

**WORLD METEOROLOGICAL ORGANIZATION**  
**WMO TECHNICAL CONFERENCE ON METEOROLOGICAL AND**  
**ENVIRONMENTAL INSTRUMENTS AND METHODS OF OBSERVATION**  
*Towards fit-for-purpose environmental measurements*  
*Amsterdam, The Netherlands, 8 - 11 October 2018*

**SUBMITTED ABSTRACT**

<b>0.</b>	<b>Paper Number</b>	51
	<b>Session Name</b>	1. Characterization and standardization of environmental measurements - traceability assurance
<b>1.</b>	<b>Title of the paper</b>	Study on the Effect of Vertical Wind Components on Compact Ultrasonic Anemometers

<b>2.</b>	<b>Institution</b>	Deutscher Wetterdienst			
	<b>Authors</b>	Dr/Mr/Ms	Family name	First name	Country
a	Lead author	Mr	Schubotz	Karsten	Germany
b	Co-author	Mr	Hensel	Paul	Germany
c	Co-author	Dr	Lenkeit	Jan	Germany
d	Co-author	Dr	Waas	Stefan	Germany

<b>4.</b>	<b>Abstract of the paper</b>
	<p>For meteorological measurements in most cases only the component of wind speed and wind direction in the horizontal plane is required. Depending on the anemometer design the horizontal component of the three-dimensional wind vector may not be measured accurately. In particular for compact anemometers the two plates enclosing the measurement volume could impede optimum flow through the instrument if the wind comes at an angle with respect to the horizontal plane. Consequently, the measured horizontal wind speed and direction may be incorrect. In a long-term field test the wind speed deviations of compact ultrasonic anemometers compared to a 3D ultrasonic anemometer, which was used as a reference, were investigated. The deviations were examined depending on the elevation angle and the horizontal angle of the incoming wind to identify possible correlations with the anemometer designs. By means of the determined deviation profiles of the anemometers the measurement uncertainties that are to be expected for non-horizontal flows were estimated. Furthermore, the possibility of an error correction of the measurement results was investigated. In addition, the statistical analysis of the measured data gives an estimate on the distribution of the elevation angles over the test period at the given test site. This result can then be used to decide for which relevant range of elevation angles future calibrations in the wind tunnel should be carried out.</p>