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Uncertainty in river discharge observations: a quantitative analysis

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Abstract. This study proposes a framework for analysing and quantifying the uncertainty of river flow data. Such uncertainty is often considered to be negligible with respect to other approximations affecting hydrological studies. Actually, given that river discharge data are usually obtained by means of the so-called rating curve method, a number of different sources of error affect the derived observations. These include: errors in measurements of river stage and discharge utilised to parameterise the rating curve, interpolation and extrapolation error of the rating curve, presence of unsteady flow conditions, and seasonal variations of the state of the vegetation (i.e. roughness). This study aims at analysing these sources of uncertainty using an original methodology. The novelty of the proposed framework lies in the estimation of rating curve uncertainty, which is based on hydraulic simulations. These latter are carried out on a reach of the Po River (Italy) by means of a one-dimensional (1-D) hydraulic model code (HEC-RAS). The results of the study show that errors in river flow data are indeed far from negligible.

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