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EFFECTS OF PARENT MATERIAL WEATHERING ON MINERALOGICAL AND CHEMICAL PROPERTIES OF SOME SOILS IN THE BAHARIYA OASIS, WESTERN DESERT, EGYPT

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ABSTRACT

The clay mineralogy and trace elements analysis of 31 selected soil profiles was recorded using X-ray diffraction analysis and X-ray fluorescence analysis. Results indicate that smectite is the predomoniant clay mineral followed by kaolinite in the soil derived from Bahariya, El Hefhuf and Khoman Formation. Kaolinite is the predominat mineral in the soils derived from El Heiz, Qazzun and Radwan formation.

The origin of these clay minerals may be related almost entirely to parent rocks without significant transformation within the soil profiles studied.

The distribution of the trace elements in the studied soil profiles indicate that, zirconium (Zr) is the dominant element in all profiles studied and Formation. Barium (Ba) is the second dominant element followed by Zin (Zn) and chromium. (Cr).

Based on the soil properties and the American soil Taxonomy (2006) Baharia Oasis soils were classified at great soil group level into
Torripsaments, Torriorthents, Haplosalids and Haplocalcids

INTRODUCTION

Geologic Setting: the Bahariya Oasis is a topographic depression located in the heart of the Western Desert. 370 km southwest of Cairo and 190 km west of Samalut in the Nile Valley. This depression is one of the most important areas in the Western Desert, and it has attracted the attention of many geologists especially in the last four decades, with the beginning of the land reclamation and discovery of ironore deposits. More detailed studies include works published by Said (1962), El Akkad and Issawi (1963). El Bassyouny (1972, 1978), Issawi (1972), Khalifa (1977), Soliman and El Badry (1980), Franks (1982), Dominik (1985), Khalifa and Abu El-Hassan (1993), Soliman and Khalifa (1993). Khalifa et al., (2002, 2003).

Ball and Beadnell (1903) further established the foundation of the Geolgoy of the Bahariya Oasis, which starts with the Cenomanian rocks at the base. Stromer (1914) was the first to introduce the term Baharije-Stufe for the Cenomanian sandstones and Claystones in the floor and escarpments of the Bahariya depression. Later on, Said (1962) used the term Bahariya Formation instead of Bahaije-Stufe. He mentioned that the Bahariya formation consists of sandstones with several intercalations of ferruginous layers, and termed the lowermost sandstone beds as the Dinosaur bed at Gabal El Dist. The base of the Bahariya Formation is unexposed, while its top shows and unconformable relationship with the overlying Upper Cenomanian El Heiz Formation (Khalifa and Abu El-Hassan, 1993) in most of the western and eastern escarpments. In the northern parts, it shows an unconformable contact with the overlying lower Middle Eocene Naqb Formation. The minimaum thickness of the Bahariya formation is 90 m in the central part of the oasis, while its maximum thickens is about 190 m at Gabal El Dist in the north.

The Bahariya formation reflects a complex depositional history that encompasses a wide range of sedimentary environments, including fluvial, beach, deltaic and shallowmarine (Soliman and Khalifa, 1993, Catuneanu *et al.* 2006). Fig. 1.

Geomorphology:

The Bahariya is a large oval-shaped depression located at the northern part of the Western Desert. Unlike other oasis in the Western Desert, the Bahariya is surrounded by scarps from all directions and has a considerable karst products. The karst features of the Bahariya eastern and northeastern plateaux are represented by the following: (soliman and Khalifa, 1993).

Karst landforms: These include:

A. Conekarst and cockpits.

B. Small-scale depressions and dolines.

C. Large-scale depressions.

Karst products; including:

A. Spheroidal weathering and corestones.

B. Surficial duricrusts (terra rossa, silicrete, ferticrete and calcrete crusts).

MATERIALS AND METHODS

31 soil profiles of a transect across the Baharia Oasis representing different parent materials, geomorphological features and wide range of land use perids Fig (2) the prfiles were described and sampled according to conventional procedures outlined in the FAO guideline (1970). These soil representing five Great soil group belonging to Entisols and Aridisol

Mineralogical Analysis

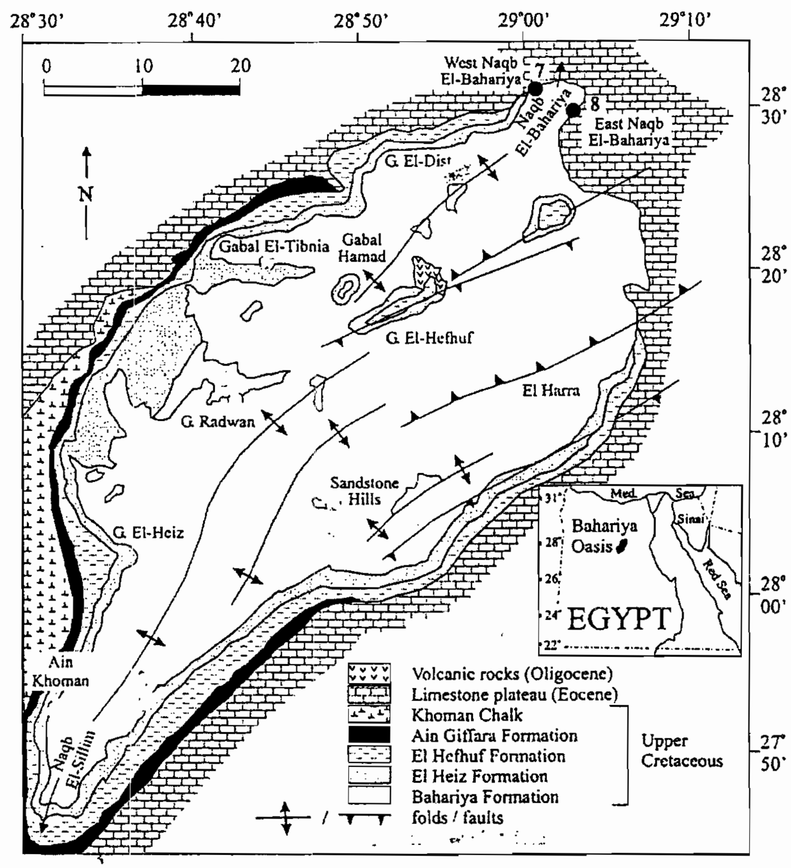
Clay fraction (<2 µ)were separated from soil samples after the pretreatment for the removal of organic matter, carbonates, gypsum and free iron oxides according to Kunze and Dixon (1986). The clay fractions were separated by the method of sedimentation and decantation .

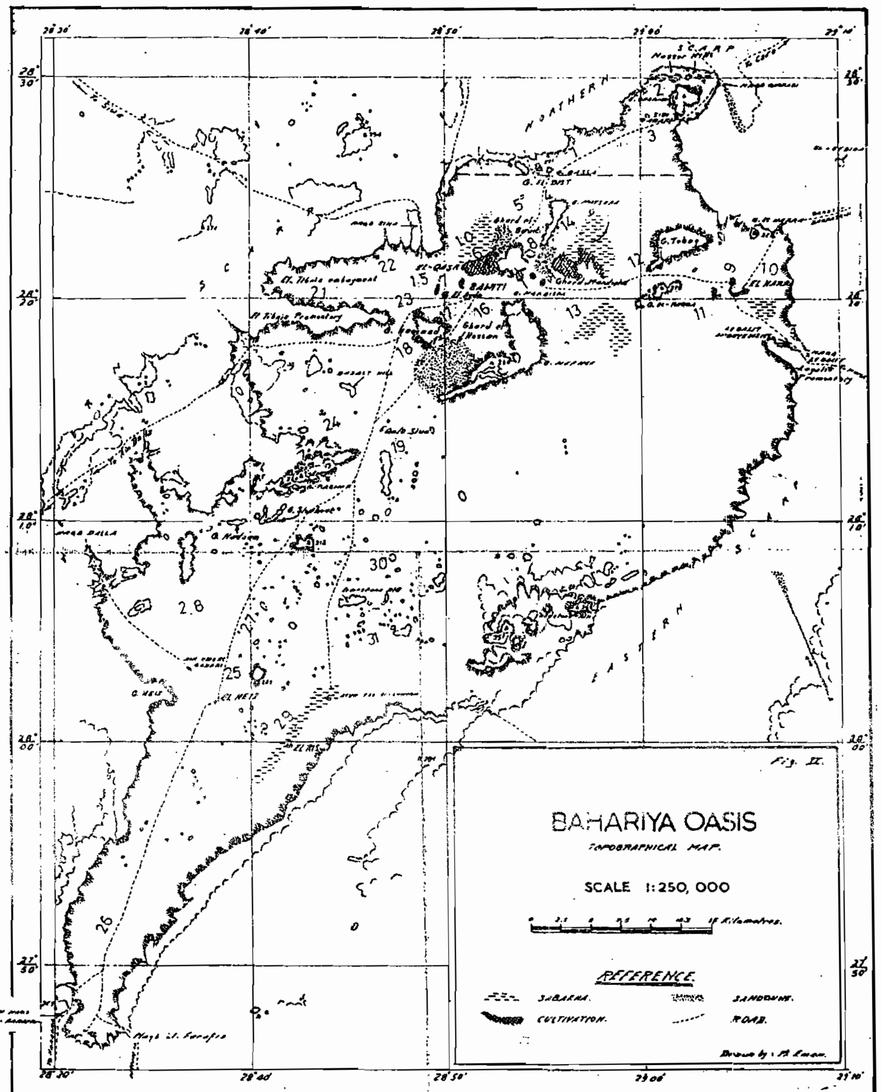
X- Ray Diffraction Analysis

Oriented clay samples were prepared from the separated clay as Mg-saturated air-dried, Mg-saturated glycerol solvated, K-saturated air dried and K-saturated heated to 500°C for 2 hours. The criteria used for clay mineral identification are those mentioned by browen (1961),Dixon and Weed,(1977)and Wilson.

X-ray diffraction technique, (XRD), was used to identify the unknown minerals using PHILPS PW 3710/31 diffractometer with automatic sample changer PW 1775, (21 positions), scintillation counter, Cu-target tube and Ni filter at 40 kv and 30 mA. This instrument is connected to a computer system using X-40 diffraction program and ASTM cards form mineral identification.

Semi-quantitative determinations for identified mineral were then conducted by measuring the peak area as outlined by Norrish an Taylor (1962).


28°30'
28°40'
28°50'
29°00'
29°10'
0
10
20
N
West Naqb El-Bahariya
7
8
East Naqb El-Bahariya
Naqb El-Bahariya
G. El-Dist
Gabal El-Tibnia
Gabal Hamad
G. El-Hefhuf
G. Radwan
El Harra
Sandstone Hills
G. El-Heiz
Ain Khoman
Naqb El-Sillim
28° 30'
28° 20'
28° 10'
28° 00'
27° 50'
Med. Sea
Sinai
Red Sea
Bahariya Oasis
EGYPT
31°
28°
26°
24°
22°
Volcanic rocks (Oligocene)
Limestone plateau (Eocene)
Khoman Chalk
Ain Giffara Formation
El Hefhuf Formation
El Heiz Formation
Bahariya Formation
Upper Cretaceous
folds / faults


BAHARIYA OASIS
TOPOGRAPHICAL MAP
SCALE 1:250,000
REFERENCE
SABAKHA
CULTIVATION
SANDDUNES
ROAD
NORTHERN
EASTERN
BAWITI

X-Ray Fluorescence Analysis

For trace elements analysis, pressed powder pellets were prepared by filling an alumina cup, (diameter 4 cm, height 1.2 cm and weight 3 grm), with 9 gm of crystalline boric acid covered by 1 gm of the grounded sample, (-200 mesh grain size), and then pressed under 12 tons using semi-automatic hydraulic press model HERZOG HTP-40.

The X-ray fluorescence technique, (XRF), was used to determine the trace element contents using PHILIPS X'Unique-II spectrometer with automatic sample changer PW 15150, (30 positions). This instrument is connected to a computer system using X-40 program for spectrometry. The trace elements concentrations are calculated from the program's calibration curves which were set up according to international reference materials, (standards), as SARM-46, SARM-50 and Stream-1. The trace laments were measured by calibrating the system under the conditions of Rh-target tube, LiF-420 crystal, gas flow proportional counter, (GFPC), coarse collimators, vacuum, 30 kv and 40 mA for the determination of V, Cr, Co, Ni, Cu, Zn and Ga, 70 kv and 15 mA, for Rb, Sr, Y, Zr and Nb and 100 kv and 10 mA for the determination of Ba and Pb, (Viswanathan, 1989). The detection limit is the lowest concentration, and it is function of the level of background noise relative to an element signal, (Norrish and Chappell, 1967). The detection limit for the elements measured by XRF technique is estimated at 2 ppm for Rb, Nb, Ga, Co, Y and Sr and at 8 ppm for Pb and Cu and 5 ppm for other measured trace elements sedimentation times according to the temperature and viscosity at a standard depth.

RESULTS AND DISCUSSION

Soils of Bahariya are developed under arid conditions where the chemical variation are expected to be at minimum. The physical weathering and the geogenetic processes are the obvious features in the formation of these soils. Soil parent materials are mainly residual, alluvial, terraces and aeolian. The parent material are the wethering product of the geological formation. The following is a general description of the different stratigraphic units and clay mineral association in the Bahariya Region (Table 1)

Mineralogical composition of the clay fraction

The results of the mineralogical analysis of he clay fraction separated from the soils derived from parent material surroundings of G. Ghorabi, G. Mysera, El-Hara, G. Tobog, G. Tibnia and El Qasr areas soil (profiles (1,2,3,4,5,12,17,19,21, 24 and 26) which derived from Bahariya, El-Hefhuf, Khoman formation, Table (2) , show that smectite is the dominant mineral followed by kaolinite.

The X-ray diffraction patterns of the clay fraction of the soils of G. Maysera, G. Mandisha, El-Harra, G. Hammad and El Heize area which derived from El Heiz, Qazzun and Radwan Formation. (Fig.3and 4) and table (2) revel that kaolinite is the predominate mineral. Minute and low amounts of illite was detected in El Fagga, Naab siwa and El Heiz soils. It is clear that no significant mineralogical changes among the different layers of each studies soil profiles.

The mineralogical analysis of the soil clays reveal that all clay minerals, are found in the geological formation of Baharia Oases. Therefore, the variation in their mineralogy probably reflect the mineralogy of parent rock and alluvium from which they are found rather than pedagogic processes . This conclusion is confirmed by the similarity of the clay mineral assemblages of both soils and rocks. Trace elements distribution in the studied soil profiles:

Table (1) Clay mineral assemblages and the different geological formations of the Bahariya Region (Issaw , 2009).

Formation	Description		Smec	Koal	Tillute	Qw
Baharia form.	Type section	Geble El Dist	++++	++	+	+
	Lithology	Fluviatile sandstone and siltstone and shale				
El Heiz form.	Type section	Eastern part of El-Tibniya promontory		+++++		+
	Lithology	Dolomite sandstone, siliceous dolostone, sand clay, calcareous grit and ironstone				
El Helfhuf form.	Type section	Geble El Hefhuf	+++++	+++++		+
	Lithology	Dolostone with sandstone, sandy clay interbeds and phosphatic beds.				
Khoman form	Type section	The scarp to the west of Ain kheman	+++	++	++	+
	Lithology	Chalky calciutite with calcite filling				
Hamra from	Type section	Geble Hamra, plateau northeast of Bahariya	+++++	++		+
	Lithology	Reef limestone and conglomerates.				
Qazzum form	Type section	Norht Bahariya plateau		+++++		+
	Lithology	Lagoonal limestone, partly chalky and dolomitic				
The Radwan form	Type section	Southern part of the Bahariya Oasis		+++++		+
	Lithology	Ferruginous sandstone and Quartzitic.				

Table (2) Clay mineral composition of the clay fraction (< 2 μ) of the studied samples.

Prof. No.	Depth cm	Classification	Smec	Koal	Ill	Quar
1	0-20	Torripsaments	+++++	++		+
	20-30	Almost flat	+++++	++		+
	30-60		+++++	++		+
	60-75		+++++	++	+	+
	75-95		+++++	++		+
	95-120		+++++	++		+
	120-160		+++++	++		+
	200m. south Ghorabi					
2	0-10	Torripsaments	++++	++		+
	10-30	Undulating	++++	++		+
	30-60		++++	++		+
	80-150		++++	+++		+
	5km. South G. Ghorabi					
3	0-15	Torripsaments	+++++	++		+
	15-35	Undulating	+++++	++		+
	35-60		+++++	++		+
	60-80		+++++	++		+
	80-100		+++++	++		+
	100-150		+++++	++		+
	2km North G. Mysera					+
4	0-20	Torriorthents	+++++	++		+
	20-55	Flat	+++++	++		+
	55-130		+++++	++		+
	East G. Fay El-Harra					
5	0-30	Torriorthents	+++	+++		+
	30-80	Flat	+++	+++		+
	80-150		+++	+++		+
	North Ain yhia					
6	0-15	Haplogypsids	++	++	+	+
	15-25	Almost flat	++	++		+
	25-80		++	++		+
	38-100		++	++		+
	south G Maysera					
7	0-25	Torrorthents	+	++++		
	25-55	Teraces	+	++++		
	85-150					
8	1km south G. Mandisha					
	0-10	Haplogypsids		+++++		
	10-35	Rolling		+++++		
	35-65			+++++		

Prof. No.	Depth cm	Classification	Smec	Koal	Ill	Quar
	65-85			+++++		
	85-150			+++++		
	East G. Fagy El Harra					
9	0-10 10-30	Torripsamments		+++++ +++++		
	30-80 80-100	Undulating		+++++ +++++		
	El-Harra					
10	0-15 15-50 50-90 90-14	Torripsaments Flat	+++ +++ +++ +++	+++ +++ +++ +++		
11	Ayun El Wadi					
	0-20 20-60 60-95 95-150	Torripsaments Flat	+++ +++ +++ +++	+++ +++ +++ +++		
12	500 m south G. Tobog					
	0-50 50-60 60-70 70-90 90-150	Torripsaments Rolling	+++++ +++++ +++++ +++++ +++++	+ + + + +		
13	Ain guffara					
	0-10 10-45 45-70 70-100	Torriorthents Undulating	++ ++ ++ ++	+++ +++ +++ +++	+ + + +	
14	El-Aguz					
	0-15 15-55 55-150	Torripsaments Undulating	+ + +	+++++ +++++ +++++		
15	Bawiti					
	0-20 20-50 50-140	Torripsaments Flat	+++ +++ +++	+++ +++ +++		
16	North G. Hammad					
	0-25 25-55 55-150	Torripsaments Undulating	+++ +++ +++	+++ +++ +++		
17	East G. Hammad					
	0-25 25-35 35-45 45-70 70-90 90-120	Haplogypsids Undulating	+++++ +++++ +++++ +++++ +++++ +++++			

Prof. No.	Depth cm	Classification	Smec	Koal	Ill	Quar
	120-150		+++++			
18	South G. Hammad					
	0-10 10-20 20-45 45-150	Haplogypsids Rooling	+++++ +++++ +++++ +++++			
19	El Tibnia					
	0-10 10-35 35-150	Haplogyspids	+++++ +++++ +++++			
20	El-Qasr					
	0-15 15-60 60-90 90-150	Torripsaments Undulating	+++ +++ +++ +++	+++ +++ +++ +++		
21	Tibnia-El Qsr					
	0-20 20-35 35-38 38-60 60-150	Torripsaments Flat	++++ ++++ ++++ ++++ ++++	++ ++ ++ ++ ++		
22	South NaQb Siwa					
	0-30 30-50 50-150	Torripsaments flat	+ + +	++ +++ +++	+ + +	+ + +
23	Ayn El Qsr					
	0-20 20-60 60-150	Torripsaments Undulating	 + +	+++ +++ +++		
24	200m. North G. Radwan					
	0-10 10-25 25-40 40-80 80-100 100-150	Torriorthents Undulating	+++ +++ +++ +++ +++ +++	+++ +++ +++ +++ +++ +++		
25	Khoman					
	0-20 20-40 40-55 55-75 75-95	Torripsaments Undulating	++ ++ ++ ++ ++	++ ++ ++ ++ ++		
26	Khoman					
	0-10 10-20 20-45 45-70	Torriorthents Undulating	++++ ++++ ++++ ++++	++ ++ ++ ++		
27	Khoman					

Prof. No.	Depth cm	Classification	Smec	Koal	Ill	Quar
	0-20 20-50 50-150	Torripsaments Flat	++ ++ ++	++ ++ ++	++ ++ ++	
28	Ayun Aza El Heiz					
	0-20 20-60 60-90 90-110	Torriorthents Flat	++ ++ ++ ++	+++ +++ +++ +++		
29	El Ris El Heiz					
	0-20 20-60 60-90 90-150	Torriorthents Undulating	+++++ +++++ +++++ +++++			
30	El Heiz					
	0-20 20-60 60-90 90-150	Torripsaments Undulating	+++++ +++++ +++++ +++++			
31	Ain Table Lymoon El Haiz					
	0-20 20-70 70-150		+ + +	+++ +++ +++	+ + +	

Trace elements distribution in the studied soil profiles:

The distribution of the trace elements in some soils of Baharia Oasis are listed in Table (3) . the following is a brief distribution of the studied elements: Zirconium (Zr) is the dominant element in all the analytical samples. The lower value is detected in profile 11, while the highest value is detected in profile No. 26.

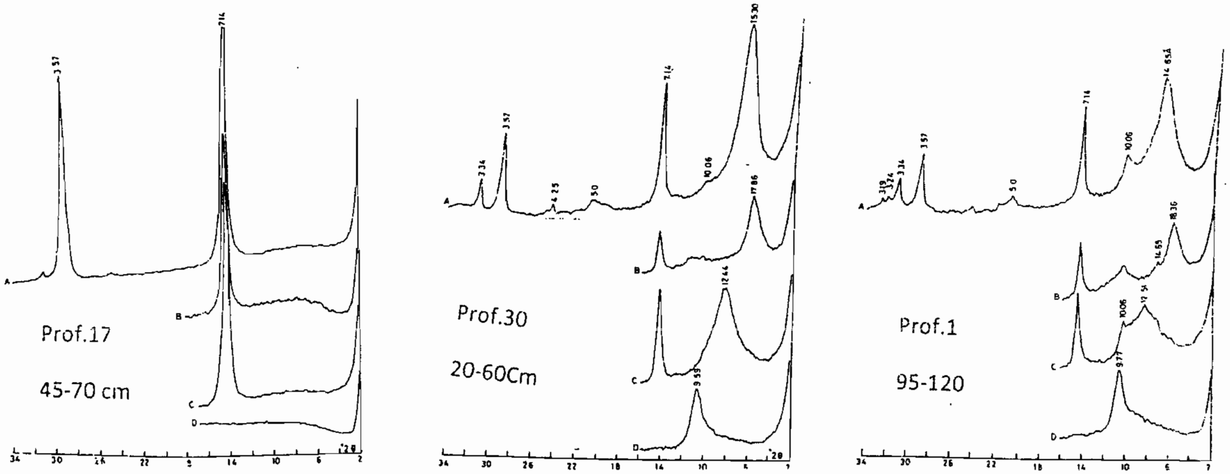
Barium (Ba) is the second dominant elements, Ba ranges from 241 (Prof. 6) ppm to 737 (prof. 21) In comparing the with data reported by Mason (1966) the barium values are higher than (580 ppm) for shale.

Zinc (Zn) range from (12 ppm) to (70 ppm) comparing with (Mason, 1966) data in shale (95ppm), in sandstone (16ppm) and in carbonate (20 ppm).

Chromium (Cr) concentration ranges from (17 ppm) to (77 ppm).

Copper (Cu) :t range from (26 ppm) to 142 ppm.

In general, trace element data for soils derived from shale, sandstone and carbonate are comparinting with data after Mason (1966) Table (4) and soliman (1989).


Prof.17
45-70 cm
Prof.30
20-60Cm
Prof.1
95-120

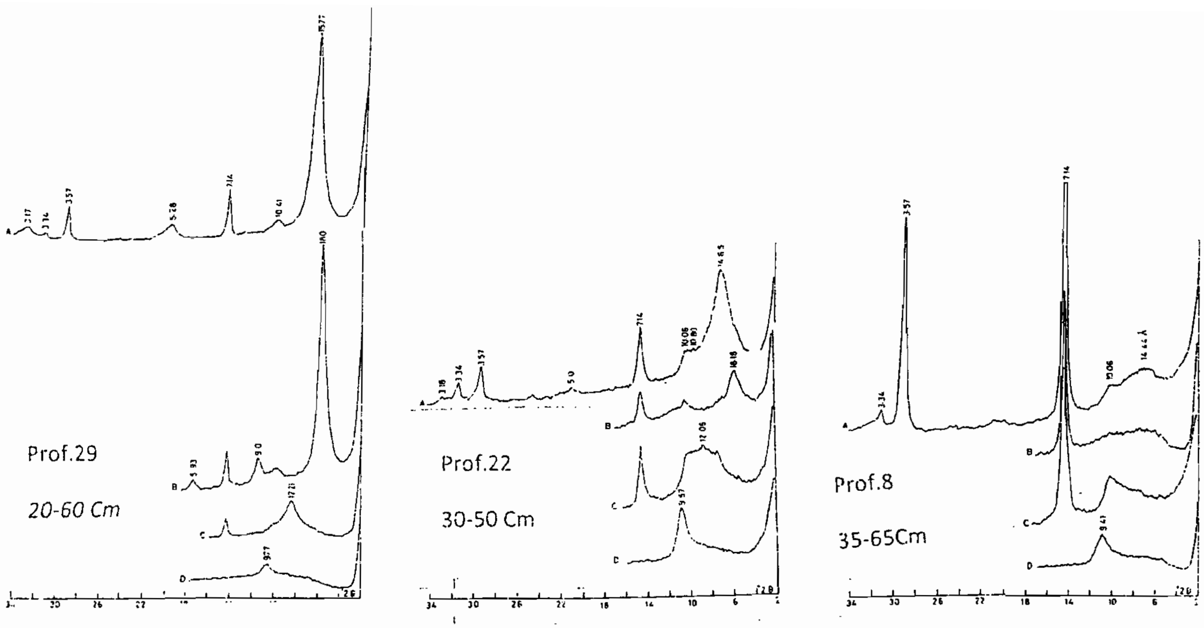

Prof.29
20-60 Cm
Prof.22
30-50 Cm
Prof.8
35-65Cm

Table (3): X-ray Fluorescence Analysis of some soil profiles (ppm) in the studied area.

Elements ppm		Zr	Y	Sr	Rb	Nb	Cu	Ni	Co	Cr	Zn	Ga	Ba	Pb	Ta	Sc	V
Profile No.	Depth cm	Parent Materials: Shale															
3	0-15	474	14	134	26	16	42	16	170	44	72	3	275	30	-	-	69
	15-35	518	18	96	32	17	35	14	155	47	37	-	468	24	4	-	83
	35-60	660	19	134	38	31	36	25	200	48	55	10	979	14	-	2	87
	60-80	606	21	122	40	28	38	26	234	56	56	22	359	6	-	3	112
	80-100	519	24	105	45	28	34	23	196	52	64	-	404	33	-	-	109
	100-150	629	22	117	41	30	38	19	207	55	39	36	495	2	-	-	102
	Average	**567**	**19**	**118**	**37**	**25**	**37**	**20**	**193**	**50**	**54**	**18**	**496**	**18**	**4**	**3**	**93**
8	0-10	393	33	173	41	49	39	35	243	81	88	-	979	14	-	2	87
	10-35	392	40	180	47	58	40	43	307	84	98	19	330	33	6	-	168
	35-65	409	35	155	42	44	44	39	298	80	84	14	297	-	-	2	83
	65-85	341	14	105	24	16	32	15	136	41	42	20	342	6	-	3	42
	85-150	282	11	95	16	13	34	14	117	42	30	-	210	9	-	-	37
	Average	**362**	**27**	**142**	**34**	**36**	**38**	**29**	**240**	**66**	**68**	**18**	**431**	**16**	**6**	**3**	**83**
9	2-10	630	20	372	35	40	35	15	148	65	38	4	199	21	-	2	133
	10-30	566	28	99	46	52	39	12	115	49	25	14	537	38	-	-	109
	30-80	568	41	89	69	95	47	21	199	80	48	4	621	20	-	-	174
	80-100	551	19	76	34	25	35	8	76	34	19	-	516	28	-	2	61
	Average	**578**	**27**	**159**	**46**	**53**	**39**	**14**	**134**	**45**	**32**	**5**	**468**	**26**	**-**	**2**	**138**
12	50-60	555	21	335	39	37	40	18	260	56	51	5	674	17	3	3	129
	60-70	512	17	118	28	26	29	16	239	40	43	18	166	39	3	-	93
	70-90	594	48	121	41	19	29	24	392	58	68	5	186	15	-	-	101
	90-150	401	46	266	26	13	28	21	431	60	48	-	185	15	-	5	60
	Average	**515**	**40**	**210**	**33**	**23**	**31**	**19**	**330**	**53**	**52**	**9**	**302**	**21**	**3**	**4**	**95**
17	0-25	246	28	197	50	45	38	30	345	69	62	6	297	20	-	8	106
	25-55	199	27	162	49	41	47	33	387	81	74	5	210	45	-	-	130
	55-150	231	27	171	53	41	41	34	411	74	74	-	193	-	3	2	127
	Average	**225**	**27**	**176**	**50**	**42**	**42**	**32**	**381**	**74**	**70**	**5**	**433**	**42**	**3**	**5**	**121**
18	2-20	397	19	212	40	30	31	72	224	55	48	4	336	8	-	6	109
	20-45	363	21	207	40	41	32	57	230	54	56	6	274	-	-	4	107
	45-100	501	31	123	54	53	38	48	384	75	67	12	337	14	-	3	159
	Average	**420**	**23**	**180**	**44**	**41**	**33**	**59**	**279**	**61**	**57**	**7**	**315**	**11**	**-**	**4**	**125**

Cont 3

Elements ppm		Zr	Y	Sr	Rb	Nb	Cu	Ni	Co	Cr	Zn	Ga	Ba	Pb	Ta	Sc	V
Profile No.	Depth cm	Parent Materials: Limeston															
19	10-35	584	27	840	37	39	32	20	8	45	39	20	541	41	-	5	99
	35-150	661	29	1160	42	52	31	17	9	57	50	n.d	795	13	-	n.d	128
	Average	**622**	**28**	**1000**	**39**	**45**	**31**	**18**	**8.5**	**51**	**44**	**20**	**668**	**27**	**-**	**5**	**113**
25	20-40	426	20	155	38	29	34	17	10	51	32	3	584	27	-	3	88
	40-55	691	19	122	30	25	32	13	9	49	37	n.d	417	2	-	2	69
	55-75	620	14	176	26	21	37	13	8	43	24	n.d	345	19	-	6	71
	Average	**579**	**17**	**151**	**31**	**25**	**34**	**14**	**9**	**47**	**31**	**3**	**448**	**16**	**-**	**3**	**76**
26	10-20	744	18	241	34	30	28	17	12	60	51	11	243	19	-	n d	97
	20-45	533	17	201	43	21	32	24	25	69	31	20	301	27	-	4	88
	Average	**638**	**17**	**220**	**38**	**25**	**30**	**20**	**18**	**64**	**41**	**15**	**272**	**23**	**-**	**4**	**92**
27	20-50	487	12	138	32	13	27	13	8	34	13	9	513	33	-	n.d	33
	50-150	340	12	129	23	8	27	16	13	34	26	n.d	705	33	-	n.d	32
	Average	**410**	**12**	**138**	**27**	**10**	**27**	**14**	**10**	**34**	**19**	**9**	**609**	**33**	**-**	**-**	**32**

Cont 3

Elements ppm		Zr	Y	Sr	Rb	Nb	Cu	Ni	Co	Cr	Zn	Ga	Ba	Pb	Ta	Sc	V
Profile No.	**Depth cm**	**Parent Materials: Sandstone**															
6	0-15	239	10	796	26	11	27	9	106	34	21	9	281	20	2	3	27
	15-25	185	7	689	14	-	24	6	86	27	9	8	99	12	-	-	11
	25-80	126	6	245	22	2	27	7	92	33	8	-	272	7	-	4	13
	80-100	223	8	240	20	6	29	9	97	35	-	8	335	8	-	3	17
	Average	**193**	**7**	**567**	**20**	**6**	**26**	**7**	**95**	**32**	**12**	**8**	**240**	**11**	**2**	**3**	**17**
11	60-95	100	11	145	25	6	29	9	118	21	17	29	249	12	-	-	17
	90-150	86	6	140	21	4	31	8	101	34	23	-	254	5	2	5	12
	Average	**93**	**8**	**142**	**23**	**5**	**30**	**8**	**109**	**17**	**20**	**29**	**251**	**8**	**2**	**5**	**14**
14	0-15	410	20	139	46	24	33	22	318	57	57	-	640	13	9	-	75
	15-55	458	20	122	52	25	34	22	310	51	57	-	724	15	2	4	77
	55-150	411	16	112	44	22	29	20	378	45	45	14	757	18	3	3	63
	Average	**436**	**18**	**124**	**47**	**23**	**32**	**21**	**335**	**51**	**53**	**14**	**707**	**15**	**4**	**3**	**71**
21	0-20	648	31	154	37	42	29	18	237	52	31	2	690	20	-	-	112
	20-35	718	20	99	34	28	21	17	152	40	25	27	630	-	-	-	70
	38-60	717	24	114	38	37	38	14	211	48	29	-	891	-	7	-	93
	Average	**694**	**25**	**122**	**36**	**35**	**29**	**16**	**200**	**46**	**28**	**14**	**737**	**20**	**7**	**-**	**91**
24	10-25	670	13	180	20	19	**28**	**9**	143	34	25	14	835	6	-	8	41
	25-40	549	15	181	22	13	**31**	**10**	125	34	12	-	553	22	-	-	44
	Average	**609**	**14**	**180**	**21**	**16**	**29**	**3**	**134**	**38**	**18**	**14**	**694**	**14**	**-**	**8**	**42**

Table (4): Chemical composition of rocks

Element	Shales	Sandstones	Carbonates	Igneous Rocks
V	130	20	20	135
Cr	90	35	11	100
Co	19	0.3	0.1	25
Ni	68	2	20	75
Cu	45	–	4	55
Zn	95	16	20	70
Ga	19	12	4	15
Rb	140	60	3	90
Sr	300	20	610	375
Y	26	40	30	33
Zr	160	220	19	165
Nb	11	0	0.3	20
Ba	580	0	10	425
Th	12	1.7	1.7	9.6
U	3.7	0.45	2.2	2.7

REFERENCES

ASTM (1981): Selected powder diffraction data for minerals. Joint Committee on powder diffractions standers 1601. Park Lan, Swarthmore, Pennsylvania 1981, USA.

Brown, G. (1961): The x-ray identification and crystal structure of clay minerals. Mineral. Soc. Of Great Britain, Monograph, London, UK.

Catuneanu, O., Khalifa, M.A., Wanas, H.A., 2006 Sequence stratigraphy and incised-valley systems of the Cenomanian Bahariya Formation, Western Desert, Egypt. Sedimentary Geology 190. 121-137.

Dixon, J.B and Weed, S.O (1977): Minerals in soil environments, soil Sci. Amer. Modison, Wisconsin, USA.

Dominik, W., 1985, Stratigraphie und Sedimentologie (Geochemie, Schwermineralalyse) der Oberkreide von Bahariya und ihre Korrelation zum Dakhal Becken (Western Desert, Agypten). Berliner Geowissenschaftliche Abdhandlugen, vol. 62, 173 pp.

El Bassyouny, A.A. ,1978 . Structures of the northeastern plateau of the Bahariya Oasis, Western Desert, Egypt. Minijbouw. 57, 77-86.

El Bassyouny, A.A., 1972. Geology of the area between Gara El Hamra of Ball-Qur Lyons and Ghard El Moharrik and its correlation with El harra area, Bahariya Oasis, Egypt. Unpublished M.Sc. Thesis, Cairo University, 180 pp.

El-Gamal, E.A. (1985) Geological and clay mineralogical studies of upper cretaceous-lower tertiary succession in Abu-Tartur Area, Western Desert, Egypt. M.Sc., Thesis, Fac. Sci. Cairo Univ.

El Akkad, S., Issawi, B., 1963. Geology and iron ore deposits of the Bahariya Oasis. Geol .Surv. Of Egypt, Cairo . Paper No.18 , 301pp.

FOA (1990) :Guidelines for soil description . 3rd edition,FOA, Rome

Franks, J.R., 1982. Stratigraphic modeling of the Upper Cretaceous Sediuments of Bahariya Oases. In: Processdings of the Sizth Egyptian General Petroloeum Corporationh Seminar, pp. 93-105.

Issawi, B., 1972 Review of the Upper Creatous-Lower Tertiary stratigraphy in the central and northern Egypt.American Association of Petroleum Geologists Bulletin 56, 1448-1463.

Issaw, B., Francis, M. , Youssef, E (2009) The PHANEROZOIC Goelogy of Egypt, A Geodynamic Approach, Ministry of Petroleum, Cairo,

Issawi, B., 1977, Review of Upper Cretaceous-Lower Teriary stratigraphy in the central and northern Egytp. American Assoication of Petroleum Geologists Bulletin 56, 1448-1463.

Khalifa, M.A., 1977. Geological and sedimentolgical studies of the El Hefhuf area. Bahariya Oases, Western Desert, Egypt. Unpublished M.S., Thesis, Cairo University, 181 pp.

Khalifa, M.A. Abu El-Hassan, M.M. 1993. Lithofacices, diagenesis, cyclicity and depositional environment of the Upper Cenomanian El-Heiz Formation, Bahariya Oasis, Western Desert, Egypt.Journal of the African Earth Sciences 17, 555-570.

Khalifa, M.A., Soliman, H.D, Abu El-Hassan, M.M., 2002. Lithonian Rocks, Bahariya Oasis, Western Desert, Egypt. In :Proceedings of the Sizth Conference Geol. Arab World. Cairo University, pp. 483-501.

Khalifa, M.A. Wanas, H.A., Tsirambides, A., 2003. Depositional history of the clastic-carbonate facies (El Reis Formation) of the Limestone Hills, central part of the Bahariya Oasis, Western Desert, Egypt. In proceedings of the Fifth International Conference of the Middle East. Ain Shams University, pp. 355-366.

Kunze, G.W. and Dixon, J.B. Bettany (1986): Pretreatment for Mineralogical analysis in methods of soil analysis, part 1, Klute (ed.), Americ. Agron. Inc., Soil Sci. Soc. Amer., Inc. Pub., Madison Wisconsin USA.

Mason, B. (1966): Principles of geochemistry, 3rd ed., John Wiley and Sons, New York, p. 310.

Norrisk and Chapell, B.W. (1967): X-ray fluorescence spectrography in: Zussman, J. (ed.), Physical Methods on Determinative Mineralogy, Academic Press, New York, pp. 161-214.

Norrisn, K. and Taylor, R.M (1962): Quantiative analysis by X-ray diffraction. Clay miner. Bull., V.5, p. 98.

Said, R., 1962, The Goelogy of Egypt. Elsevier, Amsterdam, 377 pp. selley, R.C., 2000. Applied sedimentology, second ed. Academic press Orlando, Fl. 523. pp.

Sherief, Y.S. (2008): Flash floods and their effects on the development in El-Qaá plain area in South Sinai, Egypt, a study in applied geomorphology using GIS and remote sensing. Ph. D. Thesis, der Johannes Gutenberg- Universiät Mainz .

Soil Survey Staff (2006): Key tro soil taxonomy. Tenth ed. U.S. gov. Print. Office, Washington, DC.

Soliman, FA (1989): Trace and rare earth elements geochemistry of some metavolcanics rocks in Wadi Zaghara, Wadi Saal area, Southern Sinai, Egypt, abstr. 2nd conf. Geol Sinai Develop, Suez Canal Univ., Ismaillia, Egypt, Nov., 1989, p. 17-18.

Soliman, H.E., Khalifa, M.A., 1993. Stratigraphy, facies and depositional environments of the lower cenomaanian Bahariya formation, Bahariya Oasis, Western Desert, Egypt. Egyptian Journal of Goelogy, 37, 193-209.

Soliman, S.M., El Badry, O.A. 1980. Petrology and tectonic framework of the Cretaceous, Bahariya Oasis, Egypt. Journal of Geology 24, 11-51.

Wilson, M.J. (1987): X-ray powder diffraction methods, in determinative methods of clay mineralogy, wilson, J. J. (ed,), Blacke and Son Ltd.,New York .

Wiswanathan, S., 1989, waveiength dispersive X-ray fluorescence spectrometry. Expel. Res. Atom. Min., 2, 247-268.

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تأثير تجويه مادة الأصل على الخواص المنرالوجية والكيماوية لبعض أراضي الواحات البحرية ــ الصحراء الغربية مصر

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تم دراسة معادن الطين والعناصر الصغرى لعدد ٣١ قطاع تربة ممثلة لبعض الأراضي بالواحات البحرية وأظهرت النتائج أن معدن طين المونتموريللونت هو السائد ثم معدن الكاولنيت في الأراضي الناتجة من تكوين البحرية ــ الهفوف ــ خمعان بينما يسود معدن الكاولنيت في الأراضي الناتجة من تكوين الحيز ــ الكازون ــ رضوان.

وأظهرت الدراسة ارتباط معادن الطين بالتكوينات الجيولوجية الناتجة منها.

أما العناصر الصغرى فكان العناصر السائدة هي الزركنيوم والباريوم والزنك مع وجود ارتباط وثيق بين توزيع هذه العناصر والتكوينات الجيولوجية الناتجة منها وقد قسمت أراضي المنطقة تبعا للتقسيم الأمريكي الحديث إلى المجموعات العظمى التالية:

Torripsaments, Torriorthents, Haplosalids, and Haplocalcids

قام بتحكيم البحث

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