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Transport of ^{13}C labeled Dissolved Organic Carbon in undisturbed Soil Columns at various unsaturated Flow reveals Fate and Mobility of DOC in Soil

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Dissolved Organic Matter (DOM) plays an important role in soil genesis and in the transport of soil pollutants with a high affinity for organic matter. It follows that understanding of DOM-facilitated transport of solutes and of organic matter dynamics in mineral soils requires information about the dynamics of DOM. A batch and a column experiment were set-up to investigate the influence of water flow rates and soil mineral nutrient concentration on the fate and mobility of DOC. Both used a ^{13}C labeled DOC solution prepared by incubating ^{13}C enriched plant material (5.7 *g kg*$^{-1}$ dry soil, ^{13}C atom % excess = 3.16%) in soil for 3 days (aerobic, darkness, 20 $^{\circ}C)$ and extracting its DOC with $CaCl_2$ 10^{-3} M (soil:solution ratio 1:1). The sorption and mineralization characteristics of this labeled DO^{13}C solution in a loamy soil were estimated in batch experiments. The loamy soil was sampled from the upper horizon of an agricultural field. From this horizon, 16 undisturbed soil columns (10 *cm* high, 6 *cm* diameter) were simultaneously sampled.

Prior to the start of the labeled DO^{13}C column experiment, all columns were leached with a $CaCl_2$ 10^{-3} M solution at a rate of 16 *mm day*$^{-1}$. Leaching the columns decreased the DOC concentration in the effluents from 24.4 $\pm$ 6.1 *mg C l*$^{-1}$ to 7.8 $\pm$ 3.8 *mg C l*$^{-1}$. The Specific UV Absorbance or SUVA of DOC in the column leachates was 29.6 $\pm$ 4.8 l g^{-1} *cm*$^{-1}$and did not change significantly in time. A stop-flow increased the DOC concentration by, on average, 6 *mg C l*$^{-1}$ suggesting that a fraction

of DOC is slowly released in soil. The SUVA value decreased by 14 $l\ g^{-1}$ cm^{-1} after stop-flow, suggesting that the increase of DOC was unrelated to humic substances but to decaying biomass. Currently, a pulse of ^{13}C labeled DOC solution with and without added nutrients is being applied to the undisturbed soil columns at two different flow rates: 4 and 16 $mm\ day^{-1}$. Leachate volumes, DO^{13}C concentrations and Specific UV Absorbances (SUVA) of the column effluents are being monitored every two to three days. Preliminary results show unretarded breakthrough of the ^{13}C pulse but considerable degradation. Results will be used for the evaluation of a reactive transport model using sorption and mineralization characteristics measured in the batch experiment.