Data Article

Wind and power density data of strategic offshore locations in the Colombian Caribbean coast

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A R T I C L E   I N F O

Article history:
Received 24 September 2019
Received in revised form 20 October 2019
Accepted 21 October 2019
Available online 26 October 2019

Keywords:
Wind energy
Offshore
Renewable energy
Colombia
Wind turbines
Wind power
Wind speed
Wind velocity

A B S T R A C T

The high potential of wind speed in the Colombian Caribbean coast is an opportunity to develop offshore wind energy technology. This article contains the wind speed and wind power density in four strategic locations in Colombia (Cartagena, Barranquilla, Santa Marta and La Guajira) at different elevations. The dataset from this study is related to the research paper “Renewables energies in Colombia and the opportunity for the offshore wind technology published in Journal of Cleaner Production (Rueda-Bayona et al.) [1]. Reading and processing numerous files stored in databases could be challenging because it demands software programming to do so, what could difficult the access to valuable data for the community. Also, high compressed files such as NetCDF formats demand specialised software which is not easy obtaining and utilising because it requires skills in a programming language. Then, this study used the NARR-NOAA database [2] and generated local wind and power density data stored in Excel sheets to ease their utilisation.

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The dataset is composed of a table with a monthly average of wind data and multiannual average energy densities from 1979 to 2015 for offshore areas near to Cartagena, Santa Marta, Barranquilla, and the La Guajira Peninsula. Also, another table reports the monthly averages of wind speed and wind direction year by year.

The dataset is stored in Mendeley data website (https://data.mendeley.com) and organised in two Excel sheet files: Monthly_mean_Colombia_wind_power_levels_1979_2015.xls (Monthly mean file) and Monthly_wind_1979_2015_Colombia.xls (Monthly wind file). The Monthly mean file provides the monthly multiannual statistical mean of wind velocity and power density at three elevations (10 m, 110.8 m, and 323.2 m) for the four strategic locations. The Monthly wind file gathers monthly wind data (components, velocity, and direction) from January 1979 to December 2015 at 10 m of elevation for the four strategic locations.

2. Experimental design, materials, and methods

The data source location of the four strategic sites in the north region of Colombia [1] with high wind and power densities are shown in Fig. 1.

The four strategic locations (Fig. 1) showed the highest wind speed and wind power density potential in Colombia according to the results revealed in Rueda-Bayona et al. [1]. The locations
mentioned above could contribute to increasing in Colombia the actual installed energy generation capacity of 16,700 MW [5].

The applied methodology to generate the wind and power density datasets may be seen in Fig. 2.

1. Downloading: in this stage, the data (NetCDF files) was acquired through the file manager FileZilla (https://filezilla-project.org/) in order to ease the downloading process. The file manager connects to the NARR-NOAA database server to retrieve the information stored on the website (https://www.esrl.noaa.gov/psd/data/gridded/data.narr.html).

2. Reading variables and extraction: The characteristics of the downloaded NetCDF files such as compression, size (38 GB), matrix structure, and a large number of compressed files (tri-hourly records from 1979 to 2015) requires advanced software tools. Then, this study utilised the Matlab software (www.mathworks.com/products/matlab.html) to read and process the NetCDF files. Information and examples of the application of Matlab and other software for reading and extraction of the data are available in: https://www.esrl.noaa.gov/psd/data/narr/format.html#matlab.

3. Calculation: the power densities were calculated using the equations related in the research of Rueda-Bayona et al. [1], and the wind direction and magnitude were calculated using u and v components of the downloaded wind data.
Acknowledgements

Authors thank to Universidad Militar Nueva Granada, Universidad del Norte and Universidad de la Costa for the financial support through the research project INV-ING-2985.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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