

Mineralogy of Latosols along a regional toposequence across the Central Plateau (Brazil): First results

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The Brazilian Central Plateau is constituted of the two main geomorphic surfaces: the South American surface and the Velhas surface. These surfaces were developed during the Cretaceous Superior and Tertiary and are covered by deeply weathered Latosols. The South American surface is the oldest and occupies the highest position in the landscape (950 to 1,200 m altitude) with smoothly convex plane portions. The Velhas surface is composed by irregular and slightly sloping planes and occupies in the landscape (750 to 950 m altitude). It is connected to the South American surface by areas of steep hillsides.

Latosols cover about 40% of the Central Plateau surface area. Most Latosols in the Brazilian Soil Taxonomy correspond to Oxisols in the Soil Taxonomy and to Ferralsols in the International Reference Base System. In the Central Plateau, the Latosols can be Red Latosols (Acrustox, ~28%), Yellow Red Latosols (Acrustox, ~10%) and Yellow Latosols (Haplaquox, ~2%). The main characteristics of Latosols are a poor differentiation of the horizons, a weak macrostructure and a strong submillimetric granular structure resulting in microaggregates 50 to 300 µm in size (REATTO et al., 2000). The objective of this work was to discuss the first results of the mineralogical characterization of Brazilian Latosols located along a regional toposequence across the Central Plateau.

Ten Latosols (L) developed in different parent materials were selected along an approximately 350 km long regional toposequence across the South American Surface (L1 to L4) and Velhas Surface (L5 to L10). Samples were collected in the diagnostic horizon (Bw) of these Latosols. Basic soil characteristics were determined on the air-dried <2 mm material according to the Brazilian standard procedures (EMBRAPA, 1997). Thus, the particle size distribution was determined using the pipette method after dispersion with NaOH 1N. Chemical composition obtained after dissolution in sulfuric acid was used to estimate the kaolinite, gibbsite, goethite and hematite content. Goethite and hematite content was also estimated using the soil color (hue, value and chrome). The mineralogical composition of the

<2 µm fraction was also determined by using X-ray diffraction and results confirmed those recorded after chemical dissolution. The relations Ki and Kr that are weathering indices (EMBRAPA, 1997) were computed as following:

$$K_i = 1.7 (\text{SiO}_2/\text{Al}_2\text{O}_3)$$

and

$$K_r = 1.7 (\text{SiO}_2)/(\text{Al}_2\text{O}_3 + 0.6375 \times \text{Fe}_2\text{O}_3)$$

The Latosols studied showed Ki and Kr that ranged from 0.32 to 1.36 and from 0.26 to 1.06 respectively. The averaged Ki and Kr were 0.50 and 0.40 respectively on the South American Surface with Latosols whose parent materials were originated from lateritic crusts and saprolites of detritic and mafic granulite rocks. The averaged Ki and Kr were 1.10 and 0.86 respectively on the Velhas Surface with Latosols whose parent materials originated from colluvial pediments from South American Surface and saprolites of pelitic rocks. The ratio kaolinite/kaolinite+gibbsite (RKGb) ranged from 0.24 to 0.78, and the averaged RKGb was 0.35 on the South American Surface and 0.70 on the Velhas Surface. The ratio hematite/hematite+goethite (RHGt) ranged from 0 to 1, and the averaged RHGt was 0.36 on the South American Surface and 0.74 on the Velhas Surface. The kaolinite content ranged from 20 to 65 g.kg⁻¹ for the Latosols studied, the averaged content being 28 g.kg⁻¹ for Latosols located on the South American Surface and 55 g.kg⁻¹ for Latosols located on the Velhas Surface. The gibbsite content ranged from 22 to 63 g.kg⁻¹, the averaged content being 52 g.kg⁻¹ for Latosols located on the South American Surface and 27 g.kg⁻¹ for Latosols located on the Velhas Surface.

References

- EMBRAPA (1997): Manual de métodos de análise de solo. – 2 ed. Empresa Brasileira de Pesquisa Agropecuária, Rio de Janeiro, 212 p.
- REATTO, A., MARTINS, E.S., GUIMARÃES, E.M., SPERA, S.T. & CORREIA, J.R. (2000): Variabilidade mineralógica de latossolos da área da Embrapa Cerrados em relação aos do Bioma Cerrado. – Boletim de Pesquisa Embrapa Cerrados, 20, 1–29.

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