



A NEW FUNCTION BASED ON BOLTZMANN STATISTIC TO MODEL THE DISTRIBUTION OF PHOTOSYNTHETICALLY ACTIVE RADIATION DATA

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To obtain simple correlations for the estimation of the performance of biological systems, which transform the solar energy by photosynthesis, and to generate synthetic data, it is necessary to know the frequency distributions of photosynthetically active radiation (PAR). In this work we carried out an analysis of the properties of hourly values of PAR data collected in southern Spain. Its dependence on the optical mass for all type of skies, including cloudy skies, is analyzed. Results show that, for a given value of the optical mass, the PAR density distributions are not symmetrical and have certain degree of bimodality. The increment in the optical mass value has two effects on the PAR distributions, the first one is a shift toward lower values of the maximum and the second one is a decrease in the range of PAR values. A model of the frequency distribution of PAR values, based on a new kind of functions related to the Boltzmann's statistic, is proposed. The parameters of these functions depend just on the optical mass. Results show a very good agreement between the data and the model proposed