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Advanced tropical weathering in the dynamic mountainous landscapes: experience from Sierra Madre del Sur, Oaxaca, Mexico.

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The major part of the knowledge about the rates, mechanisms and products of weathering in humid tropics originates from the research of deep alteration profiles of stable platform landscapes (Central and Western Africa, Amazonia). Less certainty exists in the understanding of the weathering processes in the mountainous lanscapes, with high intensity of geomorphologic processes. A wide spectrum of opinions exists between two polar ones:

1. Mineral alteration in humid tropics is more intensive than denudation even in the mountains, thus making possible formation of thick weathering mantles dominated by “advances” weathering products (kaolinite, crystalline Fe and Al oxides).

2. Deep and advanced weathering cannot develop in the dynamic mountainous lanscapes, it is limited to the formation of rather thin soil-regolith profiles with “immature” composition: frequent weatherable minerals in coarse fraction, 2:1 clay minerals. “Advanced” weathering products, when present, are inherited from earlier stages of landscape development.

We studied several toposequences in the mountains of Sierra Madre del Sur, Oaxaca, under subhumid to humid tropical climate and selva vegetation. Within these toposequences both “immature” weathering profiles and profiles showing advanced grade of alteration were found. The former occupied mostly summit and downslope positions whereas the latter were found on flat terrace-like surfaces but also in the middle

part of the slopes, including steep ones. The micromorphological study showed rather "odd" profile distribution of weathering features in these slope profiles. B horizons are often clayey, kaolinitic, with the matrix pigmented by hematite. It is underlain by soft saprolite with original rock structure preserved but already with abundant evidences of primary minerals substitution with kaolinite and iron oxides. However, the upper, humus-eluvial part of the profile is sometimes enriched with weatherable silicates (feldspars, amphiboles) with some etching cavities, its fine material contains 2:1 minerals.

We found no evidence that these profiles are relicts from some earlier stages of landscape development and mark the rests of the ancient stable landsurfaces. On the contrary, they are supposed to be the products of current processes and fit to heir actual geomorphic position. More "fresh" composition in the upper part of the profile results from the downslope transportation of poorly altered materials from the summit area. These processes develop simultaneously with *in situ* weathering in the middle and lower horizons were mineral alteration proceeds in more stable soil environment and could reach more advanced stage. Thus two-storey weathering profiles are formed on the steep slopes; clay illuviation evidenced by coatings in all horizons (even in the upper part of the profiles) affects the whole mantle, bypassing the storey boundaries. The rejuvenation of the topsoil material seems to be an important factor in generating nutrients and exchangeable cations as well as formation of thick Ah horizon, so that some of the slope soils fit into the concept of Luvic Phaeozems.