



## **Structural properties of dissolved organic carbon in deep soil horizons of an arable and temporarily grassland.**

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It is commonly accepted that dissolved organic carbon (DOC) is the bio-available fraction of the largest amount of soil organic matter (SOM), even if it does represent only a very small proportion. Because most of the studies on DOC dynamics were mainly restricted to forest soils, studies on the factors governing the dynamics of DOC in deep soil horizons (>1 m) in arable system are still very little limited. The objective of this work is to better define the proportion of DOC in deep soil horizons and indicate their main characteristics and structural properties. The study was conducted on the long term observatory for environmental research- biogeochemical cycles and biodiversity Lusignan site). DOC collected using lysimeters plates inserted to a depth of 105 cm was fractionated into 3 fractions using the two column array of XAD-8 and XAD-4 resins. The HPO (hydrophobic) fraction (i.e. humic substances) isolated from the XAD-8 resin, the TPH (Transphilic) fraction from the XAD-4 resin and the HPI (hydrophilic) fraction which corresponds to the DOC that does not adsorbed onto the two resins under the acid condition used (pH 2). DOM adsorbed onto the resins is recovered with a 75%/25% acetonitrile/water mixture and lyophilized. Depend on the amount of material; the chemical composition of DOC was performed using UV254 nm, fluorescence EEM, NMR and HPSEC/UV/COD. The results show that the concentration and structural properties of DOC in deep soil horizon were similar to those of groundwater (low SUVA (1.2 m<sup>-1</sup>.L.mg C<sup>-1</sup>), structures composed mainly of low molecular weight). Because of the relatively recent establishment of the treatment, the monitoring of the dynamics of the DOC concentrations did not show significant differences between arable and grassland. However, the temporal dynamic shows a slight increase in the DOC content regardless of the of land use. DOC concentrations between winter and the middle of spring tend to double going from 1 to 2.5 mg / L and then to 4-5 mg / L in summer time. The structural analysis reveals significant input of terpenoid derived organic matter was confirmed in the HPO fraction of DOC a results supported by the data of <sup>13</sup>C NMR, Infra Red and Micro Scale Sealed Vessel / pyrolysis GC / MS. The chromatographic profiles obtained by flash pyrolysis GC / MS highlight the presence of phenol and alkyl phenols, generally attributed to structures polyhydroxyaromatiques (lignin / tannins), but acetamide, pyrolysis product of amino sugars constituents of the wall microbial cells. The thermochemiolyse (TMAH) / GC / MS confirmed the presence of hydroxy aromatic structures in the extracts, however, their precise origin (lignin, tannins ...) remains uncertain. The results so far indicate that the DOC in deep soil horizons is marked by low aromaticity and dominated by small size molecules. This would consist of carbon derived from terpenoids, lignin degraded and amino sugars.