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Iva Gašparović, Mateo Gašparović, Damir Medak



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Determining and analysing solar irradiation based on freely available data: A
case study from Croatia

Iva Gašparović^{a*}, Mateo Gašparović^b, Damir Medak^c

^aState Geodetic Administration, Gruška 20, 10000 Zagreb, Croatia

^bFaculty of Geodesy, University of Zagreb, Kačićeva 26, 10000 Zagreb, Croatia

^cFaculty of Geodesy, University of Zagreb, Kačićeva 26, 10000 Zagreb, Croatia

iva.gasparovic@dgu.hr

mgasparovic@geof.hr

dmedak@geof.hr

*corresponding author

Abstract:

The aim of this research was to determine the global horizontal irradiation (GHI) for the Republic of Croatia with the GRASS GIS r.sun module and to compare it with the values of solar irradiation obtained from satellite images, ground measurements and commercial providers. Since the results obtained from the r.sun module have no quality control, the accuracy assessment was made on ground solar irradiation measurements obtained from Baseline Surface Radiation Network stations (BSRN) and stations from the Meteorological and Hydrological Institute of Croatia (DHMZ). The differences in accuracy obtained by comparison with BSRN stations indicate a 3% higher accuracy of r.sun data compared to SoDa (Solar radiation data). The trend was also observed in the differences obtained by calculating the deviations from DHMZ stations (0.5%). Compared to the r.sun and SoDa data, MSG (Meteosat Second Generation) data have 24% (BSRN) and 26% (DHMZ) higher accuracy. The reason why r.sun and SoDa data have an advantage over MSG is the higher spatial resolution. Another important aspect of using solar energy compared to other renewable resources is that Croatia experiences an increase in electricity consumption due to tourism and imports approximately 200 GWh in the summer months when the GHI value is up to 5 times higher compared to in the winter period. It can be concluded that using solar

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