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HYDROLOGICAL PARAMETER ESTIMATION FOR UNGAUGED BASIN BASED ON SATELLITE ALTIMETER DATA AND DISCHARGE MODELING. A SIMULATION FOR THE CAQUETA RIVER (AMAZONIAN BASIN, COLOMBIA)

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The main objective of this paper is to review the usefulness of altimetric data in ungauged or very poorly monitored basin. It is shown that altimetric measurements can be combined with a single in-situ gauge to derive a reliable stage-discharge relationship upstream from the gauge. The Caqueta River in the Colombian Amazon Basin was selected to simulate a poorly monitored basin. Thus it was possible to derive the stage-discharge relationship for 13 "virtual gauge stations" defined at river crossing with radar altimetric ground tracks. Stage measurements are derived from altimetric data following the methodology developed by Leon et al. (2006). Discharge is modeled using PROGUM – a flow routing model based on the Muskingum Cunge (M-C) approach considering a diffusion-cum-dynamic wave propagation (Leon et al., 2006) using a single gauge located downstream from the basin under study. Rating curve parameters at virtual stations are estimated by fitting with a power law the temporal series of water surface altitude derived from satellite measurements and the modelled discharges. The methodology allows the ellipsoidal height of effective zero flow to be estimated. This parameter is a good proxy of the mean water depth from which the bottom slope of the reaches can be computed. Validation has been conducted by comparing the results with stages and discharges measured at five other gauges available on the Caqueta basin. Outflow errors range from 10% to 20% between the upper basin

and the lower basin, respectively. Mean absolute differences less than 1.10 m between estimated equivalent water depth and measured water depth indicates the reliability of the proposed method. Finally, a 1.2×10-4 mm-1 mean bottom slope has been obtained for the 730 km long reach of the Caqueta main stream considered.