

A new approach for predicting solar radiation in tropical environment using satellite images - Case study of Malaysia

Abstract

Satellite images have been identified as an alternative and accurate method for predicting average annual daily solar radiation of a specific location. These images can be used to predict the performance and sizing of various solar energy systems such as solar thermal and photovoltaic applications. The data from satellite images are used and compared with the actual readings from solar instruments. The results are then used to estimate solar intensity for other places where solar instrument is not available. Malaysia lies entirely in the equatorial region. The tropical environment has been characterized by heavy rainfall, constantly high temperature and relative humidity. The annual average daily solar irradiations for Malaysia were from 4.21 kWh/m² to 5.56 kWh/m². The highest solar radiation was estimated at 6.8 kWh/m² in August and November while the lowest was 0.61 kWh/m² in December. The Northern region and a few places in East Malaysia have the highest potential for solar energy application due to its high solar radiation throughout the year.

Keywords

Renewable energy; Satellite images; Solar energy; Solar radiation mapping; Solar radiation modeling