

Seasonal and spatial variation of solar radiation in Nepal Himalayas

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ABSTRACT

Solar radiation data (two-hourly data from 1987 to 1999) observed at high altitude meteorological stations in Nepal Himalayas were analyzed to study seasonal and spatial variation of solar radiation and shed some light on solar energy potential and prospect of vegetation development in the mountainous region of Nepal. Results showed significant similarities and differences on solar radiation with respect to seasons and locations (altitudes). Mean seasonal amount of solar radiation was generally higher in spring than in summer. The significant amount of monsoonal clouds in the summer hindered incoming solar radiation during summer, while less or no clouds during spring allowed more solar radiation to reach the earth's surface. Absolute extreme values of solar radiation in the mountainous regions during fine weather conditions were close to the solar constant (1367 Wm^{-2}) due to negligible depletion of radiation within the atmosphere. Amount of solar radiation increased with altitude due to smaller optical depth of the atmosphere at higher altitudes. The increasing rate of annual mean solar radiation with altitude is found to be $90 \text{ Wm}^{-2}\text{km}^{-1}$ in the mountainous region of Nepal.

Keywords: Solar radiation, high-altitude, atmosphere, solar constant, Nepal Himalayas.