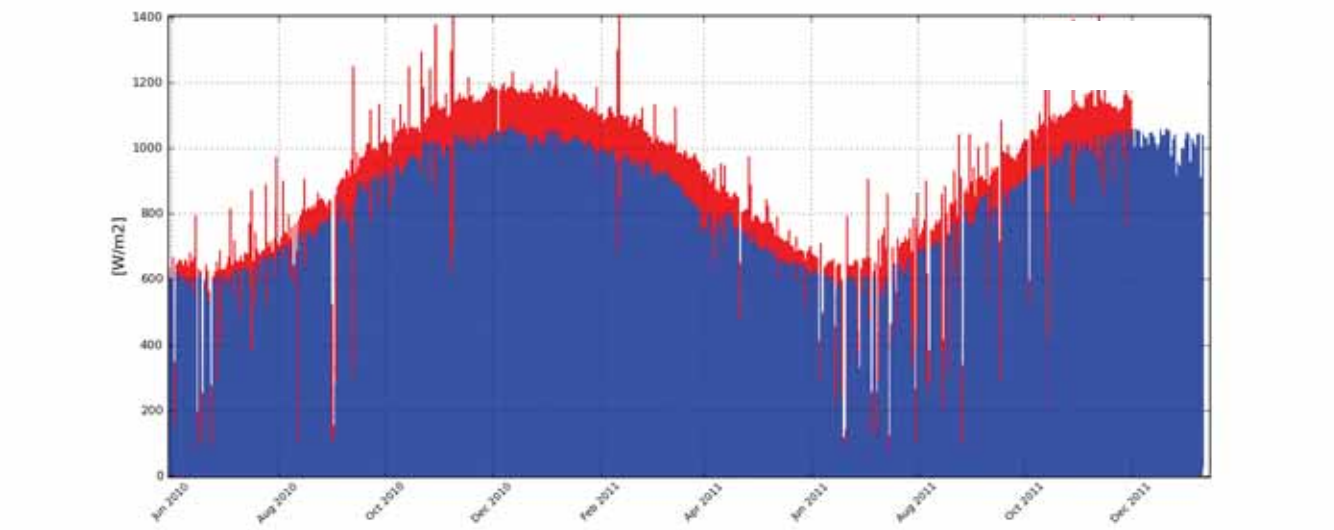
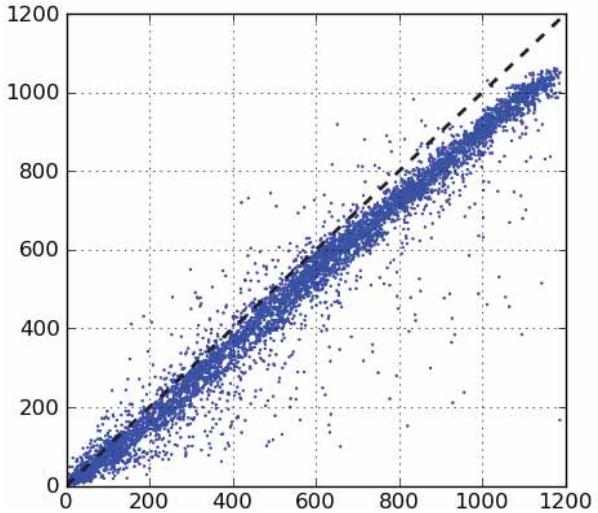
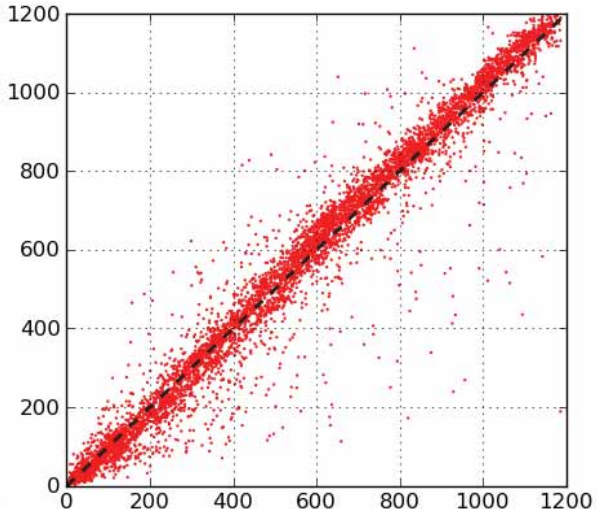
Step 3: Site-Adaptation of Satellite Data



…before data correlation



…after data correation



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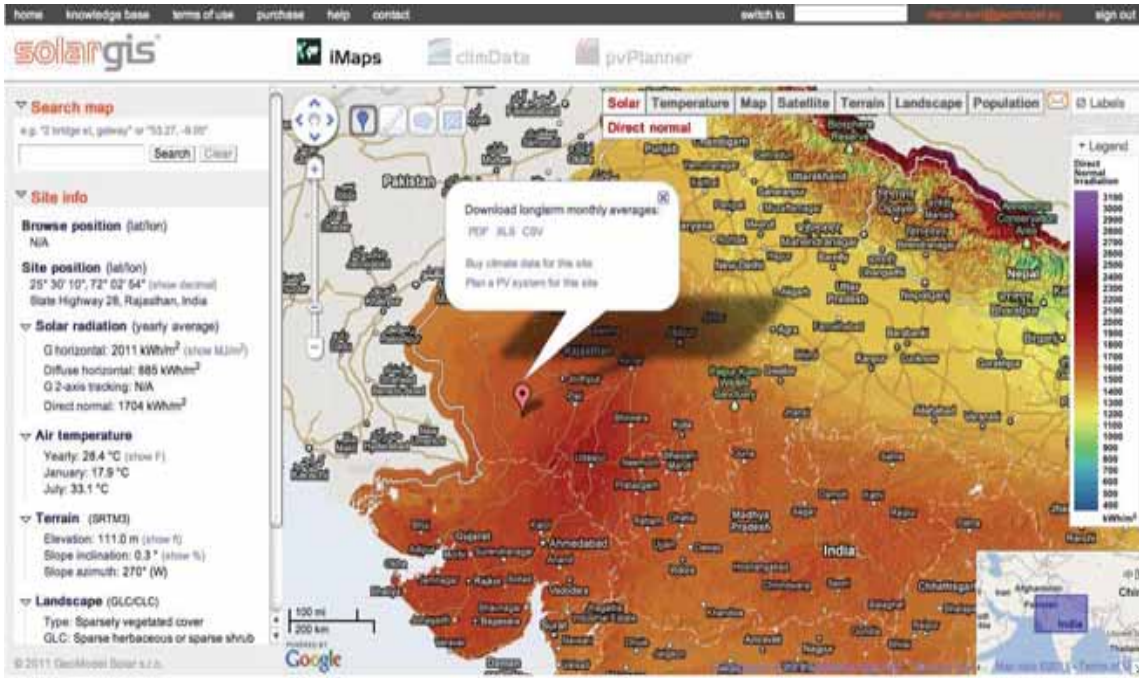
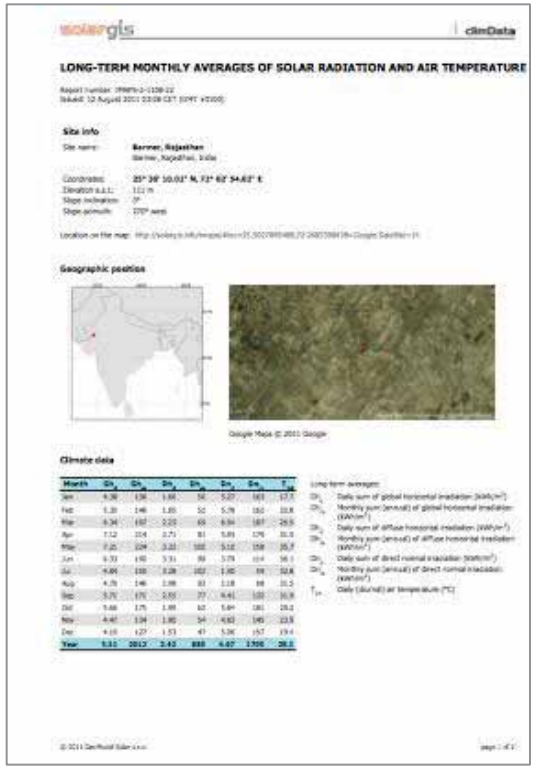
Step 4: Disseminating Investor-Grade Solar Resource Data





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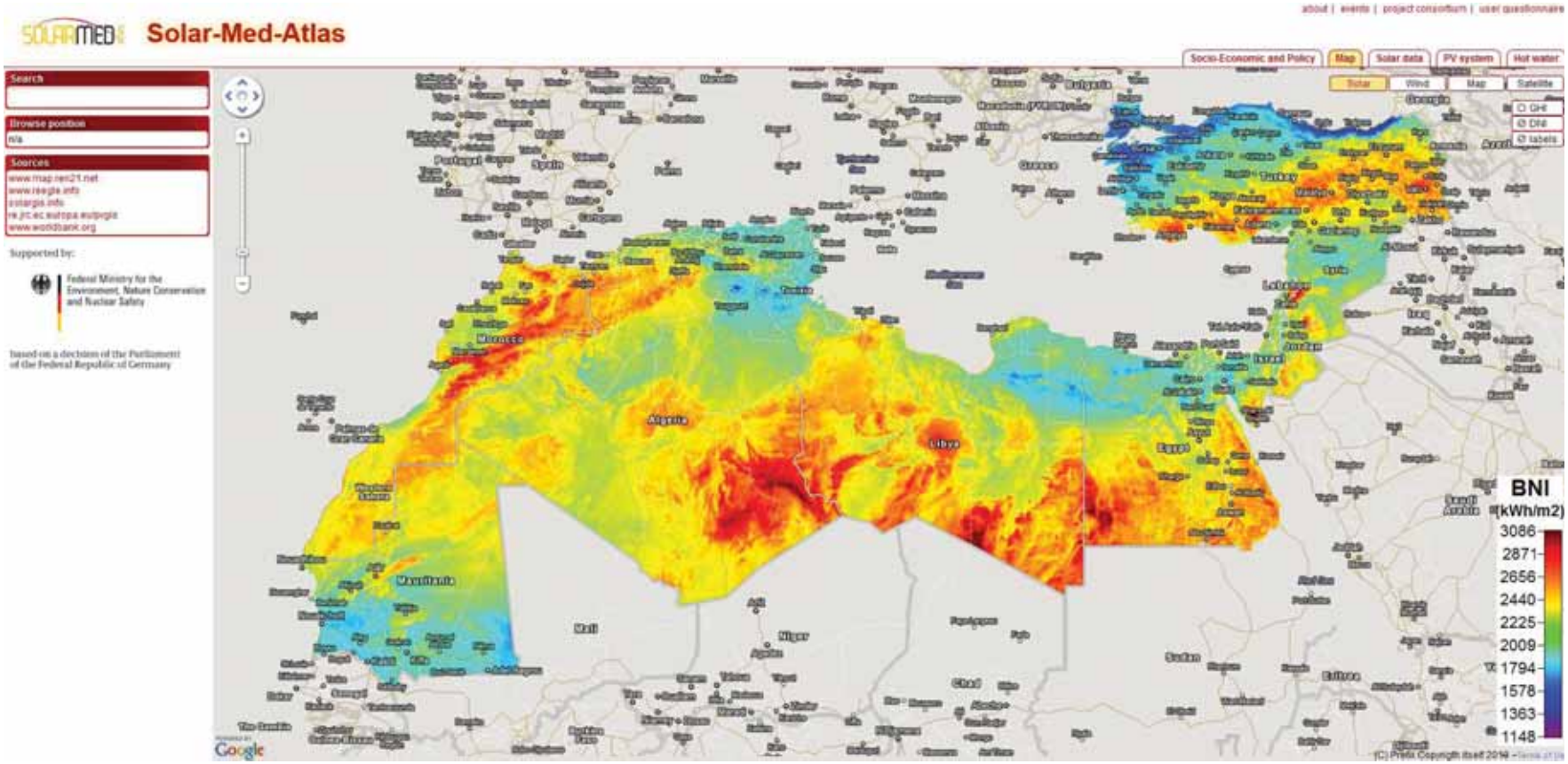

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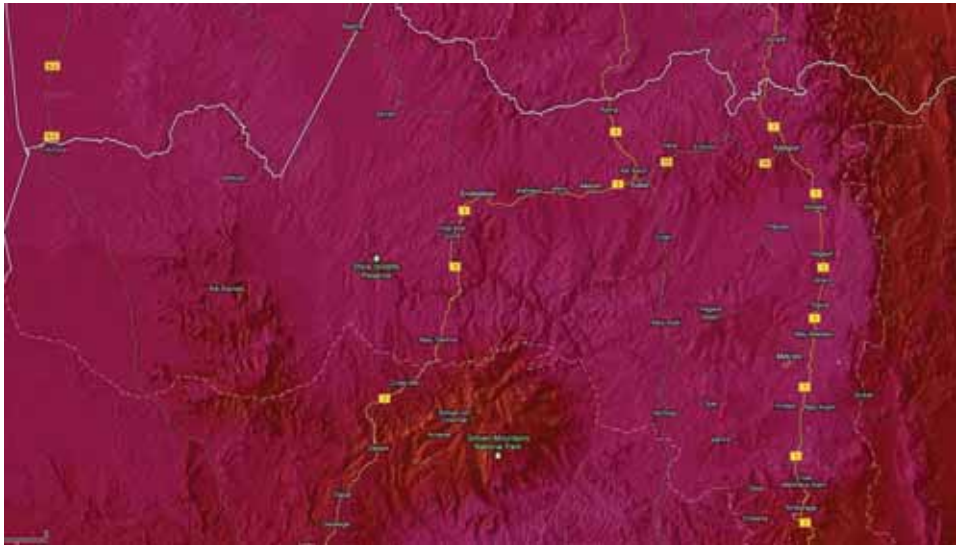
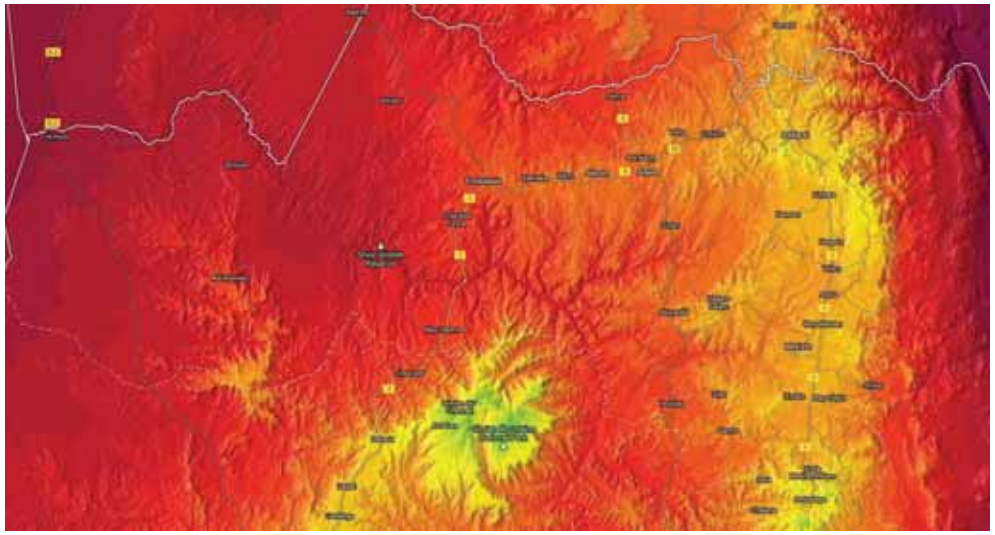
GHI and DNI is only part of the information required



GHI



TEMP

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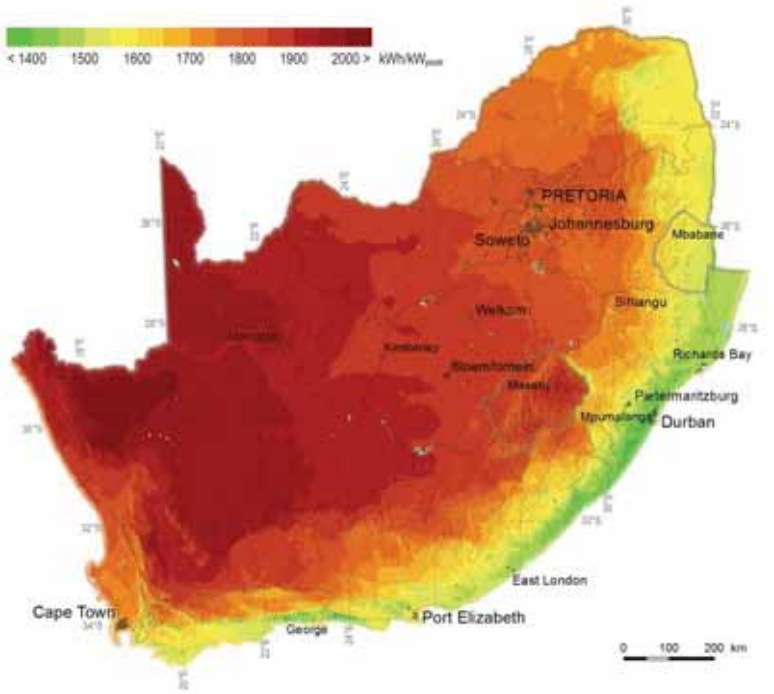
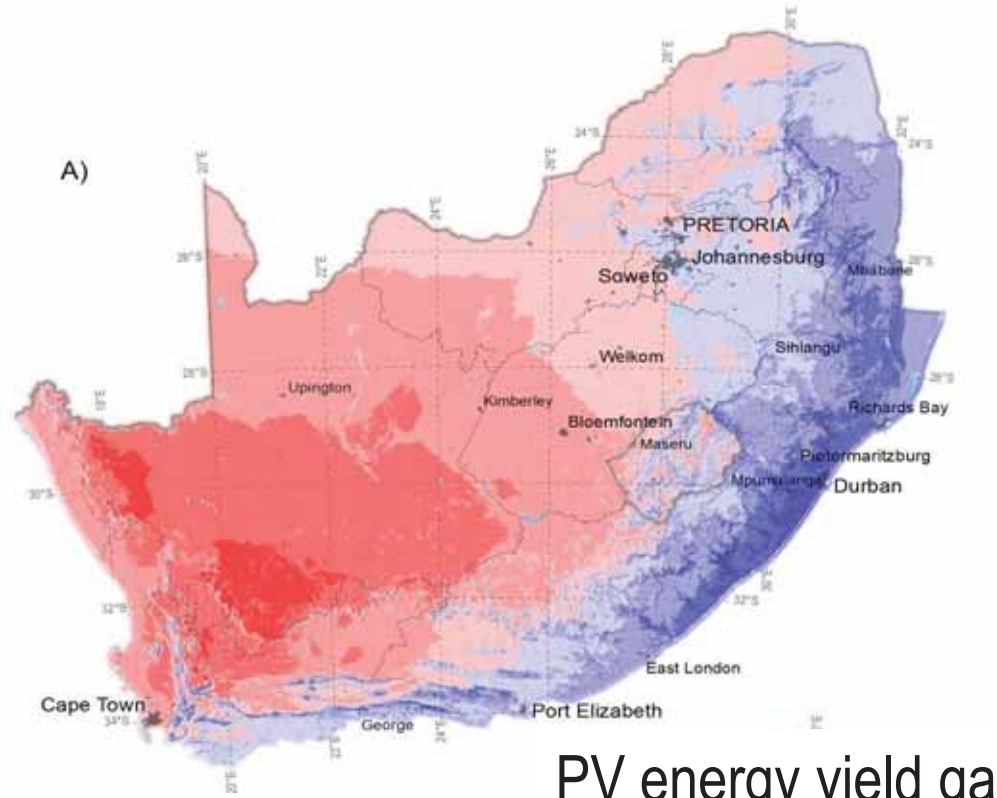
PV yield output, GTI for tracker systems, etc.



PV for fixed panels



PV energy yield gain from 1-axis tracker

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Satellite data/maps are really only good if they have been validated with high quality ground measurements

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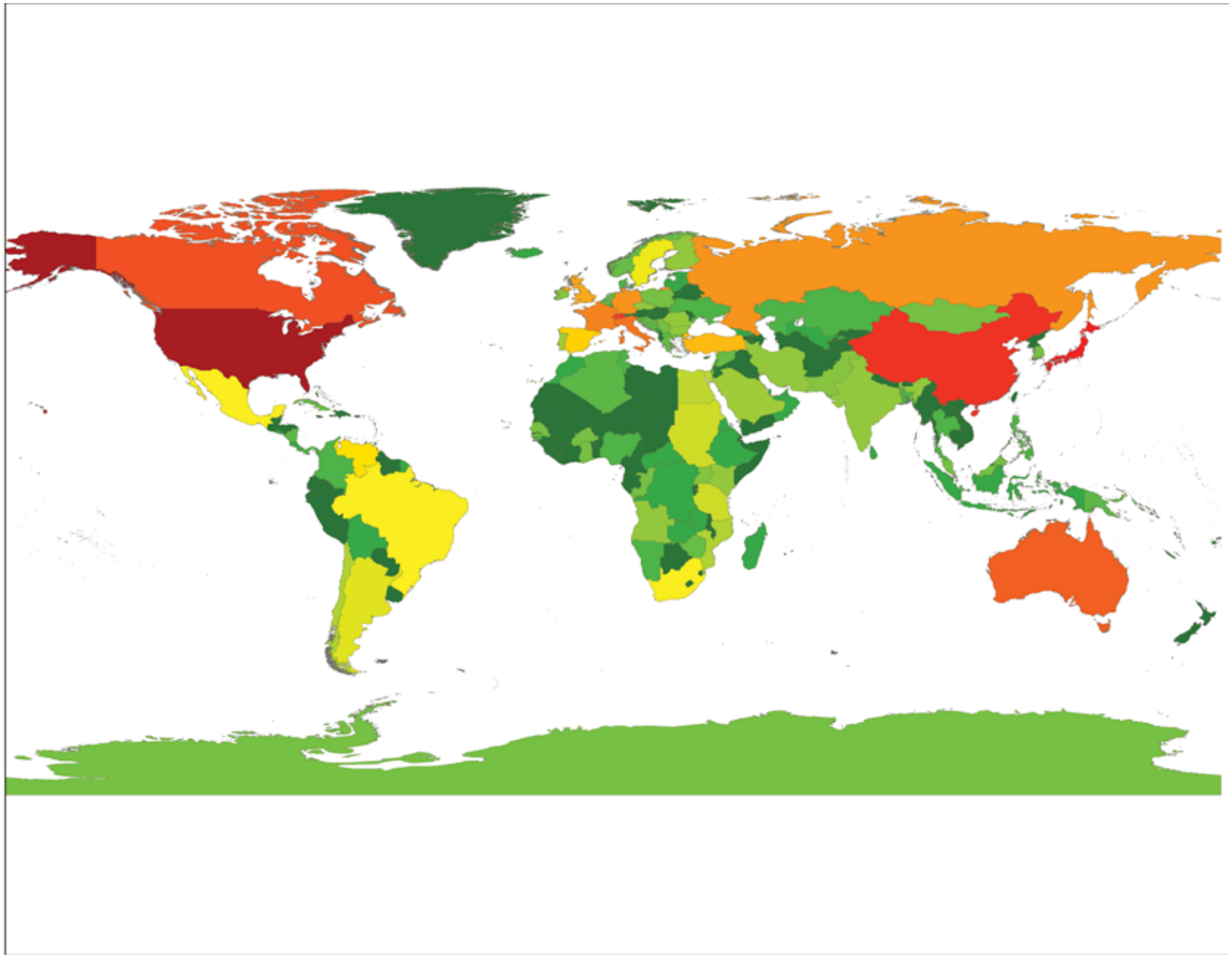
Solar Measurement Stations

Source: Meteonorm

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 18
- 21
- 24
- 29
- 31
- 34
- 41
- 44
- 46
- 67
- 78
- 90
- 268



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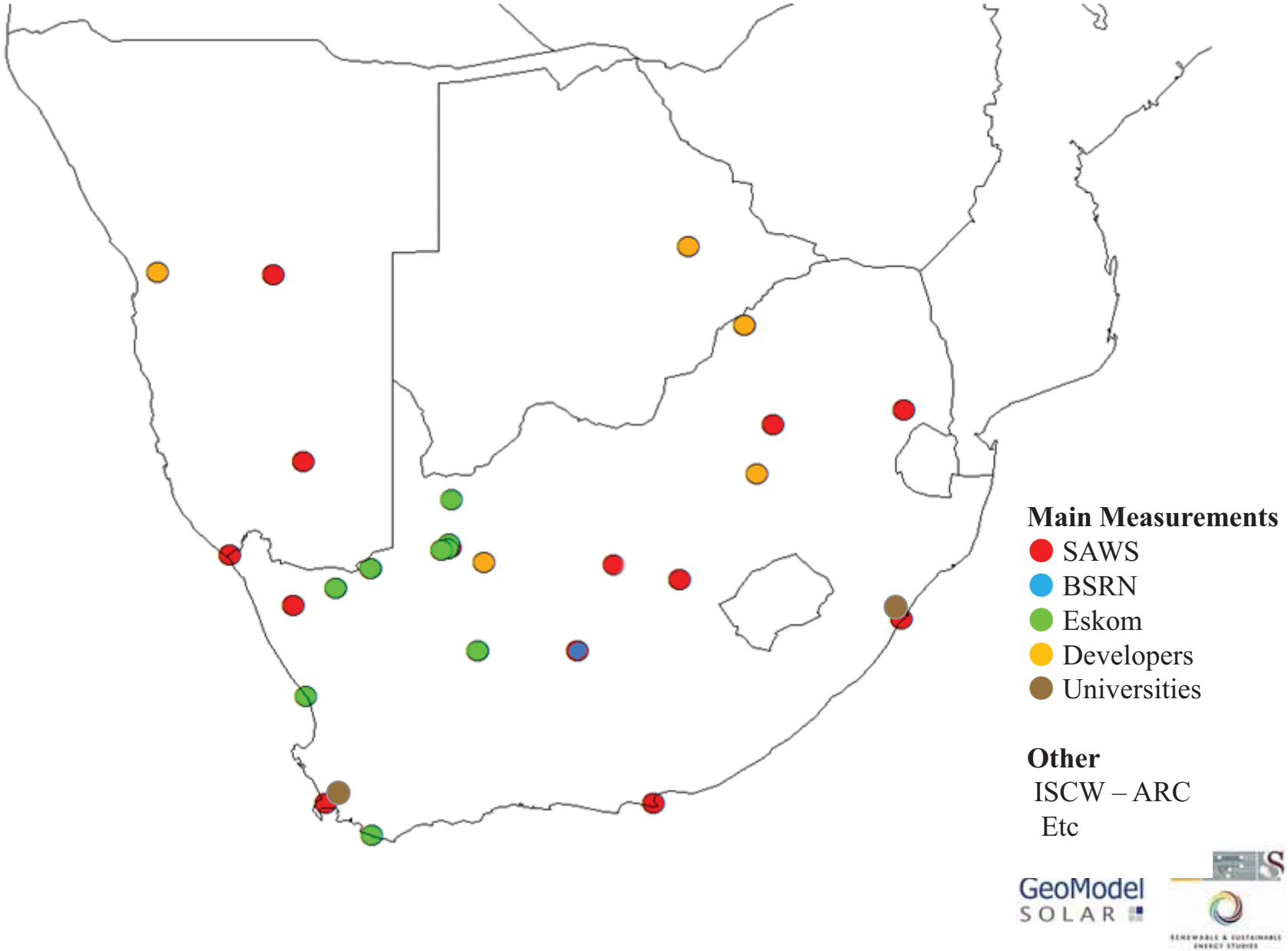
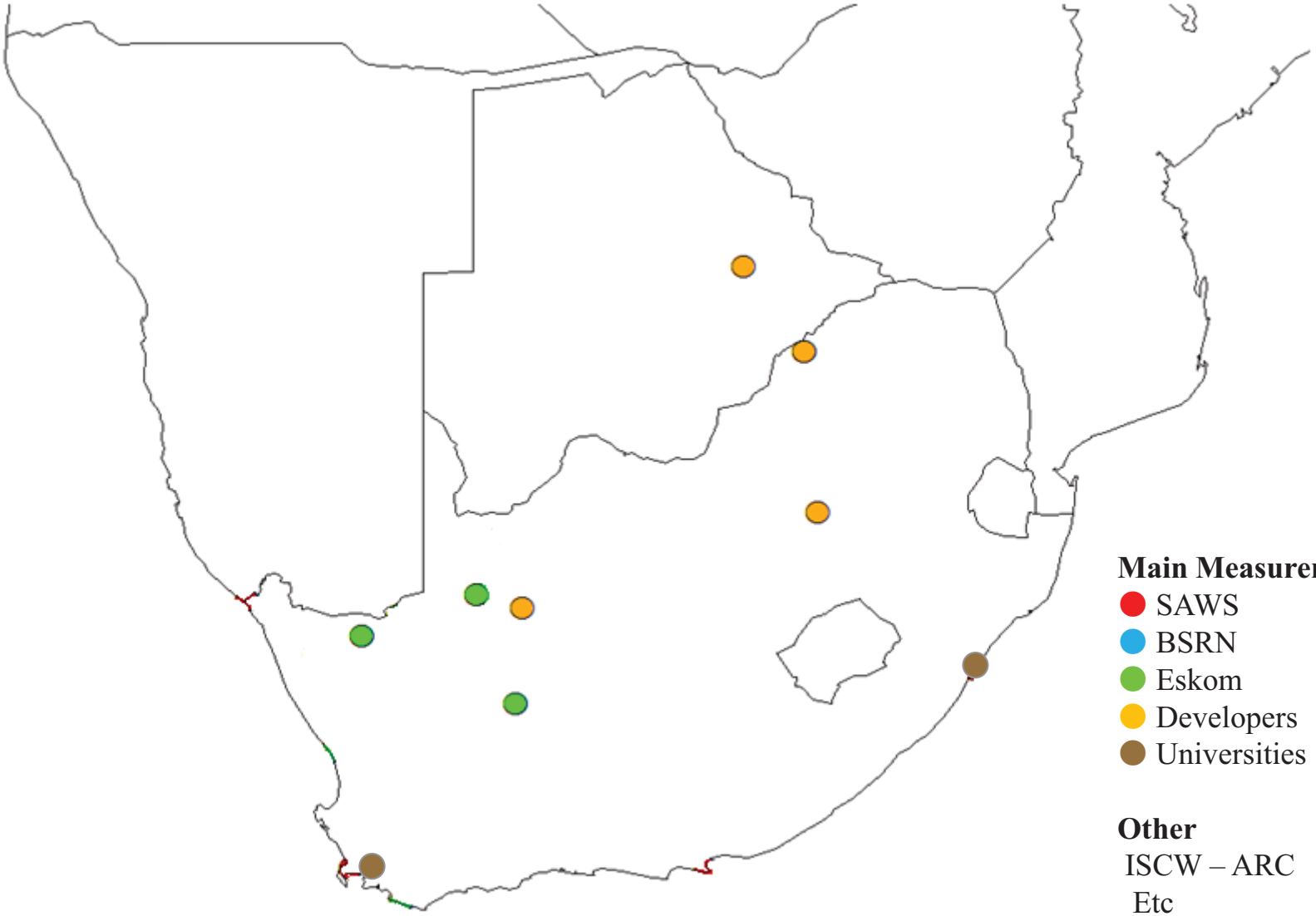

Main Measurements
SAWS
BSRN
Eskom
Developers
Universities
Other
ISCW – ARC
Etc
GeoModel
SOLAR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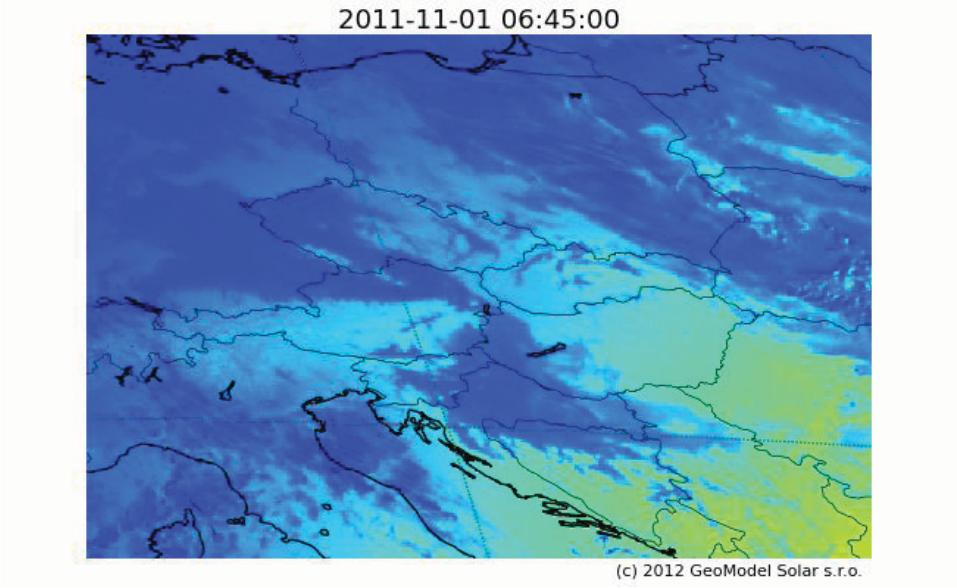
SOLAR

Next steps…



Solar Resource Forecasting

Grid Management

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Thank You

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