# Modeling of Latosol development on geomorphic surfaces of the Brazilian Central Plateau: First results

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Latosols are deeply weathered soils characteristic of the moist tropics. Many Latosols have kaolinitic horizons overlying more gibbsitic ones (Lucas, 1989), for which there has been no satisfactory pedological explanation and why they have often been considered as a sedimentary succession. Several hypotheses to explain this phenomenon were expressed: biogeochemical recycling of Si by the forest (Lucas *et al.*, 1993) or the activity of termites (Volland-Tuduri, 2005). The objective of this study is to model the development of Latosols of the Brazilian Central Plateau considering the respective effect of parent material, time or biological activity. This plateau is constituted of the two main geomorphic surfaces: the South American surface (Suface I) and the Velhas surface (Surface II). In the Central Plateau, the Latosols can be identified as Red Latosols (~28%), Yellow Red Latosols (~10%) and Yellow Latosols (~2%), (Reatto *et al.*, 1998; Embrapa, 1999).

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) (Fig. 1). The Latosols L5 and L6 were located on the upper Velhas surface, L7 and L8 on the intermediate Velhas surface, and L9 and L10 on the lower Velhas surface. 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). The chemical composition of the < 2 mm and < 2 µm fraction was determined after fusion with lithium metaborate. The mineralogical composition of the < 2 mm and < 2 µm fraction was determined using X-ray diffraction.

First results showed that the Latosols L1 to L4 from the South American surface, whose parent materials were originated from lateritic crusts and saprolites of detritic and mafic granulite rocks, were gibbsitic Latosols. These Latosols were characterized by a kaolinite/ (kaolinite+gibbsite) ratio < 0.5. The kaolinite content ranged from 20 to 41 $g.kg^{-1}$, the gibbsite content from 44 to 63 $g.kg^{-1}$, the goethite content from 8 to 17 $g.kg^{-1}$ and the hematite content from 0 to 20 $g.kg^{-1}$. The Latosols (L5 to L10) from the Velhas surface, whose parent materials originated from colluvial pediments and saprolites of pelitic rocks, were kaolinitic Latosols. They were characterized by a kaolinite/(kaolinite+gibbsite) ratio > 0.5. The kaolinite content ranged from 40 to 65 $g.kg^{-1}$, the gibbsite content from 18 to 37 $g.kg^{-1}$, the goethite content from 0 to 9 $g.kg^{-1}$ and the hematite from 8 to 20 $g.kg^{-1}$.

Further analysis will consist in establishing a more detailed description of the < 2 µm mineralogy by using high resolution transmission electron microscopy and selective chemical dissolutions. Indeed, 2:1 clay minerals were recognized in similar Latosols by Vollant-Tuduri

(2005) and their presence in the Latosols studied remains to be established. Then, the geochemical composition and associated mineralogy of the diagnostic horizons will be discussed according to the characteristics of the parent material (chemical composition, mineralogy, density). Finally, we will develop a model based mainly on the age of the Latosol and the characteristics of the parent material that will account for the current characteristics of Latosols of the Central Brazilian Plateau.

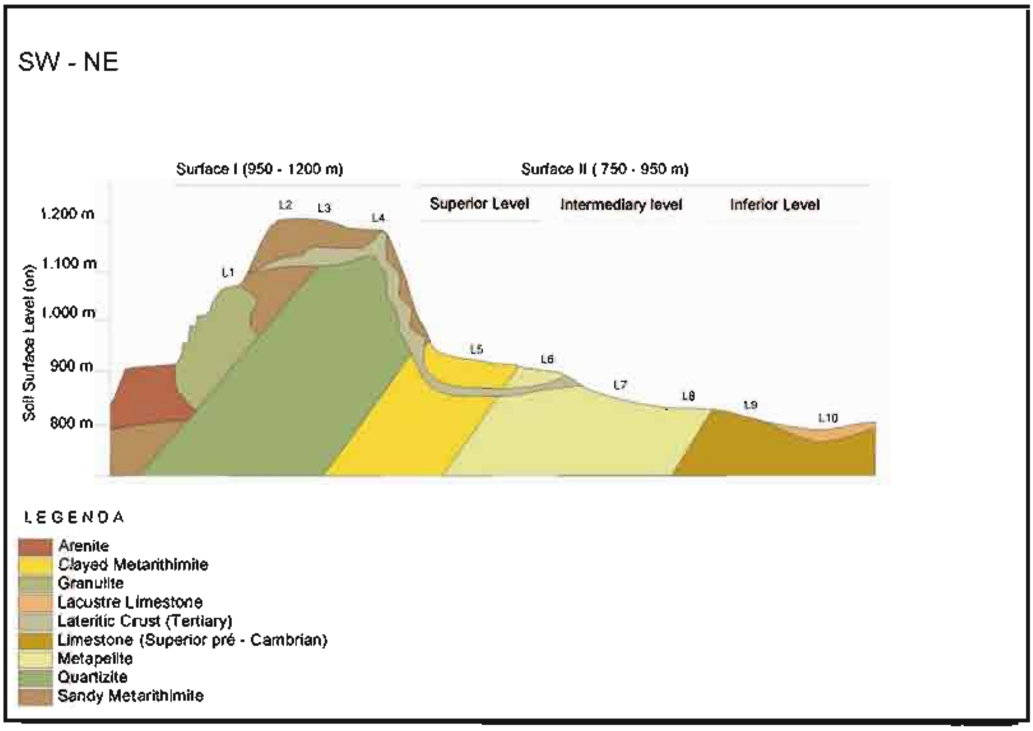


**Figure 1.** Position all sampling of the 10 Latosols (L) in each geomorphic surface in the regional toposequence of Central Plateau – Brazil.

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