



A new look at interannual variability of observed winds from operational meteorology and tower observations

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To estimate future wind resources available at a location there is a need to account for the likely variation due to interannual and longer term variations over the lifetime of the wind farm. The current practise has been based on estimates of the interannual variation (IAV) from 10m wind observations used in operational meteorology. These studies are several years old and here a new look is taken at comprehensive datasets from around the globe collected by meteorological and climatological services. The oft quoted 6% annual variation of wind speed is critically re-evaluated. Well-maintained long-term conventional meteorological observations are examined, including surface (10m) winds, upper air winds from radiosondes, and tower observations.

The IAV is obtained at several sites and regions globally using a number of quality-controlled datasets of surface and upper air wind observations compiled by climate monitoring institutes. Primarily two databases are examined: HadISD, 2016 [1] from which conventional 10m observations have been extracted, and RAOBCORE [2], for upper air radiosonde observations (Ramella-Pralungo, L et al. ,2013). Also examined are the observations used in the ERA Interim reanalyses [3]. Another dataset examined is a homogenised 43 year UK gridded climatology (Met Office UK Climate Impacts data) based on 10m winds [4].

Although there is support for the industry standard of 6% at some locations this is not universally true. Also there can be significant differences in IAV with elevation so that the 10m variation may not be representative of greater heights typical of wind turbines. Over the UK a decreasing wind speed trend is found at 10m but this is not supported by the radiosonde measurements.

References

- [1] HadISD is a global sub-daily surface dataset based on the Integrated Surface Database (ISD) dataset from NOAA's NCDC version 1.0.3.2014f http://www-hc.metoffice.com/~hadobs/www.hadobs.org/hadisd/v201_2016f/index.html
- [2] Ramella-Pralungo, L et al. (2013) RAOBCORE, <http://doi.pangaea.de/10.1594/PANGAEA.823617>
- [3] Dee DP, Uppala SM, Simmons AL, Berrisford P, Poli P, Kobayashi S, Andrae U, Balmaseda MA, Balsam G, Bauer P, et al. "The ERA-Interim reanalysis: configuration and performance of the data assimilation system". Quarterly Journal of the Royal Meteorological Society 2011; 137(656):553-597
- [4] Met Office UK Climate Impacts data
<http://www.metoffice.gov.uk/climatechange/science/monitoring/ukcp09/available/monthly.htm>