EMS Annual Meeting Abstracts
Vol. 12, EMS2015-276-1, 2015
15th EMS / 12th ECAM

Comparison of HelioClim-3v5 satellite irradiation data with in situ measurements for five states in Brazil

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Meteosat images are routinely processed at Transvalor / MINES ParisTech for assessing the solar radiation at ground. Results are stored in the HelioClim-3 (HC3) database. The latest version HC3v5 is exploiting the McClear model that predicts the radiation that should be observed in clear-sky conditions. HC3v5 has been validated with several in situ measurements in Europe and North Africa. To further validate HC3v5 over South America, in situ measurements of the hourly global irradiation were obtained from the Brazilian Instituto Nacional de Meteorologia (INMET) for five stations located in five states: Cacoal (Rondonia), Aquidauana (Mato Grosso do Sul), Curitibanos (Santa Catarina), Cidade Gaucha (Parana), and Canela (Rio Grande do Sul). The measurements were quality-checked using QC procedures developed during the EU-funded ENDORSE project and then compared to corresponding HC3v5 estimates on hourly, daily and monthly basis. The bias relative to the mean of the measurements ranges between 0% and 8%. For hourly irradiation, the relative RMSE ranges from 17% to 31%. The correlation coefficient is greater than 0.9. Overall, the errors are small and it can be concluded from this preliminary study that HC3v5 predicts accurately the solar radiation in these eastern states of Brazil. The errors show a tendency to increase with the viewing angle of the Meteosat satellite. HC3v5 is currently exploited to produce detailed local maps for solar energy purposes. A further more detailed study will be undertaken with 31 stations in these five states.