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Spatial Variation for Iron and Manganese Forms by Using Time Series Analysis Under Different Environments

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ABSTRACT

Six regions in Anbar governorate were selected to study spatial variation of iron and manganese forms using time series analysis under different environments. Al-Baghdadi, Heet, Abu Teban, Ramadi, Khalidiya and Falluja were selected. two pedons was selected under two environments: desert and alluvial soil, toward vertical in to Euphrates River. Total, available, Crystalline free and Amorphous free, for each iron and manganese was measurement as well as Crystalline form for two elements. statistical analysis by using time series was calculated. The results of the research showed the following:

1. Differentiation of models that describe forms of iron and manganese according for different sedimentation environment as well as heterogeneity of spatial reliability and sampling methods.
2. The method of Semi Variance showed its preference in obtaining the samples and describing the variation of iron and manganese forms compared

INTRODUCTION

Soil is a dynamic system that is unstable because of the constant change in the occurrence of a change in the nature of one or some environmental factors. Therefore, there is no soil in nature that preserves its main or non-main characteristics. This is reflected in soil characteristics, but the rate of change varies according to the different conditions. It is as slow as in old soils and others where change is relatively rapid, as the case with young soils (Al-Mashhadani, 1994). One of the most important properties that vary with the heterogeneity of soil conditions is their chemical properties according to the conditions of oxidation and reduction. The most important elements affected by these processes are iron and manganese forms, which include their free crystallized oxides and their amorphous crystallized oxides. The existence of these forms and their relative gives us clear indications of the degree of evolution of these soils which reflect The extent of oxidation and reduction activity, as well as their importance to the plant.

Soil surveyors work to detect this variation and then document it in the classification documents of soil and design the units of the pop-up map which are suitable for the considerations of economic feasibility studies known in the management of soils, which are based on the concepts of pedagogical, ideological, statistical and economic requirements. Therefore, studies forms of iron and manganese, to study the spatial and temporal differences by studying the differences between soil series and soil relationships, which are an important basis for inferences of the morphological characteristics of soil

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pedons. The study of spatial heterogeneity for soil properties and plant in the agricultural fields, which allows the estimation of plant growth, as well as the development of fertilizer recommendations and the application of a good management system of the field, resulting in the economy time, effort and money (Usowicz et al., 2004). The study of soil variability properties is special important in the development of taken a sampling strategy and taking soil variation at sampling taken may reduce the time and effort by half (Stutter et al., 2004). Wang (2000) said that the study of spatial variations is an attempt to establish an effective management system in terms of fertilizer requirements, especially water in general, and that the advancement of technology has helped a lot in this area since it is possible to give accurate estimation of sampling and the relationship to accurately measuring the qualities and predict the characteristics of sites other than Studied. Jabro et al., 2006, pointed out the importance of studying the variations of soil characteristics for the success of agriculture or quality management, and that the description of the heterogeneity of soil characteristics is well documented. Sigua and Hudnall, 2008, pointed out that determining the extent of soil variability gives us more accurate estimates of soil management as well as the planning of land management projects. The statisticians have divided in to random variations and systematic variants to facilitate their study. The concept of the range, the pedlogical homogeneity and the nature of the production and its cost have a mutually important that can be used by the researcher and the administrator, especially when the soil samples are represented and the necessary explanations are made for their measurements. Consequently, the correct decisions about these soils have been made, and the studies that describe the variations of iron and manganese forms, both spatially and temporally, So I conducted this research which aims to:

1.Describe the state of variation of iron and manganese and determine the appropriate statistical model for their study.

2.Determination the values of spatial reliability and evaluation of the method of obtaining samples and determining the best methods of statistics in the representation of soil samples for the distribution of forms of iron and manganese.

MATERIALS AND METHOD

Area study

The study area is located within the administrative boundaries of Anbar province, located between 34° 022′ 15″ and 33° 11′ 32″ North and 42° 20′ 00 and 43° 53′ 16″east. And extends from the city of al-Baghdadi in the north-west of the province to the city of Fallujah in the south-east and in the following provinces were taken in each region (Table 1) and (Figure 1).

Table (1) Selected districts for study

Selected districts for study	City	**Selected districts for study**	City
Al-Buwasaf	Ramadi	Saadane and Bani Jaza and Faleh	Al-Baghdadi
Ghazwan	Al-Khalidiyah	SWEEP binat alkotha	Heet
Alnassf	Fallujah	Abotiban	Abo Tayaban

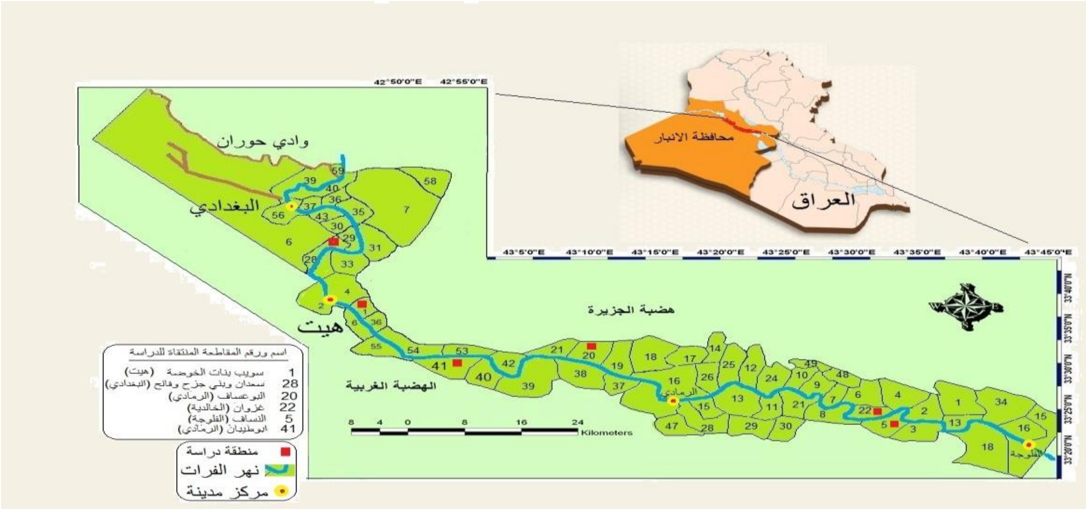

Figure 1. regions selected for study

Field Measures

In order to study the variation of iron and manganese. We need the absence of a completed survey map; the soil survey was carried out. The study area was surveyed as a preliminary step in field investigation and observation of local changes through a topographic study of the area and the type and intensity of vegetation cover as well as the nature of agricultural exploitation.

The process of surveying the semi-detailed survey of the region by the adoption of the free-lance method, by taking a vertical line toward of the river passes through two different physiographic units are desert and sedimentary in each of the study areas, which included Al-Baghdadi, Heet, Abu Teban, Ramadi, Khalidiya and Falluja. The excavation was carried out for the most part of the study areas and then the location of the study pedons was established. The information on the field of the soil was recorded and the location information was recorded. The site included the vegetation cover, land use, geological characteristics, topographical features and morphological characteristics. Which included depth, color, texture, salinity, limestone and gypsum status. Based on the results of the description of the specimen models, the pheasants described morphology as fundamental in the Soil Survey Division staff 1993 and Soil samples were taken from each horizon for the purpose of conducting the required laboratory analysis. The study area was divided into 12 different units and the sites of the pedons were identified centrally.

Chemical Soil Analysis:

Total iron and total manganese by digesting the soil models with a mixture of nitric acid, pyrochloric and hydrofluoric, and then measuring the solution by using the atomic absorption device, according to Black 1965, according to the method of measurement in the Research Department of the Ministry of Science and Technology.

Available iron and manganese: Determination of finished iron content after extraction by DTBA, according to Lindsay and Norvell, 1978 and Soltanpour and Schwab, 1977. Both were estimated in the extract by Atomic Absorption as estimated in the Agricultural Research Department of the Ministry of Agriculture.

Crystalline free iron and manganese oxides (Fe_d) : Iron and manganese extracted in the form of free citrate-Bicarbonate-Dithionite (CBD), according to the Mehra and Jackson, 1960 method, were extracted and the iron absorption spectrophotometer (882 mm) When manganese was estimated at a wavelength of 182 mm, it was estimated at the Ministry of Science and Technology.

Amorphous free iron and manganese oxides: iron and manganese oxides of soil samples were extracted using the acid ammonium oxalate solution (Schwertmann, 1964). Both were estimated in the extract by the atomic absorption spectrophotometer, which, after converting iron oxides Non-crystalline manganese. , it was estimated at the Ministry of Science and Technology.

Crystallized iron and crystallized manganese: Their ratios were calculated from the difference between the amount of free oxides and non-crystallized oxides.

Statistical analysis: The analysis of the time series of iron and manganese forms and some soil characteristics were carried out according to the following steps:

1. Constructing time series models that describe variation properties in each environment. Models were built using the computer to enter data and to find models suitable for spatial variations of each soil character through the use of SPSS.

2.Calculate the **Autocorrelation Coeffcient** for the distance (Lag) Autocorrelation according to equation (1).

K = cov (Zt - Zt + k) ɣ

=E [(Zt - μ) (Zt + k - μ)] ---------- (1)

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3.Draw a Correlogram scheme, which represents the Semi Variance with the lag space to see the link distance.

4. To calculate the variance function, use the geological statistic using Arc GIS, 9.3 in 2010, by using a satellite image of the satellite 7 Land sat and then dotting the sites of the pedons according to their coordinates taken by the GPS device so that we can take the distance readings from the program, geographically for the sites of the studied pedons to be used in the aforementioned program and then take the following steps:

1. Calculation of the Semi Variance function, according to equation (2).

Z (Xi)] ɣ (h) = 1 / 2nΣ [Z (Xi + h) -------------------- (2)

As: ((h): mean square differences between all observations separated by a given distance (h)

h: The distance between each pair of views (Lag distance)

n: The number of views pairs separated by h

(Xi): The soil value of the studied soil

Z: The studied distance

2. Draw the variogram and represent the relationship between the Semi-Variance function and the distance h to determine the effective distance and spatial reliability

3 - The number of samples required to represent the society according to the following methods:

- Spatial reliability method.
- Autocorrelation method.
- The use of one of the laws of randomness, according to Al-Nasser and Al-Marzouk(1989) equation (3).

$$N=t^2\alpha\sigma^2/(\alpha\mathbf{x})^2 \quad \text{---------------} \ (3)$$

N = number of samples required

σ^2 = Contrast.

A=Morality level (0.05)

X = average.

RESULTS AND DISCUSSION

Spatial variation of iron and manganese forms using time series analysis under different environments:

Time series analysis was adopted as a statistical method based on the spatial variation of iron and manganese forms and some physical and chemical soil properties. The idea of the distribution of different iron and manganese forms in adjacent areas, which was not reached by the surveyor and may be outside the survey area, Soil studied in the study boundary area. Based on Table (2), which represents iron and manganese forms and their relation to some soil characteristics, which will be clarified as follows:

Spatial variation of iron forms under different sedimentary environments

Total iron

Table (2) presents the average values , the coefficient of variation and standard deviation of total iron in sedimentary soils which were 5.03, 28.82, and 1.45 respectively, while the mean values and the coefficient of difference and standard deviation in desert soils were 3.96, 29.29, 1.96 respectively. The model of the time series suitable for the variations of the total iron content in sedimentary and desert soils is the MA class of the two soil cultivars. This is typical of the variation of the total iron content of different soil areas of the study.

The predictive value of total iron in sedimentary soils varied by 4.41 - 5.03% and for five other separation distances and a decrease of 0.41% for each separation interval. While the values of prospecting in desert soils were 5.72-8.96% and for five other separation distances and a decrease of 3.24% for each separation distance.

available iron

The areas under study differed in the value of available iron. The results of the time series analysis showed that the values of mean, coefficient of variation and standard deviation in sedimentary soils were 17.57, 43.65, 7.67 respectively, while their values in desert soils were 3.38, 80.47, and 2.72 respectively. The appropriate model in sedimentary soils is the MA model, while the appropriate model in desert soils is the self-regression model AR (1). This variability in the model is due to different conditions of desert soils and sedimentation as organic matter and the succession of wetting and drying through the variation of irrigation methods in addition to the amount of irrigation, which affected the readiness of iron in the soil of the study areas.

The values of prospecting for ready-made iron varied in sedimentary soils in the range of 17.57-21.68% and for five other separation distances and an increase of 4.11% for each separation distance. In contrast, in desert soils were 3.38-5.37% and an increase of 1.99% for each separation distance.

Amorphous free iron oxides

The results of the statistical analysis showed that the values of Amorphous free iron oxides varied between the study areas and the desert and sedimentary soils. The difference in the desert soil was higher with 66.66 compared with the sedimentation soil which reached 46.66 due to continuous sedimentation in sedimentary soils Compared to the desert cult. The average and the standard deviation reached in sedimentary soils 0.15, 0.07 respectively. While in desert soils reached 0.12, 0.08 for both mean and standard deviation on the relay. Predictor values in sedimentary soils varied by 0.15-0.138% and for five other separation distances and a decrease of 0.011% for each separation distance. The values of prospecting in desert soils ranged between 0.12 -0.061% and for five other separation distances and a decrease of 0.059 for each separation distance. The model that describes the variations of non-crystalline iron oxides based on the values of variance and the Akeke information standard is the ARMA model in both sedimentary and desert soils.

Crystalline free iron oxides

The values of free iron oxides varied between desert and sedimentary soils, as well as among the soil soils of the single environment. Spatial variations showed that the coefficient of variance was 67.04, 62.36 for sedimentary and desert soils on the sequence. The overall mean was 0.88, 0.93 for sedimentary and desert soils on the sequence. While the standard deviation was 0.59, 0.58 for both sedimentary and desert soils respectively. This difference between the two environments may be due to different conditions and some soil characteristics such as organic matter and calcium carbonate in addition to the percentage of clay, which led to variation of the values of prospecting in sedimentary soils in the range of 0.88-0.90% and for five other separation distances and an increase of 0.02%. In the desert soils, the values of the forecast were 0.89 to 0.93% and for five other separation distances and a decrease of 0.04% for each separation interval.

Table 2. Statistical analysis for iron and Manganese forms and related sedimentation environment by using time series analysis

properties	rating	grade	Select model	Error Variance	Akeke information AIC	Autocorrelation Coeffcient ACF	standard deviation SD	Mean %	coefficient of variation C.V	orcasting				
sedimentary environments														
Total iron	-0.0898	θ1	MA (1)	2.11	73.11	0.87	1.45	5.03	28.82	4.57	4.65	4.65	4.61	4.61
Crystalline free iron oxides	0.014	∅1	AR (1)	0.35	38.96	(1) 0.30	0.59	0.88	67.04	0.94	0.87	0.92	0.92	0.89
Amorphous free iron oxides	0.990	∅2	ARIMA (1,1)	0.005	- 41.36	− 0.34 (8)	0.07	0.15	46.66	0.141	0.140	0.138	0.137	0.137
available iron	-0.3619	θ1	MA (1)	58.84	136.33	(9)- 0.31	7.67	17.57	43.65	21.29	21.78	21.77	21.78	21.78
crystallized iron	0.9749	∅2	ARIMA (1,1)	0.33	38.30	0.26	0.58	0.72	80.55	0.605	0.595	0.585	0.575	0.556
Total Manganese	0.9558	∅1	AR (1)	18841.25	245.94	(4) −0.46	137.26	387.45	35.42	427.49	408.62	390.58	373.33	356.85
Crystalline free Manganese oxides	0.6144	∅2	ARIMA (1,1)	215.82	161.03	(9) −0.29	14.69	34.90	42.09	32.25	31.62	31.01	30.40	31.81
Amorphous free Manganese oxides	0.7483	∅2	ARIMA (1,1)	124.35	150.56	(2) 0.22	11.15	22.29	50.02	17.078	16.733	16.395	16.739	15.421
available Manganese	0.8227	∅2	ARIMA (1,1)	26.29	121.03	(1) 0.54	5.12	7.47	68.54	8.458	8.458	7.965	8.440	8.440
crystallized Manganese	0.3010	∅1	AR (1)	107.69	147.8	(7) −0.24	10.37	12.60	82.30	11.135	10.86	11.598	10.340	10.341
Environment desert														
Total iron	-0.0714	θ1	MA (1)	1.36	68.08	(1) 0.79	1.96	8.96	29.29	6.2	3.8	5.4	7.2	6.0
Crystalline free iron oxides	-0.0153	θ1	MA (1)	0.33	40.05	(1)0.39	0.58	0.93	62.36	0.99	0.99	0.84	0.83	0.83
Amorphous free iron oxides	0.9998	∅2	ARIMA (1,1)	0.008	−35.54	(1) 0.36	0.08	0.12	66.66	0.062	0.062	0.061	0.061	0.061
available iron	0.0549	∅1	AR (1)	7.44	101.05	(1) 0.36	2.72	3.38	80.47	5.361	5.379	5.378	5.378	5.377
crystallized iron	0.1480	∅1	AR (1)	0.34	40.65	(1) 0.26	0.58	0.81	71.63	0.05	0.003	0.001	0.00	0.00
Total Manganese	-0.75	θ1	MA (1)	18876.6	258.71	(1) 0.43	137.39	279.96	49.07	165.25	165.25	163.40	200.30	198.52
Crystalline free Manganese oxides	0.5846	∅1	AR (1)	27.70	179.96	(1) 0.33	19.18	27.71	69.23	30.91	18.07	10.57	6.18	3.61
Amorphous free Manganese oxides	0.9057	θ1	ARIMA (1,1)	11.63	110.88	(5) −0.24	3.41	4.15	82.16	1.07	0.21	0.57	1.27	1.91
available Manganese	0.974	θ1	ARIMA (1,1)	1.06	63.05	(1) 0.22	1.63	1.19	86.35	0.40	0.26	0.13	0.01	0.14
crystallized Manganese	-0.3458	θ1	AM (1)	339.24	178.33	(9) −0.34	18.41	23.56	78.14	28.867	27.409	27.404	27.404	27.404

The model that describes the variations of free iron oxides in sedimentary soils Autoregressive Model AR (1) of the first class, while the model that describes the variation of free iron oxides in desert soils is the Moving Averege Model MA. Indicating the different conditions of each soil in terms of the factors affecting the variation of free iron oxides for each environment.

Iron crystallization

Table (2) shows the values of the statistical criteria that show the values of the crystallized iron variations. The values of the general mean and the coefficient of variation and standard deviation in sedimentary soils were 0.72, 80.55, 0.58 respectively. While in the desert soils were 0.81, 71.60, 0.58 for both the general average and the coefficient of variation and the standard deviation respectively. Predictor values in sedimentary soils varied by 0.60-0.7% and decreased by 0.117% and for five other separation distances. In the desert soils, the values of the forecast varied between 0.81-0.0108% and a decline of 0.799 and five other separation distances. The model describing the variation of iron crystallized in sedimentary soils is the ARMA model while the AR regression model (1) was used to describe the variability of iron crystallized in desert soils. Indicating the difference in the factors affecting the crystallized iron in both environments.

Spatial variations of manganese forms under different sedimentary environments

Total Manganese

Table (2) shows the spatial variations of total manganese in the soil of the study areas under different sedimentary environments. Table (2) shows that the general average and coefficient of variation and standard deviation in sedimentary soils were 34.90, 42.09, 14.90 respectively. In desert soils, it was 279.96, 49.07, 137.39 for both the general average and the coefficient of variation and standard deviation in the sequence. The predicted values of total manganese ranged from desert and sedimentary soils. In sedimentary soils ranged from 387.45 to 391.37 mg. kg^{-1} for five subsequent separation distances with an increase of 3.924 mg. kg^{-1} for each separation distance while in desert soils ranged from 178.544 - 279.96, a decrease of 101.416 mg. kg^{-1} Based on Akeki's information and the variance of the error, he explained that the appropriate model in sedimentary soils to describe total manganese variability is the AR(1) regression model while the total manganese variations model in the desert soils was the MA (1) On the different factors and conditions affecting both soil on total manganese.

Available Manganese

The values of the manganese available were varied by the mean, and variation coefficient in sedimentary soils 7.47, 68.54, and 5.12 on the sequence. While the values of desert soils for general mean, the coefficient of variation and standard deviation were 1.29, 86.55, 1.63 respectively. Predictor values ranged from 7.47 to 8.35 mg. kg^{-1} in the sedimentary soils, with a five subsequent separation distances and an increase of 0.88 for each separation interval. While in desert soils it varied in the range of 1.188 to 1.29 and a decrease of 1.002. A model describing the variations of manganese in both sedimentary and desert soils is the ARMA model (1.1). This is due to the fact that the available form is identical in both environments.

Amorphous free manganese oxides

Table (2) shows spatial variation of Amorphous free manganese oxides in the soil of study areas under different sedimentary environments. The general average, coefficient of variation and standard deviation in sedimentary soils were 22.29, 50.02, and 11.15 respectively. In the desert soils it was 4.15, 82.16, 3.41 for the general average and the coefficient of variation and standard deviation in the sequence. The predicted values for the unfermented manganese oxides differed between the sedimentary and sedimentary soils. They were distributed in sedimentary soils in the range of 16.47 - 22.29 mg . kg^{-1} for five subsequent separation distances and a decrease of 5.81 mg . $kg^{-1}$for each separation distance while distributed in desert soils 0.061-0.120 mg . kg^{-1} with a decrease of 0.058 mg . kg^{-1} for each separation distance. Based on Akeki's information and the variance of the error, he explained that the appropriate model is in the soil.

Crystalline free. Manganese oxides

The values of free manganese oxides in sedimentary soils ranged from 31.41 to 34.90 mg . kg^{-1} for five subsequent separation distances and a decrease of 3.48 mg . kg^{-1} for each separation distance. In the desert soils, they were distributed between 13.86 and 27.71 mg. Kg^{-1} for five subsequent separation distances and a decrease of 13.84 mg . kg^{-1} for each separation distance. The appropriate model for describing the variation of manganese oxides in sedimentary soils is the ARMA model (1.1). The appropriate model for describing the variation of manganese oxides in desert soils is the Autoregressive Model AR (1), indicating a heterogeneity between the two environments, General and standard deviation in sedimentary soils 42.09, 34.90, 14.69 on the relay. In the desert soils, they reached 69.21, 27.71 and 19.18 for each of the difference coefficient, the general mean and the standard deviation in the sequence.

Manganese crystallization

The values of manganese crystallized in sedimentary soils ranged from 10.85 to 12.60 mg. Kg^{-1} for five separation distances With a decrease of 1.75 mg . kg^{-1} for each separation distance. In desert soils, they were distributed to 23.56-27.404 mg . kg^{-1} for five subsequent separation distances and an increase of 4.13 mg . kg^{-1} for each separation distance. The appropriate model for describing the variability of manganese crystallized in sedimentary soils is the Autoregressive Model AR (1). The appropriate model for describing the variability of manganese crystallized in desert soils is the Moving Average Model MA model indicating a variation in the factors affecting manganese Crystallized in both environments. The coefficient of variation, the mean and the standard deviation in desert soils were 78.14, 23.56, 18.41 respectively. In sedimentary soils, it was 82.30, 12.60, and 10.37 for the coefficient of variation, the mean and the standard deviation respectively.

Spatial reliability and sampling

Depending on the correlation between Correlograms and the distance based on the correlogram. The correlation between the attribute and the distance is determined by equation (1). The relationship with the lag period is described.

The Semi Variance function was calculated according to equation (2) and the variogram was drawn using the GIS program. Using geostatics and kriging, the relationship with the distance was determined to determine spatial reliability or range. The randomization rule, as in equation (3), was used to calculate the random number of samples.

Table (3) shows the distance with the highest correlation (more than 0.5%). As the distance that has the highest self-association of iron forms in general in the desert soils at a distance of 1432 m for total iron and Amorphous free Irion oxides, Crystalline free iron oxides, available iron, iron crystallization, total manganese, Crystalline free manganese oxide, available manganese and manganese crystallizaltion alike. The same distance was applied in sedimentary soils for all Crystalline free iron oxides, crystallization iron and manganese. The characteristics of the soil were different in the soil of the single environment as they differed in sedimentary soils in both Amorphous free iron oxides, available iron, total manganese, Crystalline free manganese oxides, Amorphous free manganese oxides and manganese crystallization. In desert soils, the distance was different in both available manganese and Amorphous free manganese oxides. As for the difference between the desert and sedimentary soils, the distance between1432 m for Amorphous free iron oxides, available iron, total manganese, Crystalline free manganese oxides and manganese crystallization.

When relying on the randomization law, the number of samples in desert soils was higher for total iron, Crystalline free iron oxides, available iron, total manganese, Amorphous free manganese oxides and available manganese, whereas the opposite of manganese crystallization, Crystalline free iron oxides, iron crystallization and Crystalline free manganese oxides occurred.

we observe the increase in the number of random samples compared to the semi-correlation samples of the studied features in sedimentary soils and desert soil. Based on the above, it is possible to depend on semi-correlation samples to show the spatial reliability of iron and manganese forms due to the importance of reducing the samples needed for analysis and study of iron and manganese forms less than when using the randomization law, thus limiting the effort and costs as well as time. results agreed with Al-Muhaimeed (1999) and Al-Quraishi (2012).

Table (3) Number of Samples in Various Methods of Statistics for Sedimentary and Desert Environment

properties	Random samples	Semi-correlation samples	The distance that has the highest semi correlation	Lag
sedimentary environments				
Total iron	91	74	1432	1
Crystalline free iron oxides	498	74	1432	1
Amorphous free iron oxides	244	13	8025	8
available iron	210	12	8285	9
crystallization iron	701	74	1432	1
Total Manganese	138	24	4403	4
Crystalline free Manganese oxides	195	12	8285	9
Amorphous free Manganese oxides	275	47	2245	21
available Manganese	519	74	1432	1
crystallization Manganese	747	18	5579	7
Environments desert				
Total iron	95	74	1432	1
Crystalline free iron oxides	420	74	1432	1
Amorphous free iron oxides	612	74	1432	1
available iron	717	74	1432	1
crystallization iron	571	74	1432	1
Total Manganese	265	74	1432	1
Crystalline free Manganese oxides	39	74	1432	1
Amorphous free Manganese oxides	744	22	4619	5
available Manganese	825	24	4403	4
crystallization Manganese	673	74	1432	1

Total distance : 106 kilometers

CONCLUSION

1. Geological statistics have succeeded in describing the state of iron and manganese heterogeneity and their oxides in the soil of the study area.
2. The sedimentation environment and the conditions of its composition influenced the heterogeneity of the statistical models that describe the state of heterogeneity.
3. The Correlograms scheme proved its success in the method of obtaining the samples to study the two components better than the other statistical methods. This provides the effort, time and costs in the statistical sampling method.

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التغاير المكاني لصور الحديد والمنغنيز باستخدام تحليل السلاسل الزمنية تحت بيئات مختلفة

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المستخلص

اختيرت ستة مناطق في محافظة الانبار لدراسة التغاير المكاني لصور الحديد والمنغنيز باستخدام تحليل السلاسل الزمنية تحت تأثير بيئتين مختلفتين. شملت البغدادي وهيت وابو طيبان والرمادي والخالدية والفلوجة. اخذت بيدونين لكل منطقة ولبيئتين مختلفتين احداهما رسوبية والثانية صحراوية وباتجاه عمودي على نهر الفرات. قدر الحديد الكلي والمنغنيز الكلي والحديد الجاهز والمنغنيز الجاهز وأكاسيد الحديد والمنغنيز الحرة المتبلورة وأكاسيد الحديد والمنغنيز الحرة غير المتبلورة فضلا عن حساب الصورة المتبلورة لكلا العنصرين ومن ثم تم اجراء التحليل الاحصائي باستخدام تحليل السلاسل الزمنية. اذ اظهرت نتائج البحث ما يلي:

1. تغاير الانموذجات التي تصف تغاير صور الحديد والمنغنيز باختلاف بيئة الترسيب فضلا عن تغاير الاعتمادية المكانية وطرائق استحصال العينات.
2. اظهرت طريقة الارتباط الذاتي افضليتها في استحصال العينات ووصف تغاير صور الحديد والمنغنيز مقارنة بالطريقة العشوائية لاستحصال العينات لما توفره من اقتصار بالجهد والوقت والكلفة فضلا عن دقة نتائجها.

الكلمات المفتاحية: حديد، منغنيز ، سلاسل زمنية، بيئات.