

The relationship between soil water behaviour and river runoff: field observations and runoff analyses

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Abstract Soil water behaviour during rainfall and/or snowmelt events and its role in river runoff is explored by soil moisture measurements and runoff analyses. The soil moisture on the slope in forest and grassland was monitored by 4-channel soil-moisture profilers in the Saromabetsu River Basin, Hokkaido, Japan, in 2008–2010. Corresponding to each rainfall and snowmelt runoff event, the unsaturated layer at 0–30 cm depth in forest stored infiltrated water for a few days after the event, and then returned to the previous moisture level by gradual drainage. The total throughflow (mm) during each rainfall and snowmelt event was calculated by using the soil moisture data, and then was compared with the runoff height (mm) for the direct runoff obtained by the runoff analysis. The relationship between the throughflow and runoff height was definitely linear. This suggests that the simulated direct runoff actually occurs as unsaturated throughflow, a quick flow, in the soil surface layer.

Key words Saromabetsu River; soil moisture monitoring; throughflow; snowmelt runoff; rainfall–runoff; tank model