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QPE adjustment using river discharge

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With the expected increase in flooding due to climate change, accurate estimation of precipitation and the resulting modelled hydrographs are an essential requirement for reliable flood forecasts. At present, most radar rainfall adjustment methods require raingauge data to increase the accuracy of the precipitation estimates. One disadvantage is that raingauges only measure precipitation at a given point and usually there are a relatively small number of these points in a typical catchment (and some smaller catchments may not have any). River discharge from the catchment integrates the influence of catchment-wide precipitation and can often be more accurately measured than the areal rainfall, especially in areas with a sparse raingauge network. Here, we present a non-raingauge radar adjustment method that utilises discharge data only to adjust radar precipitation estimates for input to hydrological models. This method allows a hydrological model to adjust its treatment of precipitation input, through an additional model parameter, by comparing the observed and modelled hydrographs. An additional advantage of this method is that it can be also applied to adjust any form of precipitation input (e.g. radar, raingauge or satellite) to produce more accurate hydrograph estimates. This proposed method is comparable to a traditional radar raingauge adjustment method over a number of catchments and hydrological models, for both peak flows and for the entire hydrograph. Additionally, this method allows for the adjusted of catchment averaged raingauge precipitation measurements to correct for any possibly errors due to using point data i.e. spatial density or representative issues. This results in a substantial improvement in discharge estimation compared to the un-adjusted raingauge measurements.