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Study of the Conditions of Air Depressions in Determining the Intensity of Rainfalls Over Iraq

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Abstract:
Due to the fact that Iraq is located in the tropical mid-latitude region, it has become necessary to study the impact of the abundant depressions and rain conditions affecting the country because of its importance in agriculture, urbanization, and the preservation of life and property. The study highlighted the prevailing frontal depressions mostly in this region, and this was done through analyzing and interpreting the maps in which the GrADS program was used and information from the mission of the Center for Tropical Rain Measurement (TRMM), where the first three torrential rainy cases addressed on January 25, 2012 were studied. And the second case on January 28, 2013, and the third case on October 28, 2015, and important points have been reached within the air depression through which to identify and predict the abundant rain condition over the country, which is in a nutshell the values of the low elevation lines clearly, the number of closed isobar lines indicating Depth of air depression, thermal slope and warm and cold thermal progress, negative anchored velocity values are a strong indication of the lifting of air to the top and the intensity of a rainstorm, the presence of sufficient humidity in the lower and upper atmosphere, a decrease in the dew value is an indication of saturation or not, the convergence of the isobar lines is indicated on the slope Strong pressure and active wind movement, as well as the convergence of isotherm lines, is an indication of strong thermal slope, which is usually near the frontal region Between warm and cold masses, the orthogonality of the isotherm lines on the isobar lines is an indication of warm or cold thermal progression and according to the characteristics of the weather system.

Keywords: Rainfall, Air depression, GrADS, Relative vorticity, Geopotential height.

INTRODUCTION:

The importance of torrential rain and rain on the countries of the world is not apparent to us, and because of its importance in knowing and defining the size of rain precipitation and its impact on the environment and society, and its importance also emerges through issuing warnings and normalization regarding torrential and torrential heavy rain events accompanying deep weather depressions, tropical storms and hurricanes, and preserving The environment and society before the occurrence of severe damages and reducing as much as possible the size of human and material losses, and the importance also emerges by

taking advantage of the large amount of rain for the purposes of storage and the filling of dams and reservoirs.The research aims to study the atmospheric depressions affecting the country and monitor the torrential rain situation through an analytical and descriptive understanding of the predictive maps. The outputs of the (GrADS) program for the weather and during the day. The study is of course above the country. Through studying, interpreting and analyzing maps and studying the conditions of the depression, it is possible to anticipate and predict the abundant rainy state through the existing data and with calculations in which the estimation of distance and time is possible. Heavy and heavy rains have been adopted by the value and division of the World Meteorological Organization.The middle latitude climate region is existing between the pole ward borders of the subtropical high pressure systems (approximate, 35 N and S), and the starting of the polar circulations (approximate, 60 N and S). for numerous years' middle latitude climate were referred to as climates of the temperature region [1]. The occurrence of Iraq within the northern temperate zone with high atmospheric pressure, between two latitudes (29.5-37.18 north), has gained its sub-continental climate affected by the Mediterranean climate. The climate of Iraq is characterized by being hot, dry, summer and cold, rainy in winter, and also by the widening of the daily and annual thermal range due to the lack of extensive water bodies that reduce the coldness of winter and the heat of summer. The country is affected in winter by the depressions coming from the southeast direction, to form warm fronts with the depressions of the Mediterranean and help with rain. As for the summer, Iraq is affected by hot, humid winds on the southern and central parts of it, causing high temperatures. Rain falls in the winter and fall seasons and there is no summer. The period between (November-April) is the most humid and represents more than 90% of the periods of precipitation. There is a clear variation of rain according to the geographical regions, as they decrease as we head from the northeast to the southwest, where they reach more than 700 mm in the northeastern regions of Sulaimaniyah, and they may reach more than 1000 mm in the highlands of Zakros in the far northeast, while the average annual total precipitation is less from 100 mm in the southwestern regions of the country [2]. There are several of research about rainfall and severe rainfall like: Shatha I. Jafaar, Jasim H. Khadum (2019) [3] The study used processes of dynamic analysis of severe rains in Iraq. by research and study the results of the four selected stations, the dynamic study disply that the base sources of rainstorms in Iraq and neighboring countries are the Mediterranean, low and Sudan, which across the Red Sea, and there are cases that demonstrated the merging of the two joined to the air disturbance. Salman et al., (2017) [4] through studying a non-directional method for the heaver stages of daily rainfall in Iraq, which inclusive estimating daily rainfall data for a long period (1965-2015), the study demonstrates a decrease in rainfall, include heavy rains during the year. Rosta et al, (2017) [5] He calculated the spatial pattern of rare instance of severe rainfall thresholds and variation in the ten-temporal spatial position at this road in the northwestern part of Iran. The difference presented a decrease in the trend in the limits of the severe precipitation in the last decades. Vries et al (2013) [6] he studied the transformation of moisture from the Arabian Sea and the Red Sea resulting from the dynamic processes of the active Red Sea, which led to severe rains over the Middle East. A cyclone is an area of low pressure around which the winds flow counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere [7]. Cold air advection, west of the trough will product sinking movement as the cold air descends for the surface behind the cold front, warm air advection, east of the trough will product rising movement near the center of the low as the warm air ascends, this sinking and rising cold and warm air cause to cold and warm air advection is named baroclinic instability, Baroclinic instability a necessary ingredient to the growth and build up in a mid-latitude cyclone. commonly need to have disturbance at the surface (region of lower pressure) normally along the polar front • as will need upper level support a short wave together associated upper level (low, trough) must be existing such that the upper level low to the

northwest of the surface low. The shortwave produce warm and cold air advection at a mid-upper levels (indicate to differential temperature advection). The differential temperature advection produce sinking and rising motion. At jet stream level, jet streaks in base of a trough produce areas of convergence west of the trough, and divergence east of the trough, without upper level assistance, surface disturbances cannot easily intensify [8].

GENERAL PRESENTATION:

850 hPa Chart: is a perfect for estimate low level warm air and cold air advection. Advection is a function to height contour spacing, the temperature gradient and the nook isotherms through height contours. Low level warm air advection participates on synoptic scale rising air and Low level cold air advection contributes to synoptic scale sinking air. Region of strong thermal gradient gives a sign of 850 hPa front and areas of convergence. Air rises sutible to low level convergence and confluence. Used dewpoint depression to locate if atmosphere is near saturation or dry at this level. To determine intensity of highs and lows: Deep low (surrounded by some height contours). Deep high (surrounded by some height contours) cover a wide spatial area. Neglect highs and lows not surrounded by at least one isohypse. Several highs located near each other refer to one wide area of high pressure and not a scattering of individual highs. For regions close to sea level the 850 hPa chart explain the top (or close to the top) of the planetary boundary layer. In the PBL friction and turbulent movement eddies are common. The wind blows at a extra constant speed and direction above the 850 hPa level. In high elevations regions such as the High Plains and Mountains, the 850 hPa level will be close to the surface or even below the surface. The 850 hPa chart is used as a substitution for the surface chart at high elevation regions while the 700 hPa chart is used as a substitution for the 850 hPa chart. The strongest thermal advections will be institute in the low levels of the atmosphere. These thermal advections are named either warm air advection (WAA) or cold air advection (CAA). The two isopleths offer on the 850 chart are isotherms and height contours. The combination of these two isopleths locate the amount of thermal dvection. Thermal advection is a function of three factors: the temperature gradient, the height contour spacing and the angle the isotherms make with the height contours. The temperature gradient is determined by how nearby the isotherms are to each other. Closely spaced isotherms increase the ratio of thermal advection, especially if the wind is strong and blowing cross the thermal gradient. The height contour spacing locates the strength of the wind. Closely spaced height contours will progres to stronger winds and the potential for a higher thermal advection. The third operator is the angle of isotherms to height contours. If isotherms are verticaly to height contours, then the advection potential is higher. Thermal advection is maximized the combination of: Closely spaced isotherms, Closely spaced height contours, Isotherms verticaly to height contours. Thermal advection is minimized by the combination of: widely spaced isotherms. Widely spaced height ontours. Isotherms equal to height contours. The next step is to determine whether the advection is cold air or warm air advection. If isotherms are closley your point of interest that are colder than the temperature at your point of interest, then it is cold air advection. If the isotherms are warmer thus it is warm air advection. An important parameter to study on the 850 chart is the dewpoint decline. Each reporting station will give a rate of the temperature and dewpoint depression in degrees Celsius. assume it is 17 Celsius with a 25 degree dewpoint depression. To find the dewpoint then, subtract the dewpoint depression from the temperature. The dewpoint is 17 - 25 = -8 ° C. If the dewpoint depression is small near the surface and 850 hPa, so the depth of near saturated conditions expands through the entire PBL, depending on elevation. Some 850 charts will show the temperature and dewpoint, not dewpoint depression. The dewpoint is always less than or similar to the

temperature. There will be a diffusion of highs and lows across the 850 chart. The key is to remove the highs and lows which are not significant. Lows with some of height contours surrounding them are important while those without contours are not key weather players and represent only a slight relative minimum of pressure. High pressure covers a big area than low pressure. At times you may see several high pressure above broad region. These highs can be classifying together into one high pressure region. The 700 hPa chart is the last of the low level charts. The 500 and 300 hPa charts are reflect the upper levels of the atmosphere. Many of the same operations analyzed on the 850 chart are also studied on the 700 mb chart. The trough/ridge pattern be more defined at the 700 hPa levels as compared to lower levels. A trough is merely a southern "bulge" in height contours while a ridge is a northerly showed"bulge". This "bulge" can be big (such as in federation with a mid-latitude cyclone) or small (such as a shortwave). One of the most concerted questions from beginning analysts is "What is a shortwave?". First, the height contours "kink" within a shortwave. This curve can be seen as lower heights displaced downwards from the overall height contour pattern. Second, temperature advection oftentimes occurs within the short wave. mostly, cold air advection is found to the left of the short wave axis with warm air advection to the right of the trough axis. The trough axis is sometimes describing as a dashed line going across the middle of the shortwave. Third, the capacity of a shortwave is small in comparison to a longwave trough. Below is a 700 hPa weather chart display examples of shortwaves. When examining model data at 700 hPa it is common for them to display upward vertical velocity. A good forecast strategy is to look at the 700 hPa forecast panels for the upward vertical velocity distribution then, locate what forces in the atmosphere are reason the upward or downward vertical velocities. there are three examples of shortwaves on a 700 hPa (UNISYS ETA) model panel. Find regions with low dewpoint depressions. Often this signal a deep layer of moisture. Use 700 hPa chart in combination with surface and 850 charts to locate depth of moisture. Locate strength of warm air advection, cold air advection and moisture advection. Thermal advection is a function to wind speed, wind direction, thermal gradient and isotherm angle of across with height contours. Locate strength of high pressure / low pressure, vigorous organizing low pressures tilt toward the northwest with height. Locate shortwaves. locate if shortwave is barotropic or baroclinic. The baroclinic shortwave is more probable to produce precipitation. Rain and storms are generally on exit sector of shortwave. contrast shortwave with other levels in the atmosphere. Rain is likely to right of shortwave especially if dewpoint decline are low. Weather is warmer than natural under ridges and cooler than natural under troughs. Search for the greatest height falls and height rises, these values give guide to how the trough/ridge style will change through time. 700 hPa front is existe where height contours kink, kinking height contours may also create a shortwave (especially if thermal advection is existe). A shortwave can existe in upper level front. When forecasters imagen of the 500 hPa chart one of the top words that arrive to their mind is vorticity. For operational targets, vorticity can be thought of purely as a counter clockwise or clockwise revolve. You already know that low pressure is compine with rising air and high pressure with sinking air. equal, a counterclockwise spin product positive vorticity while a clockwise spin in the Northern Hemisphere product negative vorticity. Three elements that productly vorticity are shear, curvature, and coriolis. Let's define every of these terms as they apply to 500 hPa vorticity. Shear: A change in wind speed over some horizontal distance. located at 500 hPa by test the spacing and rate of spacing change of height contours. Curvature: A change in wind direction over some horizontal area. This change will produce in either a counterclockwise or clockwise curvature. Coriolis (aka Earth): Coriolis is the spinning movement created by the Earth's rotation. If you stand up on the North Pole your body would make a full rotation in 24 hours. If you stand up on the equator your body would not spin but rather would face straightforward ahead as the earth turns. Therefore, coriolis is a maximum and increases toward the poles and a minimum and decreases

toward the equator. Coriolis vorticity also named earth vorticity is zero at the equator, increases when wind stream is toward the pole and decreases when wind stream is toward the equator. The magnitude and mark of each of these three terms locates the amount of absolute vorticity. Now we requir to know how these terms produce positive or negative vorticity.

Positive increasing vorticity: Wind speed increasing when movement away from center point of trough positive shear vorticity. A counter clockwise curvature in the wind stream, this happen in troughs and shortwaves, positive curvature vorticity. A south to north moving of air. Coriolis increases becomes more positive when movement from the equator toward the poles increasingly positive earth vorticity.

Negative decreasing vorticity: Wind speed decreasing when movement away from center point of trough negative shear vorticit. A clockwise curvature in the wind stream, this happen in ridges negative curvature vorticity. A north to south moving of air. Coriolis decreases becomes less positive when movement from the pole to the equator decreasingly positive earth vorticity. There are about 6 processes that can produce vorticity, four are positive earth vorticity is always positive in magnitude except zero at the equator but can increase or decrease consist on if the air flow is toward or away from the equator, and two are negative. It reasons that the more terms that are positive higher of value of absolute vorticity will be. The highest rates of vorticity are found often just to the south or east of a highly amplified trough. To the right of the trough winds will be from southerly orintation. This makes the coriolis expression increasingly positive. Winds are mostly light near the center of a trough with increasing winds away from the base of the trough. This makes the shear expression positive. If the trough is highly amplified, this will award a positive curvature vorticity expression. To simplify things further, lets look at a paper and pen representation of the 6 contributions to vorticity and these 6 contributions on 500 hPa chart. The term "negative earth vorticity" can be classify as positive earth vorticity decreasing with time. The term "positive earth vorticity" can be classify as positive earth vorticity increasing with time. Earth vorticity is forever positive with the only exception of being zero at the equator, earth vorticity domain from zero at the equator to a rate equal to the earth's angular momentum at the pole. The image that follows display the likely position of vorticity maximums. Again, vorticity maximums will be determined in areas where the awfully vorticity terms are positive and largely positive in magnitude. When looking at a vorticity plot or 500 hPa chart you should now define the processes in the atmosphere that are causingly the vorticity shear, curvature, coriolis vorticity. The strength of the wind is also quite important. All else being equal, stronger winds will product stronger vorticity in the base of a trough. The 500 hPa chart is the best for testing the total trough/ ridge pattern. Underneath troughs, temperatures are cooler than natural while under ridges warmer than natural. This is the best chart to estimate the magnitude of vorticity. Vorticity can be generated in three different ways: A. Curvature vorticity. B. Shear vorticity. C. Earth vorticity (Coriolis). High vorticity is an signal of ageostrophic flow and upper level divergence. This is the best chart in estimate the trough/ ridge pattern. A trough is an signal of cooler weather and possible precipitation while a ridge is an isignal of warmer weather and fair conditions. Greatest storminess is found to right of 500 hPa trough axis, a. Zonal flow - air stream is generally west to east, b. Meridional flow - highly grow up troughs and ridges. Use height falls and height rises to predict a move of troughs and ridges. Lows sign to develop toward regions with the greatest height falls while large height rises signal a ridge is building into the area. Temperatures at 500 hPa are rarely above 0° Celsius, temperatures can be above 0 ° Celsius at 500 hPa in a hurricane because the warm core nature of the storm. Look for shortwaves in the longwave flow. The atmosphere be unstable in association with shortwaves baroclinic instability ageostrophic flow. Precipitation is mostly at right of shortwave axis. The 500 and 700 hPa charts are the best to use when signal to shortwaves [9].

MATERIALS AND METHODOLOGIES:

We worked on archived torrential rain events and inclusive in the (GrADS) program to arrive at the conclusion of analyzing these severe rain conditions. The information is also from of Tropical rainfall measuring mission (TRMM), and during the results that emerged from the program (GrADS) in the shape of maps similar to Synoptic maps, the torrential rain situation or severe rainfall over the country was analyzed a demonstrate in three selected cases and the amount of rain precipitation was evaluated by referring to the World Meteorology Organization estimate, which considered that rain precipitation exceeding (50 mm / hour) is in range heavy precipitation and also reaches flooding, this was demonstrate by explaining maps and interpretation a variables in weather elements and weather systems, the depth of the low air pressure system and the rate of rain precipitation above the rate.

RESULTS AND DISCUSSION SEVERE RAINFALLS CASE OF 25, DEC, 2012:

By analyzing the outputs of the weather condition, dated 25 Dec 2012, a map of the average daily rainfall in millimeters, Figure 1a, shows that the average rainfall in the central region of the country (Diyala, Baghdad, Babil, Karbala, Anbar) ranged between (100-120 mm / day) heavy in spite of the rains distributed at lower rates on different regions of the country, also shows a pressure map at sea level, figure 1b that there are areas of low air pressure along a low stretch of the Red Sea, which is mainly from the Sudanese low impact and also moisture support from the Mediterranean in a way It is simple and clearly from the Arabian Gulf, the presence of quantities of clouds and densely in the areas mentioned above supports the moisture centers of the weather and certainly clouds of all kinds are present. There is wind activity in this central region of the country, as well as a decrease in the value of wind. It is a decrease that supports the area of low pressure as well as heat lines perpendicular to the flow lines, meaning there is a thermal decline and progress A warm direction from the southwest direction, as well as high relative humidity confined between (80-100%) at a layer of 850 hPa. The map of figure 1d show that there is a decrease in the geopotential height in the central region of the country and this supports the presence of an atmospheric depression as well as the relative spin increasing the value of relative vorticity i.e. the meaning of activity of the depression between (2-8 $1e^{-5}$), figure 1e show the vertical velocity in the air condition (omega) where negative values in the central region of the country indicate activity in the vertical movement and upward air area and the relative humidity is limited In the layer of 700 hPa between (70-90)% which is slightly less than the layer of 850 hPa, a map of figure 1f show a decrease in the geopotential height which is measured in units (decameters) and an increase in the relative spin with a value confined between (2-8 $1e^{-5}$) The pressure level maps of 500 hPa, figure 1g, show that the streamlines of the direction of movement of the air depression show the clear deviation of the air system in the northwestern direction a little, which is the behavior of the air depression in the upper atmosphere layers. The (70%) at this level is a slight decrease in relative humidity from the previous layer 700 hPa. The

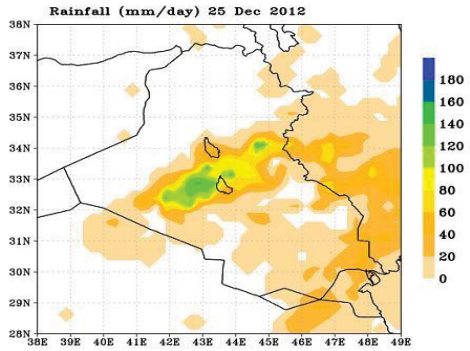

Fig.1a: Daily rainfall for 25 Dec 2012.

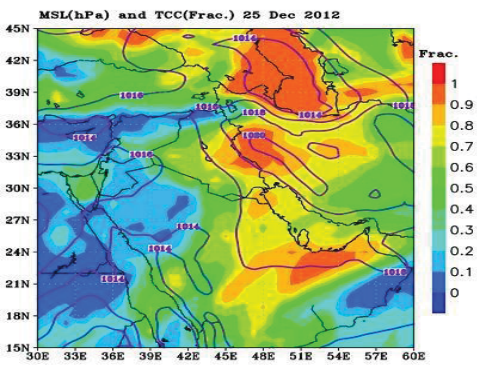

Fig.1b: Mean sea level pressure and total cloud cover for 25 Dec 2012.

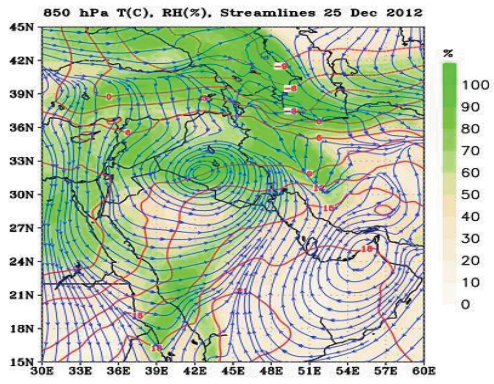

Fig.1c: 850 hPa temperature, streamlines And relative humidity for 25 Dec 2012.

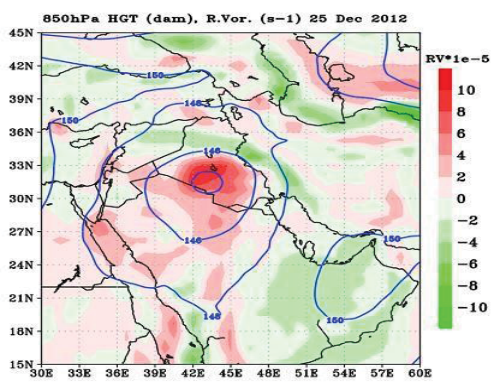

Fig.1d: 850 hPa geopotential height and Relative vorticity for 25 Dec 2012.

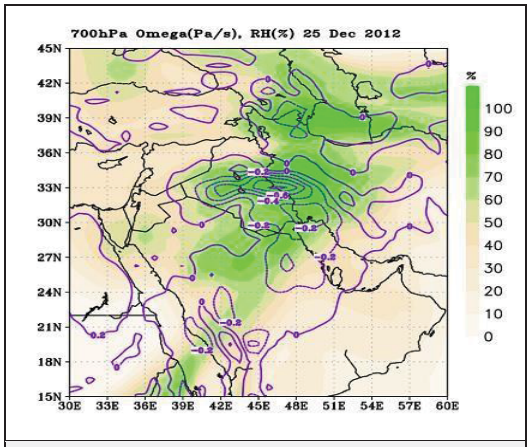

Fig.1e: 700 hPa vertical velocity and relative Humidity for 25 Dec 2012.

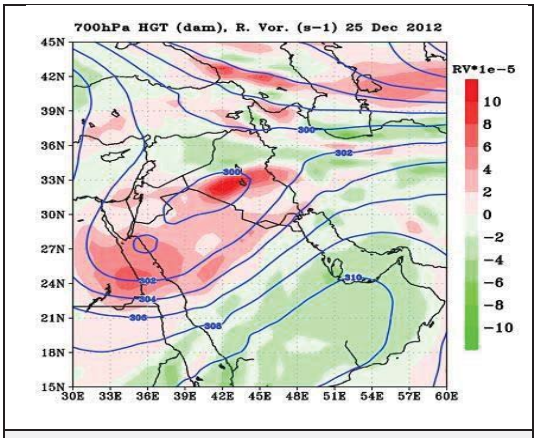

Fig.1f: 700 hPa geopotential height and Relative vorticity for 25 Dec 2012.

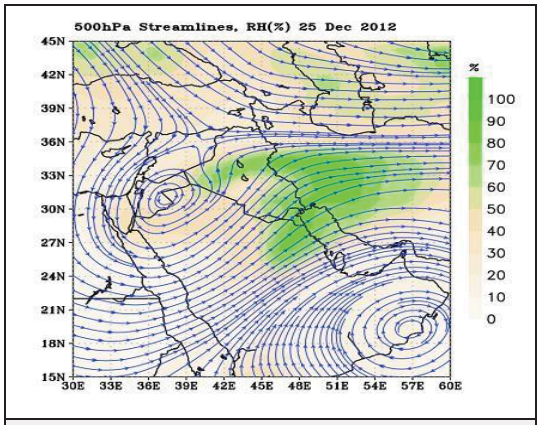

Fig.1g: 500 hPa streamlines and relative Humidity for 25 Dec 2012.

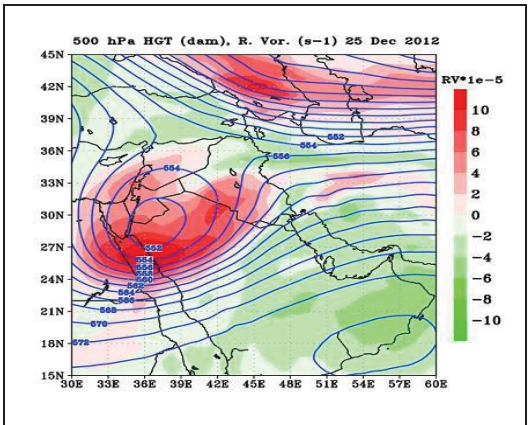

Fig.1h: 500 hPa geopotential height and Relative vorticity for 25 Dec 2012.

map for figure 1h shows the short wave is clear and can be identified from the long wave as well as trough, and the geopotential height lines are clear and the high relative vorticity which is part of the absolute vorticity which supports vorticity and air depression.

SEVERE RAINFALLS CASE OF 28, JAN, 2013:

The analysis of the outputs for the weather, dated 28 January 2013, a map of the daily rainfall rate in mm shows a shape of figure 2a that the average rainfall distributed between the northeastern region and the central region of the country (Sulaymaniyah, Erbil, Baghdad, Karbala, Anbar) ranged between (80-100 mm

/ day) heavy Although the rains are distributed at lower rates in different regions of the country, a pressure map at sea level also show figure 2b that there are areas of low air pressure along a low stretch of the Red Sea, which is mainly from the Sudanese impact, as well as moisture support and low air from the Mediterranean, if there are quantities clouds extensively in the areas mentioned above support the air humidity centers of the weather and certainly clouds of all kinds are present, figure 2c show the altitude of 850 hPa flow lines for the movement of the low air against the clock and its entry from the southeast direction and the convergence of the flow lines of the winds shows that there is wind activity in the regions Mentioned from the country as well as the decrease in the heat value is a decrease that supports the low pressure area as well as heat lines perpendicular to the flow lines in the sense that there is a thermal slope and warm air From the southwestern direction as well as high relative humidity confined between (80-100%) in the 850 hPa layer, the map of figure 2d show that there is a decrease in the geopotential height in the above mentioned areas of the country and this supports the presence of an atmospheric depression as well as the relative spin increase the value of the relative vorticity In other words, activity of the depression between (2-6 $1e^{-5}$), figure 2e show the vertical velocity in the air condition (omega) where negative values in the northeastern and central regions of the country indicate activity in the vertical movement and ascension zone to the top and relative humidity is limited to a layer of 700 hPa between (70-90)%, and it is just below the layer of 850 hPa, pressure level maps of 500 hPa, figure 2g, show that the streamlines of the direction of movement of the depression show the clear deviation of the air system and that there is a weakening of the air condition in the upper atmosphere layers, relative humidity of about (70-80)% at this level is a small decrease relative humidity of the layer previous 700 hPa, but moisture support is better than the previous study case 25 Dec 2012, the map of figure 2h shows the short wave is clear and can be identified from the long wave as well as trough, and the geopotential height lines are clear and the relative vorticity appears to be limited between (0-4 $1e^{-5}$) weather condition that does not have deep stretch in the upper atmosphere.

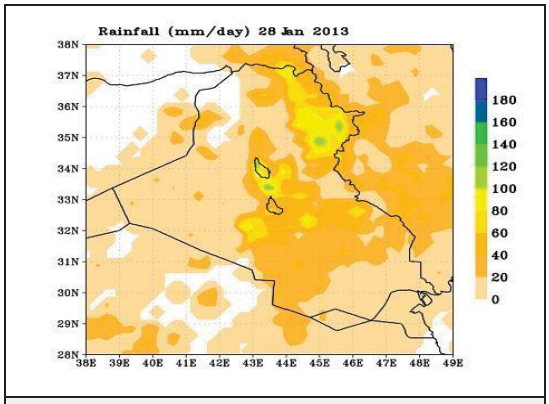

Fig.2a: Daily rainfall for 28 Jan 2013.

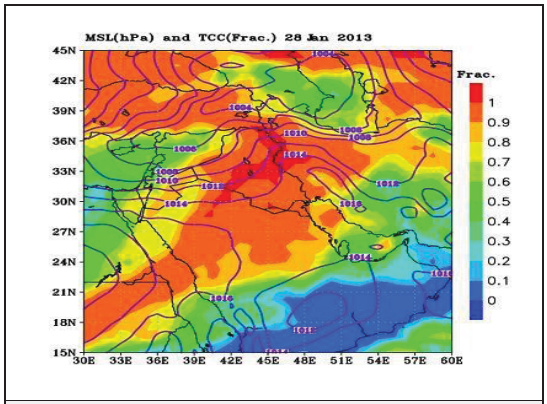

Fig.2b: Mean sea level pressure and total cloud cover for 28 Jan 2013.

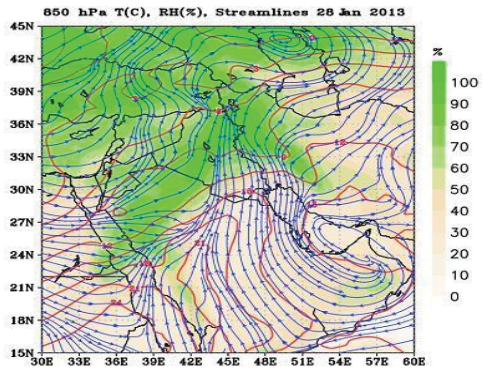

Fig.2c: 850 hPa temperature, streamlines And relative humidity for 28 Jan 2013.

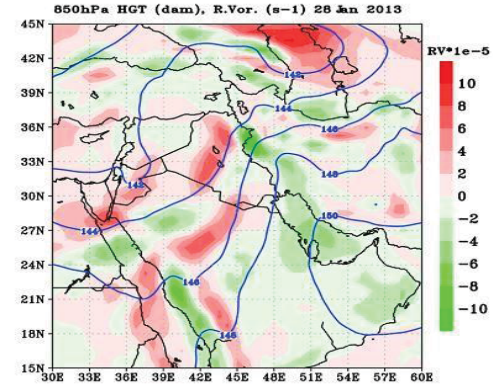

Fig.2d: 850 hPa geopotential height and Relative vorticity for 28 Jan 2013.

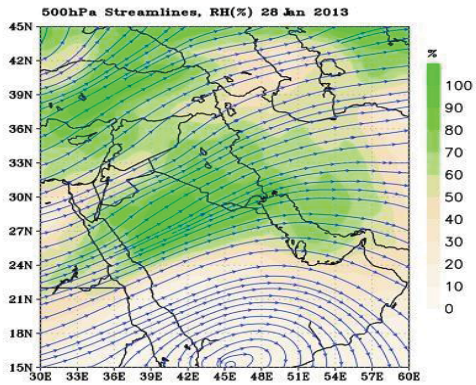

Fig.2g: 500 hPa streamlines and relative Humidity for 28 Jan 2013.

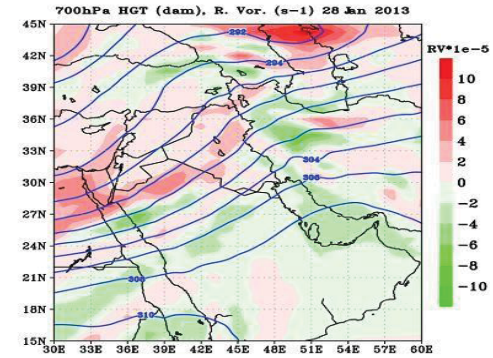

Fig.2f: 700 hPa geopotential height and Relative vorticity for 28 Jan 2013.

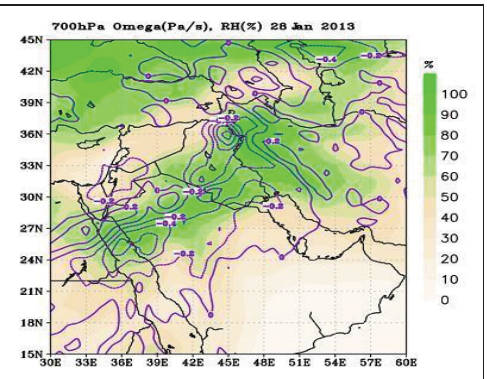

Fig.2e: 700 hPa vertical velocity and relative Humidity for 28 Jan 2013.

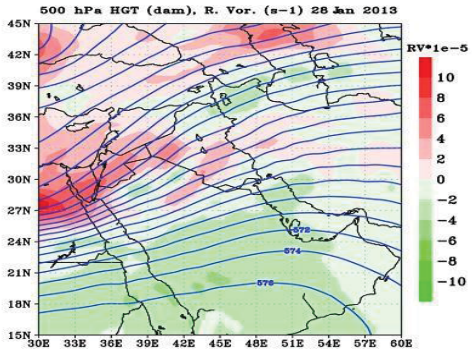

Fig.2h: 500 hPa geopotential height and Relative vorticity for 28 Jan 2013.

SEVERE RAINFALLS CASE OF 28, OCT, 2015:

The results of the analysis of the outputs of the weather condition, dated 28 Oct 2015, show a map of the daily rainfall rate in mm, figure 3a, that the rate of rain distributed between the northeastern region and the central region of the country (Sulaymaniyah, Diyala, Baghdad) ranged between (4060 mm) / day) heavy ones, despite the fact that rains are distributed at lower rates in other regions of the country, the pressure map at sea level, figure 3b, shows that there are areas of low air pressure, a low extension from the Red Sea and another air depression from the Mediterranean and clear moisture support, that the presence of clouds Dense in the aforementioned areas supports the presence of air humidity for the weather and certainly clouds of all kinds, figure 3c of the elevation shows 850 hPa flow lines for the movement of the low air and its entry from the southeastern direction and the convergence of the flow lines of the winds shows that there is activity for wind in the mentioned areas of the country as well as a decrease in the heat value It is a drop that supports the low pressure area as well as heat lines perpendicular to the flow lines, meaning there is a thermal slope and warm air is provided from the south direction The western and cold thermal progress from the northwest direction of the country, as well as high relative humidity confined between (80-100)% at a layer of 850 hPa. Figure 3d map show that there is a decrease in the geopotential height in the above mentioned areas of the country and this supports the presence of an air depression as well as spin The relative increase in the value of the relative vorticity, that is, the activity of the depression between (4-8 $1e^{-5}$). Figure 3e show the vertical velocity in the weather condition (omega) where negative values in the northeastern and central regions of the country indicate activity in the vertical movement and rise zone For air to the top and the relative humidity is limited to a layer of 700 hPa between (60-80)% which is slightly less than the layer of 850 hPa. Figure 3f show a decrease in the geopotential height which is measured in units (decameters) and an increase in the relative vorticity with a value confined between (2-6 $1e^{-5}$), maps of pressure level 500 hPa, figure 3g, show that the streamlines of the direction of movement of the depression show the clear deviation of the weather system, and there is a weakening of the weather conditions in the upper atmosphere, the relative humidity is around (50-70)% at this level. Get down Slightly less than the relative humidity of the previous layer is 700 hPa, the map for figure 3h show the short wave clear and can be identified from the long wave as well as trough, and the geopotential height lines of the decline are clear and the relative vorticity appears to be limited to between (2-4 $1e^{-5}$) weather is not It has clear extension in the upper atmosphere.

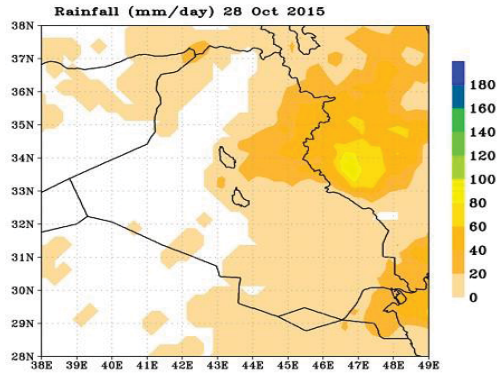

Fig.3a: Daily rainfall for 28 Oct 2015.

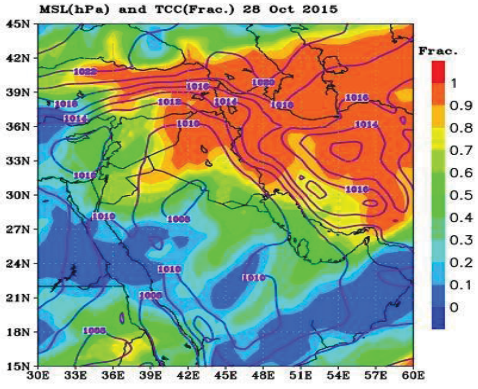

Fig.3b: Mean sea level pressure and total cloud cover for 28 Oct 2015.

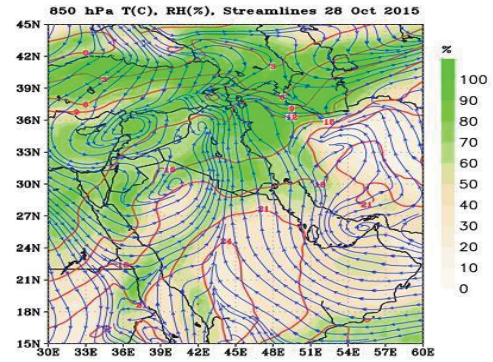

Fig.3c: 850 hPa temperature, streamlines And relative humidity for 28 Oct 2015.

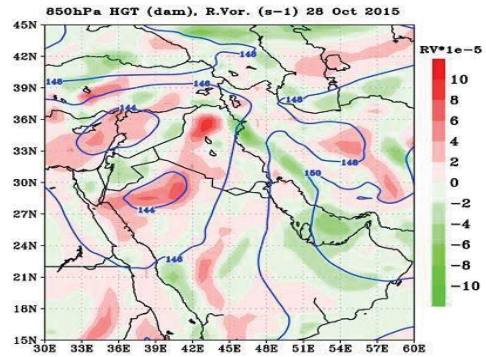

Fig.3d: 850 hPa geopotential height and Relative vorticity for 28 Oct 2015.

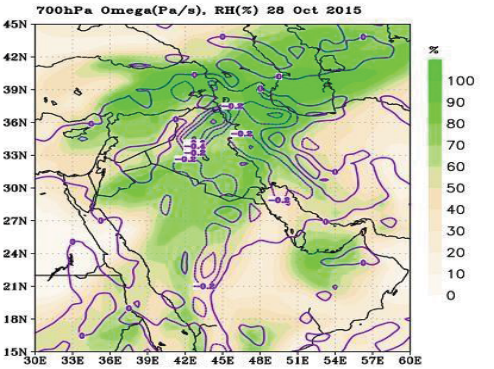

Fig.3e: 700 hPa vertical velocity and relative Humidity for 28 Oct 2015.

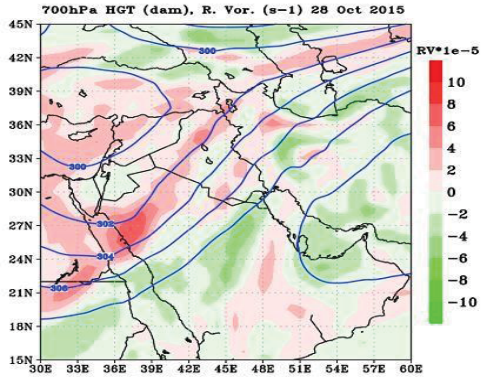

Fig.3f: 700 hPa geopotential height and Relative vorticity for 28 Oct 2015.

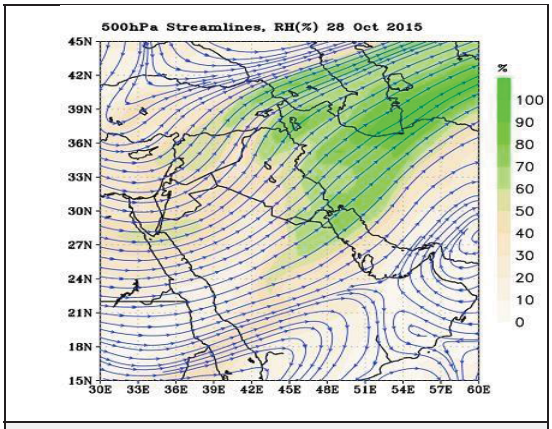

Fig.3g: 500 hPa streamlines and relative Humidity for 28 Oct 2015.

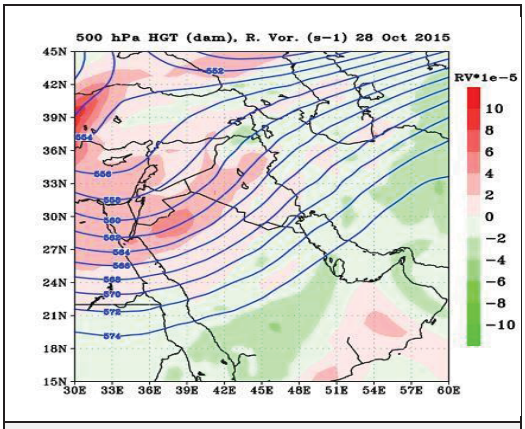

Fig.3h: 500 hPa geopotential height and Relative vorticity for 28 Oct 2015.

CONCLUSIONS:

Information obtained through the analysis of three weather conditions and a reference to the abundant rainy state is the focus point, that there are different weather conditions that occur from the surface layer near the surface of the earth to the upper atmosphere layers and are divided into points:

1- It is possible to distinguish and predict the abundant rainy state from the natural rainy weather by analyzing weather maps and the analyzed maps by GrADS program that showed that through the density of cloud cover and the form of clouds and the method of accumulation can give a great impression of the intensity of the rainy weather.

2- Whenever there are a number of closed circuits concentrated isobar lines and this is clearly a sign of a deep depression and a warning of heavy rain weather accompanied by thunderstorms. 3- Most of the depressions of intermediate shows, including the depressions that pass through Iraq in winter, and some of them in the moderate seasons, follow the behavior of the baroclinic depressions.

4- Relative humidity or dew point is an indication of the degree of air saturation and the relative humidity in the atmosphere for the different pressure levels.

5- The atmospheric depression in the natural state from the pressure level 850 hPa tends to the northwest direction at the pressure level 500 hPa when determined on weather maps and the relative spin value increases, indicating the strength of the depression.

6- Usually the 500 hPa layer is considered a transitional layer from an air depression to high, the direction of the wind, or gradually weakening, to change the movement of winds in the upper level of the upper atmosphere, and sometimes when the depression in the upper air layers deepens, it continues to grow until the jet stream layer is reached. In this case, the effect is severe.

7 - The values of the lines of voltage rise in decreasing reference to a system of low atmospheric pressure with a higher density because of the relative cold accompanying the cold thermal progression with it.

8- The values of the negative vertical velocity are a sign of air rise, the convergence of the pressure lines, a sign of the strength of the weather condition, the convergence of the isotherm lines, a sign of strong thermal slope and usually accompanied by activity in the wind and anterior front region.

9- Usually the autumn and spring depressions in the equinox are more severe and violent due to the combination of suitable weather conditions, such as heat, humidity, and cold weather, for condensation and precipitation.

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