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Taking up the challenge: Hydrological modelling of the semi-arid, poorly gauged Luangwa River using remotely sensed data

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In the Lower Zambezi, populations suffer frequently from severe floods and droughts. Dealing with these problems relies on the ability to accurately estimate the flows entering the river. This is a major challenge because most of the rivers entering the Zambezi are poorly gauged or even ungauged. For this purpose, increased insight in the hydrology of the ungauged tributaries in the Zambezi between Kariba and Cahora Bassa is essential, allowing more reliable flow predictions and hence improve dam operation and flood protection downstream. Therefore, a hydrological model will be developed for the Luangwa river; the largest mostly unregulated tributary. Due to the absence of sufficient ground measurements of good quality, remote sensing products are valuable additional data sources which allow for a more detailed representation of the spatial heterogeneity and temporal variability. The development of a hydrological model in this semi-arid and poorly gauged area is prone to various challenges which need to be dealt with in order to be able to develop a reliable tool for flow forecasting. These challenges are for example: poor station data availability and quality, large spatial variability, invisible yet large unknown fluxes (such as evaporation), local activities influencing the hydrology etc. In this study, various challenges are tackled: what exactly is going on and how should that be taken into account? A hydrological model is developed using remote sensing data for the forcing, but also calibration. For the latter, remotely sensed river altimetry and width can be very useful. Traditionally, hydrological models are calibrated on discharge time series at the most downstream point only. However when using remotely sensed river characteristics, calibration can be done at multiple points within the river basin allowing the inclusion of the spatial variability during the calibration step. First model results using this calibration methodology will be shown and its strengths and short comings will be discussed.