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Advanced catchment characterization with a combination of different methods - a case study from the Austrian Alps

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Near surface interflow and deep seated interflow can make significant contributions to catchment runoff, especially during continuous rainfall events. However, the knowledge about dominant runoff processes, runoff contributing areas and bandwidths of shallow interflow velocities in alpine catchments during continuous rainfall events is still very fragmented. Therefore the following comprehensive approach has been employed in high-altitude sub-catchments of the Wattental in the heart of Tyrol (Austria), to improve the knowledge of catchment properties:

• Rain simulation experiments (heavy rain and continuous rain) have been conducted on slopes representative for wider parts of the catchment (geological substratum, land cover, land use,. . .). Water infiltration and runoff behavior were documented by TDR soil moisture measurements and data collection of several geoelectrical profiles.

• Additional geoelectric-profiles have been performed to characterise the geological/hydro-geological situation in the sub-catchment.

• Different types of salt tracers (e.g. NaCl, LiCl) were inserted (punctual insertion or over trenches or by irrigation of 50 m^2 large plots) and accompanied by measurements of resistivity changes in the underground by geoelectrics, as well as data collection of electric conductivity in the receiving water courses.

These data derived at the plot and the hillslope scale were transferred to the catchment scale with the following data:

• Aerogeophysical investigations (characterization of substratum characteristics by use of electromagnetic, radiometrics and determination of soil surface water content with an L-band antenna.

• Results of simultaneous measurements (data on water temperature, conductivity and freight from watercourses of different orders).

• Further work comprised the development of surface runoff coefficient maps and roughness maps by use of a code of practice developed at the BFW.

This comprehensive data-set allows the development of maps of the dominant flow processes at the surface and in the near surface on the one hand and the attribution of bandwidths of shallow interflow velocities to the dominant substrata on the other. This information resulted in a significant improvement of the hydrological modeling results.

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