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Clay mineralogy in different geomorphic surfaces in sugarcane areas

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The crystallization of the oxides and hydroxides of iron and aluminum and kaolinite of clay fraction is the result of pedogenetic processes controlled by the relief. These minerals have influence on the physical and chemical attributes of soil and exhibit spatial dependence. The pattern of spatial distribution is influenced by forms of relief as the geomorphic surfaces. In this sense, the studies aimed at understanding the relationship between relief and the distribution pattern of the clay fraction attributes contribute to the delineation of specific areas of management in the field. The objective of this study was to evaluate the spatial distribution of oxides and hydroxides of iron and aluminum and kaolinite of clay fraction and its relationship with the physical and chemical attributes in different geomorphic surfaces. Soil samples were collected in a transect each 25 m (100 samples) and in the sides of the same (200 samples) as well as an area of 500 ha (1 sample each six hectare). Geomorphic surfaces (GS) in the transect were mapped in detail to support mapping the entire area. The soil samples were taken to the laboratory for chemical, physical, and mineralogical analysis, and the pattern of spatial distribution of soil attributes was obtained by statistics and geostatistics. The GS I is considered the oldest surface of the study area, with depositional character, and a slope ranging from 0 to 4%. GS II and III are considered to be eroded, and the surface II plan a gentle slope that extends from the edge of the surface until the beginning of I and III. The crystallographic characteristics of the oxides and hydroxides of iron and aluminum and kaolinite showed spatial dependence and the distribution pattern corresponding to the limits present of the GS in the field. Surfaces I and II showed the best environments to the degree of crystallinity of hematite and the surface III to the greatest degree of crystallinity of goethite agreeing to the pedoenvironment conditions of each surface. The rate goethite/(goethite+hematite) decreases the surface I to III this result is the variation of the source material that has an increase of clay which is characteristic of sandstone rock (Adamantine Formation) in the surface III. The rate kaolinite/(kaolinite+gibbsite) also shows a decrease of the surface I to the surface III. The spatial distribution pattern of mineralogy influenced the pattern of physical and chemical properties. On the surface III (with higher iron and gibbsite) had the best physical condition (lower density, higher porosity and aggregates) and greater phosphorus sorption. In this sense, the identification and mapping of the GSs, allowed a better understanding of cause and effect of the distribution of soils in the area, and the recognition of areas of controlled variability of soil attributes. These areas can be considered specific areas of management, useful for planning and management practices in the culture of sugarcane. Besides, suggesting criteria for the recognition of map units that would be equivalent to the future series of soils of the Brazilian System of Soil Classification.