



ON THE IMPORTANCE OF FLOW DISTORTION CORRECTION OF ULTRASONIC ANEMOMETERS FOR FLUX MEASUREMENTS IN THE MARINE SURFACE LAYER

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Accurate flux measurements play a decisive role in the atmospheric sciences, e. g. in climate modelling and air-sea interaction. They are commonly derived from sonic anemometer measurements with the eddy-correlation method. Various methods for the reduction of measurement errors due to flow distortion and tilting were introduced in the last decades. This is of crucial importance when high accuracy flux measurements are needed, e.g. for the validation of flux-profile relations in the marine surface layer.

Three ultrasonic anemometers are employed at different heights at the offshore measurement platform FINO I north of Borkum in the North Sea. Prior to installation, the anemometers were calibrated in a wind tunnel and an empirical correction procedure for the three-dimensional wind vector has been developed. Systematic errors similar at all three anemometers as well as errors which are specific for each individual instrument are found. For the horizontal wind components it is found that the manufacturer calibration can be improved. Additionally, a correction of vertical wind speed has to be applied. In addition to flow distortion errors, possible errors due to non vertical mounting have to be considered. While at field measurements a tilt correction method has to be applied, a simple method has been derived to determine the tilt error at wind tunnel measurements.

The correction procedure is used with example data from the FINO I platform to investigate the importance of the flow distortion correction. Comparisons of fluxes calculated with uncorrected and corrected data show the improvement in the flux calculation. Also, flux measurements from three different heights will be compared with each other.