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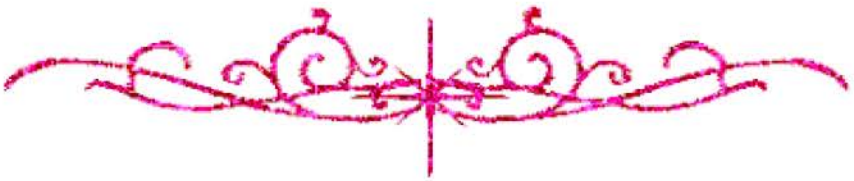

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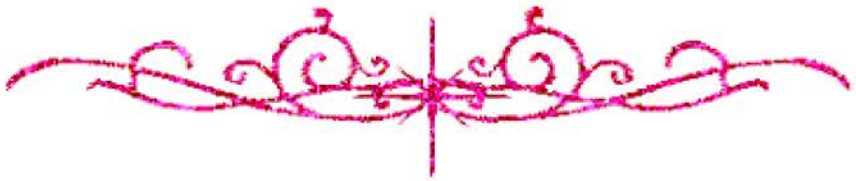

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بالرسالة صفحات

لم ترد بالأصل

HOSSAM MAGHRABY

ON THE MECHANISM OF WINTER CYCLOGENESIS IN RELATION TO VERTICAL AXIS TILT

Submitted in partial fulfillment required for
the degree of **M.Sc** in Meteorology,
to Cairo University

By

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Abstract

This work is at providing some understanding of link between kinetic energy conversion and the vertical axis tilt of cyclogensies . the analysis of the kinetic energy budget is made for a cyclonic development over the energetic of the spatial and temporal variations of the energetic of the depression were presented.

The analysis of typical Mediterranean depression in the period 18-25 Jan 1981 , one of the most significant features obtained is the increase of K.E with in the layer 500-200 h Pa especially in the growth period of cyclogensies . the tilting term (T`V`) is fond to change is sign and behavior in the growth and decay period . Also the work focused on the couplling mechanism of sinking at warmer latitudes and rising of colder latitudes which oppears to be a very effective mechanism for maximum production of Az on the destruction of Kz.The upper tropospheric jet stream was found to be major contributing source of Kz , most of this energy was found to be above 400 h Pa

Acknowledgement

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CHAPTER I

CHAPTER I

1.1 Mediterranean cyclones Historical survey

Two specific features characterize the Mediterranean cyclones:

A- strong localization of cyclogenesis ;

B-high frequency of cyclogenesis.

The first feature implies that cyclones generating in that region is initially of mesoscale size. the second feature shows that the Mediterranean is a very cyclogenetic region cyclogenetic effects in this region can be divided into two groups (Pielke,1984):

1-those that are primarily forced by deflection which is produced by surface topography, surface thermal in homogenates and surface friction differences (terrain induced cyclogensis);

2-those that are primarily forced by instabilities in travelling larger-scale disturbances (synoptically induced cyclogensis).

The cyclones developed by the first group of forces do not generally move far for their point of origin in the course of development . In general, they do not require a detailed spatial representation of the initial and of the lateral and top boundary conditions for the dependent variables These types of circulation system are readily forecast, if the bottom boundary conditions are well presented in numerical weather prediction modals . However, weather services

have not yet taken full advantage of the repetitive nature of terrain -induced cyclone circulation's.

Considering the Mediterranean cyclones in relation to the large-scale atmospheric circulation the cyclone development could be connected to

1. Upper flow patterns (upper trough , upper ridge and polar jet stream);
2. Surface pressure patterns (the Azores , the Siberian and central European highs; the Island, the Arabian and central European lows ; the North Atlantic and north European blocking) ;
3. Subtropical circulation (the north African low and high ; subtropical jet stream) ;
4. Baroclinic instability of the middle-latitude basic current (growth of disturbances due to vertical wind shear).

Some of these large-scale circulation patterns provide the conditions for orographic cyclone development. On the other hand , some of the above mentioned patterns result in cyclone development where the unsteadiness of the primary cause.

1.2 Climatology of Mediterranean cyclones

Due to the great influence of the cyclone activity upon the weather and climate, statistics of the cyclones generated in some parts of the Mediterranean region have been formed. Some of these statistics will be discussed latter.

Urbani (1961) has studied the winter and summer depressions of the decade 1946-1955 for the purpose of establishing the relation between cyclogenesis in the

Mediterranean and the weather types. The frequencies obtained by him is shown in Fig1.1 According to his statistics the principal cyclogenetic regions are the Gulf of Genoa during winter time .

Research on the climatology of cyclogenesis has been also carried out by Lecce (see Cantu, 1977) within the framework of investigations on circulation in the lee of the Alps during the decade 1952 - 1961, organized by the Centro Nacionale per la Fisica dell' Atmosfera e la Meteorology (CENFAM). From this research the following conclusions, among others, were derivedas follows

1) The frequency of Genoa cyclones rapidly decreases after the first two days of duration.

2) Maritime northern weather types present the maximum frequency of days with Genoa cyclones, which is three times greater than that associated with the western types.

3) The relationship between the behaviour of cyclogenesis and the behaviour of some meteorological elements has also been studied, and it appears that in most Genoa cyclones deviations of the elements from the mean are remarkable.

The great frequency of cyclogenesis in the Ligurian, Tyrrhanian and Adriatic Seas is caused mainly by the orographic influence of the Alps. However, the enhanced frequency in some other areas is a result of orographic influence of other mountain systems. Such type of cyclones are the northwest African or the Atlas lee depressions the Balearic depressions and the Cyprus depressions.

A northwest African depression, after Broody and Nesfor (1980), occurs when a