



Combined isotopic and hydrometric method to identify water mean transit time in subtropical montane catchments

Chiao-Ying Lan (1), Jun-Yi Lee (1), Tsung-Yu Lee (2), Yu-Ting Shih (1), and Jr-Chuan Huang (1)

(1) National Taiwan University, Department of Geography, Taiwan (riverhuang@ntu.edu.tw), (2) National Taiwan Normal University, Department of Geography, Taiwan

Estimation of water mean transit time (MTT), a descriptor for flow pathways and water sources controlling catchment hydrological function, has made great strides during the past decade. However, the MTT estimation is rarely discussed in subtropical montane catchments where is characterized by intense rainstorm invasions. This study applies the transfer function hydrograph separation model (TRANSEP) with 4 distribution models (Gamma distribution, Exponential distribution, Two parallel linear reservoir distribution, Dispersion distribution) onto 5 steep catchments (5–195 km²) in northern Taiwan. The results showed that exponential distributions model (EM) outperformed among the distributions in accordance with Akaike information criterion (AIC). The EM model could simultaneously simulate discharge and streamwater $\delta^{18}\text{O}$ concentration with high NSE of 0.90 and 0.87, respectively. It likely indicated that the well-mixed behavior in this region, even during rainstorm. The MTTs of event water in those 5 catchment ranging from 3.4 to 6.0 indicated the quick conservation from rainfall to streamflow in this region. Further, the MTTs negatively highly correlated to slope and elevation with R^2 of 0.41 and 0.93, respectively, may shed lights into the landscape control on MTT.

Keywords: mean transit time, TRANSEP model, $\delta^{18}\text{O}$ isotopic tracers, transit time distribution