# THE YEARLY AND MONTHLY AVERAGE TEMPERATURE OF THE AIR IN BOROD DEPRESSION

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#### Abstract

The aim of this study is to study the characteristics of the air temperature in the area of Borod depression. The analysis of the thermic regime was done on the basis of a rich fund of meteorological data, registered at the weather station Borod over a period of 41 years, meaning from 1970-to 2010. In this work we have tried an analysis of their evolution and of the factors that impose or generate them.

Key words: temperature, average, yearly, monthly.

### INTRODUCTION

The air temperature represents one of the most important weather elements that presents space and time variations as a result of the interactions between the weather factors. This is not a constant measure it is a direct consequence of the solar radiation flux on the surface of the Earth influencing the distribution of the other weather elements.

The thermic criterion is used in all the appreciations about weather and climate, it defines the climate areas, the types of air masses the atmospheric fronts.

#### MATERIAL AND METHODS

In order to study the main particularities of the thermic regime in Borod Depression we have used data related to the air temperature data provided by the Borod weather station on a period of 41 years (1970-2010).

For the realization of the current study we have used a series of methods. The main methods are: the analysis method, the comparative method, statistical-mathematical methods and graphic methods.

The use of specific means and methods in the weather research had in view a more exact processing of all the data that were at our disposal and by this we had in view to analyze the role that the relief plays as a weather factor in the evolution of the air temperature.

#### **RESULTS AND DISCUSSIONS**

The thermic regime of the Borod Depression department is formed under the influence of the atmosphere circulation particularities, of the radiative factors and of the underlying surface.

#### 1. The yearly average temperature of the air

Borod's average multi annual temperature for the time interval 1970-2010 registers a value of 9.4°C.

The particularities of the underlying active surface, the altitude differences between the intra mountain depression and the high peaks surrounding it determine space variations of the air's multi annual average temperature in the area of the analyzed teritory.

The highest annual average value of the air temperature, during the studied period, has registered in 2007, being of 11.1°C, a close value being registered in 2008 which was of 10.8°C. The lowest annual average temperature was of 8.1°C and it was registered in 1985, a closer value being registered in 1980 with a value of 8.2°C (see figure 1). According to these data on the whole surface of the depression the variations of the annual average temperature are relatively small, being of 3°C, value that results from the difference between the highest annual average temperature (11.1°C in 2007) and the lowest annual average temperature (8.1°C in 1985) from the mentioned time period. This value is explained through the moderating action of the surrounding peaks.



Fig.1. Evolution of annual average temperature in Borod

# Deviations of annual average temperatures in comparison with the multi annual average temperature

The characteristics of the general circulation of the atmosphere as well as the variations registered by the solar radiation throughout a year and from one year to another determine the annual air temperature variations. The annual average temperatures calculated for the period 1970-2010 represent the normal or the middle multi annual temperature at Borod weather station; this is a landmark from which one can appreciate the sense and the value of the deviations from one year to another. In order to emphasize this fact we have calculated, for the interval 1970-2010, the deviations of the annual values in comparison to the multi annual average.

Values higher than the multi annual average (9.4°C) have been registered in 41.5% from the years studied, the value of the deviations varying between 0.1°C and 1.7°C, the maximum value of the positive deviations being registered in 2007 and the lowest in many years, in 1972, 1989, and in 2004.

The years with negative thermic deviations have been major, representing 51.2% from all the cases and the value of the negative deviations varied between -0.1°C and -1.3°C. The maximum value of the negative deviation has been registered in 1985 (the annual average has been of 8.1°C), and the minimum in 1977 and 1995 (with annual average of 9.3°C) (see figure 2).



Fig. 2. Variation of annual average temperature deviations in comparison with the multi annual average

It must be noticed that in the years 1974, 1983 and 2003 the value of the annual average temperature was equal with the multi annual average, being of 9.4°C (there were no deviations in the three years mentioned). Those three years represent 7.3% from the cases in which there were no deviations in comparison to the multi annual average (9.4°C).

## 1. The air's monthly average temperature

The monthly average temperature varies in relation to the quantity of the solar energy received by the earth surface during a year.

The monthly average temperature has a normal annual rhythm, an increasing one starting with January, when it registers the lowest monthly

thermic average until July month which marks the maximum value of the monthly average temperature; after that the rhythm of the air's monthly average temperature is a decreasing one until the end of the year. So, in Borod, the air's monthly minimum temperature value registers in january, with a value of -1.4°C, and the maximum value is in July when it reaches 19.2°C, resulting a monthly amplitude of 20.6°C (see figure 3).

By analyzing the monthly average thermic values in Borod it can be noticed that after reaching the lowest average values in January the temperature start increasing from February when they become positive and then in July they reach the maximum and from then on they will decrease until December.

The annual average thermic amplitude of 20.6°C, shows the lower degree of continental aspect in comparison with the east part of the country where this value exceeds 24 - 25°C and it also shows the thermic moderator role of the relief.

In winter the average temperature is negative only in January. In December and in February in comparison with January the temperature is higher with 1.5°C, this fact is due to an intense circulation of cyclones. In January the circulation of cyclones is lower and the anti-cyclone circulation from the north-east intensifies and due to the invasion of polar or arctic cold air the monthly average temperature is the lowest.

In Borod Depression the winters are usually moderate, without strong frost due to the west circulation and due to the fact that this region is more sheltered from the invasions of the east and north-east continental polar air.



Fig. 3. The monthly rhythm of the air temperature in Borod

In spring due to the influence of the west circulation and to the expansion of the Azoric anti cyclone's dorsal over the south of Europe the beginning of spring takes place quicker and sooner than in the east depressions of the country and later than in the plane areas, a fact illustrated by the average value of April: 9.2°C in Borod, in comparison with 10.7°C in Oradea (Moza Ana, 2009).

In summer the air temperature is not very high due to the west influences and to the relief altitude, so there is a temperature of 19.2°C, in comparison with a temperature of 20.9°C in Oradea.

In fall, starting with September the temperature drops all of a sudden the multi annual average values of these months vary between 14.3°C in September and 4.3°C in November. This cooling of the air temperature happens because the cooling of the air intensifies itself through radiative processes and because the cold air advection increases under the action of the Siberian anti cyclone.

From the analysis of the thermic differences between the months of the year it comes out that the modification of the average values of the air temperature from one month to another is done slowly in summer and in winter months  $(1 - 2^{\circ}C)$ , more obvious thermic contrasts being registered in the months of the transition seasons (10°C).

### CONCLUSIONS

The air temperature is one of the main meteorological elements which affects human activity and which produce a cutaneous bioclimatic stress over the human body when its values tend to the extreme variation limits. It also appears in extreme seasons especially in winter when there are days of discomfort due the air cooling and in summer when the cutaneous stress appears due to the excessive heating of the air. The thermic comfort verge depends on the temperature, on the wind and even on the air humidity which in turn are dependent on the relief's altitude.

The thermic regime of Borod Depression Department is formed under the influence of the atmosphere circulation particularities, of the radiative factors and of the underlying surface being emphasized through : annual average temperature, extreme temperatures, the frequency of the days with different temperature values.

In Borod, the multi annual average temperature for the time interval 1970-2010 registers a value of 9.4°C. The highest annual average value of air temperature was registered in 2007, being of 11.1°C, and the lowest was of 8.1°C in 1985. The annual average temperature variations are relatively small, of 3°C, a value which results from the difference between the highest annual average temperature (11.1°C in 2007) and the lowest annual average temperature (8.1°C in 1985) from the above mentioned time period. This value is explained by the moderating action of the surrounding peaks.

The monthly average temperature has a normal rhythm, thus the minimum value of the air temperature in Borod depression area is registered

in January with a value of -1.4°C, and the maximum value is in July when it reaches 19.2°C, leading to a monthly amplitude of 20.6°C.

During the 41 years that we have studied the negative deviation represents 51.2% from all the cases while the positive deviation represents 41.5% from the studied years.

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