ACG08-07 会場:301A 時間:5 月 24 日 17:35-17:50

# 基岩内地下水位の集中観測による流域水貯留量の推定
# Intensive monitoring of bedrock groundwater level for estimating water storage capacity in a headwater catchment

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1. INTRODUCTION

The mechanisms of bedrock groundwater flow in headwater catchments and their significant contribution to catchment hydrology have been emphasized in recent studies, involving the direct monitoring of bedrock groundwater in intensively drilled bedrock wells in granitic regions (e.g., Kosugi et al., 2011). The principal goal of these investigations was to clarify the contribution of bedrock groundwater to water storage capacity of a watershed and a discharge hydrograph. In this study, we observed bedrock groundwater levels from monitoring nested bedrock wells and estimated the amount of bedrock groundwater storage in a mountainous watershed.

2. METHODS

Observations were conducted in the Fudoji Experimental Watershed, underlain by Cretaceous granite. The whole study watershed is referred to as F0, the area of which was 2.3 ha (Figure 1a). Discharge was measured at a V-notch weir at the outlet of the watershed. Groundwater levels were measured at 67 bedrock wells with depths of 2-42 m. In each well, bedrock groundwater storage was calculated by multiplying the amount of elevation in groundwater level by local porosity, which was estimated from weathering class and fissure distribution in each core sample. Within whole watershed, groundwater storage was estimated by interpolation of wells using kriging method.

3. RESULTS AND DISCUSSION

Figure 1b shows the 2D contour map of the groundwater level (annual average in 2013). In general, the groundwater surface shows a main valley line, which roughly corresponds to the ground surface topography (Fig. 1a). On the slopes on both sides of the main valley line, however, the groundwater surface across the slope is mostly planar and does not correspond to the relief of the ground surface topography. Thus, the bedrock groundwater in both side slopes flows towards the main valley line, mostly independent of the ground surface topography.

The amount of bedrock groundwater storage showed gradual variation and ranged approximately 80 mm from minimum to maximum in a year. The waveform of the groundwater storage corresponded to the base flow of discharge hydrograph. The base flow can be fitted well by quadratic function of the groundwater storage. However, after the heaviest rainfall event during observation period (total: 328 mm), the volume of observed base flow was lower than that of estimated from groundwater storage. This trend lasted for a month after the rainfall event. During that period, the contour map of the groundwater level showed a characteristic shape indicating that a considerable amount of groundwater flows out from F0 across the watershed boundary. Future studies should analyze long-term data to further clarify the effect of bedrock groundwater on the water budget of specific watersheds.

キーワード: 基岩内地下水位, 水貯留量, 地下水流, 基底流
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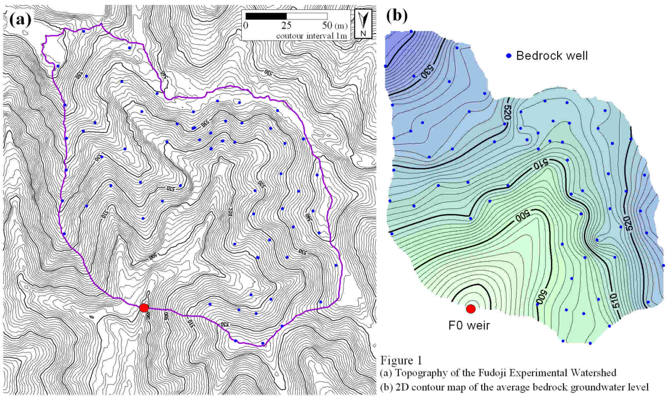


Figure 1
(a) Topography of the Fudoji Experimental Watershed
(b) 2D contour map of the average bedrock groundwater level