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Pedogenic evidence of high precipitation in red paleosols: Maastrichtian of Bauru Group/Brazil.

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Marília Formation (Upper Cretaceous) is top unit of Bauru Group, Paraná Basin, occurs in the states of São Paulo, Minas Gerais, Goiás and Mato Grosso do Sul, in Brazil. This unit consists of sandstones with grain size ranging from fine to coarse, conglomerates, with angular grains and content matrix variable. Marília Formation presents paleosols very well preserved, having been described soils without diagnostic B horizon, vertic properties, hydromorphic soils, soil with textural contrast and more commonly soils with high concentration of CaCO₃, featuring calcretes with different degrees of development.

The literature has indicated the presence of paleosols in this formation since the 1970s and this study aimed to characterize different types of paleosols that occur in this formation, normally characterized by development in arid and semiarid environments. The procedures were the description field of the profiles, chemical analysis with fluorescence spectrometry of X-ray and description of thin sections. This study work with a palaeosol profile well preserved of Marília Formation, in Campina Verde, state of Minas Gerais, Brazil.

The profile has a thickness of 667 cm with five horizons. The dominant colors are dusty red (10R3/4), pale red (7.5R6/4), pale red (10R6/3 and 10R6/4), dark red (10R3/6). The horizons display only massive structures. In the horizon 1, 3 and 4, there are grains with oxide films. In the horizon 4 occurs clay nodules of 5 to 10 mm. On the horizon 5 we identified large cross stratification still preserved and smaller structures already erased by pedogenesis. The cementation of calcium carbonate (CaCO₃) is nonexistent in the matrix, only bioturbations occur slight reaction to hydrochloric acid (10% HCl). The bioturbations are usually abundant and filled, containing associated oxi-reduction halos. The grain size is mostly sand (up to 86%), with a portion of clay (9,3%) and silt (4,7%). In the clay fraction, the minerals identified were palygorskite, dominant in all horizons, quartz, hematite and montmorillonite.

The macro morphological information and molars calculations indicate the presence of humid conditions during Maastrichtian in the area, but the mineralogical information indicates dry or sub humid conditions. However, the abundant presence of clay cutans, with hematite, indicates the free water dynamics in profile, at depths greater than 5 meters.

This apparently contradictory information could be explained by the high permeability and depth of the soil (6 meters preserved more what was decapitated), which allowed the rapid water infiltration and to maintain dry conditions in the soil, or else a result of high evapotranspiration, which in semi-arid regions, can be higher than the rates of rainfall, even when the precipitation is relatively high.

