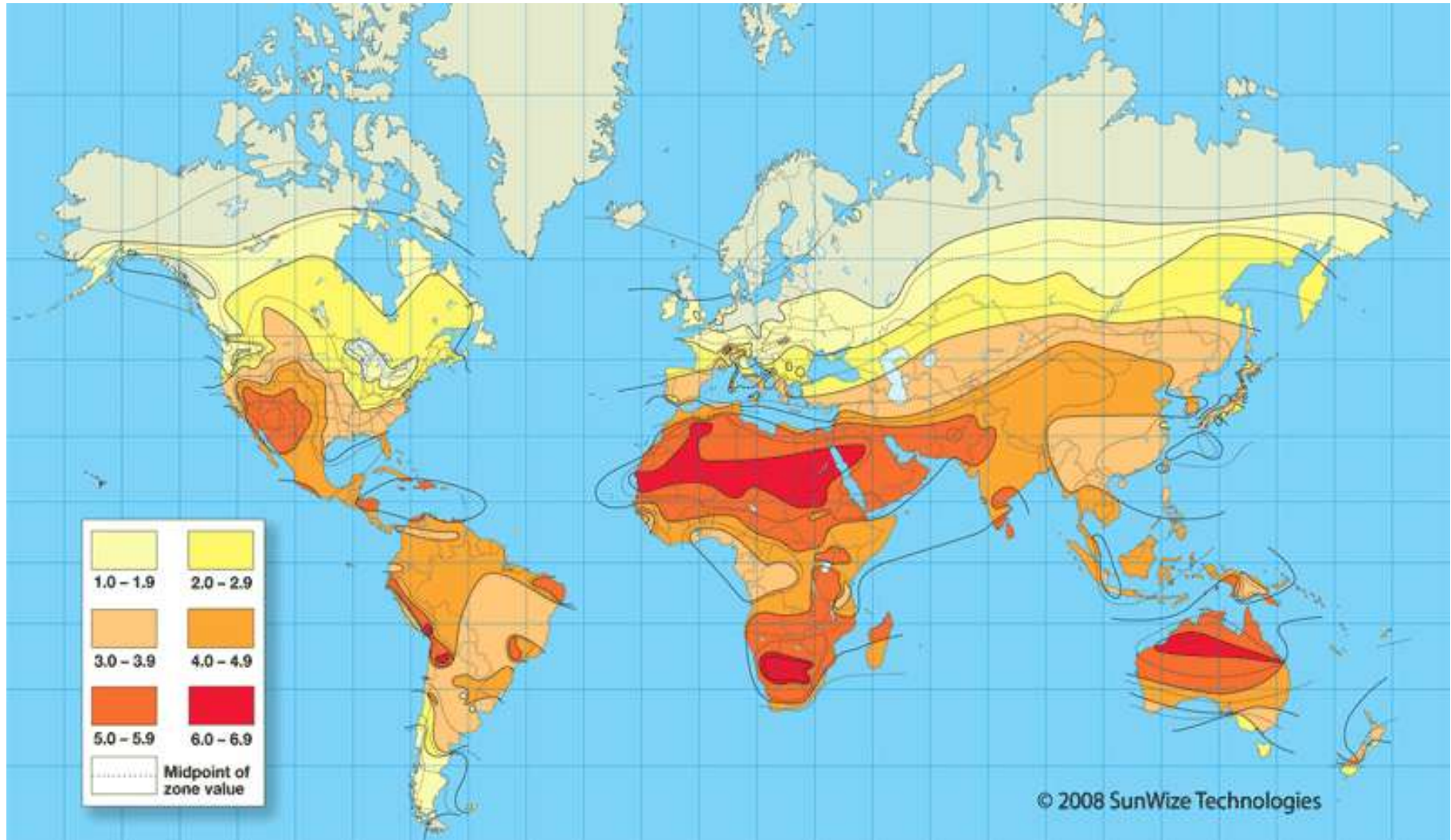
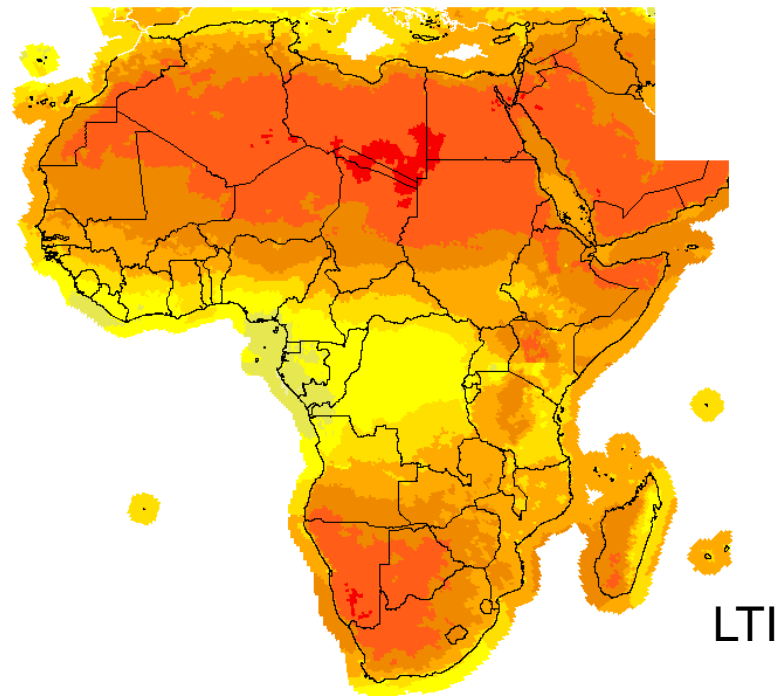
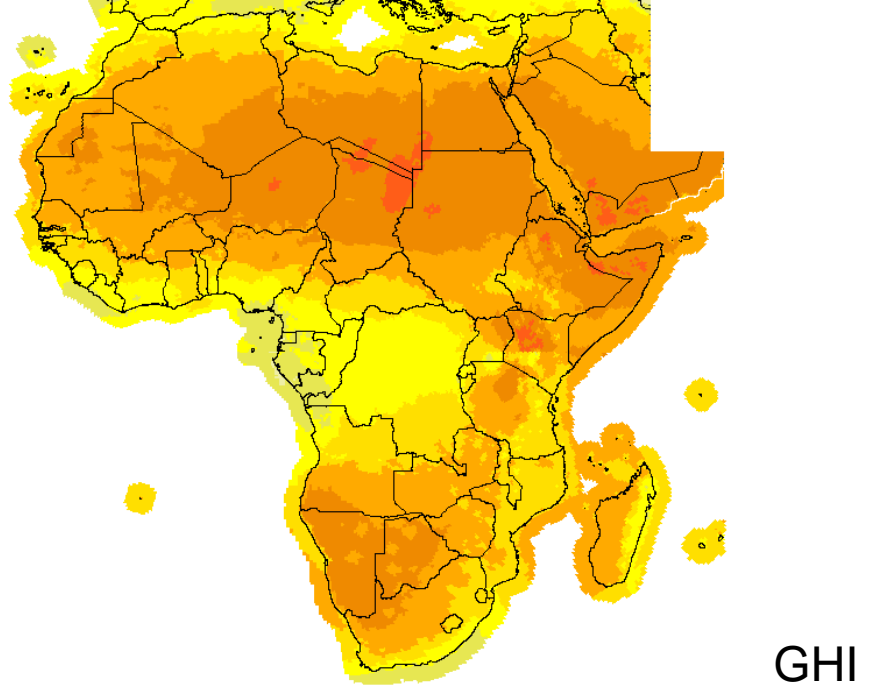
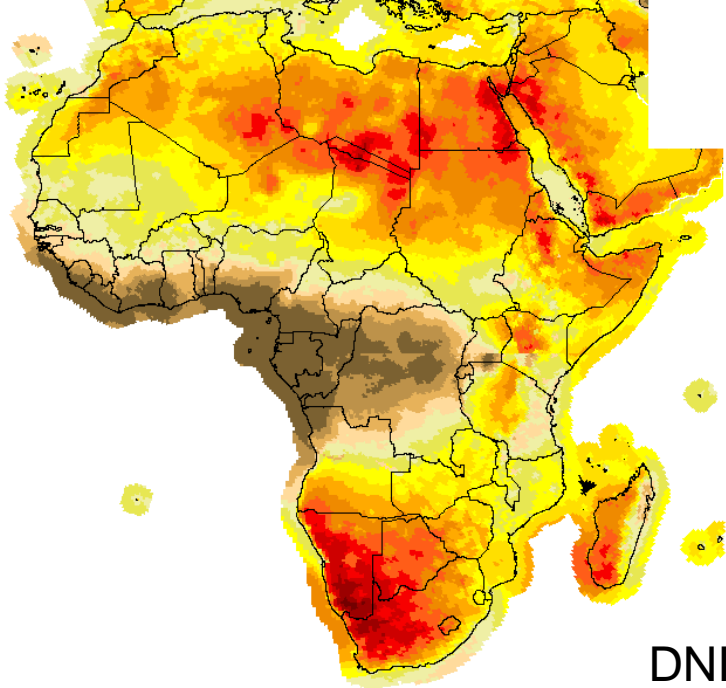


# SAM Training

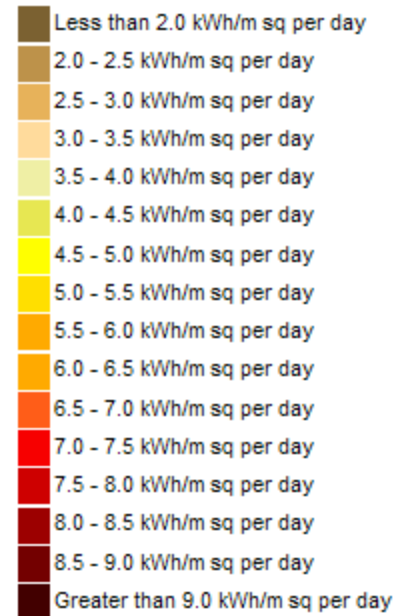
## Solar Resource Assessment/Mapping



Annual Global Horizontal Irradiation (GHI), kWh/m<sup>2</sup>/day Source: SunWize Technologies

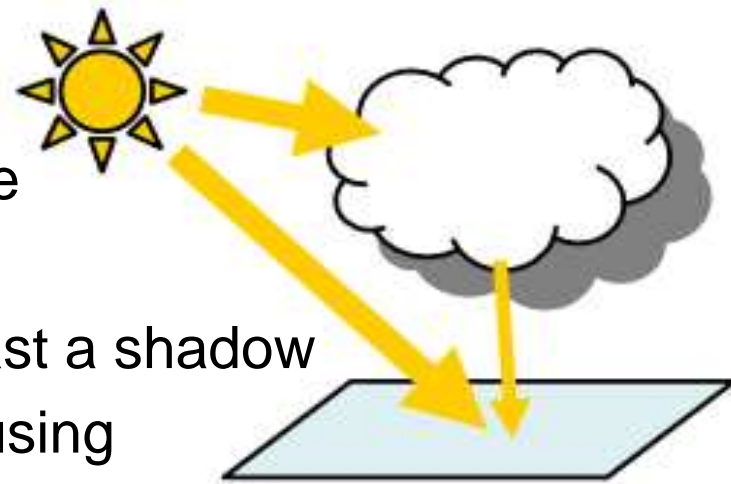


### Annual Solar Irradiance



- **Direct Irradiation**

- The direct beam component from the sun e.g. on a cloudless day
- Direct irradiation has the ability to cast a shadow
- Can be reflected and concentrated using mirrors or lenses



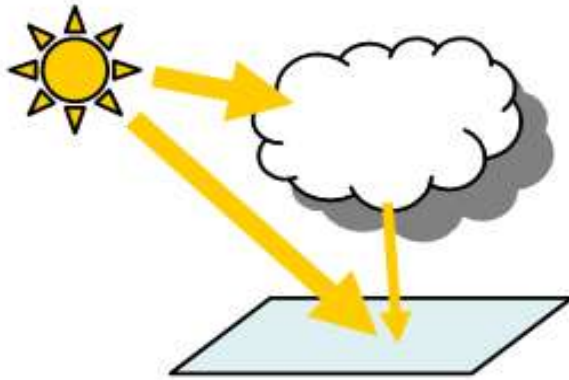
- **Diffused Irradiation**

- Scattered component of solar energy. Typically on a cloudy day.
- Cannot be reflected or concentrated.
- Can contain a large component of the total solar energy available (e.g. sunburn)

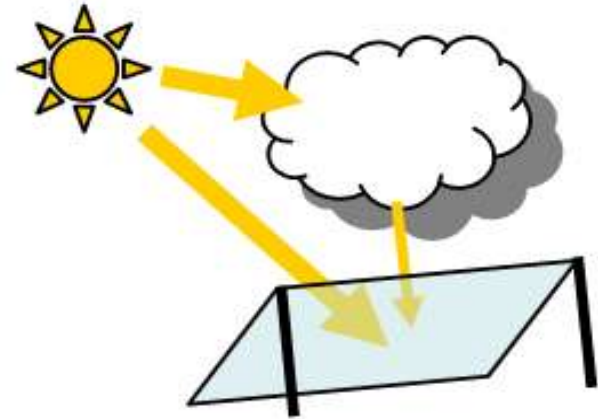
- **Global Irradiation**

- The sum of Direct + Diffused

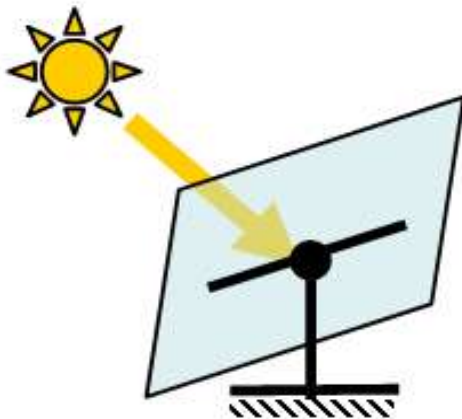
Global horizontal irradiation  
GHI



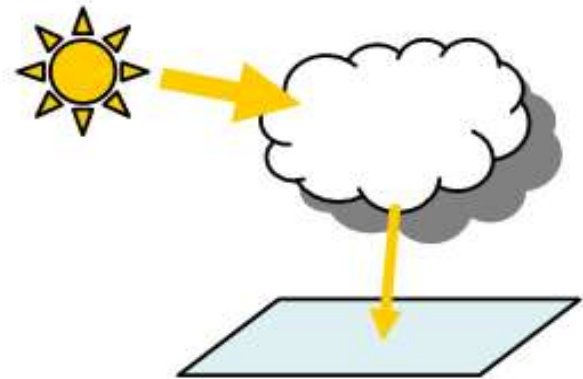
Latitude tilt irradiation  
LTI



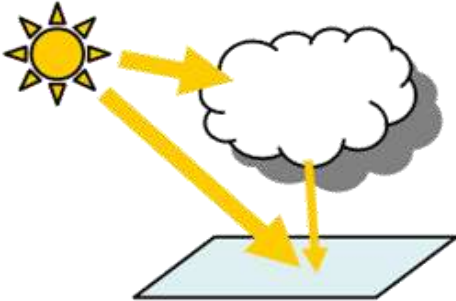
Direct normal irradiation  
DNI



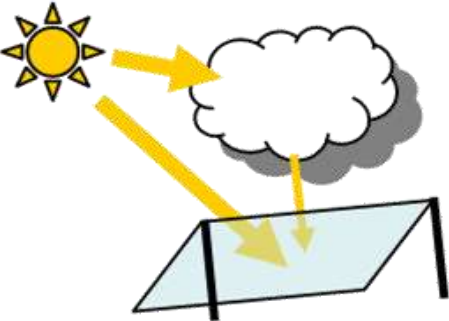
Diffuse horizontal irradiation  
DHI



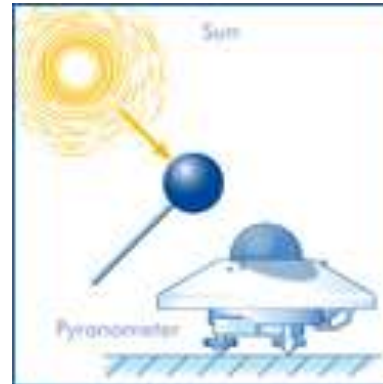
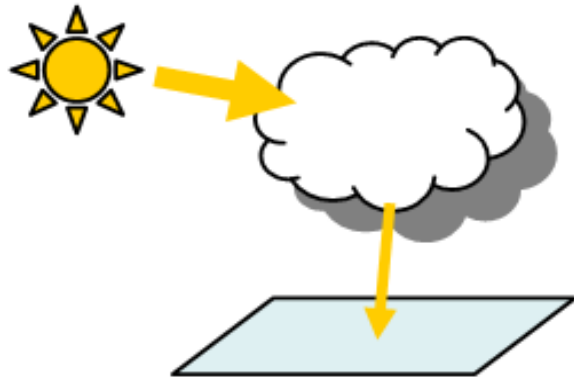
Global horizontal irradiation  
GHI



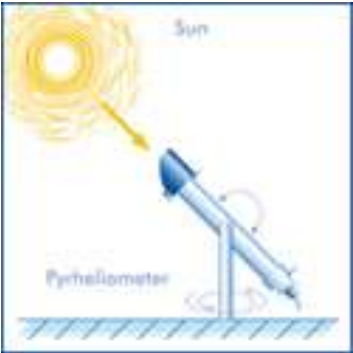
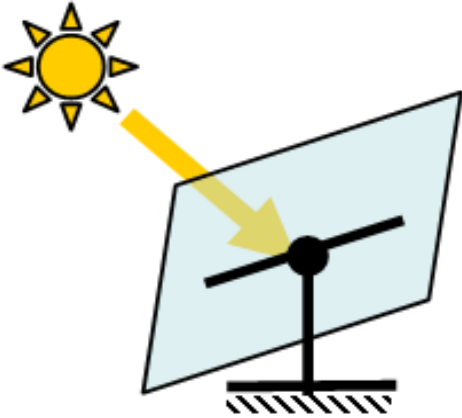
Latitude tilt irradiation  
LTI



# Diffuse horizontal irradiation DHI



Direct normal irradiation  
DNI



## Rotating Shadow band Pyranometer

Calculate DNI from GHI  
and Diffused Irradiation





# Which map should I use?

DNI (Direct Normal Irradiation)

CSP (Concentrated Solar Power) plants

CPV (Concentrated Photovoltaic) plants

DNI is the only component that can be reflected and concentrated

LTI (Latitude Tilt Irradiation)

PV (Photovoltaic) plants

SWH (Solar Water Heaters)

LTI includes the direct and diffused component of solar irradiation

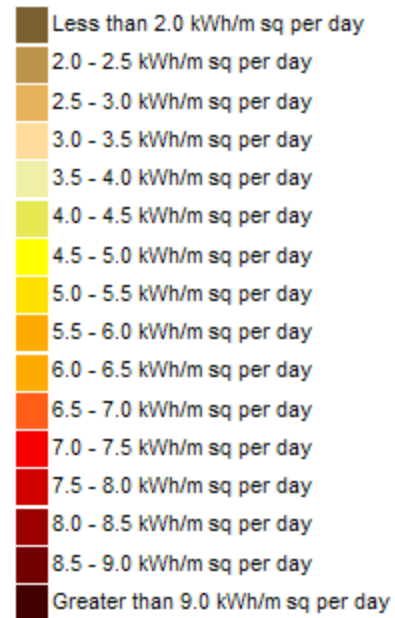
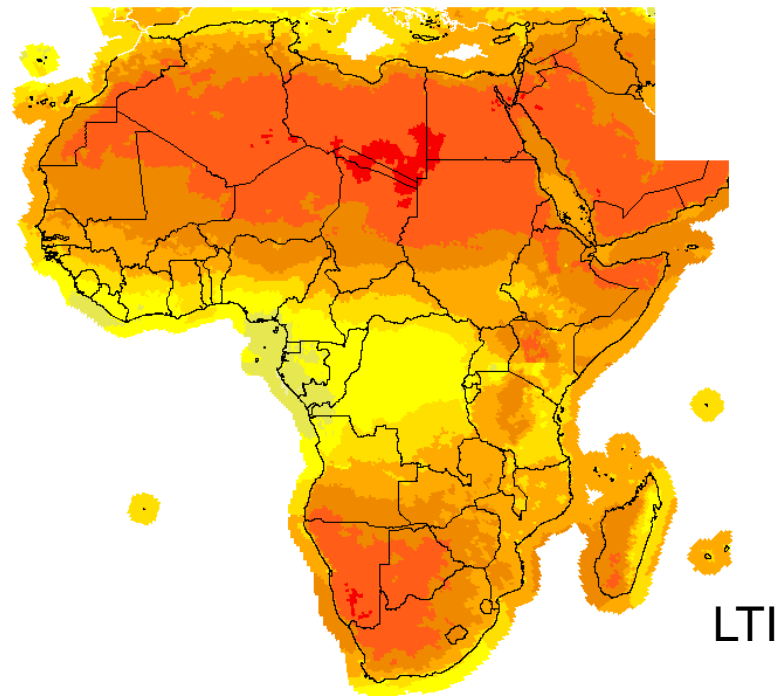
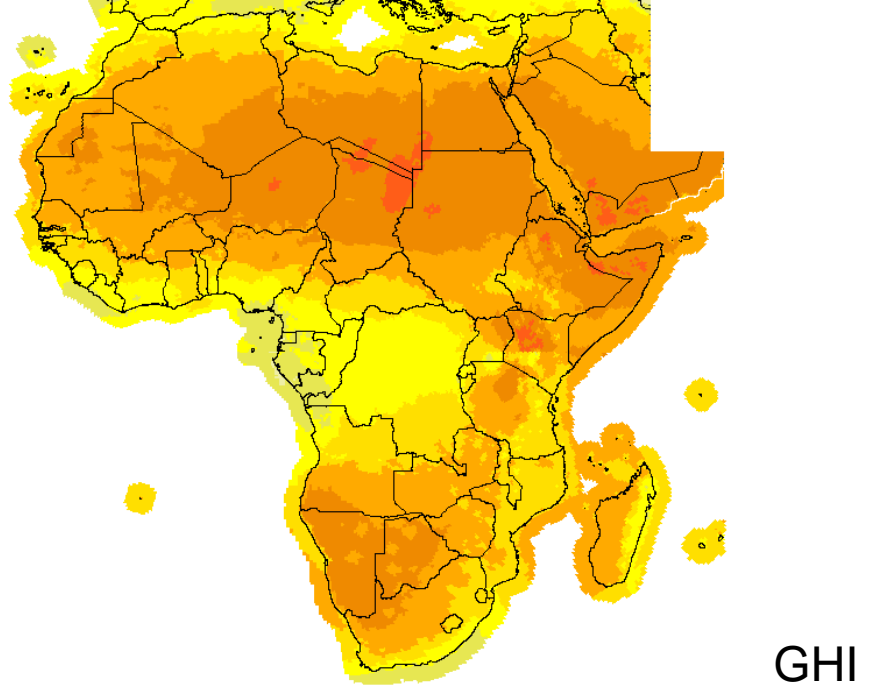
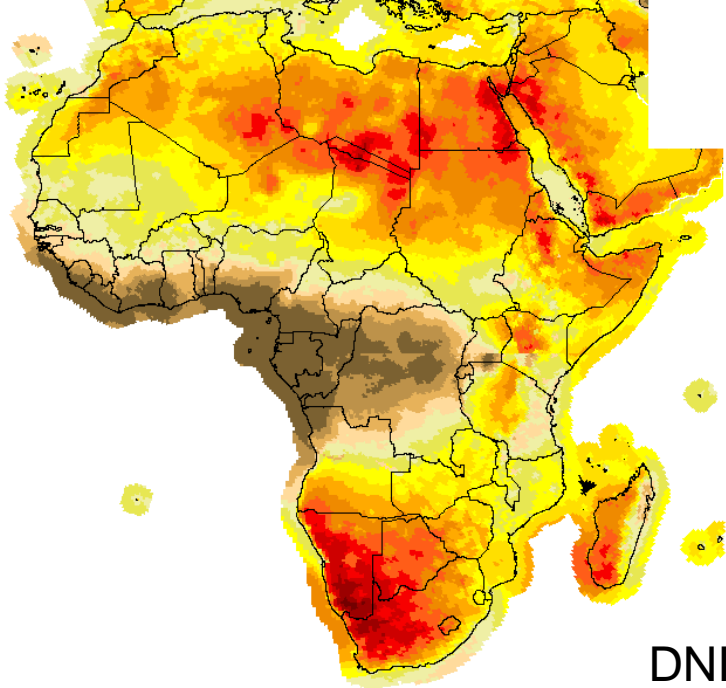
GHI (Global Horizontal Irradiation)

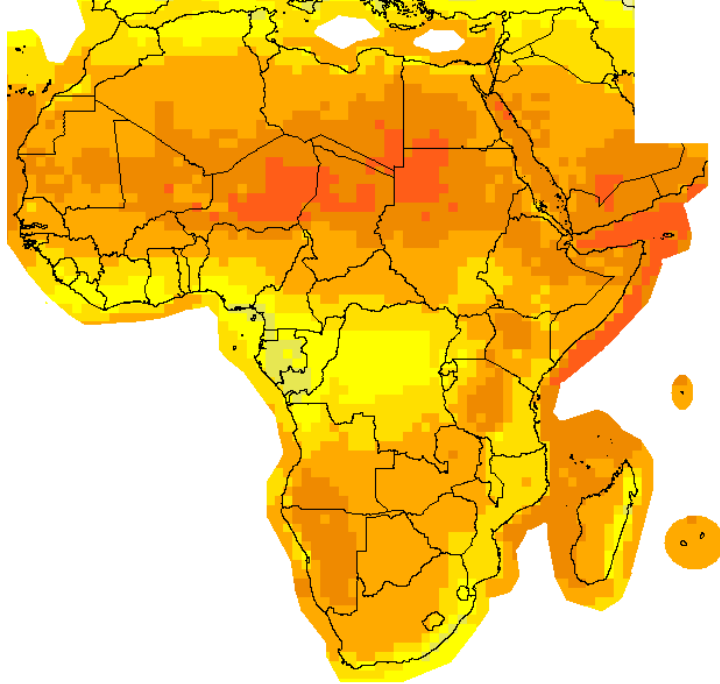
Heat loads on flat surfaces e.g. flat roofs, water bodies

Agricultural applications

Maps are constructed from either

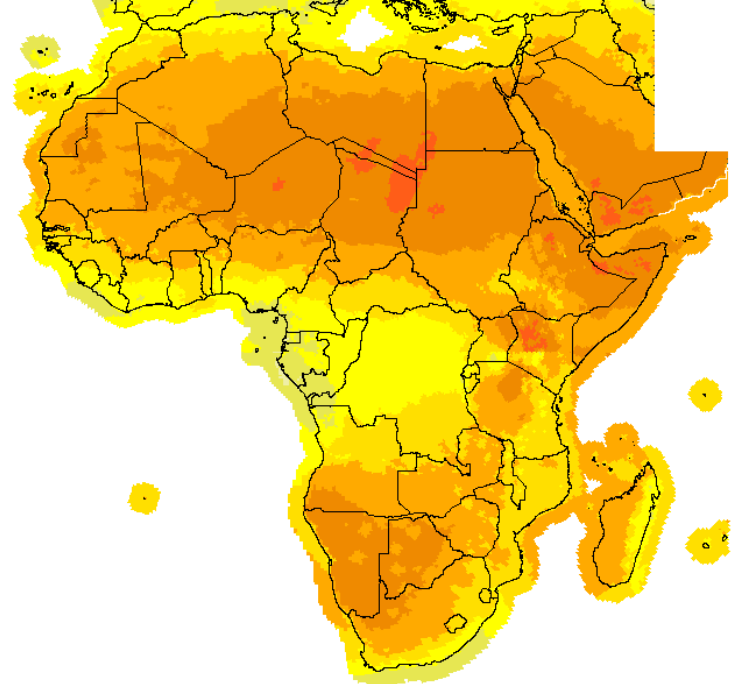
- Satellite derived data
- Ground measured data
- A combination of both





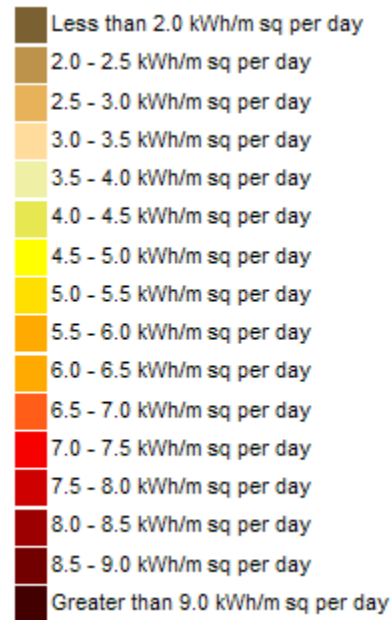
GHI

NASA

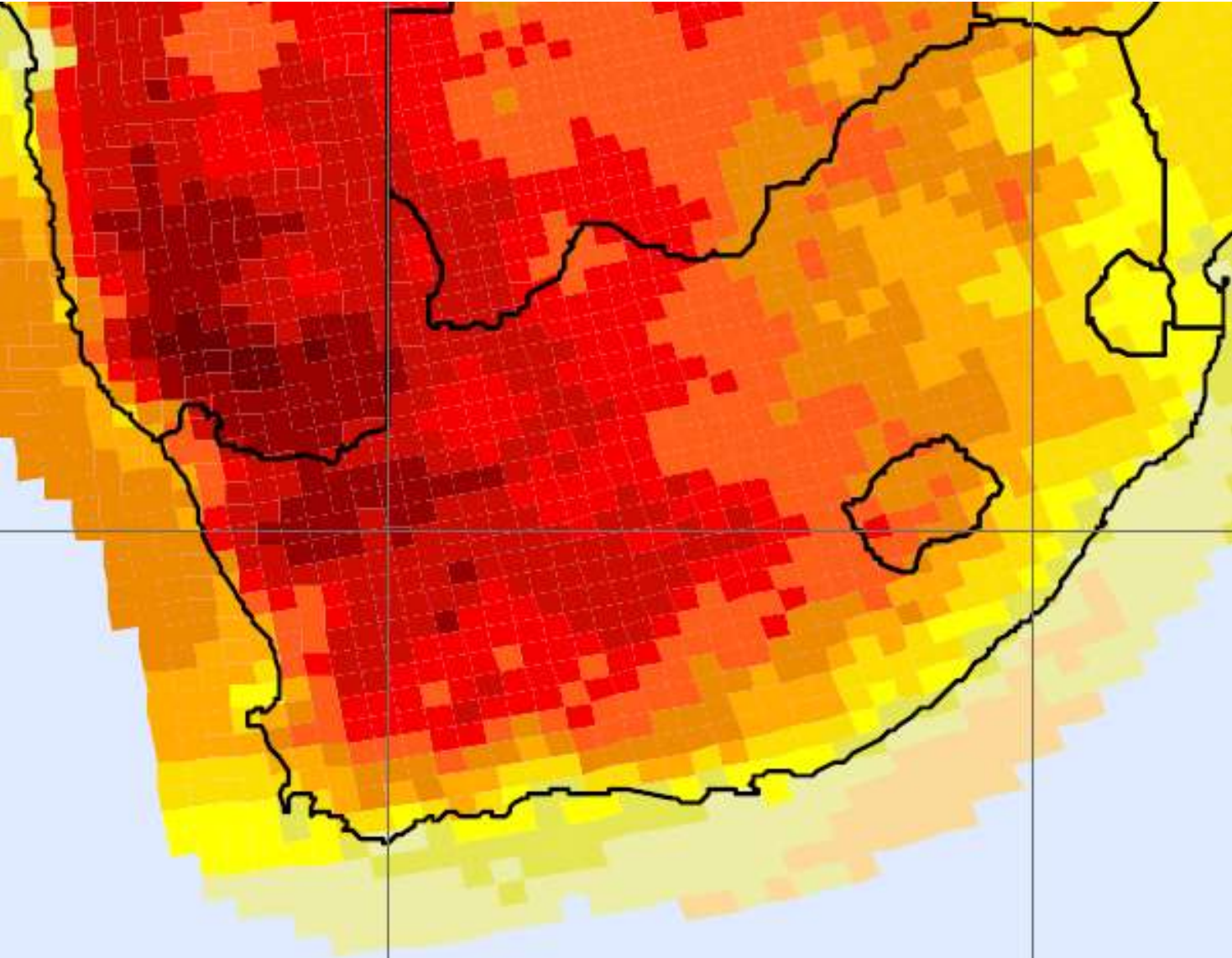


GHI

NREL



# South Africa

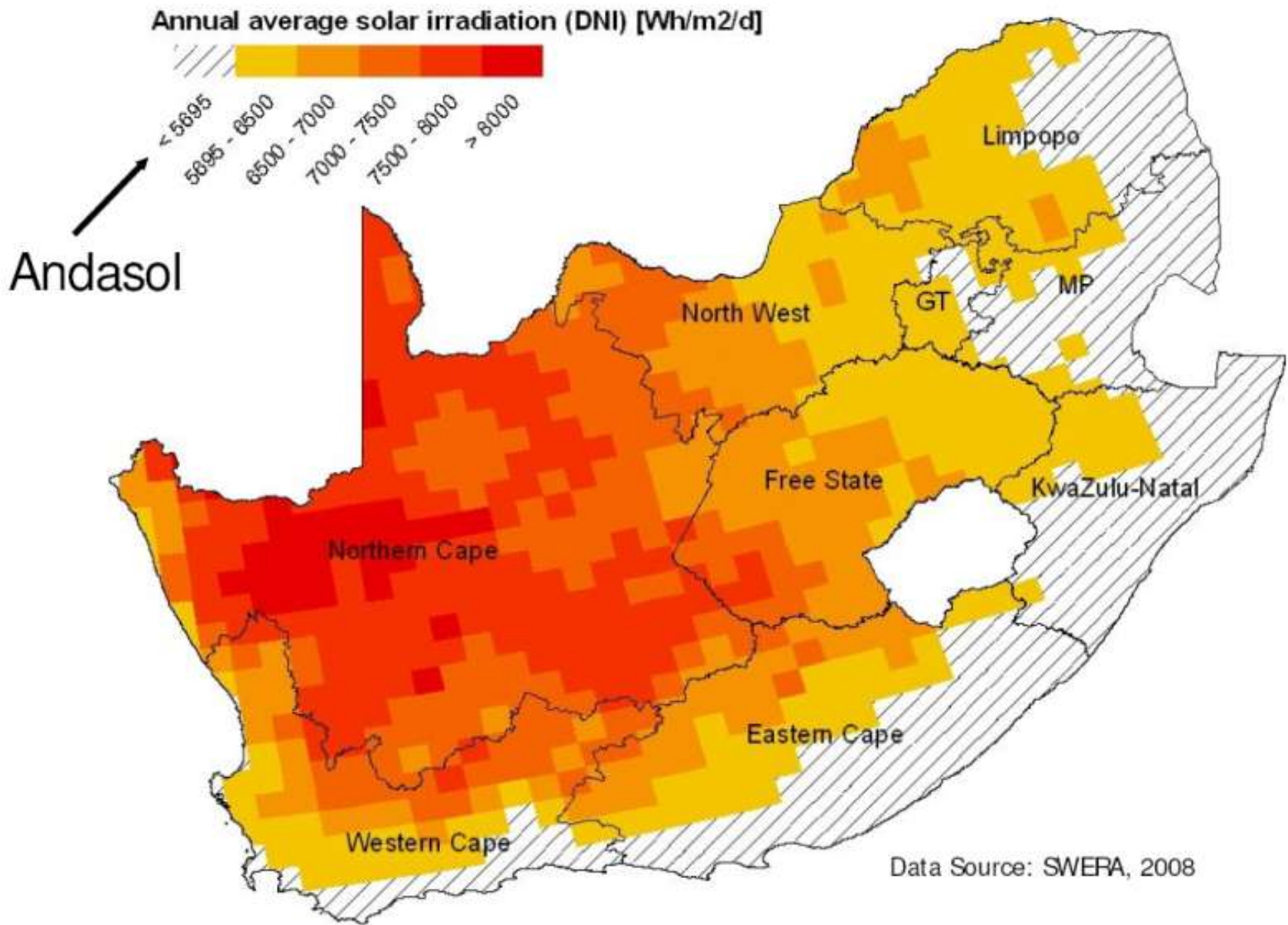


kWh/m<sup>2</sup>/day

- 8.0 - 8.5
- 7.5 - 8.0
- 7.0 - 7.5
- 6.5 - 7.0
- 6.0 - 6.5
- 5.5 - 6.0
- 5.0 - 5.5
- 4.5 - 5.0
- 4.0 - 4.5

Annual Direct Normal Irradiation Sum (DNII)

Source: NREL



Source: Dr Tom Fluri