



The OURSIN method for computing the uncertainty of moving-boat ADCP discharge measurements

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Any river discharge measurement is valuable provided its uncertainty is quantified.

The uncertainty of any river discharge measurement, performed in good or in more adverse conditions, must be accounted for in order to enhance its value and its meaning. In recent years, several studies aimed at estimating the uncertainty of ADCP discharge measurements. Most of them were developed for research purpose or are still under development before it would be ready to be used operationally by the hydrologist community. For instance, QRev software, developed by the USGS, provides a very simplistic computation of the uncertainty. On the other hand, the QUant method, based on a Monte-Carlo approach, is more advanced but requests a long computation time.

Based on a collaboration between French agencies CNR / EDF-DTG / Irstea / SCHAPI, a method, named OURSIN, has been developed for computing the uncertainty of moving-boat ADCP measurements. The OURSIN method follows the framework of the Guide to the expression of Uncertainty in Measurement (GUM). The uncertainty of extrapolated discharges in unmeasured areas is estimated by varying the maximum number of parameters, as an alternative to the Monte Carlo approach. A uniform distribution of errors is assumed so that any value in the minimum-maximum possible range is equally likely to occur. The OURSIN method also accounts for systematic versus random errors in the computation of the uncertainty of discharge measurements averaged over repeated ADCP transects. Then, the decomposition of the different error sources allows determining their influence on the overall uncertainty.

The OURSIN method has been applied to several ADCP discharge measurements performed during repeated measures experiments under steady flow conditions which provided empirical uncertainty estimates. The uncertainty estimates show consistency with the uncertainty provided by such experiments. Further research needs to be conducted to validate the method in a broader range of measuring conditions.

With the participation of the USGS, the implementation of the OURSIN method into QRev is also under development. It will lead to an operational decision-making tool that gathers a quality assurance/control and the estimation of the uncertainty.