



## **Vertical water and DOC/DIC flux estimates in a hummocky groundmoraine soil landscape**

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In the hummocky ground moraine soil landscape, a spatial continuum of more or less eroded soils developed from till under intensive agricultural cultivation. Flow and transport are affected by the variability of soil structural and pedological development, which is posing a challenge for any hydrogeological analysis. The objective of this study was to estimate the vertical component of the water and element fluxes for characteristic profiles. Further, the aim was to compare the estimated leaching of DOC/DIC for relief positions that represent pedological modification by soil erosion. The 1D water movements were described using the Richards equation as implemented using the numerical solution in the HYDRUS program. Measured DOC/DIC concentrations were combined with calculated water fluxes to obtain the solute fluxes for certain depth and positions. The soil hydraulic parameters were determined from core samples and fitted to the van Genuchten-Mualem parameter function. The simulated water fluxes under the present simplifying assumptions within an observation period of two years ranged from 160 to 240 mm y<sup>-1</sup>. The DOC and DIC fluxes in 2 m depth were up to 37 g m<sup>-2</sup> y<sup>-1</sup> and 5 g m<sup>-2</sup> y<sup>-1</sup>, respectively. The effluent comparison between the soils shows a trend from highly eroded locations towards deposition positions, which have only about half the amount of the leached DOC/DIC. Vertical flux components depend on relief position and pedological development induced mainly by soil erosion. The results suggest a strong feedback between pedological structures and hydraulic properties, hydrological behavior, and leaching of dissolved carbon fractions.