



## Validation of sunshine duration of the Surface Solar Radiation Data Set - Heliosat (SARAH-2.1) for Croatia

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Solar radiation components and sunshine duration are used in the assessment and monitoring of climate conditions, in the estimation of the potential for using renewable solar energy and in the calculation of parameters for energy consumption for heating and cooling of buildings. Future changes in solar radiation and sunshine duration are estimated using climate models and new climate services are being developed using EUMETSAT satellite data. Here we are presenting the validation of the Surface Solar Radiation Data Set - Heliosat (SARAH-2.1) that is a satellite-based climate data record of the solar components derived from satellite-observations onboard the geostationary Meteosat satellites. The validation is performed using ground observed data from the 27 meteorological stations in Croatia with less than 10% of missing data in a period 1983-2017. Although Croatia is a relatively small country, due to its location along Adriatic sea, the openness of eastern parts to Pannonian plane and pronounced orography of Dinarides, the climate is quite diverse. Hence, meteorological stations used for validation are from different climate regions: five stations are located in a continental part of Croatia, four are in the mountain region, while the rest are on the coast of the northern, middle and southern Adriatic. Overall, it is found that bias of satellite-derived sunshine duration compared to ground measurements is positive, except at the highest Zavižan station (height~1600m) where satellite data underestimate measurements in all months. Available research explains this underestimation on high elevations with deficiencies of the satellite retrieval due to increased cloudiness and snow cover during winter. Results of this analysis will serve as a basis for creating Solar atlas of Croatia, as well as complementing climate monitoring of sunshine duration on the observation stations. Benefits of this new application are expected in economic sectors of agriculture, tourism and renewable energy production.