CLIMATOLOGICAL AND SYNOPTIC CHARACTERISATION DURING WINTER 2009 – 2010

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Abstract: *Climatological characterisation for winter 2009-2010, namely the interval december 2009-february 2010, supposes analysis the evolution in space and time of the different climate parameters at meteorological stations in Banat. Meteorological parameters considered in this analysis are air temperature, rainfall and snow layer. Air temperature is a variable parameter due to the factors that influence the heating and cooling of the Earth, its lack of homogeneity and the unequal distribution of solar energy. The rainfall are a very important meteorological factor used for climatological characterisation of a region, an important link of water circulation in nature, with distinctive implications in some activities especially in agriculture. In data processing it is given a great importance for the extreme values (absolut minimum and maximum), and for monthly average. It was made an analysis on the number of frosty nights, the number of winter days, number of freezing days, and on the number of days with snow layer. For the three meteorological station from mountain we made separate references. In order to draw up the synoptical characterisation for december 2009-february 2010 we used synoptic charts with surface pressure and with height and temperature at 500 hPa level. Analyzing the deviations of average temperature in december 2009, january and february 2010 compared to normal values (1961-1990) we noted that the average air temperature overreach the normal values in december 2009 and february 2010, and it was close to normal values in january 2010. Depending on deviations of the amounts of rainfall in winter 2009-2010 compared to normal values, the rainfall were excess in most part of Banat region, which led to floods especially on lower part of the rivers from this region.*

Key words: *thermal regime, rainfall regime, snow layer, frost, freezing*

INTRODUCTION

Climatological characterization of a period in a specifically region requires analysis of spatial and temporal evolution of different meteorological parameters. Meteorological parameters considered in this analysis are air temperature, atmospheric precipitations and snow stratum.

Synoptic characterization requires analysis of soil pressure distribution maps for identifying Baric centers which operating in the area of interest and analysis of geopotential maps and temperature in the middle troposphere.

MATERIALS AND METHODS

Have been taken into account data from a number of 14 meteorological stations from Timis and Caras-Severin counties, 3 of which are mountain stations. Of great interest are the daily and monthly mean air temperature, precipitation, snow depth, but the number of nights and cold winter days or days with frost.

Frosty nights are those nights when minimum air temperature drops below-10C. Winter days are the days when the maximum air temperature does not exceed 0C and days with frost are those with the minimum air temperature below 0C.

For synoptic analysis were used primarily soil maps, which shows the distribution and

movement of cyclones and anticyclone and implicitly air masses, and also altitude maps, with geopotential and temperature distributions at 500 hPa level, for about 5500 m altitude.

RESULTS AND DISCUSSIONS

Depending on the average temperature deviations in December 2009 compared to the multiannual-normal values (1961-1990), average air temperature was situated above normal values at all Banat weather stations.

The largest positive deviation from normal values was 2.9°C occurred in Jimbolia and the smallest positive deviation, by 0.7 ° C has occurred to Tarcu peak.

In the Banat plain in December 2009, mean temperatures were generally higher than normal with 2 – 2,5°C.

Cumulative precipitations in December 2009 were in excess. The largest amount of rainfall was recorded in Herculane Bath and was 114.9mm, represents almost double to the normal, and the lowest was recorded in Sânnicolau Mare and was 56.6 mm, 18% more than normal for December.

The total number of cold nights in December 2009 was 5, the number of winter days was 7 and were15 days with frost. Mountain stations were not considered in this analysis.

In 21/12/2009 the minimum temperature at Timisoara meteorological station was -21.4 °C, which is the lowest minimum temperature recorded in Timisoara, in December.

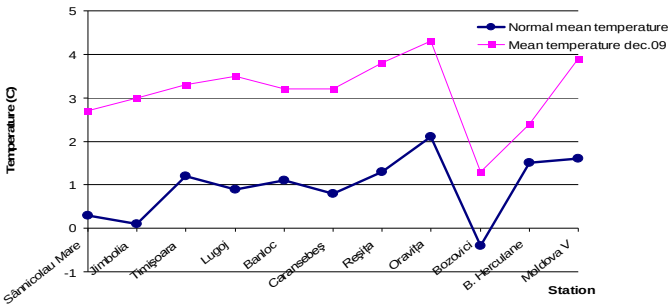

Figure 1. The average air temperature graph in December 2009, compared with normal multiannual values

In December 2009 the total days number when there was snow in Banat was 11.

In Timisoara there were 9 days with snow cover, easily exceeding the average multiannual value.

Until 12.12.2009 only in the mountains was snow, but there it generally far below 10 cm. Minimum temperatures during this period were mainly positive. The following day it snowed on large areas and has made substantial snow. In 20/12/2009 the snow stratum, present through out all the region of Banat, measured between 11 cm in Moldova Veche and 30 cm at Herculane Bath, so very low minimum temperatures from the next night have not created special problems.

Subsequently, the heating time led to growing rapidly melting snow, so from 25/12/2009 until the end, of any area, except the mountain, no longer enjoys snow and the minimum temperatures fall below-5oC.

The synoptic analysis shows that in December 2009 was very active the Mediterranean Depression, which explains the higher average temperatures and precipitation surplus.

In the first days, our country was under the influence of a vast depression field with cyclonic nuclei in the Mediterranean basin.

At 12/12/2009, Scandinavian and East-European Anticyclone unite, resulting a vast anticyclone field over Central and Eastern Europe.

In the altitude, the circulation became northern and a cold advection takes place.

Thus, temperatures drop gradually and snow precipitations occurs even in the plains.

From 15/12/2009 becomes active again a depression in the Mediterranean basin, leading to abundent snow, on extensions areas. It was deposited a consistent snow strata throughout all the region. This synoptic situation is maintained until 20.12, when ground pressure increases with the extension of the Baric dorsal. Later airflow becomes southern both to the soil and in altitude and warm weather increased. Snow strata melts faster. Precipitations reported on extension areas were as rain and some places were quantitatively significant. Snow were only in the mountains at 1600 m altitude.

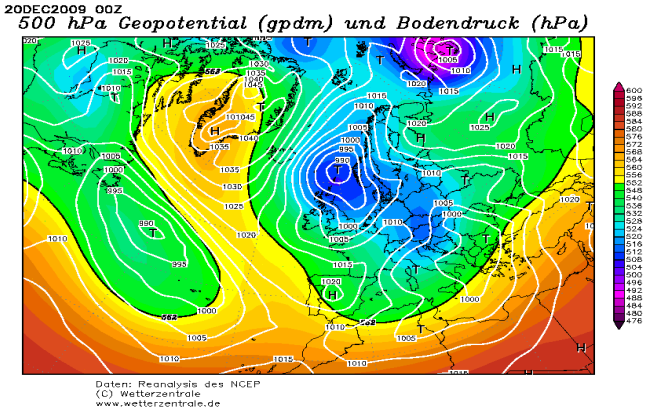

Figure 2. Soil pressure and the geopotential at 500 hPa in 20.12.2009

Under these weather conditions at the end of December 2009, available humidity reserves for winter wheat plants on the 0-100 cm soil depth was in satisfactory limits, close to the optimum level and optimal across for all the region.

Due to the lowered thermal regime from the second decade of the month, autumn crops and fruit tree- viticol species were dormant.

Under thermic aspects, January month 2010 was close to the normal value,even slightly colder in the eastern extremity of Banat and on the mountains.

In some meteorological Banat stations average temperature deviations in January 2010 towards normal values were positive, but under 1^{o}C, and in the Herculane bath and mountain deviations were negative.

Cumulative precipitations in January 2010 were in excess.

Largest rainfall amount occurred in Oravita and it was about 77,4 mm with 42% more than normal value, and the lowest one registered in Jimbolia 48,5 mm, with 28% above the normal for January.

The total number of cold nights in January 2010 was 6, number of winterdays was 13 and were 16 days with frost. Mountain stations were not considered in this analysis.

In Banat January 2010 it was 17 days with snow stratum but its thickness was generally below 10 cm.

In Timişoara were 13 days with snow stratum, multiannual average number being

12.1. Between January 3-5 snowed on extension areas and snow stratum covered up to 20 cm.

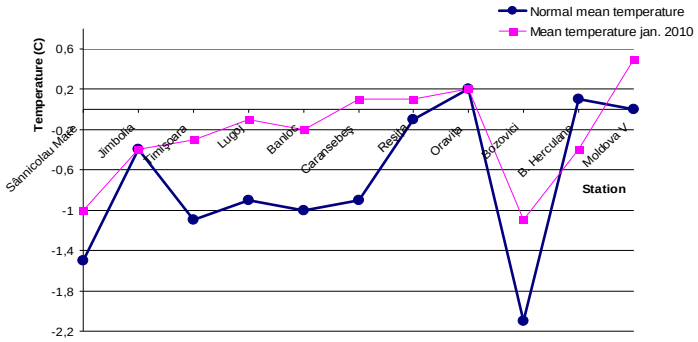

Figure 3. Average air temperature graph in January 2010 compared with normal multiannual values

Then the weather has warmed strongly and snow quickly melted.

From 12.01 the weather entered in a colder process and in some nights temperatures dropped below -5°C.

Superficial snow stata, of 2-5 cm, longer spread begining with 21.01, but in the next period minimum temperatures often fall below -10°C.

Synoptic analysis shows that the months of January 2010 was characterized both by an intense activity of the Mediterranean Basin in the first months decade, and extended presence of Eastern European anticyclone.

Maximum temperatures have reached 16-17°C, the minimum was generally positive and it rained on longed areas.

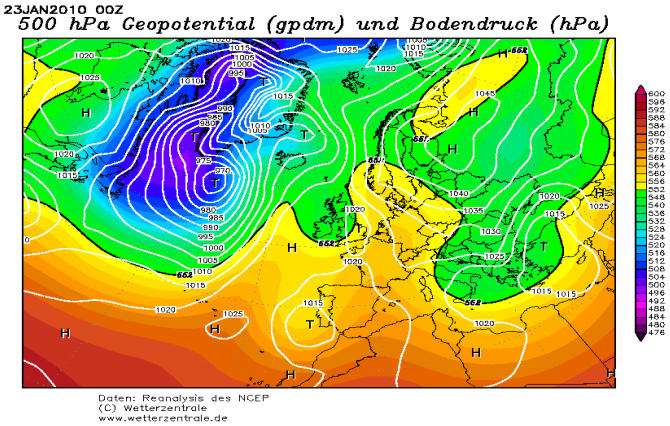

Figure 4. Soil pressure and the geopotential at 500 hPa in 23.01.2010

From 12.01 anticyclone Eastern European Anticyclone extends to westward continent and fusion with the Scandinavia anticiclone.

This vast anticyclonic field thus formed is maintained to the North part, Central and Eastern Europe until 26.01 and determine the penetration and stagnation air masses of Arctic origin. The weather was mostly beautiful but very cold, frosty particularly in eastern and

central regions. Toward the end of month, both to the ground and in altitude, an thalweg depression extends from north-west Europe causing snow on relatively large areas.

In February 2010, according to the monthly average temperature deviations compared with multiannual-values, mean air temperature was above the normal values in all meteorological stations in Banat.The largest positive deviation from normal values was 1.9 ° C and registerd in Caransebes and the smallest positive deviation by 0.7 °C occurred in Jimbolia.

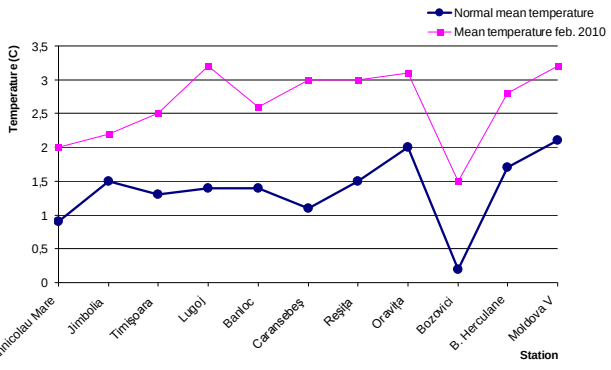

Figure 5. Average air temperature graph in February 2010 compared with normal multiannual values

Cumulative precipitation in February 2010 have exceeded multiannual normal values at all weather stations from Banat. Highest rainfall amount was recorded from Oravita and was 109.5mm, with 117% more than normal, and the lowest occurred in Lugoj and was 50.9 mm, 14% more than normal for February.

In February 2010 in Banat there was only two nights with minimum temperatures below -10^{o}C, four days with maximum negative temperatures and 12 days with frost.

For the entire region in February 2010 were recorded 16 days with snow stratum. In Timişoara were 8 days with snow cover, multiannual mean value close.

In the first days of February 2010 was 2-4 cm layer of snow in Timis county, and up to 7 cm in Caras-Severin.In 06-08.02 period, local snow and new snow layer was deposited but that melts in the next 2-3 days.From 13.02 snows again of new long-range and make more consistent snow of 2-14 cm in Timis and 5-25 cm in Caras-Severin.

It remains until around the time of 19.02 and by the end of month, snow precipitation is also recorded only in the mountains. Under the synoptic aspects February 2010 was characterized by increased activity of the Mediterranean Basin. From 06.02 a number of cyclonic nuclei resulted in the Mediterranean basin and moves away to the east and north-east influencing the weather aspect in the western part of the country. Local snow and in Southern Banat wind blew hard and snow blizzard. Snow stratum still not stay too much because relatively high temperatures and rain precipitations.

Between 13-15.02 another cyclone crosses the Mediterranean space in our area and determine snow precipitation. In the second half of the month becomes more active Icelandic Depression, the thalweg which extends to the south and south-west Europe.

In the western part of the country airflow was predominantly south both ground and in altitude. The weather has warmed and precipitation were as rain. In February 2010 the available humidity reserves for autumn wheat plants on the 0-100 cm soil depth was in optim limits.

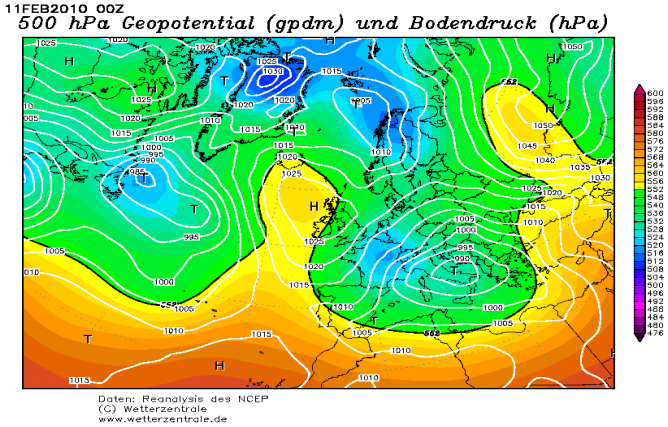

Figure 6. Soil pressure and the geopotential at 500 hPa in 11.02.2010

Agrometeorological conditions allowed temporary reversals of the growth and development processes of autumn crops, particularly in plains area.

CONCLUSIONS

From thermic regime point of view, winter 2009-2010 was a slightly warmer winter than usual average temperatures in the three winter months generally exceeding with 1-2^{o}C mean normal multiannual values. Precipitation quantities cumulated in the three winter months were in surplus. In winter months the cumulative precipitation amounts are included, usually between 110 mm in the lowlands of Banat, Sânnicolau Mare, and 170 mm in Oravița exceeding 200 mm only in the mountains. Precipitation quantities felt between December 2009 - February 2010 frequently exceeded 200 mm.

Higher thermal regime and precipitation surplus, this winter, were due to intense activity of the Mediterranean cyclone. This is a semi-permanent cyclone, which frequently form in the cold season of the year and less in summer. In December and January, however, by advanced to southwest of East European Anticyclone, Mediterranean cyclone area is reduce.

In winter 2009-2010 Eastern European maximum frequency was lower allowing expansion and movement of depressions of Mediterranean origin over our interest area. Eastern European anticyclone has made its presence only a few days in December 2009 and in the second half of January 2010.

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