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# Micromorphology, mineralogy and chemistry of a laterite profile on serpentinite in South-East Cameroon

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A laterite profile developed on serpentinite in Lomie, south-east Cameroon, was studied from the point of view of micromorphology, mineralogy and chemistry, using thin sections, SEM, microprobe (EDXRA), X-ray diffraction (XRD), Mössbauer spectroscopy and chemical analyses (CPS).

The profile contains from the bottom the top to five units: 1˚ serpentinite, 2˚ saprolite, 3˚ a clayey Lower Limonite layer, 4˚ a “Lower Breccia”, a “Hardpan” and an “Upper Breccia” 5˚ a loose cover (the soil).

In the lower saprolite magnesite is dissolved and serpentine gradually replaced by kaolinite, without loss of the lithic fabric (orientation of kaolinite, distribution of magnetite). This practically isovolumetric weathering (at the scale of the sample) can be considered as an “epigenetic” replacement of serpentine by kaolinite. Iron oxide hypocoatings form along planar voids, whereas newly formed smectite is observed in the voids. Congruent dissolution of the kaolinite in the upper saprolite leads to a collapse of the fabric and a chaotic accumulation of the hypocoating fragments. In the overlying “Lower Limonite” this fabric is even more strongly expressed, and iron oxide therefore more concentrated. Mössbauer spectroscopy indicates that this layer is very rich in well crystallised goethite, whereas hematite and magnetite are almost absent.

The "Lower Breccia" has a different fabric and consists of ferruginous nodules, very

rich in goethite, embedded in a matrix of soil-like material; a few quartz grains are observed, pointing to an admixture of different material. A similar fabric is observed in the "Lower Hardpan", completely fragmented and cemented by xenotopic gibbsite (50-60 % by volume).

The "Upper Breccia" consists of an accumulation of lateritic nodules of different pedogenic origin, embedded in a matrix comparable to that of the cover layer, with micromorphological characteristics clearly pointing to an Ferralitic or Oxic soil material.

Chemical analyses (including iso-titanium calculations) confirm the partly allochthonous character of the upper part, starting from the "Lower Breccia". The weathering profile shows a severe loss of Mg even as Ca, Na, K and Si, and an accumulation of Al, Fe, Ti, and V, Cr, Co, Ni, Cu, Ce, Nd, Pt and Au. In the "Lower Breccia" the appearance of mobile elements, such as Rb, Sr and Pb and stable Zr and Nb, and the disappearance of serpentine related minerals, clearly shows the influence of the surrounding micaschists. Also the iron mineralogy points to a discontinuity in the profile. Most probably at least three different materials are involved.