models of generalized partial linear regression models and the bandwidth for each of these explanatory variables are presented in Table 4. After finding the Bandwidth (B.W.) for each explanatory variable (X_1, X_2, X_3, X_4) we estimated each model using the link functions according to the distributions in Table 5. Then we determine the link function that gives us the best estimate of the model, using the coefficient of determination (R^2) Akaik's information criterion (AIC) Schwarz's Bayesian information criterion (BIC) according to the following table 5

TABLE IV
THE BANDWIDTH OF EACH EXPLANATORY VARIABLE

explanatory variable (x's)	Bandwidth
(X_1) average wind speed	0.78020278
(X_2) relative humidity	20.472159
(X_3) atmospheric pressure above sea level	8.9385719
(X_4) maximum temperature	13.083624

TABLE V
LINK FUNCTIONS FOR THE FOLLOWING DISTRIBUTIONS USED TO ESTIMATE THE GPLR MODELS WHEN THE TWO VARIABLES ARE NOT PARAMETRIC

parametric variables	Link functions	Gaussian	Poisson	Gamma	Inverse Gaussian	Negative Binomial
X_1X_2	(R^2)	0.7139	0.2651	0.0008	---	**0.0136**
	(AIC)	375.352	380.702	753.2183	Nan	**526.1562**
	(BIC)	388.8623	393.8851	766.1919	Nan	**539.1597**
X_1X_3	(R^2)	0.7071	---	---	---	---
	(AIC)	380.5229	---	---	---	---
	(BIC)	397.5759	---	---	---	---
X_1X_4	(R^2)	0.7031	0.2595	0.0008	---	**0.0134**
	(AIC)	380.0667	385.5506	751.2303	---	**528.1408**
	(BIC)	395.7379	400.9524	766.2441	---	**543.2076**
X_2X_3	(R^2)	0.7521	---	---	---	---
	(AIC)	376.5108	---	---	---	---
	(BIC)	400.6324	---	---	---	---
X_2X_4	(R^2)	0.7623	0.2801	0.0008	---	**0.0144**
	(AIC)	374.9476	384.0618	764.867	---	**536.4391**
	(BIC)	400.2648	409.1621	789.4916	---	**561.1446**
X_3X_4	(R^2)	0.7446	---	---	---	---
	(AIC)	379.0103	---	---	---	---
	(BIC)	403.6591	---	---	---	---

B. *Building* (GPLRM) in *Case Three Variables*

The non-parametric component consists of three explanatory variables that exhibit non-linear behavior, whereas the remaining explanatory variable exhibits a linear behavior of the parameter segment's component. According to equation (1) we will have four models of generalized partial linear regression models, and the bandwidth for each of these explanatory variables, as in Table 6. After finding the Bandwidth (B.W.) for each explanatory variable (X_1, X_2, X_3, X_4) we will estimate each model using the link functions according to the following distributions:

Then we determine the link function that gives us the best estimate of the model, using the coefficient of determination (R^2) Akaik's information criterion (AIC) Schwarz's Bayesian information criterion (BIC), as in Table 7.

TABLE VI
BANDWIDTH OF EACH EXPLANATORY VARIABLE

explanatory variable (x's)	Bandwidth
(X_1) average wind speed	0.85844717
(X_2) relative humidity	22.525256
(X_3) atmospheric pressure above sea level	9.8349967
(X_4) maximum temperature	14.395744

TABLE VII
LINK FUNCTIONS FOR DISTRIBUTIONS USED TO ESTIMATE THE GPLR MODELS WHEN THE THREE VARIABLES ARE NOT PARAMETRIC

parametric variables	Link functions	Gaussian	Poisson	Gamma	Inverse Gaussian	Negative Binomial
X_1	(R^2)	0.7146	0.2633	0.0008	---	**0.0136**
	(AIC)	349.094	385.0658	753.4378	---	**529.4522**
	(BIC)	396.4331	402.0515	469.9756	---	**546.0514**
X_2	(R^2)	0.7603	0.2808	0.0008	---	**0.0146**
	(AIC)	377.0251	385.0606	767.5061	---	**537.6034**
	(BIC)	403.8511	411.6314	793.5215	---	**563.698**
X_3	(R^2)	0.7667	---	---	---	---
	(AIC)	378.4887	---	---	---	---
	(BIC)	408.5923	---	---	---	---
X_4	(R^2)	0.7668	0.2814	0.0009	---	**0.0146**
	(AIC)	378.5821	387.7615	767.6433	---	**540.5878**
	(BIC)	408.6892	417.6254	796.9123	---	**569.9497**

From tables (2), (4) and (6), we find that the best model is when using the link function to distribute Gaussian, in other words the link function of type (Identity). The model has the lowest value of the Akaik's information criterion (AIC) and the lowest value for the Schwarz's Bayesian information criterion (BIC) and the highest proportion of the coefficient of determination (R^2) Compared to the rest of the functions.

C. Comparing Between Models

After determining the correlation function for the Gaussian distribution from tables (2), (4) and (6), we will determine the best model of the models that we obtained from these tables using the Akaik's information criterion (AIC) and the Schwarz's Bayesian information criterion (BIC) and the coefficient of determination (R^2) are presented in Table 8.

TABLE VIII
VALUES OF EACH OF THE GPLR MODELS FOR EACH OF THE GENERALIZED PARTIAL LINEAR REGRESSION MODELS

NO. of Models	Parametric component	Non-Parametric component	(R^2)	(AIC)	(BIC)
1	$\mathbf{X_1}$	$\mathbf{m(X_2X_3X_4)}$	0.7146	379.094	**396.4331**
2	$\mathbf{X_2}$	$\mathbf{m(X_1X_3X_4)}$	0.7603	377.0251	**403.8511**
3	$\mathbf{X_3}$	$\mathbf{m(X_1X_2X_4)}$	0.7667	378.4887	**408.5023**
4	$\mathbf{X_4}$	$\mathbf{m(X_1X_2X_3)}$	0.7668	378.408	**408.6892**
5	$\mathbf{X_1X_2}$	$\mathbf{m(X_3X_4)}$	0.7139	375.352	**388.6623**
6	$\mathbf{X_1\ X_3}$	$\mathbf{m(X_2X_4)}$	0.7071	380.5229	**397.5759**
7	$\mathbf{X_1\ X_4}$	$\mathbf{m(X_2X_3)}$	0.7031	380.0667	**395.7379**
8	$\mathbf{X_2\ X_3}$	$\mathbf{m(X_1X_4)}$	0.7521	376.5108	**400.6324**
9	$\mathbf{X_2\ X_4}$	$\mathbf{m(X_1X_3)}$	0.7623	374.9476	**400.2648**
10	$\mathbf{X_3\ X_4}$	$\mathbf{m(X_1X_2)}$	0.7446	379.0103	**403.6591**
11	$\mathbf{X_1\ X_2\ X_3}$	$\mathbf{m(X_4)}$	0.7031	377.3921	**390.291**
12	$\mathbf{X_1\ X_2\ X_4}$	$\mathbf{m(X_3)}$	0.7109	375.8568	**388.9691**
13	$\mathbf{X_1\ X_3\ X_4}$	$\mathbf{m(X_2)}$	0.695	379.7863	**393.3289**
14	$\mathbf{X_2\ X_3\ X_4}$	$\mathbf{m(X_1)}$	0.7112	377.9291	**393.109**

By comparing the three criteria AIC , BIC , R^2, as in Table 8, the researchers determined the best generalized partial linear regression model (GPLRM) as follows:

1) First: the Akaik's information criterion: the researchers notice that the ninth model is the best because it had the lowest value for the Akaik's information criterion and its value was $AIC = \boxed{374.9476}$. And this represents parametric component (X_2) relative humidity and variable (X_4) maximum temperature. Either that variables (X_1) average wind speed and (X_3) atmospheric pressure above sea level. They represent the non-parametric component, as shown in Figure 1.

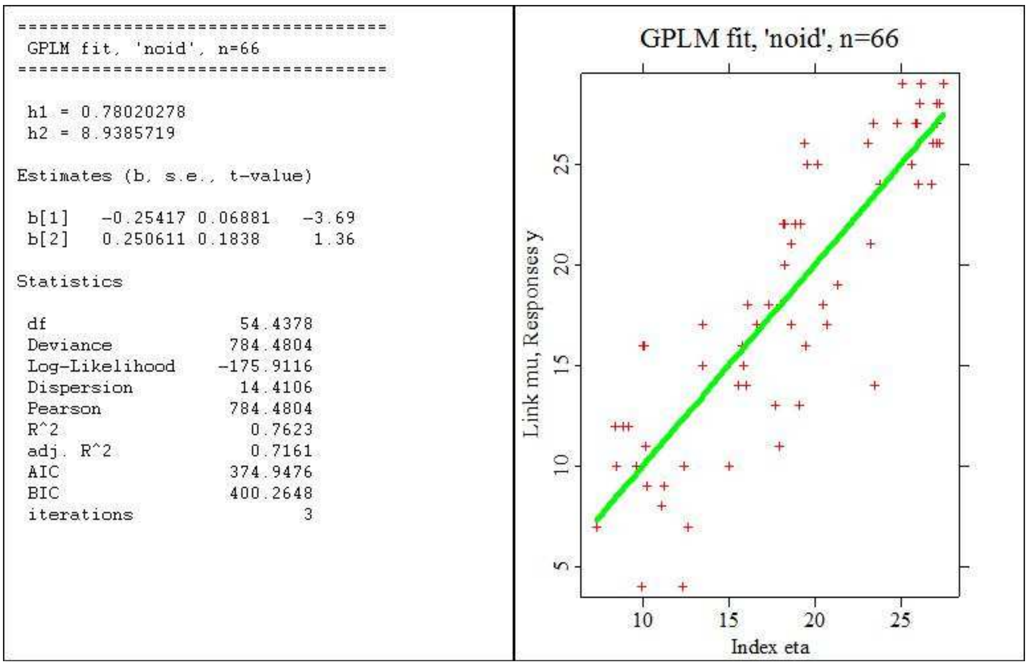

Fig. 1 GPLRM when the parameter component represents the second and fourth variables. As for the non-parametric component it consists of the first and third variables.

This model demonstrates from its parameter component that the variables achieve stability X_2 and X_4, so that the increase in one unit of the variable X_2 (relative humidity) will reduce the amount of dust concentrations by (0.25417) which is a negative and significant effect, and that the increase in one unit of the variable X_4 (Maximum temperature) will lead to an increase in the amount of polluted dust concentrations by (0.250611). Its unscientific component shows the instability of the variables X_1 (average wind speed) and X_3 (atmospheric pressure above sea level) and that their behavior is not linear.

The second came the fifth model, and the value of the AICA criterion reached AIC = 375.352, whose component represents the variable X_1 and the variable X_2, while the variables X_3 and X_4 represent the non-parametric component as in figure 2.

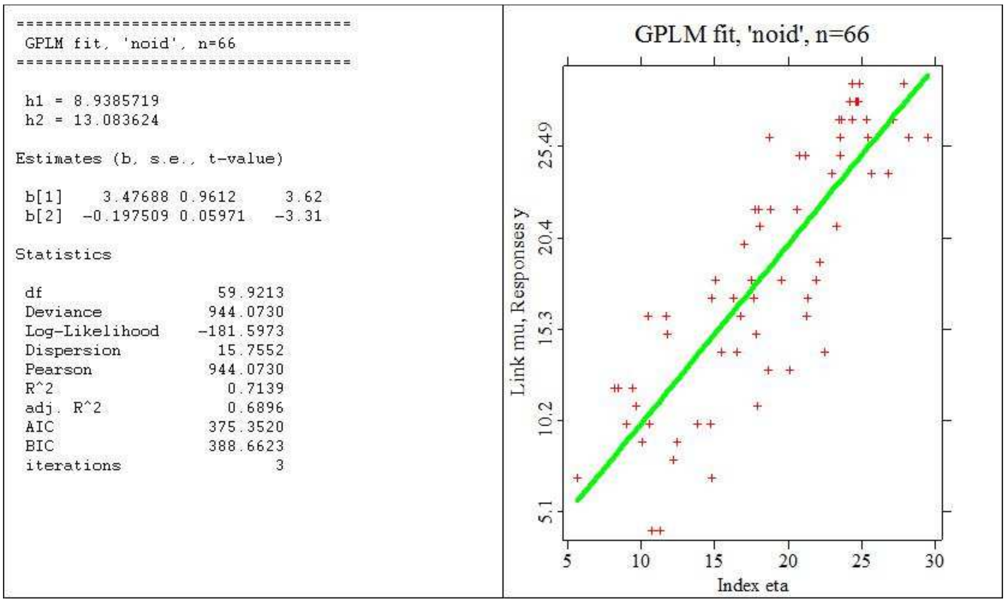

Fig.2 GPLRM when the parameter component represents the first and second variables. As for the non-parametric component, it consists of the third and fourth variables.

We note from its parameter component that stability verifies the variables X_1 and X_2, so that the increase by one unit of the variable X_1 will lead to an increase in the concentrations of polluted dust by (3.47688), which is a very big effect. While for the variable X_2, the increase by one unit will lead to a decrease in the amount of polluted dust concentrations to (0.197509), which negatively affects. As for its unscientific component, the variables in it X_3 and X_4 are non-linear and unstable.

2) *Second: the Schwarz's Bayesian information criterion:* We note that the fifth model is the best because it had the lowest value for the Schwartz criterion and its value was BIC = 388.6623, then came in second place the twelfth model and the value of the Schwartz criterion BIC = 388.9691 and its parameter component represents X_1 and X_2 and X_4 and the variable X_3 represents the non-parametric component as in figure No. (3):

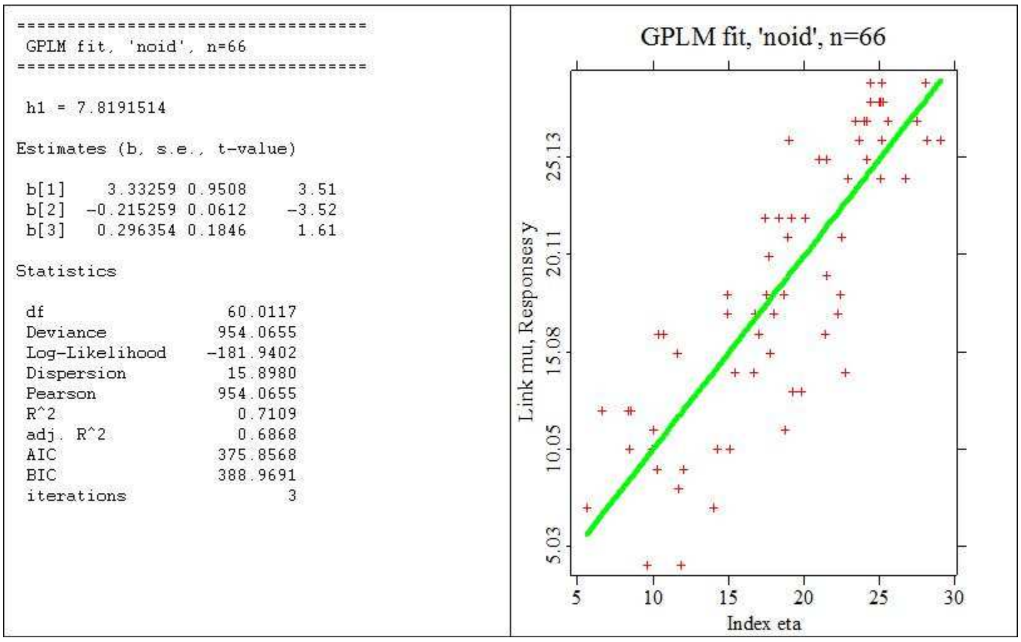

Fig. 3 GPLRM when it represents the first component parametric variables and the second and fourth either component Allamwalima consists of the third variable

This model demonstrates from its parameter component that stability is achieved in the variables X_1, X_2 and X_4, so that the increase in one unit of the variable X_1 will lead to an increase in dust concentrations by (3.33259), which is a very big effect. But for the variable X_2, increasing the intensity of one will lead to reducing the amount of concentrations of polluted dust by (0.215259) which is a negative effect. While increasing one unit of the X_4 variable will lead to an increase in the amount of polluted dust concentrations by (0.296354), which is a big effect, but its unscientific component shows the instability of the X_3 variable and its behavior is not linear.

3) Third: The determination coefficient criterion: We note that the fourth model is the best because it had the highest percentage of the determination coefficient and its value was $R^2 = \boxed{0.7668}$, whose parameter component consists of the variable X_4, while the rest of the variables X_1, X_2 and X_3 represent the non-parametric component as in figure. (4)

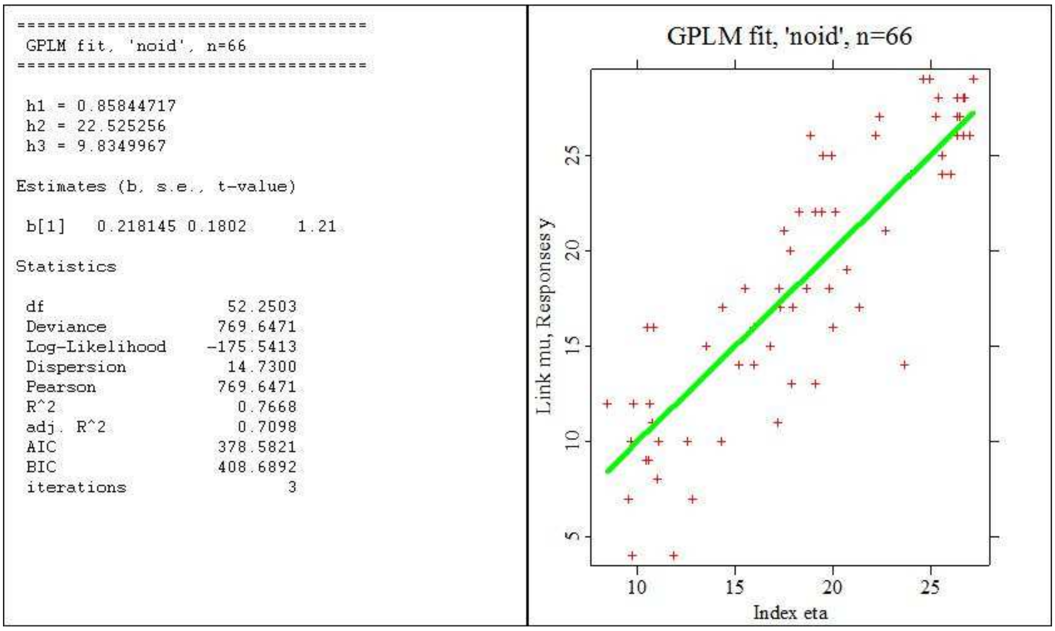

Fig. 4 (GPLRM) shows when the parameter component represents the fourth variable. As for the non-parameter component, it consists of the first, second and third variables

The model demonstrates from its parameter component that stability is achieved in variable X_4 and that increasing one unit of this variable will lead to an increase in the concentrations of polluted dust by (0.218145) which is a significant effect. Whereas its non-parametric component shows counting stability and non-linear behavior of the rest of the variables. The third model came in second place because it had the second highest proportion of the determination coefficient and reached $R^2 = \boxed{0.7667}$, whose parameter component represents the variable X_3 . The variables remained X_1 and X_2 and X_4 component represents. This model shows from its parameter component that stability is achieved in the variable X_3 and that increasing one unit of this variable will lead to an increase in the concentrations of the amount of polluted dust by (0.0458546). To us, each model will be arranged according to its order of preference in relation to the standard and Table No. 9 clarifies this.

TABLE IX

ARRANGEMENT OF MODELS IN THE THREE STANDARDS R^2,AIC, BIC

Model	R^2	AIC	BIC
m3	2	9	13
m4	1	8	14
m5	**8**	**2**	1
m9	3	1	9
m12	10	3	2

From the comparison in table No. (9), we can determine that the (m5) model is the closest to the best model because it has the first (BIC), second (AIC) and eighth (R^2), where $R^2 = \boxed{0.7139}$.

IV. CONCLUSION

The best model is the model in which the behavior of the variable (X_2) relative humidity and the variable (X_4) the maximum temperature is a stable linear behavior in the parametric component and the variables (X_1) wind speed rate and (X_3) atmospheric pressure above sea level, their behavior is non-linear and independent in the non-parametric part. The mathematical formula of the model (13) is:

$$\hat{y} = g\big(-0.25417X_2 + 0.250611X_4 + m(X_1, X_3)\big)$$

From the model in the formula (13) we conclude that the variable (X_2) relative humidity has a decreasing negative effect, i.e., increasing one unit of it will lead to a decrease in the number of dust storms by (0.25417) units. The variable is the maximum temperature (X_4), then its effect is positive increasing and that increasing one unit from it will increase the number of dust storms by (0.250611) units. From the model in the formula (13) we conclude that the variable wind speed rate (X_1) is unstable, non-linear and non-parametric, as well as the variable (X_3) air pressure above sea level is unstable, non-linear and non-parametric, and it can be said that this case represents a negative problem that suffers from it Baghdad Governorate in particular, and Iraq in general.

By studying the number of dust storms as a variable dependent on the explanatory variables, the average wind speed (X_1), relative humidity (X_2), atmospheric pressure above sea level (X_3) and maximum temperature (X_4), we conclude that the lack of green belts and afforestation causes an increase in dust storms. The criteria that have been applied are considered very important criteria in the statistical analysis to compare the preference of the models, which are the Kaikai standard, the Schwartz criterion, and the determination factor.

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