



Are re-analyses from ERA or MERRA suitable to assess surface solar irradiance in solar energy applications?

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Meteorological re-analyses such as the ERA-Interim and the MERRA ones provide surface solar irradiance (SSI) for long periods of time. This capability is appealing in solar energy as it may help in determining the potential of a given site in any part of the world. The present study presents a comparison made between ground measurements of daily means of the SSI with the same quantity extracted from the ERA-Interim and the MERRA respectively for the period 1985 to 2009. 40 stations with no marked orographic features were retained located in Europe and Africa. It was found that the SSI from re-analyses exhibit a strong bias, most often an over-estimation of the measured SSI. The correlation coefficient is low compared to what is usually observed when comparing satellite-derived assessments and ground measurements. Further analyses demonstrate that the cloud cover of the ERA-Interim and the MERRA re-analyses is not reliable in case of cloudy skies. The ERA-Interim and MERRA re-analyses often underestimate the cloud cover and therefore predict clear skies while the sky is actually overcast. It is concluded that the SSI derived from the ERA-Interim and MERRA re-analyses should not be recommended for use in solar energy applications.