

EGU2020-4661

<https://doi.org/10.5194/egusphere-egu2020-4661>

EGU General Assembly 2020

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## Uncertainty of discharge measurement using salt dilution

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Discharge measurement using salt dilution is an old method, but it has been recently more and more used thanks to the development of new sensors making it possible to measure conductivity and compute discharge in real-time. Salt dilution is very well suited for turbulent rivers, such as mountain streams. The ISO standard ISO 9555 propose a normative framework to estimate uncertainty, but it was published in 1994 and is now obsolete for new sensors and computational capabilities. In this article, we propose a complete framework to compute the uncertainty of a salt dilution gauging following the GUM (Guide to the expression of uncertainty in measurement) method that take into account the following error sources: (i) the uncertainty in the mass of salt injected, (ii) the uncertainty in the measurement of time, (iii) the uncertainty in the Conductivity to Concentration law, (iv) the uncertainty if a measurement conductivity is out of the range of the Conductivity to Concentration law, (v) the uncertainty in the computation of the area under the conductivity curve, (vi) the uncertainty due to a not perfect mixing of the tracer if the mixing length between injection and the probes is not reached (vii) the uncertainty due to a loss or a gain of tracer between the injection and the probes if tracer can be adsorbed for example and (viii) the uncertainty due to unsteadiness of the flow i.e. variation of discharge during the measurement. The method for computing each uncertainty source is presented and the new framework is applied to a set of real measurements and compared to the expertise of field hydrologists.