



Slash-and-burn in neolithic agriculture - conversion of biomass to charred organic carbon

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Vegetation fire is an important factor in the global carbon cycle. Charred organic matter could act as an extremely slow carbon pool. In soils, residues of biomass combustion can resist degradation longer than most soil organic matter. The conversion rate of biomass to charred organic matter, however, is still poorly examined for many ecosystems, especially for mixed deciduous forests.

Natural fires are rare in temperate deciduous forests. Holocene vegetation fires in Central Europe have mainly anthropogenic causes, e.g. as a tool to clear land for agriculture use. Archaeobotanical evidence for the early use of fire comes from the northern pre-alpine lowlands. Late Neolithic (4300-3500 BC) settlers used slash-and-burn to change forest into arable land, as inferred from archaeobotanical proxy-data (pollen and plant macrofossils). We took advantage of a long-term experimental burning experiment (Southwest Germany; Forchtenberg), which started in 1998. It was designed to mimic Neolithic agricultural slash-and-burn in a deciduous forest and assess the effects on vegetation, crop yields and soil properties.

Here, we focus on the conversion rate of biomass-to-charred organic matter. We measured the amount of initial biomass and after the fire the amount of produced charred organic matter, accompanied by temperature data in different soil depths. Charcoal

particles were analysed gravimetrically. Additionally, we will detect black carbon using benzenepolycarboxylic acids (BPCA) as molecular markers in the topsoil.