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Evolution and significance of soil magnetism of basalt-derived chronosequence soils in tropical southern China

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ABSTRACT

Soil samples were collected from eight basalt-derived chronosequence soils with the ages of 0.01, 0.58, 0.92, 1.33, 2.04, 3.04, 3.76 and 6.12 Ma respectively from Leizhou Peninsula and northern Hainan Island of tropical southern China. Magnetic parameters of magnetic susceptibility (MS), percentage of frequency-dependent magnetic susceptibility (FDS%), anhysteretic remanent magnetization (ARM), saturation isothermal remanent magnetization (SIRM), soft and hard isothermal remanent magnetization (IRMs and IRMh) of the collected samples were measured to study the evolution and the significance of the magnetism with soil age. The results show that the magnetic parameters changed fast from Primosols to Ferrosols (0.01 ~ 0.92 Ma) but slowly at Ferralosols stage (1.33 Ma-), it suggests a stable phase occurred for soil magnetism at Ferralosols, the existence of this phase could be supported by the little changes in the contents of clay, Fet and Fed. Obvious differences existed in the values of magnetic parameters between Ferralosols and other soil types (Primosols and Ferrosols), FDS%: Ferralosols > 10%, Primosols and Ferrosols < 10%; ARM, Ferralosols < 7000×10^{-8} $\text{Slm}^3 \cdot \text{kg}^{-1}$, Primosols and Ferrosols > 8000×10^{-8} $\text{Slm}^3 \cdot \text{kg}^{-1}$, thus, it is possible to differentiate Ferralosols from other soil types in tropical region by using magnetic indices.

KEYWORDS

Magnetic Parameters; Basalt-Derived Chronosequence Soil; Iron Oxides; Tropical Southern China

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