



Structural analysis by pyrolytic, spectroscopic and thermogravimetric techniques of the BC ring trial reference samples and real BC samples from soils and sediments

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Aiming to detect the occurrence of Black Carbon (BC) forms in natural complex matrix, the reference samples recommended by an international interlaboratory research on Black Carbon (BC) (BC Ring-Trial), characteristic Mediterranean soils from Southern Spain, affected and unaffected by forest fires, and a set of marine sediments from Southwest Atlantic coast of Spain (Gulf of Cadiz) were analysed by thermogravimetry (TG), TG coupled with IRMS, solid state ^{13}C NMR spectroscopy and Py-GC/MS. Significant chemical modifications were observed after fire in soil samples, such as aromatic enrichment and an important increase in the Organic Carbon (OC) content. Good agreement was observed between recalcitrant C as determined by TG analysis and the aromatic content measured by ^{13}C NMR. Py-GC/MS showed an important presence of aromatic compounds in samples rich in BC like material. It was possible to identify directly, with no pretreatment, specific changes in the product of burning/charring of different materials, in the composition of soil organic matter (SOM) of different kinds of soils as well as changes exerted by fire to SOM. Pyrolysis revealed specific compounds which could be used as markers of pyrogenic events and others that could allow us to distinguish the origin of the OM. Both NMR spectra and Py GC/MS analysis reveals a highly aliphatic nature of the OM from marine

sediments. The use of TG technique together with Py-GC/MS and ^{13}C NMR, provide complementary windows of information, both for BC reference materials and in complex matrices like soils and sediments.