



Pedogenesis and paleoenvironmental records in the tephra-paleosol sequences of Central Mexico: micromorphometric indicators.

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Summary

The tepetates (hardened volcanic soils) in Mexico have been studied from an agronomic and mechanisms viewpoint, however due to their different origins have not been established mechanisms that link them to environmental studies.

This paper uses morphometric tools to determine the origin of the Tepetates in Mexico, using them as indicators of environmental changes and periods of instability of the landscape.

The Glacis de Buenavista is located mainly in the northwestern portion of the state of Morelos, between the parallels 18° 20' and 19° 08' north latitude and meridians 98° 37' and 99° 30' west, forming a piedmont relief caused by erosion-sedimentation phases of volcanic materials from the Sierra de Zempoala mainly, and that is a big fan of Pleistocene age. Covers an area of 202.7 km². The maximum altitude is in the north, 2600 m, and minimum in the south to the 970 m, with an average slope of 6°.

The Glacis de Buenavista has soils cover which consists of Luvisols, Vertisols, and layers of Tepetates, Phaeozems and Luvisols, in particular, represent soils polycyclic polygenetic high degree of development that have been formed in the Holocene. The next question is what mechanisms control the presence of a floor or other unit that occurs in the area? Since the lateral boundaries between soil types are abrupt, which speaks of discontinuities in the processes that have given rise.

The morphometric study was carried out in thin sections of the blocks of Tepetates undisturbed.

The blocks were vacuum impregnated with polyester resin. The thin sections were scanned with an Epson scanner 7100 with high resolution 9600 dpi and 24 bit color depth and analyzed using Image Pro Plus 5.1 program.

The stratigraphic control was performed by ¹⁴C dating of organic matter.

The pedofeatures measured were roundness of soil fragments, matrix percentage, percentage of papules and porosity. Was also carried out a microscopic control using a microscope BX51 Olympus pedofeatures observing the following: matrix, fabric, coating clay (cutan), nodules of iron, rock fragments, fragments of roots, charcoal, organic matter, papules (fragment coating of clay).

The Tepetates contain primarily, within its matrix rounded fragments of Luvisol soil type, which also include charcoal evidence of wildfire that was in situ. When soils become devoid of vegetation, were susceptible to water erosion which caused lahar deposits were emplaced later and formed the current Tepetates.

The morphometric studies show a clear mix of materials and low porosity in Tepetates, besides giving a numerical value to the round of the materials that were incorporated into the matrix, thus giving more strength to the theory that the origin of these, this area is characterized by mass movements and their subsequent hidroconsolidacion late Pleistocene early Holocene.

The Tepetates ages show that the instability of the environment is presented in the Pleistocene-Holocene boundary where the period of greatest formation of different layers of Tepetates, after this are more stable periods which are developed soil cover type luvisol,