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Estimating and Classification of Solar Radiation on Horizontal Surfaces Using Climatic Parameters in GIS (Case Study: East Azerbaijan Province)

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Abstract

Solar radiation reached to ground as one of the essential factors for studies of water resources, environment, agriculture and vegetables coverage, designing the systems for use of clean energy and other numerous cases, has a wide application. This factor is not measured in all meteorological stations and therefore has presented a lot of empirical methods by the use meteorological, astronomical and geographical parameters for estimation. The purpose of this study is estimating the total amount of radiation reached to horizontal surface using climate parameters (minimum, maximum and average temperature, minimum humidity, sky cloud inees, sunny hours) and it's classification in East Azerbaijan province. Thus, the measured monthly data of solar radiation in Tabriz station during 2001 to 2006 were used for modeling. The climatic data of 6 synoptic stations in the province during 1987 to 2007 were

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used to estimate the amount of radiation. By calculating multiple regression coefficients the accuracy of the model was analyzed. Required layers in GIS environment were created and by applying regression model coefficients in created layers, the total amount of radiation on horizontal surfaces in the province was estimated. According to the distribution of monthly radiation maps at the province area, the radiation pattern in the province was divided to four periods: winter season, spring, summer and autumn. The lowest radiation amount is in January and the highest amount is in June. Distribution of annual radiation in state shows the reduction process from the south west to the north and northeast. Average annual radiation in the province, are 4244 W/m2/day. Amplitude changes of annual radiation in province is 443 W/m2/day and the spatial variability coefficient is 2 percent.

Keywords: Solar Radiation, Classification, Climatic Parameters,GIS, East Azerbaijan Province.

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