Gauging the ungauged basin: What is the value of limited streamflow measurements?

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The long-standing issue of hydrological predictions for ungauged basins has received increased attention thanks to the PUB imitative. Given all the problems on making predictions in totally ungauged catchments one might argue that the best thing to do in an ungauged basin is to actually take a few runoff measurements. In this study we explored how implementing such a procedure might support predictions in an ungauged basin. We used the well-studied Maimai watershed as a hypothetical ungauged basin where we pretend to start with no runoff data and add different sub-sets of the available data to constrain a simple catchment model. These sub-sets were single runoff events or a limited number of point values; in other words these data represent what could be measured with limited efforts in an ungauged basin. Besides these runoff data we used different types of soft data to constrain the model. We recently presented 'soft data' as a general framework to facilitate communication between experimentalist and modeler for new ways to test models and quantify uncertainty, parameter identifiabilty and parameter uncertainty. The model simulations were then validated using the available runoff data from different years. We found that surprisingly little runoff data was necessary to derive model parameterizations which provided good results for the validation periods, especially when these runoff data were combined with soft data. We argue that the improved dialog between experimentalist and modeler may be a necessary next step within the PUB movement for moving from calibration-reliant models to ones grounded in understanding and applicability to ungauged basins.