Editorial: Data-based perceptions on Predictions in Ungauged Basins

Data-based (or top-down) approaches are an important part of improving Predictions in Ungauged Basins (PUB). The top-down approach to model development begins with data representing the key drivers and outputs of the system of interest. The ability to identify an appropriate model structure depends on the availability of suitable data, the quality of and information contained in the data, the ability to make use of the information content, as well as the nature of the system being modelled. While many types of data are becoming more available, a general lack of information on the uncertainty in the data is a shortcoming, as the uncertainty defines the relative significance of the data. Other types of data, for example river gauge networks in some regions, and long-term hydrological experiments, are in decline or in danger of decline. The risks associated with this loss of data are not yet fully recognised.

The six papers that make up this Special Issue explore different aspects of data in the context of PUB. The first two papers explore the data being used. Hannaford et al. (2013) investigate the utility of existing hydrometric networks in England and Wales for use in PUB research, while Spence et al. (2013) review recent research in the use of data to generate information and reduce uncertainty about hydrological characteristics of ungauged basins from a Canadian perspective.

The next two papers explore the impact of sampling on parameter estimation and predictive uncertainty: Littlewood & Croke (2013) explore the impact of temporal resolution, while Hughes et al. (2013) explore the effects of spatial scale. Better understanding of the impact of sampling on model parameters and performance should lead to reduced uncertainty in statistical relationships between a model's parameters and physical catchment attributes for many gauged catchments, often used to estimate flow at ungauged sites (regionalisation).

The next paper (van den Tillaart et al. 2013) examines the impacts of uncertainty in gauged flows on parameter estimation and model performance, while the last paper (Bulygina et al. 2013) looks at the applicability of different approaches to modelling the impacts of rural land management on flood flows under data limitations.

Better understanding of the available data, and the implications of the data resolution and quality on model parameters, performance and predictive power, is vital for improving our capability to predict fluxes (solutes, suspended particles as well as water) at ungauged locations and to comprehend the nature of errors in our predictions. The papers in this Special Issue use a variety of gauged data sets and contexts with the common aim of improving this understanding.

We would like to acknowledge the support and patience of the authors and the Hydrology Research Editorial team in putting together this set of papers. We look forward to follow-up discussions of the ideas and results. Clearly there is scope for more research, and so we also look forward to reading future contributions on the topic.

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