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162 - Organo-mineral associations in agricultural soils: insights from multi-elemental STXM-NEXAFS analysis

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Abstract: The association of organic matter (OM) with minerals is recognized as the most important stabilization mechanism for soil organic matter. Application of calcium (Ca)-rich materials (liming) is a common practice to neutralize soil acidity after the conversion of land from forest to agriculture. However, the role of calcium in organo-mineral associations in agricultural soils is poorly understood. In this study, we employed STXM-NEXAFS spectroscopy at C, N, Al and Si K-edges, as well as Ca and Fe L-edges, to conduct submicron-level investigations of the associations of C and C forms with Ca, Fe, Al, and Si in agricultural soils that had received liming materials. Preliminary data analysis suggested the possible formation of organic-Ca precipitates in agricultural soils. In addition, the regions rich in both C and Ca preferentially contained phenolic compounds, while microbial C was found in the regions rich in C but depleted in Ca. This research aids in understanding the impact of management practices on soil C cycling.