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Pyrogenic carbon solubility in soils: quantification and characterisation

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Pyrogenic carbon corresponds to the organic residues left after the incomplete combustion of vegetal biomass. This fraction of the soil organic matter has been considered as passive, recalcitrant and so stable in the soils. Recently, authors observed significant biotic and abiotic decomposition of these compounds. Molecular biomarkers derived from pyrogenic carbon have been also found in surface water and in ocean sediments. The mechanisms and the quantity of pyrogenic carbon concerned by this solubilisation are still unknown.
In this study we are trying to estimate the part of pyrogenic which could be soluble in soil solution and to characterize this fraction. We used one of the international standard (Black Carbon steering committee – Castanea 450°C). The pyrogenic carbon is characterised using the benzene polycarboxylic acids method (BPCA). We are first extracting the soluble fraction in a batch experiment under controlled conditions for different modalities (with or without clay, different pH values). Then, we will measure the pyrogenic carbon in dissolved organic matter samples from a field experiment with labelled substrates (13C, 15N) in Argovia, Switzerland.
The first results showed that the soluble fraction that was extracted from the char in the lab was small (< 1%) with a much lower C:N ratio than the C:N of the original substrate.