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# Hydrological processes in a small forested watershed underlain by weathered granite

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Recent studies have revealed the large influences of bedrock groundwater on runoff generation, water chemistry, and landslides occurrences in headwater catchments. In order to clarify rainwater discharge processes affected by bedrock groundwater, intensive hydrological observations were conducted at a small forested watershed underlain by weathered granite. We measured discharge rate and water chemistry from three catchments with different sizes (the large, middle, and small catchments with areas of 5.99, 0.086, and 0.022 ha, respectively). In the small catchment, tensiometers were installed in the surface soil and the subsurface weathered granite layer. Results showed that the annual discharge from the middle-size catchment was smaller by 120 to 200 mm than that from the large catchment, indicating that 7 to 11 % of total rainwater infiltrated into the deep weathered granite layer and does not discharge at the outlet of the middle-size watershed. The annual discharge from the small catchment was very little, and 34 to 54 % of total rainwater infiltrated into the weathered granite layer. Water chemistry data (i.e., dissolved silica concentration) supported the inference that there are some water exfiltration from bedrock to soil layer in the middle-size catchment while no exfiltration is exist in the small catchment. From tensiometric observations, we found that, at a place with a deep soil thickness, unsaturated water flow was dominant in the weathered bedrock layer. At a place with a shallow soil thickness, saturated flow was observed in the weathered bedrock layer under storm conditions. Thus, physical properties of the surface soil layer affected infiltration processes into the weathered bedrock. The result of this study clarified that the weathered granite layer plays an important role for forming storm hydrographs as well as sustaining base discharge rate.