Study of mean transit time predictions in unguaged catchment of the Komaba basin

Ma, Wenchao, Yamanaka Tsutomu
Faculty of Life and Environmental sciences, University of Tsukuba

As an important parameter that reflects the characteristics of catchments, the catchment transit time (CTT) has been given much more widely attentions especially in recent years. Ma and Yamanaka (2013) applied an improved-lumped model for calculating mean transit time (MTT). For getting the highly temporal varied MTT, simulation of water fluxes and isotope mass balance were involved in sequence. Within the study, preparation data both for water fluxes and isotope mass balance are the essential and critical step for calculating CTT precisely. However, not all of the catchments are fully equipped; in another word, lots of ungauged catchments are lack of hydrological data or other information. That is why, to predict the MTT in ungauged catchment is a challenge till now, the same as other hydrological research in the PUB (predictions in ungauged basin) study.

The study area is located in the middle of Fuji basin, which area is 62.8 km^2 with outlet gauged in Komaba. Discharge is the unknown data in this area for this method. For getting the discharge of Komaba, date of water level, velocity as well as the depth of each observing point at Komaba were collected in fieldwork, which were carried out for one set of data within each month, during one-year period. The discharge were accumulated by adding each sub-discharge with a cross-section, and calculated by considering the velocity and water level. Five-layer tank model have been used to simulate the isotope balance using precipitation amount and isotope composition. River isotope compositions token as semi-week for one year, were used for calibration and validation. The coefficient of water balance and isotope mass balance were exercised by applying thousands times simulation of Mont Carlo method. Optimal results within the acceptable range were chosen by comparing RMSE value for the isotope mass balance. Different with the previous study, water balance behavior were considered as further selecting for optimal results.

The Long-term average MTT is around 8.1 years, as well as the value of MTT are ranged from 2.1 to 16.4 years, which pattern basically consistent with the results of Ma and Yamanaka (2013). The MTT values of groundwater layer are consistent with the study carried out by Yoshizawa (2012) for the near basin that sharing the same aquifer. The simulated results of daily water discharge are reliable for further study.

Reference

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