

Groundwater leakage and river runoffs in a tectonic and forested catchment

CHIKITA, Kazuhisa^{1*} ; HOSSAIN, Md motaleb² ; SAKATA, Yoshitaka¹ ; MIYAMOTO, Takuto² ;
OCHIAI, Yasuhiro²

¹Faculty of Science, Hokkaido University, ²Graduate School of Science, Hokkaido University

In order to understand how groundwater leakage in a tectonic catchment occurs and is connected to river runoffs, a water balance was estimated and a runoff analysis was performed in the geologically active and forested (88.3% in area) Oikamanai River catchment (area, 62.6 km²), Hokkaido, Japan. The geology in the catchment is early Miocene to Pliocene sedimentary bedrocks with many faults and forest soils include permeable, late Pleistocene pyroclastic deposits. Daily evapotranspiration, E , in water balance was calculated by applying the one-layer model to meteorological data in the rainfall season of 2011-2012. Then, topographic effects on heat balance of the catchment were explored. The coupling with the short-term water balance method for river runoff events allows us to estimate groundwater leaking to the other catchments. As a result, the leakage occupied 50-80 % of effective rainfall ($=P-E$: P , rainfall) in 2011, while it was nearly zero in 2012. The tank model with consideration of the leakage was applied for simulating daily mean hydrographs. The large leakage in 2011 and nearly zero leakage in 2012 were produced by the modelling.

Keywords: groundwater leakage, fault, actual evapotranspiration, water balance, runoff analysis, heat balance