Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04860, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04860
EGU General Assembly 2008

Coupling groundwater discharge with water chemistry

P-E. Mellander (1), M. Hofer (2), M. Stähli (2), S.H. Norström (1), D. Bylund (1), U.S. Lundström (1)

(1) Department of Natural and Environmental Sciences, Mid Sweden University, SE-851 70 Sundsvall, Sweden, (2) Swiss Federal Research Institute WSL, Water, Soil and Rock Movements, Zürcherstrasse 111, CH-8903 Birmensdorf, Switzerland

An expected increase in exploitation of forest resources in conjunction with global warming will have consequences on hydrological and biogeochemical processes. Catchment-scale effects, due to environmental changes of both local and global scale, are changes in volume of flow or storage, changes in the timing of flow and a change in water quality. The pathway of nutrients from the forested recharge areas to the surface waters can be modelled. The purpose of this study was thus to use a model in order to gain a more process based understanding of the mobilisation and immobilization of elements and compounds. We used a process based ecosystem model (CoupModel) together with four years of extensive measurements of watershed hydrology, soil solution and stream water chemistry near Bispgården, in northern Sweden. A first step was to learn more on the water fluxes in these systems, such as the lateral groundwater discharge, and on the total water budget as a whole. This was done with a quasi two-dimensional model approach, by coupling soil profiles along a boreal forest hill slope, whereas the lateral groundwater discharge at different depths could be quantified and the seasonality could be determined. In a second step we coupled the hydrology with the soil solution and stream water chemistry in order to identify and quantify chemical compound transport from soil to stream. The lateral groundwater discharge was successfully modelled, and the lateral flow of elements and compounds entering the different soil horizons in the discharge area, as well as immobilization/mobilization in different horizons could be calculated. The chemistry of the stream mostly imaged the soil layer that was drained. The chemical data could also be extrapolated between the sampled occasions.