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Performance of a high frequency lowered ADCP to infer finescale parameters

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There are several well known and reliable methods to determine turbulence parameters based on bottom mounted Acoustic Doppler Current Profiler (ADCP) measurements and parameterizations. Long ranging lowered ADCP measurements are by now a popular method to obtain full depth current profiles. Efforts to examine small scale processes with conventional lADCPs/CTD systems are typically based on shear-strain methods, which are suitable for a lowered platform.

During a cruise to the tropical and equatorial Atlantic in 2006 a high frequency ADCP (1200 kHz) was used as downlooking lADCP. The motivation was to determine if such data could be used to obtain information associated with turbulence in the ocean. Benefiting from the high vertical resolution (1m bin length) and fast time sampling (1 per second) such additional information seemed promising. Simultaneously conducted microstructure measurements with a freefalling probe gave the opportunity to directly compare and validate the data.

The performance of the lowered HF ADCP and the chances to infer on finescale parameters from its measurements were theoretically examined. Current shear and vertical variances of Reynolds-splitted velocities were analyzed regarding signals coming from turbulence in the watercolumn. With the aid of associated CTD data Richardson and according Froude numbers could be determined, showing good correlations with the microstructure measurements. The observations of high frequency ADCP data seemed not sufficiently long in time to result in statistically robust turbulence measurements.