

Comparative study on Mean Transit Time (MTT) and Transit Time Distribution (TTD) of Funayamabashi-catchment (FNC) and Kikkobashi-catchment (KKC)

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Quantification the time of water molecular exists in or escapes from catchment is essential for understanding the water and solute movement in catchments, which indicate the water property that belonging to a certain system or not. For measuring the time as threshold, transit time has been proved to be a very useful indicator. The age or transit time is a fundamental catchment descriptor that reveals information about the storage, flow pathways and source of water in a single characteristic (McGuire and McDonneell, 2006).

In the present study, we propose and test an approach to estimate time-variant MTTs and TTDs with a lumped hydrological model that was calibrated and validated by hydrometric and isotopic tracer observations to reduce uncertainties in transit time estimations. And motivated by a desire to understand how topographical indices and precipitation affect transit time, transit time distribution in two catchments centrally located in similar latitude, FNC and KKC that in the upstream of Fuji river catchment.

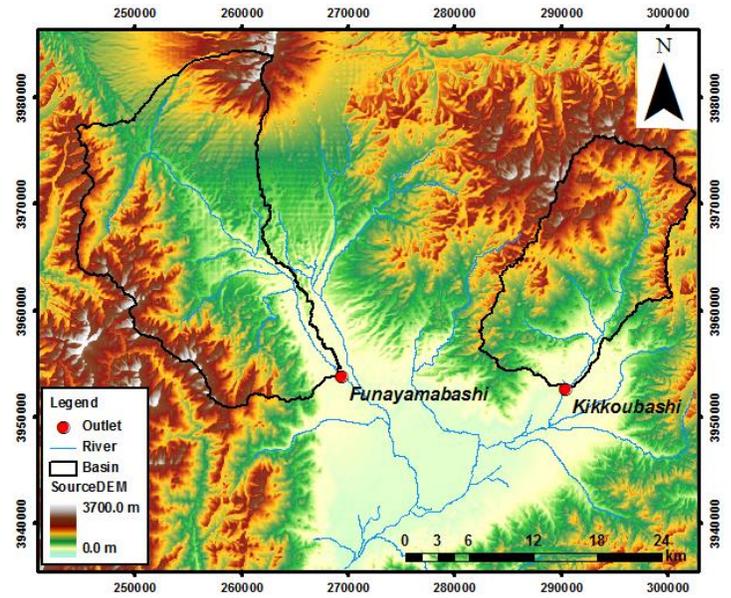


Figure 1. Map of the study area

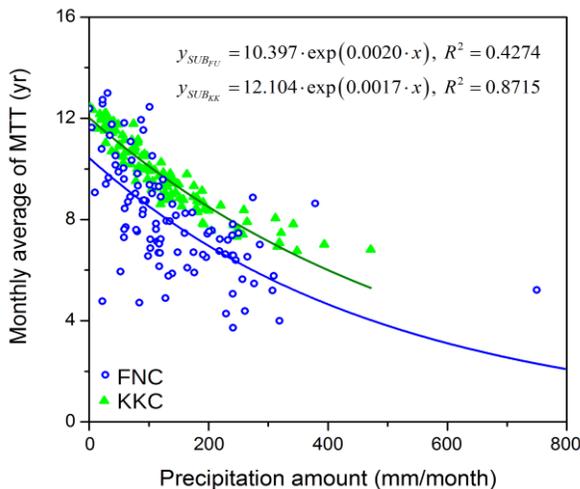


Figure 2. Comparison between monthly mean MTT and monthly total precipitation amount of FNC among KKC.

Water balance models are fit to 6 years of river discharge, and isotopic balance models are fit to nearly 2 years for considering both of $\delta^{18}\text{O}$ and δD value. The long-term average of MTT was estimated to be 9.89 years for the FNC, and 7.96 years for the KKC. For both of the two basins, precipitation alters MTT, with an increase in younger components, and shortens MTT. The relationship between monthly average MTT and precipitation volume could be closely approximated by an exponential function. This dependence of MTT on precipitation is an important descriptor for characterizing catchments.