

## **Determining the minimal sampling effort for pedo-anthroecological studies: what does additive partitioning of spatially constrained accumulation curves teach us?**

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The historical ecology of forests aims at reconstructing former land uses in forest and their influence on community composition, dynamics, and functioning. As a discipline, pedo-anthracology provides important information on the woody component of forests, which structures ecosystems, and also on the soils. However, it is still unclear how far archaeo-environmental reconstructions that are based on charcoals retrieved from the different edaphic horizons are representative from tree and shrub communities of the past. The objective of this study was to determine the minimal sampling effort to obtain a pedo-anthracological picture which is representative of specific richness and composition in forests. The vertical and horizontal distribution of charcoals was considered.

We sampled 3 soil types (cambisol, luvisol, podzol) in 3 ancient forests from North France (Compi  gne, Saint-Gobain, Creuse). For each site, to investigate the charcoal spatial distribution we sampled vertically on the soil pit (20 samples of 1L/horizon) and a plot of 1000 m<sup>2</sup> surrounding the soil pit to collect 30 topsoil samples using an auger of 15 cm depth. At the lab, soil samples were dried, weighed and sieved at 4, 2 and 0.8mm under wet conditions. The total number of charcoal fragments extracted per liter was weighed. The specific anthracomass per liter (ASL) was then calculated as the ratio between the charcoal mass and the total mass of soil. The charcoals were identified with an incident light microscope, using the key of determination (Schoch,W.,Heller,I.,Schweingruber,F.H.,Kienast,F.,2004: *Wood anatomy of central European Species.*).

We used the species x sample matrices of abundance to construct spatially- constrained accumulation curves, subsequently followed by additive partitioning of diversity. The parameters of the curves (slope and intercept) were then compared to determine the minimal sampling effort. Diversity values were used to compare this minimal sampling effort among soil types.

We will only present the result on one of the sites (Compi  gne, luvisol) in order to highlight the heuristic value of this approach. The spatial distribution of the anthracomass among soil types will complement these preliminary results. Finally a comparison between the actual vs fossil dendroflora will be shown. We discuss and conclude on the need to take into account the density of the charcoals and their vertical and horizontal spatial distribution to determine the minimum sampling effort needed to provide unbiased interpretations in historical ecology, paleo-geoecology and pedological dynamics.