



## **Conventional measurement data: good enough for offshore meteorology?**

Michael Schmidt, Jens Tambke, Gerald Steinfeld, and Detlev Heinemann

Carl von Ossietzky-University Oldenburg, Institute of Physics, ForWind - Center for Wind Energy Research, Oldenburg, Germany

The analysis of marine boundary layer properties is a fundamental task of energy meteorology. The determination of atmospheric stability and momentum fluxes out of measurement data is, for example, important for the validation of mesoscale models such as WRF and COSMO, but also for the validation of microscale models like PALM large eddy simulations. From them, major conclusions are drawn for the design of wind turbines and the layout design of entire offshore wind farms with 20 to more than 100 turbines.

Up to now, high-resolution measurements of the vertical wind are usually carried out with sonic anemometers, which are known to provide simultaneously (sound-) temperature signals. Recent investigations of data from different met masts in the North Sea have revealed errors now, which can be corrected only partially. A method will be shown for visualization of a sonic anemometers influence on the mean vertical wind speed and how it can be adjusted.

Another sonic anemometer dysfunction, the striking, not by meteorology explainable underestimation of vertical wind events for lots of fine wind direction segments can only be demonstrated so far, but not explained or actually corrected.

The quality of sonic anemometer measurements of mean temperatures is proved to be poor to mediocre – depending on the type of the device. Furthermore, there is no evidence about the quality of the high-frequency temperature fluctuation measurements, simply because comparative measurements are missing. Temperature measurements with sonic anemometers under controlled laboratory conditions and comparisons with other fast temperature measurements techniques must be performed in order to gain more certainty on this issue.

Temperature difference sensors are producing data in agreement with theory. Such a sensor is already installed on a North Sea met mast. Some new temperature difference sensor results will be presented.

New methods, especially for high-frequency and high-quality measurements of vertical wind speeds, have to be developed in the very near future for serving the high and increasing needs of modelers.