

# Thermal Aspects of September 2008

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## Abstract

Systematic observations of weather and record of meteorological parameters in an interval of time (on the order of decades) allow the establishment of a climatic environment to which a certain meteorological event and it can be told if it is close or not. September, which is a hybrid between warm and cold season, may have features of both periods. In September 2008, the circulation of air masses over Oltenia led its division into two very different periods, producing thermal change abruptly. In this context, the synoptic analysis is relevant and can thus explain the evolution of temperature during this month.

## 1 Introduction

The object of this paper is the synoptic analysis of September 2008, analysis caused by unusually high temperatures recorded during this period.

We noticed that in the first half of the month, the temperature was well above the climatological averages. The sudden drop in temperature was due to the rapid change of air masses and the side effect was the production of abundant rainfall.

With the displacement of the Azores anticyclone and East European to the north, and deepening depression in Southern Asia Minor, a much more intense circulation is favored. Thus, in our country, September is characterized in the first half by hot days and the second half by cold days.

In the Figure 9 we have represented the minimum and maximum temperatures recorded in September 2008 and maximum and minimum daily temperatures multianually.

## 2 Data and materials

In this study we used several data types, namely maps of ground level pressure reduced to sea level pressure, geopotential maps from 5000 and 1500 m, average annual daily values corresponding to the temperature range from 1961 to 2004 for different stations. We done a fleeting reference to rainfall, which was abundant in this interval, comparing the amounts of precipitation for the months of September of the last 50 years (1961-2008).

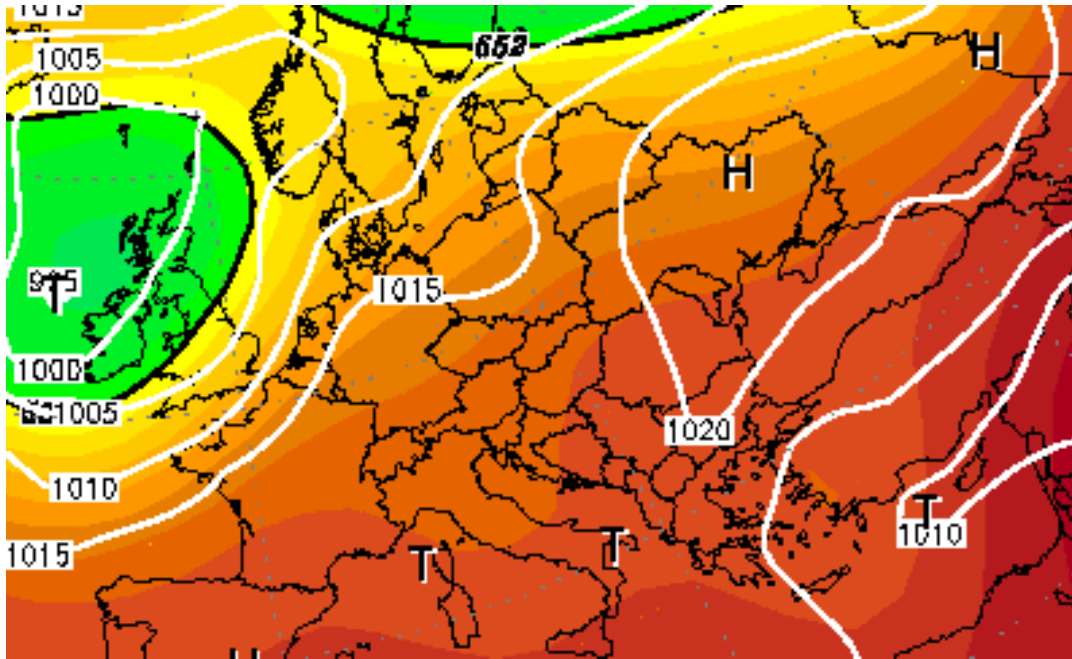


Figure 1: Geopotential of 500 hPa and Ground pressure (for 01-12.09.2008 )

### 3 The evolution of the ground level pressure field and circulation at surface level of 500 hPa

Analyzing ground pressure field for the European synoptic region, four synoptic periods have been obtained, corresponding to September 2008 as follows:

Between 01-12.09.2008 almost the entire continent was under the influence of a high pressure field consists of the Azores High and East European; with the exception of the north and the far west under the influence of the Icelandic depression (in the range maximum temperatures have reached 36-37 degrees, s. graph temperatures).

According to this synoptic interval, the circulation was zonal, south and south-east being under the influence of North African anticyclone and Romania was in a high geopotential field, the weather was beautiful, particularly warm and had values between 576 and 590 damgp.

The situation is reflected in the charts below.

Between 13-18.09.2008, the pressure gradually decreased, except northern Europe (Scandinavia) where Scandinavian anticyclone formed

Meanwhile in the western basin of the Mediterranean Sea a Mediterranean cyclone has been created, which hit the south of the continent and in its movement swept the territory of Romania eastward, producing a pronounced sudden cooling (see graph temperatures), of weather and abundant rainfall (661/m at Sadu, Gorj county). During this time, traffic was south-western, the Mediterranean nucleus that has been formed moved from the western Mediterranean basin up to the north of the Black Sea and the geopotential had values between 552 and 560 damgp.

Between 19-27.09.2008 the Azores and the East-European one formed a belt and extended over the entire Europe, except the south and the south east which remain in a depressionary field.

Romania is at the contact between the air masses and heavy rainfall is recorded again

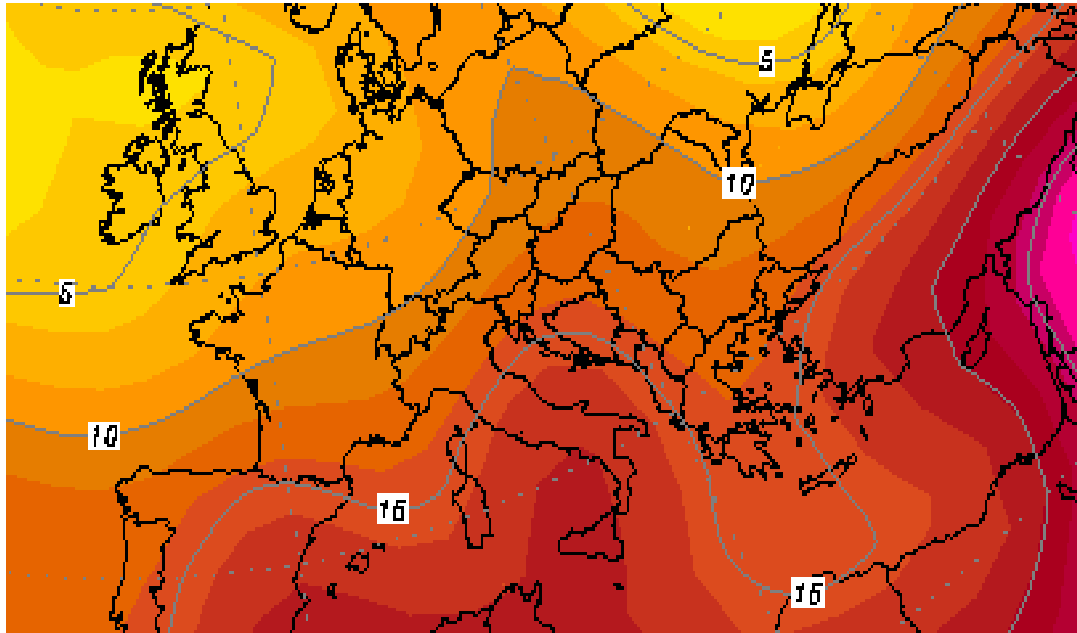


Figure 2: Temperature at 850 hPa (for 01-12.09.2008 )

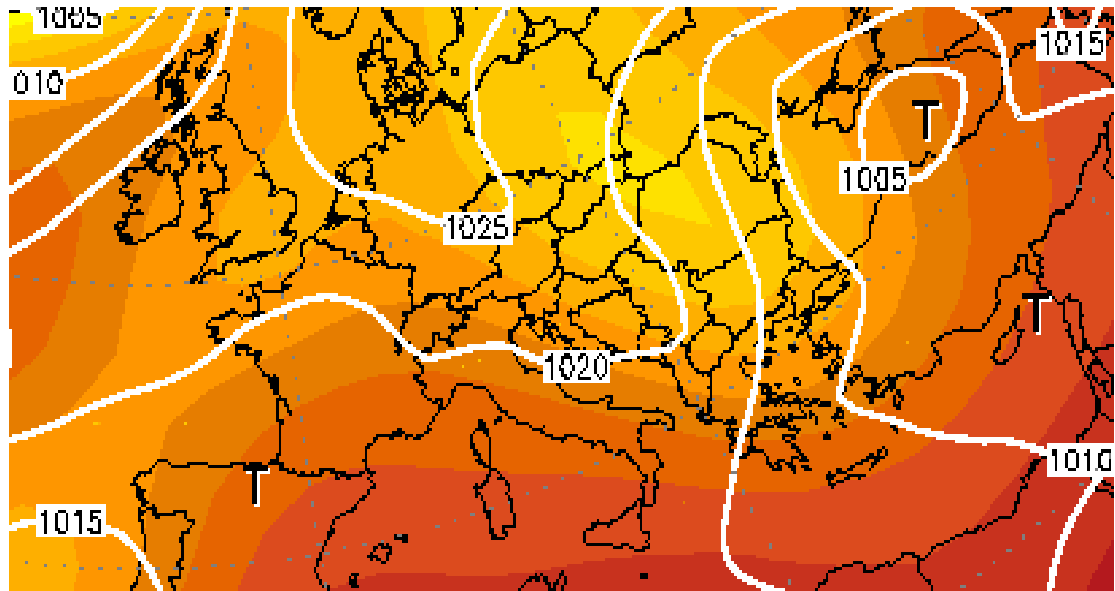


Figure 3: Geopotential at 500 hPa and ground pressure (for 13-18.09.2008)

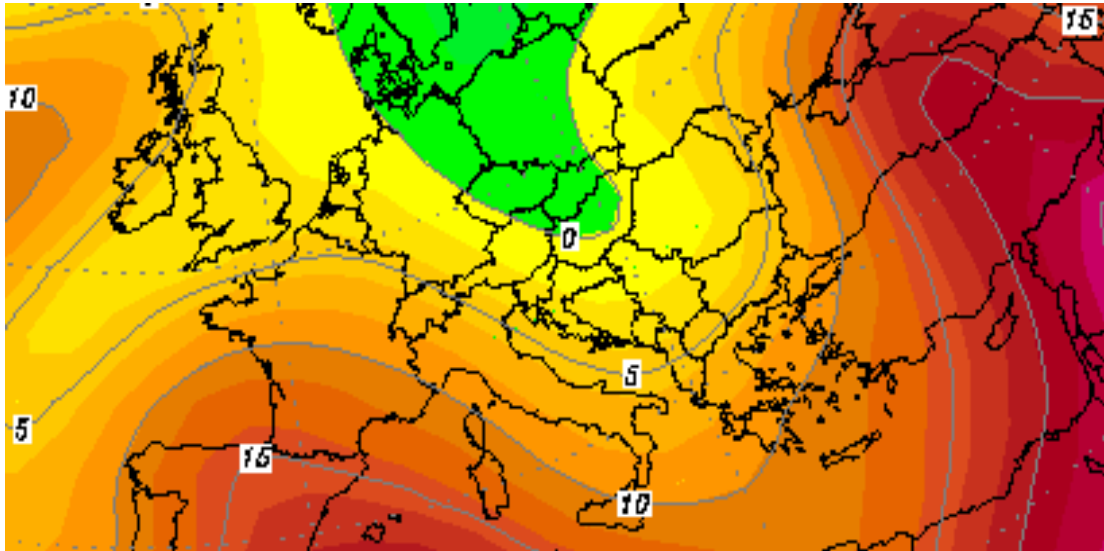


Figure 4: Temperature la 850 hPa (for 13-18.09.2008)

(48 l / m, Runcu, Gorj county).

In this interval too, circulation was south-western and another Mediterranean nucleus has moved from the western basin of the Mediteranean up to above the Black Sea and the geopotential had values between 552 and 560 damgp.

At the time of the last synoptic interval, 28-30.09.2008 the Azores high and the east European one form a belt and extend over Europe, except Scandinavia, thus, weather was, generally, beautiful and warm. In this interval the circulation was zonal and the geopotential had values between 556 and 568 damgp.

## 4 Conclusions and discussions

In the following graph (see Figure 9), we have represented the minimum and maximum temperatures recorded in September 2008 and maximum daily temperatures multianually

Comparing the temperatures recorded with the appropriate statistical ones of September, it can be seen that the real temperatures recorded during the first synoptic period exceeded by up to 10 degrees the statistical values, then stood below the statistics.

Thermal phenomena present during the month of September 2008 were due to the presence of different baric centers over Romania and in the following, their appearance will be summarized.

As we know, the Azores High is the most important atmospheric action center on the European continent and exerts influence throughout the year.

Variation of the area of action depends on the season and considering peripheral delimiting of 1020 hPa, it is found that in September, it retreats westward and in the present it covers 75% of the continent.

In September 2008 it was present for 23 days, 76%, which ranks it close to the statistical normal. The Azores High, that any other high anticyclone persistent ground level as long as dorsal in altitude and both depend on the heat wave at the 500 hPa level, a situation that was favorable at this level.

Along the Azores High, in a high percentage, the Eastern European anticyclone was active as well, for 18 days (59%) and the Scandinavian for 14 days (46%), North African

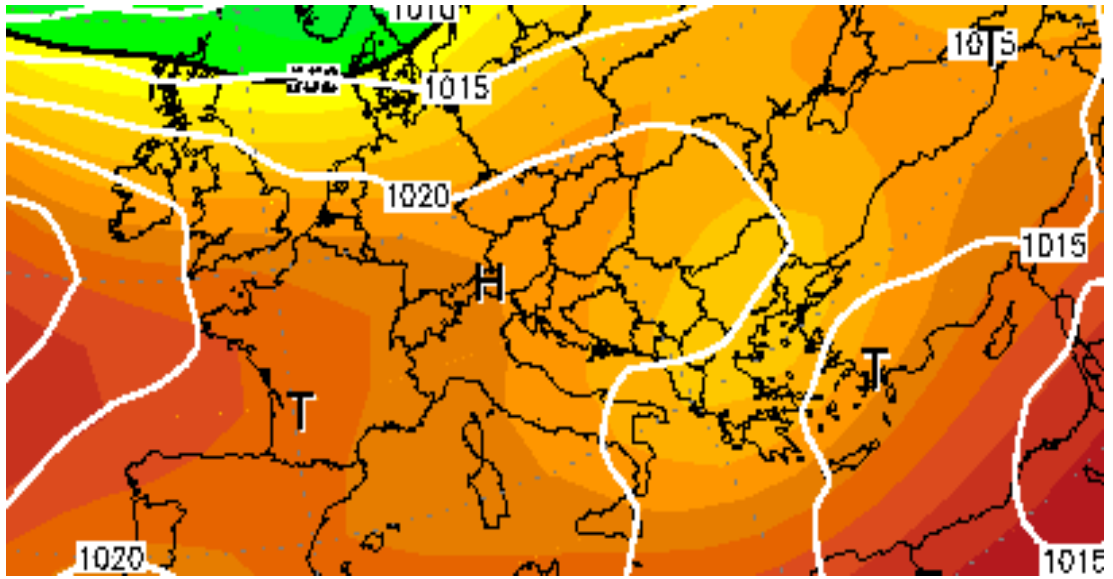


Figure 5: Geopotential at 500 hPa and ground pressure (for 19-27.09.2008)

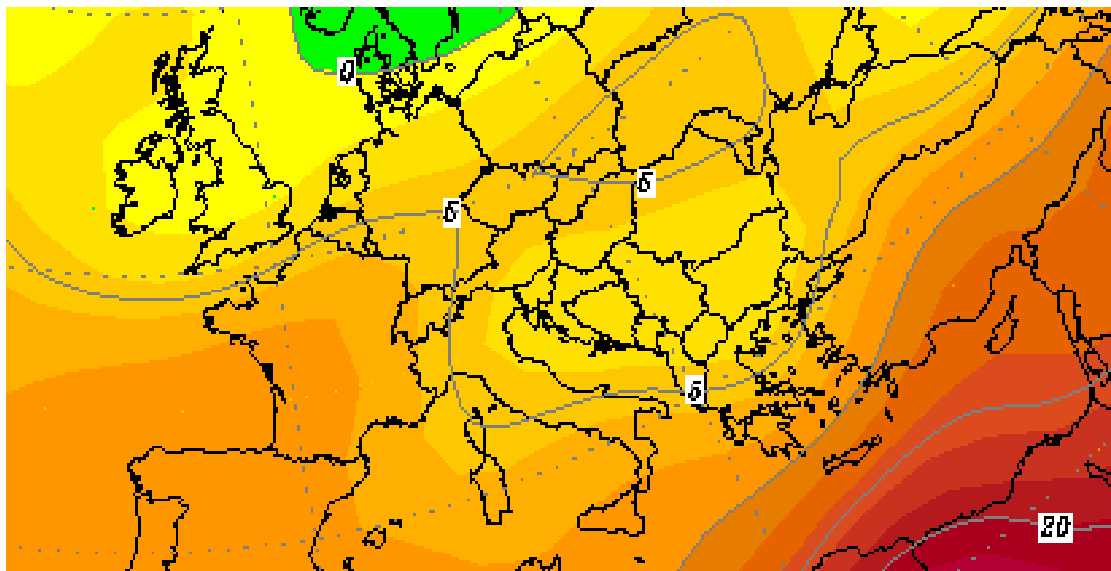


Figure 6: Temperature la 850 hPa (for 19-27.09.2008)

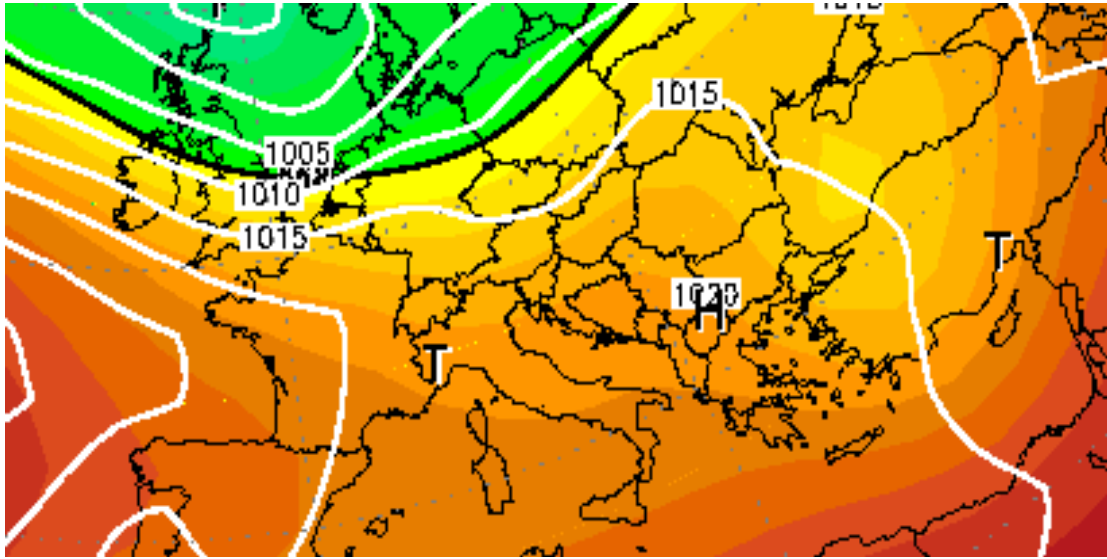


Figure 7: Geopotential at 500 hPa and ground pressure (for 28-30.09.2008)

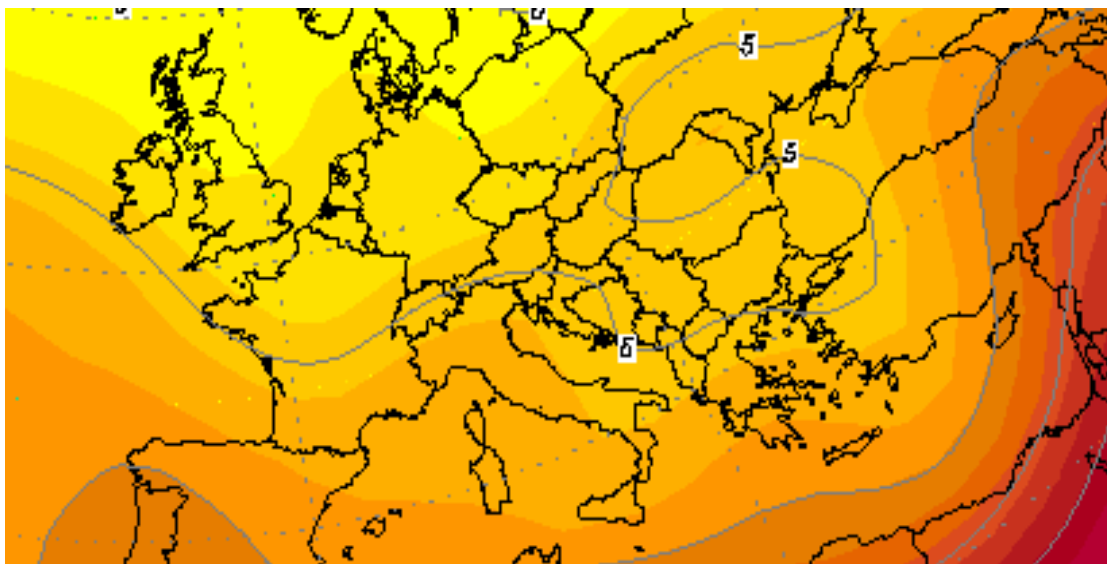


Figure 8: Temperature at 850 hPa (for 28-30.09.2008)

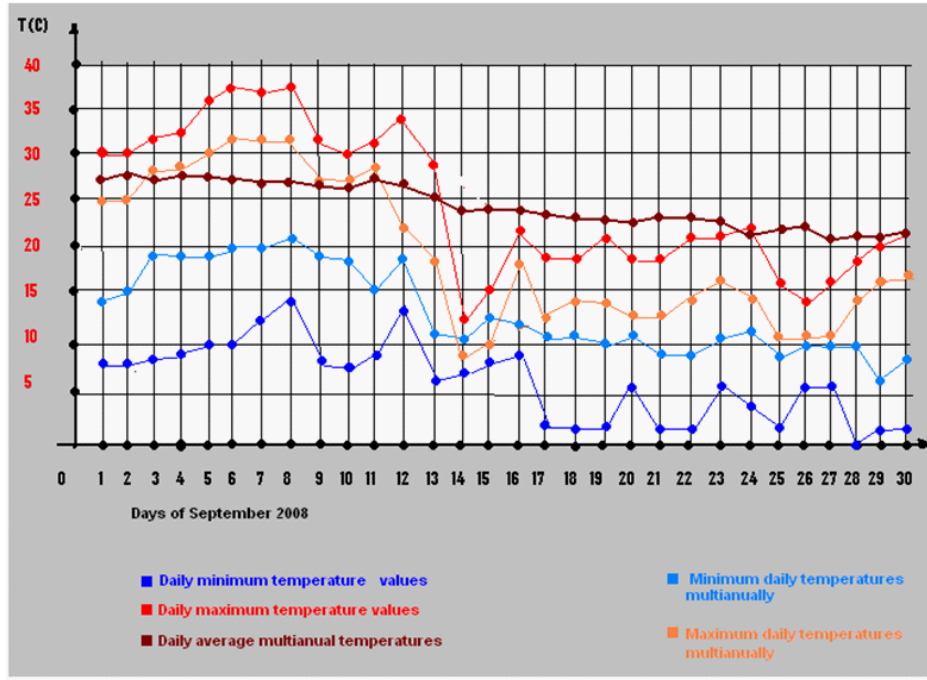


Figure 9: Graph of September temperatures in 2008

anticyclone for 7 days (23%) and Mediterranean depression for 8 days (26 %).

The Eastern European anticyclone, semi permanent, formed in September, when, its range is usually restricted in the Ural Mountains, and in this month the isobar of 1020 hPa is found at the east of the Volga. Normally, only in October it extends far to the west and southwest so the 1020 hPa isobar includes the northern Black Sea and, in November and December, it continues to expand to include Romania, while it is also intensifying, the 1025 hPa isobar surpassing Romania.

Variation of this anticyclone's area is correlated with the average temperature over Eastern Europe, so the area increases when the temperature decreases (September to January) and decreases when the temperature increases (February to May). The area variation there have been noticed two features, namely, extending to the west south west to the Danube Basin and its withdrawal to the north northeast to northern Ural Mountains, far to the north of latitude that penetrates the dorsal mainland in September.

Monthly duration of this anticyclone is high since September when it appears normal with 32%, but in September 2008 it occurred in 59%, double the normal, with favorable conditions due to the altitude cyclone in northern Europe which allowed subtropical air to penetrate northward along the Ural Mountains and also the elevation dorsal extended to east.

Persistence of the Eastern European anticyclone was due to the existence of the altitude Ridge, which turned into core anticyclone. Heat transport being strong on the western flank of the Ridge and south-north orientation, anticyclone was allowed to move west.

Scandinavian anticyclone, which is formed in northern Scandinavia and which does not have a steady evolution, monthly or yearly, was still present 14 days in the month under review, representing a 46% highly than in normal occurrence in September namely 6%. During this period it joined the Eastern European anticyclone forming an anticyclone arch over the north-east of the continent, but developed in a isolated manner over Scandinavia

as well, and extended dorsal to the south-west.

The latest synoptic period of the month, pushed from north to south by cyclones it merged with the dorsal of Azores High anticyclone forming an arc over north-west of the continent. During this period synoptic formed as a result of favorable synoptic situations, namely the passage of a cyclone over Scandinavia north to south, followed by dry arctic air and also due to the expansion of the altitude North African Ridge anticyclone above ground stationed arctic air.

These three anticyclones, interrupted at the Mediterranean basin have affected the weather in Europe and implicitly of Romania in September.

## References

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- [2] Topor N, Types of air circulation and atmospheric action centers over Europe, Bucharest 1965
- [3] Draghici I, Dynamic Meteorology, ed. Teh.1988