

# APPLICATION OF WRF MESOSCALE MODEL TO FORECAST SOLAR AND WIND ENERGY RESOURCE BY USING HIGH RESOLUTION DATABASE FOR TOPOGRAPHY AND VEGETATION.

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## ABSTRACT

The use of solar and wind energy in the Brazilian energy matrix has been growing since the last decade. As a result, the knowledge on solar and wind resource is very important for energy planning and power distribution system management, and it is mandatory for design and project of future renewable power plants like CSP, PV and wind farms. This work shows the preliminary results provided by the use of regional model WRF for the prediction of solar energy resource and wind speed at Ceará, located in Northeastern region of Brazil. Topographic and vegetation database with 90 m and 250 m horizontal resolution, respectively, was used to feed model WRF running in mode LES (Large Eddy Simulation). The use of this high resolution aims at reducing uncertainties associated with misrepresentation of ground albedo and complex topography. Observational data acquired at two Automated Weather Stations (AWS), located at coastal and continental areas presenting different climatic features, was also used to evaluate the reliability of model outputs. Both AWS's are operated by Ceará's Foundation for Meteorology and Water Resources (FUNCEME). This paper presents the results obtained for two typical climate seasons in the study area: rainy season (March) and dry season (September). Reduction up to 15% in BIAS and RMSE was obtained. Besides that, the proposed methodology leads to wind and solar irradiation data presenting similar probability density functions compared to the ground measurements.

**Keywords:** Atmospheric modeling, Solar energy, Wind energy, Numerical forecasts.