

Solar Irradiance Calculator

V0.1 30/5/2014

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Introduction

The module, developed with Nasa World Wind 1.5, estimates the spatial distribution of irradiance value (W/mq) in a specific area that has elements of complexity, e.g. inhomogeneous morphology of the terrain, buildings, vegetation. The input elements are the terrain surface and building models which can be added by the user via a specific user interface. The module surveys the earth surface and creates three representations of irradiance: (i) on bare ground, (ii) on roofs and (iii) on both. These analytical surfaces are calculated using a model which considers the angle of incidence, atmospheric factors, and other items that are entered at the user level.

Online Demonstration Guide

The demonstration video is available at

<http://youtu.be/4XBgdHOKuAk>

The features demonstrated in the video are as follows:

00:00 – 00:21 Setting the timestamp.

00:22 – 1:19 Setting buildings parameters: length, width, height, type of roof, slope aspect.

01:20 – 01:21 Setting cloud coverage in percentage.

01:22 – 01:23 Setting prevalent surface material in the area, to estimate reflections.

01:24 – 01:43 Setting the grid parameters.

01:44 – 01:51 Executing the calculus and visualizing the results: three analytic surfaces for ground, roofs and both.

01:52 – 02:03 Visualizing beams of light.

2:04 – 2:11 Visualizing shadows o due to ground obstruction (brown dots, cyan rays). Irradiance value is zero.

2:12 – 2:20 Visualizing shadows due to building obstruction (purple dots and rays). Irradiance value is zero.

2:21 – 2:26 Visualizing shadows due to building obstruction on roofs (green dots, blue rays). Irradiance value is zero.

2:27 – 2:31 Visualizing ground's analytic surface.

2:32 – 2:39 Visualizing roof's analytic surface: the colour of sheets depends by aspect, slope and incidence angle. The value of irradiance in the shadow areas is zero.

2.40 – 2.47 Visualizing both analytic surfaces.

2.47- 3:00 Visualizing all parameters.

The software is developed in accordance with NASA_Open_Source_Agreement_1.3
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