

Study of the Best Algorithm to Estimate Sunshine Duration from Global Radiation on Horizontal Surface for Tropical Region

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Abstract : The sunshine duration, which is the sum of all the moments when the solar beam radiation is up to a minimal value, is an important parameter for climatology, tourism, agriculture and solar energy. Its measure is usually given by a pyrhelimeter installed on a two-axis solar tracker. Due to the high cost of this device and the availability of global radiation on a horizontal surface, on the other hand, several studies have been done to make a correlation between global radiation and sunshine duration. Most of these studies are fitted for the northern hemisphere using a pyrhelimetric database. The aim of the present work is to list and assess all the existing methods and apply them to Reunion Island, a tropical region in the southern hemisphere. Using a database of ten years, global, diffuse and beam radiation for a horizontal surface are employed in order to evaluate the uncertainty of existing algorithms for a tropical region. The methodology is based on indirect comparison because the solar beam radiation is not measured but calculated by the beam radiation on a horizontal surface and the sun elevation angle.

Keywords : Carpentras method, data fitting, global radiation, sunshine duration, Slob and Monna algorithm, step algorithm

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