

Quick response of the groundwater to a rain storm in the mountain body

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It is very important that to clarify the mechanism of rainfall-runoff process in forest watershed. Marui (1991) and Onodera (1991) have observed the drastic rise up of water table of the piezo-meter during a rain storm event, and they concluded that this phenomenon was caused by increased pore air pressure and spread pressure in the saturated zone inside of the mountain-body. And they suggested the evidence of 'Groundwater Ridge', which was formed by subsurface flow. But, such previous studies were mainly focus on the each rainfall event.

To clarify the relationship between groundwater response to the rainfall and discharge from the mountain-body, the long-term measurements were observed from 1995 to 2000 in Tama hills. The results are compiled as follows;

- 1) relationship between drastic rise of water table in piezo-meter and change of discharge was not so clear.
- 2) total rainfall: drastic rise of water table observed: 35.5mm~275mm
- 3) duration time: rainfall begin == water table rise: 1h50m~2h30m
- 4) duration time: rainfall stop == water table drop : 2h~11h

As a result of these observations, detailed characteristics of the quick response of the groundwater were clarified. We suggest the possibility that the phenomena have been reported as 'Groundwater ridge' is 'Perched water', in fact.

We suggest the importance of the factor not only the increased pore air pressure and spread pressure in the saturated zone inside of the mountain-body but also the existence of 'Perched water' formed by heterogeneity of permeability inside of the mountain-body.

From a Point of view of biogeochemical-cycle in the forest watershed, if quick vertical water movement about 10m or more has occurred, these phenomenons are very remarkable.

Based on these results, we discuss the mechanism of groundwater behavior in the inside of mountain-body. Water chemistry was monitored during drastic rise up of water table of the piezo-meter caused by storm event on October 2004.