

Effects Euphrates river flow variation in Geographical distribution sand Minerals and path the weathering from AL Baghdadi city to AL Fallujah city

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Abstracts

Petrographic study Minerals of very fine sand were carried in two terraces of Euphrates river. which starting from AL Baghdadi in the Northwest to- AL Fallujah in the East south. the study were including petrography characterization of light and heavy minerals. The aims of this study to know the ratio of minerals and spatial geographical distribution as well as to explain the effect of the Euphrates river in this distributed and weathering state. The results of this study showed; Convergence ratio of light and heavy minerals in all terraces ancient and modern. The weathering of light minerals increased in the old desert terraces. The heavy minerals (Rutile) showed the pedo stratigraphy between the modern and ancient terraces on the long the path.

Introduction

Rivers have always been expanding and deepening their streams, and in doing so, they are working to bring about many changes and alterations, in the ground surface. In the end, it continues to decrease the level of the raised ground and remove all its topography, so that the surface of the earth turns into a low plain with a flat surface. The goal is to open rivers to stream and expand, The sides of its valleys are intended to reach their weight and balance, as it is called the set of changes that affect the river and its basin, From the beginning of its run over the surface of the earth until the high ground on which it descends is reduced until it reaches⁽¹⁾ The river erosion cycle passes through three phases, which are youth, maturity and aging, and each stage has its own characteristics, characteristics and effects that it leaves on the surface of the earth. The Euphrates is one of the rivers that passed through the stages of the aforementioned erosion cycle, as the river changed its course for several times through the stages of history and the agency that happened to the Tigris River, which led to several bodies ((river terraces)) that was named on the Tigris River, with the surface of Mutawakkil, Mu'tasim, Mahdi, and Mansour, Its chronological age was determined on the period of the Abbasid caliphs, However, the Euphrates River has formed river runways and has not been named so far, except that it was named according to the presence of the runway sites, including the Mohammedi, Zankurah, Tarabshah, Al-Jraishi and Al-Boathi amphitheater. The old ones were formed in the periods when vertical sculptures ceased and were replaced by lateral sculptures. The most important characteristic of this type of terraces is their appearance in the form of pairs on the sides of rivers, and each pair is located in one level in one of the parts of the river valley, while the second part of the terraces of the Euphrates is in the form of non-periodic terraces and it does not appear as pairs on the banks of The river does not lie on one level. This type of terraces is caused by the symmetry of vertical sculptures to deepen the course and lateral sculptures to expand rivers to their valleys⁽²⁾ The Central Euphrates River in the area between the city of Al-Baghdadi in the northwest and Fallujah in the southeast is characterized by a great diversity of geomorphological features, including flood plains, river terraces, crescent lakes and other aspects. For the purpose of highlighting the mineral components of sand separator in one of these aspects and determining its chronological sequence, this research was conducted.

Research problem

What is the relationship of the mineral composition of sand separator to river terraces? Is it possible to give a time life for these terraces?

Research hypothesis

The hypothesis is a relationship between two variables, mostly in the form that provides temporary explanations or reasonable solutions to the problem, so the following hypothesis emerged:

- 1- There is a strong relationship between the amphitheater and the mineral distribution pattern.
- 2- The light and heavy sand separated minerals are of outstanding importance in discovering the course of weathering processes and their geographical distribution as well as their importance in determining stratigraphic symmetry.

Aim of the study

- 1- Knowing the nature of the vertical and horizontal distribution of sand separated minerals within the ancient and modern river terraces.
- 2- Knowing the variation in the weathering path and its nature obtained with the minerals of sand separated within the old and modern runways.

Research Methodology

- 1- The research relied on field visits, taking soil samples and analyzing them in a laboratory.
- 2- Conducting petrographic studies (optical) in determining the proportions of very fine sand * minerals and photographing them.

Research justification

- 1- Linking the geographical curve with the geological and pedological by studying the sand separations within the terraces of the Euphrates River.
- 2- This is the first study showing the geographical distribution of minerals.

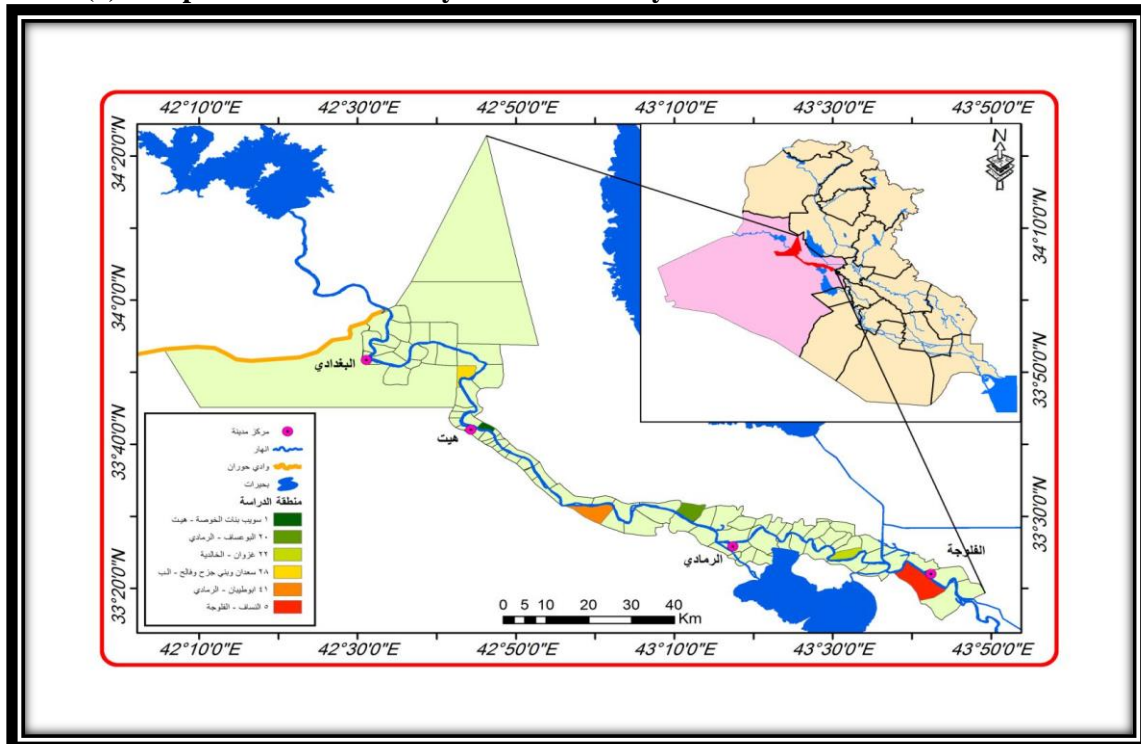
The boundaries of the study area

Six districts have been selected within the administrative boundaries of Anbar Governorate, as they are located between longitudes 00 "20-42 ° and 16" 53-43 ° east and latitude 15 "02-34 ° and 32" 11-33 ° north. Which extends from the city of Al-Baghdadi in the northwest of the governorate to the city of Fallujah in the southeast, as shown in Table (1) and Map (1).

* **The petrographic study was conducted in the laboratories of the College of Science, Geology Department, University of Baghdad.**

Region	Selected province to study	The Baydon number in the modern sedimentary amphitheater	Al Baydon number in the old desert amphitheater
Al-Baghdadi	Saadan, Bani Jazah and Faleh	2	1 league runway
Hit	Swaib Banat Al-Khoudh	4	3 league runway
Abu Tayeban	Abu Tayeban	6	5 league runway
Al-Ramdi	Abu Assaf	8	7 non league runway
Khalidiya	Ghazwan	10	9 non league runway
Fallujah	Al -Nasaf	12	11 non league runway

Table (1) The provinces of the study area and Al Baydons



Map (1) represents the location of the study area and the provinces studied in the research

Results and discussion

The very fine sand separator of (50 microns) size was used in the study of light and heavy minerals and to indicate the weathering path in the study area. The minerals of bromoform of specific weight (2,89) are called light metals and their specific weight is less than the specific weight of the liquid, while the heavy ones are the ones that indulge and settle at the bottom of the separating funnel. The slides are examined using a polarized optical microscope and based on the optical properties of each mineral to be diagnosed and separated from the rest of the minerals ⁽³⁾. The optical properties of minerals included the shape, color, cracking, extinguishing, and protrusion, as well as the number of optical axes, the angle of opacity, etc. The minerals were photographed with a German-made Lietz camera attached to a microscope.

The weathering indices of heavy and light metals were calculated based on the following equations (5).

Rate = Quartz / Feldspar, Zircon + tourmaline / Pyroxene + Amphibiol

The maturity index was calculated using the following equation

Rate = Quartz / Feldspar + Rock pieces

A_ quartz:

Quartz is a solid mineral resistant to weathering, insoluble due to the strength of chemical bonds within its crystalline structure, it is present in two types of monocrystalline quartz, which is diagnosed on the basis of its straight and wavy extinction, which appears as a single crystal as shown in the picture (1). This indicates that its granules are not subjected to the phenomenon of polishing and roundness due to transport operations from the source due to its hidden weight, which leads to its transportation further distances ⁽⁶⁾. The results of Table (2) showed that its percentage in the old desert runway was higher than the modern sedimentary runway, as it was distributed in a medium range (9.11% - 17.2%) in the old runway and a medium range of (12.3% - 15.0%). Compound granules consisting of two or more crystalline units of different crystalline orientation, and its grains are characterized by being medium in size with wavy extinguishing and with an angular shape, as shown in the picture (2). Its percentage was converging in both the old and the modern runways, as it was distributed with a medium range (1.7% - 2.4%) in the old runway and a medium range (1.4% - 2.7%) in the old runway.

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Minerals Modern amphitheater	Quartz Monocrystal line	Multicrystal line quartz	Orthoclase Feldspar Anorthite	Microcline Feldspar	Plagioclase And feldspar The bytes	Carbonate pieces	Rock Lime	Igneous rocks	Metamorphic rocks	Rocks Mud	Evaporates	grains Laminated With clay	Others	Quartz / Feldspar	Metallic Maturity Handbook
Al-Baghdadi	12.3	1.4	3.2	1.8	4.6	42	9.5	4.2	1.7	2.2	6.5	1.5	1.4	1.42	0.77
Hit	14	1.8	2.7	2	3.3	45	8.2	3.6	2.7	3.7	7.1	2.3	1.7	1.75	0.83
Abu Tayeban	13.7	3.4	2.1	2	3.8	45.3	10.5	4.2	2.3	2.3	6.2	2.3	1.3	2.16	1.02
Al-Ramdi	15	2.5	3	2	4.2	43.8	11	3.9	2.2	2.3	4	2	2	1.9	0.94
Khalidiya	15	2.7	3	1.8	4	44.3	9	3.2	2.8	3.2	5.6	3	1.5	2.01	0.97
Fallujah	13	2.3	3.7	1.9	4.1	30.5	10.1	3.4	3.1	2.9	6.1	2.8	2.4	2.25	1.03
Minerals Old amphitheater	Quartz Monocrystal line	Multicrystal line quartz	Orthoclase Feldspar Anorthite	Microcline Feldspar	Plagioclase And feldspar The bytes	Carbonate pieces	Rock Lime	Igneous rocks	Metamorphic rocks	Rocks Mud	Evaporates	grains Laminated With clay	Others	Quartz / Feldspar	Metallic Maturity Handbook
Al-Baghdadi	15.2	1.7	2.9	1.9	4.1	44.3	8.8	3.8	2.8	3	6.3	2.8	1.7	1.89	0.91
Hit	17.2	2.2	2.1	1.7	3.6	40.2	8.7	4.3	2.7	2.3	6.1	2.2	1.5	2.62	1.16
Abu Tayeban	14.2	2	2.3	2.1	4.3	44.1	8.9	3.9	2	3.3	7.1	2.2	1.8	1.68	0.86
Al-Ramdi	16.1	2.2	3.1	1.8	3.7	44.7	9.9	4.5	2.4	2.9	4.7	1.4	2.1	2.12	0.99
Khalidiya	11.9	2.3	3.3	2.4	4.4	46.1	10.3	4.2	3.9	3	3.2	1.6	2	1.40	0.66
Fallujah	14	2.4	2.7	2	4.3	45.4	9.2	3.6	2.7		3.7	5.4	2.3	1.7	0.86

Table (2) Average percentages of light minerals within the modern and ancient Euphrates runways

B. Feldspar group

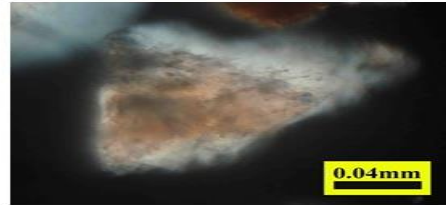
Three types of minerals have been diagnosed in this group, namely, the base feldspar (orthoclase), the plagioclase (the minerals of alpite) and the mineral microcline. According to the microscopic examination, the orthoclase basal feldspar appeared to be of a fuzzy shape with eroded edges minus facets with the presence of corners and may be sharp as its white color tends to gray as in picture (3). Its percentage in the runways of the Euphrates River is similar, as it was distributed in a medium range (2.1% - 3.7%) in the modern runway and an average of (2.1% - 3.3%) in the old runway, as shown in Table (2). As for plagioclase feldspar, it is similar in crystal structure, but it is gradient in chemical and physical wickets, and this group is characterized by the phenomenon of (logic) Zoning and appears in an angular or quasi-angular form, as shown in picture (4) of its alpite mineral. It was distributed with a medium range (4.0% -4.6%) in the modern runway and an average (3.6% -4.4%) in the old runway. As for the base feldspar microcline, it has the advantage that it has levels of cracking in two directions that intersect at an angle of 89 °, this mineral appears in a white color containing the blue and yellow color of the prismatic shape with eroded edges as shown in picture (5) and its percentage has converged in both runways as it is distributed in a medium range (1.8% - 2.0%) in the modern runway and with a medium range (1.7% - 2.4%) in the old runway.

C. carbonat rock fragment

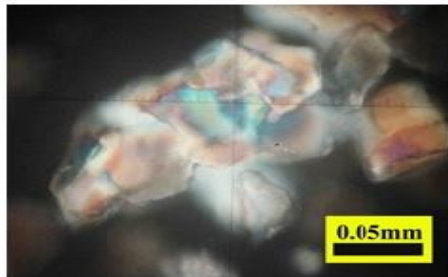
The carbonate pieces have an important role in understanding the sedimentation environments and the geological history of the study sites, as they are the main source of carbonate minerals and it is evident from Table (2) that the proportions of these rock pieces have exceeded in the old amphitheater compared to the modern amphitheater, as they were distributed in an average range of (40.2% - 46.1%) In the old amphitheater and with an average range of (30.5% - 45.4%) in the modern river amphitheater, these pieces are characterized by their medium - soft size and their crystals that took a circular shape and these rocks represent the conditions of mechanical erosion as shown in the figure (6).



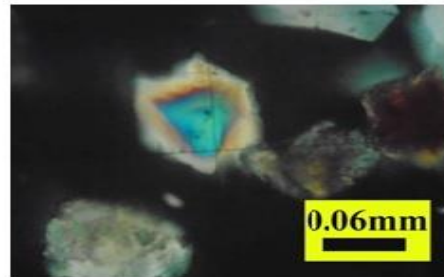
صورة رقم (6)



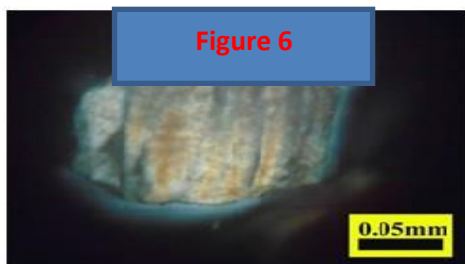
صورة رقم (5)



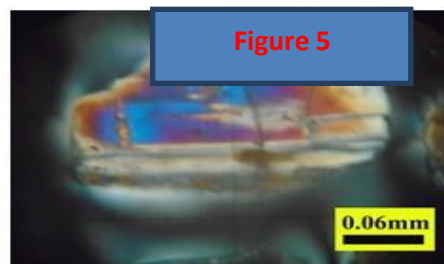
صورة رقم (2)



صورة رقم (1)



صورة رقم (4)



صورة رقم (3)

Images of some light minerals in soils of the studied areas taken by polarized optical microscopy

Figure 2

Figure 1

D. Chert rock fragment

Table (2) shows the convergence of the percentage of flint in both runways, due to the weak physical weathering process conditions, as it was distributed with a medium range (8.2% - 11.0%) in the soils of the modern runway and a medium range (8.7% - 10.3%) in the old runway. The optical properties showed that flint has an angular shape with eroded edges and a size ranging from fine to coarse, as shown in the figure (7).

E. Igneous rock fragment

These pieces are characterized by being angular in shape and of medium size - smooth and gray in addition to the blue and red color, as shown in the figure (8). While they were distributed with a medium range (3.6% - 4.5%) in the old amphitheater, we did not take these rock pieces into a specific pattern in terms of their distribution with the low topographic location, but rather their distribution was random in all areas of the study.

F. Metamorphic rock fragment

Table (2) displays the proportions of these rocks as it is evident from the table that their percentage exceeds in the ancient desert runway over the modern sedimentary runway, as their percentage was distributed in a medium range (2.0% - 3.9%) in the old runway with an average of (1.7% - 3.1%) in the modern runway, and these pieces appear in different shapes and colors as well as their random and irregular distribution within the study areas, as shown in the figure (9).

G. Evaporation

This group includes several metals, including chlorides, sulfates, and borates, which are very rare, while carbonates (dolomite and calcite) are common. In this group, the oval gypsum metal with a white color and with a glass or pearl luster appears in the figure (10) and its percentage is close to both The two runways, as they were distributed with an average range (4.0% - 7.1%) in the modern sedimentary runway and a medium range (3.2% - 7.1%) in the old desert amphitheater. This is due to the similarity of the origin material to the sand that was deposited in both runways.

H. Clay rock fragment

These pieces include clay rocks, which are Celtic stone, clay stone and lamellar clay such as mud shale and clay shale, and appear in different shapes and sizes and as shown in the figure (11). 7%) in the modern runway, with an average of (2.3% - 3.7%) in the old runway, and it showed an uneven random distribution with the slope of the topographic location of the course of the Euphrates River, and in general the group of light sand minerals took the following sedimentation in terms of dominance in both The two listed ones are carbonate rocks> quartz> feldspar> igneous rock pieces> metamorphic rock pieces> clay pieces> clay-coated grains> other minerals. Due to its resistance to weathering as well as its degree of hardness and its specific weight (2.65) ⁽⁷⁾ And what leads to its being affected by transport and sedimentation processes and moving over further distances when the transport power of the carrier of these rock pieces decreases (8). The reason for the height of the igneous rocks is due to the fact that they are highly resistant to weathering, as well as the time difference of soil age in addition to the method of mineral formation of the source material, For the purpose of clarifying the relationship between the minerals separated from the sand, as Figure (1) shows the relationship between the minerals of the feldspar group and their cycle, as it is clear from the figure that the group of feldspars and the percentages of the dissolutions occurring in them were all close in terms of converting the macrocline mineral to anorthite by increasing the calcium and the latter converting to albite by increasing the ion Sodium and then returning to the microcline by increasing the potassium ion, and this indicates the conditions of substitution and weathering occurring in them were similar and close, and this is what I confirmed in Figure (2) through the relationship between the igneous, sedimentary and metamorphic rock pieces as their geographical distribution came in the same area, The weathering index used quartz / feldspar and a mineral ripening index as shown in Figure (3), and it follows the weathering path occurring within the soils of the old and modern runways as the shape shows the contrast of the evidence of weathering and mineral maturity in the ancient and modern Euphrates River terraces. The weathering rate in the old terraces was higher than Modern terraces, the reason for this is due to the progression of the chronological age of the runway as well as the influence of climatic factors that affected the path of weathering of minerals from the source rocks to their deposition in their current locations.

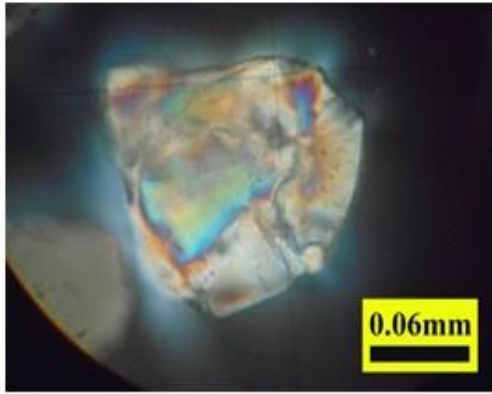


Figure 8

صورة رقم (8)

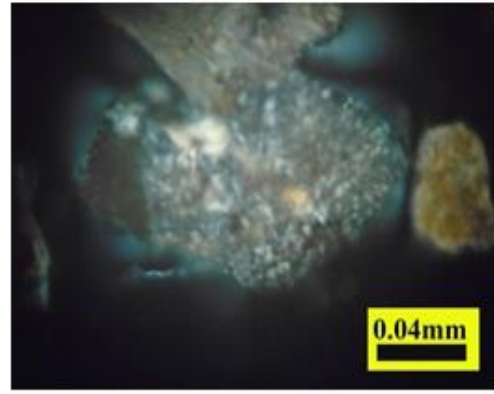


Figure 7

صورة رقم (7)

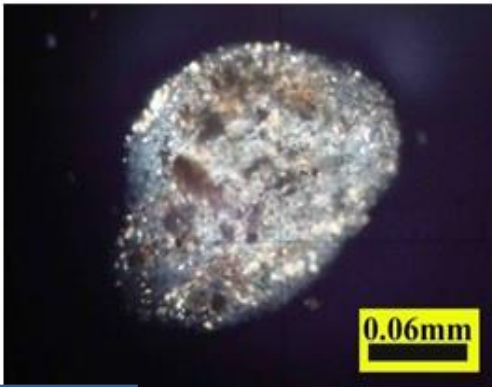


Figure 10

صورة رقم (10)

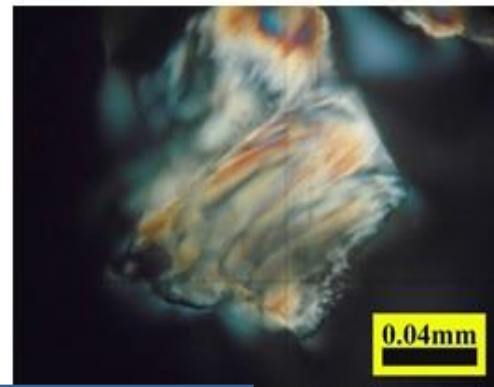


Figure 9

صورة رقم (9)

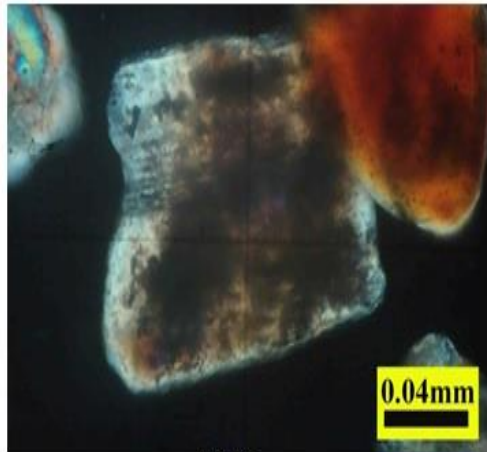
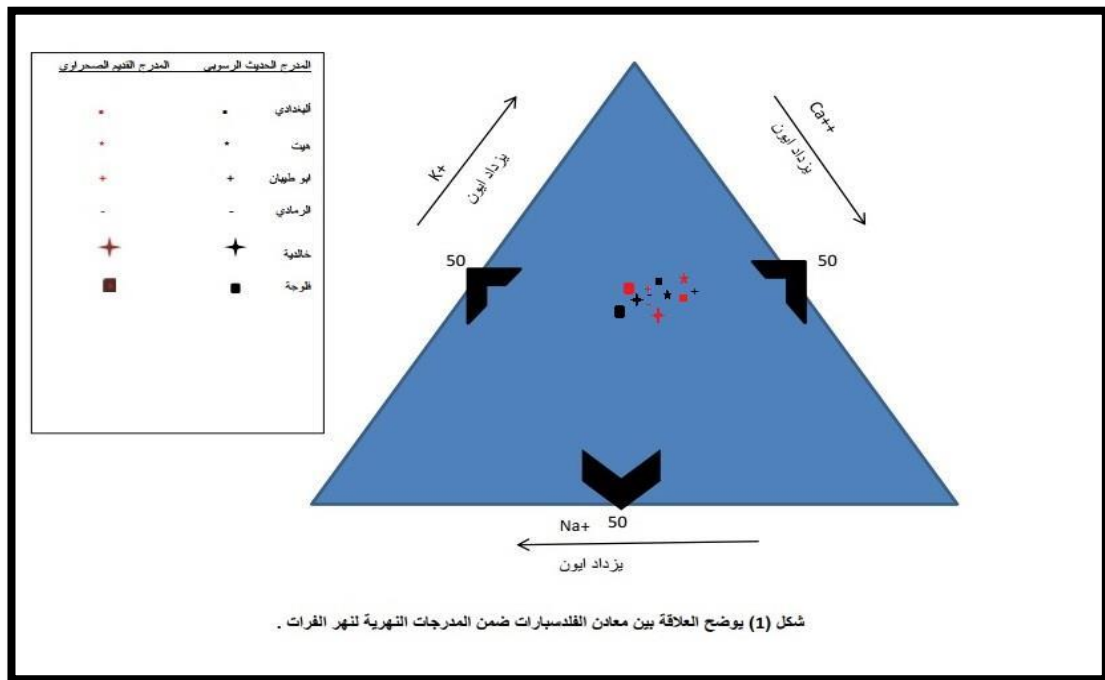


Figure 11

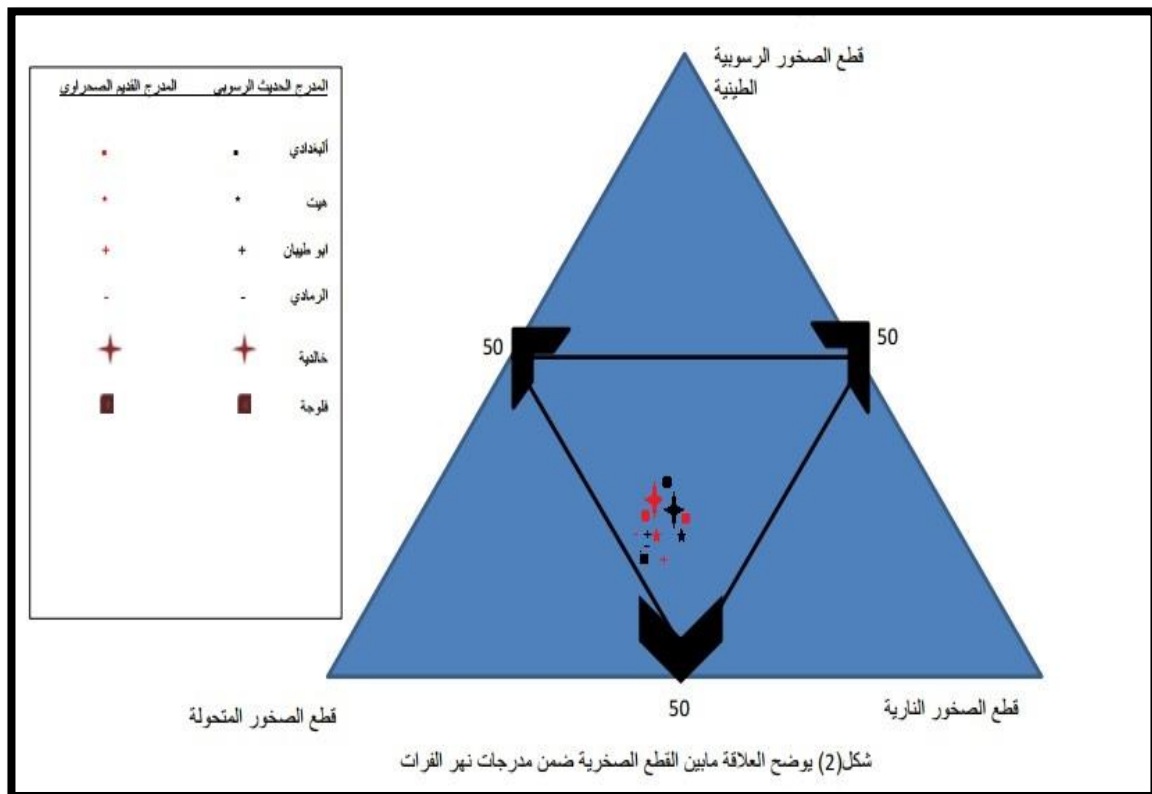
صورة رقم (11)

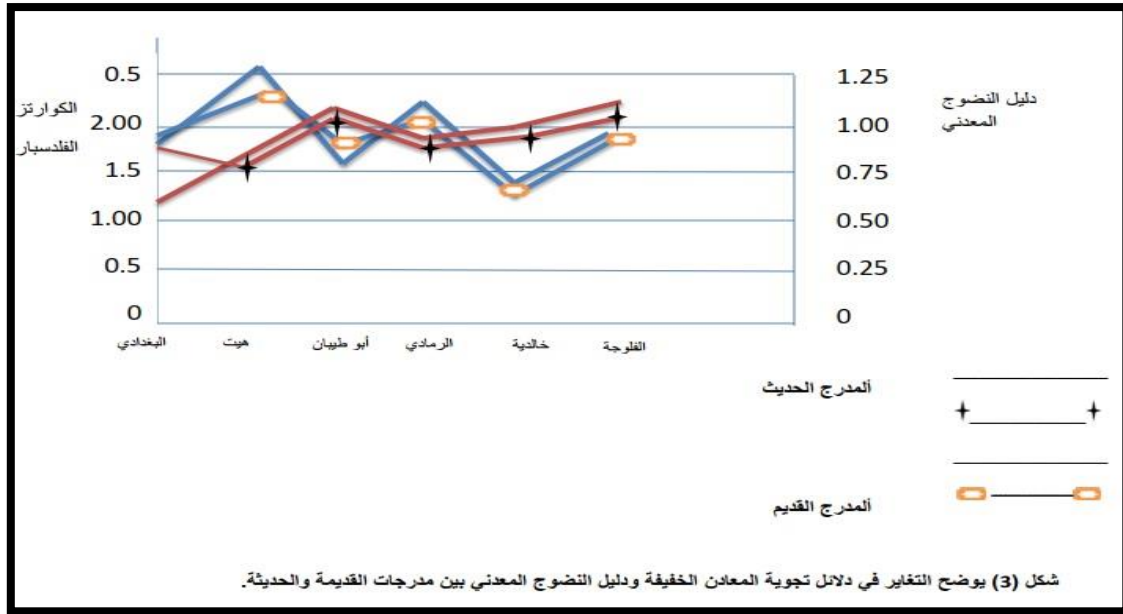
Images of some light minerals in soils of the studied areas taken by polarized optical microscopy

Figure (1) shows the relationship between feldspar minerals within the runways of the



Euphrates





Second: heavy sand minerals

This group is called heavy metals, because its specific weight is greater than the specific weight of the bromoform liquid, and it is deposited inside the liquid and it has been isolated and visually diagnosed. The following is a visual description of these minerals:

A- Table (3) displays the averages of the percentages of these minerals, as the highest percentage of these minerals is the group of opaques. These represent ferromagnetic compounds and have the advantage of having different degrees of roundness and irregular shapes, as shown in the picture (12) and their percentage has exceeded In the old runway on the modern runway, it was distributed in a medium range (36.4% - 38.0%) in the modern sedimentary runway and an average of (37.4% - 42.6%) in the old runway.

B- Total lamellar metals

This group includes both minerals (chlorite, muscovite, and biotite), as the chlorite mineral appears in its green color with a pseudo-hexagonal shape and with a glass or pearl luster of a specific weight of 2.6 - 3.3 with a single or triple inclination as shown in the picture (13). The percentage in both runways was converged, as it was distributed in an average range (6.7% - 8.0%) in the modern sedimentary runway and an average (7.2% - 8.1%) in the old river runway.

Table (3) Average percentages of heavy metals within the runways of the Euphrates River

Minerals Modern amphitheater	Opaque minerals	Chlorite	Muscovite	Biotite	zircon	Granite	Tourmaline	Amphibole	Pyroxene	Rutile	Sterolite	Kinite	Salsite	Epido t	Handbook of Heavy Metal Weathering
Al-Baghdadi	38.6	6.7	4.3	4.7	5.7	5	5	3.9	6.8	3.5	2.7	3.1	1.9	5.4	1
Hit	38	7.4	4.9	5.3	5.6	5.2	5.2	3.9	6.8	1.8	1.8	2.3	3.1	3.2	1
Abu Tayeban	37.4	7.6	4.8	5.3	5.9	5.9	6	4.6	6.4	3.2.	2.	2.3	1.7	5.7	1.08
Al-Ramdi	36.6	7.3	5.4	5.1	6.4	5.8	5.2	4.6	7	3.2	1.8	2.4	2	5.4	1
Khalidiya	36.4	6.7	5.7	5.3	6.5	5.5	5.3	5.3	6.5	2.7	1.7	2.4	2.9	5.9	1
Fallujah	37.7	8	4.7	4.8	6.4	5.4	5.1	5.4	6.2	2.1	1	5.1	3.3	6	0.38
Minerals Old amphitheater	Opaque minerals	Chlorite	Muscovite	Biotite	zircon	Granite	Tourmaline	Amphibole	Pyroxene	Rutile	Sterolite	Kinite	Salsite	Epido t	Handbook of Heavy Metal Weathering
Al-Baghdadi	38.6	6.7	4.3	4.7	5.7	5	5	3.9	6.8	3.5	2.7	3.1	1.9	5.4	1
Hit	38	7.4	4.9	5.3	5.6	5.2	5.2	3.9	6.8	1.8	1.8	2.3	3.1	3.2	1
Abu Tayeban	37.4	7.6	4.8	5.3	5.9	5.9	6	4.6	6.4	3.2.	2.	2.3	1.7	5.7	1.08
Al-Ramdi	36.6	7.3	5.4	5.1	6.4	5.8	5.2	4.6	7	3.2	1.8	2.4	2	5.4	1
Khalidiya	36.4	6.7	5.7	5.3	6.5	5.5	5.3	5.3	6.5	2.7	1.7	2.4	2.9	5.9	1
Fallujah	37.7	8	4.7	4.8	6.4	5.4	5.1	5.4	6.2	2.1	1	5.1	3.3	6	0.38

Random distribution with decreasing topographic location, due to the variation in the physical weathering process that led to the weathering of mica minerals in addition to its formation by the chloritization process of smectite minerals and in the presence of moisture with an increase in the concentration of magnesium ion ⁽⁹⁾. The muscovite mineral was identified within the group of mica, and it is light green, tends to gray, has flat crystals, has a glassy luster, has a greasy texture and has a specific weight of 2--2.5%. % - 5.7%) in the modern sedimentary runway, while it was distributed in a medium range (4.6% - 5.7%) in the old desert runway. The muscovite mineral was randomly distributed with the decrease in the topographic location with the course of the river current. The mineral biotite appeared in a dark brown color. It is also a member of the group of mica. It has a glass luster, its specific weight is 2.8 - 3.2%, and its source is acid and medium igneous rocks ⁽¹⁰⁾. The distribution of this mineral has a medium range (4.7% - 5.6%) in the modern runway and a medium range (4.9% - 5.5%) in the old runway. Its distribution came randomly within the study areas due to the variation in weathering processes, as shown in the figure (15).

C- group of minerals resistant to weathering

This group includes minerals of (zircon, karnite, and tourmaline). Zircon is characterized by being transparent, with a luster of diamonds, with full-face crystals and in integral shapes, and is characterized by the phenomenon of polychrome, as shown in the picture (16). The origin of this mineral is sedimentary rocks, igneous acid and metamorphic limestone, with a percentage in the modern sedimentary runway with a range of (5.6% - 6.5%) and in the old desert runway with a range of (5.6% - 6.6%), and its random distribution came in contrast with the nature of the weathering condition. As for the granite, it was distinguished by being colorless, completely extinguished, with a glassy luster, and a specific weight of 3.3-3.5%. It is considered one of the chemically stable minerals and its source was metamorphic rocks. - 5.7%) in the old runway, and its distribution came randomly with the decline of the topographic site. The reason for this is due to the rich sediments of the Euphrates River from it, as well as its resistance to weathering in addition to the variation in sedimentation processes ⁽¹¹⁾.

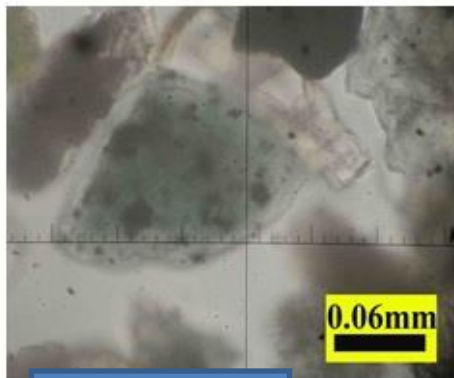


Figure 13

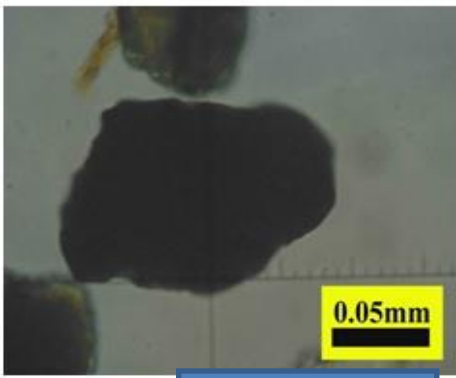


Figure 12

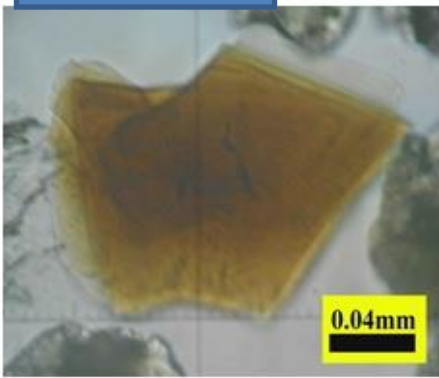


Figure 15

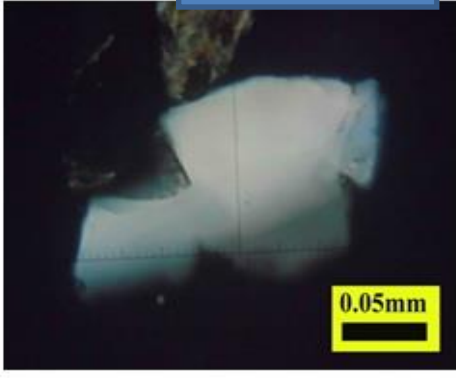
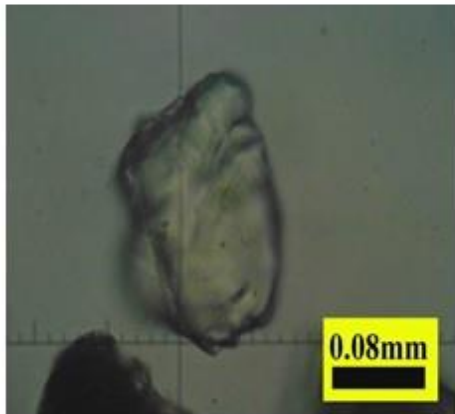


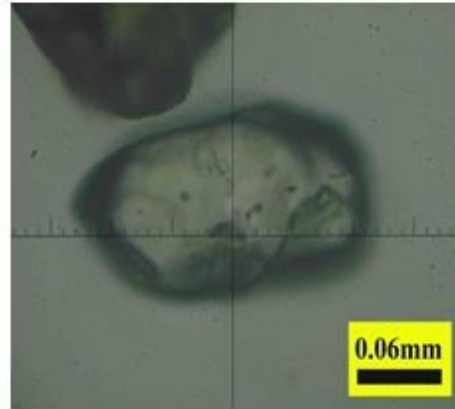
Figure 14

Images of some heavy metals in soils of the studied areas taken by polarized optical microscopy



صورة (17)

Figure 17



صورة (16)

Figure 16

Tourmaline metal appeared in a dark brown color, has a rectangular shape, has a glass luster, and has a specific weight (3 - 3.2), as shown in the picture (18). With a medium range (5.0% - 5.4%) in the old runway.

D-group of few minerals resistant to weathering

This group includes the minerals of amphibole, pyroxene, and rutile. Amphibole minerals are characterized by the fact that their composition is due to the weathering of metamorphic rocks, and they have a weak ability to resist weathering, and their presence indicates that the original material has a susceptibility to weathering, transport speed and erosion, and that physical weathering has a higher effect than chemical (12). And that one of the most important minerals of amphibole is the Hornblade mineral, which has a dark green color, glass luster, serrated edges, and a specific weight of 3.0-4.4. In the modern sedimentary amphitheater, with a medium range (3.8% - 5.1%) in the old desert amphitheater, The group of pyroxene minerals with prismatic grains, rectangular in shape, with its two types of mono-pyroxene, appeared in green color as shown in the picture (20), and it was distributed with a medium range (6.2% - 7.0%) in the modern sedimentary runway and a medium range (6.1% - 6.9%) in the desert runway. The variability of the random distribution between the study sites is due to the variation in the weathering rate in them, Rutile mineral is characterized by its dark red color and blackness and its grains are completely round, and the rock source of this mineral is the basic igneous and sedimentary rocks, and it is distributed with a medium range (1.8% - 3.5%) in the modern sedimentary runway and a medium range (1.8% - 2.3%) in the old runway. It is possible to distinguish a group of heavy metals called diagenetical minerals, and this group included all of the minerals stearite, kinite, celacite, and the mineral epidot, and their percentage converged in both the old and modern lists, as shown in Table (3) and figure (21-22), which illustrate some of these minerals the group .

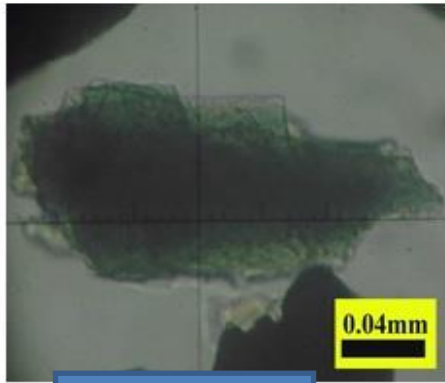


Figure 19

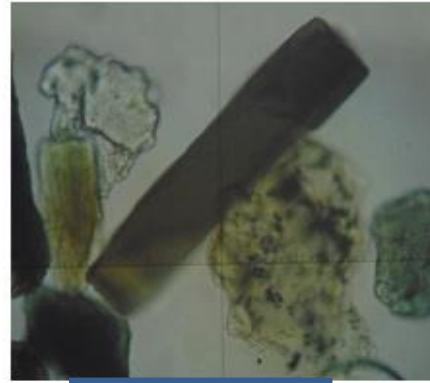


Figure 18

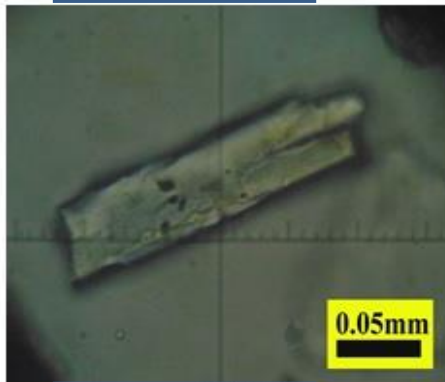


Figure 21

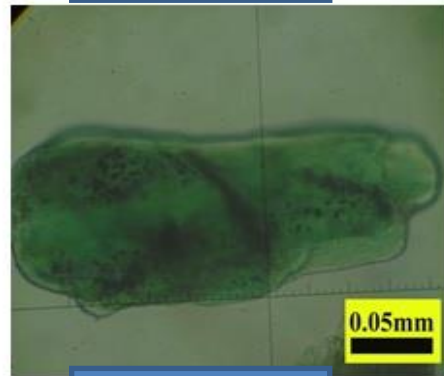


Figure 20

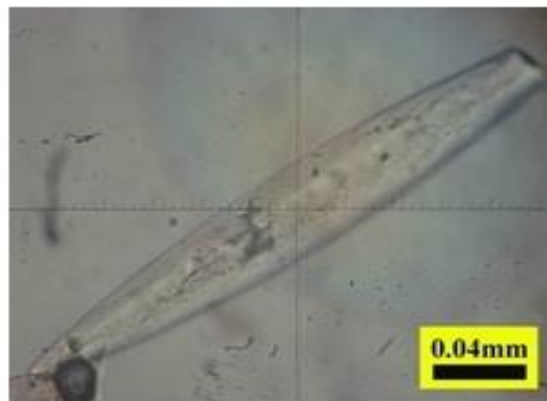


Figure 22

Images of some heavy metals in soils of the studied areas taken by polarized optical microscopy

In general, the heavy metals ratios in the soils of the study area took the following order, Opaque minerals group: chlorite, pyroxene, zircon, apidote, granite, tourmaline, biotite, amphibole, rutile, kinite, sterolite, cellulite, The results of Tables (2-3) showed a decrease in the percentage of heavy metals compared to the light metals, and in both lists, due to the nature of the mineral composition of the origin material as well as the variation in weathering and sedimentation processes. For the purpose of finding the relationship between the heavy metal groups, the relationship between both groups has been drawn, and as shown in Figure (4), if the figure shows the convergence of the mineral groups in their distribution within the runways of the Euphrates River, and as Figure (5) shows that the

Effects Euphrates river flow variation in Geographical distribution sand Minerals and path the weathering from AL Baghdadi city to AL Fallujah city

weathering path for heavy metals was very close. Between the locations of the study area and along the riverbed, and for both runways. For the purpose of clarifying the relationship between both the modern sedimentary and the old desert amphitheater, as some heavy metals showed a state of stratigraphic interconnection between the two runways and places shown in Figure (6), which was explained by the rotail mineral. According to the general slope of the course of the carrier agent, as well as the similarity of the pedochemical weathering conditions, the alternation of sedimentation processes and the effect of the torsional belts of the river within the study area.

Figure 4 shows the relationship between heavy metals in both charts

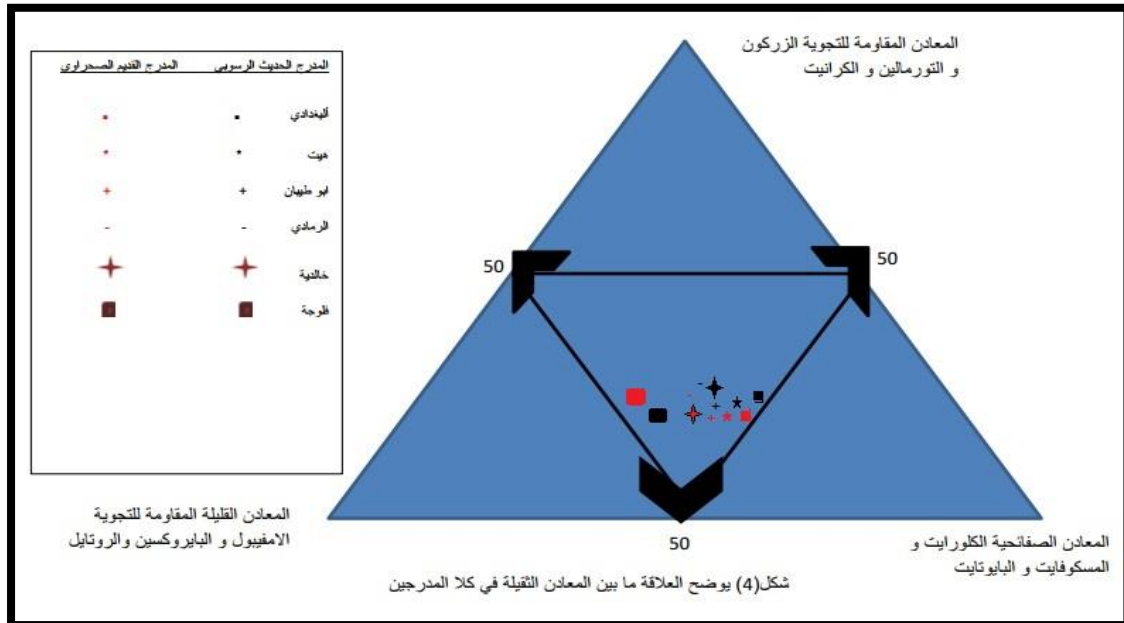
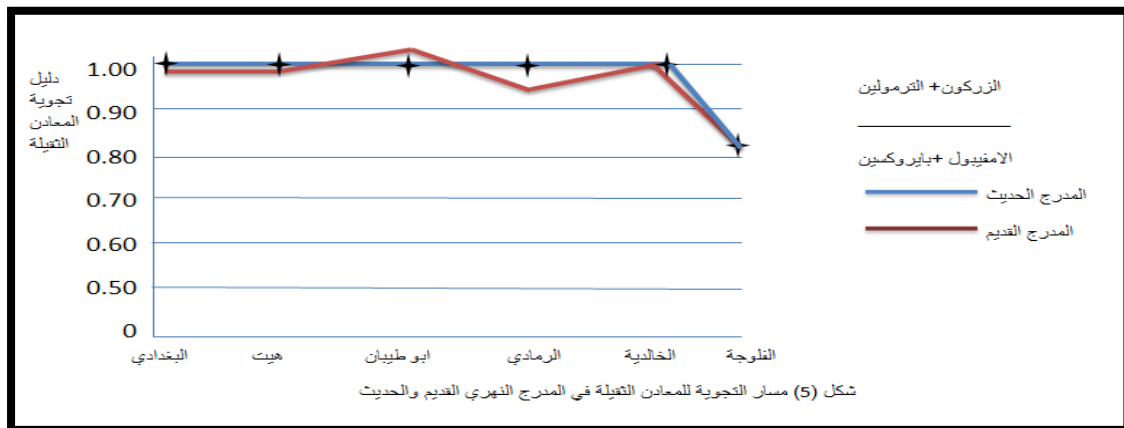


Figure 5, the weathering path for heavy metals in the old and modern amphitheater



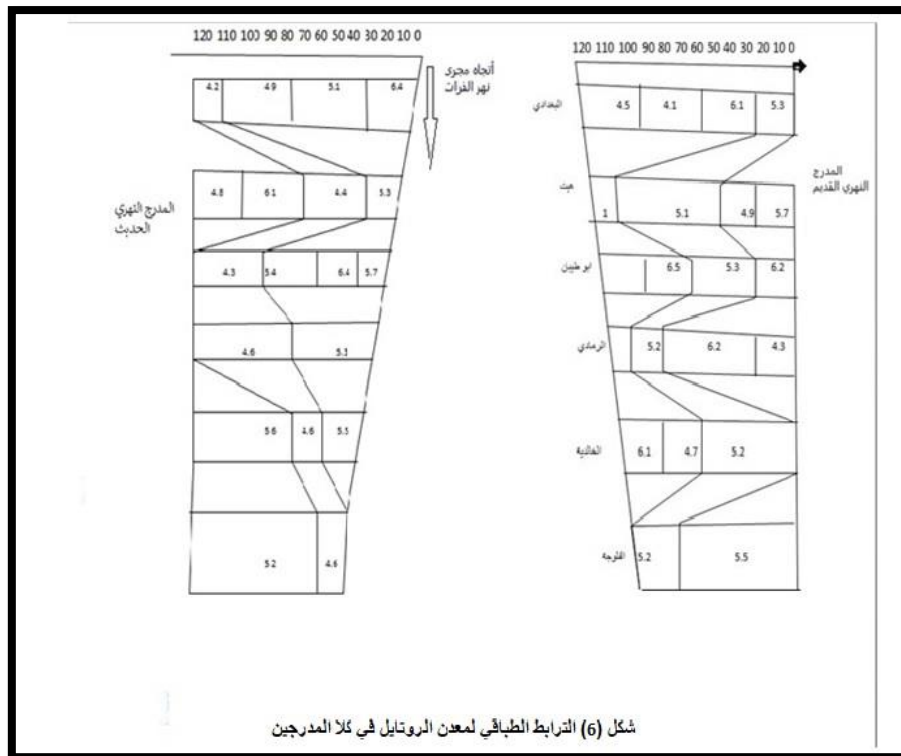


Fig. 6 Stratification of rutile in both histograms

Conclusions

- The localized slight and long distance slope and the river torsion affected the variation in the ratio of light and heavy minerals to the sand separation, which affected their geographical distribution along the path and within the soils of the modern sedimentary runway and the old desert amphitheater.
- 2- The ratios of light minerals for the fine sand separator showed a clear variation in the ratios of the weathering index and the mineral maturity index more than heavy metals due to their less weathering.
- 3- The mineral relations showed that all minerals within the sand separator are deposited within a calm water environment and from one rocky origins and for both river runways.
- 4- The results of the cycle and relationships of feldspar minerals showed the convergence of the ratio of dissolutions between Ca, K, Na elements within this group due to the similarity of the geochemical weathering conditions within the study area.
- 5- Rutile metal showed the formula of stratigraphy within the two river runways.
- 6- The results of visual inspection of minerals indicated that the weathering patterns obtained by them were represented by erosion of edges and the presence of overlapping plates as well as soils and pits on the surfaces of the diagnosed minerals.

Recommendations

- The need to pay attention to petrographic studies of minerals within the modern geographic approach in order to reveal the reality and conditions of sedimentation and to understand the geological history of any area to predict the ancient geographical reality.
- 2- The necessity to conduct studies to know the spatial distribution of minerals within the regions of the country.
- 3- Delve into the approach of this type of studies by adopting radioisotopes in determining the chronological age of the runways of the Euphrates.

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