Nowcasting solar radiation using cloud satellite and high resolution numerical model outputs

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AEMET (the Spanish Meteorological Agency) is currently developing a project for the Spanish transmission system operator, Red Eléctrica de España, to improve hourly Global Horizontal Irradiance (GHI) and direct Normal Irradiance (DNI) forecasts in Spanish solar power plants. Nowcasting is a technique for very short-range forecasting (normally within 6h ahead) covering only a very specific geographic region. There is a need of using nowcasting models to forecast the availability of solar radiation in order to low electricity generating costs. We present the current status of a nowcasting tool developed by AEMET that provides every 15 min the hourly solar radiation accumulated fluxes for the coming 4 hours. The meteorological data used for this model are: satellite cloud type observations and forecasts based on high resolution winds (EUMETSAT SAFNWC/MSG software package outputs), radiation from high resolution numerical weather prediction model (HARMONIE/AROME radiation outputs) or a combination of both sources of information depending on different forecast time horizons. The accuracy of the tool has been analyzed comparing the GHI and DNI forecasts with the ground solar radiation measurements from seven stations of AEMET network. The verification results in terms of RMSE are similar to those found in the bibliography, with the advantage that the satellite component of the tool does not require the use of a model to convert satellite imagery to average insolation on the ground.