



Impact of landuse change on the molecular composition of soil organic matter studied at the observatory for environmental research in Lusignan, France

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The transformation of grassland into agricultural land is a common practice in many parts of the world. The management commonly leads to decrease of the soils organic matter content. Continuous sampling at different time intervals after the land-use change and analysis of the samples for soil organic matter composition may allow for the assessment of the resistance/resilience capacity of the system.

We studied the long-term observatory for environmental research in Poitiers, France. At this site, an experiment was conducted in 2004, including transformation of grassland into agricultural land. Three replicated soil samples were taken from the converted soil after 3 weeks, 3 months, 1 year and 2 years, as well as from agricultural and grassland control soils. The samples were treated with 10 % HF to remove mineral material before being subjected to analysis of the bulk chemical composition by ^{13}C CPMAS NMR spectroscopy and Curiepoint pyrolysis. Additionally, we carried out wet chemical analysis to analyse transformations of the lignin and polysaccharide compounds of SOM.

Our data show that despite a significant decrease in carbon and nitrogen content after grassland transformation, the bulk chemical composition as seen by ^{13}C CPMAS NMR spectroscopy remains similar. The more sensitive molecular analysis (pyrolysis and wet chemistry) are most adapted to follow SOM changes after grassland transformation. These analyses show that after 2 years, SOM does not yet show the characteristic of agricultural soil. We conclude, that long-term monitoring of land-use changes are necessary, to assess the adaptation period of ecosystems.