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Closing the energy budget - Measuring turbulent production and dissipation rates using an Acoustic Doppler Current Profiler

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Acoustic Doppler Current Profilers (ADCP) are increasingly being used to estimate turbulent parameters of flow. An example is the determination of the rate of turbulent kinetic energy production using the variance method (Lohrmann etal 1994, Stacey etal 1999). In this contribution, we propose an alternative approach which allows estimates of dissipation via the structure function, which has previously been exploited in Radar Meteorology (Sauvageot 1992).

The technique uses the 'two-thirds law' of Kolomogorov and Obukohov's to estimate dissipation. This 'structure function' method has been applied to velocity profile data from an ADCP. The structure function dissipation estimates are compared with independent turbulent dissipation rates from a microstructure profiler and with production rates estimated from an ADCP using the variance method.

With the 'structure function method', dissipation rates can be estimated over most of the water column continuously for an extended period of time.