# CLIMATE CHARACTERIZATION DURING 2005 - 2006

# CARACTERIZAREA CLIMATICĂ A PERIOADEI 2005 - 2006

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***Abstract**: Characterising climate supposes analysing the evolution in space and time of the different climate parameters during the years 2005 and 2006 at meteorological stations in the Banat area. The varied relief, whose auditorium-like distribution opens to the south and west, allows the penetration of moister air masses from north-west or from south turning Banat's climate into a moderate-continental climate with ocean and sub-Mediterranean influences.*

***Rezumat:** Caracterizarea climatică a presupus o analiză a evoluţiei spaţiale şi temporale a diferiţilor parametrii climatici în cursul anilor 2005 şi 2006 la staţiile meteorologice din Banat. Relieful variat, a cărui distribuţie în amfiteatru deschis spre sud şi vest, permite pătrunderea maselor de aer mai umede din nord-vest şi vest, sau a celor din sud, imprimând climatului bănăţean un caracter continental moderat cu influenţe oceanice şi submediteraneene.*

***Key words:** thermal regime, rainfall regime, hail, storm, snow storm, ice deposit, fog.*
***Cuvinte cheie**: regim termic, regim de precipitaţii, ceaţă, furtună, furtună de zăpadă, gheaţă, ceaţă*

## INTRODUCTION

Within this particular geographical area bordered north by the Mures River Valley and south by the Danube Valley are located the 17 meteorological stations covering all forms of relief. In the plain area are located the stations in Arad, Sannicolau Mare, Jimbolia, Timisoara, Banloc, and Lugoj; in the gorge or depression areas are located the stations in Deva, Varadia de Mures, Caransebes, Bozovici, Baile Herculane, and Moldova Veche; in the hill areas, the stations in Oravita and Resita; and in the mountain area, the stations in Semenic, Cuntu, and the Varfu Tarcu.

## MATERIAL AND METHOD

Air temperature is a variable parameter due to the factors that influence the heating and cooling of the Earth crust, its lack of homogeneity, and the uneven distribution of solar energy.

Analysing meteorological phenomena, particularly dangerous ones, is of great importance for practice. Their occurrence is linked to advection and local processes which make them occur discontinuously in time and unevenly distributed in space.

The following phenomena are considered dangerous or risk-related: hail, storm, snow storm, ice deposit, fog and torrential rains.

## RESULTS AND DISCUSSIONS

Annual averages calculated for 2005 were close to normal values, slightly higher, reaching over $11.0^0$C at the stations in the lower plain areas and in south Banat, or below $10.0^0$C at the mountain stations.

The highest annual average was in Moldova Veche ($11.2^0$C) and the lowest at the

Varfu Tarcu (-1.0$^0$C). In south Banat there are the highest temperatures, due to the sub-Mediterranean influences (tropical circulation) overlapped by the action of the local wind Cosava. The Moldova Veche meteorological station is located on the Danube Valley at 83 m altitude, where the presence of sandy soil also contributes to higher temperatures. The second station at the Varfu Tarcu is located in a mountain area at 2,186 m altitude, where the vertical thermal gradient plays an important role.

The absolute annual maximal value was recorded in July at most meteorological stations, a month that is considered as one of the hottest of the year 2005. The highest value (36.6$^0$) was recorded in Arad and Timisoara on July 31, 2005.

The absolute annual minimal value was recorded at some stations in February, at some others in March. The lowest value (-26.40$^0$C) was recorded at the Varfu Tarcu on March 1, 2005.

The annual thermal amplitude was over 50.0$^0$C at almost all meteorological stations, except for mountain ones, and its peak reached 60.8$^0$C recorded in Arad.

Hail is recorded mainly during the hot season, as it is related to the Cumulonimbus clouds and can produce significant damage in low regions. Though most of the hails are recorded in the mountain area, damage here is lower. At the Varfu Tarcu meteorological station they recorded the largest number of hail cases (3 days); in some other stations this number oscillated between 1 and 2 days; and in half of them there was no hail case.

Storm is a phenomenon that accompanies the cold front of the 2$^{nd}$ rank and in most cases results in significant material damage and human loss. In 2005, there were fewer storm cases; the most dramatic ones (2 days) were recorded at the stations in Sannicolau Mare and Deva. It was completely absent in 60% of the meteorological stations.

Snow storm is the transport of snow high up, a phenomenon recorded mainly at mountain stations: thus, at Varfu Tarcu, there were 40 days of snow storms in 2005. It was also present at the stations in Moldova Veche (1 day), Banloc (2 days), Cuntu (… days), Semenic (6 days), and Baile Herculane (3 days).

Ice deposits are specific to cold season; they are considered dangerous phenomena because, if in large amounts, it can damage communication systems.

Hard and soft white frost is recorded mainly in the mountain area, where the number of days with deposits reaches 156 days at Varfu Tarcu. At most meteorological stations the number of cases oscillated between 35 days at Cuntu and 1 day at Moldova Veche. During 2005, there was no such case at Deva, Varadia de Mures, Resita, and Baile Herculane.

Block frost is another type of ice deposit that can affect transportation when it lasts too much. There were few stations that recorded block frost in 2005 in the Banat area, most of which in Oravita (7 days).

Rainfall is one of the main climate features and an important part of water circuit in nature. As by nature rainfall is an atmospheric phenomenon that occurs in very different amounts and discontinuously in space, its area distribution is characterised by a great unevenness. It is engendered by the conjugate action of three genetic factors: general circulation in atmosphere, activated area, and solar radiation.

In the Banat area, there is an increase of rainfall from west to east, from the low plain areas to the high mountain areas. Areas exposed to moist air advections from west and north-west or from south-western Europe get large amounts of rainfall.

Annual amounts of rainfall recorded in 2005 were between 1,522.4 mm at Cuntu and 678.6 mm at Sannicolau Mare. Amounts greater than 1,000 mm were recorded at many stations: Varfu Tarcu (1,454.9 mm), Semenic (1,384.7 mm), Baile Herculane (1,205.0 mm), Oravita (1,244.8 mm), Resita (1,101.0 mm), and Varadia de Mures (1,066.0 mm). Table 1 present monthly temperatures and rainfall in the years 2006 registered at Timisoara

Meteorological Station.
Deviations from multi-annual averages show how variable rainfall can be. The year 2005 was characterised by larger amounts than usual, which were above 100.0 mm at all stations. Positive values of the deviation from the normal ones reached 511.8 mm at Varfu Tarcu and 120.9 mm at Jimbolia. Deviations larger than 400 mm were recorded at the stations in Caransebes (433.0 mm), Oravita (402.8 mm), Baile Herculane (479.7 mm), and Cuntu (468.9 mm).

*Table 1*

Monthly mean temperatures ($^0$C) and rainfall (mm) registered at Timisoara Meteorological Station in 2006

| Month | T average | T minim | T maxim | Rainfall |
|---|---|---|---|---|
| I | -2.0 | -4.0 | 2.0 | 30.0 |
| II | 0.0 | -3.0 | 4.0 | 42.0 |
| III | 5.0 | 1.0 | 10.0 | 49.0 |
| IV | 12.0 | 7.0 | 19.0 | 79.0 |
| V | 16.0 | 11.0 | 23.0 | 50.0 |
| VI | 20.0 | 14.0 | 26.0 | 88.0 |
| VII | 24.0 | 17.0 | 31.0 | 50.0 |
| VIII | 20.0 | 15.0 | 27.0 | 98.0 |
| IX | 18.0 | 12.0 | 25.0 | 25.0 |
| X | 12.0 | 7.0 | 21.0 | 17.0 |
| XI | 6.0 | 2.0 | 13.0 | 31.0 |
| XII | 2.0 | -1.0 | 6.0 | 21.0 |

The year 2005 is considered as very wet, which was confirmed by the large number of months with moisture excess (9 months), while only June, October, and November lacked rainfall. The months with the largest amounts of rainfall were April and August at all meteorological stations, while October was the month with the lowest values.

The variation of rainfall amounts during the year points out a main rainfall maximum value in August and a secondary one in April at most stations. The largest amounts were recorded in August at Varfu Tarcu (317.7 mm), Banloc (253.9 mm), Cuntu (252.2 mm), and Baile Herculane (206.6 mm).

The year 2006 was warmer than usually and with exceeding rainfalls in most meteorological stations or deficient at the meteorological stations in the plain area. After colder winter and spring than usual, there was a relatively warmer summer with exceeding rainfall, while the autumn was warmer and with moisture deficit. There were no particular or risk meteorological phenomena that affect economic activities:

- From a climate and topo-climate point of view, Banat's plain areas are characterised by the wide opening to all wind directions with relatively simultaneous advections of air masses through a rather even distribution of climate parameters, with high radiating and caloric balance. Dryness and drought phenomena are rarer, except for the years with rainfall deficit. In years with excessive moisture, floods affect wide areas as favoured by the very low slope.

- From a climate and topo-climate point of view, depressions and passage areas are characterised by the permanent drainage of the air along them, by higher moisture, more moderate temperatures, and by the predominance of the atmospheric coolness or of fog. Torrents are favoured by the relatively small slope, and floods affect larger areas.

- From a climate and topo-climate point of view, hills are in front of the western branch of the Banat's Mountains, where torrents are stronger, favoured by the higher slope, by

morphological characteristics of the rivers, and by the less resistant erosion lithology. As a result, modelling processes are more accentuated the amount of alluviums carried by the rivers increases accompanied by damage that is more important.

- From a climate and topo-climate point of view, the mountains are an orographic barrage of particular importance for sea air circulation from the west and south that favour abundant rainfall on the slopes. Their layering introduces the areage of the main climate elements, i.e. precipitations, through the fragmentation of the relief, the presence of the valley corridors and of depressions, leads to lack of areage sometimes with excess moisture, some other times with fohn effects, with moisture deficit. The mountain preserves for a long time the snow. Sometimes, in winter under the impact of Mediterranean warm air, the snow melts suddenly resulting in torrents upstream that generate floods downstream.

## CONCLUSIONS

Depending on a series of features of the active area, of atmospheric circulation, and of solar radiation, there were three climate sectors in the Banat area, as follows:

1. The moderate temperate-continental climate sector in the plain areas, where there is interference of western and tropical circulations. It is characterised by frequent advections of maritime air and of tropical air laden with moisture: as a result, annual average temperature is below $11^0$C, moisture is above 74%, and rainfall amounts reach 600 mm.

2. The moderate temperate-continental climate sector with Mediterranean influences in south Banat, characterised by multi-annual average temperatures larger than $11^0$C, with values of relative moisture above 75%, and with rainfall amounts between 650 and 800 mm annually. A specific feature of this sector is persisting heating and strong intensifications of the wind under the influence of the local wind Cosava.

3. The moderate temperate-continental climate sector in the mountain areas, characterised by multi-annual average temperatures below $5^0$C, lower (below $0^0$C) at altitudes above 2,000 m, with moisture values above 80%, with rainfall amounts larger than 1,000 mm annually, and with strong intensifications of the wind speed.

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