Estimation of Diffuse Insolation for Nagpur, India

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Insolation at earth surface is mainly decided by atmospheric conditions. With industrialization and other anthropogenic activities aerosol load in the atmosphere increased leading to enhanced diffuse radiation which play a very crucial role in land carbon sink (Mercado et al., 2009) and canopy photosynthesis (Knohl et al., 2008). Measurement of diffuse radiation will give us better understanding of the coupling between vegetation properties and diffuse radiation, but it is measured in very few meteorological stations because it is expensive (Pandey et al., 2009) and has its own complexity regarding adjustments in instrument. This raised a need of modelling approach and in literature several models (Barbora et al., 1981, Jain, 1990 and Hayder et al., 2006) are present but these are location specific and for tropical country like India we need to develop a model that can work well for estimating diffuse insolation in different parts of India . The major objective of this paper is to develop a robust model for Nagpur. Here we have employed sunshine fraction for estimating diffuse fraction. Secondary data (1973-2003) of global radiation, diffuse radiation and bright sunshine hours are obtained from Indian Meteorological Department for Nagpur and used for model formulation. Model output is also compared with models present in literature. Different statistical test R2, RMSE and AIC (Akaikes Information Criterion) shown good results for developed model. These results clearly indicate that this model can be used to estimate diffuse insolation for Nagpur. Like this for other part of country this technique can be used for diffuse insolation model formulation.

Keywords: Insolation, Diffuse Insolation, Aerosol, Sunshine fraction, AIC.

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