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# STUDY OF WATER DYNAMICS IN A SWELLING CLAY SOIL THE DYNAMICS OF WATER CONTENT

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The study of water content dynamic of a swelling soil is approached with water content vertical sections. From a microtopographic mapping (fig. 2), the water content sections are established owing to bore-holes. The bore-holes are aligned on several meters, with a equidistance of 25 cm ; a sample is taken every 10 cm, until 110 cm deep.

These water content sections shows :

— a great heterogeneity of soil water content profiles obtained at the same time from only a few meters (fig. 4) ;

— but there are wet or dry trend zones that extend with a width of approximately 75-150 cm (fig. 5). The trend zones and the gilgaï microrelief are interdependant : the depressions are always the wettest zones, while the mounds are the driest zones.

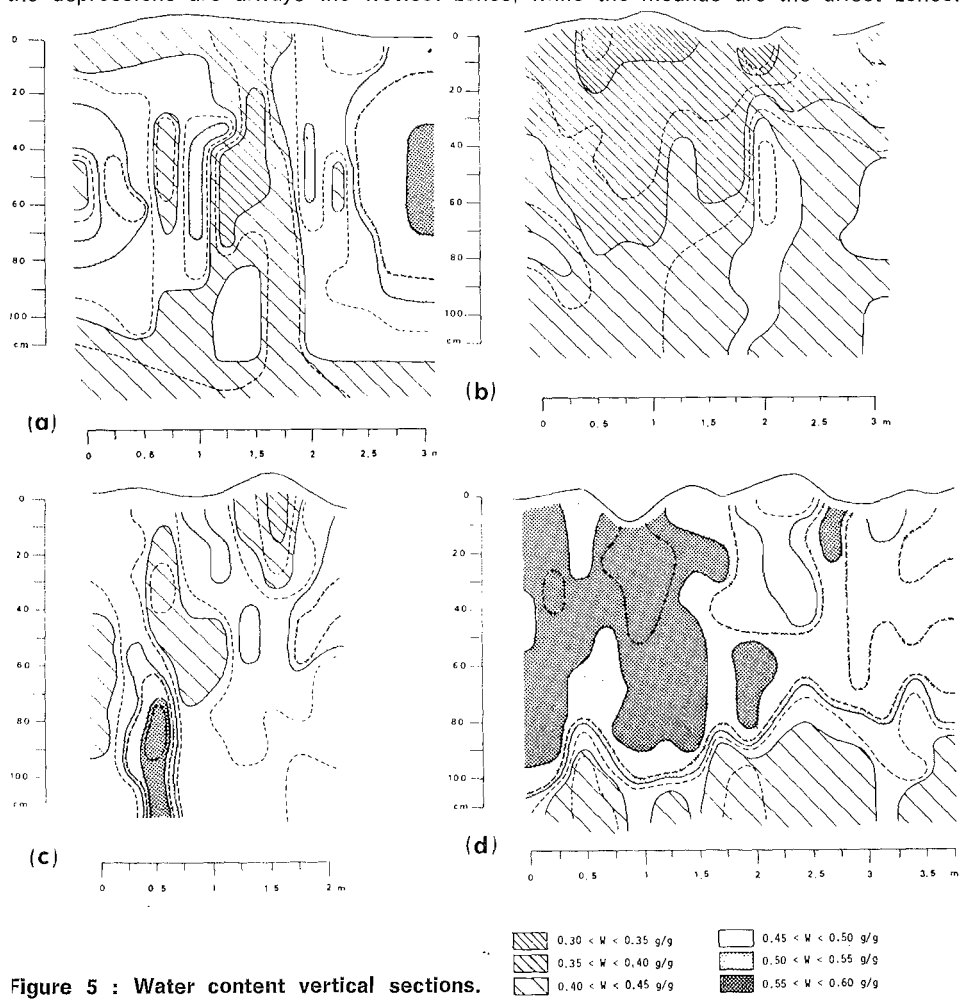


**Figure 5 : Water content vertical sections.**

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These results shows first of all the effect of cracks on the water infiltration into a swelling soil. A large quantity of water flows quickly through the cracks (STIRK, 1954 - SWARTZ, 1966 - BLACK et al., 1973 - QUISENBERRY et PHILIPPS, 1976) without a significant rewetting of adjacent media whose diffusivity is very weak. In spite of great water content gradients, the water diffusion is so weak that the soil remains heterogeneous a long time after an infiltration.

But the effect of gilgaï microrelief is the most significant. By microstream, the gilgaï microrelief involves a redistribution of rain-water from mounds to depressions. The water accumulation on the depressions brings about the water percolation throughout the cracking network (fig. 6). The phenomenon can lead to the craks-filling, which is attested by the presence of a water puddle on the depression after high intensity rains. It could be a matter of a network water table (BOUMA et al., 1980), the clay media remaining unsaturated.

So, the water content dynamic is very different between mounds and depressions. While the whole depressions profile participates in the water exchanges between soil and atmosphere (fig. 6-c et d), only the surface horizon of mounds shows a water content variation during the greater part of the year (fig. 6-a et b).

Finally, the water content dynamic of this swelling soil is defined by the gilgaï microrelief (fig. 7), the soil craking is a necessary but not sufficient condition for the appearence of such a water dynamic.

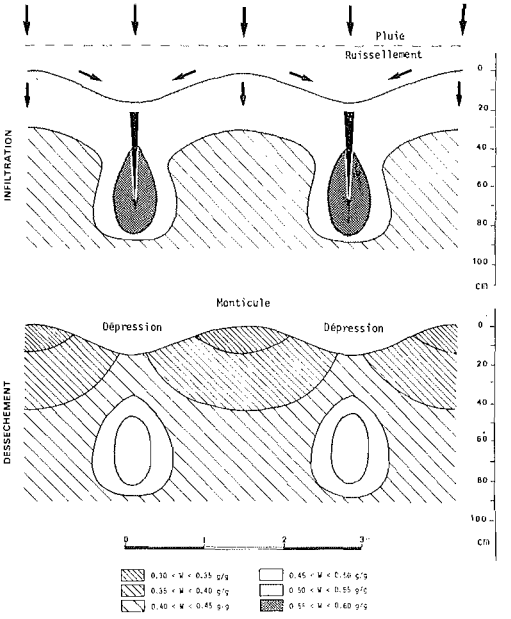


**Figure 7 : Compared evolution of water content profiles of mounds and depressions, in drying process and wetting process.**