# Uncertainty estimation and validation of data for hydrological applications

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Hydrological observations are unique in space and time. If not observed, the values can only be estimated either from observations or using hydrological models. Many applications, such as the calculation of water balances, calibration of hydrological models, or the provision of unbiased ground truth for remote sensing, require good quality datasets. Thus the reliable estimation of the variables and the assessment of the quality of these estimators is of great importance. The problem is exacerbated by the ubiquitous decimation of ground based hydrological networks. Even though the uncertainty of estimates is considered to be important in hydrology, there are very few methods which are typically used for the validation of such uncertainty estimates. In this paper we focus on some general issues. These include:
- uncertainty verification methods
- separation of bias and random error
- uncertainty at different scales (temporal and spatial)
- effects of misinterpretation of uncertainty
Examples from rainfall interpolation and hydrological modelling are used to illustrate the methodologies.