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Using remote sensing evapotranspiration solely calibrating hydrology model for predicting runoff time series in ungauged regions

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It is important yet challenging to predict runoff in data sparse regions or ungauged regions, majority of which belong to headwater catchments that are normally the major water source for middle and lower river reaches. There are numerous studies carried out since the launch of the Predictions in Ungauged Basins (PUB) initiative by the International Association of Hydrological Sciences (IAHS) in 2003. Most runoff prediction studies rely on modelling approaches via two steps. The first step is to calibrate the hydrological model against observed streamflow at the gauged catchments. The second step is regionalization in which the set of calibrated parameter values from a suitable donor catchment is used for predicting runoff in a targeted ungauged catchment. The major challenge of this approach is that when the gauged catchments are sparsely distributed or little available, it is hard to get sensible regionalization results. This study develops a new approach to calibrate a hydrological model purely against remote sensed actual evapotranspiration data obtained from 8-day and 500 m resolution PML-V2 products and the calibrated parameters can be directly used for runoff prediction across global land surface. This approach has been successfully used for predicting daily, monthly and annual runoff in Australia and southeastern Tibetan Plateau. This is an exciting research domain for hydrologists to pursue since remote sensing data is accumulated in a fast-increasing rate, and will provide researchers an unprecedented opportunity.