



How much observed river flow data are uncertain? A theoretical analysis and an attempt to assess the effect on parameterization and performance evaluation of rainfall-runoff models

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Rainfall-runoff models are usually optimized and tested on the basis of (so called) "observed" river flow data. However, strictly speaking river flows are never observed. It is well known that what is observed is usually the river stage, that is subsequently converted in a river flow value by means of a rating curve. Therefore, the "observed" river flow is affected by uncertainty, that can be induced by many different causes. As a matter of fact, the river stage measure is affected by errors, as well as the estimated rating curve. For instance there are approximations in the gauging instruments, as well as in the extrapolation of the rating curve outside the range of the observations that were used for its estimation. This study is aimed at analyzing the uncertainty that may affect "observed" river flow data. An attempt is made to quantify the different sources of errors, and to propagate them through the river flow estimation procedure, therefore retrieving an estimation of the total uncertainty in the observed variables. A simulation study is also performed by using synthetic data affected by known sources of uncertainty, in order to assess the potential effect of erroneous observations on rainfall-runoff model parameterization. The effect of errors in the observed variables on total uncertainty in the simulation of river flow data will be also investigated.