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## **Geophysical surveys contribution to structural and behavioral mapping of tropical soils.**

### **Contribution des mesures géophysiques à la cartographie de la structure et du fonctionnement des sols tropicaux.**

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For a small watershed (about 1km<sup>2</sup>) located in the rain forest of south Cameroon, structure and hydrological behavior of soils have been studied with usual direct methods (pits, hand drill logs, monitoring of rain falls, of out flows and of groundwater levels) enhanced by an indirect geophysical method: soil apparent resistivity measurement. Three arrays of increasing penetration (Wenner array with a = 10, 20 and 40 m) were used to monthly monitor during two years variations of soil apparent resistivity according to depth along 10 parallel traverses.

Statistical discriminant analysis of mean apparent resistivities spatial variations allows one to carry out a detailed map of soil structure. The apparent resistivity signature of each map unit, constrained by the observation of a few pits, may actually be semi-quantitatively interpreted in terms of principal soil material thickness (saprolites, ferruginous materials, clayey microaggregated materials, organic materials of the swamp).

Apparent resistivity variations on a timescale of two years are important. They reveal water content variations in shallow materials or water conductivity variations in ever saturated materials as swampy areas or deep materials. Hence statistical discriminant analysis of apparent resistivities time variations allows one to carry out a map of spatial units presenting the same trends for hydrological and/or geochemical behavior during the monitored period. The map is quite different from the previous one and provides original and accurate basis to define a behavioral box model of the watershed.

Keywords : Tropical soils, hydrological behavior, apparent resistivity.

Mots-clés : Sols tropicaux, fonctionnement hydrologique, résistivité apparente.