



Low wind days and wind resource variability in Africa

Christophe Lavaysse (1,2), Hanieh S. Hashemi (1), and Benoit Hingray (1)

(1) Univ. Grenoble Alpes, CNRS, IRD, G-INP, IGE, F-38000 Grenoble, France (christophe.lavaysse@ird.fr), (2) European Commission, Joint Research Centre (JRC), 21027 Ispra (VA), Italy

As a result of the world-wide attention that global climate change is receiving, laudable attempts are made to increase the share of renewable energies in electricity production around the globe. In addition to climate change issue, the need for bringing electricity to millions of people who live in the least-developed parts of the world act as a stimulus to the development of renewable energy share of electricity generation. Despite all efforts, a considerable number of people in rural and remote areas of Africa are still striving to gain access to energy. This issue has been partly addressed by the introduction and development of off-the-grids (stand-alone power systems) using renewable energy sources, including wind. The key aim of this research is to study wind power as a source of electrification in Africa. Renewable energy supply is very vulnerable to hydro-climatic variability and extreme hydro-meteorological events, and wind energy is no exception. In particular, low wind speeds throughout Africa pose a real challenge to electricity generation from wind. Using hourly estimates of wind speed provided by ERA5 (the latest climate reanalysis produced by ECMWF), this paper evaluates spatial and temporal variability in daily wind power production across Africa, for a 18-year period (from 2000 to 2017), in terms of the capacity factor of wind (the average wind power generated each day divided by the rated peak power), and the minimum required wind speed for power production (useable wind speed). Furthermore, by calculating the low percentile values of daily capacity factors, we gain understanding of the ability of wind turbines to achieve a given level of service quality, and put an economic perspective on wind power production.