



Combining Specific-Gauge Analysis and Google Earth Engine to understand the morphodynamics of fluvial systems in tropical latitudes

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In this research work several tropical rivers are analyzed within the Colombian territory (among them, the Magdalena, Cauca, Nechí, Sogamoso and Miel rivers) that present different hydrological, hydraulic, sedimentological, geomorphological and geological characteristics, to show the goodnesses of combining specific-gauge analysis and the Google Earth Engine developed by Gorelick et al. (2017) for performing multitemporal and multiscale analyzes, starting from the channel scale (cross section) until reaching the valley scale and its associated floodplain.

The motivation for this work arises from the need to understand the behavior and trends of morphodynamic evolution of regulated tropical rivers within the Colombian territory that, in addition to the regulation of the flows in the reservoirs of the hydroelectric projects, are subject to multiple anthropogenic drivers such as alluvial mining, the which has increased dramatically in the South American due to the increase in mineral prices, bringing the loss of vegetal cover, the affectation of strategic ecosystems for the country and the degradation of extensive areas of Colombian territory as reported by the Gobierno de Colombia y UNODC (2016).

Specific-gauge analysis are useful in the absence of detailed bathymetric studies as suggested by Mosselman et al. (2012) and may indicate trends in the stage of increase or decrease of the bed for a specific flow as suggested by Watson (2010). These analyzes have been successfully used in Colombia by Rios and Mosselman (2018) for the preliminary analysis of the Nechí River. In this work, they carried out using the information collected ("level-flow curve") in the cross sections where the hydrometric stations of the Institute of Hydrology, Meteorology and Environmental Studies of Colombia - IDEAM are located, thus obtaining the graphs of the development over time of water levels for certain selected flows.

Finally, the analysis at the main channel scale is complemented with the animations obtained from the Google Earth Engine tool at valley scale, thus obtaining the morphodynamic evolution behavior and trends of the regulated tropical rivers selected within the study.