



Concentrations of total dissolved organic carbon and humic and hydrophilic sub-fractions extracted from major Dutch soil types and their relation with soil properties

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Measurements of the concentrations of dissolved organic carbon (DOC) and its humic and hydrophilic sub-fractions in different soil types, and our understanding of the underlying processes, are still limited. This knowledge gap strongly hampers adequate modelling of the speciation, mobility and bioavailability of trace elements in soils, the reactive DOC concentration being a major controlling parameter, as well as assessments of carbon cycling between soil and water. In this study, we have analysed the concentration of DOC and its humic and hydrophilic sub-fractions in 10-3M CaCl₂ extractions of approximately 100 top- and sub-soil samples from major Dutch soil types (sand, peat and clay). A rapid batch fractionation procedure (van Zomeren & Comans, 2007) was used to distinguish the concentrations of dissolved humic acids (HA), fulvic acids (FA), hydrophobic neutrals (HON) and hydrophilic acids (Hy). Field-moist samples were used, as well as dried samples from the archive of samples collected for the realisation of the recently published geochemical soil atlas of The Netherlands (Mol et al., 2012). The latter samples have been incubated for one month, after being re-moisturised to field capacity, prior to the extraction and fractionation procedure, in order to limit previously observed effects of soil-drying on DOC concentration and composition. Substantial differences in the concentration and composition of DOC between dried, re-moisturised and field-moist samples were indeed observed and will be discussed. In addition, and as a first step towards a model for the partitioning of DOC and its humic sub-fractions, empirical partition functions have been derived, which relate their dissolved concentrations to potentially controlling soil properties such as pH, total soil organic matter (SOM) and the reactive surface area of iron- and aluminium(hydr)oxides, as estimated from selective extractions. The resulting empirical functions are discussed in light of current mechanistic views on chemical processes contributing to the solid/liquid partitioning of humic substances in soils.

References

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