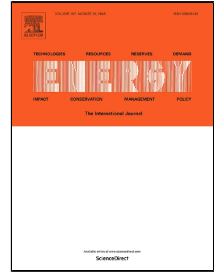


# Accepted Manuscript

Estimation Of Daily Global Solar Radiation Using Deep Learning Model

Kazım Kaba, Mehmet Sarigül, Mutlu Avcı, H. Mustafa Kandırmaz



PII: S0360-5442(18)31500-7  
DOI: 10.1016/j.energy.2018.07.202  
Reference: EGY 13467  
To appear in: *Energy*  
Received Date: 23 February 2018  
Accepted Date: 30 July 2018

Please cite this article as: Kazım Kaba, Mehmet Sarigül, Mutlu Avcı, H. Mustafa Kandırmaz, Estimation Of Daily Global Solar Radiation Using Deep Learning Model, *Energy* (2018), doi: 10.1016/j.energy.2018.07.202

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## ESTIMATION OF DAILY GLOBAL SOLAR RADIATION USING DEEP LEARNING MODEL

Kazım Kaba<sup>a</sup>, Mehmet Sarigül<sup>b</sup>, Mutlu Avcı<sup>c</sup> and H. Mustafa Kandirmaz<sup>d</sup>

<sup>a</sup>Department of Physics, Cukurova University, 01330, Adana, Turkey,  
kkaba46@gmail.com, Phone: +903223386084, Fax: +903223386070

<sup>b</sup>Department of Computer Engineering, Iskenderun Technical University, 31200,  
Turkey, mehmet.sarigul@iste.edu.tr

<sup>c</sup>Department of Biomedical Engineering, Cukurova University, 01330, Turkey,  
mavci@cu.edu.tr

<sup>d</sup>Department of Physics, Cukurova University, 01330, Turkey,  
h.mustafakandirmaz@gmail.com

### Abstract

Solar radiation (SR) is an important data for various applications such as climate, energy and engineering. Because of this, determination and estimation of temporal and spatial variability of SR has critical importance in order to make plans and organizations for the present and the future. In this study, a deep learning method is employed for estimating the SR over 30 stations located in Turkey. The astronomical factor, extraterrestrial radiation and climatic variables, sunshine duration, cloud cover, minimum temperature and maximum temperature were used as input attributes and the output was obtained as SR. The datasets of 34 stations, spanning the dates from 2001 to 2007, were used for training and testing the model, respectively, and simulated values were compared with ground-truth values. The overall coefficient of determination, root mean square error and mean absolute error were calculated as 0.980, 0.78 MJm<sup>-2</sup>day<sup>-1</sup> and 0.61 MJm<sup>-2</sup>day<sup>-1</sup>, respectively. Consequently, DL model has yielded very precise and comparable results for estimating daily global SR. These results are generally better than or they are comparable to many previous studies reported in literature, so one can conclude that the method can be a good alternative and be successfully applied to similar regions.

**Keywords:** Global solar radiation, Meteorological parameters, Deep learning, Turkey

Download English Version:

<https://daneshyari.com/en/article/8070764>

Download Persian Version:

<https://daneshyari.com/article/8070764>

[Daneshyari.com](https://daneshyari.com)