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GEOMORPHOLOGICAL MAPPING OF A SAHARAN REGION, THE STILL LANDS NORTH EAST SAHARA

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Abstract: This study is a first in a Saharan region. Following a collaboration between soil scientists and geomorphologists a geomorphological mapping was realized. This work aims to understand the evolution of Saharan soils .The result we obtained demonstrated the presence of five geomorphological soil level. Each level and defined as soil with special chemical, physical and genetic characteristic.

Key words: Sahara, soils, geomorphology, Chott, salinity, gypsum

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INTRODUCTION

In the Algerian Sahara, oases consist of small properties that rarely reach a hectare. The product of these small areas can be sufficient if the operation is highly productive. Unfortunately and contrary to appearances, the farm Saharan although it is by intensive type of tradition always remained subsistence agriculture, that ecosystem is threatened to rupture due to numerous factors: aging palm groves, non-compliance the planting density, the abuse without significant restitution or rotation. Meanwhile the contrast is accentuated by the appearance of uncultivated land surrounding acreage. Before the incessant need of a population in rapid population growth, the introduction of new irrigation becomes imperative to maintain the socio-economic balance of the area. It can thus create sources of employment and sources of livelihoods for many households.

The processes of soil values used, do not take into account all the factors (climatic, edaphic, hydrological etc.) that ensure and perpetuate this production. On the other hand, develop land, is above all take into account all factors mentioned above to assess current capabilities and meet the

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maximum requirements for increasing the intrinsic quality of the land and ensure, sustainable way, qualitative and quantitative output (Bennadji, 1998).

In the same perspective, soil scientists for us, it is essential to remember that the genetic characterization of soils in a Saharan environment requires knowledge of the geomorphological context in which these soils fit. It is also established that you can not explain in isolation, according to the only vertical migration of matter and only interdependencies with what surrounds them. The notion of topo-sequence only resulting topographical considerations, is insufficient because it could lead to a confrontation of different ages soils. Thus a new geomorphological soil approach is adopted to set a new land evaluation board in the Saharan region of Still.

GEOGRAPHICAL SITUATION

The region of Still is situated in the North - East Saharan Algeria, along the great chott Melrirh and the South of the massif of the Aurès (figure 1) it is a plain stretching to the northern border of Chott Merouan over 300 km², axis between latitudes 32 ° 45' - 34 ° 10' and longitude 5 ° 50 and 6 ° 15.

GEOLOGY OF THE REGION OF THE STILL

The region of the Still is included in a set called down Sahara. It's a Bowl wide more than 400,000 Km² which rises slowly to 200-300 m altitude on the plateau slightly inclined of the plateaus of M'ZAB in West, TADEMAIT and the valley of the Oued Righ in the South and the chott Melrirh and Tunisian DAHAR in East (figure 2). To the North, the Aures and the NEMENCHAS chains dominate this bowl. It is a Cretaceous Halo which constitutes the plateaus that surround the Central depression. The tertiary and quaternary formations occupy the central part (Gouskov, 1964).

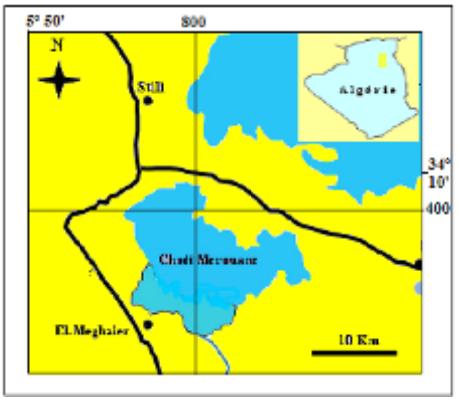

Figure 1. The geographic location of the region of Still

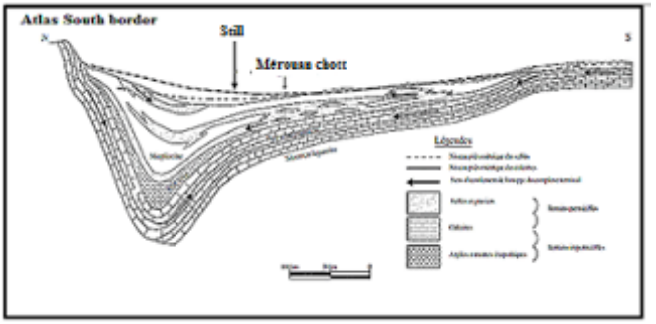

Figure 2. The geological cross-section of the low Sahara (Cornet, 1961)

CLIMATE OF THE VALLEY OF THE REGION OF THE STILL

The dry period extends throughout the year. The average annual precipitation is 66.44 mm (period 2003-2012). The driest months are June, July and August with an average of 1 mm of rain. The wettest month is January with a maximum of 17.23 mm. The annual average temperature is of 22.37 ° C with temperatures during the month of July with an average of 34.33 ° C. The lowest temperatures are recorded during the month of January (10.79 ° C on average). During the period from April to July, of the sirocco winds are very strong (ONMT, 2012)

MATERIAL AND METHODS

THE GEOMORPHOLOGICAL MAPPING

The geomorphological study is based on a systematic mapping (Guérimy & Marre, 1996; Marre, 2007). It helped to show the existence of five geomorphological levels stacked with the background of the Chott Merouane and four glaze (figure 3).

THE PROSPECTING METHODS

After a general recognition of the Valley of the OUED RIGH, using Basic documents (topographic, geological map and aerial images), it is in northern part that we focused surveys of land because it offered from the plateau of STILL to the bottom of the Chott Mérouane of many forms of landscapes that consider a distribution of varied and many soil types (Boumaraf, 2014).

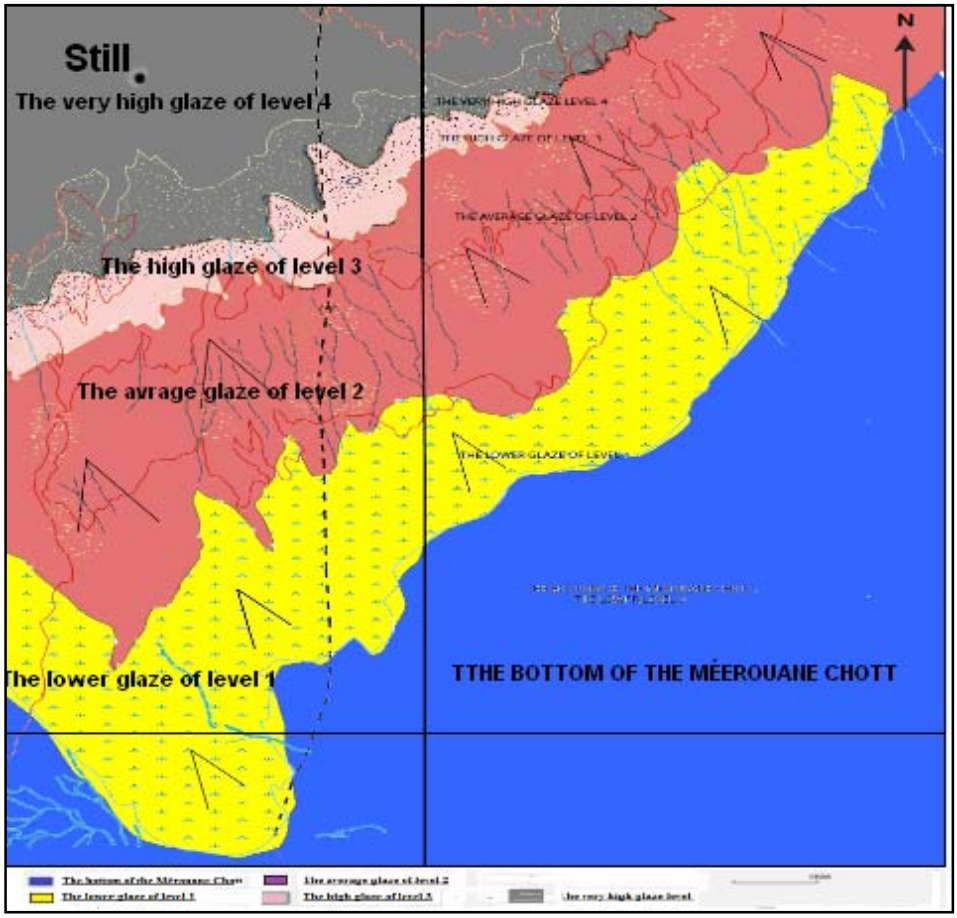

Figure 3. Geomorphological map of the area

RESULTS OF GEOMORPHOLOGIC STUDY

THE BOTTOM OF THE MÉEROUANE CHOTT, THE LOWER LEVEL 0

This level corresponds to the current bowl of settling with soils pseudogley. Covered white Salant characteristic, (the great chott) with a absolute absence vegetation it offers a remarkably flat topography (elevation-10 a-35 m). Characterized by a carpet of salt crystals white, of different types, (sulphate and chloride). In some areas, surface, becomes by its consistency a viscous crust and crunchy (figure 4).

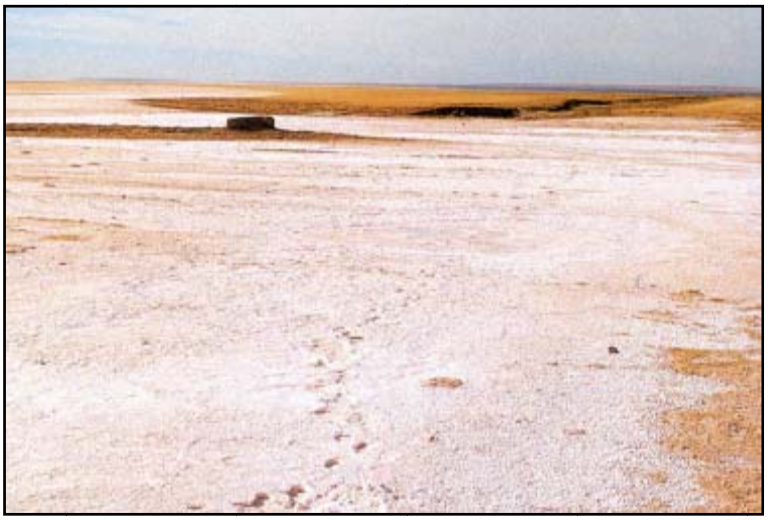

Figure 4. The Mérouane chott (Boumaraf, 2014)

THE LOWER GLAZE OF LEVEL 1

Noticeable by a passing to a higher threshold, with a transition sometimes inconspicuous, an extremely short concavity, and or the density of halophytic plants become more numerous. Located in silt saturated with salts, and which marks the passage to the Chott. He characterized by clayey silty-sandy soils. It is a fringe of large Chotts (figura 5).

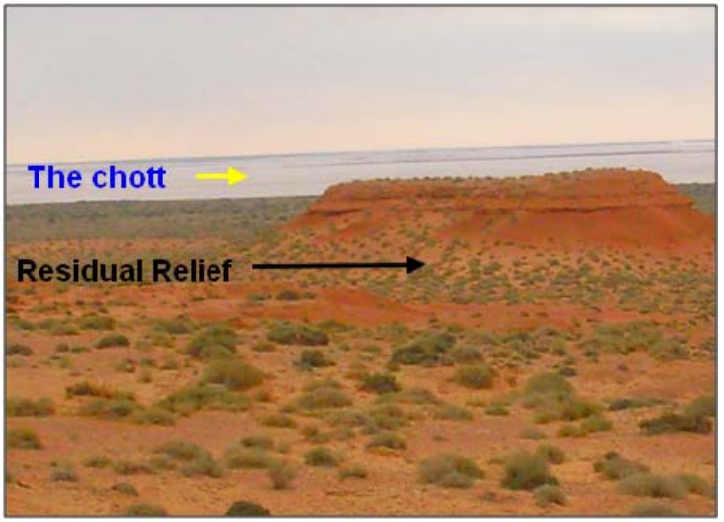

Figure 5. Chott Merouane (Boumaraf, 2014)

THE AVERAGE GLAZE OF LEVEL 2

This level appears a few meters fitted with the previous. It presents itself as a great glaze, very low slope. It is characterized by soils to gypsums accumulation, distinguished by gypsums scabbing and crusting at varying depths. Invaded by the nebkas that there are favorable conditions for their formation, (the proximity of groundwater) and gives the overall landscape a bumpy appearance. The surface of this level to an area greater than that of neighboring levels.

THE HIGH GLAZE OF LEVEL 3

These is a erosion glaze defined by some inclined surfaces. A variable slope of 5% to 15% to swallows it with a reduced spatial extension, very variable compared to the preceding level. Piedmont becomes slightly concave offering the training aspect perched. Hydrographic and more pronounced network upstream by the deep ravine of 20 to 40 cm, and to swallows it rare flutes. On the surface, there are very regular basis, thick gypsums crust, presumably period pen planation developed on miopliocene materials (Ballais, 2010).

THE VERY HIGH GLAZE LEVEL 4

This level is represented by a huge glaze, dominating the northern part of the Valley by a steep of several tens of meters. These formations are top crusts (figure 7) consist of crumbly clumps and glued nodules layer harder gypso-limestone. At its base, a consolidated marl substrate. The scabbing and crusting, glassy structure marry topography. Observed on the surface of the debris in holes of varying sizes. Covered by a veil of sandy and loose cover composed of xerophytes reaching rarely 50 cm. This level bears some traces of flow reduced to a few tens of centimetres hack.

Figure 7. The very high glaze level

CONCLUSION

The changing landscape of this region depends on a structural part of the conditions defined by lithology and tectonics and also erosion systems subjected to paleoclimatic aspects inherited Quaternary whose crusts crusts are the testimonies. It is this which is responsible for morphogenesis modeled in nested glaze. Indeed it is the 'alternation of wet and dry phases that allowed the construction of erosion surfaces interrupted by incisions and remblaiements. Considering the geomorphological data assembled in the five levels it appears that the current landscape follows a differentiation that obeys mainly to two factors of soil formation, wind and

water. Levels 3 and 4 are in an almost exclusive area of wind contribution covering geological outcrops and the slope of the tabular training. Nival 0, 1 and 2 are subjected to water and wind action with shaping mechanical and chemical soil. The geomorphological analysis of the results reflects the dominance of recent wind action on the ancient alluvial contributions resulting runoff declines and intensified role of wind denouncing increasing aridity of this region in the last phase of the Quaternary.

The chemical shaping is related to surface water table loaded tributary salt accumulations, particularly that of the well individualized gypsum. The different forms of crystallization characterize the level 2. This is the area of gypsomorphie.

Levels 0 and 1 are essentially composed of alluvial deposits purposes The action of the water table is more pronounced than in the previous level. However the action of winds with the decline of rainfall and the vastness of the area concerned (core 0) prevails. However morphogenesis well recognized throughout the crystalline accumulations surface characteristics, defines this field such as waterlogging.

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