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# Modelling mean transit time of stream base flow during tropical cyclone rainstorm in a steep relief forested catchment

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Mean transit time (MTT) is one of the of fundamental catchment descriptors to advance understanding on hydrological, ecological, and biogeochemical processes and improve water resources management. However, there were few documented the base flow partitioning (BFP) and mean transit time within a mountainous catchment in typhoon alley. We used a unique data set of 18O isotope and conductivity composition of rainfall (136 mm to 778 mm) and streamflow water samples collected for 14 tropical cyclone events (during 2011 to 2015) in a steep relief forested catchment (Pinglin, in northern Taiwan). A lumped hydrological model, HBV, considering dispersion model transit time distribution was used to estimate total flow, base flow, and MTT of stream base flow. Linear regression between MTT and hydrometric (precipitation intensity and antecedent precipitation index) variables were used to explore controls on MTT variation. Results revealed that both the simulation performance of total flow and base flow were satisfactory, and the Nash–Sutcliffe model efficiency coefficient of total flow and base flow was 0.848 and 0.732, respectively. The event magnitude increased with the decrease of estimated MTTs. Meanwhile, the estimated MTTs varied 4-21 days with the increase of BFP between 63-92%. The negative correlation between event magnitude and MTT and BFP showed the forcing controls the MTT and BFP. Besides, a negative relationship between MTT and the antecedent precipitation index was also found. In other words, wetter antecedent moisture content more rapidly active the fast flow paths. This approach is well suited for constraining process-based modeling in a range of high precipitation intensity and steep relief forested environments.