



## **Acoustic Doppler Velocity meters for low-cost multi-site gauging of streamflow**

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Acoustic Doppler Velocity (ADV) technology for measuring stream flows is not new, having been in common use since the 1980s. However, application of low-cost bed-mounted ADV meters to multi-site monitoring of flows over a stream network is uncommon. And an extensive assessment of a network of such meters over a range of flows and hydraulic conditions has previously never been published, as far as we know. Hence, we present this research, not as application of particularly new technology, but as an overdue field assessment of a developing technology. Streamflow data measured by bed-mounted ADV meters installed in the Pontbren experimental catchment in Wales, UK, are compared with measurements taken using an impeller meter which are assumed to be relatively accurate. ADV accuracy at ten sites on the stream network is assessed. The sites include natural streams and concrete-lined culverts, and including a range of flow rates and depths. Accuracy was found to be generally good – to within 20% of the current-metered flow in more than 80% of measurements over all the sites. This is considerably better than found in a previously published field assessment of these meters, although considerably worse than achievable in laboratory conditions. Calibration of the meters was found to be essential and, because the calibration coefficients could not be related to the characteristics of the site, calibration must be done for every site. The low cost and small local environmental impact of such meters allows multi-site deployment, so that the spatial variability of hydrological systems can be investigated with much more significance than would be possible using more intrusive traditional methods of continuous streamflow gauging. As the assessment produced a statistically-based estimate of flow accuracy, the uncertainty in the flow data could be formally accounted for in subsequent hydrological analysis.