



A first approach for solar irradiance short-term forecasting in Reunion Island using ground based meteorological measurements

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Cloud occurrence over Reunion Island (21S, 55.5E, Indian Ocean) is related to many factors, among them: 1) the season, due to the position of the ITCZ, 2) the location in the island (windward, leeward, wind acceleration side) 3) the strength and direction of meso-scale winds, 4) the height of the trade winds inversion layer, which limits the cloud development, 5) the orography of the surroundings (orographic clouds, Föhn effect, wind acceleration. . .), 6) the advection of cloud systems and 7) the influence of passing fronts, depressions and cyclones.

Cloud forecasting, and more particularly solar radiation forecasting, is a main issue for the photovoltaic (PV) production and optimization in Reunion Island. The capability of providing a reliable forecast will be determinant for the ambitious 2050 horizon objective of the Island: cover the 100% of energetic needs with renewable sources.

In this study we present a first approach to forecast solar radiation in short-term by using meteorological measurements from 21 meteorological ground stations widely spread around the island (and with altitudes from 8 to 2245 m) together with ECMWF meso-scale surface wind speed and direction. Ground measurements include solar irradiation, wind speed and direction, relative humidity, air temperature, precipitation and pressure.

In the application of the method, a special attention is paid to distinguish between clear (or mostly clear days) and days which begin clear and become cloudy sometime around noon, since the latter are linked to a great impact (sudden drop) in the PV production; moreover, these two regimes represent the great majority of days for most of the considered sites. The situations represented by the mentioned points 6) and 7) are out of the scope of this approach, since more offshore information (such as meteorological modeling and satellite observations) would be required.