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A model for calculating daily near infrared solar radiation

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Near infrared solar radiation (NIR) represents a large amount of the total energy of the solar spectrum. NIR is important for applying to remote satellite approaches in order to investigate an atmospheric water vapour and for other solar energy thermal applications. However, it was less investigated compared to another solar spectrum bands. Additionally, measurements of NIR are also scarce. Consequently, NIR data are not sufficient for those applications. In this work, a semi-empirical model for calculating daily global NIR was developed. The model is written in the form of the ratio of daily global NIR (H_{NIR}) to daily global broadband solar radiation (H) as an empirical function of atmospheric parameters influencing H_{NIR}/H namely, precipitable water (PW), total ozone column (TOC), aerosol optical depth (AOD) and cloud index (n). A 5-year period data of H_{NIR}, H, PW, TOC, AOD and n obtained from 4 meteorological stations situated in the main regions of Thailand were used to calculate the empirical coefficients of the model. This model was tested against an independent measured data set. It is found that H_{NIR} calculated from the model and that from the measurement are in good agreement, with the difference in terms of root mean square error of 7.7% and mean bias error of 5.3%.

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