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Morphopedologic Analysis on Cozumel Island: Quintana Roo – Mexico

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Abstract

Cozumel has a surface of 453 km^2 and an average height of 5 m above sea level (10 m at the highest point above sea level). This island has subtropical climate and registers its maximum precipitation in the summer.

Perforations of 100 m demonstrate that the island is made of reefs which date from the Oligocene and the Quaternary ages. A karstic aquifer has been formed in those rocks.

Rendzina soils are predominant in the island. These are soils with no high depth, a good structure, drainage and ventilation. Also, they easily erode due to the air and excessive rain. Regions near the beach are formed by calcareous sandstone from sea origin which form regosols and sandy soils.

9 soil samples were taken mainly from the rendzinas, and these were compared with 2 samples from the bedrock (limestone). The analysis includes parameters to the description of the soils, quantification of principal elements and traces taken with the help of ICP methods and fluorescent X-rays.

The enrichment of the soil in silice permits one to compare it with the bedrock. The enrichment factor indicates the reduction of the bedrock's bulk due to the ground formation. The highest factor observed of 60.5 reflects a reduction of 1 m of bedrock to 1.65 cm of soil.

Most of the parameters analyzed (Li, Be, Fe, Mn, Al, Ti, Zn, Pb, Cr, Ni, V, Cd, Hg, Y) reflect a lineal function that indicates that their concentration increase is directly affected by the formation of the soil. The parameters that reflect non-lineal functions (Ca, Mg, Sr, S, Na, F, P, Ba) point to affectation by dissolution and their content in the ground water is bigger.

7 territorial units have been tested in order to indicate the relations of the elements which structure the characteristics of the morphopedologic units, giving as a first result a difference among the rendzina, regosols and cambisols soils based in an analysis of phsicochemestry properties and in an analysis of the relief that permits a precise approximation to the planning and territorial arrangement.

Keywords: Cozumel, reef sediments, soils, Rendzina, geogene background.

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