

MORPHOLOGICAL, OSL DATING AND ANALYTICAL PROPERTIES IN A GEOMORPHOLOGICAL SITES IN THE NOVA LIMA GROUP – QUADRILÁTERO FERRÍFERO – MINAS GERAIS – BRAZIL

Costa, F.O.¹; Bacellar, L.A.P.¹; Castro, S.S.²; Messias, R.M.¹; Silva, S.F.³

¹Federal University of Ouro Preto; ²Federal University of Goiás; ³University of Brasília

ABSTRACT: The Quadrilátero Ferrífero, located in Minas Gerais, Southeastern Brazil is a region where Archaean and Paleoproterozoic rocks outcrop. This region is rich in mineral resources and hence many geological studies have been carried out there. Pedogeomorphological information though is still scarce for the difficulty in reaching the interest spots, which sit in places with high relief, steep slopes and poorly developed cover surfaces. It is important to understand the distribution and evolution of these materials, having the pedological systems evaluated in continuum, to identify the effect of geological and geomorphological phenomena related to the regression of erosive scarps and pedogenesis. This study aims to contribute with the understanding of the evolutionary dynamics of a geomorphological sites (GS) developed on schists from the Nova Lima Group (Rio das Velhas Supergroup). Soil borings were carried out along a 32% slope for description and sampled along a toposequence. The results confirmed that this is a system composed of 2 GS in different evolutionary stages, with effective evidence of colluvial processes, represented in 5 soil profiles (P1, P2, P3, P4 and P5) located from medium to low slope. Cambisols are deep, 8 and 2.5 meters thick in the medium and lower slope, respectively, and contain a stone line (SL), consisting of quartz and schist fragments and ferricrete from the escarpment top, behind a Bi horizon developed on colluvium. The GS1 comprises the profiles P1, P2 and P3, which is equivalent to the middle slope and has 210 meters and denotes geochemical leaking. The soil horizons overlaying the SL, especially Bi1, present silt/clay relations between 0.29 and 0.5, indicating a higher degree of weathering. The ΔpH data shows electronegative values, opposite to P3, which is electropositive. This suggests that the latter underwent a base leaching process. The horizons above SL are discordant from the rock surface and there is no evidence of lithological dependence. The GS2, with 190 meters, corresponding to the low slope comprises the P4 and P5 profiles. The silt/clay relations of the surface horizons (0.52 and 0.54) are smaller than the subsurface (1.42 and 3.29), suggesting schist rocks are the source material for B and C horizons. They also display thin interbedded quartz and muscovite minerals. The ΔpH analysis indicates predominantly electronegative horizons, confirming correlation of horizons B and C with the parent material. The development of the porous system from network cracks is at its early stage, smaller than the horizons overlaying the SL in the set amount of pedological toposequence. The geochronological data measured with OSL dating show that the surface coverage of GS1 and GS2 have Holocene ages from ≈ 6.5 Ka to ≈ 2.8 Ka. Other studies that also link hydraulic adjustments with morphopedogenetic processes for the Quadrilátero Ferrífero display values from the last ≈ 7.5 Ka.

The results show two distinct geomorphological sites with different pedogenetic evolution although both have developed Cambisols Haplic. The determining factors are: the parent material or underlying sediments, topography, subsurface hydrology processes and the base level adjustment events.

KEYWORDS: QUADRILÁTERO FERRÍFERO, SLOPE EVOLUTION, OSL DATING