

Modeling Surface Solar Irradiation at Local Scales in Reunion

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Background Introduction

1.The Need of Renewable Energy











Averaged Solar Radiation 1990-2004



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Background Introduction

3.Necessity of Solar Resource Research in Reunion



Reunion is actively engaged in the development and promotion of solar thermal and photovoltaic (PV) energy through GERRI and other programs.

However, power output from solar energy is highly volatile. Mapping of solar resources at high spatial and temporal resolution is the basic need of the PV industry in regard to electricity production in Reunion.

Main research axis of LE2P focuses on the optimization of intelligent photovoltaic solar energy systems. Under the project: Variability of solar energy over Reunion and in the tropics, we will study how climate impacts surface radiation.

Analysis Method

RegCM4 Simulation

The RegCM4, for high resolution simulations(~10km grid spacing)over the south-western part of the Indian Ocean centered on Reunion

Kriging Method

Kriging, a statistical downscaling technology applied directly on RegCM radiative outputs to obtain local-scale information(~100m)

Step 2

Assessment

Assessing the results by RegCM+kriging with global and diffuse time series records

that will be made at several locations representative of major climatic regions in Reunion

Step 3

Step 1





Why using RegCM ?

Reunion area characterized by steep topography that results in strong micro climatic differences. The observation network in Reunion is very sparse, mapping at high spatial and temporal resolutions is currently difficult to obtain.

2

Thorough knowledge of the solar resource is especially important for the design, dimensioning and building of solar energy systems.

3





Proposed Work

RegCM 4

Initial and lateral boundary conditions

Content 4 Obtain from the reanalysis of the European Centre for Medium-Range Weather Forecasts (ECMWF)

Parameterization test

Testing of the different parameterizations offered in RegCM according to the applications considered

2

4

3 Sensitivity test

To determine the best model setup for the southwestern Indian Ocean, sensitivity tests will be performed in regard to the convective parameterization, etc...

Validation model outputs

Values of solar radiation in the model outputs will be compared to corresponding satellite observations or model outputs for different model configurations

Proposed Work

Kriging Method

Kriging is a group of geostatistical techniques to interpolate the value of a random field at an unobserved location from observations of its value at nearby locations.

Validation

Kriging technique will be validated by comparison with LE2P measurements taken by pyranometers in different places over Reunion

Thank You !