



Solar resource assessment in complex orography: a comparison of available datasets for the Trentino region

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The accurate assessment of the solar radiation available at the Earth's surface is essential for a wide range of energy-related applications, such as the design of solar power plants, water heating systems and energy-efficient buildings, as well as in the fields of climatology, hydrology, ecology and agriculture. The characterization of solar radiation is particularly challenging in complex-orography areas, where topographic shadowing and altitude effects, together with local weather phenomena, greatly increase the spatial and temporal variability of such variable. At present, approaches ranging from surface measurements interpolation to orographic down-scaling of satellite data, to numerical model simulations are adopted for mapping solar radiation.

In this contribution a high-resolution (200 m) solar atlas for the Trentino region (Italy) is presented, which was recently developed on the basis of hourly observations of global radiation collected from the local radiometric stations during the period 2004-2012. Monthly and annual climatological irradiation maps were obtained by the combined use of a GIS-based clear-sky model (r.sun module of GRASS GIS) and geostatistical interpolation techniques (kriging). Moreover, satellite radiation data derived by the MeteoSwiss HelioMont algorithm (2 km resolution) were used for missing-data reconstruction and for the final mapping, thus integrating ground-based and remote-sensing information. The results are compared with existing solar resource datasets, such as the PVGIS dataset, produced by the Joint Research Center Institute for Energy and Transport, and the HelioMont dataset, in order to evaluate the accuracy of the different datasets available for the region of interest.