THE ROLE OF DEEP AND SHALLOW DEPRESSIONS IN THE DAILY PRECIPITATION CONCENTRATION IN IRAQ

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Abstract

The presence of depressions at the same time at the surface level and the level (850) milliards are called deep depressions, while they are considered shallow systems in the case of presence at the surface level only, the more deep and influential the pressure systems and their survival for a longer period, the higher the amounts of rainfall, and the study was based on the months Al-Matareya is (January and February) over a period of (11 years) for (13) stations distributed in Iraq from north to south for the period from (2009 - 2019). The Mediterranean depression is followed by the merged depression (Mediterranean-Sudanese), followed by the Sudanese depression. As for the shallow depressions, the Sudanese depression recorded the highest recurring depressions.

Introduction

Atmospheric depressions have a significant impact on rainfall in Iraq, and that the quality of the depressions is responsible for the size, duration, abundance and continuity of rain precipitation. Duration and another during the month, during the season and between one year and another, and the frequency of deep and shallow depressions varies between one region and another. The depressions in terms of their depth by tracking and analyzing weather maps at the surface levels and (850) and obtaining these statistics and were studied as follows:

1-1 Research problem: The research problem can be posed in the form of a question (Do the depressions vary in terms of their depth and shallowness in time and space?)

1-2 The research hypothesis: The depressions varied according to their depth and shallowness, and this variation, in turn, was reflected in the temporal and spatial rain concentration.

1-3 Importance of the research: The study deals with the issue of shallow and deep depressions, as the variation of the depressions in terms of their shallowness and depth affects the variation in rain concentration between one day and another and between one season and another. floods.

1-4 Research methodology and structure: The study adopted in its methodology the calculation and analysis of atmospheric depressions based on weather maps of the pressure systems affecting the rain concentration for all the days of rain during the months covered by the study, and it was studied according to the daily rain concentration periods for each month by dividing the month into three periods starting The first period of the month is (1-10) days, the middle period of the month is (11-20) days, the last period of the month is (21-30 or 31) days at the surface level and the level is (850) millibars to know the depth and shallowness of the rainy months (January and February) over a period of (11 years) for (13) stations distributed in Iraq from north to south on all days for the period from (2009 - 2019), and this is enough to give accurate and detailed information about the depressions affecting the rainfall.

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1-7 Analysis of the classification of rainfall in Iraq

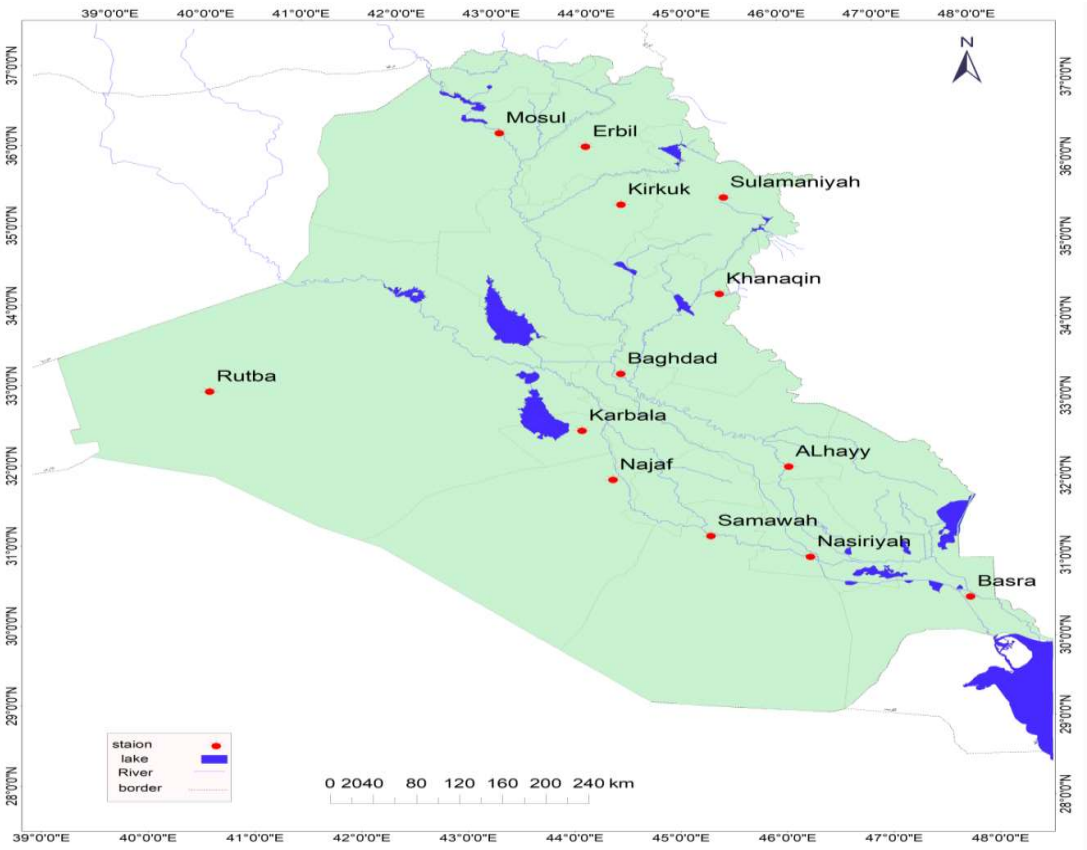
Intensity of rain: It means the amount of rain falling during a specific time period, which may be an hour or a day. Rainfall and the difference in the quality and nature of rain (Musa, 2017, p. 396), The heaviest rain falls in mountainous areas, which are characterized by high altitude, It occurs in large areas of Iraq, and sometimes meteorological stations record rainfall within (24) hours or less (Walker, 2017, p. 80**)**

Table (1) represents the location of the climatic stations included in the study in Iraq.

The station	Station No	Lat (N)	Lon(E)	Height (m)
Mosul	608	36° 19'	43° 09'	223
Erbil	616	36° 09'	44° 00'	420
Sulaymaniyah	623	35° 32'	45° 27'	843
Kirkuk	621	35° 28'	44° 24'	331
Khanaqin	637	34° 21'	45° 23'	202
Rutba	642	33° 2'	40° 17'	630.8
Baghdad	650	33° 18'	44° 24'	31.7
Al-Hayy	665	32° 08'	46° 02'	17
Karbala	656	32° 34'	44° 03'	29
Najaf	670	32° 57'	44° 19'	53
Samawah	674	31° 16'	45° 16'	11.4
Nasiriyah	676	31° 1'	46° 14'	5
Basra	689	30° 31'	47° 47'	2

Source: Atlas of Iraq's climate (1971- 2000) The General Authority for Meteorology and Seismic Monitoring, Part One, 2012.

Map No. (1) The locations of the stations covered by the study



Source: From the researcher's work based on:

1- Arc Gis 10.4.1

2- Table (1),

3- Atlas of Iraq's climate (1971-2000) The General Authority for Meteorology and Seismic Monitoring, Part One, 2012.

1-8 Surface depressions affecting the daily rain concentration : The occurrence of a decrease in atmospheric pressure in a large volume of air and its decrease from (890) millibars is then called an atmospheric depression, and the depressions are either hot or frontal (Al-Kinani, 2011, p. 37), and we will discuss the depressions affecting the daily rainfall in Iraq:

1- Mediterranean depression

Most of the rainfall in Iraq is associated with the Mediterranean depression, whose effects begin at the end of October until May (Al-Daziyi, 2013, p. 147). These depressions are formed within the low pressure range, as well as the western Mediterranean regions. Some of these depressions are renewed when they reach the Mediterranean, which is a supply station. The depressions consist of a cold front and a warm front resulting from the confluence of air masses. The cold masses come from the north and the warm masses from the southwest, and this is what is called the polar front. During the cold season, the Mediterranean is an area for the confluence and emergence and development of air depressions there. A number of centers in which the Mediterranean depression is formed, represented by the Gulf of Genoa, the second region of the southern slopes of the mountain ranges in the Atlas Mountains, which is called the Khamasinyeh, and the third region, the Cypriot depressions (Shehadeh, 2009, p. 226).

2 -Sudanese depression

It is one of the depressions that cause rainfall in Iraq, and it forms when the northeastern trade winds coming from the Sahara Desert in Africa reach areas south of the equator, especially during the cold season. A rapid supply of moisture from the African lakes and areas covered with dense vegetation, and as a result similar conditions arise for the formation of frontal depressions (Al-Kinani, 2011, p. 41).

The Sudanese depression continues towards the east and passes over the Red Sea and when it enters Iraq through two paths, the first is a southwestern path and the second is a western path (Al-Dazi, 2013, p. 144). It is one of the depressions that cause heavy rains, and the Sudanese depression is present throughout the year, and it may change its center sometimes towards the north and sometimes towards the south according to the seasonal movement. It is not possible to advance towards northern Iraq and the Arabian Peninsula because of the Indian depression's control over this region, and the effects may reach these areas in the event of the weakness of the seasonal India depression and its distance. The Sudanese depression controls these areas (Al-Dazi, 2013, p. 158).

3- Combined depressions:

They are depressions whose paths are difficult to determine due to the large number of their pressure centers formed after the merging of two or more depressions to form one effective depression (Al-Hussainawy, 2002, p. Coming from the equator, represented by the Sudanese depression and the merged depression, it has a significant impact sometimes; As it is responsible for the large number of rains, and the integrated depression is one of the deep depressions affecting Iraq (Al-Dazi, 2013, p. 158).

1-9 depressions (deep and shallow)

The deep depressions are represented by the presence of the depression at the same time at the surface level and the level of 850 millibars, while they are considered shallow systems if they are located at the surface level only, the more depressions are present at the level (850 millibars), the deeper the pressure systems (Al-Kinani, 2011, p. 26) , and its ability to displace competing systems and its control over the atmosphere indicates the strength of the surface heights and depressions and the continuity of their survival (Al-Daziy, 2014, p. 189).

Pressure systems are, according to the strength of their presence, sometimes deep and sometimes shallow, but some depressions or heights such as the Caspian Sea depression and the Black Sea are shallow depressions as well as the Sudanese depression, and if they are sometimes present at the level (850) millibars, they remain shallow depressions.

1-10 Analysis of the role of deep and shallow depressions affecting Iraq:

The variation in the recurrence of deep and shallow depressions between one region and another, and studying them according to their depth and shallowness is useful in knowing the strength of the depressions and the extent of their control over an area without another and between one season and another. The depressions will be revealed according to the periods of rain concentration for all the months covered by the study:

January

The Mediterranean depression came first among the deep depressions affecting the

rainfall during this month, as shown in Table (2), and the frequency of the deep depressions during the first period ranged between (22.0) recurrences in Erbil station and at a rate of (68.8%) and (2.0) recurrences in the station Baghdad, by (50.0%), and during this period, its frequencies increased, and the stations of Sulaymaniyah, Najaf, Samawah, Nasiriyah and Rutba recorded varying frequencies, respectively, with totals of (20.0, 10.0, 5.0, 4.0) recurrences, and the stations of Samawa and Rutba got two percentages (55.5%, 100%), while the two stations of Sulaymaniyah were equal. and Nasiriyah with a rate of (83.3%), and the stations of Khanaqin, Karbala and Najaf recorded the same recurrences with a total of (8.0) recurrences and in percentages respectively (100%, 36.4%, 85.7%), while the stations of Kirkuk and Mosul recorded recurrences with two totals (13.0, 10.0) and two rates (92.9% , 66.7%), and the two stations of Al-Hayy and Al-Basra showed a frequency of (3.0) and a percentage of (60.0%).

While the frequencies of shallow Mediterranean depressions decreased compared to the shallow depressions affecting the rainfall and ranged between (5.0) recurrences in the Mosul station and at a rate of (33.3%) and (1.0) frequently in the stations of Kirkuk and Nasiriyah and at rates of (7.1%, 16.7%), and the Erbil and Sulaymaniyah stations recorded The same frequencies in total (10.0) and at a rate of (31.3%), and the Sulaymaniyah and Samawah stations were equal with a total of (4.0) recurrences and at two rates (16.7%, 44.4%), and the frequencies of this period were equal in the stations of Baghdad, Al-Hayy, Karbala, Najaf and Basra with a total of (2.0) recurrences, and Baghdad and Karbala stations were recorded And Najaf varying percentages, respectively (50.0%, 9.1%, 14.3%), and Al-Hayy and Basra stations were equal at (40.0%), and Khanaqin and Al-Rutba stations did not witness any impact of the Sudanese deep depressions during this period, see Table (2).

As for the Sudanese deep depressions, they came third during this month, and their frequency decreased during this period; Its frequencies ranged between (4.0) recurrences in the Mosul station and at a rate of (40.0) and (1.0) in the stations of Kirkuk and Samawah, at rates (14.3, 100%). Sulaymaniyah, Erbil, Al-Rutba, Baghdad and Al-Hay recurrence the same, with a total of (2.0) recurrences, and the Sulaymaniyah, Erbil and Al-Rutba stations recorded percentages respectively (8.7%, 10.0%, 100%), and the Baghdad and Al-Hay stations recorded the same percentage (66.7%), and Karbala and Najaf stations were free of any recurrence of deep depressions. .

During this period, the frequencies of the shallow depression ranged between (21.0) recurrences in the Sulaymaniyah station, at a rate of (91.3%) and (1.0) in the Baghdad and Al-Hay stations, and equal to (33.3%, 100%), and the stations of Mosul and Kirkuk were equal in frequencies, with a total of (6.0) recurrences and at two rates (60.0%, 85.7%), while the stations of Nasiriyah and Basra recorded the same frequencies with a total of (3.0) recurrences and at a rate of (100%), and the stations of Rutba, Karbala, Najaf and Samawah were free of repetitions See table (2).

During this period, the frequency of the deep Mediterranean-Sudanese merging depressions increased; Its frequencies ranged between (12.0) recurrences in Erbil station (100%) and (1.0) recurrences in Hay, Nasiriyah and Rutba stations (100%), and Sulaymaniyah station recorded a total of (10.0) recurrences (100%), while the frequencies were equal in Mosul and Khanaqin stations recorded a total of (4.0) recurrences and two rates (80.0%, 100%), and Kirkuk and Karbala stations recorded the same repetition, with a total of (3.0) recurrences and two rates

(60.0%, 100%), and Baghdad and Najaf stations shared a total of (2.0) recurrences and two rates (40.0%, 100%), while the stations of Samawah and Basra were devoid of any repetition of the deep combined depressions, see Table (2).

As for the shallow combined depressions, its recurrences during this period were limited to the stations of Mosul, Kirkuk, Baghdad and Basra, and the frequencies ranged between (3.0) recurrences in the Baghdad station and at a rate of (60.0%) and (1.0) frequently in the stations of Mosul and Basra, at rates (20.0%, 100%), while The Kirkuk station recorded a total of (2.0) recurrences and a percentage of (40.0%), the rest of the stations did not witness any impact of the shallow merged depressions, while the Caspian and Black Sea depressions and the deep Caspian-Mediterranean depression did not record any recurrence during this month. Table (2).

During the middle period, the frequencies of the deep Mediterranean depressions ranged between (17.0) recurrences in Erbil station (56.7%) and (4.0) recurrences in Basra station (100%), and Sulaymaniyah station recorded a total of (16.0) recurrences and (55.2%) And the frequencies in Khanaqin, Kirkuk and Najaf stations were equal with totals (10.0, 8.0, 5.0) recurrences and at a rate of (100%), and the Baghdad and Al-Hay stations recorded the same recurrence with a total of (7.0) recurrences and at a rate of (100%), and the stations of Samawa and Nasiriyah shared repetitions with a total of (6.0) iterations. (100%) and Karbala station recorded a total of (4.0) recurrences and (100%).

As for the shallow frequencies of the Mediterranean depression during this period, Erbil and Sulaymaniyah stations recorded the highest frequency with a total of (13.0) recurrences and two rates (43.3%, 44.8%), and the Mosul station recorded a total of (11.0) recurrences and a rate of (84.6%), while the rest of the stations were devoid of frequencies. Table (2).

The recurrences of the deep Sudanese depression decreased compared to the shallow ones during this period; Its recurrences were limited to the Mosul station, with a total of (2.0) recurrences and at a rate of (40.0%), and the rest of the stations were free of any repetition.

During this period, the frequencies of the shallow Sudanese depression increased and ranged between (20.0) recurrences in Erbil and Sulaymaniyah stations, (100%) and (1.0) recurrences in Al-Hay station (100%) and the depression in Mosul station contributed with a total of (3.0) recurrences at a rate of (60.0%), and the stations of Rutba, Baghdad and Karbala were equal in frequency with a total of (2.0) recurrences and at a rate of (100%), and the rest of the stations did not record any recurrence during this period, see Table).

The frequencies of the deep integrated depression during this period ranged between (4.0) recurrences in Erbil, Sulaymaniyah and Kirkuk stations, and the Erbil and Sulaymaniyah stations were equal (100%), and Kirkuk station was unique with (66.7%) and (1.0) recurrences in Al-Rutba, Al-Hay, Najaf, Nasiriyah and Basra stations, and Al-Rutba stations were equal. Al-Hayy, Najaf and Nasiriyah (100%), while Basra obtained (50.0%), and the Mosul station recorded a total of (3.0) recurrences and (100%), and the Khanaqin and Baghdad stations recorded the same frequency with a total of (2.0) recurrences and (100%). While the Karbala and Samawa stations were free of any repetition, see Table (2).

The shallow merging depression frequency during this period was limited to Kirkuk and Basra stations; The frequencies were recorded in the Kirkuk station with a total of (2.0) recurrences and a rate of (33.3%), followed by the Basra station with one recurrence and a rate

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of (50.0%). See Table (2).

As for the last period of the month, the deep Mediterranean depression witnessed the highest frequency in the stations of Mosul, Khanaqin, Al-Rutba, Al-Hayy, Karbala and Najaf, and its frequencies ranged between (25.0) recurrences in the Sulaymaniyah station, at a rate of (83.3%) and (7.0) in the Nasiriyah station and at a rate of (70.0%). The stations of Sulaymaniyah, Khanaqin, Kirkuk and Mosul recorded varying frequencies, respectively, with totals of (23.0, 15.0, 12.0, 10.0) recurrences and rates (79.3%, 88.2%, 75.0%, 76.9%). Al-Ratta stations by (100%), while Al-Hayy and Samawah stations were equal by (90.0%), and Karbala and Najaf stations shared a total of (11.0) recurrences and two rates (84.6%, 91.7%), and the repetitions in Baghdad and Basra stations contributed with a total of (8.0) recurrences and two percentages (80.0%, 88.9%) see table (2).

As for the shallow Mediterranean low frequencies, its frequencies decreased compared to the deep repetitions during this period, and its frequencies ranged between (6.0) recurrences in Sulaymaniyah station, (20.7%) and (1.0) recurrences in Al-Hayy, Najaf, Samawah and Basra stations, and Najaf and Basra stations recorded two rates (8.3%, 11.1%), while Hay and Samawa stations were equal at (10.0%) Mosul and Nasiriyah stations recorded the same frequency with a total of (3.0) recurrences and at two rates (23.1%, 30.0%), and Khanaqin, Baghdad and Karbala stations shared a total of (2.0) recurrences and at rates, respectively (11.8%), respectively (20.0%, 15.0%) and the two stations of Erbil and Kirkuk recorded a total of (5.0, 4.0) and two percentages (16.7%, 25.0%), and the Rutba station did not record any recurrence, see Table (2).

During this period, recurrences of the Sudanese deep depression were recorded as the highest recurrence, with a total of (3.0) recurrences in Karbala and Najaf stations at a rate of (100%), and the stations of Nasiriyah and Samawah recorded one recurrence and at a rate of (100%), and the stations of Mosul, Rutba and Basra recorded the same recurrence with a total of (2.0) recurrences and in percentages according to respectively (20.0%, 50.0%, 100%) and the rest of the stations did not record any recurrence, see Table (2).

In contrast to the deep recurrences, the frequencies of the shallow Sudanese depression increased, ranging between (21.0) recurrences in Erbil station, at a rate of (100%) and (1.0) in Baghdad station at a rate of (100%), and the repetitions were recorded in Sulaymaniyah and Kirkuk stations in total (20.0, 5.0).) recurrences at a rate of (100%), and the frequencies in Mosul and Khanaqin stations were equal, with a total of (8.0) recurrences and at a rate of (80.0%, 100%), and the stations of Najaf and Karbala recorded the same repetition with a total of (3.0) recurrences and at a rate of (100%). (2.0) recurring with two percentages (50.0%, 100%). Rutba, Samawah, Nasiriyah and Basra stations were free of any recurrence, see table (2).

As for the frequencies of the Mediterranean-Sudanese deep integrated depression during this period, its frequencies ranged (13.0) recurrences in Erbil and Sulaymaniyah stations, with rates (72.2%, 76.5%) and (1.0) in Nasiriyah station at a rate of (16.7%), and Mosul and Baghdad stations recorded varying frequencies. Two totals (9.0, 5.0) recurrences and two percentages (90.0%, 55.6%) the frequencies were equal in Kirkuk, Khanaqin and Najaf stations with a total of (6.0%) recurrences and percentages, respectively (54.5%, 85.7%, 100%), while the neighborhood, Karbala and Basra stations recorded the same frequency with a total of (4.0) recurrences and percentages, respectively (66.7%, 44.4%, 80.0%) and Al-Rutbah and Samawah stations shared iterations with a total of (2.0) recurrences and with two percentages (50.0%,

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100%) see table (2).

During this period, the frequencies of the shallow combined depression decreased compared to the deep, and its frequencies ranged between (5.0) recurrences in the stations of Erbil, Kirkuk, Karbala and Nasiriyah, with percentages, respectively (27.8%, 45.5%, 55.6%, 83.3%) and (1.0) frequently in the stations of Mosul, Khanaqin and Basra. At rates, respectively (10.0%, 14.3%, 20.0%), Sulaymaniyah and Baghdad stations recorded the same frequency with a total of (4.0) recurrences and two rates (23.5%, 44.4%), and the frequencies were equal in Rutba and Al-Hayy stations, with a total of (2.0) recurrences and two rates (50.0%, 33.3%), the stations of Samawah and Najaf were free of any recurrence, see Table (2).

Table (2) Classification of air depressions (deep and shallow) affecting the variation in daily rain concentration for the month of January in Iraq

The station	ا.ت.ا	Mediterranean depression			Sudanese depression m-s			Combined depressions:			Combined depressions m-q			indian depression			The station	Mediterranean depression			Sudanese depression m-s			Combined depressions:			Combined depressions m-q			indian depression		
		deep	shallow	the total	deep	shallow	the total	deep	shallow	the total	deep	shallow	the total	deep	shallow	the total		deep	shallow	the total	deep	shallow	the total	deep	shallow	the total	deep	shallow	the total	deep	shallow	the total
Mosul	1 -10	10.0	5.0	15.0	4.0	6.0	10.0	4.0	1.0	5.0	-	1.0	1.0	-	-	-	Al-Hayy	3.0	2.0	5.0	2.0	1.0	3.0	1.0	-	1.0	-	-	-	-	-	-
	%	66.7	33.3		40.0	60.0		80.0	20.0		-	100.0	-	-	-	-		60.0	40.0		66.7	33.3		100.0	-		-	-	-	-	-	-
	11 - 20	2.0	11.0	13.0	2.0	3.0	5.0	3.0	-	3.0	-	-	-	-	-	-		7.0	-	7.0	-	1.0	1.0	1.0	-	1.0	-	-	-	-	-	-
	%	15.4	84.6		40.0	60.0		100.0	-		-	-	-	-	-	-		100.0	-		-	100.0	-	100.0	-		-	-	-	-	-	-
	21 - 31	10.0	3.0	13.0	2.0	8.0	10.0	9.0	1.0	10.0	-	-	-	-	-	-		9.0	1.0	10.0	-	2.0	2.0	4.0	2.0	6.0	-	-	-	-	-	-
	%	76.9	23.1		20.0	80.0		90.0	10.0		-	-	-	-	-	-		90.0	10.0		-	100.0		66.7	33.3		-	-	-	-	-	-
	the total			41.0			25.0			18.0			1.0	-	-	-				22.0			6.0			8.0	-	-	-	-	-	-
Erbil	1 -10	22.0	10.0	32.0	2.0	18.0	20.0	12.0	-	12.0	-	1.0	1.0	-	-	-	Karbala	8.0	2.0	10.0	-	-		3.0	-	3.0	-	-	-	-	-	-
	%	68.8	31.3		10.0	90.0		100.0	-		-	100.0		-	-	-		36.4	9.1		-	-		100.0	-		-	-	-	-	-	-
	11 - 20	17.0	13.0	30.0	-	20.0	20.0	4.0	-	4.0	-	-	-	-	-	-		7.0		7.0	-	2.0	2.0	-	-	0.0	-	-	-	-	-	-
	%	56.7	43.3		-	100.0		100.0	-		-	-	-	-	-	-		100.0			-	100.0		-	-		-	-	-	-	-	-
	21 - 31	25.0	5.0	30.0	-	21.0	21.0	13.0	5.0	18.0	-	-	-	-	-	-		11.0	2.0	13.0	-	2.0	2.0	4.0	5.0	9.0	-	-	-	-	-	-
	%	83.3	16.7		-	100.0		72.2	27.8		-	-	-	-	-	-		84.6	15.4		-	100.0		44.4	55.6		-	-	-	-	-	-
	the total			92.0			61.0			34.0			1.0							30.0			4.0			12.0	-	-	-	-	-	-
Sulaymaniyah	1 -10	20.0	4.0	24.0	2.0	21.0	23.0	10.0	-	10.0	-	1.0	1.0	-	-	-	Najaf	8.0	2.0	14.0	-	-	-	2.0	-	2.0	-	-	-	-	-	-
	%	83.3	16.7		8.7	91.3		100.0	-		-	100.0		-	-	-		85.7	14.3		-	-	-	100.0	-		-	-	-	-	-	-
	11 - 20	16.0	13.0	29.0	-	20.0	20.0	4.0	-	4.0	-	-	-	-	-	-		5.0	-	5.0	-	-	-	1.0	-	1.0	-	-	-	-	-	-
	%	55.2	44.8		-	100.0		100.0	-		-	-	-	-	-	-		100.0	-		-	-	-	100.0	-		-	-	-	-	-	-
	21 - 31	23.0	6.0	29.0	-	20.0	20.0	13.0	4.0	17.0	-	-	-	-	-	-		11.0	1.0	12.0	-	3.0	3.0	6.0	-	6.0	-	-	-	-	-	-
	%	79.3	20.7		-	100.0		76.5	23.5		-	-	-	-	-	-		91.7	8.3		-	100.0		100.0	-		-	-	-	-	-	-
	the total			82.0			63.0			31.0			1.0	-	-	-				31.0			3.0			9.0	-	-	-	-	-	-
Kirkuk	1 -10	13.0	1.0	14.0	1.0	6.0	7.0	3.0	2.0	5.0	-	-	-	-	-	-	Samawah	5.0	4.0	11.0	1.0	-	1.0	-	-	-	-	-	-	-	-	-
	%	92.9	7.1		14.3	85.7		60.0	40.0		-	-	-	-	-	-		55.6	44.4		100.0	-		-	-		-	-	-	-	-	-
	11 - 20	8.0	-	8.0	-	4.0	4.0	4.0	2.0	6.0	-	-	-	-	-	-		6.0	-	6.0	-	-	-	-	-	-	-	-	-	-	-	-
	%	100.0	-		-	100.0		66.7	33.3		-	-	-	-	-	-		100.0	-		-	-	-	-	-		-	-	-	-	-	-
	21 - 31	12.0	4.0	16.0	-	5.0	5.0	6.0	5.0	11.0	-	-	-	-	-	-		9.0	1.0	10.0	1.0	-	1.0	2.0	-	2.0	-	-	-	-	-	-
	%	75.0	25.0		-	100.0		54.5	45.5		-	-	-	-	-	-		90.0	10.0		100.0	-		100.0	-		-	-	-	-	-	-
	the total			38.0			16.0			22.0	-	-	-	-	-	-				27.0			2.0			2.0	-	-	-	-	-	-
Khanqin	1 -10	8.0	-	8.0	-	7.0	7.0	4.0	-	4.0	-	-	-	-	-	-	Nasiriyah	5.0	1.0	6.0	-	3.0	3.0	1.0	-	1.0	-	-	-	-	-	-
	%	100.0	-		-	100.0		100.0	-		-	-	-	-	-	-		83.3	16.7		-	100.0		100.0	-		-	-	-	-	-	-
	11 - 20	10.0	-	10.0	-	4.0	4.0	2.0	-	2.0	-	-	-	-	-	-		6.0	-	6.0	-	-	-	1.0	-	1.0	-	-	-	-	-	-
	%	100.0	-		-	100.0		100.0	-		-	-	-	-	-	-		100.0	-		-	-	-	100.0	-		-	-	-	-	-	-
	21 - 31	15.0	2.0	17.0	-	8.0	8.0	6.0	1.0	7.0	-	-	-	-	-	-		7.0	3.0	10.0	1.0	-	1.0	1.0	5.0	6.0	-	-	-	-	-	-
	%	88.2	11.8		-	100.0		85.7	14.3		-	-	-	-	-	-		70.0	30.0		100.0	-		16.7	83.3		-	-	-	-	-	-
	the total			35.0			19.0			13.0				-	-	-				22.0			4.0			8.0	-	-	-	-	-	-
Rut	1 -10	4.0	-	4.0	2.0	-	2.0	1.0		1.0		1.0	1.0	-	-	-	Basrah	3.0	2.0	5.0	-	3.0	3.0	-	1.0	1.0	-	-	-	-	-	-
	%	100.0	-		100.0	-		100.0				100.0		-	-	-		60.0	40.0		-	100.0		-	100.0		-	-	-	-	-	-
	11 - 20	5.0	-	5.0	-	2.0	2.0	1.0		1.0	-	-	-	-	-	-		4.0	-	4.0	-	-	-	1.0	1.0	2.0	-	-	-	-	-	-
	%	100.0	-		-	100.0		100.0			-	-	-	-	-	-		100.0	-		-	-	-	50.0	50.0		-	-	-	-	-	-
	21 - 31	9.0	-	9.0	2.0	2.0	4.0	2.0	2.0	4.0	-	-	-	-	-	-		8.0	1.0	9.0	2.0	-	2.0	4.0	1.0	5.0	-	-	-	-	-	-
	%	100.0	-		50.0	50.0		50.0	50.0		-	-	-	-	-	-		88.9	11.1		100.0	-		80.0	20.0		-	-	-	-	-	-
	the total			18.0			8.0			6.0			1.0	-	-	-				18.0			5.0			8.0						
Baghdad	1 -10	2.0	2.0	4.0	2.0	1.0	3.0	2.0	3.0	5.0	-	1.0	1.0	-	-	-																
	%	50.0	50.0		66.7	33.3		40.0	60.0		-	100.0		-	-	-																
	11 - 20	7.0	-	7.0	-	2.0	2.0	2.0	-	2.0	-	-	-	-	-	-																
	%	100.0	-		-	100.0		100.0	-		-	-	-	-	-	-																
	21 - 31	8.0	2.0	10.0	-	1.0	1.0	5.0	4.0	9.0	-	-	-	-	-	-																
	%	80.0	20.0		-	100.0		55.6	44.4		-	-	-	-	-	-																
	the total			21.0			6.0			16.0			1.0																			

Source: From the work of the researcher, based on: 1- Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Department, unpublished data. 2- Analysis of the weather maps accompanying the rainy days published on the website www.vortex.plymouth.edu

February

Table (3) indicates that the frequency of the Mediterranean deep depression during the first period of the month ranged between 19.0 in the Sulaymaniyah station at (79.2%) and (3.0) in the Basra station at (100%), and the Erbil, Kirkuk, Najaf and Samawa stations recorded a frequency of Variable, respectively, with totals (17.0, 8.0, 9.0, 7.0) in frequency, and the depression in Erbil and Samawa stations contributed by two percentages (89.5%, 87.5%), while

it contributed in Kirkuk and Najaf stations by (100%), and the frequency was equal in Mosul, Khanaqin and Al-Hay stations with a total of (5.0) repeatedly, and the Mosul and Al-Hay stations recorded the same percentage (100%) and Khanaqin station received a percentage of (62.5%), while the frequencies in Baghdad, Al-Rutba and Nasiriyah stations were equal, with a total of (6.0) recurrences and at percentages, respectively (75.0%, 85.7%, 100%), and they shared The stations of Kirkuk and Karbala in frequencies with a total of (8.0) recurrences and in two percentages (100%, 88.8%), During this period, a concentration of deep depressions was recorded in the stations of Sulaymaniyah, Erbil, Kirkuk, Rutba, Karbala and Najaf.

The shallow frequencies of the Mediterranean depression during this period were limited to the stations of Erbil, Khanaqin, Sulaymaniyah, Rutba, Baghdad, Karbala and Samawa; Its frequencies ranged between (5.0) recurrences in Sulaymaniyah station, (20.8%) and (1.0) recurrences in Al-Rutba, Karbala and Samawa stations, respectively (14.3%, 11.1%, 12.5%), and Erbil and Baghdad stations recorded the same frequency with a total of (2.0). Frequently and at two rates (10.5%, 25.0%), while the stations of Mosul, Kirkuk, Al-Hayy, Najaf, Nasiriyah and Basra were devoid of any recurrence, see Table (3)

During this period, the frequencies of the Sudanese deep depression ranged between (5.0) recurrences in Erbil station, at a rate of (22.7%) and (1.0) in the Rutba and Nasiriyah stations, at two rates (100%, 33.3%), and the frequencies were equal in the stations of Mosul, Baghdad, Karbala, Samawah and Basra, with a total of (3.0) Frequently, the stations of Mosul, Baghdad and Basra recorded varying percentages, respectively (33.3%, 60.0%, 27.3%), while Karbala and Samawa stations were equal at (75.0%), and Kirkuk, Khanaqin and Al-Hayy stations shared a total of (2.0) recurrences, and the low frequencies contributed to the two stations of Kirkuk. and Khanaqin by (25.0%) and contributed to the neighborhood station by (100%), and the Najaf station recorded a total of (4.0) recurrences and by (100%), while the Sulaymaniyah station was devoid of any recurrence.

The shallow frequency of the Sudanese depression increased compared to the deep in some stations; It ranged between (17.0) recurrences in Erbil station, at a rate of (77.3%) and (1.0) recurrences in Karbala and Samawah stations, at a rate of (25.0%), and Sulaymaniyah and Basra stations recorded recurrences in two groups (16.0, 8.0) and two rates (100%, 72.7%). And the frequencies were equal in Nasiriyah and Baghdad stations, with a total of (2.0) recurrences and two rates (66.7%, 40.0%), and the stations of Mosul, Kirkuk and Khanaqin recorded the same frequency with a total of (6.0) iterations, and the Mosul station recorded a rate of (66.7%), while Kirkuk and Khanaqin stations shared a percentage of (75.0%), Al-Rutba, Al-Hay and Al-Najaf stations did not record any recurrence, see Table (3).

As for the frequencies of the Mediterranean-Sudanese deep integrated depression during this period, and ranged between (9.0) recurrences in Erbil and Sulaymaniyah stations, (100%) and (1.0) recurrences in Khanaqin, Rutba, Baghdad and Al-Hay stations, Khanaqin and Baghdad stations obtained the same percentage (33.3%), while Al-Rutba and Al-Hay stations shared a percentage of (50.0%), and Mosul and Najaf stations shared a total of (4.0) recurrences and two rates (57.1%, 100%), and the frequencies were equal in Kirkuk, Samawa, Nasiriyah and Basra stations with a total of (2.0) iterations, and the low contributed in the Kirkuk and Nasiriyah stations. At a rate of (66.7%), the percentage was equal in Samawah and Basra stations (100%), and Karbala station was unique with a total of (3.0) recurrences and a percentage of (75.0%).

The frequencies of the shallow depression during this period ranged between (3.0)

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recurrences in Mosul, at a rate of (42.9%) and (1.0) in the stations of Kirkuk, Rutba, Al-Hayy, Karbala and Nasiriyah, and the depression in Kirkuk and Nasiriyah stations contributed by (25.0%), (2.0) recurrences at a rate of (66.7%), and the stations of Erbil, Sulaymaniyah, Najaf, Samawah and Basra were free of any shallow recurrences, see Table (3).

During **the middle period** of the month, it witnessed a concentration of the deep Mediterranean low recurrences in the Sulaymaniyah, Al-Rutbah and Al-Hay stations, and its frequencies ranged between (16.0) recurrences in the Sulaymaniyah station and at a rate of (80.0%) and (1.0) in the Basra station at a rate of (100%), and the frequencies varied in the two stations Erbil and Baghdad with two totals (13.0, 4.0) recurrences and at rates of (61.9%, 80.0%) and Khanaqin, Al-Rutbah, Najaf and Samawa stations recorded the same repetition with a total of (6.0) recurrences. The stations of Mosul, Hay and Karbala have the same frequency with a total of (5.0) recurrences and percentages, respectively (41.7%, 71.4%, 100%). The stations of Kirkuk and Nasiriyah shared the same frequencies with a total of (7.0) recurrences and with two percentages (87.5%, 100%), see Table (3).

As for the frequencies of the shallow depression during this period, its frequencies ranged between (8.0) recurrences in Erbil station and at a rate of (38.1%) and (1.0) recurrences in Kirkuk, Baghdad and Basra stations, and at rates, respectively (12.5%, 20.0%, 50.0%), and Mosul and Sulaymaniyah stations were recorded The stations of Khanaqin, Al-Hayy and Samawa recorded the same recurrence with a total of (2.0) recurrences, and the stations of Khanaqin and Samawa were equal at (25.0%) and the neighborhood station was alone with a percentage of (28.6%), and it was not recorded. Rutba, Karbala, Najaf and Nasiriyah stations, any repetition of the shallow Mediterranean depression.

The occurrences of the deep Sudanese depression are few; During this period, it ranged between (9.0) recurrences in Erbil station at a rate of (60.0%) and (1.0) recurrence in Nasiriyah and Basra stations at a rate of (100%), and Sulaymaniyah was unique with a total of (8.0) recurrences at a rate of (50.0%), and the frequencies were equal in stations Mosul, Kirkuk, Khanaqin and Rutba with a total of (4.0) recurrences, and the depression in the two stations of Mosul and Kirkuk contributed by two percentages (80.0%, 40.0%). Baghdad, Karbala and Samawah stations with a percentage of (100%), and Al-Hayy and Najaf stations recorded two percentages (40.0%, 66.7%), see table (3).

As for the frequencies of the shallow Sudanese depressions, their frequencies decreased compared to the first period in some stations, and ranged between (8.0) recurrences in the Sulaymaniyah station and at a rate of (50.0%) and (1.0) frequently in the Mosul and Najaf stations, at rates of (20.0%, 33.3%), and the frequencies were equal in the two stations Erbil and Kirkuk with a total of (6.0) recurrences and two rates (40.0%, 60.0%), and the neighborhood station was alone with a total of (3.0) recurrences and a percentage of (60.0%), and the stations of Khanaqin, Al-Rutba, Baghdad, Karbala, Samawah, Nasiriyah and Basra were free of recurrences, see table (3).

During this period, a concentration of the frequencies of the deep Mediterranean-Sudanese integrated depression were recorded in the stations of Mosul, Erbil, Sulaymaniyah, Kirkuk, Rutba, Al-Hayy, Karbala, Samawah and Nasiriyah, and its frequencies ranged between (14.0) recurrences in Sulaymaniyah station with a rate of (87.5%) and (1.0) iterations in Basra station at a rate of (50.0) The stations of Erbil, Kirkuk, Mosul and Khanaqin recorded varying frequencies, respectively, with totals (13.0, 9.0, 8.0, 7.0) and the depression in Erbil and Kirkuk

stations contributed in close proportions (81.3%, 81.8%), and the two stations of Mosul and Khanaqin recorded (80.0%, 100%), and the frequencies were recorded in the Rutba and Nasiriyah stations in two totals (6.0, 2.0) recurrences and at two rates (100%, 66.7%), and the frequencies were equal in the stations of Baghdad, Al-Hayy, Karbala, Najaf and Samawa with a total of (3.0) recurrences, and the low contributed in Baghdad, Karbala and Samawa stations by (75.0%) Al-Hayy and Al-Najaf stations recorded two percentages (60.0%, 100%)

As for the frequencies of the shallow combined depression, it ranged during this period between (3.0) recurrences in Erbil station, at a rate of (18.8%) and (1.0) recurrences in Baghdad, Karbala, Samawah, Nasiriyah and Basra stations. By (25.0%), and the depression in Nasiriyah and Basra stations contributed by two percentages (33.3%, 50.0%), and the stations of Mosul, Sulaymaniyah, Kirkuk and Al-Hay recorded a total of (2.0) recurrences and at rates, respectively (20.0%, 12.5%, 18.2%, 40.0%), while Khanaqin, Rutbah and Najaf stations did not record any recurrence of the shallow depression seen in Table (3).

During **the last period**, the frequencies of the Mediterranean deep depression were concentrated in the stations of Mosul and Baghdad, and its frequencies ranged between (14.0) recurrences in the Erbil station and at a rate of (82.4%) and (2.0) in the Basra station at a rate of (100%), and the stations of Sulaymaniyah, Mosul and Baghdad recorded varying frequencies with totals Respectively (12.0, 8.0, 7.0) recurrences, and Sulaymaniyah station was alone with (80.0%) and Mosul and Baghdad stations were equal (100%), and the stations of Kirkuk, Khanaqin, Al-Hayy, Najaf and Samawa recorded the same recurrence with a total of (4.0) recurrences and with percentages, respectively (50.0%, 66.0%), 80.0%), except for Al-Hayy and Samawa stations, which recorded the same rate (100%), and the frequencies were equal in Rutba and Nasiriyah stations, with a total of (5.0) recurrences and a rate of (83.3%), and Karbala station was unique with a total of (3.0) recurrences and a percentage of (75.0) see the table (3).

As for the frequencies of the shallow Mediterranean depression, they ranged during this period between (4.0) recurrences in Kirkuk station and at a rate of (50.0%) and (1.0) frequently in the stations of Rutba, Karbala, Najaf and Samawah, and at rates, respectively (16.0%, 25.0%, 20.0%, 16.7%), and recorded Erbil and Sulaymaniyah stations have the same frequency with a total of (3.0) recurrences and at two rates (17.6%, 20.0%), and the repetitions were recorded in Khanaqin station with a total of (2.0) recurrences and a percentage of (33.3%), and the stations of Mosul, Baghdad, Al-Hayy, Samawah and Basra were free of any recurrence, see Table (3).

The frequency of the Sudanese deep depression decreased during this period compared to the frequency of the shallow depression; Its frequency ranged between (4.0) recurrences in Khanaqin and Baghdad stations, with rates (80.0%, 100%) and (1.0) recurring in Sulaymaniyah, Mosul, Kirkuk, Rutba, Al-Hayy, Samawah and Nasiriyah stations, with percentages respectively (7.7%, 14.3%, 20.0%, 25.0%, 50.0%), with the exception of Samawah and Nasiriyah stations, the same percentage was recorded (33.3%), and the frequency was equal in Erbil, Karbala and Najaf stations, with a total of (2.0) iterations, and the low contributed in Erbil station by (20.0%) and it contributed in Karbala and Najaf stations by (100%), while Basra station did not record any recurrence, see Table (3).

As for the frequencies of the shallow Sudanese depression, it ranged between (12.0) recurrences in the Sulaymaniyah station, and at a rate of (92.3%) and (1.0) in the Khanaqin and Al-Hayy Basra stations, respectively (20.0%, 50.0%, 100%), and Erbil, Mosul, Kirkuk and Rutba stations recorded recurrences They varied, respectively, with totals of (8.0, 6.0, 4.0, 3.0) and the

stations of Erbil and Kirkuk were equal by (80.0%), and the Mosul and Rutba stations recorded two rates (85.7%, 75.0%), and the frequencies were equal in Samawah and Nasiriyah stations, with a total of (2.0) iterations and a rate of (66.7) The stations of Baghdad, Karbala and Najaf were free of any repetition, see Table (3).

During this period, the frequency of the deep Mediterranean-Sudanese merging depression increased; It ranged between (8.0) recurrences in Erbil, Sulaymaniyah and Basra, with rates respectively (50.0%, 53.3%, 88.9%) and (1.0) recurrences in Basra and Najaf stations with rates of (11.1%, 16.7%), and the frequencies were equal in Mosul and Kirkuk stations with a total of (7.0)) recurrences in two percentages (46.7%, 87.5%), while the recurrences were recorded in the Rutba and Baghdad stations with a total of (4.0) recurrences, and the low contributed in the Baghdad and Rutba stations by (100%), and Khanaqin, Karbala, Samawa and Nasiriyah stations shared the same repetition with a total of (2.0) iterations and the low contributed In Khanaqin and Nasiriyah stations, at rates (33.3%, 66.7%), Karbala and Samawah stations were equal at (50.0%), and Najaf and Al-Hay stations recorded total (5.0, 3.0) recurrences and at rates of (83.3%, 100%).

While the frequencies of the shallow merged depression during this period ranged between (8.0) frequently in Mosul and Erbil stations, at rates (53.3%, 50.0%) and (1.0) in Kirkuk, Nasiriyah, Najaf and Basra stations at rates (12.5%, 33.3%, 16.7%, 11.1%).) Its frequencies varied in Sulaymaniyah and Khanaqin stations with a total of (7.0, 4.0,) recurrences and a rate of (46.7%, 66.7%), and the Karbala and Samawah stations recorded the same recurrence with a total of (2.0) recurrences and a rate of (50.0%). Shallow merging seen in Table (3).

Table (3) Classification of air depressions (deep and shallow) affecting the variation in daily rain concentration for the month of February in Iraq

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The station	الدرجات	Mediterranean depression			Sudanese depression m-s			Combined depressions:			Combined depressions m-q			indian depression			The station	Mediterranean depression			Sudanese depression m-s			Combined depressions:			Combined depressions m-q			indian depression		
		deep	shallow	the total	deep	shallow	the total	deep	shallow	the total	deep	shallow	the total	deep	shallow	the total		deep	shallow	the total	deep	shallow	the total	deep	shallow	the total	deep	shallow	the total	deep	shallow	the total
Mosul	1 -10	5.0	-	5.0	3.0	6.0	9.0	4.0	3.0	7.0	-	-	-	-	-	-		5.0	-	5.0	2.0	-	2.0	1.0	1.0	2.0	-	-	-	-	-	-
	%	100.0	-		33.3	66.7		57.1	42.9		-	-	-	-	-	-		100.0	-		100.0	-	100.0	50.0	50.0		-	-	-	-	-	-
	11 - 20	5.0	7.0	12.0	4.0	1.0	5.0	8.0	2.0	10.0	-	1.0	1.0	-	-	-		5.0	2.0	7.0	2.0	3.0	5.0	3.0	2.0	5.0	-	-	-	-	-	-
	%	41.7	58.3		80.0	20.0		80.0	20.0		-	100.0	-	-	-	-		71.4	28.6		40.0	60.0	100.0	60.0	40.0		-	-	-	-	-	-
	21 - 31	8.0	-	8.0	1.0	6.0	7.0	7.0	8.0	15.0	-	-	-	-	-	-		4.0	-	4.0	1.0	1.0	2.0	3.0	-	3.0	-	-	-	-	-	-
	%	100.0	-		14.3	85.7		46.7	53.3		-	-	-	-	-	-		100.0	-		50.0	50.0	100.0	100.0	-		-	-	-	-	-	-
	the total			25.0			21.0			32.0			1.0							16.0			9.0			10.0	-	-	-			
Erbil	1 -10	17.0	2.0	19.0	5.0	17.0	22.0	9.0	-	9.0	-	-	-	-	-	-	Karbala	8.0	1.0	9.0	3.0	1.0	4.0	3.0	1.0	4.0	-	-	-	-	-	-
	%	89.5	10.5		22.7	77.3		100.0	-		-	-	-	-	-	-		88.9	11.1		75.0	25.0		75.0	25.0		-	-	-	-	-	-
	11 - 20	13.0	8.0	21.0	9.0	6.0	15.0	13.0	3.0	16.0	-	1.0	1.0	-	-	-		5.0	-	5.0	2.0	-	2.0	3.0	1.0	4.0	-	-	-	-	-	-
	%	61.9	38.1		60.0	40.0		81.3	18.8		-	100.0	-	-	-	-		100.0	-		100.0	-		75.0	25.0		-	-	-	-	-	-
	21 - 31	14.0	3.0	17.0	2.0	8.0	10.0	8.0	8.0	16.0	-	-	-	-	-	-		3.0	1.0	4.0	2.0	-	2.0	2.0	2.0	4.0	-	-	-	-	-	-
	%	82.4	17.6		20.0	80.0		50.0	50.0		-	-	-	-	-	-		75.0	25.0		100.0	-		50.0	50.0		-	-	-	-	-	-
	the total			57.0			47.0			41.0			1.0							18.0			8.0			12.0	-	-	-			
Sulaymaniyah	1 -10	19.0	5.0	24.0	-	16.0	16.0	9.0	-	9.0	-	-	-	-	-	-	Najaf	9.0	-	9.0	4.0	-	4.0	4.0	-	4.0	-	-	-	-	-	-
	%	79.2	20.8		-	100.0		100.0	-		-	-	-	-	-	-		100.0	-		100.0	-		100.0	-		-	-	-	-	-	-
	11 - 20	16.0	4.0	20.0	8.0	8.0	16.0	14.0	2.0	16.0	-	1.0	1.0	-	-	-		6.0	-	6.0	2.0	1.0	3.0	3.0	-	3.0	-	-	-	-	-	-
	%	80.0	20.0		50.0	50.0		87.5	12.5		-	100.0		-	-	-		100.0	-		66.7	33.3		100.0	-		-	-	-	-	-	-
	21 - 31	12.0	3.0	15.0	1.0	12.0	13.0	8.0	7.0	15.0	-	-	-	-	-	-		4.0	1.0	5.0	2.0	-	2.0	5.0	1.0	6.0	-	-	-	-	-	-
	%	80.0	20.0		7.7	92.3		53.3	46.7		-	-	-	-	-	-		80.0	20.0		100.0	-		83.3	16.7		-	-	-	-	-	-
	the total			59.0			45.0			40.0			1.0							20.0			9.0			13.0	-	-	-			
Kirkuk	1 -10	8.0	-	8.0	2.0	6.0	8.0	2.0	1.0	3.0	-	-	-	-	-	-	Samawah	7.0	1.0	8.0	3.0	1.0	4.0	2.0	-	2.0	-	-	-	-	-	-
	%	100.0	-		25.0	75.0		66.7	33.3		-	-	-	-	-	-		87.5	12.5		75.0	25.0		100.0	-		-	-	-	-	-	-
	11 - 20	7.0	1.0	8.0	4.0	6.0	10.0	9.0	2.0	11.0	-	1.0	1.0	-	-	-		6.0	2.0	8.0	2.0	-	2.0	3.0	1.0	4.0	-	-	-	-	-	-
	%	87.5	12.5		40.0	60.0		81.8	18.2		-	100.0		-	-	-		75.0	25.0		100.0	-		75.0	25.0		-	-	-	-	-	-
	21 - 31	4.0	4.0	8.0	1.0	4.0	5.0	7.0	1.0	8.0	-	-	-	-	-	-		4.0	-	4.0	1.0	2.0	3.0	2.0	2.0	4.0	-	-	-	-	-	-
	%	50.0	50.0		20.0	80.0		87.5	12.5		-	-	-	-	-	-		100.0	-		33.3	66.7		50.0	50.0		-	-	-	-	-	-
	the total			24.0			23.0			22.0			1.0							20.0			9.0			10.0	-	-	-			
Khanaqin	1 -10	5.0	3.0	8.0	2.0	6.0	8.0	1.0	2.0	3.0	-	-	-	-	-	-	Nasiriyah	6.0	-	6.0	1.0	2.0	3.0	2.0	1.0	3.0	-	-	-	-	-	-
	%	62.5	37.5		25.0	75.0		33.3	66.7		-	-	-	-	-	-		100.0	-		33.3	66.7		66.7	33.3		-	-	-	-	-	-
	11 - 20	6.0	2.0	8.0	4.0	-	4.0	7.0		7.0	-	-	-	-	-	-		7.0	-	7.0	1.0	-	1.0	2.0	1.0	3.0	-	-	-	-	-	-
	%	75.0	25.0		100.0	-		100.0			-	-	-	-	-	-		100.0	-		100.0	-		66.7	33.3		-	-	-	-	-	-
	21 - 31	4.0	2.0	6.0	4.0	1.0	5.0	2.0	4.0	6.0	-	-	-	-	-	-		5.0	1.0	6.0	1.0	2.0	3.0	2.0	1.0	3.0	-	-	-	-	-	-
	%	66.7	33.3		80.0	20.0		33.3	66.7		-	-	-	-	-	-		83.3	16.7		33.3	66.7		66.7	33.3		-	-	-	-	-	-
	the total			22.0			17.0			16.0										19.0			7.0			9.0	-	-	-			
Ratba	1 -10	6.0	1.0	7.0	1.0	-	1.0	1.0	1.0	2.0	-	-	-	-	-	-	Basrah	3.0	-	3.0	3.0	8.0	11.0	2.0		2.0	-	-	-	-	-	-
	%	85.7	14.3		100.0	-		50.0	50.0		-	-	-	-	-	-		100.0	-		27.3	72.7		100.0			-	-	-	-	-	-
	11 - 20	6.0	-	6.0	4.0	-	4.0	6.0	-	6.0	-	-	-	-	-	-		1.0	1.0	2.0	1.0	-	1.0	1.0	1.0	2.0	-	-	-	-	-	-
	%	100.0	-		100.0	-		100.0	-		-	-	-	-	-	-		50.0	50.0		100.0	-		50.0	50.0		-	-	-	-	-	-
	21 - 31	5.0	1.0	6.0	1.0	3.0	4.0	4.0	-	4.0	-	-	-	-	-	-		2.0	-	2.0		1.0	1.0	8.0	1.0	9.0	-	-	-	-	-	-
	%	83.3	16.7		25.0	75.0		100.0	-		-	-	-	-	-	-		100.0	-			100.0		88.9	11.1		-	-	-	-	-	-
	the total			19.0			9.0			12.0										7.0			13.0			13.0	-	-	-			
Baghdad	1 -10	6.0	2.0	8.0	3.0	2.0	5.0	1.0	2.0	3.0	-	-	-	-	-	-																
	%	75.0	25.0		60.0	40.0		33.3	66.7		-	-	-	-	-	-																
	11 - 20	4.0	1.0	5.0	2.0	-	2.0	3.0	1.0	4.0	-	-	-	-	-	-																
	%	80.0	20.0		100.0	-		75.0	25.0		-	-	-	-	-	-																
	21 - 31	7.0	-	7.0	4.0	-	4.0	4.0		4.0	-	-	-	-	-	-																
	%	100.0	-		100.0	-		100.0			-	-	-	-	-	-																
	the total			20.0			11.0			11.0																						

Source: From the work of the researcher, based on: 1- Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Department, unpublished data. 2- Analysis of the weather maps accompanying the rainy days published on the website

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The study concluded:

1- There is a discrepancy in the frequency of depressions in terms of their depth and shallowness, between one region and another, between one season and another, and between one month and another.

2- The deep Mediterranean depression dominated the atmosphere during the months of January and February, especially in the northern stations, followed by the merged Mediterranean-Sudanese depression, and finally the Sudanese depression.

3- The shallow Sudanese depression recorded the highest frequency among the shallow depressions, and the Sudanese depression recorded control of the atmosphere during the months of March and April, and this does not mean that other depressions were not present.

4- The frequency of the Mediterranean depression decreased during the month of April compared to the Sudanese and the merged depression.

5- The highest frequency of the Mediterranean deep depression was recorded during the months of December and February during the first period, while the months of March and April recorded the highest frequency during the middle period.

6- The Sudanese shallow depression dominated with the highest frequency during the first period in all the months covered by the study, and the Sulaymaniyah station recorded the highest frequency during the month of April with a total of (29) in the Sulaymaniyah station.

7- The deep merging depression witnessed its concentration during the last period during the months of January and April, while it witnessed its concentration during the middle period during the months of February and March, and the highest frequency was recorded during the month of March in Erbil station with a total of (17.0)

Sources

1. Al-Husseinawi, Aziz Kuti Hussein, directions and wind speed in Iraq, a master'sthesis (unpublished) College of Education / University of Basra, 2002.
2. Al-Daziy, Salar Ali, Concepts and Theories of Holistic Climatology, Dar Al-Raya for Publishing and Distribution, Amman, 2014.
3. Al-Dazi, Salar Ali, The Climate of Ancient and Contemporary Iraq, House of General Cultural Affairs, 1st Edition, 2013.
4. Shehadeh, Numan, Climatology, Dar Al-Safa Publishing, 1, 2009
5. Al-Kinani, Malik Nasser Abboud, The repetition of pressure systems and their impact on the variation in the characteristics of surface winds in Iraq, PhD thesis (unpublished) College of Education Ibn Rushd / University of Baghdad, 2011.
6. Mutashar, Hind Hassan, Weather turbulence in Iraq, PhD thesis (unpublished) College of Education / Wasit University, 2020.
7. Al-Husseinawi, Aziz Kuti Hussein, directions and wind speed in Iraq, a master's thesis (unpublished) College of Education / University of Basra, 2002.
8. Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Department, data (unpublished).
9. the website www.vortex.plymouth.edu.