

Modeling of Surface Water and Groundwater Cycle System in a Mountainous Catchment Underlain by Granite

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A mountainous watershed plays an important role as a recharge area, and many studies have been conducted regarding the groundwater flow. However, there have not been enough studies in headwater catchment with large topographical relief. Also, there have been few studies applying numerical simulation to the groundwater flow in the headwater catchment. Therefore, the aim of this study is to reproduce groundwater flow in a steep mountainous catchment underlain by granite using numerical simulation.

The study area is the headwater catchment of Jingu River in Yamanashi, which is one of the mountainous catchments underlain by granite. The highest relative height of the catchment is about 1400 m. The numerical simulator is GETFLOWS, which can analyze three dimensional surface and groundwater flow. In this study area, residence time and recharge altitude of groundwater have been estimated using CFCs and stable isotopes tracers previously, and this study aims to reproduce those values by numerical simulation.

The permeability was examined, and trials of reproduction of the groundwater flow system were performed. The permeability seems to have an effect on the groundwater flow system such as groundwater level and flow path. Also, in the north of the catchment, it has been found that several springs have longer residence time estimated by CFCs than the others have, and the similar result was shown by numerical simulation. Furthermore, the recharge altitude of springs showed appropriate values except some springs.

Keywords: groundwater, simulation, GETFLOWS, residence time, recharge altitude