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Soil morphology: a key for discover and understand the structured and dynamic pedological covers

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Soil is a natural body, structured and dynamic: soils constituents are organized between them, thus forming morphologies that are specific of the pedological medium. Soil structures develops permanently: they express the soils properties (physical, chemical, biological, mechanical), their history and their actual dynamics. Each soil cover has it history which is a succession of pedological structures: each structure replaces an older one and is replaced by a younger one. Part of the historical successions of structures can be visible in space. The main pedological structures are:
- Elementary organizations that assemble constituents: they can be aggregates (peds), voids (porosity), cutans, nodules, colorations...; they result from the constituents genesis and from the physico-chemical and biological constituents properties; they also result from the constituents moving dynamics (particular moving, soluble moving, biological moving).
- Pedological horizons: they are volumes, or layers more or less horizontal; each volume or layer is characterized by its constituents, its elementary organizations, it thickness, its lateral extensions, and also by the morphology of the limits that separate them from other layers and associate them with the neighbouring layers.
- Pedological covers: volumes of soil in which are associated, vertically and laterally, several pedological horizons; these associations are dynamic.
Each type of structure is defined:
- by its own characteristics and by its morphological, physicochemical and biological relationships with its neighbouring structures;
- by the transformation fronts that we can recognize between the structures: soil for-

mation and evolution are succession of structures, each structure taking the place of the precedent; these time succession of structures is also partially visible in the space, vertically and laterally.

Soil morphology has been quite well studied at the level of elementary organizations, of pedological horizons, and also at the level of the vertical successions of structures, from the bedrock until the soil surface. But, three types of morphological studies are still quite poor:

- morphology of the vertical and lateral transformations of a soil structure to another one, mainly between elementary organizations and between horizons;
- main transformation fronts that conduct soil cover formation and evolution: what are the main pedological systems all around the world?
- relationships between pedological systems (soil structures dynamics) and landscapes evolution (relief, vegetation, human activities...).

Intensification of human activities create new conditions for soil evolution: new transformation fronts, new pedological structures, new pedological covers. This also has to be studied.