Contribution ID: **514** Type: **Oral**

Estimation of daily global solar radiation at Lopburi province from meteorological parameters using artificial neural network

Tuesday 22 May 2018 11:00 (15 minutes)

Solar radiation is important to all living organisms and it is the energy source for solar technologies such as photovoltaic and solar thermal systems. Generally, the amount of incident solar radiation can be obtained from ground-based measurements. However, the number of solar radiation monitoring stations is very limited. In this work, the artificial neural network (ANN) was proposed to derive the amount of incident solar radiation at Lopburi province (14.83°N, 100.62°E). This ANN has one input layer, two hidden layers and one output layer. The input layer consists of air temperature, air relative humidity, visibility, cloud cover, wind speed and air pressure, and the output layer is daily global solar radiation. The ANN was trained using the input and output data collected at Lopburi meteorological station during the year: 2007-2014. Then it was validated against the data at the same station for the period of three years (2015-2017). The validation results show that solar radiation obtained from ANN and that from the measurement are in reasonable agreement, with root mean square error of 12.8% and mean bias error of -1.6%.

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Session Classification: A14: Environment

Track Classification: Environmental Physics, Atmospheric Physics, Geophysics and Renewable Energy