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Digital Map of the Mean Annual Global Solar Radiation Sum and Calculation Model for Global Solar Radiation on Inclined, Variously Oriented Surfaces

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This work presents a digital map of the mean annual global solar radiation on a horizontal plane, for the period 1961-1980, according to the period of the available measurements in Croatia. A linear regression model has been used to describe the relationship between this variable, the mean annual temperature and the weather station altitude. The coefficient of determination was 0.87. The remaining spatial variation of the radiation was treated, according to geostatistical methods as a local difference from the spatial average resulting from the regression analysis. Further steps included the interpolation of those differences into the entire area of the analysis and correction of the preliminary field. According to the interval of values (from 1.1 to 1.6 MWhm^{-2}) five classes of the mean annual sum of global solar radiation have been defined on the territory of Croatia. Two classes of the mean annual sum of global solar radiation can be seen in the continental part of Croatia and three in the maritime part. The digital map presented can be used as part of the Geographical Information System (GIS) for direct calculation of the various parameters related to the annual sum of global solar radiation. Compared to the European Solar Radiation Atlas (ESRA), this map has finer resolution (700x700 m^2) compared to the ESRA 10x10 km^2 and as a result can resolve orographic features like mountains and even hills. In the second part of the work, the physical model of radiation has been used to calculate the average monthly sums of global solar radiation on inclined surfaces oriented to S, SE, SW, E, W, NE, NW and N.