

## Investigations on Hydrological Connectivity between Soil Mantle and Weathered Bedrock in Headwater Catchments

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Recent studies have suggested that bedrock groundwater can exert considerable influence on hydrological processes in headwater catchments. However, direct measurements of water flow within bedrock are still very limited. To clarify the hydrological connectivity between soil and bedrock, we have conducted innovative field investigations at a headwater catchments, NO (1.87 ha), which is underlain by granitic bedrock. In the catchment NO, observations of rainwater discharge and soil mantle groundwater level were combined with observations of bedrock groundwater level using eight boreholes 20 to 70 m deep. The intensive monitoring of bedrock groundwater with the high spatial resolution is expected to reveal the effect of bedrock groundwater on the surface hydrological processes.

Results showed that, in the catchment NO, water levels in the eight boreholes exhibited different trends which were categorized in the following three types: In the upslope region, water level showed quick responses to rainfall input, despite of their depths from the soil surface (i.e., 30 to 70 m deep). In the mid-slope region, the water level had the most delayed and gradual response. Water level did not respond to storm events, but exhibited a gentle seasonal trend. In the downslope region, quick responses of the water level to each storm event were combined with a gentle seasonal change. Thus, this study proved the existence of three bedrock aquifers within the small headwater catchment. Moreover, we found that each bedrock aquifer had a unique effect on the surface hydrological processes. In the mid-slope region of the catchment, perennial or semi-perennial soil mantle groundwater was fed by the mid-slope bedrock aquifer. Furthermore, the downslope bedrock aquifer contributed to the base-flow discharge from the catchment.