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Development of a hydrological response index to represent TOPMODEL parameters

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Abstract This paper proposes an approach of constructing a hydrological response index (HRI) for description of influences of the catchment's characteristics on hydrological simulations. HRI is composed of the topographic index of TOPMODEL and curve number (CN) of the SCS model, and can be computed from characteristics of topography and land surface components by using GIS and remote sensing techniques. Hydrological simulation is based on TOPMODEL and the parameters are calibrated. The relationship between HRI and the model's key parameters was analysed on the basis of calibration results from 32 hydrological response units (HRU) that were derived from HRI. The study results show that correlation coefficients between HRI and the parameters m and $\ln T_0$ are 0.88 and 0.85, respectively. Furthermore, a good relationship between SR_0 and NDVI by using Landsat data is also found. The validation of model parameters was carried out using those parameters. The validation results show that the correlation coefficient between observed and simulated stream discharges is 0.84. These results indicate that the proposed index can be used to represent the model parameters in the study region.

Key words parameter regionalisation; hydrological response index; regression analysis; validation; Landsat data