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Aspects of temporal and spatial variability of winds and time averaging of wind data for energy calculations

H. Ólafsson (1,2,3) and S. Poret (4)

(1) Háskóli Íslands (University of Iceland), (2) Veðurstofa Íslands (Icelandic Meteorological Office), (3) Bergen School of Meteorology, Geophysical Institute, University of Bergen, Norway, (4) Ecole des Mines d'Albi, France

Wind energy is calculated from surface wind observations using different ways of time-averaging. The energy remains similar if the wind speed is averaged over 6 to 30 days, but increases regularly as the time interval for averaging is decreased. For flat land, energy calculations based on 1 hourly observations give about 170% of the energy calculated from the monthly mean, while the corresponding proportion is 10% for 1h vs. 12h and 3% for 1h vs. 3h. For weather stations on flat land, this proportion remains quite similar, but for weather stations where mountain-induced winds are strong, the ratio of energy calculated from a long-term mean to energy calculated from 1 hourly observations can be quite different. This is associated with the wind speed distribution being different for locations where mountain-induced winds are frequent from what it is away from mountains.