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The use of lateritic profiles to interpretation of geomorphological evolution in cuestas areas: the case of Itaqueri Hill, Brazil

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In the peripheral areas of the Paraná Basin (southern of Brazil) is very common the occurrence of significant escarpments associated with cuestas, and in its immediate reversal occurring sedimentary deposits of the Cretaceous and Lower Paleogene. These sediments next reverse cuesta is affected by thick lateritic profiles that show significant concentrations of iron. For this work were carried out systematic fieldwork, with mapping of occurrences of lateritic materials, fault description, construction of stratigraphic profiles and collected materials for chemical analysis.

We worked on a pilot area called Serra de Itaqueri (Itaqueri Hill), in the São Paulo state. On top of cuesta the reverse occurs the Itaqueri Formation (Paleogene). This material corresponds to the alluvial deposits poorly sorted with grain sizes ranging from clay to pebbles. Lateritic profiles are present in top surface of the Itaqueri Hill. The profile shows at the top a ferricrete (can be nodular, massive or conglomeratic) that can reach up to 10 meters thick, followed by mottled horizon and a kaolinite level, with Liesegang Rings (range from a few decimeters to more than three meters in diameter), totaling more than 60 meters thick in total, demonstrating the great tectonic and climatic stability for its evolution.

The alteration profiles of Serra de Itaqueri present relationship with the evolution of Sul Americana Surface, dating from the Upper Cretaceous - Lower Paleogene. After the deposition of the Itaqueri Formation in the early Paleogene under semiarid climate dynamics, there was a period of tectonic and climatic stability, which enabled the development of thick soils, characterized by a wetter period. The weathering characteristics indicate over time the surface stability. After the evolution of these lateritic profile, the area underwent significant tectonic uplift, resulting in the reversal topographic, raising these profile over 300 meters.

The structural control is clear in the ferricretes of the lateritic profiles, so several exposures appear as a distinct feature in the landscape and aligned along fault zones. These fault zones in the exposures are spaced at distances of 10^{-1}-10^{1} m. They are composed by several parallel fault planes or conjugate faults, which form rhomboidal patterns, vertical pebbles along these zones, and some drag fold associated to faults. In contrast to the kaolinite horizon the kinematic indicators of faults that affect the ferricretes are very rare due to the unfavorable texture of such materials.

The observation of lateritic profiles (in stratigraphic sections), their altimetry positions and the analysis of kinematics of tectonic movements has allowed observing that the NE and NW normal faults define horsts and grabens outlining the central area of the hill where occur the highest altitudes as a prominent uplifted block. The fact that the sequence of the materials is more complete and preserved in this area indicates a strong inversion of the relief. Erosional forms as a result of tectonic uplift dominate the present relief. In the western portion of the Itaqueri Hill uplift was more intense, causing the complete erosion of the lateritic profile, creating numerous stone lines formed by ferricrete blocks.