

On utilizing river widths measured from synthetic aperture radar images for calibrating rainfall–runoff models in ungauged basins

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Abstract The rainfall–runoff model is a common tool for estimating river discharge in the field of hydrology. The dependence on observed discharge data for calibration restricts its applications. In the last decade, the river cross-sectional water surface width obtained from remote sensing images, especially from the synthetic aperture radar (SAR) which can penetrate the clouds, has proved to be effective in tracing river discharge from space. In this study we present a method using river widths measured from SAR images for calibrating rainfall–runoff models based on at-a-station hydraulic geometry. One distinct advantage is that this calibration is independent of river discharge information. The results of the case study indicate that the satellite observation of river width is a competent surrogate of observed discharge for the calibration of the rainfall–runoff model and the proposed method has the potential for improving reliability of river discharge estimation in basins without any discharge gauging.

Key words river discharge; rainfall–runoff model; river cross-sectional water surface width; synthetic aperture radar; at-a-station hydraulic geometry