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Role of soil mineral components in the stabilization of organic matter in Umbric Ferralsols of South Brazil

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Climatic conditions of subtropical and tropical regions support fast carbon (C) mineralization, and thus an accelerated degradation of soil organic matter (SOM) if compared to temperate region (Sánchez & Logan, 1992). However, even in those regions, there are still soil horizons that show notable C accumulation. Examples for the latter are umbric horizons in typical tropical soils, such as Ferralsols. The occurrence of this soils with thick umbric epipedons ($\geq$ 100 cm thickness) in areas of South Brazil is a paradox, that still needs a better understanding (Marques *et al.*, 2011), in particular since the processes that are responsible for the thickness and darkness of the umbric horizons are of special interest with respect to the role of soils as carbon sink.

One major contributor to SOM stabilization represents the soil mineral phase. Therefore the main goal of this work its to study the impact of this factor on the SOM sequestration in Umbric Ferralsols from Atibaia, Campinas (São Paulo State) and Chapecó (Santa Catarina State) developed under different environmental conditions. With this objective the mineral fractions have been isolated by selective extraction of iron and aluminium oxides with different extracting solutions (sodium pyrophosphate, ammonium oxalate and dithionite-citrate-bicarbonate solution) and related to SOM quality and quantity.

The latter was studied by the use of solid-state cross polarisation (CPMAS) ^{13}C NMR spectroscopy after demineralization with hydrofluoric acid (Gonçalves *et al.*, 2003). Quantification of the NMR spectra was performed by integration of the respective chemical shift regions under consideration of the contribution of spinning side bands. For our study the following regions were distinguished (Knicker & Lüdemann, 1995): alkyl C (0-45 ppm), N-alkyl C (45-60ppm), O-alkyl C (60-110 ppm), aryl C (110-160 ppm), carbonyl C (160-245 ppm).

Preliminary results show that, the minimum vertical variation of total Fe into the profile is classical in Ferralsols and the behavior of Al points to the high presence of gibbsite in the clay fractions of the deeper horizon of the Campinas soils. The $(Al_P+Fe_P)/C$ ratios, obtained after extraction of the Al and Fe forms with a sodium pyrophosphate solution, were above 0.03 throughout the studied profile. According to Nierop *et al.* (2002) this points towards the existence of organic-metallic compounds. Most tentatively, they precipitated due to saturation of adsorption site.

The solid-state ^{13}C NMR spectra of the Chapecó samples showed that the preserved organic C is dominated by a alkyl C in lipids and amino acids (45 - 0 ppm). Other major intensities are observed between 110 and 45 ppm, in the region of O/N-alkyl C (carbohydrates, amino acids) and carboxyl C (220 to 160 ppm). The missing of a clear signal in the region between 160 and 110 ppm (signal derives from aromatic or olefinic C) indicates that in this soil lignin has minor contributions to its aromatic C content.