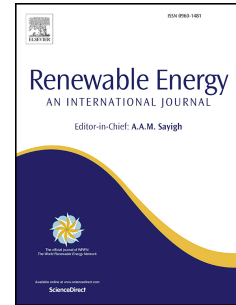


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Evaluation of diffuse solar radiation models in Northern China: New model establishment and radiation sources comparison

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1 **Evaluation of diffuse solar radiation models in Northern China: New model establishment and radiation**  
2 **sources comparison**

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11

12 **Abstract:** Conventional methods to obtain solar radiation data are from weather stations, from solar radiation  
13 models, from commercial software databases and from field measurements. Few studies have been presented to  
14 compare the results from the four mentioned methods. Considering this, new daily diffuse solar radiation models  
15 for Northern China climates are first established in this study. The solar radiation models are then compared with  
16 open-access weather station data from China Meteorological Data Sharing System (CMDSS), with TRNSYS  
17 database data and with measured data in Xi'an. TRNSYS supplies the Typical Meteorological Year data, while  
18 the solar radiation models give the long-term annual average results. It is found that combining the sunshine  
19 duration and the day of the year together can establish a group of accurate diffuse solar radiation models. Good  
20 agreements are found between the CMDSS and the newly established solar radiation model calculating daily  
21 diffuse solar radiation. The diffuse solar radiation estimated by TRNSYS is a bit higher than that from the  
22 open-access website in summer half year. TRNSYS supplies the highest annual diffuse solar radiation. The  
23 TRNSYS database is of high significance to a solar system performance evaluation. The solar radiation models  
24 can be used for the solar system design.

25

26 **Keywords:** Diffuse solar radiation, Model establishment, Solar database, TRNSYS, Solar energy.

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