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Analysis of sediments and explanation of their sedimentary environment (Case study: Bayazeh, Chopanan)

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ABSTRACT

Sedimento logical analysis methods to study historical events and environmental sections of these dimentary basins of the natural sciences is common. Analysis of sedimentary sections particularly Quaternaryse dements can be revealed climatic and environmental conditions of the area and uncover favorable view of the environmental conditions. The purpose of this study is Analysis of Bayazeh sediments and Chopanan sediments and explanation of their formation environment. In this study the physical properties of these diments containing Granulometry, Analysis, Calcimetry, Transparent rate, rounding rate and chemical properties, including the amount of lime, pH, EC were compared and the results indicated that Chopanan sediments were aeolian sediments and deposited in dry environment and Bayazeh sediments deposits in an aquatic environment. This causes indicate that in the past era there was a local pond in the Bayazeh.

Introduction

Bayazeh Hamlet is located in Isfahan province (55 – 55 15 Log and 33 – 33 30Lat) and 459 km away from Isfahan city. This village constructed on the yellow sediments that distinguish the village color from surrounding areas. The published report in 11th international congress of soil science (Ghayomi, 2010) denoted the loose origin for yellow sediments. At the same time in University of Isfahan, Gorji (2009) was studying the gully of Bayazeh and origin of yellow sedimentary spots in this area which indicated the different results with (Ghayomi, 2010) Whereas origin of these sediments could be affecting on Survey of climate changes, so research paper was approved to seek origin of yellow sedimentary spots of Bayazeh. Sedimentology science is among ordinary methods to analyze sedimentary environments and investigate environmental phenomena such as atmospheric and climate changes. Analysis of deposits samples especially in the bed of lakes is opens a new analytical value for researchers. So analysis of sediments origin, Quaternary sediments particularly can be helpful for paleontologists and archeologists about Quaternary events. Sometimes, the significance of this issue is extended, so that sediments can be cited as the climatic evidences. Looses are such as sediment samples which declared as evidence to analyze climatic changes for geomorphology and pale-climatology studies. These sediments are in relation to Quaternary deposits and according to their properties such as agricultural capabilities are meaningful for researchers. Yellow sedimentary spots in Bayazeh located in central playa of Iran were argument issue of tow pedologist and Geomorphologist researchers. One of them, origin of yellow sedimentary spots reported as loose in 11th Iran Soil Sciences International Conference (2010) and other claimed these sediments belong to the ancient lake that has been discharged result of rupture and yellow spots in Bayazeh have lake origin and Bayazeh village located on these sediments (2009). Considering loose as origin of these sedimentary deposits for this basin as one of dry and arid zone of Iran is very important particularly for studying natural history. Therefore for this purpose a proposal was confirmed. To reach these purposes, have been prepared data needed in three categories: Sedimentology, Chemical specification and Topography data. Sedimentology data were provided based on the field sampling and laboratory granulometery. Also according to the international experiences have been applied granulometery indicators such as topography category, based on morphology characteristics of lake and its bed, the elevation data prepared and then origin of forms have been analyzed. These analyses were done based on topography profile alterations in lake section. Also slope scope and surface changes (changes in convexity, concavity and smoothly) were base of analyses There are many example of origion of sediments in literature for instance: (Andalibi 1995, Assallay 1998, Ding et al 1997, Gaumi2010, Gholizade, Abdolgafor 2001, Karimikaroye 2008, Karimi 2008, Kehl 2005, Khaje 2006, Kuzila 1995, Lateef 1988, Lateef and Mohamad reza Sarvaty and 2003, Okhravi & Amini, 2001, Olowolafe, 2002, Pashaei 1997, Salehpore, Shakiba 2006, Sanaei et al 2006, Smalleyet al, 2001, Whalle 2002, Sunet al1999, Wright 2001).

The Purpose of this study is analysis of sediments and explanation of their conditions of environmental deposits.

Methods and materials

Mathematical situation of studied area

Bayazeh Hamlet being situated in the eastern part of Isfahan province, Bayazeh Hamlet is bounded by 33º, 15’ to 33º, 30’ latitude and 55º to 55º, 15’ longitude. Globally, Bayazeh Hamlet is located at 2330 meter height above sea level. Distance from city to center of province is 459 km (Boniademaskan, 2001).

Geology of Bayazeh

Bayazeh village is placed on the yellow deposits and separate its color of the village of his surrounding environment. in the bayazeh border there is various amount of bolls, which indicates an imbalance environmental. in fact, this area is placed on a glacis hillside, and is drawn to the main khor hole. in the middle and median of this glacis there are projected igneous

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which outcrops in the east acme of the village in a little distance.Bayazeh deposits area are mostly maren and silt.

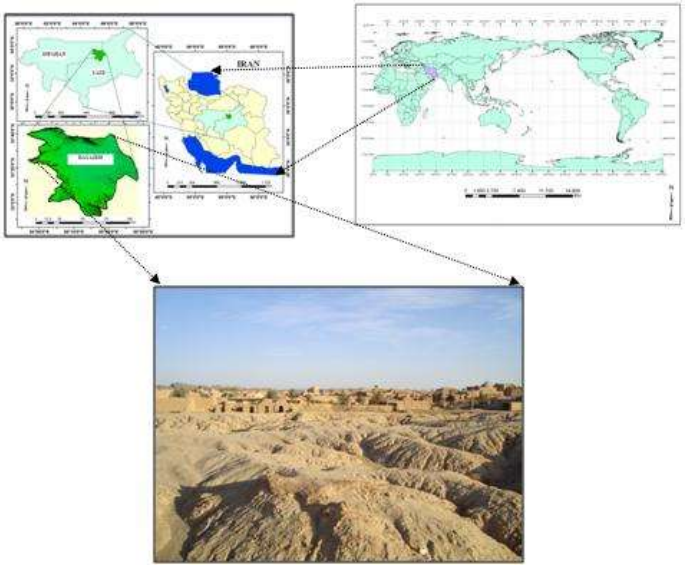

Figure 1: Mathematical situation of studied area

Research Methodology

For accomplishment of some particular test for analysis of sediments performed sampling of sediments in Bayazeh and Chopanan.

1-Appoint of appropriate points for sampling

For this purpose first appointed appropriate points for pick up of sediments. Pick up of Sediments is done accriding to below stages:

-Pokeholes and sampling ofsediments

- Encoding and transport of samples to the laboratory

2- After the field the experimental work has been applied and laboratory work was carried outas follows

- Granulometry
- morphoscopy

-Calcimetry

- Appoint of chemical specification of Sediments

3-Finally,accordingto the results ofthesedimentationexperiments formation environment were determined.

3. Discussion and results:

Granulometry of sediments

In granulometry, abundance of materials can be studied in various diameters. With measuring of theparticle diameterinsoft sedimentsand separateparticle, diameterchanges canbedetermine thedensityof each ofthem.

Granulometric table draw:

After infiniting and exact material scattering of each infinite, measure, its size in column of the table which hassix column. and its first column of the row and its second column infinite number and in the fourth column the parentage of each halp. in the fifth column comoleh and in the sixth column comoleh inverse will be calculated. comoleh is the materials weight of each infinite plus its tiny materials weight and in comoleh inverse indicates each infinites weight plus the weight of the materials infinite which is higher than that infinite (tables 1&2).

Granulometric graph design

After designing the table, we will draw the graph (figures 2&3), because using the graph and graphic in the result shows cause in the facility of its search a good graph is better than some pages of words and definition different graph is in dictated which in this research rioters graph is used we demodulate this graph on the semi-logarithmic graph.In a way that the x axis is chosed by logarithmic curve and y axis is chosed by numeric eshel.For drawing the graph we use semi-logarithmicpaper. then on X axis by logarithmic eshel enter the related diagonal to the class and on the Y axis we record 1 to 100 numbers respectively. now on the comolehs column, delineate granulometic table the place of each number on the X axis, and then find the class of each number, which is written of the second column of the table on the X axis and the draw a line parallel to the Y axis, then identify.The intersection area of the two parallel line we specify the crossing point in the same way we denote the other points and obtain the crescent graph of the deposits.

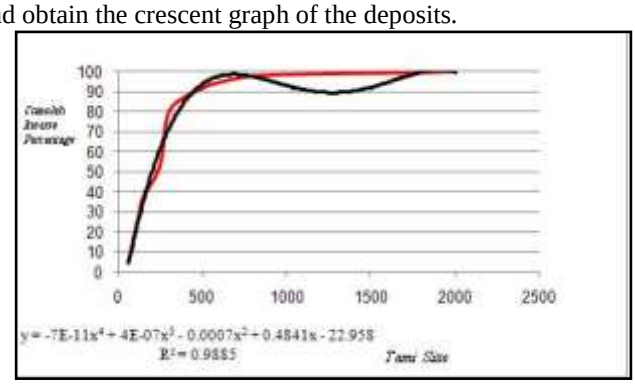

Figure 2: Granulometry graph in Bayazeh

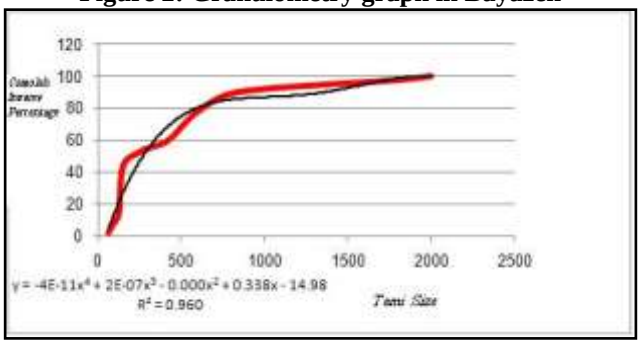

Figure 3: Granulometry graph in Chopanan

Graph description and granulometric result

Whenever we imagine the X and Y axises in a cubic position, all of the graphs have three position to the diametric which passes from the offset. they place on the top, on other words its end,on the right side or will be placed on the bottom wich means that it bottom will be place on the bottom or will be placed on the diagonal which its end is nearly zero.

These three graphs show three kinds of deposits including :

Graphs which its curvature is on the bottom, which shows that depositing is placed as a result of a current which is not able to be carry on.

Graphs which has high curvature and are near to the parallel line of the curves, their deposits are placed on the inter water.

Curves which have slight curve and are placed around the dimetral cube, and are nearly as a direct line which result in a windy deposits.

According to the fact that the Bayazehs deposits curvatives graph is to the top and is near to the parallel line of the curve (figure 2), which shows that these sedimentsare deposits in a calm place, In a way that the Chopanangraph deposits (figure 3) have light curve which itself showed windy deposits.

Morphoscopy of sediments

Morphoscopic action is done on the grains which have less than 2 micron diameters. it is better to use tomic grain between 500 to 700 micron. the sands which are wed for this purpose should be washed with acid cloric in a way that do not have impurity. the morphscopic action is usually done on the guartz, because by their high stiffenss and its stability shows its erosion better.

Procedure after preparing the sand

For macroscopic show, between 50 to 100 grain of them will be put on a special dish which has a little depth and its bottom is black and by binocolor micrometric in each separate grain will be independently investigate. two kinds of sand old and new will be observed in the old sands. the grains have sharper angle and destruction is not in them and their erosion number is zero. Of course we should not imagine this subject as the lack of erosion, because maybe this particles' produce by destructing the old particles and don't reach to the re-errosion the beaten sands, are divided in two groups brilliant and opaque. the beaten sands which are brilliant are seen by bowlike and light side has the capability of the light to be reflected in beaten quartz particles which are brilliant is a reason of their solubility in the water, so their agglomeration is up to 95 percent. the sands with opaque side have bowlike ape and their side are more regular than the beaten brilliant sand under it the bincolor lack transparency and is opaque the result of it is because of numerous star like hole which are produced because of grain clash on each other. the action of erosion of this windy erosion is the wind andby clashing the erosion to each other a hole will be produced in a way that in the grains with less than 1mm about 10 thousand kick will be seen. whenever the beaten sands amount which are brilliant, is higher than other environment,shows the action and whenever the beaten and opaque sand is higher shows wind action and saharahs event.

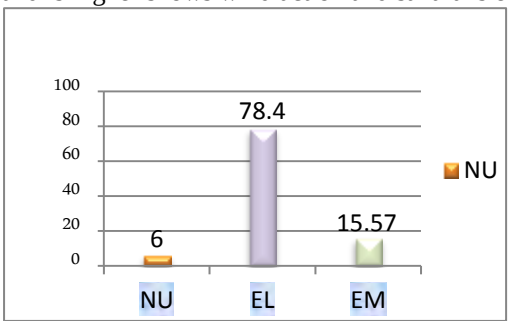

Figure 4: Morphoscooy of sediments in Bayazeh

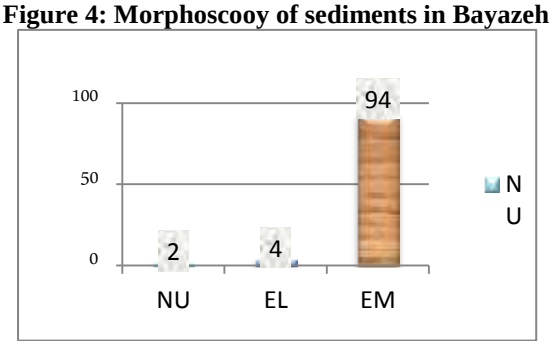

Figure 5: Morphoscooy of sediments in Chopanan

Figure 6: Bayazeh Sediments

In the Chopanan sample according to the fact that the most number of grain is related to the opaque beaten sand (figures 5&7) which indicates the windy sans.While, the number of erosion sand of the bayazeh related to the beaten and brilliant sands (figures 4&6) which shows the erosion of this sands in a watery environment.

Figure 7: Chopanan Sediments

Calcimetry

Lime which ispure is a little and is usually mixed by sand and clay. in this research for measuring the available lime in precipitate Bernard method has been used.In a way that the N gram precipitate will be beaten in a mortar completely and will be put in a dish which has a tube side and enter the tube in a graded cylinder full of water which are put reversely in the water dish.So passes' from a funnel with a band 1/2 normal acid doridric adds to the precipitate. lime will be solved in the precipitate and CO2 gas will be directed by a tube to the cylinder and reduce the surface about 7cm. by it and by using the following formula the lime amount available in the precipitates by two stages before and after washing will be measured.

$$co3ca=\left(\frac{7*100}{N*224}\right)$$

the lime amount is related to the dryness of the area, because in the wet regions, lime will be solved and goes to the lower levels.In the areas which are affected by water before and then dried, because rising the lime relating to the kapilar puer the lime amount will be rised in this regions, and its precipitations replaced in a watery environment. but the lime amount is less in the watery precipitations.Ascan be seenin thebelow diagram amount of lime determined before andafterwashing. amount oflime for Bayazeh was (55/14, 59/8), and forChopanan was (21/5, 19/7) (table 4 & figure 8). High amount of Lime in Bayazeh Sediments indicate that already existed water in this site and sediments in this region deposit in wet environment.in front, Chopanan sediments deposit in dry condition.

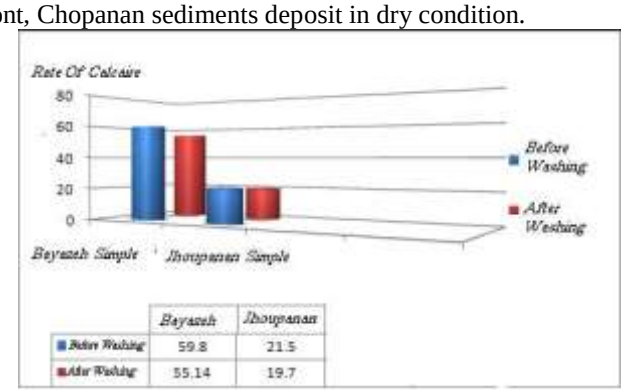

Figure 8: Calcimetry of sediments

Rounding of sediments

Rounding shows curve amount and sharpness of the angle particles. dowbkins and folk defined rounding as the rounded radius which is placed in the sharpest side of the particle as the largest radius 9restivicted circle inside the particle.

Table 1: Granulometry of sediments in Bayazeh

Number of row	Size of sample	Weight of sample (g)	Weight of sample (%)	Comoleh of sample	Comoleh inverse of sample
1	2000	14	1.354882	1.530941	100
2	1800	26	2.51621	3.871093	98.6451
3	850	26.1	2.525888	6.396981	96.1289
4	600	50	4.838866	11.23585	93.6030
5	425	83.5	8.080906	19.31675	88.7642
6	300	139.8	13.52947	32.84622	80.6832
7	250	129.6	12.54234	45.38856	67.1538
8	150	146.3	14.15852	59.54708	54.6114
9	125	130	12.58105	72.12813	40.4529
10	90	183.8	17.78767	89.9158	27.8719
11	63	104.2	10.0842	100	8.8000

Table 2: Granulometry of sediments in Chopanan

Number of row	Size of sample	Weight of sample (g)	Weight of sample (%)	Comoleh of sample	Comoleh inverse of sample
1	2000	7	2.447552	2.765596	100
2	1800	21	7.342657	9.79021	97.5524
3	850	35	12.23776	22.02797	90.2098
4	600	51	17.83217	39.86014	77.9720
5	425	15	5.244755	45.1049	60.1399
6	300	7	2.447552	47.55245	54.8951
7	250	25	8.741259	56.29371	52.4476
8	150	85	29.72028	86.01399	43.7063
9	125	19	6.643357	92.65734	13.9860
10	90	15	5.244755	97.9021	7.3427
11	63	6	2.097902	100	2.0900

Table 3: Morphoscopy of sediments

Number of Row	Location of Pick up	Number	Size of sample	Number of sample	Morphoscopy		
					Nonuse	Use	
						EL	EM
8	Bayazeh	-	600-850	100	6	78/4	15/57
10	Chopanan	-	600-850	100	2	4	94

Table 4: Calcimetry of sediments

Number of row	Location of sample	Weight of sample (g)	Weight of Sample (g)		Amount of sample (g)	Calcimetry	
			After Washing	Before Washing		After Washing	Before Washing
8	Bayazel	1	96/4	1	1	55/14	59/8
9	Chopanan	1	98/2	1	1	21/5	19/7

Table 5: Rounding of sediments

Very angular	angular	Semi-angular	Semi-rounded	Rounded	Very Rounded	Criteria / Samples
2	9	31	38	18	2	Bayazeh
1	2	6	30	41	20	Chopanan

In this measure rounding and also circling particle is divided into 6 groups including, the particle whit very angular, angular, semi angular, semi rounding, rounded, and very rounded. This way is very useful in the microscopic research the thin layer of the lime and easily rounding of the particle can be measured.

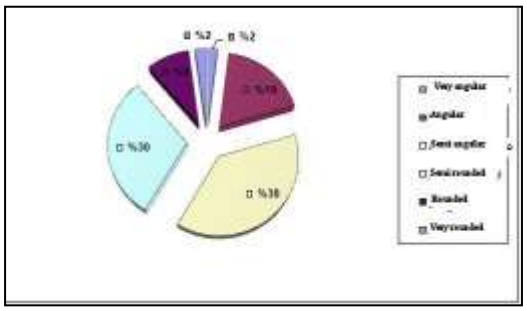

Figure 9: Rounding of sediments in Bayazeh

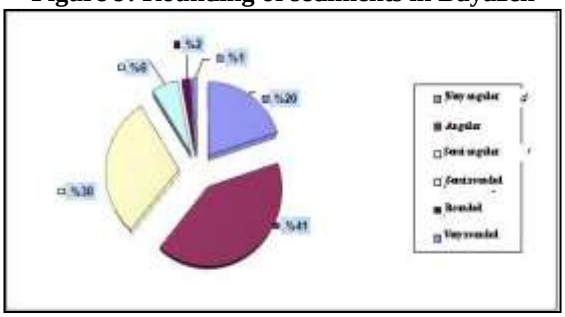

Figure 10: Rounding of sediments in Chopanan

In the windy sediments, the rounding of the sediments will become more, so that's the precipitated particles in the Bayazeh's sediments are more semi-rounded (table 5 &figure 9) and the precipitated particles in the Chopanan's sediments are more rounded (table 5 & figure 10).thus can be indicate thatBayazeh's sediments are remained in a calm place andChopanan's sediments are remaind in dry environment.

Layering of sediments

Layering Bayazeh sediments have a very regular layering (figure11). in a way that in research of a part of Bayazeh sediments, 5 layers are clearly identifiable, so that the first layer has 70 cm thickness, second layer has 40 cm thickness, third layer has 30 cm thickness, fourth layer has 50 cm thickness' and fifth one has80 cm thickness. Layering is also seen in the Chopanan sediments' (figure12), but its layering is among chalipaee and is very diligent and the precipitation rate change is a little which itself shows windy of this precipitates'.

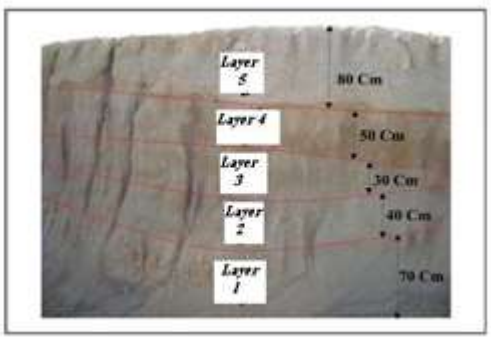

Figure 11: Bayazeh Sediments

Topography of region

Topography investigations based on slope, surface forms and elevation changes indicated that slope scope of Bayazeh sediments is about 2.5%, while this slope decreased to 0.7 % in range of yellow deposits. On the other hand, the domain level that has a concave surface area upon arrival to yellow sediments range of Bayazeh changes from concave to smooth surface and also its texture changes from Marn to lie.in front, Topography investigations in Chopanan indicated that slope scope in the region is approximately without different of level.

Figure 12: Chopanan Sediments

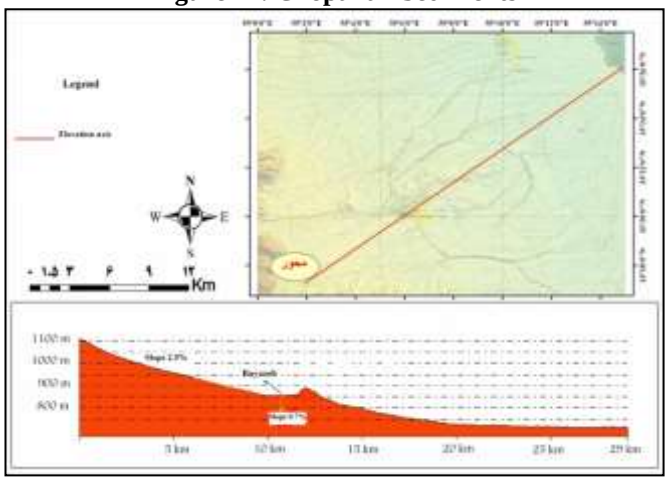

Figure 13: Topography of Bayazeh

Chemical specification of Sediments

Amount of pH in sediments

Although *pH* is changeable between1to14, so we should know that the soils *pH* change rate never follow its rate, but this restriction is about 3/5 to 10 for soils, and just about the most acidity soils meaning torbi soil, *pH* is number 3 and about the most alkaline soils this number is 11. usually *pH* is fluctuated between 5-9.high amount of pH in the Bayazeh sediments (7.56) shows that these sediments are placed in a watery environment which are now dried and results in the increase of pH in these sediments. In front, amount of *pH* in the Chopanan sediments is lower (table 6 & figure 14).

Electric direction capability (EC)

Electric direction capability is among other indexes which has high value in the soil research and investigation this characteristic represent soils brininess. Although between salt and alkaline there is some difference, some element have more electrical direction capability and if in a solution density of the solve materials increases , those elements have more capability in the nature different elements can be considered as the salt basis of the soil including internal watering poll, geological existence, salt bed, and etc. The high amount of electrical direction capability in the Bayazeh sediments(75.5) in contrast with the Chopanan sediments (1.38) itself shows an internal watering poll in the Bayazeh area. on the other hands, it shows that Bayazeh sediments are place in a watery environment, however the electrical capability amount in the sediments Bayazehare less(table 6 & figure 14).

Amont of Lime in sediments

Among the important indexes of the environmental precipitation is the lime amount in the sediments. usually, watery sedimentary environment have the great lime amount and in a special condition the available lime in the soil as the

thinner layers causes. although the lime-reducing issue in the semi-arid areas to the semi-dried is also common, but the lime-reducing reactions represent special sedimentation in a damp environment, however the lime amount is less in the Chopanan sediments (19.4), contrast with Bayazeh sediments which represents sedimentation forming in a dry environment(table 6 & figure 14).

Amount of organic Carbon in sediments

Organic carbon index in the sediments is also among available elements of life in a beaten environment, it is obvious that the amount of this activities in a windy environment is less that watery environment. the high amount of organic carbon in the bayazeh sediments (14.56) in contrast with the Chopanan sediment (10) also shows this subject (table 6 & figure 14).

Table 6: Chemical Specification of sediments

Organic Carbon	Lime	EC	PH	Criteria / Samples
14.57	35.6	75.5	7.56	Bayazeh
10	19.4	1.38	7.3	Chopanan

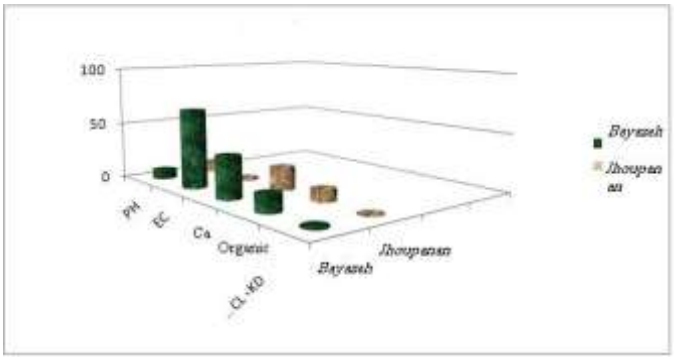

Figure 14: Chemical specification of sediments

Conclusion

Topography investigations based on slope, surface forms and elevation changes indicated that slope scope of Bayazeh sediments is about 2.5%, while this slope decreased to 0.7 % in range of yellow deposits. On the other hand, the domain level that has a concave surface area upon arrival to yellow sediments range of Bayazeh changes from concave to smooth surface and also its texture changes from Marn to lie. Relief investigations implies on mining marginal hilly area of yellow sediments in Bayazeh. Laboratory studies and calculating lime amount, Carbon and Ec indicated that sediments are like as lake deposits. The difference between wind deposits and loose is significant. The main goal of this research was analysis of aediments andexplanation of their sedimentary environment. So using morphometric comparison method on the one hand and topography analysis of sediment in other hand have been determined origin of sediments. sediments of Chopanan have been considered as evidence and comparison sample and all of morphometric indices and chemical indicators granulometery, lime amount, carbon, EC and pH were compared with vidence sample. Finding data and extracted figures of Bayazeh and Chopanan sedimentary samples which were confirmed by central lab and Geography faculty of University of Isfahan indicated severe differentiation between Bayazeh sediments and windy deposits of Chopanan. Moreover, applied qualitative analyses on surface of sediments clearly shows that deformations of concavity to plane surface and slope changes from 2.5% to 0.7% in Bayazeh deposits indicate the difference of origin and process in these sediments. Therefore, can be accepting that Bayazeh sediments has lake origin with high assertive. Therefore results of study show that chopanan sediments are Aeolian Sediments and deposit in warm and dry condition and Bayazeh Sediments have lake origin.

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