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TIERRA NEGRA ANDALUZA – AN EXAMPLE HOW BIOCHAR APPLICATION MAY ALTER SOIL ORGANIC MATTER COMPOSITION ON A LONG TERM SCALE

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The "Tierra negra andaluza" represents a Vertisol which occurs frequently in the valley of the Guadalquivir, Southern Spain. In spite of their low organic C contents (< 2 %), these soils appear rather dark. Being fertile, they have been cultivated since millennia. Analysis of their soil organic matter (SOM) by solid-state 13C NMR spectroscopy revealed high aromatic C contents (up to 35% of total organic C). Preliminary 14C dating indicated a mean age of the SOM of approximately 5000 years. Chemical oxidation with acid potassium dichromate confirmed considerable contributions of pyrogenic organic material (PyOM), possibly incorporated into the soils as a consequence of early-time slash and burn practice. Alternatively, it may have been added stepwise by continuing after-harvest-burning of crop residues, which since ancient times was and still is a common agricultural managing form in this area. The effect of PyOM and its aging on SOM turnover in these soils is presently explored in more detail with further respiration experiments. First results confirmed slightly slower turnover rates of charcoal than of SOM. Thus, the observed high PyOM contents of the "Tierra negra" are best explained by a selective preservation of PyOM and scarce fresh litter input due to crop removal and burning of the remains. Employing our observation for an evaluation of the impact of modern biochar amendment to soil, a major concern may be a considerable aromatization of the SOM. To which extend this may alter other soil properties, however, has still to be investigated.