



Experimental investigation of runoff processes in a small catchment in the Chilean Andes - qualitative and quantitative use of tracers

T. Blume, A. Bronstert

Institute for Geoecology, Section of Hydrology/Climatology, University of Potsdam, Germany
(tblume@rz.uni-potsdam.de)

Catchment scale hydrological studies in Southern Chile are of special interest as little research has been done at this scale. In addition, extensive land use changes require detailed knowledge of hydrological processes in disturbed as well as undisturbed catchments in order to estimate resulting risks of floods, erosion, nutrient loss and eutrophication. Our study focuses on data collection and experimental determination of relevant processes. This knowledge will later be used for the implementation of a physically based hydrological model. Field investigations concentrate on a catchment without anthropogenic intervention in order to understand the system in its natural state. The catchment is situated in the Reserva Nacional Malalcahuello (Región de la Araucanía). Measurements of discharge, soil water and ground water dynamics, rainfall, throughfall and soil physical parameters are carried out to determine the relevant runoff processes and their vulnerability to land use change. Tracer studies add valuable information to these more 'classical' data sets. Tracer techniques employed in this investigation include qualitative and quantitative methods. Dye tracer experiments were used to visualize flow paths in the unsaturated zone. These experiments were carried out in several locations and with different application rates. For the purpose of hydrograph separation and a better general understanding of the relevant processes discharge was sampled at regular intervals during rainfall events, and electrical conductivity of the discharge as well as water temperature of stream and groundwater were measured continuously. The water samples were analysed for major cations and anions as well as stable isotopes. Samples of rainwater, baseflow and soil water, analysed for the same constituents, allow for the separation of streamflow components.