

## **Understanding discharge data uncertainty and its consequences for analyses of spatial and temporal change in hydrological response**

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Understanding and quantifying how hydrological response behaviour varies across catchments, or how catchments change with time requires reliable discharge data. For reliable estimation of spatial and temporal change, the change in the response behaviour needs to be larger than the uncertainty in the response behaviour estimates that are compared. Understanding how discharge data uncertainty varies between catchments and over time, and how these uncertainties propagate to information derived from the data, is therefore key to drawing the right conclusions in comparative analyses.

Uncertainty in discharge data is often highly place-specific and reliable estimation depends on detailed analyses of the rating curve model and stage–discharge measurements used to calculate discharge time series from stage (water level) at the gauging station. This underlying information is often not available when discharge data is provided by monitoring agencies. However, even without detailed analyses, the chance that the discharge data would be uncertain at particular flow ranges can be assessed based on information about the gauging station, the flow regime, and the catchment. This type of information is often available for most catchments even if the rating curve data are not. Such ‘soft information’ on discharge uncertainty may aid interpretation of results from regional and temporal change analyses. In particular, it can help reduce the risk of wrongly interpreting differences in response behaviour caused by discharge uncertainty as real changes.

In this presentation I draw on several previous studies to discuss some of the factors that affect discharge data uncertainty and give examples from catchments worldwide. I aim to 1) illustrate the consequences of discharge data uncertainty on comparisons of different types of hydrological response behaviour across catchments and when analysing temporal change, and 2) give practical advice as to what factors may help identify catchments with potentially large discharge uncertainty.