



Chemical transformations along soil hydrological critical zone pathways in a Swedish till soil catchment

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Soil properties and hydrology along groundwater flow pathways characterize water quality of surface water formation. Investigations on such conditions have been carried out during five years in the critical zone observatory (CZO) Kindla in central Sweden. The Kindla CZO is a 20 ha upslope headwater catchment on altitudes above the highest coastline between 320 m and 410 m above means sea level. The climate is characterized by a precipitation of c. 900 mm with about 50% runoff and 50% evapotranspiration and mean annual temperature of +4 oC. Shallow till soils cover a massive granitic bedrock and groundwater flows occur in the upper one metre of the soil. In the recharge part of the slope, Podzol soils exist turning into Gleysols and Regosols with fairly high organic content close to the surface water streams. Groundwater sampling has been carried out at three soil depths for chemical analyses. Results reveal low ionic content and acidic water with pH between 4 and 5. The chemical constitution alters in the near stream zone where metals are captured in the upper soil organic rich layers, but protons and organic matter are added. However, at high water levels organically bound elements are flushed out. Soil hydrological conditions correlate with surface water quality. Conditions at the Kindla CZO could be compared to two other similar sites but these located to south and north Sweden.