

27

Monitoring hillslope infiltration on mountainous catchments using ERT and tensiometers

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The knowledge of system-internal water-flow pathways within catchments is of great importance for predicting runoff generation as well as water quality and quantity. To improve the knowledge of subcutaneous flow pathways on hillslopes, hydrometrical measurements are carried out on a small spring catchment in the eastern Erzgebirge since November 2007.

In addition, surface ERT measurements on several profiles were applied to enhance resolution of punctual hydrometric data. From May to December 2008, geoelectrical monitoring in nearly weekly intervals, was implemented to trace seasonal moisture dynamics on the hillslope scale. To get the link between water content and resistivity, the parameters of Archie's law were determined using different core samples. To optimize inversion parameters and methods, the derived spatial and temporal water content distribution was compared to tensiometer data and showed remarkable coincidence.

As anticipated, the measured resistivity shows a close correlation with precipitation. Depending on the amount and intensity of rain, different depths were affected by seepage water. Three different cases (small, medium, heavy), could be differentiated. A small rain event causes a short interruption of the drying pattern at the surface in summer, while a medium rain event causes a distinctive reaction at shallow depth (< 0.9m) and a heavy rain event results in a response down to 2 m.