Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03969, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03969
EGU General Assembly 2008

A learning framework for regionalisation

W Buytaert (1), K Beven(2)
(1) University of Bristol, (2) Lancaster University

Predicting hydrological behaviour of ungauged basins is a major challenge. A common approach is to calibrate a hydrological model on an existing hydrological system and to adapt the model parameters to account for potential differences in the modelled processes. The model predictions with adapted parameter values are then used as an indicator for the hydrological behaviour of the ungauged basin. However, the uncertainty on this practice may be very high, due to parameter interaction, incommensurability and various sources of uncertainty and error. Additionally, the process does not allow for a proper quantification of predictive uncertainty. In a first part of the study, we will give a concise overview of the current state of the art in predicting the effects of change (such as basin change) on hydrology. We will identify the main deficiencies of the current approaches, and propose a new framework for regionalisation including uncertainty limits. Probabilistic transformation functions are used to incorporate uncertainty in the estimation of parameter changes as a result of migrating a model structure. In a second part, we will apply the technique to four small catchments in the Andes using TOPMODEL. Model parameter behaviour is explored over these catchments within a GLUE uncertainty framework. Sensitivity analysis is used to identify the optimal parameters of a probabilistic parameter transformation function that migrates the calibrated model to the target catchment. It is shown that a proper parameter transformation function yields results that are as accurate as a direct model calibration on the target catchment, thus avoiding type I errors. The major challenge of the approach is choosing the parameters of the transformation function. In our sensitivity analysis, we found consistent patterns in parameter behaviour that can guide this parameter choice. The proposed method can be used to explore the parameter space and to learn from parameter behaviour. As such it bridges the gap between deterministic model predictions and more formal regionalisation studies that have high data

requirements.