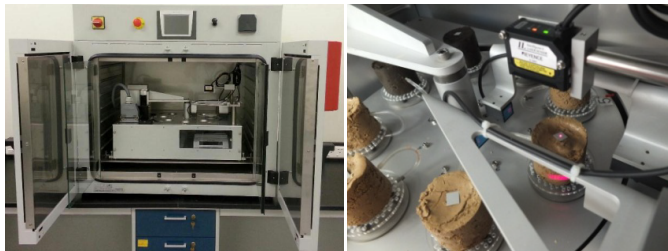


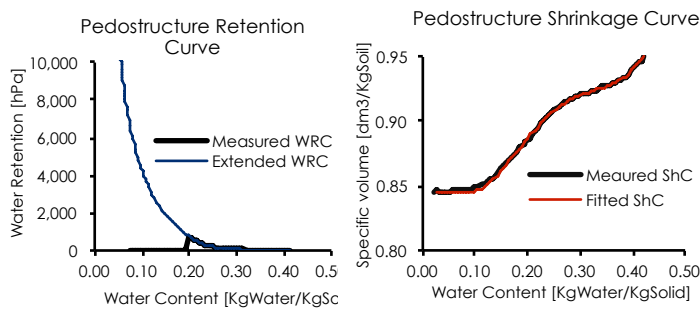
# Hydrostructural Pedology



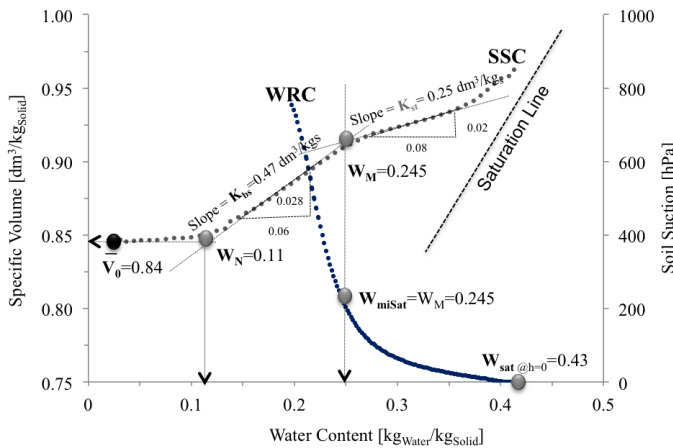
**Hydrostructural Pedology** is a new paradigm in soil science that grew naturally from the application of systems theory to soil science by addressing not only the organization of soil in the landscape (soil mapping), but also the hierarchical internal organization of the soil medium.



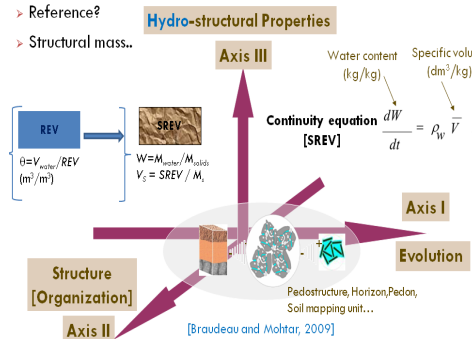
[1] Typosoil® Apparatus  
(Soil cores represent the pedostructure of soil horizon)



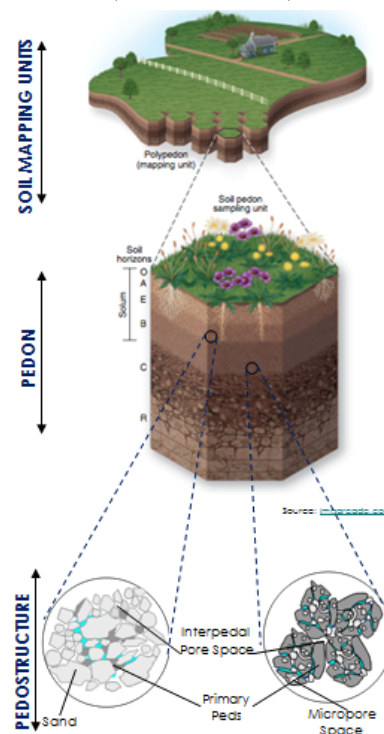
[2] Continuous and Simultaneous Measurements of water retention curve (WRC) & soil shrinkage curve (ShC)



[3] Extracting the hydro-structural Parameters  
(Hydrostructural Characterization)



[5] Structural Representative Elementary Volume (KAMEL Model)



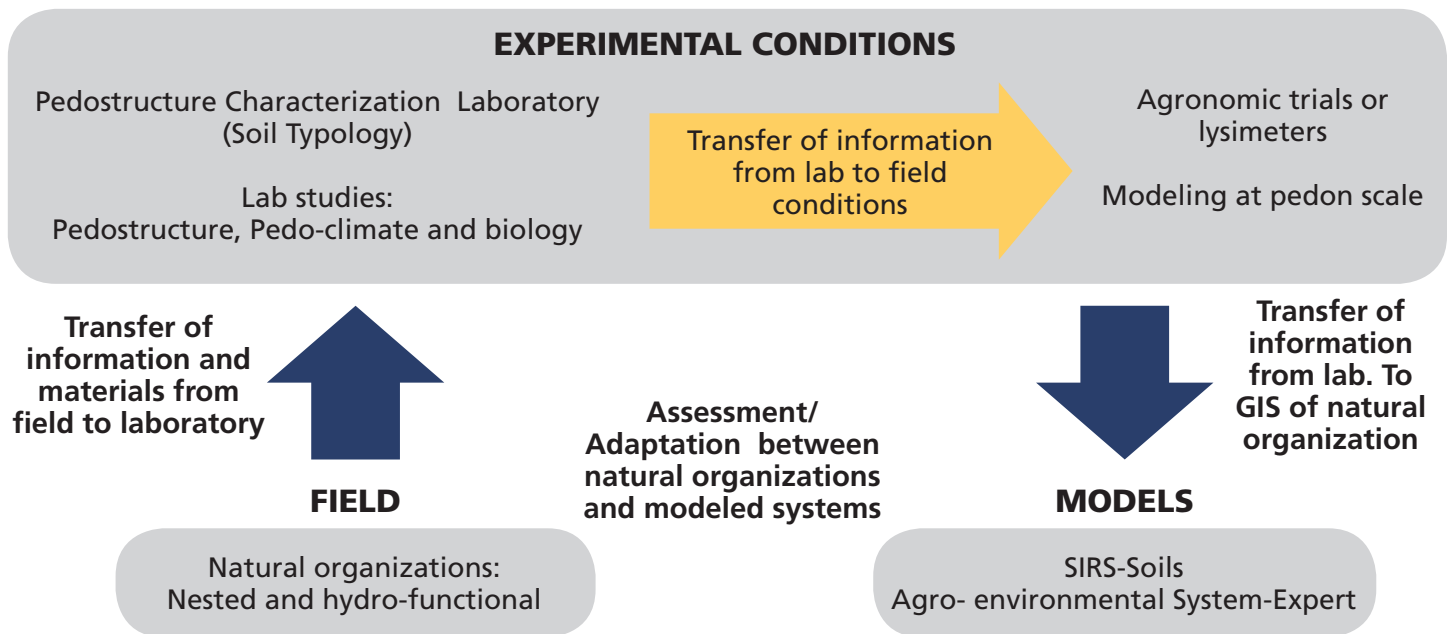
[4] Hierarchical internal organization of soil  
(Pedostructure Concept)

**Fig.1.** Hydrostructural pedology framework for soil-water modeling using the pedostructure and Structural Representative Elementary Volume (SREV) [KAMEL Model]

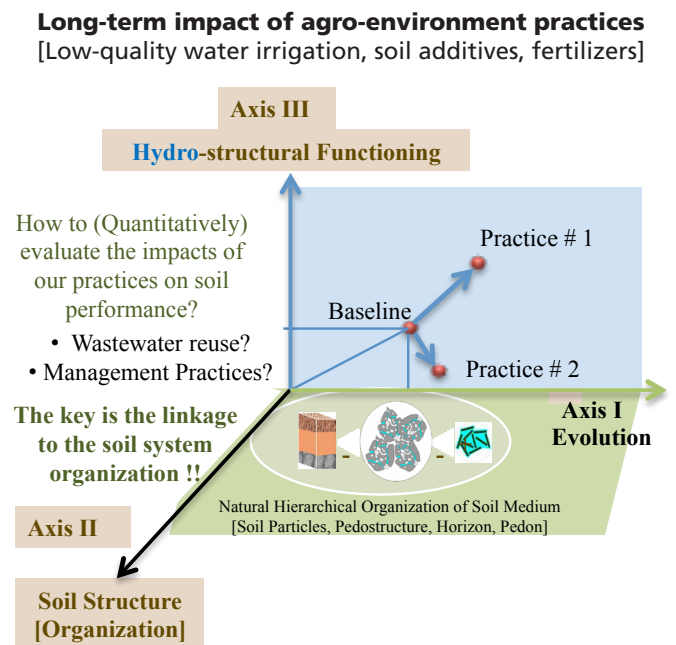
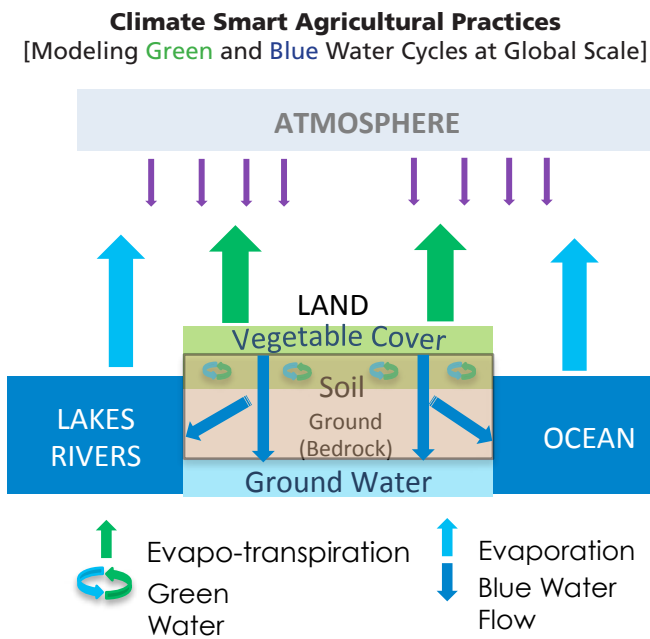
**Pedostructure** is like the motor of the soil, whose fuel is the pedostructural water. The hydrostructural properties of the pedostructure are dependent on the thermodynamic interaction between water and the surface charges of soil particles, organics, and minerals constituting the non-rigid structure of the soil. These thermodynamic interactions can be characterized by four curves:

- The pedostructure water retention curve,  $h = f(Wps)$ ,
- The pedostructural hydraulic conductivity curve,  $kps = f(Wps)$ ,
- The pedostructural shrinkage curve,  $\bar{V} = f(Wps)$ ,
- The pedostructural swelling curve,  $\bar{V} = f(t)$ .

In the **hydrostructural pedology laboratory** we are able to characterize the pedostructural characteristics of each soil horizon and to organize the data in relation to the field operations (soil sampling, mapping, experiments) and the geo-referenced soil information system.



**Fig.2.** The hydrostructural pedology laboratory in relationship with the field (sampling) and the soil mapping (NEO-GIS) for the soil plant atmosphere system modeling



**References:**

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Braudeau, E., Assi, A.T, and Mohtar R.H. (2016). *Pédologie hydrostructurale*. Collection *Système Terre - Environnement* dirigée par André Mariotti. ISTE éditions, April, 2016. pp. 188.