

EWEA Conference 2016

Section:

Resource Assessment

Presenter:

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Subtopic:

Measurements and wind speed predictions

Differential temperature measurement for evaluating the stability of the atmosphere for wind profile calculations

During a 9-months measurement campaign in Lelystad (The Netherlands) it has been researched whether the accuracy of common temperature sensors is good enough to evaluate the stability of the atmosphere to calculate the wind profile. The wind profile is essential to extrapolate the wind speed in greater heights, which are not measured with traditional met mast technology. The stability of the atmosphere gives some indication of the correction term, which is used to calculate the height profile of the wind speed.

The stability of the temperature layers has been researched by installing three different types of temperature sensors. Usually active and passive temperature sensors are used in resource assessment campaign. For the campaign in Lelystad also expensive ventilated temperature sensors have been installed. Ventilating temperature sensors provide better accuracy with only $\pm 0.1K$ tolerance, whereas common active and passive temperature sensors have $\pm 0.2K$ and $\pm 0.15K$ tolerance. In order to compare the measurement data, the sensors have been installed on 105 m and 20 m measurement height. The differential temperature has been calculated of each sensor type for detailed analysis.

There are only few differences in the measurement data of all sensors. The correlation of the same sensor type between both measurement heights is very good with $R^2=0.994$. In the winter season the correlation has been even better with $R^2=0.998$. While correlating the differential temperature of the sensors, the active and passive sensors correlated very good with $R^2=0.998$, whereas the more accurate ventilated sensor correlated only with $R^2=0.966$. In the presentation the reasons for the differences in R^2 will be analysed. The temperature trend of all three sensor types can be used to analyse the temperature layers.

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